The Social Impact of Surface Mining in Central Appalachia

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Introduction

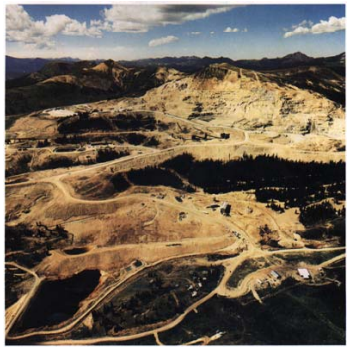
Mining is the primary cause of land-use change in the Central Appalachians (Loveland et al. 2002), with mining companies focusing the majority of their budget and energy on only five of the twenty-seven states where coal is mined (Welch 2010). This study focused on thirty-one contiguous counties of southern West Virginia, eastern Kentucky, and western Virginia to explore the mining intensity at state and county levels from 1976 to 2008. I evaluated correlations with socio-demographics to analyze how mining intensity negatively impacts the persons living in these areas. To better understand how decisions that affect the environment ultimately have connections to fluctuations in the nearby populations' demographics, I looked at areas most affected environmentally and identified whether those same areas have seen a change for the worse in their economic and social sectors.

Fig. 1. The Appalachian Region and the case study area.

This study evaluated two related hypotheses:

My first hypothesis was that the presence of mining in a community negatively impacts the demographics of that area.

My second hypothesis was that mining companies specifically target at-risk communities with degraded demographics because those persons have fewer resources to protest the presence of mining.



Summerville Mine. Public Commons. Flickr.

Methods

DATA

• Mined land cover data: Jin et al. (2010) from a time series of Landsat MSS & TM imagery 1976-2008

• Socio-demographic data: US Census 1990, 2000, & 2008

PRE-PROCESSING

•Using GIS (ArcGIS)and Excel, I calculated the percentages of area mined overall, by state, and by county.

•Focused on top 5 counties with the most area mined over the time frame (Fig. 2)

Top 5 Most Mined

1) Martin County, KY	24.15%
2) Wise County, VA	22.44%
3) Pike County, KY	16.57%
4) Boone County, WV	15.59%
5) Mingo County, WV	13.42%

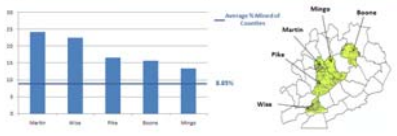


Fig.2 Top five most mined counties of the case-study. Shows that majority of mining takes place along borderlines.

ANALYSES

Hypothesis 1: Mining impacts communities

I conducted regression analysis on percentage area mined with census data to look for correlations of high mining and negative demographics. For my dependent demographic variables, I used *population, percentage of population 65 years or older, percentage of population with less than a high school diploma, median household income, and percentage of population below the poverty line*. The independent variable used to explain changes in socio-demographics was *percentage of area mined within each county.* I used census data from a later time period to account for the lag time required for impacts to be realized.

Hypothesis 2: Mining is targeted at poor communities

I also examined whether pre-existing socio-demographic condition influenced where mining was conducting by using the Census data as the independent variable to predict changes in lagged amount mined.

Results

The majority of mining occurred in a corridor along the state borders. Martin County, KY was the most mined within the study with nearly a quarter (144.4 km^2) of the total county (597.8 km^2) mined. The average land use change to mine sites was10.35% for the total area of the study (Fig. 3).

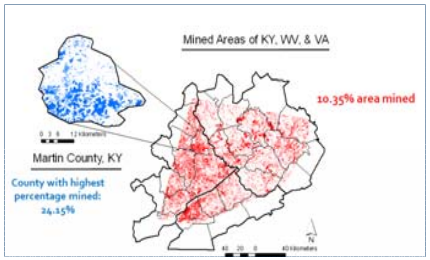


Fig.3 Case-study area with mined area overlay

Similar to the spatial pattern in mining intensity, many of the demographic variables changed most along the state borders (Fig. 4). However, in most cases the correlations were not significant at the county-level. The strongest relationship was between current percentage of population over 65 and historic mining intensity (Fig.5).

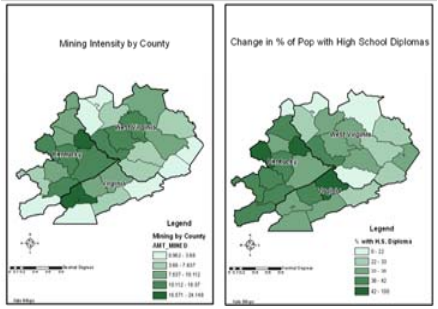


Fig.4 Spatial distribution of mining intensity and change in high school graduation over the study's time span

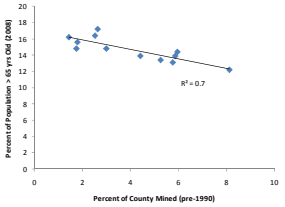


Fig.5 Percentage of population above 65 years old as a function of percentage mined (p <0.01).

Discussion

Although general patterns emerged (Fig. 6), correlations were generally weaker than anticipated. The percentage of the population below the poverty line increased as expected with the increase of mining intensity. Areas of high mining did not have a more elderly population as expected. Instead, percentage of population over 65 decreased within mining intensity perhaps due to increasingly mortality of the elderly and/or increasing birth rate associated with the increase in poverty. High school graduation rates also increased with mining, contrary to expectations. This could be attributed to the success of the 2002 No Child Left Behind program in impoverished areas.

Most Mined v. Least Mined

Actual ('08)	Martin County, KY	Summers County, WV
% Mined	24%	1%
% 65+	12%	19%
Med House Income	$22,841	$28,145
% < HS Diploma	46%	35%
% Below Poverty	35%	25%
Population	13,070	13,081
Change in % ('90- '08)	**Martin County, KY**	**Summers County, WV**
% 65+	40%	9%
Med House Income	51%	71%
% < HS Diploma	-17%	-18%
% Below Poverty	0%	4%
Population	4%	-8%

Fig.6 Demographics of the most and least mined counties (2008 statistics and change over the study period)

Summary

• Explored the mining intensity at state (WV, VA, KY) and county levels (31 counties) from 1976-2008

• Analyzed possible correlations of mining intensity with socio-demographics

• Areas most affected environmentally have seen a slight negative change in economic and social sectors, with some exceptions

• This study should be continued with better data spanning a longer time period

References

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