

ENVIRONMENTAL JUSTICE

Opportunities through Markets

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BY H. SPENCER BANZHAF
Georgia State University

Series Editor Roger Meiners



PERC

2048 Analysis Drive, Suite A Bozeman, Montana 59718
Phone: 406-587-9591 Fax: 406-586-7555
www.perc.org perc@perc.org

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TO THE READER

“Environmental justice” is a term that relates to claims that poor and minority households suffer harms from hazards imposed on them by large firms. It is alleged that powerful companies can steamroll the political system and are allowed to impose toxic wastes on people with little political power. Community organizers have used this claim to demand remediation of past environmental practices, such as Superfund sites, as well as demand participation in administrative processes that determine licensing of polluting facilities.

H. Spencer Banzhaf, who recently published a paper on the topic in the *American Economic Review*—the most prestigious academic journal in economics—furthered his work in this area while at PERC as a Julian Simon Fellow in 2007. This paper summarizes the state of the academic literature on the implications of environmental justice. A member of the economics faculty at Georgia State University, Banzhaf carefully examines some of the consequences of the policies related to environmental justice. His empirical work indicates that, as with many policies that have good intentions, the poor may not be the beneficiaries of environmental justice policies asserted to be designed to improve their neighborhoods.

This essay is part of the *PERC Policy Series* of papers on timely environmental topics. This issue was edited by Roger Meinert with Mandy-Scott Bachelier supervising production and design.

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INTRODUCTION

The publication of landmark studies in the 1980s and subsequent research showed that poor and minority households live in more polluted neighborhoods than other households—helping trigger an environmental justice movement. The statistical methods used in the research showed a robust correlation to the type of pollution considered, including hazardous waste facilities, landfills, large air polluters, and the concentration of air pollutants.¹

This finding that the poor and people of color bear a disproportionate environmental burden has led to the introduction of several environmental justice acts in Congress (though none have passed) and to President Clinton's Executive Order 12898. Still in force, the order requires nondiscrimination in federal environmental programs and focuses resources on low-income and minority communities, such as the EPA's brownfield program, designed to encourage the redevelopment of urban Superfund sites.

At the grassroots level, local residents, assisted by movement leaders, have sought more involvement in issuing permits for polluting facilities and in making other decisions that have environmental consequences.² They also have sued governments for discriminatory environmental enforcement and polluters for environmental nui-

sances. In one prominent case, activists forced California’s South Coast Air Quality Management District to settle the suit based on the geographic pattern of pollution resulting from its program, arguing that it concentrated pollution in poor neighborhoods.³

Evaluating claims of discrimination and injustice requires an understanding of the social causes behind the statistical correlation between pollution and demographics. Economic models of local public goods and real estate markets have provided important insights into this issue. In general, these models tend to “push back” the locus of injustice from company decisions, such as where to place facilities and how to operate them, to more fundamental issues of the distribution of income and wealth and the ways in which markets allocate goods—including environmental amenities—to households. These points have been discussed by such authors as Vicki Been (1993), Lynn Blais (1996), Sheila Foster (1998), and Laura Pulido (2000).

Nevertheless, the full implication of these models for the distributional impacts of potential policy *remedies* for environmental injustice are not well understood. Who captures the gains and who bears the losses depends on the processes generating the observed patterns in the distribution of pollution. If the goal of the environmental justice movement is to improve the well-being of disadvantaged groups, understanding the distributional effects of environmental policies is crucial.

This *Policy Series* begins with a review of the interpretations of the environmental justice literature. It then discusses the primary economic model used to analyze the issues. Within this framework, the process of gentrification is discussed, as are the implications of discrimination in housing. Finally, an alternative economic model, the Coase theorem, is considered.

Five Interpretations

There are at least five potentially non-exclusive interpretations of the correlation between pollution and local demographics.

1. The simplest interpretation is that firms react to demographics in determining the pollution patterns we observe. That is, firms may discriminate out of racist motives or, in the absence of any racist motives, may seek out areas with weaker political power. For example, Hamilton (1993, 1995) found that firms planned to expand their processing of hazardous wastes in areas with lower voter turnout (see also Brooks and Sethi 1997; Arora and Cason 1999).
2. A similar interpretation is that firms, while not reacting so much to local demographics per se, are attracted to other factors that happen to be spatially correlated with the demographic composition of neighborhoods. Factors might include low land prices, access to transportation corridors, and proximity to suppliers because of benefits derived from clustering activities related to firm operations.
3. A third interpretation focuses attention not so much on firms as on governments, and their failure to enforce environmental standards and regulations equitably. Governments might enforce standards more rigorously in areas with higher levels of political support for the current administration. Or, government enforcement agencies might lack the incentives to enforce standards unless forced to do so by stakeholders. Since the squeaky wheel gets the grease, agencies would be more likely to respond to better organized, better connected, and more politically powerful citizens. If so, this might also be a further reason firms would be attracted to areas with less political power.
4. A fourth interpretation, known as “coming to the nuisance,” essentially reverses the causality. Firms site their facilities and make other production decisions for many reasons, and demographics may be a negligible factor. But pollution in any given

location makes the place less attractive to residents. Wealthier households especially will move out or avoid the area. Land and housing prices will fall. Poorer households may move in, attracted by the low housing costs despite the pollution. This process was first articulated by Been in a series of papers (1993, 1994, 1997).⁴ Banzhaf and Walsh (2008) and Banzhaf, Sidon, and Walsh (2007) confirm this intuition in a formal economic model in which households choose neighborhoods based on local amenities and costs.

5. The final interpretation is that the geographic pattern of local environmental nuisances arises from negotiations between firms and local residents, in which firms compensate communities for hosting unwanted facilities (Hamilton 1993, 1995). As Ronald Coase (1960) argued, such negotiations would arise when the right to pollute (or to be free of pollution) is clearly defined and when the costs of negotiation and transacting compensatory payments are low. In this Coasian world, other things equal, firms would locate in neighborhoods willing to accept lower payments as compensation.

Why “Why” Matters

Understanding which of these explanations are most significant is important. It impacts the interpretation of injustice in the distribution of pollution. If the correlation between pollution and minority and poor populations results from intentional discrimination by government agencies, it would violate the equal protection clause of the Constitution and possibly Title VI of the Civil Rights Act, which prevents discrimination by agencies receiving federal funds.⁵

Even if there was no discriminatory intent, there would still be a question of distributive justice. If the correlation is a consequence of coming to the nuisance and similar socio-economic processes mediated through real estate markets and housing decisions, then

the correlation between pollution and demographics appears not so much a cause of unequal distribution as a result. Hence, the question of distributive injustice arises from the underlying distribution of income, not the distribution of environmental quality. The environmental justice literature generally acknowledges the role played by market dynamics but argues that such processes do not undermine the normative significance of the injustice of disproportionate environmental burdens. Be that as it may, it does not follow that understanding social processes is irrelevant.

This *Policy Series* focuses on another reason why the results of the market process are important: They have implications for the effects of different potential remedies or policies. Markets are not only efficient, but they provide an opportunity for individuals and groups to enhance their welfare, *given their limited resources*. Consequently, undermining market outcomes may sabotage the efforts of members of the most disadvantaged groups to improve their lives. Focusing on the root problem—poverty—is likely to be a more effective way for improving the lives of the poor than improving environmental quality in poor neighborhoods.

Be Careful What You Ask For

As Been (1993) points out, as long as some areas are more polluted than others, migration might re-establish the correlation between economic status and environmental quality. Moreover, Sieg et al. (2004) find that targeting polluted, poor neighborhoods for cleanup with the intention of helping the local residents can have perverse results. Residents who moved into dirtier communities tend to place a higher priority on low-cost housing than on the environment. Cleaning up the environment may increase those costs by more than their willingness to pay, as wealthier households bid up property values. As poor residents are more likely to rent their housing, they stand to lose from these increased housing costs. Sieg et al. (2004) call this effect “environmental gentrification.” Such perverse distribu-

tional effects are not only a concern of the academic literature; they have emerged as a top concern of some activist groups as well, as expressed in a report from the National Environmental Justice Advisory Council (2006).

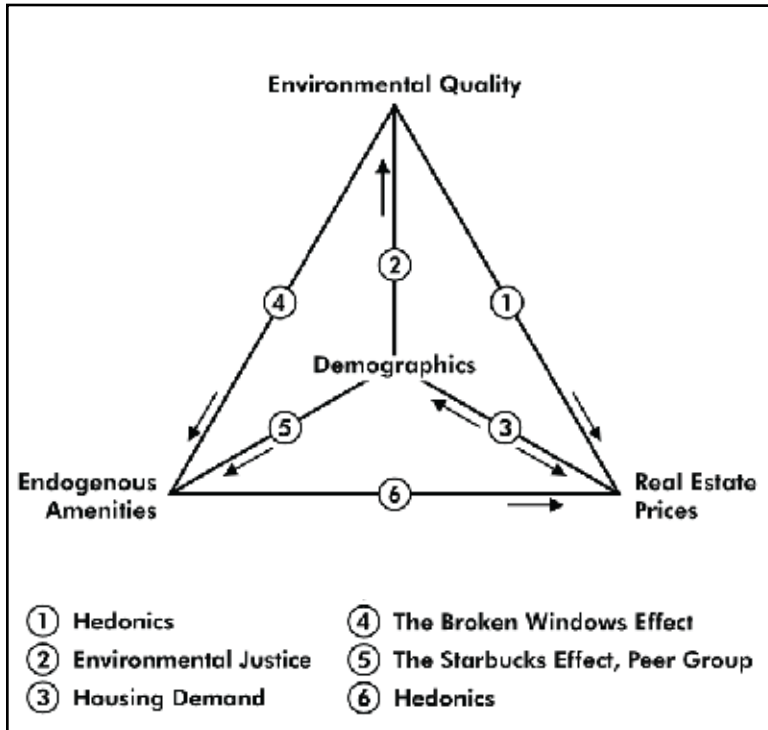
THE TIEBOUT MODEL

Since Adam Smith and David Ricardo, economists have understood that more desirable land, such as fertile agricultural land, commands higher values than more marginal land. This common sense theory, captured in real estate agents' motto location, location, location, was expanded by Charles Tiebout (1956) in a general model of local amenities, local political economy, demographics, and real estate prices. Tiebout's notion was that households can vote with their feet to live in communities that have their preferred bundle of amenities, tax rates, and housing prices.

Though everybody likes better schools, parks, and so forth, not everybody is equally willing to pay the taxes required to produce them. Citizens who have a higher willingness to pay for them—because they have more money or because they place a high priority on them—will move into communities with high taxes and high levels of local public services. Poorer citizens, and those who place a lower priority on such services, will be likely to locate in communities with lower tax rates. Similarly, households that place a higher value on a clean environment will tend to move into cleaner communities, paying a premium in housing costs if not taxes. Households that place a lower value on environmental quality will move into dirtier communities, avoiding those costs. The lower value may be a result of either incomes or preferences. In these ways, people “sort” themselves into neighborhoods with others who have a similar willingness or ability to pay for public goods.

Tiebout's insights have produced a large and fruitful literature.

Figure 1:
The Four Sides of Environmental Demography.



Source: Banzhaf and McCormick (2006)

His model has many implications for the connections among public goods, demographics, and housing markets—too many to review here. The most important connections for our purposes are depicted in Figure 1. It shows a pyramid from Banzhaf and McCormick (2006) depicting what we might call the four sides of environmental demography. Each vertex in the pyramid represents one aspect of a model of interconnecting social relations. The top represents environmental quality, e.g., the presence or absence of a local polluting facility. The

back represents the demographic makeup of the local citizenry. The right represents local real estate markets, and the left represents other local public goods, labeled “endogenous” to reflect the fact that they are determined by the actions of local residents.

The environmental justice literature documents a correlation between pollution and demographics depicted by the line connecting them in the pyramid. Efforts to document a causal relationship, however, have been frustrated by the fact that pollution and demographics are connected to a larger social system (Foster 1998, Pulido 2000). For example, an equally compelling literature documents that land and housing prices are more expensive in less polluted areas. This so-called “hedonics” literature can be represented by the line connecting the environment and real estate vertices in Figure 1. Accordingly, one also could explain the connection between the environment and demographics by the real estate prices. Since the desirability of clean neighborhoods bids up the price, poorer populations (including minorities) will be less likely to have housing in those neighborhoods. Such effects may be reinforced as richer residents vote to spend more public money for more services (see Banzhaf and McCormick 2006).

Through this sorting, poorer residents will enjoy less of the amenity without overt discrimination in siting decisions or in real estate markets. Tiebout’s process of households “voting with their feet” for more desirable localities and of residents sorting out by their willingness or ability to pay for amenities is sufficient to explain the connection. Viewed through this lens, saying that the poor live in more polluted areas is like saying they drive older cars or are less likely to have health insurance. It is a symptom of poverty, rather than a coincident event.

This does not mean there are no inequities. It means that inequities are pushed back from the way environmental quality is allocated to more fundamental differences in the distribution of income and resources that allow people to obtain public and private goods. It

is important to emphasize that in this paradigm, the residential decisions that give rise to observed demographic patterns represent individuals' best efforts to advance their interests, *given the resources available to them*. As discussed below, this has important implications for the actual effect of well-meaning policies designed to help local residents.

Voting with Your Feet

Evidence has accumulated showing that Tiebout's model—people vote with their feet—is an accurate description of reality. This evidence can be divided into three categories:

1. *Households are mobile and "sort" into neighborhoods based on their demand for public goods.* Americans are quite mobile, with the average household moving once every five years. This constant churning allows the demographic composition of communities to evolve along with changing amenities. Thus, if people move on a regular basis, so long as they look at amenities and housing prices when they do move, households with higher willingness to pay for amenities will be found living nearer to those amenities.
2. *A pattern is found in demographics, housing prices, and public goods.* If households vote with their feet, the demand for amenities should drive up prices in areas with better public goods, so that higher willingness-to-pay individuals are more likely to live in those communities. There is plenty of evidence to support this contention. Numerous studies have found a correlation between housing prices and local amenities, including pollution and undesirable land uses such as Superfund sites and landfills.⁶

Of course, this correlation may also arise if dirty industries are attracted to areas with cheaper land prices—a

problem of reverse causation. For this reason, evidence of a correlation between real estate prices and air pollution is particularly supportive of the Tiebout model, because air pollution is often determined by distant emissions. If pollution blows into a neighborhood, it will affect land prices in that neighborhood; but downwind prices will not affect the polluting behavior of the upwind firms. Smith and Huang (1995) found systematic evidence of such a correlation between housing prices and air pollution concentrations. More recently, Bayer, Keohane, and Timmins (2006) have taken an approach that specifically relies on only that portion of local air pollution that comes from distant sources. Similarly, Chay and Greenstone (2005) have looked only at the variation in local air pollution that comes from changes in federal non-attainment of air quality status. Both approaches explicitly “net out” any reverse effect of local markets and local demographics on pollution levels, yet find a strong correlation between housing prices and pollution levels.

Demographic patterns are also consistent with the Tiebout model. Of course, the correlation between pollution and poorer residents is itself consistent with the model—but no more so than any of the other four explanations considered earlier. Other patterns, however, appear more consistent with Tiebout’s model of household sorting. For example, Gramlich and Rubinfeld (1982) have shown that in metro areas with a wider menu of choices for public service levels, households are more satisfied with the level of such services in their community than are households in rural areas with fewer choices, where many households viewed local service levels as either “too high” or “too low.” Such studies suggest that, when given the opportunity, households sort into areas with amenity levels that match their willingness to pay for them. More recently, Sieg et al. (2004) found that

ranking of communities by average incomes correlates well with ranking by price.

3. *Demographic patterns change in response to changes in local environmental quality.* One might think that if the Tiebout process is in play, then neighborhoods that host undesirable polluting facilities would become poorer and perhaps see an increase in the proportion of minority residents over time. By the same token, neighborhoods receiving investments in environmental cleanup seemingly should become richer and whiter. This is the route that Been (1994, 1997) first took in her exploration of the “coming to the nuisance” hypothesis, and which has been pursued in subsequent papers.

The Tiebout model does not necessarily predict such dynamic effects, at least not in a way that can be detected easily in empirical data, for two reasons. One reason is that the effect in the area of interest needs to be compared to a suitable control (placebo) group. The best controls would be similar neighborhoods nearby, which have not experienced changes in pollution. However, such neighborhoods are affected indirectly because they are what economists call “substitutes,” with people leaving them to go to the community experiencing the cleanup, or vice versa. Banzhaf and Walsh (2008) show that, in this situation, both the neighborhood being cleaned up and the nearby control group can become richer on average. The rich neighborhood loses its poorest citizens, bringing up its average income, while the poorer neighborhood gains more residents at the upper end of its distribution, bringing up its average income too. This poses a dilemma for empirical researchers: The community affected by some environmental cleanup needs to be compared either to a community also affected indirectly, or else to a community that is so dissimilar or so far away as to be a poor substitute. Neither choice is desirable.

A second reason one might find a counterintuitive effect over time is because of a statistical bias that arises when the strength of the cross-sectional relationships is changing. Banzhaf, Sidon, and Walsh (2007) construct an example where, because of Tiebout sorting, minority populations are correlated with pollution in “before” and “after” periods, yet changes in demographics have the reverse correlation with changes in pollution. The reason is that the correlation with pollution and demographics strengthens over time. As the more polluted neighborhood becomes cleaner, race itself becomes a more notable basis for sorting than pollution.

A number of studies have looked at the evolution of demographics following siting local polluting facilities or the discovery of pollution, such as declaration as a Superfund site. The evidence is mixed. Been (1997), Cameron and McConnaha (2006), and Pastor, Sadd, and Hipp (2001) find no evidence of increased minority populations following siting (or discovery) of undesirable land uses. Baden and Coursey (2002), Lambert and Boerner (1997), and Wolverton (2002) find no such correlation at the time of siting, but do in later periods, suggesting the correlation arose *ex post* from migration to the polluted areas. Banzhaf and Walsh (2008) find that median incomes fell after new polluting facilities were sited and rose when they exited.

Given the above comments about dynamics, this conflicting evidence is not surprising. Banzhaf and McCormick (2006) and Banzhaf, Sidon, and Walsh (2007) show that the only clear demographic predictions from *changes* in public goods, when compared to nearby controls, are that the migratory responses should lead to a relative increase in population density following an improvement in public goods (or decrease following a decline in public goods), and that the effect of this increase in demand is to increase housing prices.

The empirical evidence supports these hypotheses. With respect to the migratory responses, Graves and Waldman (1991) found that the elderly tend to retire in counties where public goods are “paid

for” with lower wages rather than higher land prices. Kahn (2000) found that population growth soared in the Los Angeles counties that experienced the largest reductions in air pollution. Banzhaf and Walsh (2008) show similar effects at a more local level. They find that neighborhoods that have large polluting facilities within one-quarter mile lose a larger share of their population, compared to other neighborhoods within the same zip code or school district but further away from the facility. The difference is as much as 9 to 12 percentage points. Neighborhoods where such facilities closed or substantially reduced their pollution levels saw increases in their population of 4 to 6 percentage points over the same period. By restricting comparisons to the same area, this study holds labor markets and other regional economic factors constant, while focusing on differences in proximity to the pollution.

ENVIRONMENTAL GENTRIFICATION

Such socio-economic mechanisms have profound implications for the distributional effects of environmental cleanup, with seemingly commonsense remedies to environmental injustice actually harming the groups they are supposed to help.

If a neighborhood is cleaned up, residents who live there will enjoy the improved environment. But as the neighborhood becomes more desirable, real estate prices and rents increase. This is a boon to homeowners and to landlords, but offsets the benefits to renters. In fact, Sieg et al. (2004) show that cleaning up a high-pollution neighborhood can actually harm existing renters, through a process they call “environmental gentrification.”

Sieg et al. studied the effects of air pollution improvements in Los Angeles, where poorer and more polluted areas experienced the biggest gains from improving air quality over 15 years. The counter-intuitive effects arise from the fact that residents who live in such

neighborhoods have the lowest willingness or ability to pay for environmental amenities. They place a higher priority on affordable housing than on the environment compared to other households. Other households that had been avoiding the pollution may move back in, driving up housing prices. Competing to live in the improved neighborhood, those households bid up prices based on their higher willingness to pay. The original residents have to move out or pay the new premiums. Although they enjoy the environmental improvement, the higher rental payments more than offset that gain, making them worse off. The biggest gainers are the absentee landlords and some of the new gentrifying residents.⁷

Superfund Sites

The evidence generally supports the idea that cleaning up pollution leads to higher housing prices. The largest literature in this area examines Superfund and other hazardous waste sites. In one of the first studies, Kohlhase (1991) found that, in Houston, nearby land prices fell after sites were listed on the Superfund National Priorities List. Dale et al. (1999) and McCluskey and Rausser (2003) studied housing prices around a Dallas lead smelter that closed in 1984 and around which soil was abated for lead. They found that while the smelter was operating and through the cleanup period, housing prices were significantly lower near the smelter. This trend reversed itself following the cleanup. Similarly, McMillen and Thorsnes (2003) found that property prices initially were lower near a copper smelter in Tacoma; after the smelter closed in 1987, the discount switched to a premium.

On the other hand, in their study of long-delayed cleanup at three Superfund sites, Messer et al. (2006) find that property prices near the sites did not seem to rebound following cleanup. They suggest this may be because, during the delay, the sites became increasingly stigmatized. Greenstone and Gallagher (2008) raise an additional complication. They suggest that all these studies may be biased

if cleanup is triggered by changes in local demographics and real estate markets. They employ an innovative technique in which they compare sites that were eligible for federal cleanup under Superfund to other hazardous waste sites that just missed qualifying for such cleanup. Qualification was based on a hazard ranking system. Since the objective harm is similar for the two sets of sites, comparisons between them should isolate the effect of cleanup. Using this approach, Greenstone and Gallagher do not find any effect of cleanup on housing prices. This too may be the result of a permanent stigma from the Superfund program. It is also possible that the control or comparison sites were cleaned up by state programs in lieu of the federal Superfund program.

Although these studies raise new questions that warrant research, they appear to be exceptions to the rule that real estate prices rise following improvements to the environment. Moreover, these exceptions may be uniquely relevant to the distrust surrounding the Superfund program. In contrast, studies of air quality continue to find real estate price appreciation following improvements (e.g., Chay and Greenstone 2005).

Outbidding the Poor

In addition to the direct effect of housing price appreciation, gentrification may bring the left vertex of the pyramid in Figure 1, representing other public goods produced locally, into play. For example, the new residents may vote for higher taxes and higher levels of public services, and push for a particular mix of public and private services that matches their own priorities. These priorities may differ from those of the original residents because of the different interests of members of different social strata. In this way, the initial effects cascade into secondary effects that further harm the interests of original residents.

Such concerns about environmental gentrification are not just the musings of academics delighting in counterintuitive findings.

They also have been highlighted by environmental justice activists. For example, the National Environmental Justice Advisory Council submitted a report to the EPA on the “Unintended Impacts of Redevelopment and Revitalization Efforts.” It posits:

As the waves of new gentry move to large scale renovation projects in or near central business or warehouse districts, they come into direct contact with the current residents of these formerly forgotten places. Many of these older urban areas suffered from the industrialized waste practices of the past, and were not in high demand for residential development. Low-income people, recent immigrants, and people of color who were unable to find or afford shelter elsewhere have established communities in these areas. The commodity of land being sold in the real estate market is more than a physical structure or piece of acreage. It is also a neighborhood, a political and cultural entity necessary for the sustainability of a community in that place. Gentrification has placed populations in urban areas in direct competition for inner city space with relatively powerful and privileged groups. Environmental cleanup of these formerly industrialized, now residential, communities can be a powerfully displacing force. (NEJAC 2006, 2)

These unintended consequences of environmental cleanup are precisely the types of effects predicted by Tiebout’s model.

ROLE OF HOUSING DISCRIMINATION

The discussion to this point has assumed that segregation in communities results only from richer households’ higher demand for amenities. Willing to pay more, richer households outbid poorer households to live in a cleaner environment. Since whites are richer

on average, some racial segregation follows from stratification by income. Historically, however, segregation has been the consequence of discrimination as well. Explicit discrimination included neighborhood covenants and the refusal to sell or rent to people of color. A more subtle, and legal, form of discrimination is the decision of individuals to choose a neighborhood based on its demographic composition.

Cutler, Glaesner, and Vigdor (1999), in a fascinating study of segregation in America from 1890 to 1990, found that the pattern of housing costs for blacks and whites suggests that explicit discrimination marked the rise of segregation in the first two-thirds of the twentieth century, but that the more implicit form, based on individual residential choices, was more salient by 1980.⁸ Consistent with those findings, Card, Mas, and Rothstein (2007) estimate that in most cities whites begin to flee neighborhoods when minorities comprise 5 to 20 percent of the population. These estimates are consistent with survey findings about whites' tolerance for minority neighbors.

Such housing market behavior can magnify the consequences of the Tiebout model for environmental justice. As shown by Schelling (1971), even when everybody prefers some integration, such preferences can result in a "tipping point" at which communities become segregated. When combined with the Tiebout model, it is not surprising that whites enjoy the high-amenity areas. These areas have higher land values not only because of their environmental amenities, but also because whites value it precisely because it is whiter.

Who Captures the Environmental Gain?

The environmental justice literature has discussed the normative implications of such effects (Been 1993; Foster 1998; Pulido 2000). My concern here remains with their implications for the *policy* effects of cleaning up polluted areas. Banzhaf, Sidon, and Walsh (2007) show that gentrification effects continue to occur as households respond to improvements by moving into the neighborhood. To the extent these effects occur, landlords and homeowners reap much of the benefit,

while existing renters may be harmed as they are priced out of the now more desirable neighborhood. Thus, the main results of the previous section still apply, even when there is bottom-up segregation in housing markets.

Introducing such phenomena into the basic Tiebout model has two effects. First, it implies that new residents, though richer, will tend to be of the same race as the original residents.⁹ Other groups will avoid the area, despite the environmental cleanup, if only because of its demographics. The similarity between newcomers and the original residents may minimize secondary effects that change the community's character.

Second, and more surprisingly, when there is bottom-up segregation, cleaning up pollution in minority communities may cause the minority group to experience lower average levels of environmental quality. How? It is a consequence of the dynamics of sorting on demographics themselves instead of on the environment. Suppose a high-minority, low-amenity neighborhood is cleaned up, but not completely. The cleanup lessens the differences among communities in the environmental dimension, making sorting on demographics more important. The white community continues to be more expensive by virtue of its whiteness, but wealthier minorities who had lived there for the sake of superior environmental quality no longer have as strong a reason to do so. If those minorities move into the lower-amenity neighborhood in sufficient numbers, the average amenity level enjoyed by minorities may actually fall (Banzhaf, Sidon, and Walsh. 2007). The empirical relevance of this possibility is as yet unknown, however.

A COASIAN PERSPECTIVE

To this point, we have discussed how households pay for local public goods and other spatially distributed amenities through real

estate markets. The market allocates such goods to households able and willing to pay for them. A corollary is that providing such public goods may not always benefit local residents if rents increase by more than their willingness to pay.

A similar process may work through another market: the market for pollution itself. In his classic article, Ronald Coase (1960) pointed out that when property rights are well defined, they also become tradable. Specifying the right to pollute—or to be free from pollution—allows pollution to be traded. Coase suggested, for example, that negotiations could arise over factory smoke. If factories have a right to pollute, local residents may pay them to not pollute. If local residents have a right to be free from pollution, factories might compensate them to accept some pollution. In the same way as with land markets, environmental quality will again be highest near those who value it most, and lowest near those who value it least.

As a consequence of such negotiations, polluters will locate in neighborhoods that demand the lowest compensation—other things equal—just as in the Tiebout model. Moreover, in this case, neighborhoods may well gain from the transaction if the compensation is sufficiently high. Such a process would again have important implications for the interpretation of the correlations between polluting facilities and local demographics. As with land markets, it may be a sign of inequity in the distribution of income without itself contributing to inequity. Any Coasian-type payments in exchange for the right to pollute represent local residents' attempt to further their best interests, given their priorities.¹⁰

Coase argued that such market-like mechanisms function better when transaction costs are low. Hamilton (1993, 1995) notes that if these costs are unevenly distributed across communities, polluting firms may locate in areas that demand lower compensation only because they are unable to overcome the cost of collective action, rather than because of their true values. He finds evidence

that hazardous waste processors are more likely to expand operations where the potential for collective action is weakest (see also Brooks and Sethi 1997; and Arora and Cason 1999). To the extent that poor communities have a disadvantage in such implicit or explicit negotiations, the assistance of environmental justice leaders is a great service.

Nevertheless, there is direct evidence that Coasian processes are functioning. In their study of the largest solid-waste landfills in the United States, Jenkins, Maguire, and Morgan (2004) find that about half of the landfill owners provide compensation to communities, with payments averaging about \$1.5 million in 1996, and in one case rising to \$20 million. Forty-six percent made regular cash payments and 36 percent made miscellaneous in-kind payments, such as wells, parks, and firehouses. Though not universal and although its power would be fully unleashed by lower transactions costs, Coase's mechanism appears to be working to some extent.

CONCLUSIONS

Tiebout's process and Coase's bargaining are market-based phenomena giving rise to the observed correlations between pollution and poor and minority populations. In one case the correlation is mediated through real estate markets, in the other through negotiations over pollution itself. Both processes appear to be working.

Both imply that the exposure of different groups to different levels of pollution arises in part from individual choices. The word choice here must be interpreted carefully. It is not meant to imply that poor households are in the same position as rich households when it comes to choices. However, members of such groups are competent to work out how best to improve their own welfare, given the opportunities available to them. By choosing to live in more polluted but lower-cost areas, they are revealing that inexpensive housing is a

higher priority than environmental amenities. Similarly, by accepting compensation to host polluting facilities, they reveal that they prefer such compensation, whether represented by new public services or implicit tax reductions.

Either way, because a market helps distribute environmental quality to different groups, people pay a price (possibly hidden) to obtain a cleaner environment. Forcing a cleaner outcome through top-down planning imposes that price precisely on those groups who have revealed that they are least likely to be willing to pay it. According to the Tiebout model, cleanup will raise housing costs. This especially harms renters. People owning their homes benefit from a wealth effect, but may be induced to move. With Coasian bargaining, cleanup will reduce the compensation that firms pay to a community, which then enjoys the cleaner environment at the expense of other goods (e.g., better roads, hospitals, schools, etc.). In either case, it is not clear that forcing cleanup makes residents better off.

Nevertheless, the fact remains that low income people have fewer choices and perhaps less bargaining power. If public policy intends to address inequality, it would do better to attack poverty directly through transfer policies or by targeting its causes. This would give more people the ability to “purchase” environmental quality through markets (or to use their resources in other ways they see fit). In addition, policies could facilitate markets in pollution by reducing transactions costs, thereby allowing them to work for all groups. These may be the more effective routes for helping the poor—and prove to have “win-win” outcomes for society.

NOTES

1. On the location of landfills and hazardous waste facilities, see US GAO (1983), United Church of Christ (1987, 2007), Goldman and Fitton (1994), Been (1997), and Boer et al. (1997); on the presence of large air pol-

lutens, see Rinquist (1997), Sadd et al. (1999) and Banzhaf, Sidon, and Walsh (2007); on the emissions of air pollutants, see Brooks and Sethi (1997), Rinquist (1997) and Arora and Cason (1999); and on estimated air pollution concentrations, see Morello-Frosch et al. (2001) and Ash and Fetter (2004). But see Anderton et al. (1994) for an exception to the standard finding. Bullard (1990) provides a book-length introduction. For more recent reviews and discussion of this literature, see Banzhaf and McCormick (2006), Bowen (2002), and Rinquist (2003). See Rinquist (2005) for a meta-analysis.

2. In addition to impeding new permits, sometimes activities include bargains for compensation (Jenkins, Maguire, and Morgan 2004).
3. See Binder et al. 2001, Lazarus 2000, and the United Church of Christ (2007) on the tangible successes of the environmental justice movement.
4. See also Hamilton (1995) and Blais (1996).
5. At one time, environmental justice activists sought a remedy in Title VI of the Civil Rights Act, under rules for agencies using federal money. These rules required only proof of discriminatory effect rather than proof of intent. However, the Supreme Court ruled in 2001 in *Alexander v. Sandoval* (532 U.S. 275) that there was no private right of action to enforce such regulations.
6. See e.g. Boyle and Kiel 2001, Farber 1998, and Kiel and Williams 2007 for overviews.
7. To my knowledge, Alchian (1979) was the first to make precisely this point, also as it happens in the context of Los Angeles air quality improvements.
8. The tide against explicit discrimination began to turn with the Supreme Court's decision in *Shelley v. Kraemer* (334 U.S. 1, 1948), striking down restrictive covenants, and with passage of the Fair Housing Act of 1968. While the existence of overt discrimination in housing markets did not disappear, its importance has steadily declined. Discriminatory practices are believed to continue to play a role in the locational opportunities of different racial groups (see

US HUD 2000).

9. Although I refer to race in keeping with the literature and with the most pressing social issues in this country, the analysis could apply to other groups defined by religion, family composition, etc.
10. Foster (1998) makes a similar point about Native Americans, arguing that one aspect of environmental justice includes respecting tribal sovereignty and their ability to make decisions, including the decision to accept polluting facilities when they believe it is in their best interest (p. 802 ff.).

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