

**Making and Breaking Big Rural:
Science and Technology Construct the Coalfield**

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in
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ABSTRACT

Making and Breaking Big Rural: Science and Technology Construct the Coalfield examines the socio-technical construction of a specific rural industrial space: an Appalachian coalfield. High poverty, social issues such as addiction, and environmental issues such as brownfield remediation in this space are tied to technological shifts such as automation, single economic sector totalitarian work and living space in the United States, and depletion of social capital through federal and corporate deterioration of anchor institutions such as unions. The Pocahontas Coalfield serves as a the principal case study regarding the implications of how automation, and federal and state scientific research priorities, implicate science and technology in the construction also of social issues and how the culture of science and technology as practiced in this space becomes, in academia and also in the polity, theoretically subsumed in favor of other ruralities such as ethnic or regional identities simultaneously existent. Fulfilling the gap in Science and Technology Studies with respect to how to examine and to address this kind of rural and industrial space, this dissertation shifts the theorization of this space from largely the territory of rural studies rooted in social deficit and world systems theories to a model that includes an analysis of this single sector energy extractive space through its role in a large

technical system. Additionally, this dissertation models how to examine a rural industrial aka “big rural” space dominated through science and technology as a space with democratic potential. I also closely examine an additional coalfield space (Lindytown in the Kanawha Coal River Coalfield) and theorize whether one can be a free citizen in this space. Thus, two coalfield spaces serve as springboards for theorizing the role of similar single economic sector rural spaces and for proposing new approaches to scientific and technical research agendas, such as rooting them in actionable democratic foundation principles such as equity and liberty. Likewise, a macro analysis of the rural industrial offers paths to the creation of a US national rural strategy toward reconfiguring the relationship of science and technology research to and on the rural.

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GENERAL AUDIENCE ABSTRACT

Making and Breaking Big Rural: Science and Technology Construct the Coalfield

examines science and technology research and its role in constructing a rural industrial space such as the Pocahontas Coalfield in Southern West Virginia/Southwest Virginia. It examines the ramifications of this single sector rural space, and of automation and coalfield technology, on its inhabitants, especially on their capacity for democratic practice. In a call for science and research for public benefit, it proposes how scientific and technological research ought to engage with the people and the environment in this rural industrial space, and in the rural space more generally. Using a case study of the Pocahontas Coalfield as a springboard, a draft of a National Rural Strategy for the United States also is proposed.

DEDICATION

Clarice Lispector: What is the most important thing in the world?

Pablo Neruda: To try and make the world a worthy place for everyone, not just the privileged few.

From an interview with Pablo Neruda by Clarice Lispector in Selected Cronicas.

The academic's job in a free society is to serve the public culture by asking the questions the public does not want to ask, by investigating the subjects it cannot or will not investigate, by accommodating the voices it fails or refuses to accommodate. Academics need to look to the world to see what kind of teaching and thinking needs to be done, and how they might better organize themselves to do it; but they need to ignore the world's insistence that they reproduce its self-image. (Louis Menand)

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...and the many other people who have let me interview them, pester them for information or direction, attend their meetings, go to their conferences, or have pointed me and engaged me toward resources or intellectual direction....Thank you!

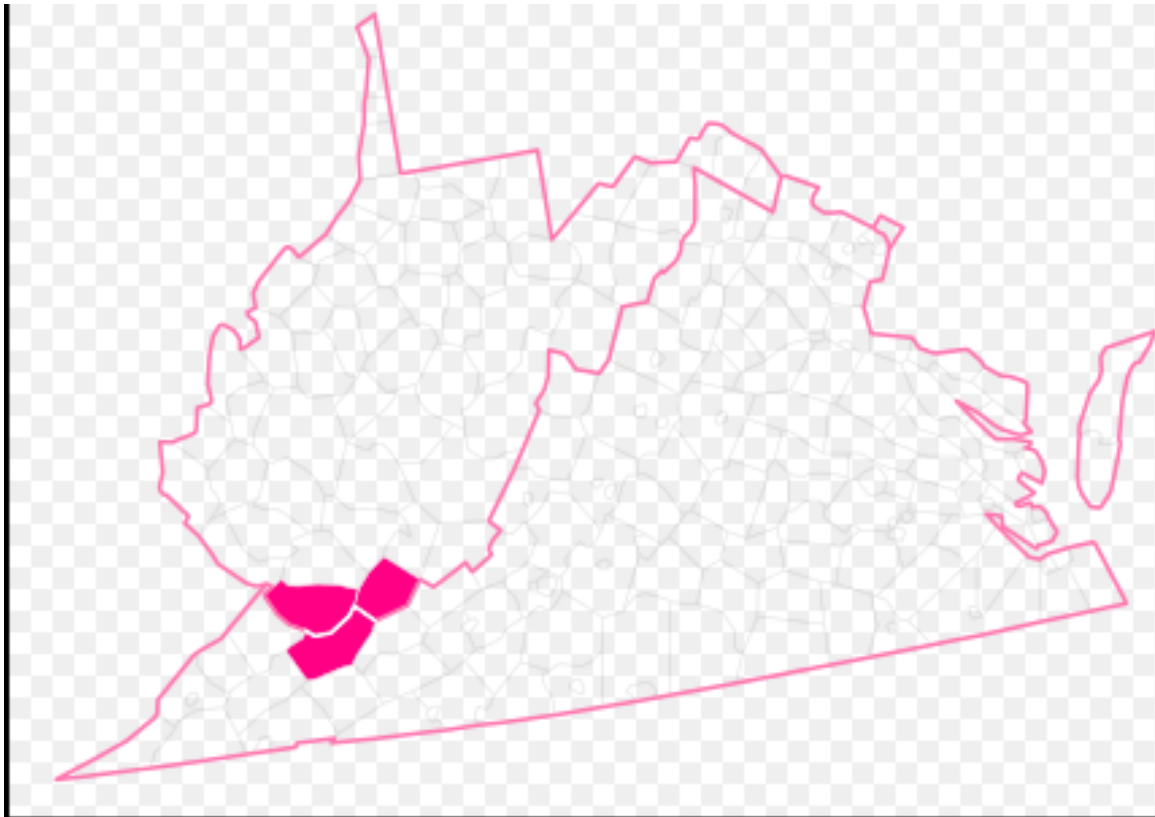
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Figure 1. Pocahontas Coalfield Map—from Geographical boundary of the Pocahontas Coalfield (in pink) comprising Tazewell County Virginia, McDowell County West Virginia and Mercer County West Virginia.¹



¹ Image source: User: Kelvin13; From Wikimedia Commons, the free media repository; (Redirected from [User:Kelvinsong](#))

PREFACE

Mode of Inquiry

In this dissertation, I stand as a critically and regionally engaged scholar who also participates in a place of inquiry. Though I demonstrate an ability to step outside my personal experience of place, I do not assume a non-identity. In 2017, substantial work in many fields occurs in which the scholar-activist or scholar-participant observer includes him- or herself as part of the scholarship. For example, in Science and Technology Studies, in the classic work *The Structure of Scientific Revolutions*, Thomas Kuhn traces his maturation in thinking leading to his development of the concept of paradigm shift. In his book *Critical Regionalism: Connecting Politics and Culture in Appalachia*, regional and Appalachian Scholar Douglas Reichert Powell analyzes his own childhood and class in Knoxville, TN, using these as a springboard on the issues of the academic and place; likewise, in the work of Talmage Stanley on the Pocahontas Coalfield, he recounts his family's history as central in his examination of the cultural and economic fabric of Appalachia in the early 20th century.²

I begin with a personal narrative, largely included in this *Preface*, and then move to a macro analysis. This move pulls the arc of this dissertation away from the sometimes intimate gaze of place in Regional and Appalachian Studies toward analysis of how rural industrial spaces function in society, and, what role science and technology (read engineering) plays there, and what it ought to play now, given the historic outcomes of the rural industrial space in terms of economy, social problems, and environment. Rooting this first step in the personal situates the

² Case in point, my first experience with this stance was in a class at Columbia University in 1993 with the anthropologist teaching it also writing about his affecting his subjects while doing fieldwork in El Salvador. Reichert Powell, Douglas. *Critical Regionalism: Connecting Politics and Culture in an American Landscape*. Chapel Hill: The University of North Carolina Press, 2007; Kuhn, Thomas. *Structure of Scientific Revolutions*. Chicago: University of Chicago Press, 1962; Stanley, Talmage. "The Poco Field: Politics, Culture, and Place in Contemporary Appalachia." Emory University; ProQuest Dissertations Publishing, 1996.

urgency of the academic treatment at hand and charts a process of moving from visceral impulse to sustained academic insight.

Overview of Dissertation

Rural studies and Appalachian studies engage in cultural and scholarly work against the assumption of the human inhabitants in the rural space as backward and unsophisticated, and, this space as devoid of technological intervention. Rather than an exception to the capitalist and industrial interventions in urban and suburban regions, I demonstrate how science and technology demarcate and prescribe the "rural" space in the United States just as much as they create and contribute to the performance of metropolitan/sophisticated spaces. Popular culture sells the rural space as wild, natural, and untouched; the reality remains that the United States has been thoroughly categorized in geography and topography for its utility for science and resource exploitation. For example, much of our "wild" now consists especially of plants and insects from around the world: very few old growth forests remain. We cannot return to a pre-Columbian North America. Both urban and rural exist on a continuum of what science and technology prevail in each space.

Throughout this dissertation I present a case study, accomplished through interviews, archival research, participant-observation, and literature review, of how a rural space came to be in use as a coalfield rural industrial space. From these resources and from theory, I extrapolate broader lessons about the US rural industrial space. I argue that the science and technology responsible for enacting the rural industrial space flattens the environment, dominates education, diminishes knowledge accumulation, guts on-the-ground democratic practice, leads to automation displacing people cum technology, and contributes to the rural industrial being black boxed in the larger culture, its wares and raw product part of the magic of modern life's offerings

simply appearing (food in stores, energy in the socket, water in the faucet, gas at the pump). I proceed to substantiate the drawbacks of this rural industrial model, or, strategy void in US policy.

These spaces call for fresh science, new research, and new scholarly and theoretical engagement. They call for a reconfiguration of science away from corporate and crony sponsorship toward a socially responsive and responsible science. I enumerate what a US rural policy ought to address in this space and review democratic and non-dominant economic practice arising in the post single sector rural industrial space.

Finally, I reflect on what an STS examination of the rural industrial space gains us in terms of understanding the space's role in society and conceiving of its relationship to research, and technology and democracy.

Personal Reflection

Don't send me another treatise labeling white Appalachian mountain people as some special breed—neither in their degenerate behavior nor in their nostalgic family fealty. Don't send me strumming rehashes of their connection to a pre-coal purity, a pristine time of childlike ways, when no one's white Appalachian mountain or lowland ancestors lorded over house or field slaves, or, in equally brutal times prior, cut the throat of an Indian, or at least accepted the land grant of those that sanctioned that doing, taking, and staking of a sliced and sectioned off land, now fondly remembered as the “old homeplace.”

I am not here to defend anyone, not coal miner, not landowner, not coal wrangler, not land holding company, not mountaineer, not investor—and not scientist. I am not writing this to show that I matter, or my family's history matters, as much or more than anyone else's, because

my family was good people, after all. I am not writing this to remove blood from my hands, or absolve anyone or myself of anything.

I am not writing to redeem. Reflect, yes. Rethink, I hope so. Rescue? I am not writing to rip from anyone their agency.

The people remaining where I am writing about, if adult, are people who have been handed and handled plenty of life experience, and can make their own decisions—whether those were to vote for Mondale in 1984 or for Trump in 2016. They, too, are as complex, honorable, and flawed as anyone anywhere else.

But not only are people at stake in Appalachia—there is the land, the water, the air, too. In full disclosure, I want you to know this:

I love the rusty, creaky, grimy, fallen down, apocalyptic Appalachia—I grew up in post-employment coal field Appalachia until I was ten years old, then we moved from there to “Cancer Valley” or the Kanawha Valley, full of miles and miles of chemical factories. Yet, in my growth as a scholar, I have come to question my own nostalgia for place, my own acceptance of created boundaries of space. Prior to my doctoral work, I was certain what Appalachia was, what counted as Appalachian, and that being Appalachian was demonstrable, categorizable from other demarcations of space. Now, while I may lament for a specific mountain, I cannot honestly wring my hands over my local site and locale without seeing its connection to spaces across the country, across the globe...Because what happens in my space of close examination—the Pocahontas Coalfield of Appalachia—happens elsewhere. To only say WE from there are effluence misses the flow and stream we are in with so many peoples and places. So, while I make my own yard my subject, it reflects the offshored, out of sight, out of mind rolled-over places being sliced into the earth’s sides worldwide to mostly feed societies’ centers. Discussing

Appalachia, I am reminded of a friend's anecdote of Russian (someone else told me it was generally Slavic) machismo—a Russian man sits at a table drinking vodka, smoking a cigarette; he moans, “Russians—we are shit. We have always been shit. We will always be shit,” while behind him a woman busies herself making dinner, looking after the children, getting things ready for everyone and herself for the next day of activity—school, work. Writing and reflecting on Appalachia strikes me sometimes as that kind of indulgence—a marginal luxury of practicing fatalism, while those adjacent to us there, or left there by happenstance or choice, focus on the now and the next day and keeping what show there is left, running.

Thus, while I sometimes get down in the weeds of this Appalachia, where I have been and where I am, and while I can appreciate Hemingway's advice to not write about Man, but a man, and while I can also appreciate that the work of legitimizing particular peripheral perspectives, places, lives is endless work, that is not where I arrive in this dissertation. Prior to entering a PhD program in Science, Technology, and Society (STS) I worked in the particulars of literary fiction—reworking and representing mostly Appalachia in that genre, as well as in creative nonfiction. Thus, I am a little worn out by the up-close, intimate gaze into Appalachia or, the first person authority, the melding and meshing look through Appalachian eyes. Some of the story, essential story, seems to be missing in the box now most often drawn of that place—a box that is literary, poetic, cultural, anthropological, sociological, and political economic. Hence, the launch pad for this dissertation is Science and Technology Studies: sociology of science and technology, history, philosophy, policy, and science and technology culture. My hope is that this path brings me, as a scholar activist and community practitioner, beyond practices of, and indulgence in, fatalism—past smug assumptions of lack of agency on the part of regional participants. Is the woman in that Russian anecdote above smart, more adept for taking care of

the work before them both, or is she complacent, stupid, acquiescent, cajoled, cowed? Does everyone else depend on her more than we can imagine? In any case, she gets up and keeps at it—and even in the best of times, existentially there can still be said something for that.

In 2002 I took a brief road trip back to the county of my birth (in the flyover, we talk counties—we assume you probably haven't been to the specifics) to the top of the Pocahontas Coalfield in southern West Virginia. By then, the area had slid even further down economically from the time I was born. In addition to following the mostly empty main streets of Princeton and Bluefield, West Virginia, with their abandoned storefronts, deteriorated downtowns with once stately or even artistic buildings, falling in on themselves, I also drove down to Bramwell, a Victorian hamlet, tucked back from Route 52, and that route's mix of blown out trailers, long gone businesses, and derelict houses. Bramwell, by comparison, registers almost fairytale-like. As the Pocahontas Coalfield was being wrestled into an industrial occurrence from the mid-1880s to the mid-19 teens, Bramwell was one of dozens of locations created whole cloth by the incoming industrial wranglers. Usually, Bramwell is discussed academically and locally as having been inhabited by coal "barons" and having once been the richest per capita place on earth: once these barons had "opened" up access to the coal seams of the region, they made their fortunes and built this stately town. Instead of baron, I employ the term "wrangler" here, as the word baron implies landed gentry not engaged in dirty work. By contrast, certainly a number of the men, and at the level of industry rule they were all White men, who engaged in the activity to "open" up this particular geological set of coal seams to export, were far more cowboy than count, and- more speculator and prospector than spectator. Bramwell is the town where they invented themselves into a local aristocracy, despite having wrangled, wrestled, shafted, and

wrested industrial production into being in a short time in a place often described then more as a remaining Eastern version of the American West. Civil rules and laws took a backseat to those of might, and homesteaders eked out livings in a rough territory and propped themselves up in other ways through livestock sales and hunting and gathering, bartering their cultivated or gathered plants, herbs, or animals into trade. Thus, Bramwell, a prim town, replete with mansions, high society gatherings, and cosmopolitan tastes, was an odd and recent development into this otherwise frontier, and, also a quick-to-rise and quickly raised symbol of assertion of dominance by the wranglers over the territories they had recently conquered in the name and the game of coal.

How had these wranglers accomplished this, where were they from, and why did they do it? Largely men who had attempted building wealth in other industrial areas, many sought their fortunes in the Pocahontas Coalfield, bringing with them experience in the Pennsylvania Coalfield (opened some hundred years prior), and from the Welsh coalfields of England prior to that.³

Back to 2002—I returned to the county of my birth for a brief visit and, although I lived twenty minutes from Bramwell from the time I was born until I was ten years old, I had not ever visited. My childhood had been peppered with countless rides past Bramwell as we traveled Route 52, hairpin turning into the coalfields to visit family friends in McDowell County’s county seat of Welch. Often, too, on those visits, my father would veer off a road and up a hollow to point out some site of family legacy: here was the house in Leckee where he was born, and look, a light is on. Someone is even still living in it! Those were some of the coke ovens your grandpappy assisted Italian masons with as a water boy after he’d completed the sixth grade—

³ Brenckman, Fred, *Official Commonwealth Historian (1884). History of Carbon County Pennsylvania.. J. Nungesser: Harrisburg, PA, 1913.*

sixth grade was as many grades as there were back then. This is the section where Cuz (our cousin Jim) grew up in Keystone. That road was where I worked as an insurance investigator for Equifax (my father worked there during the 1960s and early 1970s—it was one of two non-coal jobs listed in the Bluefield, West Virginia newspaper when he got out of the Army in 1961, the other job listed was selling Fuller brushes) and I encountered XYZ (usually some sordid tale). That road there took you to Matewan, where your grandpappy had also fought for the union. This company town is where your Uncle Junior met Madelyn (my aunt) and her Hungarian parents lived. But that town there is where Junior fought for the union. And this place here is where Junior had his own little pick operation, a mine he worked for several years with a few other guys doing by hand what big machines were doing by then. That mine was no longer worth scraping at for a big company, so they sold it off to people who could still maybe make a living of it with carts and mules. Working that mule one summer cured me of ever being in the mines. Oh, and this town is where the Black folks lived. And this town here. And this one there. These are where the White folks lived. This is where your grandmother got off the train to come visit when she took the rail from Elliston, Virginia, near Christiansburg, to Pageton. Imagine—you could ride a passenger train back then to almost anywhere big enough to be given a name!

Look, see that outhouse along that bank there heading out toward that creek, that will eventually end up in the Ohio River. Same as if you use that the bathroom in that fancy house—most everything here is straight-piped. Now, this is where the Longos lived in Welch, and that Catholic Church is where they go to church still. Joe Longo is who taught your grandpappy to make real pizza and real spaghetti sauce. Those scrubby pines along the hillside is where and what they have planted back after strip mining. And right here now, comes Mr. Peabody's Coal

train, a Norfolk-Southern one mile long, fully loaded, winding its way around the bottomland, along the river. You know?

And daddy, won't you take me back to Muhlenberg County

Down by the Green River where Paradise lay?

Well, I'm sorry, my son, but you're too late in asking

Mr. Peabody's coal train has hauled it away⁴

No one down here owns that. All the bigwigs in this—they are all up north. Your grandpappy would often recite this:

Here is to Boston, to the baked bean and the cod,

Where the Cabots speak only to the Lodges

And the Lodges speak only to God.

Later I learned that a cousin of mine, an accountant, owned one of the former coal wrangler homes in Bramwell for a time in the 1980s, yet we never did venture over that way. Looking back, I can either assume that my father took for granted that since my family had not worked in Bramwell, he had little to say about it, or, as my father had little good to say about the wealthy people of the region, he might not have had any interest in gawking at their displays. Why stare up at those on purpose who had put their foot down on your family's necks?

Yet, I turned off Route 52 in 2002 and entered this fairytale town. As I said, the main route leading up to the turn off had dilapidated houses, empty gas stations, run down trailers, and blown out buildings, most recently affected in 2002 by an influx of meth labs and other illegal commerce. Crossing over into Bramwell, with its neat small streets, its dozen or so visible

⁴ From *Paradise*, by John Prine, 1971.

Victorians, and its smattering of still standing brick facade main drag buildings, I kept thinking I had crossed into New England. Or maybe one of those Victorian neighborhoods I had seen in California. It also struck me then that this little hamlet would be a lovely college. Wouldn't that be something, I thought, a lovely college right here, I wondered, or maybe a retreat. Or, with its views and serenity, an art college? West Virginia had no standalone art institute. Wouldn't that be crazy? An art college right at the mouth of the Pocahontas Coalfield. My father had escaped mining coal by becoming a self-taught graphic artist and teaching himself Benjamin Franklin's profession: printing. Imagine, I thought, all the things that an art college right here would bring!

I shelved this concept as something that would be neat, but did not actually consider it to any real degree until 2006. That year, after ten months in Armenia on a creative writing Fulbright, I returned to my then city of residence, Los Angeles, finished the makings of a divorce, and sat with myself thinking, what else could I be doing? This concept for an art school in the coalfields came back to me, and I reached out to several sets of folks for discussion. One, Phil Hanes, who sparked the founding of the University of North Carolina School of the Arts, willingly wrote back and forth with me for a while per email, advising me to reach out to Sharon Rockefeller—the wife of Senator Jay Rockefeller. That contact and one made for me by Jeff James of a group called Create WV to the Claude Worthington Benedum Foundation maybe a year or so later for advisement resulted in dead ends. At that time I put together an outline of what this kind of school might focus on: rural arts not only for the Appalachian region but a place for rural focused art and creativity from rural spaces around the world. In the meantime, I started a job as a project manager and then executive director of a non-profit project of the actress Geena Davis to improve gender portrayal and representation in content aimed at children. I shelved this concept for a rural arts school and moved on with this work in Los Angeles.

By 2009 I found myself again sitting in West Virginia, thinking. I was approaching forty, and, also considering what I ought to do with the second half of my life. This concept of a School of the Arts in the coalfields returned to me. By then, much ado had been made in the United States both in the popular press and intellectually about the New Creative Economy and its purported benefits for places in economic decline. Most of this work had been focused on large cities, but I wondered if this solution of arts influx might function as promised also in a more out-of-the-way place. With respect to all of this, at that time I had far more questions than answers. Moreover, I had no idea how to start a school, much less whether a school would make any sense at all to do where I thought it seemed a good fit. What did one study in order to find the answers to this?

Casting a wide net, I applied to PhD programs as disparate as Digital Media (as at that time, like many people, I conflated the term technology with computers, and, understood technology to be good, its arc positive, and it as the driver of economic progress), Education (but those programs largely focus on secondary schools), and something I came across called “Technology, Innovation, and Policy (TPI)”—as those three all seemed reasonable fields to examine if starting a place of education in the 21st century. A friend already well-established in academia cautioned me—with respect to which PhD to pursue, to “go with the one that pays for you.” August found me and my newish second husband in a graduate dormitory in Stony Brook, Long Island as I delved into TPI classes. There, while in a class on the philosophy of technology, I encountered the field of Science and Technology Studies (STS). By the next year, in 2011, and with a National Science Foundation Graduate Fellowship in tow, I relocated to the STS department at Virginia Tech. By then, I had been disabused of the concept that technology was largely only digital and that this, or any other, technology necessarily prompted positive

economic or other positive change. After additional academic and research detours into energy, science, technology, and rural policy, and Appalachian and Rural Studies, along with much personal work alongside my husband on a farm we had in North Carolina (a couple of hours from Blacksburg in North Carolina), after engaging in in-depth interviews with a range of grassroots (people heading up grassroots and other civic and entrepreneurial engagement) in the region, and after attending many regional meetings and conferences as a participant-observer, I found myself in 2016 coming back full circle to some kind of school, some kind of institution, as a necessary kind of invention, an undulation, to ripple the economic tide in the Pocahontas Coalfield. In short, a whole economic system had been intervened into this region with the advance of industrial-scale coal production in the mid-1880s. The employment run on this had been reasonable, given commodity fluctuations, until the introduction of a continuous miner in the mid-1950s, which allowed coal companies to cut their workforces in half by 1960. For much of this history, the United Mine Workers of America acted as the organizing force, the social capital institution providing social coherence for the miners. In the 1980s, with the larger push nationally to downgrade the capacity of unions as a countervailing force to corporate demands upon workers, the UMWA also lost much of its remaining potency.^{5 6} Thus, along with the continued free fall of jobs in the coalfields due to technological advances, the union also weakened as an institution around which to rally.

⁵ Bell, Shannon. “‘There Ain’t No Bond in Town Like There Used to Be’: The Destruction of Social Capital in the West Virginia Coal Fields.” *Sociological Forum* 24, no. 3, September 2009: 631–57; Scott, Rebecca. *Removing Mountains: Extracting Nature and Identity in the Appalachian Coalfield*. Chicago: University of Minnesota Press, 2010.

⁶ Harvey, David. *A Brief History of Neoliberalism*. New York: Oxford University Press, 2007.

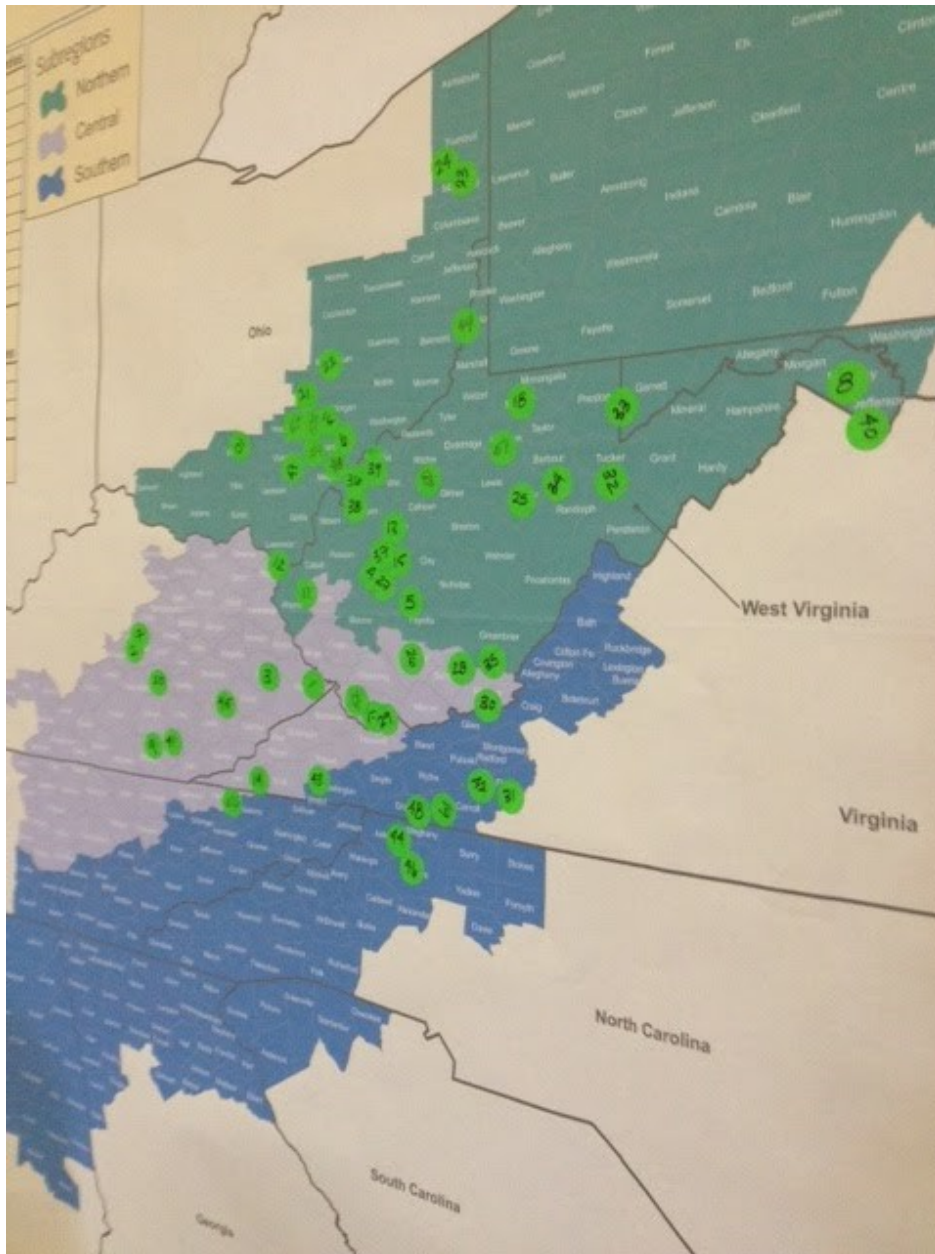


Image 2. Participants at a recent Central Appalachian Network gathering map “anchor” advocacy and practitioner groups supporting farmers in central Appalachia and work together to improve coordination of effort.⁷

In September 2016 I attended a meeting of the Central Appalachian Network (CAN), a regional network of nonprofits that works together on economic issues. At that meeting, during a

⁷ Photo by Cook Marshall, 2016.

session on the new food and sustainable agriculture economy in the region, one table I worked with made a map of the anchor or other institutions working on that throughout central Appalachia. Glaringly apparent was the lack of an organizing institution of this sort in the Pocahontas Coalfield and its immediate adjacent counties. Either, no space had been created because that emerging economy had no possibilities in the Pocahontas Coalfield (which I knew to be untrue), or we had been looked over, passed over, or left out. This meeting confirmed for me that brick and mortar institutions can serve as the lynchpin for the public good: in this case, supporting land-based (agricultural, botanical, forest-based) production capacity.

Longstanding examinations in economics and economic geography review the interplay of geography, strength of institutions, economic development in extractive regions, and variables of trade. In the US context, strength of the civil society sector in a region may also indicate strength of local democracy.⁸ Civil society is an integral part of democratic society, and where essential civil society institutions are missing, then there could also be a weakness of local governmental institutions in terms of community trust.⁹ Rodrik, Subramanian, and Trebbi offer strong evidence in the primacy of institutions in determining economic well-being.¹⁰ However, their work does not prescribe how to change governments or civil society to become more robust.

Though previous to this CAN meeting I had flirted with academic literature on the importance of actual brick and mortar institutions, at the meeting itself I could clearly see their functions as nearly technological. The shape and robustness of civil society as a contributor to

⁸ Howard, Marc Morjé. *The Weakness of Civil Society in Post-Communist Europe*. Cambridge, 2003.

⁹ Bell, Shannon, 2009.

¹⁰ Rodrik, Dani, Arvind Subramanian, and Francesco Trebbi Source. "Institutions Rule: The Primacy of Institutions over Geography and Integration in Economic Development." *Journal of Economic Growth* 9, no. 2 (June 2004): p. 131–65.

local democratic practice could also dictate what was possible on the ground. The lack of the latest technology could leave a region behind economically, but not necessarily if other factors like civil society are robust; likewise, a technological fix will not necessarily improve the economy if civil society and democracy are not also robust.¹¹ For example, there has been much activity and push for the need for broadband in the coalfields. However, broadband should not be an end stop—without other robust democratic organizing principles or institutions and kinds of technical or technological intervention, broadband might not amount to much.

Moreover, while working for the energy sector in 2015-2016 I had a chance to review what constructed a robust economic sector or at least resilient one in the region at hand. Though far from its peak heyday, in recent years, even with its decline in domestic use, coal has continued production and use, and, export from the Appalachian region.¹² Dozens of macro, policy, local, and social factors construct its production feasibility, and, from examining a handful of these up close, I assumed that also dozens of these factors would construct the sustainability prospects of any other economic activity of scale or scalable in, or adjacent to, the Pocahontas Coalfield.

I engage most demonstrably with Langdon Winner in his examination of the totalitarian workplace and what this means in a single economic sector space. I examine the rural industrial space as a large technical system and how science and technology have enabled a flattening of the environment along with community disintegration and destruction of people livelihood, and,

¹¹ Ibid.

¹² Analysis. "Appalachia Comes Up Small in Era of Giant Coal Mines." *Washington Post*, May 5, 2017. https://www.washingtonpost.com/graphics/national/coal-jobs-in-appalachia/?utm_term=.3399264b6955.

knowledge deterioration.¹³ I reflect on how policy only matters if you have institutions capable of enacting them. I return throughout the text to the problems in the 20th century rural industrial space when people as technologies are finally replaced by machines, and, specifically, what automation of once human-done work has wrought in the Pocahontas Coalfield region. From here, I posit cooperative economic and community-oriented technology policies as ethical responses, and reflect on enacting a bricks and mortar institution as a means for economic shift.

Pocahontas Coalfield as Academic Subject

Much discussion of Appalachia, and the Pocahontas Coalfield in particular, begins well after the introduction of active industrial coal mining. Both popular media and academic examinations of the region dwell on this and the region's persistent poverty. In much the way that writer Binyavanga Wainaina in his essay "How to Write about Africa" compiles the stereotypes which pepper popular and other depictions of that continent, before working through analyses of the Pocahontas Coalfield, I wanted to confront two related issues: Appalachian degradation and Appalachian exaltation.^{14 15 16} These two features of the discourse, both by

¹³ Winner, Landon. *The Whale and the Reactor: A Search for Limits in an Age of High Technology*. Chicago: University of Chicago Press, 1986. Moreover, Appalachian scholar Talmage Stanley analyzes David Harvey on the flattening of this rural space into a place controllable and controlled by rational material processes:

Here, Harvey means the abstract and theoretical ways in which we conceptualize and put into language and therefore manipulate the material processes of places: physics, mathematical measurements, social sciences, map-making, geographical concepts, and economic structures. These systems and representations rationalize and legitimate a range of forces and pressures, often condoning systems of injustice and alienation. Whether it be on the level of "common sense" and generally available knowledge, or more abstracted and difficult academic jargon, representations of space are the means of perceiving how society is.

¹⁴ Satterwhite, Emily. *Dear Appalachia: Readers, Identity, and Popular Fiction since 1878*. University Press of Kentucky, 2015; Reichert Powell, Douglas. *Critical Regionalism: Connecting Politics and Culture in an American Landscape*. Chapel Hill: The University of North Carolina Press, 2007.

¹⁵ Wainaina, Binyavanga. "How to Write about Africa." *Granta*, no. 92, Cambridge, 2005.

¹⁶ For more extensive discussion, see these academic, literary, and nonfiction references dealing with the topics of activism, historical political or ethnic subjugation, mining, or perceptions of the people of Appalachia. For example: Cunningham, Rodger. 1987. *Apples on the Flood: the Southern Mountain Experience*. Knoxville: University of Tennessee Press; Pancake, Ann. *Strange as this Weather Has Been:*

insiders and outsiders, can fall into truisms and points of contention by both camps. On the one hand, what I call the “Daddy’s on the porch playin’ fiddle while Momma’s in the kitchen singin’ and bakin’ biscuits and I sit in this rockin’ chair, patchin’ a quilt” syndrome requires the author or commentator to exalt the “true” Appalachian “virtues” of close families, traditions in food ways, handicrafts, and music—freezing “authentic” Appalachians in time, in race, in class, and in pastoral close-knit, loving families and communities. Left out from this “true” Appalachia, both by insiders and outsiders, obviously, is anyone whose experience does not mold to these conventions, thereby erasing a significant swath of people and places (e.g., urban Appalachians, coalfield Appalachians, industrial Appalachian, etc.). Layered onto these “true” depictions include tales of virtuous working class men, whether small farmers or miners, their loyal women, and the willingness of offspring to look out for each other. The contrast to this depiction includes what almost invariably comes out of a new acquaintance’s mouth if this new acquaintance is a) from the East Coast of the United States, and b) not from Appalachia—i.e. a reference to incest.¹⁷ Though I have written elsewhere about the uniqueness of West Virginia potentially worldwide for having its first association in the minds of outsiders be with incest, nonetheless starting with this extreme in narrative depiction by outsiders becomes one more layer in terms of exploration of why West Virginia has been allowed to become so environmentally degraded.¹⁸

Both the West Virginia narratives of exaltation and of degradation lead insiders and

a Novel. Emeryville, CA, 2007: Shoemaker & Hoard; Perry, Huey. *“They’ll Cut Off Your Project”: a Mingo County Chronicle*. New York: Praeger Publishers, 1972; Smith, Barbara Ellen. *Neither Separate Nor Equal: Women, Race, and Class in the South*. Philadelphia: Temple University Press, 1999; Trotter, Joe William. *Coal, Class, and Color: Blacks in Southern West Virginia, 1915-32*. Urbana: University of Illinois, 1990; Walker, Frank X.; *Affrilachia*. Lexington, KY: Old Cove Press, 2000.

¹⁷ Though seemingly irrelevant in an examination of coal, Murray Energy used this excuse to explain coalfield illness, that is, poor health due to incest. “Dr. Michael Hendryx, Measuring Mining’s Toll on Health.” PRI’s Environmental News Magazine. *Living On Earth*. Boston, MA: Public Radio International, August 11, 2012. <http://www.loe.org/blog/blogs.html/?seriesID=1&blogID=17>.

¹⁸ Cook, Crystal. *Replicas*, southernhum.com, 2006; Scott, Rebecca R. *Removing Mountains: Extracting Nature and Identity in the Appalachian Coalfields*. Minneapolis: University of Minnesota Press, 2010.

outsiders, albeit on quite different grounds, to contend that West Virginia, or Appalachia as proxy or vice versa, is exceptional—unlike anywhere else in people, circumstances, and place. I contend that this exceptionalism contributes to the potential for West Virginia's, and Appalachia's, further degradation; this exceptionalism bars West Virginians or other rural Appalachians from seeking people in similar circumstances in the United States and worldwide with whom to form solidarity or to seek affinity.¹⁹ In my fieldwork and participant observations of grassstops, some mission-driven regional non-profits arbitrarily erect boundaries in their mission or work at the created “Appalachian” border—assuming Appalachia as a fixed space to the extent I came to question the utility of Appalachia as a concept in its post coal or post-small farm twenty-first century state. Much deemed Appalachian, with examination through Rural Studies, can nearly be pointed out to be located also in other rural American places, from foods to self-reliance myths to music traditions.²⁰

Moreover, what additionally prodded my suspicions in the case of both coal and poverty and the narratives embracing their intertwinings and interwovenness was a question that many narratives seem to have shadowing their content, lurking in the background but rarely coming forward: what is the relationship between Appalachian coal production and Appalachian

¹⁹Billings, Dwight, Mary Beth Pudup, and Altina Waller, “Taking Exception with Exceptionalism: The Emergence and Transformation of Historical Studies of Appalachia,” in Billings, Pudup, and Waller, eds, *Appalachia in the Making: The Mountain South in the Nineteenth Century*. Chapel Hill: Univ. of North Carolina Press, 1995.

²⁰ Brown, David L., and Louis E. Swanson. *Challenges for Rural America in the Twenty-First Century*. Penn State Press, 2010; Schafft, Kai A., and Alicia Youngblood Jackson. *Rural Education for the Twenty-First Century: Identity, Place, and Community in a Globalizing World*. University Park, PA: Pennsylvania State University Press, 2010; Campbell, Hugh, Michael Mayerfeld Bell, and Margaret Finney, eds. *Country Boys : Masculinity and Rural Life*, 2006; Duncan, Cynthia. *Worlds Apart: Why Poverty Persists in Rural America*. New Haven: Yale University Press, 1999; Johnson, Kenneth. “Demographic Trends in Rural and Small Town America.” *The Carsey School of Public Policy at the Scholars' Repository*, March 15, 2006. <http://scholars.unh.edu/carsey/5>; Dunaway, Wilma. *The First American Frontier: Transition to Capitalism in Southern Appalachia, 1700-1860 (The Fred W. Morrison Series in Southern Studies)*. Chapel Hill: The University of North Carolina Press, 1996.

poverty? Likewise, cultural and family myths have built up on the same themes of why people stay though poverty persists, spouted in phrases like, “These people will never leave. They have mined here for generations.” Or, in turn, other myths of ancestral right and bravery with respect to the local land’s defense: at a conference on “Social Enterprise” in 2016 at Marshall University in Huntington, West Virginia, I heard a speaker proclaim her family’s fight against surface mining—they did it because this land was her granddaddy’s. Her take: her family’s historical ownership was more authentic than what a coal company would lay claim to. From this kind of claim, as well as other contemporary discussion on coal and poverty, I tease out the coal + poverty backgrounded narratives that go something like this:

Look at this mess—it’s an environmental and social nightmare. Just why on god’s green earth would anyone mine coal? What is the matter with these people that they would do this or live here?

People are so poor here. Why do they stay? You must be awfully damn dumb, corrupt, hopeless, ignorant, to stay or to have even come here at all.

Well, look at them. It has always been this way. These people, this coal; these people, these mountains.

My claim, as a White person with ancestors who settled these hills, regardless of how I came to be in them, my claim is stronger, more authentic, more caring, more nurturing, more thoughtful, by virtue of my longer claim and ownership.

INTRODUCTION

Overview of Dissertation

In *Making and Breaking Big Rural: Science and Technology Construct the Coalfield* I set myself several tasks and theoretical inquiries. For example,

- What combination of contexts and constructs are we missing when theorizing the rural space in the United States?
- Moreover, what combinations of theoretical insights might bring us fresh perspectives, and new approaches to contending with the rural industrial space and its future?

Familiar with the Pocahontas Coalfield and its myriad of social, economic, and ecological issues, I utilize it as a case study to unveil the socio-technical construction of rural industrial spaces more generally.

I do not prefer or rely upon one theory for a defining explanation. Instead, I propose additional theoretical applications to ones often already employed. I also seek to bring other actors into the academic discussion, ones not usually also associated with or often discussed in this context. In the case of this dissertation, those actors include the scientists and engineers responsible for the knowledge creation that makes this rural industrial space possible. I interrogate how might these research actors, these knowledge creators, create knowledge differently in and for this kind of space. I propose an ethics of civic science that could steer this participation.

Powerful guides to me in this interrogation include the theory of large technical systems (LTS), the explanatory force of metis—or local and intimate knowledge, the problems of living space that is nearly synonymous with the work space, and the concept that science and technology promote creative destruction and how the issues of automation of work in the single

sector rural space riddles the creative destruction theory with holes. In all of this, I am concerned with the democratic citizen, and whether the person in this space is as free, as equal, as a person in another kind of modern capitalist space, such as a metropolis. I propose that democracy does not happen by accident; it must be supported through concerted strategy, policy, and action...and it, much less its benefits, are not equally distributed across a democratic republic such as ours. There is such a thing as being more free or less free.

This journey of what to do about this space I trace to the initial intentions at the inception there of this phase of industrial science and technology. Of course it is impossible to know the “true heart” or actual intention of anyone, but in the case of this dissertation, I give the main lobbyist or advocate for the benefits of the Pocahontas Coalfield and its creation as an industrial space—I grant him the benefit of the doubt. This initial call for development of Southwest Virginia and Southern West Virginia’s mineral resources is a matter, for one Jedediah Hotchkiss, of economic development of the region to draw the region out of economic depression, to ally it more closely with the industrial north, and to jumpstart Virginia’s economic activity beyond agriculture post-Civil War.

What struck me as worth carrying forward into discussion today of continued scientific engagement in that space is Hotchkiss’ expression of civic duty as a researcher and advocate. It is highly unlikely he could have predicted the region’s current state...and, this aside, what ought the scientific and technical civic duty in this space be now?

Moreover, opening the black box of this space as being part of the large technical system of energy allowed me to extend the black boxing of the technical system also to the people in this space functioning collectively as technology to feed this industrial sector. While social and rural studies explanations have been applied to why these people are ignored in the larger culture,

extending LTS to their absence in political and cultural power affords another road into the rural industrial space and its many layers of socio-technical co-production.

Moreover, the introduction mid and late 20th century of massive machinery into this space created the erasure of life beyond work (places to hunt, to be in the woods, to engage in growing food—gone under the wheels of monster dump trucks and gargantuan draglines), and underscores how science and technology do not necessarily contribute to knowledge accumulation, but to knowledge destruction. For example, surface mining machines (by the way, first used in the making of highways) not only erase the earth, but also erase the intimate knowledges humans have of and in that space. In the extreme, these machines become harbingers of death, where science and technology knowledge contributes to the death of a community as a social unit, and quite also possibly to the actual death of citizens...yet, before any this, the death of aspects of democracy, such as freedom of movement and of equity.

The intention for this space may have been at least complex in its initial phase: economic growth in a model proposing economic growth (capitalism), economic shift from agrarian extraction to mineral extraction, a space where these do not compete, but complement. This was, then, a story of land grabs, coal wranglers and workers.

Over time and with the advent of more “sophisticated” science and technology, science and technology erased the need for workers, then also erased the surface spaces themselves, and the former multi-layered work, leisure, cultural, and land-based sustenance possibilities of those spaces.

My goal in this dissertation is not only to understand the Pocahontas Coalfield in isolation, but to theorize this space as a kind, a type, a space also as highly classified, commodified, and intervened in as much as those in society’s centers: cities, important

suburbias. To these ends, in terms of the future of science and technology and work, in particular, to quote someone now on the board of the nonprofit I co-founded to contend with the economic ramifications on workers in the region and whom I quote again later in this dissertation—I have seen the future and it looks like Appalachia:

- Decent paying work automated away and replaced with low wage jobs or no jobs.
- Social trust eroded through the gutting of institutions created during the rise of industry to contend with the effects of the rise of industry.
- Long-term economic depression.... Running actually at some 30% for this region for 70 years.
- Statutory ineffectiveness—state borders and provincialism hindering cohesive approaches.
- Little cross-rural contact or organization to other regions similarly affected.
- A regional set of public universities disinterested, at best, in solving regional issues, favoring instead large federal and corporate grants serving corporate interests.
- Regions largely cut loose to fend for themselves amid addiction, poverty, and a host of other deficits.
- Multi-generational disconnect to lifeways, foodways, passed down knowledge, that might have enabled a family and a community to survive without public or federal assistance if the land had not also been ruined.
- The climate already radically changed locally through industrial processes serving clients globally

Given this bleak picture of the rural industrial space in the 21st Century and its outlook, how might we come out of this and change this course?

In the realm of policy and strategy, there are many possibilities. For the dissertation, I focus on ones related to research, research agendas, science and technology research, and academic research. I encourage science and technology research to benefit the region of interest, to address the region's industrially-created deficits. In the realm of the practice, I encourage and outline research as the basis for new approaches—an on-the-ground approach to seek to boost land-based sectors that are unlikely to be automated away, and in the process to steward the land, the scarred land, the sullied water, to local knowledge based in the community...back to health.

I seek to inform how to cross into conversation and partnership with unlikely bedfellows, the second and third generation coal wranglers, as those are the ones, for now, with the capital.

How can we rehabilitate ruined land, re-establish social trust and re-establish metis of place?

Can we solve every problem? No. That is beyond the scope of reasonable expectations, but we can begin conversations, connections, across our region in ways that make sense, that go beyond the statutory borders, and which provide other means to livelihood, at least for now, and also that are restorative of people, land, place, environment.

A dissertation is a limited work—and to paraphrase my dissertation advisor from my doctoral orientation in 2011—the dissertation is not the end of one's work, but the gate to pass through toward the life also as a scholar among scholars.

Given more or endless time, I would have followed scientists and engineers currently at work on or working in the Pocahontas Coalfield. I would have deeply explored their culture. In particular, I would have observed and participated in classes, seminars, conferences in geology, mining engineering... become well-versed in how the scientists and engineers continuing to enable the intervention of mining in the Pocahontas Coalfield—how they characterize their

work, each other, what they hope to attain in their work, and their relationship to science as a knowledge-creating practice, and their relationships to civic duty, to citizenship, and to corporations, workers, politicians.

I would have conducted a comparative study—examined another rural industrial intervention or even interventions in the US and abroad, tested my contentions regarding LTS, the single sector totalitarian work/life space, the loss of metis with the most efficient rural industrial flattening of space, the democracy deficits of the single sector space, and the multiple layers to the devastation of the automation away of work in these rural single sector spaces.

I would have examined more places where work was automated away, no other jobs “creatively” rising to take their places, or, if rising, with lower pay, fewer or no benefits.

Alas, my time was not endless, and I now view this dissertation as a means of writing myself to some way to make sense of the coalfield as a microcosm, even a kind a field laboratory...not caught forever, however, in this rural industrial intervention, but a space intentionally invented, with a distinct and discernible beginning, and, maybe even a kind of end.

Through my dissertation I have written myself to an introduction and a conclusion to bracket the next steps of examining the people reconfiguring their social, economic, and even cultural identities with respect to living in a “coalfield”—a place distinct in its place being named also by its industrial utility or industrial asset. The framing I have constituted for this dissertation stands as useful in its application and my insistence that this space can be conceived of in its totality, and, it can be examined as a place created.

For if it was created once, it can be created again...and I am not afraid to assert how this space ought to be created henceforth. I began my doctoral work to increase my comprehension of this kind of space and also to fathom what kind of intervention might change its course to be

more life-giving than death-generating. For me, in this case, to know is not enough. To know and to see how else this space could be, and to comprehend the potential means for getting there, in this case, to not act would be soul-crushing, and, frankly, not scholarly—for, I also have learned tremendously through interacting, through being out and about with people in the polity, from being a place-engaged scholar.

In the end, I could not and have not escaped to an objective perspective devoid of intimate knowledge, emptied of James Scott’s metis. I have come to be able to slide from the snow globe to its top and peer down inside, and to slip through and be of it and exterior to it at the same time.

This dissertation stands as my close observation of a rural industrial space. I am glad to review its merits and its deficiencies with an eye toward better and more thorough and more useful theoretical application and explanation of the rural.

Structural Overview

In the following three chapters, I examine the role of science and technology research and practice in constructing the rural industrial space of the Pocahontas Coalfield, what this large technical intervention has contributed to socially and economically in this rural industrial space, and then propose how science and technology, as academic practices and research and development, ought to proceed in this rural industrial space or in the rural space more generally.

I also work from the perspective that the industrial rural space and its proliferation constitute a kind of “big” modern project akin to other corporate projects such as big banking, big ag, big pharma. We assume these are too big to fail; we assume they cannot be overhauled, or, done without.

In the *Introduction* I propose gaps in the academic fields my examination draws from, provide context for constructs such as “rural” and “big rural” and “industrial” and “Appalachia.” I then provide essential background on why the Pocahontas Coalfield merits an STS examination.

In my review of texts in rural sociology, rural studies, urban studies, and Appalachian Studies I have yet to encounter abundant analysis and engagement regarding the science and technology that serves as the base for the coalfields of this region. However, in Science and Technology Studies, through the lens of history of technology, Anthony Wallace’s detailed history of the coal mining town of St. Clair, Pennsylvania, stands as an exception in its discussion of the geology enabling, then disproving, the capacity for economically viable mining in that location.²¹ The threads of potential current inquiry into the science and engineering enabling the Pocahontas Coalfield continue to intrigue me; even a casual flip through a recent issue of *Mining Magazine* reveals connections to their continued construction of this space not only in material space but also in material culture. These bring me to lines of inquiry such as:

- What science and/or technology enables the big rural industrial space?
- Who perform its science and engineering?
- What technology constructs this mining space?
- What kind of money follows these scientists and engineers? Who employs them? Where? How?

Science and Technology Studies affords me the opportunity to layer in another question, absent in the discussion of this region: *How ought scientists and engineers engage with this space they also construct?*

²¹ Wallace, Anthony F. C. *Saint Clair: A Nineteenth Century Coal Town’s Experience with a Disaster-Prone Industry*. New York: Random House, 1987.

Numerous other scholars have more thoroughly addressed the issues of labor, identity, power, region, culture, politics, gender, race, ethnicity, and capital in the case study in question.²² Thus, I reference their work when appropriate, but my concerns pull from narratives less obvious in most popular or academic discussions of this rural space: large technical systems, laboratories, philosophy of technology, philosophy of science, sociology and history of technology, and urban studies.²³

I also examine this space as an examination of technological intervention performing economic stimulus, creating the commerce and economy.²⁴ Far from a new topic, Appalachian scholar Talmage Stanley completed a thorough, though not without issue, examination of the “Poco Field” [Pocahontas Coalfield] in both his dissertation and in an academic text. For family and personal reasons, Stanley was drawn to review the role of the Pocahontas Coalfield mid-twentieth century in fulfilling its promise of middle class prosperity. He outlines important background statistics for this industrial space:

1860: McDowell County [site of the West Virginia Pocahontas Coalfield] stood at 1,535 persons.

1880 = 3,074; 1890 = 7,300. [First industrial scale mine opened there in 1883].²⁵

²² For example: Gaventa, John. *Power and Powerlessness: Quiescence and Rebellion in an Appalachian Valley*. Chicago: University of Illinois Press, 1982; Clark, Amy D., and Nancy M. Hayward. *Talking Appalachian: Voice, Identity, and Community*. University Press of Kentucky, 2014; Lewis, Ronald L. *Black Coal Miners in America: Race, Class, and Community Conflict, 1780-1980*. The University Press of Kentucky, 1987.

²³ In urban studies can be found remnants of a once robust academic field: rural studies. By the 1960s many rural studies departments in the United States had shut down, leaving two prominent ones active: Ohio State University and McGill.

²⁴ Douglas Reichert Powell in *Critical Regionalism: Connecting Politics and Culture in an American Landscape* illuminates his use of space over place in his discussion of various sites he examines in Appalachia. Drawing and extending from his use, while a place often merits statutory description in legal codes, space connotes a place being produced, not fixed, and emanating beyond its statutory borders. While the Pocahontas Coalfield can be located on a map as a defined place, it is a space in flux in terms of what that space means, its purpose, its kind of citizenry, its technology and science. I do not employ the terms “space” and “place” interchangeably.

²⁵ Stanley, Talmage, 1996.

1900 = 18,747.

1940 = 94,354 persons. The coal boom associated with World War II brought the peak to 100,000 persons.²⁶

Stanley displays a table of two main Virginia counties that drew workers to McDowell County, West Virginia, to work and these counties' population growth over that time period—Carroll and Pulaski Counties lost population as McDowell's grew.

The industrial demand for people to mine coal stands as obvious in that table. Stanley explains how:

the heavily **industrialized and urbanized** [emphasis is mine] Pocahontas Coalfield were a place of extraordinary wealth, power, promise, and possibility. In many people's lives, the Pocahontas field came to be associated with the struggle to lay claim to a future in the American middle class as it was defined within the social context of that place...At the same time these processes were changing, they have also been continuous with the history in which the coal-rich Cumberland-Allegheny Mountains were a part of global patterns of consumption and accumulation.....The opening of the Norfolk and Western Railroad west to markets across the Ohio and east to shipping terminals at Tidewater ports, propelled a history of explosive expansion and investment. In order to acquire and retain absolute control over coal and the certain profits to be made from it, capitalists undertook a frenzied reorganization of places in Appalachia, the South, and even the world...The Pocahontas Coal Operators Association retained Phil Conley as its propagandist to use letters, pamphlets, magazines, speeches, articles, and books, to exhort the public about the benefits of Pocahontas coal. Conley constantly brought attention to the benevolence of coal companies, the progress wrought by the coal industry, and the benefits to civilization from burning the coal mined in... [the Pocahontas Coalfield].

To the discussion in the *Preface* of pastoral Appalachian purity and degradation, this excerpt layers in industrialism, class, population growth for coal work, aspiration, capital, capitalists, and coal operator propaganda. These lay significant and important groundwork for

²⁶ Ibid.

parsing the Pocahontas Coalfield as a technological and scientific space, and, as an exemplification of rural industrial spaces more generally.

In this dissertation, I examine the role of science and technology research constructing the Pocahontas Coalfield, what this science and technology has contributed to, the throughline of current science and technology, and then propose how science and technology, as academic practices and research and development, ought to proceed in this rural industrial space or in the rural more generally.

Within the American context one move to discuss technology in terms of the rural would be to focus on the potential impacts of specific technologies: for example, the potential of broadband to help rural artisans reach broader markets, or by contrast, the potential for broadband as a force of potential disruption of some kinds of imaginary pristine or homogeneous rural culture. Another move may be to analyze the hypermasculinity of large rural machines such as industrial combines or draglines and how those dictate how and what serves as masculine or feminine, and explain this phenomenon for the benefit of an academic audience outside of the countryside. Yet, another move could be to reconstruct the cultural changes stemming from the introduction of any of a wide range of machines, from new sitting hair dryers at the beauty shop (in places where people still go to “beauty shops”) that emphasize a technology most likely to be used in a form for which it was designed. Likewise, I could examine the effects of the latest military-style video games on rural children’s lives (where rural inhabitants are more likely to enroll in military service), or of cellphones for keeping track of medical issues of rural health, or of other kinds of infrastructural technology such as a lack of sewage infrastructure on rural areas

in Appalachia or on Indian Reservations and how that kind of technological system (or the lack of it) impacts rural health and the environment.²⁷

In theorizing and addressing the technology of the rural, I opt for a very different direction. Rather than focus hyper-locally on specific machines in the rural, or at work on the rural, I globalize experience, but not to flatten or erase it or make invisible any one kind of inhabitant or geography. Instead, I seek to make the case for interconnections that stretch beyond a hyper specific rural space. The field of Science and Technology Studies offers powerful analytical tools such as large technical systems (LTS), laboratories in the field, co-production, problems of categorization and classification, and issues of science in the polity for theorizing the rural industrial space.²⁸

Rurality has not been a traditional object of inquiry in STS. This dissertation serves to address a gap in STS theoretical examination and exploration, in particular in the creation of large technical systems (LTS): how rural people in the rural industrial space function in LTS, and the results and risks of large scale technological interventions. The last fifty years have seen a plethora of scholarship on this space and the greater Appalachia region incorporating deeply personal reckonings, labor war witnessing, and environmental wreckage testimonies—an often intimate scholarship.²⁹ No on-the-nose answer exists as to what renders the Pocahontas Coalfield

²⁷ For example: LaRose, Robert, Jennifer Gregg, Sharon Stover, Joseph Straubhaar, and Serena Carpenter. "Closing the Rural Broadband Gap: Promoting Adoption of the Internet in Rural America." *Telecommunications Policy* 31, no. 6 (2007): 359–73.; Horowitz, Roger. *Boys and Their Toys: Masculinity, Class and Technology in America (Hagley Perspectives on Business and Culture)*. New York/London: Routledge, 2001; Krishna, Santosh, Suzanne Austin Boren, and E. Andrew Bates. "Healthcare via Cell Phones: A Systematic Review." *Telemedicine and E-Health* 15, no. 3 (April 2009): 231–40. "Liao**, H., L Krometis, C. Hession, R. Benitez, R. Sawyer, E. Schaeberg, E. von Wagoner, B. Badgley. 2015. Storm loadings of general and human-specific fecal indicators in an inland urban stream. *Science of the Total Environment (530/531)*: 347-356. [re: sewage infrastructure]

²⁸ Roochnik, David. "Socrates's Use of the Techne-Analogy." *Journal of the History of Philosophy* 24, no. 3 (1986): 295–310; Feenberg, Andrew. "What Is Philosophy of Technology?" In *Defining Technological Literacy*, edited by J.R. Dakers. New York: Palgrave Macmillan, 2006.

²⁹ See footnotes 18, 19, and 25, for examples.

a highly technical space, but to circle closer to a range of answers, I draw from what I have thus far encountered in academic scholarship and contend with technologies and the creation of rational lands and spaces through STS.³⁰

In popular culture, in social media, from the executive branch, from politicians and company men, but also from scholars—I am weary of tired rhetorics and of myths and monsters: the easy and comfortable way from any “side” of the current political currents—whether it be the coal industry making out President Obama to be an evil job killer, or environmentalists protesting surface mines on site antagonizing coal miners, when the real bosses who call the shots live hundreds of miles away. As a scholar, I do not bring any new ammunition to these entrenched fights. Furthermore, I also generally have been far more interested in the heart of darkness in us all or, maybe said differently, but for the grace of God there go I. I do not think fueling fires or poisoning wells gains me further insights in terms of understanding the snow globe that was and is the Pocahontas Coalfield, and, how, moving forward, that industry now forever *mise en scene* can be switched up.

Moreover, I am also fatigued of discussion of abstracts in action—capital acts, capital does, rather than a naming of capitalist names. While I draw upon the work of David Harvey and others who work also in general constructs such as “the economy” and “community” or even, “rural,” I hone down the definitions, especially in the case of the latter. Though I work from a broader view of my subjects and search for a type, a representational quality, how they function as examples, I also want to see all the subjects involved as human. If I afford myself the stunted

³⁰ I also include epidemiological as recent academic cum political controversy regarding Appalachia and this space of the Pocahontas Coalfield circles on the debates regarding Michael J. Hendryx’s and Melissa Ahern’s work on correlations of health outcomes in surface mining adjacent living spaces. Their work has opened up public health and epidemiological debate on why certain Appalachian spaces host so many chronic illnesses and whether these can definitively be proven to be work, and not culturally, related.

intellectual road of painting concrete or abstract enemies, spin academic yarns of capitalist or backwards barbarians, then I open the door for any numbers of targets for whom I have deep sympathy to be also rendered subpar, to be likewise abstracted as “they,” as “them”: the poorest folks, the lowest caste, the drug users, the left-behind elderly—those in deep struggle living in the Pocahontas Coalfield region. This space’s cyclical booms and busts have transferred the fountain of luck so often that each subsequent pour has left new sets of folks high and dry.

The Importance of Field Observations: *Academic and Stakeholder Conversations that Need to Happen*

From April 2015 till September 2016, working with mining and oil engineers, I read more than seventy-five papers in mining safety engineering, reclamation science, fish and wildlife, economics, hydrology, mining engineering, epidemiology, and biological systems engineering. I interacted with more than 40 researchers in these fields. I kept abreast of research and economic trends and issues in coal and natural gas production in the United States. I visited major Appalachian coalfields as well as natural gas shale plays. I attended a conference on land reclamation and one on society and energy production (from a fossil fuel perspective). I listened to mining engineering colleagues discuss climate change, energy abundance, energy independence, energy policy, Environmental Protection Agency regulations, and jobs. At these two scientific conferences I ran into no recognizable participants affiliated with Appalachian Studies or Science and Technology Studies. Likewise, in 2017, at the Appalachian Studies Conference, I ran into no academics or colleagues from the cadre of more than 40 scholars, scientists, and engineers I worked with from seven universities in Appalachia.

In this dissertation, though I contend with the facts on the ground and the results of the single sector coal mining industry in the Pocahontas Coalfield, my aim in macro analysis remains *systems* rather than individual or even specific rural industrial spaces. In no work that I reviewed which also engaged heavily with the social and cultural context, save for Anthony Wallace's (STS) and somewhat in Jerry Bruce Thomas' (Appalachian Studies) work, was the black box of scientific and technical practice in the Appalachian Coalfields cracked open. With my hands in STS, one foot in Appalachian/Rural Studies, one foot in the a cross-section of the scientific and technical practice of the fossil energy industry in Appalachia, and, also attending a range of nonprofit and economic conferences aimed at Appalachian "transition" away from fossil energy sector read *coal* dependence, I remain struck by how definitively and completely these latter three sets of major stakeholders in Appalachia operate with little to no cross conversation. I spoke with professionals engaged in the fossil energy sector directly or as scientific and technical experts, by far and away the most impactful cultural group on Appalachia itself, whose perspective and outlook on Appalachia, vision for its future, justifications for its social and economic issues, remain largely unexamined in STS and other relevant literatures. In consideration of completing my dissertation in a timely manner, and also out of concerns for a conflict of interest while working with an energy group, I could not also then take on a new set of subjects for qualitative interviews beyond the grasstops interviewees I engaged. However, my work within the energy sector convinced me of the necessity of considering the role of current scientific and technical expertise and the culture of that expertise in the rural industrial space.

Again, major gaps remain in understanding the cultural practice of scientists and engineers in fossil energy production in the Appalachian rural industrial space. I contend with this need in my dissertation by emphasizing the saliency of science and technological research

practice in constructing the rural industrial space and by underscoring that array of practices. While these scientific and technical practices and their accompanying culture or use may seem obvious to practitioners of Science and Technology Studies, not every other reader that may encounter this dissertation will necessarily be as prepared to accept that premise. Had I not worked in the fossil energy sector and read as widely as I did while briefly engaged with it, I too would have presented a less nuanced examination of the actors behind the region's "capital" and its "technology."

One aside worth recounting: in early 2016, at a conference of major regional and federal economic development funders, the question arose of whether it is safe to farm in places formerly mined (though coal is not the only mineral mined in the Appalachia or with potential impact on agriculture). For economic development work I was engaged in adjacent to my academic work, and, at that time, for my professional work with the Virginia Center for Coal and Energy Research, I had reached out to a range of scientists on this exact question. I raised my hand and answered the inquiry. I followed up by emailing several leaders from this group. I sent them the contact information of scientists to engage. I interviewed scientists, created a set of protocols for interested parties to follow, and published them to the web.

The very people most needed to answer this inquiry with expertise so that sound economic development decisions could be made were not only not in that room, but from my field observations, operating in an entirely different social and professional circle in the region. From participant observation working with scientific and technical researchers, from my literature review of Appalachian, STS, and rural sociology and studies, and from my analysis of conference materials and nonprofit conferences, here is what I have surmised.

The public relations rhetoric of land fights regarding surface mining and natural gas pipelines has deepened an already large communication rift between those parties, academic and nonprofit, seeking to transition away from a fossil fuel dependent regional energy economy, and the scientists and engineers that work for those fossil fuel industries.³¹

The cultural studies and nonprofit community may not grasp the need for understanding the current scientific and technical practices of the current rural industrial space—the tropes of non-industrial Appalachian experience can mask the current and historical contaminations in a rural brownfield site that “seems” restored, where the scientific fact remains that each site, due to its unique geology, hydrology, and scientific and technical (read, *industrial*) history, requires individualized scientific and technical protocols, and, could for generations.³²

Because the rural space at hand is also industrial with a long industrial history, site-specific technical history along with current technical advisement must be included and implemented in new plans for site intervention. If not, contamination, geological (literal landform or potential for landform shifts), hydrological (water moves, and new issues have the potential to arise or resurface) and legal risks (to workers, to consumers) may not be mitigated.

To truly grasp the current on-the-ground economic situation, academics and nonprofits investing in economic and social change ought also to track and to follow the region’s fossil fuels and other natural-resource based industries and their accompanying partner organizations, academic departments, lobbying efforts, conferences, federal agencies, PR campaigns, donations, etc. My experience as a participant-observer during doctoral fieldwork convinced me of the need

³¹ Turrentine, Jeff. “Coal Is Literally Killing Us,” June 30, 2016. <https://www.nrdc.org/onearth/coal-literally-killing-us>; n.d. <http://www.coal-is-dirty.com/the-coal-hard-facts>; <https://www.friendsofcoal.org/>, n.d. I Martin, Richard. *Coal Wars: The Future of Energy and the Fate of the Planet*. New York: St. Martin’s Press, 2015.

³² Interview with Chris Barton, University of Kentucky, Regarding Contamination in Mine Regions and the Suitability of Said Region for Agriculture for Human Consumption, July 2016.

for bridges and engagement to be built across this wide aisle. In terms of creating regional culture and constructing regional rural space, the fossil fuel and other natural resource extraction industries continue to punch above their weight, and, to reiterate, they use science and engineering to accomplish economic and technical needs or wants, and, as an industry, always have. Those scientists and engineers are largely trained at the region's research universities. There are also large stakes for those people and the departments in which they are educated should local extractive industries greatly shift. The employ of these local scientists and engineers and the departments where they trained form part of a system of support for the local fossil fuel industry.

The following chart represents what I have ascertained to be the human actors with power in the fossil energy sector in the Appalachian Region.³³ Though I hesitate to situate science and technology research as underlying or as the common through line among the actors on the chart, without adequate scientific and technical expertise the energy sector could neither meet economic imperatives nor regulatory demands.³⁴

³³ As STS also has a theoretical tradition of assessing and including non-human actors (Latour, Bruno. *Science in Action: How to Follow Scientists and Engineers through Society*. Cambridge, MA: Harvard University Press, 1987; Haraway, Donna. *Simians, Cyborgs and Women: The Reinvention of Nature*. New York: Routledge, 1991), I have chosen to limit my theoretical discussion to those that are human. However, Actor Network Theory could readily be applied to the lifeforms mimicking human habitability in the coal producing zones: microinvertebrates, salamanders, dace, E. Coli bacteria. For example: Cook, N., Krometis, L. and Sarver, E., Inventory of Bacterial and Biological Impairments in Central Appalachia, In: J.R. Craynon (ed.), Environmental Considerations in Energy Production, April 14-18, 2013, Charleston, WV. Soc. Mining Met. & Explor., Englewood, CO, pg. 214-227; Sweeten, S., Sweeten, J., Craynon, J., Ford, W., and Schoenholtz, S. Evaluation of Current Measures of Aquatic Biological Integrity in the Central Appalachian Coalfields: Efficacy and Implications. In: J.R. Craynon (ed.) Environmental Considerations in Energy Productions, April 14-18, 2013, Charleston, WV. pp. 381 – 394.

³⁴ For example, Environmental Protection Agency regulations regarding water and surface mining requires scientific expertise in order for industry to meet regulations. For one small sample, see: Review of Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams, <https://archive.epa.gov/water/archive/web/pdf/epa-sab-11-006-unsigned.pdf>

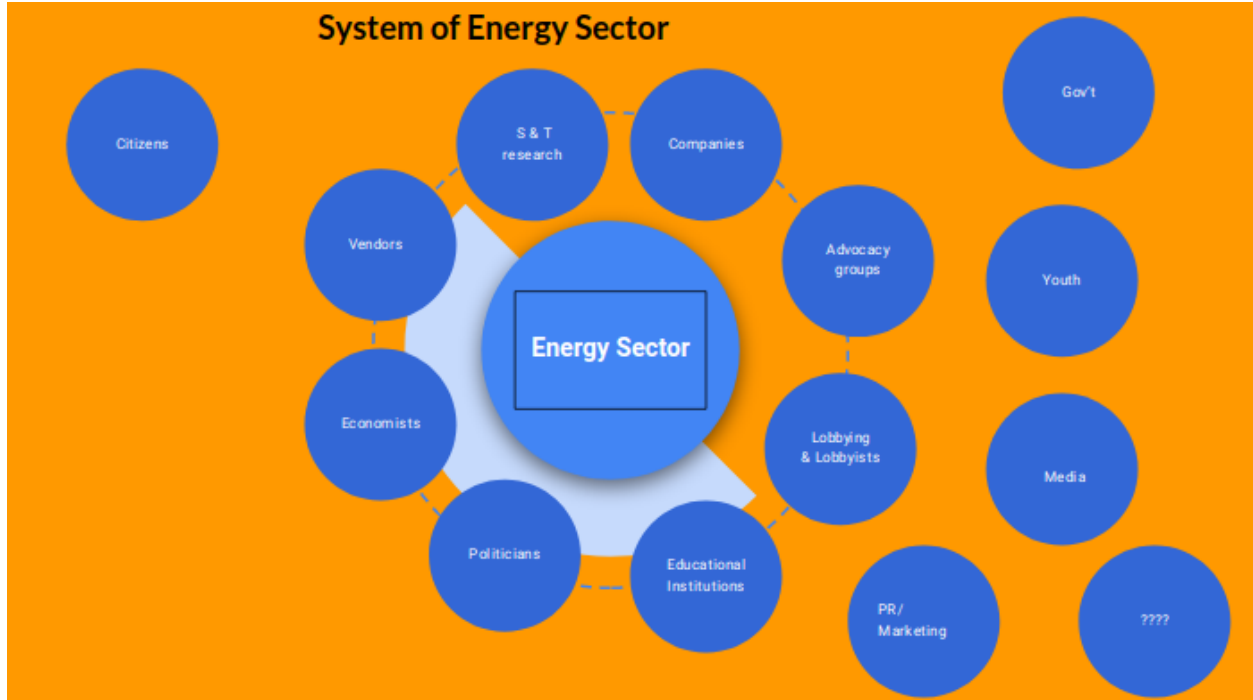


Figure 3. System of Energy Sector Model, Cook Marshall 2017. In this model, I map the major stakeholders that enable the energy industry to occur in a particular region. Note that energy production does not only consist of producers and buyers—research, lobbyists, education, marketing, advocacy, etc. all exist as part of the enabling factors of the energy sector. The major players I included on the inside circle. The others play supporting roles. The large half-moon represents the turn and swing of economic capital, which can be funneled toward necessary actors as industry interests shift.

In STS, we could approach the relationships on this chart through several lenses. Science and technology research for the energy sector co-produces with these actors: all of the stakeholders on this chart constitute “mining engineering” as they work in tandem, with the more closely-related actors spinning together on the center wheel and the half-wheel “investment capital” buoying the spins.³⁵ I could also re-create this chart to examine the rural industrial space as a kind of system.

³⁵ Jasanoff, Sheila. *States of Knowledge: The Co-Production of Science and the Social Order*. International Library of Sociology. New York: Routledge, 2004.

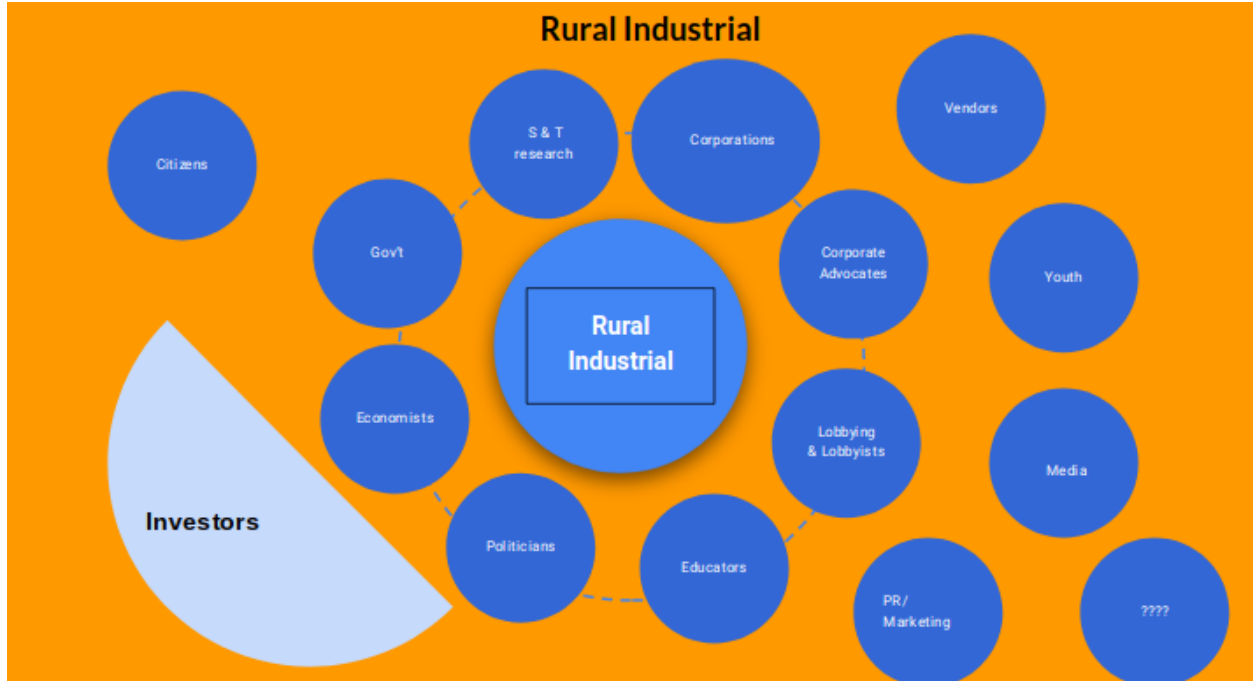


Figure 4. Rural Industrial as a System, Model. Cook Marshall, 2017.

In the chart above, I pull the investors to the side as though they may underwrite the rural industrial space, they rarely engage in the place of the rural industrial; their money funds it, but they do not engage in place creation in the here and now.³⁶ I demarcate “citizens” as those rural industrial space participants affected by what political scientist Deborah Stone terms “corporate actors” meaning entities that can exhibit so much control over individuals, that the power of these entities ought to be especially limited, such as those on the center wheel.³⁷ In my areas of academic review, I encountered abundant analysis of citizen, politician, government, and media stance or participation in the creation of the rural.³⁸ I encountered corporations and investors black-boxed under “capital.” I have encountered very little studies area (Science and

³⁶ Scott, Rebecca, 2010.

³⁷ Stone, Deborah. *Policy Paradox: The Art of Political Decision Making*. New York: Norton, 2001.

³⁸ See footnotes 18, 19, and 25, for examples.

Technology, Appalachian, Rural) concerned with theorizing the science and technology actors in the rural industrial space, especially at the more macro level.

While working for the energy group at Virginia Tech, I met a number of people from my home state of West Virginia as well as from Southeast Ohio, and Appalachian Kentucky and Pennsylvania for whom some kind of affiliation with a fossil fuel energy had provided a good living, and who earnestly believed the tradeoffs for this fossil fuel's deployment were worthwhile, and could cite solid statistics on what cheap fossil fuel energy had created in the United States in terms of material prosperity.³⁹ These were people who largely went to college locally—or not far from home—bright people with a proclivity for math, or technical modeling, or a love of geology, hydrology, statistics. I met any number of women involved in geology, forestry, fish and wildlife, and reclamation science—people who belonged to groups like Wild Women of Reclamation, Young Energy Professionals, the Association of Women in Energy, who networked in smaller energy-focused cities: Pittsburgh, Pennsylvania; Charleston, West Virginia; Lexington, Kentucky. I contend that the scientists, medical researchers, and engineers with whom I discussed the economics of the region, and its poverty and corruption, do not

³⁹ Alex Epstein is a favorite speaker with this crowd. Epstein wrote *The Moral Case for Fossil Fuels*, New York: Portfolio, 2014. He is criticized as a climate denier and of playing loose and free with facts (Gade, Eric. "Rebuilding the Ark: Alex Epstein and the Moral Case for Fossil Fuels," Los Angeles Review of Books. August 4, 2017.). Nevertheless, cheap energy has brought and enabled tremendous material prosperity and enabled the industrialization of Western society. Epstein is wrong, however, that fossil fuels must be the continued major means of cheap energy delivery. However, they remain the major players for now: ("U.S. Energy Facts Explained." U.S. Energy Information Administration, 2016. https://www.eia.gov/energyexplained/?page=us_energy_home)

Natural gas—33%

Petroleum (crude oil and natural gas plant liquids)—28%

Coal—17%

Renewable energy—12%

Nuclear electric power—10%

Whether we find their use moral, we continue to use them for more than 75% of our energy output in the United States—not including what American-based corporations use for energy production abroad. Fossil fuel use continues to require scientific and technical expertise. Researchers in the fossil energy industry may rightly point to our gap in what we prefer to what we consume. (Atkin, Emily. "Al Gore's Carbon Footprint Doesn't Matter," August 7, 2017. <https://newrepublic.com/article/144199/al-gores-carbon-footprint-doesnt-matter>) versus what we actually consume.

conspiratorially contribute to either of the latter. In 2015 I argued with a prominent regional journalist when he insisted that these scientists and engineers indeed sought definitively to take the side of the fossil energy corporations; I asked him if he understood how scientific careers worked, the need for peer review, the unlikely obvious or explicit for hire by industry of the university-based researcher. I countered, as unlikely as it may seem, that university-associated scholars may stand in a different worldview, or even paradigm, with respect to social, economic, and scientific facts regarding the region. I am not seeking to apologize for anyone, but to understand how this fossil energy sector constructs a rural industrial space, and, if we know this, whether we can intervene with other science, research, technology, means, people, for outcomes other than what we currently have.

I can see the hackles up on some readers' backs: but, but, but—*Don Blankenship*. Read on—I theorize and contend with Massey Energy, but, again...it is not that I do not have a dog in this fight: I am the dog, I am of the dogs. And, contrary to popular belief, we can learn new tricks. Yet to mix metaphors, we first also have to understand in some new ways the bird in the hand.

In STS we have a tradition of examining laboratories.⁴⁰ The Pocahontas Coalfield is enabled by science and engineering, scientists and engineers in geology, hydrology, mining engineering, safety engineering, reclamation science, materials engineering, etc.—its “natural” environment has become a cauldron of varying and various chemical inputs—legal and illegal, hydrologic machinations, geologic dumpings, and externalization of environmental costs shaftings. From the latter quarter of the nineteenth century, the whole “built” environment, from

⁴⁰ Latour, Bruno, and Steve Woolgar. *Laboratory Life: The Construction of Scientific Facts*. 2nd ed. Princeton: Princeton University Press, 1986; Kohler, Robert E. *Landscapes and Labscapes: Exploring the Lab-Field Border in Biology*. Chicago: The University of Chicago Press, 2002.

the employ of people to the railroad to the movie theater to the churches, was constructed as an extension of people as technology to service the coal industry: nature and people as industrial laboratory. Nature and people as technology, serving up coal. Coal as the institutional force—the power of the king; the regional panopticon, King Coal, sees you everywhere you go; even if you don't work for the king, you rally to his defense.

Without geology and mining engineering, there would be no Pocahontas Coalfield. I question the aim of these sciences, their morality and ethics, their scientific knowledge creation. Very explicitly, in the US context, if sciences such as geology or mining engineering concerned themselves with democratic energy policy and science that encouraged more individual liberty and equity in the polity, rather than serving mainly corporate interests, could a different material scientific practice, a different practice of science in the polity, thus a different coalfield “laboratory,” a different socio-technical reality there emerge?

For STS ethicist and theorist Dorothy Nelkin information creation and access remains political, including scientific information, and, worthy of state analysis, citizen scrutiny, and effective policy. Likewise political, the diffuse nature of some technical and scientific-created or addressed issues makes a cohesive policy attack through collective citizen response weak or ineffective.⁴¹ My analysis, in the context of recent coalfield organizing, is that while marching on a specific mountaintop removal site can be orchestrated—we can gather people together and go on a march—real change in certain rural industrial spaces will come only through shifting America's energy mix, as reorganizing or repurposing coal-fired (or natural gas) power plants takes top-down, federal, or at least, powerful and willing, state will. The latter may be what we

⁴¹ Nelkin, Dorothy. “The Political Impact of Technical Expertise.” *Social Studies of Science* 5, no. 1, 1975: 35–54; Nelkin, Dorothy. *Dangerous Diagnostics: The Social Power of Biological Information*. Chicago: University of Chicago Press, 1994; Nelkin, Dorothy. *Controversy: Politics of Technical Decisions*. Beverly Hills: SAGE Publications, 1992.

sorely need, but the former (marching) stands as more likely to happen in terms of tactical orchestration and achievement.

With respect to diffuse issues and specific policy and state-making, as one coal boss asked me in 2015 (and I paraphrase): where are all the protests against the same massive earth-moving machines being used to expand an interstate near Boone, NC, or to make way for yet another big box retail complex with cheap stuff from China where hundreds of acres are paved over and not one damn person monitors the creek change from the parking lot runoff? I note his detraction from coal industry policy and environmental monitoring (the answer is not to end monitoring coal production, but to monitor those other spaces, too), but he addresses a valid observation and makes a reasonable oranges and oranges comparison. My point again: he is not rabidly irrational.

I contend that the Pocahontas Coalfield space extends out, far beyond, and encompasses and touches, places well beyond its borders.⁴² In STS, we examine categories, classifications.⁴³ Can I trace every connection to this coalfield? Of course not. Yet, the science and technology enabling the snow globe cum laboratory cum socio-techno space is, largely, loosely identifiable as are the companies and people of the Pocahontas Coalfield's "capital" and how these first groups and these second groups connect, overlap, diverge, converge. Furthermore, the government agencies, research agenda/s, support R & D, also shape these fields. Then there are the railroad companies, the transportation engineers, the logisticians, the financiers. A complete history of this space would be unwieldy, and again, I do not aim to illustrate history, but to

⁴² Building on the assumptions in STS and in particular, the work in the Sociology of Science, that science extends far beyond the borders of a laboratory. Particularly illustrative to me in this vein was Robert E. Kohler's book *Landscapes and Labscapes: Exploring the Lab-field Border in Biology*. Not only does he examine a science which falls out of favor and finds favor again in terms of its status and resources devoted to it, but he traces the issues of producing science in the field rather than in a laboratory.

⁴³ Bowker, Geoffrey C., and Susan Leigh Star. *Sorting Things Out: Classification and Its Consequences*. Cambridge, MA: MIT Press, 1999.

illuminate potential spokes out and in such as academic research and development, investment, advocates constructing the Pocahontas Coalfield. Scholarship exists on the miners, the more local coal barons, African American communities, immigrant communities, and the prior inhabitants displaced.⁴⁴ I seek the science and scientists in and engineers constructing this kind of space.

Spokes In and Out of the Pocahontas Coalfield

In his description of scientific norms some eighty years ago, sociologist Robert Merton raises the question of science for public benefit and describes the acquisition of patents by scientists such as Albert Einstein in order to ensure their work remain available for public use. Merton highlights that, by contrast, scientists in the latter half of the twentieth century “have been encouraged to become promoters of economic enterprise.”⁴⁵ That the focus of mining engineering departments rests with working hand in hand with the mining industry comes as no surprise. However, I assert that the institutionalization of their relationship along with the institutionalization of mining engineering itself can contribute to the codification and ossification of scientific expectations for the rural industrial space where this technical expertise prevails. Mining engineering contributes to the construction of mining in the rural mining space. As the main science intervening, a paradigm shift in the goals of geology, mining engineering, and even sciences such as forestry and wildlife, which assist mining companies with science protocols to meet regulatory environmental standards, would need to manifest.

Earlier in the *Introduction*, I made known my preference for tracing actors in the polity rather than continuing to discuss constructs such as “capital” as animated. In terms of

⁴⁴ See footnote 15.

⁴⁵ Merton, Robert K. *The Sociology of Science: Theoretical and Empirical Investigations*. Chicago: University of Chicago Press, 1972.

constructing the Pocahontas Coalfield the following four mining engineering programs provide illustration of the focus of training of this expertise for hire (In *Chapter Three* I pose the need for new assessments of the rural industrial space with respect to the intervening science and technological expertise. I call for a civic science, a science for the public benefit, and a new reckoning of what “public benefit” may mean, and, by whom.):

[University of Kentucky](#) - College of Engineering - Department of Mining Engineering

[The Pennsylvania State University](#) - College of Earth and Mineral Sciences

[Virginia Polytechnic Institute and State University](#) - Department of Mining and Minerals Engineering

[West Virginia University](#) - Department of Mining Engineering

A review of the details of the programs and promotions of these departments in **APPENDIX A** reveals how openly and very typically the Pocahontas Coalfield also is in construction and performance as a space of sophisticated scientific and technical intervention and of corporate science. In short, these departments promote the federal and corporate funding they have received, the sophistication of their laboratories, their multitude of corporate partners, the success of their alumni in securing high-paying jobs, the academic publications of their faculty. What may seem odd would be how the role of mining engineering has been ignored in the cultural, economic, and social enactment of the Pocahontas Coalfield. This omission reveals gaps in intellectual conceptualization of this kind of rural industrial space, which may then also contribute to policy, governmental, and social change gaps. To recall STS theorist Sheila

Jasanoff: in the case of democracy in our country, we must include and link examination of science and technology.⁴⁶

A perusal of the multitude of jobs that accompany science and technology in a coalfield space rounds out the many scientific and technical actors in the coalfield space beyond miners.

See **APPENDIX B**.

To these, a small sampling of jobs from May 2017 postings for the American Society of Mining and Reclamation completes our glimpse into current university-led scientific and technological practice in a coalfield space⁴⁷:

- Environmental Project Manager, HDR- Austin, TX, Posted Saturday, June 10, 2017
- FORESTER II, Boscawen, NH, Posted Saturday, June 10, 2017
- HYDROGEOLOGIST II, Concord, NH, Posted Saturday, June 10, 2007.

I could continue and drown us in the number of employees at the US Office of Surface Mining Reclamation and Enforcement as part of the Department of the Interior.⁴⁸ I could provide textual and visual cultural analyses of industry journals such as *Coal Age*, *Reclamation Matters*, and then critique the rhetoric employed on the website *Friends of Coal* and the machines on display in the expo of the Bluefield, West Virginia Coal Show. Swimming in details, running lines in and out, may offer us a repetitive performance of the technical expertise, the great many expertise threads in the web buoying the performance of the Pocahontas Coalfield.⁴⁹

This aggregation of coal career and coal education artifacts becomes lost in the understanding of a rural industrial space when we draw our fields of academic inquiry too narrowly. If we do not search for the current science and technology buoying that space, we lose

⁴⁶ Jasanoff, Sheila. *The Fifth Branch: Science Advisers as Policymakers*. Harvard University Press, 2009.

⁴⁷ <http://www.asmr.us/#>

⁴⁸ <https://www.osmre.gov/contacts/EmployeeDir/osmempdir.shtm?region=Appalachian#results>

⁴⁹ Butler, Judith. *Bodies That Matter: On the Discursive Limits of "Sex."* New York: Routledge, 1993.

the threads of current *interests*—how academic department and corporate agendas overlap, for example. We miss the impact of scientists and engineers in creating the coalfield. We miss analyzing scientific and engineering culture for clues, for points of insight into their continued knowledge intervention in the rural space. By focusing on miners and “barons” we lose so many other spokes, so many other threads, so many stakeholders cum advocates—actors in this field. I can only liken it to reducing the full drama of Shakespeare to a mere two players.

Thus, this dissertation also aims to unveil several sets of other “hidden” actors in a specific rural single sector economy, to examine the role science and technology played in advocacy for the very earliest days of this single sector economy, the subsequent later role of automation in the diminishment of this single sector as a major employer, and to examine policy, institutions, and models for contending with the remnants and repercussions of this sector and its techno-cultural footprint in this rural space.

Though the qualitative case study and the corroborating quantitative data sets I employ focus on the central Appalachian coalfields primarily of southern West Virginia and Southwest Virginia, my attending analysis includes in its perspective these same issues in rural single sector areas more broadly.

An Aside into the “Rural”

Rural must be situated culturally and historically. Thereafter, I dive into the terms of rural space as it stands as a political and municipal entity. Understanding how we arrive at what has become a default and unquestioned conceptualization of the US rural sets the stage for how a kind of rural both unifies across many rurals and ruralities and subverts the culturally de facto hegemony of rural as White and male.

Rural can be synonymous in concept to how we currently consider and use the term “offshore” and vice versa regarding where rural has been located and what its function has been historically in the US. A brief detour into history brings us to the late Middle Ages and early Renaissance when Europeans were searching for riches beyond their borders. Once located, they exported these raw materials back to Europe, thereby eliminating the need for accessing certain raw materials in Europe. With time, colonists in North America accumulated raw materials and conquered locals and built cities. The cities needed raw materials and colonists stopped exporting all that was of use to Europe. As demands for raw materials grew internally, more territory was taken to satisfy these demands. Now, with the specialization of production of raw materials in different US sectors, rather than producing raw materials for all the needs of personal or corporate existence, the raw material production or extraction is Not In My Backyard (NIMBY) or offshored, with cheap energy and cheap transportation fueling the further offshoring to the cheapest producer of anyone’s personal or corporate needs. In a city, I would produce no raw materials and source all of my material products from offshore. In the single sector rural, I may extract or grow a raw material, but I do not produce the machines by which it is utilized, and, in most cases, all other things I need to survive come from what is offshore to me.⁵⁰

Certain kinds of internal US offshore or rural bubble up in larger cultural, pop, or policy discussions and others remain obscured. Now and again in pop culture we see, for example,

⁵⁰ Sakolski, A.M. *The Great American Land Bubble: The Amazing Story of Land-Grabbing, Speculations, and Booms from Colonial Days to Present Time*. New York: Harpers & Brothers, 1966; Leadbetter, David. “Single-Industry Resource Communities: ‘Shrinking,’ and the New Crisis of Hinterland Economic Development.” In *The Future of Shrinking Cities: Problems, Patterns and Strategies of Urban Transformation in a Global Context*, 89–100. Berkeley, CA: Center for Global Metropolitan Studies, Institute of Urban and Regional Development and the Shrinking Cities International Research Network, 2007; Winner, Langdon. *The Whale and the Reactor: A Search for Limits in an Age of High Technology*. Chicago: University of Chicago Press, 1986; Cowie, J., & Heathcott, J. The Meanings of Deindustrialization. In J. Cowie & J. Heathcott (Eds.), *Beyond the Ruins: The Meanings of Deindustrialization*, Ithaca, NY: ILR Press, 2003; High, Steven. *Capital and Community Reconsidered: The Politics and Meaning of Deindustrialization*. *Labour/Le Travail* 55. Spring, 2005.

White cowboys working hard in producing cattle for our consumption. White Midwestern male farmers giving us the grain for our daily bread. Arguments breaking out about whether it is okay to call a White mountain dweller a “hillbilly.” White American presidents and presidential contenders sporting rural gear—cowboy hats, flannel shirts, baseball caps—all in order to remind us of the original hard-working proto-American: the White, rural *Dirty Jobs* male.⁵¹

In the larger cultural hegemony, we do not associate Black cotton producers or pine plantation dwellers in South Carolina as rural. We skip over Indian reservations as rural. We ignore Latino migrant workers harvesting onions in Georgia or grapes in California as rural. We do not include Asian or Latino meat processors in Iowa or North Carolina as rural.⁵²

In fact, with respect to Native Americans, if we reside in the rural East, we ignore how we came to own land in the rural East; or, even if poor and White in the rural East, we have developed myths of origin for our places on that land, whether we are “native” “Appalachian” (which does not indicate Indian) or culturally “Southern” waving a Confederate flag to honor what, in human time, is a very short “heritage,” or potlucking in the upper Midwest as a real Iron Ranger (White) or celebrating our French roots in New Hampshire or Louisiana, being “born on the Bayou,” and so on we go with our internal myths of rural, likewise with our designations as *native* New Yorker, Angelino, Chicagoan, etc. The short histories of any White US heritages make for surprisingly long memories. In this respect, we do not differ that much from other White colonial conquering myth makers, such as the Afrikaners, with their and our myths of land rights, ancestral land claims, biblical claims, etc.⁵³

⁵¹ Campbell, Hugh, Michael Mayerfeld Bell, and Margaret Finney, eds. *Country Boys : Masculinity and Rural Life*, 2006.

⁵² Brown, David L., and Louis E. Swanson. *Challenges for Rural America in the Twenty-First Century*. Penn State Press, 2010.

⁵³ Akenson, Donald. *God's Peoples: Covenant and Land in South Africa, Israel, and Ulster*. Ithaca: Cornell University Press, 1992.

Both these rurals—the offshore and the myth—work in the background, usually invisible, in larger political discussions of the rural in the US. Unlike India or even now Russia, which have national discussions regarding their rural populations and also national rural policies, for the centers of US society—its cities—the rural, especially the rural that is not White and male, largely remains invisible, so necessary in terms of material production as to be rendered invisible.⁵⁴

Another layer to defining the rural comes in how theorists grapple with political terms for what lies outside metropolises. Turning again to STS and its work on boundaries, or what makes one object fit into one category while another fits into another (here I give one nod to structural linguistics and understand that not only STS is concerned with object boundaries), the demarcations I prefer also delimit the narrative I produce.⁵⁵ In my demarcations, I institutionalize and thereby rationalize (make rational and controllable) what may otherwise be uncontrollable or not truly able to be delineated. For example, although as a scholar I have come to associate constructs such as rural and urban as on a continuum, and especially in late capitalism, not as opposites, I still draw permeable lines around each in order to contend theoretically with their relationships on this continuum. I liken this accounting to the territory in translation where one language does not have an exact cultural representation or practice in its language signifiable also by only one word in another. Classification and more accurate or “better” naming may not

⁵⁴ “National Rural Employment Guarantee Act, 2005.” Ministry of Rural Development, India, n.d. <http://rural.nic.in/documents/policies-acts-bills/department-rural-developmen>; “Circular on Comprehensive Deepening of Rural Reform and Accelerating Agricultural Modernization (No.1 Central Document) 2014.” Asia Briefing Ltd, Dezan Shira & Associates, n.d. <http://www.china-briefing.com/news/2014/05/27/chinas-state-policy-rural-development-agriculture-industry.html>; The World Bank, Europe and Central Asia Unit. “Monotowns: Path to Resilience: A Brief Review of International Experiences with Urban Regeneration,” 2010.

⁵⁵ Gieryn, Thomas. “Boundary-Work and the Demarcation of Science from Non-Science: Strains and Interests in Professional Ideologies of Scientists.” *American Sociological Review* 48, no. 6, 1983: 781–95; Lepschy, Giulio. *A Survey of Structural Linguistics*. London: Faber and Faber Limited, 1970.

actually erase that gap, but they allow us to move forward with other meaning making and to behave as if they had.

By tracing how my vocabulary for what I was interested in shifted as I discovered terms new to me, and struggled to make material what I finally decided first I needed to contend with theoretically, I intend to complicate rural as a construct. Rather than trace each term in my order of discovery, I explain terms and their employ. In so doing, I hope also to lend unfamiliar readers this considered set of terms for their own use.

Micropolitan, used by the United States Census and by urban planners, denotes an area without the population of a large *metropolitan* area and which is still more connected to a rural or less populated area. Of course, it, like the term metropolitan, is not a fixed term. Though smaller in population, a micropolitan still may have many of the features of a much larger city such as cultural events, crime, White flight, etc.⁵⁶

Metropolitan, with its flexibility to indicate a city and a city-dweller, became for me a place of contrast for both micropolitan and rural. The micropolitan could only be outside a metropolitan's other spheres—suburbia, exurbia, and beyond a metropolitan *commutershed*. A micropolitan was unlikely to have an exurbia, but it could also have a suburbia and its own commutershed.⁵⁷

Rural as a geography, and as opposed to nature, became that kind of place beyond the micropolitan and the metropolitan, and usually beyond their commutersheds. Being beyond a commutershed depends on the culture of work-commuting in a region. Commuting two or more

⁵⁶ <https://www.census.gov/programs-surveys/metro-micro.html>; Leadbetter, David. "Single-Industry Resource Communities and the New Crisis of Hinterland Economic Development." *The Future of Shrinking Cities: Problems, Patterns and Strategies of Urban Transformation in a Global Context*, 2009, 89 – 100.

⁵⁷ Leadbetter, David. *Mining Town Crisis: Globalization, Labour and Resistance in Sudbury*. Black Point, Canada: Fernwood Publishing Co., Ltd., 2009.

hours one way by rail to work in New York City is not unheard of, yet, that same amount of driving to work one way to another metropolis would be impractical or highly undesirable.

A *metropolis* comes close to another useful term, the metropole. The *metropole*, as a collective, consists of the population centers also at a society's center of commerce, government, industry, etc. Offshores send their material goods to metropolises.

Over the course of time, the metropole can also shift. In the case of the United States, its White inhabitants initially sent raw goods to Europe, their (the White inhabitants') metropole. Priorities shifted and the Americans chose to keep some of the raw goods in their own territory as their own metropolises developed. Over time the US shifted from a largely rural population trading to metropolises internally and abroad, to an industrial rural supplying its own metropolises or others and increasing imports from other regions around the world.

Each *industrialized* society may have its own version of the rural and the metropole. A flow of goods characterizes these two constructs in the context of this work. Certainly, goods now flow around the world with what seems an impossible array of origins. However, this flow can be traced, and this flow also tells a story of the function of a kind of rurality. This flow seems ubiquitous and immutable, and to the metropole consumer, and depending on the product, also to a micropolitan and rural consumer, invisible. This invisibility only breaks down partially depending upon the local industry. For a miner, the source of cheap energy in a hinterland⁵⁸ mine

⁵⁸ Hinterland (an acceptable and oft-used term in urban planning and geography) regions are rural places beyond micropolitan and metropolitan commutersheds. Hinterland residents are unlikely to commute to a micropolitan or metropolitan area to work for reasons of time, expense, or difficulty of travel. I have had a wide range of responses from respondents and people in the coalfield with respect to this word. Just as rural can become synonymous with farm, "White," pristine nature—my coalfield living respondents liked this term. For them, it was race-neutral, and more neutral generally than "rural." They had struggled with being in a space with low geographic access (rural), but that was also brownfield. The term hinterland often fit the bill. I draw it from: Leadbetter, David. "Single-Industry Resource Communities: 'Shrinking,' and the New Crisis of Hinterland Economic Development." In *The Future of Shrinking Cities: Problems, Patterns and Strategies of Urban Transformation in a Global Context*, Berkeley, CA, February 2007, by the Center for Global Metropolitan Studies, 89-100. Berkeley, CA: Institute of Urban and Regional Development and the Shrinking Cities International Research Network, 2009;

may be obvious, yet he (as they are most often he's) thinks little about the sources of his cheap food. The monologic farmer profiled by Campbell, Bell, and Finney in *Country Boys* may fret about the cost of fuel for his massive farm equipment, but he spends little time considering the impact of the cheap energy on its site of extraction, and so the list goes on.⁵⁹

Raw material production areas, professions, geographies, etc., in the US usually are not only located well outside most metropolises but also away from each other. Their commonalities in experience, concerns, interests (in the Marxist sense), problems, etc. are little linked, especially theoretically or politically. STS brings a concern with networks and invisibility, seemingly unalterable systems, to fore and to focus.⁶⁰ This invisible system of *industrial rural*, offshored internally, links up to rural, raw material producers externally, making a kind of rurality the backbone of big industrial, big cities, and so on, enabling those people in society's centers to be concerned with pursuits not directly related to growing food or creating or extracting other raw materials, and, in turn, enabling various industrial rurals to hyper-specialize. Whereas a US homesteading family in the nineteenth century may have had all members farming, selling off surplus or producing surplus in a variety of goods for external consumption, especially in the US Northeast, by contrast, the flat land and rolling hill land and/or more accessible areas south of the Mason Dixon line were already a kind of industrial rural, concerned primarily with raw material production for export to the "industrial," read factory-laden, North.⁶¹

Martinez-Fernandez, C., and Chung-Tong Wu. "Shrinking Cities: A Global Overview and Concerns about Australian Mining Cities." In *The Future of Shrinking Cities: Problems, Patterns and Strategies of Urban Transformation in a Global Context*, Berkeley, CA, February 2007, by the Center for Global Metropolitan Studies, 29-36. Berkeley, CA: Institute of Urban and Regional Development and the Shrinking Cities International Research Network, 2009.

⁵⁹ Campbell, Hugh, Michael Mayerfeld Bell, and Margaret Finney, eds. *Country Boys: Masculinity and Rural Life*. University Park, PA: Penn State Press, 2006.

⁶⁰ Latour, Bruno. "On Actor-Network Theory: A Few Clarifications." *Soziale Welt*, 47, 1996: pp. 369–81.

⁶¹ Duncan, Cynthia. *Worlds Apart: Why Poverty Persists in Rural America*. New Haven: Yale University Press, 1999; Parker, William N. "Introduction: The Cotton Economy of the Antebellum South." *Agricultural History* 44, no. 1, 1970: 1-4.

For example, cotton production in the US South occurred under totalitarian circumstances, either by black slave labor or later by sharecroppers, Black and White. I understand that raw material production as also industrial in scale, with slaves as the principal enabling “technology” and slavery as the enabling industrial institution.

An Aside into Appalachia

If current scientists and engineers intervene in the Pocahontas Coalfield as a scientific, technical, and technological space, then why are scientists and engineers not the major subjects of much Regional or Appalachian scholarship, social change practice, or cultural examination? Instead, Appalachia’s many competing and overlapping cultural associations or perceptions have attached themselves to the Pocahontas Coalfield, as much as to other sections of the area, with or without basis. In the larger US culture, the perceptions of Appalachia birthed by local color fiction in late nineteenth century popular national magazines struck root: pieces on lost “mountain ancestors,” spun tales of salt-of-the-earth, clannish, feuding, poor, White, uneducated, male, moonshining hillbillies.⁶² This prototype demonstrates remarkable persistence, mutating and adapting, as with such as current preconceptions of Appalachians as poor drug users, or as ignorant people with rotten teeth from “Mountain Dew” mouth. The peoples in the West Virginia, Kentucky, Virginia, and North Carolina portions of Appalachia particularly continue to bear versions of these earlier fictionalized associations.⁶³ Changing with the times from the *Beverly Hillbillies* to the *Dukes of Hazard* to Jesco White to *Buckwild* to the *16 and Pregnant* television series to the 2016-2017 fascination and fury with Appalachia as “Trump Country,”

⁶² Satterwhite, Emily, 2011. Shapiro, Henry D. *Appalachia on Our Mind: The Southern Mountains and Mountaineers in the American Consciousness, 1870-1920*. Chapel Hill: Univ. of North Carolina Press, 1978.

⁶³ “A Matter of Taste: Reading Food and Class in Appalachian Literature,” Erica Abrams Locklear, University of North Carolina at Asheville, Thirty-Fourth Annual Appalachian Studies Conference, 2011.

these many iterations still largely dictate to the wider US imagination what supposedly *really* ranks as Appalachian: a mountain-bred White coal miner or White mountain man. Or, his kin. In every case, these people are found to be in deficit: in the 1960s, they were too poor and thin,⁶⁴ now, they are poor, fat, and in ill health from drug use, diabetes, heart disease, black lung, or other chronic illness.⁶⁵ They smoke or use smokeless tobacco; the men, when they work, do manual jobs and eschew safety gear or protections.⁶⁶

Moreover, much like other projects of nationalism, literary fiction and scholarship about or even in the region has also helped define the region.⁶⁷ For example, in the case of the critical regional approach to Appalachian Studies, its scholars, writers, policy makers, regionalists, historians, culturalists, etc. also construct Appalachia. They contribute to the creation of the cultural production of the region known as Appalachia.⁶⁸ Social scientists proposed that a culture of poverty caused Appalachia's decadence and fatalism—these Appalachian people needed to be taught better, and, how to adapt to modern society. Scholars focused on Appalachia advocated a version of Appalachia caught in exploitation. From the 1970s the discussion moved from Appalachia as an internal American colony, much like the kind of third world colony exploited for first world gains in natural resources or agricultural or mining production, to a world systems analysis approach, with Appalachia a peripheral space within a core economy.⁶⁹ Recent analyses from journalists such as Chris Hedges to scholars such as Betsy Taylor parallel this core and

⁶⁴ Harrington, Michael. *The Other America: Poverty in the United States*. New York: Macmillan, 1962.

⁶⁵ Wooley, SM, Meacham SL, Balmert LC, Talbott EO, Buchanich JM. Comparison of Mortality Disparities in Central Appalachian Coal- and Non-coal-mining Counties. *Journal of Occupational and Environmental Health*. 2015 Jun;57(6):687–94.

⁶⁶ Scott, Rebecca, 2010.

⁶⁷ Anderson, Benedict. *Imagined Communities: Reflections on the Origin and Spread of Nationalism*. Verso Books, 2006.

⁶⁸ Reichert Powell, Douglas. *Critical Regionalism: Connecting Politics and Culture in an American Landscape*. Chapel Hill: The University of North Carolina Press, 2007.

⁶⁹ Thomas, Jerry Bruce. *An Appalachian Reawakening: West Virginia and the Perils of the New Machine Age, 1945-1972*. Vol. 12. Morgantown: West Virginia University Press, 2010.

periphery concept with analyses of extractive Appalachia as a “sacrifice zone”—a space exploited so that more metropole or central places may prosper.⁷⁰

However, though Jerry Bruce Thomas in his book *An Appalachian Reawakening: West Virginia and the Perils of the New Machine Age, 1945-1972* catalogues mining machinery and its effects on job loss, little of the sociological or cultural critique of the region engages or discusses science, engineering, and investment—all essential elements to wrangling and maintaining, constructing, the Pocahontas Coalfield into existence.⁷¹ Thomas discusses how, since the 1950s, people in Appalachia missed out on the economic prosperity of the greater American experience largely due to drops in demand for coal and small scale agricultural products, the results of technological shifts in coal mining in Appalachia and farming in America’s West and Midwest toward utilizing bigger machines with fewer people. Nevertheless, he does not address at any length one of the supposed reasons for US economic expansion elsewhere during this time: scientific and engineering “progress.”⁷²

Though automation was a fear of many Americans by 1960 in terms of well-paying jobs being automated away (according to Thomas), during the 1950s and 1960s the US government and industry touted much about the supposed progress of US science and technology, especially with respect to its major competitor, the Soviet Union, and as a major driver of the US economy.⁷³ Though current popular consumer technologies also appeared and were in homes

⁷⁰ Hedges, Chris, and Joe Sacco. *Days of Destruction, Days of Revolt*. New York: Nation Books, 2012; Reid, Herbert, and Betsy Taylor. “Appalachia as a Global Region: Toward a Critical Regionalism and Civic Professionalism.” *Journal of Appalachian Studies* 8:1, no. Spring 2002 (n.d.): 9–3; Reid, Herbert, and Betsy Taylor. *Recovering the Commons: Democracy, Place, and Global Justice*. Board of Trustees of the University of Illinois, 2010.

⁷¹ Lowe, Travis. “I’ve Seen the Future. It Looks Like Appalachia: Life after the Job Apocalypse.” *Medium*, March 31, 2017. <https://medium.com/startup-grind/ive-been-to-the-future-it-looks-like-appalachia-5553bf89f275>.

⁷² For one example of this narrative, see: Bush, Vannevar. “Science the Endless Frontier.” Director of the Office of Scientific Research and Development, July 1945. <https://www.nsf.gov/od/lpa/nsf50/vbush1945.htm>.

⁷³ For example, the “space race” between the US and the Soviet Union.

across Appalachia during this time, like the economic situation in the Pocahontas Coalfield being single sector and extractive, industrial science and technology in Appalachia also focused primarily on issues of resource extraction: natural gas, oil, timber, coal, steel, other minerals such as silica and aluminum, and the Kanawha Valley's chemical industries.⁷⁴ In Appalachia, as elsewhere, these decades also saw the emergence of science contending with the environmental fallout of the industrial age such as the rise of reclamation science, environmental science, etc.⁷⁵

Constructing an Industrial Space

Scientific fields are human constructs as are the fruits of applied science. Rather than engage in an academic discussion on whether science has immutable laws existing beyond the human capacity to interpret them into the boundaries of fields of science, I draw from the STS tradition more concerned with the social choices and cultural choices of applying science. I deliberately use the verb “construct” as a shorthand to draw from the sociological theory of knowledge “social constructivism.” I do not dwell on this term with respect to its implications in language theory, but in a vein of the sociology of science, loosely model why one version of Appalachia succeeds in popular culture where another one as a cultural understanding (Appalachia as a highly technical space), falters, and I insert the implications for this gap in politics and power in the polity and in policy.⁷⁶

With respect to the term “industrial” I also reveal the construction of the Pocahontas Coalfield as an industrial space, replete with all the trappings of the industrial factory space: a move from hand production to machine production, new chemical and industrial processes, the importance of cheap energy and of steam power, and the streamlining of work and workers, as

⁷⁴ Thomas, Jerry, 2010.

⁷⁵ Ibid.

⁷⁶ Bloor, David, Jan Wolenski, and Matti Sintonen. “Sociology of Scientific Knowledge.” In *Handbook of Epistemology*, edited by Ilkka Niiniluoto, 919–62. Boston: Kluwer Academic Publishers, 2004.

well as the locating of these processes in a space that extends the factory doors to include the construction of a civic space to service the needs of workers: housing, education, farming, food, stores, churches, civic groups, etc.⁷⁷

I have outlined gaps in the literature of Science and Technology Studies about society, and Appalachian and Rural Studies, with respect to examinations of the role of scientists and engineers in the rural space. I have defined my use of constructs such as rural, industrial, Appalachia, and the term “construct.” I have proposed science as a field not only of corporate-driven science, but also knowledge production for public benefit. I have set the stage for my theoretical examination of Pocahontas Coalfield as a rural industrial space constructed also by science and technology, scientists and engineers.

⁷⁷ Dunaway, Wilma. *The First American Frontier: Transition to Capitalism in Southern Appalachia, 1700-1860 (The Fred W. Morrison Series in Southern Studies)*. Chapel Hill: The University of North Carolina Press, 1996.

CHAPTER ONE

Technology and the State of the State in the Pocahontas Coalfield

Overview

Through the promotion of the Pocahontas Coalfield rural space as a reserve for industrial progress and capital investment opportunity, by proxy, the science and technology narrative may also remain a foretelling narrative of our modern relationship in the United States with what we conceive of as rural. By examining one slice of the start of what became known as the Pocahontas Coalfield, I peer through a peephole into the past in order to more squarely view that space's current state in order to create a potential map for understanding other similar places and their current states. I claim that the Pocahontas Coalfield's current social and environmental states, with high poverty and many brownfields, results from a mix of corporate and academic science and technology research toward economic efficiency and the pitfalls in the polity of the single sector rural industrial space as a simultaneous work and civic space.

The Pocahontas Coalfield is NOT a separate world, not an Other (though maybe Othered) place, somewhere out there, not connected to the larger picture or economy, disconnected from globalism or international markets, isolated from international and sophisticated science. The Pocahontas Coalfield encompasses a place of complex poverty *and* complex science—a single sector rural economy tied to multi-faceted international companies. It also remains a place constructed *on purpose*, whose original *raison d'être* has veered in the opposite direction from that envisioned by its first and maybe fiercest conceptual advocates. In this latter respect, in addition to all the other cautionary tales the Pocahontas Coalfield embodies regarding rural industrial single sector economies, myths of self, place, and work, predictions of machines and

men, it also reveals a tale of being careful of what one wishes for—or, of the folly of good intentions and foolishness of predicting the future.

In this chapter I problematize the rural coalfield space, revealing technology and social-related issues. I open the black box on persistent Appalachian poverty, coalfield automation, resource depletion, and the United States' development of big ag (large scale agriculture achieved through larger machines and industrial scale land manipulation with massive chemical and fossil fuel inputs) in the Midwest and West over the smaller acreage family farm prevalent in Appalachia until the 1950s. I examine the contributing factors to a democracy deficit in the coalfield space, and in single sector spaces more generally. I address the single sector rural industrial space and the potential issues of corruption and depleted social capital. I argue against the concept of “resource curse,” terming it essentialist, preferring instead to address the problem of corruption in the fossil fuel rural industrial space as correlated to that in single sector economic spaces more generally, whether rural or urban. I discuss the trends in the qualitative interviews I conducted in the Pocahontas Coalfield and adjacent rural spaces with a focus on “lack of leadership” as the top problem identified by regional respondents before issues of work or health and define this problem as a function of the single sector democracy deficit.

Moreover, just as varying kinds of masculine performativity exist, so do many ways to perform the rural. They overlap with geography in attempts to quantify and qualify whether a space can be construed as rural. Some definitions rely upon a count of inhabitants, others rely upon the presence of certain kinds of ways to make a living such as agriculture and/or mining; others quantify or qualify the presence of nature, whatever that is, as a kind of rural space in contrast to the metropolitan.

What STS brings to this qualifying or quantifying of the rural may be a step back or a 20,000 foot view of the process of classification and how classification becomes a means of control or for control. Rather than only a scientific classification of tools or flora and fauna, the social constructivist position of and the awareness in STS of classification as a human-driven activity bring to light for us how we take for granted that classifying and categorizing are usual, right, what ought to be done. Whereas cultural studies, rural studies, etc. may be concerned with more accurate classifications of the rural, or as rural studies may now typify the rural as *rurals*, an STS perspective asks to begin one step prior in having us consider what compels us to classify, that is, what do we hope to gain through more “accurate” or “better” classification of the rural?

One effect of following patterns and making links could be to impose a hegemonic narrative of the rural, squeezing out the rurals that do not fit into the linkages I make. To this I point out that the goal of this accounting is not to produce a monolith. Just as there are many rurals, a range of factors contributing to rurality, the big rural I describe can also shift, flex, pulse, contract, expand, include, and exclude. I am pointing to connections as I can make sense of them and as the ground situation for big rural stands within my view and within my present. To make obvious the connections I shed a light upon may illuminate cultural and technological territories where other kinds of gender, racial, class, ethnic, etc. hegemonies already tower or assert. Because one set of descriptors or connections cannot be all inclusive because one person is incapable of seeing every set of possibilities all at once neither indicates an active desire to exclude nor does it mean that linkages should not be attempted. Thus, if in my links I exclude, and you the reader can readily point out my exclusions, then you will be producing a map of where I have been blindsided by certain hegemonies or dominant narratives. I welcome the

interest in pointing out the potentials for connection that I have not otherwise indicated and I welcome the chance, too, to engage in thoughtful consideration regarding the factors I came to focus on for this short depiction of big rural as a technological system. Let me state one more defense of plotting connections rather than focusing hyperlocal on one object or person or locality or getting down into the weeds of analyzing every feature and detail of said object, person, place, etc.

Poverty's Persistence Has Roots

In *An Appalachian Reawakening: West Virginia and the Perils of the New Machine Age, 1945 - 1972*, Jerry Bruce Thomas succinctly summarizes the state of the state and the contradictions at work in much of West Virginia beginning in the 1950s. As the rest of the country enjoyed never-before-experienced levels of prosperity, shifts in United States' energy use, along with changes in coal mining technology, created more poverty than prosperity for coalfield workers. Thomas characterizes the paradox for the single sector coal sections of central Appalachia, and the single sector agricultural sections of Appalachia in this way. For single sector coal sections, shifting energy demands toward natural gas and oil coupled with technological change to affect in the coal sections of Appalachia the same “dilemmas and dangers for workers and residents” yet, in other sections of the US, though workers provided “sweat, muscles, and backs” for economic growth, they also enjoyed some of the fruits of this new prosperity.⁷⁸ Though Thomas does not make this characterization, I contend that in some other sections of the US, Joseph Schumpeter's “creative destruction” functioned—new technologies replaced old, thereby also creating new economic and work opportunities in the

⁷⁸ Thomas, Jerry Bruce, 2010.

same or approximate location.⁷⁹ In Appalachia, gas or diesel uptick in industrial use and machines built to supplant miners reduced the need for workers mining coal. For the most part, little new technology as work arose like a Phoenix in the same locale for those thrown out of work due to these shifts. Likewise, according to Thomas, in order to keep the coal industry afloat, the United Mine Workers of America chose to side with coal management with respect to the health risks associated with these new machines. As illustration of the trajectory of growth stagnation and economic stagnation, overall in the 1950s, the US added 15.5 percent more workers, and West Virginia's rate of employment fell nearly as much (14.3 percent). Thus, West Virginia had a nearly thirty percent lag in employment behind the rest of the US, on average.⁸⁰

Important to note, Thomas highlights a general US fear that has since largely disappeared from robust national discussion: automation. In 1960, more Americans feared “automation” than feared the Soviet Union. Automation was understood to undermine high-paying work.⁸¹ Moreover, while deep mine safety had been a major impetus for the creation of the United States Bureau of Mines, the new machines in use in deep mines beginning from 1948 saw the rate of mine injury increase—almost doubling.^{82 83} With these new machines, workers in the mine had to pick up the pace, opening more possibility for injury, and creating a situation in which miners could not hear changes in stress to the roof. Surprisingly, the amount of dust in the air also increased, which then led to more lung complications, the full extent of which is only coming out in recent documentation regarding true numbers of miners sick from silicosis, coal worker's

⁷⁹ Schumpeter, J. *Capitalism, Socialism and Democracy*, 1947, 2010.

⁸⁰ Thomas, Jerry Bruce, 11, 2010.

⁸¹ *Ibid*, 13.

⁸² <https://arlweb.msha.gov/MSHAINFO/MSHAINF2.htm>

⁸³ Thomas, Jerry Bruce, 15, 2010.

pneumoconiosis (Black Lung), and cancers.⁸⁴ ⁸⁵ More dust also meant even less visibility. In an already gaseous environment, the dust could make the machines volatile.

Strip mining slowly caught on in southern West Virginia during World War II, as the federal Solid Fuels Administration pushed for more coal production. Until then, according to Thomas, environmental and aesthetic concerns had overridden interest in increased production. Post-World War II, strip mining proved more economical, both in production and in reducing associated labor costs. Large machines such as power shovels, draglines, bulldozers, and equipment associated with road building replaced underground mine workers. In addition, local towns and municipalities had to contend with blasting at the sites, rain that moved acid mine drainage into streams and wells, and ruined plants and trees. A long battle for regulation and reclamation of strip mining sites, begun in the 1930s and resulting in a law in 1967, ended with the West Virginia Department of Resources swamped in their attempts at enforcement as companies increased surface mining production.⁸⁶ In the 1970s, efforts in Kentucky and West Virginia to halt strip mining ramped up. By then, the clear disadvantages for mine workers prompted one West Virginian to note to the *Charleston Gazette* that most of the strip mine workers were not locals and their skills could afford them opportunities in other industries.⁸⁷ A longstanding democracy deficit,⁸⁸ however, led to the legislative defeat for a ban, as many political representatives either actively worked or owned in coal or had significant supporters in coal.⁸⁹ Furthermore, the agency tasked with enforcing the 1967 law could not keep pace in

⁸⁴ "Advanced Black Lung Cases Surge In Appalachia," Berkes, Howard. National Public Radio, December 15, 2016, <http://www.npr.org/2016/12/15/505577680/advanced-black-lung-cases-surge-in-appalachia>

⁸⁵ Thomas, Jerry Bruce, 15, 2010.

⁸⁶ Thomas, Jerry Brice, 2010, 287 - 292.

⁸⁷ *Ibid*, 293

⁸⁸ Defined more fully later in this chapter.

⁸⁹ *Ibid*, 297.

financial support nor backroom deals with coal industry advocates, including sitting governors.⁹⁰ A ban on strip mining was defeated, and, regulations banning or reducing impact of more aggressive means of strip mining were rolled back.⁹¹

Agrarian Technological Shifts and Remaining Timber and Extraction Issues

Jerry Bruce Thomas addresses a second machine age derailment of work, this one in Appalachia's agricultural sector during the 1950s.⁹² Just as coal mining employment entered a free fall post World War II, mountain agriculture could not compete with the large machines and surplus inputs or agricultural political advocacy of the American Midwest and West.⁹³ Machines designed for flat land and opened spaces did not suit mountain agriculture. As commercial agriculture shifted even harder to large tracts of lands, smaller holdings of fifty-five acres or less in Appalachia could not compete, and neither American tastes nor agricultural policy focused on supporting agricultural product diversification or small farm advantages.⁹⁴ This compounded the shift prior to World War II of farm offspring leaving the farm, prior full-time farmers finding employment off the farm, and farmers aging. Additionally, erosion mostly from timbering had wrought severe soil deficiencies in some twenty-five percent of available farmland in the West Virginia mountains.

Thomas points to some through lines of poverty in the region not only being caused by coal industry mechanization and shifts away from coal energy, but also to the view at the time that small farms could not "be enlarged to commercial size."⁹⁵ He also relates other natural

⁹⁰ Ibid, 299.

⁹¹ Ibid, 303.

⁹² Ibid, 25.

⁹³ Browne, William. *The Failure of National Rural Policy*. Washington, D.C.: Georgetown University Press, 2001.

⁹⁴ Ibid.

⁹⁵ Thomas, Jerry Bruce, 2010, 26.

resource extractive or environmentally destructive industries as equally devastating for some West Virginia farm communities. For example, in Hardy County, tanneries and timbering had left that area susceptible to severe flooding. As these industries closed or reduced workers, off-farm work dwindled, and landowners could no longer afford to farm even part-time. As in coal country, as mechanization happened (in timber, or as industry demands fell as in tanning and textiles), those who did not move for work elsewhere, or could not work elsewhere due to age, disability, family demands, etc., found their standard of living drop to below benchmarks for poverty. Moreover, improved approaches to forest management addressing issues of erosion and forest planning failed to replenish former timber jobs or lumber demand.

Lastly, Thomas points out the obvious, that the cities and towns tied to these industries and the many businesses formerly serving the employees or businesses themselves also declined with the drop in demand for workers. Population decline set in, and this population decline rippled and rolled through many once prosperous towns and counties, contributing on multi-levels to economic decline, education decline, and tax base drain.⁹⁶

Boom and Bust of Coal Demand and Employment

In his 1992 work, “Addictive Economies: Extractive Industries and Vulnerable Localities in a Changing World Economy,” rural sociologist William Freudenburg analyzes the dearth of entrepreneurship in the United States Appalachian Coalfields in particular as being related to the cycle of boom and bust of mining: even during hard times for the industry, there was always the promise of a job on the horizon—some day the mines would start back up, so you just needed to sit tight till then, sit where you are and wait, good times were on their way.⁹⁷

⁹⁶ Thomas, Jerry Bruce, 2010, 28-39.

⁹⁷ Freudenburg, William. “Addictive Economies: Extractive Industries and Vulnerable Localities in a Changing World Economy.” *Rural Sociology* 57, no. 3 (September 1992): 305–32.

Freudenburg likened this riding out of boom and bust cycles to the cycle of gambling addiction, what he asserted to be a very powerful lure for the next “hit” of work time, industry upswing, and prosperity.

Despite this lure, coal counties across this region have declined steadily in population since the advent of the continuous miner in 1954. Even at that time, the outlook for employment in coal was bleak as a special report for Virginia predicted and traced the US’ move from coal to oil dependence. Prior to the continuous miner, coal already was losing market share and shedding jobs.⁹⁸ See the link in **APPENDIX D** for an overview of population loss, mineral wealth, and current county economic outlook.

Economic Diversification Fallacy

Single-industry towns (monotowns) abound across the globe, from mill towns to steel towns to mining towns. Once the driving industry shifts, requiring fewer workers, in order to maintain work for residents, towns existing within commuter range of metropolises may be able to attract or to create new industries. This occurs far less frequently for locations outside larger metro commutersheds. Compounding the issue of certain monotowns are the effects of communities supporting or created for energy extraction. These locations, usually in the hinterland, suffer from additional issues of environmental degradation, few incentives to attract economic investment not dependent on extraction or natural resources, cycles of employment tied to natural resource price points that can lead local residents to over-dependence on the extractive industry for employment and diminish local initiative for entrepreneurship, extractive industries offsetting costs by neglect of environmental and social issues tied to their industry, and little community reinvestment by the extractive industries.

⁹⁸ Holm Jr., Edwin. “Production and Marketing of Coal in Virginia and the Nation.” Richmond, VA: Virginia Division of Industrial Development and Planning, 1955.

In the January 2012 policy brief, *Creating an Economic Diversification Trust Fund: Turning Nonrenewable Natural Resources into Sustainable Wealth for West Virginia*, the West Virginia Center on Budget & Policy sets the stage starkly on the first page by quoting the autobiography of West Virginia favorite son Senator Robert C. Byrd regarding the exploitation of West Virginia's natural resources by outside interests and how the people of West Virginia have been left with little to show for this.

The brief allows this Byrd quote to stand in for how West Virginia specifically came to host this economic disparity. However, the focus of the brief is not how to turn this system around or to offer critique of the mechanisms of this system, but to offer potential antidotes to this system's effects. The brief suggests that, like six other American states with energy resource-extraction industries, West Virginia ought to create a permanent severance tax trust fund. The fund would divert money that could function to offset the negative effects of West Virginia's energy extractive industries, in particular, coal and natural gas, including saving for the time when these extractive industries will end.

The brief lists the problems that West Virginia faces even in a potential bounce back scenario: “a weak labor market and underdeveloped workforce, a lack of economic diversity, deteriorating infrastructure, and limited fiscal capacity.”⁹⁹

Moreover, given the depth and breadth of so many problems in West Virginia’s particular case, one wonders, regardless of the money invested, to what degree a turnaround toward “economic diversity,” for example, is possible given the location of many of West Virginia's most high need communities—well outside of any commutershed and well-away from centers of any other industry.

⁹⁹ “Creating an Economic Diversification Trust Fund: Turning Nonrenewable Natural Resources into Sustainable Wealth for West Virginia.” West Virginia Center on Budget & Policy, January 2012.

Non-profit groups like Create WV attempt to take up the slack and encourage a creative economy in highly extractive West Virginia with some marginal success in actual urban environments like the state capital of Charleston and in former micro-metro Princeton, WV. Yet, with the shrinking or dying non-commutershed hinterland monotowns, who will relocate to these areas when they don't have to? One argument the creative economy promoters make is that because a business is not place dependent it could relocate to West Virginia. However, considering West Virginia's larger profile, the opposite is more likely. According to the World Bank, with “cheaper, easier, faster and safer transportation, information and communications. As distances and boundaries disappear, activities tend to be increasingly 'footloose.’”¹⁰⁰ Thus, little incentive exists for industries or businesses that are not place-dependent to locate in the hinterland extractive communities of West Virginia. Further, given the already stark economic disparity in West Virginia, the appeal to the creation of a creative class would leave out large numbers of West Virginians currently more employable in blue and pink collar jobs.

To begin a turnaround on these problems, the West Virginia Center on Budget & Policy includes suggestions of how the money from a permanent severance tax trust fund could be spent.¹⁰¹ Granted and absolutely, diverting money for improving any of the problems stands as better than doing little or nothing. Yet, given West Virginia's geographical, historical, economic-extractive, etc. profile, a top goal of attracting in outside industry seems unrealistic (if West Virginia were going to attract it, it already would have...). The brief calls for West Virginia to “target permanent fund expenditures toward programs that directly or indirectly increase West

¹⁰⁰ World Bank, 2010.

¹⁰¹ “Creating an Economic Diversification Trust Fund: Turning Nonrenewable Natural Resources into Sustainable Wealth for West Virginia.” West Virginia Center on Budget & Policy, January 2012.

Virginia's capacity to attract industry and generate jobs that will provide a sustainable tax base and broadly shared prosperity.”

Though the West Virginia Center on Budget & Policy references Professor of Science & Technology Policy Andrew Stirling and his discussion of economic diversification policies as support for their call, a closer read of Stirling reveals doubt about the possibility of the existence of a quantitative index that proves that a more economically diverse economy is in fact preferable in all cases.¹⁰² Researchers have contended that diversity in “institutional, technological and epistemological systems” promotes innovation. However, Stirling maintains that a demand for diversity has an actual price attached to it. In terms of an actual manufacturer, diversifying approaches, as opposed to standardizing approaches, adds cost. Even beyond this, Stirling points out that economic diversity is problematic to actionalize. What is diverse and what isn't? What do we exchange for diversity? Who and what does the exchange? He in fact cautions:

for technologies or institutions that are marginalised or in decline - perhaps for very good reasons - appeals to the general virtues of diversity may offer an alluring strategy for advocacy. Here, the benign “apple pie” connotations of diversity render the concept highly vulnerable to rhetorical use in industrial or institutional special pleading. Given this, and the prominence of diversity in so many important and topical areas of policy making, it is surprising that - compared to the analysis, for instance, of environmental or scale externalities - relatively little effort has been devoted to detailed or systematic exploration of the nature and implications of economic (and especially technological) diversity. Whatever view might be taken on the overall merits of the case for diversity, there is a serious need for the development of transparent, flexible and robust techniques for the ‘mapping’ of economic diversity in different dimensions and under different circumstances.

Again, as good as “economic diversity” sounds, we are back to what could be construed as a warning that economic diversity is not a panacea. Furthermore, it may not be the best first

¹⁰² Stirling, Andrew. “On the Economics and Analysis of Diversity.” University of Sussex, Science Policy Research Unit, 1998. <http://www.sussex.ac.uk/Units/spru/publications/imprint/sewps/sewp28/sewp28.pdf>.

line of examination or policy for a particular place or situation, and that even to speak of “West Virginia” as a coherent place with single issues ignores the differences in community viability of its commutershed panhandles that feature active public universities versus its most deeply extractive hinterlands.

Moreover, in hinterland areas, the economy there, and thus, the mode of the hinterland’s economic participation under capitalism, often becomes subscribed by local possible and actual natural resource exploitation potential.¹⁰³ Must this be? Of course not. Just as natural resource exploitation does not necessarily lead to local economic injustice. Though, as I contend later in the dissertation, under the constructs and confines of late capitalism, metropole spaces with more diversity of economic sectors also can experience not only more per capita wealth, but also more per capita liberty and equity. More economic diversification does not necessarily lead to more equitable economic distribution or personal liberty, or community well-being. Those take concerted and well-designed policy and economic structures paired with mechanisms for enforcement and/or institutions which advocate, or which redistribute wealth like a producers or workers cooperative, or such as concerted efforts to fight cronyism and corruption.

Democracy Deficit, Corruption, and Decline of Social Capital

Areas beyond suburban or exurban geography may not be capable of keeping pace with more metropole locations in terms of the demands under capitalism for economic growth. However, in the United States, participation in the market economy and economic growth have become (falsely) associated with promoting economic stability—and, remain feature goals of US policy at home and its policies abroad. On the one hand, resource extraction is used by industry

¹⁰³ Leadbetter, David, 2007; Freudenburg, William, 1992.

to tout job creation in hinterland areas.¹⁰⁴ On the other hand, academics and researchers propose that resource extractive industries squeeze out the possibilities for the growth of other kinds of industry and stifle entrepreneurship and economic diversification.¹⁰⁵

One of the key concepts in a liberal democracy rests with the idea, and the ideal, of being a free agent, not bound to a particular person or bound to the land. One is free to choose where to live, for whom to vote, etc. In a town that depends mainly or solely on one industry for its livelihood (a *monotown*), practicing democratic citizenship can become difficult.¹⁰⁶ In the US context, if where we work is not unionized or expressly non-hierarchical, we anticipate that democracy is what we practice when we leave the workplace.¹⁰⁷ At work, owners run the workplace top-down, with less or more adherence to labor laws depending on local level of enforcement.¹⁰⁸ One contention claims that competition for labor in urban geographies reduces the impact of business on the private lives of citizens.¹⁰⁹ Ideally, in an urban context in a democracy, one can vote, attend a protest, gather, etc. and otherwise exercise democratic practices with respect to political governance without direct interference by one's workplace, because the workplace does not monopolize local government.¹¹⁰ However, in a monotown, where one's workplace directly influences one's place of residence as the town exists primarily to

¹⁰⁴ Leadbetter, David, 2007.

¹⁰⁵ Di John, Jonathan. "Is There Really a Resource Curse? A Critical Survey of Theory and Evidence." *Global Governance* 17, no. 2 (2011): 167–84.

¹⁰⁶ The World Bank, Europe and Central Asia Unit. "Monotowns: Path to Resilience: A Brief Review of International Experiences with Urban Regeneration," 2010.

¹⁰⁷ Winner, Langdon, 1986: As explained above, the manipulation or introduction of technologies in the production process in order to eliminate workers for reasons of politics rather than production efficiency has a long history. The case of the National Union of Iron Workers and Cyrus McCormick II illustrates this point. Being at odds with this union, McCormick II aimed the introduction of technology squarely at the most skilled workers, seeking their displacement through machines. Though the first technology introduced to replace these workers produced lower quality castings than had the human workers, the machines achieved McCormick II's political ends of weakening the union.

¹⁰⁸ Ibid.

¹⁰⁹ Leadbetter, David, 2007.

¹¹⁰ Mitchell, Timothy. *Carbon Democracy: Political Power in the Age of Oil*. New York: Verso, 2011.

service this one industry, the totalitarian rules of work may obtain and control of local politics may be held tight directly or indirectly by the mono-industry.

By contrast, resource extraction was once heralded as a certain road to material prosperity.¹¹¹ Not only did it support boom monotowns in the United States, it also set the stage for physical work stoppages by labor, thereby making workers more efficacious in their demands for fairer wages and more humane working hours and conditions.¹¹² In the early twentieth century, coal mining's structures and heavy dependence on a large human workforce made it susceptible to labor's power to bring production or distribution to a halt. In the US, as the twentieth century progressed, mine operators shifted from heavy labor to heavy technical reliance, thereby eliminating and/or reducing the threat of labor stoppage.¹¹³ Many resource extraction locations continued to be highly productive, yet with a greatly reduced workforce. The human aspect of monotowns that had boomed with the initial extraction shrank without any plan for how to accommodate the problems that attend shrinkage: loss of necessary businesses, loss of taxes, emptying schools, crumbling infrastructure, youth and brain drain, etc.¹¹⁴

Unlike the promise of renewal under economist and political scientist Joseph Schumpeter's theory of creative destruction (which, in a nutshell, maintains that in order for capitalism to thrive, old processes get destroyed by innovations, thereby reinvigorating capitalism as a system), these extractive communities, as *communities*, in the US often shrivel with no other active or activated economy to offset that of extraction.

Even an entity as contentious as the World Bank asserts ideals about what makes a community a community: the basic obligations of a local government to “ensure the delivery of

¹¹¹ Ibid.

¹¹² Ibid.

¹¹³ Winner, Langdon, 1986; Mitchell, Timothy, 2011.

¹¹⁴ See <http://www.shrinksmart.eu/>.

quality social and communal services and a responsive supply of land and housing, so that the city becomes and remains a hospitable place for businesses and households.”¹¹⁵ Moreover, local government can and should function as an essential counterforce to significant private companies in a region. By contrast, extractive companies often are “footloose, making little lasting investment for the town's general benefit, and sharing profits only minimally through local tax revenues...”¹¹⁶ For the extractive communities, by the time the extractive industry reduces the human workforce either through increased mechanization, reduced need for the target extraction, or depletion of the target extraction, little economic counterweight exists (if it ever did).

According to Timothy Mitchell in *Carbon Democracy*, the kinds of communities that historically became sites for extending democratic practice through massive unionization and strikes often, later, may become less democratic than the places in society's centers influenced by their democratic practices (however, there are theories that these sites never realized true democratic potential due to the edging out of other industry by the mono-industry). For example, through the specific elimination of a human workforce through the introduction of technologies, management reduces the potential for work stoppage—the backbone of what lends a strike its power.

If, in these cases, the local government consists of members loyal to the company or local industry, and, the industry also reduces or has reduced the human workforce through mechanization, the monotown ceases to deserve the moniker “town.” In the West, in the context of modern democracies, to constitute being a “town” requires that some political power remain within the grasp of local citizens through local voting, community boards, municipal elections and positions, etc. If both political force and economic power in a town belong to industry, then,

¹¹⁵ The World Bank, 2010.

¹¹⁶ Ibid.

for all practical purposes, the town's function has been reduced to that of an extension of the company. The town becomes (or remains) a kind of department responsible for, among other things, providing entertainment, food, shelter, education for the place-dependent human technology needed by the industry.

Moreover, with respect to the monotown's role in a larger democracy, the peripheral monotown continues to provide many of the resources needed for society's centers (metropolises) to exist. For example, without cheap energy, most of the goods and services affording residents of more metro centers the life chance to pursue non-resource extractive, non-agricultural, or non-industrial professions would not exist. Additionally, the move over the twentieth century to abstract, education-based (*elite*) conceptualizations of democracy away from democracy as practiced by blue collar workers at that century's start further undermines the power of democracy as a practice rather than as an ideal.¹¹⁷

As for the democratic struggles by workers or laborers not exposed to higher education? Alternatively, potentially, democracy becomes internalized for many people not first through abstract-reasoning or academic critical thinking, but through democratic practices toward specific goals of broadening democracy's benefits such as through the acts of collective bargaining, fighting for workers' rights, mobilizing for voter enfranchisement, or participating in concrete acts toward social change. Certainly, in the case of how a democracy may become more democratic through being more, rather than less, inclusive and to include more participation by its citizenry, the practices of democracy outweigh in value the abstract analyses of democracy.

On these points, the practice of democracy rarely extends from the polity into the company unless through the collective action of the employed. Therefore, if a monotown has

¹¹⁷ Mitchell, Timothy, 2011.

become a technological extension of the industry through both or either means previously described, that it is not democratic may neither be obvious nor problematic to its inhabitants. If the “town” functions as or extends the industry's technology and workplace mores, the town's inhabitants may first construe themselves as necessary first to maintaining the flow of company product and then, if at all, also as citizens deserving of a voice and deserving of an impact in their lived environment.

However, it is important not to succumb to discussing companies as if they, too, remain static and do not consist of people. In the US, we often discuss corporations as if they were some kind of non-material entities and as if decision-making processes did not ultimately rest in the hands of actual people. Though legally corporations stand as entities separate from individual shareholders or employees, ethically they should not.¹¹⁸ Ethically, the people of which the

¹¹⁸ Winner, Langdon; Fisher, Stephen L., and Barbara Ellen Smith. *Transforming Places: Lessons from Appalachia*. Champaign-Urbana: University of Illinois Press, 2012. Fisher and Smith examine a range of practices that contribute to democracy that are beyond voting. These practices are worth review as they point to the deep poverty of focus only on democratic practice through voting and also carve the territory for the case of the need for high and diverse civic engagement for a robust democracy to occur:

Build bridges with allies. Show up at the events of allies.

Share limited resources: money, time, and the spotlight.

Advertise.

“Get serious about racism and oppression.” (27)

Attend public hearings.

Write fundraising appeal letters.

Hold mass demonstrations and rallies.

Lobby in Washington, DC.

Conduct civil disobedience.

Conduct a series of action campaigns.

Hold vigils.

Use the creative arts.

Create puppet shows.

Do street theater.

Create art together in public around the issue.

Do activism as a second job in addition to the job that pays the bills.

Write letters to the editor.

Create a “free” newspaper and print folks from your side in it. Distribute it widely.

Get some local experts involved.

Involve faith communities.

Involve students.

Involve young people.

Build bridges among religious folks around key issues.

corporation consists become citizens granted legal permission to suppress the rights and democratic livelihoods of other citizens. Masking the human agency in this process may be pseudoscientific economic data representing profit-driven human agency as mathematically-derived technological efficiency.

Host events when the students are still in school.

Use social media.

Train volunteers to fundraise.

Build upon each small success (43).

Provide background at meetings in order to welcome newcomers. (44)

Have courage. (44)

Multi-issue groups often garner more support yet single-issue groups often have a lot of energy (44).

Form a non-profit organization. (50)

Highlight issues of livelihood and health.

Be prepared to counter the messages than you are loony. Don't let them get you down. (52)

Form citizen groups. (54)

Get folks envisioning the future they want. (55)

Utilize local opinion and action.

Show local groups how joining a larger effort "will advance their own agenda." (56)

Give people "principled reasons" to form alliances. (56)

Welcome newcomers in the area to participate in civic life. (56)

Reflect on whether joining larger networks would work to your advantage. It may not. (57)

Create movements or actions based on values rather than interests—values last longer. Envision together the world/the community you want—this reflects values rather than issues. (57)

Use the principles of the 'solidarity economy': "reciprocity, democracy, sustainability, and equity." (59)

Help people know who they are and have a sense of identity (65).

Start a festival. (69)

Conduct solid research.

Hold fundraisers such as turkey shoots, cakewalks.

Relate your mission to religion. Use Bible verses.

Create a listserv.

Write resolutions and bring them to city and town councils.

Ask allies for email addresses.

Be dogged.

Call people directly on the phone when social media or email does not get the response you need.

"Choose an initial fight you can win." (36)

Structure your group to be able to "quickly absorb newcomers." (37)

Create a steering committee to govern.

Create bylaws.

Reach across party lines.

Believe that "it does not matter if you have no chance of winning. It does not matter than no foundation will fund you. You fight viscerally because it is right to oppose something so awful." (38)

"Usually only a few respond with deep commitment, but often that is enough." (38)

Embrace democratic statements.

Table at local events.

Create a petition.

Offer cheaper and better environmental solutions.

Advocate a positive vision, but also attack the negative. (40)

As profits and economic impact can be calculated, their formulation and representation assume the “virtues of necessity and universality generally attributed to scientific rationality.”¹¹⁹ To be also concerned with the human actors in the technological space of the technical monotown pejoratively demonstrates overly emotional or irrational concerns. Furthermore, if the technical monotown produces commodity goods such as coal, timber, natural gas, oil, grain, etc., to suggest alternative concerns other than economic efficiency can be construed by industry and by government as an aim to cripple national interest, thereby to risk being unpatriotic.¹²⁰ Economics or quantitative economics depends upon actual human agents. Economics functions as a disciplining system on competing goals for the technical monotown. The possibilities for choices not adhering to economic or pseudo-technical proposals become curbed.

This last term—”economic” along with “the economy” or “economy”—are terms which are often black-boxed, which is to say that politicians, economists, journalists, policy-makers, etc. utilize these terms without defining what they mean, taking for granted that these terms have fixed definitions, when in fact the terms and the range of concepts they represent exhibit also a range of socially-created and negotiated practices.¹²¹

Usually, in contemporary terms, these cases are directly couched in the language of cost benefit: computer programs are more accurate than the human white collar workers they replace and less costly to maintain, and so on it goes with Schumpeter's capitalist creative destruction.

¹¹⁹ Feenberg, Andrew, and Michel Callon. *Between Reason and Experience: Essays in Technology and Modernity*. The MIT Press, 2010.

¹²⁰ Kurz, Tim, Shona Crabb, and Martha Augoustinos. “Contesting the ‘National Interest’ and Maintaining ‘Our Lifestyle’: A Discursive Analysis of Political Rhetoric around Climate Change.” *British Journal of Social Psychology* 49, no. 3 (n.d.): 601–25.

¹²¹ Breslau, Daniel. “Economics Invents the Economy: Mathematics, Statistics, and Models in the Work of Irving Fisher and Wesley Mitchell.” *Theory and Society* 32, no. 3, 2003, 379–411; Stirling, Andrew. “On the Economics and Analysis of Diversity,” Brighton, UK: University of Sussex, Science Policy Research Unit, 1998.

If you cannot speak against the political power in your community for fear of losing your job (if the company also runs the politics), then you do not have freedom of speech (e.g. you have the “right” but not the capability to act on that right). Not as many people become needed in many monotowns due to technological shifts—thus, not enough people exist to counterbalance the industry's power. Under neoliberalism, freedom has been subsumed under the free market to where the latter now embodies also the former. This leaves democracy an abstract concept monopolized by elites rather than a set of practices accessible to all citizens.¹²² We also speak of corporations in the abstract rather than the sum of actual people making decisions, thus people in corporations are not held as directly accountable as individual citizens. To speak or act against a commodity of national interest can make citizens in the monotown appear unpatriotic.

The Limits of Utility for the Concept of the Resource Curse

In Science and Technology Studies we often speak of the materiality of technical artifacts as potentially impacting the social; in fact, we may even posit that these technical artifacts co-produce the social. “Steel, wires, semiconductors, nuts and bolts” may impact how people live, what choices they can make, and how they contend with each other in the polity.¹²³ This assumption underlies the concept of the “resource curse.”¹²⁴ According to the British economist Richard M. Auty, the presence of natural resources in a newly developing area creates a vacuum of power and stifles economic competition such that ruling elites rely upon rents from natural resource extraction to maintain political power rather than submitting to the will of competing economic interests or to the will of the people. The resource prescribes local economic

¹²² Harvey, David, 2007.

¹²³ Winner, Langdon, 1986.

¹²⁴ Auty, Richard. “Natural Resources, Capital Accumulation and the Resource Curse.” *Ecological Economics* 61, no. 4 (March 15, 2007): 627–34.

possibility. Likewise, a similar phenomenon, termed “Dutch Disease,” occurs even when a newly extractive country implements careful policies, but still can become affected by inflated exchange rates and wages due to an influx of extractive rents. In this case, the factual materiality of a natural resource predicts the political outcome.¹²⁵

Carbon resources do not guarantee prosperity at the sites of extraction. No material technology guarantees material prosperity just as the fact of having laws or policies (technologies of government) do not guarantee they will be followed. In fact, we have come to anticipate some gap between laws or policies and their adherence.¹²⁶ Certainly, fear of legal action or other state-directed retribution for non-adherence can make people toe the policy line; however, other modes of governance and civil society advocacy also lend policy weight. That one can get to a particular building wherein particular people work on a given issue may serve as a point of relief or stress (depending on the social standing) regarding a particular issue: think the political and social power of a union hall. The embodiment of accepted practices through the creation and maintenance of institutions empowers these institutions as disciplining or “policing” forces.¹²⁷ For example, the creation of a regulatory agency may lend material weight to the directives to follow a particular set of policies—but, as Jerry Bruce Thomas points out in the case of strip mining enforcement in the State of West Virginia in the 1970s, policy ranks only as effective as it receives institutional or other resources for adequate enforcement.

Prior to an institutionalized labor union for miners, for example, the union for miners lived not in a particular building or site but first in particular practices, and only when people

¹²⁵ Di John, Jonathan. “Is There Really a Resource Curse? A Critical Survey of Theory and Evidence.” *Global Governance* 17, no. 2 (2011): 167-184.

¹²⁶ Stone, Deborah. *Policy Paradox: The Art of Political Decision Making*. New York: Norton, 2001.

¹²⁷ Foucault, Michel. *Society, Territory, Population. Lectures at the Collège de France, 1977-78*. London: Picador, 2007; Rodrik, Dan and Arvind Subramanian and Francesco Trebbi. Institutions Rule: The Primacy of Institutions over Geography and Integration in Economic Development, *Journal of Economic Growth*, Vol. 9, No. 2, Jun., 2004, 131-165.

enacted those practices. Yet, once the union for miners assumed institutional trappings, such as a building, and professionalized, a miner no longer needed to practice the union in order to experience the union. He/she could go to the material building and seek an expert to address grievances which heretofore may have only been expressible through forms of direct democratic action.¹²⁸

So, then, material carbon resources also receive their punch from the same source that gives law or policies theirs—configurations of the social. In “Correlates of Corruption: Rethinking Social Capital’s Relationship with Government in the United States,” Richard Ledet paraphrases other scholars and agrees that “scholars interested in U.S. Politics have” “remained steadfastly uninterested in corruption issues for generations.” To put this into relief, though the field of economics has long focused on cost-benefit analysis and other idealized means for predicting efficiency and efficacy of potential policies, the same amount of energy for the rational ideal has not been applied to uncovering empirical relations or for producing an acceptable state of corruption.

So, then, what of corruption in one of these US fossil fuel extractive states? For example, in highly fossil fuel extractive West Virginia, with significant rents from coal, gas, and oil, why do many people in the most coal-producing counties suffer the largest poverty, consistent with the myth of the resource curse? Jerry Bruce Thomas demonstrates that this poverty was not only due to fossil fuel extraction, but that other kinds of extraction—such as timber¹²⁹, and that other

¹²⁸ Scott, Rebecca, 2010.

¹²⁹ For example, this text is quoted in a journal primarily about mining. It highlights the timber wealth of West Virginia in 1880: Forestry Bulletin No. 25 of the U. S. Census of 1880, by Special Agent C. S. Sargent, under date of March 1, 1883. Here is a small sample: “The forests have been largely removed from the counties bordering the Ohio river [sic], and the most valuable timber along the principal streams, especially the Black Walnut, Cherry, and Yellow Poplar, has been culled in nearly every part of the state.” In *The Virginias: A Mining, Industrial and Scientific Journal Devoted to the Development of Virginia and West Virginia*, 1880.

kinds of environmental degradation—such as tanneries, also took their toll; the mechanization of these various single sector rural industries led to massive employment and economic loss. Upon closer examination, West Virginia's most fossil fuel extractive counties rank in the middle of the state's fifty-five counties in terms of per capita income, while the state's lowest per capita income *towns* are located in its most coal extractive counties. Furthermore, while West Virginia may rank fair to poor along with many other US states in terms of political corruption, it ranks second from the bottom in poverty.

How does it then perform corruption?

Ledet differentiates among variables within the construct of social capital. For example, *networks* (his emphasis) “provide the human infrastructure necessary to accomplish economic, political, and social goals.” Furthermore, *values* (again, his emphasis) “or norms” can be constructs such as interpersonal trust and political equality. In a study he cites in Iowa, communities with “high levels of social capital also have high-quality governments.” Internationally, “higher levels of social capital are associated with lower levels of corruption.” Ledet further points out that from the research on good governance, when social capital as defined as trust strengthens, trust in good governance also strengthens.

Thus, democracy becomes precarious in the single sector space and the conflation of work and civic life is a contributing factor to this tenuousness; adding corruption to the mix further undermines democracy in that it “breaks the link between collective decision-making and people's power to influence collective decisions through speaking and voting, the very link that defines democracy.”¹³⁰ In short, perceived corruption can cause people to lose faith in

¹³⁰ Warren, Mark E. “What Does Corruption Mean in a Democracy?” *American Journal of Political Science*, 48, no. 2 (2010): 328–43.

government as a technical entity, regardless of whether the actual technical government entity is still or actually corrupt.

Moreover, Ledet points out a muddying factor with respect to extractive communities. If the number of political prosecutions defines corruption, then whether someone that is politically corrupt in fact comes to trial and is prosecuted varies widely from state to state.¹³¹ This, then, renders a comparison of corruption based on prosecution as minimally useful. More robust than conviction are public perceptions of “the abuse of public office for private gain.” Reliance on journalists as reporters of corruption, on the other hand, concurs with methods preferred in the corruption literature. Researchers view journalists as well-informed and well-positioned to judge perceptions of local or state corruption.

Case in point, in *Afflicting the Comfortable: Journalism and Politics in West Virginia*, Thomas Stafford, a former investigative reporter, chronicles the corruption of West Virginia's politics from 1945 till 1993. Though much of the text traces the corruption with respect to governors and vendors, Stafford also follows the boom and bust of the influx of money into the region through anti-poverty programs and how these programs lacked oversight (more on those below in the section on Mingo County and Huey Perry). Moreover, the struggle between business interests and miners marked the government as being in the pocket of business until West Virginia Senator Robert Byrd's election in 1953, with the first prominent former impoverished person of coalfield heritage entering the larger arena of state-level politics.

¹³¹ The Center for Public Integrity. “State Integrity Investigation,” n.d. <https://www.publicintegrity.org/accountability/state-integrity-investigation/>. In May 2013, a new report by a consortium calling itself the State Integrity Investigation, ranked American states in terms of corruption on key factors such as “campaign finance, ethics laws, lobbying regulations, and management of state pension funds.” A review of the list shows that heavily extractive states over all suffer no more from issues regarding transparency than do other states. Though, this may not be as positive as it seems. Most states fall well below acceptable in terms of the key factors listed above. Again, as with regulation, more transparency rather than less may be key across states and industries.

Stafford also contends that resource extraction during World War II took a toll on West Virginia, in particular through strip-mining, and links these corporate interests to the same corporations responsible for fiscally reckless practices that led the country into the Great Depression.

Furthermore, Stafford outlines several conundrums then of West Virginia and politics including West Virginians' loyalty to a politician, even if that politician is revealed to have been highly unethical and highly influential in his/her corruption. He cites the case of Governor Arch Moore, indicted in the early 1990s for bribery, tax evasion, lying under oath, fraud, and buying votes. Despite his long history of corruption and leading by poor example, many West Virginians still viewed him favorably and commended his rule (and elected his daughter US Senator, which she currently remains). By contrast, Stafford quotes US Attorney Michael Carey on Moore: "Those that knew him [Moore] said he had been a crook for years, and public officials seemed to believe that everyone was doing it [corruption], including the governor, so why not them."

Between 1984-1990 Carey prosecuted sixty-nine county, state, and federal officials. Though it could be contended that with this scandal, corruption in West Virginia came to its peak, Stafford reasons something less joyful. He notes that many of West Virginia's public servants had become cavalier in their acceptance of corruption. In 1991, "Members of the legislature claimed that the ethics law they passed two years earlier was too rigid. They were being denied...the opportunity to accept hotel bonus points...choice tickets to university football games...white-water rafting trips....[which] put them at a disadvantage in administering the affairs of office." He also notes the firing of a state employee who filed an ethics complaint

against management and the investigation into public servants utilizing state resources for themselves.

Stafford further points out that the kind of investigative journalism that may have revealed Moore's corruption earlier can be costly and that only a handful of West Virginia papers have the staff and legal support to conduct lengthy or potentially litigious reportage.¹³²

On this same strain, Huey Perry's *They'll Cut off Your Project: A Mingo County Chronicle* reads like an extension of one of Stafford's chapters, though Perry holds a contrasting opinion of Robert Byrd. Stafford counted him as a friend and viewed him an ally of working people. Perry viewed Byrd as an accomplice to cronyism, and indeed, someone that chose not to intervene on behalf of working people in the following incident. In *They'll Cut off Your Project*, Perry chronicles how he came to head anti-poverty programs in Mingo County¹³³ in the mid-1960s, a major coal producing county, and how his five years there played out. In addition to deeply involving the poorest people in Mingo County in the management and decisions of the Office of Economic Opportunities (OEO), Perry et al took on local politicians and politics in particular with respect to rampant election fraud. Perry posits that the smear campaign local politicians and business-owners ran against the management of OEO had to do with these politicians and business people not being able to dip into the anti-poverty money used for OEO. With the direct involvement of poor people in OEO decision-making and action-planning, Perry et al countered the prevailing concept that mountain people would not stand up for themselves. However, by 1969, after challenges for potential takeover of OEO by the Mingo County Court, the OEO began to receive directions from its federal sponsors not to involve the poor in decision-

¹³²Stafford, Thomas. *Afflicting the Comfortable: Journalism and Politics in West Virginia*. Morgantown, WV: West Virginia University Press, 2005.

¹³³ Mingo County remains one of the largest coal-producing counties in West Virginia.

making, and, to include “all segments of the county in policy decisions and the administration of community action programs.” In other words, politicians and business people were now to also be decision makers for the OEO. Moreover, if the people involved with OEO demonstrated or protested against elected officials, its federal funding would be withdrawn.¹³⁴

In Perry's case, the OEO came up against the wrath of a local political boss, State Senator Noah Floyd, who also went to bat for Governor Arch Moore during the anti-strip mine abolitionist rallying of Moore's campaign for a second term.¹³⁵ Throughout his book Perry demonstrates the intense local political plays and interests in anti-poverty money as well as examples of strong-arming, cronyism, and election fraud by local politicians. A final demoralizing blow came when four local politicians accused of rampant election fraud and vote-buying were acquitted, despite abundant testimony, leading a US Attorney from the Justice Department to remark regarding Mingo County, “Freedom has been lost...There is a government of the organization, by the organization, and for the organization....The only thing people get when they go to the polls in Mingo County is money.”

Adding Stafford's chronicling of gubernatorial corruption to Perry's chronicling of that at the county-level is Cynthia M. Duncan's characterization of patronage politics in her Appalachian site “Blackwell.” In this coalfield area in Appalachia, the school board functions to provide jobs rather than education. Indicative of how this and other corruption may affect the coalfields are the words by a local educator in Blackwell regarding politics, “You can't break the whole web. You can maybe break strands of it, and you hope, somehow, when they get rewoven, that they're different people with different ideas and things change a little.”

¹³⁴ Perry, Huey, 1972.

¹³⁵ Thomas, Jerry Bruce, 2010, 308.

Duncan points out that this corruption accompanied coal operators to Blackwell. As a means of contrast, some theorists of the resource curse point out that Norway, long before its oil boom, already had developed into an advanced democracy (though, this proposition could be questioned), thus, it entered the extractive resource market well-armed in social capital to contend with corruption.¹³⁶ However, if taken at face value, the rule to extraction would be that democracy may only be possible in resource extractive areas that were already stalwartly democratic prior to the development of an extractive industry. An important side note regarding Norway: while itself democratic, it has had millions of acreage in natural gas interests in Appalachian West Virginia, Ohio, and Pennsylvania, where it did not contribute to strengthening local social capital or governance.¹³⁷

In terms of creating the situation and culture for coalfield environmental, social, democratic, economic, and financial degradation, all contributing factors cannot be accounted for, yet corruption and technological advance in the coal industry intertwine and co-produce. They not only historically collide; they continue to resonate with current change agents and social service providers working on or in the Pocahontas Coalfield and other adjacent coalfields.

Problems Now

The environmental, social, democratic, economic, and financial degradation of the Pocahontas Coalfield can be well-documented in current statistics from the Centers for Disease Control, the US Census, state assembled statistics, various academic journals, and through investigative journalism. Additional factors make creative destruction and economic rebirth of

¹³⁶ Larsen, Erling Roed. "Escaping the Resource Curse and the Dutch Disease? : When and Why Norway Caught Up with and Forged ahead of Its Neighbors." Statistics Norway, Research Department, 2004. <http://hdl.handle.net/11250/180569>.

¹³⁷ Duncan, Cynthia, 1999; Graeber, Daniel J. "Statoil Completes Sale of Marcellus Acreage." HOME / ENERGY NEWS, September 16, 2016. <https://www.upi.com/Statoil-completes-sale-of-Marcellus-acreage/1601474030319/>.

this region different in profile from cities going through restructuring after the collapse of need for workers in their single sector economies (think Detroit or Buffalo):¹³⁸

Unlike mass exodus or abandonment of land and buildings in major cities, the extractive companies are not letting loose of many of their coalfield holdings or mineral rights. Thus, entrepreneurs looking to utilize the land in this region have to focus on what they can access by way of lease agreements on the surface. Furthermore, accessible land also must be ascertained for viability in light of longstanding chemical contamination from the energy or railroad sectors or industry-incited erosion.¹³⁹

The heart of the Appalachian coalfield sits well beyond commutersheds, that is, most of the southernmost West Virginian and Southwest Virginian coalfields sits far from large cities. Thus, little opportunity exists for converting a town there to a bedroom community, for example.¹⁴⁰

The Centrality of Well-Informed Respondents

In 2009 while working in a foundation to promote, among other things, more democratic participation in the South Caucasus nations of Armenia, Azerbaijan, and Georgia, my colleagues and I read and debated Marc Morje Howard's *The Weakness of Civil Society in Post-Communist Europe*.¹⁴¹ This text makes the case that along with extra-statutory sectors such as investigative journalism, the health and richness of civil society groups in a country can also determine the

¹³⁸ Cowie, J., and J. Heathcott. "The Meanings of Deindustrialization." In *Beyond the Ruins: The Meanings of Deindustrialization*, 1–15, 306–7. Ithaca, NY: ILR Press, n.d.

¹³⁹ Interview with respondent, 2014; Body of work by Christopher Barton: <http://www2.ca.uky.edu/forestry/bartoncv.pdf>

¹⁴⁰By contrast, only recently designated "Appalachia" by the Appalachian Regional Commission, the city of Youngstown, OH, for example, has reinvented itself from a steel town to a commuter town. Pallagst, Karina. "Shrinking Cities in the United States of America: Three Cases, Three Planning Stories." In *The Future of Shrinking Cities: Problems, Patterns and Strategies of Urban Transformation in a Global Context*, Berkeley, CA, February 2007, by the Center for Global Metropolitan Studies, 81-90. Berkeley, CA: Institute of Urban and Regional Development and the Shrinking Cities International Research Network, 2009.

¹⁴¹ Howard, Marc Morjé. *The Weakness of Civil Society in Post-Communist Europe*. Cambridge, 2003.

health and strength of the country's democracy. Local colleagues pointed out his glaring misreading of certain post-Communist societies as not being oriented toward helping their fellow citizens. They point to the overwhelming success of the locally incited and run anti-Soviet protests and the deep strength of informal kinship and friendship related norms of mutual assistance. Without veering too far into this as a side discussion, important takeaways from me included the positioning of the emerging Western-style nonprofit sector in the former Soviet states and how they had, for the most part and given how well funded they had been, ineffective at providing much stabilization of democracy in post-Soviet states.

From my work in the Caucasus, from Howard's discussion and from discussion of Howard, and from a brief stint at a DC-based nonprofit seeking to make change at the "grasstops" level, I formulated a suspicion that in the United States, especially in a region dominated by one industry recently or historically, people working at the grasstops in nonprofits, government, volunteer, or civic groups contending with the region's deficits, or, even slightly at odds with the region's dominating economic sector, may be very solid respondents in terms of ascertaining the region's principal issues, and, its unrecognized or underutilized strengths.

Prior to my dissertation and also in its initial phase, I had the opportunity to engage with grasstops in Mercer County, WV (mainly Princeton, 2007 - 2010) and in Mingo County, WV (mainly Williamson, early 2011). In both cases, I was struck by their capacity for social trust, to create institutions, and to shape identities not rooted in the energy sector. In both cases, they also had some overview, some theoretical or at least philosophical grounding for why they were doing what they were doing, and that they were results oriented, and, produced results in terms of building community capacity in economic change, cooperation, focus, and even hope. And, as one grassroots respondent later complained to me, and I paraphrase: Enough! We have been

surveyed to death! We know what is wrong with us! These groups in Mercer and Mingo worked together to create solutions to local issues, and, at least for the time being, seemed not to experience significant obstacles thrown up by local politicians or cronies.

Archival research alone would not provide me with the in-depth understanding of regional potential that I sought. Moreover, I was at an advantage culturally in being “from there” originally, and already possessed some cultural competency in terms of reaching out throughout the region for grassroots respondents. These respondents were of incomparable utility to me in terms of understanding the on-the-ground effects and issues in the Pocahontas Coalfield as was my participation as an interviewer, participant observer, and engaged placed-based scholar—in the latter role I was seeking not only to report, but also to participate.

In my archival research and in qualitative interviews, I came to view the work of these grassroots seeking and effecting change as the region’s “real” representatives, in a sense forming a government of their own and proceeding with attempting to increase liberty, health, and happiness by doing the economic development work the free market or short-sighted politicians will or cannot.

In terms of community outreach, I focused primarily on secular nonprofits, civic groups, volunteer groups, with the occasional city level politician. More than quantity, I attempted to reach a cross section of types. For formal interviews, respondents included interviewees associated with or in:

- The Chamber of Commerce
- City Managers
- Nonprofit Executive Directors, mainly focused on public health, health services
- National nonprofits who have engaged in sector change

- Local civic group founders
- Academics involved in projects to boost adjacent sectors
- Volunteers in civic groups

As a participant observer, I spoke with dozens more people, likewise from a wide cross-section:

- Agricultural grasstops
- Energy advocacy grasstops
- Energy researchers
- Scientists engaged in energy sector compliance in safety, or meeting EPA regulations
- Representatives from federal agencies, especially those in economic development, energy regulation, or agricultural or rural economic development
- Representatives from state agencies
- Representatives from groups engaged in political, environmental, and state structural zoning and reform
- Entrepreneurs
- Social entrepreneurs
- Artists
- Farmers

I focused in particular on agricultural participants as I had, by then, identified the agricultural sector in the region as a longstanding economic sector adjacent to energy.

Additionally, mainly in 2014 - 2016, I attended civic meetings, conferences, city planning meetings, and seminars aimed at economic renewal or opportunity.

With respect to the problems, grasstops respondents elucidated those born out in the archival research, but, they also could point out additional regional issues not as discussed in the press, and/or weakly acknowledged in any academic literature.

For example, one qualitative interview respondent reported that some coalfield residents felt thirty miles was too lengthy a commute for work and that his clients feared travel.¹⁴² The cultural assumption I drew was that while that same resident may not fear thirty miles travel in some familiar patterns, or, how the region is oriented, other travel may seem farther than it is due to unfamiliarity or it being outside the regional cultural orientation. For example, residents in McDowell and Mercer Counties, WV are oriented south toward Virginia, and even Northeast Tennessee, or I-77 North Carolina rather than toward Central West Virginia. Regional media market orientation analysis bear out this observation, as due my lived experience, and my discussion with respondents.¹⁴³

Local education, such as community colleges or even four-year colleges, remains focused on preparing young people for jobs that do not exist there (in energy extractive industry) or preparing them for export to other regions of the state or country.¹⁴⁴

The remaining population has become disproportionately:

- a. Elderly¹⁴⁵
- b. Disabled¹⁴⁶

¹⁴² Cook Marshall qualitative interview, 2014.

¹⁴³ Nielson. "Local Television Market Universe Estimates," 2017 2016. <http://www.nielsen.com/content/dam/corporate/us/en/docs/solutions/measurement/television/2016-2017-nielsen-local-dma-ranks.pdf>.

¹⁴⁴ The syllabi and programs at local community colleges, local colleges, high schools, etc. reflect national trends or single sector interest.

¹⁴⁵ US Census data.

¹⁴⁶ US Census data.

- c. Opioid addicted¹⁴⁷
- d. With households headed not even by grandparents, but by great-grandparents as parents and grandparents contend with addiction....¹⁴⁸

As discussed previously, low social trust¹⁴⁹ and higher poverty¹⁵⁰ obtain.

Race and racism have never been dealt with adequately in the coalfields. There is a long and complicated history of black middle class success, marginalization of black culture, and active racism.¹⁵¹

With the region's turn toward Republican voting, it is now often politically at odds with programs that provide relief.¹⁵²

Access to services remain difficult, with elderly and disabled people not able to descend from their mountain homes to get to them, even if they live in town on a ridge.

A local workforce can be difficult to hire and maintain due to addiction. Up to sixty percent of children in McDowell County counties do not live with their immediate family, but with grandparents and great-parents and are at risk for becoming wards of the state when those relatives pass. The relatives who are caregivers or foster parents often and have issues associated with being elderly or disabled.

Land ownership largely remains in the hands of corporations.¹⁵³

¹⁴⁷ Holpuch, Amanda, and Nadja Popvich. "Rural Counties across the US Becoming a Powder Keg for HIV Outbreak." *The Guardian*. July 31, 2016.

¹⁴⁸ Ibid. Centers for Disease Control.

¹⁴⁹ Bell, Shannon.

¹⁵⁰ US Census data.

¹⁵¹ Some examples of attempts to deal with race and racism in Appalachia include: Smith, Barbara Ellen. "De-Gradations of Whiteness: Appalachia and the Complexities of Race." *Journal of Appalachian Studies* 10, no. 1/2 (Spring–Autumn 2004): 38–57; Trotter, Joe. *Coal, Class, and Color: Blacks in Southern West Virginia, 1915-32 (Blacks in the New World)*. Chicago: University of Illinois Press, 1990; Weiner, Deborah. *Coalfield Jews: An Appalachian History*. Chicago: University of Illinois Press, 2006.

¹⁵² Contrera, Jessica. "In a Place of Need, an Unhealthy Contradiction: They Are Poor, Sick and Voted for Trump. What Will Happen to Them without Obamacare?" *The Washington Post*. March 11, 2017.

¹⁵³ Thomas, Jerry Bruce, 2010.

Land can wildly vary in its viability for economic development beyond energy extraction industries due to brownfield or other contamination.¹⁵⁴

Trends among Appalachian Grasstops Sources

Four trends arose from my 2014-2016 engagement with grasstops sources: economic, community development, and environmental restoration. At conferences focused on improving the region, one main issue of concern was discussed: creating economic opportunity or entrepreneurship. Prior to my interviews in the region and my participant observation, I had anticipated that this would be every respondent's major theme. However, in the region of concern itself, as I interviewed grasstops, a second major theme appeared: lack of leadership/lack of vision—which my respondents often intertwined. I had fully anticipated that the effects of poverty or the effects of coal on the environment would rank as the top concerns, given the scholarship I had read. Instead, two respondents named the opioid crisis as a third trend, nearly six months (summer 2014) before it made national media, and expressed frustration over what they deemed a generation, or two, lost to opioid addiction. Respondents pointed to a lack of adequate public or political leadership as a fourth significant issue of concern for their communities. This final, and frequently cited, concern concurs with theory regarding the effects of a conflated work/civic space on democratic practice and robustness.¹⁵⁵

My questions, as approved by the Institutional Review Board in 2014, can be viewed in **APPENDIX C**. Respondents more often engaged in similar discussion prior to my asking all of these; nevertheless, I ensured I asked this question of each of twenty-three formally interviewed respondents: what is your community's most pressing struggle? At the time of writing this list of questions, I assumed that technology would provide a potential solution for part of what ails

¹⁵⁴ Barton, Christopher, 2016. Much land has chemical contamination and/or soil fertility is prohibitive.

¹⁵⁵ Ledet, Richard, 2011; Winner, Langdon, 1986.

these communities. By contrast, respondents listed the following issues as top crises in their communities:

- Lack of leadership/Lack of Vision, which they equated.
- Opioid Addiction and Addiction Services

With respect to lack of leadership/lack of vision, respondents explained (again, this is their view) that local politicians, including state politicians, shortsightedly voted or acted in favor of short-term personal gain, either in their acquiescence to the local single sector industries, whether coal or natural gas, or, due to the prevalence and dominance of the energy sector, could not envision or explore economic opportunities beyond it. Though approving of efforts to invent and encourage tourism, such as that of the Hatfield-McCoy All Terrain Vehicle (ATV) trail, respondents did not see enough economic support, training, or marketing to make that sector thrive.¹⁵⁶ If the region had better political leaders, leaders with vision, then its myriad of other social, economic, environmental, and racial issues would not be as dire. Gaining significant ground on any of these, respondents felt, was unlikely in the public or governmental sphere. Local and state politicians had no vision. This region was falling behind in population and thus, had fewer votes that mattered. These sections of West Virginia and Virginia were far from the state capitals—thus, out of sight and out of mind. Moreover, significant federal engagement was unlikely as this area just could not compete in terms of numbers served, and in federal granting and attention, quantitative measures of impact put the declining populations in the coalfield

¹⁵⁶ Scholar Rebecca Scott problematizes the issues of a kind of tourism occurring in McDowell County, WV that would be shunned or fought against in other locations—ATV tourism. Likewise, the wages associated with tourism are meager compared to wages associated with union jobs. Tourism jobs do not equivalently replace coal mining jobs. For more about the trail: <http://www.trailsheaven.com/>.

counties at a disadvantage. Federal grants were usually aimed at helping the most people. Rural areas needed assistance but could not provide the large numbers served per dollar spent.

Respondents expressed that local residents needed hope, and that local political leaders lacked the ability to provide this either in inspiration or concrete achievement.

Respondents also indicated experience with current issues of political corruption, cronyism, and factionalism. They expressed dismay that often civic groups spent more time competing than collaborating with each other. They pointed to direct run-ins with systems of kickback alive and well in city and county governments. They expressed concern, similar to that of Huey Perry fifty years prior, of misappropriation locally of federal funds.

Respondents not serving as public officials described a need to work outside the local political system in order to achieve social change gains. They described their own community initiatives and those of faith-based groups as particularly significant.

Though not expressed in these terms, respondents prioritized the local democracy deficit of not having local political leaders acting on the true behalf of local constituents, leaders without vision beyond or in addition to the local single sector industry, and leaders not being transparent or trustworthy as the major obstacles to addressing the wider range of economic, health, social, educational, and environmental issues. Without leadership, adequate advocacy to combat the region's issues could not occur.

Conclusion

In *Chapter One*, I have argued that poverty in the coalfield Appalachian space stems from layers of economic and social factors related to workplace automation, the shift toward larger-holding farms in the Midwest and West mid-twentieth century, unmitigated single sector economies with no state or corporate policies of promoting transparency or democracy, and the

totalitarian structure of the single sector workplace and social space. No social, economic, or scientific law accounts for the strong correlation between a space with high fossil fuels production and low democratic function. Moreover, I have also claimed that the totalitarian nature of the workplace in the United States, with its top down structure of command, extends into the social space in the rural industrial single sector space, as well as in the urban single sector space. The inability to separate the social demands of the totalitarian workplace from one's social sphere contributes to an inability for a person living in this space to function as a democratic "free agent," able to make personal or political choices against the workplace imperatives. In the Pocahontas Coalfield, the union acted as a social organizing force and power counterbalance to the coal and land companies, until the era of Reagan and increased union-busting or de-legitimizing tactics of the 1980s.

The long-standing deficit in "public" work, or work beyond the farm, in the Appalachian space and the historic fallout from severe cuts to the workforce due to automation in the Pocahontas Coalfield by 1960 continues to reverberate in the region's long list of social, environmental, and health issues. Rather than listing these issues and employment as their top concerns for the Pocahontas Coalfield, qualitative interview respondents from among grasstops highlighted corruption and ineffective and uncommitted political leadership as their main concerns. In short, in the view of respondents, without transparent and ethical leadership with strong vision beyond the parameters of the historic single sector industry, and without strong grasstops leadership, the region will remain short on resources it needs to address job creation, poverty, brownfields, and health-related issues stemming from the local single sector economy.

Chapter Two addresses the founding of the Pocahontas Coalfield as a highly technical rural industrial space.

CHAPTER TWO

Scientific Promises and Prosperity: Constructing the Rural Industrial Space

Overview

In *Chapter Two*, I argue that science and technology enable the Pocahontas Coalfield as a single sector economy to occur. In short, they form the basis upon which the Pocahontas Coalfield as a rural industrial space is constructed. Scientific knowledge formed, and continues to form, the basis for coal mining. Technical knowledge opened the opportunity for industrial intervention and continues to construct coal mining and their accompanying coalfields as social and technical practices. I also assert that scientists are not absolved from the fruit that their “knowledge creation” bears, whether those fruits be political, economic, social, or environmental.¹⁵⁷ I claim that if science creates knowledge, then the large machines, in the case of surface mining, for example, not only destroy an environment, or contribute to work displacement, but also destroy a kind of knowledge, an intimacy of and practice of place. Additionally, I argue that the Pocahontas Coalfield, its science and technology, and its inhabitants, as parts of a large technical system, i.e. energy production, become rendered invisible in the larger US culture, becoming extensions in the invisibility of ubiquitous technological systems such as energy or water provided to metropole or spaces tied to the “knowledge” or “creative” economic sectors, for example. From here, I argue that the science and technical practices vis a vis corporate entities can render a rural industrial space and its residents a kind of living dead, unable to democratically change their situation, stripped of rights of actionable protest, and economically, physically, or due to rooted identity, unable to leave. I

¹⁵⁷ Ravetz, Jerome R. *Scientific Knowledge and Its Social Problems*. Oxford: Clarendon Press, 1971.

claim that residents in this space can become lesser “citizens” in terms of their abilities to construct and enable democracy and democratic practice.

Other academic work focuses on the less than forthright means by which the initial landholding companies came to possess land or mineral rights in what became the Pocahontas Coalfield.¹⁵⁸ However, I am taking several steps back further into the past. Prior to even deciding to wrangle land from the locals, people with money to invest had to decide that these proposed coalfields were going to pay off and were going to be worth the hassle of that pay-off.

At the onset of Pocahontas Coalfield, the myriad in particular of social and economic problems currently at play could not have been fathomed by its first and strongest proponents. Among these, Jedediah Hotchkiss, a geologist, and also a mapmaker and topographer during the Civil War for Stonewall Jackson, advocated strongly that Virginia ought to abandon its agrarian economic reliance and focus instead on its mineral wealth. What I call “Hotchkiss’ wager” was his insistence that this large technical intervention would bring prosperity if only capital and the state would invest. Hotchkiss insisted that focusing on mineral wealth instead of continued agrarian production would bring greater prosperity to more people in the two Virginias. To this end, he created and promoted a scientific journal to gain investment for this wager.¹⁵⁹

Evidence exists of Jedediah Hotchkiss’ journal making the rounds among investors in the region in 1880, thus predating some evidence of other scientific assessments as first to have broader investment influence.¹⁶⁰ Though the following represents part of this picture, in fact,

¹⁵⁸ See footnote 16.

¹⁵⁹ Hotchkiss, Jedediah. *The Virginias: A Mining, Industrial and Scientific Journal Devoted to the Development of Virginia and West Virginia*, 1880-1885.

¹⁶⁰ Other scholars cite later dates and evidence for the influx of interest and capital but the primary sources I used point to Hotchkiss’ predating those. For example, Talmage Stanley asserts this as the impetus into that region: “Kimball was first alerted to the extraordinary potential of Pocahontas coal by reading C. R. Boyd’s *Resources of Southwest Virginia, Showing the Mineral Deposits of Iron, Coal, Zinc, Copper, and Lead* (New York: John Wiley and Sons, 1881). So impressed was Kimball by both the economic potential of the coal reserves, and Boyd’s writing about the potential of Southwest Virginia, that

many pieces had been in place and moving with respect to mineral exploitation in that region well prior to the Civil War.

The economic, social, personal, health, and environmental degradation of this region due to the culture and corruption of the single sector energy sector in the Pocahontas Coalfield and other Southwest and West Virginia coalfields as outlined in this dissertation could not have been what Jedediah Hotchkiss envisioned when he advocated for industrial scale coal production. With technological and technical advancement, totalitarian workplace and living space conditions, externalization of corporate environmental costs, and political corruption, the Pocahontas Coalfield morphed from prosperity to a Pandora's Box.

Coal country politicking, cronyism, and corruption tell one part of this story. Hidden in plain view, and Jerry Bruce Thomas addresses some of the technological changes directly in this “new machine age,” are other kinds of leaders—those whose expertise industry relies upon.

The hard sell outside the “Virginias” for investing and how science and technology were used to frame this sell set up a narrative of industrialization, ties to the Northeast, technological sophistication, and worldliness, that, at the time, competed with the popular and likewise manufactured narratives of the greater and adjacent Appalachian region as being inhabited by backwoods, salt-of-the-earth living “ancestors” of those Whites in more sophisticated metropolises. This narrative of science, technology, and industry gets lost now in popular culture and in larger cultural associations of Appalachia. I assume that cultural narratives of rural spaces elsewhere also mask the more salient and aggressive impact of industry. In the twenty-first century when we think of the rural space, we think miner, farmer, angler rather than mining engineer, agrochemical engineer, or biological systems engineer.

he purchased a hundred copies giving one to every member of the Norfolk and Western's Board of Directors and others (Lambie 1954, 27).” And so on goes the description of this interest.

Because we fail to grasp the impact of scientists and engineers in the rural space or examine how the rural space is also categorized, classified, intervened in, manipulated, and with sophisticated technology applied to it, we lose sight of the full complex technical reality of the rural space. This loss results in scholarly, policy, cultural, and political consequences. Rather than science and technology for the benefit of people in the rural space and for land stewardship, we arrive in single sector economies in democracy deficit, with local populations and environments suffering from the problems I outline in *Chapter One*.

Promoting Science and Data to Sell Nature and a Patriotic Plan for “Improvement”

Nineteenth century industrialism was not without its social critics (Karl Marx) and even its environmental critics (Henry David Thoreau, John Ruskin, Alexander Humboldt).¹⁶¹ Accidents, injury, fires, and greed were common associations with coalfields in the United States by the time of the opening of the Pocahontas Coalfield. For example, in his close examination of the Pennsylvania anthracite coal basin, Anthony F. C. Wallace surmises that in that area, prosperity had been fleeting due to coal operators ignoring scientific evidence about the viability of the seams in that region. Mining operators ignored issues of safety, not enough coal was produced to cover the costs, technological advances did not deliver expected seam access, and despite the popular cultural displacement at that time of the war hero with the industrialist, the latter did not always rise to the occasion. In the case of the Anthracite Coalfields of Pennsylvania, the issues with the production there were well-enough known: the coal seam was not deep enough, mine construction was poor, in the early years there were no safety regulations,

¹⁶¹ Wallace, Anthony F. C. *Saint Clair: A Nineteenth Century Coal Town's Experience with a Disaster-Prone Industry*. New York: Random House, 1987.

miners were blamed for accidents, miners got “miner's asthma” from breathing coal dust, stone dust, powder smoke, methane, and carbon-monoxide gas.¹⁶²

Thus, one can assume that enthusiasm for development of the bituminous Pocahontas Coalfield had to be contextualized within the personal, financial, and community risks affiliated with the previously opened coalfields in other regions.¹⁶³ The scientific assumption by Hotchkiss was that the Pocahontas Coalfield seam was wider, and the coal of higher quality, especially for metallurgical and energy production. Science had been undermined in the St. Clair region of Pennsylvania by the industrialists willing to mine anthracite coal despite large safety and financial risks—in the end those coalfields did not produce adequate return for investors. By contrast, Hotchkiss promoted science as a cornerstone of this new potential coalfield and as a necessary driver for sound investment.

Infamous to Civil War scholars or enthusiasts for some of his feats, yet unknown or little examined with respect to his scientific and economic advocacy, Jedediah Hotchkiss included successful lobbying for mineral wealth extraction in Southern West Virginia and Southwest Virginia among his most successful acts of “public service.” Beyond his pivotal military role and his fluency as a professional scientist, regarding Hotchkiss we must set aside current assumptions, and instead engage with nineteenth century actualities pertaining to American science and technology and what qualified one then as a scientist or engineer. Likewise, Hotchkiss’ is a story of understanding the changing direction of the US economy and the post-Civil War South as well as the role, up for debate then, that science and technology ought to play in building the economy. Though a respected surveyor and geologist (and deep friends with the

¹⁶² Ibid.

¹⁶³ Holm Jr., Edwin. “Production and Marketing of Coal in Virginia and the Nation.” Richmond, VA: Virginia Division of Industrial Development and Planning, 1955.

founder of MIT, a fellow mining engineer and geologist), Hotchkiss did not undergo formal education as a topographer, surveyor, or geologist.¹⁶⁴ Moreover, Hotchkiss' tale as a businessman and technologist rests on competing narratives for the "two Virginias" (West Virginia and Virginia) and what their modern identities ought to be.

Hotchkiss created a scientific and technical journal as a promotional vehicle for attracting investment in the industries, which he envisioned as pivotal for bringing the two Virginias prosperity and himself and other mining engineers and former Confederates wealth, in lifting him to his Civil War level glory, and for pulling the South out of a still agriculturally-oriented dark ages. Moreover, Hotchkiss did not act alone in his role as chief data, science, and industrial two-Virginias propagandist. Other self-taught or university-educated surveyors, geologists, and mining engineers often cum businessmen, land speculators, financiers, or coal "barons" worked with him or in his consort. For example, a list of members and associates at the American Institute of Mining Engineers in Roanoke, VA reveals any number of people with technical expertise or interest also associated with the region as coal barons. See:

List of Members and Associates of Am. Inst. M. Eng. present at Roanoke, Va., Meeting. - As a matter of general interest we have obtained from Secretary T. M. Drown the following list of the Members and Associates of the American Institute of Mining Engineers that attended the recent Roanoke, Va., meeting in 1883. [I have marked Pocahontas Coalfield significant actors in bold.] - W. H. Adams, Cedral Mines, Villa de Musquiz, Coahuila, Mexico. E. C. Appleton, Canajoharie, Montgomery Co., N. Y. C. A. Ashburner, Philadelphia, Pa, J. B. Austin, Roanoke, Ya. W. Lawrence Austin,

¹⁶⁴ Thomas, Jerry B. "Jedediah Hotchkiss, Gilded-Age Propagandist of Industrialism." *The Virginia Magazine of History and Biography* 84, no. 2, April 1976, 189–202. The same Jerry Bruce Thomas of the *Reawakening Appalachia* text.

Philadelphia, Pa. Edward Bailey, jr., R. D. Baker, Philadelphia, Pa. C. R. Boyd,
 Wytheville, Va. A. F. Brainard, Low Moor, Va. **G. W. Bramwell**, Flushing, N. Y. **J. H. Bramwell**, Roanoke, Va. S. \1. Buck, Coalburg, W. Va. L. Duncan Bulkley, New York City. J. Lawrence Campbell, Liberty, Va. R. C. Canby, Philadelphia, Pa. H. M. Chance, Philadelphia, Pa. James E. Clayton, Baltimore, Md. W. S. Clayton, Baltimore, Md .. W. W. Coe, Roanoke, Va. ·H. B. Colburn, Liberty, Va. C. F. Conrad, Roanoke, Va. Edgar S. Cook, Pottstown, Pa. Samuel A. Crozer, jr., Roanoke, Va. Asbury Derland, Boiling Springs, Pa. F. P. Dewey, Washington, D. C. E. V. d'Invilliers, Philadelphia, Pa. H. S. Drinker, " " T. M. Drown, Easton, Pa. Thomas Dunlap, Amherst C. H., Va. **T Egleston**, New York City. 1\1. Fackenthal, Hellertown, Pa. J. W. Farquhar, Easton, Pa. Isaac Fegely, Pottstown, Pa. Philip L. Fox, Philadelphia, Pa. Persifor Frazer, Philadelphia, Pa. **John Graham, jr.**, Pearisburg, Va. Edward Gridley, Wassaic, N. Y. Edward Hart, Easton, Pa. -C. Hanf0rd Henderson, G. C. Hewett, Winifrede, W. Va. C. H. Hitchcock, Hanover, N. H. H. Hollerith, Jed. Hotchkiss, Staunton, Va. C. B. Houston, Thurlow, Pa. j., W. Hunt, Troy, N. Y. **William Jolliffe**, Buchanan, Va. Frank King, Van Buren Furnace, Va. C. O. Lagerfelt, Milnes, Va. J. S. Lane, Akron, Ohio. Edward K. Landis, Pottstown, Pa. N. M. Langdon, Chester, N. J. **W. A. Lathrop**, Pocahontas, Tazewell Co., Va. A. E. Lehman, Philadelphia, Pa. James F. Lewis, Quinnimont, W. Va. John C. Long, Richmond Furnace, Pa. G. A. Longnecker, Dillsburg, Pa. A. S. McCreath, Harrisburg, Pa. Charles , Macdonald, New York City. William P. Moore, ? Denver, Col. William G. Neilson, Philadelphia, Pa. E. C. Pechin, Cleveland, Ohio. Enoch Phillips, Catasauqua, Pa. John B. Porter, T. D. Rand, Philadelphia, Pa. Ellen H. Richards, Boston, Mass. R. H. Richards, Boston, Mass. P. G. Salom, Philadelphia, Pa. R. H. Sanders, " " P. W. Shimer,

Easton, Pa. Albert Spies, Jersey City, N. J. E. Gybbon Spilsbury, New York City. John Stevenson, jr., Lynchburg, Va. H. A. Strode, Amherst C. H., Va. William Thaw, jr., Pittsburg, Pa. Willard P. Ward, Savannah, Georgia. A. G. West, Cedartown, Ga. James Witherspoon, Pearisburg, Va.

Members, from Virginia and West Virginia, elected at the Roanoke, Virginia, Meeting, 1883. J. B. Austin, Roanoke, Va. W. W. Coe, Roanoke, Va. C. F. Conrad, Roanoke, Va. Samuel A. Crozer, jr., Roanoke, Va. John Graham, jr., Pearisburg, Va. G. C. Hewett, Winifrede, W. Va. Edward S. Hutter, Houston Mines, Va. Associates from Virginia and West Virginia elected at the Roanoke, Virginia, Meeting, 1883. J. Lawrence Campbell, Liberty, Va. T. W. Simpson, Roanoke, Va. Webster D. Smith, Paint Creek, W. Va. . ¹⁶⁵

A fight for “development”...

In addition to narratives of democratic progress tightly wound around the American project with respect to its Enlightenment roots of liberty and freedom, adjacent to this narrative also runs an American project of land grabs and land speculation, and a fulfillment of Manifest Destiny. Without resorting to presenting the obvious regarding European colonialist and white settlers’ intentions and actions with respect to the acquisition of land in North America, narratives of progress, industry, utility, commerce, access, conflict, and scheming regarding land in North America go hand in hand with the advent of America as a place created. In the American context, land was not only pecuniary but also mixed with issues of national or

¹⁶⁵ Martha Jane Becker’s colloquial and rather biased narrative of early Bramwell, WV (compiled also from work with local high school students), traces the “baron” history of the group of men mainly responsible for intervening in Mercer, McDowell, and Tazewell Counties to create the industrial Pocahontas Coalfield. Among these is also many an engineer or baron with technical expertise, though not the focus of her text. The town is named for the J.H. Bramwell, a civil engineer, appearing above on this roster. Becker’s writing and editing highlights the kind of myth-making and legacy more often discussed in popular texts about the barons. Becker, Martha Jane. Bramwell, The Diary of a Millionaire Coal Town, 1988.

individual state interest and with economic development.¹⁶⁶ For example, not only was George Washington involved in the formation of the United States as a democracy project, he was also a major land speculator, and through this speculation, arguably, America's wealthiest sitting president. Moreover, Washington's financial interest in land merged with his interest in the proposed utility of the land, and with his projections for what the American colonies, and later, the United States, ought to concern themselves/itself with economically.¹⁶⁷

Though potentially difficult for us now to consider in the context of mature industrial capitalism, the investment capital and stock boom, and the armed labor struggles of the late nineteenth and early twentieth centuries, the years of Reconstruction concurred with the US federal government contending with crushing national debt, the ruined economy of most of the former Confederacy, and how or if to convert the mainly former slave-tied agricultural base of the South toward increased industrial production and its "free labor," and, thereby, to different economic opportunity and potential stability, if not prosperity.¹⁶⁸

At this time, both agricultural and mineral extractive enterprises relied heavily upon human labor. In the South, both carpetbaggers and local Southern "patriots" sought opportunity to industrialize the economically "regressive" South. To the burdens and trials of intensified industrialism, add the details of converting the former Confederate states back to the Union, immense war debt, ruined infrastructure, interpersonal and state hostilities, and shifts in Black and White political power.

¹⁶⁶ Sakolski, A.M. *The Great American Land Bubble: The Amazing Story of Land-Grabbing, Speculations, and Booms from Colonial Days to Present Time*. New York: Harpers & Brothers, 1966.

¹⁶⁷ Ibid.

¹⁶⁸ Fitzgerald, Michael. *Splendid Failure: Postwar Reconstruction in the American South*. American Ways Series. Chicago: Ivan R. Dee, 2007.

A major interest at this time was in raising capital to service debt, rebuilding railroads, and in “modernizing” the former Southern slave-dependent economies through attracting in outside free labor and investing in industries beyond agriculture.¹⁶⁹ Toward the latter, data and facts were needed in order to attract investment. Coal was a known quantity in Virginia as in the late eighteenth century an early bituminous coal industry had sprung up near Richmond, Virginia, that in the subsequent sixty or so years was eclipsed by investment and technological adaptation by the Pennsylvanian Anthracite Coalfields.¹⁷⁰

In *Old Dominion, Industrial Commonwealth: Coal, Politics, and Economy in Antebellum America*, historian Sean Patrick Adams contends that state investment in scientific data gathering, technical infrastructure, and business policies may appear mundane each in its turn, but that in the aggregate, they result in necessary and foundational developments for supporting the growth and competitiveness of emerging industries. In short, in Virginia until after the Civil War, politics served and protected large scale slave-holding land-owners. Patrick likewise contends that not just the availability of slaves impacted industrial pursuits; slavery also impacted economic perspective—large slaveholders dictated the parameters of exploitation—focusing more on agriculture than on other kinds of industry. Moreover, state legislators responded to potential economic development projects both in concert and individually not necessarily rationally nor armed with facts. Prior to the Civil War, agriculture remained privileged in Virginia, and coal and other minerals resources remained not fully surveyed nor fully promoted till well after that war.¹⁷¹

¹⁶⁹ Tucker, Spencer C. *Brigadier General John D. Imboden: Confederate Commander in the Shenandoah*. Lexington: The University Press of Kentucky, 2003.

¹⁷⁰ Adams, Sean Patrick. *Old Dominion, Industrial Commonwealth: Coal, Politics, and Economy in Antebellum America*. Baltimore: The Johns Hopkins University Press, 2004, 1 - 3.

¹⁷¹ *Ibid*, 10 - 11.

Post-Civil War, a large concern of prominent Virginians was revitalizing the state's economy. To these ends, former Confederate Brigadier General John Imboden was involved in economic rebuilding of Virginia addressing issues of labor and land. As the demand for coal increased, with the demand for iron as part of broader industrial and railroad expansion, Imboden characterized coal as Virginia's highest prospect for return on investment. Directly after the War, Imboden explained this to a friend, "...in short time digging a mint of money out of...hills and mountains. I know of no such opening in Virginia just now for big returns on a comparatively small capital."¹⁷²

In 1872, Imboden detailed what was known at the time regarding Virginia's coal and iron deposits, and the next year visited London in order to raise British capital and investment for developing mining in Southwest Virginia. Imboden authored a paper considering the commercial potential for these minerals, which he read to the Virginia legislature in February of that year—the same month the US Congress received a report on the status of other Southern states during Reconstruction, with special examination of White on Black violence.¹⁷³ By 1875, with British investment and family interests secured in developing coal in Virginia, Imboden became the leading authority on mineral deposits in Southwestern Virginia.¹⁷⁴

In 1880, Imboden relocated to Abingdon, Virginia, and began promoting the coal stores of Dickinson, Russell, Washington, and Wise Counties. He employed a government geologist, Professor Stevenson, to assess the coal and iron deposits in extensive land holdings he had acquired there.¹⁷⁵ Imboden created a three-hundred page report in 1886 on Virginia's mineral

¹⁷² Tucker, Spencer, 2003, 294.

¹⁷³ Ibid.

¹⁷⁴ Ibid.

¹⁷⁵ Ibid.

potential for the US Bureau of Statistics containing detailed site surveys and statistical analysis.¹⁷⁶ The US Congress subsequently requested twenty-five thousand copies of the report.

By 1888 Imboden was installed as general manager of the Mineral Bureau of Southwest Virginia, Eastern Tennessee, and Western North Carolina in order to promote that region's natural resources. However, the booming iron mining he envisioned for the region stopped short when the deposits revealed themselves shallow and the new "Damascus" Imboden envisioned building in Washington County, Virginia, caved in during the severe economic downturn of 1893, when "15,000 businesses failed...150 banks closed...and 4,000,000 workers" lost their jobs in the already struggling US.¹⁷⁷

While Imboden died before the future of coal extraction for Southwest Virginia was realized, his associate Jedediah Hotchkiss succeeded. Both Imboden and Hotchkiss considered tragic for the State of Virginia the pulling of funding from the 1842 geological survey under direction of geologist and scientist William Barton Rogers, though Rogers did complete six volumes of "Reports of the Geological Survey of the State of Virginia."¹⁷⁸

In the early nineteenth century, geology was still nascent, and as a field largely incoherent, with many amateurs focused on proving biblical provenance through land formation. Pennsylvania, with its booming coal industry prior to the Civil War, also had the first lauded American Geological Society. Until the rise of William Barton's brother, Henry Darwin Rogers, the National Academy of Sciences viewed geologists as mostly underskilled and unscientific. Henry had been tapped to undertake a major geological survey of Pennsylvania and was also elected to the Geological Society of London. State support in Pennsylvania was granted.¹⁷⁹

¹⁷⁶ Ibid.

¹⁷⁷ Ibid.

¹⁷⁸ ...whose brother surveyed the Pennsylvania coalfields.

¹⁷⁹ Adams, Sean Patrick, 2004, 125.

Well prior to the Civil War, in Virginia, a stream of out-migration due to limited opportunities for non or small landholders led the state to explore possible solutions for stopping its hemorrhaging of White residents. A mineral survey was one proposal made to jumpstart an industry which might entice able-bodied White men, in particular, to stay. Two years after a Virginia Geological Survey was proposed, it was begun by Henry's brother and University of Virginia scientist William Rogers (later the first president of M.I.T) in 1835.

Like the Pennsylvania survey of his brother's before it, William Barton Rogers carefully outlined economic benefits of the survey over its scientific aims. Both Henry and William, however, were strained by the political demands placed upon their scientific and knowledge-seeking endeavors. Due to pressure from agricultural interests in Virginia, William's survey stressed mineral potential for agricultural fertilizer, causing western Virginia mineral potential to remain underanalyzed and underreported. As geology was also an emerging science, William Barton Rogers struggled to find assistants whose methods and knowledge he could trust, and those whom he could trust found the terrain and conditions in the western section of the Virginia survey formidable. William also encountered legislative opposition regarding the practical applications of his reports. After 1842, the geological survey of Virginia was defunded, with its mainly western mineral deposits still only haphazardly revealed. By contrast, Henry succeeded in publishing his reports on Pennsylvania, and, the Pennsylvania survey attracted investment as its basis in scientific facts made capital expenditures appear more certain.¹⁸⁰ Conversely, the Geological Survey of Virginia by Williams Barton Rogers languished, with little interest or state intervention.¹⁸¹

¹⁸⁰ According to Anthony Wallace, the "success" of Henry Rogers' survey in Pennsylvania in terms of rallying investment must be tempered by the reality of its projected seam depth being ignored.

¹⁸¹ Adams, Sean Patrick, 2004, 122 - 151.

In the decade prior to the Civil War, the success of Pennsylvania's coal industry renewed interest in Virginia. Whereas by then Pennsylvania had a robust selection of state-sponsored charters for mining investment, low capital match by the State of Virginia undercut the opportunity for substantial outside investment. New York financiers, for example, had definitive figures in play for judging investment potential and sought state charters close to \$1million. In its legal environment, Virginia also had not developed the kinds of security that Northern or European investors, at that time, sought. Western Virginia had in the interim developed coal mining in the Kanawha and Ohio Valleys, but their output and significance lagged far behind the industry of that time in Pennsylvania.¹⁸²

During the Civil War, the Richmond [coal] Basin was attacked, reducing but not eliminating coal production for the Confederacy. After the war, mismanagement and lack of vision continued to hamper the growth of that Basin.¹⁸³

In 1884, Hotchkiss undertook the re-publication, under one volume, of William Barton Roger's *Geological Survey of Virginia*. Both Hotchkiss and Imboden were of like mind that had this survey been more deeply considered earlier in their century, Virginia, by their estimation, would have moved more quickly away from a largely slave-based agricultural economy, and, potentially, would have been differently positioned both politically and economically prior to the Civil War. Imboden and Hotchkiss assumed Virginia would have been economically in line with the industrializing north. Moreover, they considered Barton's departure from Virginia in 1853 for Boston, where he became the first president of the Massachusetts Institute of Technology, a tragedy for science and industry in Virginia. With Barton's departure, Virginia lost its most

¹⁸² Ibid, 152 - 181.

¹⁸³ Adams, Sean Patrick, 2004, 189 - 222.

preeminent scientist and the person with the deepest geological understanding both practically and theoretically of the kinds of mineral-based economy Virginia could develop.¹⁸⁴

In “Jedediah Hotchkiss, Gilded-Age Propagandist of Industrialism” in *The Virginia Magazine of History and Biography*, Jerry Bruce Thomas depicts Hotchkiss as a fervent evangelist for the commercialization of the natural resources of Virginia and West Virginia in order to bring forth a new economic era to those states. Like many former Confederate luminaries, after the South lost, due to imposed federal restrictions, Hotchkiss found himself locked out of former investments, particularly in what became the Kanawha Coalfield in the Charleston area of West Virginia, and, he also found himself substantially reduced in social standing and station.

Though a member of Virginia’s Conservative Party,¹⁸⁵ Hotchkiss was anxious for Virginia to leave behind its slaveholding identity, for it to shed itself of its antebellum obsession with land, and to turn instead to a presumed prosperity in “mines, mills, and furnaces.” After trying his hand at many other endeavors, Hotchkiss turned his full attention to reigniting iron and coal potential in the two Virginias. In 1880 Hotchkiss assembled the first journal of what would become four volumes under the title of “The Virginias, A Mining, Industrial and Scientific Journal, devoted to The Development of Virginia and West Virginia” with himself as editor and publisher. In Volume 1, he offers this brief biographical information:

Jed. Hotchkiss,
Consulting Mining and Civil Engineer; Member of the American Institute of Mining Engineers, etc.—Author of “A Geographical and Political Summary of Virginia,” of “A Physiography of Virginia,” etc. Formerly Top Eng. of “Stonewall” Jackson.

¹⁸⁴ Tucker, Spencer C. *Brigadier General John D. Imboden: Confederate Commander in the Shenandoah*. Lexington: The University Press of Kentucky, 2003.

¹⁸⁵ Fitzgerald, Michael, 2007. Virginia’s Conservative Party was against Reconstruction.

This collected volume, coming in over 200 pages and published at Staunton, Virginia, combines scientific, technical, and economic information with advertisements for geologists, lawyers, engineers, and also promotes economic advocacy and the solicitation of additional scientific knowledge of the mineral wealth in these two states. Published monthly, Hotchkiss conceived of this journal as essential for rallying the interest of investors.¹⁸⁶

The four volumes draw from every scientific and technical expertise available at the time both in published papers and descriptive correspondence with experts regarding the two Virginias and mineral exploitation potential. Two columned and dense with graphics, maps, and explanatory text, Hotchkiss, in the introduction, contends that these two states have the mineral resource potential to support growing to be the largest in population among US States.¹⁸⁷

Important to this dissertation are the aspirations Hotchkiss utilizes science to frame. The Virginias journal's introduction is worth examining at length for its juxtaposition of science, mineral and other industries, and its postulation of mineral-based prosperity. Hotchkiss writes:

...The development of the resources of the great territory, 67,500 square miles in extent, embraced in the states of Virginia and West Virginia, is the end we have in view...there is no region, of equal extent, in the United States, having so much and such a variety of unused natural wealth, and that nothing is wanting but a development and utilization of their resources to enable them to rank with, if not lead, the first of other States in population, industrial activity and accumulated wealth, and to acquire the power derived from the possession of an unlimited store of raw materials with skilled labor and capital to work up and market them. First in importance we place the development of their iron, coal, and a dozen other mineral resources, the extent and richness of which it is even difficult to exaggerate; that done, improvement in all other directions will follow....
...a Mining Journal, striving to collect and publish full and reliable information...how they may be made profitable; providing a medium for calling the attention of capital and skill to them, and recording the progress...such a journal is greatly needed.

¹⁸⁶ Hotchkiss, Jedediah, Volume 1.

¹⁸⁷ Did not happen, though population did grow. Refer to the Talmage Stanley discussion in the *Introduction* on local country growth in Virginia.

Hotchkiss goes on to discuss other adjacent industries such as timber and agriculture and their prospects in the region...and turns again to the focus on science in this journal:

The basis of substantial material development is scientific knowledge wisely applied, therefore we shall devote a portion of our space to the presentation of scientific facts and statements relating to the Virginias.

We invite communications and correspondence about mineral deposits, the opening and output of mines, the erection and production of furnaces....

Hotchkiss' experts include a range of geologists and professors—prominent among these were John L. Campbell, professor of Geology and Chemistry at Washington and Lee in Lexington, VA; Professor Thomas Egleston of Columbia College, New York, School of Mines; Professor N.S. Shaler of Harvard University, the Director of the Kentucky Geological Survey; and, engineers in the employ of the US Navy.¹⁸⁸

In *The Virginias* Campbell notes in his section on the “Mineral Resources and Advantages of the Country Adjacent to the James River & Kanawha Canal and the Buchanan & Clifton Forge Railway” that his “explorations have been entirely voluntary” and not for any kind of commercial gain for anyone; they have been accomplished “solely in the interests of science, and the State of Virginia.”¹⁸⁹ What proceeds draws from his own research and others, including what he terms the “well-known” work of William Rogers.¹⁹⁰

Later, he characterizes the compilation of *The Virginias* as especially being in need by West Virginia and that this journal actually ought to have been created by the state itself and that through the influence of this journal, capital may be raised to develop “the long neglected mineral resources of the two States.”

¹⁸⁸ Hotchkiss, Jedediah, 22.

¹⁸⁹ Ibid, 2.

¹⁹⁰ Ibid, 5.

Included in the publication of the *Journal* are a range of testimonies of previewers and reviewers, the *Religious Herald* of Richmond noting that “such journals are invaluable for directing attention to the material resources of the State....Capitalists...will find in it much useful information.” The *Kanawha-Gazette* points out the uniqueness of this journal as being the only one like it that they know of in Virginia.¹⁹¹

Hotchkiss reveals significant investment in the Kanawha Coalfield by Swiss investors “The Swiss Commerce Society” and their possession of 35,000 acres there, about 35 miles from “Charleston, the future capital of West Virginia.” His enthusiasm for their investment is matched in kind by an enthusiasm for their race and origin. He notes:

There is no better region in the United States for the location of the hardy and substantial immigrants of Central Europe, chiefly of the Teutonic race...the true policy to be pursued in this rich mining region is to sell the surface to a good class of people and raise on the spot a plentiful class of workers—miners, manufacturers, farmers, and graziers—....such men will be born conservators of the peace...but will hear no more of “strikes” and labor riots, the ebullitions of the passion of men that are not free-holders.¹⁹²

Thus, along with anticipating the settling of additional Whites in the coalfield regions and his bias for Northern Europeans (we can assume this was a response to the significant numbers of Catholic Irish and Southern Europeans coming to the US at this time), Hotchkiss fully anticipates manufacturing, farming, and grazing to continue in the same exact region as deep coal mining.

Continuing his promotion of the scientific endeavor of this deep coal mining, Hotchkiss lets us know in the March 1880 issue that many prominent mining engineers had been active recently or were currently active in Virginia and he proceeds to roll call them. Strategically boosting the stature of his own endeavor with “The Virginias,” Hotchkiss prints the response he

¹⁹¹ Ibid, 21.

¹⁹² Ibid, 26.

received from William Barton Rogers, the “venerable father of American geology” and Barton’s request for a continued subscription of two of each issue, one for a personal copy and one for the “Institute” (The Massachusetts Institute of Technology).¹⁹³

Cataloging every scientist, article, geographic mention, friendly testimony, and investment Hotchkiss curated for *The Virginias* may be generally interesting historically, but in the context of the discussion at hand, these abundant examples in *The Virginias* serve to highlight a range of issues. Just in the samples culled and discussed, we encounter the through line to what I introduced in the *Introduction* with respect to science and engineering and their continued importance in shaping the rural industrial space of the Pocahontas Coalfield today. To recap:

- The symbiotic connection between science and the development of the SWVA and southern West Virginia coalfield and other mineral deposits. This rural space remains highly classified, categorized, and a technical space.
- The tie between scientific evidence and capitalist investment in this subsection of the nineteenth century Southeast. In the *Introduction* I pointed to **APPENDIX A** and the roll call of mine company investors and relationships with institutes of higher learning in the region. These relationships obtain.
- The use of science as a tool to promote capital investment and assure financiers.
- The self-education or apprentice education of scientists or engineers prior to the complete solidifying of, and legitimation of, certain sciences in and by academia.

¹⁹³ Ibid, 40.

- The promotion of industrialization as a progression away from slave-based agricultural economies and as a solution for the adjacent economic woes of a mostly agrarian economy.
- Engineers also as industrialists, propagandists, and entrepreneurs—in its earliest years, the Pocahontas Coalfield’s developers and later coal “barons” often possessed technical or engineering capabilities.
- The assumption that farmers, graziers, manufacturers, and miners could and would inhabit the same economic geography.
- The seeking of foreign capital and investment in the West Virginia and Virginia coalfields.
- A story of who ought to be in charge, what their optimal ethnic and racial heritage ought to be, and that the right race would keep down the riff raff or unionizers.
- The assumption that mining coal was desirable, preferable, and privileged over whatever other state of affairs and lifeworld of the region’s then inhabitants—people, animal, or mineral.
- An anticipation that development of the region’s mineral deposits would uplift the people of the region, relieving them of their “current” circumstances and that those current circumstances were undesirable.
- That the scientists at the time valued knowledge-production, but many also wore other hats, including that of patriot or economic uplift. Resource exploitation was not only for personal gain or shareholder gain, but for regional or state gain. In Hotchkiss’ case, for example, scientific or capitalist duty was not separate from patriotic or civic duty.

Sample advertising page from *the Virginias*:

<p>Wm. A. Hudson. Wm. Patrick. HUDSON & PATRICK, Attorneys at Law, Staunton, Virginia.</p>	<p>Postal Address: Shenandoah Iron Works, Page county, Va. Send Express Matter Care of MILNES & HOUCK, Harrisonburg, Va. W. M. BOWRON, F. C. S., Analysis of Ores, Minerals, and Technical Substances. Accuracy, economy, quick returns. Correspondence invited.</p>	<p>HUGH M. McILHANY, Wholesale and Retail Dealer in Hardware, Cutlery, &c., Augusta St., opp. Court-house, Staunton, Virginia.</p>
<p>Practice in the Courts of Augusta and adjoining counties. Land titles a specialty. Refer by permission to N. P. Gallett, Cashier Augusta National Bank; Thos. A. Blodson, Cashier, National Valley Bank. J. Randolph Tucker, Lexington, Va. H. St. Geo. Tucker, Staunton, Va. TUCKER & TUCKER, Attorneys at Law, Staunton, Virginia.</p>	<p>JED. HOTCHKISS, Staunton, Virginia, Consulting Engineer; Examines and Reports on Mineral Lands and their Titles; makes Geological and Topographical Surveys, Maps, &c. May be consulted in reference to purchase of lands in Va. and W. Va.</p>	<p>A. E. MILLER, Staunton, Virginia. Wholesale and Retail Dealer in Hardware, Cutlery, &c., Miners' Tools and Supplies of all descriptions. Orders promptly filled.</p>
<p>Titles to Mineral and other Lands, in Virginia and West Virginia, carefully examined. W. S. Laidley. Wm. H. Hogeman. L AIDLEY & HOGEMAN, Counselors at Law, Charleston, Kanawha Co., West Va. Examination of land titles carefully attended to.</p>	<p>E. C. VINCENT, Civil Engineer; No. 14 W. Main St., Staunton, Va. Engineering and surveying of all kinds promptly attended to.</p>	<p>THE VALLEY VIRGINIAN, Staunton, Virginia. S. M. Yost & SON, Proprietors. Terms: \$2.00 per year.</p>
<p>WILLIAM A. QUARRIER, Attorney at Law, Charleston, West Va. Special attention given to examination of titles to mineral lands Hugh W. Sheffey. Jas. Bumgardner, Jr. SHEFFEY & BUMGARDNER, Attorneys at Law, Staunton, Virginia.</p>	<p>S. FISHER MORRIS, Mining & Civil Engineer; Quinimont (C. & O. Ry), W. Va. Mineral and other Lands Surveyed, Mapped, and Reported on; Mines opened, surveyed, &c. Is located in the New River Coal Region.</p>	<p>The VIRGINIAN is an independent Republican newspaper, devoted principally to the interests of the Great Valley, and Mineral Regions adjacent thereto. Its circulation is larger than that of any other weekly newspaper published in Virginia. As an advertising medium, especially for farming, grazing, and mineral lands, &c., it has no superior. Parties desiring to buy or sell real estate will find it to their advantage to make use of its columns. Specimen copies free.</p>
<p>THOMAS D. RANSON, Attorney and Counselor, Staunton, Virginia.</p>	<p>A FIRST-CLASS SHENANDOAH VALLEY FARM FOR SALE. Contains 282 Acres of smooth, undulating, Valley land, the larger part in soil, all in a high state of cultivation, and well-watered by running streams; some 50 acres in timber. Large Brick Mansion, with 12 rooms and all necessary out buildings. Frame tenant house, large barn, stables, etc. Could be divided into two good farms, one of 120, and one of 162 acres. Also, two tracts adjoining the above.—No. 1 containing 112 acres of choice soil, well-watered and comfortably improved; No. 2 containing 120 acres, nearly all cleared and in fine condition. Situated 2 miles N. of Fishersville station of Chesapeake & Ohio Railway, and 2 1/2 miles S. of E. from Staunton. Terms liberal. Address F. M. J. G., or DAVID S. BELL, Fishersville, Augusta Co., Va.</p>	<p>THE "STAUNTON SPECTATOR," 120 E. Main Street, Staunton, Virginia, Is one of the oldest and best family newspapers in the State. As an advertising medium it is unsurpassed. Subscription Price, \$2.00 per annum.</p>
<p>FARMING, IRON ORE, AND TIMBER LAND FOR SALE. On James River, Alleghany Co., Va., at Clifton Forge, the junction of the Chesapeake & Ohio and Buchanan and Clifton Forge railways. Tract includes 2,000 acres of FIRST-CLASS, well-improved, James River farming land; fine mineral springs; a large body of superior pine and oak</p>	<p>The "SPECTATOR" is published every Tuesday morning, at Staunton, Augusta county, Va. Augusta county has a thrifty agricultural and manufacturing population of upwards of 30,000, and the lands are very fertile and productive, and it is by far the most populous and wealthy section of the great Valley of Virginia. Staunton is the county-seat of Augusta, with a population of upwards of 6,000, and a very large adjacent population not now embraced within the city limits. It is noted for its fine Female College of very high grade, which are attended by about 500 young ladies from Southern, Northern and Western States, the Graded Public Schools, and other male and female schools of high grade. It is also the seat of two of the principal State institutions—the Western Lunatic Asylum and the Institution for the Deaf and Dumb and the Blind—two National Banks doing a business of over \$1,000,000, iron foundries, machine shops, door, sash and blind factories, &c. The city has also recently erected fine water-works, at a cost of about \$500,000. The Valley Railroad, a branch of the Baltimore and Ohio Railway, intersects the Chesapeake and Ohio grand through line at this point. Travellers and pleasure-seekers will find Staunton a most delightful place to spend the summer months, as the climate is bracing and healthful, and the scenery and surrounding picturesque and beautiful. The "Spectator" was the first paper established at this place.</p>	

Image 5: In this plate alone, the appearance of circa 1880 engineers, iron furnace owners, lawyers, businessmen, and investors reads like a map of many of the Pocahontas Coalfield region's towns' names and those of many of the larger town's streets, significant boulevards or landmarks. These people inserted mineral development into the region and also inserted their own political positions in this new economy and acquired political cum geographic relevance.¹⁹⁴

The cultural work accomplished by science and technology remains largely obscured, hidden by other kinds of regional and/or even academic, theoretical, or even political narratives.

¹⁹⁴ Hotchkiss, Jedediah, 32.

The network needed to create science supporting corporate activity for coal development in the Pocahontas Coalfield remains robust, yet largely unconsidered by scholars outside the industry.

Again, my chart demonstrating actors in the rural introduction from the *Introduction*:

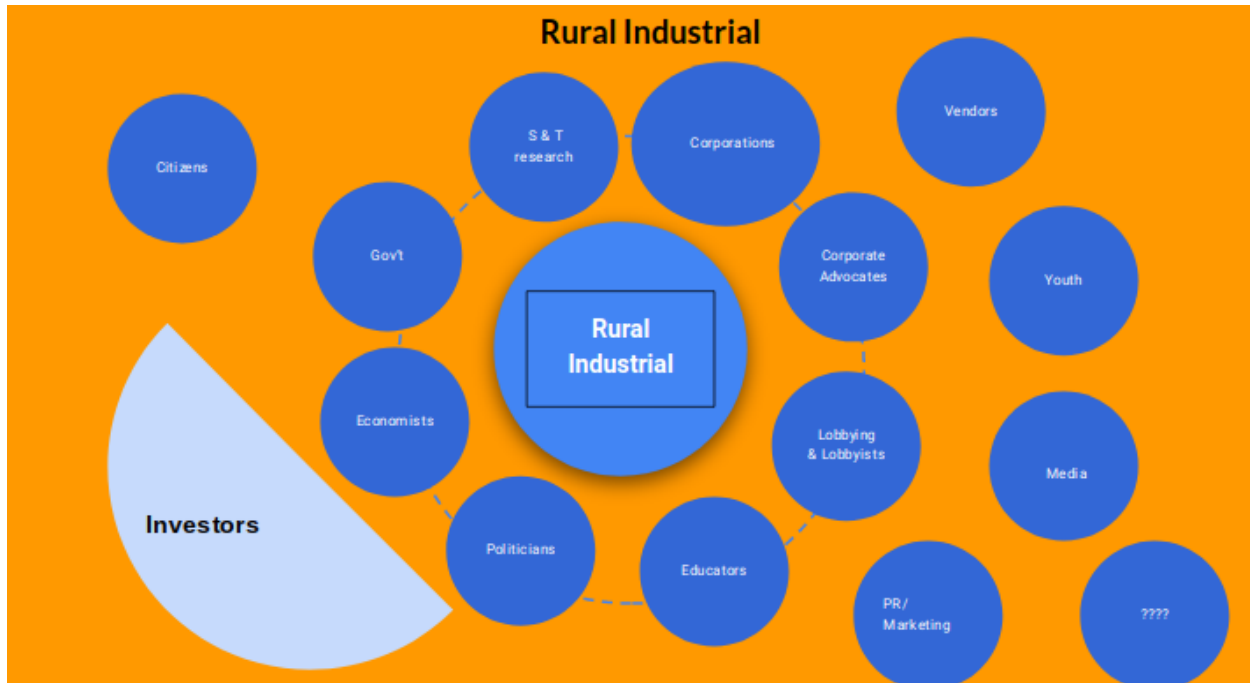


Figure 6. Repeat of Figure 4.

By contrast, in some spaces, the story of science and technology dominates and overpowers other kinds of explanatory cultural forces, and, I assume science and technology also as cultural forces.¹⁹⁵ We can draw a line from the promises and prides of Hotchkiss to continued questions of rural economic development, especially with respect to the relationship or stances to “progress,” prosperity, scientific knowledge and knowledge ownership, the responsibility of science, and the impact of technology. One tactic toward improved policy and development outcomes in the rural industrial space must include mimicking the scale and breadth of rural

¹⁹⁵ For example, according to STS scholar Travis Williams, Silicon Valley overly determines as a place of net positive technology and environmental care and adherence to regulation. However, the actual materials and workers building Silicon Valley designed product likewise become black-boxed with respect, hidden behind the narrative of progress.

industrial intervention, but with corporate science not as its base. Instead, the rural space needs actors and ethics committed to people and land for sustained stewardship.

Rational Rural and Patriotic Science

In Hotchkiss and his practices in the emerging science of geology, and his advocacy for a scientific-based industrial intervention in the two Virginias, we encounter a ménage of American values (numbered for convenience of further reference rather than implying order of Hotchkiss' or current importance):

- 1. Hotchkiss the surveyor and geologist rationalizes the land, measuring, quantifying, making nature understandable, and thereby, malleable.*
- 2. Hotchkiss the entrepreneur advocates for measurement as a means also to predict and to anticipate needed and potential capital.*
- 3. Hotchkiss the propagandist utilizes science to sell nature, to rally and to justify investment.*
- 4. Hotchkiss the patriot proselytizes courses of scientific exploration and support as well as courses of industrial and capital investment as acts of devotion to one's country (Virginia). He expects the Pocahontas Coalfield to bring prosperity to the states and peoples of the two Virginias and it is a patriotic calling and duty to lobby for this.*

Hotchkiss' faith that the Pocahontas Coalfield would bring economic prosperity to these two sections of the two Virginias I have already referred to as "Hotchkiss' wager": that one anticipates a net positive outcome from a large scale scientific and/or technical intervention, especially with respect to economic prosperity. Two on-the-nose points worth highlighting even at the expense of triteness include:

- Scientists, engineers, and those people studying them could recognize points 1 - 3 above as justifications today for scientific practice. Number four may stand as far less of a recognizable reason today for engaging in science, whether for reasons of science being presumed to be above politics or Kuhnian or Mertonian assertions of scientific impartiality and self-regulating community. Moreover, science in the United States currently directly relates to industry imperatives. The many university-corporate partnerships attest to this as evidenced in **APPENDIX A**. In the United States, we rarely turn to models of science for the public good or engage citizens in determining scientific research agendas.¹⁹⁶
- Hotchkiss could not have anticipated that the long-term effects of the Pocahontas Coalfield region itself would result in more net losses than gains for the region for economic prosperity (as in the Anthracite fields of Pennsylvania). In his texts, he is no friend to the labor movement, and his economic interests lay primarily with his own and investor return. Nevertheless, the depth of regional deficit post-automation, he could not have predicted. Given his anticipation of a continued large scale human workforce and continued surface activities of manufacturing, farming, and grazing, he did not anticipate, nor could he have anticipated, the current state of the state as outlined in *Chapter One*: the extent of surface environmental devastation, the poverty, the health issues, etc.

Let us now review each of these in turn, relate them to current science and technology in the Pocahontas Coalfield.

¹⁹⁶ Kuhn, Thomas. *Structure of Scientific Revolutions*. Chicago: University of Chicago Press, 196; Merton, Robert K. *The Sociology of Science: Theoretical and Empirical Investigations*. Chicago: University of Chicago Press, 1972.

Rationalizes the land, measuring, quantifying, making nature understandable, and thereby, malleable.

Maintaining scope with respect to the Western project of rationalizing human intervention upon nature, and American or Western colonial, measurement and intervention upon land in North America, can be a difficult task. For example, the states and state borders by which most Americans hold so much dear are human-created interventions, greatly imperfect and imposed lines of rationalization of space, territory, laws, geographies, and people. With respect to the Hotchkiss, he was both science-making (geology) and state-making (Confederate surveying and the Pocahontas Coalfield constructing), and in both cases, science and state-making categorize, rationalize, knowledge-make, and impose means of control over the land.¹⁹⁷

By way of summary, the Scientific Revolution in the West created a dent in a religious ordering of the world and offered up also a world supposedly made comprehensible by science. Simultaneous to this rise of knowledge based on observation rather than divine inspiration an increasing capitalist and middle class arose.¹⁹⁸ As access to scientific research, knowledge sharing, and the instruments to assess natural phenomena were largely sequestered to the upper classes, scientific knowledge and wealth, while not necessarily subdomains of each other, often occurred in tandem. Likewise, in current Western society, the fiscal sponsorship of science

¹⁹⁷ McGuire, Mary Richie. "The Chesapeake: Bacon's Promise, Boyle's Project in 'Translating Natural Knowledge in the Age of Revolution: Tobacco, Science, and the Rights of Man and Nature in the Journals of Benjamin Henry Latrobe, 1795-1820.'" PhD Dissertation. Department of Science, Technology, and Society, Virginia Tech, 2018; Foucault, Michel. *Society, Territory, Population. Lectures at the Collège de France, 1977-78*. London: Picador, 2007; Shapin, 541. "We make the large knowable by reducing it to charts, maps, etc. Latour circles back to a world made of paper (541)". Shapin, Steven, and Simon Schaeffer. *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life*. Princeton University Press, 1985; Bruno Latour, From Texts to Things: A Showdown: Nature is not directly beneath the scientific article; it is there indirectly at best... (laboratory provides the paper with the visual display) (67) in Kaplan, David. "Readings in the Philosophy of Technology." Lanham, MD: Rowman & Littlefield Publishers, 2009.

¹⁹⁸ Foucault, Michel. *Society, Territory, Population. Lectures at the Collège de France, 1977-78*. London: Picador, 2007.

requires such wealth that usually, now, in many countries other than the United States, taxation provides for scientific and technological development support, the patronage of science being often characterized as an issue of economic progress, national competitiveness on the world market, and a major concern of national security. We will return to science, wealth, and nationalism and their confluences or co-productions later in this chapter.¹⁹⁹

With respect to rationalization of mining as an acceptable economic practice, in *The Death of Nature* Carolyn Merchant examines Georg Agricola's *De re metallica*, the first comprehensive defense and technical guide for mining in Europe.²⁰⁰ Contemporary with Agricola's defense, Merchant explains that in sixteenth and seventeenth century Europe, the earth “was considered to be alive and sensitive, it could be considered a breach of human ethical behavior to carry out destructive acts against it.”²⁰¹ Agricola, by contrast, posits mining's relationship to nature as no different in kind from fishing, since both mining and fishing procure what lies beneath the surface for the use of man above. Merchant points out that unlike the material procured through mining, fish renew, though, she correctly explains that Agricola may have had no reason not to believe that the materials mined from beneath the surface of the earth were not also capable of regeneration.

Agricola admonished against a return to a more “savage” time when men were gatherers in the forest, that without mining, men would have to return to this kind of barbarism.²⁰² Another of his defenses of mining included a response to those people complaining of forests' being cut down for mining, that mining is located, usually, in unwanted places, places useless for anything

¹⁹⁹ Shapin, Steven, and Simon Schaeffer. *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life*. Princeton University Press, 1985; “National Security Strategy 2010.” Administration: Barack Obama. Executive Branch, n.d.

²⁰⁰ Merchant, Carolyn. *The Death of Nature: Women Ecology, and the Scientific Revolution*, New York: Harper and Row, 1983, 2.

²⁰¹ *Ibid*, 3.

²⁰² *Ibid*, 37.

other than mining. Finally, Agricola asserts that the greed encouraged by mining does not derive from the act of mining, but from the avarice already inside humans. Mining may bring this avarice to the fore, but does not cause it.²⁰³

Agricola's assumption of mining disturbing what lay below the surface and not disturbing the land above echoes with resonance in our current context. In *Removing Mountains: Extracting Nature and Identity in the Appalachian Coalfield*, Rebecca Scott explains that in the Appalachian coalfield context, the break for many miners in terms of their rationalization of the destructive force of mining altered with the post-World War II escalation of the adaptation to surface mining.²⁰⁴ Prior, Hotchkiss' contention that farmers, graziers, and miners and manufacturers could inhabit the same economic geography largely obtained. Not only could miners often also farm or subsistence farm surface land, but they could often hunt, access family graveyards, engage in other outdoor recreation, all while mining occurred below or was confined in footprint to chemical contamination on a deep mine site. Local attitudes shifted when surface mining erased historical kinds of surface interactions miners could have had with most of the surrounding land. Miners no longer could engage with the surface as they had before—hunting, farming, etc.²⁰⁵

The technology of surface mining, embodied in its gargantuan machinery associated with and derived from road building, flattened both local land and local, more intimate forms of knowledge. Even if miners had to make the rationalization leap Agricola proposes, and Merchant characterizes as a move toward acceptance of digging around in Mother Nature, deep mining, especially in its earliest years, while dangerous and difficult, also offered a kind of intimacy with

²⁰³ Ibid, 38.

²⁰⁴ Scott, Rebecca, 2010.

²⁰⁵ Ibid.

the land akin to the kind of intimacy small farmers also had to have with their own acreage, with its microclimates, topography changes, geography, and weather in order to effect the necessary interventions to produce a harvest. Technological efficiencies in deep mining, while improving output, erased or obfuscated many of the intimacies of underground mining miners had come to depend on: hearing the changes in the roof, seeing the changes in the seam, communicating to one another about any shifts in any of these kinds of observable markers. Likewise, the huge machines of surface mining took the miner completely out of the ground, placing him (it was usually a him) in a machine far above the ground the machine was hewing, and its technical capacity required little to no foreknowledge of space: any mountaintop could be flattened in a nearly similar manner until its mineral bounty was exposed. Geologists provided the map of how far and how deep. One did not need to rely upon developed knowledge perfecting what scientists aka geologists predicted, as in the case of earlier deep mining.²⁰⁶

Flattening the Pocahontas Coalfield

If science creates knowledge, then these large machines, in the case of surface mining, destroy a kind of knowledge, an intimacy of and practice of place that scholar James C. Scott likens to the Greek concept of “metis”—a practical, intimate knowledge.²⁰⁷

To broaden the perspective on this usurping of intimate knowledge by large technical machines or large scale interventions— deep mining indicated a layering in of additional

²⁰⁶ Deep mining can leave a relatively small surface print. The contamination from deep mining, however, can come with onsite chemicals used to clean or process the coal and with dust during loading and/or water passing through the mine and the site. By contrast surface mining can involve thousands of acres. A common practice until the 1990s was to remove topsoil and simply push it off the side of the mountain. Thus, once the coal had been scraped, a lifeless, biologically inert “soil” was left for reclamation. Moreover, the common practice was also to compact the surface, which made the space highly susceptible to fast-moving runoff during rain, allowing for increased flooding as the water rushed, unhindered, toward the places below. Moreover, the entire area of a surface mine was off limits for locals and could cut off access to burial sites, homesteads, hunting grounds, etc.

²⁰⁷ Scott, James C. *Seeing Like A State: How Certain Schemes to Improve the Human Condition Have Failed*. New Haven, CT: Yale University Press, 1998.

possibilities of knowledge, co-existing with then current knowledge and practices of farming, grazing, and manufacturing—all activities that continued at the time in the Pennsylvania coalfields.²⁰⁸ Though STS theorists propose that transactions of knowledge now take precedence over natural resource wealth, two facts remain current—natural resources continue to matter, especially energy resources, and science and technology were key in their exploitation during the nineteenth and twentieth centuries. While Sheila Jasanoff, for example, engages the politically new territory of managing and politically maneuvering among governments with each other and forming a State relationship to biotechnology, I contend that STS has focused too much concern for too long on certain elite sciences and technologies: physics, genetics, computer technology, nuclear technology, biotechnology.²⁰⁹ Given what I have outlined with respect to science’s enabling of the Pocahontas Coalfield and the symbiotic relationship of corporations and science in this rural industrial space since the space’s inception, blanket statements about science and its newly emerging close relationship with power and politics leaves one scratching one’s head at analysis such as this:

Science and technology have been regarded for centuries as instruments of social progress and personal liberation. Yet, as scientific knowledge becomes more closely aligned with economic and political power, producing new expert elites, the distance between the governors and the governed can be expected to grow—a dismal prospect in societies where low levels of electoral participation and citizen engagement are already causes of concern. Science, moreover, has historically maintained its legitimacy by cultivating a careful distance from politics. As state-science relations become more openly instrumental, we can reasonably wonder whether science will lose its ability to serve either state or society as a source of impartial critical authority.

While Jasanoff certainly is right that biotechnology opens new lines of concern with respect to access and equity, in the Pocahontas Coalfield, long-standing relationships among

²⁰⁸ Wallace, Anthony, 1987.

²⁰⁹ Jasanoff, Sheila. *The Fifth Branch: Science Advisers as Policymakers*. Harvard University Press, 2009.

governments, corporations, and science already account for the general disparity she outlines. One cannot imagine that she naively assumes only science which has adhered to the idealized form that she also describes remains the only legitimate “science.” Yes, as she examines, it is correct to investigate whether biotechnology will create a new “genetic underclass”; yet, I contend that other sciences such as geology and mining engineering have also already contributed to the creation of underclasses and continue to do so. In the case of the Pocahontas Coalfield, the culture of scientific objectivity aligns to turn a blind eye to the material-metis erased not only in the form of replacing people with large machines, but also the erasure of human capital and intimate knowledge, and willful ignorance of or accountability for “impartial” scientific knowledge’s economic and environmental consequences. Moreover, taxpayer funded and state allocated support for this unfortunate dance of science and technology has long been a part of this practice.

I concur with Jasanoff that discussion of democratic society must include an examination of the politics of science and technology. Where I differ from Jasanoff is that this imperative is a new phenomenon with respect to science.²¹⁰ Whether going back to the necessary support of the Virginia State Legislature’s for William B. Roger’s survey work in the 1830s or to the intermingling of democracy, research, invention, and state-making co-producing during the time of the creation of the United States, an examination of science and technology and state-science relations may not always have been part of what was examined in reflections upon post-Enlightenment democratic theory, but it ought to have been.

The natural-resource based society remains central with largely rurally-produced resources affording the metropole the luxury of focusing on and managing knowledge

²¹⁰ Jasanoff, Sheila, 2009, 5 - 11.

production. Given the continued population growth of the world, and the destruction of the environment in order to sustain growth economies to support this population expansion, we are entering a new knowledge society that potentially renders this wealth transfer from rural or offshore to metropole as continuing to be black-boxed, invisible, and thereby making the raw material resources and the people involved below the class level of knowledge worker also invisible, disenfranchised.

Any number of academic fields and literatures contend with this question of “ought we?” in science or political policy. For example, because we possess the technological capacity of massive nuclear weapons, ought we produce them? Though a decision tree indicates more economic efficiency in utilizing surface mining equipment, ought we? The risks associated with this large scale technological intervention outweigh the benefits, or, at least are unknown in the long-term, thus, ought we follow with precaution? Would we engage in this large scale technical intervention if it were in a city center, in the first world, in full view?

The introduction of technology can be layered in meaning, and the advent of a technology can vary in principal meaning from era to era. For example, in agriculture, simplicity of processes was supposed to be good and complexity was supposed to lead to failure. However, as James C. Scott demonstrates in *Seeing Like a State*, Western large scale agricultural intervention flattened local knowledge and flopped in its production capacity. In these cases, the narrative we tell ourselves about science and technology can also shift—we discover the evidence that reveals complexity as desirable, that certain scales of objects dehumanize us and result in unanticipated consequences. We find ourselves having to attempt to recreate and mimic

unplanned pre-scientific forests to replace the complexity lost through scientific and technical interventions.²¹¹

Hotchkiss' wager, a massive industrial intervention, has had long-term local consequences in human and environmental costs that have turned out far from the prosperity he proposed. In this respect, for large-scale industrial interventions, the Pocahontas Coalfield stands not as an exception, but the norm. The hand-wringing and puzzlement as to the long-standing economic, social, and health problems there rest with assessing this region in a fishbowl rather than likening it to other failures of scale like those with which James C. Scott contends such as Soviet collectivization, compulsory villagization in Tanzania, or the city-planning of Le Corbusier. Though concerned with the failures of central state planning, Scott just as well could have turned his critique of social engineering and rural settlement and production to the Pocahontas Coalfield. The Pocahontas Coalfield was economically productive for shareholders, yet as a technical intervention that created an industrial coalfield region out of a place where this did not exist, it failed as a local driver of long-term prosperity for that space as a community. People were used as technologies until they no longer were most desired or efficient and thus replaced by machines. Moreover, as an environmental intervention, given deep mining's coal processing and its and the railroad's accompanying chemicals and the scale and erasing of mountains and metis through surface mining, this space also failed. On many accounts and on many fronts unforeseeable to Hotchkiss, the Pocahontas Coalfield proves Scott's directive that "any large social process or event will inevitably be far more complex than the schemata we can devise, prospectively or retrospectively."²¹²

²¹¹ Beck, Ulrich. *Risk Society: Towards a New Modernity*. London: Sage Publications, 1992; Ravetz, Jerome, "The Post-Normal Science of Precaution." *Water Science and Technology* 52, no. 5, 2005, 11–17; Scott, James, 1998, Ch. 8; Ch. 9.

²¹² Scott, James, 1998, 309.

Why does it matter if the Pocahontas Coalfield is not associated with scientific, technical, or technological intervention in the broader US culture, possibly, beyond anti-surface mining activism? Here are only a couple of reasons why this matters.

Black-boxing the Pocahontas Coalfield

In the US context, spaces popularly associated with technology or science can be considered more sophisticated (such as Silicon Valley), worthy of time and investment, worthy of discussion—a worthy place.²¹³ Though the largest machines on earth are employed in rural spaces, the most “worthy” machines are in metropolises (“high tech” such as the software technology industry). In STS we may investigate whether technology has a politics vis a vis Langdon Winner but, in the context of party politics, kinds of technologies certainly do. That Silicon Valley had the ear of the Barack Obama administration and that the energy industry subsequently had the ear of the Donald Trump administration registers as news to no one.²¹⁴ More complicated is the lament by the latter industry that it (the energy industry) has not done a “good job” of telling its story.²¹⁵ More likely, it is the former that is more adept at covering its trails of tears.²¹⁶ Part of what makes that Silicon Valley technology compelling is that although it is not as ubiquitous as energy technology, its scale seems much more human: though coal power or gas power may fuel my handheld device, allowing me to use it, energy technologies come to

²¹³ Williams, Travis L. *Corporate Accountability and Environmental Health Advocacy in Silicon Valley*. Paper presented at the Dimensions of Political Ecology Conference, Lexington, Kentucky, February 2014.

²¹⁴ Williams, Travis, 2014.

²¹⁵ Cook Marshall, field observation, 2015. As a party to numerous conference discussions in the energy sector, I heard participants observe that environmentalists tell their side of the energy story better than coal industry participants do. The insinuation was if only the coal industry could communicate better its importance, it would not be such a target for regulation or environmentalist ire.

²¹⁶ Williams, Travis, 2014.

me as public utilities or as ubiquitous goods. I do not notice when I use them; I only notice the energy's absence. That this energy exists has become black-boxed in current US culture.²¹⁷

The people and the regions where this energy originates also become black-boxed, invisible, taken for granted, and when these regions shed people as technologies, they appear on the national radar only if politically useful.²¹⁸ In the juxtaposition of the offshore servicing the metropole, not only the Pocahontas Coalfield specifically or even conspiratorially becomes rendered invisible, but also the large scale industrial interventions in rural spaces across the country become invisible: the biggest machines on earth produce coal for energy for powering my handheld device; large scale combines produce food for making the sandwich I order from a machine at a convenience store, etc. The Pocahontas Coalfield, and the many other rural spaces like it, support the larger project of the role of rural spaces in the US, functioning as a kind of “large technical infrastructure and support system” (LTS).

For example, in “Large Technical Systems and the Discourse of Complexity,” Bernward Joerges indicates that governments in the West create dependency upon growth of their LTS in order to assert financial viability.²¹⁹ Though Joerges insists on the material and machine operations of LTS, he admits that splitting hairs in terms of what constitutes LTS in this sense could be applied willy-nilly, as aspects of various machines or systems may overlap or fit into several categories. Nevertheless, his definition of what makes a system large obtains if applied to rural spaces as industrial material-good producing spaces outside the metropole—including a rural industrial space like that of the Pocahontas Coalfield. According to Joerges, the large of

²¹⁷ Latour, Bruno. *Science in Action: How to Follow Scientists and Engineers through Society*. Cambridge, MA: Harvard University Press, 1987.

²¹⁸ Bowker, Geoffrey C., and Susan Leigh Star. *Sorting Things Out: Classification and Its Consequences*. Cambridge, MA: MIT Press, 1999

²¹⁹ Joerges, Bernward, and Lars Ingelstam. “Large Technical Systems and the Discourse of Complexity.” *Complex Technical Systems*. Stockholm: Affärs Litteratur, 1996.

LTS means that the technical system is complex with “heterogeneous systems of physical structures and complex machineries.” Surface mining equipment, literally hidden from view from most Americans, links to an energy system that is black-boxed: so ubiquitous as to be out of view in plain sight.

These physical structures and complex machineries contain materiality, intersect, and intertwine “over large spans of space and time, quite irrespective of their particular cultural, political, economic and corporate make-up.” (Joerges) My note: the energy produced from coal likewise behaves in this fashion—it and other energy often appears from the rural into homes or spaces of any sort as if now, by magic, noteworthy only when absent.

LTS supports or enables many other LTS: energy systems enable communication systems, transportation systems, scientific systems, etc. The larger the technical, machine, and physical capacity of the LTS, the larger the political negotiation and decision-making, with much of the politics also played out in science communication and in technical terms. “Smaller-scale, local, intra-organizational technical systems” may evolve from or integrate with other LTS; LTS can include “many organizations.” Joerges, again: “Those dominant actors in LTS who own, regulate or manage parts of them will be coupled...politically, financially, and legally.” My note: is coal a national security or energy security issue? If so, how? Is it saving our nation from supporting terrorists? Is cheap energy fueling our economy? Is it energy that is expensive in the long-term and killing our planet? Is it a miracle in its abundance, a murderer in its use? A blessing? A curse?²²⁰

LTS “seem to surpass the capacity for reflexive action of actors responsible for operating, regulating, managing, and redesigning them” yet these systems still maintain stability. My note:

²²⁰ Ibid; Hulme, Mike. *Why We Disagree about Climate Change*. New York: Cambridge University Press, 2009.

this plays into a rhetoric of “we are just doing our jobs.” This is the job there is, so I do this job. Someone has to do mining engineering, reclamation science, energy engineering, geology—these are, after all, jobs.

LTS, as long as they work, are assumed to function and are not objects of much larger public consideration, and usually when only in how they have failed. LTS can be ‘silenced’ and “hidden away” and only in their failures, after they have implanted in society, are they rendered visible. My note: the public scrutinizes failures if investigative journalism reports them; otherwise, out of sight, out of mind. The Pocahontas Coalfield is fascinating in its human failures, its poverty porn stories, and once in a while, for its environmental flops. Otherwise, the “Pocahontas Coalfield” cum rural industrial LTS is invisible across the country and to the country.

Issues with LTS often become externalized. Even if a social or other problem may be related to the LTS, these problems can be pushed outside the boundaries of the technical workings of the LTS. My note: the problem, of course, is not metropole energy usage, or food demands, or lack of metis or re-skilling for one’s own energy or food needs, or grid inefficiencies but evil energy companies, ill-informed coal miners, Donald Trump, Monsanto, or evil, lazy city dwellers or unrealistic expectations— how else will you feed the world or power the planet without large scale interventions like GMOs or nuclear power or oil tankers?

Though aspects of LTS can be dismissed or disappear, LTS cannot exist without considerable social and societal upheaval. My note: we can end rural LTS only through significant societal, cultural, and political shifts. They are not impossible, only improbable unless LTS fails domestically in concert with access to LTS resources abroad.

Big Rural

Here I highlight again two significant points: the Pocahontas Coalfield captures national interest for its human or other failings. As a functioning part of the LTS of energy systems in our country, systems large scale and ubiquitous, it and its story of science and technology are rendered invisible. I call this rural industrial system “Big Rural” to ally it with what has become common parlance regarding other large networks or systems which have become “too big to fail” such as big ag, big science, big government, big pharma, or even big city/ies (far more powerful than their opposite in kind and thought—small towns). Big Rural is a shift from, and in contrast to, recent popular and folk conceptualizations of the rural in hyper-local terms.

Moreover, much has been made of the need to buy local, be local, develop local as popularized through the works of Michael Shuman’s book *The Small Mart Revolution: How Local Businesses Are Beating the Global Competition*. The issue becomes that single sector rural places once overly developed in population and infrastructure and which remain well outside a commutershed cannot compete in late capitalism in terms of demands for growth as can small towns and rural spaces within commutersheds. Likewise, many of these rural industrial spaces are left holding the bag on environmental cleanup, pressing medical and other needs, and have neither leadership nor the numbers to compete with urban areas for federal grants or investment. Residents largely must export product if they wish to stay local as there are not enough local buyers to keep the market economy afloat much less robust.

Advocates for measurement as a means to also predict and anticipate needed and potential capital. And: propagandist utilizes science to sell nature, to rally and justify investment.²²¹

²²¹ The philosopher of science Paul Feyerabend downgraded the importance of empirical arguments by suggesting that aesthetic criteria, personal whims and social factors have a far more decisive role in the

These two analyses of Hotchkiss' scientific and surveying practices and science, technical, and investment advocacy resonate with the aims of corporate science today. In STS we debate what counts as science, and what the norms for science are, or have become. As scientific research generally requires significant capital, that capital can come to scientists in several ways:

1. On payroll at a corporation
2. On payroll at a university
3. On payroll with the state
4. Self-funded or funded through other endeavors
5. Patents, etc. generation

With respect to numbers 1 - 3, tax incentives, research agendas, corporate advisorships, etc. can cause the research agendas of these three to intertwine and conflate. We already have these exhibits in the *Preface* with respect to the Pocahontas Coalfield. Moreover, Obama had his Silicon Valley advisors; Trump had his energy sector advisors. Science shifts in relation to what politics enables. The US signs, then drops, the Paris Climate Accords.

The mechanism of professional standards in science obtain in the academic research realms. Scientists adhere to scientific ideals: “modesty, simplicity, straightforwardness, objectiveness, industry, honesty, human sympathy, altruism, reverence”—like perfect Calvinist piety. Yet, science is science when practiced in the public, for professional scrutiny, along with

history of science than rationalist or empiricist historiography would indicate. Feyerabend, Paul. *Against Method: Outline of an Anarchistic Theory of Knowledge*. Fourth. New York: Verso, 2010.

To this, I assert Michel Foucault: “If the economic take-off of the West began with the techniques that made possible the accumulation of capital, it might perhaps be said that the methods for administering the accumulation of men made possible a political take-off in relation to the traditional, ritual, costly, violent forms of power, which soon fell into disuse and were superseded by a subtle, calculated technology of subjection. It would not have been possible without the growth of an apparatus of production capable of both sustaining them and using them...conversely, the techniques that made the cumulative multiplicity of men useful accelerated the accumulation of capital.” Foucault, Michel. *Discipline and Punish: The Birth of the Prison*. Vintage Books, 1977.

professional recognition and promotion. Science shifted from science for science's sake or knowledge's sake.... to government giving for science without it interfering in science.²²² This rings no less true in mining engineering than in other scientific fields—it also consists of awards, accolades, friends helping friends, corporations advocating for research funds for certain sciences over others.²²³ Nevertheless, what counts as science worth advocating for matters: Hotchkiss may have wagered on the wrong intervention, but his road to hell was well-paved.

Science Taking Responsibility in the Rural Industrial Space

Scientists ought to also consider the environmental, economic, and human costs of their knowledge creation. To fully address how would require an additional dissertation; however to bring this down to earth, let me briefly consider this in the Pocahontas Coalfield context from this point forward. Reclamation scientists could engage local citizens in learning to monitor their own home sites or the streams, land, and public spaces they use in order to understand fully the issues of long-term moving contamination in the rural industrial space. Geologists could work with local citizens on understanding the hazards and benefits of remaining geological formations and mineral resources and to explain what may be of continued corporate interest or state interest. Biological systems engineers could teach citizens how and when to monitor their ground and surface water to understand the issues of this rural brownfield space and water's shift from weather and season in its potential for contamination. Economists could work from models of smart shrinkage rather than models of endless growth. Likewise, they could assist with economic modeling or work that cannot be automated away.

²²² Mulkay, Michael J. "Norms and Ideology in Science." *Social Science Information* 15, no. 4–5, 1976.

²²³ Field observations, Cook Marshall, 2015 - 2016.

That one can create a great technical intervention may be great “pure science” but that one should or should not is how science ought to be considered in society, in community, in and by the polity.²²⁴ In short, scientists and engineers in and at work on the rural industrial space can broaden their scientific service to reflect what I suggest in the previous paragraph.

In the case of Hotchkiss, we have science in service of society. His caveat, however, is science for patriotic ends. Even if all his ends were not for the good of the state in their intentions, the question of science and its service remains valid: what ought science serve? In a democracy, should not every state policy also consider whether an intervention suggested supports or brings about more democracy, and when possible, also include more democracy as an aim? Democracy and its deficit can be measured. The following brief case study brings into close relief a space adjacent to the Pocahontas Coalfield that illustrates this moral-scientific and democratic policy issue.

Corporate Science and Technology and Democracy Deficit in Lindytown, West Virginia

Named for Charles Lindbergh, the unincorporated town of Lindytown, West Virginia, sits in the Kanawha Coal River Coalfield, north of the Pocahontas Coalfield. At minimal issue in the case of Lindytown is the World Bank-defined basic obligations of a local government to “ensure the delivery of quality social and communal services and a responsive supply of land and housing, so that the city becomes and remains a hospitable place for businesses and households.” The local government, in this case, the county or state government, has not sufficiently protected Lindytown.²²⁵

Boone County, home to Lindytown, as recently as 2009 had the single largest

²²⁴ Mulkay, Michael, 1976.

²²⁵ The World Bank, 2010.

concentration of mine-related workers in West Virginia and received significant tax revenue from the mine industry. That same year, a subsidiary company of the coal company Massey Energy (Massey has since been purchased by Alpha Natural Resources, a donor to Virginia Tech, among other places) procured from most remaining citizen-residents of Lindytown their property in exchange for these residents' agreeing to leave, and, also, to submitting to not taking Massey to court, testifying against Massey, requesting for Massey's investigation, or speaking against Massey regarding local Massey mines.^{226 227} According to the April 12, 2011 *New York Times* article “As the Mountaintops Fall, a Coal Town Vanishes,” Massey Energy was motivated to buy out citizens of Lindytown due to risk of their living in close proximity to Massey surface mining sites.²²⁸ Rather than a central place of commerce or multi-layered resource-tied economic endeavors, again, in contrast to what Hotchkiss wagered—this section of West Virginia became hidden, and elsewhere, like the “throwaway” and hidden places of mining in Africa (far from the users of the mined materials) or historically in South America (also, historically far removed from the main recent users of the minerals mined there).²²⁹ In order to extend the theoretical conceptualization of the effects of large machinery and large technical systems erasing local metis, I turn to a post-colonial interpretation of the destruction of people and place, or removal of people and life, in order to exercise corporate (state) will.

²²⁶ See more about Massey Energy—from https://www.sourcewatch.org/index.php/Massey_Energy: In 2011 Massey Energy was acquired by [Alpha Natural Resources](#). For details on the April 2010 Upper Big Branch Mine Disaster see the [Upper Big Branch Mine Disaster](#) article at that site.

Alpha Natural Resources is a major donor to Virginia Tech. See **APPENDIX A**.

²²⁷ For a true sojourn into the absurd politics of this region, the federally-indicted former head of Massey Energy, Don Blankenship, has announced his bid for US Senate: <https://www.wsj.com/articles/former-coal-executive-convicted-on-charges-tied-to-mine-explosion-to-run-for-senate-1511987189>

²²⁸ Barry, Dan. “West Virginia Mining Town Bought Up by Massey Energy - NYTimes.com”, April 12, 2011. http://www.nytimes.com/2011/04/13/us/13lindytown.html?_r=1&pagewanted=print.

²²⁹ Hecht, Gabrielle. “Rupture Talk in the Nuclear Age: Conjugating Colonial Power in Africa.” *Social Studies of Science* 32, no. 5/6, 2002: 691–727.

Lindytown as read through Achille Mbembe's "Necropolitics" ²³⁰

According to Achille Mbembe, necropolitics and necropower concern the contemporary manifestations of “resistance, sacrifice, and terror” which lead to “deathworlds” in which people are oppressed through exposure to the ultimate in weaponry and control through weapons, leading to an existence that is not much more than being dead while alive. Furthermore, the power to decide life or death no longer rests with the state, but becomes scattered, residing in other formal or informal social or institutional forces. For Mbembe, scattered necropower blurs the boundaries between uprising, self-murder, recovery, suicidal martyrdom, and liberty.²³¹ In particular, he traces the interplay of these concepts as constituting necropolitics and necropower in Africa, supplanting earlier forms of colonialism concerned with terror as discipline and control, though this earlier colonialism set the stage for the current extremes of necropower.²³² For Mbembe, this control of life through death or death-like life extends Michel Foucault's concept of biopower, or, the extension of the state's sovereignty concerning who must live and who must die.²³³

For the sake of lucidity, in this examination through Mbembe's lenses of necropower and necropolitics I evaluate certain of his concepts as potentially applicable to theorizing Lindytown. Before turning to this explication, we must first become better acquainted with the situation of Lindytown.

Lindytown by Barry, Biggers, and Letson

²³⁰ I then chose to seek out the source for the contemporary conversation on necropower: Achille Mbembe's (2003) “Necropolitics.” Here I examine Mbembe's necropower as it applies to the dead physical human body for its conceptual application to the dead or murdered town. In essence, I have started with what may be a set of extremes: a monotown at its most extreme as analyzed by a critical theory examining social relations at their most extreme. This move affords me wide critical room to later move toward more moderate monotown examples and critical approaches.

²³¹ Mbembe, Achille. "Necropolitics." *Public Culture*. 15 (1), 2003.

²³² *Ibid*, 23.

²³³ *Ibid*, 16.

The two newspapers articles I employ for this examination create a composite of Lindytown's remaining residents as terror-stricken, and the town as having been purposely dismantled by Massey Energy's mining practices well before the remaining residents sold their homes. Through descriptions and quotations, the journalists create a sense of relentless anxiety. *New York Times'* writer Dan Barry sets the stage of a place lost, “here just a moment ago,” created and destroyed by coal to support “our” way of life, by which I am uncertain if he includes the first person plural to also indicate the way of life led by the remaining or former inhabitants of Lindytown. As his illustration of the people that remain in Lindytown, Barry focuses on the Richmonds, an elderly couple who have opted to stay as has their retired coal miner son. Behind the Richmonds' home, mine-blasting has exposed a huge rock. Barry notes that the elderly Mrs. Richmond has Alzheimer's and returns to the back window throughout the day to check on the rock, lest it should finally teeter to destroy their home and them.

Barry recounts the explanation Massey provides for Lindytown's demise, that residents wanted to move, thus asked Massey to purchase their homes. According to Massey's general counsel, Massey's mountaintop mining in Lindytown was well within legal limits and Massey bought these properties only as “additional back up to state and federal regulations.” Barry counters this perspective with the words of local retired miner James Smith that people wanted to leave Lindytown because “the mountaintop operations above had ruined the quality of life below.” The miner posits that it was most likely less expensive for Massey to purchase the community than to address these quality of life issues or face legal action over silica dust and other contaminants. Smith continues that he would have stayed had the mountaintop removal not made Lindytown uninhabitable, commenting that, “You might as well take the money and get rid of your torment. After they destroyed our place, they done us a favor and bought it.”

According to Roger Richmond, the Richmonds' son, people left because they “were tired of fighting” or “of having to put up with all the dust. Plus, you couldn't get out into the hills the way you used to.” For example, due to government regulations of surface mining, should Roger Richmond seek to visit a family cemetery now located within the mining zone, he would “have to make an appointment with a coal company, be certified in work site safety, don a construction helmet and be escorted by a coal-company representative.”

In Jeff Biggers' “The Coalfield Uprising” in *The Nation*, we meet Steve and Lora Webb, who leave their home directly outside Lindytown on the eve of the Environmental Protection Agency's (EPA) declaration on September 11, 2009, of the violation by all “pending mountaintop removal mining permits in four Appalachian states” of the Clean Water Act. Massey installed a twenty-story dragline²³⁴ near their home and as part of this mining operation, blasted rock twice a day, which sent coal dust and fly rock²³⁵ into the air, covering the Webb's house and property. Biggers quotes L. Webb's words, “It's unreal. It's like we are living in a war zone.” By the spring of 2009, the Webbs were one of the last families in or around Lindytown, and Biggers reports that the Webbs appealed to state and federal agencies for the enforcement of mining laws. According to the article, neither level of governmental agency responded with action, prompting the Webbs to finally sell to Massey after blasting near their home was temporarily halted by federal regulators, then allowed to resume, even closer.

Biggers cites S. Webb's concerns that though the federal government under Barack Obama seemed more responsive than the Bush administration to concerns such as his own and to the impacts of mountaintop mining, he worried that Obama made compromises similar to those

²³⁴ Draglines are large excavating machines used in surface mining.

²³⁵ Flyrock is rock expelled from rock blasting.

made by Jimmy Carter, which led to the expansion of surface mining in 1977. Biggers then extrapolates what these compromises may be, such as the EPA's issuing of new permits under the guise of economic benefits. Further, Biggers cites research that some streams contaminated with mountaintop slurry have decimated the local population of mayflies, which is equivalent to the uninhabitability of this area by humans. According to West Virginia Department of Environmental Protection biologist Doug Wood, "The loss of an order of insects from a stream is taxonomically equivalent to the loss of all primates (including humans) from a given area. The loss of two orders of insects is taxonomically equivalent to killing all primates and all rodents through toxic chemicals." Biggers moves from there to a description by activist Chuck Nelson of an action planned by the Ohio Valley Environmental Coalition to hold a vigil for Lindytown, quoting Nelson, "I guess you could call it [the planned action] a funeral, for all the families that used to love this land and considered it home."

In Al Letson's episode "Appalachia Rising" for the *State of the Re:Union* radio- and web-cast, the principal respondent includes Boone County resident and environmental activist Maria Gunnoe.²³⁶ She explains why many residents leave as pertaining to having no protection with respect to air quality or any means to safeguard their health from the coal dust from surface mining. As Letson and Gunnoe enter Lindytown, Letson describes Lindytown as reminding him of what he had seen of New Orleans's Ninth Ward after Hurricane Katrina. The houses have boards over the windows. There are insect sounds rather than the sounds of a town. Many of the doors to buildings and houses stand wide open, some homes still displaying remnants of the families that had lived there. The main difference, though, according to Letson, is that unlike the Ninth Ward, the homes in Lindytown are still habitable.

²³⁶ Letson, Al. "Appalachia Rising." *States of the Re:Union*, 2011. <http://stateofthereunion.com/home/season-2/appalachia>.

Gunnoe explains that Route 26 to Lindytown used to be “a through-road, now it dead-ends in a mountaintop removal site. The coal companies have bought up all the communities that used to be up here. They have got it down now to where there are only three communities left on Route 26.” She recounts the last days of Lindytown:

November of 2009 the people of Lindytown were given sixty days to move out. The coal company bought up all of their houses. Initially they were told they would be able to stay in their houses for an undetermined amount of time. Then, once they [Massey's subsidiary] became owners of this real estate here, they gave the folks sixty days to get out right in the middle of the holidays....the purpose of buying that town is they are blowing that mountain up which is the backdrop of that town. They can't have people living at the bottom of this mountain because then all of a sudden it goes from mining coal to murder.

Again, in this reportage, we meet the Richmonds, the town's remaining residents.

Recorded before the elder Mr. Richmond's passing, we hear his own words with respect to his choice to remain in Lindytown:

We hear blasting here about every day you know. Sometimes it's loud and you feel it right in the bottom of the floor to your feet....You wouldn't think that an individual or individuals call this home, in a place as desolate as this at this time. This neighborhood here has become part of me since I was just a young fellow, since World War II, you know. When they wanted me to move, I decided that I didn't want to move. Sentimentally this is just as important to me as what that coal is up on the hill for Massey Energy, you know.

Gunnoe punctuates Mr. Richmond's narrative by commenting that although Mr. Richmond served in World War II, he “doesn't even have the rights to protect his own home.” As Letson and Gunnoe visit the Richmonds, we again get commentary regarding the boulder perched above their home and its possibility for falling at any moment. Letson also paraphrases one of the respondents that West Virginia is a national sacrifice zone, where residents are forced to live under hard circumstances so that the rest of the nation can benefit.

Roughly three miles from Lindytown sits Sundial, West Virginia—home to Marsh Fork

Elementary. Here we meet Ed Wiley, who worked a large portion of his life on heavy equipment on surface mining sites, and during this time he had been pro-surface mining. His perspective changed, however, when his granddaughter became sick, and he noticed many more children from her school also out sick. Despite working in the industry for years, he explained that he learned facts about coal that he had never known, that is, that coal contains deposits of lead, arsenic, cadmium, and uranium. His granddaughter's elementary school sits 250 feet from a coal sludge deposit—a place for the runoff from coal once the coal has been cleaned to be shipped for industrial employ. Concerned for his granddaughter's health as well as that of the other children, Wiley contacted the county school board, the health department, and other government agencies, prompting him to claim, “Everybody I turned to that was supposed to be responsible or had the power to help our children just wasn't going to do nothing. Nobody wanted to touch this issue because it was coal.”²³⁷

Only through activism and outside attention were Wiley and the people he organized able to push successfully for relocating the school.²³⁸ Local politicians did not move unless forced or shamed by power originating outside the community.

Extensions: Necropolitics and Lindytown

Extension 1: Sovereignty

Given the descriptions by the handful of remaining and former residents of Lindytown of the choice to leave— not an authentic choice but one forced upon them through the risk to their health and the potential for an untimely demise by staying— the word “choose” becomes

²³⁷ Letson, Al. “Appalachia Rising.” *States of the Re:Union*, 2011.

<http://stateofthereunion.com/home/season-2/appalachia>.

²³⁸ “Annenberg Foundation Offers \$2.5 Million to Relocate School,”

<https://www.wsj.com/articles/SB10001424052748704302304575214530981182998>

synonymous with “forced to.” Again, one of the key concepts in a liberal democracy rests with the idea of being a free agent, not bound to a particular person or bound to the land: one is free to choose where to live, and, to live.

Further, in the current context of Lindytown, the word “citizen” loses its power to denote an active, free agent when paired with “of Lindytown.” The individual inhabitants of Lindytown did not and cannot make active, free choices with respect to the fate of their town. In the case of deciding the fate of Lindytown, through Massey's making remaining synonymous with choosing an early death, the individual inhabitants of Lindytown are stripped of their citizenship; should they stay, their lives would become lives-in-death; by leaving, they ensure the death of Lindytown.²³⁹

Prior to World War II, in the European juridical order that pre-dated necropower, authority topped out at the level of the nation-state; no one body acted as a sovereign above that of the level of nation-state. At the level of nation-state, the state possessed right to wage war on another nation-state, and, within its own borders, take life. In the case of Lindytown, the sovereignty leaves the level of the nation-state and has moved to another agent, to Massey Energy.²⁴⁰

Extension 2: State of Exception

The death of Lindytown qualifies for Hannah Arendt's explanation of totalitarianism. To be a citizen of Lindytown is an oxymoron. Lindytown is no longer a “town” and no longer has citizens; it has entered into a “state of exception,” a relational position at the extreme of our rational conception.

The environmental degradation accompanying surface mining stretches to the extreme of

²³⁹ Mbembe, Achille, 2003, 11.

²⁴⁰ Ibid, 23.

what we allow to occur, yet, the place where it occurs is not just anywhere; it is a place devalued on several fronts: peripheral, rural, ubiquitous in its kind of technological production and would-be associations (energy—energy is everywhere—it just appears). Former inhabitants and inhabitants speak of surface mining's effects on Lindytown as being like a state of war.^{241 242}

Extension 3: Politics as the work of death

Civil discourse in Lindytown is non-existent or suspended. Politics in Lindytown is not dialectical. There is no creation of common understanding through shared discussion toward the rational. Sheila Jasanoff's civil and civic science turned its back on Lindytown; the taboos against violence have been broken with the killing of Lindytown.²⁴³

Manufactured states of emergency contributed to Lindytown's death such as fear of losing jobs (they left with automation).²⁴⁴ If you have no people, you have no one you need to employ. Eliminating Lindytown strengthened Massey Energy's fiscal security.²⁴⁵

Extension 4: The Enslavement

The choices left to inhabitants of Lindytown have rendered them slave-like. They have suffered the “triple loss” of the slave: home, loss of rights over one's body, and loss of political status.

Being a member of a community implies the right to exercise speech and thought. If you face death by remaining in a community, your ability to speak for that community also dies once you leave.

To be a slave is to be left alive but in a state of injury. The Richmonds live with the threat

²⁴¹ Ibid, 23.

²⁴² Ibid, 12.

²⁴³ Ibid, 16.

²⁴⁴ Ibid, 17.

²⁴⁵ Ibid, 18.

of death from coal dust or the boulder shaking loose during a blast and killing them.²⁴⁶

Mbembe quotes Arendt, that during the two world wars, Europeans treated each other as they had been treating the colonial “savages.”²⁴⁷ People in Appalachia have been characterized as savages, in deficit.²⁴⁸ Despite my previous interrogation of the term “indigenous” being used by scholar Talmage Stanley to describe White inhabitants in the region prior to the construction of the industrial coalfield in Appalachia, it could be in this common point of destruction of the environment and denigration of “the barbarian” as justified that the stories of White *and* Black coalfield inhabitants and colonial indigenous peoples meet, if they do meet.

In the narrative of the logic of heroism, a hero defeats an enemy and thus attains glory. In the logic of martyrdom, the future collapses into the present in a desire for eternity; the body becomes a weapon; the material dissolves into eternal life.²⁴⁹

However, in both the logic of heroism and the logic of martyrdom, the death of an enemy is achieved.

In the logic of survival, and in the case of Lindytown, little freedom to live remains if you do not take the buy-out. You are left the freedom to live in the shadow of impending death. You do not even have the choice of a martyr, as in your death, you will not take down the perpetrator with you. Even a slave suicide hurts the owner economically through denying the master labor. In Lindytown, choosing to remain may be meaningful to a resident—but it does no damage to Massey Energy.²⁵⁰

Mbembe quotes Martin Heidegger: “One is free to live one's own life only in so much as

²⁴⁶ Ibid, 21.

²⁴⁷ Ibid, 23.

²⁴⁸ Satterwhite, Emily, 2011.

²⁴⁹ Mbembe, 36-37.

²⁵⁰ Ibid, 39.

one is free to die one's own death.”²⁵¹ This can be applied to towns. Lindytown, however, stands as no American exception in the rural industrial space.²⁵²

Extension 5: Science as Knowledge Creation

In his elucidation of necropower and necropolitics, Mbembe issues a critique of scientific logic and reasoning, what he terms the “generalized instrumentalization of human existence and the material destruction of human bodies and populations.” For this critique, he utilizes Foucault's supposition that the roots of the state of exception in Europe (World Wars I and II) ran deep in terms of ethnic bias, nationalism, and so on.²⁵³ In both World Wars I and II, the creation of technology enabled the capacity to exercise the state of exception (e.g.: efficient gas chambers, transport, etc.). With respect to Lindytown, the massive equipment and the explosives employed reduce the number of people mining behind Lindytown but vastly increase the power to take down a mountain and engage in coal extraction. However, the “generalized instrumentalization of human existence and the material destruction of human bodies and populations” and Foucault's “ethnic bias, nationalism, and so on” are not exactly the same things, though I can follow the logic that if engineers and scientists create technology that can be used to

²⁵¹ Ibid, 38.

²⁵² Maybe this is an odd place for this aside as a footnote, but popular culture even has its homages to this loss of place. In writing this dissertation I often thoughts of the lyrics of The Pretenders’ “My City Was Gone” (1982). In this case, big box consumer culture has replaced a different conception or home town:

I went back to Ohio

But my city was gone

There was no train station

There was no downtown....

The farms of Ohio

Had been replaced by shopping malls...

This process comes less as news post-1980s. Billy Joel’s lyrics speak more to this failure of the American “way” as THE American Way. Released the same year as the song above (1982), “Allentown”...a bit from those lyrics:

Well we’re living here in Allentown

And they’re closing all the factories down...

But they’ve taken all the coal from the ground...

And the union people crawled away

²⁵³ Ibid, 14.

exercise a state of exception based on ethnic bias, nationalism, and so on, though they themselves may not actually push the buttons or work the levers, they become complicit in the state of exception. However, political theorists and philosophers such as Karl Popper or later, Yaron Ezrahi, may counter that the state of exception becomes enabled because we have not been too logical, but rather, not logical enough.^{254 255} Yet, I am aware that the construction and the conceptions of what counted as “science” in examining World War II as a state of exception may not count as science today (think eugenics). In this respect, the science used to support surface mining may not be more political than scientific (rational, objective, peer-reviewed, created in a scientific community). Mining requires input from geologists and needs scientific expertise in order to meet regulatory demands. These are facts, not political viewpoints. Ezrahi also might point out that, now, since countering science has arisen to react to the science of surface mining, the issue becomes less political and more reliant on knowledge production. However, reclamation and other sciences such as hydrology can largely work to enable regulation rather than temper industry.²⁵⁶ Science in reaction to coal mining enables a more potent strategy based in reason and instrumentalization to arise to counter a more political platform. Further, according to Ezrahi, “once the resources for depersonalizing and objectifying public actions are depleted, actors find it more difficult to persuade their audience that their actions do not stem from personal or partisan political considerations.”²⁵⁷

Yet, political theorist Ulrich Beck, in *Risk Society*, points out that the democratic apparatus of instrumentalized correction upon which Ezrahi relies to function to counter bad

²⁵⁴ Popper, Karl R. *The Open Society and Its Enemies: The Spell of Plato*. Vol. 1. New Jersey: Princeton UP, 1966; Popper, Karl. *The Open Society and Its Enemies: The High Tide of Prophecy: Hegel, Marx, and the Aftermath*. Vol. 2. New Jersey: Princeton UP, 1966.

²⁵⁵ Ezrahi, Yaron. *The Descent of Icarus: Science and the Transformation of Contemporary Democracy*. Cambridge, MA: Harvard University Press, 1990.

²⁵⁶ Such as Environmental Science or Reclamation Science.

²⁵⁷ Ezrahi, Yaron, 1990, 51.

science or bad politics falls short when faced with global risks such as acid rain.²⁵⁸ Certainly, as unveiled above in the *Extensions*, democracy already has failed the people of Lindytown, and very potentially similar rural industrial spaces not even under such extreme physical duress regarding their people or environment.

Even if science as posited by Ezrahi can be counted on to check morality and arbitrary and political actions, the science, or policy, countering the force of surface mining has come too late for this community in Boone County, West Virginia.²⁵⁹ This totalitarianism also persists in various ways, also remaining invisible to the metropole US.

In Europe and the other states of exception with which Hannah Arendt concerns herself, only another massive intervention swayed the course. James C. Scott reveals the destruction in this course of action. My examination and focus on the Pocahontas Coalfield, likewise. If we multiply all the Lindytown like spaces across the United States, has not the larger project of American democracy also been derailed?²⁶⁰ ²⁶¹

This brings us back to science and technology policy—or policy in a democracy; any kind of state (communist, totalitarian) can have a science and technology policy. The main questions become, how is that policy democratic policy and how is it enacted to further enable more democracy, more liberty, more human flourishing? And, as in the case of Hotchkiss, what then in the realization of policy serves the people, long-term?

We have an active federal history of making explicit the purpose of certain of our policies, and those policies subscribing our actions. For example, what if the policies the US

²⁵⁸ Beck, Ulrich, 1992.

²⁵⁹ Ezrahi, Yaron, 1990, 61.

²⁶⁰ Popper, Karl. *The Open Society and Its Enemies: The High Tide of Prophecy: Hegel, Marx, and the Aftermath*, Vol. 2, 162.

²⁶¹ *Ibid*, 158.

purports to support abroad, in its United States Agency for International Development (USAID) mission, were also what the US supported domestically, or promoted and supported science and technology research to investigate, innovate, and advocate? These would be a strong sets of democratic strategies to also promote domestically. **SEE APPENDIX E.**

Conclusion

In *Chapter Two*, I assert the implications for science and technology as practices in a single sector rural industrial space, where they contribute to the denigration of the citizen-resident. This citizen-resident experiences the fruit of the scientists' or engineers' "knowledge creation" as political, economic, social, and environmental derogation. Work, and thereby community, is displaced. Large machines flatten the land and the local understanding of that land. As parts of a large technical system, local problems in the rural industrial space become invisible to society's metropolises. In the single sector rural industrial space, democracy suffers a deficit through the destruction of a habitable environment and through the conflation of work and civic life.

By contrast, policy examples exist that would set a more equitable course for governmental and a range of other policies for citizen-residents in place like the Pocahontas Coalfield or Lindytown. Education, research, science, technology, etc. could follow a policy highlighting first the call to democracy and the creation of a "free society." Science can be no less scientific, no less technical, if it also responds to civic duty.

In *Chapter Three* I turn to this and other policies and strategies with implications for a space like the Pocahontas Coalfield.

CHAPTER THREE

Increasing Democratic Possibilities and Policies in the Rural Industrial Space

Overview

The aim of this dissertation is not to uncover the one underlying solution for the issues enumerated in *Chapter One*. As I have stated abundantly, many factors, actors, stakeholders, etc. contribute to the creation of a rural industrial space. This dissertation concerns itself with actors (scientists and engineers), the goals of science, and the issue of democratic citizenship not as often in discussion in others works of scholarship or media with respect to the coalfield, or, the rural industrial space.

Very simply, to hearken to my earlier discussion of David Harvey and free market science and of Timothy Mitchell and actionable democracy, and even my footnote of Barbara Ellen Smith's work and the list I created from it of democratic practices beyond voting, what ought science and what ought policy be addressing in the rural industrial space in the US context that is currently undervalued, or, weak but could contribute to more democratic practice and more measurable liberty and equity if strengthened?

In this chapter, I argue that liberty and equity ought to be cornerstone ideals of both a functioning liberal democracy, and of a functioning policy in a liberal democracy. I demonstrate my argument through proposing an approach, a strategy, to inform science and technology practice and research in and on the rural industrial. I also agree with political scientist Deborah Stone that liberty and equity have material and real applications in the polity; they can be enacted and practiced. They are attainable and actionable by humans; likewise, people also create the economy and the market. None of these constructs function through immutable laws or absolutes; they all must be defined, redefined, and exercised in order to attain material

substance.²⁶² All are works in progress, and their characters and abundances are determined by real human actors in society.

Furthermore, I assume the basis of policy in a democratic state ought to be to increase liberty and equity for individuals and communities—as they have the least organized protections in the US in comparison with a range of corporate entities. In the application of policy, I concur again with Deborah Stone, that in the American context, corporations have very few restrictions on the consequences of the actions of their agents. She explains that “public policy must address conflicts between the liberties and interests of individuals and those of corporate actors” such as “churches, trade unions, sports franchises, professional associations, business corporations,” etc. Because these entities can exhibit such control over individuals, their power ought to be especially limited. In the US, we falsely assert that these actors and private corporate actors are “weak” and that the individual is strong, when by contrast, these kinds of groups assert tremendous power over workers, the fate of communities, and over society.²⁶³ Moreover, rather than a conflict between equity and liberty, or liberty as construed as the absence of harm, another way to consider liberty is “whenever a person’s control over her or her life is increased.” Stone prescribes power (such as voting and meaningful social decision making), wealth (material resources), and knowledge (capacity to envision “solutions” to “problems”) as necessary to increasing liberty—and as measurable. Liberty is available by amount, by degree, and can be maximized. Thus, how much liberty one has relates to how able and amenable a society is to addressing the attributes of liberty issues directly.²⁶⁴ I add here my reluctance to speak generally of society in that in the context of this dissertation, I have named specific people and

²⁶² Breslau, Daniel, 2003; Stone, Deborah, 2001.

²⁶³ Stone, Deborah. *Policy Paradox: The Art of Political Decision Making*. New York: Norton, 2001.

²⁶⁴ *Ibid*, 128 - 130.

classes/categories of people who must be amenable or be forced, through direct exercises of democracy such as bottom line affecting strikes, to be amenable.

With respect to equity, Stone highlights that every issue of policy accords an issue of dispensation, whether material or of making one's luck or having one's luck dictated such as compulsory military service, access to education, or holding an elected office.

Rather than go through her brilliant analysis of the complexity of defining equity (worth reviewing if one is not familiar), more important are the questions she assigns to the policy analyst. I paraphrase Stone, indicated by parentheses:

(Stone) First, who are the recipients and what are the many ways of defining them?

I have spent considerable time in this dissertation defining the macro and micro of the group at issue—the people of the Pocahontas Coalfield currently (micro) and people in a rural industrial single sector regions in the US (macro).

(Stone) Second, what is being distributed and what are the many ways of defining it?

My examination, and answer to this question: the practice and benefits of equity and liberty available in the Pocahontas Coalfield and in the context of a rural industrial space currently in the United States.

(Stone) And third, what are the social processes by which distribution is determined?

I have reviewed some of the social processes at stake in the Pocahontas Coalfield and in the similar single sector rural industrial space:

- Work and town conflating into the totalitarian state. The Pocahontas Coalfield illustrates what happens in a single sector rural industrial space.
- Science and research serving mainly corporate liberty rather than also individual or community liberty.

- Corporations automating away workers-citizens or making a space uninhabitable for citizens.
- Corruption by state stakeholders on behalf of themselves and corporations.

Policies

In responses to desire for actionable liberty in the Pocahontas Coalfield, I have conceived of policies incorporating informed possibilities for potentially increasing liberty and democratic practice specifically in the Pocahontas Coalfield and in similar spaces where technology and corporations have especially negated metis (practical, intimate knowledge), environment, and liberty.

During interviews for this dissertation respondents surprised me by listing lack of vision and lack of leadership as the top issue in their regions (Pocahontas Coalfield and coalfield adjacent). This view from respondents mirrors the scholarly work, for example, of Cynthia Duncan and her portrait of the ruling class in her amalgam site Blackwell as elected leaders acting in their own self-interest rather than for the good of their greater community.²⁶⁵

In this exploration of how to marry research and policy for the increased benefit of more actionable and measurable liberty and equity in the Pocahontas Coalfield, or rural industrial space, I first discuss a range of approaches and possibilities for re-envisioning the Pocahontas Coalfield and similar spaces. I then outline actionable rural policy, with the Pocahontas Coalfield as a case study/test case. Again, what I outline should be taken together as actions to work in consort, not one or the other dominant in terms of efficacy or preference. I have not listed these in any order of importance or ranked their impact potential.

²⁶⁵ Duncan, Cynthia. *Worlds Apart: Why Poverty Persists in Rural America*. New Haven: Yale University Press, 1999.

Decentralize LTS and Support Metis-Friendly Institutions

If we consider the Pocahontas Coalfield as part of the large technical system (LTS) that is energy, then decentralizing this kind of large technical system could potentially make energy production both more democratic and less condensed in its associated financial and environmental risks, both for the end-consumer and for people in the current LTS rural industrial space.²⁶⁶ Even with US production drops in coal-fired power plant-destined coal, coal remains valuable in its use in industry and as an export. Moreover, significant federal R & D spending remains budgeted for clean coal technology.²⁶⁷ Nevertheless, a long functioning history of more democratic institutions and more metis-amenable institutional structures such as workers cooperatives and producers cooperatives allows us to envision how energy production and resource extraction might be reorganized to afford more democracy at its resource site or origin.²⁶⁸ If coal and energy company administrative structures could be restructured toward more democratic institutions such as cooperatives, worker-owned or citizen-owned LTS, along with a diffusion of technological interventions which place power generation with the end-consumer or even the end-corporate consumer, then it could follow that all of these spaces would increase in liberty; each of these spaces could then absorb more equitably the personal, environmental, economic, and social risks associated with energy production.^{269 270}

²⁶⁶ Bijker, Wiebe, Trevor Pinch, and Thomas Hughes. *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*. Cambridge, MA: M.I.T. Press, 1987.

²⁶⁷ See the grants listed for various Mining Engineering Programs in **APPENDIX A**. For example, here is an overview of federal support for coal-related research: <https://www.nap.edu/read/11977/chapter/13> at the National Academies Press.

²⁶⁸ "Sustainable Practice? An Examination of Canada's Agricultural and Energy Cooperatives." *Professional Geographer* 67, no. 2: 2015, 187-194; Rothschild, Joyce. "Workers' Cooperatives and Social Enterprise: A Forgotten Route to Social Equity and Democracy." *American Behavioral Scientist* 52, no. 7, 2009: 1023-1041; Zahran, Sammy, Samuel D. Brody, Arnold Vedlitz, Michael G. Lacy, and Chelsea Lynn Schelly. "Greening Local Energy: Explaining the Geographic Distribution of Household Solar Energy Use in the United States." *Journal of the American Planning Association* 74, no. 4: 2008, 419-434.

²⁶⁹ Scott, James, 1998, Ch. 10.

²⁷⁰ Stoll, Jennifer, Jessie P. H. Poon, and Trina Hamilton. 2015. "Sustainable Practice? An Examination of Canada's Agricultural and Energy Cooperatives." *Professional Geographer* 67, no. 2: 2015, 187-194;

As I have narrated abundantly, in most respects many of these spaces have already hit bottom as communities (as defined by the World Bank) and environmentally (as I describe in my theorization of Lindytown). Thus, to characterize to locals such moves toward democratic structures as “high risk” reeks of a neoconservative assertion that deregulating “invisible hand” market impulses must be characterized as high risk.

Promote Science and Technology that Supports and Stewards the Rural

As pointed out earlier in this chapter, corporations maintain civic strength in legal code, in state policy, and in liberty in the US. Science contributing to the bottom line for corporations is alive, well, and strong, and in the region at hand, if one reviews again my first discussion of academic departments in the region and their corporate benefactors, the marriage of mining engineering and geology with corporations to produce knowledge for corporate gain or for regulatory compliance is likewise robust. Thus, room exists philosophically, ethically, and in practice to propose the strengthening of citizen liberty and equity through scientific knowledge, especially in the case of science and engineering research or practice that is funded by the public. Rather than the flattening of knowledge by Taylorism, and the false assumptions of redistribution of innovation of Schumpeter, public-funded science and science and technological education could first serve civic purposes such as increasing liberty and the democratic practices outlined in *Chapter Two*: in sum, transparency of government, corporate cost-sharing of rehabilitation of land, efficacy of voting leadership and civic education, corporate responsibility, etc. To this list

Rothschild, Joyce. "Workers' Cooperatives and Social Enterprise: A Forgotten Route to Social Equity and Democracy." *American Behavioral Scientist* 52, no. 7, 2009: 1023-1041; Zahran, Sammy, Samuel D. Brody, Arnold Vedlitz, Michael G. Lacy, and Chelsea Lynn Schelly. "Greening Local Energy: Explaining the Geographic Distribution of Household Solar Energy Use in the United States." *Journal of The American Planning Association* 74, no. 4: 2008, 419-434.

add science that increases worker rights, supports environmental stewardship, and works with citizens to research needed science for economic and environmental sustainability.

The public universities that currently send mining engineers and geologists to support extractive scientific cum economic practices in the Pocahontas Coalfield —West Virginia University, Virginia Tech, the University of Kentucky, and Penn State, etc.—ought to devote their science and technology education programs also to science and technology that increases liberty and democracy as practice for the people in the region where their institutions are located through increased citizen participation in research agendas and from reaching out to the community for research needs. The Department of Mining Engineering or School of Engineering or Science ought to support science and technological expertise to increase democratic practice and more measurable liberty for people in that region, reduce corporate and governmental corruption, and support more democratic leadership in this rural space—those ought to be the stalwarts of energy policy in a democratic society serving citizens rather than corporations. These same universities need to incorporate local citizens, taxpayers, in citizen science for more democratic land stewardship decisions going forward with the region’s assets, and, train citizens in the evaluation of proposed resource utilization.²⁷¹ Each science and/or technology department could work with local citizens to understand the science at work in the region and the technology proposed before any department could jump on any pro or con bandwagons. This approach could increase knowledge and possibly open up dozens of avenues for scientific and technical engagement by scientists and citizens alike.

Moreover, citizens ought to lobby for needed democratic science and technology in their region. Taxpayer funded R & D would need also to reflect democratic imperatives. “What of

²⁷¹ Einsiedel, E., E. Jelsøe, and T. Breck. “Publics at the Technology Table: The Consensus Conference in Denmark, Canada, and Australia.” *Public Understanding of Science* 10, no. 1, 2001: 83–89.

academic freedom?” critics may cry. With the kind of corporate roster currently in play and corporate partnerships for state-funded universities and, with the roster of corporate lobbyists attending to governments, academic freedom would likely increase rather than decrease if citizens became engaged and understood the potential impact of their taxpayer dollars on improving or at least attempting new technical, policy, and scientific approaches to their current problems. Academic integrity would remain integral in “idealized” science and science for knowledge’s sake might even return in importance in the US as it would be seen, given open source applications now, as a public good.²⁷²

Build on Regional Groups and Their Emerging Coordination

Despite their myriad of economic, health, and environmental problems, neither the Pocahontas Coalfield nor Lindytown is caught in a snow globe, forever swishing in acid mine drainage, decorated in loose rock, peppered with fly ash. Within the area, regionally-focused groups such as the Central Appalachian Network, the Appalachian Funders Network, and the Appalachian Regional Commission (ARC) have supported exploration and discussion of other economic possibilities for central and southern Appalachia beyond coal mining in particular. However, directly engaging science and technology’s R & D or education agendas have not generally been part of their approaches for change.²⁷³ In particular, the ARC’s relationship to the current model for the regional energy sector becomes complicated due to political and other interests involved in their federal partnership. Though the Central Appalachian Network and the Appalachian Funders Network have promoted the concept of “Appalachian Transition”—a new discourse in the region—these organizations imply but, for political reasons, do not explicitly

²⁷² This may be a farfetched assertion but we currently understand the present state of science for hire and what this has done to knowledge production.

²⁷³ The Appalachian Regional Commission, for example, supports no academic research.

advocate transition from coal. Likewise, the strongest emerging sector, natural gas, largely remains outside of discussion when not part of anti-pipeline efforts. Though a powerful industry on the ground, natural gas has not yet attained cultural affiliation for this region. Of equal importance, but overshadowed by the environmental and other issues of active coal country, ought to be the issues accompanying any of the region's rural single sector industries: natural gas in Pennsylvania, Ohio, West Virginia, Virginia, North Carolina, etc.,²⁷⁴ timber in certain counties throughout the region, etc. I often think of the *Charleston Gazette's* section, *Coal Tattoo*, which might best serve the region by also focusing on energy companies beyond coal.²⁷⁵

Despite the massive extraction over centuries—timber, minerals, and the ruination of growing capacity (arable land), soil and water—the region remains rich in a vast array of natural, human, and geographic resources. Various groups in the region seek to work from these remaining assets. Though less connected to these greater regional groups, and not self-identified with “Appalachian Transition,” institutions in the Pocahontas and adjacent coalfields have arisen in recent years to address economic and human potential there beyond coal, confronting both directly and indirectly issues of job loss and automation. Longstanding groups such as Big Creek People in Action in War, West Virginia, the Council for the Southern Mountains, the Appalachian South Folklife Center, Community Connections, and the South Central Educational Development Corporation have been working in this region for years on health, education, senior issues, youth outreach, etc. More recently, associations or nonprofits have also taken on leadership in the arts (Gary Bowling's House of Art, RiffRaff Arts Collective) and business innovation (the MIT FabLab partnership of Pastor Travis Lowe and the Center for Applied

²⁷⁴ <https://irjci.blogspot.com/2017/06/decades-will-be-needed-to-fully-assess.html>; Decades will be needed to fully assess fracking's impact on drinking water, Geological Survey says.

²⁷⁵ Coal Tattoo: <http://blogs.wvgazette.com/coalattoo/>

Research Technology at Bluefield State University) and youth entrepreneurship (American Youth Agripreneur Association) out of McDowell County, West Virginia. Despite technological interventions and advancement, the coal industry did not usually share tech modifications or advances across companies, nor did they support a local culture of invention.²⁷⁶ Moreover, because of the stasis of this local single sector economy and the conditioning of local workers and management to rely mostly upon this sector and supporting sectors for employment, the kinds of social diversity or entrepreneurial diversity taken for granted in large metropolitan areas, if they set up and function in the Pocahontas Coalfield, can seem and be nothing short of revolutionary. Thus, emerging groups and emerging partnerships can magnify impact and to do this, need financial and transparent support equal to that of prior coalfield development support.

Clear in all of these partnerships is a concern with employment, and the very high likelihood of little to no coal-related employment returning: automation remains starkly real and the anticipation is that it will continue in most industry left, whether coal, retail, natural gas, or medical.

***Look to the Present and the Future—but don't muddle or deify the past.
What good old days? Whose good old days?***

Respondents for this dissertation have described that since the region at hand has been in population decline for decades, current youth do not remember “the good old days.” They want new models of what their towns or places can be and need reasons to remain.²⁷⁷ It can be tempting, also, to whitewash the history of the region prior to coal-industry dominance. That the land companies were ruthless in their acquisition of mineral rights is a provable fact, and that

²⁷⁶ Hodge, Dan. “Appalachian Coal Industry, Power Generation, and Supply Chain.” Hodge Economic Consulting: Appalachian Regional Commission, 2016.

²⁷⁷ Qualitative Interview Respondent, 2014.

mining companies exploited and/or controlled miners and other employees also a well-proven fact.²⁷⁸

Since coal offers a complicated legacy on a number of levels (health, wealth distribution, environment), current transition discourse should not draw significantly from that legacy or heritage for justification of entitlement to alternate spatial creation.

I do not subscribe to a right of heritage for the region's European colonist progeny. It is terrible to be swindled out of one's legally held land and connived from potential profit from it. Nevertheless, we enter dangerous territory ethically and academically when we assert that the inhabitants in this space prior to industrial coal had a legacy right to be there. Long-time Appalachian scholar Talmage Stanley writes of his family's correspondence from the industrial coalfields and he laments the treatment of the people living there immediately prior to coal's industrialization:

Hidden behind Apperson's mention of the "Poco fields" is a mountain culture that was all but destroyed as the Norfolk and Western Railroad and its subsidiaries sought to wrest control of the mineral and timber rights from the indigenous farmers of Mercer and McDowell counties, in West Virginia and Tazewell and Buchanan counties in Virginia during the last twenty years of the nineteenth century.

Indigenous? No, the farmers there were highly likely to NOT have been Native Americans (I contend that an ugly streak in the region is the local White claim to a "Cherokee" grandmother—thereby manufacturing a right of occupation or place. As an Affrilachian friend and I joke—both Whites and Blacks in the region like to point to potential Native American ancestry, when we/they likely ought to be pointing at each other/one another).²⁷⁹ Indeed, those

²⁷⁸ Gaventa, John, 1982; Stanley, Talmage, 1996; Thomas, Jerry Bruce, 2010.

²⁷⁹ Fay Yarbrough found this to be the case in Oklahoma. Yarbrough, Fay. *Race and the Cherokee Nation: Sovereignty in the Nineteenth Century*. University of Pennsylvania Press, 2007. For critique of white Appalachians as indigenous see "Pearson, Stephen. This is [Not] Our Land: Settler Colonial

farmers' kin likely had a hand in driving those people out by foot, fight, or murder.²⁸⁰ Thus, the spiral backward for who has a right to be in this region becomes sticky very quickly. That there ought to be fair practices and environmental stewardship does not rely upon an Ur-Appalachian claim to land. Likewise, the current transition from a coal region to the region having other meaning rests also in a cultural and identity conversion of “coal” families to something else as meaningful.²⁸¹ Likewise, in this, what of African Americans forced to work in the mines or who chose to move into the region? Or of the Jewish, Italian, Hungarian, and Slavic descended people in this space now? They get erased in this Ur-narrative.^{282 283}

That the US sits upon a history of land conquering and resource theft by actual real people acting collectively becomes absconded in absurd assertions such as mountain White people being or having become “indigenous.” Now, the people in these same coalfields are being replaced, purposefully, by machines as the same companies replaced the regional purpose during the wresting of this area into an industrial coalfield. Had these working class people then developed a right to be there in the coal employment years' interim? What about their managers? The local small boss operators? What about these people Stanley mentions? Do their progeny now have a “right” to be there? To make a heritage- or legacy-based land claim?

Implied but unstated in the “Poco fields” is the rich and diverse culture of African Americans, ethnic Europeans, and indigenous Appalachians who converged by the thousands on the Pocahontas Coalfield beginning in the 1880s.

Commoning, Self-Indigenization, and the Bowl with One Spoon,” Shawnee State University, Appalachian Studies Association Conference, 2016.

²⁸⁰ Zinn, Howard. *A People's History of the United States*. New York: Harper Perennial Modern Classics, 2005.

²⁸¹ Rebecca Scott points to the ways in which “meaningful” and “masculine” are co-determined in the coal fields.

²⁸² Lewis, Ronald, 1987.

²⁸³ Stanley, Talmage, 1996, 69.

Above, Stanley references other invisibility in certain artifacts—an erasure of African Americans from this rural industrial narrative. His dissertation reads in its Poco Field section of a long “thick” description of democracy deficit. Though he focuses on the coal baron Koppers, he also illuminates their manipulation of people, the replacement of workers by machines, the fight by workers for fair wages, and the switch over time by these same workers to loyalty to company rather than loyalty to comrades.

Thus, argument of Ur-right and legacy as reasons for rights to land and why certain crimes ought not have been committed against the people on these lands may not get us to the best current conceptualizations of fair or equitable.²⁸⁴

Redefine Region. Redefine Power. Connect Across the Rural.

In order to find solutions or new approaches to dire regional issues (to improve health outcomes, for example, or to increase economic sector participation outside the energy sector), statutory borders may need to be circumvented by other modes of regional organization.²⁸⁵ Large organizing interventions may work in single sector economies but fail when a region’s interests do not align with those of the people in power in the individual states.²⁸⁶ “Right size” for social organization may not be fixed or on the binary of macro-scientific rational response or overly-determined small is beautiful localist solutions.²⁸⁷ In a subsection of this region, host to a long list of economic, community, and environmental problems, the rural needs to be reconfigured and reassembled, connecting and empowering the people in these adjacent overdeveloped and

²⁸⁴ Scott, Rebecca, 2010.

²⁸⁵ Respondent, 2015. For example, the region’s opioid use and economy crosses regional statutory borders, but the tactics for curbing its impact and for treatment stop at the state borders.

²⁸⁶ I draw these conclusions based on interviews with grassroots and other stakeholders in the case study region and also by following funding to those regions to address dire needs.

²⁸⁷ There is a long literature on the latter in extractive Appalachia in particular.

increasingly ever more rural sections to link to one another in action and economy, irrespective of statutory borders or power.

There is no one-size fits all solution and even the charms of the localist movement can fall apart when locals reveal prejudice, lock out others due to provincialism, fail to bring people at the margins to the table, or engage in cronyism and corruption. That said, there is still the potential for citizens, or grasstops in particular, to lobby for transregional approaches to economic development. Likewise, training and support for more distributive models of corporate organization ought to be provided. The hyperlocal and marginalized rural there needs to be reassembled into a connected rural through a National Rural Policy, Strategy, or Assembly.

Redefine Regional Success.

Longtime residents remain attached to coal identity and heritage, as most families have had members working at some time in coal, and coal employment is identified with masculine “breadwinning.”²⁸⁸ Talmage Stanley points out the scholarship related to imagining place not attached to economic imperative or to fluctuations in the global marketplace—to a meaning of place beyond capital.²⁸⁹ I would also state that this would need to be a creation of a region beyond certain state strategic or scientific measurement—two other main reasons for geographic assessment in the US.²⁹⁰ But these latter tasks continue even if assessments for global capital’s utility remain negative. How does one get an honorable valuation of place now? Who gets to decide? And can scientific, capitalist, state and the conflated configurations of these be usurped or subverted?²⁹¹ One dissertation respondent asked this question directly—why must valuation

²⁸⁸ Scott, Rebecca, 2010.

²⁸⁹ Stanley, Talmage, 1996, 45. He draws on Herbert G. Reid, “Global Adjustments, Throwaway Regions, Appalachian Studies: Resituating The Kentucky Cycle on the Postmodern Frontier, unpublished paper, October 1995, held by the author, Aronowitz 1992,51 -52.

²⁹⁰ Harvey, David, 2007; Scott, James, C., 1998.

²⁹¹ Lowe, Travis, 2017.

be tied to capital? From a theoretical post-capitalist standpoint, this would be a great exercise. However, in the meantime, I approach the possibilities for this region with far too much pragmatism for this suggestion to merit high priority consideration.

Rural people can create identity not tied to what was the biggest rural industrial intervention in their area. For example, Rebecca Scott tackles issues of masculine coal identity. Campbell et. al tackle the issues of American rural country identity. In short, a range of work-related identities exists in the rural US context. Coal is not the end all and be all for rural work-related identity.²⁹²

Search for Other Assets.

Social entrepreneurship models can upend the deficit models of community assessment and measurement focused only on what is lacking, and, work instead from assets identified. In the case of Mercer Street in Princeton, West Virginia, the disrepair of Downtown opened an opportunity to recreate Mercer Street as a creative hub, very different in character and personality from its coal and railroad town heyday. In the case of McDowell County Farms in the Pocahontas Coalfield, through their Appalachian farming model, they teach about and promote the many valuable products that can be harvested noninvasively from the woods, often shocking local folks that so many things of value can be found there still, that their region is not completely bereft of use if not coal, natural gas, or timber related.²⁹³

²⁹² Scott, Rebecca, 2010; Campbell, et al, 2006.

²⁹³ Valencia, Richard. *The Evolution of Deficit Thinking: Educational Thought and Practice*. Stanford Series on Education & Public Policy. New York: Routledge, 1997.

Science and Technology for Other Assets: Reorient all state institutions of community and higher education to solving regional issues.

Imagine how powerful this would be. For example, instead of Virginia Tech's 2017 focus on autonomous technology, what if it focused instead on achieving in its own very rural backyard, work for all... health for all?

Create a Real National Rural Strategy/Policy beyond the Farm Bill.

In *The Failure of National Rural Policy*, in addition to a critique of United States' federal policy approaches to the rural, William P. Browne chronicles the development of science-based and driven agriculture in the United States in the nineteenth century and its massive acceptance by universities and by farmers in the early twentieth century. His framing of the introduction of science into US agriculture unsurprisingly follows similar trajectories in US industrial development during this same time—a period of industrial, academic, political, and scientific specialization as well as social and geographic upheaval. In short, most science in agriculture did not focus on mountain or forest farming; the Midwest and West came to dominate rural and agricultural policy and decisions in US federal policy regarding the rural.²⁹⁴ Rural scholars Lyson and Tolbert in “Civil Society, Civic Communities, and Rural Development” hammer home that rural communities are part of the global economy, and that large corporations set the agenda there. Rural folks can be blindsided, even when they do everything “right:”

Communities that did not invest in their infrastructure or in their residents, as well as those that did all the right things but were unable to attract business, were simply ‘forgotten.’”^{295 296 297}

²⁹⁴ Browne, William, 2001.

²⁹⁵ Tolbert, Charles M., Michael D. Irwin, Thomas A. Lyson, and Alfred R. Nucci. “Civic Community in Small-Town America: How Civic Welfare Is Influenced by Local Capitalism and Civic Engagement*.” *Rural Sociology* 67, no. 1, March 1, 2002, 90–113.

²⁹⁶ Ibid, 229

²⁹⁷ Ibid.

Rural America did not neatly follow the plan of free market capitalism. Regeneration and rebirth in a Schumpeterian model do not follow, and places with multigenerational poverty, uneven wage attainment, and splotchy economic recovery persist. Rural became “Big Rural” as even the largest family farms became owned by national and multinational corporations—likewise with mining companies, forestry, and paper.²⁹⁸ The current US rural strategy is to continue more of the same, looking to big corporations as guides for what kinds of education, economic policies, etc. should prevail. As big corp subsumed Big Rural, the potential for national level or local government intervention with respect to setting an agenda for rural development has become increasingly weak, as evidenced by big corps’ “sucking in” of rural industries in the 1970s and 1980s.²⁹⁹

The nation-state is not as useful (but still somewhat useful) in conceptualizing movement of capital currently at stake. Though trade was international, local and national policies still obtained. However, with transnational corporations, NAFTA, IMF, World Trade Organizations.... how much of local is controlled locally? What does local mean? How local is local? In short, in the rural industrial space, how bad does it have to get before inhabitants advocate for something else? Is there a bottom to hit or is it a bottomless pit?³⁰⁰

Recognize the Fallacy of Economic Diversification of the Rural in the US as a Rescue Tactic

With respect to the popular economic buzz phrase “economic diversification” as a cure for the single sector rural industrial space, this construct is empty. First, how diverse is diverse? Rarely is this defined, just as “economic” is rarely defined. With respect to single sector rural

²⁹⁸ Ibid, 229

²⁹⁹ Ibid, 230

³⁰⁰ Bonano, Alessandro, and Douglas Constance. *Stories of Globalization: Transnational Corporations, Resistance, and the State*. Penn State Press, 2008.

economies, the popular movies and book series, *The Hunger Games*, sectioned off the US fairly accurately: rural spaces have become relegated largely to single sectors. This is not news in the American South, historically land of tobacco and cotton, now replete with 32 million acres of pine plantations and thousands of contract chicken house grist mills.³⁰¹ ³⁰² Or of the mountain South—denuded by the late nineteenth century. The environmental sociologist William Freudenberg contended that if a location is not already economically diverse, it will most likely not become it. Said in popular parlance: location, location, location. Metropolises maintain society centers and pivotal access.

Likewise not every rural industrial space is extractive but many rural spaces in the United States are single sector. Moreover, with respect to political power, there are more similarities than differences among single sector areas. For example, similarities in rural industrial single sector US spaces include:

- Federal and state policies often ignore geographic limitations such as access.
- Politicians overpromise the ability to attract in other industries that are not extractive or single sector.
- Politicians keep the focus on economic or bootstrapping or jobs as fixing issues rather than actually fixing issues.
- The isolation of rural spaces from one another (and rural people from one another via racism) keeps the US from developing a national policy of dealing with areas in the rural depleted in people and other resources.
- This disconnect among people across these rural industrial spaces keeps the US from requiring industry to develop a Plan B for the demise of said industry— any benefit in terms of attracting in outsiders to work or keeping locals local, with no Plan B for the day when operations end.
- Focus on blaming the poor keeps middle class and upper middle class rural people from dealing with the people who are left (the poor).

³⁰¹ <https://www.srs.fs.usda.gov/pubs/9647>

³⁰² <http://grist.org/article/parker1/>

- Economic development teams in professional employment focus on attracting in work rather than on community longevity, or even the benefits of degrowth.
- Seeking to attract in more single sector industry keeps a focus on an outside source of income being the answer.³⁰³

In the face of these similarities, what if the checks (whatever those are and from whomever) stop? Who suddenly becomes most valuable in the community? How can we then start to value and follow those people now? What would we lose or gain?

Stop Educating the Rural to Leave the Rural

National educational policy does not take into account the kinds of skills necessary to stay rural. Here is a brief overview by way of example—and this is supported by many large corporations:

The P21 Framework represents both 21st century student outcomes...and support systems.

Their explanatory graph then goes on to depict a range of skills needed in a mix and interplay among information, media, and technology; learning and innovation; life and career... mainly skills aimed at work in larger corporations. On the surface, this framework seems reasonable. Yet, let's examine the kinds of groups shaping this framework:

The following organizations and individuals were instrumental in founding P21:

Government: U.S. Department of Education

Founding Organizations:

- AOL Time Warner Foundation
- Apple Computer, Inc.
- Cable in the Classroom
- Cisco Systems, Inc.
- Dell Computer Corporation
- Microsoft Corporation

³⁰³ Stirling, Andrew.

- National Education Association
- SAP

Individuals:

- Ken Kay, President and Co-Founder
- Diny Golder-Dardis, Special Advisor and Co-Founder

No small businesses. Little focus on the kinds of skills that can help a student mitigate the issues in the rural industrial and stay rural, if he or she chooses. Not that this framework is not useful; it simply focuses on many abstract and “soft” skills that may or may not afford one an opportunity to remain rural. Likewise, in the Obama Administration, his main business advisors and visitors were all from large companies, with Honeywell topping the list. See: Brown, Jeffrey R. and Huang, Jiekun, All the President's Friends: Political Access and Firm Value (April 2017). NBER Working Paper No. w23356. Available at SSRN: <https://ssrn.com/abstract=2961081>.³⁰⁴

Thus, education and business priorities from a federal level down remain skewed for large corporations, in other words, work that does not exist in rural industrial areas.

So, What of a National Rural Strategy?

In favor of exploring what a national rural policy might enable to make a rural industrial space such as the Pocahontas Coalfield more democratic, I will first set out an additional range of issues to keep an awareness of, but, for the sake of this dissertation, cannot fully elucidate without veering too far from analyzing this rural industrial space through an STS lens.

³⁰⁴ Brown, Jeffrey R. and Huang, Jiekun, All the President's Friends: Political Access and Firm Value (April 2017). NBER Working Paper No. w23356. Available at SSRN: <https://ssrn.com/abstract=2961081>

Many issues contained in the rhetorics of the rural in the US, for example—popular culture, political and academic fights over who speaks for the rural, how the rural may stand in for other issues, and all the rhetorics of associations of the rural space (American progress, jobs, environmentalism, big ag, localist movement, local ag, idealizing the White male rural, idealizing the current state of nature, gender, race, deficit models, degrowth, spatial realities of services, myths of self-reliance, myths of government largesse, etc.)—can make the task of compiling a general national US rural policy appear futile. Nevertheless, policies, or another federal “policy” document, *the strategy*, would be a welcome step in addressing how we as a nation ought to assess, understand, and approach the myriad of issues in a space like the Pocahontas Coalfield, especially with respect to ensuring and safeguarding democracy in these spaces.

In large strokes, the focus in this dissertation on the Pocahontas Coalfield brings to the fore major issues in the rural industrial space that scientists and engineers assist corporations and government to enable. What if similar strategy instead focused on economic sectors in rural spaces in which jobs are less likely to be automated away? And R & D also focused deeply on solving issues of rural health? Rural sustainable business? Rural land and plant environments? The list goes on.

As I have stated in various ways in this work, the issues affecting the Pocahontas Coalfield are not unique and are being experienced in many rural places across the United States. In an ideal situation, the United States would not continue to subsume national rural policy under agricultural policy (including economic policy) under the Farm Bill. We would join nations such as Canada, Chile, Finland, France, and Korea with explicit national rural policies or plans. However, in the absence of such explicit national policy regarding rural spaces, nothing prevents

me from outlining potential policies to be worked on jointly by stakeholders such as nonprofits, local governments, and educational institutions. If individual states or legislators or legislatures choose not to engage, then other regional grassroots or faith-based constituents could move forward with cross-border and extra-statutory connections and coordination. In short, if government cannot or will not address issues in rural subsections, people in those subsections ought to join together for mutual benefit and affinity.

If states have not comprehensively and thoroughly addressed the issues I outlined in *Chapter One*, regional grassroots ought to commit to working in subsections to make their work more effective. The federal government ought to continue its support of cross-border and extra-statutory work in the realm of rural economic development regarding the need to connect to adjacent subsections with more financial and earning experience in these emerging economic sectors.

In addition to forming regional policy and coordination on issues of health, declining population and smart shrinkage, and explicit discussion of regional vision, economic sectors, and the kinds of research and development to be supported in the region, regions must connect to other similar rural regions and work together. By way of example, it is time for central Appalachia and other rural spaces to stretch beyond nineteenth and twentieth century work-affiliated identity out to other economic sectors, linking to and building on an agricultural and pastoral past and embracing emerging sectors and long-standing cultural strengths for a creative, neighborly, and hospitable future.

What follows is a snapshot potential strategy with a meta-analysis of components of a national rural strategy that could involve research and development, scientific and technical expertise, education, economic policy, and democratic participation. A remaining set of

additional strategic considerations kin to a more democratic, healthier, and more economically robust rural United States can be found in **APPENDIX F**. I am not drafting a full national rural strategy, but a loose template with a focus in particular on the elements that enabled the Pocahontas Coalfield—science, technology, research, finance, and government financial support. I do not rehash the issues explicated in *Chapter One*, and I do not review statistics, positive or negative, reflecting quality of life and robustness of democracy in the rural US—though these would be obvious parts of an actual national rural strategy.

National Rural Strategy

In the spirit of the United States National Security Strategy, the following National Rural Strategy addresses a range of issues explicitly affecting sections of the United States with fewer than 50,000 inhabitants.³⁰⁵ Rather than approach issues in these sections through the Farm Bill, as is largely currently done with respect to the federal government’s approach to rural spaces, this National Rural Strategy stands on its own as a call for moving beyond examining the rural in the United States first through the needs of the agricultural sector. For sake of brevity I also do not outline the kinds of rural places nor redefine rural industrial.

³⁰⁵ The US Census sets the line for rural versus urban at 50,000 inhabitants. 2010 Census Urban Area FAQs,” n.d. <https://www.census.gov/geo/reference/ua/uafaq.html>; “National Security Strategy 2010.” Administration: Barack Obama. Executive Branch, n.d.

Coordinate federal and intra-state R & D for additional economic sectors beyond single sectors and support work and jobs that cannot be automated away.³⁰⁶

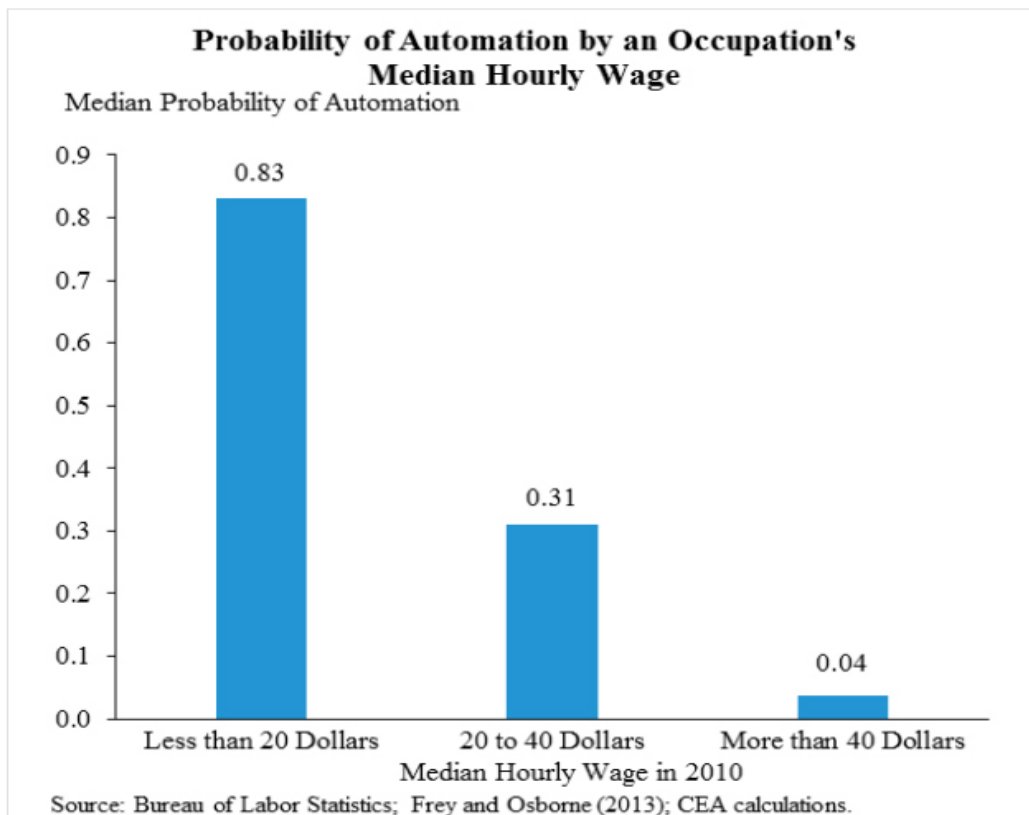


Figure 7. Graph from “Artificial Intelligence, Automation, and the Economy.” Washington, D.C.: Executive Office of the President, December 2016.

<https://www.whitehouse.gov/sites/whitehouse.gov/files/images/EMBARGOED%20AI%20Economy%20Report.pdf>.³⁰⁷

³⁰⁶ Bureau of Labor Statistics, Frey and Osborne, 2013, CEA Calculations; “Artificial Intelligence, Automation, and the Economy.” Washington, D.C.: Executive Office of the President, December 2016. <https://www.whitehouse.gov/sites/whitehouse.gov/files/images/EMBARGOED%20AI%20Economy%20Report.pdf>.

³⁰⁷ Pursuant to federal law, government-produced materials appearing on this site are not copyright protected. The United States Government may receive and hold copyrights transferred to it by assignment, bequest, or otherwise.



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Large-scale industries seek efficiency and to eliminate labor by humans. Humans unionize, get sick, demand health insurance, need retirement payments, take time off, need vacation, can produce errors, etc. This directive remains as true in clean energy as in coal or other energy sectors, or in large manufacturing, etc. Clean energy is important for many urgent environmental reasons, but also does not offer a long-term jobs solution. Emerging economic sectors in rural areas must focus on high-touch sectors in which human labor and management still remain relevant into the future.³⁰⁸

Moreover, places that have not yet been developed by multiple industries or by a single sector, or even a single operation, ought to be required to create a sunset fund to set money aside for relocation and retraining of workers and their families once they are no longer needed either due to technological advancement or the end of operations at that site. This is separate from the severance taxes on industries such as coal, which states can choose to have allocated or dispersed beyond the immediately affected workers or location. Countries such as Sweden and Japan have developed sunset fund requirements for factories or operations locating into previously non-industrial rural areas, with the understanding that no operation lasts forever, and that the burden of retraining and relocating ought not be externalized onto the state.³⁰⁹ Furthermore, the workers who relocated to work in that factory ought not be responsible for bearing the burden of relocating after the factory or industrial site closes or downsizes (as is expected that it will).

license to the rest of the world for their submissions to [Whitehouse.gov](https://www.whitehouse.gov) under the [Creative Commons Attribution 3.0 License](https://creativecommons.org/licenses/by/3.0/).

³⁰⁸ A major point made by popular writers such as Daniel Pink, however, these same concerns can be extrapolated from documents such as the very recent “Artificial Intelligence, Automation, and the Economy.” Washington, D.C.: Executive Office of the President, December 2016. <https://www.whitehouse.gov/sites/whitehouse.gov/files/images/EMBARGOED%20AI%20Economy%20Report.pdf>.

³⁰⁹ Pallagst, Karina, ed. “The Future of Shrinking Cities: Problems, Patterns and Strategies of Urban Transformation in a Global Context.” Berkeley Institute for Urban and Regional Development: Center for Global Metropolitan Studies and the Shrinking Cities International Research Network, 2009.

Likewise, all of the accompanying businesses, schools, and institutional and real infrastructure built to serve the needs of people associated either directly or through locale with that industry must also have plans in place for the eventual downsizing due to technological or industry shift.³¹⁰

Understand the resource wealth and follow their markets. Develop economic policies and procedures irrespective of supposed technological “advance.”

Despite energy company bankruptcies and asset shifts, as the central Appalachian and adjacent region remains resource wealthy, companies are unlikely to shed their land assets in the absence of significant changes to tax policy.³¹¹ Thus, unlike urban depopulating areas with land opening up for complete repurposing in and by a different economic sector (think brownfield into a museum or housing development into an urban farm), lands currently owned by resource companies mainly will remain owned by resource companies (think coal to timber, coal to natural gas, coal to water, maybe coal to rare earth elements—still resource driven). Natural gas development remains large, with the potential to access the Marcellus Shale through coal-mined land real and high.³¹²

Anticipation of future use due to the development of technologies that provide access to or demand for mineral or other resource wealth remains a standard expectation in the energy sector. For example, new technologies give access to below-the-surface minerals previously

³¹⁰ Martinez-Fernandez, C., and Chung-Tong Wu. “Shrinking Cities: A Global Overview and Concerns about Australian Mining Cities.” In *The Future of Shrinking Cities: Problems, Patterns and Strategies of Urban Transformation in a Global Context*, 29–36. Berkeley, CA: Center for Global Metropolitan Studies, Institute of Urban and Regional Development and the Shrinking Cities International Research Network, 2007.

³¹¹ Leadbetter, David, 2007.

³¹² For example, in November 2017, China proposed investment in West Virginia-based natural gas. Reuters Staff. “China Energy Investment Signs MOU for \$83.7 Billion in West Virginia Projects,” November 9, 2017. <http://www.reuters.com/article/us-trump-asia-energy-west-virginia/china-energy-investment-signs-mou-for-83-7-billion-in-west-virginia-projects-idUSKBN1D90S9?il=0>.

inaccessible; new processes allow for cost effective refining of materials once either too cheap to harvest (no profit incentive) or too costly (can be gotten elsewhere). This technological determinist stance anticipates technology will always evolve to reactivate “fallow” resources.³¹³

Likewise, the US’ cultural anticipation of technology always producing positive economic impact and new economic sectors arising fully to replace antiquated or shifting sectors does not bear out in workforce, environmental, or population statistics, especially in rural industrial space such as those in central Appalachia.

Unlike in urban areas, in the rural industrial coal producing regions proper, the emerging economic sectors (agricultural, liquor, tourist, and creative community sectors, etc.) must contend with limited access to land and buildings for their sectors. In the case of agricultural cooperative McDowell County Farms in coal-laden McDowell County, West Virginia, its principals lease land from a coal-based land company in order to Appalachian “farm” on formerly mined land and to expand their available acreage for maple syrup harvesting and livestock production. This agreement between an organic farm and a coal-based land holding company results in an atypical match, but also serves as a model and a potential pilot to solve land-access issues for non-energy entrepreneurship in that Appalachian sub region.³¹⁴

Worth stating again is that larger scale industries focus on technological advancements that eliminate workers.³¹⁵ For the remaining people living in the region, work promoted and supported ought to be that that remains tenable into the future and which could steward future generations.

³¹³ Smith, Merrit Roe & Leo Marx, *Does Technology Drive History? The Dilemma of Technological Determinism*. The MIT Press, 1994.

³¹⁴ Respondent, 2016.

³¹⁵ Artificial Intelligence, Automation, and the Economy, 2016.

Support transparency and technology for democracy to increase democratic participation

Corruption and democratic power imbalance in practice remains an issue where local residents mainly work in one industry. As outlined or evidenced in other sections of this work, totalitarian work/living space and/or low social trust erode the capacity for democracy to function in a rural industrial space where one economic sector or employer dominates. Means and modes of transparency become especially important in these scenarios.

The US devotes much attention to increasing democracy in other countries and ensuring transparency. In its own rural “backyard” the US must implement programs of leadership, technology, and investigative citizen journalism to add more safeguards to American democracy in its rural contexts.

Some technology that supports these aspects of democracy has also made a radical shift in the last fifteen years, and an even more radical shift in the last two to three years. This technology—mobile phones, mobile web, and the internet (shortened here to MMI)—given a democratic regulatory environment, can be powerful in the hands of citizens, who may use it to fill in where the local fourth estate fails. MMI is a technology whose content, in a democratic regulatory environment, can be utilized by non-media or technology professionals, or by non-state-sanctioned commentators, to check and balance power. Training in this technology and access to this technology ought to be part of a rural broadband policy. Rural broadband is not a cure-all for rural poverty. Broadband is only as useful as people have access to technology to make best use of high speed internet, including its use for democratic as well as commerce and information seeking purposes.

Moreover, groups like the Central Appalachian Network and the Appalachian Funders Network provide essential grassroots cross-border leadership in the region and their Appalachian

Transition Fellowship provides one entry point into grassroots leadership by stewarding capable beginning career candidates into social change work.³¹⁶ Yet, more must be done. However, an extra-statutory (cross-border) approach and coordination of civic leadership or participation is essential.

Although efforts at democratization in central Appalachia were historically corrupted in the post UMWA formation era, this does not mean they ought not be tried again.³¹⁷ Social media, tracking online corruption through on-the-scene video documentation, etc. can contribute to a scenario for corruption mapping or reportage.

In order to address this rural region's many issues, more people must be trained in how to assess and to address economic, political, educational, and social change. The kinds of programs the US supports abroad through USAID to promote democratic reform, train local citizens in democracy, and to promote youth leadership ought to be funded in rural America.³¹⁸

Break and conceptualize regions beyond sector flows and regional economic sector flows beyond single sectors and urban commutersheds.

Despite black-boxing and legitimizing state borders in the United States context, in fact, in terms of flow of people and flow of commerce, states rarely best define either. For example, a region can be broken into primary historical economic interests, and, these specific economic interests have often superseded local and state governmental power as regional power structures (think the power of a king, then reflect on the analogy and power of King Coal or Big Ag or the Tennessee Valley Authority).

³¹⁶ "Appalachian Transition Fellowship," n.d. <http://www.appfellows.org/>.

³¹⁷ Scott, Rebecca, 2010; Bell, Shannon, 2009.

³¹⁸ See **APPENDIX E**.

Another view of examining how regions relate include examining the regions through media market saturation. For example the nonprofit-business sector collaboration in the Pittsburgh metro region, the Power of 32, defines its service and economic area by media market.³¹⁹ The gas industry in the United States by shale plays. The coal industry by coterminous coalfields.³²⁰ In a regional subsection, coalfields or shale plays or media markets often define cultural, interpersonal, and business relationships. To this, add in proximity to major metropolitan areas, and, according to economic and urban geography literature, most areas within an hour of commute from a city (within a commutershed) usually find much of their economy tied to production or in relationship with their closest urban center.³²¹ Political allegiances and alliances often follow these geographical-industrial or business sector orientations.

Political influence has often followed the money and how industries cross state borders. A region can be broken down along economic sectors or main industries nearly as much as it can be along state lines.

Large scale extra-statutory (across state border) coordination and support for emerging economic sectors ought to be provided, including significant investment in federally sponsored R & D. The federal government and non-profit sector ought to provide concrete meetings, support, and policies for promoting cross-border and extra-statutory approaches in economic and community development, with incentives to link to more prosperous adjacent regions.³²²

³¹⁹ Respondent, 2016.

³²⁰ Field Observation, 2016.

³²¹ Pallagst, Karina, 2009.

³²² The US currently provides much R & D for private sector development, particularly in the energy sector through the Department of Energy, Department of Defense, National Science Foundation.

Brownfields research and rehabilitation for other economic sectors.

The research for brownfield rehabilitation for agricultural and recreational use in rural industrial areas is not coordinated, and, according to rehabilitation scientists, what is known often is not sufficient to guarantee public safety, for example, of consumable products.³²³ More resource support for brownfields research and rehabilitation to support the emerging sustainable economic sectors such as agriculture, tourism, creative economic sectors, in which jobs cannot be automated away, must be provided.

For example, it is not easy to find the correct combination of expertise with respect to anticipating issues of agriculture for human consumption on former surface mining sites, and, especially, on sites near current or past deep mines in the central Appalachian coalfields. Often each site is different and requires different protocol. Thus, what works at one site and is true of one site, may not be true or work at another site. Science and ongoing assessment on each proposed site is key to allowing local citizens to understand the economic limitations and potential in their brownfield sites. Thus, scientists ought to offer this to these sites rather than wait on people from sites to seek them out.

Support more scholarship of all kinds on the rural—medical, public health, epidemiology—and comparative scholarship, etc.

As demonstrated in earlier sections of this dissertation, major scholarship focused on rural areas of the United States includes rural studies, rural sociology, geology, various regional studies, agricultural, forestry, reclamation and scientific and engineering energy sector scholarship. In recent years scholarship on deindustrialization has focused largely on urban

³²³ Barton, Christopher, 2016.

areas.³²⁴ Urban studies and urban planning as fields include scholarship on many of the issues also facing rural industrial spaces—depopulation, poverty, brownfields, economic revival and renewal, crime, etc. However, rural studies as a robust field in the United States faded from universities largely by the 1960s.³²⁵ Moreover, most studies on addressing addiction, brownfield, or work-related exposures focus on urban dwellers, exceptions being very recent work focused on rural areas in public health, epidemiology, etc.³²⁶ Robust and committed cross and interdisciplinary work is needed again on the rural US, which brings together industry, economic, health, and other scholarship into dialogue toward developing programs of research and development for rural planning and stewardship.

Fund innovation and entrepreneurship in the rural and community-based technology initiatives

Rural Americans take much personal risk with respect to physically demanding labor and personal consumption habits.³²⁷ However, the boom and bust single sector economies promote dependence upon a single sector for employment.³²⁸ Often appropriate emerging economic sector risk is not well-supported by state, federal, or private foundation or bank funding or by educational institutions.

Rural Americans may know best what kinds of technological inventions suit their local environments and economies. The federal government ought to support the creation of Community-Based Innovation Hubs and Patent and Invention Stations. These spaces would bring together diverse and divergent elements, such as:

³²⁴ High, Steven. "Capital and Community Reconsidered: The Politics and Meaning of Deindustrialization." *Labour/Le Travail* 55 (2005): 187–96.

³²⁵ Field Observation.

³²⁶ In 2014, for example, an academic database search brought me to one academic paper from the 1980s on heroin in Appalachia.

³²⁷ Thomas, Jerry Bruce, 2010; Scott, Rebecca, 2010.

³²⁸ Freudenburg, William, 1991.

- **People with heritage knowledge and skills** (*think: know how to do the basics of community using the basics*)
- **People with modern (last 100 years) knowledge and skills** (*think: mechanics, fabrication, welding, electrical work, ICT*)
- **People with emerging knowledge and skills** (*think: upcoming and on the horizon like robotics*)

It is essential to create and to support a physical place for divergent people to converge to create inventions and innovation. One key factor in innovation is diverse elements coming together, and rural spaces (heritage and modern and high tech skills) support a different kind of diversity from urban spaces (ethnic, multi-industry).³²⁹

Likewise, support could be provided to business and nonprofits to search for innovation and entrepreneurship in the region to support. Moreover, rather than waiting to be approached for funding, foundations and federal and state groups ought to seek out projects and businesses thriving and worthy of support despite the odds. The federal government, state governments, and private foundations ought to fund asset-based qualitative interviews, like those accomplished by Professor Ellen Darden at Concord University with their master in rural social work students, in order to uncover not-your-usual suspect problems needing addressing and not-your-usual suspect solutions being provided in the community.³³⁰

Governments, foundations, and universities must provide technical assistance for social entrepreneurs not frequenting the same social circles and loops as urban focused private foundations or the federal government or universities—some of the best ideas and projects in places hardest hit and most in need are by people not necessarily already in those circles.³³¹

³²⁹ Muro, Mark, and Bruce Katz. "The New 'Cluster' Moment: How Regional Innovation Clusters Can Foster the Next Economy." Metropolitan Policy Program. The Brookings Institution, September 2010.

³³⁰ "Master of Social Work," n.d. <http://www.concord.edu/sws/node/3>.

³³¹ Field Observation, 2016.

Support R & D qualitative asset-based assessments to develop potential for new entrepreneurial sectors.

The United States must devote university, R & D, and private research to create human-centered economies and human livelihoods in rural America for work that cannot be automated away.

Economic markets are created by humans and not extra-human forces.³³² With a loss of land knowledge through work not intimately connected to nature, literally rural Americans do not know the value of what is underneath their feet. Exploring entrepreneurship and resource-based work not tied to historic or emerging large-scale single sector industries in a rural site allows for the opportunity for work to develop that will not necessarily be automated away. Moreover, with the brain drain and export of youth out of rural areas, local asset-based assessments and support for smaller scale entrepreneurship offer the opportunity to potentially allow for more residents to stay who might otherwise be forced, for economic reasons, to leave.³³³

Programs and R & D must focus on return on small capital investments and modes of business mentorship and cooperation that do not require willing and hardworking participants to have college degrees.

Qualitative research and along with a regional publication outlet focused on the region can help the region discover its latent resources and its off-the-beaten path movers and shakers. We must support in-the-field discovery of our human resources and promote their connections across the rural regions.³³⁴

³³² Callon, Michel. *The Law of the Markets*. Hoboken, NJ: Wiley-Blackwell, 1998.

³³³ Carr, Patrick, and Maria Kefalas. *Hollowing Out the Middle: The Rural Brain Drain and What It Means for America*. Boston: Beacon Press, 2010.

³³⁴ Ahlstrom, D. Innovation and Growth: How Business Contributes to Society. *Academy of Management Perspectives*, 24(3), 2010, 11-24; Tidd, J., Bessant, J., & Pavitt, K. *Managing Innovation*, 3rd Edition, John Wiley & sons Ltd, UK, 2005; Fueller F., Muehlbacher H., Matzler K., Jawecki G., "Consumer

Lose rotten rhetoric in order to bridge land and identity.

Toxic in central Appalachia sits the us versus them rhetoric of both the energy sector (against the EPA, the federal government, and environmentalists) and the environmental justice sector against the energy industry and its participants (surface mining, climate change, pipeline proponents). The region had already been fitted for this rhetoric prior to the advent of Donald Trump's adversarial political rhetoric of us versus them.³³⁵

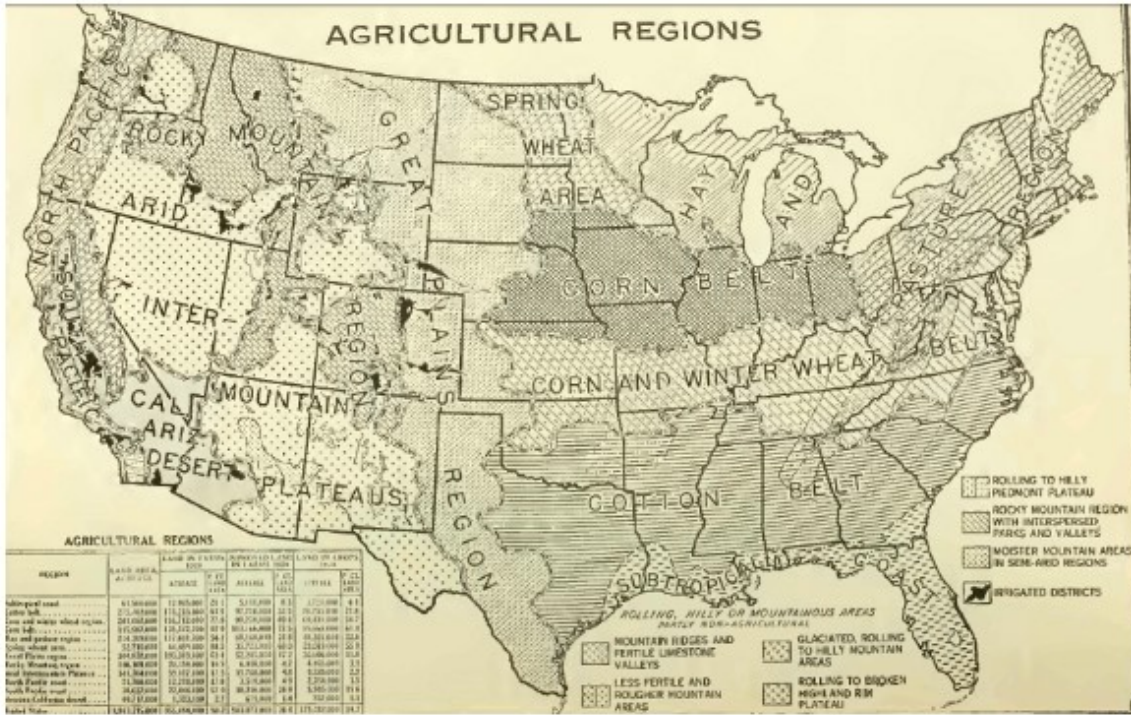
Moreover, the allegiances of local people in coal country have shifted post-1980s from a union orientation to a company orientation, with the adversarial relationship with coal management replaced by an adversarial orientation to regulation.³³⁶ The technological changes to the industry to reduce human worker need is absconded in this post-Reagan rhetoric.

Empowerment through Internet Based Co-creation." *Journal of Management Information Systems*. Winter 2009–10, Vol. 26, No. 3, pp. 71–102; Von Hippel, Eric. "Horizontal Innovation Networks-By and For Users" *Industrial & Corporate Change*, Apr2007, Vol. 16 Issue 2, 293-315.

³³⁵ Grunwald, Michael. "Trump's Love Affair with Coal." *Politico*, October 15, 2017.

<https://www.politico.com/magazine/story/2017/10/15/trumps-love-affair-with-coal-215710>.

³³⁶ Scott, Rebecca, 2010.



(1920s)

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Figure 8. Agriculture and the region’s livestock production history offer a path to land connection that may resonate with remaining resident or attract in new ones.

It is possible to be empathetic to the environmental and health results to people and the land due to coal production AND be empathetic to the miners and others who lose high wage work.

As the population dwindles in much of rural America with respect to the US’ growing urban population³³⁸, the United States must bridge urban and rural toward creating work and

³³⁷ “A ‘Corn Belt’ Was Well-Defined by 1850 Source: Baker, O. E., A Graphic Summary of American Agriculture, Based Largely on the Census of 1920, Publication 878, Separate from Yearbook of the Department of Agriculture, 1921, P. 10, Government Printing Office, 1922,” n.d. <http://www.virginiaplaces.org/agriculture/corn.html>.

³³⁸ Surprisingly, the total US rural population has actually held steady over the last sixty years. However, it now represents a much smaller piece of the total: <https://data.worldbank.org/indicator/SP.RUR.TOTL>. Note 54,208,527 in 1960 and 58,847,983 in 2016.

markets that cannot be automated away or offshored, and finding common points of identity and ethics we can abide by together.

Energy Production in the Rural

Coal, oil, and natural gas remain very abundant US resources.³³⁹ It is unlikely they will be completely put out of use given their abundance in the US and in the world, especially in developing economies. For example, energy companies will continue to invest in technology to anticipate coal coming online again, but, technology will replace human workers when it can be used.³⁴⁰

Natural gas is debated as to whether it is clean energy, as its carbon emissions as an industry rank just below that of coal.³⁴¹ Also, in the United States, coal is both a domestic and an export product, often moved through largely poorer communities by rail.³⁴² Again, as large commodity industries, energy industries will continue to focus on technological solutions to access, production, transportation, etc. in lieu of hiring workers.³⁴³ Thus, while large corporations control millions of acres of land for energy production, they are not going to hire millions of workers. However, given the abundance of coal and natural gas resources, companies are unlikely to let go of land they already hold or hold mineral rights to. Thus, rural planning and

³³⁹ Tewalt, Susan, Jason Willett, and Robert Finkelman. "The World Coal Quality Inventory: A Status Report." *International Journal of Coal Geology*. 63, no. 1/2 (July 2005): p190–94.

³⁴⁰ World Nuclear Association. "'Clean Coal' Technologies, Carbon Capture & Sequestration," September 2017. <http://www.world-nuclear.org/information-library/energy-and-the-environment/clean-coal-technologies.aspx>.

³⁴¹ Jaramillo, Paulina, Michael Griffin, and Scott Matthews. "Comparative Life-Cycle Air Emissions of Coal, Domestic Natural Gas, LNG, and SNG for Electricity Generation." *Environmental Science & Technology* 41, no. 17 (2007): 6290–6296.

³⁴² Union of Concerned Scientists. "The Natural Gas Gamble: A Risky Bet on America's Clean Energy Future," March 2015. <http://www.ucsusa.org/clean-energy/coal-and-other-fossil-fuels/natural-gas-gamble-risky-bet-on-clean-energy-future#.WeMjKxmGPrc>.

³⁴³ Lowe, Travis, 2017; Respondent 2016; Field Observation; Felton, Ed, and Terah Lyons. "The Administration's Report on the Future of Artificial Intelligence," October 12, 2016. <https://obamawhitehouse.archives.gov/blog/2016/10/12/administrations-report-future-artificial-intelligence>.

research must assess and track these companies, landholding companies, and industries. Local planners must keep abreast of the local energy mix, its players, and what role they anticipate continuing to play in the local rural industrial space.

Universities and R & D

The fossil fuel industry places tremendous pressure on research universities, benefactors of their largesse (See **APPENDIX A** for examples), and their economic development departments to develop technology that will allow the sustainable and clean use of fossil fuels and the commodification of timber, water, and other resources both directly for use in large scale industry and by the government (institutions and military) and indirectly through externalized industrial costs (processes developed to allow industry to have their environmental impact or training or retraining costs paid by taxpayers rather than directly by industry).³⁴⁴ Both corporate and federal contracts and grants (such as through the Department of Energy and the Department of Defense—the latter being the US’ greatest consumer of energy) offer tremendous support and incentive for this devotion of research foci and economic development department resources.³⁴⁵

Cheap energy provides the backbone for our current economic model and enables nearly all of our other current economic sectors.³⁴⁶ That energy remain cheap and plentiful is not only an industrial and economic imperative, but also an internal and external security one.³⁴⁷ For example, the interest in central Appalachia’s abundant energy resources will always include national and international interests, as just the following map of West Virginia’s international

³⁴⁴ Office of Fossil Energy. “University Coal Research,” October 15, 2017. <https://energy.gov/fe/science-innovation/clean-coal-research/crosscutting-research/university-coal-research>.

³⁴⁵ Schwartz, Moshe, Katherine Blakeley, and Ronald O’Rourke. “Department of Defense Energy Initiatives: Background and Issues for Congress.” Congressional Research Service, June 26, 2012.

³⁴⁶ Institute for Energy Research. “North American Energy Inventory,” December 2011. <https://www.instituteforenergyresearch.org/wp-content/uploads/2013/01/Energy-Inventory.pdf>.

³⁴⁷ Schwartz, Moshe, Katherine Blakeley, and Ronald O’Rourke. “Department of Defense Energy Initiatives: Background and Issues for Congress.” Congressional Research Service, June 26, 2012.

investment alone alludes. See:

http://www.wvcommerce.org/App_Media/assets/doc/businessandworkforce/Intl/Investment_Fla_g_Map_2014.pdf

Support Work that Cannot be Automated Away³⁴⁸

To insist upon the refocusing of regional and rural research and economic development resources toward supporting economic sectoral development in which workers will not be displaced by technology is not to demand some Luddite throwback to another era. Instead, it is but a shift in the goals of efficiency and technical direction and service. For example, nearly every research university in central Appalachia is a public university, and, with significant taxpayer support and tasked with developing work and workers for that region's economic future, thus also ethically bound to serve the region's people. This means work for generations, rather than work that will inevitably, sooner rather than later, be displaced.

This same region's university-based research ought to support economic sectors and develop work as well as financial, political, and community processes that will not displace workers with technology, and, which will address land, water, and community stewardship imperatives. This kind and quality of support is also possible to incentivize through federal grants and corporate contracts.³⁴⁹

Conclusion

A strategy or policy stands not as an end-all or be-all with respect to policy or action in the polity. As a reviewing professor reminded me some years ago—the People's Republic of

³⁴⁸Felton, Ed, and Terah Lyons, 2016; Lowe, Travis, 2017.

³⁴⁹ Rather than serving the need for work that cannot be automated away, for example, Virginia Tech recently sought and received funding to continue work on automation of work: Demmitt, Jacob, "Virginia Tech Planning 300-Acre 'Automation Park' to Test Drones, Self-Driving Cars." *The Roanoke Times*. August 29, 2016. http://www.roanoke.com/business/news/virginia-tech-planning—acre-automation-park-to-test-drones/article_56e245ff-af92-54a4-91ac-da839cc327f2.html.

China has liberal freedom of expression laws on the books. Any policy proves only as good as the institutions tasked or taking responsibility for enacting it. The lens for this National Rural Strategy included a focus on research and development for support for emerging or increasing sustainable economic sectors in the rural United States, with nods to, education, entrepreneurship, rural innovation, asset-based assessments, and energy stewardship.

Scientists, engineers, financiers, academics, and government officials all play significant roles toward enabling a robust rural strategy that supports work that cannot be automated away and disburses more democratic technology in major areas of production usually out of sight of metropole consumers. Their policies and strategies with respect to scientific and scholarly research agendas can inhibit or promote liberty and equity. As demonstrated in *Chapter Two*, scientific and technical practice as knowledge seeking directly affects the polity, in the lived environment and experience of citizen-residents. In this current chapter, I propose means by which research can actively support more liberty and equity. I define concrete practices that ought to lead to more equitable distribution of the benefits of science and knowledge-making by outlining how universities can engage with and on behalf of the citizens they ought to serve. I link specific practices to the major issues I have argued in the subsequent chapters: automation, democracy deficit in single sector economic work-civic totalitarianism, the flattening of metis by scientific and technical practice and machines, and brownfield rehabilitation.

CONCLUSION

Model and Next Steps: Practices in the Polity

In this dissertation I have engaged with the development of a large technical intervention (as part of a large technical system), and with the construction of a rural industrial space and its subsequent flattening of metis, democracy, and habitable environment. The large technical systems or other large processes that feed the metropolises largely reside in the rural industrial space which, rather than being considered by the larger public or popular culture on a continuum of modernity and industry with metropolises, becomes construed culturally as the metropole's antithesis—a space both off-shored and ignored. Likewise, I have traced the role of scientists, engineers, and their allies as a justification for intervening - in the rural space to recreate it as an industrial space. I have proposed ethical concerns for science and technology, and scientists and technologists, intervening in the rural as well for the corpora-science, government, and/or academic institutions functioning as their sponsors.

The rural industrial space remains as subjected to categorization, classification, and scientific and technical intervention as the metropole space. As in metropolises, science and technology experts intervene in the rural industrial space. Moreover, the whitewashing of the rural industrial and its large technical systems both obscures the ethnic and other human diversity of these spaces, erasing the rural space inhabitants altogether, unless a media subject as an exception or as an example of something in deficit through a narrative of poverty or environmental deficit or cultural or mental depravity. In the rural industrial space one is subjected to personal and global risk—the latter in the form of sullied environment and the automation away of jobs, the former in having one's material and civic experience isolated and/or ignored or rendered as exceptional, rather than the rational result of industrial interventions in the rural. This isolation of person and of theoretical and cultural analysis

undermines the capacity for persons in the rural industrial space to connect to other people in similar spaces and their plights. This disconnect keeps citizens in the rural industrial space from more effectively organizing and responding to the major issues resulting from single sector domination. Furthermore, one’s individual liberty also becomes delimited by local single sector dominance; one’s democratic potential becomes sold away to corporate, R & D, and metropole imperatives. Local government and the federal government fail the worker and environment in this space, either colluding in corruption or failing in providing adequate civic society support and failing in ensuring policies first which support greater liberty.

To unveil the rural industrial in this dissertation I worked through a principal case study, the Pocahontas Coalfield, in order to elucidate a model for reflection on the rural industrial space. As outlined in the following table, I move from assessing deficits and assets remaining in the rural industrial space, to theorizing the role and results of the rural industrial space, to proposing actionable research and other agendas toward mediation and mitigation of the democratic and environmental deficits in that space.

Revealing the Rural Industrial Space or “Big Rural”

<i>Revealing the Rural Industrial Space</i>
Find and analyze the inciting intervention
Examine the material interventions of the rural industrial site—not as an abstraction
Examine levels of liberty and technological intervention
Assess science and technology intervention realities with cultural or pop culture myths of this rural space
Prescribe modes for change to also increase democracy and move away from losing work to

automation, invisibility, necropower, and single sector totalitarianism

Describe modifications to the model

Describe and link change makers already in motion in this site or adjacent site

The irony regarding the potential for re-envisioning and activating a different economy in the Pocahontas Coalfield, or likely, other rurals subjected to single sector economies, especially environmentally ravaging ones, remains that opportunities for new directions arise once large corporations and/or government entities have used up the resources once profitable, and thus thereby gutted the stream of local government corruption.

More than one respondent I interviewed in, and associated with, the Pocahontas Coalfield spoke about working from the ashes of what has been left. With respect also to taking on new economic directions, when asked what was most needed in their town, one respondent answered with what is supposedly an old Chamber of Commerce joke:

The thing we need most to make change happen is about six good funerals.

Rather than a memoriam, let this dissertation stand as an examination of how to consider more democratic intervention in the highly technical and highly manipulated rural industrial space, how to open the black box on big rural and its construction, and how to intervene in the rural with scientific, technical, and scholarly research and practices that support rather than reduce liberty and equity.

Next Steps

In the process of assembling this dissertation, I have engaged for hundreds of hours as a practitioner-researcher and social change agent in the region at hand. I have been fortunate to work with any number of groups in the Pocahontas and adjacent coal areas who have “had the funeral” and are engaged in taking their economic and community visions in directions that could or do provide employment beyond coal; this is not to say that every town council member or community member is on board, but these groups hold steady in their path anyway, building and utilizing social capital as much as if not more than financial capital.³⁵⁰ Importantly, each of these entities, without having an explicit mission of increasing liberty for people who live in their communities, still engages with concepts of more choice, more work, more ways to make a living, more ways to connect to each other, and with potential economic drivers that do not depend on the kind of work that can be automated away.

Scalability stands at issue in each of their respective sectors, though here I want to make two points. Thought tempting as it may be to insist that these small rural communities should not have to rely upon interstate and regional or even global commerce for their chosen economic direction/s, the reality on the ground in every case in the region of examination in this dissertation is that non-local tourists, product export, and sales relations in metropolises largely determine local sector sustainability. Though food security is also at issue in this region, and, being able to produce substantial amounts of one’s own food in many cases may be possible as a family or in community, complete self-sufficiency of any of these communities would be at most a kind of macho cultural fantasy. After all, despite the country & western anthem of a “Country Boy Can Survive,” any number of material and technical items mentioned even in that song

³⁵⁰ Bell, Shannon.

require trade with the non “backwoods.”³⁵¹ My point being is, largely, self-sufficiency of a location, a family, or country has long been more fantasy than reality.³⁵²

Furthermore, I assume that the actors in the groups with which I engage have agency and the sophistication to understand that even their location is connected to a global, or at least greater regional, marketplace. To this point, if any of the groups with which I deeply engage receive the kind of financial backing, R & D support, academic research and energy, state and federal government push, educational commitment, and tax incentives offered the remaining and historic coal industry, then they too may be able to scale to meet the demands of the remaining and decreasing population for meaning, connection, community stewardship, and long term multi-generational work. My dissertation stands as a call to action on these points.

Reviewing actual on-the-ground groups matters because though a single sector has come to dominate and to construct this rural industrial space, the single sector’s narrative of technology, work, social interaction, social capital, science and research, does not remain the only work cum identity that has existed there or that can exist. While unlikely that a rural hinterland location will have many different and diverse economic sectors happening at once, it stands likely to have a range of businesses all dependent on local natural resources, but not the same in exact kind. For example, Williamson, West Virginia, known as the heart of the billion dollar coalfields, also now has significant ATV tourism for the Hatfield and McCoy Trail (depends on mountain trails), sponsors extreme sports events (mountain trails again), promotes local health and wellness activities, and has jumpstarted local markets and business related to

³⁵¹Mostly technology: shotgun, rifle, 4-wheel drive, coal mines, 45, and one consumer good—Beech Nut, the chewing tobacco...and of course, Hank Williams Jr. mentions the “West Virginia coal mines,” a highly technical rural industrial space.

³⁵² Blethen, H. Tyler. “Pioneer Settlement,” in Richard A. Straw and H. Tyler Blethen, eds., *High Mountains Rising: Appalachia in Place and Time*. Urbana: Univ. of Illinois Press, 2004, 17-29, 2004.

agriculture (local land, some surface mined land). All of these in some way are local resource dependent, but not all one sector. Are four sectors (coal mining, tourism, agriculture, creative industries) diverse enough? As I discussed in my section of diversification, the number of sectors matters less than the safeguards and stewardship of liberty and equity. Thus, rather a well-stewarded producers cooperative engaging in restorative land practices and distributive compensation than five sectors paying people sub-par wages and extracting only from the land and community.

Nevertheless, as I outlined in *Chapter One*, the totalitarian workplace cum single sector community can weaken democratic practice; in Norway, strong democratic practice prior to their energy economy boom along with their internal policies shields Norwegians from the “resource curse” (though it does not shield spaces of Norwegian investment, like central West Virginia and Pennsylvania). The means and modes of energy sector work culture established in the Pocahontas Coalfield do not reinforce democracy as practice as I abundantly demonstrated in my earlier discussion of corruption, government, corporate power, and citizen debilitation.

Furthermore, on-the-ground functioning models ought to be examined for additional areas for further economic, scientific, and technical research and collaboration. They ought to be examined in order to illustrate focuses for rural technology, scientific research, and economic advocacy.

Said at a recent meeting of business owners in Bluefield, West Virginia— *any business in this context* [its myriad of social, economic, and other issues] *is social entrepreneurship*.

My next steps from this dissertation include the following:

Promoting energy adjacent economic upgrowth³⁵³ in land-based products/sustainable agriculture, creative work, and tourism through a for-profit producers cooperative and a non

³⁵³ From dictionary.com, for those people unfamiliar with the term: “the process of growing up; development: *the upgrowth of nuclear science*. 2. something that grows or has grown in an upward direction: *Part of the pituitary gland is an upgrowth of the roof of the mouth*.”

profit I co-founded with dissertation respondents. Coordinating regional economic development in land-based production.^{354 355}

³⁵⁴ For example— the producers cooperative. We chartered this in the spring of 2017 and I am its first president. We chartered an economic development nonprofit this fall (2017) for supporting regional energy-sector adjacent coordination, education, etc. More on the producers cooperative below from our initial working documents (unpublished, 2017).

Mission

The Southeast Economic and Educational Development Hub (SEEDH, pronounced “seed”) is the regional anchor and leader for rural economic entrepreneurship building on, and building, regional abundance. A jewel of the Southeast, SEEDH houses, supports, promotes, and builds affinity among agricultural, liquor, textile, artisan, culinary, tourism, recreation, and cultural economic sectors and creates and responds to opportunities for economic inventiveness and resourcefulness. Supporting innovation as well as heritage, SEEDH creates jobs, educates and advocates toward a robust economic present and an exciting and purposeful economic future, especially for the rural Southeast.

Vision

A for-profit producers cooperative, the Southeast Economic and Education Development Hub (SEEDH) engages from a regional approach, across statutory borders, and builds on land-based products and strengths. SEEDH cultivates affinity across economic sectors, with special attention to economic sectors in which jobs are unlikely to be automated away. SEEDH coordinates among education, business incubation, sales, distribution, health promotion, and serving the underserved, with special attention to veterans and workers in employment transition. A model for rural replication and worthy of national prominence and recognition, SEEDH provides necessary economic sector infrastructure in, but not limited to:

Sustainable Agriculture and Sustainable Liquor

Heritage products

Hospitality

Aggregation & Distribution

Marketing, Public Relations, and Promotion

Tourism

Appalachian Innovation (heritage skills + 20th C. know-how for 21st C. purposes)

Appalachian Farming (woodland harvesting, maple syrup production, etc.)

Health

Textiles

Artisanal arts and products

The Arts

Culinary arts

Why multi-sector coordination and collaboration?

The Southeast is rich in natural resources, water, and land with an amenable climate. From this abundance many heritage, agricultural, textile, and artisanal products can be produced. To this, add the region’s natural beauty, tourism opportunities, and cultural (art, music, dance), liquor, culinary arts, and artisanal production. These land-inspired and land-based sectors overlap and enrich each other. Their entrepreneurial potential is limitless as is their potential for collaborative effort. SEEDH engages in the necessary coordination to assist all of these sectors in growth, development, production, marketing, and distribution.

Why Bluefield, West Virginia? (Coordinates: 37°15'44"N 81°13'7"W)

Bluefield, West Virginia has traditionally been a crossroads for the central Appalachian and southern Appalachian region. Located along Highway 460, ten minutes from Highway 77, twenty minutes from Highway 64, thirty minutes to Highway 81, with a 14 track railyard, Bluefield remains positioned as a

Writing a book for *West Virginia University Press* on the concept of the rural industrial and engaging in in-depth interviews with four clusters of social and economic change agents in the coalfield and greater coalfield region. For some samples of these social change agents, view **APPENDIX G**.

In my engagement I have uncovered a wide array of science, engineering, and other scholarly research needed in this rural industrial space, and not only addressing its health and social problems. I seek to highlight the issues of the rural industrial and to facilitate linkages across the rural. I am in discussion with Concord University for their hosting of a rural semester to steward and to engage scholarship toward better leadership in the rural. ^{356 357}

regional leader in aggregation and distribution. Moreover, with abundant commercial infrastructure to support additional business growth, Bluefield has long attracted in workers and businesspeople from both West Virginia and Virginia. With a historic Affrilachian community and longstanding cultural support of White and Black regional musical and creative expressions, Bluefield is poised culturally to be Appalachia's "Memphis in the Mountains." Furthermore, it draws upon a rich railroad and coal heritage, and, adjacent tobacco and mountain product heritages.

What is this region? (S WV, SWVA, NW NC, NE TN, SE KY)

For a 50 – 100 mile swath roughly along the 36th parallel, a person can drive from south of Norfolk, VA nearly 10 hours west before hitting a town above 50,000 people, with most of that parallel being rural or towns of less than 10,000. ***A significant portion of this very rural swath of the Southeast is situated along a five "corners" region in Appalachia where five states patchwork their most rural "corners": Virginia, West Virginia, North Carolina, Tennessee, and Kentucky.***

In the West Virginia, Virginia, and North Carolina I-77 corridor we have a strong opportunity for increased presence of local tourism, foods, and ag tourism and related value-added product and business.

Two tourist-related attractions sit now along I-77. Tamarack[#] in West Virginia kicks off the top of this very rural section whereas the Yadkin Valley Wine country in the I-77 corridor of North Carolina pierces through its lower fifth.

Large sections of this same corridor lack opportunities for tourists to stop, visit, eat, and spend. As a gateway from Canada, the Midwest and Upper Midwest, and West Virginia to North Carolina, I-77 should be a featured section of West Virginia for attracting tourist eating, drinking, and spending.

³⁵⁵ For example, maple syrup production, grass-based livestock, sustainable textiles, etc.

³⁵⁶ For example, R & D for mountain farming technology and scaling mountain farming. Surface mine rehabilitation through mobile poultry. Water and soil safety in varied topography in the Coalfield and developing protocols for farming there. R & D for transport and logistics. Engineering for botanicals harvesting. The list goes on.

³⁵⁷The Rural Semester: Policy; Political leadership; Business Leadership; Rural connections across the Southeast, the United States, and the world

In short, I am engaging directly with Hotchkiss' wager, its aftermath in this rural industrial area, and, the call for an engaged and socially responsive scholarship of space/place. In addition to on-the-ground institution building, I seek to continue scholarly work on technology, science, and research in the rural.

Cohorts focus on our region as a case study and for practicum: service month working for a regional nonprofit.

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APPENDIX A

Mining Engineering Programs in Appalachia Sample Overview

Excerpt from West Virginia University's Mining Engineering's webpage outlining key faculty research.³⁵⁸:

Faculty members have wide-ranging expertise and are active in research in a wide range of specialties within mining engineering, including mine systems, rock mechanics and ground control, mineral/coal processing, and mine health and safety. The faculty members consult with industry and governments around the world, and are committed to mentoring students who are interested in pursuing careers in mineral sciences. The Department of Mining Engineering offers students and faculty state-of-the-art laboratories for teaching and for research in a wide range of research specialties within mining engineering. These include:

Rock Mechanics and Ground Control

The mining engineering program at WVU has had a significant contribution in the development of this unique field known as Ground Control. Two faculty members, Drs. Keith Heasley and Brijes Mishra are extensively involved in the advancement of Ground Control.

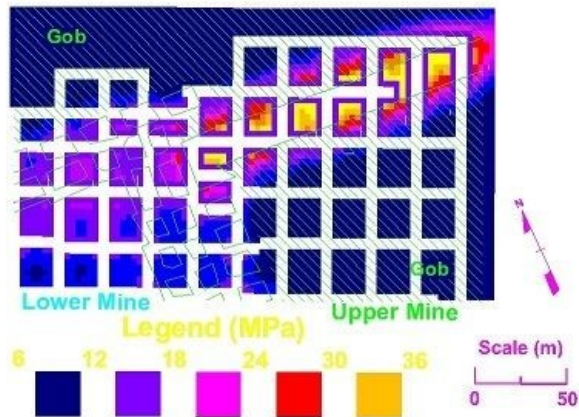
Dr. Heasley has a 5 year (2011-2016), \$1.1 M dollar research project on building capacity and enhancing the LaModel program for mine design. Specific tasks in this project include:

1. Developing a calibration technique for shallow cover mines³⁵⁹
2. Implementing a local mine stiffness calculation for determining bump potential in mine design
3. Developing an on-line [sic] user's manual and training course.
4. Implementing a faster multiple-seam calculation algorithm
5. Implementing the Analysis of Roof Bolts Systems (ARBS) program into the AutoCAD-based Stability Mapping Program.

This project is also expected to produce 2 M.S. and 5 Ph.D. graduates. Total vertical stress at the Huff Creek Mine is calculated by LaModel.

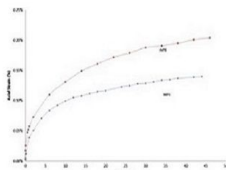
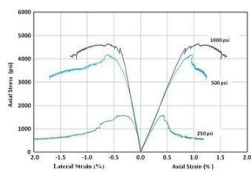
³⁵⁸ <http://mine.statler.wvu.edu/research>

³⁵⁹ A kind of underground mining.



Dr. Mishra has a 5 year (2011-2016), \$730,000 grant from National Institute of Occupational Safety and Health (NIOSH) for generating geomechanical and time-dependent properties of coal measures rocks. The project tasks include:

1. Generation of post-failure properties for coal and coal measures rock
2. Performing uniaxial and triaxial creep tests of coal measures rocks
3. Investigating the property behavior in mine wide models developed in FLAC3D and 3DEC.



Research Labs

1. Rock Mechanics Laboratory
2. High Pressure and High Temperature Triaxial Laboratory
3. Coal and Mineral Processing Laboratory
4. Mine Ventilation Laboratory

Penn State's Department of Energy and Mineral Engineering's home page:
<http://www.eme.psu.edu/>

University of Kentucky's Department of Mining Engineering's landing page, promoting earnings and career potential: <http://www.engr.uky.edu/mng/>

A summary of UK's related research facilities from that site:

The Department of Mining Engineering at the University of Kentucky has been favored with an excellent faculty, a sufficiency of space and an abundance of modern equipment. This section attempts to describe succinctly the Department's capabilities in research and development for the benefit of potential research collaborators and sponsors.

In summary, the mining faculty has access to 25,259 square feet of space and to equipment with an original purchase value in excess of \$1.6 million. They are served by an elaborate but flexible computing network containing personal computers, workstations and minicomputers.....

Although described separately, the facilities of the UK Center for Applied Energy Research (CAER), are readily available to Departmental researchers. A number of completed cooperative projects point to the open relationship between the Center and the Department. The CAER is a 60,000 square foot facility containing over \$7 million in process development and analytical equipment.

Pictured at this link, <http://www.mining.vt.edu/sponsors/sponsors.htm>, are the corporate sponsors and recruiting companies of Virginia Tech's Department of Mining and Minerals Engineering, a who's who of regional coal and gas companies.

APPENDIX B

Overview of the Many Kinds of Employment in Mining

To round out this toe in the water of technical spokes in and out of the Pocahontas Coalfield, the associated occupations of coal mining and recent real hired numbers—a buffet of jobs far beyond that of only miner. Follow this link:

https://www.bls.gov/oes/current/naics4_212100.htm

APPENDIX C

Approaches for Community Based Technology and Innovation in Economically Challenged Communities

Full List of Questions

1. How would you characterize the state of your community currently?
2. Briefly describe the recent history of the community where you reside and what factors contributed to its current state.
3. What activities aimed at community revitalization do you currently participate in? Please describe the activities and your role.
4. What are the goals of these activities? Please describe any progress or challenges toward meeting these goals.
5. Describe a proposed activity for community revitalization that you thought might be far-reaching or unusual. Assess its viability in your community for success. What brings you to this conclusion?
6. Describe the most innovative or creative community revitalization activity, project, or action you have encountered in your community. What makes it innovative or creative?
7. What is your community's most pressing struggle?
8. What are your community's strongest assets? Why?
9. How would you characterize the people that actively participate in community revitalization activities?
10. What kinds of people would you like to see involved in the community revitalization activities that are not?
11. What material, infrastructural, technical, educational, artistic, or civic resources do you think your community currently has?
12. What material, infrastructural, technical, educational, artistic, or civic resources do you think your community needs that it doesn't currently have and why?
13. If you could envision anything for this community, what would you like to see occur? What would you like to see it have?
14. What makes this community a community?
15. Whom else should I interview about community revitalization or resilience in your

community?

APPENDIX D

**Follow this link for a 50 County Comparative Data Set on Population, Employment,
Economic and Ag Sectors, and Income.**

This data set includes counties in Virginia, West Virginia, North Carolina, Tennessee, and Kentucky, beginning with Montgomery County, VA and ending at McCreary County, KY.

[https://docs.google.com/spreadsheets/d/1zL3Zs64bUvPEuVvBISKdnL5AIGKvVHRQBqE
EEBCi6Pk/edit?usp=sharing](https://docs.google.com/spreadsheets/d/1zL3Zs64bUvPEuVvBISKdnL5AIGKvVHRQBqE
EEBCi6Pk/edit?usp=sharing)

APPENDIX E

USAID Democracy and Capitalism Promotion

The United States promotes transparency, democracy, and market capitalism abroad. See:

<https://www.usaid.gov/what-we-do>

APPENDIX F

Further Recommendations for Policy and Strategy

For the body of this dissertation I confined my suggestions for policy and strategy to those principally concerned with research and science. However, the issues at hand, the deficits, call for strategy far beyond those only related to research. In order to flush out the latter, I included many and broad strategies and policies for consideration. What follows is a sample of those strategies and policy suggestions.

Offer Dignity and Hope.

One local social service provider respondent highlighted needing projects and programs that restore dignity as top priority; among so much loss, pain, and destitution, finding a way to contribute and to be valued is key.³⁶⁰

Scale Appropriately.

Projects ought to focus on appropriately scaled ways to diversify their local economies as with a focus on local assets both in material goods and in social capital.

Provide Cover.

Part of the culture is to doubt the opportunity for less familiar modes of doing things to succeed. Social entrepreneurship models also can provide provide good “cover” for local folks to try new businesses, approaches, etc.

³⁶⁰ Respondent

Support High Potential for Innovation Diffusion.

Focus on models with success that is researchable and with results that are verifiable. Thus, lasting models can be dissected and replicated for regional diffusion.³⁶¹

Tell New Stories.

Focus on narratives that shake up the coal narrative and provide meaning beyond the energy sector. Focus on practical work that sidesteps automation.

Low population

Though many other issues face rural spaces, population decline will strike the hardest blow. Simply, without population- you cannot fill jobs, start or support local businesses, fund schools, and compete for private and federal grants.³⁶² Likewise, low and declining population in much of rural America handicap business and nonprofit competitiveness and nonprofit measures of quantitative impact.

Low and declining population will remain a key struggle. The United States needs a national discussion of “right size” for the rural, or, how many people an economic sector in a place truly can support. For example, from Montgomery County, VA to McCreary County, KY across 50 counties, the sum of that population is less than that of metro Pittsburgh.

³⁶¹ Hippel, Eric von. *Democratizing Innovation*. Cambridge, Mass: MIT Press, 2005.

³⁶² <http://www.shrinksmart.eu/>

As rural population continues to decline, we must find ways to bridge sectors across state lines and to bridge interests. There are simply not enough local residents in sections of some individual states for economic sector participants to compete across state lines. Many inter- and cross-regional alliances across economic sectors must be jump started to produce economic viability for the large rural sections of our region.

Economic policy ought to shift toward smart shrinkage, low growth, and even potential degrowth. In short, most of this kind of rural America is losing population, becoming increasingly poorer, and regional and national rural policy ought to address this head on.

We must have a frank discussion in the US more generally about population decline in rural areas. We must frankly and openly plan for shrinkage of population in most rural areas.

Europe spent much time in the early 2000s rethinking its approach to its population declining areas. The European Union developed the Shrink Smart program and only one US city has implemented a similar program (the Appalachian town of Youngstown, OH). Likewise, the World Bank made a series of recommendations for the relocation or phasing out of small populated Russian monotowns.³⁶³

In Martinez and Wu, 2009, one can find a very useful framework for rethinking a city's purpose in an age of shrinkage. Their graph lays out the strategies for policy and action regarding a town's potential for enduring.

We must come to face the fact that some subsections of our region may not be jump started economically and discuss what is required to live in these places: what should these kinds of communities' "survival and thrival" tactics become?

³⁶³ World Bank, 2011.

While we grow these emerging economic sectors, how can we re-skill for homestead and rural livelihood in locations where even new emerging sectors may not take root, or root deeply enough? How do we offer skills to make rural living possible for people wanting to stay in their location, but in a generation not raised to live from the land?

We must also begin to plan now for the day the relief stops, for both sectors and for individuals.

Develop leaders/leadership

Low trust often exists among the rural population of their elected leaders. Alternatively, few thriving centers exist to train residents in civic leadership or participation or to encourage or train locals to run for state or local office.³⁶⁴

Create leadership institutes and programs for children and adults at all levels of society in the rural US.

Many texts cite long-standing issues of corruption and cronyism in rural single sector regions. Current qualitative interviews suggest this is the number one issue local citizens wish to be addressed, as, without leadership, emerging economic sectors will falter, educational institutions will fail, and the local population continues to lose hope.

Coordinate public health response

Large swaths of rural America are targeted by the Centers for Disease Control for an explosion of HIV, Hep B and Hep C, and in this respect, is similar to other low populated regions of the United States. These outbreaks also follow historically marginalized or rural single sector areas.

Currently, little federal coordination of the response to rural HIV, Hep B or Hep C exists, and, likewise, little extra-statutory coordination of response to these diseases.

³⁶⁴ Bell, Shannon; Ledet, Richard; Respondents.

As the issue of poor health looms so large in much of the rural US, with a long list of chronic diseases ranking high, and, the coming anticipation of an explosion of HIV, Hep B, and Hep C infections, the coordination of public health response must be key.

A federal task force ought to be created, with federal support, and replication potential for other rural regions and federally-coordinated linkages with other rural regions to:

- Address rural HIV, Hep B and Hep C to prevent even more people in the rural United States from dying of these diseases.
- Address these crises using place-based knowledges and through on-the-ground rural health and prevention providers. Each rural area may require a different culture-based response. The on-the-ground health and prevention providers have this local knowledge.
- Implement smaller-scale prevention grants through the Center for Disease Control that work for the scale of population in rural areas. Current grants are too large and the CDC passes over rural areas in favor of large urban areas to demonstrate more impact.
- Assume coordination of broad rural subsection response, such as creating implementation sectors similar to those focused on economic development like the Appalachian Regional Commission or the Delta Regional Authority, for example.
- Fully fund rural HIV, Hep B and Hep C treatment and prevention response.
- Train workforce and economic developers to partner with prevention and treatment providers as HIV, Hep B and Hep C also deeply affect rural workforce participation.
- Fund the Comprehensive Addiction & Recovery Act (CARA) to combat the opioid addiction crisis (currently passed but with no funding).³⁶⁵

Coordinate Education

³⁶⁵ Respondent.

Little to no extra-statutory (cross-border) coordination exists in rural America pertaining to economic sectors in which work has less of a chance of being automated away. The education that does exist is not tiered, in which case it would provide appropriate entry point education for novices or the unemployed as well as professional development for experienced professionals in these emerging sectors. Furthermore, the education for novices often is not tied to market imperatives or predicting upcoming work trends.

Fund regional educational coordination for emerging regional economic sectors

Create regional educational coalitions and conferences to address the range of emerging training needs for the emerging economic sectors. Centralize a system for credit participation, where students may earn credit or degrees through credits earned at various locations. Support a range of regional initiatives addressing professional development. For example, in the sustainable agricultural sector, this gray text box highlights potential participants in regional agricultural sector educational coordination.

Investors and Advocacy: Finance and Government Finance

Rural America needs investment scaled to local needs, and, it needs to link investors to each other for education on impact investing for emerging economic sectors to succeed. If federal and state entities do not step up to assist with this emerging economic sector organization, then the private, nonprofit, philanthropic, and education sectors must step up to do this work themselves. This governmental assistance so far largely has been lacking and not comparable to the assistance given energy or large scale industry; moving forward we can anticipate that this will remain true.

Moreover, we must move forward from a model that more than likely, in many locations, who is left and what is left is what is left to be built on.

We can build on how the emerging economies and how people already flow in rural regions. We can follow how people already currently network (such as media markets, transportation flow, even how schools play sports against one another) to form connections in rural subsections that make the task of working together manageable and sensible.

Private foundation and federal shifts need to scale grants that make sense for low rural populations and/or to offer technical assistance to help counties work across borders to serve higher population impact.

The giving to rural areas does not match, per capita, the giving to urban regions. Federal and state grants are tooled for quantitative impact (how many people served). New kinds of federal and state and private foundation grants must be created to address the scale and needs of rural giving. Likewise, appropriate investor giving ought to be scaled and created for rural regions.

Philanthropic, governmental, and private investment must support giving and lending in rural economic sectors that will not lead to the automation of rural jobs and the continued displacement of rural workers by technology. The US Bureau of Labor recently anticipated that many jobs currently paying less than \$20 will be automated in the future.

Dump NIMBY

Very plainly, whether offshore, abroad, or in the rural US, the bulk of consumer goods as well as products resulting from large technical systems (energy, for example), have been situated in the US outside metropolises. The rural has become an “out-of-sight” industrial resource area for society’s centers. Along with increasing food and energy security, co-locating food and energy production in urban, suburban, and exurban environments can diversify those sites’ economies, reduce the ag and energy burden from the off-shore, provide opportunities for entrepreneurship,

and reintroduce metropole dwellers to the sources of their food and energy. If food and energy production are safe and not unsightly, there is no reason for them not to be co-located with metropole dwellers. We anticipate technology and science R & D to answer the current paradigm of off-shoring/NIMBYing food and energy production. Why not then significant science and technological research for bringing energy and food production down to smaller entrepreneurial scale with wider and broader distribution and disbursement. ³⁶⁶

³⁶⁶ The geographic profile of a rural area often dictates its utility to the metropole. For example. In 2013 I brainstormed and then reviewed purpose and work in the rural seeking to find patterns. I identified remoteness from the metropole as a key feature.

1. mining
2. industrial agriculture
3. oil and gas
4. recreation
5. hydro production
6. aquaculture
7. fishing
8. industrial transportation
9. shipping
10. energy production
11. water production
12. wastewater management
13. waste management & storage (individual and industrial)
14. college towns
15. factory towns
16. bedroom communities
17. tourist towns
18. tourist sites
19. national forests
20. chemical factories
21. paper mills
22. retirement communities
23. military training
24. hobby farming
25. timber production
26. subsistence farming/homesteading
27. intentional communities
28. artisanal farming
29. religious communities
30. transportation hub/logistics
31. incarceration/prisons

Soil and water health and strange as this weather has been

Without healthy soil or healthy water, we cannot build on an agricultural or pastoral past for a lively and autonomous future. Coordinating across borders and developing agricultural and land use protocol and education across rural regions for soil and water health remains key to producing entrepreneurs who can shepherd both our rural land and economy into the future.

We must seriously consider unpredictable weather as a factor in the kinds of long-term enterprises we seek to steward, and we must plan and respond to the demands of highly erratic weather.

Rural America and Its Organizations Must Address the Elephants in the Room

Identity

Our relationships to each other and to place evolve. For example, prior to the rise of coalfield identity in central Appalachia in the 1880s, people in subsections of this region

-
32. mental institutions
 33. relocation
 34. deindustrialization
 35. demise
 36. no growth
 37. degrowth
 38. shrink smart
 39. economic diversification
 40. power generation
 41. subcultural haven
 42. creative economy
 43. drug addiction and sales
 44. exporting youth
 45. Federal and/or state dependency
 46. Relocalization of skills
 47. Skill sharing
 48. Community subsistence practice
 49. Barefoot College
 50. Invention center a la Open Source Technology/ MakerSpace
 51. Training people for skills that ensure human capital export

identified in various ways: Southerners, pioneers, sharecroppers, with their families or kin, with their professions, with their states, etc. Prior to this, Europeans in the region were trappers, surveyors, or soldiers—and the peoples who worked on and lived on, and loved, this land prior to European involvement are mostly gone from the region, removed through death, conquest and war, or by forced migration. Thus, an “Ur” (proto, primal, or original) claim to Appalachia by many current residents highlights the complexities and even complications of place-based identity.

Treading in and out of much central Appalachia place-based identity also is a strong masculine work identity: a coal mining family is defined as such because the men in that family work/ed in the mines. Every family member becomes part of the mining technology that is the coal miner himself.

Identities shift and change-...and we can redefine relationships and region to suit our current emerging modes and participants in work. We can come together to articulate common vision, common mission, and common values with respect to our self-descriptions and our current and future stewardship to land for which we find ourselves responsible either by choice or by industrial overdevelopment and abandonment. We can become a sustainable agriculture region, or as a farmer in Greenbrier County, WV wished West Virginia to be, “a new Vermont.” We can become a cultural, liquor, environmental, recreational and farm tourist region.

We can redefine our region and make new subsections through new connections or rekindling broader or older ones. We can embrace shrinkage, degrowth, and small as positives and we can embrace right size.

With respect to the coalfields, many more people have left the coalfields than remain. Health care is the number one employer in most central Appalachian states. The emerging

economic sectors highlighted in this white paper point to other potential family or work-based identities within grasp.

Regions ought come together to form common purpose and common vision for this common ground through means such as a regional envisioning summit, branding and marketing campaigns, theorized through public intellectuals, etc.

Just as these prior “Appalachian” identities were not forever, other rural American identities are not forever. How else could or ought political, personal, economic, and cultural connections from rural regions or sub regions?

Race and class

Race and class remain large dividing factors in many rural communities. Very rural sections of the US with African Americans, Latinos, and Native Americans receive less state funding and less national attention, and African Americans and groups of other races often remain invisible at academic, federal, state, nonprofit, and other conferences, in media in the region and beyond, especially lacking recognition for and in positions of leadership.³⁶⁷

Likewise, the continued underclass of rural America continue to be targets of mixed local feelings, especially by a region’s remaining middle and upper classes.³⁶⁸

Though charity exists, systemic changes for integration into the new emerging economies often remain elusive. However, one highlight in rural America includes the Grow Appalachia program with its focus on food security, and that as some participants re-learn heritage skills in food production and preservation, Grow Appalachia has become a path to farm entrepreneurship.

³⁶⁷ Respondent. Field Observation.

³⁶⁸ Respondent. Field Observation.

However, such as with the water crisis in central West Virginia in 2014 affecting the capacity for food relief supplied by food donations, that region teeters close to the edge if any one system (federal, nonprofit, or faith-based) or relief stream should fail.

We need rural policies that focus on solutions for employment and that make hard choices. Maybe relocation packages such as those proposed under Medvedev in Russia as suggested by the World Bank (as metro areas will continue to offer more employment opportunities in the coming decades)?

Certainly, open and frank discussions must occur regarding the difference between a mode of rural living focused on homesteading and self-sufficiency, production for export, the continued shrinking of local economic purchasing markets, and the models of continued economic relief.

Lesbian, Gay, Bisexual, Transgender, Queer, Asexual (LGBTQA)

Just as race and class divides exist, the recent spate of marriage inequality attempts and restroom gender laws create a hostile atmosphere to the *LGBTQA* community. In order for rural regions to prosper, or even, not dwindle away, they must engage all of their citizens.

Programs aimed specifically at supporting rural *LGBTQA* community ought to be funded. In the profile of foundation donations, gifts that support diversity ought to be highlighted and promoted. The economic power of this group also ought to be highlighted and promoted as a potential regional drivers.

APPENDIX G

Coalfield Social Entrepreneurs

This appendix offers a glimpse into some coalfield social entrepreneurs with additional commentary from me in order to set context and fill in gaps for coherency.

Create, Convene, Collaborate: the RiffRaff Arts Collective

The county seat of Mercer County, West Virginia, Princeton has become a hub for regional drug traffic and use. In 2014 it was reported to have the highest H.I.V. and Hepatitis C rates per capita in the United States. Mercer Street in Downtown Princeton became one of two main regional thoroughfares for prostitution and drug traffic. At the height of coal employment and coal production, Princeton was a gateway to the southern West Virginia Coalfield and a railroad community.

Prior to work or jobs, regional grasstops are most concerned with addressing the large population on drugs. One proven approach to this has been to change the character of drug hubs physically and to show locals other ways of making a living in their community.^{369 370} Returning from college outside the region, Lori McKinney envisioned starting a theater and creative space in her hometown of Princeton. She and her husband Robert Blankenship started the RiffRaff Arts Collective in 2006 on Mercer Street to work with other creative sector locals—musicians, poets, artists, etc.—to grow creative community in this region. At that time, only a handful of resident businesses remained on Mercer Street—a thrift store, a decrepit diner, a pawn shop, and a bar,.

³⁶⁹ Respondents

³⁷⁰ <http://theriffraff.net/>

<http://www.princetonrenaissanceproject.org/>

<http://culturefestwv.com/>

<http://www.downtowncountdown.org/>

Most of the other storefronts were empty and the city had little to no interest in turning around what was once a vibrant thoroughfare. McKinney's words regarding the RiffRaff:

We're giving people powerful human experiences and showing them that life can be colorful and meaningful. Our events are like oases of creativity and inspiration, our public works of art change people's perception of what is possible, our community garden brings people together and offers a chance to work towards a collective and fruitful goal, our music gives people hope, our art galleries showcase the diverse expressions of our community members, and our presence lets people know that there are people in the world who still believe in good. The dynamic of our downtown is like microcosm of the planet, and it's our own little corner of the world to heal. Our positive energy is multiplying fast and causing waves of change throughout the region.

In the interceding eleven years, the many entities involved in the collective have expanded to include:

- Two live performance venues
- A recording studio
- 6 artist studios
- A music school
- Fine art gallery with 11 working artists
- Open Stage Night every Monday night
- A major mural project with The City of Princeton
- The Princeton Renaissance Project which works to revitalize major creative structures like the historic movie theater
- Two additional independent art galleries
- An organic café
- A used book store

and the city has since turned their historic Post Office on Mercer Street into a public library serving local residents and created an outdoor theater space and community garden in a street front park.

One of the RiffRaff Collective's current major projects is bringing their model for change to other parts of West Virginia. The Create Your State Tour is a workshop features original music, visual projections and a compelling exchange about how the arts, creativity and an out-of-the-box approach can establish a creative scene that redefines and reinvigorates a community.

Participants leave with skills, tools and on-the-ground contacts to ignite positive change

in their communities. They have access to a web portal with step-by-step instructional toolkits, video shorts, and webinars. They receive ongoing guidance from the Create Your State (CYS) founders to execute community projects and plant new creative capital in their communities.

In the case of the RiffRaff Arts Collective, they did not seek out new economic theory or seek on purpose to work in the paradigm of the “new creative economy.” Despite assistance from family capital, posting in-the-black profits and covering operating expenses remain ongoing threats to the RiffRaff’s existence. Largely working outside of regional nonprofit circles—with both the RiffRaff and these circles unaware of each other, the RiffRaff, a for-profit, only began to receive more regional attention on the heels of an Appalachian Regional Commission-sponsored tour there in 2016, which led to the RiffRaff being solicited by a well-respected foundation to submit a proposal for its Create Your State project.

Though much potential for cross-state line collaboration exists with other creative-making places in the region, such as Floyd, Marion, and Galax, VA and Elkin, NC, manpower capacity and lack of robust-funding in this sparsely populated Appalachian/Piedmont sub region keep these places from connecting in the way that cross-border industries and sites such as coal, natural gas, or even agricultural do. Agricultural extension, which plays a rural economic development role, does not engage in cross-border work. Economic development at the handful of colleges and universities located in this region focus mainly on manufacturing or high tech.

Little cross-border coordination exists of this creative sector and little to no public or tourist board cross-border promotion. Despite this, three regional media with cross-border reach do provide some support for regional arts and entertainment: WBRF radio out of Galax, VA draws audience from a four state region (VA, NC, WV, TN), WVVA television serves the Bluefield micropolitan and significant portions of Southwest Virginia, and *The Roanoke Times*

has significant draw in Southern WV in addition to its Virginia reach. Again, capital and manpower limit the success of outreach even through those outlets.

With respect to jobs creation, the RiffRaff applied for an Appalachian Regional Commission (ARC) POWER Grant and anticipated upgrowing their activities to become a Whitesburg, KY Appalshop kind of location in this subsection of Appalachia. For this application, they drew in a wide range of supporter, and anticipated aggressively marketing regional creative activity. Though not funded by POWER, the RiffRaff received \$100,000 in other ARC funding in 2017. Theirs has been a ten year + trajectory toward fiscal viability. In the meantime, they have experience a melt with respect to local government and financial interests, finally becoming more amenable to the changes the RiffRaff and its partners have brought to Mercer Street.

Various kinds of R & D and analyses would benefit this sector in this region and build capacity. For example, what would be the benefits of cross-border work and assistance among regional creative placemaking spaces. What would be a projection for livelihood and work that could not be automated away? How or should this sector scale up? Last but not least, what technologies could enable scaling, and, what would scaling in this sector look like, and what would its impact be on democracy as practice in the region?

Mentor, Model, Mobilize: Williamson Health and Wellness

Mingo County, West Virginia knows the boom and bust cycle and the issues attached to single sector economies quite like nowhere else in Appalachia. As recently as 2010, Mingo County saw its gross GDP grow as a county, and high on a hill overlooking Williamson, the county seat, sits

the former residence of ex-Massey Energy Coal magnate Don Blankenship. As the fate of coal has gone, often has gone Mingo County. However, Mingo County currently faces the reality of stark population decline, high poverty rates among those remaining, an increasingly unhealthy population (Mingo County recently ranked #1 for diabetes prevalence in West Virginia, hence local focus on diabetes intervention), the consolidation of its high school—a major marker of local identity, and the dire need for new models of and for business, community organizing and identity, and politics.

In his book *They'll Cut Off Your Project*, former Mingo County community organizer Huey Perry chronicles attempting community organizing intervention with the large underclass of Mingo County working *on many of the same issues still prevalent today and using approaches championed now as inclusive of lower income citizens in deciding their own fates; Perry was working on this in the early 1960s*. His book details how the local political machine intervened at that time in his work, creating legal structures to intercept Federal funds, and shut down his project. This history of cronyism and connections runs deep in Mingo, with local officials receiving penitentiary time for corruption-related issues as recently as 2013. About 30% of the population of this county remains under the poverty line, with that topping nearly 40% for those under 18 years of age.

Mingo County is in search of new meaning beyond its former marker as gateway to the “billion dollar coalfield.”

Williamson, West Virginia has become a mega-pilot of intertwining public health initiatives where issues of health, poverty, work, identity, community, and mentorship are being approached in tandem, building on osteopath Dino Dr. Beckett’s holistic approach.

A bit from their websites—**Williamson Health & Wellness Center + Mingo County Diabetes Coalition + the Williamson Farmers Market + Sustainable Williamson:**

<http://williamsonhealthwellness.com/>

<http://mingodiabetes.com/>

<https://www.facebook.com/WilliamsonFarmersMarket>

<http://sustainablewilliamson.org/>

Dr. Donovan "Dino" Beckett, born and raised in Williamson, West Virginia, returned there in 2003 to establish his family practice, and immediately began applying his holistic approach to community development. As Chairman of the Williamson Redevelopment Authority he helped launch the Williamson Health & Wellness Center, Inc., a non-profit that functions as a Federally Qualified Health Center and the parent organization to the Mingo County Diabetes Coalition, the Williamson Farmer's Market, and Sustainable Williamson. Through his leadership both as public servant and as an entrepreneur, Dr. Beckett has guided and personally invested in the rejuvenation of Williamson's city center. Dr. Beckett focuses also on diversifying the Mingo County and Tug Valley economy by mentoring local entrepreneurs in business development ideas and outreach strategies.

Coming together to work on common issues in the mid-2000s, by 2013 Beckett and allies had jumpstarted multi-faceted collaborations including health, wellness, tourism, reviving local agriculture, putting out of work miners to work in construction and farming, and eliminating the local booming legal opioid trade. Key to their success has been their mobilization of social capital rather than necessarily accumulating much fiscal capital. This social capital has allowed Beckett et al to build on regional assets—cross border tourism opportunities with Kentucky and Virginia, the Hatfield and McCoy ATV Trail, access to central West Virginia and Kentucky markets—and also sustain mobilization of volunteer partnership and federal and private funding by being able to fund proficient staff. Beckett, and allies like the RiffRaff, coalesced around a vision of what their coalfield site could become:

Beckett said perhaps the most important lesson they've learned—and the most important lesson other communities can take from Williamson's successes—is that they were able

to accomplish all this with very little money. **“Call it sustainability or call it market-driven development, the end result is always the same; by linking health and innovation we ensure the long-term resilience of our community.”** These are replicable efforts that other communities can adopt and then adapt to fit their particular needs. Being such strong stewards of the resources they have offers the community great hope for the future.

They also drew heavily from a model in the Deep South—, so they were not reinventing a wheel, only retrofitting it for their location.

McDowell County Farms: Farm, Gather, and Teach

The hinterland county of McDowell County peaked in population nearing topping 100k in the late 1950s but had fewer than 20k residents in the last census.

It has been hit hard by unemployment and the regional drug crisis. Many children now reside with great grandparents as their parents and grandparents are addicted.

It is host to both the highest elderly and highest African American populations per capita in West Virginia.

Disproportionately, most of this region of Appalachia is hinterland, or without access to metropolitan areas or to high volumes of passers-through (such as by interstate highway traffic).

It is also often the last area served by initiatives, outreach, or grants due to its less central access and to its low population. As Williamson Health and Wellness explained regarding their location. “We are often the last outpost for grants or service areas, and, we also need staff to address the needs of our people, but, it is difficult for us to compete in numbers served with metropolitan areas.”

McDowell County also boasts between 80 – 85% outside land ownership. As of 2013, no commercial farm existed in McDowell or Mingo County, West Virginia.

US Military Police veteran Jason Tartt, a Valls creek, West Virginia native, and two time decorated Vietnam Marine Corps Veteran turned longstanding organic farmer, Sylvester (Sky) Edwards, are providing the model for potential turnaround of this region of Appalachia's hinterlands. This section of the Appalachians is not only rich in mineral and liquid mineral deposits (the owners of which are unlikely to offload) including coal, oil, natural gas, silica (used in making solar panels, among other things), and rare earths (used in making cell phones and, also, solar panels), its surface area is rich in timber and diverse and sellable plants, herbs, and nuts. It is also well-suited to grazing and pastured livestock such as pigs, poultry, goats, and small herds of mountain-adapted cattle.

However, commercial farming had not existed for decades in McDowell County until Tartt and Edwards chose Tartt's hometown to start their farming and educational operations in 2014. Presently, McDowell County ranks as the 26th poorest in the United States per capita, the fourth poorest in the region, with high rates of addiction, foster children, elderly stranded by disability and connection to homes they fear going into disrepair and looting should they leave them, and widespread undereducation and unemployment. They came to engage in serious commercial farming, to connect with locals to demonstrate how farming is possible even in McDowell County, and to spread their model through this desperate region.

Tartt's and Edwards' farm enterprise, a cooperative, is not a pilot or a one-off demonstration project. Their 311-acre farm turns a profit, and, they have opened the minds and paths for a new direction and new kinds of export from the hinterland coal and coal adjacent region.

Though tourism has brought some jobs to this area in the form of low-wage work, Tartt's and Edward's model of a profitable non-invasive organic farming done on land leased from

absentee landowners provides THE model for how this region can potentially find its way forward.

Their **Appalachian Farming**, focused on gathering from the surface high demand and high price commanding items such as wild mushrooms, beech nuts, chestnuts, black walnuts, ginseng, mountain herbs; tapping maple trees for syrup; and managing pastured livestock for soil improvement and health focus on return on small capital investments and modes of business mentorship and cooperation that do not require willing and hardworking participants to have college degrees.

Moreover, unlike the often “overpromise and underdeliver” of projects promoting smaller scale sustainable agriculture well outside metropolitan areas (the reality often being that small scale farmers in those areas do not earn enough to survive, much less thrive), Tartt’s and Edwards’ **Appalachian Farming** model sells to and fulfills the needs for local, fresh food but also focuses on export to larger cities such as Columbus, Richmond, Charlotte, Lexington, Winston-Salem, etc.

In addition to Appalachian Farming woodland cultivated and harvested products such as mushrooms, herbs, nuts, maple syrup, and pawpaws, Tartt and Edwards cultivate:

- corn
- beans
- peppers
- tomatoes
- variety of greens
- garlic
- onions
- strawberries
- apples
- cherries
- mushrooms
- zucchini
- variety of squash

- watermelons
- cucumbers
- arugula
- Swiss chard
- spinach
- cabbage
- small goat production (milk & meat)
- free range chickens (2016) for meat and eggs
- honey

McDowell County currently has one grocery store, a Save-a-Lot, to meet the needs of its 18k residents. Additionally, according to WVU Extension report, “West Virginia ranks #1 in the United States for lack of adequate fruit and vegetable intake. In fact, 9 out of 10 West Virginia adults (1,240,143) suffer from health risk due to limited fruit and vegetable intake. (2011 *Behavior Risk Factor Surveillance Survey*) Those with limited education and income are at the greatest risk.” Tartt and Edwards have engaged with local schools and communities in voucher programs to help parents and children have more access to fresh and local food. The Kids Koupon project overcame “the barrier of a lack of market...that centered on bringing the market to the kids and families vs. bringing the families to the market. This was achieved by arranging markets and to correspond with school open house or community events as well as school based markets.” Tartt and Edwards were the only farmers with enough product to get the project initiated.

In addition, Tartt and Edwards have:

- Collaborated with WVU Extension to give Appalachian Farming lectures at SAFE for abused families.
- Founded Iron Sharpening Iron in 2015, a youth program designed to empower young people and to encourage a sense of community building, socially, economically and spiritually.
- Collaborated with teachers at Mt. View High School to mentor high school students in farming and farming business.
- Collaborated with Commission on Aging to provide a farmers market to the elderly throughout McDowell County. The elderly were being shuttled to Princeton, West

Virginia, 45 minutes away, which was very taxing on many of them. By the time they arrived in Princeton, most of the best produce was sold. Tarrt comments, “We decided to take the market to elderly and they loved it!”

- Working currently with a Mennonite organization to mentor 20-30, 18-22 year olds on agriculture and organization in Appalachian Farming
- Testified before the West Virginia Legislature and received a standing ovation for the support for home-based canning as a means of intermediary income and passing a law allowing for home-based canning sales

Veterans and Farming

Last but not least, with their own military experience, Tarrt and Edwards also are reaching out to veterans’ groups and the regional National Guard centers to mentor veterans interested in pursuing Appalachian Farming. This region has a higher than average portion of veterans and other ex-military. To these ends, Tarrt and Edwards’ model provides a means by which veteran can return to their hinterland areas of origin in Appalachia and make a living.