Information Politics, Pollution Geography, and Changing Riskscapes

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Abstract

This paper reports on initial findings of a research project that examines the effects of information disclosure policies on environmental decisionmaking, specifically, actions related to control of toxic chemical emissions in the United States. The project seeks to determine why some companies do more to reduce toxic chemical pollution than others and why some communities encourage such pollution reduction more than others. **Theory**: We examine county trends in reduction of toxic chemical emissions through the lens of comparative environmental policy. We hypothesize that clusters of facilities reducing air pollution releases and risk are a function of: (1) population demographics and economic prosperity; (2) the structure of local interests; (3) and local policy factors. **Method**: Correlations and Ordinary Least Squares regression are used on data representing trends in reported toxic air releases and risk levels for 5,268 facilities in 319 counties reporting in 1995 and 2000. **Results**: A county's percent Hispanic was positively correlated with the percent of TRIs increasing pollution while our ratio measure of leading to lagging TRIs produced an unexpectedly negative correlation with the number of persons with a High School degree. Consistent with theories of local environmental capacity, significant correlations were found between a county's TRI performance and a series of social capital surrogates. However, multiple regression models contained only a few or no significant coefficients when accounting for socioeconomic, political, and policy factors. These findings reinforce our longer-term goal of incorporating qualitative analysis in an effort to explain the patterns of toxic chemical releases and the effects of information disclosure policies on corporate and community decisionmaking.

In what has become a rite of spring, the United State Environmental Protection Agency (EPA) each year publishes a report of the latest data from the Toxics Release Inventory (TRI). The TRI is EPA's most well known information disclosure program. Authorized by a provision of the Superfund Amendments and Reauthorization Act (SARA) of 1986, TRI often has been cited as a success story in dissemination of information about releases of toxic chemicals by industrial facilities. The agency itself calls the TRI a "tremendously successful program," the results of which "speak loudly for themselves" (U.S. EPA 2002a).[2] Title III of SARA created the Emergency Planning and Community Right-to-Know Act (EPCRA), section 313 of which mandates that manufacturing facilities report their annual releases of listed toxic chemicals to the EPA; the agency in turn makes the information public.[3] It is available in an online database that can be accessed by the public and other stakeholders, and summary statistics are provided in a TRI Public Data Release report. In addition, some environmental groups, most notably Environmental Defense, make the data available online in a variety of graphic formats that allow community residents to assess what each industrial facility in their communities is emitting (www.scorecard.org).

Each year when the most recently collected data are made available one sees a flurry of media reports that disseminate to the wider public some basic information about the nature of toxics releases.[4] In general, over the life of the program (1988 to 2002 reports), the trends have been downward; the releases of key toxic chemicals to air, land, and water have been decreasing. Occasionally, as in the 2002 data release, there are increases reported in some categories. What sometimes gets overlooked in the reporting of national or even state summary data is that in any given year facilities can vary widely in their changes from previous years. For example, although states like Texas, Nebraska, and Indiana saw their pollution levels increase between 2001 and 2002, states such as New York, Alabama, and New Mexico saw their levels decrease.

Some news reports, especially in local or regional newspapers across the country, have picked up on facility differences, giving special emphasis to their own communities. The media may give some attention to descriptive information about why these changes have occurred at the local level (for example, an article may describe the key facilities in a given place that drove the changes between years), but generally pay little attention to the larger question of why there are these variations across facilities in the first place. Much of the time, if cross-facility comparisons are made, they are done at the level of comparing rankings; for example, how well or badly does a given companies compare to other ones over time? Such variation could conceivably be random, having everything to do with the particular facilities within a community and nothing to do with the communities themselves. We have reason to believe otherwise.

As Graham and Miller (2001), among others, argue, the overall reductions in release of toxic chemicals reported in the TRI require careful interpretation in light of the complexity of the reporting system, major changes made to it over time, and the multiplicity of variables that can affect corporate environmental decisions. They note, for example, that reported decreases in chemical releases "mask widely varying trends in major manufacturing industries" (15). It is apparent that economic factors associated with particular industries, new regulations or enforcement actions by federal and state regulators, and decisions made by managers of facilities with large releases can significantly affect the national trends on which analysts usually focus (see also Natan and Miller 1998).[5] The EPA itself regularly includes comparable warnings in its annual TRI report on the "limitations that must be considered when using the data"; these include the widespread use of estimated rather than actual data on chemical releases and significant variation among companies in the way they estimate such releases (U.S. EPA 2002a, ES-13).

The lack of a full accounting for the causal explanation for *substate variations* is the motivating force behind the analyses in this paper. Our goal is to better understand not only toxic *releases* from facilities within communities but also variations in relative *risks* to populations around these facilities. We analyze these variations at the county level partly because theory suggests that they do matter in the impact that public policies have on environmental conditions, and that such variations reflect important political, institutional, economic, and cultural differences across the states.

What we find, in brief, is that some policy and political factors do relate to county level variations in pollution reductions, although it is also clear that not all of the factors under study have an impact. Inconsistent with findings from previous comparative community environmental policy studies, the density of civic organizations is not the most influential factor affecting a county's ratio of firms reducing toxic releases to firms increasing them. Counties with a larger manufacturing base for their economy also tend to host more release reducers than increasers. However, multiple regression models contained only a few significant coefficients when accounting for resource, political, and policy factors.

A local theory of policy capacity and performance

A number of recent empirical studies have provided a window on third ways (that is, beyond regulation and markets) to achieve better environmental performance in localities. Researchers have highlighted community efforts in resolving land-use conflicts (Knopman, 1999); local cases of water quality management (Scheberle, 2000); and municipal adoptions of recycling programs (Feiock and West, 1993). However, many lack any direct measure of environmental impacts. DeWitt John (1993, 2005) anticipates that much environmental leadership will now come from nonfederal efforts in states and localities in what he has called "civic environmentalism."

Robert Putnam may be regarded as the civic scholar of the nineties with his conceptualization of social capital; "features of social organization, such as trust, norms, and networks, that can improve the efficiency of society by facilitating coordinated action" (1993, p. 167). In his latest book (Putnam, 2000) he argued that Americans in the last fifty years became less and less active in clubs, church committees, and political activities; all the involvements that make democratic efforts to influence policy succeed. Daniel Press and Alan Balch (2003) integrated social capital into a framework of local environmental policy capacity that expects regions and communities with higher stocks of social capital will be more cooperative and more likely to do more to protect the environment. Press and Balch identified the key mediating "policy capacity" components as social capital, economic resources, political leadership, administrative resources, and proenvironmental attitudes. These factors are necessary conditions that facilitate the production of policy measures that improve environmental conditions. We focus on three of these five components for explaining environmental decisions: social capital, policy constraints and opportunities (particularly economic constraints), and local political system factors. We believe these are likely to be the most important for the kind of behavior we examine in this project (See Figure 1).

Figure 1 about here

Subnational variations in environmental performance

That subnational jurisdictions vary in pollution production and reduction is not really in doubt. However, some researchers have examined variations in environmental policy expenditures (Davis and Feiock 1992; Bacot and Dawes, 1996, 1997), state enforcement actions (Lombard 1993), or a locale's propensity to adopt recycling programs (Feiock and West 1993). Several articles extend this type of analysis to also explain a variety of ecological outcomes. Ringquist (1993) , for instance, tested the relationship between economic factors, political pressures, political system elements and a dependent measure of state variations in air and water quality. His evidence suggested that economic resources did not strongly influence policy outputs, but strong regulatory choices did improve air quality (and water quality to a lesser extent). A subsequent analysis by Yu and others (1998) also found state enforcement to be an important determinant of decreases in industrial toxic releases. More provocatively, the paper measured and concluded that informational policy instruments (such as state pollution prevention education) may matter more than authoritative tools.

A similarly structured literature on local environmental performance also developed in the 1990s. Folz and Hazlett (1991) produced one of the earliest in this vein when they sought to test the success of recycling programs in diverting solid waste from local landfills. They postulated that waste diversion would vary across communities in different regions, with variations in population levels, contrasts in socioeconomic composition, differences in political cultures, and various forms of government. Perlin and others (1995) turned this kind of local environmental outcome analysis towards counties and toxic waste. Their research found that pollution emissions (measured by TRI) varied by a county's income and ethnic group composition.

A later county-level analysis of the spatial distribution of air pollution in the southeastern U.S. also considered toxic releases as a measure of environmental outcomes. Responding to concerns about environmental injustice, Cutter and Solecki (1996) failed to find an association between a county's racial composition and the frequency of airborne toxic releases. They did however find that economic indicators correlated with air releases, albeit in a positive and unexpected direction. A subsequent analysis by Ringquist (1997) continued the focus on associations between TRI emissions and socioeconomic characteristics at the zip code level. He found that even with background controls, TRI facilities and releases were concentrated disproportionately in residential zip codes with large minority populations. Hird and Reese (1998) followed with a return to a county-level analysis. Their research first examined associations among variations in county demographics and numerous measures of surrogates for environmental quality. Second, they focused on the variations in socioeconomic characteristics of counties with high levels of multiple pollutants. Their data produced strong positive associations between population density, manufacturing activity, race, ethnicity, and pollution. Moreover, their results paralleled earlier research (Cutter and Solecki 1996) with the unexpected finding of a positive correlation between wealthier locales and lower environmental quality.

In the same year, Neumann and others (1998) produced an innovative study constrained to Oregon. The research combined TRI releases, a media-specific toxicity index, and GIS to screen for hazards associated with demographic variables. The study found that while TRI facilities were located disproportionately in ethnic and minority neighborhoods, the analysis found no relationship between the hazardousness (releases + toxicity) of industrial sites and the socioeconomic characteristics of surrounding communities. Two significant papers followed in 1999 and continued to advance the literature on a locale's environmental quality measured with TRI releases.

Daniels and Friedman (1999) examined the question of whether pollution distributed unevenly across counties and the correlation with social groups. They found evidence of uneven pollution releases across the U.S. in a manner supportive of environmental injustice. Their study controlled for urbanization and industrial location but environmental inequalities remained as a county's proportion of African-Americans positively associated with toxic air releases. Arora and Cason (1999) completed a similar study but used zip-code level data and a dependent measure of three-year changes in TRI releases. Their study proffered three significant conclusions. First, race positively associated with releases in nonurban areas in the southeast. Associations between pollution, income levels, and unemployment suggested that economic factors were a second determinant of toxic releases. Third, in an analysis of California only, they found that voter turnout influenced environmental outcomes mainly in nonurban areas.

In sum, previous research suggests a multi-faceted examination of the policy relevant factors which may influence changes in industrial pollution over time. Key categories of variables include both political and administrative factors. Regulatory and non-regulatory variations across states are potentially critical and cannot be ignored. Finally, control variables—such as the severity of the problem or economic conditions—must be included in order to better assess whether policy choices are proactive or reactive.

Data and Methods

For quantitative analysis of the hypotheses, the unit of analysis will be the county level. A variety of existing research focuses on smaller (companies) or larger (regions) units of analysis. But the local policy capacity framework requires the use of a consistent spatial unit capturing all of the pertinent socioeconomic factors. The selection of the county level also allows us to compare our results to a large part of the existing literature on factors influencing TRI variations (Perlin, et al. 1995; Cutter and Solecki 1996; Hird and Reese 1998; Daniels and Friedman 1999). Our analysis excluded counties with less than 25,000 in population because they generally lack enough facilities to meaningfully compare environmental performance. We also analyzed pollution trends in counties with seven or more TRIs to facilitate the distinction between high and low environmental performance among clusters of facilities. Our sample therefore represents the more industrialized counties in the United States whose population in 1997 averaged over 400,000 while hosting about 16 TRIs.

Dependent Variable Measurement

The EPA's Toxics Release Inventory (TRI) database was the principal source of data for the construction of dependent measures. The architecture of the TRI data includes facility-level information on contacts; permits; types and amounts of chemicals released, shipped off-site, and treated on-site; annual chemical maximums; and source reduction activities (U.S. EPA 2001). Table 1 displays our conceptualization of measuring environmental outcomes pertaining to facility level pollution. We use trends in *releases* and *risks* to distinguish facility performance by placing them into four categories: green, blue, yellow, and brown. The x-axis represents a continuum of releases where facilities on the left-hand side increase releases. If they decrease releases, they progress to the right side of the axis, towards cleaner production. A continuum of risk runs along the y-axis, with facilities that increase pollution risks on the bottom. If they reduce risk, they progress upwards towards safer production. When facilities reduce both releases and pollution risk, they move from the lower-left to the upper-right, reflecting an ideal case of cleaner and safer production. In turn, the aggregation of facilities so categorized with counties allows a comparison across communities in terms of the number of high and low performing facilities within their borders.

First, we identified TRI facilities that reported releases in both 1995 and 2000. The sample included only the 1988 core chemicals to assure consistent comparisons of facility-level toxic chemical management across the comparison period.[6] Following Yu et al. (1998), we calculated the percent change in a facilities TRI release pounds by subtracting the weight of releases in 2000 from the weight of releases in 1995 and dividing that by the weight of releases in 1995 (2000 lbs – 1995 lbs)/(1995 lbs). An index of performance for pollution amounts was then estimated by dividing the 86 facilities into quartiles of amount changes ranging from a net decrease of sixty-four percent to a net increase of over two-hundred percent. Facilities falling into the first quartile with the larger pollution amount reductions received a score of 1 while facilities in the second, third, and fourth quartiles received a 2, 3, and 4 respectively. While the TRI dataset has become quite fashionable in social science, it does have limitations. Despite these limitations, the project's use of TRI data will allow comparisons with the current literature, replication of previous analyses, and guidance for future studies.

Since its inception, the TRI's skeptics have criticized its self-reported nature and many other problems with the information disclosed in the inventory. Much has also been made about what the TRI does not disclose and, in particular, the lack of any risk characterizations that would allow a comparison of various toxic releases. In fact, EPA documentation on using the TRI begins by telling potential users that the database's chemicals can vary widely in their toxic effects. One's perception of and attention to high-volume releases may be misdirected when more toxic chemicals are being released at lower volumes (U.S. EPA 2002b). As one group of researcher's noted, "the human health impacts of the various carcinogens and noncarcinogens in the inventory can differ by up to seven and eight orders of magnitude, respectively. That is, a single pound of the most toxic chemicals . . . is toxicologically equivalent to one hundred million pounds of the least toxic of these substances" (Bouwes, Hassur, and Shapiro 2001, 3-4).

The present study overcomes this limitation by applying the EPA's Risk Screening Environmental Indicators (RSEI) model, which the Office of Pollution Prevention and Toxics (OPPT) released in 1999. It provides a way to estimate the relative toxicological impacts of air releases reported in the TRI. The RSEI model provided facility-level risk characterizations for both 1995 and 2000.[7] The final product of applying the RSEI model is an indicator value that represents a risk characterization where users can discern and compare chemicals with dramatically different toxicological effects that are released from manufacturing facilities. Using RSEI, we also calculated a range of risk reduction performance for the 3,295 facilities arranged by quartiles. The best facilities achieved more than sixty-six percent reductions in risk while the lowest performers actually increased risk by sixty-percent or more. Again, first quartile facilities received a score of 1 followed by 2, 3, and 4 for facilities in the second, third, and fourth quartile. Both the release and risk scores were then combined to create an overall environmental performance index ranging from the very best at two and eight representing the poorest results.

We relied on ratios because it allowed us to normalize our dependent measures across counties with significant variations in the number of facilities.

Independent Measures

Candidate independent variables encompassed county measures of *socioeconomics*, *politics*, and *policy* (see Table 2). No single variable was critical in our initial data gathering. Rather, we sought to identify a set of interrelated clusters of variables that captured our understanding of what the literature suggests are the compelling factors in driving local differences.

Our *socioeconomic* variables were meant to serve as controls. Our intent was to avoid attributing to policy or politics what may have more to do with demographic or economic differences across counties (although the three categories of variables are intertwined to some degree). Population, percent Hispanic and Black, education, income, unemployment, and household measures all came from the U.S. Census**.**

Political variables included measures of both total presidential vote 1996, the Democratic presidential vote, and the percent Democratic vote. Following Potoski and Woods (2002) and Ringquist (1993, 1994), we included proxies of industry group strength, such as manufacturing establishments, their employment, their production worker employment, their payroll, their value added to the county's gross product, their value of shipments, and their material costs. These were normalized by calculating per capita versions of each measure. County level civicness was explored through Census County Business Patterns' data on a measures of Standard Industrial Classification (SIC) category 813 or tax-exempt religious, grantmaking, civic, professional & other nonprofit organizations. The number of establishments, their mid-march employment, their first-quarter payroll, and their annual payroll were examined for the following types of nonprofits: (1) business, labor, and political like organizations (8139); (2) civic and social organizations (8134); (3) social advocacy organizations (8133); grantmaking and giving organizations (8132); and religious organizations (8131).[8] In sum, the variables were meant to capture the extent to which political forces at the local level might either directly or indirectly influence pollution reduction.

A set of local *policy* measures included 1992 total and per capita measures of local government revenue, local government property taxes, local government expenditures, local government employment, property taxes, and state government employment. Another two variables were included: federal government employment and expenditures for 1995. The policy measures were intended to capture the extent to which local policy factors may influence trends in facility efforts to reduce pollution.

Results

Bivariate correlations for a variety of resource, political, and policy measures on four categories of dependent variables (county percentages of green TRIs, browns, the ratio of greens to browns, and the ratio of the very best pollution reducers and TRIs increasing pollution the most) yielded a diversity of expected and unexpected patterns (see Table 2). Both percent Hispanic and percent persons with a high school degree were significant socioeconomic variables; they produced a negative and moderate correlation with a county's ratio of firms reducing both releases and risk (Green TRIs) to those increasing them (Brown TRIs). Median household income (MHI) displayed a moderately positive correlation with a county's ratio of the very best to the very worst TRIs. Consistent with an environmental injustice perspective, percent Hispanic produced a moderately positive correlation with the percentage of brown TRIs in a county.

Significant political factors included a county's per capita manufacturing establishments and the percent of county's nonprofits that were civic and social organizations. In an extension of previous research (Potoski and Woods, 2002 and Ringquist, 1994), more industrialized counties did not have as large of a share of facilities reducing pollution. However, counties with a larger proportion of tax-exempt organizations in the civic and social category hosted higher ratios of green facilities. Finally, a county's per capita local expenditures produced an unexpectedly negative correlation with the ratio of a county's TRIs that were characterized as green performers.

In the next phase of the study, the correlation analysis and our theoretical framework guided the exploration of multiple regression models of environmental release and risk reductions using ordinary least squares (OLS). Since our key dependent variables are interval measurements, OLS is an appropriate statistical estimation technique. In order to better understand the influence of each group of variables (resources, policy, and politics), we used hierarchical regression (adding blocks of variables in sequence), comparing not only the importance of particular variables, but also goodness of fit. We began with the resource variables, adding the political and policy variables in turn, in order to more closely examine the impact of the latter two blocks of variables.

The exclusion of insignificant variables left six independent variables (two socioeconomic variables, three political variables, and one policy variable) in our models of toxic chemical trends among facilities aggregated across counties. In three models, we performed multiple regressions on distinct dependent variables that combined release and risk information by county: (1) a percentage measure of county TRI facilities reducing toxic releases among all TRIs; (2) a ratio measure of county's TRI facilities characterized as green in proportion to brown TRIs; and (3) a ratio measure of the top pollution reducing TRI facilities to facilities increasing toxic releases.

In the first model of the percentage of toxic release reducers to increasers, the F-ratio for the resource variables was significant, suggesting that these variables as a whole help to explain the variance of the dependent variable (see Table 4, Column 1). The F-ratio for change due to the addition of the political variables was also significant. For the complete model, the adjusted R^2 accounted for roughly 4.2 percent of the variance and the F-ratio for change that arose from the addition of the policy variables was insignificant. Variables that had an impact on the model included the per capita manufacturing employment (see Table 4, Column 2 and 3), and percent Democratic vote (Table 4, Column 2 and 3).

The regression model meant to capture the effects of the independent variables on a ratio of green to brown facilities (see Table 5) faired better than the release model. Roughly six percent of the variance was explained, and once again, the F-ratio for socioeconomic factors ($p<0.05$) and the F-ratio for change ($p<0.05$) due to the addition of the political variables were both significant. Variables of impact were similar to the previous model.

In the third model of the ratio of the best toxic reducing TRIs to risk increasers (see Table 6), when looking just at our control variables (socioeconomic), the F-ratio was insignificant. The addition of the three political variables had a significant influence (F-ratio for change = $p<0.05$) on the model, suggesting that these variables are having an impact. The addition of the policy factor did not produce a significant difference.

Discussion

The results, taken in their entirety, are suggestive rather than conclusive. There are at least three points we take away from them.

The first is that socioeconomic and political factors may both play a role in driving county differences. For example, state spending per capita manufacturing employment correlates positively with all three of our dependent variables. This is somewhat puzzling because it suggests the counties with a larger share of economic impact from polluting manufacturing have, on average, better environmental performance in their local facilities. Some theoretical work would suggest the opposite; industrially dependent communities may tolerate more pollution. However, the measure of civicness never produces significant associations in our multiple regression models while it did produce significant bivariate correlations.

The control variables are initially significant but in a contradictory way. Poverty levels produce a significantly negative coefficient but so does educational attainment. How to interpret these results is not entirely clear. Although it was predicted that increases in polluting facilities would negatively correlate to economic prosperity, the particular causal mechanism is not obvious given other results. There may be a collective action dynamic or the variable may serve as a proxy for something else of importance.

The third major finding, the lack of significant variance explanation across most of our independent variables, is itself telling. Arguably, some of variance should be explained not only at the county level but also at subcounty levels. Community interactions and internal facility level work may themselves help to explain the variance not yet accounted for at the county level. In sum, county differences can mediate some of what happens at the local level, but only marginally in our current specifications.

Future Directions

Measuring and modeling the factors that influence innovative environmental decisions and outcomes will significantly advance our understanding of their relationship to information disclosure policies. However, we also intend to augment this modeling with qualitative analysis through the use of questionnaires, interviews, and case studies. Such a precedent was outlined by Meier and Kaiser (1996) when they leveled a provocative criticism of traditional regression techniques. They point out that these focus on average cases when more interest may lie in unusual cases. For the research under way, this would be communities with high concentrations of facilities that have undertaken source reduction or have decreased pollution levels beyond what would have been expected (performers). If the most ideal presumptions about information disclosure are right, we would expect to find performing firms to indicate that their environmental management choices were partially or even fully influenced by community factors. On the other hand, much can be learned from communities hosting facilities that struggle to change (or even worsen) their environmental management and/or pollution levels (strugglers).

The initial results presented in this paper will guide our sampling of leading and lagging facilities and the communities in which they are located. We will use survey questionnaires and interviews with corporate officials, state and federal regulators, emergency management committee members, and active citizens in an attempt to document how environmental decisions have been affected by TRI information disclosures. This qualitative phase in the research and use of an explicit comparative case study approach should enable us to learn much about why firms make the kinds of decisions they do about toxic chemical pollution and how communities respond to and influence such decisions.

As suggested early in the paper, there are significant policy implications to work of this kind. Until we know more about the effect of information disclosure programs, we cannot speak with confidence about either their previous success or what changes in policy design or implementation might make them more effective in the future. In later reports we hope to be able to address how the TRI program might be redesigned to provide greater incentives to industrial facilities to reduce both pollution releases and risk levels. We also expect to say more about how communities can use TRI data (including new data coming from the RSEI model) to become better informed about health and environmental risks and help to influence corporate environmental decisions that can have a substantial effect on those risks.

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Figure 1. Community Environmental Capacity and Performance

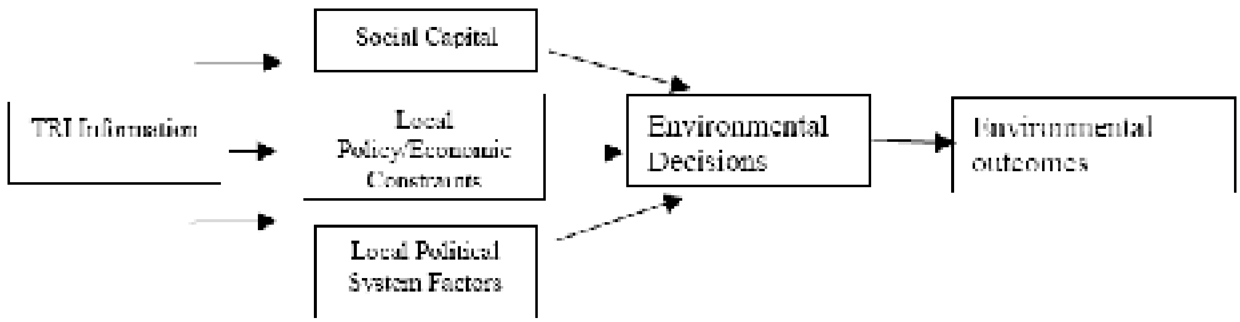

Table 1. Facility Environmental Performance Characterized by Increasing or Decreasing Toxic Releases and Risks

	Increasing (Dirtier)	**Decreasing (Cleaner)**
Decreasing (Safer)	**Blue Facilities** Example: a firm could substitute a more benign chemical for one of its most toxic air releases, but still generate and even release large quantities of less toxic pollutants.	**Green Facilities** Example: a firm installs new pollution control equipment that decreases the volume of its more toxic air releases and initiates source reduction activity that reduces its risk levels.
Increasing (Riskier)	**Brown Facilities** Example: a firm increases production but takes no steps to control the higher volume of toxic air releases and the risk they pose.	**Yellow Facilities** Examples: a firm targets its biggest releases for reductions while maintaining or even increasing a low volume, but highly toxic (riskier) air release.

Table 2. Descriptive Statistics for Variables

	N	Minimum	Maximum	Mean	Standard Dev.	Skewness		Kurtosis	
Dependent Measures						*Statistic*	*SE*	*Statistic*	*SE*
Green Facilities	319	.00	90.00	7.2947	8.37680	5.376	.137	41.486	.272
Brown Facilities	319	1.00	111.00	7.2257	9.11867	7.405	.137	72.610	.272
Pct. Green Facilities	319	.00	.85	.4357	.15962	-.017	.137	-.166	.272
Pct. Brown Facilities	319	.09	.92	.4458	.16500	.258	.137	-.088	.272
Pct. Best facilities	319	.00	.60	.1716	.11948	.529	.137	.087	.272
Pct. Worst facilities	319	.00	.63	.1657	.12403	.873	.137	.820	.272
Green - Brown Ratio	319	.00	8.00	1.3460	1.25612	2.621	.137	8.356	.272
Best - Worst Ratio	272	.00	9.00	1.2643	1.34766	2.090	.148	6.299	.294
Independent Socioeconomic Measures									
Population - total, 1997	319	22472	9145219	435061.97	725553.501	6.992	.137	70.997	.272
Population – black, 1996	319	13	1369307	62245.40	141794.365	5.486	.137	37.209	.272
Pct. Black 1996	319	.030	66.23	11.971	12.836	1.501	.137	1.962	.272
Pct. Hispanic 1996	319	.20000	73.50000	5.2564263	9.25478702	3.809	.137	17.908	.272
Educational attainment – Pct. HS grad	319	53.90000	90.70000	75.7442006	6.85177909	-.549	.137	.333	.272
Educational attainment – Pct. College grad	319	6.70000	41.90000	18.6137931	6.86847216	.716	.137	.002	.272
Median household income 1993	319	21441	59013	34034.22	6732.891	.984	.137	.898	.272
Median household income 1989	319	18522	56273	30467.08	6623.300	1.190	.137	1.508	.272
Pct. persons below poverty 1993	319	2.60000	32.50000	13.4034483	5.25679142	.689	.137	.658	.272
Pct. persons below poverty 1989	319	2.20000	28.00000	11.6996865	4.74611061	.517	.137	.322	.272
Households 1990 (100%)	319	7701	2989552	151954.27	246318.635	6.568	.137	62.985	.272
Pct. Households change 80-90	319	.00000	65.50000	14.6739812	12.14154908	1.496	.137	2.692	.272
Family households 1990	319	5738	2013926	105126.05	165674.602	6.529	.137	62.587	.272
Pct. retail trade establishments 1995	319	16.50000	33.00000	24.3175549	2.87881095	.211	.137	-.170	.272
Pct. service establishments 1995	319	25.60000	42.90000	35.0833856	3.26447524	-.221	.137	-.319	.272
Per capita retail sales1992	319	2879	17183	7925.34	1972.534	.645	.137	2.405	.272
Manufacturing establishments 1992	319	26	18439	694.80	1336.633	8.618	.137	102.515	.272
Manufacturing establishments 20 or more employees	319	15	6032	238.97	444.393	8.630	.137	99.940	.272
Manufacturing establishments 100 or more employees 92	319	5	1325	66.64	106.315	7.755	.137	79.754	.272
Manufacturing employees 1992	319	.00000	725.40000	34.4595611	57.23936358	7.355	.137	75.486	.272
Manufacturing payroll 1992	319	.00000	22617.70000	1147.0874608	1978.42959263	6.236	.137	53.789	.272
Manufacturing production workers 1992	319	.00000	443.80000	20.5642633	32.74089689	8.418	.137	96.475	.272
Manufacturing production worker hours 1992	319	.00000	879.20000	41.8633229	66.10662202	8.158	.137	90.717	.272
Manufacturing value added 1992	319	.00000	48775.90000	2806.9210031	4427.22130049	5.997	.137	49.364	.272
Manufacturing material Costs 1992	319	.00000	49891.40000	2980.7827586	4524.06515651	5.932	.137	47.958	.272
Manufacturing shipments value 1992	319	.00000	103001.60000	5818.1316614	8914.15750790	6.237	.137	54.250	.272
Manufacturing new capital expenditures 1992	319	.00000	2561.50000	194.5169279	293.06670656	4.596	.137	27.856	.272
Manufacturing employment 1995	319	1963	656282	34619.80	53546.310	6.868	.137	66.723	.272
Manufacturing establishments 1995	319	27	18168	700.32	1322.931	8.504	.137	100.299	.272
Manufacturing establishments 100 or more employees 95	319	4	1299	69.30	106.359	7.333	.137	72.783	.272
Unemployment rate 1996	319	1.70000	12.70000	4.9996865	1.77562990	1.182	.137	2.020	.272
Manufacturing employment 1990	305	8	1141383	23477.95	106359.729	9.022	.140	86.528	.278
Earnings in all industries 1994	319	0	164046345	7529411.88	13779481.712	6.568	.137	61.517	.272
Earnings in manufacturing 1994	319	0	27319276	1513036.87	2508091.449	5.806	.137	46.340	.272

Descriptive Statistics	N	Minimum	Maximum	Mean	Standard Dev.	Skewness		Kurtosis	
Independent Political Measures									
Political orgs 1st qrtr payroll	317	0	204409	4965.73	13920.894	10.220	.137	136.888	.273
Political orgs annual payroll	317	0	843308	21107.40	58011.771	9.995	.137	131.708	.273
Political org establishments	317	1	1885	107.38	169.262	5.612	.137	47.379	.273
Civic orgs total employment	317	0	8133	535.26	793.436	5.027	.137	38.834	.273
Civic orgs 1st qrtr payroll	317	0	28727	1572.39	2767.826	5.859	.137	48.859	.273
Civic orgs annual payroll	317	0	124078	6838.08	12063.288	5.788	.137	47.773	.273
Civic org establishments	317	0	613	48.60	58.174	4.355	.137	31.514	.273
Social advocacy orgs employment	317	0	3324	142.47	310.101	5.954	.137	49.405	.273
Social advocacy orgs 1st qrtr payroll	317	0	19021	761.90	1848.987	6.312	.137	53.114	.273
Social advocacy orgs annual payroll	317	0	79695	3248.85	7770.294	6.157	.137	50.815	.273
Social advocacy org establishments	317	0	300	16.02	27.783	5.243	.137	41.798	.273
Giving orgs total employment	317	0	5449	196.91	442.831	6.749	.137	67.647	.273
Giving orgs total 1st qrtr payroll	317	0	42597	1410.71	3486.443	6.979	.137	69.466	.273
Giving orgs annual payroll	317	0	177425	6083.27	14975.290	6.640	.137	62.512	.273
Giving org establishments	317	0	340	20.66	34.089	5.140	.137	39.495	.273
Religious orgs total employment	317	0	3324	142.47	310.101	5.954	.137	49.405	.273
Religious orgs 1st qrtr payroll	317	0	19021	761.90	1848.987	6.312	.137	53.114	.273
Religious orgs annual payroll	317	0	79695	3248.85	7770.294	6.157	.137	50.815	.273
Religious org establishments	317	0	300	16.02	27.783	5.243	.137	41.798	.273
Presidential vote 1996	319	9455	2411014	155045.31	220192.515	5.282	.137	42.720	.272
Democratic presidential Vote 1996	319	4402	1430629	80094.17	129533.077	5.977	.137	51.508	.272
Independent Policy Measures									
Per capita local govt revenue 1992	319	910	5111	1998.10	548.644	1.109	.137	3.064	.272
Per capita local govt property taxes 1992	319	101	2012	629.92	306.010	1.127	.137	1.939	.272
Per capita local govt expenditures 1992	319	831	4543	1987.13	564.699	1.035	.137	1.802	.272
Local govt employment 1992	319	687	451370	18139.78	38306.169	8.002	.137	78.442	.272
Local govt FTE 1992	319	648	424455	15895.71	34418.348	8.240	.137	83.878	.272
Local govt per capita property taxes	319	1564	21979	4543.03	2053.336	3.454	.137	20.405	.272
Local government employment 1990	305	57	497120	9060.02	39989.723	9.265	.140	96.496	.278
State government employment 1990	305	8	404526	5755.55	26886.124	11.925	.140	165.346	.278
Federal government employment 1990	305	9	255881	3940.65	18006.517	10.595	.140	133.899	.278
Per capita federal expenditures 1995	319	1527	24774	4367.50	2145.980	4.175	.137	29.390	.272

Table 3. Selected Pearson Correlations between Local Environmental Performance and Socioeconomic, Political, and Policy Variables

	Environmental				Socioeconomic					Political				Policy	
	Pct Green	Pct Brown	Green Ratio	Best Ratio	Pop	Pct Hispanic	MHI	Pct Pvty	Pct HS	Pct Dem	PC Ma Payroll	PC Civic	Pct Civic	PC Lcl expnd	PC Lcl employ
Environmental															
Percent Green	1	-.836**	.783**	.546**	-.055	-.078	.044	-074	-.047	.038	.181**	.042	.113*	-.028	.026
Percent Brown	-.836**	1	-.796**	-.559**	.046	.125*	-.017	.049	.011	-.047	-.150**	-.069	-112*	.047	-.039
Green Ratio	.783**	-.796**	1	.592**	-.100	-.119*	-.042	-.046	-.114*	-.020	.177**	.047	.116*	-.116*	.044
Best Ratio	.546**	-.559**	..592**	1	.004	-.028	.146*	-.098	.025	.032	.161**	-.089	-.074	.033	-.008
Socioeconomic															
Pop.	-.055	.046	-.100	.004	1	.493**	.120*	.195**	.090	.278**	-.120*	-.217**	-.262**	.257**	-.080
Pct Hispanic	-.078	.125*	-.119*	-.028	..493**	1	-.006	.301**	-.067	.210**	-.251**	-.236**	-.214	.318*	-.151**
Median Income	.044	-.017	-.042	.146*	.120*	-.006	1	-.770*	.678**	-110*	.111*	-.227**	-.208**	.206**	.241**
Pct Poverty	-.074	.049	-.046	-.098	.195**	.301**	-.770**	1	-.566**	.410**	-.195**	-.049	-.094	.125*	-.377**
Pct HS	-.047	.011	-.114*	.025	.090	-.067	.678**	-.566**	1	-.023	-.084	.020	-.227**	.252**	.070
Political															
Pct Dem	.038	-.047	-.020	.032	.278**	.210**	-.110**	.410**	-.023	1	-.112*	-.042	-.319**	.409**	-.300**
PC Ma Pay	.181**	-.150**	.177**	.161**	-.120*	.251**	.111*	-.195**	-.084	-.112	1	.148**	-.107	.024	-.093
PC Civic	.042	-.069	.047	-.089	-.217**	-.236**	-.227**	-.049	.020	-.042	.148**	1	.701**	-.160**	-.005
Pct Civic	.113*	-.112	.116*	-.074	-.262**	-.214**	-.208	-.094	-.227**	-.319**	.116*	.701**	1	-.365**	.189**
Policy															
PC Local Expend	-028	.047	-.116*	.033	.257**	.318*	.206**	.125*	.252**	.409**	.024	-.160**	-.365**	1	-.581**
PC Local Employ	.026	-.039	.044	-.008	-.080	-.151**	.241**	-.377**	.070	-.300**	-.093	-.005	.189**	-.581**	1

Correlation is significant at the 0.01 level (2-tailed)**; or at the 0.05 level*.

Table 4. Hierarchical Regression of the Percentage of County TRIs Reducing Releases

Independent Variables	1	2	3
Socioeconomic			
Percent persons below poverty (1993)	-.161**	-.136	-.132
Percent persons with High School Degree (1990)	-.134*	-.046	-.040
Political			
Per capita manufacturing employment (1992)	-	.166**	.168**
Percent nonprofits characterized as civic and social (1998)	-	.102	.099
Percent Democratic Presidential vote (1996)	-	.156**	.161**
Policy			
Local government general expenditures (1992)	-	-	-.017
Adjusted R Square	.013	.044	.042
F	3.134*	3.936**	3.281**
F (Change)	-	4.403**	.064
N	319	319	319

All of the regression coefficients reported here are standardized coefficients. ***Significant at $p \le .01$. **Significant at $p \le .05$. *Significant at $p \le .10$.

Table 5. Hierarchical Regression of the Ratio of County TRI Reducers (Greens) to Increasers (Browns)

Independent Variables	1	2	3
Socioeconomic			
Percent persons below poverty (1993)	-.169**	-.094	-.073
Percent persons with High School Degree (1990)	-.207**	-.090	-.055
Political			
Per capita manufacturing employment (1992)	-	.207**	.218**
Percent nonprofits characterized as civic and social (1998)	-	.067	.049
Percent Democratic Presidential vote (1996)	-	.086	.114*
Policy			
Local government general expenditures (1992)	-	-	-.095
Adjusted R Square	.026	.055	.059
F	5.197**	4.700***	4.293***
F (Change)	-	4.262**	2.167
N	319	319	319

All of the regression coefficients reported here are standardized coefficients. ***Significant at $p \leq .01$. **Significant at $p \leq .05$. *Significant at $p \leq .10$.

Table 6. Hierarchical Regression of the Ratio of The Best TRI Reducers to Top Increasers

Independent Variables	1	2	3
Socioeconomic			
Percent persons below poverty (1993)	-.134**	-.046	-.044
Percent persons with High School Degree (1990)	-.068	.033	.037
Political			
Per capita manufacturing employment (1992)	-	.193**	.194**
Percent nonprofits characterized as civic and social (1998)	-	-.011	-.014
Percent Democratic Presidential vote (1996)	-	.007	.010
Policy			
Local government general expenditures (1992)	-	-	-.011
Adjusted R Square	.012	.040	.040
F	1.954	2.590**	2.156**
F (Change)	-	2.989**	.026
N	319	319	319

All of the regression coefficients reported here are standardized coefficients. ***Significant at $p \leq .01$. **Significant at $p \leq .05$. *Significant at $p \leq .10$.

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[2] The quotation comes from the "overview" section of "The Toxics Release Inventory (TRI) and Factors to Consider When Using TRI Data," www.epa.gov/tri/tridata/tri00/press/overview.pdf.

[3] TRI facilities include all industrial firms that are required by the EPA to self-report the release of any toxic chemical into the environment. The federal guidelines stipulate that a facility must file a report for the TRI program if it conducts manufacturing operations within Standard Industrial Classification codes 20 through 39 (with a broader set of categories applicable after 1998, such as metal mining, coal mining, and electric utilities that burn coal); has ten or more full-time employees; and manufactures or processes more than 25,000 pounds or otherwise uses more than 10,000 pounds of any listed chemical during the year. For 2000, the TRI was expanded to include new persistent bioaccumulative toxic (PBT) chemicals, with lower reporting thresholds. The full TRI list now includes over 650 chemicals.

[4] There is a lag of two years for data, so the 2004 report (U.S. EPA 2004) references pollution data from 2002.

[5] One striking figure drives home the importance of large manufacturing facilities. In 1999, just 50 facilities out of the 21,000 reporting that year accounted for 31 percent of all the TRI releases nationwide (cited in Graham and Miller 2001). It also is apparent that larger facilities have been more successful on the whole in reducing toxic releases than have smaller facilities.

[6] EPA doubled the reportable chemical list in 1996, thus potentially distorting longitudinal analyses.

[7] The RSEI software begins with the chemical and its air release amount and puts it into a steady-state Gaussian plume model. It then simulates downwind air pollutant concentrations from a stack or fugitive source as a function of facility-specific parameters (stack height, exit gas velocity), local meteorology, and chemical-specific dispersion and decay rates. These factors are then overlaid on demographic data taken from the U.S. Census to produce a surrogate dose estimate for the surrounding population.

8 The industry groups within the subsector are defined in terms of their activities, such as establishments that provide funding for specific causes or for a variety of charitable causes; establishments that advocate and actively promote causes and beliefs for the public good; and establishments that have an active membership structure to promote causes and represent the interests of their members. Establishments in this subsector may publish newsletters, books, and periodicals, for distribution to their membership. (www.census.gov/epcd/ec97/def/813.TXT)