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Extraction, Ecology, Exploitation, and Oppression: The Political Economy of Coal in Appalachia

William R. Wishart

University of Tennessee - Knoxville

To the Graduate Council:

I am submitting herewith a thesis written by William R. Wishart entitled "Extraction, Ecology, Exploitation, and Oppression: The Political Economy of Coal in Appalachia." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Arts, with a major in Sociology.

Robert E. Jones, Major Professor

We have read this thesis and recommend its acceptance:

David L. Feldman, Asafa Jalata, Paul Gellert

Accepted for the Council:
Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

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EXTRACTION, ECOLOGY, EXPLOITATION, AND OPRESSION: THE POLITICAL ECONOMY OF COAL IN APPALACHIA

A Thesis

Presented for the

Master of Art

Degree

The University of Tennessee, Knoxville

William R Wishart

Dec. 2007

DEDICATION

This work is dedicated to Rachel Gramig, who first inspired me to go beyond describing the world as it is (the point is to change it), and to all people working for environmental and social justice in Appalachia and everywhere in the world.

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ABSTRACT

This thesis examines the social and ecological problems associated with mountaintop mining in central Appalachia. Theoretical insights from world system theorists and other political economists are used to trace the roots of these problems to the historical progression of different modes of extraction in the region. The restructuring of the region's social, cultural, and ecological systems to meet the needs of core production over time has perpetuated its position as a resource extractive periphery. This occurred in three major modes: a frontier mode, an agricultural mode, and an industrial raw materials mode. The last mode has been characterized primarily by coal mining and has shifted from labor intensive forms to capital intensive forms. The role different classes of actors have played and continue to play is discussed. Finally, key processes are summarized and conclusions offered.

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Introduction

Appalachia is a region in the eastern United States that has been historically defined by its mountainous geography. The term "Appalachia" originally referred only to the mountain ranges but has come to encompass the people and cultures that inhabit the mountains as well (Montrie 2003). These mountains have been a rich source of natural resources for humans for over a thousand years (Guffey 2005). The number of humans, their relationships to each other and to the mountain ecosystems they inhabit changed drastically over the past 400 years as the region has been incorporated and evolved within the capitalist world system. Central and southern parts of the region have followed significantly different development paths from other core industrial areas United States (see Figure 1 for a general description of these sub regions).[1] These areas have become peripheral economies supplying the core with cheap natural resources and labor. The economy of central Appalachia has been particularly dominated by the appropriation of materials from the ecosystem and their export in relatively unaltered form to core areas.

"Because this appropriation and its ecological results affect the class structures; the organization of labor; systems of property and exchange; the activities of the state; the distribution of populations; the development of physical infrastructure; and the kinds of beliefs, and ideologies which shape social organization and behavior," Bunker's terminology "modes of extraction" is useful in conceptualizing the historical progression of central Appalachia's economy (Bunker 1984:1020). My thesis proposes that the material bases and productive relations characterizing central Appalachia's economy have gone through three main modes of extraction. First extraction of plants and animals

[1] All figures are located in the Appendix.

through hunting, gathering and trapping; second extraction of agricultural products by grazing livestock on wild foods and by converting forestland to agricultural monocrops; finally extraction of minerals for industrial production through initially labor intensive mining and later by more capital intensive forms.[2] The argument will be made here that the spatial association of social problems and coal surface mining is the result of complex historical progression of central Appalachia as an internal periphery within the United States.

Today central Appalachia has higher unemployment and poverty rates, lower levels of education and receives more transfer payments per capita than other parts of the region or nation.[3] Figures 2 and 3 show the higher than average poverty rates and levels of "economic distress" suffered by parts of eastern Tennessee, western Virginia, eastern Kentucky, and southern West Virginia. It is these areas of Appalachia (usually categorized as central or sometimes southern Appalachia) that this work is most concerned with. It is not coincidence that these are also the regions in which forms of mountaintop surface or "strip" mining, including "mountaintop removal," are increasingly violently restructuring ecosystems and rural communities. Many explanations of the connection between Appalachia's history and its current problems, particularly those offered by government and industry, are highly problematic and overly simplistic. In reality, the origins of Appalachia's problems are more complex and their resolution will likely require more fundamental changes than the dominant discourse recognizes. The central tenet of my thesis is that the restructuring of social relations and

[2] Timber also played a significant role during the early stage of this mode (peaking before 1924) but unfortunately a proper treatment of role of timber was impossible under the time constraints for this work.
[3]Source: www.arc.gov

ecological systems by extractive economies throughout Appalachia's interaction with the capitalist world-system has been a determining factor in the unequal power relationships and unequal exchange of economic, social, and environmental values. These processes continue to cause social and environmental crisis in the region.

This work begins with a description of strip mining and some of the environmental and social effects which make this topic such an important issue. The following section discusses the capitalist world system and the particular logic of capitalist wealth and valuation. These ideas are then applied to the history of Appalachia and the three progressive modes of extraction that have characterized it. After a brief discussion of the political dynamics involved in this history, a summary, conclusions, and implications are presented.

Coal Mining in Appalachia Today and Its Place in the US Coal Market

Although Appalachia contains most (88%) of the nation's 1,398 coal mines it was only responsible for little more than one-third (35%) of the 1,131,498,000 short tons of coal produced in 2005.The region was home to 458 (75.5%) of the nation's 606 under ground or "deep" mines and 682 (86%) of the nation's 792 surface mines. However, just 17 surface mines in Wyoming produced more coal than all of Appalachia combined. Not only did they produce more coal but they did so with less than a one-tenth of the workforce in Appalachia.[4] To understand this "productivity gap" it is first necessary to examine differences in the conditions of production in these two major mining areas of the United States.

The Powder River Basin in the western United States runs between Wyoming and Montana and has one of the largest coal reserves in the world. Its coal seams are very thick and the land is fairly level compared to thinner seams found in the mountains of Appalachia. The bituminous and lignite coal beds in Appalachia were formed by different geologic and biophysical processes that produced some of the highest quality coal in the world. However, these same processes produced more potentially hazardous mineral and chemical compounds within its coal seams. For example, Appalachian coal generally contains more sulfur and produces more "fly ash" or particulates when burned than does western coal, with notable exceptions in West Virginia (Fox 1999).[5] These coal

[4] Source: U.S. Department of Labor, Mine Safety and Health Administration, Form 7000-2, "Quarterly Mine Employment and Coal Production Report" Note: Includes all employees engaged in production, preparation, processing, development, maintenance, repair shop, or yard work at mining operations, including office workers. Excludes preparation plants with less than 5,000 employee hours per year, which are not required to provide data. Calculations and percentages are the author's.

[5] Source: www.eia.doe.gov

properties significantly influence prices and demand in coal markets. This is because 90 percent of coal produced in the United States is burned in electrical power generation, and given air quality regulations, some power companies find it more profitable to purchase cleaner coal rather than pay to install pollution control equipment (Branscome 1978; Fox 1999).

Appalachian coal seams are covered with some of the most diverse deciduous mixed hardwood forest in world. The energy and expense required to clear these forests is greater than that needed to clear the scrubland which covers most of the Powder River Basin. Additionally, state and federal environmental agencies have more mandates that come to bear regarding species and watershed protection in Appalachia because biodiversity and precipitation are significantly greater in this region. Both ecological conditions contribute to the large number streams, rivers and waters that fall under governmental jurisdictions. Not only are these waterways under threat of obliteration by being strip-mined, they also face potential impacts from sediment and chemical runoff from coal processing and storage sites (Nolt and Bustos 2005). Though acid mine drainage, wastewater and other mine wastes associated with deep mining create serious impacts to Appalachia's waterways, surface mining is a far more damaging mode of coal extraction. In fact, Congress passed the Surface Mining Control and Reclamation Act of 1977 (SMCRA) in response to intense public agitation over surface mining practices by which "companies pillaged, profited, and proceeded onto new ground, leaving behind thousands of miles of tortured moonscape-land that will never be reclaimed and may take centuries to heal" (Nolt and Bustos 2005:241). Even after that legislation, the federal government reported that 724 miles of streams were buried with mine waste between

1985 and 2001 in Central and Southern Appalachia. Official federal estimates of the total impact from mountaintop mining are that 800 square miles of forest have been destroyed (7% of Appalachia's forests) and 1,200 miles of streams have been buried (EPA 2004). However, a study by the West Virginia Department of Environmental Protection suggests that these figures are grossly underestimated (Shank 2004).[6] Certain parts of Appalachia, namely southern West Virginia and eastern Kentucky, have suffered more grievously than others. For example, it has been estimated that up to 25 percent of the mountaintops in southern West Virginia have already been removed (Fox 1999).

Reclaimed mines areas are usually turned into grassland rather than trying to restore the land back to a diverse forest ecosystem and even when they are reforested "the understory vegetation probably takes over a century to recover- if it ever does" (Nolt and Bustos 2005:243). Neither does reclamation remove the need or the costs of monitoring and maintaining coal slurry impoundments, a necessary byproduct of processing surface mined coal. In Martin County Kentucky one such coal waste impoundment ruptured in 2000 flooding residents' homes as well as 70 miles of streams with 300 million gallons of coal sludge and killing 1.6 million fish. Still, Martin County residents were "luckier" than the 125 people who died in Buffalo Creek, West Virginia from a similar incident in 1972 (*Sludge* 2005). In fact, many people in Appalachia are being exposed on a daily basis to significant risks from mining and its environmental impacts. For example, Appalachian miners have some of the highest rates of injuries and fatalities in the developed world. For instance, although Appalachian strip-mined coal accounts for 20% of the U.S. supply,

[6] The 2004 EPA study relied primarily on mining permits to estimate impacts. This study in southern WV by a member of the WV DEP found that nearly 40% of valley fills, accounting for 25% of the impacted surface area, did not have permits on record. Therefore it is fairly certain that the EPA study drastically underestimates the impact of MTR in Appalachia.

Appalachian strip-mines suffer 75% of strip-mine fatalities nationally.[7] Wells in nearby communities are often poisoned by toxins leached into groundwater or run dry from changes to the water table from blasting (EPA 2004). The barren landscapes created by mountaintop removal have been implicated in exacerbating lethal floods in West Virginia (Goodell 2006). In addition to water problems, blasting creates shock waves that damage homes and spew enormous amounts of dust that can engulf nearby communities in thick, blinding, choking clouds (*Pancake* 2006). Debris flung loose from surface mining also led to the tragic death of a 16 year-old boy riding in his parents' car on Interstate 75 in Campbell County, Tennessee in 1994 and the death of a three year-old boy sleeping in his bed in Wise County, West Virginia in 2004(Nolt and Bustos 2005).[8]

It seems that the lives of many mining families have changed very little in 40 years since President Kennedy launched the War on Poverty from the steps of a porch in Appalachia. This became apparent to many when Democratic presidential candidate John Edwards recently stood on this same porch listening to new stories of suffering caused from mountaintop mining. It is clear that many Appalachian mining communities still face severe, some would argue worse (Szakos 1990), social and environmental problems as less labor-intensive and more environmentally destructive mining processes such as MTR processes replace more traditional ones (Couto 1993; Fox 1999; Seamon 2005; Nolt 2005; Pancake 2006).

Residents of the coalfields have suffered from and fought against surface mining practices since as early as the 1940s, but the worst social and environmental impacts are

[7] Source: Ken Ward Jr. Dec. 10 2006 *The Charleston* (W.Va.) *Gazette*

[8] Source: Tim Thornton. Sept. 8 2006 "Southwest Virginia family and A&G Coal settle in 3-year-old's death" *The Roanoke Times*

now being caused by mountaintop removal. Mountaintop removal essentially reverses the conventional mining process of taking the coal out of the mountain by taking the mountain off the coal. This is achieved by giant bulldozers, crane-like shovels, or draglines that can reach the size of a skyscraper, and by literally blasting away the mountaintop with a mixture of ammonium nitrate and fuel oil. The exploded remains of the mountaintop are then shoved over the side to an adjacent valley. The result of this burial process is known in the industry as a "valley fill".[9] This method of mining uses fewer employees, often with different skills than those involved in deep mining.

Two-thirds of the nation's miners still work in Appalachia. The majority of those miners, 65 percent, are employed underground, despite nearly double the number of mines located above ground. The number of mining jobs in the region is decreasing and so are the populations of many mining communities. Although the same large scale strip mining technologies that are associated with the great productivity of western mines are being increasingly used in mountaintop mining, other methods are still currently responsible for a majority of the region's coal production. Nevertheless, the scale and intensity of surface mining in Appalachia is rapidly rising.[10] For example, the number of

[9] The official definition of "Mountaintop Removal" is partially an outcome of a political compromise during the creation of SMCRA. It's effect is twofold- first it allows mine operators to dispose of overburden in a way that would otherwise violate numerous regulations and, second, it gives an exemption from the requirement to return the mountain to its "approximate original contour" (AOC) during reclamation. This exemption was only to be granted in cases where a higher economic use for leaving the mountain flat could be demonstrated (SMCRA 1977). However, this is generally not enforced (only one-fourth of MTR sites in WV possess the required permit) despite the federal investigators findings that companies are creating the fills simply to reduce their costs, regardless of intended post mining use (Fox 1999). As noted in the previously mentioned study (Shank 2004) the lack of a permit does not stop companies from creating valley fills. Additionally smaller fills, sometimes called "hollow fills" are allowed in certain areas but do not result in the official designation of MTR. Hence, the definition of AOC is also somewhat arbitrary and varies between different agencies' interpretation (Fox 1999). If a valley fill is not created and instead the overburden is stored and repacked into the "AOC" then the mine is considered a mountaintop mine but not MTR.

[10] Source: EIA "Impact of Technological Change and Productivity on The Coal Market" http://www.eia.doe.gov/oiaf/analysispaper/coal.html

surface mines in the region increased by three percent but productivity from those mines increased by eight percent in 2005.[11] Much of this increase in productivity can be attributed to the increased deployment of large scale mining technology such as that used in MTR. The following sections will discuss the macro economic and social forces which shape resource extraction in the capitalist world system and then examine the dialectic interplay of those forces with local actors and environments throughout Appalachia's history.

[11] Source: U.S. Department of Labor, Mine Safety and Health Administration, Form 7000-2, "Quarterly Mine Employment and Coal Production Report"

Resource Extraction and "Uneven Development" in the Capitalist World System

> "The Congress hereby finds that the Appalachian Region, while abundant in natural resources and rich in potential lags behind the rest of the nation in its economic growth and that its people and that its people have not shared in the nation's prosperity. The region's uneven past development, with its historical reliance on a few basic industries and a marginal agriculture, has failed to provide the economic base that is a vital prerequisite for vigorous, self-sustaining growth. The State and local governments and the people of the region understand their problems and have been working and will continue to work purposefully toward their solution." -Appalachian Regional Development Act of 1965 establishing the Appalachian Regional Commission

Many political economists and other sociologists generally do not agree that the troubles in Appalachia are simply due to the region's own failure to create a diverse economy. Some have even suggested that the passage of the Appalachian Regional Development Act, like the National Industrial Recovery Act of the 190s, was mostly an attempt to retain legitimacy of the state and to maintain the status quo in the face crushing poverty brought about by contradictions in the capitalist system (Walls 1978; Salstrom 1994). They also point out that the contradiction between of the vast amounts of wealth created by the resources extracted from the region and the impoverishment and immiseration of the region's inhabitants is hardly unique in the world. Instead, they suggest that many of the social and environmental problems and inequities associated with Appalachia, coal mining and mountaintop removal stem from deeper roots that feed global capitalism (Walls 1978; Plaut 1978; Gaventa, Smith, and Willingham 1990; Couto 1993; Salstrom 1994; Fox 1999)

According to World Systems Theory (WST), the world capitalist economy is stratified at multiple geographic scales. Mediated unequal relationships are reproduced

globally between the northern and the southern hemispheres, geopolitically between individual states, regionally within states, and locally within individual communities. The core areas benefit from exploitation of the periphery. The semi-peripheral areas are exploited by the core and simultaneously exploit the periphery. Semi-peripheral areas also act as a mediating political, economic, and ideological force by preventing dichotomous polarization that could lead unified peripheral resistance and revolutionary change.

WST characterizes the exploitation between regions as a process of political and military domination and, most fundamentally, economic "unequal exchange." However, there is disagreement over what this term means and how the process takes place (Shannon 1996). Theories of unequal exchange may be separated into two broad categories: those concerned primarily with economic values involving terms of trade, prices, or labor and those concerned primarily with material/ecological flows of matter, energy, and organisms. Both categories are interrelated and offer an incomplete explanation of uneven development when taken in isolation (Bunker 1984). The structural position of a region in the economic system has implications for the extent to which residents are separated from the means of subsistence and exposed to environmental harms (Foster 1992; O'Connor 1989). Structural position also affects the degree to which those communities are able to retain and reinvest the surplus value created by extractive industries (e.g., mining, timber, fisheries) for the purposes of community development (Frickel and Freudenburg 1996; Bunker and Ciccantell 2005). Additionally, structural position critically influences the effectiveness and availability of

different methods by which these communities can resist exploitation (Cable 1993; Gaventa 1980).

Resource extraction usually takes place in more rural, less politically powerful areas with little financial capital (Bunker and Ciccantell 2005). These communities are also usually internally peripheral or internally colonized within a given state (Adeola 2000, Adeola 2001). Capital flows into these communities from outside, often transnational, sources. This is true within the internal periphery of the U.S. as seen in the development of coal mining in Appalachia (Fox 1999; Gaventa, et al. 1990; Lewis, Johnson, and Askins 1978). Although external political domination through violence and unequal exchange more pronounced in the economies of more globally peripheral areas, such as the exploitation of oil resources in the Niger Delta (Celestine 2003), scholars have demonstrated parallel processes exist within Appalachia (Lewis and Knipe 1978). Multinational corporations, governments, and local elites typically do not reinvest surplus for sustainable development within the extractive-based community but rather invest it elsewhere or non-productively. Surplus that is reinvested tends to be in the form of linkages and infrastructure to increase the volume and profit of resource extraction not on infrastructure for socio-economic sustainability such as education, healthcare, and appropriate technology (Bridge 2004; Fox 1999; Frickel & Freudenburg 1996; Bunker 1989). Furthermore, any linkages which are created are often dependent on the extraction activity and cease to provide any beneficial or "multiplier" effect to the community once extraction ends (Frickel and Freudenburg 1996; Bridge 2004). It would be misleading to view these outcomes as simply the result of poor governance or economic planning, local

actors respond to structural pressures shaping these choices to exploit their environments unsustainably.

While acknowledging the importance of wealth and power inequities as a danger to ecological integrity and justice both within and between nations (Boyce 1994), there appears to be an even more fundamental connection between the flow of ecological resources and development (Bunker and Ciccantell 2005). Resource extraction dependent economies result in patterns of development that are problematic in a number of ways. Frickel and Freudenburg (1996) argue that the ability of extractive-based industries (mining in particular) to create sustained economic development has decreased over time (see also Bunker and Ciccantell 2005). They attribute this trend to "historically contingent levels of extractive capacities, pre-existing competition, linkage specialization and transportation" (1996: 445). Increased efficiency of extractive technology often depletes resources more rapidly, shortening the duration of economic contribution. Increased competition between resource providers is facilitated by better regional and global transportation networks and tends to create a race to bottom. These processes reduce the creation of wealth tied directly to the process of extraction. Some sources of wealth generated at the location of extraction include wages, profits of local corporations, and related taxes or fees extracted by government and other organizations. These benefits are subject to the market fluctuations of the produced commodity on the world market and are inherently limited in duration if a commodity is either produced from non-renewable resources or from renewable resources that are being consumed at an unsustainable rate (Frickel & Freudenburg 1996). More specialized linkages have tended to mean that extractive infrastructure does not contribute to other forms of economic

growth (Bunker 1989; Frickel and Freudenburg 1996). These are clear problems for the success of capitalist economies dependent on resource extraction.

In addition to these problems, Bunker argues that because economic relations in peripheral areas dominated by extractive industry have often not been fully capitalist productive relations, models created to study unequal exchange between and or within capitalist societies are inadequate. Development models need to recognize important contributions of particular resource use values to core development and related disruption of preexisting modes of production and ecosystems caused by the restructuring social and environmental relations in peripheral areas towards commodity production for external markets (Bunker 1984; Bunker and Ciccantell 2005). Although "the exploitation of natural resources uses and destroys values which cannot be calculated in terms of labor or capital…" the negative effects on those values tends to have future negative impacts on the adaptive capacity of labor and capital in the area (Bunker 1984:1019). Understanding this loss of adaptive capacity will help us unravel the paradox that areas with abundantly rich resources such as Appalachia are generally poor and appear culturally and politically backwards to many people living outside of the region.

The prevalence of resource extraction for export within a nation's economy has been found to predict economic impairment regardless of internal income equality, political culture, and market openness (Sachs and Warner 1997; Ross 1999). Others reject the notion of a "resource curse" and argue that there is actually no relationship between natural resource abundance [wealth] and impaired development after controlling for the effects of income concentration, government and institutional factors and ethnic diversity. (Stijns 2002, see also discussion of this debate in Bridge 2004). The surface appearance

of a “resource” curse is in fact the result of dialectical interplay between core competition for cheap natural resources and the internal social dynamics that tend to occur as resource rich areas’ social relations and environments are restructured toward producing export commodities for core markets(Bunker and Ciccantell 2005).

Understanding the relationship of natural resources to economic development also requires understanding the relationship between nature, the capitalist economy, and capitalist forms of wealth and value. Bertell Ollman draws on Marx’s work to shed light on this key relationship: “Marx…views “the evolution of the economic foundations of society” as a “process of natural history”… or includes among the forces of nature “those of man’s own nature” along with “those of so-called nature”…” (2001:37). Farms, towns, and cities are all different forms of nature that have been restructured by humans. The development of different forms of “built environments” has been made possible by certain forms of social organization and that in turn created the possibility for further new forms of social relations.

Material or real wealth is always a product of natural resources (or the environment) which serves particular human needs or desires. However, particular social forms of wealth may arise in which wealth can be possessed in the abstract. Such is the case under capitalism whereby productive relations come to be dominated by the production of commodities for the purpose of exchange. The subsequent commodification of both humans and nature results in a form of abstract homogenous value that is most obviously embodied in the relation of money (Burkett 2006). “Money is homogeneous, divisible, mobile, and quantitatively unlimited, by contrast with the qualitative variegation, interconnection, locational uniqueness, and quantitative limits of

natural and ecological wealth" (Burkett 2006:54). The social organization of human interaction with the environment, which is bound by physical laws of the latter category, under the logic of the former results a fundamental contradiction. [12] "Capitalist production, therefore, develops technology, and the combining together of various processes into a social whole, only by sapping the original sources of wealth- the soil and the labourer" (Marx 1967:506). In short, the drive to acquire abstract forms of wealth through power, technology and exploitation of people and the environment destroys the sources of real wealth.

A dialectical approach to the problem reveals immediately that "development" and "economy" are abstracted constructs describing human social interaction with the environment. Therefore, any relationship between natural resources and development will be mediated through social relations for which natural resources constitute a precondition. Put differently, important features of the interplay between the historical development of an area's internal institutional and cultural aspects with its position in the modern capitalist world-economy are revealed when viewed from the vantage point of the social forces linking natural resources to both. Therefore, when examining the relationship of resource extraction to socio-economic wellbeing or "development", what needs to be explained is the historical and structural dynamics of the incorporation of resource rich areas into the capitalist world-system (Bunker 1984; Dunaway 1996; Bond 2006; Salstrom 1994).

[12] It should be emphasized that Marx argued the domination of the market over production only became possible as workers lost the ability to meet their needs through direct interaction with the land and other conditions of production (Burkett 2006).

Areas in which the extraction of resources for external markets dominates economic activity have historically followed trajectories that are distinct from regions of industrial production of commodities utilizing those extracted resources (Frickel and Freudenburg 1996; Bunker and Ciccantell 2005). Understanding why some resource extractive regions seem to be struck by a "resource curse" and others are able to diversify their economic activities and ascend economically requires examination of the particular historical circumstances of each region. Observations that success seems always to have been, and is increasingly, the exception rather than the rule also suggest something about the nature of the broader political and economic forces at work (Frickel and Freudenburg 1996; Freudenburg and Wilson; Bunker and Ciccantell 2005). Clearly, the intervention of global actors within resource rich peripheral regions and reaction of local actors to changing market demands tend to encourage the simultaneous development of the type of problematic social relations of corruption, high levels of inequality, etc. which Stijins (2002) claims are the true determinates of economic impairment in resource rich areas.

These discussions demonstrate the need for the creation of what Bunker and Ciccantell (1999, 2005) wryly term a "New Historical Materialism" which would better integrate ecology, geology, and other spatial considerations within world-system political economic analyses.

> As we compare different extractive economies over time, we see that social, technological, material, and spatial processes, operating at very different levels of abstraction and across very different domains intersect differently to configure specific ecosystems and the extractive economy organized to appropriate particular material forms from each (Bunker and Ciccantell 2005:5).

This particular context created by intersecting material and social processes is important for understanding how the extraction of certain commodities comes to dominate economic in a given area. Analysis of the different dominant extractive economies of Appalachia over time reveals dialectical interplay between economies of scale and diseconomies of space, labor and capital, rents and profits, state interests and the interests of Capital, and, importantly, extractive economies and socioeconomic and environmental welfare (Podobnik 2006; Bunker and Ciccantell 2005). The following section demonstrates that long before Appalachia's economy was characterized by capitalist productive relations extractive economies connected to the world-system degraded the lives and environment of its inhabitants.

Early Incorporation

Before contact with Europeans, a number of densely populated agricultural chiefdoms occupied Appalachian river valleys. Many of them cultivated beans, maize and squash as staple crops and supplemented them with walnut and mulberry orchards and by hunting, gathering and fishing of wild foods (Guffey 2005). Fire was used to open up new areas for agriculture, enrich existing soils, create habitat for game and maintain river cane for building construction and weaving. These ways of life were all but destroyed by 1600 from European diseases which killed 90 percent of the Native American population. This pandemic drastically changed socio-ecological structures of these indigenous people, even prior to the arrival substantial European populations. Forest cover increased as lands fell out of cultivation and management. Bison and elk herds expanded into the area and grew in number while deer populations leveled off as their preferred habitat decreased with reduced land management (Guffey 2005). By the next century the Cherokee were the only remaining indigenous group with a significant population. They persisted partly by responding to the colonialists demands for commodities such as deer and elk hides, and beaver pelts and by readily adopting firearms, steel traps and other European practices in their hunting, agriculture and culture. By the middle of the 18th century they had become economically dependent on extracting and trading these commodities and by the end of the century, beaver, bison, wild turkeys, passenger pigeons, and most predators had been wiped out (Dunaway 1996; Guffey 2005). The European leather industry was especially hungry for the native deer (Dunaway 1996). Pigs, cattle, sheep, goats and other invasive species introduced by European settlers also significantly disrupted the ecosystems they penetrated and

threatened existing species (Guffey 2005; Dunaway 1996). European plants began to displace indigenous flora and plants such as snakeroot and ginseng were prized commodities in European and Asian markets and nearly vanished (Dunaway 1996). Continued epidemics and entanglement in warfare between European powers and colonialists in the 18th century further reduced the indigenous population by 90 percent (Dunaway 1996).

The early and widespread adoption of European technologies for trade, subsistence and defense, day-to-day dealings with the settlers and traders and their already vast knowledge of Appalachian ecosystems thus allowed the Cherokee to rapidly exploit organisms which became desirable commodities. So successful, in fact, that the British had to take steps to regulate the flood of colonialists setting up trading operations to capture a share of the profits (Guffey 2005). Cherokee also registered numerous complaints with the local governments about "long hunters" from nearby settlements poaching within indigenous territories in an attempt to cash in on the booming export market (Guffey 2005). But dependency on these new social productive relations also left them dependent on imports of food and tools and depleted local game. This dependency doubtlessly contributed to their involvement in military conflict between the British and the colonialists later in the century and subsequent hardships when goods were cut off (Guffey 2005).[13] Although the extractive-based economy of the Cherokee and colonialists was not characterized by capitalist relations, the insatiable demand of the markets they produced was capitalistic in nature. Despite the non-capitalist social productive relations in Appalachian indigenous and settler society their society-nature

[13] Shifting alliances cut off the Cherokee's supply of guns and ammunition resulting in a return to having to hunt increasingly scare game, and defend against well armed foes, with bows and arrows (Guffey 2005).

relations had already begun to be characterized by the anti-ecological domination of exchange-value over use-value as a motivation for the production of commodities.

It is at this early stage of the region's integration into world capitalism that we begin to see that although the formation of capitalist markets requires the separation of producers/consumers from the means of production (Marx v.3 1967), once those markets are established in one society the relations which characterize those markets are able to link to and influence societies whose modes of production are not capitalist. In linking to those non-capitalist modes of production, the capitalist system introduces new productive forces which may or may not create alienated productive relations in the short term but do result in changes to the conditions of production. In the long term we shall see that the development of capitalist productive relations is in fact the tendency.

Extractive Agriculture[14]

The 19th century was a bleak one for the Cherokee. White settlers continued to invade their territory and they were soon outnumbered and displaced. In the winter of 1838 the last large segment of their population were forcibly removed from Appalachia to the Oklahoma territory by the young United States government in a death march known as the "trail of tears" (Guffey 2005). This seizure of native people's lands and the severing of their political claims to the resources there was a crucial precondition for capital to freely appropriate ecological values from the region. It allowed the settlers to expand into their territories and produce enough crops and livestock to help fill growing demands for these market commodities in other regions. Two major trade goods were

[14] This section will argue that the severe depletion of ecological values associated with 19th century Appalachian agricultural goods meets the criteria for a mode of extraction.

corn and hogs. Both of these could be consumed for subsistence, sold individually, or combined into commodities for exchange- feeding excess corn to hogs to increase their sale price, or distilling it into whiskey (Salstrom 1994; Guffey 2005). Hogs were particularly well suited to foraging in the forests for mast from oak and chestnut (Guffey 2005). As settlement and land claims in areas increased, poorer and later arrivals settled into more marginal agricultural lands in the hollows, ridges, and terraces (Salstrom 1994; Dunaway 1996; Guffey 2005). In addition to free settlers, a significant, but commonly underestimated, number of black slaves were brought to the region to work in export oriented sectors (Davis 2000). Modern cities such as Knoxville, Tennessee and Asheville, North Carolina emerged as transportation hubs of mountain goods bound for external regional and international markets (Guffey 2005).

Appalachia provided a significant proportion of livestock, as well as grains and some luxury commodities like tobacco and liquor, to the Deep South, allowing their plantation economies to devote more land to cotton production. Foraging of livestock, although prominent and easy during frontier conditions, was increasingly supplemented with grains and by 1860 three-fifths of corn produced in Appalachia was used as feed (Dunaway 1996). The first wildlife laws were passed to protect the interest livestock producers by creating bounties for wolves and cougars and mandating their extermination (Salstrom 1994; Guffey 2005). Agricultural exports used much more land than simple subsistence production. For example, on average livestock consumed three and a half times more food than an19th century Appalachian household and required four times the amount of labor to produce than subsistence farming (Dunaway 1996). More land needed to be cleared to do this, often by burning, and at a scale unimaginable to indigenous

inhabitants. Deforestation and agricultural practices resulted in widespread soil depletion and erosion which was exacerbated by overgrazing livestock that destroyed seeds and young plant growth. Consequently, non-native plants grasses and weeds rapidly displaced native varieties and over half of Appalachia had been deforested by the Civil War. The overall ecological consequences were a highly degraded, more homogenized and less biodiverse regional ecosystem (Dunaway 1996). This amounted to a reduction in the adaptive capacity of ecosystems and a reduction in their resilience often resulting in catastrophic collapse. Although Appalachia remains the most biodiverse region in the nation, many of the species which survived the glacial advances of the ice age in its mountains were lost forever during this period. Similarly fecundity that was lost from the mountains will only return on a timescale broader than most human concerns, if ever (Dunaway 1996).

Social systems were also rapidly changing during the 19th century. Although still not characterized by capitalist productive relations, the end of frontier conditions in Appalachia promoted in greater class distinctions between larger and smaller landowners, and these became significantly wider after the Civil War (Salstrom 1994). Although production and trade of commodities within capitalist markets had increased, displacing traditional systems of barter and reciprocity, most transactions did not involve cash but payments in kind. Merchants with access to markets and credit obtained goods and exchanged them for agricultural commodities and livestock, however, the terms of exchange were set by the prices in the capitalist market (Salstrom 1994).[15] The disruption of those markets by the Civil War and the increasing productivity and market penetration

[15] This meant the terms of trade were based on exchange value not on the use values which characterized barter/reciprocity systems.

of mid-western agriculture greatly undermined Appalachian commercial agriculture. Outside speculators came to control a greater majority of land and resources in the region. As the turn of the century approached those capitalists and dependent local capitalists created and molded political and material infrastructure to cash in on the industrializing nation's demand for resources, especially coal. Industrial resource extraction which had started in the early 1800s rapidly expanded and became the major commodity chain linking the region to world markets. This process would have significant long lasting effects on the conditions and relations of production in central Appalachia and throughout the region.

Industrial Extraction and the Rise of King Coal

Mineral exploitation in Appalachia was already having a greater relative environmental impact in Appalachia than in any other region of the country as early as 1810 (Dunaway 1996). Iron, salt, gold and copper production consumed large amounts of forest for charcoal and left chemical wastelands, some of which still persist today (Dunaway 1996; Guffey 2005). "By 1860, timbering and extractive industries were underway in two-thirds of the region's counties" (Dunaway 1996:375). The management of these extractive operations, much more so than those characterizing the small landholder extractive agricultural mode of production, was characterized by production driven not only by production for the purposes of exchange but of accumulation of value in the abstract (M-C-M'). The agricultural producers often produced livestock and crops not primarily for use but for exchange. However, the purpose of exchange was to procure more use-values (C-M-C') not the accumulation of value in the abstract.[16] New extractive interests with capitalist value orientations would come to dominate decisions about land use without concern for alternative uses for future generations. The increasing organization of production for short term maximization of abstract value became a driving force of gluttonous exploitation and degradation of the environment and ushered in brutal class conflict and oppression that characterized much of 20th century Appalachia.

Before the Civil War local elites and entrepreneurs as well as outside capitalists engaged in land and resource speculation but a congressional act passed in 1865 placed

[16] Evidence presented by Salstrom (1994) and Dunaway (1996; 1998) suggests that many middlemen involved in agricultural commodity trade and outside capitalists providing investment in the form of productive goods were engaged in M-C-M' relations but ultimately production was controlled by the farmers whose choices were still fundamentally based on their own subsistence and competency needs.

the brakes on this by prohibiting local banks from issuing banknotes and by raising the financial reserves with which national banks were required to back notes. By default this act also restricted access to finance capital only to actors connected to larger national banks in core financial centers most of which were in the North (Salstrom 1994). This state action constituted an additional precondition to deepening dependence on outside capital investment and perpetual extraction of surplus economic value from the region. "Local production with outside financial backing tended to be export oriented. Hardest hit by this trend were areas with high capacity for production but a low level of accumulated wealth…" (Salstrom 1994:29). Those areas included the majority of the coalfields of central Appalachia and led to the development of a dependent capitalist class. In effect, the only banks which could issue credit in cash were national banks that were unable to accept real estate as loan collateral until 1914. This also limited access to credit and money exchanges in the resource periphery of Appalachia primarily to the form of checking deposits---available only to classes who had access to bank accounts (Salstrom 1994). The most prominent of which were absentee owners who already controlled the majority of the regions land (Dunaway 1996). Local bourgeoisie could not generate their own supply of financial capital in the same way other regions had but were dependent on outside sources (Salstrom 1994). Although money had not been a direct intermediary in most economic transactions in the region the consolidation of access to capital into fewer hands was an important contribution to the way in which the region's resources were utilized in response to the demands of industrialization (Salstrom 1994).[17]

[17] Although money did not usually change hands in economic transactions the terms of barter were often set by the market prices the commodities involved (Salstrom 1994).

Appalachia's peripheral position within the emerging world economic system was established during the restructuring of its social and ecological systems around the requirements of extractive agricultural production for external markets. Because Appalachian counties were less politically influential in their state legislatures, they had difficulty procuring State funds for transportation systems. The inability of Appalachian counties to improve transportation linkages to markets as fast as other regions caused a loss of agricultural market share as early as 1845. These structural conditions according to Dunaway (1998) limited the potential of Appalachia and many of its people:

> As privately owned public monopolies, transport infrastructure opened those geographical locations where extractive industries, travel capitalism, and large export monopolies were being developed, leaving isolated those small farmers and poorer Appalachians who were less articulated with external trade (p.120)."

The evolving transportation networks helped to rearrange social relations for export of raw materials on a new scale. Rail lines steadily penetrated remote areas in Appalachia during the two decades after the Civil War providing efficient transport to industrial markets for export of raw materials and import of core produced commodities. Shaping these new connections with the national and international markets were local elites, petty bourgeois, and American and British capitalists who scrambled to obtain land and resource rights. The determining factor in the accumulation of land and mineral rights throughout Appalachia by outside capitalists and subsequent movement of farming families into mining is of some dispute. Salstrom (1994) argues that the determining factor was that farmers in the region began choosing to supplement their farming with wage labor as population pressure, soil depletion and erosion made subsistence farming more difficult. The catastrophic collapse of many local ecosystems and degradation of

regional ecosystems prior to 1860 is well documented by Dunaway (1996). However, Salstrom's explanation holds true only in the context of land that was available to those families which must have been decreasing faster than population growth. Although Salstrom describes the consequences of the closing of the frontier, it should be emphasized how it was closed. Well before his tipping point of agricultural decline around 1860 more than half of the acreage of Appalachia was controlled by outsiders (Dunaway 1996). The change to an industrial extractive mode of production (and the accompanied deepening of dependency) involved dialectic interplay between the restructuring of ecological systems and social systems of property and production.

Companies acquired the control of mineral and surrounding property rights through a combination of deception, mercenary violence, and manipulation of state judicial power and violence (Gaventa 1980; Wright 1978). Salstrom (1994) suggests that the system of "partible inheritance" significantly increased the number of families living off a given piece of land over time and consequentially created strains on subsistence capabilities. This likely accelerated the process of primitive accumulation within the coalfields. For example, if only one heir of many to a property decided to abandon farming and sell, the coal companies could often force the other heirs off their land through legal action:

> A common pattern, which extended into the 1930s, was for the Company to acquire the rights of a single heir to a property left to several family heirs. When the other heirs refused to sell, the Company would go to court and ask for a judgment on whether the property could be 'fairly and impartially partitioned' and on whether the 'said property is of such a nature so that its sale could be of manifest interest to all parties'. Almost invariably, the court would rule that it could not be divided, and that it should be sold at a 'public auction to the highest bidder'- usually the [Company] (Gaventa 1980:54).

Ironically, the communal nature of the property was officially recognized by the court as a pretense for facilitating its transformation into private means of production. Given the lack of money assets most families possessed (Salstrom 1994) forcing the sale at auction rather than at an appraised price must have been particularly devastating.

Even residents who still owned surface rights to the land but not its "mineral rights' would later find their livelihoods similarly stripped away capriciously by the court interpreting "broad form" deeds in favor of strip mine operators. Around the turn of the 19th century, many struggling farmers or those looking for extra cash sold or "leased" their mineral rights to supplement their farming activities.[18] Selling or leasing only the mineral rights to property appeared advantageous to locals but often was devastating for both the owner and the surrounding community. Those purchasing or leasing the mineral rights as a capital investment were usually free from most or all tax responsibility attached to "land" ownership but given effective superiority over surface owner rights as well (Salstrom 1994; Montrie 2003).

> Written in finely printed legalese, however, the broad form deeds often signed over the rights to 'dump, store, and leave upon said land any and all muck, bone, shale, water, or other refuse,' to use and pollute water courses in any manner, and to do anything 'necessary and convenient' to extract subsurface minerals (Montrie 2003:66).

Capital's control of property rights served to separate Appalachian people from aspects of their means of subsistence and was combined with the creation of new socio-cultural needs for industrial goods as well as joint state-corporate policies to encourage immigration. Many of these immigrants were blacks or recent immigrants to the US who

[18] Leases were for extremely long periods of time, often hundreds of years, which was only possible through coal interests ability to influence courts to ignore clear violations of other states laws, for example, regarding "perpetuities" (Wright 1978; Montrie 2003).

were sometimes brought in as strikebreakers. Black immigration to central Appalachia was highest between 1900 and 1930 when large numbers came from the Deep South to work on rail lines and in coal mines (SAMAB 1996). Although miners often formed solidarity across racial and ethnic lines, these tactics were temporarily successful in creating an exploitable labor force for the mines (Gaventa 1980; Salstrom 1994). When mining markets went bust blacks and more recent foreign immigrants left in disproportionately higher numbers (Salstrom 1994; Davis 2000).

Infiltration and control of local governments and institutions by the servants of coal capital was not only consciously designed to provide material control over the local inhabitants but also reflected the realization that "[through] control of the socializing agencies of government, church and school…values could be shaped," (Gaventa 1980:67). Through the establishment of opulent resorts and health spas in Appalachia's rural regions "the industrial order was introduced to the mountaineers' society by conspicuous consumption, with an exaggerated demonstration of its benefits" (Gaventa 1980:63). The change in mountaineers' socio-cultural value structures in favor of the colonial bourgeois lifestyle was an important precondition for subsequent profit accumulation potential through the present. The glamour during boom conditions encouraged both the sale of potential subsistence farmland and encouraged migration to (often company controlled) mining boomtowns. When boom conditions inevitably failed and companies ratcheted up exploitation their workforce had few options for escape (Gaventa 1980). Although subsistence agriculture continued to play an important role in reproducing the labor force, by 1923 "between two-thirds and four-fifths of [the] miners of these Southern Appalachians lived in 'company-controlled communities'" (Gaventa

1980:86; Salstrom 1994). This type of subsistence supplemented wage labor regime is seen around the modern developing world (Salstrom 1994; Deere 1976; De Janvry 1984).

Although the national coal market rapidly expanded during the industrialization of the early 1900s, the markets were very competitive. Control of the industry was initially highly dispersed among different capitalists and fierce competition between mining companies drove a cycle of boom and bust. During the booms companies expanded operations and invested in mechanization to increase productive capacity leading to crises of overproduction (Couto 1993; Podobnik 2006). A surplus of coal meant competition undercut coal companies' ability to extract rents from railroad and steel companies who needed the coal as inputs. The scramble to maintain enough sales to recoup expanded production costs drove down the price of coal. Coal operators outside of Appalachia invested in mechanization much sooner and more intensely due to their higher labor costs from unionized workforces (Salstrom 1994). In Appalachia coal companies were better able to regain profits by extracting more surplus-value during production by cutting labor costs through cuts in wage rates and jobs. In the absence of unionized resistance coal companies lowered the cost of labor-power by laying off workers and driving remaining workers harder forming a vicious cycle.[19]

Mechanization, in addition to reducing the number of workers required, changed the spatial organization of work allowing greater control over workers. For example, Podobnik (2006) describes how the adoption of mechanical cutting machines and conveyor belts used in "long wall" mining brought workers from individual chambers into a central corridor allowing for intensified labor through greater supervision by mine

[19] Gaventa illustrates this process in the case of three central Appalachian counties early in 1931 (1980:96).

foremen. The miners' lost the ability to listen for signs of cave-ins and make decisions over where to cut and what to leave for support increasing their vulnerability to the consequences of decisions made by management working safely above ground (Podobnik 2006). The powered cutting and loading machines also increased the risk of injury and lung disease (Salstrom 1994). This increased risk and exploitation, naturally, increased agitation and resistance by miners. Early investment in strip mining technology to western coal areas was an effective deterrent to labor demands. It prevented organization of miners there because miners were exposed to less risk and they did not share the cultural "memories" of oppression carried by deep miners in the east (Couto 1993:172; Podobnik 2006). Of course, the ability to pressure mine workers into more dangerous conditions is not just a function of the technology employed but of the social and political control capital has over the workforce and state regulatory institutions.

From Labor Intensive to Capital Intensive Extraction: Changes in the Conditions and Relations of Production

Coal production in Appalachia shifted from labor intensive to larger and more mechanized production in the 20th century. Mechanization ushered in very high rates of poverty, unemployment, outmigration, and hard times in Appalachian coal mining communities *and* more widespread and serious environmental impact to the region. All of which severely limited future economic opportunities. But during the 1920s coal mining capital interests were under pressure from increased unionization other parts of the country such as the Midwest (Podobnik 2006; Salstrom 1994). Broadening coal mining geographically within the non-union Appalachian region allowed for deepening exploitation of labor and increased profits dramatically. The political power exercised by

the coal industry in Appalachia led to different production strategies there. In particular, Appalachian operators focused on consolidating their political and social control rather than mechanizing. The essence of this control was the "company town". There were no such towns before 1885 but by 1910 70 percent of miners in the region lived in these totalitarian communities (Salstrom 1994). The use of company scrip as wages instead of cash prevented miners from saving up money and allowed the companies to charge whatever they wished for goods and services- often trapping their workers in perpetual debt equivalent to indentured servitude (Gaventa 1980; Salstrom 1994). Leadbelly's song of lament captured these conditions for posterity:

> *You load 16 tons and what do you get---another day older and deeper in debt. So St. Peter don't you call me cause I can't come----I owe my soul to the company store.*

During this same period the wage share of Appalachian miners went from being similar to Midwestern miners to significantly lower (Salstrom 1994:74-75). This reflected Appalachian coal companies' increasing ability to exploit their workers and Appalachian miners' ability to continue to survive on decreasing wages. Miners' families in company towns were encouraged by company incentives during good times and compelled by necessity and debt in hard times to engage in subsistence activities but their tenancy was contingent on obedient wage labor in the mines (Gaventa 1980; Salstrom 1994).

Although often drawn into their situation by hopes of greater material comforts offered by the wages, miners living conditions tended to decrease dramatically with crippling injuries from dangerous work and "black lung" disease (Gaventa 1980; Seamon 2005). Outside of these miserable conditions' contribution to labor/class struggle, they were not of concern to the coal operators as, among other population growth sources, the

high birth rate of miner families generally kept the labor force well stocked (Salstrom 1994). As far as the needs of capital accumulation are concerned such a "quick succession of unhealthy and short-lived generations will keep the labour market as well supplied as a series of vigorous and long-lived generations" (Marx 1976:57). However, the affliction of a significant proportion of the population with disabling illness and injury from mining would drain families economically and made them all the more dependent on the health and pension benefits provided by union contracts. Although this would drive miners to fight harder when companies tried to shrug their commitments to retired miners, the need to care for a generation of stricken miners also reinforced the communities' dependence on continued coal production to receive those benefits.

Appalachian coal companies who maintained non-union, labor intensive operations had two primary advantages. First, they were able to provide production that was comparatively uninterrupted by strikes. That in turn earned them more favorable haulage rates from railroads who were assured of steady business (Salstrom 1994). This, combined with lower wages for miners, made Appalachian coal generally less expensive than coal from other regions. Second, when coal demand and prices fluctuated, producers in other regions had less flexible costs of production because of capital invested in mechanized cutting and loading equipment and unionized labor. On the other hand, Appalachian producers, with their ample exploitable supply of surplus labor, could cut jobs, force down wages, or hire additional miners as needed for continued profitability or gaining additional market share (Salstrom 1994; Gaventa 1980). The mine operators' intuitive understanding of the process of "free appropriation" of the natural productive power of miners' procreation is expressed by a conversation recounted by one miner in

the film *Harlan County USA*. When instructed not to allow the mule he was driving into any dangerous situation the miner asked "what about me boss?" to which the mine foreman responded "we can always hire another man but you gotta *buy* that mule."

Appalachian coal operators responded to surging global demand for coal that occurred during the World War I by investing in mechanization. By the end of the war 70 percent of Appalachian coal was being cut by machines. Mechanization of the mines aggravated conflict in the coal towns. Consequently the 1920s and early 1930s were a period of intense class struggle in Appalachian mining communities as companies' private militaries as well as and State and Federal troops were dispatched to defeat miners attempts to unionize and carry out strikes. The most famous of these, the 1921 Battle of Blair Mountain remains the largest use of federal military power against US civilians since the civil war and the only time US air forces have been ordered to kill US civilians (Shogan 2004). However, it was not until after the New Deal policies starting in 1933 that other forms of mechanization, including loading systems, greatly expanded (Salstrom 1994). As a result of controls on wages, prices, and production put in place by the National Industrial Recovery Act (1933) the Appalachian mode of extraction was no longer as advantageous. Because of price controls it was no longer possible to capture market share by underselling producers in other regions by lowering the price of coal. Wage floors and widespread unionization under new labor laws drastically limited Appalachian operators ability to cut wages. Protected by price supports, Appalachian coal companies quickly mechanized to cut jobs in order to maintain and expand profits (Salstrom 1994).

The performance of oil-fueled war ships during World War I lead the United States and other nations that were industrializing to invest significant capital in oil infrastructure and oil fueled transportation technologies (Podobnik 2006). During the interwar period oil and other energy sources started to successfully compete as an energy commodity in manufacturing, transportation and heating steadily displacing coal from some of its traditional markets (Podobnik 2006). This had significant impacts on King Coal and the miners in Appalachia. The number of industries dependent on coal began to sharply decrease, problems with overproduction became clear, and again, more mining jobs were cut. Labor unrest in coal mining also produced the fear of supply disruptions and drove more investment in oil and other energy sources. Meanwhile, coal companies and the state responded to increased coal miner militancy through a brutal campaign of oppression and violence (Podobnik 2006; Gaventa 1980).

Although continuing development of electrical technology created new demand for electric power generation, coal did not initially enjoy the dominant position it does today. In 1913 hydroelectric plants generated over forty percent of the US electrical supply (Podobnik 2006). The place of coal in electrical production would increasingly determine its future as a commodity. It was this realization that finally brought coal companies to make serious industry-wide agreement with the United Mine Workers of America (UMWA) in 1950 (Couto 1993). This was a major historical shift in labor relations from the gun battles were fought in the 20s and 30s between miners trying to organize and coal companies hired thugs and state police and military forces (Gaventa 1980). Decades of bloody struggle had brought unionization to the Appalachian coalfields so that in 1947 ninety percent of the nation's coal was produced by UMWA

workers (Couto 1993). The constant battles between the UMWA and coal operators were finally becoming a liability the coal industry could not afford.

> By 1950… Coal was losing traditional markets, like railroads and home heating, to oil and natural gas. To compete for new markets, such as electrical utilities, the coal industry needed to supply customers reliably, without interruption by strikes. They also needed to modernize and mechanize production. This required capital investment which they hoped would come from higher profits and uninterrupted production. Peace with labor became important to major producers (Couto 1993).

The result was the formation of the Bituminous Coal Operators Association (BCOA). The BCOA made a pact with John L. Lewis's UMWA which applied at every UMWA mine. This was significant considering UMWA labor supplied close to 90 percent of the coal industry (Couto 1993). Although the contract brought security and increased wages and benefits to remaining workers, the *mechanization of the industry over the following decade eliminated over half of mining jobs.* Figure 4 shows this wave of mechanization clearly. The terms of the contract provided a fund from royalties on each ton of coal produced to provide for the wellbeing of the workers who would lose their jobs from the changing methods of production. However, Lewis would not allow the royalties to rise to a point he feared would raise the price of coal and harm its competitiveness. Instead the amount of benefits and the number beneficiaries was reduced further below the already insufficiently planned amount, with calamitous effects on impacted communities (Couto 1993).

This represented a turning point in the UMWA's history. Although the UMWA had already crushed earlier democratic movements within its constituency in Appalachia (Gaventa 1980) the BCOA agreement created a new level of contradiction between the interests of the union and the interests of its members. The union's ability to meet its

constituents' needs was now linked directly to the volume of coal produced by an industry dominated by a shrinking number of increasingly large and powerful international corporations. This contradiction would ultimately crush the union's ability to support communities as an organization for broader social change. Couto (1993) speaks to this issue: "[W]hen large-scale organizations like trade unions lose their organic connection to local communities, they lose their role as actors in social movements" (P.185). The contradiction of the co-opted UMWA leadership structure with the union's potential for grass roots empowerment could be seen in the 1969 "black lung strike." Early that year in West Virginia, miners had put forth legislation that would give them the same type of protections and compensation which British miners had had since the 1941 (Gaventa 1980; Salstrom 1994; Nyden 2007). Rank and file miners then launched the "longest political strike in modern U.S. labor history" that finally lead to the passing of "black lung" legislation into law even though these efforts were all against the orders and lobbying efforts of the union leadership (Gaventa 1980; Nyden 2007: 41). The contradiction between rank and file interests and the UMWA hierarchy was further exposed by revelation that union president Tony Boyle had ordered the assassination of democratic reform candidate (and strip mining opponent) Joseph Yablonski. This launched the Miners for Democracy movement and ushered their presidential candidate, Arnold Miller, to victory (Nyden 2007). Miller was a rank and file miner and had been president of the Black Lung Association and organized and organized and fought for a ban on strip mining (Montrie 2003). However, as president of the UMWA his position against strip mining was progressively weakened along with his support for other rank and file issues (Montrie 2003; Nyden 2007). In 1977 he opposed the Surface Mine

Control and Reclamation Act as too stringent. In 1978 he opposed the formation of "Miners Support Committees" formed by "union, church, community, and professional leaders" and cut off funds to miners involved (Nyden 2007:46). Miller's failure is representative of the union's failure as a whole. Because the union was focused on extracting rents from coal companies' profits instead of independent development for coal mining communities it could not become a force to counteract Appalachia's extraction dependency. Instead the UMWA would be marginalized along with other labor groups during the 1980s.

By the 1980s the large multi-national coal corporations were attempting to withdraw from the BCOA agreements. Under pressure from increasing international competition A.T. Massey and Pittston coal companies began a process of subcontracting mines to avoid union agreements. During this time ownership patterns in the coal industry also changed. Ownership of mineral and land rights were further consolidated under large corporations such as oil companies. The process of subcontracting also put more local operators with power in the community in charge of production and insulated the parent company from risk. Contractors and subsidiaries produced wealth for their parent companies and executives but often later declared bankruptcy leaving the environmental effects of strip mines unreclaimed and millions of dollars in wages, benefits, and taxes unpaid (Nyden 2007). Although placing a heavy burden on communities and local government resources, these collapses had little effect on parent companies assets. The 1989 Pittston strike against these practices was the last great rank file union mobilization. The rallying of thousands of miners and community members to occupy and shut down the company's largest processing plant was barely able to save

aging miners pension and health benefits (Couto 1993). The growing productive power of non-union strip mines would be the undoing of the bargaining power of the union and any potential it may have had for reorganizing the economy for the people of Appalachia. Appalachians hoping to save their land and break the grip of king coal would be forced to look elsewhere for help.

It was also during this period that scaled up extraction using new larger draglines and cheaper, more efficient explosives achieved skyrocketing productivity. While western coal extraction rose dramatically, total output in Appalachia stayed roughly the same (see Figure 5). New technologies made mountaintop mining possible on an ever greater scale and displaced less productive forms of mining. The steadily increasing number of mountaintop mines in West Virginia during the 1980s and 1990s was a determining force in the plummeting employment during that time, clearly visible in Figure 4. Most deep miners lost their jobs, and union locals felt often irresistible pressure to allow violations of safety standards to keep their mines from being shut down by competition (Yarrow 1990). Moreover, the union's top leadership dropped all support for addressing environmental impacts on communities. During this time community organizations in (a sometimes wary) alliance with environmental groups turned to their government for help. The continued profitability of coal extraction in Appalachia has been largely a function of the industry's ability to minimize amount of rents captured from it by the state- particularly in relation to maintaining free appropriation of ecological and social values destroyed by strip mining. Therefore, at this juncture a closer examination of the role of the state is required.

The Politics of "Keeping the Lights On"

> [Y]ou can't try and fight on an issue like this without having to fight the whole system and you can't organize the community to fight such an issue without trying to trying to change the whole system.- Mary Beth Bingham of The Appalachian Group to Save the Land and People (Montrie 2003:205)

In their analysis of the formation and early years of federal surface mine regulation, Shover, Clelland, and Lynxwiler (1986) argue that neo-Marxist approaches are superior to others but they must pay careful attention to the ways in which capitalism is dynamically affected by the state due to historical conditions. Examples include the role of interest groups and social movements as agents of class struggle, the way state actors can both support and limit diverse capitalist interests, the dialectical relationship between local and national state actors, the exclusion of policy options that would cause major crises of capital accumulation, and "the relative autonomy of law as a constraint on policy" (Shover et al 1986:127).

The failure of states and local governments to avoid legitimation crises was the ultimate driver behind federal strip mine regulations (Montrie 2003). Federal law makers under pressure from a swelling environmental movement were faced with overwhelming evidence of the failure of state officials to effectively regulate surface mining. During the construction of the legislation and later bureaucratic rule making by the Office of Surface Mining (OSM), lawmakers were focused on avoiding the kind of regulatory capture by capital interests exhibited historically in the states (although, obviously not conceptualized in those terms) (Shover et al 1986). This desire for regulatory autonomy was in many ways fulfilled. However, although the OSM was initially ideologically and legally insulated from the corporations they sought to control, the agency was vulnerable

to local and national politicians who would later, under the neo-liberal policies of the Reagan administration, be rallied as agents of capital to undermine the agency's mission "from above" by replacing its leadership (Shover et al 1986).

Ross (2001) offers insights into rent seeking and rent seizing which are relevant to changes in the OSM during the Reagan administration.[20] In order to secure rents from capital, state actors may engage in "rent seizing". Rent seizing or taking steps to increase their ability to distribute rents. This is detrimental to state institutions because when they are restructured to facilitate rent distribution often they lose their efficacy in performing their original mandate (Ross 2001). By threatening the rent seizing ability of state politicians and the rent seeking activities of local government actors the OSM prompted a backlash that would undermine their future ability to enforce the intent of SMCRA. Grassroots opposition was in effect an attempt to prevent the "free appropriation" and destruction of cultural and environmental values by the coal industry. Organizing against strip mining began first at the local governmental level but eventually moved to the national stage.

Strip mining began in earnest first in Kentucky in the early 1940s followed by West Virginia later in the decade and Tennessee and Virginia in the 1950s (Montrie 2003). Between 1950 and the mid 1970s surface mining increased from being less than one-fourth of America's coal production to producing the majority of it. As production

[20] Wealth is only created during production and is appropriated by capital as profit and by workers employed by capital as wages. Other groups sustain themselves only by redistributing wealth from those sources in the form of rents. State/government actors seek rents in the form of taxes, bribes, and campaign contributions. Other organizations like unions seek rents from dues from their members or from royalties imposed on production. Capitalists may also seek rents from the state such as subsidies, tax breaks, or other state facilitated reductions in the cost of production. Capitalists may pursue similar rent seeking activities with union officials (Ross 2001).

methods became increasingly mechanized and larger in scale, acid mine drainage and sedimentation increasingly threatened residents' water supply, while landslides, floods, blasting, and a lack of reclamation threatened homes and productive lands (Shover et al. 1986). Grassroots campaigns to regulate surface mining in Appalachia began at the state level almost immediately after the practice was introduced and soon Appalachia became the home of the most militant advocates for the prohibition of strip mining at the federal level (Montrie 2003). Widespread government corruption (or capture) and failed mining reclamation efforts persuaded many that a strip mining ban was the only lasting solution to its social and environmental costs. Eventually this stance would create a wedge between grassroots activists and bourgeoisie mainstream environmental groups, as well as some local groups, who were more willing to compromise (Montrie 2003; Shover et al 1986).

Surface mine regulation began to be proposed in Appalachia as early as the 1940s (Montrie 2003). Regulation usually consisted of some combination of requirements of reclamation such as grading spoil piles and backfilling pits. But often there was a conflict over when these processes needed to be done and how thorough they should be. Productive agricultural lands and steep slopes prone to landslides or flooding were of prime contention. Usually some type of bond payment was required in advance to insure the costs of reclamation in case the mining company went bankrupt. But in practice these funds were inadequate to restore the land to its previous condition, *which was often impossible* because no amount of labor or capital could restore the previous ecosystem (Montrie 2003). For this reason opponents of strip mining often compared the reclamation process to "putting lipstick on a corpse" (Montrie 2003). Another serious

conflict stemmed from the previously discussed “broad form” deed. In effect, a company which had a claim to the mineral rights that had often been sold *generations previously* could bulldoze the property owner’s home to get to the coal under it, and do so with impunity. This led many groups to call for state legislation to guarantee protection or compensation to owners of surface rights. This was a bitter issue and often took decades to resolve. For example, Kentucky did not end the broad form deed until grassroots organizations passed a constitutional amendment in 1988 (Montrie 2003).

Some community members and organizations fighting coal companies in Appalachia became more radical after it became clear to them that state governments were consistently upholding the rights of mine operators to make higher profits while denying the rights of small landholders to secure their health, safety, and survival. Volunteers and government anti-poverty workers were also appalled by the injustice they saw and began to help communities organize politically against strip mining. *They experienced strip mining as contributing to poverty by restructuring the local environmental in ways which prohibited alternative economies and by replacing deep mines which had employed more people* (Bingham 1993; Montrie 2003; Goodell 2007). Many people began to feel that violence or the threat of violence was the only protection left to them. Bulldozers were sometimes stopped at property lines by the end of a rifle and there were several instances of industrial sabotage against stripping equipment (Montrie 2003). Coal interests responded by pressuring the government to cut funding for poverty workers and prosecuting them and community leaders under charges of sedition and communism (Montrie 2003). Indeed, a few called for the States to take ownership their natural resources to be used for the public good instead of profits that were mostly

sent outside the region. Though most of the mineral rights were owned by capitalists from outside the area, the mine operators were usually local and wielded considerable political power with judicial and legislative officials. Their claims that regulation would violate their rights in the form of an "illegal taking" that would put an end to coal mining and thereby deprive the nation's industries of a critical resource served to prevent legislation strong enough to make any significant impact on the unequal exchange of ecological and social values. Any improvement from legislation that was passed was usually quickly negated by increases in the number and scale of mines (Montrie 2003).

A prominent institution at the nexus of these forces in Appalachia is the Tennessee Valley Authority (TVA). Originally established in 1933 to bring rural electrification, economic development, soil and forest conservation, and flood control to the region, its primary role today is electrical power generation through coal, nuclear, and hydroelectric power plants (Nolt and Bustos 2005). Hydropower was the first form of power generation developed. But between 1945 and 1965 TVA had brought 12 of the largest coal plants in the world online (Nolt and Bustos 2005). During this same period TVA financed both smaller non-union underground mines and enormous surface mining operations from which its power plants could purchase coal extremely low prices. TVA used government financing to cover capital costs of these small operations in the name of development while workers received wages, safety conditions, and benefits that were far below the newly established industry standard (Couto 1993). In fact, Aubrey Wagner, the chairman of TVA later argued for overturning parts of the Mine Health and Safety Act in the interests of increased production (Branscome 1978:289). TVA's provision of financial, technical, and logistical support produced many new strip mines with

equipment of previously unimaginable scales (Branscome 1978). TVA used its position as the largest purchaser of coal to drive prices as low as possible (Branscome 1978; Couto 1993). But smaller companies incapable of raising the capital required for the increased mechanization were forced to fold or else consolidated into larger corporations. With the exception of smaller mines financed by TVA, the resulting financial crises quickly led to widespread consolidation by capital within the industry (Couto 1993).

Rapidly increasing demand for electricity from industry and consumers kept competition between coal and other energy sources at a lower level of intensity than might have otherwise occurred (Nolt and Bustos 2005; Podobnik 2006). Still, John Lewis was infuriated by TVA's practices because it asked BCOA members to meet the same low price (Couto 1993). No doubt part of that anger was because Lewis felt pressured to further cut pension and benefit costs to meet this objective. However, "few coal miners realized that the reason for the sweet-heart contracts, the withdrawal of UMW hospital cards, and the starvation economy was in part the steam coal policies that TVA was pursuing quietly in Knoxville" (Branscome 1978). Under pressure from the governor of Kentucky TVA agreed to include language in coal contract provisions requiring providers to control runoff during operations and do some reclamation afterwards (Montrie 2003). These agreements had little effect. In 1973, after touring TVA sponsored strip mines in eastern Kentucky Senator Fred Harris confronted one of TVA's environment and reclamation employees: "No man has the right to do to another man what I have seen today. But what is worse, I find that an agency of our own government is doing it" (Weller 1978). The next year TVA was generating four-fifths of its power from coal, a third of which came from strip mines in eastern Kentucky (Branscome 1978). Although

born as a multi-faceted regional development program, by 1938 TVA had staked its legitimacy as an agency that provided cheap electricity for industrial development and national defense (Branscome 1978). Their defense of destructive mining practices and pollution from coal fired power generation as being necessary for the nation's economic health and security was mirrored by mining and power companies.

It was also during this era that explicit agendas for depopulation of the coal fields began to appear as a possible "solution" for community resistance and dissent over surface mining (Gaventa 1980). The ability of companies to depopulate areas surrounding strip mines would be facilitated by the transportation infrastructure developed with federal funding through the Appalachian Regional Commission (ARC) and other programs (Montrie 2003). Improved transport allowed companies to hire miners from further away and thus reducing or eliminating the need for local workers (Nyden 2007). In fact, ARC has arguably been responsible for increased uneven development in Appalachia. The majority of the agency's ARC money is spent on road construction and in 1998 only two of the top 20 counties receiving funding were among the 108 counties in the region labeled by the agency as "economically distressed."[21] Out of the 118 major coal producing counties in the ARC region nearly half were classified as "economically distressed." These counties were almost exclusively located in central Appalachia (Thompson et.al. 2001: 130). Although ARC's 2001 report analyzes the coal industry as a completely beneficial industry which has no externalized costs (Thompson et.al. 2001), coalfield citizens have long known better.

[21] Source: Ferenchik, Mark and Jill Riepenhoff. September 26, 1999 "Federal Tax Dollars Miss the Mark in Core Appalachia" *Columbus Dispatch*

Strong support for a total or partial ban on coal strip mining in the late 1960s and early 1970s drove the coal industry to publicly support strict but decentralized federal regulation as an alternative. But as soon as the first national environmental groups began to break ranks with abolitionists the coal industry reversed position and vehemently denied any federal regulation was necessary. This resulted in weaker strip mining legislation than what the industry had previously supported (Montrie 2003). Opponents of strip mining had lost key demands such as prohibition of mining in areas which could not be reclaimed and a ban on mountaintop removal mining. However, the industry was still not happy with the legislation that did pass. Its strongest complaints were directed against the provisions in the bill for the Department of Interior to designate areas “unsuitable for mining”, and allowances for public input during the permitting process and citizen involvement in inspection and enforcement stages (Shover et al 1986). The final compromise reached by legislators kept both the provision for mountaintop removal and the ability to designate areas unsuitable for mining in the SMCRA legislation (Montrie 2003). At the time mountaintop removal was a seldom practiced phenomenon but development of new technologies in the 1980s allowed the coal industry to exploit loop holes created by this compromise to rapidly expand the number of mountaintop mines (Fox 1999, Montrie 2003)

Current Events

The past four years have seen a surge in opposition to MTR and strip mining across central Appalachia. In 2005 activists from Tennessee, Virginia, West Virginia, and Kentucky launched an ongoing campaign against strip mining called "Mountain Justice Summer". The heightened opposition to surface mining and a number of fatal underground mining accidents had increased in the amount of regional and national media attention on central Appalachia's coal mines. For the first time since the 1970s, coalfield community groups have formed a regional coalition to coordinate plans for stopping mountaintop mining and for creating alternative economies to coal. Former public officials are also speaking out about the harmful economic effects of mountaintop mining. For example, David Callaghan, the former head of West Virginia's mining regulation recently concluded: "I just look at Southern West Virginia in particular and you see just absolute environmental devastation and poverty and that's after 100 years of mining the very best quality coal on the North American continent, and the local communities just don't seem to have benefited from it."[22] Another, William Maxey, the chief forester for West Virginia recently resigned in protest over the state's refusal to address the destruction of West Virginia's forests by MTR (Montrie 2003).

Federal enforcement of SMCRA has remained lax in favor of cheap energy. The Bush administration is more dominated by coal interests than any other since Reagan. Its policies favor increasing coal development to counteract rising insecurities in oil

[22] Source: Ward, Ken Jr. July 22, 2007 "30 years later, mine law's success debated" *Charleston Gazette*

supplies. The key compromise in SMCRA allowed strip mining opponents to petition for lands to be declared unsuitable for mining and allowed for mountaintop removal mines to petition for exemption from returning land to its "approximate original contour" (AOC) if detailed plans were submitted for economic development of the flattened area. In the mountains of eastern Kentucky and southern West Virginia returning mountains to their AOC is practically impossible. This means that mining companies should have to establish that leaving the flat land constitutes the "highest and best use" and submit detailed plans for the development planned for the flat land. However, in 1997 studies found that 70 percent of the mine in West Virginia did not receive the required permits and most post mining uses which the West Virginia DEP did approve are illegal under SMCRA (Montrie 2003). Although the coal industry and the Energy Information Agency make claims that flat land created by MTR provides land for post-mining economic development, less than one percent of the 300,000 strip mined acres in WV has seen any development.[23] Increased public scrutiny does seem to be having an effect and may be the reason why the EPA filed suit in 2007 against one of the region's largest coal companies, Massey Energy, for violating the Clean Water Act over 4,000 times.

Never the less, SMCRA and the Clean Water Act have provided Appalachian communities with more legal recourse to combat strip mining. However, it is also clear that the coal industry's economic clout continues to allow them to dominate at the local level. In 1999 coalfield residents successfully filed suit against the Army Corps of Engineers and the West Virginia Department of Environmental Protection (DEP) for violating the Clean Water Act, SMCRA and other laws in granting Arch Coal a permit to

[23] Source: www.appalachianvoices .org

expand their mountaintop removal operations (Montrie 2003). But when the company dismissed 30 workers at the strip mine and threatened to eliminate hundreds more, the UMWA lashed out at " 'the environmental community' pointing the blame at coalfield residents themselves rather than the energy conglomerates that own the coal companies and their subsidiaries" (Montrie 2003:199). These events played out again in 2004 when the same judge again ruled that valley fills are a violation of the Clean Water Act. This time Massey Energy was the company laying off workers but the UMWA's reaction was the same. State government elites also acted to promote a panic and backlash. Although Judge Haden clearly stated his ruling only forbid the creation or expansion of valley fills and not the operation of existing ones, the West Virginia DEP interpreted it as requiring the cessation of all mountaintop removal activities effectively put all employees at those mines out of work. Simultaneously, the Governor of West Virginia declared a "state of economic emergency" and froze state spending while lashing out at "environmental extremists" (Pancake 2006). The actions by the DEP and Governor were unwarranted and blatantly intended to provoke a reactionary response from the public. Under such intense pressure Judge Haden suspended his ruling pending appeal. The issue was rendered moot when the Bush administration ordered the EPA to change its definition of "fill" to include mine waste thereby eliminating the legal basis for the claims (Goodell 2006). In the past year coalfield residents have won suits against the Army Corp of Engineers for violating federal environmental laws in issuing valley fill permits and in a case establishing that commonly used retention ponds for treatment of toxic mine runoff are also a violation of the Clean Water Act.

Community groups are still struggling to develop viable alternative economic agendas. One such alternative has been studied by Appalachian Voices and is supported by the local community organization Coal River Mountain Watch. WindLogics, one of the top two wind energy firms in the United States, evaluated the potential for wind power in the Coal River Valley, West Virginia and found that areas adjacent to mountains flattened by strip mines had less wind potential than others. The study undertaken by Appalachian Voices determined that the ridges of/on Coal River Mountain would be capable of supporting an economically viable wind farm; however, three proposed surface mining operations would flatten the majority of these ridges. Appalachian Voices also compared the estimated economic benefits of wind power in terms of power generation, tax revenue, and jobs that would be created by a maximum utilization of wind power along the ridges versus the benefits estimated from the coal company's permit application. Their findings show that development of the wind farm would produce more jobs in the long term, as well as continuous power generation and revenue streams from property and Business and Operations taxes (McIlmoil 2007; See Figures 5 and 6).

The most proximate economic factor in the continuing impoverishment of Appalachia's coal fields is competition with larger more efficient western mines. A key factor in this competition is the transportation of coal to markets. More coal is transported by truck in West Virginia than in all other states combined. Trucking is used extensively to haul coal from strip mines and is supported by a transport infrastructure that is heavily subsidized by the taxpayers of West Virginia. Western coal mines, however, are subject more to the economy of scale and diseconomy of space contradiction which has been

identified by Bunker and Ciccantell (2005). Because they are located so far from major sites of consumption (i.e., urban areas) transportation is the main limiting factor in their production capabilities and the profits of Powder River Basin coal operators. Many mines load coal twenty-four hours a day seven days a week. Operators are faced with bargaining with railroad companies that often hold a monopoly on transport routes to power plants (Goodell 2006). Up to four-fifths of the price consumers pay for Powder River Basin coal is for transportation. Construction and expansion of railroads has provided more efficient transport allowing western mines to more effectively compete in eastern markets. However, those rail lines are currently stretched to their capacity (Goodell 2006). The dynamics of transportation are somewhat different in Appalachia. The transportation sector is much more competitive in the region. Many Appalachian coal companies currently pay contractors by the ton to haul their coal to market. This places pressure on coal truck drivers to haul more coal than is legal or safe at speeds which are neither (Hansell 2002). Driving a coal truck is one of most accessible jobs to workers in areas affected by strip mining. These jobs provide political support for continued strip mining. The subcontracting of truck driving, like the subcontracting of mining operations, frees the parent company from legal responsibility in case of accident or a market downturn but leaves communities and tax payers to deal with the consequences (Hansell 2002). Regulations have recently been passed to attempt to address these problems (EIA 2005).

Outmigration caused by deteriorating economic and environmental conditions is being accelerated by intentional depopulation of communities near strip mines. Leaked internal documents from Massey Energy reveal plans to buy out nearby homeowners.

Those families whose home are often purchased at market prices deflated by the opening of the nearby mine. Furthermore, those who sell their homes are required to withdraw any complaint or suit against the company and are forbidden under terms of the contract to ever to live in the community again (Pancake 2006).

The result of these historical political and economic forces is that today outmigration, poverty, unemployment, and substandard education continue to be disproportionately high in the regions of Appalachia with the most surface mining (De Young 1985; Perry 1985; Fox 1999; Montrie 2003). Figures 8-11 show the relationship of these indicators to the location of surface mines.

Summary, Conclusions, and Implications

Contact with European colonialists resulted in the restructuring of indigenous modes of extraction and the ecosystems within Appalachia. Most of these changes were made to suit the needs of European and colonial American productive markets. For example, responding to demand of core region leather and fur productive economies the Cherokee and European settlers created an extractive mode of hunting and trapping that decimated fur bearing species. The resulting changes in the ecosystem and loss of biodiversity and the simultaneous political need for industrial technology for agriculture, trade and security made it impossible for the Cherokee to return to previous modes of reproduction. The reorganization of Appalachia for extractive agriculture required the removal of Cherokee populations. The accumulated knowledge of animals and plants and the habitats that supported them left with them. Bunker (1984:1028) points out the true costs of such exchange relationships cannot be expressed in conventional capitalist economic terms of value: “The extraction costs of what was being exchanged included not only human labor but also human life, social organization and technology, and the ecological viability of various interdependent plant and animal systems on which human communities had depended”

The description of Appalachia’s “marginal” agricultural production offered by the Appalachian Regional Development Commission is misleading. The mountain terrain is not capable of sustained intensive agriculture yet labor intensive agriculture did produce substantial volumes of agricultural commodities during the 19th century. Although the regional transport hubs and merchant middle men captured more of the economic value

of the livestock and grains rural Appalachia exported, the loss of environmental use values caused by the extractive agricultural mode were significant as well. The forests, plant life, and soils of Appalachia' mountains were impoverished more rapidly by additional stress created by export production. The closing of the frontier by the accumulation of large tracks of land by outside capitalists also increased the pressure on settled lands by preventing agricultural expansion into those areas. Mountain peoples social subsistence networks of handicrafts, barter and reciprocity were eroded as growing agricultural export provided industrial commodity substitutes. When changes external markets reduced demand and prices for staple exports like corn and hogs mountain people were unable to return to previous productive relations. These changes to the conditions (agricultural productivity per capita) and relations of production (waning traditional production of goods) created the preconditions for the rise of extractive industry and coal mining as the dominant mode of extraction.

The form of primitive accumulation that took place in Appalachia was shaped by its position as an internal periphery within an ascending core nation (Dunaway 1996; Davis 2000). Indigenous people held the land as communal property which could be commodified (Davis 2000). Therefore, their elimination was an important precondition for capitalist development. European settlers held farmland as family property and continued to treat the forested highlands as a communal property during much of the extractive agricultural period (Davis 2000). These practices were displaced with the enclosure by extractive industry. As a whole, mountain people were not simply forced off their land and into wage labor (although some were). Rather it was a combination of

perceived benefit, deception and unequal understanding of the market value of resources, manipulation of state legal institutions on the part of local elites and outside capital. The greater penetration of transportation networks brought with it outside social values and new definitions of subsistence that required money which wages could bring (Gaventa 1980). Changes in federal banking laws following the Civil War limited capital generation within the region and increased dependence on outside capital for investment. A few large landholders sold their assets willingly to outside capital and joined with outsiders as mine operators becoming petty bourgeois (Salstrom 1994). Although the land, minerals, and mines were often owned by outside capital, local elites whose livelihoods depended on the continued profits utilized their knowledge of local culture to protect those profits (Gaventa 1980).

Most Appalachians who became coal miners continued to produce at least some of their own food. The lower cost of the reproduction of labor in Appalachia resulted in local managers initially pursuing an expanded labor intensive mode of coal mining instead of the mechanization approach favored in other regions. The extent of success achieved was due to local and federal governmental support of coal company efforts to suppress the organization and unionization of coal miners in Appalachia. Coal companies began to rapidly mechanize when the federal governmental introduced new policies that began to help organized labor. However, the social relations that had emerged during the labor-intensive mode of extraction had by then developed into a highly militant labor force. Loss of market shares in the energy market from increased competition from oil and other commodities forced coal companies to increase productivity and lower the

price of coal by increasing their capital investment in mechanization. Although the union secured some benefits for its workers as a result of mechanization the overall process was economically devastating for much of Appalachia. Organized labor owed many of its greatest victories to alliances that bridged racial, ethnic, and gender boundaries but unfortunately these alliances have been somewhat transient and not translated into deeper solidarity (Gaventa 1980; Couto 1993). The UMW's power and representation of rank and file concerns steadily declined with the increased competition from non-organized production as well as changes in the nature of the energy market and the structure of the coal industry. For example, it was in spite of union leaders that legislation was passed to address the unequal exchange related to the degradation of a generation of miners' health by black lung and other occupational disabilities.

The history of TVA illustrates the uneven relationship between productive and extractive economies. Charged with bringing economic development to the region, TVA geared its policies toward providing cheap power for industrial production. The effect of these policies on the extractive coal economy of central Appalachia was extremely negative. Not only by eliminating jobs and undermining working conditions and benefits for deep miners but also by encouraging the development and spread of larger and more destructive forms of surface mining such as mountaintop mining. The Appalachian Regional Commission and States' transportation investments have facilitated unequal exchange between productive economies and extractive coal peripheries. The ability to transport coal by truck across publicly financed roadways helps counterbalance the lower efficiency of Appalachian mines.

A key feature of the continued profitability of Appalachian coal mining has been the ability of the coal industry to limit the state's ability to extract rents in the form of taxes or limiting its ability to "freely appropriate" nature The reliance of productive economies in the U.S. on cheap power and the exclusion of alternative economies and strategy of depopulation resulting from present political barriers to local economies extracting increased rents or halting the "free appropriation" and disruption of mountain ecosystems by big coal.

. The dynamics of struggle between the coal industry and local groups seeking to prevent the free appropriation of natural values, such as drinking water, are complicated by the federalist political system of the United States. Linkages between national level environmental and anti-poverty movements, however, have sometimes provided more political influence to marginal Appalachian groups. These groups have been crucial to the minor increases in rents and protection of non-commodified values that have occurred in Appalachia's extractive periphery. Community groups have tended to more be more explicit in their critique of the damage to future economic health by the effects of coal extraction on non-economically recognized biophysical and social forms of value. Local groups have been the most vocal advocates for radical changes to the relations of production, for example, democratic or state control of natural resources (Montrie 2003). Although there have been some attempts to create economic strategies oriented more toward the production of local social use values rather than abstract economic value, these attempts have been limited in scope and success (see case studies in Gaventa et. al 1990).

Possibilities for sustainable human development are rapidly deteriorating in areas of Appalachia affected by strip mining. Loss of forests and clean water are of primary concern. In 1994 75 percent of West Virginia's streams were polluted (Fox 1999). Drinking water in 70 percent of wells near reclaimed strip mines has failed EPA standards (EPA 2004). Property owners have also been discouraged from building structures near potential mine sites because of fears of structural damage from blasting caused by MTR and other strip mining practices.

It seems likely that coal industry ownership of the vast majority of land in many coal producing counties produces more of a significant barrier to economic development than does a lack of flat land that comes from MTR (Gaventa 1980; Fox 1999). Since the establishment of state laws protecting surface owners' property rights it is even less likely coal companies will sell or lease surface rights for development purposes. Continuing outmigration from coal dependent communities caused by loss of jobs, environmental deterioration and hazards, and buyouts associated with planned depopulation efforts by the companies may decrease the population and work force below a critical threshold needed for future productive development.

Better understanding the past and current socioeconomic, structural, and environmental conditions in Appalachia can provide insight into its future Although the trends towards increased mechanization are clear enough, upcoming elections, currently debated environmental laws, legal proceeding regarding current laws, and (most hopeful) mobilization of social movements make the future of coal mining in Appalachia difficult to predict.

Future trends on the supply side of the coal market are the most straightforward. Just as the ability of Appalachia's extractive agriculture mode to capture rents was undermined by the increased efficiency of transport linkages to Midwestern agriculture, increased efficiency in rail transport from the Powder River Basin has further undermined Appalachia's labor coal extraction mode. This process is typical of the contradiction between economies of scale and diseconomies of space described by Bunker and Ciccantell (2005). Currently it appears the transportation systems linking the Powder River Basin are stretched to their limits and checking further expansion of the scale of extraction in the west (Goodell 2006). By adapting the similar scale technologies of extraction in Appalachian, limiting the extent of overproduction by consolidating control over and eliminating less efficient types of mines and workers, and securing taxpayer support for transport systems the largest Appalachian coal companies appear to be they are again earning higher profits than their western counterparts.[24]

The future trends on the demand side of the coal mark are more uncertain. Coal's use in electrical power generation has faced contradictory effects from environmental movements since the post war economic boom. Nuclear power entered into competition with coal during the post war period driven by strong state support, but environmental opposition and cost overruns largely halted its expansion in the 1970s (Podobnik 2005; Nolt 2005). The properties of coal, such as sulfur and ash content, became increasingly important as industrial nations began to respond to large numbers of deaths from air pollution with smokestack laws (Podobnik 2006). New stricter laws in the 1970s resulted

[24]James, Steve. July 27, 2007. " Eastern U.S. coal profits top the West." *Reuters*, NY

in decreased demand for high sulfur and ash coal reserves in Appalachia (Nolt 2005).[25] Where cleaner coal seams do exist such as West Virginia, they have been more rapidly and thoroughly exploited. The State's legislature cut severance taxes on thin seams of coal by up to 80 percent in 1997 and has increased the use of MTR to mine seams that were previously unprofitable.

The future of regulation is the most difficult to predict at this time. The ability of the Bush Administration and others to ignore the scientific consensus on the dangers of global climatic change seems to be waning and many see carbon regulation as inevitable in the future. As the largest source of carbon per unit of energy of any available energy source, the viability of coal as a power source may become contingent on the economic viability of carbon sequestration strategies. However, if large scale investment does take place in so called "clean coal" technologies (for example, power plants using "gasification" to isolate pollutants and trap carbon) it could open up more areas for strip mining and MTR. This is because some supporters of "clean coal" claim that this technology could remove such a large proportion of pollutants that toxic coal seams which are currently considered uneconomic because of pollution laws could begin to be exploited by surface mining.[26]

[25] Some operators have found clever ways around this: "In 1996 investigators from the Tennessee Valley Energy Reform Coalition and the Foundation for Global Sustainability videotaped a large and politically well-connected coal operator loading trucks bound for TVA power plants with high-sulfur coal and then placing a layer of low-sulfur coal on top to conceal the substandard shipment" (Nolt and Bustos 2005: 244).
[26] These coal plants do not eliminate pollution but rather prevent it from becoming air born, allowing for more control over its disposal.

Conclusions

Appalachia's modern social and environmental problems are the outcome of its combined and uneven development as an internal periphery of the United States. Clearly the appraisal of Appalachian Regional Development Commission was a gross oversimplification which overlooked the interaction internal and external processes. Appalachia has long been part of the larger national and even world economy. The coalfields of Appalachia represent a dependent periphery within the United States. This dependent economic relationship was the result of both the adaption to changing market conditions by local actors and of imposed control by core political and economic actors. The development of mining by employing partially self sufficient workers spurred the development and growth of a labor intensive mode of extraction. Social organization to maintain this low wage labor intensive mode helped to establish strong political control by coal interests and prevented the capture of surplus through taxes and facilitated the "free appropriation" of nature by preventing environmental limits on mining methods. The wealth controlled by local mining elites helped propel them into positions of local and sometimes national political power.

This process did not occur unopposed, however, and labor and community organizations organized, linked to broader organizations and have shaped its progression. However, success by these groups has been limited by basic structural arrangements and barriers inherent in global capitalism. Capitalist forms of wealth are inherently anti-ecological and until other forms of value are given primacy in political and economic decision making the rift between extractive and productive economies cannot be

reconciled. It is also a tragedy that many active and retired miners are restrained from "going against the union" by speaking out against strip mining. The UMW's current contradictory position in regards to the effects on communities caused by MTR and other surface mining is the result of their dependency on the coal industry for identity and function.[27] Struggle against the full array of values which are unequally exchanged in coal dependent communities has currently fallen to community organizations. However, many rank and file miners recognize that the increasing competition that has come with strip mining and the changing ownership structure within the industry weakens the bargaining position on wages and safety for deep miners (Yarrow 1990; Couto 1993; Montrie 2003). This realization has caused some to call to move beyond organizing as coal miners to organizing as workers and citizens broadly (Yarrow 1990).

> [C]apitalization and marketisation of natural and social conditions constantly generates new needs, new problems for workers that cannot be adequately addressed by struggles within the wage-labour relation, but, rather, call for worker-*community*-centered management of communal conditions as conditions for human development. *The struggle against capital's degradation of nature is largely located here, beyond wage-labour, in the broader struggle for less money- and market-driven forms of economy, politics and culture* [emphasis mine]…Although they overlap, combine, and even clash in complex ways, the ultimate success of either mode of struggle in displacing the power of capital arguably depends on the other (Burkett 2006:139)

As a capitalist state, the U.S. has tended to favor capital in conflicts concerning the extractive periphery in Appalachia. However, the history of Appalachia is full of complex interactions between different segments of capital as well as labor and grass roots organizations. Shifting power relationships between actors at different levels of

[27] It was precisely this type of outcome that the International Workers of the World structured their organization against.

government continue to play a determining role and although this research has not fully described the process it has shown its complexity:

> [T]he relations of national and local states-to each other, to national and international firms…critically mold the ways that local economies are incorporated into global markets. A close analysis of how states respond to or are manipulated by different agents acting in a variety of power domains provides critical insights into the interaction of the local and global processes (Bunker and Ciccantell 2005:17).

As a political institution between the state and federal level of government the Appalachian Regional Commission provides an example of these complexities. A 2001 study commissioned by ARC on "the Current Economic Impacts of the Appalachian Coal Industry and its Future in the Region" there is no consideration of economic impacts of environmental destruction. Although the word "environmental" appears 36 times in the nearly 200 page report it is in every instance in used in reference to the harm or threat of harm by environmental regulation to the wholly positive economic effect of mining in the region (Thompson 2001). In fact, the paper appears to be largely designed to present an argument against the adoption of the Kyoto Protocol as detrimental to the region. In 2006, however, ARC released its "Energy Blueprint" in which it outlined support for energy conservation, renewable energy development, and "clean coal" technology which would capture carbon as major economic opportunities for the region. Identifying what roles the changing influence of sectors of capital, environmental organizations, and grassroots community activism played in this substantial shift in valuation from the agency's position 5 years earlier will require further analysis but shows evidence of the dynamics at work.

Implications for Theory Development and Future Research

Clearly there are some limitations to the historical analysis presented here. These include, for instance, a lack of detailed consideration of timber and metallurgical coal markets in the region. More incorporation of the ways in which Appalachian cultural traditions of independence and connection to the land contribute to social movements would also have been desirable. There was great difficulty in attempting to be comprehensive while organizing an analysis of unequal exchange taking place between economic, political, cultural, and ecological systems- each with their own particular forms of value. As a result, the influence of shifts in productive economies on extractive economies in the region, as well as Appalachia's direct interaction with global markets, needs to be better incorporated.[28] Despite these limitations, this work has identified major historical trends and forces that have shaped the people and mountains of Appalachia's coalfields in a way that both recognizes the influences of the structure of capitalism and the agency of different classes of actors.

Some aspects of this work can inform future empirical evaluation. The above analysis suggests that areas in central Appalachia that are dominated by surface mining are more impacted by unequal exchange than studies focused on purely economic factors such as wages and number of jobs would suggest. It also suggests that poverty and anti-democratic political structures will tend to be nested in space and time in areas where surface mining is more prevalent. Separating the effects of these social relations from

[28] This is particularly true of the market for metallurgical coal which although proportionally small is unique in certain ways from the primary power generation market.

those of restructured ecosystems on future economic conditions is difficult. I hope to better evaluate this relationship in the future by analyzing geographic data on surface mine acreage being compiled and refined by Appalachian voices with census data on social and economic indicators.

Finally, I would suggest that a particular theoretical perspective not recognized in the literature may be useful for analysis of extraction in Appalachia. Bunker and Ciccantell (Bunker 1984; Bunker and Ciccantell 2005) offer detailed analysis of how successive extractive modes of production restructured not only social relations how changes in human-ecosystem and internal ecosystem relations lead to a downward spiral in both and abrupt socio-ecological change. As is evident in the history of Appalachia, both local human and environmental systems become increasingly vulnerable to changes in broader market and political forces resulting in reoccurring economic and environmental crisis. But is there a framework to express the systemic degradation of the human and ecological systems in resource extraction dependent areas without obscuring the unique properties of each system? Burkett (2006) critiques attempts by environmental economists to do so with the simple use of energy models based on thermodynamics. Extractive economies transfer not only energy but particular forms of matter from the periphery to the core. For this reason the values exchanged are often heterogeneous or "non-homogenizable" (Burkett 2006). It is also important to distinguish between the necessary conditions for sustaining capitalism and the those conditions necessary for the development of human potential- includes the flourishing of other forms of life. The level of ecological integrity and the quality of human life necessary for capitalism to continue

to function is far lower (Kovel 2002; Burkett 2006). Therefore a framework of unequal exchange capable of conceptualizing and operationalizing multiple qualitatively particular but interacting systems is preferable.

Ecologists Holling and Gunderson (2002) have developed such a framework for examining dynamic, overlapping and evolving systems that may provide deeper insights into the complexities raised by Bunker and Ciccantell (2005) and Burkett (2006). Their concept of *panarchy* offers a framework for understanding dynamic changes within and between hierarchically nested systems (Holling and Gunderson 2002). Their framework has four underlying propositions: 1) Processes are always in motion at different, often changing, rates of speed that interact to create episodic phenomenon. 2) The relationship between processes of different spatial scales is nonlinear and uneven. 3) Destabilizing forces create diversity and potentials while stabilizing forces maintain and realize potentials created by the former. 4) Management of ecosystems will fail if it does not recognize the interconnections of the facet being targeted and account for the unpredictability associated with the complexity of those interconnections. Such a framework may present a way to better map the interaction of overlapping political, economic, and ecological systems throughout Appalachia's history.

The future of both the people and the unique mountain ecosystems of Appalachia continue hang on the ability of social movements to understand and address the historical progression of extractive modes of production. This work makes a first step in charting the region's entrapment as an extractive periphery but more empirical studies will be necessary to sway public opinion and political leadership. Finally, better frameworks,

such as panarchies, to address the temporal, spatial, and dimensional complexities of development may be a valuable in charting a path out of the exploitive relations of global capitalism.

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APPENDIX

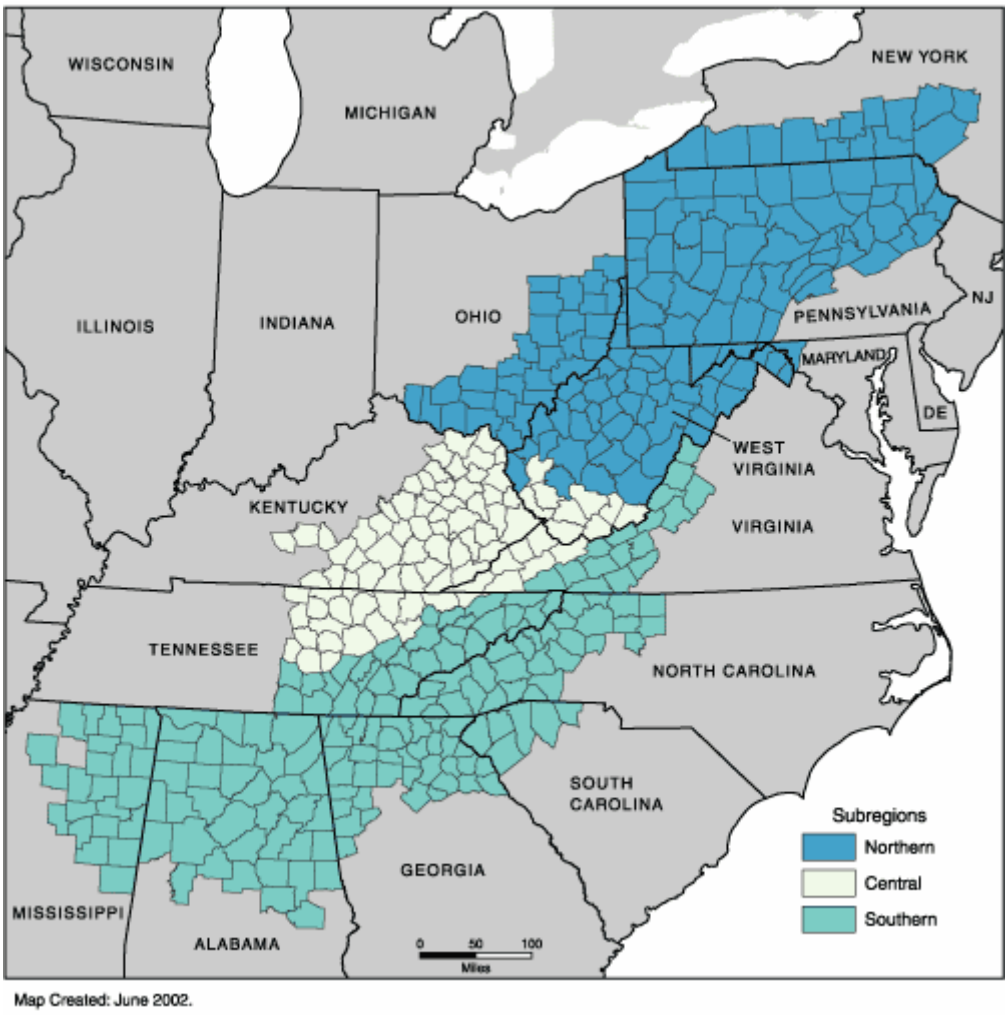

Figure 1. Sub Regions in Appalachia

Source: Appalachian Regional Commission

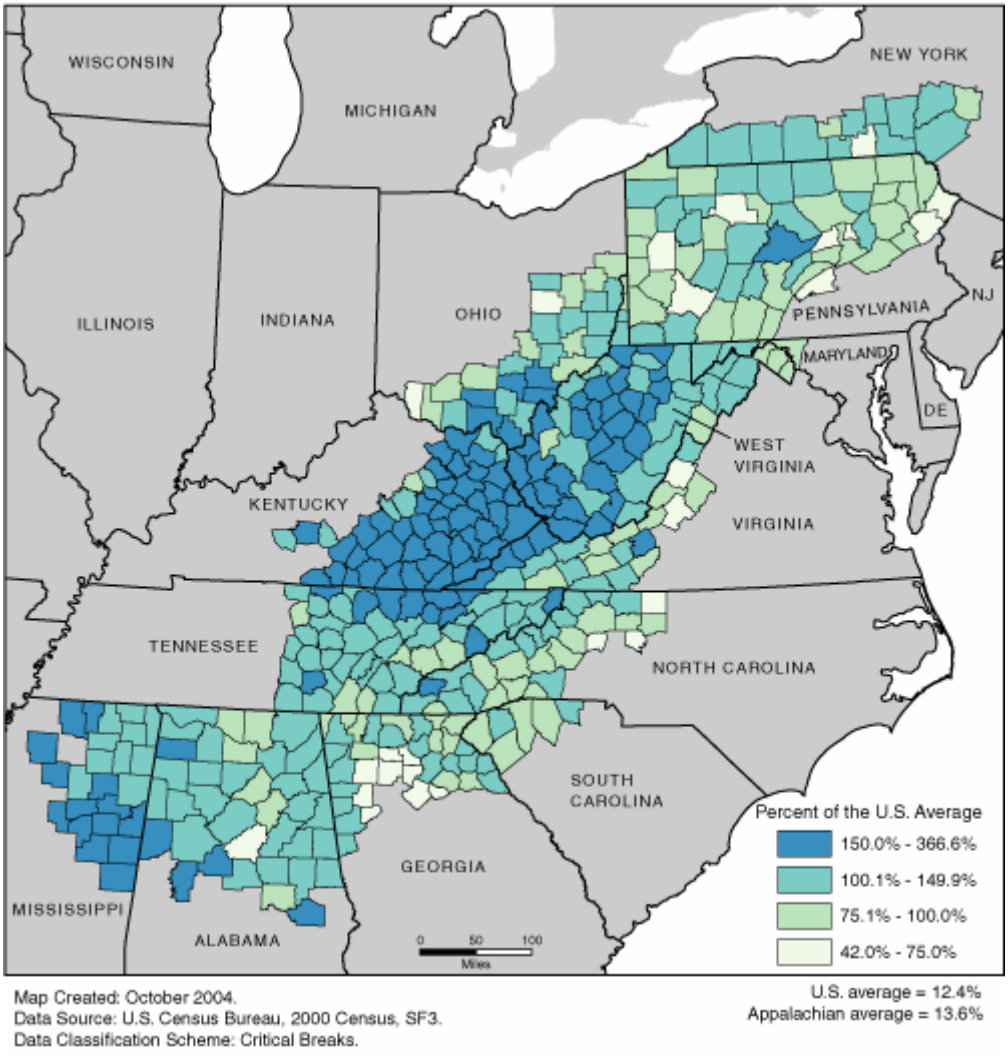

Figure 2. Poverty Rates as % of the National Average

Source: Appalachian Regional Commission

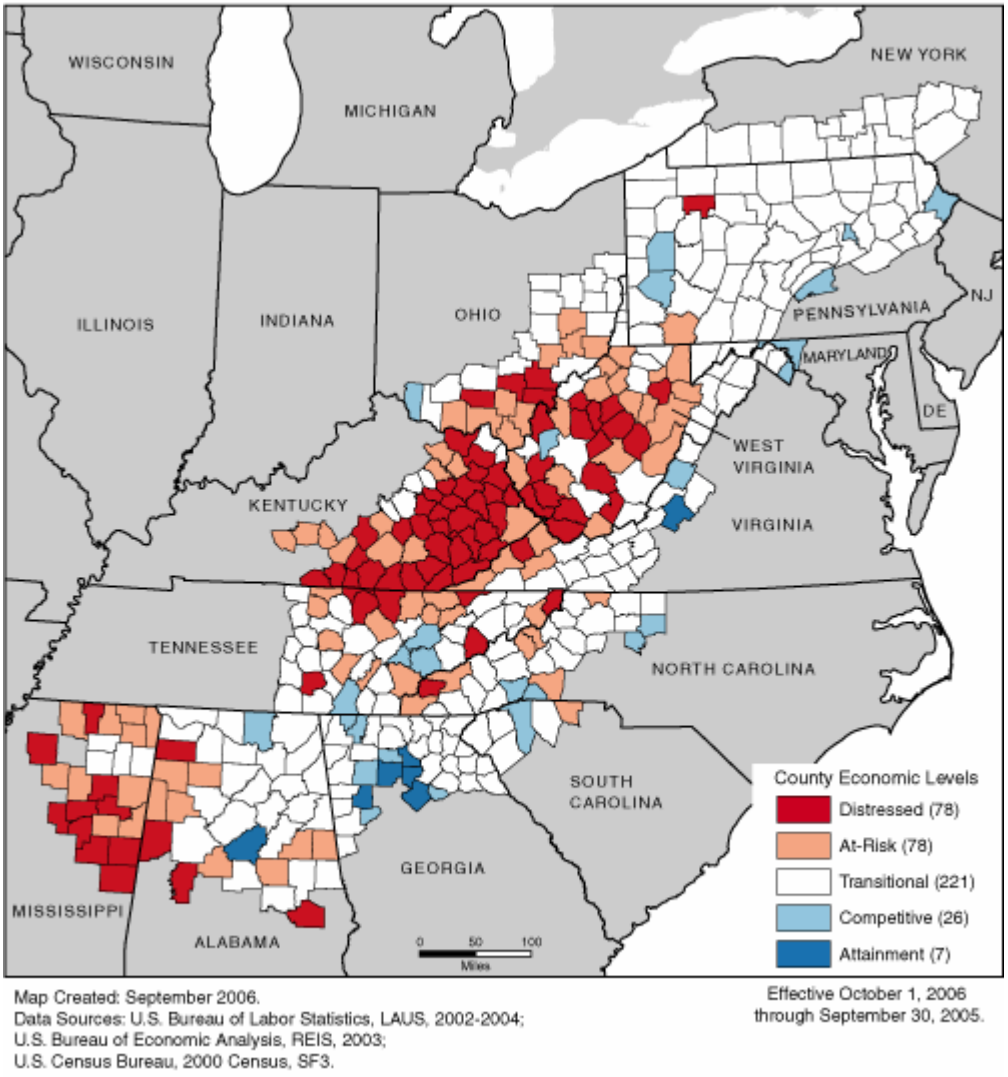

Figure 3. Economically Distressed Counties

Source: Appalachian Regional Commission

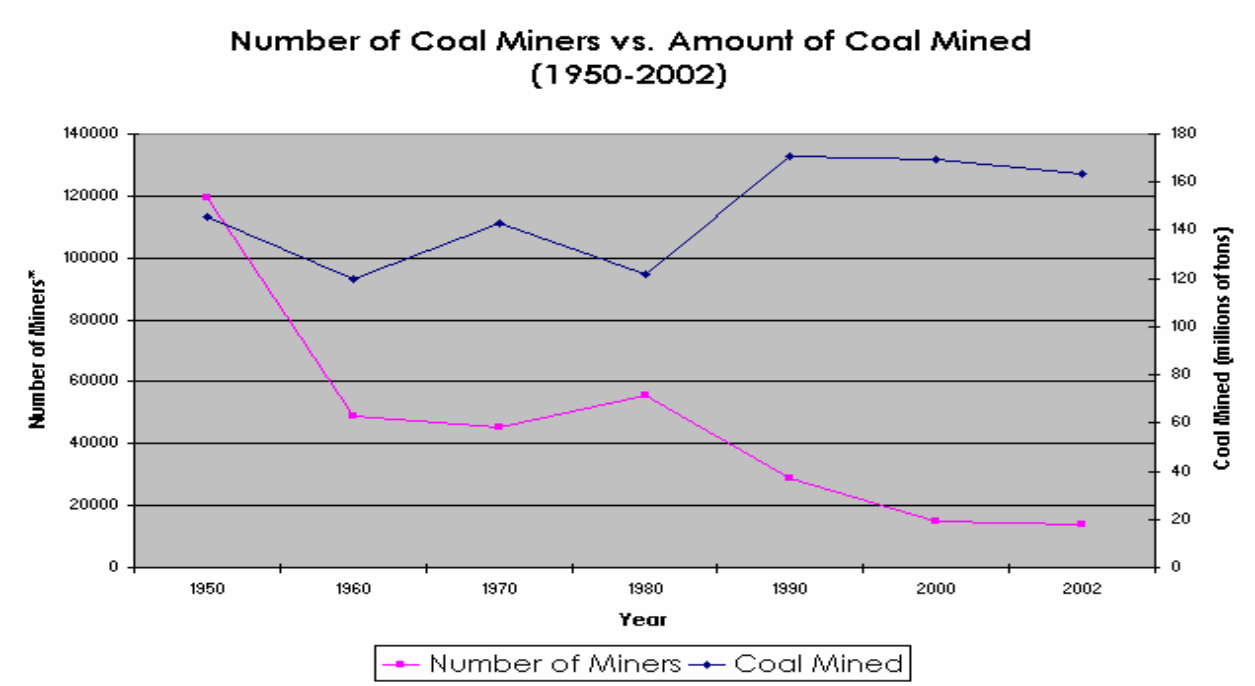

Figure 4. Number of Coal Miners vs. Amount of Coal Mined in West Virginia

Source: Graph produced by Appalachian Voices, data is from the U.S. Energy Information Agency (EIA)

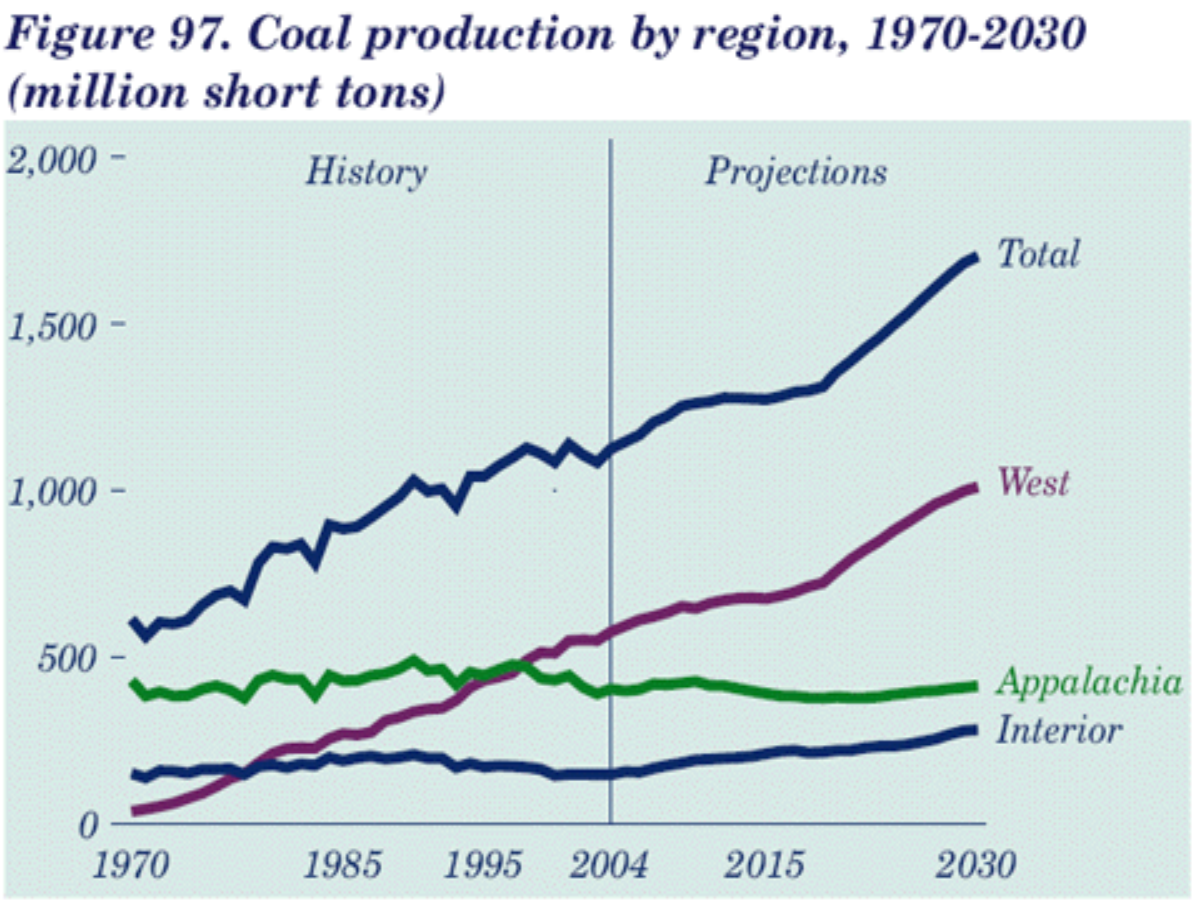

Figure 5. Past and Projected Coal Production by Region

Source: Energy Information Agency

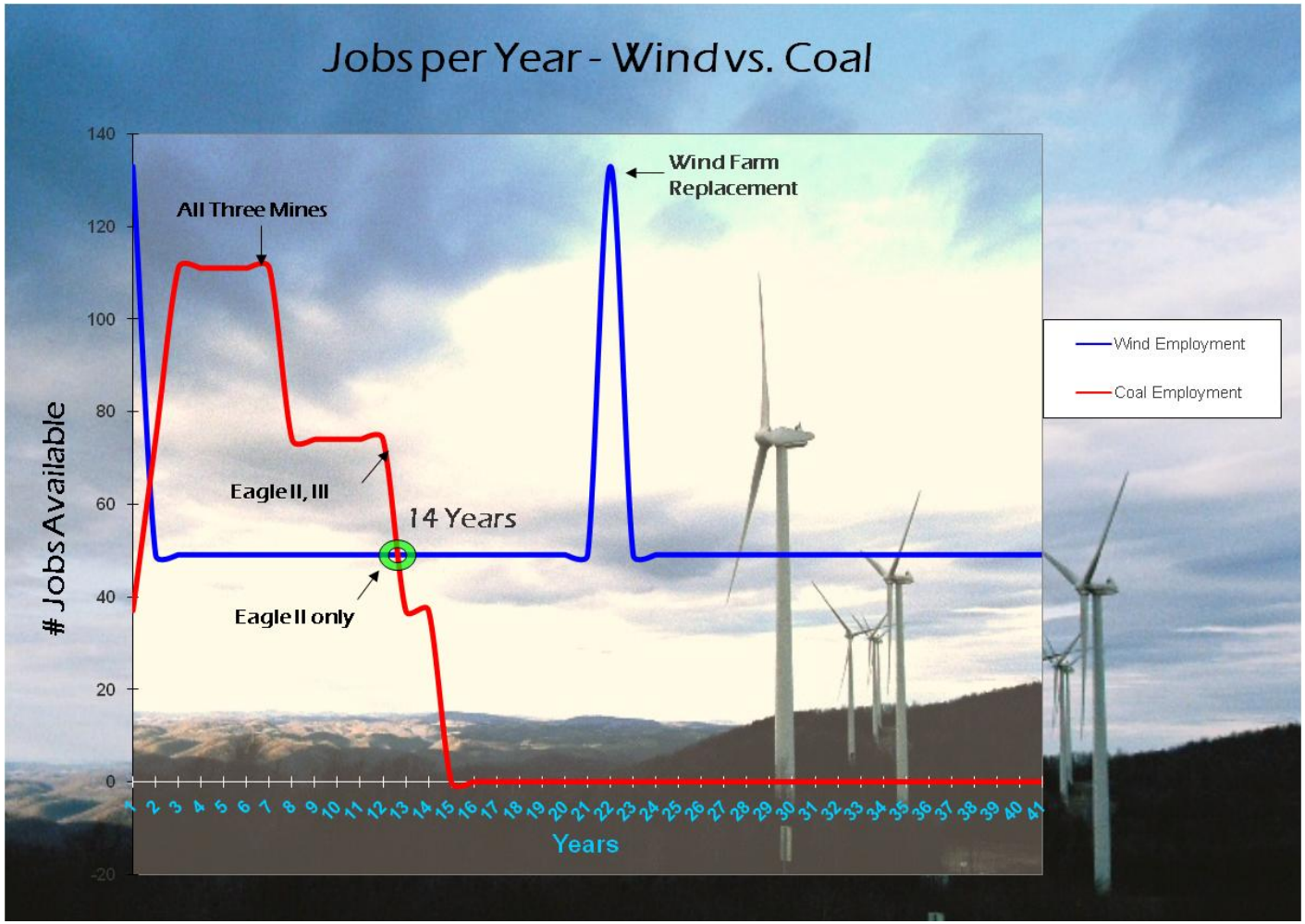

Figure 6. Coal vs. Wind- Employment

Source: (McIlmoil 2007)

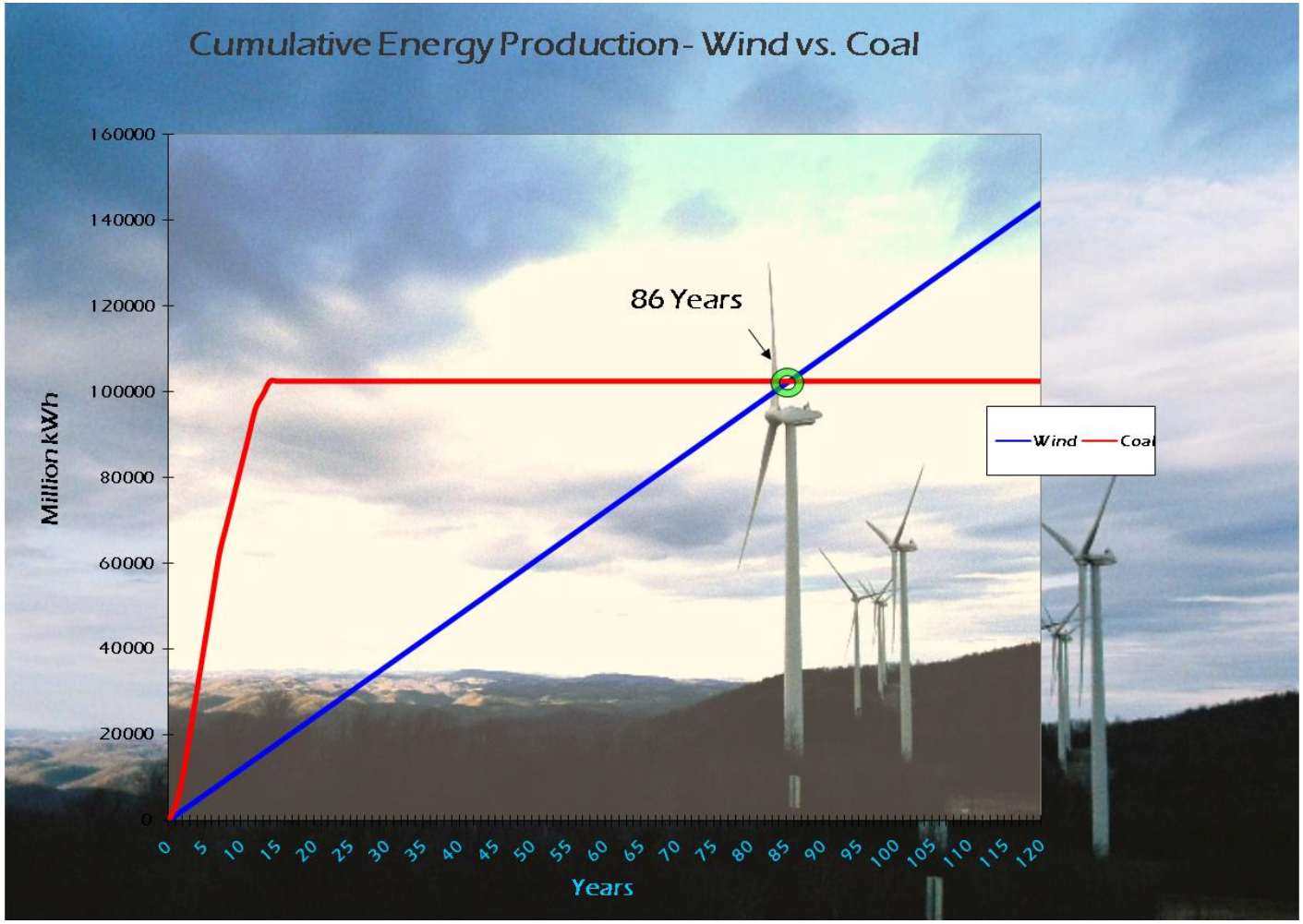

Figure 7. Coal vs. Wind- Energy

Source: (McIlmoil 2007)

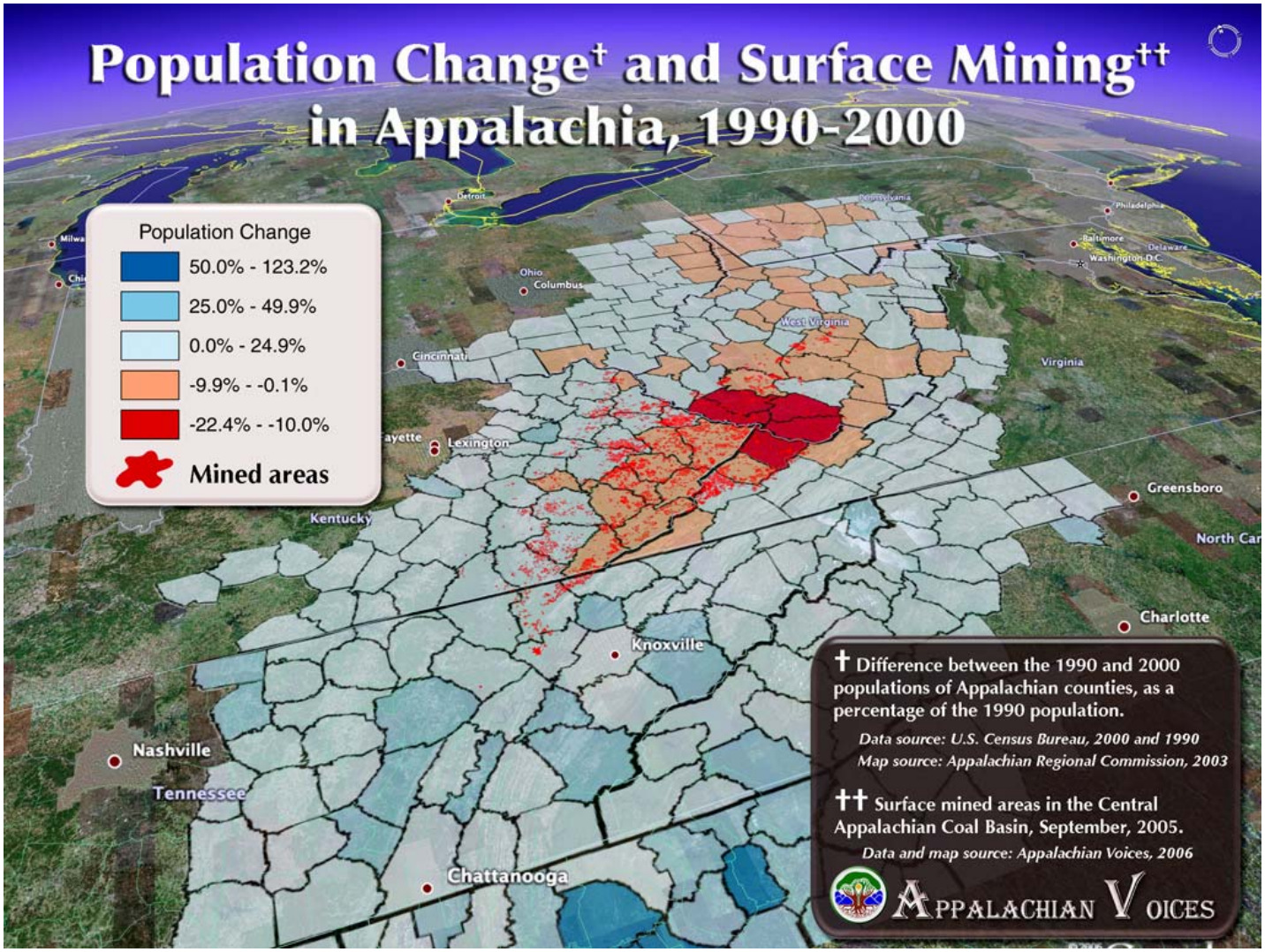

Figure 8. Population Change and Surface Mining

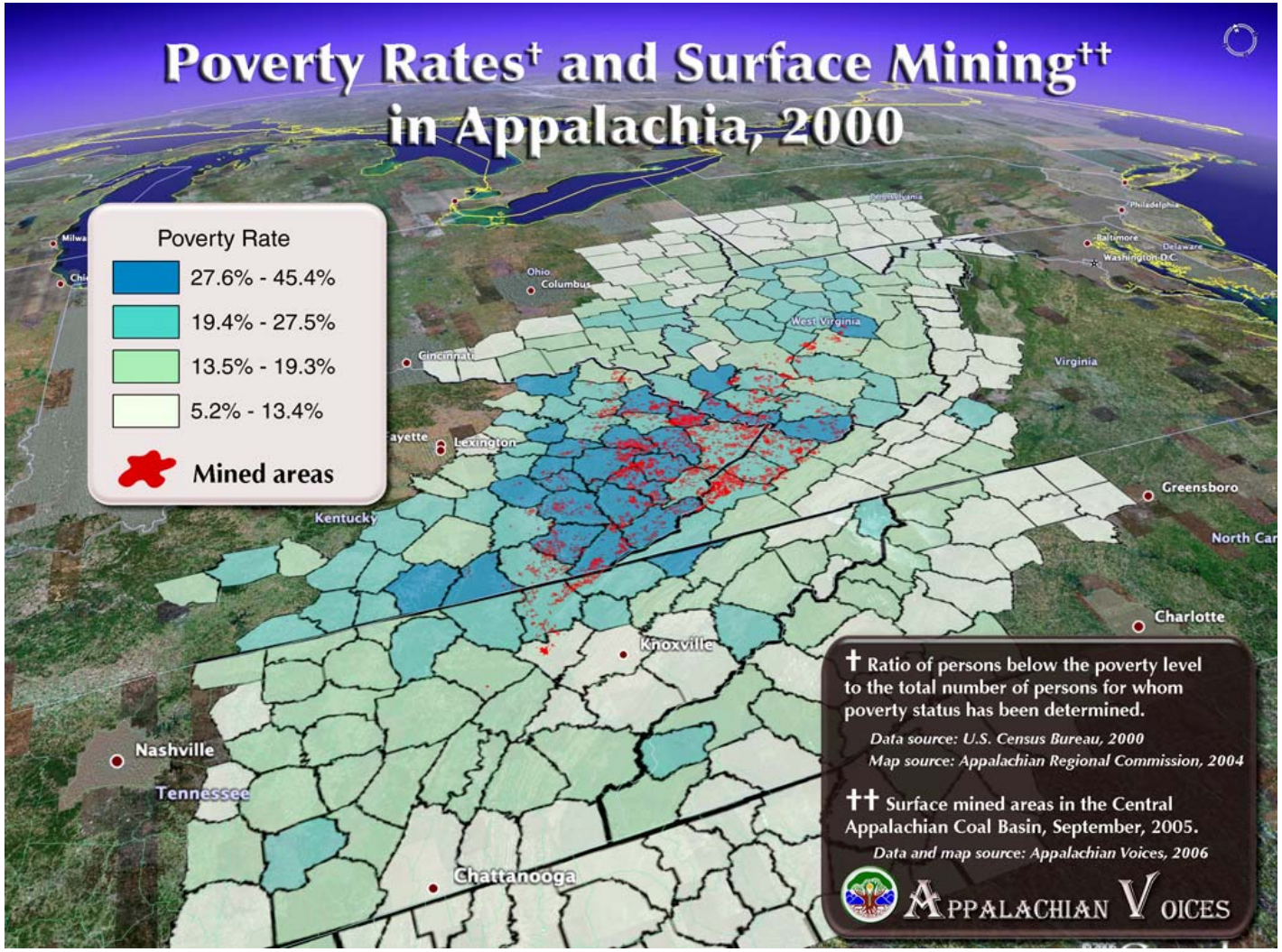

Figure 9. Poverty Rates and Surface Mining

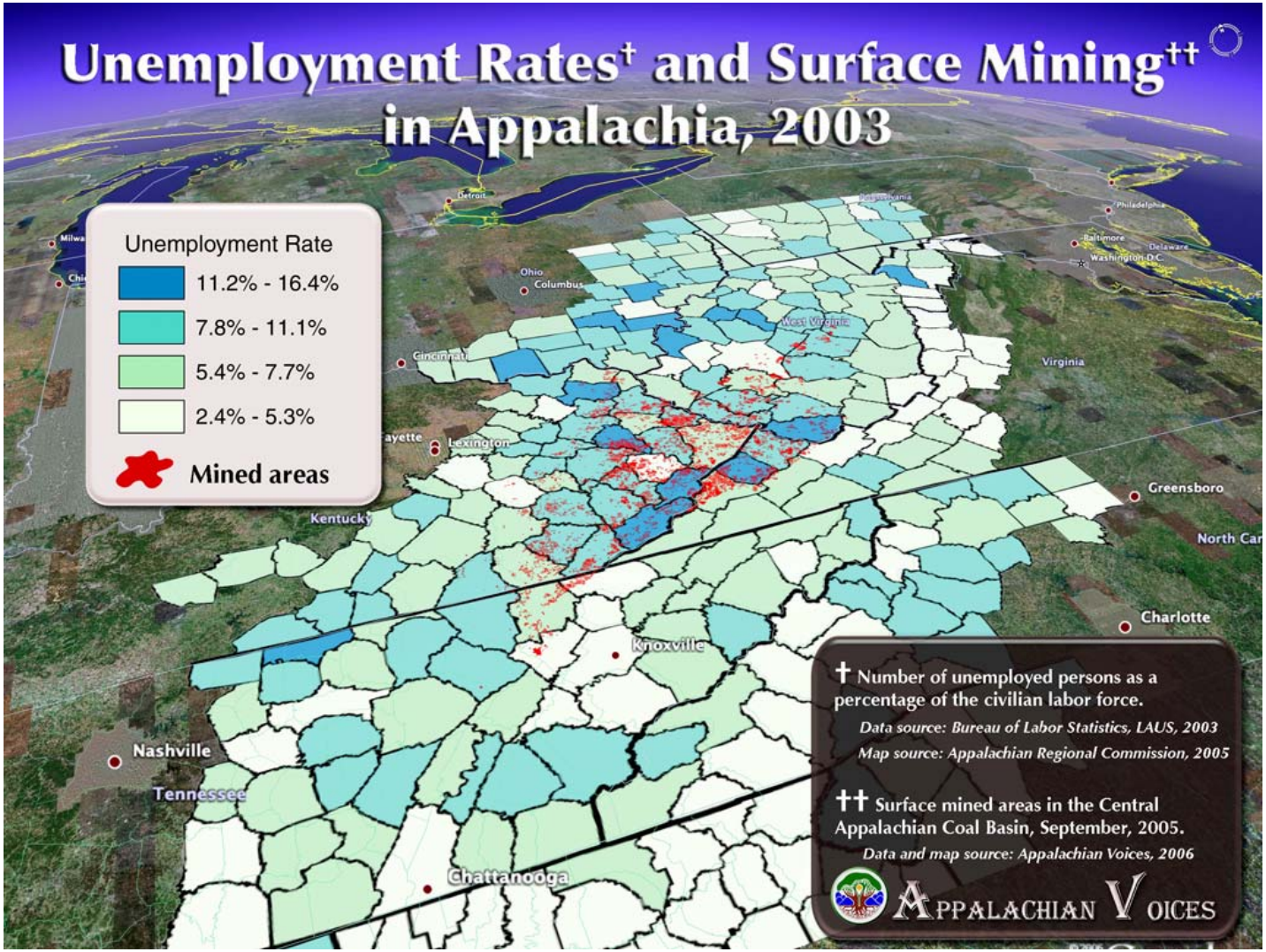

Figure 10. Unemployment Rate and Surface Mining

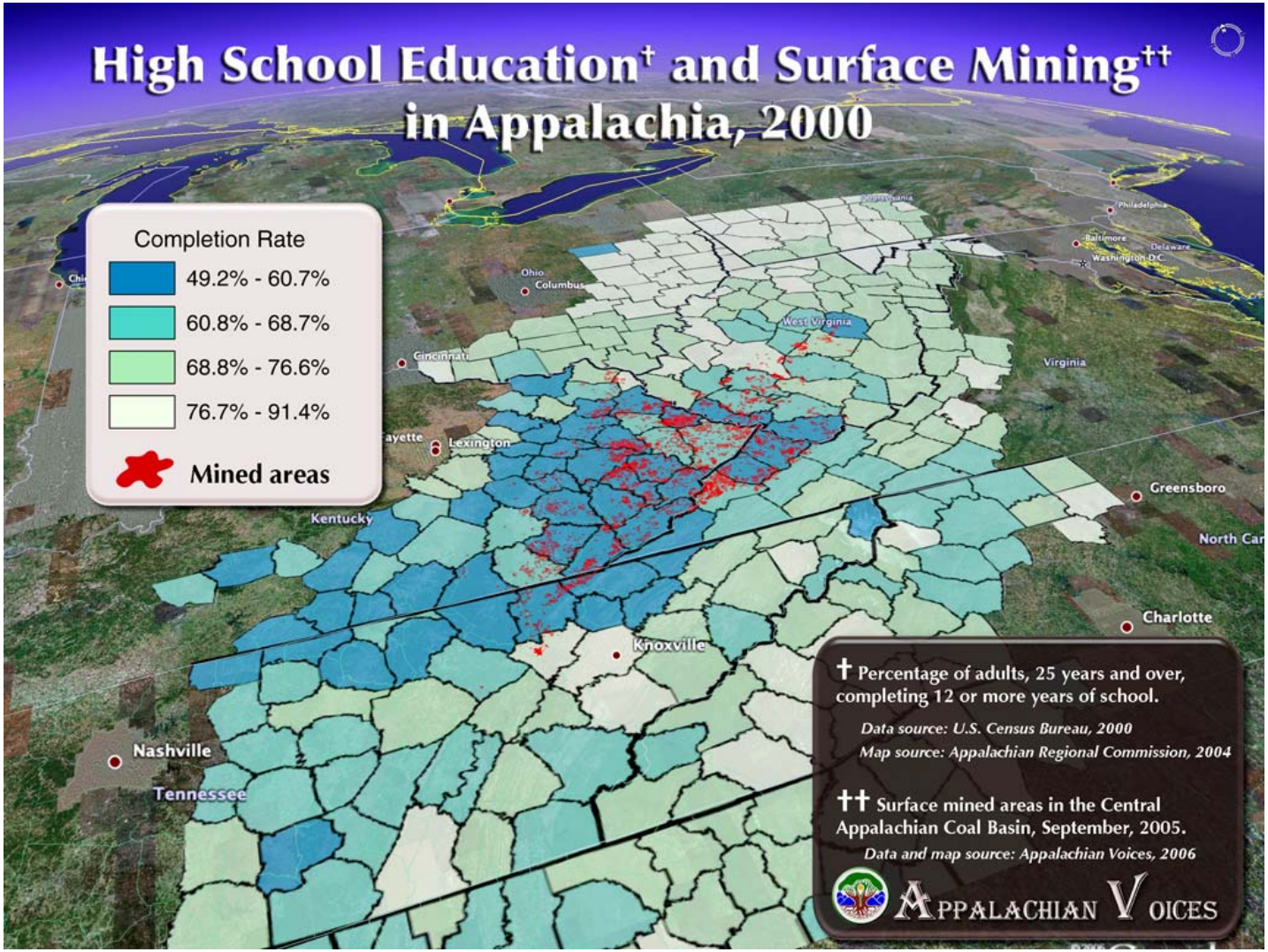

Figure 11. Education and Surface Mining

VITA

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