

Aggregate Airs: Atmospheres of Oil and Gas in the Greater Chaco¹

SONI GRANT²
UNIVERSITY OF CHICAGO

Abstract

In the Greater Chaco region of northwest New Mexico, new fracking technologies are stirring up lands, chemicals, and relations that concentrate attention in the surround. This article argues that extraction's cumulative atmospheric effects are experienced by Diné residents of the region in ways that cannot be accounted for by the agencies that manage oil and gas. The state's presumption of atmospheric commensurability is reinforced by techniques of settler governance that fragment ecological and ontological domains like air and land. This fragmentation often preempts the possibility for Indigenous claims to meaningfully disrupt administrative or judicial actions. Unfolding extraction's atmospheres across three cases, I examine how scale mediates the problem of commensurability. I describe how prevailing approaches to regulating impacts of the oil and gas industry manipulate scale in ways that obscure the cumulative effects of extraction. Drawing on fieldwork with Diné residents of the region who have mobilized to study how fracking affects their wellbeing, and I show how this scalar work facilitates the commensuration of extraction's impacts across Indigenous and non-Indigenous worlds—as well as when this commensuration fails.

Keywords

atmospheres; incommensurability; oil and gas extraction; scale; settler colonialism

Atmospheres

At the highest point on the mesa where we stood, Mario Atencio pointed out peaks and landforms faintly visible on the horizon. It was truly special to be able to see so many sacred places from one spot, he said. With the landscape as guide, he relayed a story of Diné emergence into this world. He spoke of how not far from here and long ago, Changing Woman gave birth to the Hero Twins who would save the Diné by slaying the monsters that were killing the people. "That's the head of the biggest one, over there," said Mario, gesturing to a prominent shape bulging out from the ground in the distance. When the Hero Twins slayed Yé'itsoh, the biggest and tallest of the monsters, his head fell to lay forever northwest of the Jemez mountains, becoming the rounded peak that the Spanish would later call "Cabezon."

¹ This is an updated version (published on August 21, 2022) of this essay. The addendum from the previous version has been published at the following link: <https://doi.org/10.17351/ests2022.1867>.

² Soni Grant, Email: spgrant@dal.ca.

“But you can’t *really* see them now,” Mario said of the many formations. Their profiles were clouded by a film of grayish-brown haze, lending them an almost spectral look. Despite the bright autumn sun in the cloudless sky, it still didn’t quite feel like a clear day. The air had an opacity to it that gave me the sense that there was something between the world and my perception of it.

I had accompanied Mario that day as he showed the facilitator of New Mexico’s Methane Advisory Panel some of the hundreds of oil and gas wells that had recently been drilled in the Navajo Nation Chapter of Counselor.³ Counselor is one of many small Diné communities located in traditional Diné homelands just east of the Navajo Reservation boundaries on what, through colonial settlement, has become a patchwork of federal, state, private, and tribal lands known colloquially as “the checkerboard.”⁴ In the middle of the present-day checkerboard sits Chaco Culture National Historical Park, a UNESCO World Heritage Site. The vast landscape that surrounds the park and its impressive stone structures is held sacred by Diné and Pueblo peoples across the Southwest today. In recent years, an Indigenous-led movement to oppose oil and gas extraction in the region has mobilized around the place-name “Greater Chaco,” which invokes the demand that not only the park but also the living landscape that surrounds it be protected from extraction.

Convened to advise state agencies on the development of a rule to reduce methane and other air pollutants from the oil and gas sector, the Methane Advisory Panel (MAP) was composed of representatives from industry and environmental groups, as well as a few members from impacted ranching and Indigenous communities, like Mario. The MAP facilitator had previously been on tours with petroleum engineers, during which she had learned how industry was already doing its best to capture methane. In contrast, Mario, who represented several communities in Eastern Navajo Agency on the MAP, wanted to convey to the facilitator that even the smallest of emissions could have a large impact for those who breathe this air everyday—especially when the emissions from a single well are understood in relation to those from the 40,000 wells in the densely drilled region.⁵

Mario’s gesture—of pointing to the land to explain the impacts of air pollution—prompts a question about how the cumulative effects of extraction are understood in relation to their sources. Following Mario, this article probes at how settler governance carves out regulatory approaches for managing atmospheric phenomena. I argue that while extraction’s atmospheres are experienced incommensurately in the Greater Chaco, a fractured regulatory system treats them as commensurate, parsing aggregate airs in ways that stretch the scope of settler rule. Inhabiting the checkerboard’s late industrial atmospheres (Fortun 2012) involves taking in—and sometimes challenging—these contested conditions of jurisdiction.

³ The Navajo Nation is currently organized into 110 Chapters, units of local governance (see Rodgers 2004).

⁴ For a concise history of the region’s legal geography, see Grant (forthcoming) and Redhouse (1984).

⁵ The Navajo Nation is organized into five regional agencies: Chinle Agency, Eastern Navajo Agency, Fort Defiance Agency, Northern Agency, and Western Navajo Agency. Eastern Navajo Agency is located in what is now New Mexico and comprises 31 Chapters, including Counselor Chapter.

The inducement to do something about methane in northwestern New Mexico began in earnest in 2014, upon the discovery that the largest cloud of methane over the United States was hovering above the Greater Chaco region (Kort et al. 2014). The billowing plume was detected by an infrared spectrometer aboard a spaceborne satellite. From this vantage, scientists discerned that methane emissions from the region were in fact much greater than previously estimated in national and international greenhouse gas inventories. Follow-up studies soon confirmed that the surprising rate of emissions could be largely attributed to the oil and gas sector (Frankenberg et al. 2016; Smith et al. 2017).

Methane is the primary component of natural gas and a powerful greenhouse gas. Over a twenty-year period, it traps 86 times more heat than carbon dioxide (CO₂), and at least 28 times more heat over 100 years (IPCC 2019). The reduction of methane emissions is thus widely recognized as critical for achieving international climate goals (Nisbet et al. 2019). In the United States, the oil and gas sector is the largest single source of methane, accounting for approximately 31% of the country's annual emissions (EPA 2019).³ Methane seeps out of oil and gas infrastructure at multiple points in the production and transportation process—a loose valve, a leaky storage tank, a poorly maintained pipe. Sometimes the gas is intentionally vented directly into the atmosphere when a facility doesn't have infrastructure onsite to capture it. At other times, it is flared off from a stack, turning into a fiery blaze of CO₂, volatile organic compounds (VOC), and hydrogen sulfide.

For the residents with whom I conducted research, methane is as much a harbinger of these other airborne substances as it is a serious concern in itself. Methane is odorless and invisible to the naked eye. But when it is released from oil and gas production, it is usually co-emitted with VOCs, nitrogen oxides, and other air toxics that can quickly overwhelm the senses. These pollutants, which can be directly harmful to human health and contribute to the formation of ground-level ozone, often have recognizable fumes. But on the checkerboard, there is no infrastructure to measure and understand daily exposures to these toxics, either as they spike and the wind conspires to blow them inside through a window, or as they average out over years, becoming part of a body's burden.

The announcement of the methane hotspot drew heightened attention to the air at the same moment that a new wave of extraction hit the Greater Chaco region. By 2014, new fracking technologies had rapidly taken hold, with oil and gas operators injecting high volumes of water, chemicals, and proppants through a wellbore that could now travel horizontally for hundreds of feet below ground. Fracking heralded the opening of a new resource frontier: the Mancos shale. This pocket of hydrocarbon potential is concentrated in Eastern Navajo communities on the checkerboard, like Counselor Chapter, and in previously undrilled areas near Chaco Culture National Historical Park. Quickly, small rural Diné communities were inundated with semi-

³ Peer-reviewed studies have found that the EPA underestimates the contribution of the oil and gas sector to the country's methane budget. A prominent study by Alvarez et al. (2018) found that EPA underestimates methane leakage from the oil and gas sector by 60%.

⁴ On the region's long history of extraction, see Curley 2018; Masco 2006; Powell 2018; Redhouse 1984; Voyles 2015.

trucks that tore up local dirt roads. The air began to smell different and the darkness of the night sky was diluted by lights and flaring gas.

While these new aerial disturbances concerned residents, the cloud itself also directed attention right back to the land. It pointed to the contested territorial conditions that have enabled extraction to flourish in the region, often at the expense of Diné life (Yazzie 2018), with fracking but the latest phase. The data used to identify the hotspot was collected between 2003-2009, years before the Mancos shale boom. This meant that the emissions responsible for the cloud, as it had been glimpsed from space, derived not from the recent fracking boom in particular but rather from the region's tens of thousands of conventional wells that had been drilled, in surges, since the 1920s. In other words, the space-borne spectrometer elucidated an atmospheric condition nearly a century in the making, now punctuated anew.

I take inspiration from recent interdisciplinary scholarship in treating "atmosphere" as both a planetary envelope of gases that provides material continuity across space, albeit in uneven concentrations and circulations, and as a live background that is lived through, composing ordinary life (Choy 2014; Choy and Zee 2015; Simmons 2017; Sharpe 2016; Stewart 2011). The atmosphere is that gaseous medium in which substances like methane trap heat and warm the planet. But so too do distinct scenes of habitation spawn their own atmospheres, shared scenes of experience in which, as Berlant puts it, "structural conditions are suffused through a variety of mediations, such as predictable repetitions and other spatial practices that might well go under the radar, or in any case, not take up the form of an event" (2011: 101). For instance, Fanon (2004) diagnosed an "atmosphere of violence" (1-52) that reigned during wartime in Algeria as the primary cause of the ailments his patients suffered. Meanwhile, Simmons (2017) describes the "normative and necessary violences found in settlement" in the United States as part of a "settler atmospheric" that is felt palpably through Indigenous lands and bodies and experienced by Indigenous people as an expected daily rhythm.

In what follows, I consider what scholars have called affective atmospheres (Anderson 2009), on the one hand, and a planetary atmosphere with its localized meteorological conditions, on the other, as always already entangled. The atmospheric, as I approach it here, is akin to what de la Cadena (2018) calls "uncommons"—a space of partially connected and heterogeneous worlds that are neither nested within nor separate from one another, but in constitutive relation (Blaser and de la Cadena 2018; Strathern 2004). As an ethnographic concept, uncommons helps me attend to ways in which ambient phenomena can have incommensurate effects. While the atmospheric may be a shared medium, approaching it as uncommons interrupts a liberal tendency to suppose that all that circulates atmospherically is shared, and that even what is held in common is the same (see also Berlant 2016).

As Choy (2018) writes, the apprehension of atmospheric things is relative to "norms of assessment, registration, and existence" (55) through which people sense and know something about their world. What may not be discernible to some can exert itself as a concrete pressure for others. In discussing atmospheric politics of oil and gas in the Greater Chaco, my aim is not to elucidate the content of atmospheric difference between Diné and other worlds. Instead, I trace

managerial practices through which settler governments attempt to render Diné atmospheric claims commensurate with state techniques of assessment, and when these attempts fail.

This article unfolds extraction's atmospheres across three sites. In each, I examine how scale mediates the problem of in/commensurability. I begin by showing how the regulation of air pollution from the oil and gas sector is grounded in an administrative fragmentation of air and land that makes it difficult to account for the cumulative atmospheric burdens of extraction. Next, I look to a recent court case in which Indigenous and environmental advocates argued under federal historic preservation law that fracking in the Greater Chaco is detrimentally altering the region's atmospheric qualities. I show how assessment techniques employed by the Bureau of Land Management (BLM) fragment the landscape in ways that preempt these claims but still satisfy the procedural requirements of the law, thus foreclosing the consideration of incommensurable values. Finally, I turn to a study led by Diné residents who mobilized to understand, in their own terms, how fracking was affecting their wellbeing. With air monitors they installed, residents detected pollution that no one else was tracking. They also found that extraction reproduces colonial relations that disrupt collective knowledge practices, and they began to leverage this disturbance to build a better future that affirms Diné epistemology.

Across each case, there is an unspecified excess—what I hope to conjure with “aggregate airs”—that spills over my descriptions. With this gesture, I do not mean to imply an ontological position from which an aggregate grasp of extraction's atmospheres is possible. Rather, I signal that the conflicts I describe play out in terms of how the cumulative experiences of extraction are broken up into intelligible categories of jurisdiction and action. These distinctions—and who gets to make and enforce them through law—matter. Because air and land are not only resource categories that state institutions subject to management: they are also relational ontological categories that differ for and between Diné people and federal agencies like BLM (see Tuck and Yang 2012). In the management of oil and gas, these categories are fragmented in ways that enable settler governance to expand its zones of settlement.⁷

Double Bind of In/Commensuration

During my fieldwork in New Mexico between 2018-2020, as I tracked a mounting controversy around fracking in the Greater Chaco, I participated in dozens of tours organized by local residents like Mario. Residents arrange these tours primarily for people from outside the region, such as environmentalists from New Mexico's cities, representatives of allied Indigenous and environmental movements visiting from other parts of the country, grade school and university students, or elected officials and policy makers. The tours are meant to teach participants about the lived realities of fracking in the Greater Chaco. By sharing parts of their story with those willing to listen, residents hope to garner support for their efforts to slow the expansion of fracking.

⁷ I thank Cameron Hu and Hannah Burnett for helping me refine the points in this paragraph.

As I worked alongside Diné residents in their advocacy, I frequently witnessed them struggle to convey to state and federal agencies the expansiveness of their claims about the harm that fracking was causing in their communities. At nearly every step of the way, they came up against a double bind: they either had to modify their claims such that they could be adjudicated by the agencies or insist on the incommensurability of their claims and risk that they might not be heard.⁸ This double bind is not unique to their situation. Settler liberalism tends to shift the burden of social commensuration onto its others (Byrd and Rothberg 2011; Povinelli 2001 & 2011). As “the transformation of different qualities into a common metric” (Espeland & Stevens 1998: 314), commensuration can be a way of subsuming difference rather than reckoning with it, forcing self-correction to a norm as a condition of meaningful participation in public discourse (Povinelli 2001).

For instance, every few months a staff person with the regional BLM office would attend a council meeting of three adjacent Chapters—Counselor, Ojo Encino, and Torreon—to discuss leasing parcels of federally-managed minerals for oil and gas extraction. While residents and Chapter officials sometimes brought up site-specific concerns regarding the parcels at issue—a ceremonial site, a particular plant or animal species known to inhabit the site, or the parcel’s proximity to a home—most often they articulated worries about the overall impacts of additional development. They repeatedly expressed concerns about air quality, public health, and concerns that had to do with the integrity of the entire landscape, undivided. These conversations always ended at an impasse, with the agency unable to address the Chapters’ most pressing concerns. This impasse, I would discern, had to do with a kind zoning at work in the management of oil and gas: any given decision was made at a circumscribed scale (for instance, the scale of a 300-acre parcel up for lease), and input into that decision had to be articulated within that restricted space. At each scale of analysis, only commensurately scaled impacts that corresponded to the jurisdictional purview of the responsible agency could be considered. These scalar limitations impose ontological ones for Diné people who relate to land as Mother Earth, a living totality.

As I will explore, the ensuing ontological disagreement (de la Cadena 2015) is amplified on the checkerboard, where a chaotic spatial distribution of authority forces residents and regulators alike to tack back and forth between scales of rule when managing an industrial presence whose effects are indifferent to such boundaries. Indeed, the management of oil and gas on the checkerboard makes visible an administrative logic in which regulatory frameworks pretend to encompass the objects they are meant to manage—like air—even while uncontained consequences of industrial activity—like climate changing pollution—make themselves known. In the process, the cumulative fallout (Masco 2015) of late industrialism becomes harder and harder to grasp. Over the course of my research, I became increasingly interested in the patchwork jurisdictional arrangements that both obscure accumulating environmental

⁸ As Povinelli (2001) puts it, liberalism’s message to radical worlds “be other so that we will not ossify, but be in such a way that we are not undone, that is make yourself doable for us” (329).

degradation, and that force my Diné colleagues time and time again into a double bind of in/commensuration.

STS scholars have intricately traced how knowledge gaps and regulatory fragmentation in environmental management can enable industrial pollution to go unaccounted for. Regulatory exemptions for industry (Wylie 2018), the separation of oversight activities across multiple government agencies (Allen 2003), the spatial fragmentation of environmental monitoring (Frickel and Vincent 2011; Kinchy et al. 2016), and other forms of “undone science” (Frickel et al. 2010; Hess 2020; Murphy 2006) are all processes that can get in the way of holding polluters responsible and protecting communities from harmful impacts of industry. Building on this critical scholarship, I show that the fragmentation of environmental data, along with its purposeful nonproduction, not only makes it difficult to substantiate claims to environmental harm. As I argue, it also facilitates processes of commensuration that conceal how environmental exposures are differentially experienced across social worlds.

In her study of a proposed dam project on Yavapai lands in Arizona, Espeland (1998) argues that commensuration is an important component of rational decision making for the federal bureaucrats with whom she researches because the development of a common metric allows them to compare otherwise disparate things. But, Espeland notes, just as commensuration can enable social actors to draw some information into new relationships, it can also be a way of discarding other kinds of information: “everyday experience, practical reasoning, and empathetic identification become an increasingly irrelevant basis for judgement as context is stripped away and relationships become more abstractly represented by numbers” (25). Decision-making processes that rely on commensuration foreclose the inclusion of incommensurable values, values that are socially unique and cannot be conveyed in terms of another category (28-29).

Incommensurable realities do not disintegrate just because they exceed state taxonomies. In her ethnography of partial connections across Indigenous and non-Indigenous worlds in Peru, de la Cadena (2015) shows how runakuna people “engage in political practices that the state recognizes as legitimate while also enacting those that the state cannot recognize” (14). That is, the radical worlds that bear the burden of commensuration do not always accept to carry it (see Lyons 2020; Povinelli 2001; Simpson 2014). In the Greater Chaco, Diné residents participate in policy processes around the management of oil and gas by following the terms outlined by those processes, while simultaneously insisting on their own. Although many of their claims go unrecognized by state authorities, they still hang in the air.

Permissible Pollution

Large-scale atmospheric consequences of extraction, like the region’s infamous methane cloud, often fly under the radar of the agencies responsible for air quality because air pollution from the oil and gas sector is regulated on a facility-by-facility basis. While pollution from each facility mixes in the atmosphere, its sources largely indistinguishable, regulation happens at the scale of a single source: well by well, compressor by compressor, pipeline by pipeline. This approach can have immense consequences for local, regional, and planetary airs.

After years of witnessing air quality in the Greater Chaco worsen, Mario has become an expert on the Clean Air Act, the 1963 federal statute designed to control air pollution. The US Environmental Protection Agency (EPA) typically delegates the authority to implement the Clean Air Act to states, except on tribal lands where the EPA retains jurisdiction or authorizes tribes to do so. On the checkerboard, jurisdiction over air quality is split between the state and the Navajo Nation. The state regulates air pollution from sources on federal, private, and tribal allotment lands, while the Navajo Nation has authority over air on patches of tribal trust land scattered amid other jurisdictions on the checkerboard. To determine who has jurisdiction over the air in a particular spot, one has to look to the land.

With a keen eye for what falls through regulatory cracks on the checkerboard, Mario was the first person to draw my attention to the piecemeal way that air pollution from the oil and gas sector is permitted. Each of the tens of thousands of wells in northwest New Mexico is authorized to emit a range of air pollutants, but many of these facilities do not require a permit at all if they emit under a given threshold. Smaller emitters only require a registration with the state or may be eligible to operate without a registration at all if they emit less than 10 tons of a regulated pollutant annually (NMAC 20.2.73).⁹

And yet, with tens of thousands of wells densely spread throughout the region, and hundreds in the small community of Counselor alone, it is paradoxical to residents that these sources of pollution aren't considered together. This is why, in meetings with regulators, Mario consistently brings up the question of "source aggregation." Source aggregation is a concept from the Clean Air Act in which two or more facilities that the Act treats as "minor sources" of pollution can be aggregated and treated together as a single "major source" if they emit above a threshold of pollutants and meet benchmark criteria of spatial proximity, shared industrial grouping, and ownership. This is significant, because the permitting process and obligations of permittees for major sources are more arduous than for minor sources. Major sources require the use of additional pollution controls, reporting, and a process of public notification and involvement that is absent in the minor source permitting process. For Mario and other residents who are surrounded by polluting facilities, source aggregation would be a better approach for getting a handle on air pollution in the area than treating facilities individually. But in practice, no oil and gas wells in the state of New Mexico are aggregated in this way because no grouping of wells meet the oil and gas sector-specific criteria for source aggregation, which require not only that oil and gas infrastructures be owned and operated by the same entity but also that they be located within $\frac{1}{4}$ mile of one another.¹⁰ Here, the regulations absorb spatial and proprietary

⁹ New Mexico Administrative Code (NMAC). Title 20 (Environmental Protection).

¹⁰ See the United States Environmental Protection Agency's "Source Determination for Certain Emission Units in the Oil and Natural Gas Sector" 2016 Final Rule (EPA-HQ-OAR-2013-0685). The issue of source aggregation under the Clean Air Act has a complicated regulatory history dating to the 1980s. The specific question of how and whether to aggregate sources from the oil and gas sector was animated in the mid-2000s during George W. Bush's Administration and again during the Obama Administration in 2009 (Bumpers and Williams, 2013; Lord Jr. 2012; McCarthy 2009). Information about major and minor source permitting in New Mexico was obtained through interviews with New Mexico Environment Department

norms of the industry in a way that forestalls the consideration of a large cluster of wells as a major source of pollution.

All of this means that air permitting is not the place where the cumulative air impacts of oil and gas are meant to be considered. Rather, this is meant to occur during land-use planning and leasing, processes that are conducted by land management agencies. In the world of oil and gas, the issuance of a lease is an irrevocable commitment to allow extraction. After issuing a lease, a federal or state agency may impose conditions to mitigate or limit emissions; but with the lease in hand the leaseholder has a legal right to drill.¹¹ An oil and gas operator cannot apply for a permit to emit before first securing the land from which it purchases a right to extract.

On the checkerboard, a complex set of federal and state agencies regulate different components of the leasing, drilling, and production process across the region's multiple jurisdictions. Consider the work of BLM, the federal agency that oversees most extraction in the Greater Chaco on both federal and tribal lands.¹² BLM is required by the National Environmental Policy Act (NEPA) to evaluate the direct, indirect, and cumulative effects of any form of land-use it authorizes, including the decision to make lands available for mineral leasing.¹³ During this planning process, BLM is required to forecast the air quality impacts of potential development.

The seemingly precautionary process prescribed by NEPA is thwarted in the Greater Chaco, where BLM has leased over 91% of available federally managed lands for extraction and has for years authorized new fracking development based on planning processes that were undertaken prior to the advent of fracking in the region. Drillers' interest in the Mancos shale has resulted in hundreds of additional wells and emissions that were not accounted for in BLM's last comprehensive plans for the region, finalized in 1986 and 2003 respectively (BLM 1986 and BLM 2003). Since 2014, the BLM has authorized this development while deferring analysis and regulation of actual emissions to the agencies that issue air permits for each facility. For residents who live with the outcomes of this process, administrative distinctions between air and land quickly lose meaning, but these distinctions still help underwrite the expansion of oil and gas.

Two months before Mario's tour with the MAP facilitator, on an afternoon in mid-August 2019, Counselor Chapter hosted state agencies and community members for a public meeting so the state could solicit feedback on the development of its methane rule. During the

(NMED) Air Quality Bureau (AQB) staff and the online NMED AQB Air Permit Map, available at: <https://air.net.env.nm.gov/rsmt/>.

¹¹ This principle was recently tested in *WildEarth Guardians v. Ryan Zinke* 1:16-cv-01724-RC (2019). In its memorandum of opinion regarding leases the BLM issued in Wyoming, the DC Federal Court ruled that BLM had to consider greenhouse gas emissions at the leasing stage, rather than defer climate change analysis to the drilling stage, because leasing represents "an irrevocable commitment to oil and gas drilling" (24).

¹² While the Bureau of Indian Affairs acts as the trustee for the Navajo Nation in negotiating leases on tribal trust and tribal allotment lands, BLM approves drilling permits.

¹³ At the time of writing, the Trump Administration has recently made significant changes to NEPA that eliminate the requirement of federal agencies to consider "cumulative effects." Any reference to "indirect effects" has been removed from the statute (85 FR 43304). The significance of these changes cannot be understated. The changes will likely be litigated for years to come.

public comment period, Samuel Sage, the Chapter's Community Services Coordinator, was one of the first to speak. Samuel was resolutely in favor of strong and enforceable rules to regulate air pollution. Something needed to be done to rein in oil and gas operators because "slowly," he said, "they are killing our kids." Letting the "slowly" lag as if to emphasize a gradually aggregating impact, he continued:

Last year, our Chapter President who was a bus driver for that school [pointing to Lybrook Elementary up the road], he was pretty shocked the first day of school because the students, the majority of those little kids, are actually using inhalers. He had never seen that before. He was pretty disturbed by it. And from then on, he kept saying *we have to do something, we have to do something*. Unfortunately, he is now battling cancer.

In relaying observations of the Chapter President—whose school bus is often delayed by poor conditions on local roads torn up by oilfield traffic—Samuel provided an example of how conditions have shifted in the community as fracking has spread. People notice that things are different than before. While they may not be able to draw causal relations, they know enough to put two and two together. Their stories overlap and resonate with one another, intensifying. Resonating stories and observations, layered on top of one another as if stacked, exert a felt pressure on residents who worry about embodied and ecological changes since fracking began.¹⁴

Several commentators later, a Diné woman from Counselor approached the microphone. Currently living in an adjacent community, she travels through Counselor daily to go to work. "Sometimes when I'm travelling, coming back by the mesa [...] I can actually *smell* in my vehicle, smell the methane and then some kind of real bad odor like a rotten egg. I would slow down and get a headache," she said.¹⁵ Impressing upon the regulators that there is no escaping the fumes, she continued: "And at night when I'm driving back through sometimes, *way* late at night you know when everything is calm? You think that you won't smell these things. I roll down my window so that I don't have to use the air conditioner, but guess what? I smell it again!"

In just a few years since fracking began, a noxious odor has become an ambient fixture of ordinary life for rural Diné residents in Counselor. It can be anticipated. Habitual practices like smelling rotten eggs, getting stuck in a pothole, or running out of breath compose the atmospheres of oil and gas in the area. This scene contains enough structured repetition that most of what happens is no longer surprising: rather, the iteration of gestures and sensory experiences gives way to an atmosphere in which it has become reliably oppressive to breathe.

The presentation of these facts to regulators, too, is a form of repetition that sutures everyday life. Each re-presentation of lived cumulative exposure—for which there is little monitoring data and no clear regulatory solution on offer—is unlikely to alter the jurisdictional arrangements that give way to bad air. But still, residents persist in reciting their stories for the record.

¹⁴ I learned to think about resonance between stories as generative of atmospheres from Lepselter (2016).

¹⁵ Methane itself is an odorless gas, but many co-emitted pollutants and other emissions from oil and gas production have a strong odor. Hydrogen sulfide, in particular, smells like rotten eggs.

“Setting, Feeling, and Association”

In May of 2019, the United States Court of Appeals for the 10th Circuit issued a decision long awaited by Indigenous groups and environmentalists in their multi-year legal battle against BLM. The plaintiffs, Diné Citizens Against Ruining our Environment (CARE) and several non-native environmental organizations, alleged that BLM’s continued approval of drilling permits for fracked wells in the Greater Chaco was in violation of the National Historic Preservation Act (NHPA), a law intended to preserve historical and archeological sites across the country.¹⁶ The court found that BLM had met the procedural requirements of NHPA and dismissed the plaintiffs’ allegations. This decision reveals the limits—and also the sedimented purpose (Whyte 2018)—of settler jurisprudence when called upon to adjudicate incommensurable claims to space in the settler colony. As Povinelli (2011) puts it, the law of recognition always seems to demand that the justice of an indigenous claim “speak its difference within a legislated norm” (27).

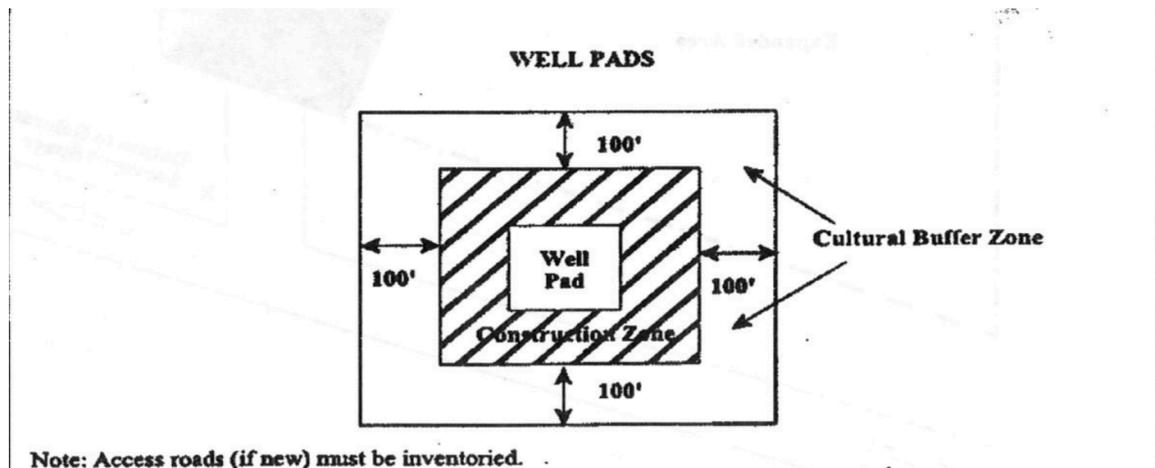


Figure 1 – Caption: BLM Diagram of a Standard Area of Potential Effect (APE) for a well pad and a “cultural buffer zone” of 100 feet on each side (Pappas & Juen 2014: Appendix B).

The case, *Diné Citizens v Bernhardt*, was argued before the 10th Circuit on a crisp March morning in Salt Lake City.¹⁷ Law students filled a dim auditorium at the University of Utah where they had come to observe oral arguments. On stage, a panel of three judges presided. The

¹⁶ Plaintiffs also claimed that BLM had violated the National Environmental Policy Act. The 10th Circuit found in their favor, agreeing that BLM failed to evaluate the potential cumulative water use of Mancos shale development. The 10th Circuit remanded this issue to the district court, which required supplemental information and analysis from BLM. Plaintiffs continue to challenge the legality of the drilling permits under NEPA in this venue. As this matter is unresolved, I do not analyze the NEPA claims here.

¹⁷ *Diné Citizens v Bernhardt*, 1:15-CV-00209 (10th Cir. 2019). 10th Circuit court cases are usually heard in the Byron White Court House in Denver. The court occasionally travels to hear cases at universities as part of an educational initiative.

question of whether BLM was in compliance with NHPA pivoted around interpretations of the appropriate scale at which to assess potential impacts to cultural properties from fracking.⁸ In NHPA parlance, an Area of Potential Effect (APE) is “the geographic area or areas within which an undertaking [a project under the jurisdiction of the federal government] may directly or indirectly cause changes in the character or use of historic properties” (36 CFR 800.16d). The standard APE for an oil or gas well is the footprint of the well pad and access road, with an additional buffer of 100 feet on each side (see Figure 1).

Representing the plaintiffs, attorney Samantha Ruscavage-Barz of WildEarth Guardians explained that BLM’s survey for cultural properties within the standard APE for each drilling permit was an inadequate approach for understanding the cumulative impacts of extraction in the Greater Chaco:

When you’re talking about air, noise, and visual impacts, you are not talking about surface impacts. You’re not talking about a bulldozer going through one of those Chacoan outlier sites. What you’re talking about is that the cumulative air pollution coming off this development could compromise the historic setting of these larger properties.

By contrast, attorney Avi Kupfer with the US Department of Justice began his opening remarks on behalf of the federal defendants with a challenge to the scalar basis of the plaintiffs’ argument.

Although it is understandable that plaintiffs value the entire landscape of the San Juan Basin as a whole, that is not a basis for bringing an APA [Administrative Procedures Act] challenge to particular, site-specific drill permits.

As Kupfer referenced, NHPA is a procedural statute. The job of the court is not to determine whether BLM made the best land management decisions, but rather whether the agency followed procedures outlined in the Act. The federal government argued that none of the cumulative impacts of extraction cited by the plaintiffs—such as an upswing in heavy truck traffic or increased air, noise, and light pollution—could be attributed to a BLM decision to approve a single well.

The plaintiffs argued the opposite. They sought to establish not only a geographic nexus between individual well pads in the Greater Chaco region: they also argued that there is a connection between individual land-use decisions and cumulative atmospheric effects. Once BLM designates an APE for a project, the agency must determine whether the proposed action—in this case, a drilling permit—has the potential to adversely affect historic properties within the APE. A historic property is a structure, building, object, site, or district eligible for

⁸ I use terms like “cultural properties” and “cultural resources” because this is the language used in NHPA. See Dongoske et al. (2015) and Tsosie (2006) for discussions of how Indigenous communities are forced to take up these terms to defend important sites, even though the terms themselves fail to capture what is at stake.

listing under the National Register of Historic Places because it is deemed “significant.” It may be so if it is associated with an important historical event or person, has a distinctive construction style characteristic of a type, or is likely to yield important information about American history.¹⁹

The “significance” of a property may be diminished by physical destruction, damage, or removal from its historic site. But NHPA also mandates that federal agencies consider whether the “introduction of visual, atmospheric or audible elements” could “diminish the integrity of the property’s significant historic features” (C.F.R. 36 Part 800.5). Under NHPA, “integrity” is the “ability of a property to convey its significance.” There are several aspects of integrity through which a cultural property is thought to impart significance: location, design, setting, materials, feeling, and association (DOI 1995)

In *Diné Citizens v Bernhardt*, plaintiffs highlighted “setting,” “feeling,” and “association” as constitutive of the cultural significance of the Greater Chaco for Diné people, arguing that these elements of integrity are particularly susceptible to adverse effects brought on by “visual, atmospheric or audible” changes.²⁰ BLM’s failure to consider these potential disruptions, plaintiffs argued, resulted in an arbitrary decision to rely on a standard APE. Once BLM defined this APE, it assessed only the potential for adverse effects to cultural properties within that small space, in which it missed the ambient and large-scale impacts of extraction that concern Diné plaintiffs and environmentalists alike. Within the standard APE, BLM found only archaeological sites and artifacts that the agency argued could “yield important historic information regardless of whether [they are] in a pristine location or surrounded by development” (*Diné Citizens v Bernhardt*). The BLM reasoned that “so long as the site itself remains undisturbed; setting is not an important aspect of its integrity” (*ibid.*).

It is worth pausing to ask how BLM could assess whether setting, feeling, or association were negatively affected by oil and gas development. A 2014 Protocol that outlines how the BLM is to meet its responsibilities under NHPA in New Mexico provides a clue:

If setting, feeling and/or association are contributing aspects of integrity for any historic property, and a proposed undertaking will be visible from the historic property, but the project elements will not dominate the setting or attract the attention of the casual observer, the BLM will document the decision and a finding of “No Adverse Effect” is appropriate (Pappas & Juen 2014: 28).

The figure of the casual observer belies an important assumption about the conditions of possibility for knowing, seeing, or sensing something culturally or historically important about place.²¹ Following BLM’s protocol, significance can be discerned by the naked eye of the cultural

¹⁹ This is a brief summary of criteria of significance A, B, C, and D under NHPA.

²⁰ Setting, here, means “physical environment of a historic property that illustrates the character of the place.” Feeling is the “quality that a historic property has in evoking the aesthetic or historic sense of a past period of time.” And association is “the direct link between a property and the event or person for which the property is significant” (CFR 36 Part 800).

²¹ The “casual observer” is a figure that appears across national BLM policies regarding the management of visual resources. It is not unique to New Mexico.

resource specialist during a pedestrian survey of the APE. But both Diné and Pueblo groups have consistently affirmed that federal agencies do not have the knowledge or capacities – what Choy (2018) might call an apparatus of atmospheric attention—to know what is significant for Diné and Pueblo people. Indeed, plaintiffs and Amici put forth this argument in *Diné Citizens v Bernhardt*.

In an Amicus Brief in support of the plaintiffs, the All Pueblo Council of Governors (APCG) and the National Trust for Historic Preservation (NTHP) argued that BLM could not know what is culturally and historically significant about the Greater Chaco because the agency failed to consult with Pueblos about the drilling permits at issue. While BLM focused on assessing adverse effects within a standard APE for properties that were significant because of their “informational potential,” the Amici argued that if BLM had meaningfully consulted with them, Pueblo governments would have been able to identify many traditional cultural properties across the Greater Chaco that are potentially eligible for protection because of their setting, feeling, or association. The identification of these properties may have required BLM to consider a larger APE in its evaluation of drilling permits. The Amici expand on the importance of tribal consultation for identifying the appropriate scale of analysis:

The significance of these sacred sites is often safeguarded through traditional, unwritten practices within Pueblo communities, and formal written recordation is often culturally inappropriate. The religious and cultural importance of the Greater Chaco Landscape can only be understood through meaningful dialogue and consultation between the Pueblos and the federal agencies who risk unintentionally disrespecting these areas through uninformed actions.

Amici note that the only attempt made by the federal government to consult with Pueblos on oil and gas development in the Greater Chaco was through a letter sent to the Pueblos of Acoma, Jemez, Zia, and Zuni (four of 20 Pueblo nations) regarding an oil and gas lease sale in 2014. Local Navajo governments echo this point. Chapters like Counselor consistently state in protest comments that BLM has not adequately communicated with them, and they note that many sacred Diné sites are unknown to BLM and are often unrecognizable by non-Diné specialists.

Diné Citizens v Bernhardt highlights challenges that Indigenous groups and sovereign nations face in rendering their claims about the protection of sacred sites intelligible to federal agencies and courts, especially without disclosing too much about their location or importance (see Dongoske et al. 2014; Tsosie 2012). The 10th Circuit ultimately declined to consider the Amici argument that BLM did not meet the standard of tribal consultation outlined in NHPA, because neither the plaintiffs nor the Amici had made this argument in district court. The court also found that BLM had the authority but was not legally obliged to consider a larger APE.

The argument made by plaintiffs and Amici about setting, feeling, and association points to an important characteristic of extraction's atmospheres: they are not all the same. Techniques like the use of a standard APE manipulate scale in an attempt to commensurate atmospheric effects of oil and gas, but they miss the mark, denying the existence of what exceeds them. Not only is airborne pollution unevenly distributed. Differently positioned subjects and groups can access different atmospheric qualities in the same place. These divergent atmospherics circulate within an atmospheric uncommons, "a space that is not only the same space" (de la Cadena 2018). From within distinct worldings, atmospheres take form and differentially materialize extraction's disturbances.

Counselor Health Impact-Hózhóogó na'adá Committee

Not long after the Mancos shale boom took off, Diné residents of Counselor and the two adjacent Chapters of Ojo Encino and Torreon—together known as the Tri-Chapter Council—became worried about changes in their community. By 2015, shared concerns about public health, constant truck traffic, poor road conditions, the degradation of sacred sites, and community tensions were being discussed at Chapter meetings. Across human and non-human kinship relations, there was a noticeable difference in the air.

A group of particularly concerned residents from across the Tri-Chapter mobilized to document what was happening. Calling themselves the Counselor Health Impact-Hózhóogó na'adá Committee, the group launched a community health study. Upon the discovery that there were no air monitors anywhere in the vicinity that would register what residents were exposed to on a daily basis, the Committee fundraised to set up their own temporary air monitors.²² They built on a tradition of civic science in which frontline communities seek to fill consequential knowledge gaps by studying their own environmental exposures (Jalbert 2016; Ottinger 2013; Wylie 2018). The Committee also convened a series of conversations across the Tri-Chapter and began a course of study that incorporated Diné traditional teachings to understand the specific cultural and spiritual impacts of fracking for Diné people. I had the privilege of working with the Committee for two years, mostly providing administrative support in the form of grant writing and helping with other documentary needs, and I learned a great deal from this collaboration.

The Committee's air monitoring revealed levels of airborne formaldehyde that far exceeded nationally established safe standards and showed elevated levels of VOCs and particulate matter, the latter surpassing national air quality standards and reaching concentrations that can be harmful to human respiratory health.²³ While these "episodic intense peak exposures may only last for a few minutes to an hour in Counselor," the Committee found that "such exposures can cause acute health symptoms, even though the total exposure averaged

²² There are a handful of continuously operating air monitors in the region, but nowhere near the Tri-Chapter or other parts of Eastern Navajo Agency affected by Mancos shale extraction.

²³ See Shapiro (2015) on airborne formaldehyde exposure. Formaldehyde can form from a chemical reaction of methane and sunlight.

over a 24-hour period appears acceptable and falls within a limit below a current threshold to consider action to prevent immediate health impacts” (Tsosie et al. 23). When considered at the scale of ordinary life in Counselor, these exposures were worrisome.

In addition to an air monitoring campaign, the Committee collected health surveys from 80 residents in Counselor (representing 11.4% of the Chapter’s population of 700). Among them, 90% reported a sore throat and sinus problems; 80% reported coughs, headaches, itchy eyes, joint pain, and fatigue; 70% reported nosebleeds and wheezing; and others reported experiencing one or more symptoms associated with chemical exposures, like nausea and shortness of breath.

The Committee also found that residents shared significant concerns that traditional Diné knowledge may be threatened by the social and environmental changes introduced with fracking. They felt that agencies responsible for oil and gas regulation ignored traditional knowledge in their decision making. “This implies that non-western, non-modern world views no longer count as contributors to how health and wellbeing are perceived and acted upon,” wrote Dr. Herbert Benally and the late Dr. Larry Emerson in one of the Committee’s first preliminary reports (2017: 13). They surmised that “human and ecological trauma” occurs when Diné epistemology is sidelined. Threats to the environment, upon which many Diné rely “for a sense of wholeness and with a beloved kinship with the earth and sky,” also pose significant threats to “Diné ways of knowing” (ibid: 14).

In its ongoing research the Committee has identified a range of felt impacts across the Tri-Chapter. Some of these impacts are measurable as data points—such as how many people experience a sore throat or share a concern about the destruction of ceremonial sites—but their aggregation does not provide a straightforward answer to the question of how fracking affects wellbeing. What emerges instead is a clear sense that fracking causes a disturbance in collective Diné relations with the environment.

As Dr. David Tsosie writes in the introduction to a 2020 Committee report, echoing phrases directly from Diné Fundamental Law:

It is important to note that Mother Earth and Father Sky are part of us as Diné and we are part of Mother Earth and Father Sky; thus, we must treat this sacred bond with love and respect without exerting dominance. The love, respect and honor that is shown to our natural environment is displayed by following the proper protocols of making offerings at sacred sites requesting permission to only take what is needed and to place them back with prayers and songs (Tsosie et al. 2020).

In bringing Diné epistemology to bear on the question of fracking, the Committee examines how shared metaphors and values may be shifting under the pressure of extraction.²⁴ The Committee’s research has registered a shift in the Tri-Chapter, perceptible yet hard to define, evinced in changes to bodies, lands, and the relations between them. Accounting for this shift at this scale, as the Committee asserts, is part of what it means to understand the cumulative impacts of extraction. Ambient conditions that sustain forms of Diné knowledge and life, rooted

²⁴ See Cajete (2014) on shared metaphors as the foundation of Indigenous epistemologies.

in local ecologies, are changing. In this way, through air pollution and other impacts, extraction reproduces and further sediments colonial relations (see Gilio-Whitaker 2019; Pasternak and King 2019).

Recognizing this, the Committee is able to leverage its findings to advocate for the practice, teaching, and further development of Diné research methodologies, which they see as a partial corrective to the forms of relationality perpetuated by extraction. Members of the Committee partner with medicine men and traditional knowledge keepers to organize workshops and share teaching with Diné communities of all ages in schools, at community events, and at Chapter meetings. Herein lies a promise amid the late industrial predicaments of extraction on the checkerboard. In this atmosphere, Tri-Chapter residents locate both an imperative and an opportunity to strengthen land-based systems of reciprocity and kinship. The mode of grounded relationality (Byrd et al. 2018) towards which they labor is one in which externalities as such don't exist—not because human interactions with their milieus do not produce consequences, sometimes unintended, but because these consequences entail a form of reciprocity in the present.

Conclusion

Atmospheres are felt differently by differently situated subjects. I have argued that in the management of oil and gas in the Greater Chaco, the presumption of atmospheric commensurability is reinforced by techniques of settler governance that fragment ecological and ontological domains like air and land. This fragmentation often preempts the possibility for Indigenous claims to meaningfully disrupt administrative or judicial actions. I have shown how prevailing approaches to regulating air pollution and other impacts of the oil and gas industry manipulate scale in ways that obscure the cumulative effects of extraction, and I have highlighted examples of how this scalar work facilitates the commensuration of extraction's impacts across Indigenous and non-Indigenous worlds. On the checkerboard, this commensuration eases the expansion of fracking despite Indigenous opposition.

Importantly, however, state attempts at commensuration are only ever partially successful, if at all: an excess always remains. The persistent albeit unrecognized claims by plaintiffs and Amici in *Diné Citizens v Bernhardt*, the teachings that the Counselor Health Impact-Hózhóogó na'adá Committee animate in their work, and the unrelenting patience of people like Mario and Samuel who keep reiterating their subtle gestures and stories, are all examples of atmospheric knowledge that evades capture. These refusals to render Diné worlds commensurate with state techniques of assessment represent a form of resistance to both extraction and settler governance that is generative of its own political proposals (see de la Cadena 2015; Simpson 2014). In these ways, Diné residents advance what Tuck and Yang (2012) call an "ethic of incommensurability," an orientation to social difference in the settler colony that insists on incommensurability, rather than reconciliation, as necessarily foundational to decolonizing projects. The strategies of Diné residents that I have explored suggest that there may be ways of intervening in aggregate airs that do not require participants to confront an impossible double

bind of rendering oneself doable or going unheard, but that instead take incommensurability as the starting point to any atmospheric politics in late industrialism.

Author Biography

Sonia Grant is a PhD Candidate in the Department of Anthropology at the University of Chicago.

Acknowledgements

First and foremost, I am grateful to the Counselor Health Impact-Hózhóogó na'adá Committee, the Diné Centered Research and Evaluation team, the Tri-Chapter Council, and friends and colleagues in the Greater Chaco Coalition for their work and for making this research possible. I thank Ali Kenner and Chloe Ahmann for curating this special issue with such care and for their generative comments on this essay. Special thanks to Becca Grady, Cameron Hu, Hannah Burnett, and Joseph Masco, and Maria Lane and her group at UNM for their encouragement and feedback at different points in the process. This essay was improved by the insightful comments and editorial direction of Katie Vann, Daniel Kleinman, and two anonymous reviewers at ESTS. This research was supported by a SSHRC Doctoral Fellowship and by the Center for Engaged Scholarship.

References

- Allen, B. 2003. *Uneasy Alchemy: Citizens and Experts in Louisiana's Chemical Corridor Disputes*. Cambridge, Mass.: MIT Press.
- Alvarez, R., and et al. 2018. "Assessment of Methane Emissions from the U.S. Oil and Gas Supply Chain." *Science* 361 (6398): 186–88.
- Anderson, B. 2009. "Affective Atmospheres." *Emotion, Space and Society* 2: 77–81. <https://doi.org/10.1016/j.emospa.2009.08.005>.
- Berlant, L. 2011. *Cruel Optimism*. Durham, N.C.: Duke University Press.
- _____. 2016. "The Commons: Infrastructures for Troubling Times". *Environment and Planning D: Society and Space*. 34(3): 383-419. 10.1177/0263775816645989
- Bumpers, W. and P. Williams. 2013. "Sixth Circuit Pushes Back on EPA Oil and Gas Source Aggregation Under the Clean Air Act." *Harvard Business Law Review Online*. 41. <https://www.hblr.org/2013/01/sixth-circuit-pushes-back-on-epa-oil-and-gas-source-aggregation-under-the-clean-air-act/>.
- Byrd, J., A. Goldstein, J. Melamed, and C. Reddy. 2018. "Predatory Value: Economies of Dispossession and Disturbed Relationalities." *Social Text* 36 (2): 1–18.
- Byrd, J. and M. Rothberg. 2011. "Between Subalternity and Indigeneity: Critical Categories for Postcolonial Studies." *Interventions* 13 (1): 1–12.
- Cadena, M. de la. 2018. "Uncommons." *Theorizing the Contemporary*, Fieldsights, <https://culanth.org/fieldsights/uncommons>.

- . 2015. *Earth Beings: Ecologies of Practice Across Andean Worlds*. Durham, N.C.: Duke University Press.
- Cadena, M. de la, and M. Blaser, eds. 2018. *A World of Many Worlds*. Durham, N.C.: Duke University Press.
- Cajete, G. 2014. "Foreword." In *Diné Perspectives: Revitalizing and Reclaiming Navajo Thought*, edited by L. Lee, ix–xii. Tucson, Arizona: University of Arizona Press.
- Choy, T. 2014. *Ecologies of Comparison: An Ethnography of Endangerment in Hong Kong*. Durham, N.C.: Duke University Press.
- . 2018. "Tending to Suspension: Abstraction and Apparatuses of Atmospheric Attunement in Matsutake Worlds." *Social Analysis* 62 (4): 54–77.
- Choy, T. and J. Zee. 2015. "Condition - Suspension." *Cultural Anthropology* 30 (2): 210–23.
- Curley, A. 2018. "T'aa'hwo Aji t'eego and the Moral Economy of Navajo Coal Workers." *Annals of the American Association of Geographers*, 1–16.
- Diné Citizens v Bernhardt, 1:15-CV-00209 (10th Cir. 2019).
- Dongoske, K. T. Pasqual, and T. King. 2015. "The National Environmental Policy Act (NEPA) and the Silencing of Native American Worldviews." *Environmental Practice*, no. 17: 36–45.
- Emerson, L. and H. Benally. 2017. "Hózhóogó Na'adá Assessment Regarding Local Fracking and Drilling Operations, Eastern Navajo Agency." Counselor Chapter, Eastern Navajo Agency: Counselor Health Impact- Hózhóogó na'adá Committee.
- Espeland, W. 1998. *The Struggle for Water: Politics, Rationality, and Identity in the American Southwest*. Chicago: University Of Chicago Press.
- Espeland, W. and M. Stevens. 1998. "Commensuration as a Social Process." *Annual Review of Sociology* 24: 313–43.
- Fanon, F. 2004. *The Wretched of the Earth*. Translated by R. Philcox. New York: Grove Press.
- Fortun, Kim. 2012. "Ethnography in Late Industrialism." *Cultural Anthropology* 27 (3): 446–64. <https://doi.org/10.1111/j.1548-1360.2012.01153.x>.
- Frankenberg, C., A. Thorpe, and E. Kort. 2016. "Airborne Methane Remote Measurements Reveal Heavy Tail Flux Distribution in Four Corners Region." *Proceedings of the National Academy of Sciences* 113 (35): 9734–39.
- Frickel, S., S. Gibbon, and J. Howard. 2010. "Undone Science: Charting Social Movement and Civil Society Challenges to Research Agenda Setting." *Science, Technology, & Human Values* 35 (4): 444–73. <https://doi.org/10.1177/0162243909345836>.
- Frickel, S. and M. Vincent. 2011. "Katrina's Contamination: Regulatory Knowledge Gaps in the Making and Unmaking of Environmental Contentio." In *Dynamics of Disaster: Lessons on Risk, Response, and Recovery*, edited by R. A. Dowty and B. L. Allen. 11-28 London: Earthscan.
- Gilio-Whitaker, D. 2019. *As Long as Grass Grows: The Indigenous Fight for Environmental Justice, from Colonization to Standing Rock*. Boston: Beacon Press.
- Grant, S. Forthcoming. "Chess or Checkers? Fracking in the Greater Chaco," in *Essays on the 21st Century West*, edited by B. Rensink. Lincoln, NE: University of Nebraska Press.

- Hess, D. 2020. "The Sociology of Ignorance and Post-Truth Politics." *Sociological Forum* 35 (1): 241–49. <https://doi.org/10.1111/socf.12577>.
- Intergovernmental Panel on Climate Change. 2019. "Global Warming of 1.5." United Nations. <https://www.ipcc.ch/sr15/>
- Jalbert, K. 2016. "Building Knowledge Infrastructures for Empowerment: A Study of Grassroots Water Monitoring Networks in the Marcellus Shale." *Science & Technology Studies*, 29(2).
- Kinchy, A. S. Parks, and K. Jalbert. 2016. "Fractured Knowledge: Mapping the Gaps in Public and Private Water Monitoring Efforts in Areas Affected by Shale Gas Development." *Environment and Planning C: Government and Policy* 34: 879–99. <https://doi.org/doi:10.1177/0263774X15614684>.
- Lepselter, S. 2016. *The Resonance of Unseen Things Poetics, Power, Captivity, and UFOs in the American Uncanny*. Ann Arbor: University of Michigan Press.
- Lord Jr., S. 2012. "Aggregation Consternation: Clean Air Act Source Determination Issues in the Oil & Gas Patch." *Pace Environmental Law Review* 29 (13).
- Lyons, K. 2020. *Vital Decomposition: Soil Practitioners and Life Politics*. Durham, N.C.: Duke University Press.
- Masco, J. 2006. *The Nuclear Borderlands: The Manhattan Project in Post-Cold War New Mexico*. Princeton, N.J.: Princeton University Press.
- . 2015 "The Age of Fallout." *History of the Present: A Journal of Critical History* 5 (2). 137-168.
- McCarthy, G. 2009. "Withdrawal of Source Determination for Oil and Gas Industries." United States Environmental Protection Agency Office of Air and Radiation. Memo to Regional Administrators. September 22, 2009.
- Murphy, M. 2006. *Sick Building Syndrome and the Problem of Uncertainty Environmental Politics, Technoscience, and Women Workers*. Durham, N.C.: Duke University Press.
- New Mexico Administrative Code (NMAC). Title 20 (Environmental Protection).
- Nisbet, E., Manning, E. Dlugokencky, et al. 2019. "Very Strong Atmospheric Methane Growth in the 4 Years 2014–2017: Implications for the Paris Agreement." *Global Biogeochemical Cycles* 33: 318–42. <https://doi.org/10.1029/2018GB006009>.
- Ottinger, G. 2013. *Refining Expertise: How Responsible Engineers Subvert Environmental Justice Challenges*. New York: New York University Press.
- Pappas, J. and J. Juen. 2014. "State Protocol Between the New Mexico Bureau of Land Management and the New Mexico State Historic Preservation Officer Regarding the Manner in Which BLM Will Meet Its Responsibilities under the National Historic Preservation Act in New Mexico." Santa Fe, N.M.
- Pasternak, S. and H. King. 2019. "Land Back: A Yellowhead Institute Red Paper." Toronto, Ontario.: Yellowhead Institute.
- Povinelli, E. 2001. "Radical Worlds: The Anthropology of Incommensurability and Inconceivability." *Annual Review of Anthropology* 30: 319–34.
- . 2011. "The Governance of the Prior." *Interventions* 13 (1): 13–30.
- Powell, D. 2018. *Landscapes of Power: Politics of Energy in the Navajo Nation*. Durham: Duke University Press.

- Redhouse, J. 1984. *The Leasing of Dinetah: An Eastern Navajo Odyssey*. Roots of Navajo Relocation Series. Albuquerque, New Mexico: Redhouse/Wright Productions.
- Rodgers, L. 2004. "Chapter Images: Profiles of 110 Navajo Nation Chapters." Window Rock, AZ: Navajo Nation.
- Shapiro, N. 2015. "Attuning to the Chemosphere: Domestic Formaldehyde, Bodily Reasoning, and the Chemical Sublime." *Cultural Anthropology* 30 (3): 368–93.
- Sharpe, C. 2016. *In the Wake: On Blackness and Being*. Durham, N.C.: Duke University Press.
- Simmons, K. 2017. "Settler Atmospherics." *Cultural Anthropology Website Member Voices* (Fieldsights). <https://culanth.org/fieldsights/settler-atmospherics>.
- Simpson, A. 2014. *Mohawk Interruptus: Political Life Across the Borders of Settler States*. Durham: Duke University Press.
- Smith, M, and et al. 2017. "Airborne Quantification of Methane Emissions over the Four Corners Region." *Environmental Science & Technology* 51: 5832–37. <https://doi.org/10.1021/acs.est.6b06107>.
- Strathern, Marilyn. 2004. *Partial Connections*. New York: AltaMira Press.
- Tsosie, D, T Seamster, S Joginpally, C Lewis, B Velivis, H Benally, and M Benally. 2020. "A Cultural, Spiritual and Health Impact Assessment of Oil Drilling Operations in the Navajo Nation Area of Counselor, Torreon and Ojo Encino Chapters."
- Tsosie, R. 2006. "Challenges to Sacred Site Protection." *Denver University Law Review* 83 (4): 963–80.
- Tuck, E. and K. Wayne Yang. 2012. "Decolonization Is Not a Metaphor." *Decolonization: Indigeneity, Education & Society* 1 (1): 1–40.
- United States Department of the Interior Bureau of Land Management (BLM). 2003. "Farmington Resource Management Plan with Record of Decision." Farmington, New Mexico: United States Department of the Interior Bureau of Land Management Farmington Field Office.
- _____. 1986. "Rio Puerco Resource Management Plan and Record of Decision." Albuquerque District, Rio Puerco Resource Area: Bureau of Land Management.
- United States Department of the Interior (DOI). 1995. "National Register Bulletin: How to Apply the National Register Criteria for Evaluation." Washington, D.C.
- United States Environmental Protection Agency (EPA). 2019. "Overview of Greenhouse Gases: Methane Emissions." <https://www.epa.gov/ghgemissions/overview-greenhouse-gases>.
- Voyles, T. 2015. *Wastelanding: Legacies of Uranium Mining in Navajo Country*. Minneapolis: University of Minnesota Press.
- Whyte, K. 2018. "Settler Colonialism, Ecology and Environmental Injustice." *Environment and Society: Advances in Research*. 9: 125-144. doi:10.3167/ares.2018.090109
- Wylie, S. 2018. *Fractivism: Corporate Bodies and Chemical Bonds*. Durham, N.C.: Duke University Press.
- Yazzie, M. 2018. "Decolonizing Development in Diné Bikeyah: Resource Extraction, Anti-Capitalism, and Relational Futures." *Environment and Society: Advances in Research* 9: 25–39.