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Battle for the Mountains: Restructuring Extractive Production and the Socio-ecological Crisis in West Virginia's Coalfields

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Abstract

The coalfields of southern West Virginia have faced recurring crises linked to its regional political economy. Today's crisis is constituted by the decimation on the United Mine Workers of America and the greater use of mountaintop removal coal mining in conjunction with policies and market conditions. This thesis argues that crisis in southern West Virginia's coalfields, like previous crises, will mean the reorganization of human and extra-human natures in which social movements along with economic conditions play an integral role in transcending the crisis. Tracing the history of crises in southern West Virginia's coalfields and interviewing retired coal miners, community members, and environmental activists I examine how the current crisis is different than previous crises. Utilizing James O'Connor's theory of second contradiction of capitalism and Jason Moore's world-ecological perspective, I geographically and historically situate a case study of southern West Virginia's coalfields with the intention of bridging large-scale theories and empirical studies. I conclude that large-scale theories such as these can better help understand the complexity of local crises that informs broader understandings of the ways in which capitalism emerges and develops through crisis.

Battle for the Mountains:
Restructuring Extractive Production and the Socio-ecological Crisis in West Virginia's Coalfields

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Coal has always cursed the land in which it lies. When men begin to wrest it from the earth it leaves a legacy of foul streams, hideous slag heaps and polluted air. It peoples this transformed land with blind and crippled men and with widows and orphans. It is an extractive industry which takes all away and restores nothing. It mars but never beautifies. It corrupts but never purifies. ...the curse of coal [is] a crown of sorrow.

-Harry Caudill, 1963

Introduction: 'Overmining' and 'Undermining' West Virginia's Coal Communities

Two summers ago, under the blazing sun, West Virginians of multiple-stripes gathered together in hopes of challenging the West Virginia Coal Association and Alpha Natural Resources desire to mine Blair Mountain. In a weeklong procession environmentalists from Coal River Mountain Watch, Radical Action for Mountain Peoples Survival (RAMPS), Ohio Valley Environmental Coalition (OVEC), union supporters, and historians marched single-file along the winding roads of southern West Virginia dodging rumbling coal trucks and enduring verbal abuse from company men and mountaintop removal (MTR) supporters. Police officers surrounded the scene, raising tensions between those seeking to save and those seeking to mine Blair Mountain. The 2011 March on Blair Mountain was organized as an attempt by a range of social movements to save Blair Mountain, a historic labor site, from the decimation of yet another mountaintop removal operation. The outcome of the march was forced removal of activists, multiple arrests, and a temporary moratorium on the mining of Blair Mountain. Recently a judge announced that Blair Mountain would be ineligible for status on the national registry of historic places that would preserve the historical and cultural landmark of the struggle for coal miners to unionize. This event, and other key moments such as the War on Coal and the emergence of hydro-fracking, is telling for the current socio-ecological crisis and prospects for what the future holds for the coalfields of southern West Virginia. These moments coalesce

around multiple forms of crises of coal operating at different scales that illuminate the way social relations are constituted in and through regional and global capitalism. The story of the crisis in the coalfields of southern West Virginia is the story of the historical restructuring of the coal industry that contributed to the contemporary socio-ecological crisis, and the potential for social movements developing out of this crisis to mediate and resolve the current state of the conditions of production.

The following study examines the *origins* of the contemporary economic and ecological (or what I refer to as socio-ecological) crises in the coalfields of southern West Virginia through qualitative interviews with coal miners, environmentalists, and community members. Using data from in-depth open-ended interviews, I argue that the restructuring of the coal industry and the subsequent changes in the relations and forces of production have contributed to the contemporary socio-ecological crisis. Furthermore, the study seeks to grasp the *characteristics* constituting the socio-ecological crisis, detailing the more explicit contours and contradictions of capitalist production. Interviewees frequently related stories of their experiences of the destructive impacts of the coal industry and their communities' contentious relations with the coal industry over a span of thirty years. Lastly, the thesis examines the potential for anti-mountaintop removal (MTR) groups and community movements to influence the resolution of crisis in the coalfields.[1]

[1] Anti-MTR and community movements are not mutually exclusive and there is a great deal of overlap between the two movements.

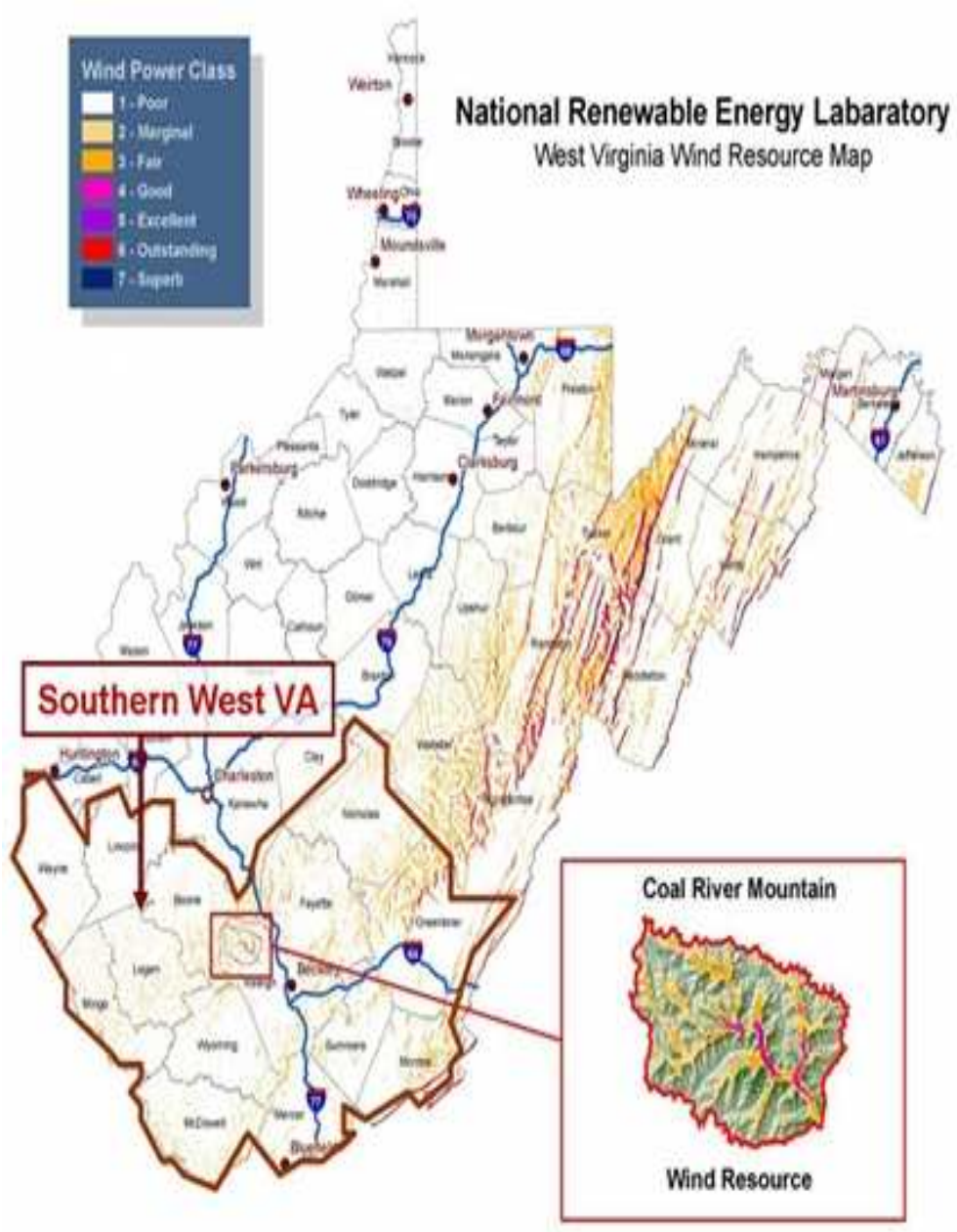

Figure 1.1 Map of West Virginia[2]

Beginning with James O'Connor's second contradiction of capitalism, this thesis utilizes economic and ecological insights to the ways in which capitalism produces certain types of outcomes and how those outcomes constitute crises and conflict. In particular, I focus on how

[2] Source: Aurora Lights, http://auroralights.org/map_project/theme.php?theme=wind&article=7. Although all but two counties in West Virginia contain coal, southern West Virginia is the most active mining region in the state, utilizing underground and surface mining. Much of the study, but not exclusively, focuses on Mingo County, Boone County, and Logan County.

MTR mining has undermined what O'Connor calls the conditions of production: labor, community, and the physical environment. This form of mining hinders the social reproduction of the regional political ecology generating conflict among and between a variety of groups. O'Connor's theorization of economic and ecological crises provides a starting point for operationalizing a study of conflicts and crisis in West Virginia's coalfields.

This thesis argues that there is a socio-ecological crisis in coal producing resource dependent communities in West Virginia. In articulating an empirical case of O'Connor's theory of ecological and economic crises, this thesis makes the claim that the crisis is place-based and requires a contextual analysis of the dynamics not only between social movements and capital (the state and coal companies) but relations between the communities and social movements. Coal communities' resource dependence makes them disadvantaged through the focus on a singular resource, which highlights the particularities of the socio-ecological crisis in the coalfields of West Virginia. Thus, it is necessary to examine how crises in resource-dependent communities can contribute to an ecological theory of crisis. To complicate O'Connor's theory of crisis and theorize the contemporary socio-ecological crisis, I utilize Jason Moore's theory of world-ecology that argues capitalism is a world-ecological regime—"joining together the accumulation of capital and the production of nature as an organic whole" (Moore 2012: 227). The capitalist world-ecology is constituted in the dialectic of overproduction (machinery) and underproduction (inputs, raw materials) producing what Moore calls 'ecological transformations' (2011a).

A second claim the study puts forth is that we cannot simply understand the current crisis in southern West Virginia without taking seriously the historical contingencies of the coal industry, communities, and social movements (labor and environmental). Although Moore calls

for a world-historical analysis in relation to capitalist in the world-ecology, this thesis focuses on the history of coal mining in Appalachia in general and in West Virginia in particular. To understand the contemporary socio-ecological crisis requires an historical investigation of the strategic relations that reproduce the socio-ecology of West Virginia. The recurring crisis moments constituted in the socio-ecology of West Virginia represent different crystallizations of nature-society complexes in which crises are cumulative and new. In addition to the importance of history and social relations making up that history, external forces have continuously played a vital role in creating and resolving crises in the coalfields. Here I am specifically concerned with the restructuring of the coal industry in relation to the emergence of neoliberalism. In particular, the thesis focuses on the ways in which neoliberalism nationally and in West Virginia transformed the coal industry from one dominated by a union labor force to an industry where the majority of miners are non-union.

A final claim is that the dialectic of overproduction and underproduction undergirded by competition in conjunction with political pressure from social movements necessitates the reorganizing of human and extra-human natures, ultimately leading to a new ecological regime. The technological innovations that scaled-up the production of coal through mountaintop removal practices creates vast tracts of destroyed landscapes that in turn generates political pressure from anti-MTR social movements as the social and ecological impacts of this form of production devastates communities. Overproduction through MTR mining is dialectically bound to the underproduction of extra-human natures. That is, extra-human natures are underproducing life-sustaining environments (water, air, soil) that communities are dependent upon for socio-

ecological reproduction.[3] While the relationship between MTR mining and the growing opposition to its practice is not inevitable, factors such as a strong historical opposition to coal mining practices and politics have certainly influenced these new social movements. The pressure from social movements, namely anti-MTR groups like Coal River Mountain Watch, RAMPS, and Kentuckians for the Commonwealth, play a significant role in the transition out of the socio-ecological crisis and into a new ecological regime. Local scale processes operate and are dialectically bound with national and global political conditions, and tightly linked with emerging forms of hydrocarbon energy, namely natural gas. In this case study, social movements act regionally in conjunction with national economic conditions to end or slow down the destructive nature of MTR mining. Social movements become a powerful force when local, regional, and national/global crises are ubiquitous and the potential for radical change is present. A new ecological regime is soon to follow as pressures from social movements intensify and as MTR mining, and coal mining more broadly, has exhausted its profitability.

These claims are extracted from empirical data collected from formal and informal interviews throughout the summer of 2012. Spending six weeks of intensive research in the coalfields of West Virginia, these research questions evolved after extensive interactions with the communities, which ultimately shaped the outcome of this project. The principle research questions orienting this thesis are:

1. What are the origins of the current socio-ecological crisis in resource-dependent communities of southern West Virginia?
2. What are the characteristics of the socio-ecological crisis and the hidden costs of resource dependency?

[3] Moore rightly points out that all human and extra-human natures at all moments are producing and reproducing the world-ecology. In the case of West Virginia's socio-ecological crisis we need to consider to some degree the ways in which extra-human natures, for example liverworts, are underproducing various environments.

3. In what ways have social movements mediated the crisis? Also, what is the potential for social movements to assist communities in transcending this crisis?

Significance of Study

There are multiple reasons I have chosen to do a case study in southern West Virginia. First, southern West Virginia has a long historical dependence on the coal industry and this highly dangerous and exploitative dependence has, in part, resulted in labor and environmental struggles and conflicts. These struggles and conflicts have been well documented by historians, political scientists, sociologists, anthropologists, and geographers. Second and related to the first reason, southern West Virginia has consistently and to this day remains one of the poorest regions in the US. This is in part due to its high level of dependency on coal mining and the lack of social and economic safety nets for its communities. Coal extraction under the imperative of capital accumulation has not only impoverished the communities of southern West Virginia but has provided 'cheap' energy for the U.S. and other parts of the world, producing uneven development. Third, southern West Virginia utilizes more MTR mining than any other part of the state. High frequency rates of MTR mining have produced spatial terrains of contestation in which anti-MTR groups, grounded in sustainable development, are challenging the coal industry's hegemony.

Methodologies

Over the summer of 2012 I conducted in-depth interviews with environmentalists, retired coal miners, and community members. A total of 18 interviews were completed ranging from 35 minutes to 3 hours. To initiate contact with potential interviewees from my target groups, I attended a one-week activist training camp that provided several interviews and contacts

throughout southern West Virginia. In the course of this study I used a snowball sampling strategy for obtaining interviews.

The three general categories used for identifying target interviewees were environmentalists, retired coal miners, and community members. Like all categories, these groupings are fluid and contingent. In multiple cases “environmentalists” were “retired coal miners”, while in some cases “community members” considered themselves “environmentalists”. These categories are not explicit and set in stone. Rather they are socially produced and change over time and space. Classifying participants into one of the three categories is helpful for situating his or her identity and potential understanding of mining and the socio-ecological crisis. In all but one case I identify participants as ‘environmentalist’, ‘retired coal miner’, or ‘community member’ in order to ensure participant anonymity. The one participant, Larry Gibson, gave me permission to keep his name in the write-up, explaining to me that many researchers had interviewed him using his name.

In addition to qualitative interviews I took advantage of the Charleston Gazette Newspaper in which there is a blog dedicated exclusively to the local, regional, and global concerns of coal. The name of the blog is “Coal Tattoo” and is written by Ken Ward who has been reporting on coal news for the last 25 years. Between interviewing Ken and reading his daily blog, I was able to obtain current coal news inside and outside of West Virginia. Moreover, Ken provided coal employment and production data sources that has proven to be fruitful in understanding the quantifiable changes occurring throughout the coal industry.

As with any research method, qualitative research provides researchers advantages and disadvantages from the beginning to the end of the project. For myself qualitative interviews were useful for uncovering participants stories and experiences through broad open-ended

questions. Because many of the participants I interviewed were actively involved (opponents and proponents) or directly linked to coal mining, they felt at ease with questions pertaining to the history and current practices of mining. More often than not participants answered my questions directly, explicating their stories and the relationship between their local community and the coal industry. In-depth interviews provided rich data, enabling a fuller understanding of the participants experience and a more structured and coherent narrative of the restructuring of the coal industry and the ensuing socio-ecological crisis. A couple of participants interviewed remarked how they felt relieved of stress, or that the interview felt like a pleasant therapy session (Gupta & Ferguson 1997; Avis 2002).

Aside from in-depth interviews, participant-observation was also a helpful strategy for gaining access to participants. In particular, my time spent at the activist training camp, protesting MTR mining, working with a community atop Kayford Mountain, and volunteering on a farm secured a trust and bond with participants that may not have been otherwise possible. Through these various activities I was able to meet amazing people and friends who allowed me information on their experiences. However, throughout my research many participants commented on how academics and researchers often came into their communities gathering data immediately and returning home, often never to be seen again. This experience (researcher/researched) is nothing new to communities of central Appalachia. In fact, during the 1960s-1970s there was a major rift between ‘insiders’ and ‘outsiders’ that in some cases was reinforcing economic inequality, cultural inferiority, and paternalism (Montrie 2003). My genuine interest in the people and communities impacted by mining (underground or surface) helped me in overcoming barriers that exist surrounding ‘outsiders’.

There are certain implications as an ‘outsider’, researcher, and an activist researching this topic. As an ‘outsider’ conducting research about the exploitations of a historically marginalized group I had to cope with an array of unavoidable assumptions and stereotypes. In fact, a community organizer I attempted to interview was vehemently opposed to researchers making a career from the experiences of Appalachians. However, in most cases ‘insiders’ claimed that if you come into the coal communities with a genuinely open-mind and heart you can overcome those ‘outsider’ barriers. My involvement as an activist allowed me to gain trust and access that may not have been possible. In some cases, participants clearly knew my perspective and politics on MTR mining. In other cases, participants were not fully sure of my position on MTR mining. A number of those participants avoided the politics of MTR mining.

Disadvantages are undoubtedly apparent in participant-observation and in-depth interviews, and more broadly in qualitative research. Participant-observation, although building bonds and trust, may elicit participants to provide answers they know I want to hear. In-depth interviews are a disadvantage because interviews are generally time-consuming, hindering the ability to have many participants. Another disadvantage with in-depth interviews is that in a few cases participants briefly addressed the question asked and quickly went on to a related topic, but not of interest to the research project. One last important disadvantage with in-depth interviews is the fact that with only a limited number of interviews, the case study makes it harder to generalize the experiences of participants and communities in relation to mining (Haraway 1988; Marcus 1995; Rose 1997; Burawoy 2000; Pratt 2010).

In-depth interviews and participant-observation offered the best strategies for answering the questions my research project asked. On a personal level, I felt more comfortable utilizing qualitative research techniques, and will likely continue it in future work.

West Virginia's Coal Economy

For most of West Virginia's history coal has dominated the state's economy, generating profits, employment, and indirect economic activities. West Virginia is second leading coal-producing state in the U.S., making up 13% of total U.S. production (U.S. Energy Information Administration 2012). In 2008, West Virginia produced around 165 million tons of coal, roughly the same as in 1984 (Blaacker et al. 2012). While West Virginia continues to be a major coal producing state, coal production is projected to decline (McIlmoil & Hansen 2009). As of 2010, West Virginia's coal industry employed 22,599 people, roughly 3% of the state's total employment (Blaacker et al. 2012). It has been estimated that West Virginia's coal industry directly and indirectly employees 46,000 jobs (ibid). However, job insecurity and increased mechanization has resulted in major losses in coal mining jobs. Importantly, United Mine Workers of America (UMWA) membership has declined in West Virginia from 30,000 members in 1979 to 4,000 members in 2001 (Burns 2007). The decline in UMWA membership in West Virginia coincides with a broader decline in national UMWA membership (ibid). The chart below illustrates the changes in national UMWA membership.

Nationwide UMWA Membership 1941-2000									
1941	1951	1955	1960	1965	1970	1985	1989	1995	2000
300,000	349,406	185,499	139,038	94,229	92,565	85,000	65,000	37,266	20,522

Figure 1.2 Nationwide UMWA Membership
Source: Burns (2007)

What is socio-ecological about the crisis in West Virginia?

Beginning with Moore's world-ecology, I utilize the concept *socio-ecological* as an attempt to transcend the binary of nature and society (Moore 2012).[4] The binary hides more than it reveals, often describing how capital produces economic or ecological crises, rather than conceptualizing crises as "constitutive of capitalism as a historical system" (Moore 2011a). Moore rightly argues that an 'economic' crisis or an 'environmental' crisis is the process and outcome of the *longue durée* of capital and ecological accumulation, and the functioning of the world-ecology (2011c). That is, we need to think through contemporary relations and processes through a longer historical lens that simultaneously engages with the social and ecological and how those relations reproduce the capitalist world-ecology. Within the capitalist world-ecology humans and extra-human natures are continuously reproduced over time and space through the gravitational pull of capital accumulation. The "relations between humans are messy bundles of human and biophysical natures, and are bound, at every turn, with the rest of nature" (Moore 2012: 227). The seemingly social and the seemingly ecological are at all times *socio-ecological*, and at all times making and re-making environments. Socio-ecological transformations are both products and producers of what Moore calls the 'oikeios' (2011d).[5] Therefore, the concept socio-ecological seeks to move beyond what O'Connor and other eco-Marxists call the twin crises (economic and ecological) of capitalism by conceptualizing human and extra-human nature as the messy bundles constitutive of the webs of life (Moore unpublished).[6]

[4] For Moore, world-ecology is more specific understanding of socio-ecology that posits 'social' and 'ecological' changes over the *longue dureé* of capitalism. The use of world in world-ecology is borrowed from the world-systems literature, whereas ecology is borrowed from the political ecology literature. For more in-depth discussion on world-ecology see chapter two.

[5] Oikeios is defined as "a way of naming the creative, historical, and dialectical relation between, and also always within, human and extra-human natures" (Moore unpublished).

[6] For O'Connor, an economic crisis is when capital seeks to restructure the forces, relations, and/or conditions of production to restore capital accumulation. An ecological crisis, as a result of capitalist production, is when nature's tap and sink are "depleted and clogged" respectively (O'Connor 1998: 185).

Socio-ecological crises are not exclusive to the development of capitalism. For example, feudalism faced its moments of crises fostering the transition to capitalism. The concern here is to build a more coherent theory of socio-ecological crisis in capitalism that provides clarity and usefulness for theorizing and analyzing regional political economies. Under capitalism socio-ecological crises take particular forms that are dialectically produced through the movements, transformations and contradictions arising from the matrix of the production of nature and capital accumulation on multiple-scales in and through time and space. Each socio-ecological crisis coinciding with different socio-ecological projects of capitalism have a unique character in which the rich totalities temporarily crystallize constituting qualitative and quantitative differences.[7] The socio-ecological crises represent distinct time-spaces in which human and extra-human natures must be restructured to revive capital accumulation in more life-sustaining ways (albeit unevenly).[8]

Utilizing the concept *socio-ecological*, like world-ecological, provides the potential for moving beyond the dualism of nature and society. For this thesis, socio-ecological allows us to transcend the jobs versus the environment binary that have limited the ways in which we think and understand the crisis in the coalfields. The coal industry continues to reproduce this simplified abstraction through its War on Coal campaign efforts, in which miners, community members, and even a few environmentalists have internalized the discourse of jobs versus the environment.[9] The socio-ecological approach comes to understand the jobs versus the

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[7] I define socio-ecological projects as local-scale practices and policies that characterize a place in terms of political and economic power and the way these are organized through the relations of the state, civil society, and industry as ways of organizing nature, while also being organized by nature. Additionally, socio-ecological projects are periods of relative stability (e.g. Fordism).

[8] For example, following the Great Depression and WW II the US government worked with labor and capital to create job security and high profit margins. For most workers this led to increased wages and greater benefits. However, security and stability for workers was unevenly distributed across race, class, gender, and sector.

[9] The War on Coal is the idea that big government, big labor, and environmentalism are working to end coal mining (see chapter five).

environment discourse as a problematic abstract in which the natural environment is external to jobs or society. Thinking socio-ecologically means analyzing how jobs and the environment are both messy bundles of human and extra-human natures. Conceptualizing the crisis as a socio-ecological crisis is an exercise of theoretical abstraction in which I seek to push theories of economic or ecological crises in a new direction by combining two large-scale theories, second contradiction of capitalism and world-ecology, on the local and regional scales. In a practical sense, utilizing socio-ecological crisis may help us better understand capital's historical-material practices that are simultaneously exploiting human and extra-human natures. Moreover, conceptualizing the crisis as socio-ecological allows an understanding of capitalist development in which the 'social' and the 'ecological' are always dialectically bound, and that any solution/s to the crisis will be irreducibly socio-ecological.

Analyzing West Virginia's southern coalfields through a socio-ecological approach necessitates a paradigm shift, in which the ontology of nature is not simply the biophysical processes of the soil, streams, and mountains, rather the ontology of nature shifts to viewing nature as constitutive of the messy bundles of human and extra-human natures. For example, mountains are produced by geological processes associated with the movement of tectonic plates along with the activities of humans (e.g. mining, walking, hunting, foraging). Moreover, as Moore's world-ecology approach notes, the far-reaching activities of financialization produce and reproduce local ecologies, like the mountains of West Virginia. For example, Bank of America lends coal companies large business loans to conduct MTR mining. Just as West Virginia's mountains are socio-ecologically produced through the messy bundles of human and extra-human natures, so are the machines and miners that mine those mountains (see chapter 4).

The socio-ecological crisis in West Virginia is constitutive of the contradictions of capitalist development and the historical relations between the coal industry, communities, and social movements. While a historical theorization of crisis is necessary for understanding contemporary socio-ecological change, O'Connor's definition of crisis is helpful for pinpointing the crisis. "The most important meaning of crisis, including ecological, would seem to be a 'turning point,' and thus 'time for decision'" (O'Connor 1998: 137). Through interview data, participant-observation, and secondary reading it is clear that coal communities of West Virginia are in a crisis moment, in which multiple groups are contesting one another for control over development.[10] Every participant remarked that coal reserves throughout West Virginia were depleting and natural gas would soon dominate the energy market. Moreover, participants stated that the coal communities and the state of West Virginia were going through an economic transition period. There was great anxiety over this economic transition, whether West Virginia would continue mining coal and/or develop alternative economies. The socio-ecological crisis in the coalfields of West Virginia is of course subjective, but the evidence and data collected from interviews and secondary sources conclude that fundamentally serious economic and ecological changes are occurring and that a transition is soon to follow.[11]

In the 1980s-1990s, scholars argued that there were drastic economic changes unfolding to the detriment of the coal communities. Michael Yarrow argued coal mining regions in Appalachia were facing an economic crisis: "The union work force in that area (West Virginia and Virginia) has shrunk from approximately 58,000 in 1980 to 17,200 in 1987…Employment here has been particularly hard hit, shrinking by 83 percent in the past decade" (Yarrow 1990:

[10] Much of the secondary reading comes from Ken Ward's Coal Tattoo blog.
[11] According to O'Connor, crises always contain subjective and therefore are always political (1998). Certainly naming and describing the coal communities of West Virginia is in a socio-ecological crisis is a political move. This, however, does not take away from the serious challenges and problems people of the coal communities face.

39). For Yarrow and many others studying coal communities of Appalachia, there was a significant economic crisis due to economic and political changes within the coal industry (Gaventa et al. 1990; Bradshaw 1992; Ziliak 2012). For the majority of scholars the economic crisis was due to the coal industry reacting to a profit squeeze produced by higher wages for miners and a revitalized UMWA. Since the 1980s, coal companies have utilized more capital-intensive large-scale strip mining, including MTR mining, with greater frequency leading to more layoffs and spatially expansive environmental degradation. One retired UMWA coal miner sums up the current crisis quite well:

> Then you got these MTR sites that may give 14, 16 people work. So it's really hurt the community as far as economic stability of the communities and the overall environmental impact its having on the communities. And the union is not looking at it that way, they're trying to preserve every job they can get, whether it's just a couple or whether its 2,000. They need those jobs at any cost, even at depopulating and destroying communities. (Interviewed June 18, 2012)

Another retired coal miner/community activist from Boone County said,

> I was working with community people and it wasn't like directly, it was like 15 miles from my own community but these are people I went to school with, some of my family live down there and there's people I know down the line. And the coal slurry and they're on well water, the coal slurry got into the well water by this mountaintop removal because they did slurry injections, stored this stuff back in underground mines, the cleaning process, they shot it back in the mines and they come in doing mountaintop removal using all these explosives and they've just ripped these mountains apart to where this stuff leaks back out into the aquifer and got into peoples well water. And their bodies are full of heavy metals, a lot of them have brain tumors and died. (Interviewed June 14, 2012)

Another retired coal miner described the ecological impacts of mining.

> I am convinced that within 25 years the devastation that's already been done, even if they stop today, will haunt southern West Virginia for another 100 years. Because every time they do a valley-fill they take heavy metals that have been buried in these mountains for 300,000,000 years, they bring it to the surface, rip it up, put it up in a valley-fill and as soon as it rains it gets flushed like a toilet down stream. (Interviewed June 25, 2012)

The conservative judicial courts of West Virginia have been one of many institutional bodies governing the ecological degradation in the neoliberal era. In 1999, Judge Haden ruled

that valley-fill waste dumping violated the Clean Water Act by burying streams. Coal industry lawyers pointed to the ill-defined nature of what exactly is 'waste' and 'fill'. Often siding with coal companies, the Fourth Circuit Court of Appeals overturned Judge Haden's decision against the coal companies, allowing them to practice valley-fill waste dumping (Burns 2007). In 2004, the Bush administration working with the director of the Office of Surface Mining, sought to weaken the buffer zone between valley-fills and streams, which had previously been 100 feet. Now, new environmental regulations permitted companies to use best practice for managing and minimizing the impacts of valley-fills on streams (Burns 2007). This left decisions on buffer zones at the discretion of the coal companies. The gutting of the EPA and the all out ignoring of environmental regulations and policies are constitutive of the neoliberal era in West Virginia. Neoliberalism in the coalfields sees coal companies in control of the political and legal apparatus of the state and federal institutions that should be governing the impacts of mining. This changed political environment has externalized environmental costs, which manifest as a cost for the coal communities (see chapter 3). That is, unlike the 1960s-70s, mine safety and environmental monitoring is now seen as something that impinges on profits.

These stories and experiences illustrate how West Virginian communities have suffered. While some of the participants had compared some of today's current problems with pre-union days of the early 20th century, they also said that there were greater problems with new technologies of extraction, namely those of MTR mining. Others argued the institutions governing mine permits, mining, and coal processing such as the West Virginia Department of Environmental Protection (WVDEP) and the Army Corps of Engineers have been equally important to the story of coalfield conflicts.[12] The characteristics of the socio-ecological crisis

[12] These institutions, however, will not be discussed as a main source constituting the socio-ecological crisis in West Virginia's coalfields.

will be addressed thoroughly in chapter 4 through the stories and experiences of the participants of the study. In addition to the characteristics of the socio-ecological crisis, I examine the dynamic relationality of West Virginia's coal dependency and the crisis, which produces what I call the hidden costs of coal.

In essence, the socio-ecological crisis in the coal communities of West Virginia is the inability to sustain a healthy life for individuals and families throughout the coalfields. In part, this socio-ecological crisis is closely linked with the decimation of the UMWA and the greater use of mountaintop removal coal mining. Previous socio-ecological projects produced relative wealth and stability for large portions of the working population (see chapter 3). The socio-ecological reproduction of workers and families is hindered by the neoliberal socio-ecological project unfolding in and through the production and accumulation of capital. Even West Virginia and central Appalachia's coal industry is facing a profitability crisis caused by a variety of forces: the March on Blair Mountain, the War on Coal, competition from natural gas, and cheap coal from the Powder River Basin. In addition, other forces such as the "implementation of the Clean Air Interstate Rule, climate legislation, tighter restrictions on mercury emissions, regulations on coal combustion wastes, and pending restrictions on valley fills from surface mining are all likely to add to the decline in West Virginia coal production" and its profitability (McIlmoil et al. 2010). The neoliberal socio-ecological project is in a crisis moment in which the coal industry, environmental activists, and communities are fighting for the future economy of West Virginia.

Outline of Thesis Chapters

The rest of the thesis will address the three main questions stated above. Chapter 2 is a brief review of Marxian theories of crisis that is followed up with a literature review of resource-

dependent communities, arguing the need to bridge the gap between Marxian theories of crisis and more empirical work like resource extraction. In chapter 3 I examine the long history of coal mining in West Virginia leading up to the major restructuring phase of the early 1980s. In particular, the chapter dives into the *origins* of the current socio-ecological crisis and the relation between the coal industry, miners, and technologies of mining. In chapter 4 I address what are the characteristics of the socio-ecological crisis. Using O'Connor's notion of conditions of production, I map out the ways in which the restructuring of the coal industry has 'overmined' and 'undermined' the conditions of capitalist and communal reproduction. To answer this question I draw heavily from the interviews that detail much of the hardships faced. In chapter 5 I turn to the ways social movements have mediated the socio-ecological crisis in resource-dependent communities. Social movements include environmental and community groups who oppose the actions of the coal industry. In addition to the ways environmental and community groups have mediated the socio-ecological crisis, I focus on the potential for these groups to wrest control over and shape future ecological regimes in West Virginia. Chapter 5 is framed around three important moments: the March on Blair Mountain, the War on Coal, and the ever-increasing possibility of hydrofracking. In the concluding chapter I utilize O'Connor and Moore's theories of crisis and capital accumulation to delve deeper into the inner workings of the socio-ecological crisis and beyond.

Chapter 2: Theories of Crises and Resource-Dependent Communities

In the following chapter I review the broad literature on Marxist theories of crisis, beginning with Marx. Marxist theories of crisis have shaped and influenced various schools of thought that are still relevant to our understanding of crises. After surveying the classic Marxist inspired schools of thought I focus on an ecological perspective of crisis through Marxist notions of crises. In particular, I examine James O'Connor's second contradiction of capitalism to analyze the dynamics of ecological and economic crises. O'Connor's foundational eco-Marxist perspective provides a methodology of investigating the ways in which capitalism undermines the conditions of production. Next, I complicate O'Connor's second contradiction of capital by infusing Jason Moore's theory of capitalism as world-ecology. A world-ecology perspective contributes a more thorough and complex understanding of social and ecological change and crisis. This is followed up with a literature review of empirical studies of resource-dependent communities. Chapter 2 seeks to bridge the gap between generalized theories of economic and ecological crises with empirical studies of resource-dependent communities.

Theories of Capitalist Crises

Crises are the manifestation of the contradictions of the logic and tendencies of capitalism. As such, capitalism has been characterized as a crisis-ridden and a crisis-dependent economic system (O'Connor 1998; Harvey 2006; Moore 2011a). Crisis-ridden in the sense that the actual development of capitalism creates its own economic barriers for reproduction through the tendencies of overproduction of goods and exploitation of workers. The contradictions have historically been managed or mediated through the political and economic apparatus of the state and social movements. Additionally, capitalism is dependent on economic crisis for disciplining capitalists and labor and restructuring capital in ways that are more transparent and social (O'Connor 1998: 182). Given that capitalism is a crisis-ridden and crisis-dependent system,

O'Connor's second contradiction of capitalism provides a "systematic theory of the 'whys' of ecological destruction in general and of the complex inner connections between capital accumulation and economic and ecological crisis trends and tendencies, on the one hand, and social movements and politics on the other" (1998: 125). O'Connor begins with Marx's first contradiction of capitalism in conjunction with Marx's theories of crises to build a theory of economic and ecological crises.

The First Contradiction of Capitalism and Classical Theories of Crisis

Marx's first contradiction of capitalism analyzes the contradictions between the forces and relations of production. The contradiction arises from the need for capitalists to extract greater surplus-value from lesser socially necessary labor-time generating an overaccumulation crisis. Marx clearly illustrates in *Capital Volume 1* how the forces of production must be revolutionized because of competition among capitalists and demands of higher wages put forth from the working-class. As the forces of production are revolutionized the relations of production at-times become more exploitative causing an increased inability for workers to reproduce their labor-power. A straightforward example of the contradiction is the introduction of machinery into the labor process whereby the value of labor in each commodity produced is lower due to an increase in constant capital.[13] In general, capitalism has decreased variable capital and increased constant capital. Eventually the contradiction escalates to the point where not enough profits are secured, and thus, capital must extract greater surplus-value from workers.

Most of the literature examined here is heavily influenced by Marx's analysis of the logic and tendencies of capitalism and its historical development. Although Marx did not have a systematic theory of crisis, he argued that the antagonistic social relations developing under

[13] See Marx's *Capital Vol*ume *I*, especially chapters 10: The Working Day and 15: Machinery and Large-Scale Industry.

capitalism would necessarily produce economic crises because of the inherent and deepening contradictions of capitalism. In particular Marx posited that in some cases the falling rate of profit was the main cause of a crisis, while at other times it was capitalist tendencies of overproduction that led to a crisis.[14] Lastly, Marx associated economic crisis with the general law of capitalist accumulation, which entailed capital's overaccumulation in the hands of the bourgeoisie. "Marx appears to associate crises with the tendency for the rate of profit to fall, with tendencies to overproduction, underconsumption, disproportionality and over-accumulation with respect to labour, without ever clearly championing one or the other theory" (Clarke 1994: 5).[15]

A diverse school of crisis theory rooted in Marx's thought has emerged over the past one hundred years. One school of thought, one that Engels spearheaded, was the tendency towards overproduction. Overproduction, for Engels, was that "the expansion of production necessarily ran ahead of the growth of the market so that eventually the result must be a crisis, which is likely to be all the more devastating the longer it is postponed" (Clark 1994: 19). There are literally too many goods produced for the market to consume, which was the case in the Great Depression of the 1930s. Overproduction is fueled by technical innovations that speed up production as a strategy for capitalists to compete for a larger share of the market. Another famous theorist and proponent of the overproduction school was Kautsky. Kautsky, like Engels, grasped the importance of innovations in the forces of production, but emphasized the falling rate of profit tendencies under capital that would cause an economic crisis (Clark 1994).

Another major school of thought was the theory of underconsumption, pioneered by Rosa Luxemburg. Unlike Marx, Engels, and Kautsky, Luxemburg viewed consumption as one of the main driving forces of capitalism. Instead of focusing on the quantity of goods being produced,

[14] Engels more explicitly argued the tendency of overproduction in regards to economic crisis in later work.
[15] For a thorough review of Marxist theories of crisis see Clark (1994).

Luxemburg focused on the underconsumption by waged workers in the industrialized countries. For Luxemburg imperialist endeavors opened up markets for surplus goods to be consumed. Capitalist expansion through imperial projects not only opens markets for surplus goods to be consumed, but the transformation of 'backward' social relations to capitalist social relations subsidized industrialized countries wage-laborers ability to consume so that they could increase consumption. Paul Sweezy followed the underconsumption school by examining the changing organizational structure of economies and companies under monopoly capitalism (Baran & Sweezy 1966).[16] Importantly for Sweezy and Baran were the major trends in late capitalism in the industrial world in which fewer companies were controlling larger segments of the market.

An Ecological Understanding of Capital's Economic Crisis

Emerging from the tradition of Marxist crisis theories are ecological theories of crisis. The most significant contributor to an eco-Marxist crisis theory is James O'Connor who developed the theory of the second contradiction of capitalism. The second contradiction refers to "the contradiction between capitalist production relations (*and* productive forces), on the one hand, and the *conditions* of capitalist production on the other" (O'Connor 1988:160). In short, it is the inability of capital to reproduce the necessary conditions of production due to the logic and tendencies of capitalism (competition, cost barriers, accumulation for accumulation sake, labor struggles). Borrowing from Polayni's ficticious commodities of land, labor, and money, O'Connor describes the conditions of production in three ways: 'laborpower', 'communal conditions', and 'external physical conditions' (1998:160). Where O'Connor differs from Polanyi is the greater emphases on production rather than circulation (Prudham 2005:11). The overall well-being of workers and the level of exploitation forms one nexus of the conditions of production. The communal conditions simply refer to the built environment including public and

[16] Sweezy is highly influential to radical theorists such as Frank, Wallerstein, and the "Monthly Review" school.

private structures making up communities and urban spaces. Lastly, the external physical condition refers to the conditions of local eco-systems, such as water, soil, and air. In essence, O'Connor's theory of the second contradiction of capitalism laid the foundation for the development of ecological Marxism.

The second contradiction of capitalism results in multiple types of economic and ecological crises in which such crises are dialectically produced. An economic crisis can cause an ecological crisis that in turn may cause a qualitatively different economic crisis. For example, during the late 1970s and early 1980s the coal industry in Appalachia faced an economic crisis due to competition from abroad, mounting pressure from labor unions, and somewhat stricter environmental regulations. In order for the coal industry to survive the crisis, companies needed to restructure the relations, forces, and conditions of production to revive capital accumulation. Thirty years later, as a result of the restructuring that utilized more non-union labor and more mechanized mining, places like southern West Virginia and eastern Kentucky faced an ecological crisis. In this instance of ecological crisis, individuals dependent on mining coal were impaired by the ecological destruction of southern West Virginia, which resulted in an economic crisis for coal communities. While normal capital accumulation degrades the environment, an economic crisis can induce ecological crisis signifying that reproductive conditions have been compromised (O'Connor 1998: 183). Here, it is difficult to decipher O'Connor's thinking on the difference between 'normal' ecological degradation and an ecological crisis. I will address this further in what follows. Relating the complexities of the economic crisis to ecological crisis, O'Connor writes:

> Capitalist accumulation normally causes ecological crisis of certain types; economic crises is associated with partly different and partly similar ecological problems of different severity; external barriers to capital in the form of scarce resources, urban space, healthy and disciplined wage labor, and other conditions of production may have the effect of raising costs and threatening profits; and, finally, environmental and social

> movements defending conditions of life, forests, soil quality, amenities, health conditions, urban space, and so on, may also raise costs and make capital less flexible (O'Connor 1998: 183).

The complex relations of economic and ecological conditions occur as an uneven combination and coexistence that produces economic and ecological crisis in different ways.

For O'Connor the role of the state is necessary for divvying up the conditions of production for capitalist development (1998: 148). This means that without an entity like the state to mediate the relations of capital and civil society, capitalism would fail. The state in some cases gives capital access to land and resources to be placed into production, while in other cases the state may provide necessary infrastructure for capitalists. Furthermore, the state needs to take heed of what civil society feels is just and fair, if not the state may face a legitimacy crisis (O'Connor 1998: 150). Additionally, the state O'Connor rightly argues has its own tendencies, contradictions, and politics it must work through. That is, there are variegated interests within the state vying for material and political gain. Therefore, the state should not be seen as an independent entity absent of political leanings within society, but as dialectically produced through the triad of capital, civil society, and the myriad interests of the state. As such, the state is a historically and geographically produced entity that has developed in part through the contradictions of the forces/relations and conditions of production. The state is an organizing and necessary entity for most economic systems and thus, should not be simply understood as mediating between capital and civil society, but actively producing and reproducing the production conditions.[17]

As capital accumulation intensified, the contradiction between the relations and forces of production and the conditions of production intensify to the point at which capital must

[17] The state has always been important to capitalist development in regards to coal mining in West Virginia. However, the role of the state does not play a prominent role in this thesis.

restructure itself into more social forms (O'Connor 1998:158). Creating more social forms of capitalism requires more state planning and involvement from marginalized groups. Again, for O'Connor the role of the state becomes paramount for restructuring capitalist production. As capital attempts to address the rising costs of production, it restructures the forces and relations of production and in turn the conditions of production (nature, labor, community, state, etc.) often bear the brunt of these higher costs.

Equally important as the state with regards to capitalist restructuring, the social relationships of reproduction are also sites of contestation and transformation (O'Connor 1998:161). Importantly for O'Connor, social movements pressure corporations and the state to "internalize the externalities, i.e. pay the social and environmental costs" (Foster 2002:3). One of the main points of O'Connor's second contradiction is how the relations and forces of production undermine the ability for the social reproduction of the conditions of production thereby manifesting a more social form of capitalist relations, providing the opportunity for radical change through a red/green alliance.[18] In short, as capitalist production increasingly exploits workers and the environment social movements along with state and communal institutions arise to create more equitable social change.

The versatility of O'Connor's second contradiction is witnessed among a variety of scholars. Turner and Brownhill add a gendered-class analysis to O'Connor's 'second contradiction' to take up an eco-feminist perspective for understanding unwaged labor, specifically women and the ways women are undermined by the "male deal" (2004). Stroshane (1997) compares differences and similarities between Polanyi and O'Connor, arguing Polanyi did not recognize the importance of social reproduction in relation with the state. For Stroshane,

[18] For O'Connor the red/green alliance refers to the traditional labor class and the new social movements. He believes there is viable and necessary alliance between the two groups. The possibility of an alliance between each group is conceivable due to the ways in which capitalist production undermines the reproduction of labor and nature.

O'Connor's acknowledgment of the relations of social reproduction are vital for understanding contemporary policies for the informal sector such as lax environmental pollution laws on oil refineries that cause health problems for surrounding neighborhoods, whereby citizens may lose their job, simultaneously increasing public expenditure and constraining local businesses and creating a domino effect of ecological devastation (1997:115).

Of course, like any theory, scholars will and must be critical of such work. One of the major critiques, posited by Foster, is the 'second contradiction' attempts to simplify capital's complex and dynamic ecological destruction within a narrow "economic crisis theory" (2002:3). On a similar note, Clark and York critique the 'second contradiction' for not critically engaging with nature in understanding the nature/society dialectic (2005). Further, there is little empirical data illustrating the costs barrier to capital production and accumulation (Foster 2002:3).[19] Finally, for Foster the 'second contradiction' is problematic as it falls prey to economic dualism, whereby the reproduction of capital is dependent on the degradation of nature, thus constraining the ability to reproduce the conditions of production (2002:4). While Paul Burkett, an eco-Marxist, critiques O'Connor, who

> "artificially separates his first contradiction from the conditions of production…Yet if the first contradiction is generated by a rising rate of exploitation, one that "expresses capital's social and political power over labor" (107), how can it be separated from the conditions of production? …As per this second contradiction, it is not clear that rising "external costs" from capital's use of natural and social conditions need translate into profitability problems *as a whole*. All capital accumulation requires is exploitable labor power and material conditions conducive to the extraction of surplus labor and its objectification in marketable use value" (1999:194-5).

To avoid economic dualism or an economic crisis theory, capital's ecological degradation should be understood within a historical-materialist perspective whereby human and nature are to be conceptualized "as a dialectical and endlessly contingent process." (Foster 2002:5). In addition to the importance of historical-materialism, Foster utilizes Marx's concept metabolic rift

[19] O'Connor gives historical examples of costs barriers to capitalism such as the cotton crisis during U.S. Civil War, "wages advances in excess of productivity in the 1960s, and the "oil shocks" of the 1970s." (1998:242)

to understand "complex relationships of ecological degradation and sustainability" (Foster, Clark, and York 2010:46). Moreover, the metabolic rift as a concept, is not only concerned with economic unsustainability, but the dynamic interrelationality of nature and society.[20]

The metabolic rift is not without its shortfalls. To start, the metabolic rift does not circumnavigate the classic dualism Foster critiqued the second contradiction for doing. Specifically, the metabolic rift looks at how nutrient cycles are disrupted through capitalist production processes whereby soil and the urban environment are degraded. Therefore, increased (necessary) capitalist production creates environmental degradation, thus Foster and others fall into the same dualism they critique O'Connor. Besides falling prey to dualism, Foster's theory of the metabolic rift does not thoroughly engage with the materiality of class exploitation, which is necessary for engaging in red/green alliance work for social change.

Aside from the 'second contradiction' and metabolic rift, a third concept based in eco-Marxism is the treadmill of production first developed by Allen Schnaiburg in *The Environment: From Surplus to Scarcity* (1980). The treadmill of production "argues that ecological destruction is intrinsic to capitalist (as well as some other) modes of production" and continually increased production is necessary (Bell & York 2010:113). Furthermore, "The increase in production led to an escalating need for natural resources, which were extracted at greater rates" (Bell & York 2010:113). Although the treadmill of production clearly explains the way capitalism increases exploitation of labor and resources through technological innovation, its focus is too narrowly within the realm of production, thus missing the importance of accumulation. That is, the treadmill of production does not acknowledge accumulation in general and the social relations of accumulation in particular (Foster, Clark & York 2010:203).

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[20] To see how metabolic rift has been utilized in studies see Clausen and Clark (2005), Clark and York (2005), McClintock (2009), Moore (2011a).

The second contradiction, metabolic rift, and treadmill of production all have beneficial ways of conceptualizing the interaction between capital and nature and accumulation and degradation, but I believe the 'second contradiction' is better equipped for understanding those processes because of its wide analytical scope, attention to complexity and detail, and with the need to engage in new and old social movements. Moreover, the 'second contradiction', unlike the metabolic rift, is more apt to engage in class analysis, while being able to move outside the narrow confines of production and technology on which the treadmill of production focuses.

Moving Beyond Nature & Society: Capitalism as World-Ecology

Another recent addition to theories of ecological/economic crisis is Jason Moore's theory of capitalist world-ecology. In essence, world-ecology is a unified theory of accumulation of capital and the production of nature (Moore 2011a: 1).[21] Moore argues that all forms of capitalism (early, agro-capitalism, industrial, financial) and feudalism for that matter did not simply act upon nature but emerged "*through* the messy and contingent relations of humans with the rest of nature" (Moore 2011b: 110). Adopting a world-ecology perspective means understanding the history of capitalism "as a symbolic and material matrix, co-created through the activities of humans with the rest of nature" (Moore 2009: 348). This ontological formation of society-in-nature differs from traditional formations that posit society acting upon nature. In doing so, Moore and a world-ecology perspective can, for example, reconceptualize how modern slavery or sugar plantations were socio-ecological processes articulated towards world accumulation. Nature and society, then, should not be conceptualized as discrete categories, but as interconnected and reproduced from the scale of the body to the scale of the global market, in which the logics of capital become the principle organizing force.

[21] The production of nature is Neil Smith's thesis that argues nature is constructed as both external and internal to humans and society, thus an attempt to move beyond the dualism of nature and society.

In order to shift the dominant ontology of nature and society, Moore utilizes the *oikeios* to argue that all historical systems have developed through substantively different ecological regimes. “Ecology and ecological (as oikeios), then, signify the relations of the whole. These are mediated through the partial totalities of capital accumulation and the shifting mosaics of nature-society relations” (Moore 2011b: 117). So for Moore ecological regimes are trans-historical, comparable to Marx’s idea of labor. "Ecological *regime* signifies the historically stabilized process and conditions of extended accumulation; ecological *revolutions* mark the turbulent emergence of these provisionally stabilized processes and conditions" (Moore 2011a: 34). Within this conception of ecological regimes as transhistorical, Moore argues that there have been successive configurations of socio-ecological relations of temporary stability that characterize different regimes of production and accumulation (2011b).[22] While certainly sharing theoretical insights from Regulation Theory, Moore’s perspective is situated in world-systems theory and political ecology.

Related to successive configurations of socio-ecological relations is Moore’s idea of “ecological transformations” (2011b). Instead of declaring environmental or ecological crises as endpoints, Moore uses ecological transformations to emphasize the continuity of society and nature relations. Ecological transformations simultaneously allow for a more historical analysis of the crisis and the study of “unconventional sites of environmental history” (Moore 2011b: 113).[23] Historically accumulation through crisis meant that ecological transformations occurred through the depletion and degradation of particular zones and the movement to new frontiers

[22] Nature and society or economics and environment would be more useful to be conceptualized as socio-ecological to better understand industrialization, imperialism, or even financialization (Moore 2011).

[23] These ecological transformations are further broken down into what Moore calls epochal and developmental crises (2011). An epochal crisis would be a radical transformation in the economic system, such as the development of capitalism out of feudalism. A developmental crisis refers to ‘smaller’ or less radical changes within a given economic system, such as emergence of neoliberalism out of Fordism. The idea of developmental crisis is useful in the context of the thesis and is discussed in chapter five and the conclusion.

(Moore 2011b). In other words, the transformations meant expanding geographically and the deepening of capitalist relations.

The socio-ecological organization of capital accumulation required capitalism to expand into new spaces, along the frontiers of less capitalized natures. Moore illustrates how there was both vertical and horizontal expansion of frontiers. Vertical expansion occurred as the ability to go deeper in the coalmines and horizontal expansion occurred as the transformation of small farms into large industrial farms, especially in the US mid-west (2011b). Related to Moore's concept of ecological transformations is what Arrighi (1994) refers to as organizational exhaustion. The idea behind organizational exhaustion is that the structures and relations that created and sustained a stable socio-ecological project have reached its 'limits' thereby producing a crisis of accumulation, in which a new socio-ecological project must emerge through the ruins and remnants of the previous project.

Another contribution of Moore's theory of capitalist world-ecology is the idea of ecological revolutions and ecological surpluses. The idea behind ecological revolutions is that "a large ecological surplus is found whenever a relatively modest amount of capital sets in motion a very large mass of use-values. When the volume of appropriated natures is sufficiently large, it reduces the share of the system wide *oikeios* that depends on the circuit of capital for its daily and inter-generational reproduction" (Moore 2011b: 128). Here Moore is telling us that technological advancements that appropriate a greater portion of nature than the previous socio-ecological project generally lowers the cost of production (especially labor), thereby allowing for a medium to long-term run of accumulation. The greater appropriation of nature is what Moore calls ecological surplus. To explain ecological surplus through transitions to different forms of energy we can describe the transition from wood to coal, from coal to oil, and presumably from

coal and oil to natural gas. Of course, this does not mean we no longer use wood or coal, but that wood and coal are increasingly replaced by other sources.

The historical development of capitalist world-ecology is dependent on the production of cheap labor, food, fuel, and raw materials. If capitalism does not have access to and can produce labor, food, fuel, and raw materials at a sufficiently low cost it will face a crisis. For Moore, the rising organic composition is the principal force intensifying the contradiction between overproduction and underproduction (2011a: 30). Moore comes to understand the tendency of capital's crisis through the dialectic of overproduction/underproduction and appropriation/capitalization (Moore 2011a: 39). The idea behind underproduction, unlike O'Connor underproduction of capital, is that there is "insufficient flow of food, energy, and materials relative to the demands of value production" (Moore 2011a: 21). For Moore, this is especially true for early capitalism where there were not sufficient flows of inputs, namely for fueling factories and feeding workers (2011a: 21). To lower the cost of production capitalists are continuously searching for cheap inputs from nature's free gifts to secure higher profits. However, because of the capitalist tendency to overproduce and rapidly consume nature's free gifts, often times there are not sufficient flows of inputs. Moore argues, "Here, the overproduction of machinery (fixed capital) finds its dialectal antagonism in the underproduction of raw materials (circulating capital)" (Marx 1967 III, 119; cited in Moore 2011a: 21).

> "Thus, an enduring priority of capitalism has been to drive down the share of circulating relative to fixed capital, driving down the value composition of inputs and energy while simultaneously expanding the material volume of commodity production. Hence the centrality of frontiers of appropriation throughout the history of capitalism" (Moore 2011a: 21).

Related to the dialectic antagonism between overproduction and underproduction is the contradiction of appropriation and capitalization. Through each successive ecological regime, capitalism must appropriate greater portions of nature through geographic expansion into new

frontiers to offset the rising capitalization of production. “Productivity-maximizing technologies (capitalization) revive system-wide accumulation when it sets in motion the large-scale appropriation of uncapitalized nature” (Moore 2011a: 25). Technological innovations, in the case of energy extraction (MTR mining, hydofracking, tar sands extraction), in conjunction with appropriating new frontiers will produce ecological-surplus. However, like many tendencies and outcomes of capitalist development, these ecological-surpluses are temporary as exhaustion of resources, new technologies of extraction, and political pressure from social movements exhaust the ecological regime.[24]

A shortcoming in Moore’s world-ecology perspective is the degree to which class conflict and social movements pressure for reform or radical transformation. This is not to say that Moore does not acknowledge the capabilities of the traditional working-class or new social movements, but that he does not explicitly or systematically engage with them either. In part this absence of the capabilities of change caused by social movements is a result of Moore’s overall project, that of analyzing how the history of capitalist development has occurred through socio-ecological projects. Additionally, the high level of abstraction in Moore’s theory tends to lose the social relations that occur in real time and space. With Moore’s world-ecology perspective there is a tendency for a functionalist understanding of the historical socio-ecological projects or regimes he is referring to, thereby reducing the complexities of the real world to the logic and laws of motion of capitalism. However, he does somewhat acknowledge that capitalism has substantively changed due to the specific socio-ecological processes, relations, and projects of that particular regime.

[24] The dialectic antagonism of overproduction/underproduction and appropriation/capitalization will help explain the current socio-ecological crisis in the coalfields of West Virginia.

To address the specific regional socio-ecological relations I term successive configurations of socio-ecological projects (SCSEP). While Moore states that ecological regimes highlight the relatively stable patterns of governance, technologies, class structures, and organization forms, I argue that these elements also constitute socio-ecological projects and that understanding these elements can only occur at a smaller regional scale where each of these can be linked up within a specific context. The resource dependency of Appalachia provides an ideal case for studying how these variables operate in conjunction to contribute to the accumulation of capital for industry and the socio-ecological devastation experienced by Appalachian communities. The development of social movements contesting that particular practices of mountaintop removal in Appalachia transcend each of these individual elements to constitute the socio-ecological projects within which accumulation occurs. Resource dependency has generated a relative stability that helps investigators identify the specific shifts, which have given rise to new socio-ecological projects.

So, what can this thesis glean from Moore's theory of world-ecology? For one, world-ecology provides a strategy for moving beyond the modernist ontology of nature and society by arguing that nature and society are bundled tightly together from the scale of the body to the scale of the global market. Capitalism as world-ecology, then, conceptualizes the production of nature not simply as clear-cutting old-growth forests or blowing off tops of mountains, rather the "the production of nature has been as much about the factories, stock exchanges, shopping centers, slums, and suburban sprawl as it has been about soil exhaustion and species extinction" (Moore 2011d: 42). In doing so, we can come to understand, for example, the ways in which financialization and other non-productive activities organize human and extra-human natures.

A central tenant of the world-ecology perspective worth taking is the importance of labor productivity as the main source of capital accumulation. Lower levels of labor productivity have resulted in the geographical expansion and development of new resource frontiers. Decreasing labor productivity in the case of coal mining in central Appalachia resulted in the development of mining in the Powder River Basin. Increasing labor productivity from a world-ecology perspective is made possible by the undervaluing or de-valuing of extra-human nature (Moore 2011d). This increased labor productivity has the effect of temporarily increasing profitability for individual capitalist and capitalism as a whole. Another important useful point from a world-ecology perspective is that the dynamism of capitalism perpetually exhausts the conditions that it requires to reproduce, requiring the movement of capital and labor to new frontiers of exploitation. New frontiers can mean moving production elsewhere or deeper through technological advancements. For example, the 19th century steam engine allowed miners to dig deeper underground than had previously been possible. Lastly, ecological surplus is temporarily realized during new socio-ecological projects, thus lowering the cost of production and furthering capital accumulation.[25] During the early 1980s, following the profit-squeeze of the late 1970s, coal companies aggressively pursued MTR as a practice for mining coal. However, as pressure from social movements and competition from other coal producing regions coupled with the further development of cheaper clean burning natural gas profits can quickly run dry for coal companies.

The Second Contradiction of Capitalism & Capitalist World-Ecology

A mix of O'Connor's theory of the second contradiction of capitalism, and Moore's theory of capitalism as world-ecology will inform the study of the crisis in the coalfields of West

[25] The idea of ecological surplus will be useful for the analyzing the restructuring of the coal industry, especially in regards to mountaintop removal mining.

Virginia. In particular, O'Connor's need to include the state and social movements to understand economic and ecological crises in conjunction with Moore's dialectic of overproduction/underproduction and appropriation/capitalization and SCSEP that examines the changing socio-ecological relations and processes constituted in historical and contemporary capitalism. O'Connor provides the need to take seriously the actions of the state and social movements and class relations undergirding socio-ecological crisis that is often missing from Moore's theory of capitalism as world-ecology. However, Moore's conceptualization of capitalism as an ecological regime and the continuous exhaustion of previous regimes provide a useful structure to the changes occurring in the coalfields of southern West Virginia. For Moore, unlike O'Connor, history is the driving force for understanding crises in capitalism. Lastly, within the global ecological regime of the world-ecology, I utilize SCSEP to regionalize coal industry changes and its relation to resource-dependent communities.

A Regional Perspective of Crisis & Resource Dependence

Regional scale studies have been fundamental to the work of many geographers (Massey 1984; Blaikie & Brookfield 1987; Peet & Watts 1996; MacLeod & Jones 2001; Paasi 2002; Hudson 2007). Geographer Allen Pred (1984) stated regional studies were an essential analytical scale for human geographers. Although regional geography has gone in and out of fashion since the inception of the discipline, regional work has not been exclusive to geographers.[26] For many geographers the regional scale represents a "*meso*-scale that mediates between local and global processes" (Walker 2003: 12). Examining social and ecological relations and processes at the meso-scale enables and ensures attention be paid to the historical and contemporary specificities

[26] Hudson remarks how regional work has been take up by a variety of social science disciplines, "For example, in the core disciplines of economics (Krugman 2000), politics (Keating et al. 2003) and sociology (Urry 1985) as well as in more applied areas of the social sciences such as business studies (for example, Porter 2003; Snowdon and Stonehouse 2006)" (2007: 1150).

of the local scale that produce and are produced by global processes. Therefore, spatial and temporal scales are central epistemological tools for regional studies.

Ontologically and methodologically speaking, regional studies have focused and emphasized the centrality of spatial uneven development through capitalist production and accumulation. Massey writes, “The process of accumulation within capitalism continually engenders the desertion of some areas, and the creation of there of new reserves of labour-power, the opening up of other areas to new branches of production, and the *restructuring* of the territorial division of labour and class relations overall” (1978: 106, italics added for emphasis). In the case of spatial flows of resources, uneven regional development links seemingly unconnected and disparate regions across increasingly longer distances. LeBillon examines uneven development linked with core-periphery through “the materiality, location, flows, and political economy of resources” (2008: 346, cited from Neumann 2010: 371). The challenge for regional studies, as Hudson (2007) rightly points out, is most case studies are predominately, for example, narrowly focused on a major city with little attention paid to global economic and political processes. On the flipside, Hudson also argues, many regional studies have focused on global economic and political processes without a deeper understanding of the specificities and histories of places and regions (2007). The difficulty lies in how much emphasis regional geographers place on the global and/or local, and whether that work can speak to those scales.

The spatial uneven development of capital accumulation at multiple-scales has formed the basis of regional geographers. Regional perspectives can inform the development of crises in spatially different parts of a given country, holding multiple spatial and temporal scales in tension in a dialectal fashion underwritten by the logic and history of capitalism. Global crises engender national and regional crises that are expressed qualitatively and quantitatively different

based on economies, divisions of labor, ecologies, and histories. Regional crises, then, should be understood as contingent on the spatial uneven development co-constitutive of the specificity of the historical geography of capitalism, in which crises necessitates the restructuring of the relations, forces, and conditions of production.

Often credited for being one of the most influential scholars on resource dependence, Harold Innis provides important insights to the complexity of regions dependent on resources, specifically primary resources such as furs, timber, fish, and coal. For Innis these resources become staples to be exported to core markets to be consumed (1995). Moreover, staples-producing areas built infrastructure, institutions, and communities to support the production of the particular staple. Although Innis was concerned with the production and exchange of different staples, and the ways different regional economies developed from those staples, his staples theory is still quite relevant for geographers. “In Innis’s staples approach, it is the staple itself that brings together and integrates diverse relationships within a place around technology, the physical environment, production and consumption, and institutions and social relations” (Barnes et al. 2001: 2130). Eventually these towns or regions create what Barnes et al. (2001) call a ‘structured coherence’. Structured coherence, meaning in the sense that stability existed between capital, labor, and the state. However, because of primary resources frequent commodity price fluctuation staple producing communities’ experience crisis after crisis. Changes in technology have always played an integral role in the changing relations of the staple producing communities. For example, large-scale open pit copper mining in the American Southwest changed the working and living environments of copper towns. Unlike some political economist of the time, Innis saw technology as one force that increased the speed to the

inevitable economic crisis. For Innis the local scale and context mattered because of its specific history, institutions, and the physical landscape (Innis 1933).

What is helpful to take from Innis's staple theory is the ways in which resource-dependent communities get locked into a set of local-global market relations and are disproportionally disadvantaged compared to non-resource-dependent communities. Additionally, Innis is helpful for taking seriously the role of local institutions, technological transformation, and the need to think about local communities through their connection to the capitalist world-system (not his phrasing). Equally important is the seeming inevitability of the economic downturn of staples and its subsequent destructive impact upon resource-dependent communities. Lastly, each staple has its own sets of relations, infrastructure, and institutions that create a structured coherence to create a stabilizing relationship between labor/civil society, capital, and the state.

Hayter and Barnes (1997) analyze the restructuring of the timber industry in British Colombia in the changing forms of organization and production, namely the move from 'fordism' to post-fordism or flexible production. Specifically, the focus is the changing technologies of production, worker flexibility, and coping strategies for single industry towns dealing with globalization (Hayter & Barnes 1997: 8). Each of these articles are not merely investigating the local historical relations of the timber industry and the community, but contextualizing these changing relations to the changing capitalist world-system. Barnes and Hayter rightly point out that single industry towns are directly connected to global capitalism and feel more of the burden and pains of a changing market. That is, the price of primary resources such as oil, natural gas, coal, and timber, are more susceptible to drastic changes in the market, which impacts investment and production.

In another article on the restructuring of the timber industry in British Columbia, Hayter argues, “resource peripheries must negotiate the imperatives of flexibility and neoliberalism from vulnerable, dependent positions on geographic margins” (2003: 706). Additionally, Hayter argues environmentalism and indigenous groups have contested the new forms of production and organization in hopes of remapping the ‘war in the woods’ (Hayter 2003: 706). Environmental and indigenous groups contest and clash with post-Fordist changes and values in hopes of creating a more equitable and sustainable development (Hayter 2003: 707). Contesting such development on the results of neoliberal economic restructuring highlights the ways in which communities are impacted and in part the changing relationship of society and nature.

While Barnes and Hayter focus on the evolving timber industry in British Colombia and its impacts on the local community, Graham and St. Martin (1990) focus on how the timber industry in the US, specifically the solid wood products industry (SWPI), has restructured not only from market competition for lower value wood products and innovations in technologies of production, but in part to the natural processes of the resource base itself. Natural processes should be considered on equal footing to social processes in terms of industrial restructuring, and furthermore, there should not be a hierarchy of determinates (1990). Although Graham and St. Martin are not focused on any particular community, they point out how deforestation has meant the movement of the timber industry across varying geographies. Along with the movement of the timber industry there has been changes in the labor market. Specifically, timber industry workers in the Pacific Northwest were paid high wages and had higher levels of unionization, whereas the workers in the US southeast were paid lower wages and were for the most part non-union (1990: 294). Therefore, and not unlike industrial cores, resource peripheries are competing against other regions which has profound impacts on labor, the environment, and the community.

Randall and Ironside (1996) closely examine and challenge some of the generalizations that have been made concerning resource dependent communities by classic and contemporary economic geographers. Generalizations include a relatively homogenized labor market and economic structure, impacts of isolation, a largely male dominated labor market (Randall & Ironside 1996). Randall and Ironside perform an analysis of empirical analysis of 220 Canadian resource dependent communities in 6 industries to help debunk these generalizations (1996). They found resource-dependent communities to be much more complex than originally thought. In fact, they found that many resource-dependent communities were dependent on multiple resources, rather than a single resource (Stedman et al. 2004).

McCarthy (2006) examines economic restructuring of the timber industry in British Columbia and the US through "a specific and relatively narrow initiative, the introduction of a community forest tenure, and engaging larger questions of neoliberalism, environmentalism, and the dynamics of political change in the course of progressively contextualizing that initiative" (85). That is, McCarthy focuses on a narrow community based forestry project while attempting to engage in the ways this project is shaped and in turn shapes neoliberalism and capitalist development. McCarthy argues within the forestry industry in British Columbia environmental governance has entered a new stage, where different actors play an integral role in their relations to nature and society.[27] Additionally, McCarthy compares community owned forests in Canada and the United States and concludes the different forms of land tenure, cultures, and responses from social movements produce quite different outcomes (2006: 101). Thus, both McCarthy and I would argue, that neoliberalism does not produce even effects across all societies, regions, or

[27] Actors include First Nations, municipal governments, environmental nonprofits, local societies and nonprofits, etc. (McCarthy 2006: 84)

industries and therefore should be examined under specific historical and geographical conditions and relations.

Prudham (2007) provides another observation and analysis of the forest industry in British Columbia. Specifically, Prudham, examines the triad (labor, capital, and state) of society to understand the emergence of a particular form of forestry regulation that occurred after WWII. Under Fordism, Prudham argues, there was a class compromise that is facilitated by the very specific forms of forestry regulation (labor, capital, and state) that enabled higher rates of growth, increased wages, and some sense of stability (2007).

Moving away from renewable resources, geographer Ray Hudson (2011) traces the historical trajectory of the decline in coal mining production and employment in northeast England from 1947-97. In particular, Hudson argues the declining market for coal was a result of changes in national energy policy, namely the transition from a nationalized to a privatized industry, the further globalizing political economy of coal, and the imports of cheap oil from the Middle East (2011). When the coal market was nationalized in 1947 employment was around 704,000 and output was around 187 million tonnes. In 1997, after the coal industry was privatized and in conjunction with competition from the oil industry, employment dropped to 8,000 and output was only 39 million tons (Hudson 2011). Employment changes varied from region to region. For example, huge investments were made in the central coalfields temporarily increasing employment, while many miners from the northern coalfields were laid-off and mines closed (Hudson 2011). Hudson's study of the post-WW II era of the coal industry highlights how privatization via neoliberal ideas and policies and competitive energy sources like oil, produced spatial uneven regional development throughout the coalfields of England.

A Review of Mountaintop Removal Coal Mining

Publications on the nature of mountaintop removal (MTR) mining have grown tremendously with the rise of environmental and community groups and celebrities/politicians.[28] Many documentaries have been produced in conjunction with the fight against MTR in central Appalachia[29]. Additional documentaries, news stories, journalistic accounts on MTR mining have added to the literature and understanding of MTR mining. The most comprehensive study on the impacts of MTR mining in Appalachia is Shirley Stewart Burns *Bringing Down the Mountains,* where she delves deeply into details about the emergence and impact of MTR mining in communities in southern West Virginia (2007). Although Burns covers a wide range of topics, from the history of MTR mining to the decline of unions to the political economy of coal mining and to its legality, there is little theoretical analysis throughout the study. In *Something's Rising,* Silas and Howard (2009) conducted 12 interviews of individuals ranging from retired coal miners to musical artists to politicians in an oral history format, describing their relationship to coal and MTR mining. They found that most people, aside from the 12 interviews, were unwilling to speak out against the coal companies' practice of large-scale surface mining because of Appalachians cultural politeness and economic dependence (Silas & Howard 2009).

In *Combating Mountaintop Removal*, McNeil (2011) critically examines the changing relationship among the coal industry, communities, environment, and economy from the perspective of local grassroots activists' organizations. For McNeil, mountaintop removal becomes the organizing process by which the various groups come into contention with one another. "I prefer to analyze mountaintop removal as the logical product of neoliberalism"

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[28] Environmental groups include Kentuckians for the Commonwealth, Statewide Organizing for Community eMpowerment, Southern Appalachian Mountain Stewards, Coal River Mountain Watch, Keeper of the Mountains Foundation, Ohio Valley Environmental Coalition, West Virginia Highlands Conservancy, Appalachian Voices, Heartwood, Sierra Club Environmental Justice, and Southwings. All of the groups fall under a parent organization called The Alliance for Appalachia. Celebrities include Daryl Hannah and Woody Harrelson. Bobby Kennedy Jr. has also talked out against MTR.

[29] Documentaries include The Last Mountain, Coal Country, Saving the Last Mountains, and countless other ones.

(McNeil 2011: 2). Although McNeil couches the emergence of mountaintop removal in neoliberal development, he moves quickly away from abstract ideas like neoliberalism, development, and capitalism to the "everyday life in which people struggle with the process of reassigning meaning to their encounters with the coal industry" (2011: 3). Coming from an anthropology background it is no wonder why McNeil predominately focuses on local people, local struggles, on the local scale. Like, much of the literature on mountaintop removal mining, theory plays a minor role, and the people become the center of the story.

Conclusion:

What is missing from MTR mining literature is a systematic or a thorough theorization on MTR mining and its relation to the community. The majority of work on MTR mining focuses mostly on the relations of the coal industry and environmental groups like Coal River Mountain Watch, RAMPS, etc. without providing a deeper historical and theoretically engaging understanding of those relations. Furthermore, there tends to be little engagement of external forces shaping the conflicts between the coal industry and community. Specifically, much of the literature focuses analysis on the local and regional scale without critically engaging with larger scales. In part, this may have to do with romanticizing the local and celebrating Appalachia's rich cultural heritage. The next chapter highlights parts of the rich cultural heritage of coal miners and communities challenging the coal industry regional hegemony. Certainly resistance from marginalized groups in the coalfields of West Virginia can inform certain our understanding of class conflict under capitalism. However, it is not enough to solely focus on class conflict, and as such, focusing on 'external' forces becomes a necessary requirement for developing new theoretical insights.

It is one of the goals of this thesis to bridge the gap between strong empirical studies of resource-dependent coalfield communities and abstract crisis theories of capitalism. Placing crisis theories in socio-ecological study of the crisis in West Virginia allows for engagement and theorization of real world relations and processes that is often missing in abstract generalized theories. Utilizing crisis theories in the real world puts theory to work as a way to better understand the complex structures governing the socio-ecology in West Virginia. In particular, an eco-Marxist theory of crisis is well suited for analyzing the ways in which the contradictions of capitalism create crises and how capitalism restructures the forces, relations, and conditions of production to resolve those crises. Resolving crises is only a temporary solution to the crisis-ridden system constitutive of the historical and geographical development of capitalism. Lastly, the study is not simply about applying crisis theories to the case study in West Virginia. The study builds on our current understanding of crisis theories through concepts like SCSEP and socio-ecological crisis informing different historical and geographical ‘slices’ of the capitalist world-ecology.

Chapter 3 The Making of West Virginia's Coal Economy

In the following chapter I outline the history of coal mining in Appalachia in general and West Virginia in particular. At times West Virginia's long historical relationship with coal has provided well paying jobs, temporary communal stability, and a sense of pride in mining. In other times, it's meant overexploitation, communal instability (boom-and-bust), and the death of human and extra-human nature. At the heart of these socio-ecological changes are the state, capital, and labor/community relations that have changed through each successive socio-ecological crisis. This chapter seeks to address what are the *origins* of the current socio-ecological crisis in the coalfields of West Virginia? To address this question I examine and break down the history of coal in West Virginia into three distinct periods or socio-ecological projects. Although the neoliberal socio-ecological project's crisis is the focus of the thesis, it must be historicized within path-dependent trajectories that developed through SCSEP and crises that have been articulated through national and world economies. As a result, West Virginia's path dependency has destroyed its landscape with underground mining and then was intensified by surface mining. "From a nailclip [contour strip mining] to mountaintop removal to mountain range removal" as one interviewee noted. A series of crisis moments are signaling the end of the neoliberal socio-ecological project as people organize against the socio-ecological impacts of mountaintop removal mining. This chapter will trace the history and origin of the neoliberal socio-ecological crisis in the coalfields.

History of Coal in West Virginia

Since the emergence of West Virginia's coal industry in the 1870s, there have been three major socio-ecological projects orienting relations in West Virginia, and Appalachia more broadly. The first occurred with industrialization, lasting from the 1870s to 1930s, the second corresponds with the period of embedded liberalism and Keynesian economics from the 1930s to

1970s, and the third and current socio-ecological project has origins in the 1970s era of neoliberalization. This chapter argues that the neoliberal socio-ecological project in Appalachia is now in crisis and suggests that a new socio-ecological project characterized by partially new processes, structures, and organization may be emerging from the ashes of the socio-ecological destruction wrought by the neoliberal socio-ecological project. This section of the chapter will examine the history of the first two socio-ecological projects in relation to the technologies, labor practices, and organizing that remain as critical threads cumulatively operating to invigorate accumulation after crisis.

The historical narrative discussed in this section serves the purpose of structuring a historical understanding of the neoliberal socio-ecological project in Appalachia. The rough outline of the period from the mid-19th century to the 1930s and the period from post-World War II to the 1970s each had socio-ecological projects structuring relations in the coalfields. The division of labor, technologies of extraction, and the political environment were governed by relatively stable processes that included the contradicting environment that led to the emergence of the UMWA in the coalfields of West Virginia in the 1930s. The first socio-ecological project can thus be associated with the emergence of unions in the coalfields, culminating with West Virginia's successful push for unionization. The post-WWII socio-ecological project is associated with the push for further mechanization in the coal industry, expanding labor productivity that led to the mass emigration of miners out of the coalfields. This was supported by the UMWA, which didn't anticipate how the industry would transform with the neoliberal socio-ecological project.

The first period in coal mining in the United States began in the 19th century and lasted until roughly the 1930's. The boom in the coal industry in the mid-19th century brought

immigrants from England, Scotland, Ireland, and populations throughout Europe to the coalfields of West Virginia, ultimately changing West Virginia's socio-ecology and the capitalist world-ecology (Corbin 1981). Many miners that arrived in the U.S. from England had mining experience and were quickly promoted as coal mine bosses (Andrews 2008). Other labor migrants included African-Americans from the U.S. South who moved to the coalfields to escape the oppressions of the Jim Crow south (Corbin 1981; Lewis 1987; Trotter 1990). Scholars have frequently argued that mining companies encouraged immigrants and minorities to work in the mines because ethnic and racial differences were reinforced through labor assignments within the mine, which created tensions among the coal miners that would prevent union organizing (Corbin 1981; Long 1991). Divide-and-conquer tactics of course were not unique to the coal industry, but in some cases the dangerous working conditions underground tempered ethnic and racial tensions (Andrews 2008).

The first period of coal mining is associated with the hand-loading era when mining was a craft occurring on an industrial scale. Primitive mining technology consisted of a pick, shovel, hand auger, and sticks of dynamite. During this period, mining required certain skills associated with knowing the subtleties of the shaft, when a roof might collapse, how to approach picking the coal, and the knowledge associated with the sounds of mining (Dix 1988). Learning how to mine took many months and even years to eventually earn the title of miner. Inexperienced miners worked as loaders, alongside experienced miners, to learn the craft of how and where to make cuts. Thus, underground miners possessed a certain level of knowledge of extra-human natures that they later passed down to younger inexperienced miners. Miners were also responsible for kneeling stooped over in narrow shafts to clean the coal and rock away for the experienced miners working at the face of a seam. A miner worked in a 'room' with one or two

hand loaders extracting coal while the loaders would hand shovel the coal into the carts (Dix 1977). During this process, the miner would educate loaders on the labor process of mining coal while emphasizing of what dangers to be aware. Thus, knowledge was passed down from miner to loader and eventually the loader would transition into the role of a miner, educate his loaders and the cycle would continue. The material practice of mining and training are simultaneously social and ecological processes, highlighting how human and extra-human natures become and are becoming the messy bundles of West Virginia's socio-ecology.

The high demand for coal during World War I generated a great demand for mining jobs in the bituminous coalfields of central Appalachia. The socio-ecology of mines posed difficult challenges for mining companies and tested the expertise of miners. For the most part health and safety conditions in the mines were poorly understood during this period of mining, when mines were thought to be "gaseous" or "nongaseous" (Long 1991). These gaseous spaces were called "damps" where gases and vapors collected and were particularly deadly due to the general lack of ventilation in mines, mixing with fine coal dust particles that produced huge explosions (Fishback 1986). Firedamp, blackdamp, and whitedamp were all major hazards that existed in the coalmines (Long 1991; Andrews 2008).[30] These dangers were exacerbated by the fact that men could be found working up to their knees in water for 10-14 hours a day (Long 1991). The dangers of coal dust extended beyond the risks of an explosive damp since the prolonged exposure to coal dust almost guaranteed pneumoconiosis, or Black Lung Disease.

During most of this period coal miners had a considerable amount of freedom in the mines. Having their own set of tools, schedules, and 'rooms', miners were able to work for the

[30]Coal dust is implicated in each of the damps. Firedamp was the most dangerous. It involved the concentration of methane in a mine and when intermixed with five percent oxygen becomes extremely flammable. Whitedamp was the least common and consists of carbonic oxide gas that concentrated after a firedamp explosion or the routine blasting associated with mining. Blackdamp is simply an atmosphere deficient in oxygen and was not uncommon in the unventilated mines.

most part unsupervised (Dix 1977; Andrews 2008). The sense of freedom in the early years of coal mining was meaningful because it allowed for the miner to perform the work in a way he saw fit.[31] In some cases, miners made up their own work schedules and took vacations when they pleased (Andrews 2008). Workers had their own room assigned to them where no one else was permitted to mine, even in the case of long periods of absence or injury (Dix 1988). Working a room involved "undercutting the coal face with a miner's pick, drilling the face with a hand auger (sometimes called a breast auger), blasting of the coal, and finally, shoveling the broken coal into empty mine cars" (Dix 1988: 5). The cutting and undercutting part took two to three hours (Goodrich 1925). The cutting, drilling, and blasting had to be done in such a manner that used the least amount of blasting powder because miners were responsible for paying for their own powder. After the coal was blasted the less-experienced apprentice miner would clean the coal and separate it from the slate and other debris in order that they did not get docked weight. The job did not just consist of cutting, drilling, blasting, and clean up but also consisted of timbering for roof support and laying track for the cars/carts. Timbering and laying track was known as "dead work" since miners were compensated on the basis of coal tonnage produced (Andrews 2008).

The socio-ecological project during this period was very much dependent on the ecological knowledge of the miners who had a great deal of control over the labor process. Miners' craft skills were significant to the safety not only of each individual worker but also of the broader underground workforce. The relationship of laborers to the earth they worked with occurred in the context of the tools of the trade that enabled workers to understand the tacit qualities of the mountains they mined. Under the competitive pressure from coal producers and other energy sources, operators continually attempted to introduce new technologies in the mines

[31] Thus, for miners the degree of alienation was much lower during this period.

with an attempt to create greater supervision, preempt organizing, and deskill the labor force (Dix 1977; Dix 1988; Long 1991). During this period, the traditional room-and-pillar mining method was slowly eroding as mechanization entered the mines. The undercutting machine was introduced prior to 1900s and functioned like a horizontal jackhammer delivering 200 picks per minute. While mines during this period lacked regulations, the introduction of new technologies generated new dangers for miners who could no longer use their tacit knowledge to anticipate dangers due to the noises and hum of the machinery.

Coal camps were common during this period. Coal operators bought up land close to the mine such that miners could not engage in agricultural pursuits and were dependent on the mine for a job as well as for everyday needs (Gaventa 1980; Bradshaw 1992). In the 1920s, 60-80% of coal miners lived in company-controlled towns that were on average no less than five miles from communities with civic liberties associated with "ordinary urban centers" (Gaventa 1980: 86).

> "In these towns, the coal companies owned the houses, the streets, the schools, the water systems, the churches, the recreational facilities (if there were any), the doctor's office, and the company store, which was the only store in the town where one could buy groceries, furniture, clothes, and other goods. In addition, most coal companies paid their employees in "scrip," their own monetary system redeemable only within that particular company's town (Lockard 1998). The use of scrip ensured that the miners and their families were unable to travel outside the town to buy fundamental supplies and that the company store was able to charge monopolistic prices for its goods. The company store system and the other company-supplied services for which miners were charged, such as tool sharpening, health care, and housing rent, were "a key mechanism . . . for increasing company profits" (Cook 2000:192)" (Bell & York 2010: 120).

Deductions of miners' paychecks included rent, medical bills, funeral expenses, and goods from the company store (Gaventa 1980: 89). In many cases, the store prices were twice as high as comparable goods outside of the coal camps (Andrews 2008). If miners frequented stores and shops outside the company store, they were fired and blacklisted preventing them from obtaining a new job. Such mechanisms prevented communication on the conditions in the mines and cross-community organizing.

Because wages were low and the cost of goods high many coal miners and their families

had to take loans from the company, forcing coal miners into debt. In some cases to pay off the debt, the wives of coal miners slept with the managers and owners of the mines. This was known as *esau scrip*.[32] The highly uneven power relations in the coal camps have often been characterized as a 'friendly' form of slavery that produced enormous profits for coal barons and supplied the necessary inputs for U.S. industrialization. The control over production that miners had underground was mirrored aboveground where coal companies asserted their power over mining communities through a totalizing influence encompassed in the company-town that completely controlled miner's families, housing, and commerce.

This first period of coal mining in Appalachia dramatically changed the socio-ecological organization of production away from largely subsistence agriculture towards the concentrated ownership by coal companies and associated land-holding companies that refashioned land-ownership patterns in a way that opened a lively coal extraction sector at the expense of agriculture (Morrill and Wohlenberg 1971; Bradshaw 1992). During this early period, secular trends in the coal sector were characterized by thirty-year waves that fluctuated between periods of prosperity and decline (Perry 1984). The 1920s and 1950s were periods of low coal prices and underemployment in the coalfields when employment dropped by as much as a third.[33] By the close of the 1960s and in the second period of coal, the mining labor force had eroded to around 125,000 due to increasing productivity associated with fewer mines and improved technology.

The 1930s was the first nadir in coal production and is associated with the rise in organizing for coal miners rights. Around the United States declines in the mining labor force were associated with some of the most violent and important battles in the history of coal. These

[32] A number of retired coal miners related stories of wives and mothers paying off the debts of the miners by having sex with managers and owners.

[33] From 1920 to 1932, employment dropped from 640,000 to 400,000 and the number of working days per worker decreased from 220 to 146. In the 1950s, working days remained stable but the number of mines in operation declined to around 7,700 (Perry 1984).

include the Ludlow Massacre (CO), Bloody Harlan (KY), Paint Creek-Cabin Creek Strike (WV), Matewan Massacre (WV), and the Battle for Blair Mountain (WV). The violence erupting in the nation's coalfields was over the right to organize, political representation, prohibition of blacklisting, and making sure that the check weighman, the person responsible for weighing the coal tonnage pay rate, was from the union and not a company man. It was around this time the UMWA started to gain traction in West Virginia. The passage of the National Industrial Recovery Act (New Deal) in 1933 allowed for the first time the protection of workers' rights to unionize (Bradshaw 1992).

The second socio-ecological project began in the 1930s and was characterized by the large-scale industrialization of mining through mechanization and the heyday of union organizing in Appalachia. From the 1930s to the 1950s, the UMWA had a great deal of control over coal production. During this time, the coal industry was booming because of the war effort. Throughout World War II the federal government nationalized the coal industry (McGinley 2004). Negotiations between the federal government and UMWA President John L. Lewis resulted in higher wages paid to miners (ibid). This boom period eventually came to an end and in the early 1960s the crisis in the coalfields began anew, only to be tempered by the emergence of the neoliberal socio-ecological project, characterized by the use of mountaintop removal mining practices and the assault on organized labor. It was during the second socio-ecological project in the coalfields that strip mining emerged and a new set of messy bundles were constituting West Virginia's coalfields.

The reproduction of capitalism requires the increasing mechanization of production on ever-larger scale (Clark et al. 2012). In the context of early 20th century coal mining, contour strip mining was first introduced into West Virginia in 1916. The strategy of contour strip mining

involves the terracing of mountainsides, scraping away the overburden to reveal horizontal coal seams. The mountainous landscape of Appalachia prevented the widespread adoption of this method of extraction (Montrie 2003). Strip-mining increased ten-fold during World War II due to the high demand for coal and the low labor requirements. While an underground operation would require forty miners, a surface mine frequently had ten or fewer miners (Montrie 2003). Strip mining may have increased coal production with fewer miners, but it was apparent the environmental costs were adding up.[34] The large-scale use of strip mining also led to a massive labor migration out of the coalfields in the 1950s due to mechanization, low coal prices, and competing energy alternatives (Laslett 1996).

This precarious time in the history of labor occurred in the context of John L. Lewis's forty-year long leadership of the UMWA. With John L. Lewis at the helm during the close of the first period of coal mining (1920s), the UMWA became a force to reckon with, being one of the most strike-prone industries (Clark 1981; Silver 2003). When most unions were going along with national legislation like the National War Labor Board (NWLB) and the War Production Board (WPB), legislations that promoted a no-strike pledge during the war years, John L. Lewis ordered strikes all over the anthracite and bituminous coalfields (Zieger 1996; Brisbin 2002). In 1941 prior to US entry into WW-II there was a major strike in the coal industry that was followed with another major strike after the war (Podobnik 2006). Lewis's uncompromising position, even during the war effort, was successful in securing welfare and retirement funds for union miners and included medical benefits (the best in heavy industries) and pensions (Clark 1981). "Between 1934 and 1952 there were thirty-four major work stoppages in the coalfields, including eleven industry-wide strikes." (Clark 1981: 15). The strong labor militancy of John L.

[34] Contour strip mining would soon be modified into the modern day mountaintop removal mining beginning in the early 1970s.

Lewis and the UMWA's awareness of the necessity of coal provided an ideal situation for those miners who were unwilling to compromise, even during the war, and sought to maintain an autonomous labor movement (Zieger 1996).

Changing market conditions pushed Lewis into a more compromising position by the 1950s, but he remained closely aligned with the concerns of the rank-and-file. The pressure for compromise occurred in the context of a falling share of the energy market from 30.3 to 23.1 percent (1940-1964) in the United States as home heating and power locomotives replaced coal with oil and gas (Clark 1981). In 1951, the UMWA agreed to further mechanization in the mines in exchange for higher wages and benefits with the passage of the Bituminous Coal Wage Agreement (Clark 1981; Brisbin 2002). One of the largest changes that increased labor productivity was the continuous miner, a machine that could be operated by a five-man crew, using a rotating toothed-wheel to cut coal seams and transfer it directly to buggies that drew the coal to the surface (Brisbin 2002). Capitalism's dependence on increased labor productivity necessitated the shift to machine dominated mining. The outcome of this coal technology was a reduction in the number of miners, the elimination of incentive based production, and it created a more factory like environment governed by the supervised assembly line production of Fordism (Brisbin 2002). The result was that from 1950 to 1959 mining employment decreased from 416,000 to 180,000 (Brisbin 2002).

The period leading up to the emergence of the neoliberal socio-ecological project was a depressing time in the coalfields of Appalachia. During the 1950s, the coal industry went through a long slump that resulted in the Great Migration out of Appalachia. Over two million Appalachians migrated out of the region to thriving industrial cities like Detroit, Chicago, Columbus, Cleveland, and even New York City (Caudill 1963). In part the reduction in coal

production was the result of the competitive advantage of oil as energy for fueling factories and heating homes (Raitz & Ulack 1984). With the slumping coal market, coal companies had to shut down mines and reduce their labor force, thus pushing communities further into poverty. West Virginia's resource-dependency and ensuing economic depression demonstrates how its socio-ecology is constitutive of capitalism in the world-ecology. In West Virginia, coal mining declined by 70 percent between 1950-1970 (Maggard 1993). With the combination of strip mining and the introduction of the continuous miner, competitive energy markets, and compromise between the union and the coal companies, poverty was deepening in the coalfields. Appalachia had poverty rates as high as 60% in the early 1960s, while for the rest of the country poverty was around 30% (Ziliak 2012). Under these conditions "War on Poverty" and the Appalachian Regional Commission (ARC) of the 1960s are created.[35]

In the context of deepening poverty, Tony Boyle emerged as the eleventh UMWA president in 1963. Boyle failed to align with the rank-and-file miners and their interests, instead engaging in corrupt practices and used violence to discipline union-members. Resisting these practices, the Miners for Democracy were formed under the leadership of the newly elected UMWA President Arnold Miller replacing Boyle, who was imprisoned for orchestrating the murder Jock Yablonski and his family. Miners for Democracy gave voice and power to rank-and-file miners, who were fighting for the recognition of Black Lung Disease and benefits for the disease's management (Chomsky & Montrie 2012). This tumultuous period of UMWA history

[35]In part, the regional acts were an outgrowth of past development projects and in particular the contentious development of the Tennessee Valley Authority (TVA). The TVA was a government funded development project that provided flood control, electricity, and potential economic development for parts of Appalachia. Its goals were to stimulate regional economic development that would help lift the United States out of the Great Depression. This top-down approach to economic development was the predecessor to the "War on Poverty" and ARC (Bradshaw 1992).

provided stability and benefits to miners, while also witnessing the violence that historically characterized the coal industry enter into the labor organizations of the rank-and-file.

Not only were the strengthening of the rank-and-file miners of the UMWA central to the exhaustion of the second socio-ecological project, but environmental and health acts such as the "Coal Mine Safety and Health Act, the Clean Air Act, the Federal Water Pollution Control Act, and the Surface Mining Control and Reclamation Act" are essential as well (Bell & York 2010: 122). These develops are significant to the organization of the neoliberal socio-ecological project by highlighting the continuity between technological innovation, labor-capital relations, energy markets, policies. Previous SCSEP provide clarity to the narrative of the neoliberal socio-ecological project that this chapter outlines. The relations in the coalfields are organized through the national, and to a lesser extent global, market volatility of the energy industry but the coalfields simultaneously structure those market relations, illuminating the significance of labor organizing to these earlier socio-ecological projects. Clear socio-ecological changes were unfolding in which the coal industry, within a broader national political economic change, would restructure human and extra-human natures to suit the needs of ever larger coal companies based on non-union labor and greater mechanization of the mines. With the fall of the union in the 1980s, there was a vacuum in organizing in the coalfields that was later filled by community and environmental groups that largely stayed true to the ideals that the UMWA had previously fought for.

The Neoliberal Socio-Ecological Project

Before jumping straight into West Virginia's neoliberal socio-ecological project, I will broadly characterize neoliberalism and some of the general patterns that have evolved from its establishment. Neoliberalism is difficult to define because it is often used to draw links from a variety of economic, political, cultural, and social relations and processes. Harvey broadly

defines neoliberalism as a global project to revive capital accumulation and to restore power to economic elites (2005). Heynen et al. (2007) agrees with Harvey's definition of neoliberalism, but argue for a more context and geographically driven analysis of neoliberalism on the ground. Much of the literature engaging with neoliberalism do not have a single definition, rather they often lay out the general characteristics forming neoliberalism (McCarthy & Prudham 2004; Peet & Hartwick 2009; Peet et al. 2011). The general consensus from the literature on neoliberalism is that market fundamentalism is the principle force organizing the political, social, and economic facets of society. Neoliberal ideology values the privatization of goods, services, and property, along with the entrepreneurial spirit of individuals unhindered by governmental intervention and regulation. In reaction to the Kenynesian crisis, neoliberalism was an attempt to shift the federal government to the free-market and individual states as principle organizing force for society.[36]

Following the multiple oil-crises of the 1970s, and as part of reviving capital accumulation in the neoliberal era Reagan and Thatcher (under the slogan of There Is No Alternative) targeted and dismantled powerful unions like the Professional Air Traffic Controllers Organization (PATCO) and the National Union of Mineworkers (NUM). Aside from controlling labor unions, Reagan focused on reducing the role of the federal government on issues like the environment. Neoliberalism on the national scene during the Reagan administration resulted in major changes in environmental policy and practice. As part of the neoliberal ideology, Reagan along with other "neocons" was interested in shrinking the federal government's involvement in environmental issues. Reagan's three-prong policy for reducing the federal government's involvement in environmental issues consisted of deregulation, defunding, and devolution (Andrews 1999). Deregulation refers to limiting further involvement from the

[36] Many political ecologists have studied the relationship between neoliberalism and the social and naturel environment (Prudham 2004; Bakker 2005; Goldman 2005; Li 2007; Lockie & Higgins 2007; Potter & Tilzey 2007; Prudham 2007; Castree 2008; Brockington et al. 2008; Guthman 2008; Klooster 2010)

federal government, along with relaxing existing environmental regulations. As part of the EPA's defunding the regulatory agency's budget was drastically cut in combination with large tax cuts. Lastly, devolution meant the shift of environmental regulation and responsibility from the federal government to the state government (Ibid). Its impact on coal resulted in a weakening of the institutions governing health and environmental safety.

Coal companies, communities, and social movements have formed the neoliberal socio-ecological project in West Virginia. The organization of the current socio-ecological project developed out of the restructuring of the world-economy after the crises of the 1970s and 1980s. Neoliberal restructuring of the coal industry in the 1980s resulted in the widespread elimination of union mines in conjunction with the greater use of large-scale mega-mining in the form of mountaintop removal mining.[37] The restructuring of the United States coal industry has also included a shift from traditional areas of extraction in Appalachia to places like the Powder River Basin in Wyoming and Montana where large-scale open pit mining is standard practice. "A large factor in this [unemployment] decline was the surge in federal coal leasing in the Western United States, shifting production to these extensive and less expensive reserves" (Perdue & Pavela 2012: 373). These mining regions typically use non-union workforces and engage almost exclusively in surface mining. The Powder River Basin and similar regions around the United States represent new resource frontiers that force Appalachian coal to compete. Productivity per worker-hour in the Powder River Basin is 39 tons compared to West Virginia's 7.59 tons, meaning lower operational costs (Goodell 2006). On the one hand, the data below illustrates increased production and employment in the western coalfields, like Wyoming and Montana. On the other hand, it also shows how decreased production and employment is part of Appalachia's

[37] Or as one interviewee noted, "mountain-range removal" is a more apt description of the scale of destruction associated with such mining practices.

declining industry. However, one major advantage Appalachian coal has over most other coal regions in the U.S. is the high heat from its combustion that is used for steel making. This

U.S. Coal Producing States (2006)

State	Total Coal Production	Underground Mining Jobs	Surface Mining Jobs	Total Jobs	Annual Production Per Miner
West Virginia	152,374	13,190	6,886	20,076	7.59
Kentucky	120,848	11,902	6,057	17,959	6.73
Pennsylvania	66,029	5,099	2,427	7,526	8.77
Wyoming	446,742	128	5,709	5,837	76.54
Virginia	29,740	3,623	1,639	5,262	5.65
Alabama	18,830	2,621	1,574	4,195	4.49
Illinois	32,729	3,507	470	3,977	8.23
Indiana	35,119	1,231	1,627	2,858	12.29
Ohio	22,722	1,384	1,029	2,413	9.42
Colorado	36,322	1,682	547	2,229	16.30
Texas	45,548	0	2,138	2,138	21.30
Utah	26,018	2,030	6	2,036	12.78
New Mexico	25,913	368	1,004	1,372	18.89
North Dakota	30,411	0	947	947	32.11
Montana	41,823	58	884	942	44.40
Washington	2,580	0	673	673	3.83
Tennessee	2,804	333	327	660	4.25

Maryland	5,054	205	285	490	10.31
Arizona	8,216	0	418	418	19.66
Louisiana	4,114	0	243	243	16.93
Oklahoma	1,998	73	151	224	8.92
Mississippi	3,797	0	178	178	21.33
Alaska	1,425	0	96	96	14.84
Kansas	426	0	61	61	6.98
Arkansas	23	41	2	43	0.53
Missouri	394	0	20	20	19.70
Total U.S.	1,162,750	47,475	35,398	82,595	14.08

Figure 3.1 U.S. Coal Producing States
Source: http://www.sourcewatch.org/index.php?title=Coal_and_jobs_in_the_United_States

metallurgical coal provides the high BTUs required for steel making (see Figure 3.2 for an explanation of the various types of coal). The restructuring of the coal industry is associated with vastly larger-scale levels of coal extraction, far fewer unionized mines, drastically fewer miners, an increase in surface mining (especially MTR), and competing coal frontiers, like the Powder River Basin.

Types of Coal Found in the United States

Types of Coal	**Definition and Use**
Anthracite	Has highest carbon content, 86-98%. Most of which is found within Pennsylvania, many deposits have been exhausted and it has largely fallen out of use.
Bituminous • Metallurgical or Coking Coal • Steam Coal	Most plentiful and commonly used, especially for industrial purposes. Carbon content is 48-86%. Metallurgical or coking coal is used for the steel industry. Steam coal is used primarily to generate electricity
Sub-bituminous	Cleaner burning coal but with a low carbon

	content of 35-45 percent. Found mostly in Western states and Alaska.
Lignite	Has the lowest carbon content, 25-35%. Used for electricity generation.

Figure 3.2 Types of Coal Found in the United States
Source: Energy Information Administration

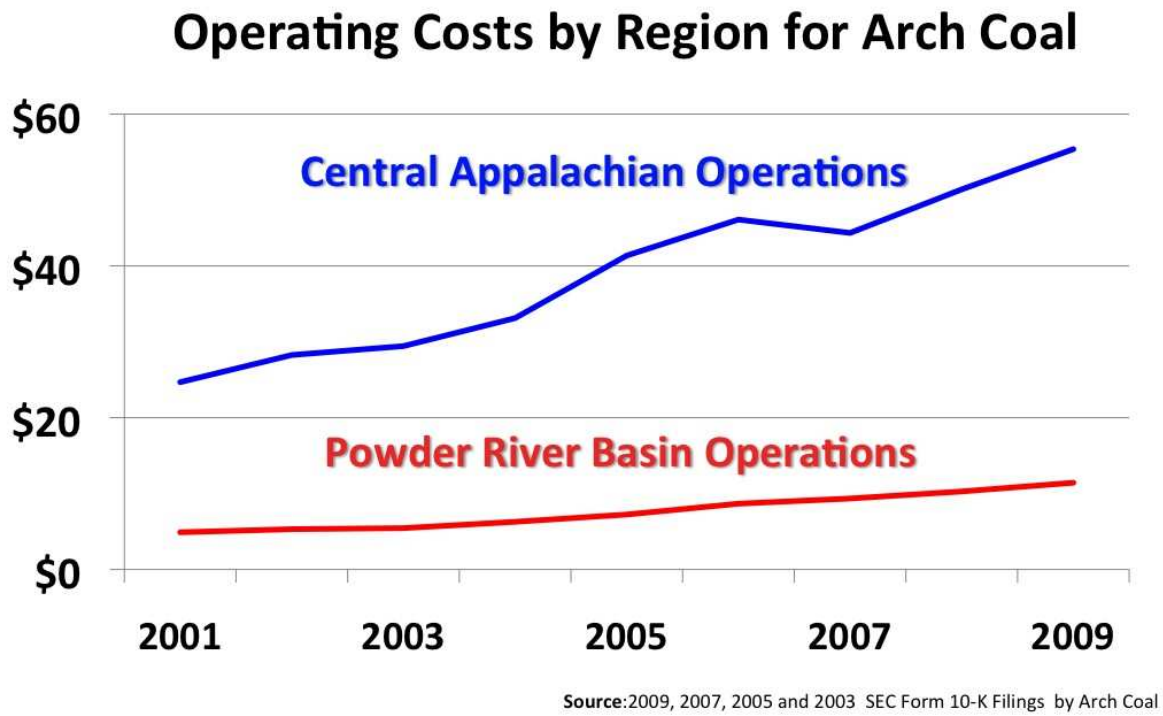

Figure 3.3 Operating Costs by Region for Arch Coal
Graph Courtesy: Appalachian Voices

Historically barriers to the globalization of the coal industry were rooted in the transportation costs associated with this low-value bulky commodity (Pomeranz 2000; Podobnik 2006; Mitchell 2009, 2011). In the 1970s, the coal industry restructured around global markets, consolidating internally and merging to form energy and mining conglomerates (Perry 1984; Seidman 1990; Mitchell 2009). For example, Gulf Oil Company acquired Pittsburgh and Midway Coal Company and Conoco merged with Consolidations Coal. The globalization of coal meant that newly created conglomerates were concerned with the economics of extraction both in terms of price and return on investment (Perry 1984). Since the 1970s, there has been a doubling in the international trade of coal that has been facilitated by rising oil prices and the

increasing the use of sea-shipment for transporting coal (Ellerman 1995). Sea shipment was essential for very cheap and important bulk goods like coal (Leitner 2004). Coal experienced the most dramatic globalization with seaborne trade increasing from 145 billion ton-miles in 1960 to 1849 billion ton-miles in 1990 (Ciccantell and Bunker 2002). The transformation of the coal industry through globalization meant that coal could be shipped throughout the world and was now competing internationally rather than regionally, weakening the UMWA's power. The globalization of the industry permitted companies to travel to the Global South, especially important are Columbia and South Africa, to source the production of coal while also utilizing lower grade coal deposits within the United States. The qualities of Appalachian coal for metallurgy insulated it at least partially from the threat of globalized production illustrating how the specific physical qualities of coal is constitutive of the world-ecology. However, there were clear changes occurring in West Virginia's socio-ecology that can be partly explained through the increasing globalization of the coal industry.

Associated with the globalization of coal, rising oil prices, new labor and environmental regulations, and railroad deregulation eroded the power of the union as the industry began to consolidate and operated in disparate locations around the world (Chomsky and Montrie 2012). Rising oil costs in the 1970s expanded coal markets while several federal initiatives promoted the use of surface mining and further mechanization in the industry by channeling funds to the coal industry as part of the war on poverty in Appalachia (Ziliak 2012). This attempt at modernizing the industry through larger scale extraction as a means of promoting higher standards of living challenged the power of the UMWA as labor productivity increased, even as individual miners were receiving higher wages (Clark 1981). The Mine Health and Safety Act of 1969 as well as state and federal surface mining laws imposed new requirements such as

inspections, training, and surveillance in an effort to reduce coal dust and increase ventilation in underground mines (Perry 1984; Ellerman 1995). New regulations meant that coal companies had to internalize the costs associated with the health and safety consequences of underground coal mining. The deregulation of the railroad industry with the 1980 Staggers Act removed federal controls on state price fixing and provided an incentive for the globalization of coal (Winston 1998; Goodell 2006). Between the profit squeeze of railroad deregulation, new environmental and labor legislation, and rising oil prices, the coal industry restructured and globalized in the face of the economic challenges of the 1970s.

In concurrence with the restructuring of the coal industry, Reagan repeatedly tried to dismantle the 'war on poverty' and Appalachian Regional Commission. Many of the governors of Appalachia fought for the continuation and expansion of ARC as they saw how the people of the region were benefiting from the funneling of federal funds into education, infrastructure, and industry. The Reagan administration ended up gutting many of the programs and funding of ARC (Bradshaw 1992), demonstrating the goals of less governmental intervention, at least in regards to environmental matters. Aside from Reagan dismantling regional development acts and projects, he promoted removing barriers of international trade. In the context of coal mining in Appalachia this meant disciplining the UMWA by importing coal from parts of South Africa (Seidman 1990). With the slump in the coal market, many coal companies were merging, consolidating, and being taken over be oil companies that were simultaneously exploiting low-wages in South Africa and threatening the powerful UMWA that had emerged through 1970s coalmining boom (Seidman 1990). Lastly, one retried coal miner I interviewed described the impacts Reagan had on the coal miners in Appalachia.

> Reagan to me, Bush was bad, but in my opinion Reagan is the worst and done more damage and got more credit for being something that I don't think he was. I like to think 3 [things] that he

> always done. Ya know the miners marched the streets down here in Charleston and all across this country to get black lung benefits in the late '60s and early '70s. Reagan basically wiped out all of them with a swipe of a pen by making restrictions. So they put what they call a blood gas test on the miners. That you basically had to be dead to get it. In other words, you had black lung. Out of the 29 miners that got killed at Upper Big Branch, I think it was 25 of them that had black lung. If a100 miners apply for black lung 3% of them get it. How did 24 of the 29 miners have black lung and the other I think 4 or 5 that didn't have it was young kids that were 20 or 21 years old that just went in the mines. Anybody can tell you this and anybody that has time in the mines, if you worked in the mines for 10 years you've got black lung. If you are underground you've got black lung. Pay the man something. That was another one of coal company things, if you sign a waiver that makes the restrictions so tough that you have to bag of oxygen around in order to get it or you have to die and your wife has to get an autopsy performed on you and she is more likely to get it than you are. That was one of the things that was taken from union miners by Reagan.

The above changes began with what many miners and community members call a rogue company, A.T. Massey, who in 1984 refused to sign the national contract negotiated through the Bituminous Coal Operators' Association (BCOA), an institution mediating relations between the coal operators and miners. The UMWA and coal companies had historically both agreed to the conditions of the contract. When A.T. Massey refused to sign the contract negotiated through the BCOA, they drew a line in the sand in which they were no longer willing to work with the union. A.T. Massey then proceeded to buy out union mines in southern West Virginia only to close them and later re-open them as non-union mines.

> Well I mean it [union to non-union mining] started probably around; it started changing around the early 80s. That's when ya know everything back then was like I said union and Massey brought one of the first non-union operations on the Coal River, just happened to be right across from the river where I use to live at. It's about 25 minutes from here down in Sylvester. So ya know we watched this plant being built and everybody knew it was kind of gunna go non-union. And so when it did we tried to organize them. We spent a solid year on the picket line and they were bringing out of area people in there paying them over union scale to keep them working there to, to go through the picket line to have to deal with all this violence and intimidation they were facing.[38]

During this period, contracted union mines could be sold one day and the next re-opened as non-union mines (Brisbin 2002). Frequently these mines employ the same supervisors and overseers. Massey proceeded up and down the Coal River Valley buying up union mines, closing them

[38] Interview, retired coal miner.

down, and later reopening to a non-union workforce. The effects cannot be overstated.[39] One retired coal miner remarked such changes,

> These communities were a lot larger than they are right now and it was like tight-knit and everybody was a lot more family orientated, communities were. All that's been dismantled. You very rarely see or even hear talk about the United Mine Workers. They just don't do any organizing. You just don't see or hear from them. It started effecting the communities to where ya know the communities use to stand up and fight for what was going on in their communities and now ya know a lot of these communities neighbors don't even know their neighbors. It's just torn the communities apart. But now there is little union support and even any presence of the union in our communities.

The outcome of Massey's union-busting was the diffusion of these practices to other coal companies and a broad defeat of the union. By 2000, nationwide UMWA membership was 20,522 (Burns 2007). Over half the regional mining labor force disappeared between 1979 and 2003 (Moody 2007: 70). Associated with the decline of UMWA numbers was the appropriation of UMWA leadership as a booster for the coal industry (Chomsky and Montrie 2012).

Resource Frontiers & Technologies of Mass Destruction

The historical development of capitalism in the world-ecology has been creation of technologies of mass destruction that have constituted the development of resource frontiers. Resource frontiers, enabled by the reorganization of cheap labor and new techniques of growing, mining, and extracting, developed as a need to supply cheap resources to core economies.[40] Further development of the forces of production often meant greater use of raw materials and resources and increased circulation of commodities. As Timothy LeCain (2009) rightly points out, the development of economies of scale formed around mass production and mass consumption are simply not possible without the development of mass destruction. Mass destruction, constituted in the development of increasing scale of resource extraction in conjunction with the geographical movement of resource frontiers has reproduced the capitalist

[39] These changes are discussed in Ch. 4: Contours of the Socio-Ecological Crisis: Labor, Community, and the Natural Environment.
[40] Examples of resource frontiers include logging, fishing, copper and coal mining, and sugar and coffee plantations.

world-ecology. Development of resource frontiers meant the reorganization of human and extra-human natures, bringing spatially together cheap labor, large resource reserves, and increasing sums of capital.

One of the early resource frontiers in capitalism occurred in the 15th and 16th century with large-scale sugar plantations on the island Madeira, in which cheap and slave labor along with an abundance of forests for fueling sugar production, provided the necessary resources for the production of cheap sugar (Moore 2009). As deforestation quickly ensued over the next century, Madeira's profitable resource frontier became in crisis. The copper mines of the American southwest represent another resource frontier enabled by relatively cheap labor and large-scale technologies of open-pit mining (Bridge 2000; LeCain 2009; Huggard & Humble 2012). Beginning in the early to mid-20th century, large-scale earth moving machines like steam shovels and bulldozers enabled the transformation from underground to above ground copper mining. The greater utilization of constant over variable labor opened new profitable reserves that were only possible through the engineering of new techniques mining, refining, and processing of copper ore. This resulted in the radical transformation and organization of the geographical socio-ecology of the American southwest.

Appalachia's coalfields represent another resource frontier in which relatively cheap labor and technologies of mass destruction have been spatially integrated over time. A.T. Massey and other powerful coal companies used large-scale surface mining, especially mountaintop removal mining. Mountaintop removal practices officially began with the opening of the Bullpush Mine in 1970, located in West Virginia (Burns 2007). Technological innovations, although traditionally slower in coal mining compared to other industries, had deleterious effects on the workforce. According to the Bureau of Labor Statistics, West Virginia had no less than

125,000 miners in 1950 but by 2004 that number had declined to 16,000 (Keep WV Wild 2012). The dramatic increases in labor productivity saw a thirty-two percent increase in coal production while at the same time there was a twenty-nine percent decrease in the mining labor force (Keep WV Wild 2012). In 2009, of the 56,000,000 tons of coal produced through surface mining, 46,000,000 tons were produced using mountaintop removal mining (West Virginia Coal Association 2013).[41] In 2010, West Virginia produced 142,944,106 tons of coal and of that 50,708,470 tons was from surface mining (MHS&T 2012). A retired UMWA member noted the changes in production during his career.

> Ben, in the 1972 there are a 125,000 underground coal miners in the state of West Virginia. What happened to all those guys? What happened to their jobs? Times change. The equipment has changed the mining industry. When I went into the mines in 1980 or '81 our shuttle cars only held like 15 to 18 tons. They hold 33 tons now. So if you had two guys driving the 15 to 17 tons, how many do you need now if one of them hauls 33? Just one. Ya know how big a big loader is now? I mean some of these loaders are so big you could put multiple pick-up trucks in the buckets, just the loader. They have shovels 285-ton truck takes two shovels bang-bang its loaded. Mechanization improvements in equipment, improvements in efficiency have changed the coal industry and will continue to change it. (Interviewed June 25, 2012)

As stated in chapter 2, labor productivity is significant to the profitability of specific industries and capitalism as a whole. MTR mining provided the much needed increase in labor productivity that the coal industry required. However, its adoption has left large portions of the working population of southern West Virginia redundant. With the widespread adoption of MTR mining, the eco-systems of Appalachia have not faired any better.

Mountaintop removal mining entails utilizing large earth-moving machinery to get to difficult sources of thin coal seams, sometimes as thin as one foot, that occur relatively close to the surface. These massive earth-moving machines are tremendously capital intensive, creating cost barriers very few coal companies are able to overcome. The largest companies practicing MTR mining include Arch Coal Inc., National Coal Corporation, and Alpha Natural Resources

[41] Although MTR mining jobs only make up about 1% of West Virginia's workforce, the average worker brings home over $900 a week (McGinley 2004).

(Massey Energy merged with Alpha Natural Resources in June 2012). These companies supported by financial institutions, private companies, and investors are able to raise enough capital to purchase the necessary equipment and machinery for MTR mining. The heart of the extraction process is the 20-story dragline, which can cost over $25 million and take years to assemble (Burns 2007:8). The bucket of the dragline can move more than 110 cubic yards of rock, dirt, coal, etc. (Fox 1999:166). Transformations in productive technologies have generated unprecedented production levels while UMWA membership has dipped to all-time lows (Chomsky and Montrie 2012). The socio-ecological consequences of such practices cannot be underestimated.

To begin the large operation of MTR mining, companies must clear cut forests to make space where equipment, trucks, and machinery can have easy access to operate. The next step is removing the topsoil to get greater access to coal seams, which consequently destroys habitat for wildlife and vegetation. The Surface Mining Control and Reclamation Act of 1977 legalized the destruction caused by strip mining and in 2002 the Bush Administration redefined mining waste as ‘fill’ to allow the coal industry to fill in valleys and waterways with the overburden of surface mining and MTR (Montrie 2002; Chomsky and Montrie 2012). Following the removal of the soil is the use of explosives (usually ammonium nitrate) to blow up parts of the mountain to expose coal seams along with non-coal materials. These explosions can blow rock and dirt up as high as 800 feet. This ‘fly rock’ is an uncontrollable danger to nearby homes and communities that lie below, large rocks and boulders have been known to crash onto houses and peoples properties even causing death. The rubble and debris, or overburden, from the mountain is gathered and pushed off the side of mountains into what the industry calls valley fills (Burns 2007).

Photo Courtesy: Ilovemountains.org
"Mountain Range Removal"

Mountaintop removal is the material practice that organizes the socio-ecological project in Appalachia, as it exists under neoliberalism. Draglines, bulldozers, dump trucks, coal trucks, and explosives all make MTR possible are made of the messy bundles of human and extra-human natures. Engineering, manufacturing, and repairing, along with iron, steel, copper, oil and other resources are constitutive of the earth-moving machines of MTR operations. This is not to say that extra-human nature is merely a passive source of resources to be used, rather extra-human nature is actively producing the environment in which the earth-moving machines are produced and in which they operate. From the mountains, streams, valleys, hollows, and even humans, extra-human natures are constantly producing environments. For O'Connor, machines of production are viewed as external to nature. While for Moore and the socio-ecological

approach, machines are made up of human (engineering, manufacturing, repairing) and extra-human natures (raw materials and natural resources). West Virginia's coalfields socio-ecology is governed by MTR practices at the level of the worksite, the community, the state, and the region. Capitalist global market relations organize this form of productive activity by situating the socio-ecological project in space and time. Given the immense devastation caused by MTR mining and the significant decline of the UMWA, communities in the last decade are starting to fight back against the coal industry. From its inception in the coalfields, the UMWA had worked in support of not only labor issues but community issues as well. With the decline of the union, community and environmental organizations have begun to fill this void. Environmental and community groups opposing the practice of MTR realize its impacts on the water, soil, and air quality of the local environment. Cancer rates are twice as high in MTR areas as compared with non-MTR areas (Hendryx et al. 2012).[42] Poverty rates too are significantly higher the closer one resides to an MTR site (Hendryx 2011). Community outreach, letters to politicians and legislators, and protests have been on the rise.

The origins of the contemporary crisis in West Virginia are found both in the restructuring of the coal industry under neoliberal development and longer histories of exploitation as a resource rich region. West Virginia's crisis, therefore, can be historically and geographically situated and produced in the dynamic and unequal power relations of capitalist development that takes different forms constituted in different socio-ecological projects. It is capitalist development that actively produces different socio-ecological time-space relations in which we come to understand how West Virginia has transitioned through crises during its 150-year relationship with coal. In doing so, nature-society relations are reconfigured in specific

[42] The coal industry responded by claiming the higher rates of cancer were due to inbreeding instead of the toxic chemicals leaching from mine sites. Source: Sheppard, Kate. 2011. "Cancer Rates Higher Near Mountaintop Removal Sites" *Mother Jones*.

ways to both (albeit highly unevenly) renew capital accumulation and provide the necessary conditions for social reproduction. In chapter 5, I will discuss the *potential* for moving beyond the crisis and the ways in which different interests group vie for control over the future of West Virginia. In the next chapter, however, I will examine the characteristics of the crisis and its hidden costs for the coal communities of West Virginia.

Chapter 4: Contours of the Socio-Ecological Crisis: Labor, Community, and the Natural Environment

The purpose of this chapter is to identify: what are the characteristics of the socio-ecological crisis and the hidden socio-economic, political, and ecological costs of regions and communities historically dependent on coal? To answer these questions I draw on data collected from interviews and secondary sources that both describe the socio-ecological crisis and highlight the hidden costs of coal. Extracting data from interviews allows for an empirical study to speak to the theory, or, in other words where the rubber hits the road. In particular, the data highlights and details the socio-ecological crisis from different angles: workers, communities, and the physical environment. This socio-ecological crisis is constituted in the coal communities' historical resource-dependence, political decimation of the UMWA, and the overproduction of mining through MTR that has entailed the shaping and reproducing all forms of human and extra-human natures.

The Socio-Ecological Crisis

As discussed in chapter 3, the production and origins of the current socio-ecological crisis lie in the restructuring of the coal industry in the early 1980s and in the longer histories of regional resource dependency. This chapter seeks to characterize the socio-ecological crisis through the stories and experiences of community members, environmental activists, and coal miners of West Virginia. Throughout the many interviews I conducted, participants detailed disturbing stories linked to the practice of mining and regional dependence on resource extraction. Their stories and experiences form the narrative of chapter 4.

West Virginia's socio-ecological crisis is defined as the inability to sustain a healthy life for workers and families of the coal communities due to the material practice of MTR mining and the political and economic decimation of the UMWA. That is, the socio-ecological crisis is

both always social/economic and ecological in that humans and extra-humans are the messy bundles constitutive of the webs of life (Moore 2013). MTR mining has resulted in the clear-cutting of some of the oldest forests in the world, the pollution of the earth's systems (air, water, and soil), the elimination of entire communities, and the making of thousands of miners redundant. These are the broad characteristics expressed in the material practice of MTR mining constituting West Virginia's socio-ecological crisis. The following chapter will bring to light the characteristics of the socio-ecological crisis and the hidden costs of coal through illuminating interview passages. It should be noted that the characteristics of the socio-ecological crisis and the hidden cost of the long historical dependence of coal are not mutually exclusive processes and outcomes. As such, they are dialectically produced in time-space at multiple scales. These transcending scales encapsulate innovations in the technical means of production, class conflict, accessibility or inaccessibility to clean environments, and economic development. These elements of the narrative will be categorically explained through labor, community, and the natural environment, or what O'Connor calls the 'conditions of production' (1998). The exploitation and degradation of these three elements are the contours forming the socio-ecological crisis of West Virginia.

Before examining the three elements in turn, it will be helpful for the reader to review the changes occurring in the coalfields of Appalachia and more broadly the economy of the US. As stated in chapter 3, in the wake of the oil crisis of the early 1970s there were massive investments in coal mining as a stable secure energy source. This generated thousands of well-paid mining jobs throughout the coalfields. One interviewee explained how when the men came home from Vietnam, they went straight into the mines where they could earn a great living even on part-time work (Community member: Interviewed July 2, 2012). This interviewee later

explained how even men from outside Appalachia were coming to West Virginia because there was such a high demand for workers with little education required. Wildcat strikes occurred frequently, to the point where many retired miners explained to me how they were striking over the smallest things, such as mine roads not being suitable.

Below is a chart detailing total U.S. coal production, total U.S. coal employment (union and non-union), and annual production per miner over the last century. Notably is the increase in coal employment in the 1970s due to the oil crisis and massive federal investments in mining. Also, it should be noted of the decrease in employment beginning in the early 1980s in conjunction with increased production per miner. Lastly, in the last decade or so annual production per miner has actually decreased, creating a profitability crisis for coal companies (discussed in detail in chapter 5).

History of U.S. Coal Production (Tons)

Year	Total U.S. Coal Production (Tons)	Total U.S. Coal Miner Employment	Annual Production Per Miner (in thousands)
1900	269,684	**448,581**	0.60
1910	501,596	**725,030**	0.69
1920	658,265	**784,621**	0.84
1930	527,172	**644,006**	0.82
1940	512,256	**530,388**	0.97
1950	560,388	**488,206**	1.15
1955	490,838	**258,616**	1.90
1960	434,329	**188,451**	2.30

1965	526,954	**144,864**	3.64
1970	612,659	**146,078**	4.19
1975	654,641	**193,787**	3.38
1980	829,700	**228,569**	3.63
1985	883,638	**169,281**	5.22
1990	1,029,076	**131,306**	7.84
1995	1,033,000	**83,462**	12.38
2000	1,073,600	**71,522**	15.01
2006	1,162,750	**82,595**	14.08

Figure 4.1 History of U.S. Coal Production (tons)
Source: http://www.sourcewatch.org/index.php?title=Coal_and_jobs_in_the_United_States

Today, there are less than 26,000 UMWA miners in the U.S. and less than 860 members in West Virginia (Activist: Interviewed July 21, 2012). The testimonies from retired coal miners about the UMWA and mining in the 1970s speaks to the re-emergence of a unified UMWA combined with increasing demand for coal. A retired coalminer I spoke with said he entered the mines in the 1970s and 75% of the workforce was unionized (July 2, 2012). With the restructuring of the coal industry in the 1980s, unionized coal suffered a major blow and saw a dramatic decrease in the number of mining jobs (see chapter 3). From 1993 to 2008 unionization rates declined from 21.3% to 9.6% (Morantz forthcoming). Today there are very few mining operations that employ union miners, leading to a race to the bottom that negatively impacts miners' health and safety.

Contemporary Labor

Since the 1980s, unsafe labor conditions and low standards have become progressively worse. A major element factoring in this pattern is the assault on US labor movements in general

and the UMWA in particular.[43] In fact, recent studies have shown an increase in cases of black lung for coal miners (surface and underground mining) (Ward 2012). The Mine Safety and Health Administration (MSHA) has issued few violations, monitoring has been sparse, and the monitoring system for measuring dust in the mines is easily circumnavigated by the companies leading to rising rates of black lung (ibid). In the last seven years there have been two major mining tragedies that could have been avoided. The first tragedy occurred on January 2, 2006 in Sago, West Virginia known as the Sago Mine Disaster killing 12 miners. The second tragedy occurred on April 5, 2010 in Montcoal, West Virginia known as the Upper Big Branch Mine Disaster killing 29 miners. Because it was more recent, the Upper Big Branch Mine Disaster struck a chord in many of the retired coal miners. They argued that because the mine was not union, mine owners Massey Energy forced the men to work in unsafe conditions. In a non-union mine the company will send mine-bosses down to inspect for dust, ventilation, and methane levels often ignoring clear health and safety violations. One retired coal miner explained how Massey's mining policy is 'run as much coal as fast as possible', often neglecting the well being of miners (Interviewed June 14, 2012). At Upper Big Branch there was a build up of methane in the mine and with one spark the whole mine lit up, killing the miners. Later, investigations revealed Massey had ignored many safety violations and previously had many more safety violations. An activist stated after the Upper Big Branch disaster someone from the company commented in a newspaper saying, 'I wish these MSHA (Mine Safety Health Administration) inspectors would just leave our men alone so they could do their jobs' (Interviewed May 22, 2012), highlighting the way the company views non-company inspectors.

[43] Within in the scope of this chapter and the thesis, I will only focus on the dismantling of the UMWA, not the broader patterns of labor struggles in the US.

This section examines the importance of mining coal backed by the UMWA. The restructuring of the coal industry has challenged organized labor, leading to dramatic differences between unionized and non-unionized mines. Union mines have lower rates of non-traumatic and traumatic injuries compared to non-union mines (Morantz forthcoming). As the Upper Big Branch Mine Disaster illustrates, a non-union mine uses company mine-bosses to inspect the mine. The mine-bosses are often under pressure from the company to 'run coal' as fast as a possible, and any obstacle to running coal should not be taken seriously. In a union mine, the UMWA has its own mine-bosses that inspect mine conditions before every shift (typically there are two shifts each day). If the union mine-bosses find any safety or potential hazards they report to the company, the miners, and the UMWA, allowing for documentation and a paper trail of any issues.[44] At first glance this may not seem like a big difference, but coal miners working in a non-union mine often do not feel comfortable pointing out potential health and safety hazards because of the risk of being fired or blacklisted.[45] One participant told me that he spoke out against the lack of ventilation in Massey Energy's mines and within a week he was 'laid-off' (Retired coal miner: Interviewed June 14, 2012). With 30 years of experience in every position in the mine, he applied at 15 to 20 mines without hearing a single call back. This legitimate fear of backlash from the company controls the miners, creating greater potential for risk of injuries or death. Miners are not the only laboring population faced with these work related issues, but there are higher risks of losing your job and/or not finding another equal or better paying job because of West Virginia's resource dependency.

[44] Many miners stated that companies like Massey Energy either distort their injury books or simply do not record many injuries.

[45] A number of retired coal miners had told me how non-union coal miners were fired for telling the company they weren't comfortable working in unsafe conditions. Blacklisting is often thought of as a turn of the century phenomena where companies placed names of miners who attempted to form unions or spoke out against mining companies, thereby limiting or eliminating the possibility of future jobs in the mines.

Aside from health and safety issues in the mine, the UMWA provides some of the best healthcare for workers in the U.S. The UMWA has a long history of concerns over adequate healthcare for obvious reasons. Working in the mines was and is one of the most dangerous jobs a person can do. Under the control of mining companies undergirded by the neoliberal socio-ecological project, the mines have permanently injured, killed, and slowly (black lung) taken the lives of thousands of miners throughout Appalachia. It is the dangers of mining that led to the UMWA fight for better healthcare for its members. One retired miner stated that while the United Steel Workers of America were fighting for higher wages, the UMWA was more concerned about improved medical care. Important to note, if a miner works for 20 years as a member of the UMWA they receive a 'health card' for life. This health card provides health, medical, and dental coverage for the miner and immediate family. One retired coal miner emphasized the importance of the health card.

> When I grew up in the coal camp in the '50s they had just got what they called their health card. And they called it HS55 and before my father lost his job we were covered by that, 7 children and my mother. That had a great effect on the health conditions on the coal miners and their families in the coal mining areas. In the Appalachian fields and coal mining everywhere in this country, it had a tremendous impact, protecting children women, miners, yourself if you got injured. And they [UMWA health card] are still pumping millions of dollars in these coal-mining communities for health services and pensions. (Retired miner: Interviewed July 16, 2012)

The health and medical care benefits achieved by the UMWA is all but a distant memory for most coal miners today. Non-union miners do not have anywhere near the equivalent of the UMWA health card, making it difficult to retire or care for their families. Often times non-union coal miners, like millions of working people in the US, either pay high costs for healthcare benefits or go without. Non-union miner's face particularly risks because of inadequate healthcare that frequently does not exist at all. Without healthcare, workers have difficulties paying for medical care and if they recover, they may continue to experience lingering health

issues associated with an untreated condition. Sometimes injured miners do not want to return to the mines but have difficulty finding comparable wages in other industries.

While healthcare benefits are an obvious important necessity for coal miners and any worker for that matter, pensions are vital for the soon-to-be retired. The UMWA takes care of miners during and after their working years, providing a reliable and stable standard of living within individual households and throughout the communities. Receiving decent pensions from the UMWA, retired coal miners are able to relax after working many tough years in the mines. The younger generation of miners' pensions come in the form of 401K's that many union miners argue is not a reasonable retirement plan for families to depend on.

The majority of members in the UMWA in West Virginia are retired coal miners. The younger generation of miners are simply not joining the UMWA. As a result, the future of the UMWA seems precarious. The organization's unsustainability has caused financial stress because there are fewer and fewer members joining and paying union dues. There is likely to be more financial pressure placed on the UMWA with a growing segment of retired miners dependent on pensions. Due to these conditions, one of the UMWA's top concerns is job creation/protection, including jobs in MTR mining. None of the retired coal miners I spoke to thought MTR mining was a 'great' long-term form of mining. In fact, the majority of them think it is wrong, as it is destroying the environment and eliminating mining jobs as a whole. Certainly not all union or non-union miners are opposed to MTR mining, but the ones I interviewed were opposed. Tension exist within and between miners over funds for pensions via MTR mining jobs and concerns for caring for the natural environment, making it a difficult topic to discuss within the organization.[46]

[46] The UMWA's does not have an official stance on the practice of MTR mining. Officially, the UMWA's main aim is to secure any and all mining jobs, whether its underground or surface mining. Some of the retired coal miners

So what are the hidden costs for non-union coal miners in the context of the socio-ecological crisis and the long history of continued economic dependence on coal? First, from the description above, it is clear that coal miners do not have a say in the operations of the mine, and thus are at the mercy of the companies policies and practices. This in turn leads to pressuring miners to produce as much coal as fast as possible while ignoring health and safety concerns. One retired coal miner pointed out how even community members were blaming the miners for the disaster, "Well they knew what they was working in, they could have spoke out and said something" (Interview June 14, 2012). Second, and related to the first, outspoken coal miners can quickly become alienated from their fellow miners if they disagree with certain practices such as MTR mining. In one case, a retired coal miner spoke out at against MTR mining at a monthly UMWA meeting. His fellow miners accused him of being a tree-hugger and to stop fighting the coal industry (Interviewed June 15, 2012). Third, because of the long history of economic dependence on coal mining, members of the coal community do not envision an alternative to a coal economy. This idea is materially reinforced by the historical practices of the industry. Historically, the coal industry kept other industries out of the regional economy allowing for coal companies to exploit a depressed dependent population that has internalized notions of 'West Virginia is coal' and 'we are nothing without coal'. Lastly, the hidden cost for labor in the context of the socio-ecological crisis is that miners are finding fewer and fewer well paying jobs. These jobs have been replaced by large-scale mechanized surface mining, creating what Davis calls 'surplus humanity' (2007) and allowing for companies to suppress wages for the remaining jobs. Coal miners today, then, have a drastically different socio-ecological relation with coal mining than the previous generation. The socio-ecology of coal mining has reorganized

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stated that MTR mining was not 'real' mining, often comparing their experiences as underground miners to surface miners. Some of the rank-and-file union miners are more willing to come out against MTR mining, although this is occurring in certain chapters of the UMWA.

in ways that favor capital accumulation, rather than miners' security, health, and safety. In fact, a retired miner compared today's working conditions with the early 20th century, noting mining conditions are about as bad as they were during the early years on the industry (Interviewed June 15, 2012).

The Community

In this section I examine the changes and characteristics of coal communities that have coincided with the restructuring of the coal industry and the socio-ecological crisis. In keeping with the discussion of the UMWA, I highlight the importance of the UMWA and the local communities in which it operates and is part. The UMWA's role is not only important for labor, but local communities as well. After all, it is UMWA members who form the basis of the community; they sustain those communities. While not so much recently, the UMWA was a major force in shaping West Virginia's communities socio-ecology. The degree to which the UMWA was a central force in West Virginia's communities, although difficult to answer, certainly has declined. Non-union members of the community are playing a greater role than in the past in regards of protecting and stabilizing community development. As one community member/activist stated the destructive nature of the coal industry to the communities, "I am fighting the genocide of a community, a culture, a heritage that goes back beyond the Civil War for some people. I identify myself as a survivalist." (Interviewed May 25, 2012)

With the restructuring of the coal industry, communities have been negatively impacted. The UMWA was at one time a central element of the reproduction of community bonds in the coalfields, a theme that frequently arose in interviews. For much of the history of coal in West Virginia, communities were identified in relation to the local UMWA chapter and the nearby mines. Now many of the local UMWA chapters have consolidated, creating less of a presence in

more communities. A member from the International Executive board stated that the UMWA is involved in many community activities, such as fundraising for school activities, coaching baseball/softball teams, and summer cookouts (Interviewed May 23, 2012). However several retired coal miners stated that, "you hardly ever see the UMWA anymore. They don't recruit anymore. And they don't make their presence felt in the communities" (Interviewed June 14, 2012).[47] This is due to restructuring in the industry where coal companies began offering higher wages to non-union miners, undercutting union organizing and resistance to MTR. The following passage highlights how the restructuring of the coal industry impacted the communities.

> It started effecting the communities to where, ya know, the communities use to stand up and fight for what was going on in their communities and now ya know a lot of these communities neighbors don't even know their neighbors. It's just torn the communities apart. But now there is little union support or even any presence of the union in our communities. (Retired miner: Interviewed June 14, 2012)

The pension the UMWA provides to its retired members contributes to the economic vitality of the local community. One retired coal miner related the importance of union pensions contribution to the communities,

> In my best estimates there are over 2,000 retired UMWA miners in this county [Mingo] that are drawing UMWA pensions and have UMWA healthcare. A lot of that money or all of that money goes back into the communities and businesses around here. Most people don't realize the economic impact retired UMWA miners have on the local communities. They don't realize when these miners and they are dying off everyday, these older miners that that's a little bit more taken out of your economy in this area. (Retired miner: Interviewed July 2, 2012)

This pattern of fewer and fewer pensioners is indicative of the general absence of younger miners from the UMWA. Over the last 30 years a full-on assault of organized labor and the UMWA has hollowed out the union as well as the communities themselves in this regional

[47] In the entire history of the UMWA there have always been tensions between the rank-and-file miners and the leaders. In the last 30 years tensions have increased between the groups, although possibly less so today, since most of the members are retired, because of the leaderships lack of response to large-scale surface mining, especially MTR mining, that has been a major contributor to fewer working miners in the industry.

economy dependent on coal extraction. Compounding this issue is the rise of MTR mining that has eliminated many underground mining jobs.

The characteristics and changes of the local communities in relation to MTR mining can be described as the forced removal of rural people from the newly configured capitalist landscape. The dual process of eliminating union miners and increased mechanization of coal extraction has cut the bottom out from underneath the local communities, creating increasing instability. As MTR mining has become more common throughout central Appalachia, there has been an increasing spatial expansion of mining and spatial dislocation of households and communities. Because MTR mining is so spatially expansive coal companies frequently offer buy-outs to residents homes that are near the mining site. Burns describes the typical process of buy-outs in the case of Blair, West Virginia.

> In Blair, both residents and businesses were bought out by Arch Coal with businesses purchased first, resulting in the loss of these business taxes. Residents would soon find themselves traveling miles for basics such as milk and bread, massive buy outs of the residents in the area took place, and population decline forced the closure of school systems, often the death knell for a small community. Before selling, homeowners signed agreements that they would never again return to the area to live and agreed not to criticize the strip mine operations. In its quest to limit the adverse affect MTR has on communities, the best solution equaled removal of the communities. In truth, these communities present an obstacle to the corporations which need the land for expansion. Only through the elimination of these communities can this be achieved. (Burns 2007:54)

This is a common practice occurring all over the southern coalfields of West Virginia. Residents' homes and private property are obstacles that coal companies must constantly deal with. For example, Larry Gibson and his family and friends own 50 acres with cottages and trailers on top of Kayford Mountain where MTR mining surrounds the community on all sides.[48] Larry and the community have refused to sell the land to the mining company. After many offers to lease the land the company and/or workers of the company have taken more overtly violent forms of persuasion. Larry has received many death threats and just last year his dog was hung and his

[48] As stated in the introduction chapter, Larry Gibson gave me permission to use his name and reveal his identity.

home robbed. Before Larry passed in early September 2012 he told me how he carried a pistol wherever he went for fear of the threats from the company. His family still owns the 50 acres on Kayford Mountain and refuses to sell to the coal company.[49]

The problems for home-owners do not end with simply being pressured by coal companies to sell. Problems extend to geophysical location in proximity to industrial activities and the health consequences arising therefrom. In fact, home-owners that are in proximity of mine sites have witnessed major declines in the value of their properties. The home value of Mary Miller's was originally assessed for $144,000, however, as a coal-fired prep plant and a new mine site opened, the value of her house dropped to $12,000 (Burns 2007). A retired coal miner commented on the negative effects from coal plants, "I mean we were breathing coal dust that had been run through a prep plant with 237 chemicals and your breathing this dust that's coming off this stock pile into your lungs and you can see that much build up on your furniture inside your house" (Interviewed June 2, 2012). The negative effects on property values make it nearly impossible to sell without taking a considerable loss. Many residents have no choice but to sell their homes because of the negative health effects from mining and processing coal. Most residents that end up selling their homes leave West Virginia for better job markets and healthier environments.

The Natural Environment

This section focused on the ways in which MTR mining have devastated the so-called natural environment and have caused great risk to the life sustaining ecosystems of Appalachian communities. Utilizing data from interviews provides a thorough understanding of the

[49] The poor air quality around the Gibson property has resulted in the death of many birds and respiratory problems for the residents. Larry actually showed me dead birds he stored in his freezer that he was going to get tested. Moreover, the residents complained about the increased sightings of snakes due to the loss of wildlife habitat.

degradation of the environment caused by MTR mining by allowing for real people telling personal stories and experiences of their relation to a more than compromised environment.

Although the messy bundles of human and extra-human natures are constitutive of all three conditions of production and because we currently lack a fully-developed language to discuss and analyze certain features of the environment, it is easier to abstract parts of the environment through O'Connor's formulation. As such, the physical environment has been seriously degraded as a result of MTR mining and the lasting effect of mining in general.[50] The landscapes of Appalachia have been altered from a life-sustaining ecosystem to a barren wasteland. The natural environment represents one of the three conditions of production necessary for capitalist production and accumulation. The state structures the relationship between labor, community, and industry to the land upon which mining occurs. In West Virginia, landowning companies are closely linked to the coal industry. Essentially the landowning and coal companies have a monopoly over ownership of land, generating unequal access to life sustaining eco-systems. These life-sustaining eco-systems not only provide clean water, animals, plants, and other resources, they are also spaces and places of cultural practices with long traditions.

Mining companies have externalized the cost of production and processing onto local and non-local eco-systems. With the advent of MTR mining there has been a radical transformation of the environment, hindering the ability of human and extra-human natures to reproduce. As stated above, large-tracts (well over thousands of acres per permit) of forests are clear-cut to allow massive machinery, like bulldozers, dump trucks, and the dragline onto the newly created mine site. These biologically rich forests are what ecologist E. Lucy Braun called mixed

[50] It is a 'so-called' natural environment because its arbitrary to name what is out 'there', or external, as the natural environment, and what people are as the social environment.

mesophytic (Hufford N.D.). This means while most forests might have two or three difference tree species, forests throughout central Appalachia, West Virginia in particular, often have up to thirty species in a given forest (Osha 2010). These biodiverse forests are permanently erased from the earth with the penetration of large-scale surface mining into the highlands of Appalachia. Large-scale surface mining erases these forests from the highlands of Appalachia.[51] Mining companies clear-cut large tracts of forests before bulldozing earth into the valleys, thus destroying critical wildlife habitat. Topsoil is removed around the mine site creating a higher probability of flooding in an already flood prone region. The picture below represents a typical MTR mining operation illustrating the drastic differences between the topographic characteristics of the landscape. As a result of clear cutting, many nearby residents of MTR sites stated they have seen more snakes than in the past. The loss of habitat has resulted in snakes migrating to other forested areas and more frequent encounters with people. This is not say that there is an aggregate shortage of land, but that surface mining has radically transformed local landscapes and ecologies, producing specific kinds of environments that are not biodiverse life-sustaining ecosystems. Southern West Virginia's biological diverse and complex socio-ecology is becoming increasingly simplified through capitalist production, generating all sorts of life-sustaining problems for human and extra-human natures.

[51] Proponents of MTR mining often argue that this form of mining flattens out mountains for development projects, like housing and shopping malls. As of now there have only been two development projects on a post-MTR mining site. One was a prison built in Martin county Kentucky, and the other was a golf course built on Mingo County, West Virginia (Burns 2007). The soil after MTR has performed is quite unstable making it dangerous to even walk around, let alone build houses and communities.

Photo Courtesy: Vivian Stockman, ohvec.org; Flyover Courtesy: southwings.org

Continuing with the transformation of the environment, the degradation of waterways has become one of the most contentious issues surrounding MTR mining. Access to clean reliable water sources is a necessary condition for all living organisms. First and foremost, because of long histories of poverty and discrimination, parts of central Appalachia still do not have access to clean running water and/or indoor plumbing. The director of the community center of Whitesville, West Virginia described to me some of the main issues community members were facing—one issue was of water quality and accessibility. She described to me how the mining companies around Whitesville had plenty of water for mining and processing the coal, but that some residents had no indoor plumbing or even nearby access to clean water. While attending a mountaintop removal ‘tour’, I witnessed nearby residents collecting buckets of water from water

sources close to the mining site. Although this water source showed no visible signs of pollution, anti-MTR groups discussed that the water was likely contaminated with heavy metals from mining, illustrating how poverty-stricken communities have few options of good quality accessible water. Water pollution is not unique to coal mining. In fact, natural gas extraction and hydrofracking, tar sands mining, and gold and silver mining have resulted in water pollution. However, in the case of coal communities, local and non-local institutions have allowed coal companies to do as they wish, reinforcing coal's long historical dominance in the region. What is particularly important is the fact that concerned community members often do not have the financial resources to fight mining permits or file lawsuits against companies.[52] In part, many community members are poor due to lack of alternative employment opportunities that has been historically produced and reproduced through the state-capital nexus that have often favored the coal industry surrounding water governance.

In what specific ways has mining polluted the streams, rivers, and watersheds of central Appalachia? The practice of MTR mining has buried thousands of miles of waterways by pushing what the industry calls 'overburden' down below the mountain and into valleys (otherwise known as valley fills). Overburden has "impacted 1,200 miles of headwater streams between 1992 and 2002. In fact, from 1985 to 2001 valley fills *buried* an estimated 724 miles of streams in Appalachia" (Bell &York 2010:123). Another major site of pollution comes from the slurry impoundments. Slurry impoundments are what hold 'waste' after coal has been processed. The slurry impoundments contain millions of gallons of "water, coal dust, clay and toxic chemicals such as arsenic mercury, lead, copper, and chromium. Impoundments are held in place by mining debris, making them very unstable" (Coal River Mountain Watch 2013). There have

[52] Although community members often do not have the financial resources to contest mining permits or mining in general, they have worked with a variety of anti-MTR groups to either contest mining or secure clean accessible water (see chapter five).

been a number of incidents involving impoundments that leak mercury and other heavy metals into the surrounding soil and streams.[53] They can easily leak as when rainfall leads to breaches and flooding. Polluted water spreads throughout the watershed, geographically contaminating wide expanses. Key here is the understanding that these watersheds are not limited to the "environmental sacrifice zone" of the Appalachian coalfields, but extends beyond its boundaries into downstream cities producing other regional socio-ecologies. From start to finish, water issues surrounding MTR mining and waste containment are irreducibly socio-ecological, in that at all times human and extra-human natures are forming and organizing the entire mining process.

Despite a cozy working relationship between the state and mining companies, the state at times limits the exploitations occurring in the coalfields. In one case, the Army Corp. of Engineers rejected a permit to allow a mining company to build a slurry impoundment. The company proceeded to build the slurry impoundment anyway, and despite being fined, the company was allowed to keep the slurry impoundment (McNeil 2011). This example along with others discussed earlier in the chapter highlights how coal companies can act with impunity, only later on paying for the externalities it produced. However, as chapter five points out, the growing cost incurred by coal companies is fast becoming a problem.

The waterways near and far from MTR mining sites are not the only system impacted. In fact, soil and air quality has been impacted. Coal-fired power plants are one of the worst contributors to poor air quality: increasing global warming, acid rain, and smog (Sierra Club

[53] In 1972 a slurry impoundment dam located above the Buffalo Creek community broke down killing 125 residents and destroying houses and public spaces (Burns 2007). In 2000, in Martin County, Kentucky an impoundment broke, spilling over 250 million gallons of slurry, "polluting more than 70 miles of West Virginia and Kentucky waterways, killing wildlife, and razing habitat. Homes were destroyed by the thick, black, sludge" (Bell & York 2010:124). Additionally there are at least forty slurry impoundments in West Virginia considered to be high risk (Eades 2000).

2012c). One retired coal miner noted that he used to live next to a coal-fired power plant and after every shift he would return home to coal dust collecting on his porch, along with coal dust seeping into the house through windows (Interviewed June 2, 2012). After a week of working, interviewing, and living on Kayford Mountain surrounded by the activities of a mountaintop removal site, I could feel my lungs working harder and at times felt the pain of continued exposure to MTR dust. Respiratory infections, asthma, and lung disease around MTR sites are higher than areas further away from MTR sites (Appalachian Voices 2013).[54] Beyond the air quality issues, residents face contaminated soils. One participant explained how the county actively discouraged people from growing gardens, as mining and processing negatively impacted the soil. Important here is the geographic extent of counties in this area, emphasizing both the numerical and spatial extent of MTR operations and their impacts.

This section has illustrated how MTR mining degrades the natural environment, focusing on the impacts the hydrosphere, atmosphere, and biosphere. Life sustaining eco-system 'services' can no longer reproduce due to the scale and rate of pollution caused by the coal industry. Under the current socio-ecological project human and extra-human natures are greatly compromised, questioning the long term sustainability of coalfields socio-ecology.

Conclusion

In this chapter I mapped out the contours of the socio-ecological crisis in the coal communities, with a particular focus on MTR mining. In addition to examining the contours of the socio-ecological crisis, I focused on the hidden costs of resource regional dependency that characterizes many of the coal communities. Examination of the exploitation and degradation of labor, communities, and the physical environment allowed for a systematic analysis of the socio-

[54] For a fascinating interactive map exercise, visit ilovemountains.org. Here you can input various variables (poverty, cancer, health risks, etc.) in relation to where MTR sites are operating.

ecological crisis. Utilizing the concept of the socio-ecological enables the possibility of moving beyond the binary of nature in one box and society in another. The implication of conceptualizing the crisis as socio-ecological is that the solution must also be socio-ecological, incorporating the multi-dimensions and complexities of the world-ecology, rather than positing the solution as economic (jobs) or ecologic (environment). The decimation of the UMWA is as much as ecological relation and process as it is social, and the impacts of MTR mining on the community is as much ecological as it is social as well. These elements are the expressions of capitalist production organized around coal as a natural resource. This is not to say coal determines the relations, processes, and outcomes embedded in the coal communities. Rather, the logic and history of capitalism structures and restructures the regional political economies of Appalachia through technological innovations during moments of crises. Moving sustainably beyond the socio-ecological crisis will mean transcending the discourse of jobs versus the environment through coalition building among conflicting groups.

Chapter 5: The End of Mountaintop Removal Mining? Mediating the Socio-Ecological Crisis and Beyond

In this chapter I explore the ways in which social movements have played an integral role in mediating the crisis in the coalfields. Community and environmental groups have filled the void of the UMWA as the protector and defender of the coal communities, while in some cases actually working with the union and coal miners. Chapter five seeks to address, *in what ways have social movements mediated the socio-ecological crisis?* And, *what is the potential for social movements to assist communities in transcending the crisis?* The chapter will briefly examine the history of the anti-mountaintop removal movement, tactics, and its participation in creating alternative sustainable development. The rest of the chapter investigates three new moments that highlights the potential end of MTR mining and coal mining altogether (25-30 years) in West Virginia. They are 1) the March on Blair Mountain, 2) the War on Coal, and 3) greater competition from natural gas. These moments are produced and expressed at different spatial and temporal scales illustrating the dialectical tensions between scales and socio-ecological relations. Working through the geographies of the moments allows us to make sense of the production of the crisis and beyond. Through the examination of these moments, the chapter attempts to understand the very recent changes occurring in the coalfields and where these changes could lead.

Anti-Mountaintop Removal: The So-Called New Social Movement in Appalachia

How did the anti-mountaintop removal movement form? The inception of Mountain Justice occurred a month after August 20, 2004 in the town of Appalachia, Virginia.[55] About 2:30 in the morning A&G Coal Company was illegally operating a bulldozer without a permit to enlarge an access road. The inexperienced bulldozer operator pushed a boulder down a mountain

[55] Mountain Justice is the head coalition of the many anti-mountaintop removal groups exists under.

crashing through a house and killing a 3-year-old boy sleeping in his bed.[56] In September following the tragedy there was a rally and march in Appalachia, Virginia that solidified Mountain Justice as a non-violent civil disobedient coalition aimed at ending mountaintop removal and building stronger communities in Appalachia (region). Although groups had been fighting MTR mining prior to the tragedy in different regions throughout Appalachia for less than a decade, there was limited interaction between the various groups, including the UMWA. The groups coalesced around the tragedy enabling broader-based actions and commitments to all Appalachian communities.

The anti-mountaintop removal movement has longer histories rooted in the anti-strip mining movement and is in part a product of the decline of the UMWA.[57] Prior to the anti-mountaintop removal movement there was the anti-strip mining movement that began in the 1960s-1970s.[58] This group consisted of local groups, underground coal miners, sportsmen's groups, women, and young people from outside of Appalachia (Montrie 2003).[59] Many of the people fighting strip mining were quite violent, sabotaging the company's machines and beating up armed guards (Montrie 2003). Some people in the anti-strip mining movement were not entirely opposed to coal mining, but were opposed to the destructive nature of surface mining in general. In fact, both the anti-strip mining movement and the more recent mountaintop removal movement have attempted to work with coal miners on specific projects. In one instance of

[56] A&G Coal Company received the maximum penalty of $15,000.

[57] The decline of the UMWA left communities unprotected from the decisions and actions of coal companies. The UMWA was an active force securing living wages, safer working conditions, and communal development. Community groups have emerged in the absence of the UMWA, attempting to protect the communities from MTR mining and provide alternative development. The decline of the UMWA is discussed in detail in chapter three. As the end of chapter four pointed out, moving beyond the socio-ecological crisis will mean building coalitions between coal miners and environmentalists. Both retired coal miners and environmentalists I spoke with acknowledged the need for each group to work together in the hopes of wresting control over the coalfields.

[58] Mountaintop removal mining has its origins in strip mining (see chapter three). For an in-depth history of the anti-strip mining movement see Chad Montrie's *To Save the Land and People* (2003).

[59] These groups opposed strip mining for different reasons. For example, the sportsmen's groups saw the destruction of animal habitat as a result of strip mining, impinging on hunting. Coal miners realized that strip mining and other technologies of extraction would mean less work, and thus fewer jobs.

coalition building the anti-stripping movement and the UMWA worked side by side as a major flood destroyed the community of Williamson.[60] One activist from the anti-strip mining movement told this story in regards to working with coal miners.

> They painted X's on all the houses that were flooded and beyond redemption. Well HUD had trailers lined up on the four lane (highway) up above Williamson, which had not yet come into town or passed over town. But they could not bring them into Williamson because the federal law said that you could not bring HUD trailers into the flood plain but the only part of the land the people owned was in the floodplain, everything else was owned by the corporations like 85%. And they were driving 5 miles out of town and seeing all these HUD trailers lined up for as far as the eye could see that nobody would let them be in. The union still had strength then so we decided that what we would do was work with the union. So what happened was we thought let's go see if we can get the miners not to work today in protest of this bad situation. So a bunch of us young people and old fanned out and went to the face of the mines early in the morning, pre-dawn and one or two of us with picket signs stood out in front of the mines and said, 'Don't work today, Tug Valley Recovery Center'.
>
> The miners pulled up and said were not working today and all the mines in that county and maybe even in the surrounding counties went home and did not work. And we were stunned but we didn't know what was going on with anybody else because there was one or two of us at the portal of each mine so by mid-morning we all gathered back at the church in Williamson and people were weeping and crying because of the solidarity we felt with the West Virginia miners. It was one of the most powerful moments in my life, that's all I can say. It was so powerful to feel the union and to the know that the union understood the people, cared about the people and were willing to not to work and put their stuff on the line. And what was truly amazing about it was that night on the national news, Bob Kerr reported that the issue had been resolved on a federal level that fast. It went to Washington DC that fast. These miners are not working; get those damn HUD trailers down in there to those people. And so they found a way to wave the rule and in came the trailers and people got to live in them. That took place that fast.

Although this story was a clear success for the anti-strip mining movement and the community, tensions and different ideas divided the movement. Eventually, the movement split into two factions: the abolitionists, who wanted to end strip mining, and the regulationists, who thought by placing regulations on strip mining would ease environmental degradation.[61] It was the regulationists who won out and later led the charge for the passing of the Surface Mining Control and Reclamation Act (SMCRA) of 1977 signed by then President Jimmy Carter. The two basic tenants of SMCRA were regulating active coalmines and the reclamation of abandoned coalmines. Countless activists argued that SMCRA legalized strip mining, which enabled the practice of mountaintop removal. Further, coal companies ignored many of the regulations that

[60] Floods are frequent southern West Virginia due to surface mining.
[61] Interview: community member.

were in place allowing for the continuation of the destruction of the coal communities of Appalachia (Montrie 2003).

Similarities and differences run through the anti-stripping mining movement and the anti-mountaintop removal mining movement, but here I am concerned with the tactics of the current movement and the ways the groups are mediating the socio-ecological crisis in the coalfields. There are a range of anti-mountaintop removal mining groups throughout Appalachia that have specific goals and tactics, but the overall goal for these groups is to end mountaintop removal mining, create alternative sustainable development, and protecting the peoples culture and heritage. This past summer, in an attempt to stop and/or slow down a mountaintop removal operation, a group of activists from Mountain Justice Summer (one-week action camp) and I blocked the entrance of a mine site on Kayford Mountain. The group formed a blockade with signs stating, "Clean Coal is a Dirty Lie", "People Over Profits", and "This is what Justice Looks like". Before the police forced us off the mountain we had blocked nine coal trucks from leaving and entering the mine site, costing the coal company an estimated $250,000 from delayed production and transportation. Meanwhile in Charleston, West Virginia (35 minutes northeast of Kayford Mountain) on the Kanawha River, five activists chained themselves to a coal barge causing further delays in shipment.[62] Other action days have included marches, protesting at major banks that support mountaintop removal operations, and blockading trains carrying coal.

[62] Mountain Justice holds one-week action camps every spring, summer, and winter break. During the week participants learn the basics of mountaintop removal and discuss tactics to stop large-scale surface mining. Near the end of every action camp there is an action day in which most of the camp participates filling various roles such as drivers, police liaison, organizer, medics, etc. In general, all the participants at action camp are asked about their ideas for what type of action to take and whether they are willing to be arrested. At this action camp most participants were not willing to be arrested and the few that were participated in chaining themselves to the coal barge.

Photo Courtesy: Vivian Stockman, ohvec.org
Pictured here is the now deceased Larry Gibson, where he often brought students, activists, and anyone that was interested about MTR mining. He is standing atop a mountaintop removal operation that is adjacent to his house.

Ending the practice of mountaintop removal is just one goal of environmental groups in Appalachia. For example, one of the major groups in West Virginia is Coal River Mountain Watch (CRMW) who has been involved in multiple community projects. Recently CRMW attempted to build a wind farm in the Coal River Valley as an alternative sustainable energy that could provide energy to 70,000 homes, employee over 200 people, and 40-50 permanent maintenance jobs.[63] Furthermore, it would provide more years of taxes than coal because it's a renewable energy that can seemingly last forever and would greatly reduce greenhouse gas emissions (see chapter four for the costs of coal). The County Commission told CRMW that 'coal had been so good to the state' that the wind farm would compete too much with coal. In

[63] Interview: community member.

part, coal has been so good to the state because there has been so little economic diversification and what jobs the industry provides are usually well paying. However, the mono-economy as one retired coal miner explained, provides the coal companies with desperate people willing to work for lower-wages and undermines opposition (Interviewed June 14, 2012). It also perpetuates unsafe working conditions in the mines, and to stamp out opposition.

Aside from attempting to create alternative sustainable development, groups like CRMW are participating in community building with actions like the Tadpole project. Funded by various granting institutions, CRMW put together a team of members with the community to pick up trash and junk from around the river. A dumpster was placed in the local community for over a week for people to drop off their garbage. Multiple dumpsters and trucks were filled over the span of a week and folks throughout the community teamed with CRMW to clean up the community creating stronger bonds. Building stronger communities is one the most important goals of the environmental groups. In this way, environmental groups are assuming the roles of the UMWA coal miners who had historically brought the community together. But with the absence of the union the communities no longer trusted each other or retained the strong bonds they once had.[64] Again coal companies were relying on their tried and true method of divide-and-conquer to exploit without care. Divided and apathetic communities make it a constant challenge for environmental groups to contest MTR mining and build genuine sustainability.

In another instance, one community member and his family were concerned about how surface mining would impact the local communities water.[65] Before the surface mining could begin the company had to request a permit and hold a town-hall meeting in which the local community members could voice their opinions on whether to accept or contest the permit. He,

[64] Interview: retired coal miner.
[65] The interviewee's real name has been changed to secure confidentiality.

along with his daughter went to the courthouse and searched through deeds, attended meetings, researched public records, went door-to-door and made phone calls to other community members to fight the permitting of the surface mine. The president of the coal company called him, first offering money to stop protesting and then later made threats. Eventually after months of research, meetings, phone calls, and threats he and his daughter were able to secure the community with city water and prevented the permit to surface mine. This act, like many other acts community members and activists spoke about inevitably cost the coal company time (permitting and litigation mostly) and ultimately money.

The socio-ecological crisis in the coalfields is unfolding through more than simply environmental movements (see below), but these movements act as what O'Connor calls a social barrier to capital by making the coal industry 'deal' with the externalities it produces. The externalities or costs have weighed so heavily on the communities that many have been either bought out or have left West Virginia. The economic crisis of coal in the 1970s forced the industry to restructure in highly capitalized and politicized ways, so much so that the UMWA is all but a memory of the golden years and that in large part, environmental groups are the only hope for the coal communities to transcend the socio-ecological crisis. The present socio-ecological crisis was historically produced through the restructuring and resolving of previous socio-ecological crises that sought to undermine the power of the UMWA through socio-technical innovations and political struggles outside the mines. Anti-MTR groups have become integral actors in the re-making of the socio-ecology of West Virginia's coalfields. They have gained traction in many counties, Mingo, Boone, and Logan, attempting to create alternative forms of development.

Moments Indicating the Socio-ecological Crisis and Beyond

Socio-ecological devastation imposed on the communities of Appalachia where mountaintop removal is occurring coupled with the loss of power by the UMWA has created a regional crisis in Appalachian communities as health, safety, history, culture, and sustainability are compromised. The UMWA's decline in power has shifted community organizing outside of the traditional avenue of the UMWA and into local community/environmental organizations that have emerged in its wake. The current crisis in Appalachia is illuminated through three moments that signal a necessary reconfiguration of socio-ecological relations in West Virginia's coalfields. The moments are the March on Blair Mountain, the War on Coal, and the rise in use of hydro-fracking for natural gas extraction. A recent announcement by Patriot Coal, a leader in large-scale surface mining, to phase out MTR mining also indicated major changes, and is recognized in relation to these moments. Combined, these events signal a crisis in the coalfields as the profitability and economic vitality of the coal industry founders and competitive energies emerge as potential alternatives to replace the widespread use of coal as an electricity producing energy. The sequence of these moments highlights the active role social movements have in contesting development, influencing policy, and challenging the industry hegemony.

The March on Blair Mountain

In a hot and balmy week where temperatures reached well over 90 degrees, over 300 marchers trekked over 50 miles through the winding mountain roads from Marmet to Blair, West Virginia. The marchers were greeted with MTR supporters stating "go home tree-huggers", "go collect your welfare check", "what do you do for a living?" and "my daddy works for a living", indicating a fairly large portion of West Virginians support some form of coal mining. The 2011 March on Blair Mountain was an attempt by a range of social movements to save the mountain from the complete annihilation of yet another mountaintop removal operation. Community

groups such as Friends of Blair Mountain, Coal River Mountain Watch, Ohio Valley Environmental Coalition, and members of the United Mine Workers of America participated in a direct action meant to save Blair Mountain, a place of historical significance to the labor history of Appalachian coal miners. These movements represent histories of resistance by communities linked to the coal industry against coal companies, which operate with impunity in this rural resource frontier. Environmental groups through political activist activities have mediated and attempted to transcend local communities beyond the socio-ecological crisis.

While it was clear the march was about celebrating the 90th anniversary of the Battle for Blair Mountain by saving it from MTR mining, there were a variety of perspectives of coal mining. Some participants were against MTR mining, but not against underground coal mining, arguing that underground coal mining jobs provide a great living for miners and their families if safety and health concerns are top priorities for coal companies. Other participants were against all forms of coal mining, arguing the mining and burning of coal is too high of a cost for the long-term economic viability of coal communities and the warming of the earth. Still other participants were not necessarily against MTR mining, but against MTR mining Blair Mountain, a site of significance for the history of the labor movement. In short, there is not a universal view on MTR and underground mining within and out of the anti-MTR mining groups.

The Battle for Blair Mountain was one of the most important events in U.S. labor history, bringing the UMWA's fight for human rights to the West Virginia coalfields. As the second largest civil uprising in United States history (second only to the Civil War), the Battle for Blair Mountain began in late-1921 when hyper-exploited miners confronted coal companies' armed mercenaries over the organization of production and reproduction in the coalfields (Blizzard 2004; Shogan 2004). This exploitation encompassed every aspect of the coal miners' lives and

that of their families (Wheeler 1976). Over a five-day period, 10,000 coal miners stood their ground against the coal companies violent mercenaries. Later, the U.S. government sent federal troops in to quell the violence, ultimately backing the coal companies. Multiple interviewees noted that the federal government not only sent in troops but also dropped bombs on the striking workers. The truth, however, was that a West Virginia coal company plane had dropped "homemade bleach and shrapnel bombs" (APWU 2010). This history is still evident where bunkers that served to protect the troops are still embedded in the landscape.[66] Despite the threat of terror, murder, and espionage, the unionization struggle was eventually successful, making Blair Mountain a significant site in U.S. labor history (Nida and Adkins 2010). While the immediate aftermath of the Battle for Blair Mountain was a significant decline in union organizing, widespread union organizing emerged in conjunction with Roosevelt's New Deal as a solid block in the coalfields within a decade (Clark 1981). The broader implications of the Battle for Blair Mountain included the emergence of militant labor organizing in other important industries in the U.S. such as the automotive, steel, and oil industries.

Blair Mountain nearly became a registered site in the National Register of Historic Places (NRHP) in March 2009. A majority of the property owners in the surrounding area were in favor of listing the site in the NRHP (Sierra Club 2012a). However, after being nominated for permanent inclusion and included in the listing for the NRHP, Blair Mountain was delisted in September 2010 after coal companies expressed interest in exploiting the coal deposits using mountaintop removal practices. On the 90th anniversary of the Battle for Blair Mountain, a five-day March on Blair Mountain was organized to bring together environmentalists, concerned community members, miners, activists, and other diverse interests with the objective of relisting

[66] Friend of Blair Mountain, a community group in Blair, West Virginia, has put together a museum celebrating and preserving artifacts from the Battle for Blair Mountain. The museum is also interested in building a sustainable future for Blair, West Virginia and other small communities throughout Logan County.

Blair Mountain on the NRHP and urging the West Virginia Department of Environmental Protection to designate the site as unsuitable to surface mining. The rich cultural history and heritage of Blair Mountain continues to be contested today as communities and activists battle coal companies in the courts, through the use of petitions, and other strategies meant to slow the process of permitting down.

The March on Blair Mountain brought together diverse community groups in support of the labor struggles of the past and the community struggles of the present. This mixture of past and present was not fully appreciated by many of the remaining local UMWA branches that saw the March as concerned more with abolishing mountaintop removal rather than a celebration of labor history. In the struggle over what the March what truly about, represents a confrontation between many local UMWA branches that simplistically interpret job prospects according to the propaganda war waged by the coal companies (the war on coal) and the more holistic perspective of certain community groups that were seeking the build bridges in a contentious political environment.

The conflicting interpretations of the March on Blair Mountain meant that support was not forthcoming from a majority of coal miners, unionized or not. For the few coal miners that were supportive, many were retired and only recently gaining a place in the fight over the ecological conditions within which people are required to live in the coalfields. The UMWA largely did not support or attend the March on Blair Mountain because as UMWA President Cecil Roberts stated they were not concerned with dirty water. However, they marched because of the health effects of dirty water, which is linked to the traditional role the UMWA has played

in Appalachia because the UMWA has a long history of working with communities over just such issues.[67]

The lack of support coming from the UMWA is directly related to the strong pressures for coal miners to support the coal industry.[68] According to several interviewees, in any situation where coal miners or their families have supported community-centered activism against mountaintop removal, those people are labeled as tree-hugging environmentalists and alienated from their families whose livelihoods depend on the coal industry and feel pressure from their employers. “If miners speak out or are seen with us in the store or anything, they’re going to lose their jobs ‘cause they work for the same companies that do the strip mines” (Retired coal miner: Interviewed June 25, 2012). One retired coal miner stated “they’ve called me an enemy because I am standing up for my communities and they have classified me as a tree-hugger but ya know, when people stand up and protest mountaintop removal, that’s how they are treated” (Interviewed July 2, 2012). Appalachia’s resource dependency is a relatively totalizing environment where dissenting voices are ridiculed and marginalized. It speaks to contentious issue over MTR mining and the anxiety-filled future of the coal economy in West Virginia. The immediate marginalization of dissenting voices is significant to understanding how small profit margin in primary products like coal seemingly require the relatively totalizing environment that has been built and maintained since prior to the Battle for Blair Mountain. With declining employment rates, increasing poverty, and a lack of effective political representation, this environment is increasingly unstable making support for a coal economy increasingly problematic. Dissenting voices are gaining the political space and support for change in the organization of coal production in Appalachia. As more voices begin to express discontent with

[67] Interview, retired coal miner.
[68] Interview, retired coal miner & wife.

the practices of MTR, communities groups are seeing some coal miners reach out and join the fight against the destruction of land, water, air, and communities, in short: socio-ecology.

The War on Coal: Jobs versus Environment

The War on Coal emerged as a dominant discourse in the coalfields, indoctrinating those dependent on coal for their livelihood into a paradigm that demonizes the community, environmental groups, the EPA, the UMWA, and President Barack Obama.[69] This is not to say that members of coal communities are duped, but that this over exaggerated and overused discourse unavoidably shapes certain ideas of jobs versus the environment. The War on Coal is a public relations campaign waged by coal companies that generates a simplistic and binaried story centered on the argument that "they take your jobs". "The coal companies stress the thought is jobs versus the environment."[70] Coal companies are brainwashing and feeding coal miners propaganda, saying that environmentalists and the government will regulate their jobs away.[71] Although a few retired coal miners have claimed this, not all view coal companies as brainwashing and controlling. However, the creation of violently antagonistic relations between the coal industry and communities has generated rigid barriers and distrust amongst the opposing sides. When communities fight for their rights to a clean environment, the bastions of support amongst the coal miners is evident in the at times violent actions taken against those seeking to protect mountains, clean air and water, and mountain culture.

The coal industry is fighting the War on Coal on all fronts, penetrating organizations and the government with propaganda that promotes the coal industry at any and all costs. This propaganda war's effectiveness can be judged by the fact that in the 2000 presidential elections,

[69] Recently, the CEO of Alpha Natural Resources came out acknowledging how the War on Coal campaign has been quite divisive throughout the coalfields, and that the industry must collaborate with communities and other groups for the betterment of West Virginia.
[70] Interview: community member.
[71] Interview: retired coal miner.

West Virginia voted Republican for the first time in its long history of unionized workers allied with the Democratic Party. This also points out the union who traditionally votes Democratic are playing less of a role in politics. Billboards and signs all over coal country proclaim “Obama: No Job Zone”, “Stop the War on Coal, Fire Obama”, and “Gang of Four: End of Coal” that has pictures of Gov. Manchin, President Obama, UMWA President Cecil Roberts, and E.P.A. Administrator Lisa Jackson. The organization Friends of Coal has political content on its website with a video containing propagandistic slogans demonizing President Barack Obama’s energy policy while audio of former Massachusetts Governor Mitt Romney speaks on the ills of the Obama administration’s energy policy. The strategy coal companies use is to exploit the fears of people who are directly and indirectly connected to the coal industry and have friends, relatives, and family members that are dependent on the continuation of coal mining. People of coal-dependent communities have very few job opportunities outside of the coal industry, which makes them susceptible to the discourse of the War on Coal expounded, by the coal industry whose sole objective is working to further profits at the expense of environmental regulation, safe working conditions, and citizen’s political representation.

The War on Coal is using rhetoric and politics to question the science behind climate change and therefore the need to improve regulations on the toxic chemicals, like mercury, and greenhouse gases exuding at various points along the coal commodity chain, particularly from coal processing plants. When President Obama and the E.P.A. proposed an emissions limit of carbon dioxide to 1,000 pounds per megawatt-hour, the coal industry fought back claiming such standards were economically unfeasible (Barringer 2012). Many of the existing coal-fired power plants exceed this limit, and are one of the major contributors to birth defects, cancer, respiratory

problems, and global warming (Hidden Costs of Energy 2010).[72] In some cases, big energy companies like FirstEnergy Corp. have recently decided to close six coal-fired power plants, arguing it is cheaper to close the power plants rather than modernizing them with pollution control technology (Ohio Environmental Council 2012). While in other cases, and in response to emissions standards and other proposed regulations of the industry, coal companies lobby congress and buy public offices in West Virginia in an effort to circumvent the policies. The failure to implement these environmental policies and regulations impacts public health and safety by externalizing the environmental costs of coal production, shirking these responsibilities off onto communities. When coal companies skirt environmental regulations and environmental policies are weakened or not enforced, the costs of coal production are decentralized as individual problems for community members. The use of mountaintop removal mining means that miners are no longer the sole victims of coal dust as the toxic impacts are spread throughout the community. This individualization of the coal industry's environmental externalities provides fuel to community activists struggling against these safety and health problems.

Communities engaged in efforts to save their mountains from the socio-ecological havoc wrought by mountaintop removal have been pegged as environmental crazies and outsiders entering "our" communities to impose their values. In reality it has been the members of the coal communities that have initiated the anti-strip and anti-MTR movement, in which outsiders eventually came to support.[73] Proponents of MTR mining create simple explanations constructing the opposition as outsiders and miners as real members of the community by

[72] Coal-fired power plants are one of the biggest contributors to the continuation of acid rain. This acid rain undoubtedly mixes with local streams and wells. Those local streams and wells are often contaminated with mercury and heavy toxic metals that when pregnant women ingest could put the fetus at risk (Reece 2005).

[73] For example, Coal River Mountain Watch, arguably the most well-known anti-MTR group, began with a group of community members from Whitesville, West Virginia.

manipulating the heritage of coal and bastardizing the labor history of the coalfields in order to maintain a complacent workforce. One interviewee explained the logic of the industry:

> "For a couple weeks we had a dumpster, a free dumpster where people could come bring their trash and junk. That got some folks kinda interested and it showed them we're not really out here to convert your children to Islam. We are not going to, there are so many crazy things ya know. You just went against the coal industry so you and your Muslim minion buddy Obama can hand our economy over to the Arabs." (Activist: Interviewed May 19, 2012)

The industry attempts to construct the economic identity of coal communities as aligned with the industry (Bell and York 2010). Anyone straying from this simple formula is pegged as an extremist and an outsider. Friends of Coal is the coal industry's "grassroots" support mechanism, posing as representative of coalfield communities, that promotes the coal industry as vital to West Virginia's economy and uses tactical mechanisms to instill a sense of resource nationalism where those contesting coal extraction are cast as outsiders. Friends of Coal also donates money to West Virginia's sole coal museum, located in Beckley, West Virginia, which portrays the history of coal in a favorable way to the coal companies, leaving out important historical events. The coal companies are controlling the narrative. They have captured the state through lobbying efforts and significant contributions to political campaigns and captured the hearts and minds of many within and outside the coalfields by erasing the violent history of coal companies and the significance of labor to West Virginia's history. Again, this is not to say members of coal communities are being duped or naïve, rather historical structural forces combined with scare tactics make it difficult for people to think about the complex issues around the coal economy.

While there is a clear attempt to regulate the coal industry with environmental policy updated for the twenty-first century, the coal industry uses these regulations as a political weapon against coal communities including coal miners. Coal miners and the general population of West Virginia live in a relatively totalizing environment where critiques of the coal industry

and struggles to maintain the health and safety of miners and communities are demonized and marginalized. This relation points to how the socio-ecology of West Virginia is formed by local and extra-local processes that are made up of messy bundles of human and extra-human natures, whether its environmental regulation from President Barak Obama and the EPA, or its environmental groups concerned over local communities. The War on Coal may be a strategic exaggeration of the coal industry, but it is clear there are definite changes in terms of the production and processing of coal, which will be discussed in the next moment.

Fracking Natural Gas! Coal's New Competition

The emergence of natural gas as a competitive energy source has exacerbated the crisis in the coalfields, as coal-fired power plants must now compete with natural gas-based electricity plants. The discovery of the Marcellus Shale as a viable energy resource is linked directly to the emergence of new technologies of extraction, namely horizontal hydro-fracking, and a financial environment that has raised the economic feasibility of natural gas extraction. The Marcellus Shale contains large amounts of natural gas in parts of Appalachia running all the way to the Southern Tier New York. Marcellus Shale stretches 1,000 of miles through Ohio, West Virginia, Pennsylvania, Maryland, and New York making these states prime resource frontiers of natural gas extraction. In addition to the Marcellus Shale, the Utica Shale sits roughly 1,000 feet below the Marcellus Shale but covers a more expansive region. As higher-grade coal deposits are exhausted and MTR runs its course generating greater quantities and qualities of externalities, natural gas is likely going to figure as an important replacement energy source (Bridge 2004).

Although the War on Coal is a principal force shaping the coal industry, others have argued that the advent of new forms of natural gas extraction, especially horizontal drilling and hydro-fracking is a bigger challenge for the continuation of coal. The costs of coal production

increase as economies of scale exhaust easily accessible deposits in conjunction with new methods of extracting natural gas cheaper. In particular, coal companies operating in West Virginia and Kentucky are finding it more expensive to operate than its Western mines. With MTR mining, a site can be

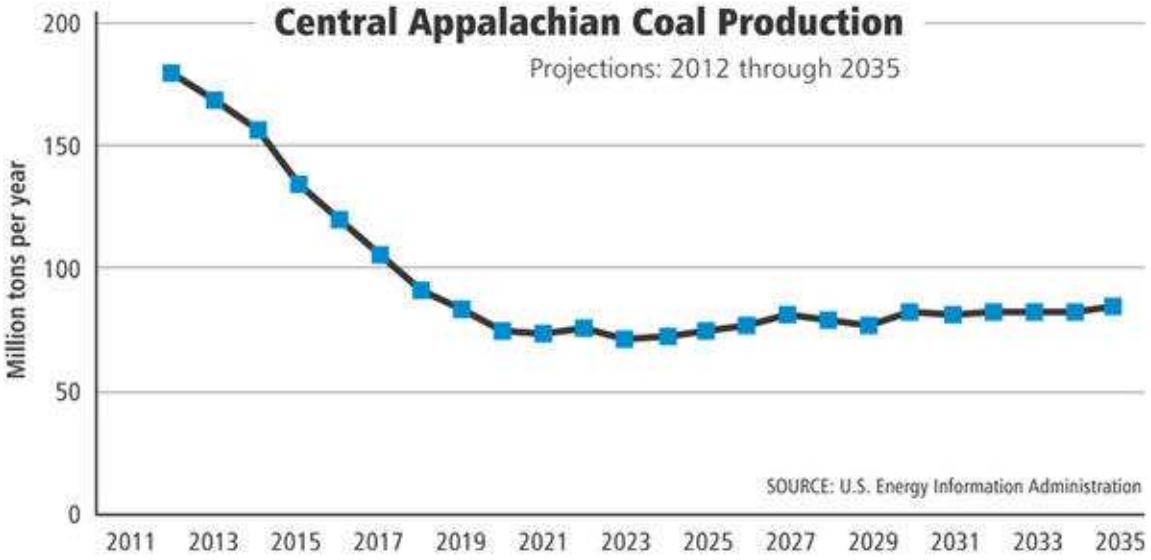

Figure 5.1 Central Appalachian Coal Production
Source: Ward (2013)

rapidly exhausted but a great deal of capital is fixed in extremely complex machinery that takes years to assemble on-site. The economic volatility of coal will become increasingly extreme, as easily accessible deposits are exhausted and increased regulations place constraints on linked sectors that use coal energy. Regulation enforcement by the Obama Administration has challenged MTR mining and pushed the industry away from the steam coal of MTR and towards underground mining of higher quality metallurgical coal, which employs more people and challenges the War on Coal discourse propagated by coal industry CEOs (Ward 2012). One retired coalminer remarked on the changing dynamics of the industry:

> "Natural gas is cheaper and the coal-fire plants are switching to natural gas. The world economy is bad. Our economy is bad. They don't need the steel so they don't need the coal to make the coke; so it fluctuates. It's either feast or famine. That's what's facing the coal miner and it always has." (Interviewed June 25, 2012)

Another retired coal miner said this about natural gas:

> "Now the big gorilla in the room is natural gas. That's where the loss of West Virginia, of the Appalachian area, that's where the loss is occurring. Everybody who can that has a plant that can be converted to natural gas is making the switch because of the economics of it. Right now the cost of coal is twice the cost of natural gas. If you have a natural gas plant, you can increase and decrease the temperature at the plant to provide more or less electricity. With a natural gas plant you can basically flip a switch and that power plant can be up and running in a very short period of time as compared to a coal-fired power plant. Coal fire plants take a long time to bring up and bring down. If you have it running all the time you are burning all that coal and your costs keep rising and if you're not running it when you need to its difficult to get up quickly" (Interviewed July 10, 2012)

Natural gas appears to be a miracle fuel source or in the words of the energy industry a "green" energy. Natural gas is easier to work with as its properties make it easy to transport, easier to use, safer for workers, and less energy intensive to extract. Further natural gas power plants emit considerably less carbon dioxide. But at what cost?

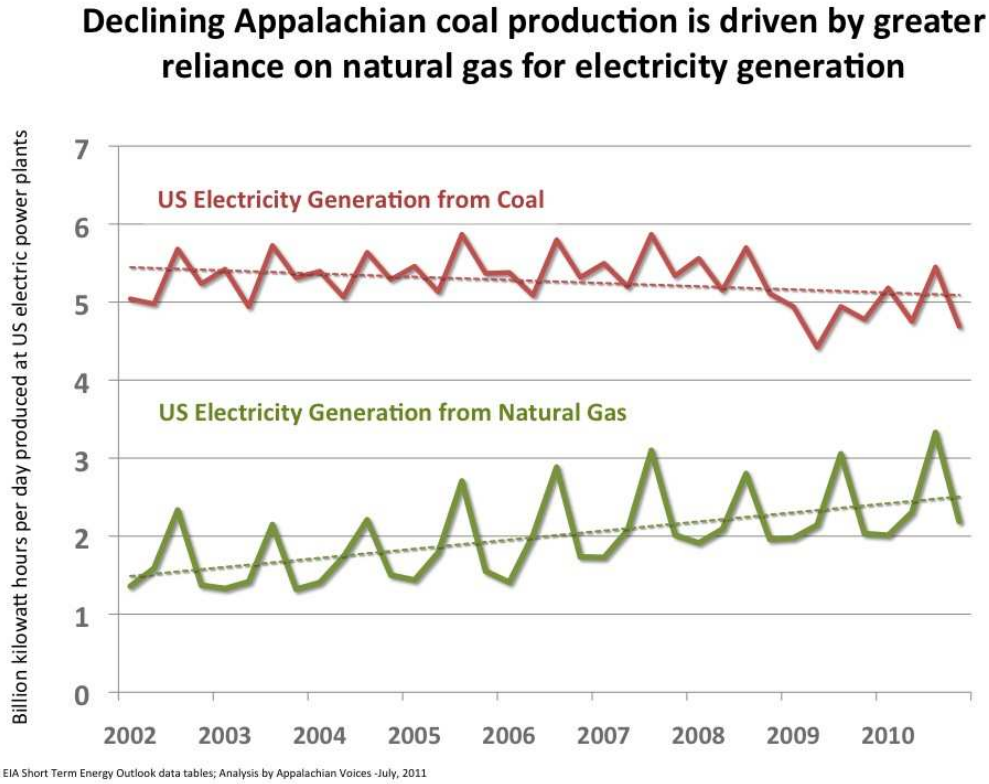

Figure 5.2 Electricity: Coal versus Natural Gas
Graph Courtesy: Appalachian Voices

Natural gas lacks a long history of environmental catastrophe that is associated with mountaintop removal. The risks of coal mining are well documented and many coal miners and community members have related stories of breached slurry ponds, the generalization of silicosis, or black lung, and mine explosions to name a few (Burns 2007; McNeil 2011; Fox 1999; Scott 2010). New technologies for extracting natural gas is still a relatively new phenomena that has not had time to develop such an extensive history of disaster, even if the risks are well-known and environmental risks and contamination are documented. These histories of socio-ecological devastation have sparked environmental and community organizing in opposition to the frequently illegal and illegitimate practices of the coal industry.[74]

Articulating the Socio-Ecological Crisis in Appalachia's Coalfields

The moments discussed above are the expressions of contradictions manifested in the socio-ecological crisis in Appalachia coinciding with the restructuring of the coal industry and longer histories of mining. These moments coalesce around the efforts of environmental and community organizations and world-economic conditions which frame the socio-ecological crisis in Appalachia. Specifically, organizations are contesting the destructive practices of coal companies' by pressuring them to make the process of mining coal less flexible through political and legal means of slowing down production and making it more costly. The links between coal communities and miners have been cultivated by organizations operating in the coalfields and the coal industry is beginning to feel the effects of a global financial crisis as it is compounded by the efforts of local populations struggling to contain the environmental and economic impacts of MTR.

[74] For a time-lapse perspective of MTR at the Hobart Mine site in WV from 1984-2012 see: http://earthobservatory.nasa.gov/Features/WorldOfChange/hobet.php

Environmental organizations like Coal River Mountain Watch, Ohio Valley Environmental Coalition, and Kentuckians for the Commonwealth have spent the past thirty or more years fighting against the environmental impacts of mountaintop removal. Their strategies have been to slow the process down by contesting the permitting process, litigation, and direct action. Direct action techniques include shutting down the narrow, winding roads that massive, overloaded speeding coal trucks travel (Burns 2007). This technique requires around thirty protesters to safely execute, with several people spread along the road to warn the coal trucks that there is a road blockage ahead. While protesters generally cannot stop MTR with direct action techniques, they are adept at interfering with the transportation networks that are vital to profitability. Environmental groups are forcing coal companies and the state to recognize the destruction wrought by mountaintop removal mining and as a result have become what O'Connor calls a 'social barrier' to capital (1998: 170). Through extended litigation, community organizations successfully fought for the relocation of the Marsh Fork Elementary School, which sat just below a mountaintop removal site, a 2.8 billion gallon slurry impoundment that lies 400 yards away, and coal preparation plant (Sendor 2011). Marsh Fork's new elementary school opened in January 2013. Other litigation is related to the emergence of water issues after coal slurry has been reinjected into old coalmine shafts. The subsequent use of explosives in mountaintop removal operations "just ripped these mountains apart to where this stuff leaks back out into the aquifer and got into peoples well water. And their bodies are full of heavy metals, a lot of them have brain tumors and have died."[75] With the permitting process, communities are concerned with their right to clean potable water. After one interviewee filed a request for a public forum on a permit, the president of the coal company called the interviewee

[75] Interviewee, retired coal miner.

and asked if he would drop the request for a public hearing.[76] Community organizations have been fairly successful in slowing down the mining process and creating higher operational costs for the coal companies.

Photo Courtesy: Vivian Stockman, ohvec.org
Caption: Marsh Fork Elementary sits below a sludge pond and immediately adjacent to a coal processing plant. The school is located on the bottom left, near the round coal silo building. Out of sight to the top right is the mountaintop removal site feeding the processing plant.

The continuity between the UMWA as an organization fighting for the rights of coalminers and the communities within which they collectively experienced the impacts of the coal industry's stranglehold on politics and the economy have made environmental and community groups work tirelessly at remembering this history. Using this history as a means of maintaining solidarity in the fight against the contemporary coal industry's practices, which has a

[76] "The first thing the DEP (Department of Environmental Protection) does when they get your letter opposing a permit is to send it to the coal company so they have your name and address." Community member: Interviewed May 25, 2012.

far broader impact environmentally than it did historically, the March on Blair Mountain exemplifies this situation and brings to light the importance of Appalachian communities rather than the opposition's claim that those protesting MTR have origins outside Appalachia. This discursive strategy of the opposition arises from the War on Coal, which links outsiders to environmental activism and ignores the serious environmental problems communities experience.

The success of environmental organizations as significant actors in mediating and transcending the socio-ecological crisis cannot be understated. Recently, Patriot Coal announced it would phase out its MTR mining in the next couple years. As one of the largest MTR operators, the company's president explicitly acknowledged the human impacts of surface mining practices (Sierra Club 2012b). Of course, these statements must be viewed within the context of the huge fixed costs of MTR operations and the legal battles waged by grassroots organizations against coal companies. The case of Patriot coal highlights the dynamic relationship between those opposing MTR and the environmental destruction it causes and the coal industry whose profit margins are contracting as diseconomies of scale cause coal to be increasingly difficult to extract.

Associated with Patriot Coal's commitment to end mountaintop removal practices, new legislation has entered into the United States Congress. In the June 2012, over 13 legislators from around the U.S proposed the Appalachian Communities Health Emergency (ACHE) Act. The act would put a moratorium on all permitting of MTR operations until Department of Health and Human Services conducted tests that did not show ill effects of MTR mining. One study found that non-coal mining communities had lower rates of poverty and an overall higher rate of socio-economic well-being (Perdue & Pavela 2012). The table below illustrates a correlation

between MTR mining and socio-economic and health effects of various counties. A selection of eighteen counties in West Virginia was taken: nine counties where MTR occurs and nine counties where MTR does not occur.

Health Issues of MTR and Non-MTR West Virginia Counties

	Life Expectancy change: 1997-2007	Deaths from Cancer per 100,000: 1999-2007	Deaths from Chronic Cardio. Disease per 100,000: 1999-2007	Poverty Rate (%): 2010	Population Change (%): 1980-2010
U.S.	1.51	165	201	15.3%	36.3%
MTR-Counties					
Boone	-1.15	220	265	19%	-19.2%
Fayette	0.5	203	246	23%	-20.4%
Lincoln	-0.46	214	272	24%	-8.5%
Logan	-0.82	239	293	22%	-27.5%
McDowell	-0.73	218	326	34%	-55.5%
Mingo	-0.6	224	306	24%	-28.3%
Clay	.44	230	218	26%	-16.8%
Raleigh	1.02	167	228	18%	-9.3%
Wyoming	-1.21	199	308	20%	-33.8%
Non-MTR Counties					
Barbour	0.58	171	257	18%	-0.5%
Brooke	-0.12	168	226	15%	-22.6%
Doddridge	0.52	173	271	21%	9.8%
Gilmer	.41	175	256	29%	3.5%
Marshall	1.16	168	241	17%	-20.4%
Monongalia	0.81	165	216	22%	27.6%
Ritchie	-0.08	175	298	20%	-8.8%
Taylor	0.89	173	256	20%	1.8%
Wood	.93	162	289	16%	-7.2%

Figure 5.3 Health Issues of MTR and Non-MTR West Virginia Counties
Source: www.ilovemountains.org

The emergence of ACHE shows that the War on Coal is rooted at least partially in reality because it is extremely destructive not only in the immediate environments where it occurs but in the water-intensive processing phase where large quantities of toxic heavy metals, gasses, and other minerals contaminate the atmosphere and water supply. The release of these toxic effluents

into the environment intentionally or not contaminates large swaths of the United States as these waters travel downstream and within the watersheds from which they are released.

The trope of the War on Coal ultimately fails when we interrogate the broader world-economic system within which productive activities occur. Natural gas has emerged as a supposedly cleaner and competitive fossil fuel resource, despite the unknown environmental consequences of this form of production. Scientific-technological innovation in the extraction of natural gas in conjunction with competitive market prices is beginning to challenge coal's hegemony in Appalachia as global energy shifts.

The current socio-ecological crisis in Appalachia is linked the restructuring of the coal industry and energy politics at the national scale. The implications of the crisis are as yet unknown. While the three moments outlined above in conjunction with the recent announcement of an end to MTR practices by Patriot Coal are significant to understanding the crisis in the coalfields of Appalachia, it remains to be seen whether this crisis is of the developmental or epochal variety. We can ascertain that the crisis is developmental given that during the neoliberal restructuring mountaintop removal revived the cycle of accumulation in the coal industry through the elimination of underground mining jobs. However, the confluence of events surrounding MTR as articulated through the three moments indicates something more. Here I suggest that perhaps the crisis in the coalfields indicates something much broader, an epochal crisis. This form of crisis indicates the exhaustion of capitalism's profitability and deep problems of systemwide reproduction as more people are pushed off the land into urban areas outside of West Virginia and in the coalfields of Appalachia a great exodus characterized by acceleration of

population emigration.[77] The epochal crisis signals the exhaustion of the neoliberal regime in the energy sector as it begins to experience diseconomies of scale in coal production. The sunk costs associated with technologies of extraction, processing, and transportation mean that fewer resources are extractable due to the rapid depletion of available coal deposits. Profitability cannot begin anew in a region that completely undermines its resource base by fundamentally reorganizing the landscape in a way that diminishes the life-giving resources of the land. Regional reproduction is likely to continue to be difficult at best and socio-ecological externalities will continue to disproportionately impact the coal communities.

[77] Epochal crises reconfigure the relationships between humans and nature-environment. Developmental crises create new ways of commodifying nature-environment so as to spark accumulation and profitability anew. Moore 2011b.

Conclusion: Socio-Ecology and Future Research

> *I just want people to realize and remember that mountaintop removal is just a symptom of a larger problem. We see these symptoms all the time, whether it's the symptoms here with all the coal extraction or its hydrofracking or the tar sands or anything else like that. The main problem is rich people and our capitalist system that we live in right now. Yeah that's really the root of all the problems that we have, all the social problems.* (Community member: Interviewed May 17, 2012)

It should be clear from the following study how industrial change underwritten by capitalist imperatives is constitutive of the socio-ecological crisis in the coalfields of West Virginia. The following three claims were made and supported: 1) crisis is place-based and requires contextual analysis of the dynamics between conflicting groups, 2) any study on the political economy of crisis should systematically engage with the historical, geographical, and ecological relations that produces crisis, and 3) the dialectic of overproduction of machinery and the underproduction of socio-ecological services in conjunction with political pressure from social movements leads to new socio-ecological projects. Specifically, the thesis examined how MTR mining constituted in the historical development of the increasing scale of coal mining in central Appalachia is dialectally bound with the underproduction of extra-human natures and the life-sustaining systems for the reproduction of the coal communities of southern West Virginia.

The overproduction of machinery and the underproduction of socio-ecological services could very well be interpreted as technologically deterministic. That is, the scaling up of mining generates new sets of contradictions inhibiting new groups to emerge. The history of coal mining in West Virginia and greater Appalachia is filled with examples of the introduction of machinery in the mines that was met with anger and resistance. However, as chapter three pointed out there are many external forces forming the introduction of new mining machines and the resistance from miners. As such, the overproduction/underproduction perspective could be a starting point

for future research focused on the production of commodities, but must necessarily incorporate the external forces (imperialism, hegemony, crises, trade and environmental policies) to understand how different spatio-temporal scales are implicated in the reproduction of places and regions.

Social movements, the fossil fuel industry, and the state are attempting to transition out of the socio-ecological crisis and into a new economy, albeit in different ways and for different reasons. While the focus on this thesis was not on the fossil fuel industry and the state, social movements, I argue, play an integral role in the exhaustion of socio-ecological projects and are formative to constructing new socio-ecological projects. The UMWA have been arguably more successful in obtaining specific goals than new social movements of the anti-MTR groups. Successes and failures of the UMWA illustrate how goals and struggles are never completed projects. For anti-MTR groups this means the continuation of contesting MTR mining and building alternative sustainable development for coal communities, at least in the medium term. As I hope this thesis demonstrated, the success of social movements must be historically and geographically situated within the wider national and global economies along with the specific goals they seek to achieve. For the UMWA this meant greater control of the mines, higher wages, better medical care, and a livable retirement fund at a time when the US economy was ascending but was still heavily dependent on coal. With growing concern over local and global environmental risks, like water contamination and global warming, and the continued exhaustion of the neoliberal socio-ecological project, the anti-MTR certainly could achieve its goals.

Why do the socio-ecological changes occurring in West Virginia matter? What relevance do the changes in West Virginia matter for our understanding of changing regional and national political economies? Local, regional, national, and global economies are still based on the access

and exploitation of natural resources, especially fossil fuels, and as such, it is important to study the ways in which local and regional processes enable the spatial flows of resources. With the restructuring of the coal industry socio-ecological changes in the coalfields of West Virginia have enabled greater access to coal while displacing the costs onto its people and environment. Greater access to difficult coal seams through MTR mining has meant a period of cheap coal for the U.S. and other economies. As chapter five pointed out, the end of cheap coal could be coming as environmental groups, stricter environmental regulations, and competition from natural gas drives up the cost. In fact, labor productivity in Appalachia and even the Powder River Basin has declined in recent years and is projected to continue (McIlmoil & Hansen 2009). Declining labor productivity ensures a higher cost of production that will cut into fossil fuel companies profits, forcing companies to discover strategies of cost cutting through externalizing costs on the socio-ecology of West Virginia.

The study situated socio-ecological change and crisis in theories of economic and ecological crisis, namely in Marxist notions of the contradictions of capitalism. While there has been copious theorizing on the contradictions of capital accumulation and production and the expressions (crises) of those contradictions, this study sought to engage theoretically with eco-Marxists theories of crisis. Specifically, the thesis worked through O'Connor's second contradiction of capitalism and Moore's world-ecology frameworks for understanding ecological and economic theories of crisis. In keeping with Moore's world-ecology perspective, I utilized the concept socio-ecological as an attempt to transcend the dualism of nature and society, while holding true to O'Connor's more class-based/social movements theorizing. Moreover, the socio-ecological approach places studies at the regional scale, regionalizing Moore's world-ecology perspective. Moore's world-ecology fails to systematically engage with the dynamics of class

conflict and the importance social movements have in shaping local economies and capitalism at large. However, a world-ecology perspective of the ways in which capitalism has functioned historically and globally has enabled a greater emphasis on the historical and geographical relations embedded in the coalfields of West Virginia.

After reviewing theories of crises and a brief literature review on the restructuring of resource-dependent towns and regions, I traced the historical trajectory of the coal economy in West Virginia. Focusing on labor relations between coal miners and operators and the development and increasing importance of the UMWA. In the late 19th century the non-unionized workforce faced horrific exploitation. Since that period, coal mining has been one of the most dangerous jobs. At the end of the first socio-ecological project (1930s), the UMWA finally became an effective workers organization improving the well-being of workers and coal communities. The most famous UMWA president John L. Lewis radically transformed the union into a powerful force challenging the coal industry's hegemony and ultimately reorganizing the socio-ecology of the coalfields.

In reaction to the growing strength of the UMWA in the 1970s with the Miners for Democracy and massive federal investments into coal mining, the industry pursued a strategy of breaking the union. Central to breaking the UMWA's strength were the actions of A.T. Massey. Prior to their actions, the UMWA in the Coal River Valley all along "the river, everybody was union because they was neighbors and family and friends. So it was strong bonds" (Community member: Interviewed May 17, 2012). A.T. Massey bought up union coalmines along the Coal River Valley and quickly shut them down only to reopen as non-union mines. Eliminating union mining jobs placed workers and the communities in a precarious position in which the concessions union miners had gained in the past were eliminated. One interviewee remarked on

these changes stating: “people remember the boom times when you know Whitesville, which is now almost a ghost town, but you drive down the street and there is boarded up after boarded up window. [There] used to be movie theatres, bowling alleys, multiple grocery stores, [and] multiple bars. They say on a Saturday night it was shoulder to shoulder walking around downtown Whitesville” (Community member: Interviewed May 18, 2012). The restructuring of the coal industry did not end with closing down union mines. Developing new methods of extraction radically transformed the relations and conditions of production profoundly, reshaping the organization of coal mining and communities.

First developed in the early 1970s, MTR mining was a complete game changer for coal miners and their communities. In the past when industry made technical or organizational changes in the mines coal miners incurred most of the burden from these changes. With MTR mining the socio-ecological changes are not spatially contained within the mines impacting only miners, rather the material practice of MTR is spatially expansive impacting the socio-ecology of West Virginia and beyond. Remarking on the socio-ecological changes due to MTR mining a community member stated, “we are getting more of this health data that studies the impact of mountain removal showing increase in cancer risk, increase birth defect rates even when account for things like you would expect in less prosperous communities” (Interviewed May 18, 2012). In Mingo County between 1999 and 2007 deaths from cancer were 224 per 100,000 and deaths from cardiovascular diseases were 306 per 100,000. In Logan County in those same years death from cancer were 239 per 1000,000 and deaths from chronic cardiovascular diseases were 293 per 100,000. Non-MTR counties in West Virginia like Monongalia County deaths from cancer were 165 per 100,000 and chronic cardiovascular diseases were 216 per 100,000.[78]

[78] Data collected form www.ilovemountains.org

The socio-ecological changes occurring in the counties of West Virginia, however, do not stay contained. In fact, many interviewees discussed how the extraction (especially MTR) and burning of coal was a major contributor to global warming. Large tracts of forest-covered mountains are clear-cut for MTR mining, thereby eliminating earth's 'natural' carbon sinks. These carbon intensive practices are some of the biggest perpetrators of greenhouse gas emissions. Additionally as discussed in chapter four, thousands of miles of streams, rivers, and watersheds are contaminated through MTR mining highlighting the difficulty of containing the socio-ecological consequences.

Related to the socio-ecological consequences of MTR mining, chapter four examined the hidden cost of coal-dependency. Hidden costs associated with West Virginia's long historical mono-economy have reproduced many different forms of inequality (socio-economic, gender, racial, religion). In conjunction with the various hidden costs of resource-dependency the political apparatus has been controlled by the coal industry. Although not discussed in this study, politicians, Democrats and Republicans, have been bought off by the coal industry. "When you have a state who intentionally promotes a mono-economy based on an extraction industry, is when you need to change your politicians. But in the state of West Virginia it makes no differences whether Democratic or Republicans because they both work for the coal company. The coal company has the money to give to the campaigns that finance the elections" (Retired coal miner: Interviewed June 25, 2012). Moreover, politicians interested in being elected or re-elected often cannot be vocal against the coal industry. For example, in the late 1970s Jay Rockefeller running for governor of West Virginia, now Senator of West Virginia, was vehemently opposed to large-scale surface mining. Rockefeller lost the election based on his

position on surface mining. Four years later running for governor again, Rockefeller changed his stance on surfacing mining and was elected the governor of West Virginia.

The hidden and not-so hidden costs of coal dependency have created great anxiety for the coal communities of West Virginia, often asking what will happen after the coal is all mined? Or, how can we transition away from a mono-economy dependent on coal? Discussions surrounding the inevitable transition away from a coal economy were evident in every interview conducted. From environmentalists to community members to retired coal miners there was talk of creating a diversified economy that could provide an array of jobs that were sustainable over the long run. Conflicts over mining and the potential of creating a diversified economy were ultimately over whether local people had a voice in the ways in which economic development unfolds, and more broadly, concerns of social reproduction.

Social movements, whether from labor or elsewhere, have attempted to wrestle control over economic development and social reproduction in the coal communities of West Virginia. Prior to the restructuring of the coal industry beginning in the 1980s, the UMWA had played a prominent role in economic and social activities in the communities. The UMWA began declining in membership and was less involved in community organizing. Social movements, like the anti-MTR movement, partially filled in the gap attempting to protect communities from the exploitation of the coal industry.

Beginning with the objective of abolishing MTR mining, community groups have spoken out against this new form of surface mining that radically transformed the socio-ecological landscape. The anti-MTR movement has it roots in the anti-strip mining movement of the 1960s-70s that began with concerned citizens whose communities were impacted by MTR mining. From there environmentalists outside of Appalachia got involved in the fight against MTR.

Recognizing the connection between energy consumption in the northeast and blowing up mountains to extract coal in West Virginia, the high cost of cheap energy became increasingly clear for concerned citizens and environmentalists. Community groups like Coal River Mountain Watch, RAMPS, and Keeper of the Mountains have offset many of the externalities of mining creating many success stories (see chapter five).

The success stories created by community and anti-MTR groups should be celebrated in of themselves. In particular, the success stories point out how local and non-local groups and institutions have challenged the coal industry's hegemony. Responses (direct action, community consultation, outreach, education, etc.) from community groups and environmentalists alone illustrate the crisis generating practices of large-scale mining. Continued use of large-scale mining will hinder social reproduction in a region that has already suffered from the restructuring of the industry.

Creating sustainable economic development and social reproduction will mean building stronger coalitions between coal miners (retired or not) and community groups. Groups with seemingly conflicting interests will have to collaborate in strategic ways that can transcend the discourse of jobs versus the environment. If we look at the recent history we can see a number of collaborations that have been successful (see chapter 5). Celebrating and retelling the successful collaborations can enable a more hopeful future in which workers and united with community groups.

Conceptualizing the crisis in the coalfields as socio-ecological may be one step towards enabling future collaborations. Although theoretically abstract, socio-ecology points out many of the aspects community members/activists and retired coal miners have detailed in interviews. Many of the participants interviewed acknowledged the construction of the jobs versus the

environment and its power, but have continued to work through this simplified understanding of reality. Thinking socio-ecologically enables a sort of theorizing that moves beyond the binary of jobs versus the environment. It gives us a strategy for understanding change and contradictions in which crisis moments are both simultaneously ecological and economical. Therefore, solutions to crises must be both simultaneously ecological and economical, and thus socio-ecological.

This thesis is a story that first sought to understand the changing relations between the coal industry, coal communities, and social movements with a focus on the neoliberal socio-ecological project. Then I sought to understand the origins of the crisis through interview and secondary data. I spelled out the contours of the socio-ecological crisis utilizing O'Connor's formula of the conditions of production. Afterwards I examined how social movements are playing an integral role in mediating and moving beyond the crisis. Aside from analyzing empirical data, the thesis research project was a space for engaging with ecological theories of crisis, namely O'Connor's second contradiction of capitalism and Moore's world-ecology. I found it most beneficial to mix O'Connor and Moore's theorization of crises in capitalism. Beginning with O'Connor's concern over the degradation of the conditions of production and the ways in which social movements arise from such practices, I modified Moore's world-ecology to a more regional perspective—the socio-ecological approach. This allowed for a more nuanced understanding of nature-society relations in capitalism that is often missing in traditional eco-Marxist studies. One other goal of the thesis was to bridge the gap between theories of crisis and empirical work on resource-dependent communities, specifically studies on coal mining in Appalachia. Currently, most of the work on MTR mining in Appalachia is empirically based often lacking theorization of the historical and contemporary changes in relation to the

community and MTR. This thesis provided a systematic theorization of the changing socio-ecologies in the coalfields of southern West Virginia, tying together abstract theories with empirical work.

While arguably the first two research questions guiding the thesis have been answered, the third question is surely unanswered. In part, the third question is orientated towards the future development of the coal communities socio-ecology, and the ways in which social movements are integral to that development, making it implausible to answer. In hindsight it may have been more beneficial to examine the differences and similarities between the anti-strip mining and anti-MTR movements.

Limits of the Socio-Ecological Approach and Future Research

The limits of socio-ecology and the world-ecology perspective are multiple and varying and will be discussed in some detail, along with its potential use in future work. To begin, Moore's world-ecology perspective is in part about piecing together specific nature-society configurations to understand the ways in which historical capitalism has emerged and developed through periods of crises. Similar to O'Connor's second contradiction of capitalism, a world-ecology perspective represents another grand theory of capitalism in relation to nature-society. More so than O'Connor, Moore utilizes history to trace the longue dureé of capitalism through successive configurations of human and extra-human natures that are constituted in the production of nature, the pursuit of power, and the endless accumulation of capital.

Grand theories such as these pose practical problems for pursuing localized contemporary studies such as MTR mining in southern West Virginia. A world-ecological perspective is deeply rooted in historical archival work focused on long waves of accumulation. How does a world-ecological perspective methodology translate to interviewed based empirical studies? Interview

driven empirical studies essentially provide data from a single individual or a group of individuals about specific relations, processes, and recent histories. Interviewees often cannot easily detail and capture how regional socio-ecologies are constituted in the longer historical movements of resource frontiers, and how those regional socio-ecologies are constitutive of the future development of capitalism. In short, the world-ecology perspective focus on the broad sweeping histories of capitalism, specifically commodity production, creates a difficult disjuncture between theory/methodology and contemporary interview based empirical studies.

Interview driven research utilizing a world-ecological perspective thus must confront the disjuncture between the grand theory and localized studies. For researchers, myself included, the trouble lay in capturing different levels of analysis at multiple spatio-temporal scales. World-system theorists, like Moore, focus upon the long spanning histories on the scale of the world-economy. Such theorizing and research inherently misses the complexities and importance of localized struggles and institutions. For example, statewide institutions like the WVDEP and the Army Corps of Engineers play an integral role in mine permits, mining, and waste processing. These institutions provide a specific set of rules, norms, and guidelines for the coal industry, community members, and concerned citizens to act. They provide a structured coherence in which different groups with varying interests are able to impose their will on the other. It is often the case that these institutions are heavily influenced by the coal industry, or in some cases the coal industry outright ignores the recommendations of the WVDEP (Reece 2005). In any case, a grand perspective such as world-ecology is hard-pressed to deal with the finer details of conflicting groups struggles to influence the local institutions governing the extraction and processing of resources.

A further limitation of the world-ecology perspective in regards to contemporary studies is that it is difficult to show empirically how the messy bundles are constitutive of the webs of life. Most critical theorists engaged in political ecology and other subfields of nature-society studies would agree with Moore's call for the ontological shift in thinking through ideas of nature and society. However, as this study illustrated, empirically demonstrating the messy bundles becomes a difficult obstacle to overcome. Then, we must ask how can data collected from interviews be of use in thinking through and illustrating to our readers how the empirics gathered can demonstrate the forming and reforming of the messy bundles.

Natural and social sciences ontologically frame problems and pose solutions within modernity's dualism. This has limited our conceptual vocabulary for understanding problems, solutions, and change. Therefore, socio-ecology as a concept is limited by our current ontology of nature and society, and thus may not have the proper tools and concepts for a more holistic view of change. Related to this is the abstraction of the ecological and the social when writing and speaking about certain forms of change. Socio-ecology, then, over time may provide epistemological worth as new ways of thinking, writing, and speaking about change unfold. The socio-ecological approach, a modified version of Moore's world-ecology perspective, attempts to move theoretical and empirical studies beyond modernist conceptions of society and nature without falling into the trap of post-modernism. In essence, it is an approach that works in the direction of a paradigm shift, yet has not been fully realized.

Future research will continue to utilize the concept socio-ecology to study further extractive regional political economies with particular attention on commodities. The mode of analysis of commodities links geographically distant places and regions structuring different regional political economies to global markets. Through the socio-ecology of commodities we

can begin to see how nature-society configure in time-space, often around the organizational structures and imperatives of capital.

The fossil fuel industry has recently discussed projects about constructing a coal and natural gas export in the Pacific Northwest, exporting dirty energy to the growing economies of China and India. Will the extraction, transportation, and consumption of fossil fuels over greater distances help to create collaborative opportunities for social movements against dirty energy? Or will the geographic expansion of the hydrocarbon commodity chain create what Marx called commodity fetishism? A socio-ecology understanding of the changing political economies can help make sense of the ways in which human and extra-human natures are constituted through the histories and geographies of hydrocarbon commodity chains. Another future project could entail the development of the Alberta tar sands linked to the end of cheap fossil fuels. New ways of extracting, processing, and consuming energy are irreducible to socio-ecologies and ways of organizing human and extra-human natures. Seeking out new strategies of capital accumulation while respecting marginalized groups rights becomes increasingly untenable. In sum, contradictions arising from regional political economies of new and old energy frontiers should not be understood as ecological or social contradictions, but as socio-ecological.

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Curriculum Vitae

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Education

M.A. Geography, Syracuse University, 2013
B.A. Sociology, Syracuse University, 2008

Areas of Interest

I am broadly interested in the political economy of extractive frontiers, historical capitalism, theories of crises, and energy regimes. Specifically I am interested in the multi-scalar processes of the political economy of coal extraction in Appalachia and the ways in which the nexus of state, capital, and labor relations are dialectically produced through historical capitalism.

Publications

(in review) "Placing Ecological Regimes: Socio-Ecological Projects and Crisis in the Coalfields of West Virginia" *Journal of World-Systems Research* [with Samantha Fox]
(forthcoming) Book Review for *Capitalism, Nature, Socialism* a peer-reviewed journal Santa Rita Del Cobre: A Copper Mining Community in New Mexico
(2011) Book Review for *Labor Histories* a peer-reviewed journal *Killing for Coal: America's Deadliest Labor War* by Thomas G. Andrews.

Awards and Honors

(2013) Syracuse University Graduate Student Organization Conference Fund $200
(2012) Geography Dept.-Syracuse University Geography Department Research Fund $3,600
(2011) Graduate Assistantship-Syracuse University
(2008) Golden Key International Honour Society-Syracuse University
(2008) Alpha Kappa Delta: International Sociological Honor Society-Syracuse University

Presentations

(2013) "The Crisis of Capitalism in the Coalfields: Conflict, Moments, and Beyond," at Dimensions of Political Ecology Conference, Lexington, KY.
(2012) "Removing Mountaintops in the Mountaineer State: Spaces of Accumulation are Spaces of Contestation," paper presented at the Association of American Geographers Annual Meeting, New York, NY, February
(2008) "Jobs For Sale: Polarization of Labor Market in Syracuse" Senior Thesis, Presented at MayFest. Syracuse University.

Teaching Experience

America and the Global Environment

World Cultures

Research Experience

(2011) Research Assistant for Prof. Tod Rutherford “Small differences that (still) matter? Cross Border Regions and Work Place Governance in the Southern Ontario and US Mid-West Automotive Industry”, Regional Studies (forthcoming)

Professional Development

(2011-present) Future Professoriate Project (FPP)-Syracuse University