From Brownfields to Greenfields: Assessing the Environmental Justice of Cleaning Up Brownfields

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Issues of environmental injustice in siting of environmental hazards are well known. Based on past research, the expectation is that lower socioeconomic status populations are systematically subject to higher levels of environmental risk in their communities. In this paper, I investigate whether similar patterns appear prevalent in environmental improvement as well. First, I assess the characteristics of the communities in which brownfield sites are currently located. Then, I compare the likelihood and prioritization of cleaning up brownfield sites based on the composition of their neighborhoods. I find that while sites in communities with larger minority populations are likely to move at a slower pace through the initial assessment phases of the cleanup process, they are no less likely to ultimately be cleaned up. I suggest that economic and political considerations are better explanations of this result than overt discrimination.

INTRODUCTION

A substantial base of literature tends to confirm the notion that lower socioeconomic status populations (however defined) tend to live in proximity to lower environmental quality (Hamilton, 1995; Arora and Cason, 1999; Pastor, Sadd, and Hipp, 2001; Ringquist, 2005; Mohai and Saha, 2006; Campbell, Peck and Tschudi, 2009). There is considerably less clarity with regard to the causes of this empirical result. Environmental justice studies are usually cross sectional investigations of the consequences of environmentally hazardous land uses at a particular point in time (Noonan, 2008). It is thus not surprising that several causal explanations have been given empirical support, nor is it surprising that there is considerable variation in the effects for different types of lower status populations. Nevertheless, a consensus is emerging that the relationship between minority status and living in proximity to lower environmental quality is robust (Campbell, Peck, and Tschudi, 2009), and that the three most common causal explanations are insufficient to explain this result independently (Hamilton, 1995).

While much attention has been given to siting hazardous facilities (Been and Gupta, 1997; Banzhaf and Walsh, 2008) – that is, the justice implications of environmental degradation – considerably less has been given to the decontamination and redevelopment, or generally, environmental improvement. Is there a second side to environmental justice concerns? Do lower socioeconomic status areas also tend to see less environmental improvement than their higher status counterparts?

The U.S. Environmental Protection Agency (EPA) defines a brownfield as "a property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant". In this paper, I investigate the cleanup prioritization of brownfields in a framework that incorporates each of the three major causal arguments found in the environmental justice literature: the discrimination argument, the collective action argument and the residential sorting argument. Findings are mixed: brownfield sites located in lower socioeconomic status areas are no more or less likely to ultimately be cleaned, but they tend to move more slowly through the early assessment stages of the cleanup process. I suggest that this result is indicative of politics and economic pressures rather than overt discrimination by policymakers. In the sections that follow, I first provide a background review of environmental justice and describe why there may be an additional area of concern with regard to environmental improvement. Then I describe the empirical model, hypotheses and data I use to test the general hypothesis that there is discrimination in environmental improvement. Finally, I discuss the results and offer some suggestions for policy.

ENVIRONMENTAL JUSTICE

The environmental injustice effect has been noted in several social science fields, leading to several different explanations for the observed phenomenon (Hamilton, 1995; Campbell, Peck, and Tschudi, 2009). Commonly, these explanations, discrimination, collective action, and residential sorting, are treated as mutually exclusive, with much of the literature consisting of refutation of one causal explanation in the context of validation of another (Anderton, et al, 2004; Bowen, 2000). For example, Been and Gupta (1997) posit a residential sorting explanation in the context of a critique of discrimination literature which failed to account for the effect of time. Noonan (2008) notes that methodological assumptions and predilections tend to color the results of much of the environmental justice research.

Nevertheless, with evidence supporting each of the three causal explanations, it is most likely the case that some combination of each is important to understand the environmental injustice outcome. It may be the case that methodological approaches or contextual factors determine the relative importance of each factor vis a vis the others, but it seems more likely that that different factors affect the overall system at different points in the process. After describing the three major causal arguments in turn, I will propose a conceptual framework in which different effects are conceived as being relatively more important depending upon the stage of the process that is being analyzed.

Discrimination

The fact that this general area of research is generally referred to as *environmental justice* is indicative of the strength of the discrimination explanation. When issues of environmental justice began to attract the attention of researchers and policymakers, the assumed cause was discrimination. The initial description of the phenomenon began in the late 1980s with several studies, the Commission for Racial Justice Study for the United Church of Christ in 1987 being the most visible. This study, and others, first noted the trend by assessing the placement of hazardous facilities, such as hazardous waste processing plants and dumps. Such sites were much more likely to be situated in poor and/or minority neighborhoods, and were extremely unlikely to be found in middle or upper class areas.

These findings led to a subsequent stream of academic research positing that the explanation was, at least by implication, discrimination (Bullard, 1990; Goldman and Fitton, 1994; Wolverton, 2002). Whether acting in the capacity of policymakers or of firm owners, elite made decisions to place facilities in predominantly minority areas in order to, at best, shelter themselves and other elites from environmental risk, or, at worst, to specifically site risk with non-elite populations (Mohai and Bryant, 1992). Findings, framed in this conceptual context, tended to reinforce the idea over time, even when varying the geographical units of analysis (Mohai and Saha, 2006). Poor populations, especially poor minority populations had a tendency to live in closer proximity to environmentally risky facilities than whites (Ringquist, 2005). Although the effect may be stronger in the southern states than in other regions (Kriesel, Centner and Keeler, 1996), the correlation between an area being the site of a locally undesirable land use (LULU) and also having a larger concentration of minority residents seems to remain robust (Rinquist, 2005).

Making the leap between correlation and causation based on discrimination has proved far more tenuous. The primary problem with the causal argument is based on the methodological approach employed in environmental justice studies (Mohai and Saha, 2006; Noonan, 2008). For the most part, studies are cross sectional in nature, focusing on the current composition of a community in which a LULU was located. In the mid 1990s, some investigators (Kriesel, Centner, and Keeler, 1996; Been and Gupta, 1997) began to note the limitations in making a causal assertion based on the current composition of the neighborhood. If indeed the cause of the phenomenon was discrimination by elites, then the current composition of a neighborhood with a site is not necessarily relevant; the more relevant consideration was the composition of the community at the time the siting decision was made. This differentiation and also called into question the validity of the discrimination explanation (Hamilton, 1995). When considering composition at the time that a facility was sited, it was found that areas did not always tend to be any poorer or have larger minority populations (Been and Gupta, 1997). In fact, as the 1990s wore on, and policy makers became aware of environmental justice, sites were a bit less likely to be placed in certain minority areas (Been and Gupta, 1997). Nevertheless, minorities and the poor still tended to be clustered in the vicinity of LULUs (Hird, 1993). If not discrimination, at least not exclusively, then other causal mechanisms must be at work.

Residential Sorting

One of the competing explanations is based on the Tiebout (1956) residential sorting hypothesis. Not surprisingly, it has been noted that real estate values and neighborhood quality reputations are negatively affected by the siting of a hazardous facility (Hird, 1993). After a hazardous facility begins operations, real estate prices in its proximity can be expected to fall (Kohlhase, 1991), and with them, the reputation of the community is also likely to suffer (Messer, et al, 2006). That is, even if a facility was built in a middle class, primarily white neighborhood, it is likely that those who can afford to move away will, demand for homes near the site will drop, causing values (and prices) to drop as well (Banzhaf and Walsh, 2008). These price decreases can make the area affordable for poorer regional residents; wealthier residents filter out, poorer, often minority, residents filter in, and the net result is a cluster of poor, often minority residents near a hazardous facility. What may have appeared overtly discriminatory is in fact a natural mechanism of the housing market.

The problem with this causal explanation, however, is evident in many empirical works. Been and Gupta (1997) investigate the composition of neighborhoods at the time the siting decision was made. Their results suggest that the sorting hypothesis is a plausibly valid causal explanation, but it is incomplete. While they note that hazardous facilities were actually a bit less likely to be sited in predominantly African-American neighborhoods, sites were a bit more likely to be placed in predominantly Hispanic neighborhoods. Subsequent studies, as noted by Ringquist (2005), Campbell, Peck and Tschudi (2009), and others find cause to suspect that the residential sorting hypothesis is a limited, although certainly important aspect of environmental justice.

Collective Action

Largely missing from the discrimination and residential sorting explanations is an acknowledgement of the central importance that political activities can have on decisions that affect communities (Hamilton, 1995). A third causal view is based on collective action and political power, and posits that when considering where to site hazardous facilities, owners or policy makers will opt for locations where they expect relatively little political conflict, that is, areas where the political opposition will tend to be disjointed and ineffective. Not coincidentally, areas where political action tends to be either weak or disorganized also tend to be poorer (Hamilton, 1995). The extensive research in this area relates to the so-called NIMBY (not in my backyard) phenomenon (Arora and Cason, 1999). When residents of a community are sufficiently organized and politically active, the expectation is that they can thwart a potential decision to place a hazardous facility in their vicinity. In addition to active lobbying and collective action, NIMBY effects can also be implied and assumed by policymakers. It may be assumed that some residents in certain areas will be more likely to act collectively, so, in an effort to avoid any political conflict, some areas may not even be considered as potential sites for hazardous facilities (Helland and Whitford, 2003). If political opposition is expected to be disjointed or negligible, the community will be an attractive site. Thus, rather than firm owners or policy makers acting in a discriminatory manner, they act in a self interested manner, limiting negative publicity and enhancing their individual electoral prospects; economic factors matter mostly in terms of political power. Wealthier communities are expected to have more political power, expressed via a greater propensity to engage in political activity.

However, it is difficult to extrapolate these political causes from either discrimination or residential sorting, since collective NIMBY actions may work in two separate ways, both of which reinforce existing siting trends and residential sorting. In the first case, an area may not even be considered for a siting if opposition is expected to be organized and active; but is this lack of consideration a function of expected political activity, a function avoidance of devaluing high value land (based on the Coase Theorem, see Hamilton, 1995), or a function of a desire to avoid exposing elites to environmental hazards? In a second case where a site decision has been proposed, if residents are spurred to collective opposition, the desire on the part of policymakers or firm owners to mitigate or avoid political confrontation and negative publicity may convince them to scrap a proposed or even planned site and move to another community where opposition will be less intense. The difficulty is determining which factors lead to an end result. The expectation is that political opposition will tend to be disjointed in minority neighborhoods, especially poor minority neighborhoods, so firms and policymakers will have a tendency to place hazardous facilities in these locations. However, even when firms and policymakers consider environmental justice and seek to site facilities in other locations, after construction, those who can move will, and through residential filtering (Banzhaf and Walsh, 2008), will be replaced by lower socioeconomic status residents. Thus, although firms and policymakers were not acting in a discriminatory manner, the end result is the same – clusters of poor minority residents near hazardous sites.

These complications illustrate the likelihood that political activity, elite decision-making, and market activities occur over time, with each in turn affecting subsequent decisions, political actions and market activities. For example, collective action can affect policy decisions, but this political activity is also a reaction to a policy's market outcomes and previous decisions that were made. Policymakers react to political activity but also to market outcomes, and are constrained by decisions that were made in the past. The market is constantly reacting to and interacting with the rules and institutions that policy decisions establish, and the result of these interactions in turn affect the propensities of individuals to engage in political or collective action.

Given this complexity, it is not surprising that it has been difficult to differentiate the effects of any particular activity on environmental justice outcomes. The relative importance of one effect versus another may be heavily dependent upon the timing of the study, or nature of the data used in an analysis (Noonan, 2008). This may be further complicated by consideration of the path dependence and feedback loops of policy decisions and market interactions within a policy system, as illustrated in Figure 1. I attempt to address these complications by focusing on a study of environmental improvement rather than cases of environmental degradation. In this manner, I may be able to better control for the effect of market pressures on environmental policy decisions and instead focus on the potential for discriminatory decisions.

****Figure 1 about here****

ENVIRONMENTAL IMPROVEMENT

A Second Side

Virtually all existing environmental justice research relates to increased environmental risk or degradation (Ringquist, 2005). However, as the American economy transitions to post-industrial realities, decisions are increasingly likely to focus on environmental improvement and abatement of environmental risk (De Sousa, 2004). Thus, there may be a second side of environmental injustice to consider; in addition to living with higher levels of environmental risk, the poor and/or minorities may also face less, or a slower pace of, abatement of that risk. A consideration of the equity implications of environmental cleanup will provide a useful bookend for the existing understanding of environmental justice, and may also offer advantages in understanding the relative importance of the discrimination and collective action explanations versus residential sorting.

In the residential sorting framework, the expectation is that changes in environmental quality will appeal to certain types of residents (Banzhaf and Walsh, 2008). If environmental quality in a community decreases, then comparatively wealthier residents will leave, and the demand for homes in the community will fall amongst other wealthier potential residents. This will depress property values, making the homes affordable to those for whom environmental quality is a secondary consideration to price, if it is a consideration at all (Kohlhase, 1991). Thus, the community in which a hazardous facility has been sited will come to be made up of poorer residents than those who were there prior to the siting. Conversely, when the environment improves, wealthier residents and investors may see properties that are undervalued in a neighborhood that had, but no longer has, low environmental quality (Dale, et al, 1999). Subsequently, demand for these properties will increase, causing values to rise, incentivizing poor property owners to sell for a profit and relocate to an area with lower prices, and potentially lower environmental quality (Seig, et al, 2004).

By focusing, as I do in this study, on the period well after degradation has occurred but before any cleanup activities have begun, residential sorting factors are likely to be minimized. The environment in the community is likely not in significant flux prior to the cleanup of brownfields, thus even if we assume explanatory power of the residential sorting hypothesis, the extent to which sorting is occurring should be no more than would be normally expected. Viewing the relationship between people and their environment in the context of the policy process, we can explicitly assess the importance of timing within an analytical framework. As depicted in Figure 1, the policy process is viewed as a dynamic system whereby elites, political interests and market actors interact with and feed information back to one another during the lifecycle of a public policy. At any particular time, one of those forces may be stronger than another. Consider, for example, a point after which institutional rules have been set and policies have been implemented. At this point, the key activity in the policy's lifecycle is likely the aggregation of individual responses and market interactions within the confines of the rules established by the policy. Similarly, in a period during which there are no significant environmental quality changes taking place, there is little reason to suspect that economic incentives based on environmental quality are driving residents to sort either into or out of an area (although other economic incentives certainly could be). Thus, while external economic pressures may be a factor in determining cleanup, I expect that the decision will be more strongly influenced at this point by elite preferences and political action by interested stakeholders. That is, during this period of the lifecycle of a brownfield redevelopment, economic factors are more likely to have an effect as an input to the political and decision-making activities of relevant stakeholders and policy makers than to the behavior of individuals making residential location choices in proximity to the brownfield in question.

Brownfields and Risk

Brownfield sites can vary considerably in the extent of pollution and the environmental risk posed. When a brownfield is especially contaminated and risky, it is often on the EPA's National Priority List (or NPL – but more commonly referred to as Superfund). These Superfund sites receive considerable federal money and, while being the most hazardous, are also usually the most salient with the public (Messer, et al, 2006). As implied by the name of the program, NPL sites are the top EPA cleanup priorities and thus receive considerable attention. However, non-Superfund brownfield sites can still receive EPA funds through a variety of different grant programs. While a handful of brownfields are assessed and cleaned exclusively with private funds, most cleanups receive some funding benefit, either in the form of grants and direct loans or via indirect methods such as tax incentives from federal, as well as state and local governments (Meyer and VanLandingham, 2000). The prioritization of this second set of sites, constituting the vast majority of brownfields, is less clear; however, a key directive of the "Brownfields Law" requires the EPA to consider "the extent to which the [cleanup] grant would facilitate the identification and reduction of threats to the health or welfare of children, pregnant women, minority or low-income communities, or other sensitive populations" as well as give priority to grantees when "a community has an inability to draw on other sources of funding for environmental remediation and subsequent redevelopment of the area in which a brownfield site is located because of the small population or low income of the community."[1]

Thus, the EPA is specifically directed to ensure that grants for brownfield cleanups are provided to low income and minority communities. However, provision of grants is not the same as prioritization of cleanup. The EPA has recently investigated the distribution of grants, finding that communities receiving brownfield grants tend to have larger minority populations and more poverty as compared to the national average, but this may simply be a factor of more sites being located in such communities, and again provides no indication about the prioritization of cleanups nor actual funding provided, only the distribution of grants[2]. In terms of prioritization, Hird (1990; 1993) investigated the cleanup prioritization of Superfund sites, finding that Superfund sites were neither more likely to be located in poor or minority counties (note: counties, not communities), nor did the county's characteristics predict the prioritization of the cleanup effort. Several studies tangentially consider justice considerations by investigating changes in land values. Values decrease while brownfield sites in the Superfund subset are being cleaned up (McCluskey and Rausser, 2003) and increase once the cleanup has been completed (Dale, et al, 1999), however this increase may be limited by the visibility of the site and its salience with the public (Messer, et al, 2006). Some research has also considered how neighborhoods change after environmental conditions improve. Seig, et al (2004) noted increased land values in school districts after air quality improvements, while at a smaller unit of

[1] Public Law 107-118 (H.R. 2869): "Small Business Liability Relief and Brownfields Revitalization Act"
[2] See: www.epa.gov/brownfields/policy/ej_brochure_2009.pdf

analysis, Eckerd (2010) found that neighborhoods in which environmental risk was reduced were no more or less likely to gentrify than other neighborhoods.

However, missing in these analyses is consideration of whether the current composition of a neighborhood predicts whether an existing site is cleaned. Very few brownfield sites are actually on the NPL – in fact, most are relatively low risk with comparatively low levels of contamination (or suspected contamination). The prioritization of Superfund sites is relatively straightforward: those sites that are most risky (either in terms of contaminants or affected population) are prioritized. Prioritization is less clear for the substantially larger number of sites that are not on the NPL. Furthermore, aggregating to the county level (Hird, 1993) or zip code level (Arora and Cason, 1999; Seig, et al, 2004) almost certainly misses important effects at the neighborhood or community scale. Given the size of some counties and zip code regions, most residents are unlikely to be affected in any way by a brownfield site, but when the site is located in their neighborhood, it is more central to the neighborhood, although it should be acknowledged that focusing on census tracts, as I do here, may dampen effects that could be more pronounced by considering concentric rings surrounding a facility (Mohai and Saha, 2006). Nevertheless, in this analysis, I will broaden the scope and context of Hird's (1993) analysis by considering a fuller range of hazardous facilities (all brownfield sites that receive any EPA funding, not just Superfund), and by investigating at a much more local geographic level (census tract).

DATA AND METHODS

The data used to assess the likelihood of environmental injustice in the brownfield cleanup process come from several different sources. Information about brownfield sites is self-reported from grant recipients to the EPA, which tracks detailed information about each site to which it provides some level of funding, including the site's geographic location, history, and an inventory of known and suspected contaminants. Information about the risk characteristics of these contaminants was acquired from the Indiana Relative Chemical Hazard Score (IRCHS)[3] data set. In the IRCHS, chemicals have a total hazard score based upon toxicity to human health and persistence in air, land and water; index scores enable scaled comparison of the hazardous content of different types of chemicals. Demographic information for assessing socioeconomic status was derived from the 1990 and 2000 censuses – if a site cleaning was initiated during the 1990s, 1990 census data was used, and if a site cleaning began during the period from 2000-2009, 2000 census data was used. Finally, in an attempt to account for the effect of political activity on cleanup decisions, state level voting data was acquired for three states: California, North Carolina, and Minnesota.

Three different sets of analyses will follow a detailed description of the operationalization of variables. In the first model (hereafter model 1), the state of brownfield distribution is assessed using comparisons between characteristics of census tracts that contain brownfields with those that do not. These comparisons are used to understand the current layout of brownfield sites to determine if brownfields tend to be distributed more heavily in lower socioeconomic status tracts, as one would expect given direction from environmental justice empirical results. The second set (model 2) assesses the pace of site cleanups through survival analysis models predicting the likelihood of movement through phases of the cleanup process,

[3] The IRCHS is a product of the Clean Manufacturing Technology Institute at Purdue University. For a detailed description of the IRCHS, please see: engineering.purdue.edu/CMTI/IRCHS/

given the demographic characteristics of the tract in which it is located, with the expectation that sites in lower status tracts move through the process at a slower pace. The third set of models (model 3) uses logistic regression techniques to estimate the likelihood of a brownfield being cleaned up, holding all else constant, again, given the characteristics of the tract in which the site is located, with the expectation that sites in lower status communities are, overall, less likely to be cleaned up.

For model 1, I compare census tracts that contain at least one brownfield site that received or receives some level of EPA funding with those tracts that do not contain a site. Thus, the dependent variable for this set of models is the presence of a brownfield site in a census tract; I use this differentiation for some basic comparisons and also to estimate a logistic regression equation predicting the presence of an EPA funded brownfield site. The unit of analysis is the full set of 2000 census tracts, normalized to use either 1990 or 2000 data, depending upon whether the site(s) in the tract began the cleanup process before or after 2000[4]. For the identification of tracts containing brownfield sites, all 6309 sites listed (as of October 2009) as having received EPA funding since 1990 are used in model 1, with subsets used for the estimates in models 2 and 3 based on data availability. It should be noted that even the full sample of 6309 brownfield sites used here is likely not representative. There are various estimates of the total number of brownfield sites, ranging into the hundreds of thousands. The sample used here is likely not representative in that sites that receive EPA funding are likely amongst the most hazardous, and well-known. Further, as can be seen in Figure 2, the sites are almost certainly not distributed evenly geographically. As would be expected, brownfields tend to be concentrated near large populations in traditional industrial areas in the northeast and Midwest. It is also clear

[4] In cases where a tract had more than one site, for which cleanups began both before and after 2000, 2000 data was used for model 1.

from looking at the map that some states are clearly better at identifying brownfield sites and securing EPA grants for their cleanup (for example, see the border area between Oregon and Washington, between Maryland and Virginia, and the overall dearth EPA funded sites in Texas). Nevertheless, this sample is representative of the most salient sites, and those perceived to be the most environmentally risky. These sites also constitute the entire set of brownfields considered under the EPA's environmental justice directive.

****Figure 2 about here****

Models 2 and 3 predict dependent variables based on the process through which a brownfield is cleaned up. For EPA purposes, during the brownfield cleanup process, a specific procedure is followed, with a site usually progressing through four distinct stages. In order, they are: 1. Phase I Environmental Assessment; 2. Phase II and in some cases Phase III Environmental Assessments; 3. Cleanup Activity and; 4. No Further Action Required (NFA). During Phase I, sites are predominantly visually assessed, relevant stakeholders are interviewed, and a risk assessment is carried out – generally Phase I assessment procedures are non-intrusive and indicate whether subsequent action is required on the site. A Phase II assessment is intrusive, with measurements of contaminants collected and a full site remediation is planned (Phase III is more intrusive, generally carried out when sites are particularly contaminated). After the assessment and remediation planning processes are complete, cleanup (if necessary) actually begins and continues until the site has been issued an NFA designation, indicating that for all intents and purposes, the site is safe for reuse. An NFA designation may also be issued at any time if the result of any of the assessment phases indicates no cause for concern if the property in question were reused for another purpose. That is, if a Phase I assessment shows no sign of visual contamination, an NFA letter will be issued and the site can be reused without remediation. If a Phase I assessment shows cause for concern, a Phase II assessment is conducted, after which a site can a) receive an NFA designation if there is no cause for concern; b) enter a Phase III assessment if more specific planning and testing is required; or c) begin the cleanup process. Thus while a highly contaminated site could go through all stages in order, not all sites will. Nevertheless, the end point for any of the sites included in this study is NFA designation, which even if not indicative of a thorough cleanup, is indicative of a perception of environmental improvement, which can be as important in terms of reuse as an actual cleanup (McMillen and Thorsnes, 2003). The total project time is measured in months from the start of the Phase I Environmental Assessment through the receipt of an NFA designation, or as of October 1, 2009 if no NFA designation has yet been received. Phase I assessment time is measured via the amount of time, again in months, that a site was undergoing a Phase I assessment, or again until October 1, 2009 if Phase I was not yet complete. Total assessment time is the amount of time until either an NFA designation was received if the site did not require a full-scale cleanup, or the total amount of time a site required to complete all assessment and planning projects before cleaning could begin (or October 1, 2009 if assessment was not yet complete).

For model 2, Cox regression equations (Allison, 1984) predict the odds during a specific period (the next month for these analyses) that sites move through a given phase. For these models, hazard rates predict the likelihood of a site moving through either a Phase I assessment, an entire assessment and planning process, or a completed project indicated by receipt of an NFA designation, at one month increments. The dependent variable is a time-dependent indicator of whether a site has completed the project or phase in question. These survival analysis methods are appropriate for a couple of reasons. First, sites may not have up to date information, akin to the patient in a drug experiment with whom the researcher loses contact. Dropping consideration of these sites may bias the results. Secondly, given that not all sites go through all phases, the amount of time spent in any particular phase is potentially a more telling indicator of prioritization than other considerations. Model 3 is an assessment of the current status of brownfields that have received an NFA designation through a dichotomous dependent variable estimated through logistic regression. Sites are coded 1 if they have reached the NFA stage and 0 otherwise.

****Table 1 about here****

Independent variables generally fall into four categories: resident status characteristics, characteristics of the overall nature of the neighborhood, site specific characteristics, and political activity indicators. Neighborhood socioeconomic status is measured via a number of identifiers commonly included in socioeconomic status indices, from either the 1990 or 2000 census as appropriate. These variables are included in all of the models described. Minority status is assessed by inclusion of the focal tract's black and Hispanic population proportions. Income status is assessed via the tract median household income level (logged). Age status is included as the proportion of residents in the tract that are under the age of 18 and the proportion over the age 65. Additionally, the proportion of the tract population possessing at least a bachelor's degree is included. All models also include some basic neighborhood level characteristics, also with data from the 1990 or 2000 census. Population density, and the percent of the tract that is categorized as urban are included, and the proportion of homes built prior to 1940 is included to differentiate tracts with an older, potentially architecturally valuable housing stock.

****Table 2 about here****

Model 1 predicts the presence of at least one brownfield site in a census tract, with the above variables as the predictors (holding state level effects constant through dichotomous indicators of the state in which a site is located) and census tracts as the unit of analysis. Models 2 and 3 are assessed with brownfield sites as the unit of analysis, and in addition to the census tract-level variables described above, also include some site-specific characteristics. First, an indicator is included to identify Superfund sites, which should help differentiate between the most salient sites and all others (Messer, et al, 2006). Secondly, a unique proxy for risk is included as well based on information about the specific contaminants known or suspected to be present at the site. Unfortunately, the quantities (or suspected quantities) of the contaminants are usually unknown or unreported, so the hazardous potential for each site can only be assessed assuming constant contaminant quantities across sites. This is assessed using the IRCHS scores for the pollutants found at each site. The IRCHS score for each chemical is a standardized and thus comparable indicator of the level of toxicity to humans and the persistence of the chemical in soil, air and water. Table 3 displays some of the IRCHS scores for common brownfield pollutants. For each site, hazard scores of each chemical known or suspected to be present are summed for a total site hazard score[5]. Given chemicals for which information is available, the maximum hazard score possible is 203.7, with 0 as the minimum. As can be seen in Table 4 (summarizing all descriptive statistics), the mean hazard score is 16.3, indicating that most sites are likely relatively low risk. Inclusion of a consideration for risk (albeit, an imperfect one) is unique in environmental justice studies, and should provide a useful contextual improvement to

[5] It may well be that the actual hazard is more multiplicative than additive when more than one pollutant is present, but without knowing specific quantities of contaminants at the site, additive effects seem to be the more conservative assumption.

environmental justice considerations. Finally, at the site level, an indicator variable is included to identify sites that are located in census tracts in which at least one other site is also located. Hazardous sites tend to be located in proximity to other hazardous sites, and this indicator will identify the effect of clustering on the likelihood of site cleanup (Campbell, Peck, and Tschudi, 2009).

****Table 3 about here****

In models 2 and 3, additional regression equations are estimated to include variables that relate to political activities. Secondary models are estimated only for sites located in California, Minnesota and North Carolina with variables included to assess the impact of political participation and political ideology. For sites in these three states, models include the proportion of registered voters who cast votes in the 2000 election, as well as the proportions of voters registered as Republicans and as Democrats. This measurement of the likelihood to be politically active is admittedly rough but substantially the same as in most previous efforts (Arora and Cason, 1999). Despite being one of the three key explanations of environmental injustice, it is rare in the literature for collective action variables to be assessed more fully than this. The case has been made, convincingly, that election participation is, at best, a poor proxy for collective political activity (Campbell, Peck, and Tschudi, 2009). Noting the data limitations, the variables are included here only as a rough gauge of the potential effect of broad based political activity and ideology in communities.

RESULTS

In terms of the current placement of the brownfield sites in this sample, it is clear that the sites are more likely to be located in lower socioeconomic status neighborhoods than in higher status areas. As can be seen in Figure 3 and Table 4, tracts with brownfield sites are more likely to have lower income levels, and larger proportion of black residents. Sites are unlikely to be located in areas with high levels of income and education, or those with larger proportions of children or elderly residents. Care must be taken, however, with regard to causality. This proximity result is similar to other investigations into environmental justice issues (Ringquist, 2005), but in and of itself, provides little insight into whether issues of discrimination, residential sorting or political action contribute to the result. In fact, since the sites in question are those receiving EPA funding, this result may be indicative of the EPA following its environmental justice mandate to consider ways to reduce the threats to "minority or low-income communities" when providing brownfield grants. Or, it may also be the case that over the years, residential sorting occurred nearby these sites such that the current community demographics near brownfield sites tend to be poor with larger black populations even if that was not initially the case. Regardless of the specific cause, however, this result indicates that, similar to studies of other types of undesirable land uses, the communities in which brownfield sites are located tend to be poor with a larger share of minority residents.

****Figure 3 about here****

****Table 4 about here****

Three different dependent variables are listed in Table 5, which constitute progression through 1) the Phase I environmental assessment, 2) through all assessment planning phases, and finally 3) completion of the cleanup, indicated by achieving NFA status. Overall, the results from models 2 and 3 assessing the probability of brownfield cleanup offer a complicated picture of the influences on environmental improvement decisions. Table 5 details survival analysis results using a series of Cox regressions; odds ratios report the predicted odds that given a one unit increase in the specific characteristic mentioned, all else equal, the site will complete the phase in question in the next month. For example, if the odds ratio for percent of educated residents was 2, this would indicate that the odds of a site completing the status in question during the subsequent month would double for every additional one percent increase in the proportion of educated residents in its neighborhood.

****Table 5 about here****

Odds ratios for sites in communities with larger Hispanic populations indicate that assessment periods tend to take longer than for other sites, all else equal. Similarly, completion of the Phase I Environmental Assessment stage appears to slow down in communities with higher proportions of black residents. However, progression through subsequent assessment phases does not appear to be hampered in these communities. Interestingly, relatively wealthier communities (as indicated by higher levels of median household income) tend to move slowly through the Phase I assessments, but more rapidly through subsequent phases. Overall, the results indicate no other substantial trends in socioeconomic status variables, nor do the results of the logistic regression model estimating the probability of a site achieving NFA status, shown in Table 6. Sites in tracts with more highly educated residents are more likely to be cleaned up, but no other socioeconomic variables indicate any significant relationship with sites being cleaned up versus those that are not yet cleaned up.

****Table 6 about here****

The most consistent predictors of both site cleanup and the pace of that cleanup relate to the characteristics of the site and its proximity to other brownfields. In a unique finding, results indicate that a site's hazard score consistently increases the odds of a site progressing through each of the stages of cleanup. This appears to indicate a slight prioritization of more environmentally risky sites, as one might expect that riskier sites might otherwise take long to assess if prioritization were constant. Superfund sites, expected to be amongst the most environmentally risky, tend to progress quickly through the first phase, but then slow, most likely because conducting cleanup is complicated at Superfund sites. Another clear result through all models is that the more recently a site cleanup has begun, the more likely it is to progress through each of the phases more quickly; this may indicate that learning, technological innovation, and institutionalization of the cleaning process facilitate more efficient movement through the process. Another consistent result is that sites that are clustered together tend to make less progress through the cleaning process. When a site is located in a neighborhood with at least one other brownfield site, it is much less likely to be cleaned up, and is much less likely to move quickly through the cleanup process.

A final consistent result regards the general age of the housing in the tract. Brownfield sites are much more likely to be located in communities with larger share of older homes (those built prior to 1940). But in communities with the largest share of such homes, sites are consistently predicted to move much more quickly through all phases of cleanup (see Table 5), and are much more likely to reach NFA status (Table 6). Although limited to just three states, political and ideological characteristics of neighborhoods do not appear to indicate much of a relationship with site cleanup. Of course this may be due to the limitation of including these characteristics for so few states and sites; nevertheless, the limited sample (which does include sites in California, a state commonly used a proxy for the nation) shows no indication that there would be a larger trend with more robust political participation data.

DISCUSSION

Three themes are discernable in the results of this study. First, site and neighborhood risk appear to be the most consistent predictors of the prioritization of brownfield site cleanup. Sites that are polluted with comparatively more dangerous toxicants tend to be cleaned up more quickly, although this may be tempered by a site being a particularly complicated Superfund site or by a site being located in the vicinity of other brownfields. So while comparatively riskier sites tend to be prioritized for cleanup, a higher concentration of brownfields in a neighborhood tends to dampen this effect. This could suggest a prioritization of cleaning sites in areas where redevelopment might be comparatively more economically viable. That is, when a site is risky, but tends to be isolated, redevelopment might be more likely than a site that, while risky, is surrounded by industrial sites or other contaminated land.

The housing stock characteristics might also indicate an economic effect. A brownfield site in an older neighborhood is more likely to be cleaned and to be cleaned more quickly than sites in other neighborhoods. An older housing stock with potentially historic architecture is thought to be one of the major predictors of neighborhood revitalization efforts and gentrification (Kolko, 2007; Eckerd, 2010). In the case of brownfields, sites located in neighborhoods with architecturally interesting structures may be under more pressure to be cleaned by developers or gentrifiers looking to increase equity in homes under renovation, or local officials may be pressing for cleanup in areas where they can expect the cleanup to foster redevelopment and revitalization. These potential economic pressures merit future consideration; all else equal, it appears that the EPA may focus on cleaning up sites where it expects the cleanup to contribute to neighborhood redevelopment, while those sites that exist in clusters, perhaps in areas where revitalization is thought to be comparatively less likely move more slowly.

These pressures, speculatively based on risk potential and demand, appear to be more influential overall than any of the socioeconomic characteristics assessed, with possible exception of the proportion of Hispanic residents in a neighborhood. Been and Gupta (1997) similarly found that hazardous facilities were more likely to be sited in communities with large Hispanic populations; the finding here indicates that brownfield sites in communities with large Hispanic populations may also move through the cleaning process more slowly than sites in other types of neighborhoods, although they are no more or less likely to actually end up being cleaned. An overall finding is that sites located in predominantly minority neighborhoods (assessed here through the proportion of black or Hispanic residents in the community) tend to take longer to get through the early assessment phases, although they are no less likely to end up being cleaned, nor do they take appreciably longer through the entire process. This result merits more consideration and may indicate political considerations beyond those potentially evident in the models assessing voter turnout or ideological predilections. Environmental assessments and planning for cleanups could be relatively contentious; cleanup efforts can be complicated and potentially disruptive to a community (McCluskey and Rausser, 2003), but they can also provide short-term employment and carry the potential for economic redevelopment (McMillen and Thorsnes, 2003). In minority neighborhoods, this process may be more contentious owing to historical trends in power and mistrust of political elites (Stone, 1989) especially given that one of the key activities of a Phase I assessment involves talking with local stakeholders about the history of the site. This result may indicate that it is more difficult for assessors to reach minority populations, perhaps especially those for whom English is not their primary language. This result can also be considered in the context of the finding that sites in wealthier communities tend to move more slowly through the initial assessment phase as well. Various powerful interests may choose intractable positions and keep a consensus cleanup plan from emerging as each side attempts to write their preferences into the assessment plan. Regardless, it seems clear that some aspect of political activity is important in the initial stages of a brownfield cleanup. As previously acknowledged, voter turnout in an election is, at best, a poor proxy for collective action, and this slowing of the initial phases of the cleanup, may be evidence of the importance of political activity in the process, especially in light of the fact that socioeconomic characteristics do not appear to be especially important predictors of the pace of the final cleanup of a site (the complications of the site itself appear to be the major contributors to a slowing down of the full cycle of the cleanup). This important process merits future consideration.

CONCLUSION

In this paper, I have assessed the environmental justice implications for environmental improvement via a detailed view of the patterns and priories of cleaning up brownfields. Although sites in communities with larger proportions of minority residents move through the initial assessment and planning phases of the cleanup process more slowly than their counterparts in other neighborhoods, these sites are no less likely to ultimately be cleaned up. So while this research seems to indicate that cleanup and redevelopment policies, at least at the federal level, are conducted with environmental justice in mind, the question of why assessing sites and planning cleanups in minority neighborhoods takes longer is left open.

Although possibly indicative of discriminatory environmental injustice, I contend that this result is more likely due to economic and political factors. First, economic factors appear to be influential in that cleanup is much more likely to happen and happen quickly when a brownfield is relatively isolated from other brownfield sites, all else equal. This might indicate an effort by policymakers to target cleanup resources on sites where they expect that redevelopment of the site and possible revitalization of the community are more likely than areas where pollution is more concentrated and intractable. Secondly, characteristics of the housing stock appear influential as well. Sites in communities an older housing stock are relatively more likely to be cleaned up and again, to move through the cleanup process more quickly. This may be due to economic pressures from developers and gentrification pressures from higher income individuals interested in reconditioning architecturally valuable land or properties (Smith, 1979).

These same outcomes may be affected by the political machinations occurring during the assessment and planning phases of the cleanup as well. In communities with relatively low levels of environmental risk, there may be less general political debate about the merits of one cleanup plan versus another. Economic interests might be aligned with those already in the community in wanting redevelopment to occur as quickly as possible. A lack of political disagreement may move sites more quickly through the initial planning phases, enabling the cleanup itself to occur more quickly. Conversely, in those neighborhoods where there is less consensus, the political debate might be carried out through the assessment and planning process. When there is disagreement about the plan for cleaning up a site, the realm for this debate might be the period during which a brownfield site is assessed and the cleanup planned, with the expectation that the cleanup plan will, in part, dictate how the site is to be used in the future.

Nevertheless, this research ends on a generally positive note if one is concerned about environmental justice. Since the early 1990s, the EPA has been mandated to consider the environmental justice consequences of the distribution of resources used for environmental improvement. Although the planning process in some communities may be more complicated than in others, the EPA appears to have done a good job working under its mandate. For those sites to which the EPA contributes funds for cleanup, sites in poor or minority neighborhoods appear as likely to be cleaned up as their counterparts in other communities. While this result may or may not hold when considering the broader view of all brownfield sites, at the very least, the federal government has taken its environmental justice mandate seriously, while still maintaining a focus on cleaning up those sites that are most potentially environmentally hazardous to their communities.

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Table 1: Clean Up Stage and Time Descriptive Statistics

	Mean	SD	Min	Max	N
For all Sites					
No Further Action (NFA) Status Achieved*	0.059	0.237	0.00	1.00	6401
Phase I Environmental Assessment Complete*	0.985	0.121	0.00	1.00	7443
All Environmental Assessments Complete*	0.448	0.497	0.00	1.00	7443
Months to NFA Status**	46.910	24.540	2.00	212.00	4921
Months to Phase I Completion**	6.156	10.511	1.00	162.00	3178
Months to Assessment Completion**	45.530	24.702	2.00	201.00	4958
For Sites with Political Characteristics Included					
No Further Action (NFA) Status Achieved*	0.019	0.137	0.00	1.00	1152
Phase I Environmental Assessment Complete*	0.992	0.088	0.00	1.00	1152
All Environmental Assessments Complete*	0.169	0.375	0.00	1.00	1152
Months to NFA Status**	47.188	16.055	8.00	126.00	1018
Months to Phase I Completion**	8.502	6.787	1.00	59.00	207
Months to Assessment Completion**	47.442	15.839	9.00	126.00	1007

Note: *Each variable is coded as a dichotomous (0/1) indicator of whether the particular clean up milestone has been met. **Months for sites that have not yet achieved the specified milestone are indicative of total time either in the stage, or for the entire process as of 10/1/2009.

Table 2: Other Variable Descriptive Statistics

	Mean	SD	Min	Max	N
For Census Tract-Level Analysis (Model 1)					
Brownfield in Tract (yes=1)	0.039	0.195	0	1	64931
Population Density (people/square mile)*	5318	12044	0.002	223600	64931
Percent of Housing Units Built before 1940*	0.172	0.189	0	1	64931
Percent of Residents with Bachelor's Degree*	0.232	0.169	0	1	64931
Median Household Income (logged)	10.754	0.431	7.823	12.206	64868
Percent of Residents Over Age 65*	0.130	0.072	0	1	64931
Percent of Residents Under Age 18*	0.253	0.068	0	0.714	64931
Percent of Hispanic Residents*	0.115	0.190	0	1	64931
Percent of Black Residents*	0.140	0.238	0	1	64931
Percent of Tract Classified as Urban*	0.775	0.375	0	1	64931
More Than One Brownfield in Tract (yes=1)	0.012	0.107	0	1	64931
For Site-Level Analysis (Models 2 & 3)					
Population Density (people/square mile)*	3596	4296	0.002	124614	6308
Percent of Housing Units Built before 1940*	0.257	0.197	0	1	6298
Percent of Residents with Bachelor's Degree*	0.136	0.115	0	0.852	6302
Median Household Income (logged)	10.387	0.450	7.823	11.802	6294
Percent of Residents Over Age 65*	0.124	0.058	0	0.865	6308
Percent of Residents Under Age 18*	0.271	0.077	0	0.536	6308
Percent of Hispanic Residents*	0.129	0.187	0	1	6308
Percent of Black Residents*	0.279	0.347	0	1	6308
Percent of Tract Classified as Urban*	0.830	0.343	0	1	6308
More Than One Brownfield in Tract (yes=1)	0.710	0.453	0	1	6308
Hazard Score	16.319	28.687	0	160	6308
Superfund Site (yes=1)	0.150	0.357	0	1	6308
Period in Which Project Began**	3.580	0.609	1	4	7443
For Site-Level Analysis in Tracts with Political Characteristics (Models 2 & 3)					
Population Density (people/square mile)*	4157	3779	1.93	37294	1152
Percent of Housing Units Built before 1940*	0.157	0.169	0	0.7	1152
Percent of Residents with Bachelor's Degree*	0.124	0.107	0.001	0.709	1152
Median Household Income (logged)	10.322	0.513	9.319	11.734	1152
Percent of Residents Over Age 65*	0.116	0.058	0.018	0.311	1152
Percent of Residents Under Age 18*	0.268	0.086	0.021	0.524	1152
Percent of Hispanic Residents*	0.272	0.222	0	0.941	1152
Percent of Black Residents*	0.207	0.273	0	0.956	1152
Percent of Tract Classified as Urban*	0.974	0.119	0	1	1152
More Than One Brownfield in Tract (yes=1)	0.905	0.293	0	1	1152
Hazard Score	16.233	28.857	0	140	1152
Superfund Site (yes=1)	0.034	0.181	0	1	1152
Period in Which Project Began**	3.501	0.517	2	4	1152
2000 Election Turnout (percent of registered)	0.668	0.014	0.385	0.955	1152
Percent of Voters Registered Democrat in 2000	0.549	0.157	0.242	0.914	1152
Percent of Voters Registered Republican in 2000	0.253	0.135	0.026	0.629	1152

Note: *Includes data from both 1990 and 2000 census where appropriate. ** Period = 1 if project began in 1990-1995, 2 if it began from 1995-2000, 3 if 2000-2005 and 4 if 2005 - present.

Table 3: Hazard Scores for Some Common Brownfield Pollutants

Pollutant	Hazard Score
Petroleum	16.6
Asbestos	25.6
Volatile Organic Compounds (VOC)	18.0
Lead	33.3
Mercury	28.7
Polyaromatic Hydrocarbons (PAH)	21.7
PCBs	20.5
Methane	9.6
Propane	11.9
Iron	7.3
Aluminum	10.5

Table 4: Logistic Regression -- Presence of a Brownfield Site in a Census Tract

	Odds Ratio		Standard Error
Population Density (people/square mile)	0.999	*	0.001
Percent of Housing Units Built before 1940	10.515	*	1.328
Percent of Residents with Bachelor's Degree	0.334	*	0.078
Median Household Income (logged)	0.341	*	0.027
Percent of Residents Over Age 65	0.292	*	0.111
Percent of Residents Under Age 18	0.388	*	0.153
Percent of Hispanic Residents	1.388		0.264
Percent of Black Residents	1.744	*	0.194
Percent of Tract Classified as Urban	1.002	*	0.001
Likelihood Ratio Pseudo R2	0.168	*	

*p<.05; N=64252

Table 5: Cox Regression -- Likelihood of Milestone Accomplishment per Month

Dependent Variable	Phase I Complete		Assessment Complete		NFA Complete**
			Odds Ratio (Standard Error)		
Population Density (people/square mile)	0.999	0.999	0.999*	1.000	1.00
	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
Percent of Housing Units Built before 1940	1.335*	0.499	2.909*	0.626	6.563*
	(0.181)	(0.456)	(0.602)	(0.906)	(3.808)
Percent of Residents with Bachelor's Degree	2.283*	151.174	0.948	0.738	7.705
	(0.802)	(390.346)	(0.470)	(1.962)	(9.287)
Median Household Income (logged)	0.701*	0.078*	1.060*	2.114	0.720
	(0.063)	(0.058)	(0.156)	(1.478)	(0.274)
Percent of Residents Over Age 65	1.575	0.174	2.791	0.027	15.021
	(0.816)	(0.960)	(1.813)	(0.136)	(26.210)
Percent of Residents Under Age 18	3.933*	0.028	0.566	0.001*	1.759
	(1.855)	(0.055)	(0.375)	(0.001)	(3.367)
Percent of Hispanic Residents	0.493*	2.155	0.306*	2.800	1.837
	(0.084)	(3.794)	(0.107)	(7.107)	(1.491)
Percent of Black Residents	0.672*	0.380	0.852	18.275	0.667
	(0.074)	(0.391)	(0.161)	(25.056)	(0.398)
Percent of Tract Classified as Urban	1.000*	1.045*	0.998	1.004	0.992*
	(0.001)	(0.021)	(0.001)	(0.013)	(0.003)
More Than One Brownfield in Tract (yes=1)	1.035	0.647	0.779*	0.178*	0.455*
	(0.061)	(0.224)	(0.068)	(0.076)	(0.107)
Hazard Score	1.000*	0.999	1.013*	1.001	1.017*
	(0.001)	(0.003)	(0.001)	(0.005)	(0.003)
Superfund Site (yes=1)	2.307*	28.146	0.174*	1.640	0.377*
	(0.496)	(64.763)	(0.054)	(1.583)	(0.160)
Period in Which Project Began	2.349*	4.827*	12.604*	177.71*	7.108*
	(0.192)	(2.218)	(1.327)	(121.73)	(1.842)
2000 Election Turnout (percent of registered)	--	3025.37*	--	0.252	--
		(7858.9)		(1.089)	
Percent of Voters Registered Democrat in 2000	--	0.001*	--	272.15	--
		(0.001)		(1443.1)	
Percent of Voters Registered Republican in 2000	--	0.001	--	192.43	--
		(0.003)		(1089.5)	
Wald chi2	198.64*	93.37*	1648.2*		232.82*
N	2273	207	4710		4909

Note: *p<.05; ** Of 1018 sites in tracts with time to phase change and voting data, only 2 have achieved NFA status, yielding no relevant conclusions.

Table 6: Logistic Regression -- Likelihood of Sites Reaching NFA Status

Dependent Variable	NFA Status Achieved Odds Ratio (Standard Error)	
Population Density (people/square mile)	1.00	1.00
	(0.000)	(0.000)
Percent of Housing Units Built before 1940	3.452*	0.235
	(1.146)	(0.602)
Percent of Residents with Bachelor's Degree	18.065*	3.598
	(12.260)	(17.038)
Median Household Income (logged)	0.889	3.632
	(0.201)	(5.402)
Percent of Residents Over Age 65	2.761	0.001
	(3.311)	(0.013)
Percent of Residents Under Age 18	0.933	0.003
	(1.015)	(0.017)
Percent of Hispanic Residents	1.380	0.120
	(0.641)	(0.369)
Percent of Black Residents	0.833	0.162
	(0.258)	(0.441)
Percent of Tract Classified as Urban	0.993*	1.010
	(0.002)	(0.023)
More Than One Brownfield in Tract (yes=1)	0.357*	0.884
	(0.046)	(0.716)
Hazard Score	1.022*	1.036
	(0.002)	(0.010)
Superfund Site (yes=1)	0.774	1.954
	(0.207)	(2.331)
Period in Which Project Began	2.206*	5.324
	(0.308)	(4.552)
2000 Election Turnout (percent of registered)	--	0.237
		(1.181)
Percent of Voters Registered Democrat in 2000	--	1749.4
		(16182.1)
Percent of Voters Registered Republican in 2000	--	37.619
		(368.525)
Wald chi2	469.01*	31.93*
N	6294	184

Note: *p<.05

Figure 1: The Dynamic Policy Process

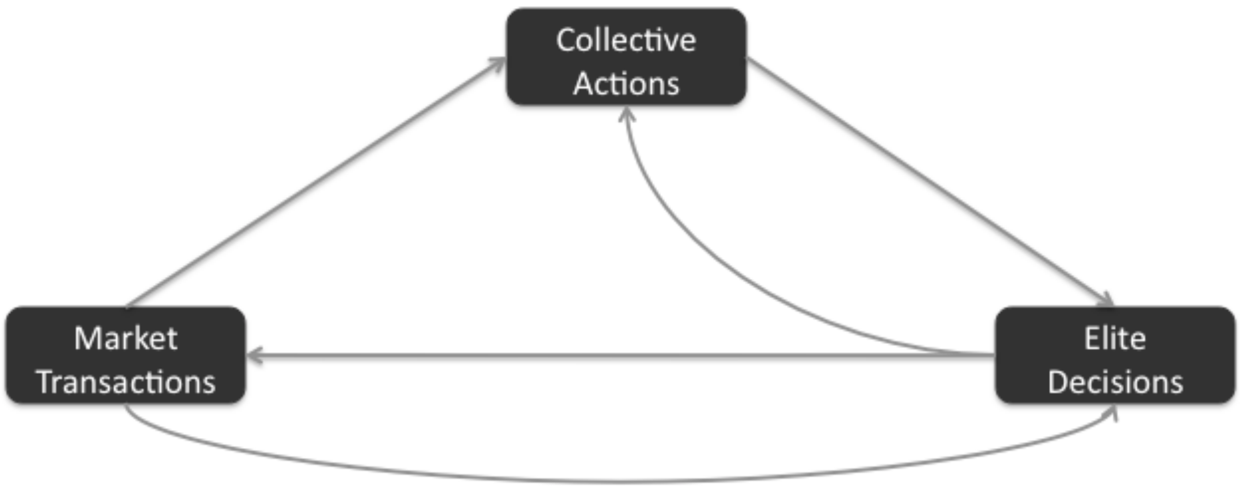

Figure 2: Geographic Distribution of Brownfield Sites Receiving EPA Funding

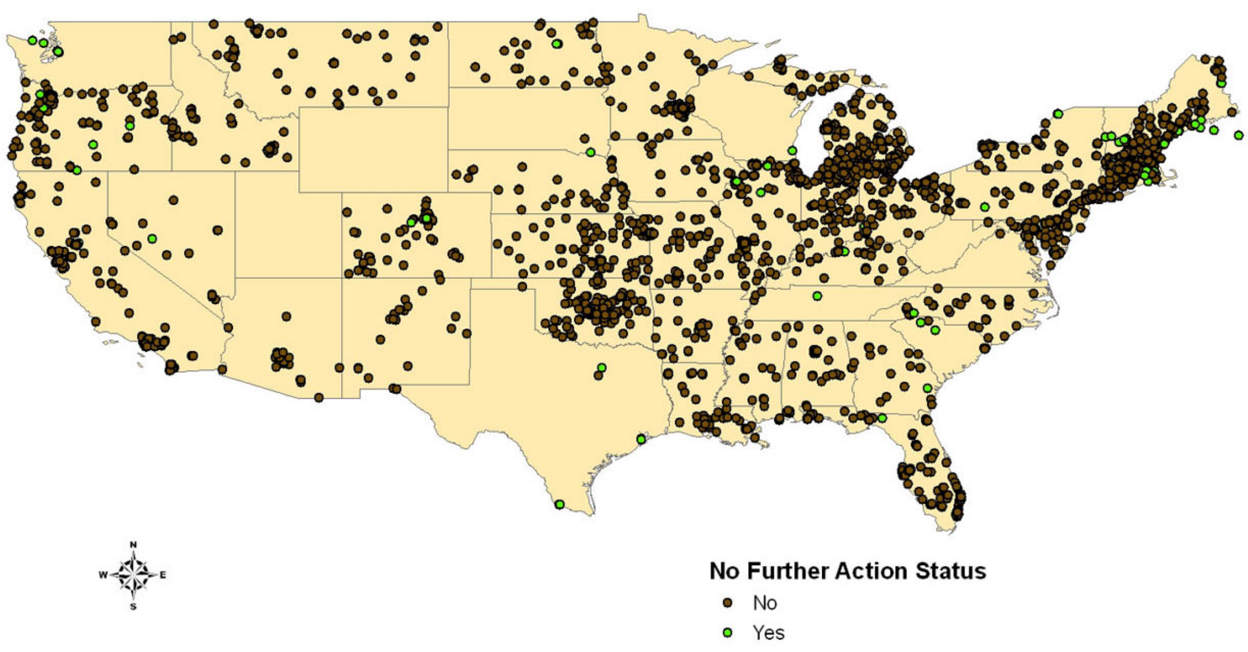

Figure 3: Comparisons of Demographic Characteristics Between Census Tracts that Contain Brownfield Sites and All Census Tracts