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Assessing the Silica (Frac) Sand Mining Environmental Regulatory Frameworks in Minnesota and Wisconsin: Who Has a Better Plan for Digging, the Gophers or Badgers?

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I. INTRODUCTION

In recent years there has been significant growth of silica sand mining in the United States due to increased demand for the sand in the hydraulic fracturing (or "fracking") oil and gas extraction industry.[3] Minnesota and Wisconsin are home to abundant deposits of the specific type of silica sand that is needed in the fracking process, yet these silica "frac" sand[4] resources are not found widely elsewhere in the country—resulting in a localized and highly profitable mining boom in the upper Midwest.[5]

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[1] Minnesota and Wisconsin are often referred to as the "gopher state" and "badger state," respectively, in honor of each state's population of prolific burrowing mammals.

[2] Juris Doctorate Expected May 2015, Hamline University School of Law. I thank my wife Beth for her endearing support in all that I do.

[3] *See, e.g.*, Paul Tosto, *MPR News Primer: Frac Sand Mining*, MINN. PUB. RADIO NEWS, http://www.mprnews.org/story/2012/03/08/frac-sand-mining-mpr-news-primer (Feb. 15, 2013).

[4] Although commonly, and often pejoratively, referred to as "frac sand," this article will use the more diplomatic and scientific term "silica sand." Frac sand is a specific type of silica sand, and most of the health and environmental issues associated with silica "frac" sand mining operations are of equal concern for all types of silica sand mining. *See generally Silica Sand Mining in Wisconsin,* WIS. DEP'T OF NAT. RES., at 12-32 (Jan. 2012), http://dnr.wi.gov/topic/\Mines/documents/SilicaSandMiningFinal.pdf (discussing the broad range of potential environmental impacts associated with sand mining).

[5] *See* Tosto, *supra* note 3. As of May 2013, there were seventeen active silica sand mines in Minnesota, with an additional twenty-one mines being planned. *Mapped: More than 20 proposed frac sand facilities*, MINN. PUB. RADIO NEWS

However, silica sand mining has become a controversial issue in the region, with supporters touting economic benefits of industry expansion, while local communities are concerned about potential health and environmental impacts associated with the mining.[6]

Minnesota and Wisconsin state agencies, as well as some local governmental units (LGUs) within each state, have long regulated sand mining operations. But the accelerated development of sand mining sites, the rush of associated economic activity, and uncertainty about the potential environmental risks of silica sand has generated debate about the proper roles for state and local regulators.[7] Concerns over regulation include determining whether the state or local governments are best suited to oversee mining activities; whether sufficient regulatory controls are in place to manage the risks of silica sand mining; and whether mining operations are being regulated proportionate to the risks, so as to not impede beneficial economic development. This debate has spurred recent state and local regulatory activity in Minnesota and Wisconsin to address the concerns of the various silica sand stakeholders—mine developers, state agencies, LGUs, and the public.[8]

This article sets out to analyze the silica sand mining environmental regulatory schemes in Minnesota and Wisconsin to determine if this booming industry is met with an appropriate state-local oversight framework. Part II of this article provides a brief explanation of silica sand mining, including a discussion of the potential health and environmental risks and economic benefits and

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(May 1, 2013), http://minnesota.publicradio.org/collections/frac_sand/frac_map/. In Wisconsin, silica sand mining and processing operations doubled from 2011 to 2012. In May 2013, there were 112 permitted and nineteen proposed silica sand facilities, including mining, processing, and rail loading sites. *Map: Wisconsin's Frac Sand Industry*, WISCONSINWATCH.ORG, http://www.wisconsinwatch.org/viz/fracmap/ (May 1, 2013).

[6] *See* Tosto, *supra* note 3.

[7] *See, e.g.*, Tony Kennedy, *Southeastern Minnesota Asks State for Frac Sand Help*, STAR TRIBUNE (Feb. 20, 2013, 6:27 AM), http://www.startribune.com/local/191942801.html.

[8] *See infra* Part IV.

concerns associated with silica sand. Part III provides an analysis of environmental regulatory theories as applied to silica sand mining, with a focus on the state-local regulator dynamic, to determine the best regulatory approach for silica sand mining in Minnesota and Wisconsin. Part IV assesses the current state-local environmental regulatory frameworks in Minnesota and Wisconsin to identify aspects that are likely to be effective, as well as opportunities for improvement and approaches that may be imprudent. In Part V, this article concludes by highlighting the aspects of Minnesota and Wisconsin's regulatory frameworks that are indicative of an effective state-local adaptive oversight approach for silica sand mining. However, the recent legislative trends in each state indicate that Minnesota is on a better path to properly manage the risks and benefits of silica sand mining for all stakeholders, whereas Wisconsin may be evolving towards a state primacy regulatory framework that could result in negative consequences for public health and the environment.

II. DIGGING FOR SAND: WHAT'S THE BIG DEAL?

Silica sand mining, and its connection to oil and gas fracking, involve fairly technical industry processes, substantial health and environmental risks, and significant economic implications. These various aspects intertwine to create a number of important and complex public policy issues associated with environmental regulation of silica sand mining. Therefore, in order to assess the efficacy of the silica sand mining environmental oversight frameworks in Minnesota and Wisconsin, it is important to first understand how silica sand mining and its associated risks and implications operate. The following sections provide background information on silica sand mining operations, the associated environmental concerns, and the potential economic effects of the mining industry.

A. Silica (Frac) Sand and the Mining Process

Silica sand, which is composed of the mineral quartz, has historically been mined throughout the country for a variety of commercial and industrial uses, such as glass-making and water-filtration.[9] But recently, a certain quality of silica sand is in very high demand for a new purpose, as it is a required ingredient in fracking[10]—the controversial oil and gas extraction method sweeping the nation.[11] In fact, many of the environmental,

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[9] *See Silica Sand FAQs*, MINN. DEP'T OF NAT. RES. (Mar. 21, 2014), http://www.dnr.state.mn.us/lands_minerals/silicasand/faq.html.

[10] Fracking is an enhanced extraction technique used to access oil and gas resources (hydrocarbons) that are locked in geologic formations with very low permeability, such as shale, from which hydrocarbons cannot be extracted through conventional methods. Fracking involves drilling a well vertically and horizontally into the hydrocarbon-containing bedrock located thousands of feet beneath the ground surface. Then fracking fluid containing water, chemicals, and silica sand is pumped into the bedrock at very high pressures to create, expand, and prop open fractures, releasing the trapped hydrocarbons. *See Energy Resources Program: Hydraulic Fracturing Research*, U.S. GEOLOGICAL SURVEY, http://energy.usgs.gov/OilGas/UnconventionalOilGas/HydraulicFracturing.aspx#3892235-overview (last visited Jan. 15, 2014)..

[11] The widespread expansion of fracking throughout the U.S. is a hotly debated issue due to the potential significant advantages for national energy and economic development versus the high risks to health and environment surrounding the drilling sites. *See* John Ydstie, *Will Renewables Suffer Because Of U.S. Oil and Gas Boom,* NPR (Dec. 27, 2013, 3:24 PM), http://www.npr.org/2013/12/27/257654578/will-renewables-suffer-because-of-u-s-oil-and-gas-boom. The potential benefits of expanding oil and gas development include nation-wide economic and jobs growth and increased U.S. energy independence promoting economic stability and national security. *See* Jim Efstathiou, *Fracking Boom Seen Raising Household Incomes by $1,200*, BLOOMBERG (Sept. 3, 2013, 11:01 PM), http://www.bloomberg.com/news/2013-09-04/fracking-boom-seen-raising-household-incomes-by-1-200.html. Some also argue that a large-scale transition from coal- to cleaner natural gas-fired energy production is an important step in reducing carbon emissions in the effort to combat climate change. *Id.* The environmental and health risks associated with fracking include impacts to surface and groundwater, air quality, and effects on seismic activity. *See Natural Gas Extraction - Hydraulic Fracturing*, U.S. ENVTL. PROT. AGENCY (Mar. 14, 2014), http://www2.epa.gov/hydraulicfracturing. In addition, some argue that

economic, and regulatory issues associated with silica sand mining and fracking are quite analogous, with support for silica sand mining coming directly from the fracking industry and an aspect of the opposition to silica sand mining stemming from its very connection to fracking.[12]

Silica sand is used as a "proppant" during oil and gas well fracking activities; the sand is needed to prop open fractures created in low-permeability bedrock to facilitate petroleum resource extraction.[13] The silica sand that is used as a fracking proppant must meet specific industry standards with respect to the sand composition, shape, size, and compressive strength in order to withstand the extremely high-pressure conditions present beneath thousands of feet of bedrock.[14] Although Minnesota and Wisconsin do not have significant petroleum resources to be fracked, they are among the few places in the country that have just the right type of

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expansion of oil and gas drilling will result in continued primary use of climate change-inducing fossil fuels over expeditious development of renewable energy technology. *See* Ydstie, *supra* note 11.

[12] To be clear, although the silica sand mining and hydrocarbon fracking industries are related due to the use of silica sand in hydrocarbon fracking operations, sand mining and hydrocarbon fracking are two distinct processes and industries that occur in different locations, have different environmental impacts, and are regulated under different schemes. This article assesses environmental regulation of silica sand mining, not hydrocarbon fracking. A brief discussion of the fracking process and national debate regarding the risks and benefits of fracking is included in this article to provide the larger context regarding the forces that are driving the silica sand industry and regulatory debate. For in-depth analyses of fracking environmental regulation, see Emily C. Powers, *Fracking and Federalism: Support for an Adaptive Approach That Avoids the Tragedy of the Regulatory Commons*, 19 J.L. & POL'Y 913 (2011); Robert H. Freilich & Neil M. Popowitz, *Oil and Gas Fracking: State and Federal Regulation Does Not Preempt Needed Local Government Regulation*, 44 URB. LAW. 533 (2012); John R. Nolon & Victoria Polidoro, *Hydrofracking: Disturbances Both Geological and Political: Who Decides?*, 44 URB. LAW. 507 (2012).

[13] *Silica Sand Mining in Wisconsin*, *supra* note 4, at 3.

[14] *Id.*

high-quality and accessible silica sand formations that are sought by the fracking industry.[15]

The silica sand deposits that are targeted for the most cost-effective mining are generally located at relatively shallow depths (within fifty feet below the ground surface), therefore the typical technique to remove the silica sand is strip-mining from large pits that are open at the ground surface.[16] Explosive blasting in the mine pit followed by material crushing are both typically performed to remove and break up heavily-cemented sand deposits.[17] The sand is usually processed at the mine site or at an off-site plant by washing and screening to remove unwanted grain sizes.[18] In some cases the sand is further prepared by coating it with resin to enhance performance in the fracking process.[19] Chemical additives such as polyacrylamide, which can breakdown into a toxic pollutant, are usually used during sand processing to aid in separating grain sizes.[20] The sand is then transported off-site by open- and closed-topped trucks and railroad cars.[21] After sand mining is finished at a site, state and local regulators typically require reclamation of the mine site to establish safe and usable terrain for an approved post-mining use.[22]

B. The Health and Environmental Risks

There are various potential impacts to health and the environment associated with silica sand mining, processing, and transportation activities. There are potential impacts to air quality

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[15] *See* Tosto, *supra* note 3.
[16] *See Silica Sand Mining in Wisconsin*, *supra* note 4, at 7.
[17] *Id.* at 7-9.
[18] *Id.* at 9.
[19] *Id.*
[20] *Id.* at 22-23.
[21] *Id.* at 10.
[22] *See Silica Sand Mining in Wisconsin*, *supra* note 4, at 10-11. Mine site reclamation activities generally include grading slopes, adding topsoil, and planting vegetation. Former mine sites are reclaimed for uses including wildlife habitat, agricultural land, or building sites.

due to fugitive silica dust (respirable crystalline silica [RCS]) and other particulate matter that is generated throughout the mining activities; the RCS becomes airborne and escapes mining and processing sites or vehicles during transport.[23] RCS is an air pollutant of high concern, because there are known health risks associated with exposure to high concentrations of RCS in occupational settings.[24] However, there is little known about the level of RCS concentrations and the associated air quality health risks to communities that are adjacent to silica sand mining sites and transportation routes.[25] Therefore, communities in close proximity to silica sand mining operations are particularly concerned about the potential health impacts of RCS.[26] In addition to RCS, various hazardous air pollutants are also emitted from the heavy equipment used to mine, transport, and process the silica sand.[27]

There are several potential impacts to water resources associated with silica sand mining. Water is used often during the mining and processing activities to wash fine particles out of the silica sand.[28] This process water, in addition to accumulated stormwater, is held on-site and discharged off-site.[29] There is potential for sediment-laden or contaminated water generated at the mining or processing site to impact groundwater or surface waters

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[23] *Id.* at 12.

[24] *See Silica (crystalline, respirable) Chronic Toxic Summary*, CAL. OFFICE OF ENVTL. HEALTH HAZARD ASSESSMENT (Feb. 2005), http://www.oehha.org/air/chronic_rels/pdf/silicacrel_final.pdf (citing numerous studies indicating that RCS exposure causes silicosis and other serious chronic diseases to miners and other industrial occupations).

[25] *See Silica Sand Mining*, MINN. POLLUTION CONTROL AGENCY (Nov. 26, 2013), http://www.pca.state.mn.us/index.php/air/air-quality-and-pollutants/air-pollutants/silica-sand-mining/index.html [hereinafter *MPCA Silica Sand Mining*].

[26] *See, e.g.*, *Silica Sand Dust,* CONCERNED CHIPPEWA CITIZENS*,* http://ccc-wis.com/page8/page8.html (last visited Mar. 31, 2014) (community action brochure discussing the health concerns of silica sand dust associated with mining activities in the Chippewa Valley region of Wisconsin).

[27] *See Silica Sand Mining in Wisconsin*, *supra* note 4, at 12.

[28] *Id.* at 21.

[29] *Id*.

such as streams and wetlands.[30] Further, groundwater is sometimes encountered during mining activities and pumped from the mine pit to facilitate removal of the silica sand, which can potentially cause groundwater and surface water depletion problems in the area.[31]

Sand mine development involves removal and disturbance of surface soil at the site, which can damage future soil viability at the mining site, resulting in unproductive and unhealthy land for agricultural or other post-mining uses.[32] When the mining operations end, mine sites are usually required to be reclaimed to remediate damage to the soil and land; however, there is concern that current mine reclamation programs do not properly restore soil health at former mine sites.[33] In addition, if a mine site is not reclaimed properly to prevent erosion, open pits, or unstable slopes, the former mine area can be hazardous to people who enter the site and also be prone to refuse and hazardous material dumping.[34]

There are also aesthetic and nuisance-type impacts associated with silica sand mining operations that can burden nearby residents and users of recreational land adjacent to mining operations.[35] Ongoing noise and light emanate from mine sites that operate long hours, disturbing people and wildlife in proximity to the site.[36] Scenic bluffs and other landscape features could be

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[30] *Id.*

[31] *Id.* at 22.

[32] *See* Richard Kremer, *UW, Chippewa County Will Investigate How Frac Sand Mining Affects Soil*, WIS. PUB. RADIO (Feb. 5, 2014, 5:00 AM), http://www.wpr.org/uw-chippewa-county-will-investigate-how-frac-sand-mining-affects-soil.

[33] *Id.* (indicating that Wisconsin university and county personnel are studying how sand mining activities affects soil health, because little is known about the extent of soil damage and repair outcomes associated with sand mining and site reclamation activities).

[34] *See* Alison Dirr, *With Frac Sand Boom in Full Swing, Study to Guide Mine Reclamation*, WISCONSINWATCH.ORG (Feb. 5, 2014), http://www.wisconsinwatch.org/2014/02/05/with-frac-sand-boom-in-full-swing-study-to-guide-mine-reclamation/.

[35] *See Silica Sand Mining in Wisconsin*, *supra* note 4, at 30-33.

[36] *Id.*

destroyed by mining activities.[37] Additionally, there is often an increase in heavy vehicle traffic coming and going from mine sites that can create nuisance and safety issues.[38]

C. The Economic Potential

The economic impact of new silica sand mining operations on the surrounding communities and the state is also a controversial issue, but no doubt there is the potential for substantial financial gains associated with the mining expansion. Private property owners who sit atop silica sand deposits can obtain large payments for selling the mining rights, while the sand mining companies stand to make millions from selling the sand when in high demand by the fracking industry.[39] But more significantly, mining supporters point to the widespread and long-term economic benefits of growing the silica sand industry. They maintain that silica sand mining will create many new high-paying jobs and boost the local economy in rural areas where the mining is typically performed and where economic stimulus is especially needed.[40] Supporters further declare that silica sand mining is projected to be sustainable for years as fracking expansion continues throughout the county.[41] Additionally, supporters state that the sand resources are unique to the region, so the industry cannot be moved out of state.[42]

However, others warn that the proposed long-term economic benefits of mining have not been born out historically across the

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[37] *See Altering Landscapes - Frac-sand mining removes our bluffs*, HOUSTON CNTY. PROTECTORS, http://www.sandpointtimes.com/environment/landscape.asp (last visited Mar. 31, 2014).

[38] *See Silica Sand Mining in Wisconsin*, *supra* note 4, at 30.

[39] *See* Mike Ivey, *Wisconsin at 'Global Epicenter' of Frac Sand Mining Industry*, THE CAP TIMES (Oct. 10, 2013, 8:55 AM), http://host.madison.com/news/local/writers/mike_ivey/wisconsin-at-global-epicenter-of-frac-sand-mining-industry/article_45690930-3125-11e3-ba86-0019bb2963f4.html#ixzz2qfpz4Kto (reporting that silica sand mining is a $1 billion dollar industry in Wisconsin primarily driven by demand from the fracking industry).

[40] *Id.*

[41] *Id.*

[42] *Id.*

country, and increased mining operations can actually do more harm than good regarding the economic prosperity of local communities and the state. Mining economies tend to be unstable and undergo boom and bust cycles, which can have significant negative impacts on small and rural communities.[43] In fact, the demand for silica sand from Minnesota and Wisconsin has already undergone a cycle of waning after the initial substantial growth, halting mining activities and leaving those involved in the industry with economic uncertainty.[44] Property values tend to depress in counties that contain mining sites, with decreased property values especially common in areas adjacent to mine sites and haul routes.[45] One economic study prepared for Wisconsin town and agricultural associations, indicates that job creation associated with expanded silica sand mining in west-central Wisconsin is expected to be modest, representing only a fraction of one percent of the total employment in the region.[46]

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[43] *See generally The Economics of Frac Sand Mining*, UNIV. OF WIS. COOP. EXTENSION,http://conservationvoters.org/wordpress/wp-content/uploads/2013/05/uwex_flyer_on_frac_sand_property_values.pdf?c5398br (last visited Feb. 17, 2014). The growth and recession of the mining industry is largely driven by commodity prices, which can fluctuate rapidly and unpredictably. Labor migration is often connected with volatile industries such as mining, resulting in population growth and decreases that mirror the ups and downs in demand for mined commodities. Rural communities can become dependent on the local mining industry and without a well-diversified economy they are particularly at risk of high local unemployment and decreases in the tax base when mining activities slow.

[44] *See* Kate Prengaman, *Mining Firms Stockpiling Frac Sand Until Price Goes Up*, LACROSSE TRIBUNE (Dec. 22, 2012, 12:00 AM), http://lacrossetribune.com/news/local/mining-firms-stockpiling-frac-sand-until-price-goes-up/article_0aaa7294-4c00-11e2-8efb-001a4bcf887a.html; *see also* Elizabeth Baier, *Slowing Demand for Frac Sand Changes the Landscape in Southeast Minnesota*, MINN. PUB. RADIONEWS (Nov. 10, 2013, 7:20 AM),http://www.mprnews.org/story/2013/11/11/environment/frac-sand-mine-saratoga.

[45] *See The Economics of Frac Sand Mining*, *supra* note 43, at 1.

[46] Thomas M. Power & Donovan S. Power, *The Economic Benefits and Costs of Frac-Sand Mining in West Central Wisconsin*, INST. FOR AGRIC. & TRADE POL'Y, at 5 (May 2013), http://www.iatp.org/files/2013_05_30_FracSandMining_f.pdf.

III. ASSESSING ENVIRONMENTAL REGULATORY THEORIES: WHAT IS THE BEST APPROACH FOR SILICA SAND MINING IN MINNESOTA AND WISCONSIN?

Since the rise of modern environmental regulation, legal scholars have debated what regulatory schemes are best suited to appropriately manage the environmental risks associated with various industries, while also being careful not to unnecessarily stifle economic growth and productivity. The debate has often focused on theories of economic efficiency as a basis for achieving the ideal environmental regulatory balance.[47] Economic efficiency theories dictate that environmental regulation should be only as stringent and costly as necessary to prevent environmental impacts for which remedial costs are not greater than the economic losses resulting from over-regulation.[48]

One such economic efficiency theory is the "matching principle," which seeks to identify the best match between a level of government—federal, state, or local—and the nature and geographic extent of the environmental risks.[49] The matching principle holds that interaction between an industry and primarily one regulating body (or a sole regulator in a strict matching approach), rather than overlapping regulatory layers, is preferred for some industries because it would result in higher economic

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[47] *See* Powers, *supra* note 12, at 934.

[48] *Id.* at 915-16, 932 (discussing a basis for economic efficiency theories--regulation is reciprocal: "[b]enefits to industry in the form of less regulation can be correlated with costs of protecting public health and the environment from harm or increased risk of harm. Thus, the operative inquiry for policymakers concerns who should bear the cost of regulation, which can be discussed in terms of efficiency or may require reaching normative conclusions about who ought to bear the burdens environmental harms present. The idea that harms are reciprocal is the building block of arguments that posit that regulation becomes inefficient when it is overly cautious and leads to unnecessary costs, as in the form of lost jobs.").

[49] *Id.* at 935.

efficiency for all players.[50] The matching principle is usually applied to questions of environmental federalism;[51] but, the federal-state dynamic is not at issue while assessing regulatory approaches to silica sand mining, as the industry primarily involves environmental risks of state and local scale. However, the matching theory could be applied as a regulatory approach to silica sand mining, because in most circumstances state or local regulation, rather than federal, is deemed most appropriate due to the specific geographic nature of environmental problems.[52] Thus, it is worthwhile to apply the matching principle to the state-local regulatory dynamic at the heart of silica sand mining in Minnesota and Wisconsin, to explore if the state or LGUs alone would be the most efficient and effective silica sand regulator.

To begin, it seems clear that LGUs would not be best suited under a strict matching approach as the sole regulators of silica sand mining. Minnesota and Wisconsin currently regulate industrial impacts to land, air, and water through state-wide regulatory schemes that implement at least base-level standards required by federal law, as do most states.[53] So, transition of all power to LGUs to regulate silica sand mining environmental impacts would be a dramatic upheaval of established state-led frameworks. In addition, numerous independent LGU regulatory jurisdictions would likely create drastically different regulatory schemes and requirements across the state, leading to inefficiencies and uncertainty for silica sand mining stakeholders.

On the other hand, a scheme in which the state has sole regulatory authority over silica sand mining seems more plausible. As mentioned above, statewide air and water regulatory programs are the norm, and some states also administer specific mining oversight programs. The advantages of sole state regulation of silica

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[50] *Id.*

[51] *Id*. (the focus of environmental federalism is usually on whether the federal government or the states and local governments can best regulate a specific industry or environmental issue).

[52] *Id.* at 935.

[53] *See infra* Part IV for a more in-depth discussion of the current silica sand regulatory frameworks in Minnesota and Wisconsin.

sand mining would likely include promoting uniform requirements and streamlining regulatory processes.[54] However, complete state control with no LGU involvement could lead to regulatory gaps regarding locale-specific circumstances.[55] LGUs are in a better position to understand and protect the unique local resources that they deem valuable, rather than state regulators, who do not have as strong of an incentive as LGUs to ensure that all risks of silica sand mining are mitigated.[56]

In addition, an exclusively state-led silica sand mining regulatory scheme would require a large administrative body with numerous personnel in order to provide effective oversight across the entire state and of all the various technical aspects involved in

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[54] *See* Jan G. Laitos & Elizabeth H. Getches, *Multi-Layered, and Sequential, State and Local Barriers to Extractive Resource Development*, 23 VA. ENVTL. L.J. 1, 15-16 (2004). The authors argue that layered state and local resource extraction regulations may overlap and create actual or seeming conflicts of law, creating confusion for the developer as to what requirements must be followed. This often results in the developer making duplicative regulatory efforts or spending additional resources to solve the legal confusion.

[55] *Cf.* Powers, *supra* note 12, at 935. In the context of environmental regulation of the fracking industry, Powers argues that "geographic correlation between problems and regulatory authorities should guide any attempts to regulate." Powers continues, "[a] corollary of this argument is that one-size-fits-all federal regulations are ineffective due to highly disparate ecological and social conditions across the states." *Id.* This argument is also convincing when applied to the state-LGU relationship regarding silica sand mining, in which one-sized state oversight programs may not be responsive enough to address the variety of interests of LGUs across the state.

[56] *Cf.* Laitos & Getches, *supra* note 54, at 16-17. The authors argue that state and local governmental interests often diverge regarding regulation of energy resource extractive industries. "States are interested in uniform statewide natural resource regulation that will satisfy its citizens' need for clean and efficient energy sources. On the other hand, local governments are interested in preserving communities not burdened by the environmental and aesthetic social costs of resource extractive operations." This state-local tension dynamic appears analogous to the state's interest in facilitating the larger economic benefits of silica sand mining across the state, versus LGU interests in protecting the quality of life in its region.

mining.[57] It is unlikely that such a large and comprehensive state agency structure would be flexible enough to adequately address all the site-specific issues involved in silica sand mining operations.[58] Whereas, a decentralized regulatory framework, that includes state and local roles, offers a more workable and responsive structure including personnel closer to and more involved in mining activity oversight. Thus, it appears that a strict matching regulatory approach, whether led by the state or LGUs, is not a good fit for silica sand mining.

A more recent regulatory theory proposed to best address complex environmental problems is "adaptive federalism," because it involves "flexible roles for the three levels of government, based on the observation that overlapping jurisdiction provides a system of vertical checks and balances."[59] Due to its dynamic and

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[57] For example, the Wisconsin Department of Natural Resources (WDNR) implements a state-wide nonmetallic mine site reclamation program in conjunction with the counties. The WDNR oversees the individual county reclamation programs and the counties are the direct regulators of mine site reclamation in their jurisdictions. If the WDNR were responsible for direct oversight of all mine site reclamation across the state, it would need to expand greatly to fill the roles currently in place in each county. *See Nonmetallic Mining Overview*, WIS. DEP'T OF NAT. RES., http://dnr.wi.gov/topic/Mines/Nonmetallic.html (last visited Jan. 15, 2014) [hereinafter *WDNR Nonmetallic Mining Overview*].

[58] *Id.* The WDNR state-county nonmetallic mine reclamation program again serves as a useful illustration. If only the WDNR oversaw mine reclamation across the state, it would need personnel with expertise about the various geographic regions in Wisconsin (i.e., bluff and river valley lands, central plains, and woodlands) and knowledge about the specific characteristics of the locality surrounding the mine site, in addition to the ability to expeditiously inspect each mine site when necessary. It seems unlikely that a single state agency would have all of these capabilities and execute them efficiently to properly oversee numerous mine sites across the state, because it would require a large network of uniquely trained personnel. But rather, the more effective and efficient approach would be to task the LGUs across the state with oversight roles that require knowledge of and access to local site conditions.

[59] Powers, *supra* note 12, at 916. The local nature of silica sand mining does not require strong direct federal oversight, so this discussion will primarily assess the adaptive approach regarding the state-local environmental regulatory relationship. Interestingly, Minnesota and Wisconsin are both home charter

overlapping nature—which is compared to an "ecologic" system—the adaptive approach is more likely to create comprehensive regulation, filling gaps that may be left under a strict matching approach.[60] However, the multiple layers of oversight are also more likely to create over-regulation and inefficiencies, due to potentially redundant requirements and the complexity of navigating multiple regulatory channels.[61]

The "regulatory commons" theory should also be considered when applying a regulatory scheme with overlapping jurisdictions, such as the adaptive approach. The regulatory commons theory identifies the potential for gaps in protection that arise due to "confusion over jurisdictional boundaries . . . even where an apparently vigorous overlapping regulatory scheme is in place."[62] Thus, other scholars have suggested that combining an adaptive approach with regulatory commons considerations can create a robust and self-checking regulatory framework that provides appropriate oversight for complex environmental issues.[63]

It appears that an adaptive approach that layers state and local regulatory control could also apply well to silica sand mining. Under this approach, the state sets uniform baseline regulations to protect the land, air, and water resources, promoting the general welfare of the state. Uniform state environmental regulations not only ensure that at least minimum protective measures are in place at each silica sand site, but also foster regulatory certainty for silica mining industry stakeholders, which increases wider industry economic efficiency. A truly adaptive scheme should also allow

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states, in which the state constitutions provide LGUs broad authority to regulate in furtherance of the general welfare within their jurisdictions. The state-LGU power dynamic in home charter states is analogous to the traditional framework of United States federalism, and home charter states have localized "federalism" debates regarding power relationships between the state and LGUs.

[60] *Id*. at 936-37.

[61] *See* Laitos & Getches, *supra* note 54, at 40 (arguing that environmental regulation of resource extraction industries is becoming increasingly local, yet state regulation still exists, leading to increased likelihood of over-regulation).

[62] Powers, *supra* note 12, at 916-17.

[63] *Id.* at 917.

LGUs to set silica sand regulations in addition to or more stringent than the state, to protect the general welfare concerns specific to that LGU. For example, a LGU may have a strong interest in taking special precautions regarding industrial activities near trout streams or sensitive groundwater resources, which are valuable recreational, economic, and public health resources that the community depends on. Yet, LGU regulations must not frustrate the purpose of the state's regulatory framework and should be contained within a reasonable scope so as to not create widely inconsistent requirements among the various LGUs.

However, to maximize regulatory effectiveness and efficiency over silica sand mining, the regulatory approach should go beyond a basic state-local dual authority scheme. A cooperative framework that integrates state and LGU regulators would create an even more adaptive and responsive system.[64] The state and LGUs can provide support for each other in ways that address each entities regulatory strengths and weaknesses: the state can lend its adept technical expertise to LGUs, and LGUs can provide a network of local knowledge and proximity to mining sites.[65] With the state and LGUs working as partner regulators, problems with redundant and excessive requirements would be less likely, because the state and LGU programs could be more closely integrated, rather than separately layered.[66] In addition, a state-LGU cooperative relationship would be more likely to prevent gaps that arise in the regulatory commons context, as the state and LGUs would have further refined regulatory roles and knowledge of each other's programs, limiting confusion over jurisdictional authority.[67]

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[64] *Id.* at 953-54. The author argues that a regulatory regime that includes "responsive interaction" among multiple levels of government can give "states and localities a better chance to formulate policies aligned with their resources and expertise, leading to increased political accountability, jurisdictional confidence, and fewer regulatory commons problems."

[65] *Id.*

[66] *Id.*

[67] *Id.* at 937. "[D]espite the potential for jurisdictional confusion that overlapping vertical jurisdiction presents, one can conclude that regulatory commons problems are more likely to be prevented by clarifying roles and

The state-local cooperative approach to regulate silica sand mining may sound ideal in theory, but in reality there would no doubt be tension over power between the state and LGUs throughout the regulatory framework.[68] A system of overlapping authority will inevitably lead to preemption battles, and when it does, state-local law preemption rules would resolve the conflict.[69] In general, state regulation would trump LGU regulation over silica sand mining in circumstances when there is direct conflict between the rules or if the local law impedes the state's ability to achieve its regulatory objectives. Field preemption issues should not arise, because as discussed above, a regulatory scheme in which the state occupies the entire field is not appropriate given the primarily local environmental impacts of silica sand mining.[70]

Developing a silica sand regulatory scheme through the cooperative approach would limit conflicts between state and local rules, because the state and LGUs would work together to develop clearly defined oversight roles and programs. However, if state law preempts local authority to regulate a public health or environmental issue, the state must provide adequate oversight to replace the limit on LGU action. A state law is unreasonable and against public policy if it preempts local law and results in under-protection that the LGU could have otherwise addressed through supplemental regulation.[71]

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granting a variety of regulators increased responsibility for problems than by contracting jurisdiction and reducing available resources."

[68] *See* Laitos & Getches, *supra* note 54, at 12-15. There are many opportunities for conflict between state and local regulators who have concurrent authority over mining operations, as the state seeks to apply uniform standards while the LGUs assert power to regulate within their jurisdiction as they see fit.

[69] *Id.* at 14-15 ("There are three basic ways a state statute can preempt a county ordinance or regulation: (1) by express statutory language; (2) by inferring state intent to completely occupy the field; or (3) by operational conflict, where partial preemption may occur if the effect of local law would conflict with the application of an applicable state statute.").

[70] *See supra* Part II.B.

[71] *Cf.* Freilich & Popowitz, *supra* note 12, at 535. The authors highlight examples of state legislatures preempting LGU authority to regulate environmental risks associated with fracking, yet the states do not provide

Even if some form of replacement oversight is provided by the state to address the LGUs concerns, a bar on LGU authority and involvement regarding the more local aspects of silica sand mining is not the proper approach. A LGU regulator is empowered by a local legislative body that is closer, both physically and interest-based, to the residents of a community.[72] Therefore, the LGU regulator should be responsive to specific needs of the community, as well as accountable for its oversight actions.[73] On the other hand, state regulators and the state legislature are further removed from the local communities, rendering state law less likely to meet the site-specific oversight needs of communities where the silica sand mining is occurring. In addition, there seems to be a fundamental problem in removing regulatory authority from the LGUs regarding land use issues that primarily affect the people within its jurisdiction. Limiting LGU authority to oversee silica sand operations impedes on its ability to promote the general welfare of its community.

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additional oversight to address the concerns of communities where the oil and gas extraction is occurring. The authors deem this method of legislative action to bar local supplemental regulation as contrary to public policy.

[72] *See* Laitos & Getches, *supra* note 54, at 13-14. The authors argue that modern growth of the environmental ethic and increased citizen involvement are leading to increased assertion of local control over resource extractive activities, as "[l]ocal governments and their regulatory agencies seek to represent the interests of their constituents."

[73] *Cf.* Freilich & Popowitz, *supra* note 12, at 535. In the context of fracking regulation, the authors argue that it is the proper role of local government to ensure adequate health and environmental protection for the community surrounding the fracking well, whereas the state has the proper role of regulating the on-site drilling and production process. This concept of proper LGU responsiveness and accountability for regulating the potential impacts of fracking applies equally well to the risks that silica sand mining pose for the surrounding community.

IV. SILICA SAND MINING REGULATORY FRAMEWORKS IN MINNESOTA AND WISCONSIN

A. Federal Regulatory Involvement

Silica sand mining activities are subject to a number of federal environmental protection statutes, such as the Clean Air Act, Clean Water Act, Safe Drinking Water Act, and the Endangered and Threatened Species Act.[74] The states, including Minnesota and Wisconsin, administer most of the federal environmental requirements that stem from these laws as part of their state regulatory programs.[75] Yet, there are exceptions in which federal agencies actively regulate jointly with the states, such as wetlands oversight in Wisconsin by the WDNR and U.S. Army Corps of Engineers.[76] As another example, the federal Mine Safety and Health Administration (MSHA) works cooperatively with the states to develop and implement on-site mine safety and health programs to protect mine workers.[77] In addition to jointly regulating with states, the federal government always has the power to increase its regulatory presence and pursue its own enforcement actions regarding federal statutes.[78]

The current regulatory structure in which Minnesota and Wisconsin state agencies act as the primary regulators to implement federal rules applicable to silica sand mining appears to be the best arrangement. A framework in which the states administer broad land, air, and water protection programs, requiring mining facilities to meet state and federal permitting rules, has been in place and proven successful for decades in Minnesota and Wisconsin. Many

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[74] *Silica Sand Mining in Wisconsin*, *supra* note 4, at 39-40.
[75] *See* Powers, *supra* note 12, at 930-31.
[76] *See Silica Sand Mining in Wisconsin*, *supra* note 4, at 39-40.
[77] *See Silica Sand Mining in Wisconsin*, *supra* note 4, at 39-40; *See also MSHA's Statutory Functions*, MINE SAFETY & HEALTH ADMIN.,http://www.msha.gov/MSHAINFO/MSHAINF1.HTM#.Uz7RPcetonI (last visited Apr. 4, 2014).
[78] *See Silica Sand Mining in Wisconsin*, *supra* note 4, at 39-40.

more sand mining sites are being developed in Minnesota and Wisconsin in recent years, which may create a greater burden on state regulators. However, it appears that the state agencies can continue to provide effective oversight without federal involvement, as long as the states can keep up with processing and enforcing the stream of mining environmental permits. The fact that silica sand mining is growing rapidly in relatively few areas around the country and the associated environmental issues are local in nature also indicates that a limited federal regulatory role seems most appropriate.

B. Minnesota's Regulatory Framework

1. The Current Approach and Legislative Activity

In Minnesota, the state and LGUs each have varying degrees of regulatory power to oversee silica sand mining sites. LGUs have broad authority to plan and site general land use activities, including mining, within their jurisdiction through zoning ordinances.[79] Additionally, LGUs can regulate more specific on-site activities with further ordinances focused on facility operations, safety requirements, and environmental standards.[80] However, as silica sand mining activity increased, many LGUs did not have specific ordinances to regulate mining activities or the technical resources to create and implement effective sand mining oversight

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[79] MINN. STAT. ANN. § 462.357 (West 2014).

[80] Minnesota LGUs are granted this power through state statutory authority to regulate for the general welfare or through home rule charter (local constitution) general welfare clauses. However, LGUs cannot regulate contrary to state law or the Minnesota Constitution. *See generally* Deborah Dyson, *State-local Relations*, RESEARCH DEP'T. OF THE MINN. HOUSE OF REP'S (Oct. 2010), http://www.house.leg.state.mn.us/hrd/pubs/ss/sslcstrel.pdf; MINN. CONST. art. XII, § 4; MINN. STAT. ANN. § 412.221 (West 2013).

measures.[81] LGUs may implement moratoriums to temporarily prohibit silica sand mining activities while the LGU develops regulations to address mining operations.[82] Moreover, if a LGU articulates important public interest justifications, it may completely exclude new silica sand mining sites from the jurisdiction through ordinance.[83]

At the state level, the Minnesota Department of Natural Resources (MDNR) and Minnesota Pollution Control Agency (MPCA) regulate various aspects of sand and gravel mining operations through issuing water, air, and wetland impact permits.[84] Silica sand mining operations are categorized as a nonmetallic mining industrial activity, and must follow general permit requirements associated with this regulatory category.[85] Yet until recently there were few state rules that focused directly on potential

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[81] *See* Tosto, *supra* note 3 (discussing Minnesota counties and cities that enacted moratoriums and new ordinances to address rapidly growing silica sand mining development).

[82] For example, the City of Winona, Minnesota adopted a year-long moratorium on silica sand operations that was in place through March of 2013.During the moratorium, the city conducted a study and ultimately adopted new ordinances to address health and environmental concerns associated with existing and future silica sand operations. New requirements were created for moisture testing, fugitive dust control plans, and facility setback from residences, in addition to expanding other conditional use permit zoning requirements for silica sand facilities. *See Frac Sand Information*, CITY OF WINONA, http://www.cityofwinona.com/city-services/planning-zoning/frac-sand-information/ (last visited Jan. 14, 2014).

[83] *See, e.g.*, Elizabeth Bundar, *Houston County Could Permanently Ban New Frac Sand Mining*, MINN. PUB. RADIO NEWS (Jan. 30, 2014), http://www.mprnews.org/story/2014/01/30/houston-county-frac-sand-mining-ban. Houston County is considering enacting a ban on new silica sand mining operations based on concerns that increased truck traffic from mining activities would overwhelm the county's infrastructure and the potential environmental impacts on trout streams and other natural features that are critical to the region.

[84] *See MPCA Silica Sand Mining*, *supra* note 25.

[85] *See Nonmetallic Mining and Associated Activities: Permit MNG490000*, MINN. POLLUTION CONTROL AGENCY (Mar. 17, 2014), http://www.pca.state.mn.us/index.php/water/water-permits-and-rules/water-permits-and-forms/nonmetallic-mining-and-associated-activities.html.

off-site health and environmental impacts that are specific to silica sand operations, such as fugitive silica dust emissions.[86] In response to vocal public concern about the many new silica sand sites popping up around the state, the 2013 Minnesota Legislature passed new laws to specifically address several health and environmental issues associated with silica sand mining.[87]

The 2013 laws direct multiple state agencies to develop regulations regarding various aspects of silica sand mining and to provide LGUs with technical assistance for implementing local regulation.[88] Importantly, the 2013 laws also allow LGUs to extend for one year an interim ordinance or renew an expired ordinance prohibiting new or expanded silica sand projects.[89] This moratorium extension authority gives LGUs additional time to develop their own silica sand oversight measures, and take advantage of state technical assistance in doing so, before silica sand sites become established in their communities that currently have underdeveloped sand mining regulatory tools.

There are a number of provisions in the 2013 silica sand laws that direct state agencies to act to facilitate LGU regulation, with the Minnesota Environmental Quality Board (EQB) positioned as the central body in assisting LGUs to regulate at the local level.[90] By December 2013, the EQB developed a draft version of in-depth model standards to aid LGUs in creating individual local silica sand

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[86] *See MDH Health Based Guidance - Crystalline Silica*, MINN. DEP'T OF HEALTH (Mar. 21, 2014), http://www.health.state.mn.us/divs/eh/hazardous/topics/silica/silicaguidance.html.

[87] *See State of Minnesota Silica Sand Information*, MINN. ENVTL. QUALITY BD., http://silicasand.mn.gov/ (last visited Jan. 14, 2014). The package of new silica sand laws that were enacted in the 2013 Minnesota legislative session are referred to as the "2013 laws" throughout this article. This website was created following adoption of the 2013 laws as a one-stop portal to access silica sand mining regulatory information from various state agencies.

[88] *Id*.

[89] 2013 Minn. Laws ch. 114, art. 4, § 106.

[90] The EQB is comprised of the Governor's Office, five citizens, and nine state agency leaders to develop policy, long-term planning, and review significant project proposals affecting Minnesota's environment. *See* MINN. ENVTL. QUALITY BD., http://www.eqb.state.mn.us/ (last visited Apr. 24, 2014).

mining ordinances.[91] The EQB is also tasked to assemble a silica sand technical assistance team to help LGUs regarding a wide range of regulatory matters upon request.[92] In addition, the EQB has created and must maintain an online library of local silica sand mining ordinances and permits as a resource for all stakeholders.[93]

Several provisions of the 2013 silica sand laws require various state agencies to adopt new rules regarding silica sand mining aspects of particular concern to health and the environment. The law directs the MPCA to develop rules for the control of particulate emissions in air from silica sand projects.[94] The MDNR is required to adopt rules pertaining to the reclamation of silica sand mines.[95] The EQB must implement new heightened environmental review requirements for proposed mines.[96] The Minnesota Department of Health (MDH) was required to adopt an air quality health-based value for respirable crystalline silica by January 2014—the MDH released its health-based value in July 2013.[97]

Minnesota state agencies have been actively engaging LGUs and the public for input during the new silica sand regulation and rule-making process. The EQB, MPCA, and MDNR are in the process of creating a joint advisory committee, including representation from LGUs, the silica sand industry, and concerned citizens, to provide comments to the agencies throughout

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[91] *DRAFT Tools to Assist Local Governments in Planning for and Regulating Silica Sand Projects*, MINN. ENVTL. QUALITY BD. (Dec. 13, 2013), http://www.eqb.state.mn.us/documents/Tools%20for%20Local%20Govt%20draft%20DECEMBER%2013_2013.pdf; *see* MINN. STAT. § 116C.99 (2013).

[92] MINN. STAT. § 116C.99 (2013).

[93] *Id. at* § 116C.992; *Library of Local Government Ordinances and Permits Regulating Silica Sand*, MINN. ENVTL. QUALITY BD., http://www.eqb.state.mn.us/silicaLibrary.html (last visited Feb. 18, 2014).

[94] 2013 Minn. Laws ch. 114, art. 4, § 105.

[95] *Id.*

[96] *Id.*; MINN. STAT. § 116C.991 (2013).

[97] *See MDH Health Based Guidance - Crystalline Silica*, *supra* note 86; 2013 Minn. Laws ch. 114, art. 4, § 105

development of the new silica sand rules.[98] Prior to proposing any new silica sand rules, the MPCA provided a broad initial request for public comments in order to get early and extensive public input and to allow for potential inclusion of water pollution standards related to silica sand projects, going beyond the requirements mandated in the 2013 laws.[99]

2. Assessing Minnesota's Regulatory Framework

Minnesota's state-local regulatory scheme for silica sand mining is an adaptive framework that is evolving toward a more cooperative regulatory approach. The Minnesota scheme is adaptive because it layers state and local regulators, allowing each level of government proper authority to oversee activities that it can regulate most effectively.[100] The state gives Minnesota LGUs substantial power to regulate land use in their jurisdictions for the

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[98] *See Soliciting Applicants for Joint Silica Sand Advisory Committee*, MINN. ENVTL. QUALITY BD. (Nov. 14, 2013), http://content.govdelivery.com/accounts/MNEQB/bulletins/94e0ac.

[99] *See Request for Comments on Planned Amendments to Rule Pertaining to the Control of Particulate Emissions and other Pollutants from Silica Sand Projects*, MINN. POLLUTION CONTROL AGENCY (Jul. 10, 2013), http://www.pca.state.mn.us/index.php/view-document.html?gid=19801.

[100] The LGUs are best suited to site and oversee the mining activities in their jurisdiction, because LGUs are on the ground and have more intimate knowledge of what is happening in the community. *See* Freilich & Popowitz, *supra* note 12, at 535 (arguing that it is the proper role for LGUs to protect the "health and safety of the community through the use of comprehensive planning and zoning tailored to the unique needs of each community"). Whereas the state agencies are better equipped to create the technical regulations required to protect against health and environmental impacts associated with mining activities, because the state often has more resources and a central team of technical experts can more efficiently produce general and consistent rules. *Cf.* Powers, *supra* note 12, at 967 (arguing that in the context of fracking, an adaptive regulatory approach would allow state and local regulators to focus on roles within their expertise, such as the state developing environmental regulations and ensuring compliance with federal environmental laws and LGUs using their land use and municipal zoning powers).

general welfare.[101] LGUs can determine if, where, and under what conditions silica sand mining activities can be performed in their communities through zoning and other ordinances.[102] This allows LGUs to control burgeoning development of sand mining in the manner to best promote the specific economic and environmental interests of their residents. LGUs can choose to be more accommodating to silica sand development or they can choose to closely limit or outright exclude sand mining in line with the community's economic and land use planning ideals.

Underneath the layer of strong local oversight authority, the state administers broad environmental regulatory permitting programs through the EQB, MPCA, and MDNR. State implemented land, air, and water programs provide a base-level of consistent standards to be followed by all stakeholders across the state. Some Minnesota LGUs do not currently have well-developed regulations to address silica sand mining, so the robust state environmental programs are critical to provide at least a minimum level of oversight protection for mining sites and surrounding communities.

In response to public concern that silica sand mining was under-regulated in communities across Minnesota, the 2013 legislature swiftly enacted a package of new laws that not only direct state agencies to create additional rules where gaps existed, but also direct agencies to assist LGUs in strengthening local regulation.[103] The 2013 laws allow LGUs to extend moratoriums to provide adequate time to develop well-conceived ordinances to regulate silica sand mining in their jurisdiction. The release of time pressure and availability of state technical assistance should allow

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[101] *See supra* Part IV.B.1.

[102] *See supra* Part IV.B.1.

[103] For example, the MPCA and MDH created silica dust air emissions management rules and a health impact standard to specifically address the public concern of respirable crystalline silica hazards from silica sand mining sites. The EQB, with LGU input, created a model ordinance for LGUs to use in drafting their own silica sand regulations and an EQB technical advisory team is available for LGUs to consult regarding various silica sand regulatory issues. *See supra* Part IV.B.1.

LGUs to create effective silica sand oversight programs to properly protect the community and efficiently process mining site permits.[104]

Under the 2013 laws, state agencies are required to work with and seek LGU input during many of the newly directed regulatory actions.[105] In addition to LGU input, Minnesota state agencies are also actively involving the public and industry players on a joint advisory committee that will help guide the agencies through the new silica sand rule-making process.[106] The state is also taking actions to aid and increase regulatory efficiency for all stakeholders by maintaining an online LGU silica sand ordinance and permit library.[107]

The 2013 laws seem to be stimulating regulatory teamwork between the state and LGUs over silica sand mining. By working with the state, LGUs are better able to craft local ordinances that complement existing state regulator efforts, so the local regulation can focus on the specific issues that need strengthening in their jurisdiction and avoid creating redundancies. The State of Minnesota and LGUs are also seeking input from community and industry interest groups while developing the new silica sand regulations in an effort create a regulatory scheme that works for all stakeholders.[108] These examples of teamwork throughout the silica sand regulatory framework should lead to more effective oversight, greater budget and time efficiencies, and fewer costly disputes for regulators, industry, and the public.

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[104] *See* Laitos & Getches, *supra* note 54, at 40. The authors argue that the increasingly local regulation of mineral extraction activities can lead to unnecessarily burdensome oversight throughout the duration of the project, if the LGU "micro-manages" the project without clearly set out standards. Thus, both the developer and LGU can benefit from "an up-front, one-stop, pre-permitting system to [provide the developer certainty and consistency regarding the requirements and] avoid repeated and costly regulatory challenges by the developer [against the LGU]."

[105] *See supra* Part IV.B.1.

[106] *See supra* Part IV.B.1.

[107] *See supra* Part IV.B.1.

[108] *See Soliciting Applicants for Joint Silica Sand Advisory Committee*, *supra* note 90.

Although there are many positive signs that state and local regulators are working together in an adaptive regulatory approach to silica sand mining, there are still greater opportunities for the state and LGUs to actively cooperate to further improve the overall regulatory framework. The state and LGUs could integrate aspects of their regulatory programs or create a hierarchy structure[109] to increase efficiency and reduce costs. Minnesota could adapt a framework similar to Wisconsin's state-county mine site reclamation program[110] for its new MPCA silica sand air quality monitoring program and MDNR nonmetallic mine reclamation program directed under the 2013 laws. Regulatory programs that integrate state and local staff, or implement a hierarchy of state and LGU agency responsibilities, can better utilize the strongest skills of regulatory personnel and the geographic network currently in place across the state.[111]

The EQB has taken an important step to increase shared electronic data practices between agencies by creating an online library of LGU silica sand ordinances and permits as a resource for stakeholders. However, this concept can be taken further to create a comprehensive regulatory portal that provides all of the applicable state and local regulations, guidance documents, and permits based on the specific location and characteristics of the mine site. This online portal could also provide public information regarding each mine site across the State, ideally in the form of an interactive map, for reference by the community and other stakeholders.[112]

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[109] For example, state regulators could oversee LGU regulatory programs, and the LGU regulators would provide the direct oversight for mining activities--like the WDNR nonmetallic mining reclamation program hierarchy framework. *See WDNR Nonmetallic Mining Overview*, *supra* note 57; *see also infra* Part IV.C.2 for a more detailed description of the WDNR nonmetallic mining reclamation program.

[110] *Id.*

[111] *See supra* note 100.

[112] The MPCA operates an online mapping application titled "What's in my neighborhood?" (WIMN) that provides information about MPCA-regulated sites such as site characteristics, operating and environmental permits, permit violations, and environmental monitoring. *See What's in My Neighborhood*, MINN. POLLUTION CONTROL AGENCY (Jan. 30, 2014),

C. Wisconsin's Regulatory Framework

1. The Current Approach and Legislative Activity

Wisconsin, like Minnesota, is a municipal home rule state. Thus, Wisconsin LGUs have wide authority to regulate silica sand mining through various land use activity controls, such as zoning, site operation, and environmental ordinances.[113] However, many Wisconsin towns have not enacted a zoning ordinance or they must obtain county board approval in order to change their zoning ordinance.[114] Thus, many Wisconsin towns completely lack the zoning oversight power, or are under county control, to regulate mine site and operating conditions within their community.[115] But in a recent Wisconsin Supreme Court decision, *Zwiefelhofer v. Town of Cooks Valley,* towns were provided greater autonomous regulatory power over sand mining.[116] The court held that a town

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http://www.pca.state.mn.us/index.php/data/wimn-whats-in-my-neighborhood/whats-in-my-neighborhood.htmlWIMN. WIMN is a useful tool, but it should be expanded, or a new comprehensive silica sand mining mapping database should be developed to include LGU and other state agency (i.e., MDNR) regulatory information. This compilation of silica sand site and regulatory information would be especially useful within an interactive map format to aid regulators in assessing cumulative effects of mine sites in a specific area and to offer more transparency to the public regarding mine site locations and operations.

[113] The Wisconsin Constitution grants municipal home rule authority, which provides cities and villages the power to determine their local affairs and government without interference from the state legislature. The municipal home rule power is only limited by other provisions of the Wisconsin Constitution and legislative enactments of statewide concern that uniformly affect every city and village. S*ee* Rick Champagne*, Municipal Home Rule*, WIS. LEGIS. REFERENCE BUREAU (Jul. 2004), http://legis.wisconsin.gov/lrb/pubs/consthi/04consthiiv3.htm; WIS. CONST. art. XI, § 3.

[114] *See* Jason Stein, *Frac Sand Bill Won't be Taken Up Until Spring, Assembly Speaker Says*, JOURNAL SENTINEL (Oct. 22, 2013),,http://www.jsonline.com/blogs/news/228816481.html.

[115] *Id.*

[116] Zwiefelhofer v. Town of Cooks Valley, 809 N.W.2d 362 (Wis. 2012).

ordinance regulating nonmetallic mining was validly enacted under its police power, and the town's mining ordinance did not require county board approval because it was not a zoning ordinance.[117]

In addition to police power oversight authority, towns and counties may implement moratoriums to temporarily prohibit silica sand mining activities.[118] LGUs may also enact complete bans on new mining operations within their jurisdiction if it reasonably promotes the general welfare.[119] However, Wisconsin recently passed a law that puts in place heightened requirements for LGUs to enact moratoriums, such as obtaining a written report from a certified engineer or health professional to document that a moratorium is essential in addressing public safety concerns.[120]

In contrast to the generally broad LGU regulatory power in Wisconsin, there is a bill currently moving through the Wisconsin Legislature, Senate Bill (SB) 349, that seeks to significantly limit both LGU and state regulatory power over silica sand mining.[121] SB

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[117] *Id.* at 378-79.

[118] For example in September 2013, Trempealeau County enacted a one-year moratorium on new or expansion of silica sand mines to allow county supervisors to study potential health impacts of silica sand mining. *See* Richard Kremer, *Company Skirts Trempealeau County Frac Sand Mining Ban*, WIS. PUB. RADIO (Nov. 5, 2013, 4:06 PM), http://www.wpr.org/company-skirts-trempealeau-county-frac-sand-mining-ban.

[119] *See, e.g.*, PEPIN CNTY., WIS. CODE OF ORDINANCES ch. 28 (2013), http://newords.municode.com/readordinance.aspx?ordinanceid=598774&datasource=ordbank. In June 2013, Pepin County enacted an ordinance that prohibited silica sand mining in a designated area along the Mississippi River in order to protect the region's character and tourism economy.

[120] WIS. STAT. § 66.1002 (2013).

[121] *See* Steven Verburg, *Far-reaching bill stirs conflict over who should—and can—monitor mining*, CHIPPEWA HERALD (Oct. 27, 2013), http://chippewa.com/dunnconnect/news/local/far-reaching-bill-stirs-conflict-over-who-should-and-can/article_f9eb34f4-3e64-11e3-a4c8-001a4bcf887a.html ("The sweeping sand mining bill [SB 349] is in part a response to [the] 2012 [*Town of Cooks Valley*] decision that said towns could regulate sand mines using their ordinary police powers, rather than through zoning ordinances. That was a significant shift because many towns do not have zoning authority, and those that do generally need the approval of their county boards to make zoning changes.").; S.B. 349, 2013-2014 Leg., Reg. Sess. (Wis. 2014).

349 limits LGU regulatory authority over sand mining to only zoning and mine reclamation ordinance powers—removing LGU authority to oversee many on-site mining activities and associated environmental impacts.[122] The bill also restricts LGU regulation of non-conforming land uses, protecting mining sites that were legally operating before the LGU determined that mining was not an appropriate land use in that area.[123] In addition, and likely the most substantial regulatory limitation, SB 349 prohibits LGUs and state agencies from promulgating air and water regulations that are more stringent than the minimum standards set out in current state law, requiring state legislative action to increase silica sand mining oversight standards.[124]

At the state level, the Wisconsin Department of Natural Resources (WDNR) is the primary state agency that regulates silica sand mining activities through the WDNR's nonmetallic mining program, water program, and air program.[125] Due to high interest from various stakeholders surrounding the rapid expansion of sand mining in Wisconsin, in January 2012, the WDNR published a report that assessed the environmental risks associated with silica sand mining and the regulatory framework in place to manage the risks.[126] The report concluded that Wisconsin's current state-local regulatory framework adequately protects against potential impacts to public health and the environment associated with silica sand mining.[127] No new state laws or WDNR rules have been adopted that specifically regulate silica sand mining in Wisconsin.

The main focus of the WDNR nonmetallic mining program is to administer the state-wide mine site reclamation program, in which the WDNR oversees counties as they implement local

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[122] S.B. 349, 2013-2014 Leg., Reg. Sess. (Wis. 2014).

[123] *Id.*

[124] *Id.*

[125] *See Silica (Frac) Sand Mining*, WIS. DEP'T OF NATURAL RES., http://dnr.wi.gov/topic/Mines/Silica.html (last visited Jan. 15, 2014).

[126] *Silica Sand Mining in Wisconsin, supra* note 4.

[127] The report also stated that "[a]s the number of sand mines and processing facilities increase, especially if clusters of these facilities begin to occur, the [WDNR] may consider examining cumulative environmental impacts." *Id.* at 41.

mining reclamation programs that must meet WDNR requirements.[128] Counties that implement local mining reclamation programs are deemed regulatory authorities (RAs), and the RAs regulate silica mining operations by issuing reclamation permits that require conformance to approved reclamation plans.[129] Mine site reclamation plans must include procedures to manage environmental impacts, properly restore the site following mining, and bond posting to ensure funding for site reclamation activities prior to commencing mining.[130] Mine sites located in LGUs that have not implemented a local mine reclamation program are regulated directly by the WDNR.[131] The RAs are the direct regulators of mine site reclamation, but the WDNR is available to provide technical assistance to RAs on reclamation issues.[132] In addition, the Nonmetallic Mining Advisory Committee, consisting of representation from industry, scientific, and community stakeholders, advises the WDNR on administering the state-wide nonmetallic mining reclamation program.[133]

The WDNR regulates potential impacts to surface waters and groundwater that may result from silica sand operations through various statutes and WDNR water program requirements.[134] The state also directs counties to regulate potential water quality impacts to shoreland surface waters through zoning ordinances, in which there are statutory minimum standards that LGUs must enforce.[135] Many counties have adopted tighter standards that go beyond the state minimum standards.[136]

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[128] *See WDNR Nonmetallic Mining Overview*, *supra* note 57.

[129] *See Information for Regulatory Authorities*, WIS. DEP'T OF NAT. RES., http://dnr.wi.gov/topic/Mines/RA.html (last visited Jan. 15, 2014); WIS. ADMIN. CODE NR § 135.32 (2013).

[130] WIS. ADMIN. CODE NR § 135.32 (2013).

[131] *See Information for Regulatory Authorities, supra* note 129; WIS. ADMIN. CODE NR § 135.32 (2013).

[132] *See Information for Regulatory Authorities, supra* note 129.

[133] *See Wisconsin Nonmetallic Mining Advisory Committee*, WIS. DEP'T OF NAT. RES., http://dnr.wi.gov/topic/Mines/Advisors.html (last visited Jan. 15, 2014).

[134] *See Silica Sand Mining in Wisconsin, supra* note 4, at 36-38.

[135] *Id.* at 35; WIS. ADMIN. CODE NR § 115 (2013).

[136] *See Silica Sand Mining in Wisconsin, supra* note 4, at 35.

The WDNR regulates potential impacts to air quality that may result from silica sand operations through various statutes and WDNR air program requirements.[137] The WDNR does not specifically regulate respirable crystalline silica, which is currently an air emission contaminant of significant concern to the public.[138] However, the WDNR requires silica sand operations to implement a comprehensive, site specific fugitive dust control plan to eliminate or reduce all sizes of dust emissions.[139] The WDNR also requires large mining operations (production averaging more than 2,000 tons per month) to install and operate ambient air monitors to continuously monitor particulate pollution, in connection with United States Environmental Protection Agency (U.S. EPA) air monitoring network requirements.[140]

2. Assessing Wisconsin's Regulatory Framework

Wisconsin's current silica sand mining regulatory scheme appears to be an adaptive approach with effective state and local oversight layers. LGUs have wide authority to regulate mine siting and on-site operations as needed to protect health, environment, and the general welfare within their jurisdiction.[141] Wisconsin counties administer mine site reclamation and shoreland protection programs that must meet state minimum standards; however, the counties can include additional standards in their site reclamation and shoreland programs to protect its communities' unique concerns.[142] In addition, the *Zwiefelhofer* decision asserted that Wisconsin towns have separate authority, not limited by county control, to adopt non-

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[137] *Id.* at 36.

[138] *See Respirable Crystalline Silica from Sand Mining*, WIS. DEP'T OF HEALTH SERV. (Oct. 5, 2012), http://www.dhs.wisconsin.gov/eh/Air/fs/RCS.htm.

[139] *Id.*; WIS. ADMIN. CODE NR § 415.075 (2013).

[140] Kristin Hart, *Air Pollution Control Requirements for Industrial Sand Mines*, WIS. DEP'T OF NAT. RES., at 3 (June 8, 2012), http://dnr.wi.gov/files/pdf/pubs/am/am491.pdf.

[141] *See supra* Part IV.C.1.

[142] *See supra* Part IV.C.1.

zoning mining ordinances to further protect the towns' specific interests.[143]

The linked oversight layers of the Wisconsin nonmetallic mining reclamation program, in which the state oversees county programs and the counties (and sometimes towns and cities) oversee the individual mine sites,[144] promotes regulatory effectiveness and efficiency. This hierarchical framework establishes clear state and local regulator roles to prevent redundant regulation, matches appropriate regulatory workloads for the state and LGUs, and prevents oversight gaps with dual regulator layers. The local county and towns are best suited to implement the specific reclamation plans and mining ordinances at the mine site level, due to the LGU's proximity to and knowledge of land use and economic goals in its jurisdiction. The WDNR, on the other hand, is better suited as an administrator of the state-wide reclamation program, to ensure that the counties are implementing at least consistent base standards and a proper overall reclamation program.

The WDNR mining reclamation program is characteristic of an integrated and cooperative regulatory framework for silica sand mining. The separately operating but connected, state and county reclamation programs work together to reduce regulatory gaps and increase efficiency.[145] The WDNR provides technical assistance to counties regarding mine site reclamation issues,[146] so the state and county staff also directly work together to strengthen the local programs. In addition, the WDNR involves input from industry, scientific, and community stakeholders through the Nonmetallic Mining Advisory Committee to guide the reclamation program at the state level.[147]

However, the recent Wisconsin legislative activity, which has restricted LGU moratorium powers[148] and seeks to significantly reduce state and local authority to strengthen nonmetallic mining

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[143] *Zwiefelhofer*, 809 N.W.2d 362.
[144] *See supra* Part IV.C.1.
[145] *See supra* Part IV.C.1.
[146] *See supra* Part IV.C.1.
[147] *See supra* Part IV.C.1.
[148] WIS. STAT. § 66.1002 (2013).

oversight,[149] are steps taken in the wrong direction to limit state and local silica sand regulation. Deference should be given to the LGU moratorium authority, as a local legislative act, without the need for LGUs to produce extensive findings to justify the moratorium decision. This law fundamentally changes the LGU use of moratoriums as a legislative land-use planning tool. The traditional purpose of the moratorium is to halt land use activities with poorly understood consequences, while the LGU assesses the adequacy of the regulatory scheme to protect against risks associated with the land use. It is proper to require the LGU to provide rational public interest reasons for a moratorium, but if LGUs must conduct a technical study in order to provide enough evidence to support a moratorium (and such a study might be a high financial burden on many small towns), the suspect land use and potential for harm continues while the LGU begins its assessment, negating the protective purpose of the moratorium.

Removing oversight power from LGUs in combination with restrictions on the WDNR to prevent additional mining regulations, as set out in SB 349, is likely to result in under-protection of the health and environmental risks associated with silica sand mining. If LGUs do not have authority to regulate certain aspects of mine site operations, then the state will need to fill in the regulatory gaps. However, the WDNR is ill equipped to provide local and suitably responsive oversight at each of the more than one hundred silica sand mining sites across the state. The WDNR would need to substantially increase its staff and network to meet the specific silica sand oversight needs of each LGU, which is unlikely to occur due to budget issues and the apparent injudiciousness of such an approach.

SB 349 would change the Wisconsin silica sand regulatory scheme from the current state-local adaptive cooperative approach to a scheme with more state regulatory primacy, yet the bill simultaneously prevents the WDNR from increasing regulatory standards without a change in state laws. If SB 349 is adopted, it will likely lead to even stronger public concern and opposition to

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[149] S.B. 349, 2013-2014 Leg., Reg. Sess. (Wis. 2013).

silica sand mining, which may have unintended consequences that undermine the goals of the bill to deregulate and promote silica sand mining industry expansion.[150] Intense public opposition could lead to more moratoriums and complete bans on silica sand mining in LGUs across Wisconsin, because once SB 349 removes substantial LGU authority, the counties and towns are only left with these more drastic regulatory options.

V. CONCLUSION

The silica sand mining boom in Minnesota and Wisconsin has aroused much debate over the potential economic benefits and environmental risks connected with the mining activities. The debate has largely focused on determining the proper state and local regulatory controls and overall framework to adequately protect against health and environmental impacts while also avoiding undue regulatory burdens that hinder economic development. It appears that a state primacy regulator approach with limited LGU involvement is poorly suited to provide efficient regulatory processing and comprehensive environmental protection for silica sand mining activities, due to the local geographic nature, yet wide dispersion of mine sites across the state.[151] Instead, an adaptive regulatory approach that integrates state and local oversight

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[150] *Cf.* Powers, *supra* note 12, at 915 (arguing that New York's state law primacy regulatory approach to fracking, in which the federal government has no significant oversight role, has led to intense public opposition to the fracking industry that may result in underdevelopment of natural gas resources due to the influence of public criticism on regulators). The adoption of SB 349 could lead to similar results regarding silica sand mining development in Wisconsin, as the bill seeks to confine regulation of nonmetallic mining to a state primacy approach by limiting LGU authority. Yet, to head off the potential for state and local regulator reaction based on public opposition to silica sand mining, the bill prohibits state agencies and LGUs from making more stringent environmental regulations than are currently set as base standards. However, one might predict that the boldness of SB 349 in removing LGU authority and at the same time limiting state oversight power may lead to public backlash that will negatively impact the silica sand industry.

[151] *See supra* Part III.

authority and promotes cooperative functioning between the state and local regulators creates thorough environmental controls and promotes regulatory efficiency over silica sand mining.[152] The adaptive cooperative scheme combines the responsive capabilities of LGUs with the technical expertise, uniformity, and organizational resources of state regulators. This results in a flexible state-local regulatory framework that better meets the specific needs of the communities adjacent to the mining activities and streamlines regulatory actions.

Several aspects of Minnesota and Wisconsin's silica sand regulatory frameworks meld to create effective state-local adaptive approaches in each state, including: broad LGU authority to regulate land use to promote its communities' best interests; state enforcement of base-level uniform environmental standards; state regulators providing technical assistance to local regulators; state-local regulator teamwork to strengthen local regulation (Minnesota) and implement oversight programs (Wisconsin); and state agencies inviting stakeholder input to guide regulatory changes.[153] These examples of state and local dual-layer authority and teamwork should create confidence in all stakeholders that silica sand mining is being properly regulated to protect environmental and economic interests in Minnesota and Wisconsin.

However, Minnesota and Wisconsin diverge regarding the nature of recent legislative activity associated with silica sand mining in each state. In 2013, Minnesota enacted laws that create additional state oversight programs to address public concerns and facilitate a more cooperative state-local regulatory approach to silica sand mining.[154] Wisconsin, on the other hand, has recently legislated heightened burdens on LGUs to control silica sand mining and a bill is currently under consideration that would significantly limit local and state authority to regulate sand mining while also transitioning to a state primacy regulatory scheme.[155]

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[152] *See supra* Part III.
[153] *See supra* Parts IV.B & IV.C.
[154] *See supra* Part IV.B.
[155] *See supra* Part IV.C.

Thus, it seems that Minnesota is taking steps in the right direction to develop a highly effective state-local regulatory framework that meets the needs for all stakeholders.[156] But Wisconsin is treading on shaky ground that threatens to erode its strongly adaptive silica sand regulatory scheme, which may well lead to negative results for industry, public health, and the environment.[157]

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[156] *See supra* Part IV.B.2.
[157] *See supra* Part IV.C.2.