

Who blames corruption for the poor enforcement of environmental laws? Survey evidence from Brazil

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Abstract Who blames corruption for the poor enforcement of environmental laws? The answer to this question is important since corruption is an important reason why environmental policies are not properly enforced, but previous studies of environmental public opinion do not address the issue. We analyze data from a survey fielded in Brazil in June 2012, immediately preceding the Rio+20 environmental summit. We test hypotheses on income, education, and perception of corruption as a cause of poor enforcement of environmental policy. We find that wealthy individuals are more likely to associate corruption with enforcement failure than their poorer counterparts. However, education is not associated with the belief that corruption is a primary cause of enforcement failure. These results suggest that since wealthy Brazilians have a higher exposure to corruption because of their interaction with government officials, they understand the role of corruption in policy failure. Conversely, the kind of general information that education offers does not raise concern about the role of corruption in

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environmental policy. The results have important implications particularly in democratic societies, where governments have stronger incentives to address the problem if the concerned public associates corruption with enforcement failure.

Keywords Environment · Corruption · Latin America · Brazil · Public Opinion

1 Introduction

Governments of many developing countries have written impressive environmental policies, but their effects on environmental quality are undermined by a lack of rigorous enforcement (Ascher 1999; Bechtel and Tosun 2009). While the lack of bureaucratic resources matters for monitoring and oversight of industry groups, corruption is a key facet that prevents effective environmental policy (Fredriksson et al. 2004; Cole 2007). If corrupt officials accept bribes for looking the other way, individuals and organizations who pollute or destroy natural resources can avoid fines without changing their behavior (Hu et al. 2004; Asproudis 2011).

Who among the general public blames corruption for the poor enforcement of environmental laws? This question has both academic and policy relevance—it is particularly important in a democratic society, where governments are more responsive to concerns from the public than in autocracies (Stigler 1972; Wittman 1995). To the extent that voting constituencies worry about corruption as an impediment to environmental quality, governments have an incentive to implement anti-corruption reforms in environmental policy implementation. Without the public perception of corruption as a cause of weak enforcement, the government has little incentive to combat corruption in environmental policy implementation. In consequence, environmental degradation goes unpunished.

Unfortunately, previous studies have shed little light on how publics perceive the importance of corruption as an impediment to enforcing environmental policy. While existing research has paid attention to the causes of environmental attitudes based on de facto characteristics such as wealth, education and political orientation (Van Liere and Dunlap 1981; Dietz et al. 1998; Dunlap 1975; Dunlap and Mertig 1995), there is a little evidence on why people believe environmental policies are not improving environmental quality based on their de jure characteristics. As much as the demographic traits of people matter in shaping public opinion and government policy, their perceptions are equally important, given that they may motivate politicians to act (Ohdoko and Yoshida 2012). Understanding public perceptions of the causes of enforcement failure can, therefore, help predict and facilitate future action by governments of democratic countries. In turn, such action shapes the effectiveness of environmental legislation on actual outcomes.

We present evidence from a June 2012 survey on environmental issues and policies in Brazil. The survey was conducted by DataSenado, an official Brazilian government agency, in preparation for the Rio+20 United Nations Conference. It surveyed about 1,200 respondents on their opinion on the environment and its regulation in the country. We use a question on the respondent's perception of

corruption as the primary reason that hinders environmental law enforcement. Brazil is an interesting case to study because it is one of the world's biodiversity hotspots, suffers from severe environmental degradation (e.g., Amazonian deforestation), and has in place various environmental policies that are not being properly enforced (Drummond and Barros-Plataiu 2006; Fearnside 2005; Andersen and Granger 2007). Moreover, the failure of enforcement in the country is also associated with corruption (Tabarelli et al. 2005), and there has been little research on environmental public opinion in Brazil.¹

Our primary interest is in the respective roles of income and education, and our findings suggest that personal wealth is an excellent predictor of the perception that corruption is responsible for the lax enforcement of environmental policy. We show that respondents who earn less than minimum wage in Brazil believe corruption to be the primary cause of the loose enforcement of environmental regulations with a probability slightly higher than 0.20; however, this probability increases to more than 0.40 for respondents with the highest levels of income. These findings make sense, given that wealthier individuals interact more with government officials and have more opportunities to observe bribery and therefore associate corruption with enforcement failure in general (Mocan 2008; Hunt and Laszlo 2012).

By contrast, we do not find evidence for educational effects. Assuming education is a good proxy for being informed, the findings suggest that improved environmental awareness does not strengthen the link between corruption and the lax enforcement of environmental policy. While educated people have more access to media and, therefore, information about environmental problems, this information does not seem to strengthen the connection between corruption and environmental policy. One reason could be that the Brazilian media does not emphasize violations of environmental regulations. Another could be that the effect of education on awareness about corruption in environmental enforcement is offset by the selection of educated people into the service sector, where environmental issues are less pronounced than in agriculture and industry.

To set the stage, we begin with a review of environmental legislation in Brazil. We focus on how the environmental laws in the country have changed over time and the disconnect between the laws and its enforcement. Next, we review the literature on public perceptions of environmental policy failure and identify the key contributions of this paper to the fields of environmental politics, corruption, and public opinion. In the following section, we list the main hypotheses on income and education and their relation to the perception of corruption and enforcement of environmental policy in Brazil. Then, we present the research design focusing on the construction of the dependent, explanatory and control variables. Lastly, we present the results of our findings.

2 Environmental problems and legislation in Brazil

The fifth largest country in the world, Brazil houses a wide range of ecosystems. On the whole, the country's diverse climate conditions have made it home to approximately

¹ An exception is Aklin et al. (2013) who examine the environmental preferences of Brazilians.

1.8 million species constituting 13.1 % of the world's biota (Lewinsohn and Prado 2005). However, the large endowment of diverse ecosystems has also resulted in a number of problems in protecting them, especially the deforestation of the Amazonian rainforest (Goodland and Irwin 1975; Booth 1989; Setzer and Pereira 1991; Moran 1994). While these rates have had a positive correlation with the country's economic growth, it has also caused a loss in biodiversity, an increase in greenhouse gases, and problems of pollution (Fearnside 2005).

According to Drummond and Barros-Platiau (2006), environmental legislation in Brazil can be categorized into three major phases. During the period 1934–1964, environmental protection was not a priority for the country. The Brazilian state undertook massive efforts to increase investment in the agricultural sector, formulating national codes for ore, wood, and other natural resource production. Any environmental laws that were put into place during this period were not done for the preservation of the environment to increase economic growth rates.² In the second phase (1964–1988), state intervention in the agricultural economy continued, but there were some targeted regulations to preserve the environment. These included establishing an environmental ministry in 1985 (Aklin and Urpelainen, forthcoming), tackling land reform, becoming a signatory of the Biodiversity and Climate Conventions in 1972, creating the country's first national environmental agency (Special Secretariat for the Environment or 'Secretaria Especial do Meio Ambiente') in 1973 and enacting the Law of the National Environmental Policy in 1981. These measures were seen as a way to balance economic growth and environmental sustainability (Drummond and Barros-Platiau 2006). It was only during the third phase (1989–present) that environmental law in Brazil began to follow a scientific basis and adhered to international standards (Drummond and Barros-Platiau 2006). In 1989, the government established the Institute of the Environment and Renewable Natural Resources, a centralized agency that was responsible for executing and monitoring all environmental regulations (Rylands and Brandon 2005), and after the 1992 Rio Summit, Brazil became a signatory to the Convention on Biological Diversity and protocols on Climate Change and Biosecurity (Fernandes 1992).

Despite the above measures to protect the environment, these laws have not had their intended impact (De Oliveira 2002). Notwithstanding the licenses, implementation, tax credits, and sanctions, deforestation levels in the Amazon basin have not decreased (Fearnside 2005). Though areas have been identified as part of protective regions, these laws have not been enforced to ensure the preservation of the environment. Indeed, "the concept of protective forests is regularly enforced only in some of the more settled Brazilian regions, and even then only to a mild degree" (Drummond and Barros-Platiau

² For instance, the Water and Mines Code decreed that land owners no longer had the right to water or ores that may be present on their private holdings. The reason behind this code was not to protect water and ores from exploitation by the private groups, but to transfer control of such resources to the federal government (Drummond and Barros-Platiau 2006). Indeed, this law helped Brazil become a powerhouse in both ore mining and hydroelectricity during the second half of the twentieth century. Another example of such a law was the Forest Code which established government control over all forests in the country. However, the implementation of this law proved difficult, and the coming decades saw the rise of the logging industry in Brazil and the resulting deforestation of the country's rainforests.

2006, 88). The huge logging industry in Brazil, which accounts for about 3.5 % to the country's GDP (Fordaq 2009), has also contributed to the depletion of the forest region in the country with their culling of newer trees and the estimated damage being almost twice the reaped levels (Veríssimo et al. 1992; Fearnside 2005). More generally, Hochstetler and Keck (2007: 51) argue that

“While Brazilian environmental law is ample and often well formulated, those characteristics are not enough to guarantee its effective application. When Brazilians are asked about particular laws and their impact, one possible response is ‘That law never caught on’ (*essa lei não pegou*). The phrase captures the frequent gap between legal and substantive reality ... the rule of law has always been tenuous and its application profoundly unequal.”

In other words, Brazil is a country with an unusually wide gap between de jure and de facto environmental legislation. This makes the question of corruption as a cause of enforcement failure a central one. Though corruption in Brazil is lower than other big countries like India and China, it is still high compared to its Latin American neighbors (Transparency International 2012). Illegal loggers, big polluting industries like oil, natural gas, and petrochemical production have been accused of flouting regulations to continue their polluting activities (Greenpeace 2001; Tabarelli et al. 2005; Drummond and Barros-Platiau 2006). Even when the culprits are caught, corruption in the legal industry results in prosecutors unwilling to pursue charges against the violators (Kellman 2001–2002).

3 Environment, corruption, and public opinion

The reasons behind the lax implementation of environmental laws can be many. For instance, the laws themselves may be inadequate, or there might not be proper oversight by bureaucratic agencies, a possible lack of environmental education among the populace, or a national consensus of favoring economic growth over environmental protection. This section details the role of corruption in enforcement failure and relates the issue to public opinion.

Several academic works have examined the link between corruption and environmental policy. For instance, Fredriksson et al. (2004) provide a theoretical model where the government achieves utility from two sources—bribes from capital groups and the social welfare of the general population. The bribes induce the government to relax its enforcement of environmental policy which allows for higher productivity of both labor and capital.³ Their model presents a link between corruption and environmental enforcement where higher corruption levels are associated with greater incentives to relax implementation of environmental regulations and favor bribes from the industry over the general welfare of the population. Another related model is Farzin and Bond (2006), who examine the theoretical relationship between democracy and environmental quality. There is also some empirical evidence on the relationship between corruption and the environment. For instance, Welsch (2004)

³ This is not always a clear result. See Farzin (2003) for example.

and Cole (2007) provide a cross-country analysis on the effect of corruption on different measures of pollution. Other scholars have also examined the role of trade, FDI, and political stability mediating the relationship between corruption and environmental policy (Fredriksson and Svensson 2003; Cole et al. 2006; Damania et al. 2003). In addition to the above macro perspectives, there is some micro-level evidence of the link between corruption and environmental regulation in the form of case studies from South Africa, India, Venezuela, Mexico, and Nigeria (Sundström 2012; Desai 1998).

We contribute to the above literature by focusing on public opinion in Brazil, and specifically on corruption as a cause of environmental policy failure. While public opinion on environmental policy has been studied (Inglehart 1995; Bloom 1995; Dunlap and Mertig 1995; Brechin and Kempton 1994), these works do not examine why people believe environmental policies are failing. The focus on public opinion is also relevant in the Brazilian context. Before the 1980s, there was general public consensus that economic growth was favored over environmental protection, but this has changed over the last two decades (Drummond and Barros-Plataiu 2006; Mittermeier et al. 2005). This has also led to heightened calls for government policy to pay more attention to its effects on the environment, and the rise of political parties like the Workers' Party and the Green Party who have articulated clear environmental policies (Guimarães 1991; Moran 1994).

Against this backdrop of increased environmental interest, we examine what Brazilians believe to be the primary impediments to improved environmental quality. We also contribute to the literature on corruption that focuses specifically on Latin America. For instance, Seligson (2002, 2006) uses survey evidence from the region to examine the differences between corruption perception and experience and their impact on regime legitimacy. In a similar vein, Fried (2012) studies clientelism in Brazil through a focus on conditional cash transfers and redistributive politics in the country. Further, Dobson and Ramlogan-Dobson (2012) present cross-country evidence to show the uniqueness of Latin America with respect to corruption and income inequality. In contrast, we study the role of corruption for the enforcement of environmental policies in Brazil. Specifically, we study the perception of corruption in the poor enforcement of environmental laws in the country.

4 Hypotheses on income, education, and perceptions of policy enforcement

There are a number of studies that have examined the nexus between demographic factors and environmental attitudes. The primary predictors of these perceptions include age, education, income, gender, and political ideology (Van Liere and Dunlap 1981; Dietz et al. 1998). We focus primarily on two of these factors— income and education. Both are known to have a profound impact on the environmental attitudes of the respondent, and this is particularly salient in Brazil, where there is a wide variation in both income levels and educational attainment. Our original contribution lies in explaining how individuals perceive the causes of environmental policy failure. Though we choose to focus on income and education, we control for the other possible factors in our empirical assessments.

Higher income levels are generally associated with more concern for the environment since wealthy individuals have already fulfilled their basic economic needs and can hence care more about the environment than poorer members of society (Van Liere and Dunlap 1980; Inglehart 1995). A related reason is that richer individuals have more disposable income and hence are willing to bear the cost of higher levels of environmental quality (Diekmann and Franzen 1999). However, income is also known to have a strong relationship with corruption levels in society and public perceptions of corruption. For instance, You and Khagram (2005) argue that richer people in society are able to lobby and bribe public officials and manipulate both the formulation and enforcement of laws. Moreover, it allows them to be more exposed to corruption and hence they are more likely to think that corruption is a primary reason for the lax implementation of laws. These attitudes towards the environment and corruption are not necessarily conflictual. There is evidence to show that respondents with higher income do not generally support increased government spending on the environment (Jones and Dunlap 1992), possibly because of their exposure to corrupt public officials.

Cross-country evidence on perceptions of corruption supports this assumption. Mocan (2008) analyzes survey data from 49 countries, including Brazil. He finds that in developing countries, people in the upper 50 % of the income distribution have a higher probability of being asked to pay a bribe than people below the median, even controlling for country characteristics or using country fixed effects. However, the relationship does not hold in industrialized countries. Hunt and Laszlo (2012) analyze detailed bribery data in Peru and Uganda. They find that in both countries, “the rich use officials more often, and among users, the rich are more likely to bribe. The benefit of bribery is avoidance of the poor service delivered to clients who refuse to bribe” (Hunt and Laszlo 2012, 355). Both articles are consistent with the causal mechanism between income and corruption that we posit, namely, the idea that a high income increases exposure to corruption.

Given the above arguments, we expect wealthier individuals in Brazil to hold the belief that corruption is responsible for a lack of enforcement. In view of this experience with corrupt officials, they understand that corruption is a roadblock to the implementation of laws. When they see environmental protection failing, they associate the failure with their own experiences as victims or perpetrators of corrupt acts. A common finding in the literature, Damania et al. (2003) show for a mix of developed and developing countries that corruption reduces the stringency with which environmental policy is implemented. Fredriksson et al. (2004) find a similar relationship for 11 industrial sectors in 12 OECD countries, while López and Mitra (2000) demonstrate that in a theoretical rent-seeking model corruption is expected to negatively affect pollution; Welsch (2004) verifies this empirically in a cross-sectional study.

Brazilian political culture may strengthen the association between income and the holding of the belief that corruption is responsible for the failed enforcement of environmental policy. As Hochstetler and Keck (2007: 51) write, “[t]he grotesque levels of social inequality that affect other aspects of Brazilian social and political life are strongly reflected in the legal system.” In such a setting, where wealth is a way to avoid the legal punishment for violating law, individuals with high incomes

are aware of the opportunities that the legal system offers for the privileged not to comply with environmental policies in the books. Exploiting such opportunities is a form of corruption because it requires officials to overlook a violation in exchange for some favor, such as a bribe, either now or in the form of a future quid pro quo. Given this reasoning, we hypothesize as follows.

Hypothesis 1 (Income, Corruption, and Enforcement of Environmental Policy)
Income is positively associated with the perception that corruption is the main reason for the loose enforcement of environmental policy in Brazil.

Other than income, education levels of individuals are also known to affect both environmental preferences and perceptions of corruption. For instance, educational attainment is positively associated with heightened awareness and more concern for the environment (Van Liere and Dunlap 1980; Vining and Ebreo 1990). The reason for this relationship is typically attributed to greater access to information and an ability to understand the complexities that come with preservation of the environment (Howell and Laska 1992). Education is generally accepted to not only increase knowledge, but also change attitudes such as increased spending to protect the environment (Jones and Dunlap 1992). Education is also known to have an impact on perceptions of corruption. Using the 2004 International Social Survey Program, Melgar et al. (2010) show that education is a significant predictor of corruption perception. At a more micro level, Olken (2007) examines the effect of providing more information to individuals and shows that it changes people's perception of corruption.

Based on this reasoning, we consider the possibility that educated individuals in Brazil see corruption as a cause of the failure of environmental policy enforcement. If education creates awareness about both environmental problems and raises concerns about corruption in government and bureaucracy, then educated individuals may associate corruption and environmental policy failure more readily than their less educated counterparts. This argument makes particular sense in a country like Brazil where, as we have shown above, corruption is a real problem for the enforcement of environmental policy. The ties between corruption and environmental policy have been documented both theoretically and empirically in various contexts. Fredriksson et al. (2003) show that corrupt bureaucrats under certain conditions have an incentive to weaken environmental policies to increase rents. In a similar vein, Fredriksson and Svensson (2003) model environmental policy as a function of corruption and political instability, and demonstrate that corruption has a negative effect on environmental regulations, at least when political stability is relatively high (a situation which applies to Brazil in our sample). Finally, using cross-national data, Pellegrini and Gerlagh (2006: 332) claim that "corruption stands out as a substantial and significant determinant of environmental policies."

Hypothesis 2 (Education, Corruption, and Enforcement of Environmental Policy)
Education is positively associated with the perception that corruption is the main reason for the loose enforcement of environmental policy in Brazil.

5 Research design

To determine whether education or income is associated with the belief that corruption is the main reason that hinders the enforcement of environmental laws, we use a telephone survey conducted by DataSenado in preparation for the Rio+20 United Nations Conference on Sustainable Development in June 2012.⁴ The survey was conducted during the first two weeks of June 2012, where respondents were asked about their environmental policy preferences, their opinion on the trade-off between economic growth and environmental protection, and their views on current levels of environmental legislation in the country. To be part of the survey, the respondent had to be a resident of the country, at least 16 years of age, and have access to a landline telephone.⁵ A two-stage sampling strategy was employed for the survey: in the first stage 119 municipalities, including all state capitals, were chosen via probabilistic sampling that included state capitals with probability one and municipalities with a probability equal to their percentage of the total population. For the second stage, quota sampling was used to select landline telephone numbers since no master list of all telephone numbers exists in Brazil.⁶ This resulted in a total of 1,226 respondents.

This survey is one of the few systematic attempts to ascertain the opinion of Brazilians on the environment and its management. We primarily use one question from the survey: the respondent's opinion on the most important reason that hinders environmental law enforcement. Respondents were given six substantive choices: bad laws, inefficient oversight, corruption, economic growth, lack of environmental education, and social inequality (all of which are typical reasons for the lax implementation of environmental laws in Brazil), and respondents were only allowed to choose one of them.⁷ In addition to the above six substantive options, the survey also accounted for other possible reasons by giving respondents the options of 'other' and 'don't know'. The actual wording used for the above question in the survey is provided in the Supplementary Appendix.

We use the respondent's answer to the above question as the main dependent variable of our study. Specifically, we construct an indicator variable of whether Brazilians think corruption as the most important reason that hinders the enforcement of environmental laws. About 30 % of the survey respondents thought of corruption in this manner. Corruption could also manifest itself through different channels. For instance, corruption could be the result of bad legislation where

⁴ DataSenado is an official service of the Department of Research and Opinion, and its objective is "to develop research that serve[s] to strengthen communication between the Senate and the needs and desires of society." See <http://www.senado.gov.br/noticias/datasenado/institucional.asp>. Accessed 5 Nov 2012.

⁵ This survey does not include survey weights. We assume that the polled sample is representative of the population in Brazil, notwithstanding those who have no telephone. See the summary statistics in Table 1 for the demographic characteristics of the survey respondents.

⁶ According to DataSenado, about 20 % of the interviews were checked by trained professionals and the margin of error is 3 %.

⁷ While these substantive choices are indicative of the possible reasons that hinder the enforcement of environmental laws in Brazil, we do not claim that these reflect the actual reasons behind the problem. In this paper, we are interested in explaining Brazilian public opinion about the environmental law enforcement in the country, which is precisely what the survey does.

Table 1 Summary statistics

	Mean	SD	Min	Max	Count
Age	3.49	1.53	1	6	1,072
Education	1.97	0.70	1	3	1,072
Income	2.41	0.97	1	5	1,072
Female respondent	0.53	0.50	0	1	1,072
Environment matters for vote choice	1.97	1.22	1	5	1,072
Opinion on env. legislation	2.71	0.53	1	3	1,072
<i>Responses to survey question 1</i>					
Corruption	0.30	0.46	0	1	1,072
Bad laws	0.08	0.26	0	1	1,072
Inefficient oversight	0.26	0.44	0	1	1,072
Other options ^a	0.36	0.48	0	1	1,072
Total	1				

^a The other options include economic growth (2.8 %), lack of environmental education (24.6 %), social inequality (7.4 %) and other (1 %)

crooked officials intentionally make ineffective laws. Another possible channel could be inefficient oversight by Brazil's environmental regulating agency, the Institute for the Environment and Renewable Natural Resources. Taking these into account, we use an alternative estimation model and different measures of the dependent variable in our section on robustness checks below. We recode the dependent variable among the three main contenders—corruption, bad laws, and inefficient oversight—and examine the channels that influence Brazilian's perception of the most important reasons for the lax implementation of environmental laws.

5.1 Explanatory and control variables

Based on the hypotheses listed above, the main explanatory variables we use are income and education. Income is coded as an ordered variable on a five-point scale based on how much the respondent earns relative to the minimum wage, which, in January 2013, is R\$667 per month, or about US\$300. The lowest value for income corresponds to respondents who earn no income, and the highest category corresponds to a respondent who earns more than ten times the normal minimum wage. The intermediate categories reflect up to twice the minimum wage, between two and five times the minimum wage, and between five and ten times the minimum wage. Like income, the education level of the respondent is also coded as an ordered variable on a three-point scale. The lowest category corresponds to those respondents who have completed primary school education, the next category is for those who have completed secondary school education, and the highest category is for those who have completed a university degree.

We use age and gender of the respondent as two control variables in this study. Both variables are known to affect environmental preferences. In general, age is said to be negatively correlated with environmental concern since the younger generation is generally more active in protecting their natural surroundings, while older individuals in society typically favor a more conservative approach to support the status quo (Van Liere and Dunlap 1981; Mohai and Twight 1987). Similarly, women are generally known to have more concern for the environment than men, who tend to favor economic development over environmental issues. While the precise reasons for this difference are still debated, it is mostly accepted that gender differences do play a role in shaping opinion about the environment (Blocker and Eckberg 1989; Mohai 1992; Stern et al. 1993). Age is coded as an ordinal variable on a seven-point scale with the lowest category for respondents <20 years of age, the highest category for those more than 60 years of age, and the others in between at intervals of ten years. Gender is coded as an indicator variable for a female respondent.

It is also possible that the opinion of the respondent is influenced by their political preferences (Dunlap 1975). For instance, a respondent could think that corruption is the main reason hindering the enforcement of environmental laws in Brazil because corruption is so endemic across the political spectrum. To account for this, we control for the frequency with which the respondent took a candidate's proposals into account when they voted. This variable is coded on a five-point ordinal scale where the highest category corresponds to the respondent always taking a candidate's environmental positions into account followed by 'frequently', 'sometimes', 'rarely' and 'never', in that order.

In addition, it is possible that people reason about the causes of the poor enforcement of environmental laws because they think that the laws themselves are insufficient to protect the environment. Hence, we control for their opinion on the sufficiency of the environmental legislation in Brazil. This variable is coded on a three-point ordinal scale where the respondents can choose between whether they think the current laws are 'too rigorous', 'adequate', or 'too lenient'. The actual wording used for the above questions in the survey is provided in the Supplementary Appendix.

In Table 1 above, we present the summary statistics for the dependent, explanatory, and control variables. It is also notable that the vast majority of Brazilians believe environmental policy is not enforced rigorously enough; the mean value is 2.71 on a 1–3 scale, with 3 indicating the opinion that enforcement is 'too lenient'. We also provide the correlation matrix between the different variables used in this study in the Supplementary Appendix. We can observe that there is a positive correlation between education and income (0.37) and between age and income (0.27). The correlations between these variables are expected and are not so high as to raise concerns about multicollinearity.

We use two main estimation equations in this paper. In the first, we treat the income and education categories as ordinal categorical variables and examine whether the coefficient of the income categories are increasing. That is,

$$\text{Logit}(Y_i) = \sum_s \beta_{1s} I(\text{Income}_i \in \text{Category}_s) + \sum_t \beta_{2t} I(\text{Education}_i \in \text{Category}_t) + \beta'_3 X_i + \gamma_j + \psi_k + \epsilon_i$$

where Y_i is the dependent variable that captures the importance of corruption in explaining the resistance towards efficient environmental law enforcement, $I(\cdot)$ represents an indicator function, X_i is a vector of control variables, γ_j are state level and ψ_k are municipal level fixed effects, and ϵ_i is the error term. For Hypothesis 1, we test whether the coefficients of income categories are increasing, i.e., $\beta_{11} < \beta_{12} < \dots < \beta_{15}$. For Hypotheses 2, we test whether the coefficients of education categories are increasing, i.e., $\beta_{21} < \beta_{22} < \beta_{23}$.

In the second estimation, we treat the income and education categories as continuous variables

$$\text{Logit}(Y_i) = \beta_0 + \beta_1 \cdot \text{Income}_i + \beta_2 \cdot \text{Education}_i + \beta'_3 \cdot X_i + \gamma_j + \psi_k + \epsilon_i,$$

where Income_i and Education_i are the main explanatory variables, and the remaining variables Y_i , X_i , γ_j , ψ_k and ϵ_i are the same as in the previous estimation equation. The use of logistic regression is useful since our aim is to compare the importance of corruption versus all other possible reasons for the loose implementation of environmental regulations. We could have also used a multinomial logistic regression model, but this depends on the baseline category chosen. In any event, we include the multinomial model as part of our robustness checks.

6 Findings

We present four sets of results. First, we present a graph that shows the proportion of respondents who thought that corruption was the main cause for the loose enforcement of environmental policy in Brazil separated by income and education. This helps to visually present correlations between the dependent variable and the main independent variables. Second, we discuss the main regression results of the study where income has a positive and statistically significant effect on corruption being an important hindrance for the implementation of environmental laws. These results are robust to the inclusion of controls as well as state and municipality fixed effects. However, the education level of the respondent is not significant in any of the models. Third, we present results from a multinomial logistic regression model where we examine different channels through which income could affect the respondent's choice. The results provide support that corruption is the primary reason for the respondent's choice, even if we allow for alternatives like bad laws or inefficient oversight. Lastly, we show a placebo test showing that the robust effect of income is specific to perceptions of enforcement, and that it is not a good predictor of environmental concern. This alleviates concerns about the possibility that wealthy people are simply more worried about the environment, and therefore emphasize corruption—something the federal government could address—as the cause of the lax enforcement of environmental policy.

6.1 Main results

There is a high degree of correlation between respondents with a higher income and their opinion of corruption as the main reason for the loose implementation of environmental policy. As Fig. 1 below shows, wealthy respondents are more likely to think of corruption in this manner. This high correlation level is, however, absent for the respondent's education levels. There is only a slight increase in the proportion of respondents who perceived corruption as the primary reason for the lax enforcement of environmental regulations in the country. In the results that follow, we will show that the association of this perception of corruption and income levels is robust, whereas its correlation with education levels is weak and not statistically significant.

The main regression results are presented in Tables 2 and 3 below. The dependent variable in all models is an indicator of whether the respondent perceived that corruption was the main reason for the loose implementation of environmental laws. We have included the two competing explanatory variables—income and education—in all the models. Individual control variables like age, gender, role of environment in vote choice, opinion on environmental legislation as well as municipal and state fixed effects are introduced progressively. In Table 2, we treat the different categories of income and education as ordinal categorical indicator variables. We can observe that the coefficient of income increases with the income categories and is statistically significant in all models. However, the coefficient of education does not increase and is statistically insignificant in all models. These results provide support for Hypothesis 1, but not for Hypothesis 2.

In Table 3, we treat income and education as continuous variables, and we can observe that income has a positive association in all models, and these effects are statistically significant at the 0.01 level throughout. Hence, the main results lend support in favor of Hypothesis 1 that income is a significant predictor of whether respondents thought corruption was the reason for the loose enforcement of environmental laws in Brazil.⁸ In contrast, education does not have a statistically significant effect in any of the models. Although both variables are correlated, only income has an impact in our models.⁹ We attribute this difference to the different mechanisms of income and education in shaping the respondent's opinion. We posit that income increases the chances of experience with corruption, whereas education does not necessarily do so.

Notably, these results are different from a study in Mexico City, where the poor are more vulnerable to corruption in traffic control than the rich (Fried et al. 2010). In the case of environmental policy, corruption allows wealthy individuals to avoid

⁸ While these results point to income having a statistically significant effect on the respondent's perception, the survey unfortunately does not include questions that ask respondents on their exposure to corrupt activities. In addition, since the survey included respondents with landline telephones only, we rerun the estimations using weights from the Brazilian census and our main findings hold in all models. These results are available in the Supplementary Appendix.

⁹ In order to account for the correlation between the income and education variables, we present the Variance Inflation factors for the full model in the Supplementary Appendix.

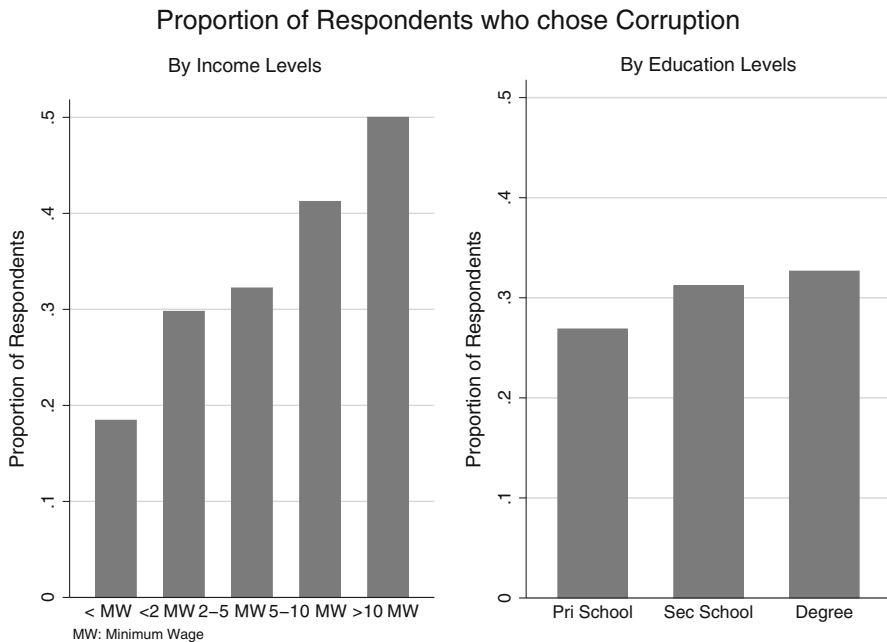


Fig. 1 Proportion of respondents perceiving corruption as the primary cause of lax environmental policy enforcement

regulation; in the case of traffic control, the poor are more vulnerable, and so they need to pay bribes to avoid receiving a speeding ticket.

It is also worth noting that gender has a statistically significant effect on the respondent's perception about corruption. Female respondents are less likely to think that corruption is the main reason for the lax enforcement of environmental regulations in Brazil. Although we do not focus on gender in this paper, we attribute this result to gender inequality in Brazil. Women in Brazil are more educated than men, on average, but still earn less than their male counterparts.¹⁰

Since, we cannot interpret coefficients directly from a logistic regression model (King et al. 2000), we use model 6 in Table 2 (minus the state and municipal fixed effects) to generate Fig. 2 that graphs the predicted probability of whether the respondent perceived that corruption was the main reason for the loose enforcement of environmental regulations on the respondent's income. For this substantive plot, we fix the respondent's age, education, gender, whether the environment matters for their vote choice, and their opinion on environmental legislation at the median levels in the sample, and compute the predicted probability as a function of the respondent's income. The graph shows that while respondents without income believe corruption to be the primary cause of enforcement failure with a probability slightly higher than 0.20, this probability increases to more than 0.40 for respondents with the highest level of income.

¹⁰ See, for example, <http://www.socialwatch.org/node/14372>. Accessed 20 Dec 2012.

Table 2 Main results (with discrete IV)

	(1)	(2)	(3)	(4)	(5)	(6)
0–2 minimum wages (0/1)	0.637*** (0.224)	0.574** (0.225)	0.573** (0.225)	0.559** (0.225)	0.552** (0.226)	0.529** (0.233)
2–5 minimum wages (0/1)	0.764*** (0.246)	0.596** (0.254)	0.586** (0.254)	0.565** (0.254)	0.559** (0.254)	0.601** (0.264)
5–10 minimum wages (0/1)	1.174*** (0.315)	0.993*** (0.324)	0.993*** (0.324)	0.985*** (0.323)	0.969*** (0.324)	1.032*** (0.332)
>10 minimum wages (0/1)	1.526*** (0.413)	1.256*** (0.428)	1.267*** (0.426)	1.311*** (0.427)	1.299*** (0.429)	1.438*** (0.443)
Secondary school (0/1)	0.159 (0.172)	0.200 (0.174)	0.183 (0.174)	0.159 (0.175)	0.154 (0.176)	0.127 (0.181)
Degree (0/1)	-0.023 (0.221)	0.086 (0.226)	0.065 (0.226)	0.049 (0.225)	0.042 (0.226)	0.010 (0.232)
Age	0.007 (0.048)	0.027 (0.049)	0.024 (0.049)	0.021 (0.049)	0.022 (0.049)	0.018 (0.051)
Female respondent		-0.386*** (0.143)	-0.395*** (0.143)	-0.427*** (0.144)	-0.423*** (0.144)	-0.416*** (0.151)
Env for vote choice			-0.051 (0.058)	-0.046 (0.058)	-0.043 (0.058)	-0.061 (0.061)
Opinion on env. legislation				0.276** (0.134)	0.276** (0.134)	0.296** (0.141)
Constant	-1.602*** (0.279)	-1.421*** (0.286)	-1.288*** (0.324)	-1.994*** (0.476)	-1.939*** (0.494)	-2.237*** (0.759)
Municipal fixed effects	No	No	No	No	Yes	Yes
State fixed effects	No	No	No	No	No	Yes
Observations	1,072	1,072	1,072	1,072	1,072	1,063

The dependent variable in all models is an indicator for whether the respondent thought corruption was the main reason for the lax implementation of environmental laws in Brazil. All the above models are logistic regressions. Huber–White (robust) standard errors reported in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3 Main results (with continuous IV)

	(1)	(2)	(3)	(4)	(5)	(6)
Income	0.327*** (0.080)	0.260*** (0.084)	0.260*** (0.084)	0.265*** (0.084)	0.262*** (0.085)	0.299*** (0.089)
Education	-0.037 (0.105)	0.015 (0.108)	0.003 (0.108)	-0.005 (0.108)	-0.009 (0.108)	-0.021 (0.112)
Age	-0.006 (0.047)	0.014 (0.048)	0.011 (0.048)	0.008 (0.048)	0.010 (0.048)	0.007 (0.050)
Female respondent		-0.376*** (0.142)	-0.384*** (0.143)	-0.413*** (0.144)	-0.409*** (0.144)	-0.399*** (0.150)
Env for vote choice			-0.051 (0.058)	-0.044 (0.058)	-0.042 (0.058)	-0.059 (0.060)
Opinion on env. legislation				0.279** (0.134)	0.278** (0.134)	0.294** (0.140)
Constant	-1.538*** (0.262)	-1.354*** (0.273)	-1.219*** (0.309)	-1.961*** (0.480)	-1.895*** (0.499)	-2.314*** (0.764)
Municipal fixed effects	No	No	No	No	Yes	Yes
State fixed effects	No	No	No	No	No	Yes
Observations	1,072	1,072	1,072	1,072	1,072	1,063

The dependent variable in all models is an indicator for whether the respondent thought corruption was the main reason for the lax implementation of environmental laws in Brazil. All the above models are logistic regressions. Huber–White (robust) standard errors reported in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

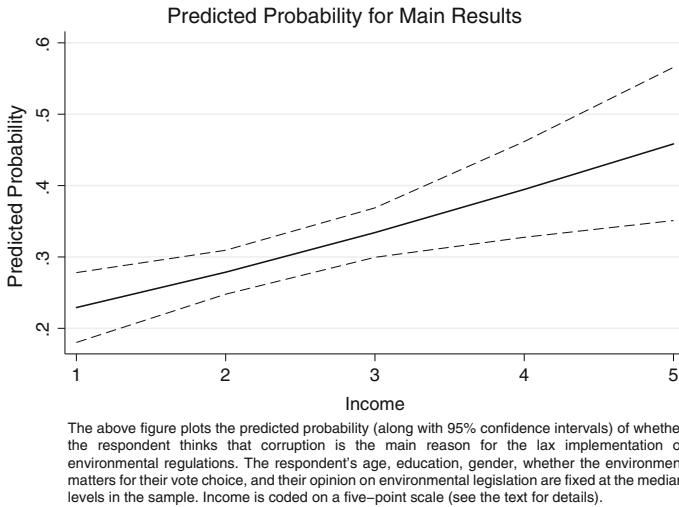


Fig. 2 Predicted probability of perceiving corruption as the primary cause of lax environmental policy enforcement

In short, we have established that income is a statistically significant predictor of whether the respondent thought that corruption was the main reason for the lax implementation of environmental regulations in Brazil. On the other hand, we find that education is a poor predictor of this perception. In the next section, we present two sets of robustness tests to further reinforce support for Hypothesis 1.

6.2 Robustness

The dependent variable in our main models was an indicator of whether the respondent thought that corruption was the primary reason for the loose enforcement of environmental laws. The survey question also included other options that relate to policy implementation, such as poorly formulated legislation and inefficiencies in oversight. To gain a better understanding of how the respondents thought about the role of corruption relative to other deficiencies in implementation, we now explicitly distinguish between these different alternative views.

To account for the above two possibilities, we present robustness tests that distinguish between these different channels. Specifically, we create an alternative measure of our dependent variable where we differentiate between respondents who chose ‘corruption’, ‘bad laws’, and ‘inefficient oversight’ as the primary reason for the lax implementation of environmental regulations. In the Supplementary Appendix, we present the results of a multinomial logistic regression with these different alternatives.¹¹ Income continues to have a positive effect across all models

¹¹ We test the Independence of Irrelevant Alternatives assumption with the Hausman, seemingly unrelated estimation, and the Small–Hsiao tests. The results of these tests are also available in the Supplementary Appendix.

for the ‘corruption’ alternative and remains statistically significant at the 0.01 level. The effect is sustained even when we include control variables like age, gender, and municipal level fixed effects. The ‘bad laws’ alternative has income with a positive and statistically significant effect at the 0.05 level in models (1) and (2), but this drops to the 0.1 level as additional controls are imposed. The ‘inefficient oversight’ option has income with a positive effect, but is not statistically significant in any of the models.

Taken together, these results suggest that the respondents perceive corruption as a distinct cause of enforcement failure. There is no evidence that inefficient oversight, as distinguished from corruption, would cause public concern. The respondents also seem to be concerned about weaknesses in the formulation of legislation, though the confidence intervals around the estimated impact of income on this perception are wider than those around the corruption estimate. Even allowing for a lack of trust in competent policy formulation, corruption continues to worry the citizens. Among other things, this may suggest that our initial corruption result does not stem from anti-government ideology, as respondents who are against government intervention would presumably select ‘bad laws’ over the ‘corruption’ option.

6.3 Placebo test

As discussed in the hypotheses section above, income could affect the respondent’s perception of corruption as the main reason for lax implementation of environmental regulations in Brazil because of exposure to corrupt activities. However, income could also influence an individual’s opinion on the importance of environmental policy (Scruggs 2003). In this case, it could be that income does not change the perception of enforcement; instead, income strengthens environmental concern and causes the frustrated individual to blame corruption for failure. The real cause behind the respondent’s option would be environmental concern, not income.

First, notice that in our main results in Table 3, the inclusion of the respondent’s opinion on the environment does not change either the magnitude or the statistical significance of the income variable. To further rule out this possibility, we present a placebo test where we show that income does not determine a respondent’s environmental policy preference. While environmental quality is often assumed to be a normal or a luxury good, additional income may have little effect in a country such as Brazil. Higher income has been shown to increase environmental concerns in wealthy countries (Franzen and Meyer 2010), but a pro-environmental stance might only be triggered after a given absolute level of income is reached. Such a prediction is consistent with the literature on the environmental Kuznets curve (Grossman and Krueger 1995) and country-level evidence that finds a positive relation between average income and environmental views (Franzen 2003).

In the Supplementary Appendix, we use a continuous variable that represents the frequency with which the respondent takes a candidate’s environmental proposal into account before voting as the dependent variable, and show that income is not a significant predictor of such environmental policy preferences. This lends support to

the theory that income affects the respondent's perception due to corruption exposure rather than political preferences.

7 Conclusion

Many environmental policies go unenforced, and the problem is particularly severe in developing countries. While there are many reasons for this enforcement failure, corruption ranks high among them in importance. In democratic societies, action to remedy the problem is more likely if the public associates corruption with enforcement failure. In this context, it is important to understand the perceptions of the general public when it comes to the enforcement of environmental regulations, especially the determinants of those who think of corruption as the key reason for the lax implementation of environmental laws.

We have examined this question using data from a survey fielded in Brazil only two weeks before the Rio+20 summit. In one of the survey questions, the respondent was given a variety of reasons why environmental policies are not enforced more rigorously. We focused specifically on corruption and found that wealthy individuals believe corruption to be a significant cause of enforcement failure. However, no such effect was found for education. We found that this relationship is robust to the addition of many controls and also provided a placebo test to show that the results are not driven by environmental concern among richer respondents. This lends support to the theory that wealthier respondents are more likely to be exposed to corruption, and are more likely to perceive corruption as being the main cause for the loose enforcement of environmental regulations in Brazil. Other than the theoretical contribution, these results also have policy implications. Since, we do not find any effect for education in our study, it shows that improved awareness of the environment may not necessarily lead to the strengthening of the link between corruption and the lax enforcement of environmental policy. This could possibly be reversed with an information campaign in schools and media outlets highlighting the relationship between corruption and environmental policy in Brazil. Similarly, awareness campaigns about corruption and environmental policy could be targeted to lower income people. This would help in increasing attention to an important reason for the weak implementation of environmental policy in Brazil.

References

- Aklin M, Urpelainen J (forthcoming) The global spread of environmental ministries: domestic-international interactions: *International Studies Quarterly*
- Aklin M, Bayer P, Harish SP, Urpelainen J (2013) Understanding environmental policy preferences: new evidence from Brazil. *Ecol Econ* 96:28–36
- Andersen LE, Granger CWJ (2007) Modeling Amazon deforestation for policy purposes: reconciling conservation priorities and human development. *Environ Econ Policy Stud* 8(3):201–210
- Ascher W (1999) Why governments waste natural resources: policy failures in developing countries. Johns Hopkins University Press, Baltimore

- Asproudis E (2011) Revisiting environmental groups and members' behaviour: budget, size and (im)pure altruism. *Environ Econ Policy Stud* 13(2):139–156
- Bechtel MM, Tosun J (2009) Changing economic openness for environmental policy convergence: when can trade agreements induce convergence of environmental regulation? *Int Stud Q* 53(4):931–953
- Blocker JT, Eckberg DL (1989) Environmental issues as women's issues: general concerns and local hazards. *Soc Sci Q* 70(3):586–593
- Bloom DE (1995) International public opinion on the environment. *Science* 269(5222):354–358
- Booth W (1989) Monitoring the fate of the forests from space. *Science* 243(4897):1428–1429
- Brechin SR, Kempton W (1994) Global environmentalism: a challenge to the postmaterialism thesis? *Soc Sci Q* 75(2):245–269
- Cole MA (2007) Corruption, income and the environment: an empirical analysis. *Ecol Econ* 62(3–4):637–647
- Cole MA, Elliott RJR, Fredriksson PG (2006) Endogenous pollution havens: does FDI influence environmental regulations? *Scand J Econ* 108(1):157–178
- Damania R, Fredriksson PG, List JA (2003) Trade liberalization, corruption, and environmental policy formation: theory and evidence. *J Environ Econ Manag* 46(3):490–512
- De Oliveira JAP (2002) Implementing environmental policies in developing countries through decentralization: the case of protected areas in Bahia, Brazil. *World Dev* 30(10):1713–1736
- Desai, U (eds) (1998) *Ecological policy and politics in developing countries: economic growth, democracy, and environment*. State University of New York Press, Albany
- Diekmann A, Franzen A (1999) The wealth of nations and environmental concern. *Environ Behav* 31(4):540–549
- Dietz T, Stern P, Guagnano G (1998) Social structural and social psychological bases of environmental concern. *Environ Behav* 30(4):450–471
- Dobson S, Ramlogan-Dobson C (2012) Why is corruption less harmful to income inequality in Latin America? *World Dev* 40(8):1534–1545
- Drummond J, Barros-Platiau AF (2006) Brazilian environmental laws and policies, 1934–2002: a critical overview. *Law Policy* 28(1):83–108
- Dunlap R (1975) The impact of political orientation on environmental attitudes and actions. *Environ Behav* 7(4):428–454
- Dunlap RE, Mertig AG (1995) Global concern for the environment: is affluence a prerequisite? *J Soc Issues* 51(4):121–137
- Farzin HY, Bond CA (2006) Democracy and environmental quality. *J Dev Econ* 81(1):213–235
- Farzin YH (2003) The effects of emissions standards on industry. *J Regul Econ* 24(3):315–327
- Fearnside PM (2005) Deforestation in Brazilian Amazonia: history, rates, and consequences. *Conserv Biol* 19(3):680–688
- Fernandes E (1992) Law, politics and environmental protection in Brazil. *J Environ Law* 4(1):41–56
- Fordaq (2009) http://www.fordaq.com/fordaq/news/softwood_logsprices_19189.html. Accessed 7 Dec 2012
- Franzen A (2003) Environmental attitudes in international comparison: an analysis of the ISSP surveys 1993 and 2000. *Soc Sci Q* 84(2):297–308
- Franzen A, Meyer R (2010) Environmental attitudes in cross-national perspective: a multilevel analysis of the ISSP 1993 and 2000. *Eur Sociol Rev* 26(2):219–234
- Fredriksson PG, Vollebergh HRJ, Dijkgraaf E (2004) Corruption and energy efficiency in OECD countries: theory and evidence. *J Environ Econ Manag* 47(2):207–231
- Fredriksson PG, Svensson J (2003) Political instability, corruption and policy formation: the case of environmental policy. *J Public Econ* 87(7–8):1383–1405
- Fredriksson PG, List JA, Millimet DL (2003) Bureaucratic corruption, environmental policy and inbound US FDI: theory and evidence. *J Public Econ* 87(7–8):1407–1430
- Fried BJ (2012) Distributive politics and conditional cash transfers: the case of Brazil's *Bolsa Família*. *World Dev* 40(5):1042–1053
- Fried BJ, Lagunes P, Venkataramani A (2010) Corruption and inequality at the crossroad: a multimethod study of bribery and discrimination in Latin America. *Latin Am Res Rev* 45(1):76–97
- Goodland RJA, Irwin HS (1975) *Amazon jungle: green hell to red desert? An ecological discussion of the environmental impact of the highway construction program in the Amazon Basin*. Elsevier Scientific Publishing, Amsterdam
- Greenpeace (2001) *Partners in mahogany crime: Amazon at the mercy of 'gentlemen's agreements'*. October 1 <http://www.greenpeace.org/usa/en/media-center/reports/partners-in-mahogany-crime/>

- Grossman GM, Krueger AB (1995) Economic growth and the environment. *Q J Econ* 110(2):353–377
- Guimarães R (1991) The ecopolitics of development in the third world: politics and environment in Brazil. Lynne Rienner, Boulder
- Hochstetler K, Keck ME (2007) *Greening Brazil: environmentalism in state and society*. Duke University Press, Durham
- Howell SE, Laska SB (1992) The changing face of the environmental coalition: a research note. *Environ Behav* 24(1):134–44
- Hu J-L, Huang C-H, Chu W-K (2004) Bribery, hierarchical government, and incomplete environmental enforcement. *Environ Econ Policy Stud* 6(3):177–96
- Hunt J, Laszlo S (2012) Is bribery really regressive? Bribery's costs, benefits, and mechanisms. *World Dev* 40(2):355–372
- Inglehart R (1995) Public support for environmental protection: objective problems and subjective values in 43 societies. *Polit Sci Polit* 28(1):57–72
- Jones RE, Dunlap RE (1992) The social bases of environmental concern: have they changed over time? *Rural Sociol* 57(1):28–47
- Kellman JE (2001–2002) The Brazilian legal tradition and environmental protection: friend or foe. *Hastings Int Comp Law Rev* 25:145–167
- King G, Tomz M, Wittenberg J (2000) Making the most of statistical analyses: improving interpretation and presentation. *Am J Polit Sci* 44(2):341–355
- Lewinsohn TM, Prado PI (2005) How many species are there in Brazil? *Conserv Biol* 19(3):619–624
- López R, Mitra S (2000) Corruption, pollution, and the Kuznets environment curve. *J Environ Econ Manag* 40(2):137–150
- Melgar N, Rossi M, Smith TW (2010) The perception of corruption. *Int J Public Opin Res* 22(1):120–131
- Mittermeier RA, Da Fonseca GAB, Rylands AB, Brandon K (2005) A brief history of biodiversity conservation in Brazil. *Conserv Biol* 19(3):601–607
- Mocan N (2008) What determines corruption? International evidence from microdata. *Econ Inq* 46(4):493–510
- Mohai P (1992) Men, women, and the environment: an examination of the gender gap in environmental concern and activism. *Soc Nat Resour* 5(1):1–19
- Mohai P, Twight B (1987) Age and environmentalism: an elaboration of the Buttel model using national survey evidence. *Soc Sci Q* 68(4):798–815
- Moran EF (1994) The law, politics, and economics of Amazonian deforestation. *Indiana J Glob Leg Stud* 1(2):Article 6
- Ohdoko T, Yoshida K (2012) Public preferences for forest ecosystem management in Japan with emphasis on species diversity. *Environ Econ Policy Stud* 14(2):147–169
- Olken B (2007) Monitoring Corruption: Evidence from a Field Experiment in Indonesia. *Journal of Political Economy* 115(2):200–249
- Pellegrini L, Gerlagh R (2006) Corruption, Democracy, and Environmental Policy: An Empirical Contribution to the Debate. *The Journal of Environment & Development* 15(3):332–354
- Rylands AB, Brandon K (2005) Brazilian Protected Areas. *Conservation Biology* 19(3):612–618
- Scruggs L (2003) *Sustaining Abundance: Environmental Performance in Industrial Democracies*. Cambridge University Press, New York
- Seligson MA (2002) The Impact of Corruption on Regime Legitimacy: A Comparative Study of Four Latin American Countries. *Journal of Politics* 64(2):408–433
- Seligson MA (2006) The Measurement and Impact of Corruption Victimization: Survey Evidence from Latin America. *World Development* 34(2):381–404
- Setzer AW, Pereira MC (1991) Amazonia Biomass Burning in 1987 and an Estimate of their Tropospheric Emissions. *Ambio* 20:19–22
- Stern PC, Dietz T, Kalof L (1993) Value Orientations, Gender, and Environmental Concern. *Environment and Behavior* 25(5):322–348
- Stigler GJ (1972) Economic Competition and Political Competition. *Public Choice* 13(1):91–106
- Sundström A (2012) Corruption in the commons: why bribery hampers enforcement of environmental regulations in South African fisheries. University of Gothenburg Working Paper
- Tabarelli M, Pinto LP, Silva JMC, Hirota M, Bedê L (2005) Challenges and Opportunities for Biodiversity Conservation in the Brazilian Atlantic Forest. *Conservation Biology* 19(3):695–700
- Transparency International (2012) Corruption Perceptions Index <http://www.transparency.org/cpi2012/results>

- Van Liere K, Dunlap R (1980) The Social Bases of Environmental Concern: A Review of Hypothesis, Explanations and Empirical Evidence. *Public Opinion Quarterly* 44(2):181–197
- Van Liere K, Dunlap R (1981) Environmental Concern: Does it Make a Difference how it's Measured. *Environment and Behavior* 13(6):651–676
- Veríssimo A, Barreto P, Mattos M, Tarifa R, Uhl C (1992) Logging impacts and prospects for sustainable forest management in an old Amazonian frontier: the case of Paragominas. *Forest Ecol Manag* 55(Logging Impacts and Prospects 1–4):169–199
- Vining J, Ebreo A (1990) What Makes a Recycler? A Comparison of Recyclers and Nonrecyclers. *Environment and Behavior* 22(1):55–73
- Welsch H (2004) Corruption, Growth, and the Environment: A Cross-Country Analysis. *Environment and Development Economics* 9(5):663–693
- Wittman DA (1995) *The Myth of Democratic Failure: Why Political Institutions are Efficient*. University of Chicago Press, Chicago
- You J-S, Khagram S (2005) A Comparative Study of Inequality and Corruption. *American Sociological Review* 70(1):136–157