Article

Citizen Partisanship, Local Government, and Environmental Policy Implementation

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Abstract

Local governments play a large, if understudied, role in the implementation of environmental policy in the United States. The major environmental statutes outline explicit responsibilities for the federal and state governments in enforcement under a cooperative federalism framework, and a literature on environmental federalism has developed looking at how variables at the state level affect implementation. Largely ignored by this literature is the important part local governments play in implementation. This study explores one way local politics may influence implementation, investigating the effect of citizen preferences on municipal compliance with the Safe Drinking Water Act (SDWA). The findings show that utilities in Democratic leaning areas violate the SDWA less frequently than those in Republican leaning areas. The results suggest that just as politics influence environmental policy implementation at the federal and state levels, the local role in environmental policy is inherently tied to the political incentives facing municipalities.

Keywords

environmental policy, government responsiveness, policy implementation

Local governments play a large, if understudied, role in the implementation of federal environmental policy in the United States. The major environmental

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statutes of the 1960s and 1970s outlined explicit responsibilities for the federal and state governments in enforcement under a cooperative federalism framework, and a large literature on environmental federalism has developed that investigates how political variables at the state level affect implementation. Largely ignored by this literature is the important part local governments play in implementing the laws. While not explicitly involved in enforcement, U.S. local governments own and operate many of the facilities regulated by the major environmental statutes. In this way, the implementation of environmental regulation in the United States often requires three levels of government, and in many cases, it is local governments that are ultimately responsible for pollution control.

Surprisingly few studies to this point have considered the large part that local governments have in the implementation of federal environmental regulation. This study attempts to investigate one possible political influence on environmental policy implementation at the local level, exploring whether municipal government compliance with environmental regulation depends on the political preferences of the citizens they serve. Recent literature in urban politics has challenged the long-standing idea that city governments are unresponsive to the preferences of their citizens (Einstein and Kogan 2016; Gerber 2013; Tausanovitch and Warshaw 2014). These studies show that local governments are in fact quite responsive to the preferences of the citizens they serve, with governments serving more liberal constituents adopting more liberal policies and cities serving more conservative citizens adopting conservative policies.

Following the recent literature in urban politics, I argue that citizen preferences will influence local government compliance with environmental regulation. I suggest that the incentive structures facing local governments mean cities with more liberal constituents should be incentivized to comply with environmental regulation at higher rates than those serving more conservative citizens. I take up this question by analyzing municipal compliance with the U.S. Safe Drinking Water Act (SDWA). Compliance with the SDWA is an excellent area to investigate how citizen preferences influence environmental policy at the local level. While the citizens served by local governments vary greatly in terms of their partisanship, the SDWA requires all utilities to comply with relatively uniform standards related to the levels of contaminants in drinking water, treatment technologies, and communication with the public. I find that SDWA implementation greatly depends on citizen political preferences. Using Einstein and Kogan's (2016) measure of citizen partisanship at the municipal level, I find that cities serving areas with a higher Democratic vote share commit far fewer violations of the SDWA, even after controlling for a number of demographic, utility, and institutional variables.

The article begins with a discussion of the three-level system that governs environmental policy implementation in the United States, with special attention on the role that local governments have in the process. I then turn to an overview of the urban politics literature on responsiveness, focusing on the recent studies that emphasize how city governments respond to the preferences of the citizens they serve. I follow this by developing a hypothesis about how citizen political preferences may influence the logic of environmental compliance, testing the hypothesis with a quantitative analysis of compliance with the SDWA. The results hold important implications for both the literatures on environmental policy implementation and urban politics.

The Role of Local Government in Environmental Policy Implementation

Many of the iconic U.S. environmental laws enacted in the 1960s and 1970s made cooperative federalism a central part of implementation. Under cooperative federalism, the federal and state governments share responsibility for implementing the goals set out in the statutes. Beginning with the Air Quality Act in 1967 and Clean Air Act in 1970, Congress built explicit roles for state government administration of the new environmental legislation (Jones 1974, 1975). Under the Clean Air Act, Clean Water Act, and SDWA, among others, the national U.S. Environmental Protection Agency (EPA) establishes environmental quality standards that the states can choose to administer themselves. Under these laws, states can establish primacy for implementation and choose to take over responsibility for the enforcement of the laws, as well as set their own regulations above the EPA's minimum requirements.

Importantly, the cooperative federalism framework was not necessarily a consequence of careful policy design, but rather a result of political expediency (Ackerman and Hassler 1981; Hayes 2001; Jones 1974; Melnick 1983; Milazzo 2006). A large literature on "environmental federalism" has developed that explores how this shared responsibility for the administration of the major environmental laws shapes the implementation of environmental policy (e.g., Crotty 1987; Jones 1975; Konisky 2007; Lowry 1992; Oates 2001; Rabe 1999; Ringquist 1993; Scheberle 2005; Wood 1992).

While the literature on environmental policy has played a great deal of attention to the robust role of states in the implementation of the major pieces of U.S. environmental legislation, comparatively little attention has been given to the important role of local governments in implementing the statutes. Indeed, in the cases where local governments own and operate the regulated facilities, it is ultimately the responsibility of local governments to ensure that their citizens are protected from pollution, an important role made clear by the lead crisis in

Flint, Michigan, where the local government decision to change the primary drinking water source from the Detroit Water System to the Flint River led to the leaching of lead into the water supply. Local governments operate drinking water utilities regulated under the SDWA, wastewater treatment plants regulated under the Clean Water Act, landfills regulated under the Resource Conservation and Recovery Act, and many of the variety of facilities regulated under the Clean Air Act. In the case of the SDWA, the subject of inquiry in this article, local government utilities provide drinking water to around 85% of the U.S. population. This means that for most of the country, it is the responsibility of local governments to protect drinking water from pollutants. In this way, while the major environmental laws formalize a system of two-level cooperative federalism, in practice, implementation involves three levels of government.

While local governments have major responsibilities in the implementation of environmental policy, few studies investigating the implementation of environmental policy have focused on local governments. Of the studies cited above, only Jones (1975) and Scheberle (2005) give serious attention to the role of local governments, and even their accounts are primarily focused on other aspects of policy. A few recent studies have begun to investigate local government compliance with environmental legislation, but the theoretical contributions of these studies are generally not focused specifically on political variation among local governments but rather administrative differences (Konisky and Teodoro 2016; Teodoro and Switzer 2016).

What little research has been done on the role of local governments in environmental federalism is mostly descriptive (e.g., Weiland 1998). A few researchers have looked at the local role in environmental federalism through investigations of "unfunded mandates" (Nivola and Shields 2001). These studies investigate how local government capacity affects governments' ability to comply with regulations when these regulations are imposed without a large amount of financial assistance. Cimitile et al. (1997) investigated a series of case studies in New York State, looking how local government administrative capacity affects the implementation of federal policy. Similarly, Rasmussen (2000) explored how local governments balance regulatory compliance pressures with citizen concerns over costs. These studies point to the important possibility that local government characteristics may shape environmental policy implementation in interesting ways, opening up further avenues for research that explore the role of local governments from a large-*N* quantitative approach.

Citizen Preferences and Local Government Policy

Separate from the literature on environmental policy implementation, a large literature in urban politics has addressed the responsiveness of municipal

governments to citizen preferences. Much of the early literature on municipal politics paid little attention to the possibility that governments are responsive to the ideology and political preferences of their citizens. Indeed, until recently, most of the literature on urban politics has argued that due to political constraints and the competitive nature of local government provision of services, including water, fire, police, and education, citizen ideology should play little role in the government policy at the local level. There are a few reasons why this might be the case. First, local governments are often constrained in their decision-making by state politics. Scholars have noted that the numerous constitutional and legislative constraints on local governments mean that local politics are often highly subject to state-level politics (Burns and Gamm 1997; Frug 1980). The hierarchical nature of the relationship between local governments and states means they may not have a great deal of discretion when it comes to their ability to respond to citizen preferences (Gamm and Kousser 2013; Gerber and Hopkins 2011; Vigdor 2004).

In addition to the hierarchical relationship between local governments and state governments, horizontal competition for the provision of services means cities may be limited in their responsiveness to citizen ideology. This competition between cities may mean that they may converge in policy regardless of citizen preferences (Peterson 1981). The Tiebout (1956) model of city politics also suggests that citizen ideology may matter little in local government policy. According to the Tiebout model, citizens will sort themselves into the cities that provide the specific package of public services they desire. In this way, citizens may vote with their feet and not at the ballot box, so the specific policies adopted by cities will not be determined through expressed political preferences in political participation, but rather through the movement of citizens.

Despite the long held idea that cities are not responsive to the policy preferences of their citizens, recent work has begun to investigate the possibility that municipal governments are indeed responsive to the preferences of the citizens they serve. A number of recent articles have found that local governments may be more responsive to citizen preferences than previously thought (Choi et al. 2010; Einstein and Kogan 2016; Gerber 2013; Palus 2010; Tausanovitch and Warshaw 2014). Einstein and Kogan (2016) developed a dataset of municipal-level partisanship using precinct level election data from the 2008 election to investigate the effect of local citizen partisanship on municipal policy. They found that Democratic vote share had an impact on both city spending and revenues, with cities in higher Democratic voting areas having higher revenues and higher spending. Similarly, Tausanovitch and Warshaw (2014) found that cities with more conservative citizens had more conservative policies overall, a higher share of taxes from sales tax, and

lower expenditures and taxes per capita. Somewhat surprisingly, Tausanovitch and Warshaw (2014) found that municipal institutions do not moderate the effect of citizen ideology on municipal policy. Regardless of what types of governmental institutions exist in a municipality, including partisan or nonpartisan elections, cities appear to be responsive to the preferences of their citizens. They conclude that institutions have little effect on the representation of citizen preferences in local government.

Citizen Preferences and Environmental Policy Implementation

Considering the large responsibility of local governments in the implementation of the major pieces of U.S. environmental legislation, the responsiveness of local governments to citizen preferences holds potentially important implications for our understanding of environmental policy implementation. If municipal governments are responsive to the political ideology of their citizens, this could mean that municipal compliance with environmental regulation is determined to some degree by citizen preferences at the local level.

The literature investigating the implementation of environmental policy at the national and state level has long found that enforcement of the major pieces of environmental legislation is impacted by political considerations (Konisky 2007; Ringquist 1994; Wood 1988, 1992). Importantly, citizen policy preferences appear to play a large role in this process. Ringquist (1994), in his investigation of the implementation of the Clean Water Act and Resource Conservation and Recovery Act, found that states with more liberal citizens generally have stronger pollution control programs.

In this article, I argue that government responsiveness to citizen preferences will affect environmental policy implementation at the local level as well. I suggest that municipalities serving more liberal citizens will be more likely to comply with environmental legislation at high rates. I develop this argument using the logic of compliance discussed by Winter and May (2001), where agencies will comply with regulation when the costs of compliance is less than the cost of noncompliance (see also Konisky and Teodoro 2016). Compliance costs include not only the direct capital and operating costs required to comply with environmental regulation but also the indirect political costs associated with raising revenues for compliance (Konisky and Teodoro 2016). While the capital and operating costs may reasonably be assumed to be similar for utilities of similar size (Konisky and Teodoro 2016), the indirect political costs of compliance may be higher or lower depending on the political constraints facing the municipality. Similarly, the costs of noncompliance include not only penalties imposed by regulators for

violating regulations but also indirect political costs for failing to protect public health. Noncompliance means that the local government has failed in preventing pollution, and citizens may choose to punish local governments politically. There are good reasons to think that a more liberal and Democratic leaning city populace would increase the political costs of noncompliance while a more conservative citizenry may increase the political costs of compliance, all else being equal.

First, it is likely that more liberal citizens will demand compliance with environmental law. As noted by Gerber (2013), the public opinion literature gives ample reason to believe that support for environmental protection at the local level should be higher in Democratic leaning areas. Research on environmental public opinion has shown that partisanship and ideology play a significant role in perceptions of environmental risk and support for environmental policy. In their analysis of a series of surveys on environmental issues, Liu, Vedlitz, and Shi (2014) consistently found that political ideology had a strong and significant effect on general environmental concern as well as concern for pollution. In a series of eight surveys on environmental issues over nine years, they found that in each survey, self-identified liberal respondents had significantly greater concern for environmental issues than conservatives. Hannibal, Liu, and Vedlitz (2016) similarly found that more liberal citizens exhibited significantly higher concern over the environment, climate change, and pollution. This greater environmental concern among liberals and Democrats also extends to water issues. Leiserowitz et al. (2011), in their survey of individual opinion on climate policy, found that while 70% of Democrats believed protecting local water supplies from global warming was very important or extremely important, this was true for only 48% of Republicans. Similarly, Bishop (2013) found that Democrats were far more concerned about water availability and more supportive of local regulations on water use than Republicans.

Following the environmental public opinion literature, which has consistently shown higher levels of environmental risk perception and environmental policy support among Democrats and liberals, it is reasonable to expect that more liberal and Democratic leaning citizens will generally pay more attention to environmental policy at the local level and be more politically active when policy is not being implemented properly. This is not to suggest that conservative citizens do not care about pollution or desire noncompliance. Citizens of all partisan and ideological perspectives likely desire less pollution, especially when that pollution can directly affect public health, as is the case with drinking water pollution. Instead, the argument suggests that liberal citizens, given their higher concern for environmental issues and water policy generally, are more likely to be aware of below-standard environmental policy

implementation and more likely to punish noncompliance through political participation. Environmental justice scholars have pointed to latent potential for collective action as a major determinant in compliance with environmental law (Hird and Reese 1998; Konisky and Reenock 2013; Teodoro, Haider, and Switzer, forthcoming). This literature suggests that the political costs of violations will be higher in areas where citizens are more likely to punish noncompliance through political action. If, as expected, liberal citizens would be more likely to be aware of noncompliance and engage in collective action in response to a noncompliant local government, this would increase the expected costs of violation of environmental law for a municipality accordingly.

In addition to the possibility that the expected costs of noncompliance are greater for municipalities serving liberal citizens, it is also possible that the political costs associated with compliance are higher in areas with more conservative citizens. Tausanovitch and Warshaw (2014) found that cities serving more conservative citizens had lower taxes per capita and expenditures per capita. Einstein and Kogan (2016) likewise found that cities with more Republican voters in the 2008 election had lower spending per capita and revenues per capita. Compliance with environmental legislation can be expensive for local governments, and more conservative citizens may not be supportive of the increased costs that come from the investments necessary for compliance. Indeed, Ivanova and Tranter (2008) found that liberals are generally more willing to pay higher taxes for greater environmental protection. In this way, it may be politically costly for the municipalities serving conservative citizens to raise revenues and invest in the infrastructure necessary for compliance, increasing the possibility of violations. Once again, it should be noted that the argument here is not that more conservative citizens desire noncompliance with environmental law. Rather, this theoretical argument suggests that municipalities serving more conservative citizens may face political constraints in their ability to raise the revenues necessary for achieving compliance with environmental law.

The combination of the theorized increased costs of noncompliance in areas with more liberal citizens and the theorized increased costs of compliance in areas with more conservative citizens means it is reasonable to expect that as citizen liberalism increases, the costs of noncompliance should increase accordingly, decreasing the number of expected violations. In this way, citizen preferences may affect local government implementation of environmental policy. This theoretical logic leads to the expectation that municipalities serving more liberal and Democratic leaning citizens will comply with environmental regulation at higher rates than those serving more conservative and Republican leaning constituents. The logic of municipal compliance leads to the following hypothesis to be evaluated:

Hypothesis 1: Municipalities serving citizens with more liberal policy preferences will comply with environmental regulation at higher rates.

Data and Models

The empirical subject of this article is American municipal utilities' compliance with the SDWA. The SDWA, first passed in 1974 and amended in 1986 and 1996, regulates drinking water sources and infrastructure in the United States (USEPA 2004). The SDWA applies to all public water systems in the United States, and requires them to meet certain standards in the treatment and distribution of the potable water. These standards set maximum contaminant limits for drinking water and specify allowable treatment technologies. The SDWA also specifies procedures for testing and public reporting of drinking water quality data. The EPA sets national standards, and states then have the opportunity to set their own standards that are at least as stringent as the national standards. Every state but Wyoming has assumed responsibility for the implementation of the SDWA (Wyoming Department of Environmental Quality 2017). These drinking water standards apply to utility facilities, not individual water customers.

Importantly, while there exists a great deal of variation among local governments that own and operate utilities regulated by the SDWA, all must comply with similar regulatory requirements, allowing for directly comparable measures of implementation. American municipalities vary greatly in terms of institutions, resources, and the populations they serve. Crucially, the partisan voting and policy preferences of citizens within municipalities also vary greatly across the United States. The uniform standards applied by the SDWA and the great variability among American municipalities makes municipal compliance with the law an ideal empirical subject for exploring the effect of citizen partisanship on local environmental policy implementation.

Compliance with the SDWA requires municipal utilities to perform tasks related to both the removal of contaminants from the water and monitoring and reporting. Violations of the SDWA can be grouped into two distinct categories. First, *health violations* reflect a utility's ability to keep contaminants in their water supply below acceptable levels. Included in this category are maximum contaminant limit violations, which occur when the utility fails to keep the contaminants in its water below certain limits set by the EPA and state, and treatment technique violations, which occur when a utility does not use EPA-approved methods of treatment for their water supply. In addition, the SDWA requires utilities to follow certain protocols with regard to testing of their water, filing of reports, and communication with the public. These

include what the EPA calls "monitoring and reporting" violations and "other" violations. The SDWA requires water samples to be sent to certified laboratories at certain time intervals, the issuing of boiled water notices, or simply sending out an annual report to the residents. The violations of these requirements can be considered *management violations*. Previous research has shown major differences in these violations (Teodoro 2014; Teodoro and Switzer 2016), so the analyses here analyze them separately.

Data

I draw on data from a number of sources. I obtained utility data from the EPA's Safe Drinking Water Information System (SDWIS) database. This database contains information about utility size, water source, and compliance. In the present analysis, I evaluate the compliance of municipal water utilities serving populations of five hundred or more. While county governments and special districts are also responsible for the implementation of the SDWA, limiting the analysis to municipalities makes sense for a couple of reasons. First, it allows for a direct comparison between local governments. The relationship between citizen partisanship and local government policy implementation may be quite different between municipal, county, and special district governments, meaning they may not be directly comparable. This is especially true with respect to special districts, where the emphasis on single policy areas has been shown to significantly affect responsiveness to median voter preferences (Mullin 2008). Second, focusing on municipalities alleviates concerns over unit mismatch that often occurs when evaluating environmental outcomes at the local level. A key point of contention in the environmental justice literature has been that many studies are unable to properly match demographic data to environmental data, which has been shown to lead to bias in some findings (Baden, Noonan, and Turaga 2007; Bowen and Wells 2002; Mohai and Saha 2006). Importantly, by focusing on municipal compliance, it is possible to match political and demographic data directly to the environmental outcome under investigation. While it is the case that some municipalities sell water to citizens outside of the city limits, those individuals do not have formal representation in city government, and so their ideology should not impact municipal decision making.

Demographic data were drawn from the 2012 American Community Survey (ACS) five-year estimates. Municipal partisanship data were obtained from Einstein and Kogan's (2016) dataset of municipal partisanship in 38 states. I drew data on municipal institutions from the 2011 International City/County Management Association (ICMA) Survey. In all, 1,424 of the utilities could be matched to the ICMA municipal institutions dataset.

Table 1. Descriptive Statistics.

	Percentage	*M*	*SD*	Minimum	Maximum
Binary variables					
Groundwater supply	59.22				
Purchased water supply	21.29				
New system	3.52				
Partisan elections	15.02				
Ward elections	40.31				
Continuous variables					
Health violations		0.96	5.07	0	240
Management violations		3.42	12.88	0	442
Democratic vote share %		48.33	16.27	0	100
Socioeconomic status		0.00	1.00	−3.07	5.41
% with high school degree		85.34	9.25	21.2	100
% with bachelor's degree		21.88	13.88	0	88.4
% Below poverty		15.86	9.29	0	60
Median household income (1,000s)		48.86	20.98	12.08	250
% Hispanic		11.11	17.36	0	99.76
% black		7.89	15.07	0	100
Population served (1,000s)		21.86	135.96	0.50	8,000
Logged population served		8.59	1.45	6.22	15.89
Mayor-manager balance		−0.10	0.37	−0.60	0.77
Direct democracy		0.27	0.42	−0.34	1.34

The dependent variables in this analysis are counts of the violations of the SDWA committed by a municipal utility from 2009 to 2013. Again, this includes two different types of violations. The first dependent variable is the number of health violations committed by a municipal utility from 2009 to 2013. The second is the number of management violations committed over the same five-year period. Descriptive statistics for these and all other variables can be seen in Table 1. Management violations are far more common than health violations, with utilities in the dataset committing an average of 3.42 management violations and 0.96 health violations over the five-year period from 2009 to 2013.

To measure citizen policy preferences, the primary independent variable in this analysis, I use the municipal partisanship dataset developed by Einstein and Kogan (2016). Einstein and Kogan were able to develop a measure of major party vote share in the 2008 election by matching Census Designated Places with 2008 election precinct data. Their final dataset contained municipal level partisanship for 38 states. I was able to match their dataset to the municipal utilities serving 500 or more individuals from the SDWIS, leaving a total of 6,712 utilities for evaluation. It should be noted here that because

the models include state fixed effects, the use of only 38 states should not introduce any selection bias into the models, since the relevant variation is within state. Although partisanship is not directly equivalent to ideology, they are highly related, and my expectation is that a higher Obama vote share in the 2008 election will be associated with fewer health and management violations of the SDWA.

The analysis also includes a number of control variables. First, it is important to control for municipal demographics. Socioeconomic indicators and race and ethnicity are highly correlated with partisan voting, but they also may be related to environmental implementation. The large literature on environmental justice has found that inequities in environmental policy implementation may be linked to race, ethnicity, and SES (Konisky 2009; Konisky and Reenock 2013; Konisky and Schario 2010; Liang 2016). Implementation may be weaker in poorer communities and communities with larger minority populations. For this reason, the models contain controls for SES, race, and ethnicity. Using data from the 2012 ACS five-year estimates, I control for the percentage Hispanic population and percentage black population in each municipality. The environmental justice literature would suggest that utilities serving municipalities with higher black and Hispanic populations would commit more violations of the SDWA than those serving predominately white communities.

While the literature on environmental justice has been consistent with respect to measures of race and ethnicity, it has been less consistent with measures of SES. Rather than use any single measure to represent SES, I created a variable using factor analysis that incorporates median household income, percent high school educated, percent with a bachelor's degree, and percent below poverty. This is a strategy that has been used in a number of recent articles on environmental justice (Konisky and Reenock 2013; Liang 2016). The factor analysis of the four variables revealed a single factor with an eigenvalue of 2.39, with both of the education variables and median household income loading positively on the first factor and poverty rate loading negatively. Details on the factor analysis can be seen in the statistical appendix. I believe this factor variable more fully represents SES than any single measure of income, education, or poverty. I was able to generate a standardized, regression-based factor score, ranging from −3.07 to 5.41 about a mean of zero, with each unit representing a standard deviation of SES. In other words, a municipality with an SES of zero represents a socioeconomically average community, a value of one is one standard deviation above average SES, and a value of negative one equivalent to one standard deviation below average SES community. The literature suggests that municipalities in higher SES areas should commit fewer violations of the SDWA.

I also included a number of control variables for utility characteristics. I included a control for whether a utility's major source of water is groundwater or surface water, coded as 1 for groundwater and 0 for surface water. Groundwater tends to have fewer contaminants than surface water, so utilities that use groundwater are expected to have fewer health violations (Wallsten and Kosec 2008). Similarly, I expect that utilities that purchase their water supplies primarily from wholesale water suppliers will commit fewer health violations, since the provider is responsible for initial source quality and treatment (Teodoro 2014; Wallsten and Kosec 2008). Water source should have little effect on management violations, since management violations are not directly related to water treatment. The age of a system could also influence the number of health violations committed by a utility, since older systems may have antiquated technology and therefore have a difficult time complying with stringent regulations. Unfortunately, the SDWIS contains no information on the exact age of systems. As a next-best alternative, I created a new system dummy variable coded 1 if the system existed in 1981 (the SDWIS's first year) and 0 if it was first entered into the system at a later date. Since this analysis looks exclusively at municipal utilities, most of the utilities existed at the inception of the SDWIS, and only 3.52% of the systems were entered into the SDWIS after 1981. I also included a variable for the size of the population served by the utility. Smaller utilities often struggle to comply with SDWA regulations, and so it is important to control for the scale of the utility (Scheberle 2005; Teodoro and Switzer 2016). I use a natural logarithmic transformation of the population served measure since it is likely that utility scale has a nonlinear effect on violations. For example, the difference between utilities serving 5,000 and 10,000 residents should be more relevant to violations than the difference between utilities serving 100,000 and 105,000 residents.

Finally, I control for the municipal institutions, matching data from the 2011 ICMA survey to the municipalities in the SDWIS. A large body of literature exists linking municipal institutions to environmental policy adoption at the local level (Bae and Feiock 2013; Lubell, Feiock, and Ramirez de la Cruz 2005; Mullin 2008; Teodoro 2010). Considering the link between institutions and local environmental policy adoption, it is possible that they may affect implementation of the SDWA as well. Following Lubell, Feiock, and Ramirez de la Cruz (2009), I used factor analysis to create measures of local political institutions. Details can be seen in the statistical appendix, but two factors were retained, one representing Mayor-Manager Balance, and the other representing Direct Democracy. Higher numbers for Mayor-Manager Balance means the institutions favor mayors, while higher values of the

Direct Democracy variable represent more institutions favoring direct citizen action. I also included dummy variables for whether the municipality used partisan elections and for whether city council members are primarily elected via ward elections.

Finally, since the EPA and state governments jointly administer regulation of the SDWA, it is important to control for state-level variation. States may vary in their regulatory requirements and the stringency of enforcement. For this reason, I included state fixed effects in all of the models estimated to control for state-level differences in regulatory regimes.

Models

To evaluate the hypothesis that utilities in areas with higher Democratic vote share will commit fewer violations of the SDWA, I estimated a statistical model with the following general form:

$$V_i = \alpha_1 + \beta_1 D_i + \beta_2 E_i + \beta_3 U_i + \beta_4 M_i + \beta_5 S_i + \varepsilon_i,$$

where V represents the count of violations, either health or management, for utility i, D represents Democratic vote share, E represents demographic characteristics related to environmental justice, U represents utility-level characteristics, M represents municipal institutions, S represents state fixed effects, and α and ε are constant and error terms, respectively.

Only 1,424 of the municipalities in the dataset were fully included in the responses to the 2011 ICMA survey. For this reason, I estimated models both with and without the municipal institutions data. Therefore, four models were estimated. Two models evaluated health violations, one without institutional controls and one with, and two models were estimated predicting management violations. The dependent variables in these analyses are counts, meaning linear regression is not an appropriate modeling strategy. In addition, the counts are overdispersed in both cases, meaning a Poisson model may lead to biased results (King 1998). For this reason, I use negative binomial models to estimate the results, since they relax the Poisson assumption of equal mean and variance (King 1998).[1]

The cross-sectional nature of the analysis means the possibility of endogeneity should be addressed. Since the analysis cannot be modeled in a panel time series, this means that there is the possibility that the causal relationship is actually in the opposite direction, meaning environmental implementation influences national election results. There are a few reasons why this is not of large concern here. First, the time lag between the election results in 2008 and the violations data between 2009 and 2013 provides some reason to think that

the relationship is likely modeled in the correct causal direction. Still, if utilities frequently commit violations, this may not fully address the possibility of reverse causality.

The nature of the election data also gives good reason to believe that the relationship is modeled correctly. While vote share in the national election serves as a good proxy for citizen preferences generally and previous research has found that it is related to local government policy (Einstein and Kogan 2016; Gerber 2013), it is more difficult to imagine that drinking water implementation at the local level greatly influences vote choice at the national level. Finally, if it is the case that poor environmental policy implementation influences national election voting, it is likely that the relationship is the opposite of the hypothesis presented here. Citizen experience of poor environmental policy implementation would lead them to vote for candidates more likely to protect the environment, meaning there would be a positive relationship between Democratic vote share and violations, rather than the negative relationship expected here.[2]

Results

The results of the four estimated models can be seen in Tables 2 and 3. Table 2 presents the models predicting health violations of the SDWA, while Table 3 presents the models predicting management violations of the SDWA. Negative binomial models can be difficult to interpret directly. For this reason, I estimated marginal effects for each of the variables with all other variables held at their means. In addition, Figures 1 and 2 display predicted counts showing the effect of Democratic vote share on the number of violations committed by a utility from 2009 to 2013.

Models without ICMA Institutions

Beginning with model (1) in Table 2, which is the model predicting health violations from 2009 to 2013 without the inclusion of municipal institutions, the results show a negative and significant effect for Democratic vote share on health violations. The effect of Democratic vote share is statistically significant at the .001 level, while also being substantively strong. This provides support for the hypothesis suggesting that utilities serving municipalities with a higher Democratic vote share would commit fewer violations of the SDWA. The substantive size of the effect is large, with a single percent increase toward Obama in the 2008 election associated with a 0.020 predicted decrease in the number of violations. This effect can be clearly seen in the top panel of Figure 1, which displays the predicted count of violations

Table 2. Negative Binomial Regression Predicting Health Violations of SDWA 2010–2013.

	(1)			(2)		
	Coefficient	*p* Value	Marginal Effect	Coefficient	*p* Value	Marginal Effect
Democratic vote share	−0.021	<.001	−0.020	−0.034	<.001	−0.034
	(0.004)			(0.010)		
SES	−0.293	<.001	−0.275	−0.494	<.001	−0.495
	(0.056)			(0.134)		
% black population	0.009	.028	+0.009	0.022	.057	+0.022
	(0.004)			(0.011)		
% Hispanic population	0.012	<.001	+0.011	.009	.300	+0.009
	(0.003)			(0.009)		
Ground water	−0.563	<.001	−0.528	0.020	.934	+0.020
	(0.099)			(0.249)		
Purchased water	−0.628	<.001	−0.590	−0.436	.109	−0.437
	(0.112)			(0.273)		
New system	−0.079	.724	−0.074	0.022	.969	+0.022
	(0.225)			(0.583)		
Logged population served	−0.039	.240	−0.037	−.017	.854	−0.017
	(0.033)			(0.092)		
Mayor-manager balance				−0.242	.459	−0.242
				(0.326)		
Direct democracy				0.701	.021	+0.702
				(0.304)		
Partisan elections				0.406	.267	+0.406
				(0.365)		
Ward elections				−0.295	.209	−0.296
				(0.235)		
Constant	1.412	<.001		1.186	.156	
	(0.309)			(.836)		
Observations		6,712			1,424	
Wald Test χ^2		594.27			208.95	
Prob > χ^2		<.001			<.001	

Note. Standard errors in parentheses. Models also include state fixed effects. Marginal effects calculated with other variables at means. *p* Values the result of two-tailed tests, despite directional hypothesis. SDWA = Safe Drinking Water Act; SES = socioeconomic status.

from 2009 to 2013 across Democratic vote share, with all other variables at their mean. A two standard deviation increase in Democratic vote share, from one standard deviation below the mean to one standard deviation above the mean, is associated with a predicted 0.63 decrease in the predicted number of violations over the five-year period investigated here. Considering the average number of violations committed is only 0.96 over the five-year period, a 0.63 decrease is large. The predicted decrease is equivalent to a 49.10% decrease in the predicted number of health violations.

Table 3. Negative Binomial Regression Predicting Management Violations of SDWA 2010–2013.

	(3)			(4)		
	Coefficient	*p* Value	Marginal Effect	Coefficient	*p* Value	Marginal Effect
Democratic vote share	−0.004	.087	−0.013	−0.007	.196	−0.018
	(0.002)			(0.006)		
SES	−0.107	.002	−0.365	−0.158	.046	−0.398
	(0.034)			(0.079)		
% black population	0.007	.004	+0.025	0.005	.424	+0.013
	(0.003)			(0.006)		
% Hispanic population	0.005	.013	+0.018	0.002	.748	+0.004
	(0.002)			(0.005)		
Ground water	−0.229	<.001	−0.778	−0.026	.859	−0.066
	(0.063)			(0.148)		
Purchased water	−0.270	<.001	−0.919	0.007	.968	−0.017
	(0.071)			(0.169)		
New system	0.114	.424	0.387	0.326	.341	+0.821
	(0.142)			(0.343)		
Logged population served	−0.128	<.001	−0.436	−0.066	.231	−0.165
	(0.021)			(0.055)		
Mayor-manager balance				.108	.555	+0.272
				(0.183)		
Direct democracy				0.215	.240	+0.542
				(0.183)		
Partisan elections				−0.088	.723	−0.222
				(0.249)		
Ward elections				−0.238	.093	−0.599
				(0.141)		
Constant	2.346	<.001		1.888	<.001	
	(0.196)			(0.507)		
Observations		6,712			1,424	
Wald Test χ^2		1,964.28			432.28	
Prob > χ^2		<.001			<.001	

Note. Standard errors in parentheses. Models also include state fixed effects. Marginal effects calculated with other variables at means. *p* Values the result of two-tailed tests, despite directional hypothesis. SDWA = Safe Drinking Water Act; SES = socioeconomic status.

The results for management violations, seen in Table 3, are similar. Looking first at model (3), which shows the results for the management model without the ICMA institutional data, Democratic vote share again has a strong negative effect on the number of violations. This finding provides more support for the hypothesized relationship between citizen political preferences and environmental policy implementation. Although the effect is only significant at the .10 level, this *p* value is the result of a two-tailed test, meaning it understates the significance of the effect given

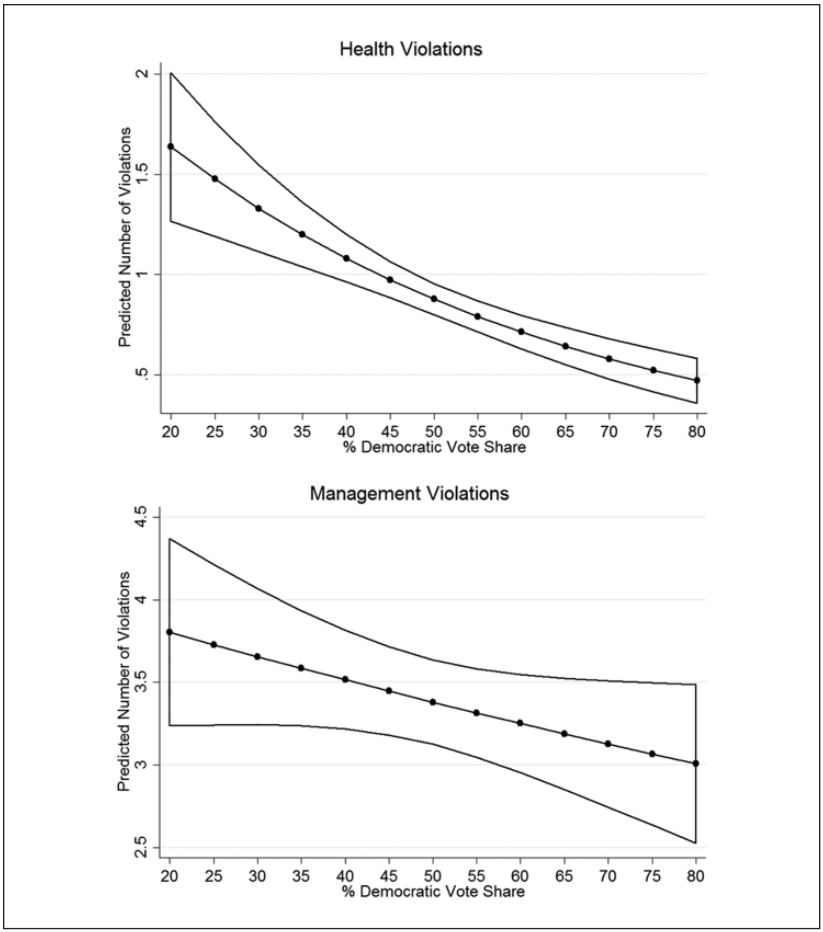

Figure 1. Effect of democratic vote share on SDWA violations.
Note. Figure depicts 95% confidence intervals. SDWA = Safe Drinking Water Act.

the directional hypothesis. Applying the appropriate one-tailed test would yield a p value of .044. A one-percentage point increase in Democratic vote share corresponds with a predicted 0.013 decrease in the predicted number of management violations committed over the five-year period analyzed here. It should be noted that while the size of the marginal effect between the health model and the management model is similar in terms of the effect of partisanship on the number of violations, management violations are far more common than health violations, meaning the

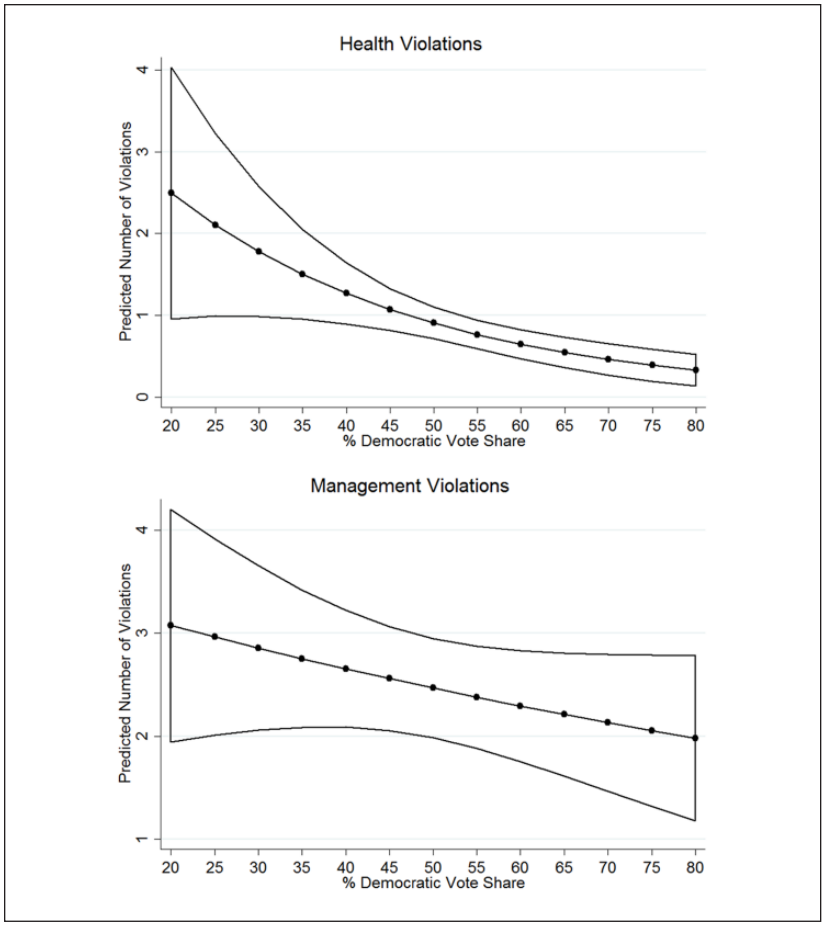

Figure 2. Effect of democratic vote share on SDWA violations with municipal institutions.
Note. Figure depicts 95% confidence intervals. SDWA = Safe Drinking Water Act.

relative size of the effect is not nearly as large. The bottom panel in Figure 1 shows the predicted count of management violations across Democratic vote percentage. Again, the negative effect of Democratic vote share on violations is clear. A two standard deviation increase in Democratic vote share, again moving from one standard deviation below the mean, leads to a 0.44 predicted decrease in the number of management violations, or a decrease of 11.95%.

The effects of the control variables in these models also have some interesting implications. First, all of the demographic variables had strong effects on the number of violations in both the health and management models. Consistent with the environmental justice literature, I found that percentage black population and percentage Hispanic population had a positive effect on the number of violations, while the SES factor score variable had a negative effect on the number of violations. A two standard deviation increase from the mean in percentage Hispanic population is associated with a 0.48 and a 0.69 increase in the number of health and management violations, respectively. A two standard deviation increase from the mean in percentage black leads to a predicted increase of 0.30 health violations and 0.80 management violations. Moving from one standard deviation below mean SES to one standard deviation above is associated with a 0.53 predicted decrease in the number of health violations and a 0.72 predicted decrease in the number of management violations. These models are consistent with what the environmental justice literature would suggest. The SDWA appears to be violated at a higher rate in municipalities that have poorer citizens and have larger minority populations.

The findings for the utility variables also largely conform to expectations. Utilities using groundwater and purchased water as their primary source of water were unsurprisingly found to commit far fewer health violations. Somewhat surprisingly, groundwater and purchased water users were also found to commit fewer management violations. The new system variable was not found to have a significant effect on either health or management violations, while utility size, here represented by the logged population served, had a negative effect in both models, but was only statistically significant in the management model.

Models with ICMA Institutional Data

I now turn to the models that include the institutional controls from the ICMA dataset. These can be seen in models (2) and (4), which show the results for health and management violations, respectively. In general, these results are substantively similar to those of the models without the institutional controls. Beginning with health violations, the results again show that the effect of Democratic vote share has a statistically significant and substantively large negative effect on the number of health violations. In model (2), a one-percentage point increase in Democratic vote share leads to a 0.034 decrease in the number of predicted health violations. The predicted count plot for this model can be seen in the top panel of Figure 2. Once again, it is clear that municipal partisanship strongly effects the implementation of the SDWA at the local level.

In this model, a two standard deviation increase in Democratic vote share is associated with a 1.11 decrease in the predicted number of health violations, equivalent to a 66.67% reduction in the expected number of health violations.

The results for management violations are also similar to the model without the ICMA controls. Although the effect of Democratic vote share on management violations does not reach statistical significance at conventional levels in model (4), the substantive size is still large and essentially equivalent to model (3), with a one-percentage point increase in Democratic vote share resulting in a predicted 0.018 decrease in management violations, actually higher than in the model without institutional variables. The bottom panel in Figure 2 shows the predicted count of management violations across Democratic vote share. This figure shows that the substantive size of the result is still large. Indeed, a two standard deviation increase leads to a predicted 0.60 decrease in management violations, equivalent to a 21.24% reduction. Given the substantively similar effect size between models (3) and (4), it is likely that the reduction in statistical significance is not due to the lack of institutional controls in model (3), but rather the difference in the number of observations between the two models. Again, the two-tailed test actually understates the statistical significance of the effect. Given the directional hypothesis predicting a negative effect of Democratic partisanship, a one-tail test is actually appropriate, meaning the actual p value is .098, meaning it is significant at the .10 level. Regardless, given the substantively similar effect size, and the significant effect of Democratic vote share on violations in the three other models, the evidence for the effect of municipal citizen partisanship on SDWA implementation is still strong.

Some of the municipal institution variables had significant effects on SDWA violations, but no consistent pattern emerged. More mayoral powers were associated with fewer health violations and more management violations, although neither effect was statistically significant. Municipalities with more institutions for direct democracy were found to commit more health and management violations, although the effect was only significant in the health model. Partisan elections had a statistically insignificant relationship with both kinds of violations, while municipalities that primarily elected council members using a ward system committed fewer violations, although this effect was only significant at the .10 level in the management violation model.

Interestingly, the findings for the other control variables were somewhat different in the models including the institutional controls. While SES still had a strong negative relationship with the number of health and management violations, the effects of black population and Hispanic population were mostly no longer as statistically significant and the substantive size of the effects decreased. Black population continued to be significant at the .10

level in the health violations model, but none of the other effects reached significance at conventional levels. In addition, of the utility variables, only purchased water in the health model continued to have a strong effect on the number of violations, and was nearly significant at the .10 level.

Discussion

This study makes contributions to the both the literatures on urban politics and environmental policy implementation. First, this research builds on previous studies investigating the responsiveness of local governments to the preferences of citizens (Einstein and Kogan 2016; Gerber 2013; Tausanovitch and Warshaw 2014). In finding a strong relationship between citizen partisanship and municipal violations of the SDWA, these results provide further evidence that municipal governments are responsive to the ideological preferences of the citizens they serve. As expected, the models showed that as Democratic vote share in a municipality increased, the number of violations of the SDWA decreased. Importantly, this study identifies that municipal responsiveness extends to the implementation of federal environmental policy. Previous research has identified that local government policy is shaped in part by the ideological and partisan preferences of the citizens; this study shows that municipal responsiveness extends to compliance with federal policy as well.

The study also makes a contribution to the large literature on environmental policy implementation. Previous research on the implementation of the major pieces of U.S. environmental policy has largely ignored the crucial role of local governments in achieving the desired policy outcomes, instead focusing exclusively on the two-level cooperative federalism system. The literature has long noted that political variables at the national and state level influence how environmental policy is implemented but has paid little attention to the possibility that political variation among regulated local governments may similarly influence implementation outcomes. This study is an important first step in recognizing how variation in local politics may in part determine environmental policy implementation. In showing that heterogeneity in citizen preferences in part determines government compliance with environmental law, this study brings new attention to the role local governments play in implementation. The results here suggest that environmental policy implementation is perhaps best understood as a three-level system, instead of the commonly discussed two-level system.

While the results here are an important first step in establishing the important role of local politics in environmental policy implementation, they are limited in a few ways. Importantly, the limitations of this study point to the great opportunity scholars of urban politics and environmental policy have in

exploring the political dynamics of environmental policy implementation at the local level. First, the cross-sectional design means that the models may potentially miss over time dynamics of government responsiveness and cannot fully control for the possibility of reverse causality. While panel time series election data are difficult to find at the local level, it may be possible to use data for a select number of states and cities. It will be fruitful to model implementation over time to more fully understand the dynamics of municipal responsiveness in implementation.

Second, while this study explores the politics of municipal compliance with the SDWA, local governments are regulated under most of the major United States environmental laws. While the theoretical argument is easily exportable to other areas of environmental law, it is possible that the dynamics of local compliance are different across the different environmental contexts. A comparative analysis investigating how local politics differentially affects the implementation of the different major pieces of U.S. environmental policy could provide important insights. Implementation of the Clean Air Act, Clean Water Act, SDWA, and Resource Conservation and Recovery Act all require navigating different political challenges for local governments, and exploring these differences comparatively may increase our understanding of environmental policy in the United States.

Finally, the hypothesis discussed here is just an initial inquiry into how local politics affects implementation, and therefore is presented in a fairly simple manner. While this approach has the virtue of being parsimonious, it does mean there is a great deal of nuance to the relationship between local politics and implementation left unexplored. It was not the goal of this study to explore all possible local influences on environmental policy implementation or even provide a complete theory of how citizen preferences are represented in implementation. This study is simply a first step in understanding the role of local governments in the three-level system of environmental policy in the United States. The influences on environmental policy implementation at the local level likely do not end with citizen political preferences. While the results for political institutions were inconclusive in the analysis here, the urban politics literature gives strong reason to believe they may affect implementation of environmental policy. Future research should explore the role of political institutions in greater detail. In addition, there also exists a great deal of variation among the types of local governments responsible for compliance with environmental law. While the analysis here explored municipalities exclusively, county governments and special districts are also responsible for implementation at the local level, and the political dynamics that influence compliance may differ across types of government. Finally, situating local governments in state and national political context

may provide some important insights into how the three levels of government involved in environmental policy implementation interact together to generate environmental outcomes.

While the potential contributions of future research on the topic of local environmental policy implementation are exciting, this should not diminish the important contribution of the present analysis. In extending the focus of environmental policy implementation beyond the cooperative federalism system and exploring the role of local governments, this research reveals the important role of local political dynamics in shaping the environmental policy outcomes in the United States. The findings strongly suggest that just as politics influence implementation at the federal and state levels, the local implementation of environmental policy is inherently tied to the political incentives facing local governments.

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Supplementary Material

Supplementary material is available for this article online.

Notes

1. As is the case in many studies investigating compliance with government regulations, the possibility of unobserved noncompliance merits brief discussion. Konisky and Reenock (2013) have recently used detection-controlled estimation (DCE) to model the possibility that regulators may systematically underreport noncompliance, using the implementation of the Clean Air Act. Although the DCE procedure is useful in some contexts, it does not necessarily apply to SDWA compliance. With respect to the Safe Drinking Water Act (SDWA), the logic that leads to strategic underreporting does not apply. The SDWA regime does not rely on inspections in the same way the SDWA does, meaning that the determination of a violation is strictly procedural, and there is little room for strategic underreporting of the kind described by Konisky and Reenock (2013). While a 2011 audit of the Safe Drinking Water Information System (SDWIS) found that violations might be underreported (GAO 2011), there was no evidence of any motivated underreporting or systematic bias. Thus, for the purposes of inference, it is reasonable to assume that any errors are randomly distributed and will not bias parameter estimates.

2. It is possible that the effect of partisanship on violations is moderated by other variables. Although the goal of this article is not to explore all possible nuances to the relationship between partisanship and compliance, one potential interactive relationship of interest is the possible interaction between socioeconomic status (SES) and partisanship, since citizen ability to collectively mobilize for ideological purposes may be conditioned by their relative prosperity. In addition, it is possible that wealthier populations may care about water quality regardless of partisanship. After testing these possibilities, no consistent finding emerged. Models with the interactions included can be found in the statistical appendix.

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