

1. [Damascus Citizens for Sustainability.org](#)

2. Photo by FracTracker.org

3. [The Economic Benefits and Costs of Frac-Sand Mining](#)

INTRO TO FRAC-SAND MINING

HYDRAULIC FRACTURING (also hydrofracturing, hydrofracking, fracking or fraccing), is a well-stimulation technique in which underground rock layers are fractured (broken) by highly pressurized liquid made of water, sand, and chemicals in order to extract oil or gas. As a vital part of the full cycle of fossil fuel mining, frac sand is the proppant that holds the induced fractures open for the gas or oil to flow when the pressure is released. According to research from The FracTracker Alliance, the average horizontal shale gas well is currently using 4,300-5,300 tons with demand increasing by 344 tons per year as the wells are drilled longer.

WHY WORRY...

The essential frac sand is obtained by strip mining, which leaves behind it a range of devastation from lunar landscapes similar to mountaintop removal in the case of surface operations, to destruction of vital aquifers in the case of subsurface mines, and water contamination (ex. Rockwood Quarry, Newport, MI). As is evident in the experience of Wisconsin and other states in which frac sand mining has already progressed, the list of health, safety, economic, and environmental problems caused is devastating. To start mining operations before essential controls could be put in place for this entirely new industry, mining companies have

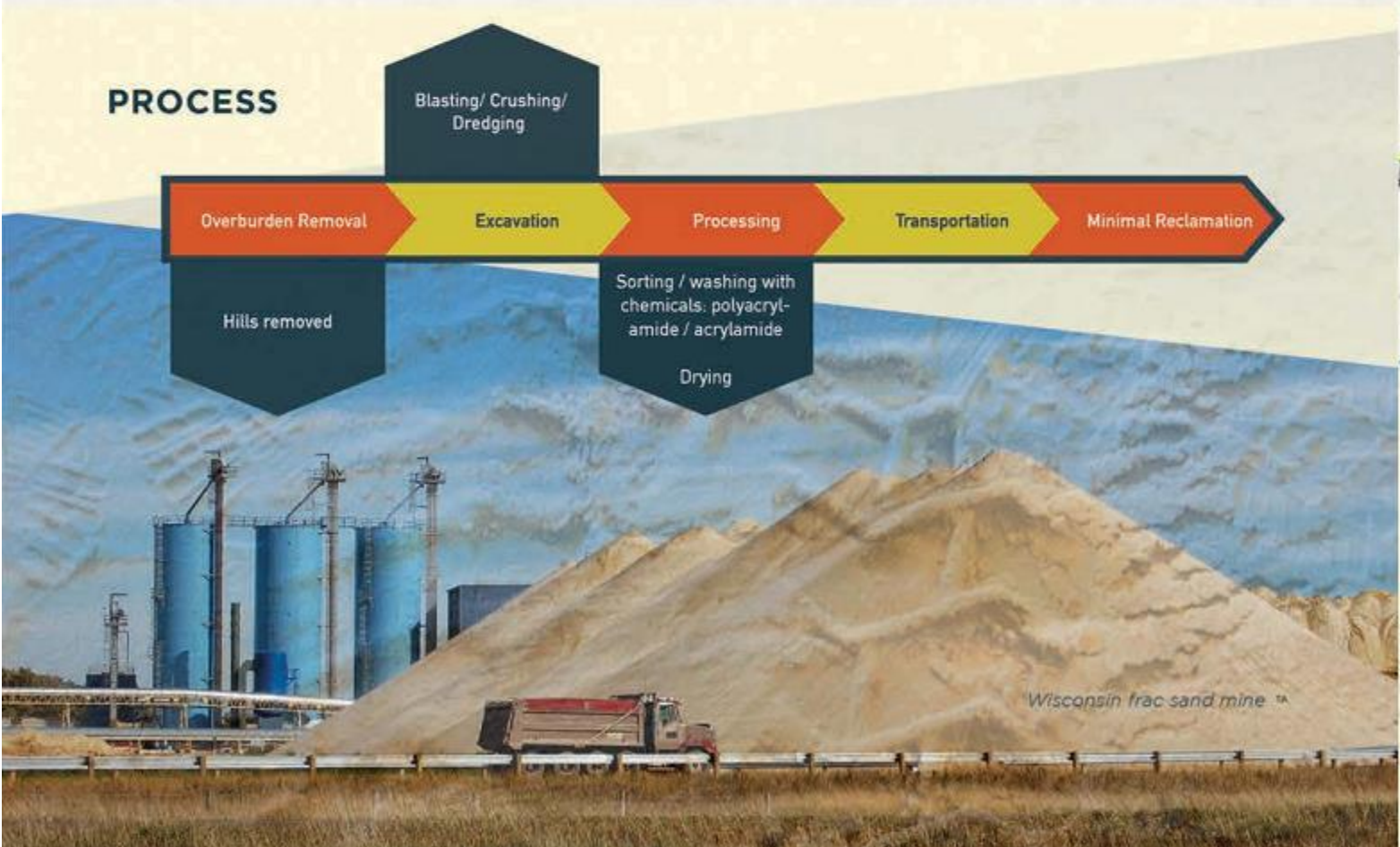
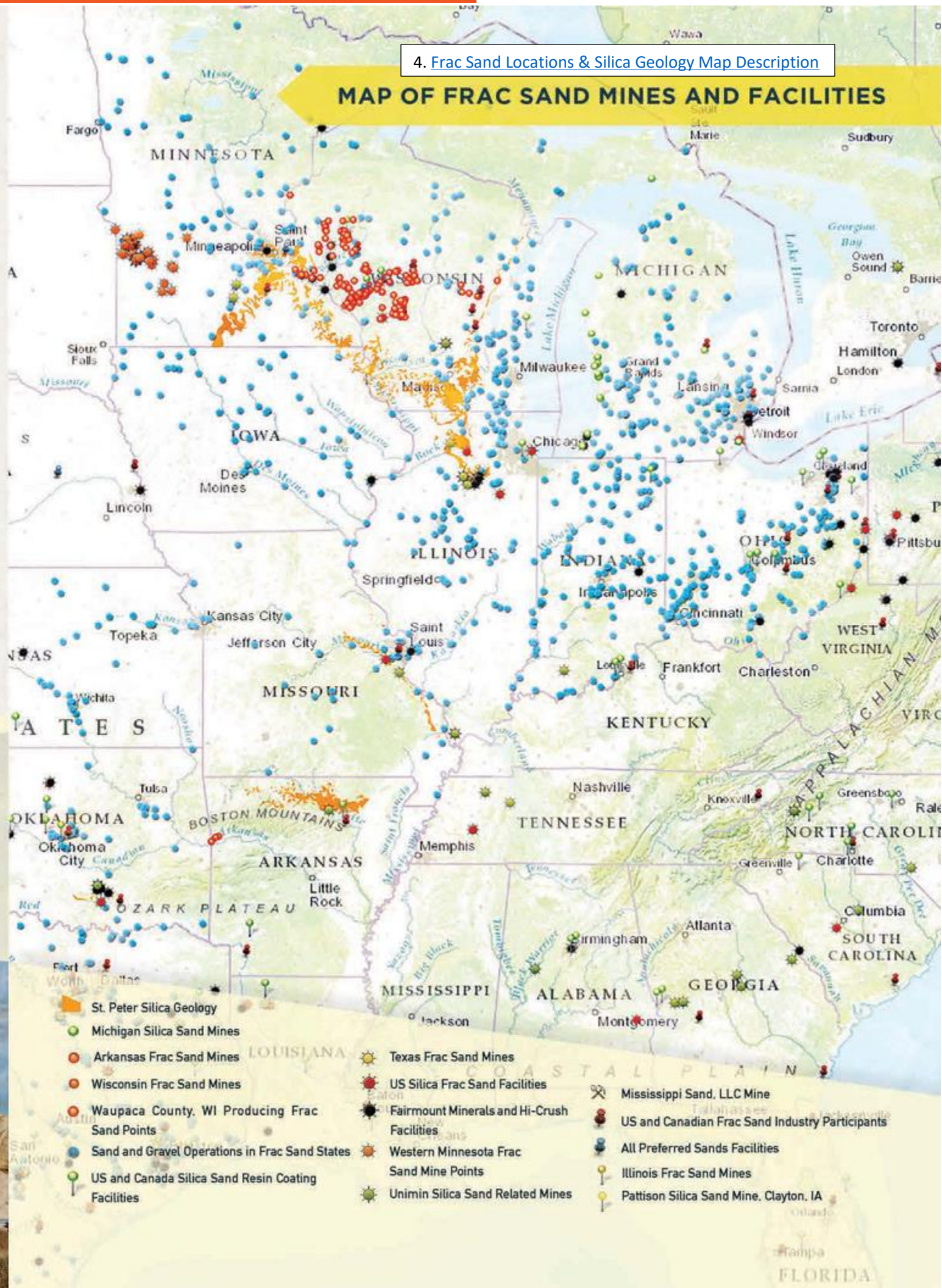
financed propaganda campaigns that have overwhelmed township and county officials lacking the knowledge of the industry required to make foresightful decisions on behalf of those they represent. As the frac sand mining industry proceeds without extremely tight controls, the degradation it is causing could well exceed all other damages since white settlement, and the social fabric, tax burden, quality of life, and health in rural communities is being negatively impacted, perhaps for decades, if not forever.

WHAT CAN YOU DO?

The industry now wishes to move quickly, through a rapidly expanding swath of towns and counties in the U.S. Midwest — the breadbasket of the world. Fortunately, informed and highly motivated citizens can prevent such landscape-removing atrocities. LAND-USE / ZONING ORDINANCES at the municipal or county level and state laws backing their power have been used successfully in many states to block sand mining and fracking-related activity. Join local and regional groups, write letters to local media, educate your neighbors, voicing your opposition to industrial frac sand mining can awaken and inspire elected officials at all levels, and convince them to use the legal tools at hand to block or restrict frac sand mining and other sand facilities.

4. [Frac Sand Locations & Silica Geology Map Description](#)

MAP OF FRAC SAND MINES AND FACILITIES



5. [Silica Fact Sheet - Mayo Clinic](#)

6. [Risks to Respiratory Health](#)

7. [Health Concerns for Silica in Outdoor Air](#)

8. [From Communities at Risk: Frac Sand Mining](#)

9. [The Myth of Polyacrylamide Hydrogels](#)

10. [Drinking Water Contaminants](#)

11. Example: [Family Trapped in a Frac Sand Mining District](#)

12. [New Frac Sand Mining Report Details Health, Environmental, and Economic Harms](#)

HEALTH & SAFETY

CANCER. Mayo Clinic doctors who have studied the impact of mining, trucking, and shipping silica sand by rail or barge warn of its correlation with lung cancer. They have said, "If it's silica sand, the dust that is created is carcinogenic, and it leads directly to lung cancer." Under any circumstances other than sand mining and related activities, silica dust is very highly regulated.



MORE HEALTH EFFECTS. Other risks entailed by silica pollution include emphysema, tuberculosis, bronchitis, autoimmune diseases including scleroderma, lupus and rheumatoid arthritis, and kidney-related diseases, such as chronic renal disease.

GROUNDWATER CONTAMINATION. Once blasting opens up those aquifers, their water-filtering capacity is eliminated or greatly diminished, and the potential for contamination is extremely high. Chemicals used to wash and process the sand can infiltrate groundwater and aquifers. One of them is known to produce nervous system damage, blood problems or increased risk of cancer in cases of long-term exposure. The US EPA does not have tests for these chemicals, but puts the 'safe' limit at 0.0 (zero) concentration.

The holding ponds or pits have been known to lack required liners, and to break or overflow, also causing erosion as well as additional contamination.

TRAFFIC SAFETY. Silica sand is often hauled by speeding semis on narrow rural roads 24/7 or very long trains creating serious safety issues for all vehicles.

13. [Unit trains are very long and carry only frac sand \(see p 27 – 29\)](#)



Trains waiting for sand loads, 45 minute roadblock, New Auburn, WI © mkenosian

ENVIRONMENTAL IMPACTS

DIMINISHING GROUNDWATER. Mining and processing silica sand takes enormous quantities of surface and groundwater, lowering water tables and reducing or eliminating the availability of water that is critical for scores of other purposes. In a period of drought across over half the U.S., this is an unacceptable use of precious water.



WI silica frac sand mine unlined water impoundments

WILDLIFE HABITAT. Mining eliminates entire landscapes that are the natural habitats of important populations of birds, mammals, reptiles, amphibians and other members of the food web on land, and fish and a multitude of small creatures that live and make up the ecological integrity of surface waters. Some of these species are of high conservation concern.

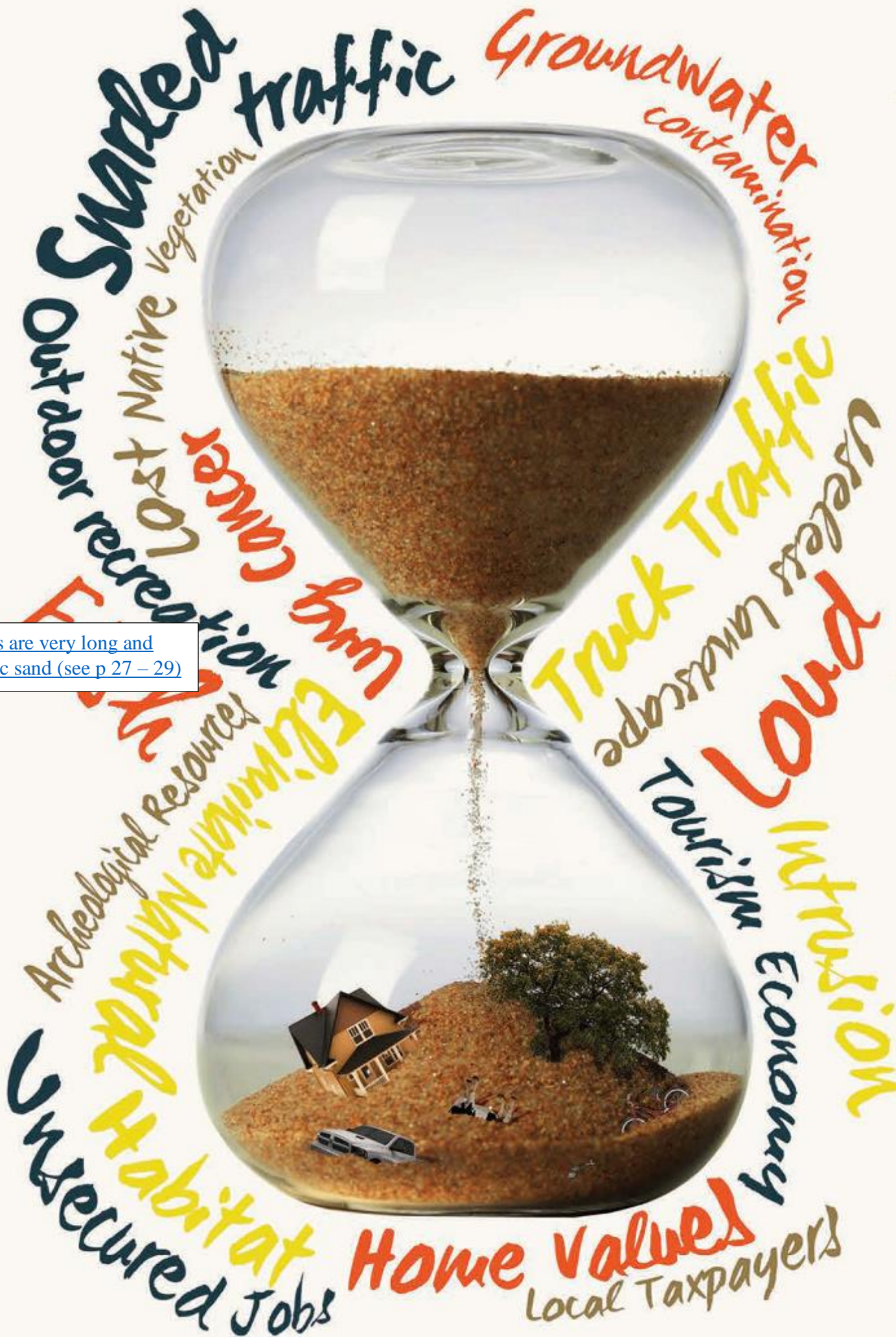
OUTDOOR RECREATION. Frac sand mining eliminates or severely degrades all forms of nature-centered recreation. This includes hiking, biking, birding, canoeing, sight-seeing, outdoor photography, and opportunities for those who fish or hunt. Tourism is a big industry, but not near sand facilities.

HERITAGE. Native American burial sites, village sites, and numerous other valuable artifacts from the first residents and later immigrant residents will be destroyed if frac sand mining is allowed to take place wherever the mining corporations wish.

CLIMATE CHANGE. Frac sand is an essential part of natural gas and oil production, a major contributor to global warming via the potent greenhouse gas methane. A combination of leaks and intentional venting by gas/oil production facilities adds emissions equivalent to 35 million additional automobiles each year.

No frac sand mine in heavily mined Wisconsin has ever been reclaimed or restored with natural or native vegetation.

This boom-and-bust industry benefits out-of-state corporations enormously. A very few local landowners might gain financially, but that is unlikely with the kinds of contracts mining companies offer. Meanwhile, all taxpayers and entire local populations are impoverished, and left with nothing but health effects, the ugly and useless landscape and greatly reduced quantity and quality of groundwater.



THE RADICAL APPROACH

To allow outside corporations to enrich themselves at the expense of local residents and leave behind nothing but a destroyed landscape and devastating economic, social, environmental, health, and quality-of-life problems.

THE CONSERVATIVE APPROACH

To preserve human and natural resources, and enjoy the status quo and the quality of life it provides.

"...frac sand mining is in various stages of being permitted in WI, MN, Illinois, Iowa, Missouri, Arkansas, Michigan, Texas and other states. We have helped keep frac sand out of some areas by extending a hand, giving out information, and sharing the strategies used by mining/oil/gas companies to come in and 'get their way.'" - PAT POPPLE (Concerned Chippewa Citizens)

15. [Concerned Chippewa Citizens](#)

14. [The Economic Benefits and Costs of Frac Sand Mining](#)

ECONOMIC IMPACTS

JOB. While the industry has promised jobs, very few local residents have secured a job associated with a frac sand mine. Any job is temporary in this boom-and-bust industry. Other local jobs have been lost as recreation, hospitality and second homes cut back.

HIGHWAY DAMAGES. Semis hauling dense loads of frac sand from just one mine damaged a blacktop highway so severely in just 8 weeks in Wisconsin, that the highway had to be rebuilt. Mines are typically expected to operate from 5 to 20 years, some longer.

HOME VALUES. One home dropped in assessed value by 50% in just two years due to semi traffic hauling frac sand on a nearby highway. Worse, if no one is willing to put up with the dust or such a loud invasive intrusion and buy a home, the home value actually becomes zero.

TRUCK TRAFFIC. Repetitive semi traffic and speeding truck drivers not only damage bridges and other transportation infrastructure, they are also a traffic hazard for school buses, commuters and general traffic.

LOSS OF TOURISM ECONOMY. Many areas with scenic vistas and a healthy environment receive huge economic benefits from tourism and second homebuyers. These sectors are at serious risk if frac sand mining takes over the landscape.



Processing at frac sand mine, Wisconsin

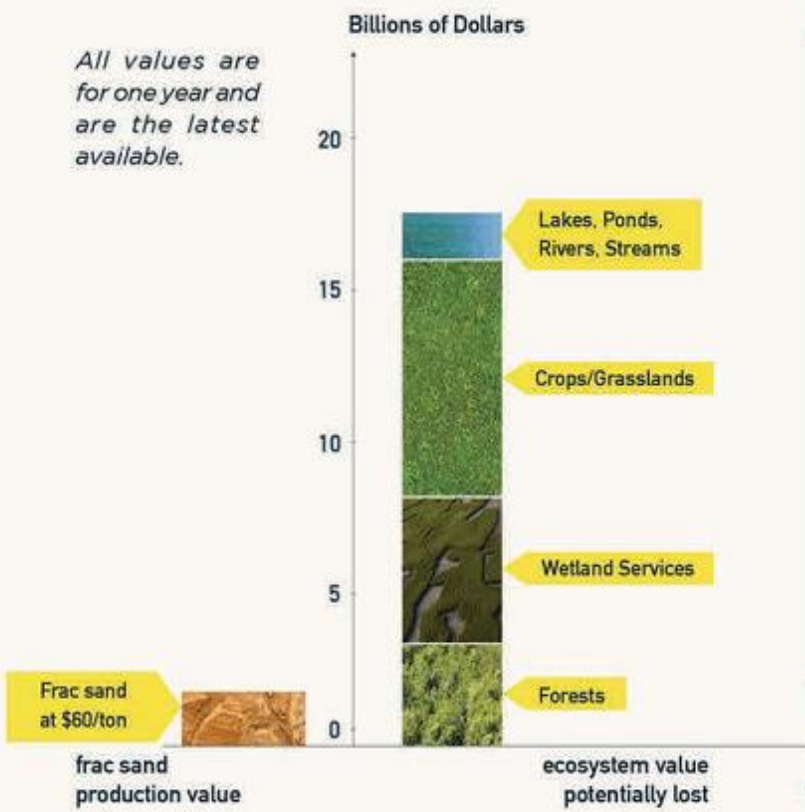
LOCAL TAXES GO UP. Each of the previously listed problems present, in one way or another, an increased and unnecessary tax burden on local residents. No frac sand mine in heavily mined Wisconsin has ever been reclaimed or restored with natural or native vegetation.



Wisconsin frac sand mine removing forested hill

UN-ECONOMICAL TRADEOFF

ECOSYSTEM & VALUE LOST IN 7 STATES INCLUDING MN, IA, WI, AR, IL, OK & MO



RESTRICTIONS ON FRAC SAND MINING AND FACILITIES

There are a number of municipal and county land use ordinances controlling frac sand mining or facilities via zoning and overlay districts that establish clear restrictions on heavy truck road use, chemical use, prohibited processes, setbacks from communities or specified geologic features — e.g., Allamakee Cty., Iowa.

There have been a series of short-term municipal and county moratoria while the study was undertaken — some being followed by ordinances, while others simply lapsed.

Efforts are underway to pass state laws ending local land use rights (in Wisconsin, for one); contact your state legislators and educate them about the appropriateness and necessity of keeping local land use decision-making (zoning) in place.



Explosive blasting breaks open sandstone so it can be crushed, with resulting noise, vibration, and fugitive dust emissions.

PLUMMETING PROPERTY VALUES. Studies show that property values near sand and gravel mines drop sharply the day the mining operations start, with losses of 25-30% at ¼ mile out, 15% at ½ mile out, 9% at 1 mile out. Evidence is mounting that the loss of property value is even greater for frac sand operations.

DECLINE IN \$ VALUE OF LAND PRODUCTIVITY. Even if land is reclaimed after mining for agricultural purposes, it is estimated that the economic value of the agricultural production will be 40-60% less than the value of ecosystem services prior to mining.

INCREASED COST OF LOCAL SERVICES. With frac sand mining, local costs for road maintenance and repair increase dramatically, along with the costs of first responder and health services.

DEVASTATING BOOM-BUST CYCLES. History shows that any prosperity brought by mining is transient at best, followed by economic collapse. A study by Dr. Tom Power, Professor Emeritus of the University of Montana (Missoula), confirms this to have been true in his look at Wisconsin in particular. Current frac sand mining threatens to repeat the cycle.



Air

Vast clouds of fine silica particles, including respirable crystalline silica dense enough to be clearly visible are produced at the extraction site, processing facilities, transloading facilities, and hydro fracking sites — creating a high risk of silicosis, lung cancer, cardiovascular diseases, asthma, bronchitis and other diseases to all those exposed to it, including workers, adjoining neighbors and communities along rail and truck routes. The most dangerous particles are the tiniest ones that you can't see.

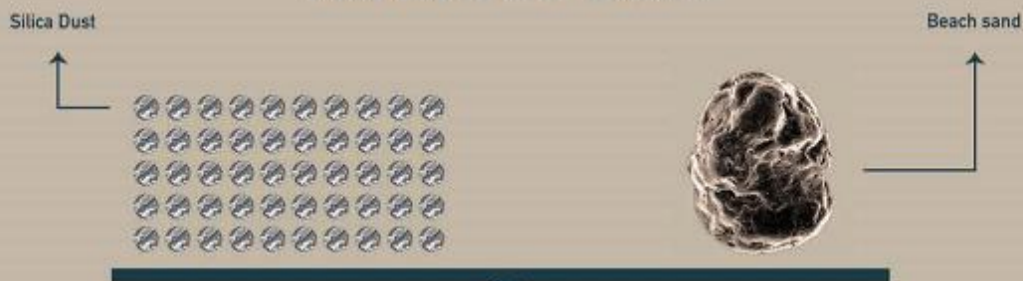
WORKERS. Employers have been cited by OSHA, who issued a hazard alert for workers not having the correct face masks to protect them from the silica dust. What about nearby communities breathing without face masks 24/7?

Also, some sand not sold for use in fracking is sold for cow bedding and playgrounds without sufficient oversight. Once this sand dries out and if there are fans or wind blowing, the fine particles become airborne.

FOOD. Crops near sand mines and other sand facilities (including uncovered barges, trucks and rail cars) will be coated with fine particles with any wind — not a regulated situation.

16. OSHA Fact Sheet for Crystalline Silica

HOW BIG IS THE "SAND"?



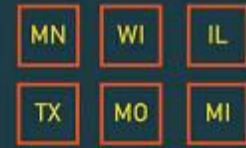
These particles are so light they can be carried a half mile or more in the air.

Beach sand is 30 - 50 x larger than Silica Dust

As the sandstone is removed from the hills, bluffs, and ridges, the sand it holds is a mixture — even after it is graded, sorted, and washed, what is needed for fracking use is still intermixed with sharp tiny particles of respirable crystalline silica, with more produced as it is moved about. Beach sand, for instance, is 30 to 50 or more times larger than these particles, which are so light they can be carried a half mile or more in the air. Put another way, your average beach sand is generally more than 0.03 inches while frac sands are 0.0033 to 0.0027 inches and include particles so tiny they are nearly invisible. Freshly broken pieces are the sharpest.

Statistics are lacking due to lack of elapsed time since the frac sand mining really took off in the area, and/or government collusion in not monitoring operations and their impacts.

18. Frac Sand Mining in WI



In six states (MN, WI, IL, TX, MO, and MI) there are more than 80 sand and gravel operations within 15-20 miles of existing silica mines that are likely to start mining silica. The price per ton has gone from \$1.93 (in 1902 to 1973) to \$12.07 (1974 to 2000) to \$25.33 (in the 2000s) and is now north of \$45 per ton and likely to approach \$60 per ton by the end of 2015.

20. Graph Constructed from: USGS Information on Silica



Land

The first activity to set up a strip mine for sand is to remove the "overburden" — which means everything over the sand deposit — all soil, trees... everything.

The majority of frac sand mining land in the Upper Midwest was previously forested; in West Central Wisconsin, for instance, that percentage is over 98%. Plans are to "reclaim" it to agricultural land rather than forest. Farmers leasing think they will have usable plantable acreage at the end, but this belief is based on false and unproven promises made by the mining companies because "reclaim" does not mean "restore."

IMPAIRED AND CONTAMINATED WATER SUPPLIES. Loss of forest cover and flattening of the topography during mining operations will lead to loss of precipitation capture and water storage capabilities. And given that in many cases the mine floor is close to groundwater level—only 3 to 5 feet in some cases—groundwater supplies could be easily contaminated by sand washing chemicals and if returned to farming, by pesticides and fertilizer.

IMPOVERISHED TOPSOIL. By reducing water storage capacity, the landscape-flattening effects of frac sand mining also reduce the ability of land to accrue organic matter to enrich the topsoil.

HABITAT LOSS. In Wisconsin alone, there are at least 10 listed species endangered by landscape changes and habitat fragmentation associated with frac sand mining, including the federally endangered whooping crane, which is in peril due to interference with its migratory paths and nesting areas.

UNIQUE GEOLOGY. In the last Ice Age, the glacier did not bulldoze through the Driftless Area of the SW part of Wisconsin nor SE portions of the state. Yet miners for frac sand wish to take portions of the driftless area, which contains many ancient formations, animals, unique plants, etc. Sand stone formations are over 500 million years old in frac sand areas of the state.

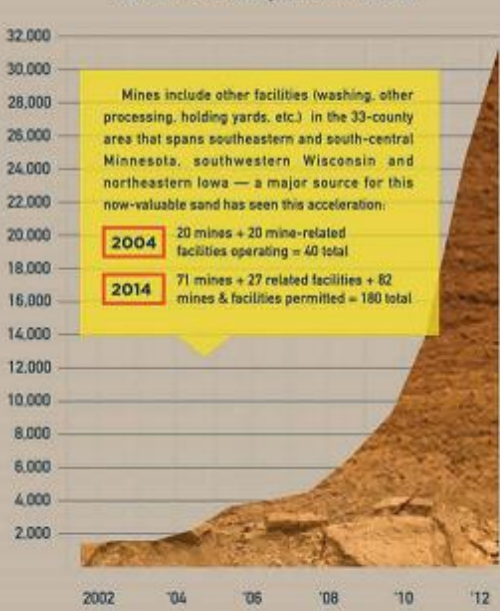
In Wisconsin, there are occurrences of strip mining and in some cases dismantling entire formations of sand stone in depth. In others they are removing deposits of frac sand from the surface. Some are using dewatering techniques whereby they go beneath the groundwater or work in it.

Also in Wisconsin and some other states, where the Tunnel City formation is being disturbed and there are sulfides in that formation, if

21. Frac Sand Locations & Silica Geology Map Description

there are also low pH's in the formation, heavy metals leach out into the water supply. The worst worry is that the waste products put back into the pits for reclamation will contain heavy metals that can then move into aquifers. Little is known about this situation, but heavy metals in the water create a serious condition for the health of people (arsenic, aluminum, lead, and other heavy metals have already been found). MUCH more needs to be studied about heavy metals in so called non-metallic mines. (CSI)

U.S. FRAC SAND PRODUCTION BOOMS



Gas and oil drilling with hydraulic fracturing uses a lot of frac sand. The drilling (with exemptions to protective federal laws) causes air and water pollution, contaminates drinking water supplies, kills animals and plants, and poses serious risks to humans.

WHO IS NEARBY?

Environmental Working Group found:

Over 58,000 people live less than half a mile from existing permitted or proposed frac sand sites

Over 182,000 people live less than a mile from existing permitted or proposed frac sand sites

Silica levels detected near frac sand facilities in Wisconsin and Minnesota are at least 10 times higher than the health-based exposure limit of 0.3 µg/m³ that EWG considers safe for children and other vulnerable populations. This represents a significant health risk for residents living in close proximity to these sand mining and processing facilities — and along the sand truck driving routes.



22. Silica Particles from Frac Sand Mining Put Tens of Thousands at Risk

Frac Sand Facilities



CREATIVE RESPONSE

Families such as the Schultzes in Trempealeau County are signing PERMANENT CONSERVATION EASEMENTS. Doing so allows them to continue farming and allocates some acreage to the restoration of oak savanna and dry prairie, considered by the WI Department of Natural Resources (DNR) as "globally imperiled" and "globally rare," respectively.

17. The Economic Benefits and Costs of Frac-Sand Mining

QUESTIONS FOR COMMUNITIES TO ASK & ANSWER BEFORE AUTHORIZING ADDITIONAL FRAC-SAND PRODUCTION

- What will the pay levels and the mix of higher- and lower-paid projected new jobs be?
a. Direct mining, processing and transportation jobs may or may not be high-paying jobs. b. "Induced" jobs tied to workers spending their paychecks are likely to be low pay.
- Who will get each type of job?
a. Mining towns do not show faster job growth. b. Will locals or out-of-towners get these jobs?
- Will frac sand production continue?
a. As natural gas and oil prices fluctuate, will the demand for frac sand fluctuate as has happened recently? b. Will small local businesses survive competition and consolidations? c. What about labor saving — like railroads instead of trucking? d. Will the damage and disruption in the "bust" be greater than the benefits of the initial growth or "boom"?
- How big will the frac sand production "footprint" (acres) ultimately be?
a. The area of operating and abandoned mines? b. Intensity of added truck traffic on local roads? c. The number and location of processing plants, unit-train loading facilities, rail-spur extensions, rail heads, storage piles?
- What will be the environmental impacts of these activities?
a. Fine silica dust from sand mining, handling, trucking, processing, and railroad hauling travels distances and diesel and other emissions from trucks, etc., will impact whose health? b. Besides the washing chemicals, will there be other chemical treatment or coating of the sand and resulting pollution from those chemicals? How much water will be used? And contaminated? c. Besides removing the hills that collect and filter water, will there be abandoned pits, storage piles, rail spurs and rail heads, etc.? d. What level of bonding is required to assure complete reclamation? Are frac mine operations willing to put up such guaranteed bonds?
- Will other economic activities suffer?
a. Will pollution, congestion, industrialization of small towns and rural areas impact agricultural productivity? And new residents, businesses, including retirees and the visitor economy? b. Will local labor availability and costs change?
- How important will the economic impact of frac sand production be to the local economy?
a. What will be the percentage growth of jobs, total income, and population and for how long? b. How does the frac sand production impact for instance, to the ongoing growth in the other sectors of the economy? c. Who pays for road damage and repair?
- Will frac sand production help or hurt?
a. Are the short-term monetary benefits worth the environmental and health impacts? And to whom?

ADAPTED FROM REPORT:
<http://www.iato.org/documents/the-economic-benefits-and-costs-of-frac-sand-mining-in-west-central-wisconsin>

The Economic Benefits and Costs of Frac-Sand Mining in West-Central Wisconsin: Phase One of Study - General Economic & Community Overview

By Thomas Michael Power, Ph.D., and Donovan S. Power, MS, Power Consulting, Inc.

A report prepared for Wisconsin Farmers Union, Wisconsin Towns Association and the Institute for Agriculture and Trade Policy, May 2013.

23. Based on Kate Prengaman, Wisconsin Center for Investigative Journalism, Source:



24. [Damascus Citizens for Sustainability.org](http://DamascusCitizens.org)

DAMASCUS CITIZENS FOR SUSTAINABILITY

In February of 2008, alarmed by the threat posed by the shale gas extraction industry, local residents of the Upper Delaware River Valley formed Damascus Citizens for Sustainability (DCS). Through grassroots organizing, education, and litigation, DCS has sought to protect the Delaware River Watershed, an irreplaceable source of drinking water for over 15.6 million people. As the threat to people's health has grown, DCS has increasingly extended its efforts across the states of New York and Pennsylvania, to the entire Marcellus Region and beyond. For DCS, this frac sand poster is another effort to help our fellow citizens, and foster a precautionary approach to the Commons.

B. Arrindell, Director and Chief Science Officer
DamascusCitizens.org



Designed by Frances Miller, April Nguyen, Rebecca Adam
In Kathy T. Hettinga's Design as Service, Messiah College
DesignAsService.org

SPECIAL THANKS TO

Ronald J. Gulla, Anne Willard, Vera Scroggins

Pat Popple, Concerned Chippewa Citizens (Wisconsin)
and Frac Sand Sentinel

Ted Auch, PhD, FracTracker.org



Robert Nehman, Ric Zarwell, Allamakee County
Protectors (Iowa)

And for exceptional background information:
Environmental Working Group (EWG),
Civil Society Institute (CSI), and Institute for Agriculture
and Trade Policy

CONTACT YOUR LOCAL GROUP. Or form one!

25. FracTracker.org

27. [Allamakee County Protectors](http://AllamakeeCountyProtectors.org)

26. [Allamakee County Protectors Recognized](http://AllamakeeCountyProtectors.org)



-RIC ZARWELL
ALLAMAKEE COUNTY PROTECTORS

For more information and documentation on these fracking facts, visit: DamascusCitizens.org/frac-sand

Photos provided by Ted Auch ^{1A}, Pat Popple ^{1B}, and others, all used with permission.

Silica Mine, New Auburn, WI, mining and buildings. ©