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Environmental Justice in Kentucky: A County-Level Study of Enforcement of the Clean Air Act

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Background

Environmental justice is the term coined by policy analysts interested in measuring the equity of exposure to toxic waste and pollution for citizens. The theory first gained traction in the 1980's with the basic argument being that facilities creating pollution and managing hazardous waste are more likely to locate in areas with lower incomes and more minority citizens. The underlying assumption of the theory of environmental justice is that the voting population is not comprised of high percentages of the poor and minority population; therefore, politicians may face fewer political obstacles in allowing facilities to locate in areas where low-income and minority populations live. From an economic basis, inequitable exposure could be attributed to the lower cost of land in counties with low-income citizens. This is an example of reverse causality and could also be the case that low-income citizens may choose to live in areas with hazardous facilities because there is a lower cost of living and accept the risk associated with these facilities. This economic explanation has been questioned by academics who found that only some inequity in the location of facilities could be attributed to land cost.

This economic argument will not be explored further as this paper does not look to study the possible inequitable placement of facilities. Instead, this paper studies the distribution of actions taken by state and federal officials to enforce environmental law. The reviewed literature frequently tests environmental equity by measuring if there is a higher likelihood of a hazardous facility being located in a low income area or an area with a greater number of minority households. The theory has developed beyond the placement of facilities to explore environmental equity as the study of the enforcement of environmental regulations in areas with concentrations of low income and minority

individuals. Again, because it is hypothesized that these areas are less likely to take political action, regulators may not ensure that federal regulations are being enforced, or may enforce them less often. It is the goal of this paper to measure enforcement in the state of Kentucky by county and examine whether there is a difference in the number of enforcements based on the income or racial characteristics of the county's population.

Environmental justice was first recognized in the federal government in an executive order from the Clinton administration. Issued in 1994, the order requires that agencies, "shall ensure that all programs or activities receiving Federal financial assistance that affect human health or the environment do not directly, or through contractual or other arrangements, use criteria, methods, or practices that discriminate on the basis of race, color, or national origin" (Executive Order 12898). While recognition that inequalities might exist was an important first step for the environmental justice movement, the order did little to impact the processes and practices for the placement of facilities. Instead of acting as a guideline, the order was treated as more of a recommendation by the EPA and other federal agencies. However, it did establish environmental justice as an issue worthy of federal attention and would lay the groundwork for future regulation by the Environmental Protection Agency and other departments like Health and Human Services.

The Environmental Protection Agency (EPA) is the main agency with the authority to impose and responsibility to enforce environmental justice measures at the federal level. As a way to incorporate environmental justice into the EPA's organizational structure and culture, the agency introduced Plan EJ 2014. The plan focuses on making environmental justice a core consideration for the EPA when decisions are made regarding permitting and

enforcement. There was also attention given to increasing efforts to educate the public and to build community-based programs that focus on environmental justice. The plan was created in 2010 with the hope that it would be implemented and in practice by 2014.

Although Plan EJ 2014 seems to be a reasonable attempt to incorporate environmental justice concerns into the culture and practices of the EPA, a Government Accountability Office report on the progress of these efforts states "without additional progress on these practices, EPA cannot assure itself, its stakeholders, and the public that it has established a framework to effectively guide and assess its efforts to integrate environmental justice into the fabric of the agency" (GAO, 31). Changing the culture and everyday practices of an agency like the EPA is a difficult and complex undertaking and, realistically, cannot be accomplished in four years, particularly with recent changes in leadership. Plan EJ 2014 is the most comprehensive approach to come from the EPA in addressing environmental justice; however, it seems that practices which can result in environmental inequity might arise from more deeply imbedded patterns. The Health and Human Services strategy is similar to Plan EJ in that it relies largely on educating and empowering those communities that are, or would be, impacted by these facilities. Like the EPA's strategy, this has the problem that there may be an inherent barrier of access for these communities where traditional programs may not reach the intended audience.

Literature Review

Academic articles in the field often come to opposing conclusions, and a great debate exists between those who find that minorities and low income populations face a disproportionate share of environmental damage and those who do not find that their data

supports such conclusions. This debate exists across studies that use location of pollution and toxic substances as the dependent variable as well as articles that use governmental enforcement of regulation as the dependent variable. Studies in environmental justice have focused on a variety of concerns including: location of facilities, cleanup efforts, and enforcement. The studies considered in this literature review all focus on the enforcement of regulations as the main focus of analysis.

In the article, "Rush to judgment: An empirical analysis of environmental equity in U.S. Environmental Protection Agency enforcement actions" Atlas critiques the findings and methodology of one National Law Journal article and improves upon the authors' methods to recreate a study of enforcement (Atlas 2001). The National Law Journal article and the Atlas article both focus on the EPA's enforcement of environmental regulation in terms of litigation and subsequent penalties. Atlas concluded that minorities were not facing discrimination in environmental enforcement. Atlas is not the only academic to report such; some other studies that were structured similarly to his study reported similar results. This study helped lay the framework for further analysis of the quality of studies finding significant results. In order to compare results across studies, one must compare the quality of the methods employed by Atlas to other studies. This type of comparison in the literature can lead analysts to improved models to capture the possible existence of environmental injustice.

Bowen and Wells (2002) focus their attention on the methodological limitations that plagued earlier environmental justice studies. Mainly, the authors report, these studies had limited data available and suffered from an inability to use one clear geographic unit of measurement. This issue regarding unit of analysis is discussed in further detail below

where the author will suggest additions to the county model to improve the overall study. As of 2002, Bowen and Wells report that, “The country's environmental justice research requirements include vastly increased data gathering and more, better empirical research” (Bowen & Wells, 696). While the data available to researches has come a long way from 2002, the quality of the models employed by analysts remains problematic.

Evan Ringquist is one expert in the field who has performed many time-series studies to test various theories of environmental justice. The findings from his studies consistently indicate that minorities do face discrimination in both the placement of facilities as well as in governmental enforcement of regulations. Recognizing the need to organize and make sense of the environmental justice literature, Ringquist performed a meta-analysis of the existing studies. (Ringquist 2005). The author and his team sorted through the literature to identify studies with reliable statistical methods to include in his aggregated analysis. Once these studies were combined, Ringquist tested the probability of an environmental justice study finding significant results in terms of race and income. Ringquist states three conclusions can be drawn from the analysis, the most important being that “race-based environmental inequities exist, and this conclusion is unaffected by the type of risk examined, the level of aggregation employed, or the type of control variables used in the analysis” (Ringquist, 233). After comparing over 49 studies Ringquist comes to the conclusion that, regardless of the methods employed by the study, racial minorities do face discrimination. Ringquist, however, does not find that the same discrimination occurs based on economic class or income level.

Recently, a study by David Konisky (2007) reported findings opposite to that of the Ringquist meta-analysis. Konisky found that lower income populations face a statistically

significant level of discrimination in environmental justice, in terms of the enforcement of federal regulations, whereas racial minorities do not. To find correlations within the data Konisky used a negative binomial regression, using each instance of enforcement of federal regulation as count data. For the study Konisky looked at the enforcement of the Clean Air Act (CAA), the Clean Water Act, and the Resource Conservation and Recovery Act. Konisky's use of the dependent variable of enforcement is less common in the literature, with fewer studies focusing on governmental action. The study includes data from state-level enforcement and provides the aggregate conclusion that state governments discriminate in their enforcement in lower-income counties.

It is the goal of this paper to recreate the study conducted by Konisky using data from the Commonwealth of Kentucky, altering some of the independent or control variables included. To fit the specific characteristics of the state some variables are dropped and more appropriate ones added to test for the possibility of environmental inequity within the counties in terms of both EPA and state-level enforcements and inspections.

Research Design

This study addresses the two following research questions. First, is there a difference between Kentucky counties in the number of inspections of registered facilities that can be significantly explained by the demographic characteristics of the county? In this research question, the author assumes the null hypothesis that there is no difference between counties that can be explained by the demographic make-up of the county. The alternate hypothesis assumes that there is a significant difference in the number of

inspections occurring between counties. Second, is there a difference in the amount of enforcement action taken in counties based on the demographics of the county? The null hypothesis in the study would find there is no significant difference in the enforcement of these regulations and the alternative hypothesis that will be tested states that there is a statistically significant, negative difference in the enforcement of regulations in low income/high minority counties as compared to other counties.

The dependent variable in this study is a count variable of the inspections and enforcements of federal regulations of the Clean Air Act (CAA) by Kentucky officials and by those from the EPA. For this study "enforcement" refers to both formal and informal notices of violation of the CAA. These dependent variables were chosen because, while the placement of facilities may indicate former inequity, inspections and enforcement of regulation will test the possibility of current or ongoing inequity in counties with low incomes or high minority populations. The use of a count variable as the dependent variable necessitates the employment of a negative binomial regression for hypothesis testing. A negative binomial is appropriate in this case, as it was in Konisky's study, because the counts cannot be considered independent of one another. If an inspection or enforcement action is taken in a county once, it can be assumed that enforcement action has a greater likelihood to occur again in the county.

Enforcement and inspections data come from the EPA through the Environmental Compliance History Online (ECHO) and reflect the past five years of EPA and state action in Kentucky counties. These data come from actions taken in 2008-2013 for each facility and are aggregated by county. The only facilities included in this study are those that have been designated as "major" facilities by the EPA, which is defined as "active, 'federally-

reportable' sources" (ECHO). Smaller facilities have not been included in this study, and are not commonly included in the literature, because reporting of inspections and compliance for these facilities is often sporadic and does not provide enough data to make reliable assumptions regarding enforcement actions.

Data to account for the minority distribution within the county comes from the 2010 Census by the U.S. Census Bureau. The variable indicates the proportion of non-white citizens within the county. This will be sufficient in this study as it is the goal to test discrimination against minorities overall, but not necessarily to test discrimination against specific races within the population. While other studies indicate that different ethnic groups may face different environmental inequities (Konisky, 2013) this study looks to gain an overall understanding of the impact on all non-white citizens. In order to measure income, two variables are included in the model: median household income and percentage of the population below the poverty line. It is important to include both variables because median income could be skewed by disparities in the distribution of wealth. The variable measuring poverty will provide a more accurate measure of the concentration of poverty within counties.

In addition to variables indicating population income and minority status, the model includes two variables to act as proxy measures of political capacity within the community. It was important to include these variables in the model because the underlying theory of environmental inequity suggests that low income/high minority communities face discrimination because of a bureaucratic incentive to be more responsive in a community that is more politically active (Konisky, 2013). As proxy indicators of political capacity the

data includes a measure of county voting behavior as well as one for the population's education level. The voting variable is defined as the percentage of the county's eligible voters who voted in the 2008 presidential election. This data was obtained from the Kentucky State Board of Elections. The education variable indicates the percent of a county's population who are over the age of 25 and have at least a high school diploma or GED equivalent. Population, in thousands, is also included as a control in the models as it is expected that the more people present in the county the more likely an inspection and/or enforcement will occur.

Beyond these demographic variables and political capacity variables, three additional control variables are used in the model. One additional control included is a variable that accounts for the number of facilities in the county, as counties with more facilities are more likely to be regulated than counties with just a few. This variable comes from the EPA as a count of how many facilities operate in the county that have an Air ID and are required to comply with the CAA. This variable, along with the two variables measuring political capacity, are variables that come from the model introduced by Konisky's study and their logical explanatory relationship to enforcement.

A major shortcoming acknowledged by Konisky article is the use of county as the unit of analysis in the model. Konisky explains that, because of the mixed size of counties, heterogeneity within counties, and lack of exact locations of facilities and populations with particular characteristics, there are definite limitations to using county-level data. Konisky continues with this unit of analysis, however, because that is the industry standard and the EPA data used only exists in a county-level format. In an attempt to address issues with county-level data, the current model includes a variable indicating whether the county is

considered a metropolitan statistical area (MSA). The final variable the model includes as a control is a dummy variable identifying "coal counties" within the state. This variable is included and is important to consider for a coal-producing state like Kentucky because the large coal industry represents many jobs and a powerful lobby. It is the author's assumption that the existence of major coal facilities in a county could impact the likelihood that the state will enforce the CAA. These seven explanatory variables should create a good fit for the model in predicting the number of enforcement actions taken by the state government. The variables explained for the models are given by the regression equations below.

Model One: Inspections Regression Equation	Inspections= constant + nonwhite + median income + poverty rate + population + land area + voter turnout + education + number of facilities + MSA + coal + error term
Model Two: Enforcement Regression Equation	Enforcement= constant + nonwhite + median income + poverty rate + population + land area + voter turnout + education + number of facilities + MSA + coal + inspections + error term

Results and Interpretations

The results of this study vary substantially from the literature and may provide unique insights into environmental justice in Kentucky. Of the 120 counties in Kentucky, 78 of the counties had at least one facility with an EPA Air ID. The 42 counties that did not have a facility are not included in the regression model, as it is illogical to expect there would be no inspections or enforcements of facilities in these counties. The number of inspections varies greatly, ranging from as few as one inspection to a high of 423 inspections in the last five years. The enforcement variable also varies, less so than inspections, with one to 131 enforcements in different counties. The US Census data

included in this study - regarding race, income, population, and education – are described in Table One below.

Table One: Summary Statistics

	Observations	*Mean*	*Median*	*Standard Deviation*
Inspections	120	26.63	10.5	52.56
Enforcements	120	7.45	1	17.63
Number of Facilities	120	2.51	1	4.56
Population	120	36,161.39	18,751	74,122.76
Median Income	120	$37,922.73	$37,648.50	$10,151.65
Percent Below Poverty Line	120	21.3%	19.8%	6.9%
Percent Nonwhite	120	8.1%	6.1%	6.1%
Percent Hispanic	120	2.2%	1.7%	1.6%
Percent High School Education	120	77.5%	77.9%	7.4%
Percent Voter Turnout	120	60.2%	61.5%	6.9%
Land Area (Square Miles)	120	329.05	305.89	129.14

As shown in the table above, enforcements and inspections have high standard deviations due to the few counties with high counts. By looking at the medians, the distribution of these variables is easier to discern. When running both models, the only county observations that are included are those with at least one facility in the county. The demographic variables appear as expected from census data, given known historical trends and variations. The variables measuring coal and MSA are dummy variables, meaning 1 is assigned if the county is designated a coal-producing county or an MSA, and a 0 is assigned if not. Table Two contains the frequency counts for the two dummy variables, coal and MSA.

Table Two: Frequencies of Dummy Variables

	Frequency	*Percent*
Coal-Producing		
0	92	76.67%
1	28	23.33%
Coal Total	120	100%
MSA		
0	86	71.67%
1	34	28.33%

MSA Total	120	100%

The first model defined inspections as the dependent variable, controlling for all the variables described above - excluding enforcements and the size of the Hispanic or Latino population in a community as variables to be discussed in following models. Table Three, given below, shows the results of the negative binomial regression testing the count of inspections while holding all other variables constant, given that there is at least one eligible facility in the county.

Table Three: Inspections Model Results

	Coefficient		Standard Error
Number of Facilities	0.210	***	0.023
Population (In Thousands)	-0.008	***	0.001
Median Income (In Thousands)	0.006		0.017
Percent Below Poverty Line	7.602	***	2.967
Percent Nonwhite	0.139		1.413
Coal	-0.043		0.221
Metropolitan Statistical Area (MSA)	0.475	***	0.181
Percent High School Education	5.301	**	2.533
Percent Voter Turnout	4.835	**	2.290
Land Area (Square Miles)	0.001		0.001
Constant	-6.536		2.402

*** p<0.01, **p<0.05, *p<0.1

When the number of facilities in a county increases, the expected number of inspections will significantly increase, holding all other variables constant ($p<0.01$). This finding is consistent with expectations, as an increased number of facilities would require increased inspections within the county. Another important finding in the inspections model comes from the population predictor variable. For a one thousand person increase in the population, there is a highly significant decrease in the number of inspections in the county, controlling for all other variables ($p<0.01$). This finding is does not align with the

beginning assumptions that a population increase would, in-turn, increase the number of inspections in the county.

Two variables that were expected to affect the number of inspections, median income and percentage of nonwhite citizens did not yield significant results. This indicates that the race variable and one of the income variables did not influence the likelihood of an inspection for the given county, holding all else constant. However, the second income variable included in the model, representing the percent of the population below the poverty line, is found to be a significant predictor. According to the model, a one percent increase in the population below the poverty line will increase the number of inspections in the county, holding all other variables constant ($p<0.01$). This finding is opposite of what some of the literature suggests and could be attributed to increased efforts to reverse environmental inequities or could suggest that environmental injustice, in terms of inspections, does not exist in Kentucky or cannot be captured due to limitations within the model. Possibilities for this finding and implications for future research will be discussed further in a later section of this paper.

The two variables included in the model to gauge political participation, voter turnout and high school education, are both moderately significant in these findings. In this regression, a one percent increase in the number of citizens (over 25 years old) with a high school education will result in a moderately significant increase in expected inspections, holding all else constant ($p<0.05$). Similarly, a one percent increase in voter turnout will increase the number of inspections with moderate significance, *ceteris paribus* ($p<0.05$). These political participation variables may be capturing the bureaucratic incentives to be more active, in CAA inspections in counties that are more politically involved.

The variable that accounts for a MSA is also significant in this model. Counties that contain a MSA have a highly significant relationship with the dependent variable that increases the count of inspections as compared to those counties that do not have a MSA ($p<0.01$). This is an interesting finding in comparison to the results from the population variable and may indicate that population density could be a better predictor of CAA inspections. The variables that account for coal and land area do not yield significant results in the inspections model.

The second model in this study switches from a focus on inspections and instead looks at the number of enforcements within a county in the past five years. One addition to this model is the variable *Inspections Squared*. This transformed version of the inspections variable is included because of the non-linear relationship between inspections and enforcements. Table Four gives the discrete change values of the inspections in terms of their relationship to the dependent variable enforcements.

Table Four: Discrete Change in Enforcements

Inspections	***Predicted Enforcements***	***Predicted Enforcements for Inspections + 1***	***Discrete Change***
0	0	0.08	0.08
50	10.09	10.16	0.07
100	16.14	16.19	0.05
150	20.78	20.81	0.03
200	21.54	21.55	0.01
250	17.97	17.98	0.01
300	12.07	12.07	0.00
350	6.53	6.53	0.00

As the first inspections occur it is predicted that there will be enforcement action taken in the county. However as inspections increase the expected number of resulting enforcements does not increase at the same rate, slowing down as more and more inspections are conducted. This relationship provides a basic insight into the interaction

between monitoring and penalizing facilities. After a certain point it seems, inspections could be conducted and no enforcement is necessary due to eventual compliance with the CAA. Another possibility for this is that inspections are being conducted on repeatedly offending facilities but enforcement action is not taken because it has not been effective in changing the behavior of the inspected facility. These are not the only possible explanations for the relationship between inspections and enforcements; other factors may be contributing to the nonlinearity of these two variables.

Table Five, below, contains the results of the negative binomial regression for the model using enforcements as the dependent variable. Both inspections (original and transformed) are included here with highly significant relationships with enforcement in opposite directions.

Table Five: Enforcements Model Results

	Coefficient		Standard Error
Inspections	0.018	***	0.006
Inspections Squared	-0.001	***	0.001
Number of Facilities	0.244	***	0.067
Population (In Thousands)	-0.007	*	0.004
Median Income (In Thousands)	0.032		0.025
Percent Below Poverty Line	5.007		4.457
Percent Nonwhite	-1.556		1.817
Coal	-0.904	***	0.348
Metropolitan Statistical Area (MSA)	-0.088		0.280
Percent High School Education	7.280	*	3.967
Percent Voter Turnout	-3.689		3.434
Land Area (Square Miles)	.001		0.001
Constant	-5.262		3.944

*** p<0.01, **p<0.05, *p<0.1

Like the first model, this shows a significant negative relationship between population and the number of enforcements in a county, indicating that the number of citizens may not translate to the number of regulatory actions for a county; however, population size in this model is only significant if the p-value is increased to a 0.1 chance of

error, from the 0.01 probability found in the data on inspections. Again, race does not appear to have any kind of significant relationship with the number of enforcements of the CAA. Also, in this enforcements model, neither measure of income appears to have a relationship with the number of enforcements. This is unexpected, as before, because the literature would suggest race or income may be a significant predictor of enforcement activity. Based on this model, this is not the case for federal and state enforcement of environmental regulations in Kentucky counties over the last five years.

One particularly interesting variable from this regression output is the dummy variable for coal. In this model, coal has a highly significant negative relationship with enforcements ($p<0.01$). This indicates that, within the parameters of this study, counties that are identified as "coal counties" are less likely to experience enforcement of the CAA. One possible explanation for this finding, which is not controlled for in the model, is the consideration that coal counties have different geographic features that make EPA or state action less likely in the county. The problem with this theory is that being a coal county is not significantly related to inspections in the first model. If land features specific to these counties prevented enforcement action, it would follow they should also prevent inspection actions. An alternate explanation for the significant negative relationship between coal counties and enforcements could be a political one. In Kentucky, the coal lobby has been criticized as having the power to help shape regulatory legislation that impacts production and mining jobs. There is no evidence included in this model to confirm this possible political explanation of reduced enforcements in coal counties. Further research may include controls for political factors within the counties in order to test if the relationship is changed when controlling for politics.

Both of these models were also run after changing the race variable from the percent of nonwhite citizens in a county to the percent of Hispanic/Latino citizens in the county, as some literature suggests there is a growing concern about environmental inequality for Hispanic and Latino communities (Konisky 2013). The results again indicated no significant effect on inspections or enforcements to the racial makeup of the county.

Recommendations

The findings of this study could signal the possibility of important developments in the topic of environmental justice. With the data available and given the models employed by this study, it seems that environmental inequality, as defined by number of inspections and enforcements, is not an issue among the counties of Kentucky based on their demographic characteristics. It is impossible to say if this study reflects an improvement in environmental equity considering there are no prior studies of the topic in the state to provide a comparison. There are at least two possible explanations for these findings: environmental justice has never been an issue in the state or efforts to improve equity on the state and federal levels have been successful. It could be the case that there has not been a problem, in Kentucky, in equal governance of the CAA in the last five years. This finding could also indicate success in efforts to improve equity across all counties, but again without a baseline comparison preceding this study the author cannot definitively draw this conclusion. What can be concluded from this study is that governance, in terms of inspections, seems to be more responsive to counties with a high percent of the population below the poverty line. This is an encouraging finding considering the body of literature

that would suggest that this would not be the case. The racial makeup of the county also has no relationship with the number of inspections or enforcements in the county. This could be because the state of Kentucky is not particularly diverse; there is little racial variation among Kentucky counties, with most counties as predominately white, which could explain this finding.

This study could be an indicator of a state with equitable governance of environmental justice. To further confirm this possibility, a future study would expand beyond the CAA and look at the enforcement of legislation like the Clean Water Act and the Resource Conservation and Recovery Act across facilities in the state. Future studies of environmental justice in Kentucky should also attempt to find controls that explain this significant relationship of reduced enforcements in coal counties. If the relationship can be explained by a lobbying or political variable, the state will need to consider the implications of reduced enforcement for coal counties. There is the possibility of terrain as an explanatory factor for some of the relationship between coal counties and governance and future studies should look to control for this geographic difference.

Caveats

As explained before, this study does not control for terrain, which could explain the highly significant relationship between coal production and reduced enforcements. The author questions this possibility, however, because the number of inspections is not affected by the presence of coal within a county. The author again must note that the number of counties with facilities with an Air ID and regulated by the CAA is only 78, leaving this study with a relatively small sample size. In order to draw conclusions about

environmental justice overall in the state, this sample must be widened to include other legislation and facilities with water IDs. This study can lay the framework for future studies in the state and provides the hopeful possibility that governance appears to be equitable in counties, regardless of income or race. Another common issue in environmental justice literature that this study looks to help resolve is the problem with using county as a unit of measurement. Often, when using counties it is difficult to interpret the data in counties that contain a large city where the population is dense. The inclusion of the MSA variable is the author's attempt at controlling for this, however MSA does not account for counties with *relatively* large urban areas, which could be a factor in an environmental justice study. Future research may find that using Micropolitan Statistical Areas may help account for cities that still contribute to population density, but are not large enough to be MSAs.

Summary

This study of environmental justice in Kentucky is only the beginning for research on this issue. Kentucky does not appear to have an inequitable distribution of governance activities, as indicated by inspections and enforcements, for the CAA in last five years in terms of race. Considering income and inspections, the state and the EPA seem to be more responsive in counties with a larger percent of the population below the poverty line. This could be because facilities in more impoverished areas require more inspections because the facilities are operating in a more polluting manner than other facilities in higher income communities. However, the presence of coal in a county significantly reduces the likelihood of a CAA enforcement in that county but it does not have a relationship with the number of

inspections in that county. These conclusions indicate, more than anything, the need for further study of environmental justice in the state of Kentucky.

Bibliography

Atlas, M. (2001). Rush to judgment: An empirical analysis of environmental equity in U.S. Environmental Protection Agency enforcement actions. Law & Society Review, 35, 633–682. Web. http://www.jstor.org/stable/3185398.

Bowen, W. & Well, M. (2002). The politics and reality of environmental justice: A history and consideration for public administrators and policy makers. Public Administration Review, 26, 688-698. Web. http://www.jstor.org/stable/3110327.

Downey, L. & Hawkins, B. (2008). Race, Income, and Environmental Inequality in the United States. Sociological Perspectives, 51, 759-781. Web. http://www.jstor.org/stable/10.1525/sop.2008.51.4.759.

Downey, L. (1998). Environmental injustice: Is race or income a better predictor? Social Science Quarterly, 79, 766–778. Web. http://astro.temple.edu/~jmennis/Courses/GUS_0150/readings/downey98.pdf.

Exec. Order No. 12898, 3 C.F.R. Web.

Hamilton, James T. 1995. Testing for Environmental Racism: Prejudice, Profits, Political Power? Journal of Policy Analysis and Management 14 (1): 107–32. Web.

Murphy-Greene, Celeste & Leip, Leslie. (2002). Assessing the Effectiveness of Executive Order 12898: Environmental Justice for All? Public Administration Review, 62, 679-687. Web. http://www.jstor.org/stable/3110326

Konisky, D. (2010). Inequities in Enforcement? Environmental Justice and Government Performance. Journal of Policy Analysis and Management, 28, 102-121. Web. http://www.jstor.org/stable/29738988.

Konisky, D. (2007). Regulatory competition and environmental enforcement: Is there a race to the bottom? American Journal of Political Science, 51, 853–872. Web. http://www.jstor.org/stable/4620104.

Mohai, P., & Saha, R. (2006). Reassessing racial and socioeconomic disparities in environmental justice research. Demography, 43, 383–399. Web. http://www.jstor.org/stable/4137203.

Noonan, D. (2008). Evidence of Environmental Justice: A Critical Perspective on the Practice of EJ Research and Lessons for Policy Design. Social Science Quarterly, 89, 1153-1174. Web. http://onlinelibrary.wiley.com/doi/10.1111/j.1540-6237.2008.00568.x/full.

Pastor, Jr., M., Morello-Frosch, R., & Sadd, J. (2006). Breathless: Schools, air toxics, and environmental justice in California. Policy Studies Journal, 34, 337–362. http://cjtc.ucsc.edu/docs/Breathless_03_with_figures_unlinked.pdf.

Pollock, P., III, & Vittas, M. (1995). Who bears the burdens of environmental pollution: Race, ethnicity, and environmental equity in Florida. Social Science Quarterly, 76, 294–310. Web. http://connection.ebscohost.com/c/articles/9507263312/who-bears-burdens-environmental-pollution-race-ethnicity-environmental-equity-florida.

Reenock, C., & Konisky, D. (2013). Compliance Bias and Environmental (In)Justice. *The Journal of Politics*, 506-519.

Ringquist, E. (2005). Assessing evidence of environmental inequities: A meta-analysis. Journal of Policy Analysis and Management, 24, 223-247. Web. http://www.jstor.org/stable/3326208.

Ringquist, E. (2006). Environmental justice: Normative concerns, empirical evidence, and government action. Environmental policy: New directions for the twenty-first century (pp. 239–263), Washington, DC: CQ Press.

Ringquist, E., & Clark, D. (1999). Local risks, states' rights, and federal mandates: Remedying environmental inequities in the U.S. federal system. Publius: The Journal of Federalism, 29, 73-94. Web. http://www.jstor.org/stable/3330892.

U.S. Department of Health and Human Services. (2012). 2012 Environmental Justice Strategy and Implementation Plan. Washington, DC: U.S. Web. http://www.hhs.gov/environmentaljustice/strategy.pdf

U.S. Environmental Protection Agency. (2011). Plan EJ 2014. Washington, DC: US. Web. http://www.epa.gov/environmentaljustice/resources/policy/plan-ej-2014/plan-ej-2011-09.pdf

U.S. General Accounting Office. (2011). Environmental Justice: EPA needs to take additional actions to help ensure effective implementation . Washington, DC: U.S. Web. http://www.gao.gov/assets/590/585654.pdf.