Local interest group activity and environmental degradation in authoritarian regimes

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Abstract

An extensive literature shows that democracies tend to do a better job of protecting the environment than autocracies. Much less work has been done to explain the considerable variation in environmental quality *within* many authoritarian settings. We help fill this gap with an empirical study of Vietnam – one of the world's most stable authoritarian regimes as well as one of the most environmentally vulnerable. We focus on the relationship between interest group activity and environmental outcomes (air and water quality) at the district level. While participation of more actors in civic and political life has the potential to improve outcomes by enhancing scrutiny of government, interest group activity can also harm the environment, as environmental goals often run counter to economic development. Our analysis shows that districts characterized by higher levels of local interest group activity tend to have lower air and water quality. This result is consistent across a range of model specifications and estimation strategies. These findings imply that organization of local interests may be detrimental to environmental quality in authoritarian settings and that effective mobilization of actors who would benefit from high environmental quality (i.e., citizens) may be overshadowed by those of pro-business interests. As such, our findings highlight the limits of popular participation related to environmental protection in authoritarian regimes – particularly those that base their legitimacy on economic development.

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1 Introduction

The past decade has been characterized by exceptional global heat, retreating ice, and record sea levels – largely as a consequence of human activities (IPCC, 2019). At the same time, rapid industrialization in the Global South has led to unprecedented levels of air and water pollution in many countries (GBD 2017 Risk Factor Collaborators, 2018). The scope and nature of such impact is not uniform, however, which reflects in part variation in government responses. Differences in regime type are understood as particularly important to explain this variation. In particular, democracy is believed to favor environmental protection: electoral pressures serve to both promote responsiveness to citizen concerns about the environment and accountability for addressing these concerns (Barrett and Graddy, 2000). Indeed, empirical studies find that democracies tend to perform better when it comes to reducing human-induced environmental degradation, including air pollution, water pollution, and deforestation (e.g., Li and Reuveny, 2006; Bernauer and Koubi, 2009; Mak Arvin and Lew, 2011).

However, certain features of democracy have been shown to hinder environmental protection. First, the efficacy of popular participation in environmental planning is rife with collective action problems, given that any individual's engagement is unlikely to generate benefits sufficient to offset the costs of participation (Rydin and Pennington, 2000). Moreover, democracy empowers not only citizens but also corporations and special interest groups who may be opposed to pro-environment policies (Midlarsky, 1998). Although there are widespread long-term benefits to environmental protection, policies to achieve such goals are often seen as detrimental to economic interests in the short term (Kirchgässner and Schneider, 2003). Therefore, economic interests can organize and undermine environmental quality or avoid regulation – through both legal and corrupt means (Fredriksson et al., 2004; Lopez and Mitra, 2000). Indeed, the strength of organized economic interests has been shown to correlate with lower environmental quality (Bernauer and Koubi, 2009).

The empowerment of anti-environment interests at the expense of the collective good is not unique to democracies, however. Indeed, we might expect this phenomenon to be even more pernicious in autocracies – particularly those that base their legitimacy on economic development. Given the short-term trade-offs between economic and environmental interests, and the fact that economic development is an important concern for the population in low- and middle-income countries (Ingle-

hart, 1995), business interests often trump environmental concerns (Vi and Rambo, 2003; Bruun, 2020). Moreover, unlike in democracies, citizens concerned with environmental degradation in authoritarian regimes often lack opportunities to demand responses from their governments and hold them accountable if they fail to act (Norlund, 2007; Taylor et al., 2012; Nguyen and Datzberger, 2018).

To better understand the ways in which different groups in society advocate for their interests, and the consequences of such activity for environmental quality, it is important to move beyond cross-country comparisons. We therefore focus our study on subnational variation in one authoritarian regime: Vietnam. The country is one of the most stable authoritarian regimes in the post-World War II era (Levitsky and Way, 2013). Vietnam's stability is thought to be owed primarily to its dramatic economic growth in recent decades, which has been achieved largely through reforms to liberalize the economy (Hiep, 2012). The country is also one of the world's most vulnerable to climate change, ranking sixth on the Global Climate Risk Index 2020 (Eckstein et al., 2020). Although environmental degradation is increasingly visible, it does not feature prominently among citizens' concerns, which tend to be focused on improving their material circumstances (Bruun, 2020). Hence, Vietnam is an ideal setting to study the trade-offs between economic growth and environmental degradation, and identify the local institutions that facilitate them. Studying a single country also allows us to isolate key features of political institutions while holding a number of other factors constant, strengthening our ability to draw credible inferences.

We focus on the relationship between interest group activity and environmental outcomes at the local (district) level. Following Bernauer and Koubi (2009), we take a broad view of interest group activity[1], and include citizens' memberships in civic and political groups, participation of non-party and self-nominated candidates in elections, and the (corrupt) influence of anti-environment business interests. We then consider how the presence of these local interests relate to two key environmental outcomes: air and water quality.

Our analysis draws on data from Vietnam's 208 districts. While Vietnam is a one-party state, decentralization policies have been pursued alongside economic liberalization beginning in the mid-1980s. Furthermore, seats for local office are popularly contested and non-party members are

[1]Their definition encompasses labor union strength, share of green parties in national parliaments, and civil liberties.

permitted to run. In addition, civil society participation in Vietnam is on par with democracies at similar income levels.[2] As a result, there is considerable variation in the degree of local interest groups' engagement across Vietnamese districts.

Our analysis shows that districts characterized by higher levels of local interest group activity tend to have lower air and water quality. This result is consistent across a range of model specifications and estimation strategies. These findings imply that organization of local interests may be detrimental to environmental quality in authoritarian settings and that effective mobilization of actors who would benefit from high environmental quality (i.e., citizens) may be overshadowed by those of pro-business interests.

This study makes a number of important contributions. To our knowledge, it is the first to systematically examine how interest group activity relates to environmental quality at the local level. Furthermore, we provide insights about the dynamics of environmental protection in an authoritarian setting, adding an important perspective to a literature that to date has been dominated by China. This is an important research agenda, given that over half of the world's population currently live in autocracies and that democratic backsliding threatens to constrain the advantage enjoyed by citizens in many other countries (V-Dem Institute, 2020). Furthermore, the majority of non-democracies are concentrated in the Global South (Ibid.), which is also home to some of world's greatest environmental challenges (Givens et al., 2019). Finally, our findings highlight the limits of popular participation related to environmental protection in authoritarian settings – particularly those that base their legitimacy on economic development.

This paper proceeds as follows. The following section presents our theoretical expectations regarding how environmental quality can be affected by interest group activity in authoritarian regimes. Section 3 then provides relevant background information about Vietnam and Section 4 describes our empirical strategy and data. Results are presented in Section 5 and discussed in Section 6.

[2]See Figure 1 in Section 4.

2 The Challenge of Environmental Protection in Authoritarian Regimes

Environmental protection presents a challenge to polities around the globe as it often entails actions seen to slow down short-term economic growth – particularly when growth is based on increases in material production and exploitation of natural resources. Moreover, it is often not the first priority for citizens (Inglehart, 1995).

While this challenge manifests regardless of regime type, it may be more pernicious in autocracies for a number of reasons (Li and Reuveny, 2006; Bernauer and Koubi, 2009). First, authoritarian settings have fewer fora for increasing public awareness about environmental issues. Autocracies are also less likely to have environmental issues on their political agenda than authoritarian regimes as they are less open to a variety of interests. Finally, the lack of free and fair elections means citizens cannot hold politicians accountable for promises to address environmental concerns (Povitkina, 2018). As a result, environmental protection in authoritarian settings depends almost entirely on the will of authoritarian leaders. Such leaders tend to favor business interests – who often have close ties with political elites (Barboza, 2012) – at the expense of environmental protection. The influence of business interests is especially likely to prevail in authoritarian regimes that base their legitimacy on economic development. We discuss this in greater detail below and then turn our focus to the activities of local interest groups and their relationship to environmental outcomes.

2.1 Economic development as authoritarian legitimation

Authoritarian regimes rarely rule by repression alone. Rather, establishing some form of legitimacy is understood as vital to the survival and durability of authoritarian rule (Backes and Kailitz, 2015). Scholars concur that most durable authoritarian regimes legitimate their rule through socioeconomic performance (Dukalskis and Gerschewski, 2017; Von Soest and Grauvogel, 2017). Economic development has been seen as fundamental to the creation of legitimacy and subsequent survival of military regimes in Latin America (Epstein, 1984), as well as that of authoritarian rule in South Korea (Park, 1991), Indonesia (Mietzner, 2018), and Vietnam (Hiep, 2012).

Authoritarian regimes that base their legitimacy on economic development may be hesitant to constrain pro-business interests, even when their activities are detrimental to the environment

(Bruun, 2020). This can open the door to lax regulation and corruption, where pro-business interests can bribe their way out of regulation, or influence political decision-making related the environment through other corrupt means (Alcaide Garrido et al., 2011; Hoang, 2018). Unconstrained political leaders in turn have incentives to engage in practices that bring private benefits from being in power, but are detrimental to the achievement of long-term goals for the benefit of the general population, such as environmental protection (Povitkina and Bolkvadze, 2019). For example, Eaton and Kostka (2014) illustrate how short tenure cycles in China incentivize local cadres to prioritize short-term over long-term gains, tolerating or even promoting corruption related to environmental regulation while they benefit from bribes and kickbacks.

Much less is known about how such dynamics play out at the local level *within* authoritarian regimes. That is, why do some localities perform better or worse than others when it comes to curtailing environmental degradation, for example, limiting air pollution or ensuring that water is safe for household use? In order to explain such variation, we argue that the degree of interest group activity is particularly important.

2.2 Local interest group activity and environmental quality

The influence of different actors and interests on policymaking in authoritarian regimes is constrained in comparison to democracies, but is non-negligible in many cases. For example, in electoral autocracies, opposition political organizations or candidates are able to participate in elections to varying degrees. In many less draconian regimes, citizens may organize in groups to pursue their collective interests and ideals to some extent. Many such regimes also see business actors, trade unions, and environmental non-governmental organization advance their interests through lobbying or extra-legal means.

The influence of more actors on policymaking can be helpful to ensure higher levels of scrutiny of governing actors, and more channels to hold them accountable. Involvement of local actors also increases the chances that welfare-promoting issues will be in the interest of one of the key political actors and reach the political agenda. For instance, Cruz et al. (2020) show that social fractionalization, measured in terms of the number of distinct clans, reduces the risk of elite capture and leads to increased public goods provision at the village level in the Philippines. Rosenberg et al. (2018) consider how local pluralism affects health outcomes within Russia. Here, pluralism is

understood in terms of the degree to which multiple groups of influential elites with independent bases of economic and political support exist and compete for control of a given region. They show that higher levels of pluralism are associated with better health outcomes – though only in rich regions.

While such examples speak to the benefits of having more actors influencing policymaking, there is also a risk of empowering actors with divergent interests and thus potentially undermining achievement of development goals – particularly those characterized by large scale collective action problems. Environmental quality stands out in this regard, since government, industry, and the population at large often have competing and incompatible interests – at least in the short term. These trade-offs can be especially poignant for low-income countries, where economic development is critical for improving livelihoods but environmental degradation represents an existential threat for some communities (Nguyen and Pham, 2012). For example, O'Rourke's (2001) study of the Tan Mai paper factory outside Ho Chi Minh City paints a vivid picture of a divided community that both depends on the factory for income and is injured by its activities.

Previous research on democracies reflects the potential downsides of empowering a range of interests when it comes to environmental quality. Madden (2014) shows that OECD countries with more veto players (i.e., federalism, bicameralism, presidentialism, the existence of referendums, judicial review, single-member district electoral rules or pluralist form or interest-group representation) are significantly less likely to adopt climate policies. Additionally, Scruggs (1999) finds that in pluralist systems with competitive interest representation, where various interest groups stand on equal footing when lobbying their interests to the governments, environmental performance is worse than in corporatist societies.

Turning to the influence of local actors on environmental protection *within* countries, Stadelmann-Steffen's (2011) analysis of climate change policy in Switzerland is enlightening. This study suggests that direct democracy makes it difficult to implement far-reaching climate change policies, though it can produce more incremental changes supported by a broad political elite. Schwartz (2004) argues that in China, devolving power to local authorities has been detrimental for environmental protection since local governments tend to focus on short-term economic growth. Relatedly, Van Rooij (2006) argues that weak enforcement of environmental regulation reflects conflicts of interest between national regulations and local stakeholders.

In this study we take an exploratory approach and investigate the connection between the influence of local interests and environmental outcomes (air and water quality) at the district level in Vietnam.

3 Local actors and environmental protection in Vietnam

The Socialist Republic of Vietnam is a one-party state comprised of four formal structures: the Vietnam Communist Party (VCP), the People's Armed Forces, the state bureaucracy (central and local government), and the Vietnam Fatherland Front (an umbrella group for mass organizations) (Thayer, 2010). Following constitutional reforms in 1992, the unicameral, popularly elected National Assembly officially became the supreme organ of the government with exclusive powers to pass laws and oversee government. In practice, however, the VCP is still seen as playing these roles and thus the National Assembly has been understood as a rubber stamp for decisions already decided upon by the government or the party. Furthermore, close observers of Vietnamese politics hold that the central party-state leadership pre-plans the composition of the National Assembly in a "paint-by-numbers" manner (Malesky and Schuler, 2009, 2019).

Although power is centralized in terms of party politics, decentralization policies have been pursued since the *Doi Moi* ("Renovation") reforms begun in 1986, which sought to replace the central planning model of socialism with a "market-oriented socialist economy under state guidance" (Beresford, 2008: 221). These reforms have empowered three additional tiers of government below the central government level.[3] The pace of decentralization has accelerated since the late 1990s, and local authorities have been granted increasing fiscal autonomy since the adoption of the 2002 State Budget Law (SBL) (World Bank, 2015).

Vietnam's subnational units also exhibit varying degrees of environmental degradation. While air pollution is a problem in urban locales given traffic congestion and widespread use of cars and motorbikes, it also stems from ground level ozone (O_3), brick kiln emissions (Nguyen, 2009), and industrial activities, spread throughout the country outside the urban centers. Major sources of

[3]First, the country is divided into 58 provinces and five centrally-controlled municipalities – Hanoi, Ho Chi Minh City, Can Tho, Da Nang and Hai Phong. Provinces and municipalities are subsequently divided into districts, provincial cities, and district-level towns. These second-level administrative units are subsequently divided into communes, townships, and wards. For the sake of readability, and reflecting the dominant administrative unit type at each level, we refer to all first-level administrative units as provinces, all second-level units as districts, and all third-level units as communes.

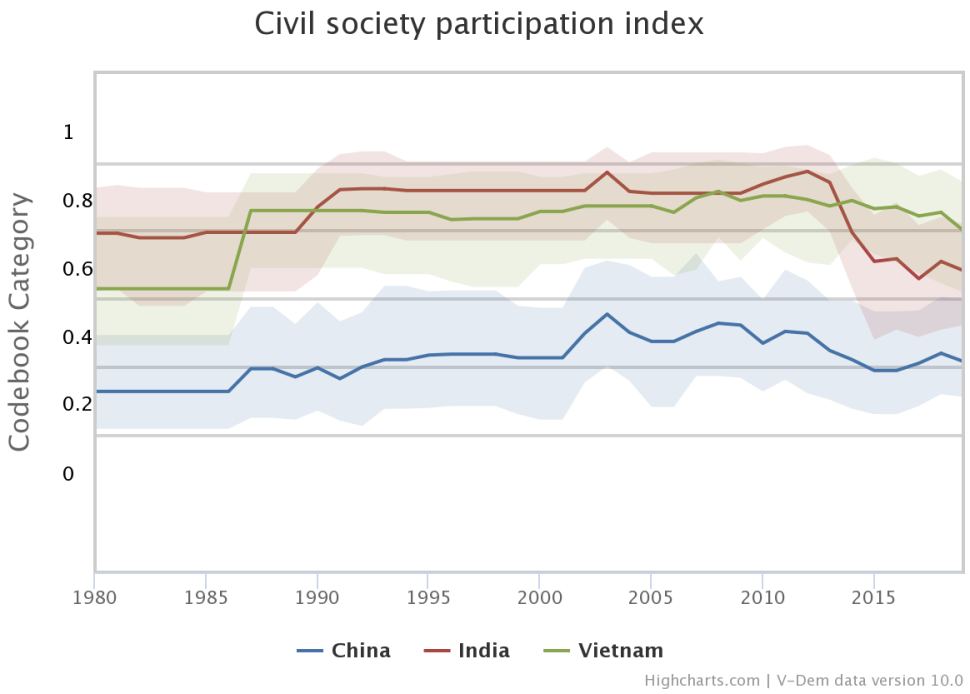
water pollution include agricultural and industrial chemicals, waste, deteriorating health of forest surrounding the waterways, and lack of wastewater treatment from industries and towns (Ortmann, 2017). The 2002 SBL empowers local governments to play an influential role with respect to these and other aspects of environmental protection. When it comes to water resources management, various functions have been decentralized: for example, provincial and district authorities are responsible for service provision and infrastructure maintenance (Waibel, 2010; UNICEF East Asia and Pacific Regional Office, 2016).

Vietnam's subnational units also exhibit variation in effective participation of local actors. First, Vietnamese citizens vote to elect their representatives in the legislative branch (the National Assembly at the central level and People's Councils at subnational levels), who in turn elect the leadership of the executive branch and appoint the heads of the judiciary. Given that Vietnam is a single-party regime, government institutions at every level are subordinate to the VCP. Candidates for public office are therefore vetted by the Party. However, seats are contested by multiple candidates and turnout is high, leading to considerable variation in the degree of competition in local elections (Malesky et al., 2014). In addition, non-party members and self-nominated candidates are allowed to compete in local elections and their agenda may gain visibility and influence through their active participation. In the most recent (2016) elections covered in the Vietnam Provincial Governance and Public Administration Performance Index (PAPI) survey, 8 percent of all respondents reported that there was a self-nominated candidate in the local elections, while 14 percent reported the presence of a non-party member.

Interviews conducted in relation to the 2007 elections suggest that many self-nominated candidates are motivated to run in order to raise awareness about waste and corruption in major infrastructure projects. Self-nominated candidates may perform this function through their capacity to question officials during the two-month sessions where the full body is convened. Some have also speculated that self-nominated candidates are motivated to run as a means of gaining access to central government officials in order to further their business interests (Malesky and Schuler, 2009). Analysis of the 2016 National Assembly results suggest that non-party members tend to be less highly educated, hold less prestigious occupations, and occupy less high profile/powerful positions in government institutions (Malesky and Schuler, 2019). We expect similar dynamics to prevail at the local level when it comes to the profile of non-party candidates.

Furthermore, though Vietnam's one-party system inhibits participation of new political groups in elections to a large extent, civic participation is relatively high (Bui, 2013). Figure 1 shows that civil society participation, as measured by the civil society participation index from the Varieties of Democracy Institute (Coppedge et al., 2020),[4] is rated significantly higher in Vietnam than in China, and has been on par with or even exceeded participation in democratic India.

Figure 1: Civil Society Participation in Vietnam, China, and India



Although mass organizations that are affiliated with the VCP dominate civil society, the *Doi Moi* reforms have engendered a greater diversity of civic life (Bui, 2013; Vu, 2017; Taylor et al., 2012), which is also reflected in the jump in Vietnam's civil society participation score after 1986 in Figure 1. This has opened up more space for more non-state actors to engage in civic and political life (Larsen, 2011).

Vietnam's emerging civil society has registered some important wins when it comes to environmental protection, natural resource management, and increasing transparency (Bui, 2013; Vu, 2017; Taylor et al., 2012; O'Rourke, 2001). However, environmental groups have overall low participation (Norlund, 2007) and are often "associated with religious, human rights and community

[4]The index covers 1) whether people can freely participate in civil society organizations(CSOs); 2) whether CSOs are routinely consulted by policymakers; 3) whether women are prevented from participating; and 4) whether legislative candidate nomination within party organization is decentralized or made through party primaries.

groups"(Bruun, 2020: p.177) operating "on the margins of society" (Dalton and Ong, 2005: p.4-6). For example, Trang (2014) shows that the involvement of many localities and various sectors constitute a challenge for managing water quality in the Dong Nai River Basin. Mobilization around environmental issues is instead most prominent in protests connected to specific environmental problems (Nguyen and Datzberger, 2018). In addition, a number of CSOs report that it has been difficult to achieve their objectives without relying on personal connections to government officials (Taylor et al., 2012). However, if members of mass organizations decide to engage in environmental protection or help environmental NGOs, they tend to do so "in secret" (Nguyen and Datzberger, 2018: p.11).

On the other hand, the activity of local business interests has been shown to be more influential – and damaging for environmental quality. As To et al.'s (2014) ethnographic study of timber trade in the lower Mekong reveals, lower-status traders engaged in illicit activities are frequently protected by more powerful patrons within and outside state agencies, in exchange for financial and other gifts. More generally, Suu (2007) identifies three major areas of business influence through corrupt means in rural Vietnam: in land management and use, the construction of infrastructure projects, and financial management. All three of these are understood to facilitate water pollution as relates to the establishment of industrial zones, investment in water treatment, and fee collection.

The *Doi Moi* reforms also set Vietnam on the path of rapid economic growth, expansion of agricultural activities, and industrialization. This has facilitated poverty reduction and improvement of living conditions for a large proportion of the population (Ortmann, 2017). However, such advances came at the expense of environmental health, resulting in deforestation, destruction of habitat and biodiversity, and intense air and water pollution – all intensified by inefficient environmental management (Bruun, 2020).

By now, Vietnam has extensive coverage of environmental issues in legislation, including the Vietnam Climate Change Strategy (CCS 2011), Vietnam Green Growth Strategy (GGS 2012–2020), National Strategy for Environmental Protection (NSEP 2012–2020), Vietnam Reduce Emissions from Deforestation and Forest Degradation program (REDD+ 2009-), and a number of policy instruments on the protection of forest, water, and environment in general. Despite extensive legislation, implementation lags behind, not least because of the strong presence of economic interests and the fact that economic development and poverty reduction remain among the top priorities for

the government and general population (Bruun, 2020; Nguyen and Datzberger, 2018).

4 Empirical Strategy and Data

For our empirical analysis, we leverage data primarily from the Vietnam Provincial Governance and Public Administration Performance Index (PAPI). PAPI surveys around 14,000 randomly selected Vietnamese citizens each year, and covers all of Vietnam's 63 provinces, including 208 districts, 414 communes, and 828 villages.[5] We use PAPI data to construct district-level variables, taking the average for all responses in a given district.[6]

PAPI is jointly administered by the Center for Community Support and Development Studies, the United Nations Development Programme, and the Centre for Research and Training of the Vietnam Fatherland Front (VFF-CRT). As the Fatherland Front is an umbrella group of mass organizations aligned with the VCP, there is a potential risk that pro-government responses are over-represented. We are not aware of any such concerns raised with respect to the widely cited literature that uses PAPI (e.g., Malesky, 2014; Schuler, 2019; Nguyen et al., 2015). However, even if PAPI is biased in favor of the ruling party, we do not expect this to vary systematically across districts, which prevents systematic bias in our analysis and results. Moreover, recent studies find that citizens in authoritarian regimes on average tend to over-report their support for the government in surveys (Robinson and Tannenberg, 2018). This would imply that participation of non-party and self-nominated candidates in elections might be under-reported in our study. Therefore, if we find an effect from the reported presence of non-party and self-nominated candidates, it is likely that this effect would be even stronger than if pro-government responses were not over-represented.

Turning to our modeling strategy, we begin by comparing the extent of between-district and within-district variation in environmental quality by calculating an intra-class correlation coefficient (ICC). The ICC shows that most of the variation (71 per cent in air quality and 78 per cent in water quality) comes from variation between districts; therefore, analyzing differences between districts is more informative than analyzing changes over time.[7] We analyze differences between districts

[5] For more information on PAPI's sampling strategy and methodology, see `http://papi.org.vn/eng/faq` and PAPI (2011).

[6] See Appendices C and F for further details on variable construction.

[7] While we compare districts in our main models, we perform some analysis of within-variation in Appendices J and K

using ordinary least squares regressions for the year 2018 with lagged values of the independent variables and robust standard errors, to correct for heteroskedastisity:

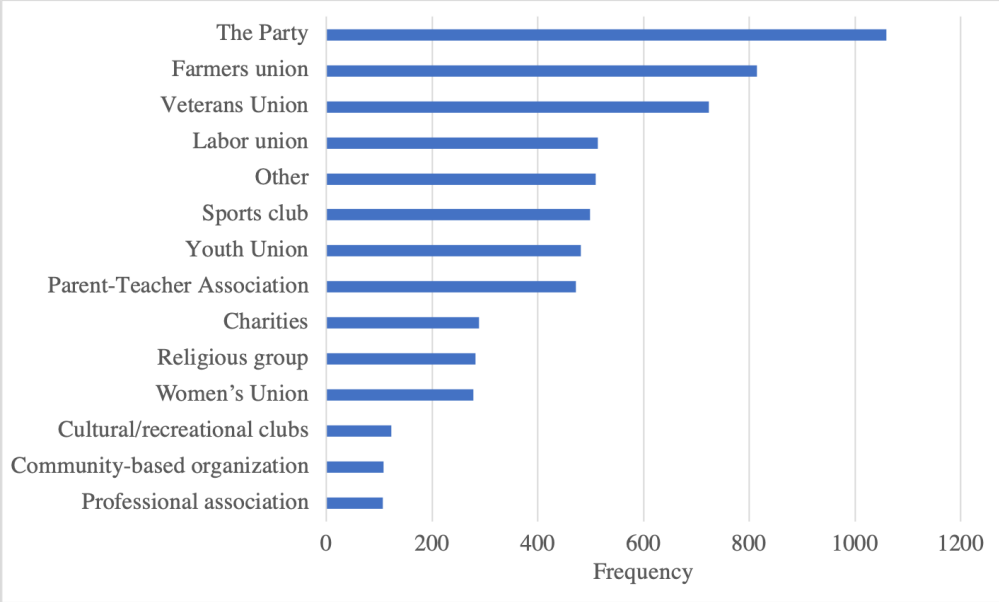
$$Y_i = \alpha + \beta_1 X_i + \epsilon_i \tag{1}$$

where Y is predicted values of a dependent variable in 2018, i is a district, α is an intercept, X is a vector of independent variables prior to 2018, with most taken for the year 2016, β_1 is a vector of coefficients for the independent variables, and ϵ is the error term.

4.1 Operationalizing local interest group activity

This paper attempts to capture local interest group activity in different ways. First, we look at the degree of citizen participation in civic and political life. The measure of civic engagement is a district-average of "yes" responses to the question, "Are you a member of the Party, a Mass Organization, a professional association, cultural or social groups (for example, dance club, opera, sports team)?" Figure 2 illustrates the range of groups of which respondents to the 2018 PAPI reported being active members. Notably, there are no environmental groups listed. Given the nature of civil society in Vietnam discussed the previous section, participation in environmental groups is likely underreported and if it reflected at all, it is through the answers 'other', 'religious group', or 'community-based organization'.

Figure 2: Tabulation of reported group membership, 2018 PAPI



Although Party membership is not typically understood as civic participation, we consider it important to include in our analysis since political participation in communist regimes can be a way to bring individual concerns on the political agenda, especially at the local level (Guo, 2007). We also perform robustness checks that rerun analysis after removing (1) all respondents who reported that they were only members of the Party and not any other organizations (290 people in 2018) and (2) all respondents who reported that they were members of the Party among other organizations (1,875 people in 2018). The results are presented in Appendix H.

To capture how active citizens are in delivering their interests to local officials, we also introduce a variable measuring whether citizens have made a proposal or suggestion to the local authorities during the past year. Our measure is a district-average of "yes" replies to this question.

Second, we operationalize the (corrupt) influence of anti-environment business interests with district-average agreement with the statement, "Companies in my district can avoid environmental regulations by paying a bribe."

Third, we examine how the influence of non-party actors through electoral means, although rather limited given the one-party context, relates to environmental outcomes. We measure influence through elections by the reported presence of non-party members and self-nominated candidates in elections to commune/ward People's Councils in 2016 - the most recent election at this level

captured by PAPI. We use district-average replies to the PAPI questions, "Of the candidates for commune-level People's Council members for selection, were there any self-nominated candidates (self-nominated candidates are those who are not introduced by the state to become candidates)?" and "Were any candidates non-party members?". Responses to these questions reflect how many candidates were present in commune elections per district, but also whether people can recall candidates, and whether people are willing to report their presence. In all these cases, a higher number of reports implies higher visibility and influence of non-party and self-nominated candidates in these districts. The number of reports on the presence of self-nominated candidates varies from 3 in Chau Thanh district of An Giang Province to 37 in Thanh Tri district of Hanoi, the capital city of Vietnam, while the reports on the presence of non-party members in elections varies from 3 to 42, in the same districts.

4.2 Operationalizing environmental quality

We measure environmental quality with two indicators – air and water quality – that reflect two of the most severe environmental problems in Vietnam (Ortmann, 2017). We capture air quality by taking the district-average of replies to the PAPI question 'Could you please rate the air quality in your area?', with replies varying between poor (1) to good (4). To check whether people's perceptions reflect the actual air quality, we attempt to validate our measure with the objective air quality data from the World Air Quality Index project. The objective data on air quality are available for seven stations in Vietnam in seven different districts in different parts of the country. Therefore, air quality data collected from these stations overall provide some idea of the regional differences, which we compare to those reflected in the PAPI data. Table E.1 in Appendix E shows that differences in people's perceptions of air quality between districts approximately match the differences in the objective air quality across the stations.

To measure water quality, we also use a perception-based indicator from PAPI. Our measure of water quality is a district-average of "yes" replies to the question on whether the water quality in the nearby waterway is suitable for swimming. We found it more challenging to validate our water quality measure because the few objective water quality measures that exist are outdated and only available for specific water sources. We nevertheless managed to obtain the recent measures of water pollution from local water distribution companies for two districts - Hoc Mon in Ho Chi Min

and Soc Trang city in Soc Trang province. Appendix E presents the comparison and shows that water quality perceptions reflect objective water pollution. The distribution of replies on both air and water quality per district are presented in Appendix F.

4.3 Control Variables

We control for the relevant factors that could potentially explain the variation in air and water quality between the Vietnam districts, while also aiming for parsimony. All models control for a measure of the district economic situation, measured by the district-average response to the question, "As for your own family, how do you rate your economic situation today?"

We also control for the extent of agricultural activity in each district, using a district-average response to a question from the PAPI survey on respondents' main occupation. This captures several important factors. First, it reflects remoteness from urban areas, which can positively affect air and water quality. However, more agricultural activity in a district can mean higher air and water pollution. Agricultural activity increases air pollution through NH_3 gases (ammonia) from nitrogen-rich fertilizers and livestock waste, as well as agricultural technology using fossil fuels. Cutting of forests and mangroves for expanding land areas suitable for agriculture also negatively contributes to the air quality in the region. Agricultural activity can increase water pollution through fertilizers and pesticides that accumulate in the soil and get washed to the nearby streams and rivers by rains, as well as oil spills from agricultural machinery, and garbage. Moreover, cutting mangroves for aquaculture increases the risk of flooding, which can intensify water pollution problems (Bruun, 2020).

We also incorporate data from two additional sources. First, we control for district population size using gridded data from WorldPop (http://www.worldpop. org.uk/), since larger populations are usually associated with more air and water pollution. We use QGIS to match district shape files with the population grids, to extract district-level estimates for population size for 2010 and 2015.

Second, we control for average night light brightness. Night lights are a frequent proxy for economic development (Henderson et al., 2012), which affects the capacity to invest in environmental protection. Night lights also reflect urbanization and industrialization, and thus the extent of emissions from fossil fuels used for electricity generation as well as pollution from motor vehicles.

Our data on night lights comes from the United States Air Force Defense Meteorological Satellite Program Nighttime Lights Time Series and are available yearly from 1992-2013. We incorporate district-level data on average brightness of night-time lights for 2011-2013.

None of our selected variables correlate at a high level; therefore, we include them all in the same models. Details of the construction of all variables used in the analysis are presented in Table B.1 in the Appendix. Summary statistics and correlation between all variables used in the analysis are presented in Appendix C. Distributions of observations across districts for all variables for the years when they are included in the models are presented in Appendix D.

5 Results

Figure 3 depicts Vietnam's 208 districts ordered according to their levels of civic participation measured by the average self-reported membership in civic and political organizations and their air (left) and water (right) quality. The figure shows a slight negative association between group membership and the two aspects of environmental quality.

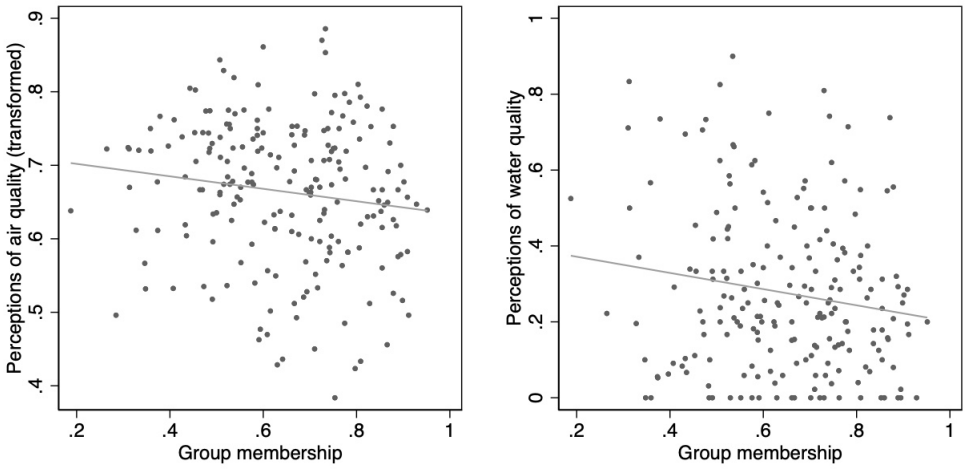


Figure 3: Vietnam districts positioned according to their levels of civic participation and air/water quality

In a similar manner, Figure 4 positions Vietnam districts according to the reported presence of non-party members in commune elections and air and water quality. The figure also shows a negative relationship between the presence of non-party members in elections and the selected measures of environmental quality.

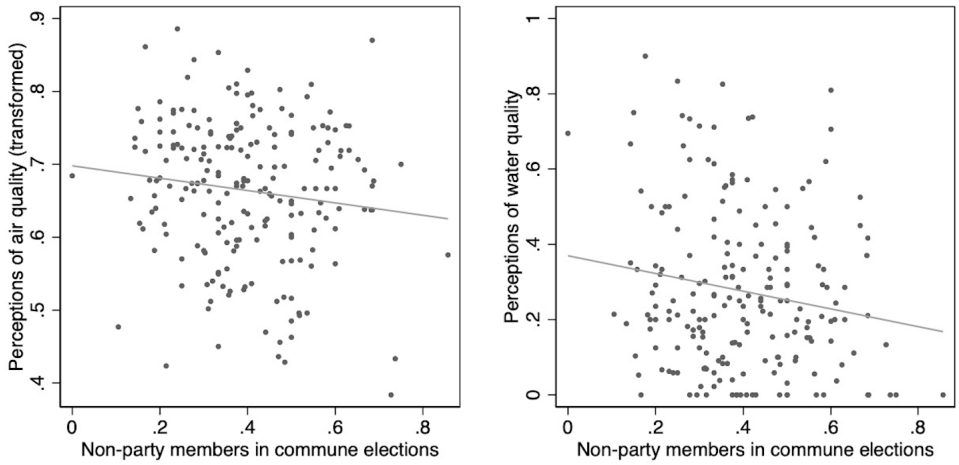


Figure 4: Vietnam districts positioned according to the reported number of non-party members in elections and air/water quality

Finally, Figure 5 shows that the (corrupt) influence of business interests is linearly and negatively associated with air quality: districts with greater business influence on average tend to have lower air and water quality, as perceived by the residents of these districts.

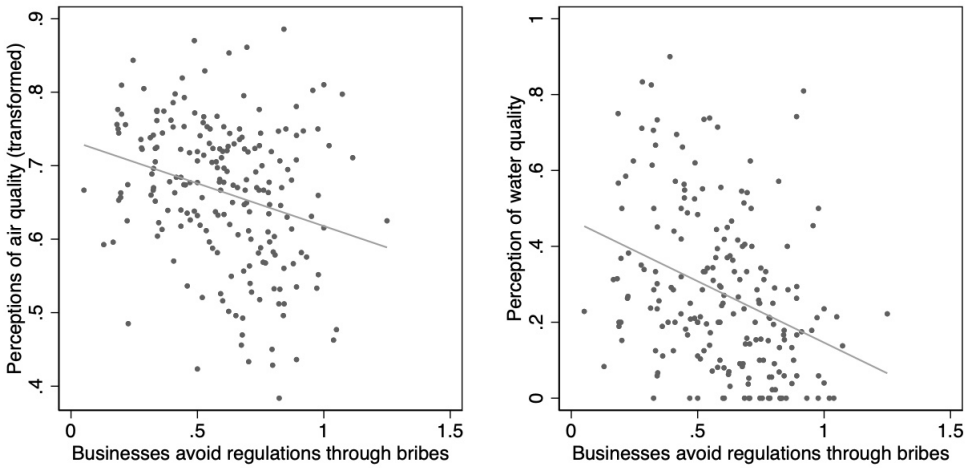


Figure 5: Vietnam districts positioned according to their levels of business corruption in the environmental sector and air/water quality

The trends in all three figures indicate a negative association between interest group activity and environmental quality. We proceed by investigating these associations in a greater detail by controlling for the relevant factors that might explain the variation in air and water quality between districts in a number of regressions. Table 1 shows the relationship between our different measures

of civic participation and air/water quality in Vietnam's 208 districts. Models 1-4 present the result for air quality, while models 5-8 - for water quality. In Models 1, 2, 5 and 6, we operationalize civic participation as membership in civic and political groups, while in Models 3, 4, 7 and 8, we use the average number of citizen proposals to the local governments. Models 1, 3, 5 and 7 show bivariate relationships, while Models 2, 4, 6 and 8 account for the influence of the control variables.

Table 1 shows that the association between civic participation and air/water quality is negative and significant. Overall these results imply that districts with higher civic participation have lower air and water quality. Similarly, higher number of proposals to local governments is associated with lower water and air quality across districts, although the result for air quality is only significant at 10 percent.

Table 1: Relationship between civic participation and air/water quality across Vietnam districts

	DV: Air quality				DV: Water quality			
	1	2	3	4	5	6	7	8
Group memb.	-0.085*	-0.132***			-0.213*	-0.336***		
	(0.038)	(0.038)			(0.098)	(0.094)		
Gov.proposals			-0.008	-0.111†			-0.111	-0.514**
			(0.054)	(0.065)			(0.148)	(0.154)
Econ. sit.(ln)		0.232***		0.216***		0.284*		0.303*
		(0.058)		(0.061)		(0.136)		(0.141)
Agriculture		-0.066*		-0.074*		-0.050		-0.055
		(0.033)		(0.034)		(0.063)		(0.064)
Night lights(ln)		-0.016**		-0.017**		-0.046***		-0.054***
		(0.005)		(0.005)		(0.009)		(0.010)
Pop. size(ln)		-0.026*		-0.022*		-0.034†		-0.028
		(0.010)		(0.011)		(0.018)		(0.019)
Constant	0.719***	0.865***	0.666***	0.784***	0.414***	0.692**	0.307***	0.545*
	(0.025)	(0.124)	(0.016)	(0.130)	(0.069)	(0.211)	(0.046)	(0.219)
Observations	208	203	208	203	204	199	204	199
R-squared	0.020	0.145	0.000	0.115	0.026	0.187	0.003	0.182

OLS cross-district regressions of air (1-4) and water (5-8) quality in the year 2018 on civic participation, measured by group membership and average number of proposals to local governments. Robust standard errors in parentheses. ***p<0.001, **p<0.01, *p<0.05, †p<0.1. The regressions control for natural logarithm (ln) of economic situation, the extent of agriculture, ln night lights, and ln population size. All independent variables are lagged 2 years, apart from night lights, which are from 2013, and population size, which is from 2015.

Table 2 shows the relationship between the reported presence of non-party members (in Models 1, 2, 5 and 6) and self-nominated candidates (in Models 3, 4, 7 and 8) in local elections on the one hand and air/water quality on the other hand in the 208 Vietnam districts. Similarly to the previous table, Models 1-4 present the result for air quality, while models 5-8 - for water quality. Models 1, 3, 5 and 7 show bivariate relationships, while Models 2, 4, 6 and 8 account for the effect of the control variables. The association between electoral competition and air/water quality across districts in Vietnam is again negative and significant in most models. Districts with more non-party members competing in the commune elections have significantly lower air and water quality. The same result for air quality also holds in models with self-nominated candidates.

Table 2: The relationship between reports of alternative candidates in local elections and air/water quality across Vietnam districts

	DV: Air quality				DV: Water quality			
	1	2	3	4	5	6	7	8
Non-part. memb.	-0.085†	-0.084†			-0.235*	-0.198†		
	(0.047)	(0.045)			(0.101)	(0.101)		
Self-nom. cand.			-0.152**	-0.141**			0.051	0.186
			(0.053)	(0.053)			(0.138)	(0.134)
Econ. sit.(ln)		0.202***		0.169**		0.210		0.204
		(0.058)		(0.059)		(0.144)		(0.147)
Agriculture		-0.072*		-0.101**		-0.067		-0.062
		(0.033)		(0.034)		(0.067)		(0.068)
Night lights(ln)		-0.014**		-0.015**		-0.042***		-0.044***
		(0.005)		(0.005)		(0.009)		(0.009)
Pop. size(ln)		-0.021*		-0.016		-0.023		-0.024
		(0.010)		(0.010)		(0.020)		(0.020)
Constant	0.698***	0.792***	0.696***	0.769***	0.370***	0.501*	0.266***	0.407†
	(0.019)	(0.132)	(0.013)	(0.126)	(0.045)	(0.230)	(0.032)	(0.231)
Observations	208	203	208	203	204	199	204	199
R-squared	0.017	0.119	0.034	0.129	0.028	0.148	0.001	0.139

OLS cross-district regressions of air (1-4) and water (5-8) quality in the year 2018 on the reports of non-party members and self-nominated candidates in commune elections. Robust standard errors in parentheses. ***p<0.001, **p<0.01, *p<0.05, †p<0.1. The regressions control for natural logarithm(ln) of economic situation, the extent of agriculture, ln night lights, and ln population size. All independent variables are lagged 2 years, apart from night lights, which are from 2013, and population size, which is from 2015.

Finally, Table 3 presents the results for the association between the influence of corrupt business interests and air/water quality across the Vietnam districts as well as results for the tests when all

three measures of interest group activity are included in the same model. Models 1-3 present the results for air quality, while models 4-6 - for water quality. Models 1 and 4 present results from the bivariate regressions, Models 2 and 5 account for the control variables, and Models 3 and 5 combine our measures of group membership, non-party members competing in commune elections, and the measure of business corruption against the environment, accounting for the relevant control variables. The results show that districts where corrupt business interests are more influential have lower air and water quality and this relationship is statistically significant across all models. Analyzing the findings presented in models 3 and 6, the corrupt influence of business interests seems to be the strongest predictor of air and water quality across districts, compared to civic participation and the presence of alternative candidates in elections.

Table 3: Business interests and air/water quality across Vietnam districts

	DV: Air quality			DV: Water quality		
	1	2	3	4	5	6
Business influence	-0.116***	-0.117***	-0.092*	-0.323***	-0.286***	-0.222***
	(0.029)	(0.030)	(0.036)	(0.064)	(0.063)	(0.062)
Group memb.			-0.063			-0.168†
			(0.044)			(0.092)
Non-part. memb.			-0.035			-0.075
			(0.046)			(0.096)
Econ. sit. (ln)		0.163**	0.194**		0.117	0.195
		(0.056)	(0.061)		(0.129)	(0.134)
Agriculture		-0.107**	-0.091**		-0.150*	-0.109
		(0.033)	(0.035)		(0.063)	(0.067)
Night lights(ln)		-0.014**	-0.014**		-0.042***	-0.043***
		(0.005)	(0.005)		(0.009)	(0.009)
Pop. size(ln)		-0.020†	-0.023*		-0.019	-0.028
		(0.010)	(0.010)		(0.019)	(0.018)
Constant	0.734***	0.861***	0.904***	0.470***	0.680**	0.788***
	(0.017)	(0.124)	(0.127)	(0.043)	(0.208)	(0.206)
Observations	208	203	203	204	199	199
R-squared	0.075	0.175	0.186	0.121	0.221	0.237

OLS cross-district regressions of air (1-3) and water (4-6) quality in 2018 on (corrupt) business influence. Robust standard errors in parentheses. ***p<0.001, **p<0.01, *p<0.05, †p<0.1. The regressions control for natural logarithm(ln) of economic situation, the extent of agriculture, ln night lights, and ln population size. All independent variables are lagged 2 years, apart from night lights, which are from 2013, and population size, which is from 2015.

To query the robustness of our results, we perform a number of additional tests. First, we use alternative measures of the dependent variables: the perceived change in air and water quality. We analyze district-average responses to the questions "How does the air quality compare with three years ago?" and "How does the water quality compare with the three years ago?" The findings are presented in Table G.1-G.3 in Appendix G and confirm a negative association between local interest group activity and air and water quality change across districts, with the results being even stronger than in the main models.

Second, as we mentioned in our data descriptions, we perform the analysis for a modified measure of civic participation, where we exclude respondents who mentioned that they hold membership in the Party. The results are presented in Appendix H and are even stronger than in the main models.

Third, we test for potential reverse causality. In principle, our results could indicate that people in districts with poor air and water quality tend to organize more and thus such districts have higher levels of civil society participation. To reduce these concerns, all our independent variables are lagged two years in the main models. However, given that the variables are relatively stable over time, we performed further checks. We estimated regressions with the measures of civic participation as dependent variables and air and water quality as independent variables using a fixed effects specification. This allows us to estimate if changes in air/water quality perceptions are associated with changes in reported group memberships and the average number of proposals made to local governments per district. The results, presented in Appendix L, are insignificant. This implies that poor water and air quality do not seem to drive civil society participation, at least not in the short term or in the organizations included in PAPI.

Fourth, we analyze the proposed relationships between interest group activity and air/water quality across Vietnam provinces (the administrative unit above the district), which allows us to control for additional relevant factors that lack data at district level. These include an alternative measure of business corruption from the Vietnam Provincial Competitiveness Index (Malesky, 2018), a measure of income per capita, the degree of industrial production, and population density from the official Vietnam statistics (General Statistics Office of Viet Nam, 2019). In the province-level analysis, we similarly use the perceptions of air and water quality as dependent variables but aggregate them up to the province level, instead of per district. The results reflect those in the

main analysis: provinces that exhibit a higher degree of interest group activity also tend to have lower air and water quality. We note that the results for water quality are weaker; this could be explained by the aggregation of more water sources on the province level, creating more noise in our analysis. Notably, the result for the alternative business corruption indicator is also negative and significant, just as in the main analysis.

Finally, we estimate a series of models that capture changes within districts over time. Here our analysis is restricted to those indicators of local actor presence that vary within districts according to available data: civic participation and the corrupt influence of business interests. We lag all independent variables two years assuming it takes some time before they exert an effect on air and water quality. We also interpolate missing years for night lights and population size assuming steady linear growth within districts. We estimate both fixed effects models and a pooled time-series regression with panel corrected standard errors, lagged dependent variable and Prais-Winston transformation to eliminate auto-correlation. As tables in Appendices J and K show, we find significant results only in a pooled regression with panel corrected standard errors. The results, nevertheless, reflect those in the main models: increases both in the number of group memberships, and reports on corrupt business influence are associated with decreases in air and water quality.

6 Discussion

Our quantitative analysis suggests that local interest group activity can facilitate environmental degradation in an authoritarian setting like Vietnam. We show that the activity of various interest groups, including civil society organizations, non-party and self-nominated candidates in elections, and business interests, is detrimental for air and water quality. The results are robust to alternative specifications and various estimation strategies, being particularly strong in models that analyze the role of business influence. These findings indicate that in contexts where business interests have enough power to bribe public officials in order to avoid environmental regulations, air and water quality may be particularly harmed.

We also find strong evidence that more membership in civic and political groups and more proposals to local governments are related to lower air and water quality, suggesting that citizens can promote their interests favoring economic growth and poverty reduction (e.g., through expanding

agriculture) at the expense of environmental quality. This implies that even if environmental degradation motivates people to organize, grassroots movements may have limited success due to the powerful presence of pro-growth interests in the same "civil society" that might have ties with the government. For example, one of the largest mass organizations in Vietnam, the Farmer's Union, plays a key role in aligning agricultural production with political goals. It promotes fertilizer-heavy agriculture to increase production and therefore, profits for farmers, which comes at the expense of environmental quality, and water quality in particular (Bruun, 2020).

In order to gain further insights into the nature of local interest group activity, we conducted qualitative interviews with researchers based in three Vietnamese districts.[8] The interviews suggest a limited role for non-state actors at the local level – as one noted, "Vietnam is a socialist country. The local actors are tools of the government." One exception however, was the influence of large corporations. In characterizing their influence, one interviewee noted, "They work for their own sake and sometimes at the expense of the nation and society." Another interviewee stated that the main way local non-state actors express their interests and preferences is by bribing local officials to manipulate the results of projects under their purview.

Private sector influence may hinder the implementation of environmental protection policies through non-corrupt means as well. A recent survey of over 10,0000 enterprises demonstrates a lack of awareness of the relevant laws and climate change mitigation strategies (UPS et al., 2020). Furthermore, the presence of strong economic players with ties to the ruling party has been thought to hinder the development of effective environmental protection policies in Vietnam (Bruun, 2020).

The dynamics we uncover in Vietnam are more broadly relevant to understand the challenges of promoting environmental quality in authoritarian regimes. Our findings also offer an important complement to previous research on interest group activity and the achievement of environmental goals, which to date has been dominated by the study of advanced democracies. The effects we find are rather small and we expect this may be due to our focus on an authoritarian regime, where interest group influence takes a different form that in democracies. Indeed, our operationalization of civil society participation does not record citizens' participation in pro-environment groups. Further research is needed to identify the particular challenges and opportunities facing such groups

[8]The interviews were conducted at the suggestion of one of the anonymous reviewers. We circulated a questionnaire online that interviewees could fill anonymously. For more details, see Appendix A.

in authoritarian regimes.

Finally, our study highlights the pernicious influence of corruption on environmental protection. Whereas reforms to liberalize Vietnam's economy have facilitated a transition from one of the world's poorest countries to its current lower middle-income status, these same reforms have also empowered business actors to further their interests – in some cases through corrupt means (Gainsborough, 2003). Our study thus adds an important layer to the acknowledged tension between economic development and environmental protection. Future research is needed to identify the most effective means of resolving such tensions in order to achieve sustainable development.

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A Questionnaire

In order to get in-depth insights from experts on the influence of local actors on environmental outcomes in Vietnam, we sent out an online questionnaire to local experts, academics, and activists. The questionnaire included the following text:

> The goal of our study is to understand challenges and opportunities related to environmental protection at the local (district) level in Vietnam. That is, what are the reasons for why different districts have different levels of air and water pollution? More specifically, we are interested in the role of different local actors, such as citizens organizations (unions, religious groups, professional associations, nongovernmental organizations and similar), self-nominated candidates and nonparty members in local elections and business companies, in determining political priority of environmental issues on the political agenda and affecting environmental outcomes.
>
> We are going to ask a few questions about the influence of different local actors on decision-making in general; however, if you have the knowledge about influential actors that work for or against the environment in particular, please think of them when replying to the questions. You can answer the questions by filling out the form below. Your responses will be recorded but we will not record any identifying information (such as your name and email). You can choose to skip any questions you prefer not to answer.
>
> By local actors we mean businesses, non-governmental organizations, citizen assemblies, independent candidates in elections and others.

1. Which district do you live in?
2. How would you categorize your profession?
   (a) Academic/research
   (b) Nonprofit/civil society
   (c) Private sector/Business
   (d) Government
   (e) Other
3. What are the main policy areas that district officials have control over?
4. Do local actors have an influence on which issues are brought up on the political agenda at the district level? If so, which ones?
5. How do different local actors express their interests/preferences to district officials?
6. Does this mechanism vary across districts or is it approximately similar?
7. Do local actors influence implementation of policies in any way and therefore influence outcomes?
8. How do they influence implementation of policies and outcomes?
9. Do you have any other comments about the operation of local actors in Vietnam?

B Description of the Variables

Table B.1: Description of the Variables: Data Sources and Construction

Variable	Source	Method of construction
Air quality	PAPI	Average responses to the question: "Could you please rate the air quality in your area?" Responses are given on 4-point scale: 1 "Poor", 2 "Poor on most days", 3 "Good on most days", 4 "Good". The measure is negatively skewed. We reverse it to achieve positive skewness and then take an inverse.
Water quality	PAPI	Average of "yes" responses to the binary question: "Is the water clean enough to swim", which is a follow-up to the question "Is there a waterway near your house?"
Air quality change	PAPI	Average responses to the question "How does the air quality compare with three years ago?". Responses are given on a 3-point scale: 1 "worse", 2 "same", 3 "better".
Water quality change	PAPI	Average responses to the question "How does the water quality compare with the three years ago?". Responses are given on a 3-point scale: 1 "worse", 2 "same", 3 "better".
Group membership	PAPI	Average of "yes" responses to the binary question "Are you a member of the Party, a Mass Organization, a professional association, cultural or social groups (for example, dance club, opera, sports team)?"
Government proposals	PAPI	Average of "yes" responses to the binary question "Here are actions that people sometimes take as citizens. For each of these, please tell me whether you, personally, have done any of these things during the past year: Make a proposal or suggestion to the local authorities"
Non-party members in elections	PAPI	Average of "yes" responses to the binary question: "Were any candidates non-party members?" as a follow up to the question "Has election for Members of commune/ward People's Council been held in your locality in 2016?"
Self-nominated candidates in elections	PAPI	Average of "yes" responses to the binary question: "Of the candidates for commune-level Peoples Council members for selection, were there any self-nominated candidates (self-nominated candidates are those who are not introduced by the state to become candidates)?" as a follow up to the question "Has election for Members of commune/ward Peoples Council been held in your locality in 2016?"
Business influence	PAPI	Average agreement with the statement "Companies in my district can avoid environmental regulations by paying a bribe." The responses are given on a 3-point scale: 2 "agree", 1 "somewhat agree", 0 "disagree"

Economic situation	PAPI	Average response to the question: "As for your own family, how do you rate your economic situation today? Is it ...?". The responses are given on a 4-point scale: 4 "very good", 3 "good", 2 "neither good or bad", 1 "bad", 0 "very bad". The variable is negatively skewed. We reverse it to achieve the positive skewness, take the natural logarithm, and then reverse it back for higher values to mean better economic situation
Agriculture	PAPI	Average responses "01 Agriculture" to the question "In which sector is your current primary occupation [was your last job if retired]?"
Education	PAPI	Average responses to the question: "What is your highest level of education?" The responses vary from 1 "no formal education" to 10 "post-graduate degree"
Business corruption*	PCI	Total percentage of responses "agree" or "totally agree" to the statement "Enterprises in my line of business usually have to pay for informal charges"
Population size	WorldPop	District shape files matched with the gridded population data from 2010 and 2015. We fill in missing values assuming constant linear population growth. We use a natural logarithm of the variable due to its positive skewness
Night-time lights	DMSP-OLS	Average brightness of nighttime lights for 2011-2013. We fill in missing values assuming constant linear growth within districts. We use a natural logarithm of the variable due to its positive skewness
Industrial production*	Vietnam National Statistics	We calculated the measure of industrial production using yearly growth data in per cent relative to the base year (2010) and the data on the price of the gross industrial output in billion dong in current prices in the base year. We use a natural logarithm of the variable due to its positive skewness
Population density*	Vietnam National Statistics	people/km2. We use a natural logarithm of the variable due to positive skewness
Income per capita*	Vietnam National Statistics	In thousand dong, at current prices. We use a natural logarithm of the variable due to positive skewness

*Variables only available at the province-level and included in the analysis in Appendix I

C Summary statistics and correlations

Table C.1: Summary statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Air quality	208	3.46	0.26	2.39	3.87
Air quality (transformed)	208	0.66	0.10	0.38	0.89
Water quality	204	0.28	0.21	0.00	0.90
Member of political or civic group	208	0.65	0.16	0.19	0.95
Government proposals	208	0.27	0.11	0.07	0.62
Business corruption	208	0.60	0.23	0.05	1.25
Non-party members in elections	208	0.40	0.15	0.00	0.86
Self-nomin. candidates in elections	208	0.21	0.12	0.00	0.65
Economic situation	208	2.00	0.15	1.23	2.30
Economic situation (ln)	208	1.01	0.14	0.43	1.36
Agriculture	208	0.38	0.26	0.00	0.94
Night lights	203	16.52	18.09	0.00	63.00
Night lights (ln)	203	1.74	1.99	-4.33	4.14
Population size	203	141323.50	98306.05	7916.77	751977.10
Population size (ln)	203	11.63	0.71	8.98	13.53

Table C.2: Correlations between variables

	Air qual.	Water qual.	Group memb.	Prop osal	Corr upt	Non par	Self-nom	Econ sit	Agric.	Lights	Pop.
Air quality	1.00										
Water quality	0.17	1.00									
Group memb.	-0.15	-0.16	1.00								
Gov. proposals	-0.02	-0.06	0.66	1.00							
Business corrupt.	-0.28	-0.34	0.35	0.12	1.00						
Non-party memb.	-0.11	-0.15	0.27	0.26	0.20	1.00					
Self-nom. candid.	-0.17	0.04	-0.05	0.00	0.10	0.12	1.00				
Econ. sit.(ln)	0.13	-0.07	0.11	0.05	-0.02	0.12	-0.01	1.00			
Agriculture	-0.05	0.14	0.20	0.32	-0.24	0.09	-0.29	-0.33	1.00		
Night lights(ln)	-0.12	-0.33	-0.14	-0.36	0.15	0.04	0.16	0.48	-0.63	1.00	
Pop. size(ln)	-0.14	-0.19	-0.19	-0.23	0.06	-0.04	0.20	0.35	-0.33	0.41	1.00

Average number of observations per district

The number of responses per district on each of the variables varies depending on the district population and land area size. For example, in 2018, the number of respondents per district varied from 56 in sparsely populated Tay Tra district in Quang Ngai province to 141 in highly populated Hoc Mon district in Ho Chi Minh city, as shown in Figure C.1.

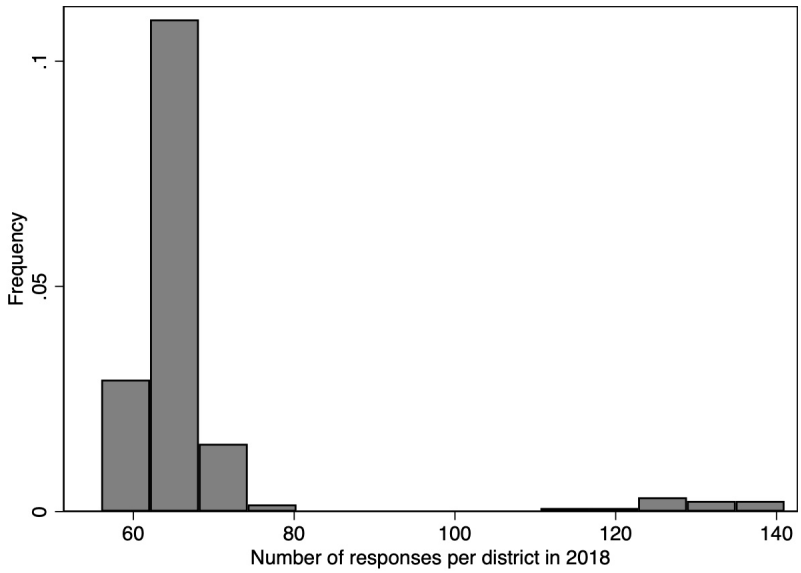

Figure C.1: Number of responses across Vietnam districts

D Frequencies across districts

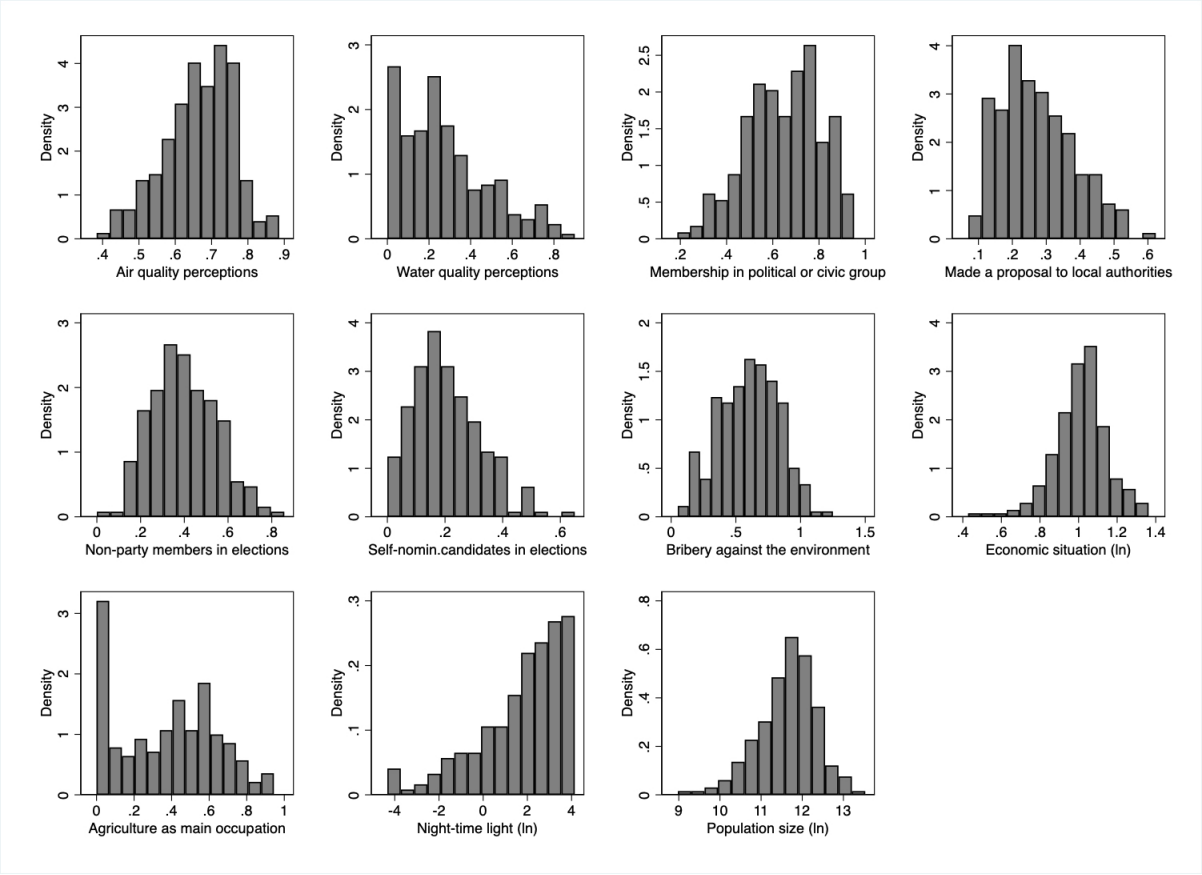

Figure D.1: Distribution of observations on the original variables across districts

Note: the frequencies for air and water quality are taken for the year 2018; for night-time lights - for the year 2013; population size - for the year 2015; and the rest of variables - for 2016.

E Air and water quality validation

E.1 Verifying air quality

Air quality index is available for seven stations in Vietnam located in different parts of the country. The stations collect data for the concentration of $PM_{2.5}$, PM_{10}, SO_2, NO_2, O_3 and CO hourly. Historical data on the concentration of these pollutants are available daily, for some stations since 2014, with large gaps. For more information about the index, please visit `https://aqicn.org/`.

We checked the date when PAPI survey took place in each of the districts in 2018 and evaluated the general trends in air quality measures during the closest months to the survey in 2018 or closest years available from the World Air Quality Index project. Historical records on air quality also summarize the number of days per month, when the air quality was good, moderate, unhealthy or hazardous. In Table E.1, we summarize our observation of trends for the months closest to the PAPI survey in the respective districts and compare the air quality index data with the district-average perception of air quality from PAPI survey. The comparison shows that the average perceptions of air quality reflect objective measures of air pollution.

Table E.1: Air quality validation

Station /district	**Month of PAPI survey**	**Perception of air quality (PAPI2018)**	**Air quality index trends**
Viet Tri	July	3.28	good**
Hanoi	October	2.83	unhealthy on most days
Ha Long	October	3.49	good*
Ho Chi Minh	November	3.24	good-moderate on most days
Nha trang	November	3.51	good*
Da Nang	August	3.50	good*
Hue	August	3.66	good**

Note: * - trends for respective months in 2019; ** - trends for respective months in 2015

E.2 Verifying water quality

Although water quality measures are challenging to find, me managed to obtain objective measures of water pollution from local water distribution companies in two districts - Hoc Mon in Ho Chi Minh city and Soc Trang city of the Soc Trang province. Similarly, we compared the average perceptions of water quality in these districts from PAPI with these objective measures of water pollution. We

would like to note, however that the latest available PAPI survey is available for 2018, while water pollution measures are from October-November 2020. Nevertheless, both objective water pollution measures and water quality perceptions from PAPI show that water quality in Soc Trang is worse than in Hoc Mon, indicating that public perceptions reflect the reality.

Table E.2: Water quality validation

District	**Province**	**Perceived water quality** *PAPI 2018*	**Objective water pollution (2020)** **Sulphate** mg/L	**Nitrate** mgN_NO_3	**Chloride** $mgCl^-/L$
Hoc Mon	TP Ho Chi Minh	.053	22	0.5	23.75
TP Soc Trang	Soc Trang	0	179.8	0.84	226

Higher values on "Perceived water quality" measures imply higher water quality or lower water pollution.
Higher values on "Objective water pollution" measures imply lower water quality or higher water pollution

F Responses on air and water quality across districts

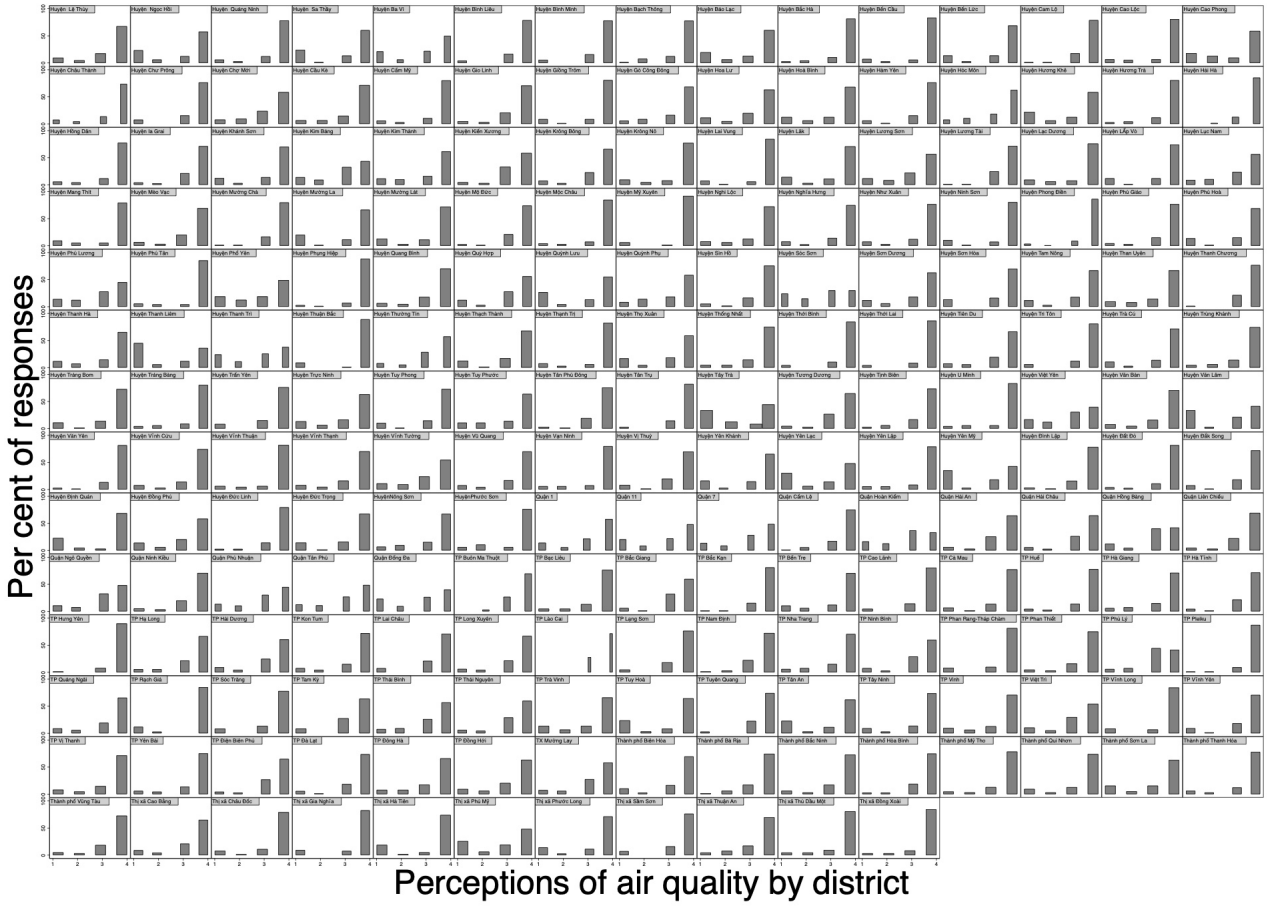

Figure F.1: Distribution of responses on air quality per district

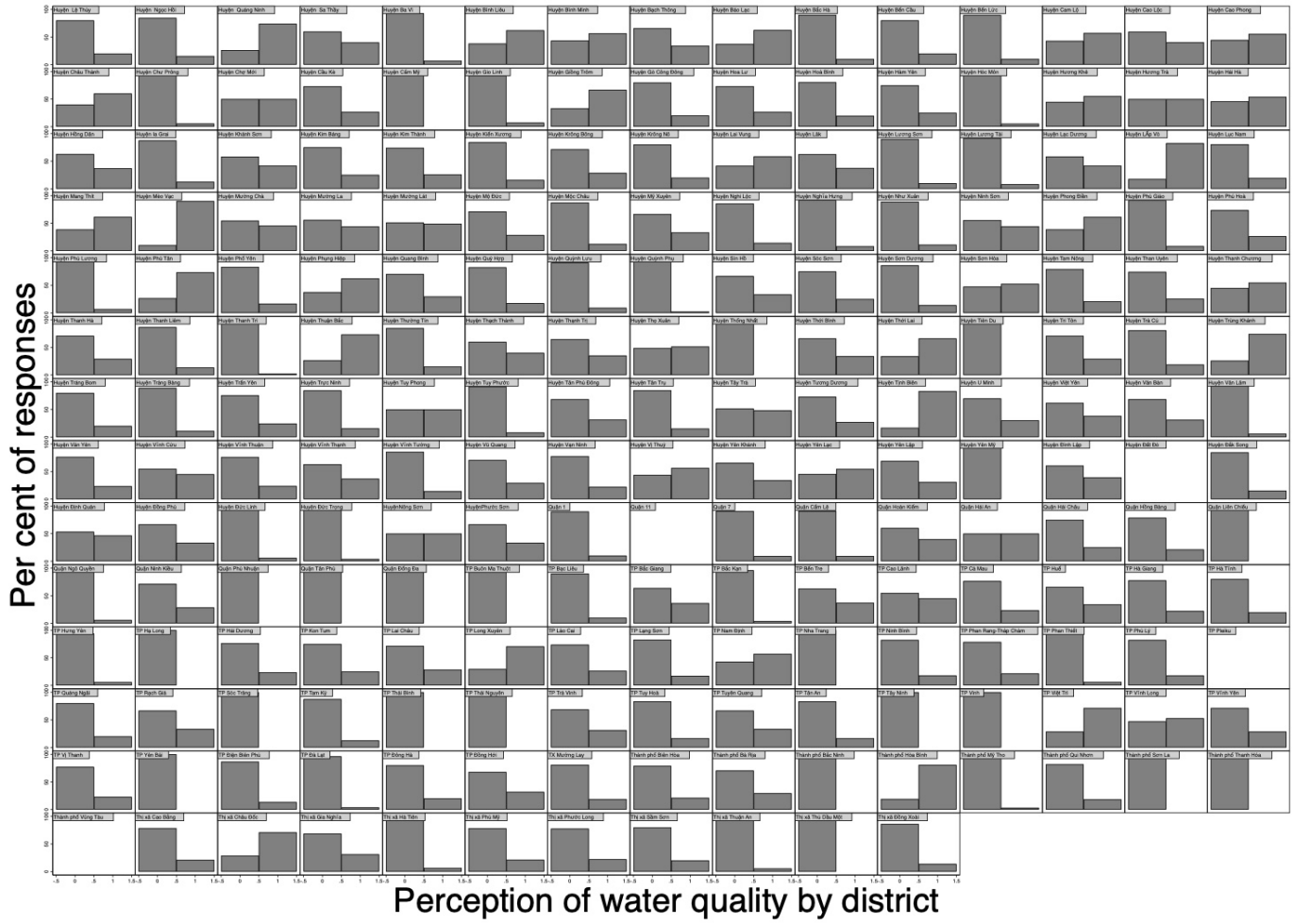

Figure F.2: Distribution of responses on water quality per district

G Robustness checks. Alternative dependent variables

Table G.1: The relationship between civic participation and perceptions of air/water quality change across Vietnam districts

	DV: Change in air quality				DV: Change in water quality			
	1	2	3	4	5	6	7	8
Group memb.	-0.329***	-0.382***			-0.749***	-0.644***		
	(0.082)	(0.086)			(0.138)	(0.135)		
Gov.proposals			-0.429***	-0.651***			-1.023***	-0.855***
			(0.121)	(0.133)			(0.193)	(0.211)
Econ. sit.(ln)		0.222†		0.257*		-0.135		-0.128
		(0.115)		(0.115)		(0.184)		(0.183)
Agriculture		-0.123		-0.127†		-0.341***		-0.358***
		(0.075)		(0.075)		(0.092)		(0.098)
Night lights (ln)		-0.025*		-0.036**		-0.006		-0.019
		(0.012)		(0.013)		(0.014)		(0.015)
Pop. size (ln)		-0.042†		-0.036		0.024		0.037
		(0.023)		(0.022)		(0.031)		(0.034)
Constant	2.230***	2.614***	2.136***	2.459***	2.030***	1.961***	1.827***	1.649***
	(0.055)	(0.275)	(0.038)	(0.263)	(0.096)	(0.336)	(0.062)	(0.350)
Observations	208	203	208	203	204	199	204	199
R-squared	0.064	0.119	0.050	0.131	0.146	0.221	0.125	0.191

OLS cross-district regressions of air (1-4) and water (5-8) quality change as reported in 2018 on civic participation, measured by group membership and average number of proposals to local governments. Robust standard errors in parentheses. ***p<0.001, **p<0.01, *p<0.05, †p<0.1. The regressions control for natural logarithm (ln) of economic situation, the extent of agriculture, ln night lights, and ln population size. All independent variables are lagged 2 years, apart from night lights, which are from 2013, and population size, which is from 2015.

Table G.2: The relationship between the presence of alternative candidates in local elections and perceptions of air/water quality change across Vietnam districts

	DV: Change in air quality				DV: Change in water quality			
	1	2	3	4	5	6	7	8
Non-part. memb.	-0.344***	-0.316***			-0.472***	-0.376**		
	(0.093)	(0.092)			(0.128)	(0.136)		
Self-nom. cand.			-0.180	-0.184			0.460*	0.168
			(0.120)	(0.127)			(0.230)	(0.212)
Econ. sit.(ln)		0.144		0.071		-0.275		-0.313†
		(0.116)		(0.122)		(0.184)		(0.188)
Agriculture		-0.133†		-0.193*		-0.373***		-0.391***
		(0.074)		(0.080)		(0.101)		(0.101)
Night lights (ln)		-0.020		-0.024†		0.001		-0.003
		(0.013)		(0.013)		(0.015)		(0.015)
Pop. size (ln)		-0.031		-0.020		0.045		0.047
		(0.023)		(0.024)		(0.035)		(0.033)
Constant	2.155***	2.433***	2.056***	2.322***	1.733***	1.595***	1.450***	1.429***
	(0.040)	(0.267)	(0.028)	(0.263)	(0.054)	(0.373)	(0.047)	(0.363)
Observations	208	203	208	203	204	199	204	199
R-squared	0.061	0.093	0.011	0.053	0.051	0.158	0.031	0.130

OLS cross-district regressions of air (1-4) and water (5-8) quality change as reported in 2018 on the reports of non-party members and self-nominated candidates in commune elections. Robust standard errors in parentheses. ***p<0.001, **p<0.01, *p<0.05, †p<0.1. The regressions control for natural logarithm(ln) of economic situation, the extent of agriculture, ln night lights, and ln population size. All independent variables are lagged 2 years, apart from night lights, which are from 2013, and population size, which is from 2015.

Table G.3: The relationship between business influence and perceptions of air/water quality change across Vietnam districts

	DV: Change in air quality			DV: Change in water quality		
	1	2	3	4	5	6
Business influence	-0.336***	-0.358***	-0.283***	-0.132	-0.263*	-0.056
	(0.063)	(0.064)	(0.075)	(0.110)	(0.104)	(0.111)
Group memb.			-0.154			-0.555***
			(0.096)			(0.150)
Non-part. memb.			-0.173†			-0.223†
			(0.090)			(0.124)
Econ. sit.(ln)		0.016	0.109		-0.393*	-0.138
		(0.103)	(0.112)		(0.186)	(0.183)
Agriculture		-0.247***	-0.194*		-0.472***	-0.339***
		(0.073)	(0.075)		(0.095)	(0.092)
Night lights(ln)		-0.021†	-0.020†		-0.001	-0.003
		(0.011)	(0.012)		(0.015)	(0.014)
Pop. size(ln)		-0.024	-0.034		0.052	0.023
		(0.021)	(0.022)		(0.033)	(0.031)
Constant	2.220***	2.622***	2.748***	1.624***	1.680***	2.030***
	(0.036)	(0.242)	(0.254)	(0.063)	(0.362)	(0.347)
Observations	208	203	203	204	199	199
R-squared	0.137	0.191	0.218	0.009	0.161	0.233

OLS cross-district regressions of air (1-3) and water (4-6) quality in 2018 on (corrupt) business influence. Robust standard errors in parentheses. ***p<0.001, **p<0.01, *p<0.05, †p<0.1. The regressions control for natural logarithm(ln) of economic situation, the extent of agriculture, ln night lights, and ln population size. All independent variables are lagged 2 years, apart from night lights, which are from 2013, and population size, which is from 2015.

H Robustness checks. Modified measure of civic participation

In this analysis, we recalculate the measures of membership in civic and political groups and remove 1) all respondents who reported that they were only members of the Party out of all other organizations (270 people in 2016) and 2) all respondents who reported that they were members of the Party among other organizations (1,616 people in 2016). Table H.1 presents the results.

Table H.1: The relationship between civic participation and perceptions of air/water quality change across Vietnam districts

	Air quality 1	Air qual. change 2	Water quality 3	Wat.qual. change 4	Air quality 5	Air qual. change 6	Water quality 7	Wat.qual. change 8
Group memb.,	-0.143***	-0.396***	-0.321***	-0.649***				
party only excl.	(0.038)	(0.087)	(0.094)	(0.133)				
Group memb.,					-0.156**	-0.349***	-0.265*	-0.579***
party excl.					(0.048)	(0.099)	(0.110)	(0.164)
Econ. sit.(ln)	0.235***	0.224†	0.277*	-0.137	0.216***	0.157	0.221	-0.243
	(0.058)	(0.115)	(0.137)	(0.184)	(0.057)	(0.118)	(0.140)	(0.192)
Agriculture	-0.061†	-0.113	-0.045	-0.327***	-0.042	-0.080	-0.023	-0.271**
	(0.033)	(0.076)	(0.064)	(0.093)	(0.035)	(0.083)	(0.068)	(0.104)
Night light(ln)	-0.016**	-0.025*	-0.045***	-0.005	-0.014**	-0.021†	-0.042***	0.002
	(0.005)	(0.012)	(0.009)	(0.014)	(0.005)	(0.012)	(0.009)	(0.014)
Pop. size(ln)	-0.026*	-0.041†	-0.031†	0.027	-0.023*	-0.032	-0.024	0.041
	(0.010)	(0.023)	(0.019)	(0.031)	(0.010)	(0.023)	(0.020)	(0.033)
Constant	0.862***	2.594***	0.653**	1.911***	0.835***	2.479***	0.550*	1.724***
	(0.124)	(0.275)	(0.212)	(0.332)	(0.122)	(0.270)	(0.225)	(0.347)
Observations	203	203	199	199	203	203	199	199
R-squared	0.151	0.124	0.181	0.221	0.142	0.086	0.153	0.178

OLS cross-district regressions of air/water quality and air/water quality change as reported in 2018 on civic participation, measured by membership in civic and political groups (members in the Party only excluded in Models 1-4 and members in the Party excluded completely in Models 5-8). Robust standard errors in parentheses. ***p<0.001, **p<0.01, *p<0.05, †p<0.1. The regressions control for natural logarithm (ln) of economic situation, the extent of agriculture, ln night lights, and ln population size. All independent variables are lagged 2 years, apart from night lights, which are from 2013, and population size, which is from 2015.

I Robustness checks. Province-level analysis

In order to allow for alternative control variables, we conduct the analysis comparing Vietnam provinces instead of districts, as there are more data available on the province-level. When comparing provinces, we measure corruption using the data from Vietnam Provincial Competitiveness Index on informal charges that businesses have to pay when conducting their operations in different provinces in Vietnam (Malesky, 2018). The data are based on a large-scale survey of business representatives in the entire country and our measure is a total percentage of affirmative responses with the statement "Enterprises in my line of business usually have to pay for informal charges" by the survey respondents.

The measures of income per capita, the level of industrial production and population density come from the National Statistics of Vietnam (2019). We calculated the measure of industrial production using yearly growth data in per cent relative to the base year (2010), available from the national statistics, and the data on the actual level of production levels in the base year. The results are presented in Tables I.1 - I.3

Table I.1: The relationship between civic participation and air/water quality across Vietnam provinces

	DV: Air quality				DV: Water quality			
	1	2	3	4	5	6	7	8
Group memb.	-0.160*	-0.172*			-0.161	-0.229		
	(0.064)	(0.066)			(0.157)	(0.150)		
Gov.proposals			-0.125	-0.239*			0.071	-0.096
			(0.086)	(0.096)			(0.228)	(0.250)
Income/cap (ln)		0.050		0.047		-0.219*		-0.208*
		(0.043)		(0.045)		(0.100)		(0.100)
Agriculture		-0.028		-0.030		-0.047		-0.097
		(0.064)		(0.064)		(0.115)		(0.131)
Ind. prod. (ln)		-0.009		-0.006		0.011		0.013
		(0.009)		(0.010)		(0.020)		(0.021)
Pop. dens. (ln)		-0.033*		-0.040*		0.011		0.004
		(0.015)		(0.016)		(0.040)		(0.039)
Constant	0.767***	0.667*	0.697***	0.659*	0.394***	2.007**	0.270***	1.842**
	(0.042)	(0.281)	(0.026)	(0.281)	(0.111)	(0.656)	(0.072)	(0.657)
Observations	63	63	63	63	63	63	63	63
R-squared	0.102	0.273	0.023	0.230	0.022	0.126	0.002	0.090

OLS cross-province regressions of air (1-4) and water (5-8) quality in the year 2018 on civic participation, measured by group membership and average number of proposals to local governments. Robust standard errors in parentheses. ***p<0.001, **p<0.01, *p<0.05, †p<0.1. The regressions control for natural logarithm (ln) of income per capita, the extent of agriculture, ln industrial production, and ln population density. All independent variables are lagged 2 years

Table I.2: The relationship between the reports of alternative candidates in local elections and air/water quality across Vietnam provinces

	DV: Air quality				DV: Water quality			
	1	2	3	4	5	6	7	8
Non-part. memb.	-0.309**	-0.269*			-0.309	-0.277		
	(0.113)	(0.116)			(0.219)	(0.218)		
Self-nomin. cand.			-0.187*	-0.179*			0.398	0.452*
			(0.093)	(0.083)			(0.248)	(0.193)
Income/cap (ln)		0.068		0.055		-0.196*		-0.184†
		(0.041)		(0.042)		(0.097)		(0.101)
Agriculture		-0.045		-0.105†		-0.080		-0.060
		(0.058)		(0.055)		(0.131)		(0.127)
Ind. prod. (ln)		-0.011		-0.005		0.009		0.006
		(0.009)		(0.010)		(0.022)		(0.022)
Pop. dens. (ln)		-0.031*		-0.039*		0.012		0.005
		(0.014)		(0.016)		(0.040)		(0.037)
Constant	0.786***	0.535†	0.699***	0.572*	0.413***	1.819**	0.211***	1.578*
	(0.043)	(0.279)	(0.020)	(0.254)	(0.093)	(0.600)	(0.051)	(0.629)
Observations	63	63	63	63	63	63	63	63
R-squared	0.129	0.263	0.041	0.206	0.028	0.108	0.039	0.134

OLS cross-province regressions of air (1-4) and water (5-8) quality in the year 2018 on the reports of non-party members and self-nominated candidates in commune elections. Robust standard errors in parentheses. ***p<0.001, **p<0.01, *p<0.05, †p<0.1. The regressions control for natural logarithm (ln) of income per capita, the extent of agriculture, ln industrial production, and ln population density. All independent variables are lagged 2 years.

Table I.3: The relationship between business corruption and air/water quality across Vietnam provinces

	Air quality			Water quality		
	1	2	3	4	5	6
Business corruption	-0.158***	-0.168***	-0.134**	-0.359**	-0.345**	-0.366**
	(0.043)	(0.040)	(0.048)	(0.111)	(0.118)	(0.132)
Group memb.			-0.035			0.052
			(0.072)			(0.152)
Non-party memb.			-0.128			0.000
			(0.106)			(0.244)
Income per capita (ln)		0.079*	0.076†		-0.167†	-0.161
		(0.038)	(0.039)		(0.096)	(0.100)
Agriculture		-0.102†	-0.069		-0.160	-0.178
		(0.052)	(0.061)		(0.114)	(0.125)
Industrial production (ln)		-0.007	-0.009		0.013	0.014
		(0.009)	(0.008)		(0.018)	(0.019)
Population density (ln)		-0.043**	-0.038**		-0.005	-0.007
		(0.014)	(0.013)		(0.034)	(0.036)
Constant	0.756***	0.489*	0.546*	0.502***	1.767**	1.714**
	(0.024)	(0.240)	(0.266)	(0.073)	(0.580)	(0.627)
Observations	63	63	63	63	63	63
R-squared	0.173	0.362	0.387	0.190	0.258	0.260

OLS cross-province regressions of air (1-3) and water (4-6) quality in the year 2018 on business corruption. Robust standard errors in parentheses. ***p<0.001, **p<0.01, *p<0.05, †p<0.1. The regressions control for natural logarithm (ln) of income per capita, the extent of agriculture, ln industrial production, and ln population density. All independent variables are lagged 2 years.

J Robustness checks. Fixed effects models

We also check whether the relationships we found in the cross-sectional analysis, manifest themselves in the analysis of short-term changes within districts. We perform the analysis over 2011-2018 keeping the differences between the districts constant using a fixed-effects specification:

$$Y_{it} = \alpha_i + \beta_1 X_{it-2} + \epsilon_{it} \tag{2}$$

where t is a year and α_i is an unobserved time-invariant individual effect (fixed effect) or a separate intercept for each district. When performing these regressions we have imputed the missing values on nighttime lights and population size using a linear interpolation based on the values for the available years, 2010-2013 for nighttime lights, and 2010 and 2015 for population size. Tables J.1 and J.2 present the results.

Table J.1: The relationship between civic participation/business influence and air quality across Vietnam districts. Fixed effects models

DV: Air quality	Model 1	Model 2	Model 3	Model 4	Model 5
Group membership	-0.014	-0.031†			-0.001
	(0.015)	(0.016)			(0.043)
Business influence			0.003	0.007	0.007
			(0.027)	(0.030)	(0.031)
Economic situation (ln)		0.018		0.040	0.040
		(0.031)		(0.047)	(0.047)
Agriculture		0.006		0.041	0.042
		(0.035)		(0.061)	(0.061)
Night-time light (ln)		0.008		0.015	0.015
		(0.009)		(0.011)	(0.011)
Population size (ln)		-1.048**		-0.696	-0.696
		(0.336)		(0.659)	(0.661)
Constant	0.675***	12.835**	0.664***	8.681	8.677
	(0.010)	(3.913)	(0.016)	(7.674)	(7.689)
Observations	618	603	416	406	406
R-squared	0.002	0.024	0.000	0.011	0.011
Number of districts	208	203	208	203	203

District fixed effects OLS regressions of air quality on civic participation, measured by membership in civic and political groups, (1-2) and business influence (3-4). Robust standard errors in parentheses, ***p<0.001, **p<0.01, *p<0.05, †p<0.1. The regressions control for natural logarithm (ln) of economic situation, the extent of agriculture, ln night lights, and ln population size. All independent variables are lagged 2 years, apart from business influence that is lagged 1 year due to data availability.

Table J.2: The relationship between civic participation/business influence and water quality across Vietnam districts. Fixed effects models

DV: Water quality	Model 1	Model 2	Model 3	Model 4	Model 5
Group membership	-0.012	-0.003			-0.067
	(0.027)	(0.031)			(0.077)
Business influence			0.062	0.094	0.099
			(0.056)	(0.060)	(0.060)
Economic situation (ln)		0.006		0.060	0.074
		(0.059)		(0.072)	(0.075)
Agriculture		-0.047		0.153†	0.160†
		(0.085)		(0.091)	(0.092)
Night-time light (ln)		-0.011		0.028†	0.030†
		(0.013)		(0.016)	(0.016)
Population size (ln)		1.008		1.942	1.992
		(0.828)		(1.530)	(1.547)
Constant	0.277***	-11.410	0.237***	-22.514	-23.075
	(0.019)	(9.612)	(0.032)	(17.772)	(17.973)
Observations	604	589	407	397	397
R-squared	0.000	0.009	0.008	0.038	0.041
Number of districts	204	199	204	199	199

District fixed effects OLS regressions of water quality on civic participation, measured by membership in civic and political groups, (1-2) and business influence (3-4). Robust standard errors in parentheses, ***p<0.001, **p<0.01, *p<0.05, †p<0.1. The regressions control for natural logarithm (ln) of economic situation, the extent of agriculture, ln night lights, and ln population size. All independent variables are lagged 2 years, apart from business influence that is lagged 1 year due to data availability.

K Robustness checks. Models with panel-corrected standard errors

We also perform the over-time analysis for the pooled sample using panel-corrected standard errors (Beck and Katz, 1995) with Prais-Winston transformation (Tables K.1 and K.2) and lagged dependent variable included in the list of the predictors (Tables K.3 and K.4) to correct for first-order auto-correlation.

Table K.1: The relationship between civic participation/business influence and air quality across Vietnam districts. Panel-corrected standard errors with Prais-Winsten transformation

DV: Air quality	Model 1	Model 2	Model 3	Model 4	Model 5
Group membership	-0.078**	-0.096*			-0.095†
	(0.028)	(0.038)			(0.052)
Business influence			-0.151**	-0.165**	-0.132*
			(0.056)	(0.061)	(0.054)
Economic situation (ln)		0.106**		0.069†	0.106*
		(0.034)		(0.041)	(0.042)
Agriculture		-0.070***		-0.095***	-0.082***
		(0.013)		(0.025)	(0.021)
Night-time light (ln)		-0.009***		-0.008***	-0.009***
		(0.002)		(0.001)	(0.002)
Population size (ln)		-0.014*		-0.015*	-0.019***
		(0.006)		(0.006)	(0.004)
Constant	0.719***	0.833***	0.753***	0.916***	0.966***
	(0.018)	(0.049)	(0.034)	(0.027)	(0.026)
Observations	618	603	416	406	406
R-squared	0.644	0.638	0.538	0.452	0.521
Number of district	208	203	208	203	203

Pooled time-series regressions with panel corrected standard errors and Prais-Winsten transformation of air quality on civic participation, measured by membership in civic and political groups, (1-2) and business influence (3-4). Robust standard errors in parentheses, ***p<0.001, **p<0.01, *p<0.05, †p<0.1. The regressions control for natural logarithm (ln) of economic situation, the extent of agriculture, ln night lights, and ln population size. All independent variables are lagged 2 years, apart from business influence that is lagged 1 year due to data availability.

Table K.2: The relationship between civic participation/business influence and water quality across Vietnam districts. Panel-corrected standard errors with Prais-Winsten transformation

DV: Water quality	Model 1	Model 2	Model 3	Model 4	Model 5
Group membership	-0.054†	-0.081†			-0.195***
	(0.030)	(0.047)			(0.034)
Business influence			-0.212†	-0.183†	-0.131†
			(0.111)	(0.100)	(0.079)
Economic situation (ln)		0.027		-0.021	0.055
		(0.051)		(0.069)	(0.063)
Agriculture		-0.010		-0.032	-0.009
		(0.023)		(0.033)	(0.025)
Night-time light (ln)		-0.031***		-0.026***	-0.029***
		(0.001)		(0.002)	(0.001)
Population size (ln)		-0.020**		-0.028**	-0.036***
		(0.007)		(0.010)	(0.008)
Constant	0.307***	0.590***	0.394***	0.775***	0.889***
	(0.027)	(0.053)	(0.064)	(0.110)	(0.098)
Observations	604	589	407	397	397
R-squared	0.082	0.158	0.103	0.180	0.195
Number of district	204	199	204	199	199

Pooled time-series regressions with panel corrected standard errors and Prais-Winsten transformation of water quality on civic participation, measured by membership in civic and political groups, (1-2) and business influence (3-4). Robust standard errors in parentheses, ***p<0.001, **p<0.01, *p<0.05, †p<0.1. The regressions control for natural logarithm (ln) of economic situation, the extent of agriculture, ln night lights, and ln population size. All independent variables are lagged 2 years, apart from business influence that is lagged 1 year due to data availability.

Table K.3: The relationship between civic participation/business influence and air quality across Vietnam districts. Panel-corrected standard errors with Prais-Winsten transformation and lagged dependent variable

DV: Air quality	Model 1	Model 2	Model 3	Model 4	Model 5
Group membership	-0.001	-0.017			0.002
	(0.041)	(0.052)			(0.048)
Business influence			-0.044*	-0.043	-0.043**
			(0.023)	(0.026)	(0.014)
Economic situation (ln)		0.024		0.015	0.015
		(0.048)		(0.045)	(0.048)
Agriculture		-0.009		-0.021	-0.021
		(0.014)		(0.019)	(0.015)
Night-time light (ln)		-0.003		-0.003†	-0.003
		(0.002)		(0.001)	(0.002)
Population size (ln)		-0.009†		-0.009†	-0.009
		(0.005)		(0.005)	(0.006)
LDV	0.728***	0.721***	0.674***	0.673***	0.673***
	(0.170)	(0.182)	(0.183)	(0.189)	(0.197)
Constant	0.182	0.290†	0.242†	0.346*	0.345†
	(0.128)	(0.164)	(0.129)	(0.155)	(0.181)
Observations	416	406	416	406	406
R-squared	0.604	0.648	0.560	0.592	0.592
Number of district	208	203	208	203	203

Pooled time-series regressions of air quality on civic participation, measured by membership in civic and political groups, (1-2) and business influence (3-4), with panel corrected standard errors, Prais-Winsten transformation and lagged dependent variable. Panel corrected standard errors in parentheses, ***p<0.001, **p<0.01, *p<0.05, †p<0.1. The regressions control for natural logarithm (ln) of economic situation, the extent of agriculture, ln night lights, and ln population size. All independent variables are lagged 2 years, apart from business influence that is lagged 1 year due to data availability.

Table K.4: The relationship between civic participation/business influence and water quality across Vietnam districts. Panel-corrected standard errors with Prais-Winsten transformation and lagged dependent variable

DV: Water quality	Model 1	Model 2	Model 3	Model 4	Model 5
Group membership	-0.049	-0.103*			-0.092*
	(0.045)	(0.049)			(0.042)
Business influence			-0.050	-0.046	-0.018
			(0.037)	(0.037)	(0.032)
Economic situation (ln)		0.073***		0.025	0.065*
		(0.013)		(0.030)	(0.025)
Agriculture		-0.020		-0.035*	-0.023
		(0.015)		(0.014)	(0.015)
Night-time light (ln)		-0.009*		-0.008*	-0.009*
		(0.004)		(0.003)	(0.004)
Population size (ln)		-0.014		-0.010	-0.014
		(0.010)		(0.011)	(0.010)
LDV	0.810***	0.772***	0.798***	0.775***	0.763***
	(0.143)	(0.158)	(0.149)	(0.158)	(0.165)
Constant	0.088	0.246*	0.088	0.204	0.259†
	(0.068)	(0.125)	(0.060)	(0.127)	(0.135)
Observations	406	396	406	396	396
R-squared	0.652	0.661	0.654	0.660	0.655
Number of district	203	198	203	198	198

Pooled time-series regressions of water quality on civic participation, measured by membership in civic and political groups, (1-2) and business influence (3-4), with panel corrected standard errors, Prais-Winsten transformation and lagged dependent variable. Panel corrected standard errors in parentheses, ***p<0.001, **p<0.01, *p<0.05, †p<0.1. The regressions control for natural logarithm (ln) of economic situation, the extent of agriculture, ln night lights, and ln population size. All independent variables are lagged 2 years, apart from business influence that is lagged 1 year due to data availability.

L Robustness checks. Testing for reverse causality

Table L.1: The relationship between air/water quality and civic participation. Fixed effects models

	DV: Group membership				DV: Gov.proposals			
	1	2	3	4	5	6	7	8
Air quality	-0.026	-0.038			-0.074	-0.087†		
	(0.072)	(0.072)			(0.050)	(0.049)		
Water quality			-0.015	-0.008			-0.004	0.003
			(0.034)	(0.036)			(0.027)	(0.025)
Education		0.043**		0.042**		0.044***		0.044***
		(0.015)		(0.016)		(0.011)		(0.011)
Econ. sit. (ln)	0.154***	0.127**	0.153***	0.127**	0.156***	0.129***	0.153***	0.126***
	(0.042)	(0.041)	(0.041)	(0.041)	(0.036)	(0.036)	(0.036)	(0.035)
Agriculture	0.098	0.172*	0.098	0.171†	0.093†	0.168**	0.098†	0.175**
	(0.083)	(0.086)	(0.083)	(0.088)	(0.051)	(0.053)	(0.051)	(0.054)
Night lights (ln)	-0.014†	-0.018*	-0.014†	-0.017*	0.014*	0.010†	0.014*	0.010†
	(0.008)	(0.009)	(0.008)	(0.009)	(0.006)	(0.006)	(0.006)	(0.006)
Pop. size (ln)	0.453	0.422	0.566	0.511	-0.728*	-0.759*	-0.597†	-0.655*
	(0.422)	(0.428)	(0.442)	(0.455)	(0.323)	(0.310)	(0.337)	(0.323)
Constant	-4.761	-4.621	-6.074	-5.657	8.570*	8.713*	6.993†	7.435*
	(4.908)	(4.969)	(5.125)	(5.259)	(3.757)	(3.601)	(3.909)	(3.736)
Observations	609	609	595	595	609	609	595	595
R-squared	0.042	0.060	0.044	0.060	0.069	0.103	0.067	0.101
Number of district	203	203	199	199	203	203	199	199

District fixed effects OLS regressions of civic participation, measured by membership in civic and political groups (1-4) and average number of proposals to local governments (5-8), on the perceptions of air and water quality. Robust standard errors in parentheses. ***p<0.001, **p<0.01, *p<0.05, †p<0.1. The regressions control for the average level of education, natural logarithm (ln) of economic situation, the extent of agriculture, ln night lights, and ln population size.

Table L.2: The relationship between perceptions of the change in air/water quality and civic participation. Fixed effects models

	Group membership				Gov.proposals			
	1	2	3	4	5	6	7	8
Air qual. change	0.014	0.026			0.027	0.040†		
	(0.031)	(0.031)			(0.024)	(0.024)		
Water qual. change			-0.014	-0.011			-0.008	-0.005
			(0.019)	(0.018)			(0.014)	(0.013)
Education		0.045**		0.041**		0.045***		0.044***
		(0.015)		(0.016)		(0.011)		(0.011)
Econ. sit. (ln)	0.151***	0.122**	0.153***	0.126**	0.148***	0.118**	0.153***	0.125***
	(0.041)	(0.041)	(0.041)	(0.041)	(0.036)	(0.036)	(0.036)	(0.035)
Agriculture	0.099	0.175*	0.101	0.173*	0.098†	0.175**	0.100†	0.175**
	(0.082)	(0.085)	(0.082)	(0.086)	(0.050)	(0.053)	(0.051)	(0.054)
Night lights (ln)	-0.013	-0.016†	-0.014†	-0.017*	0.016*	0.012*	0.014*	0.010†
	(0.008)	(0.009)	(0.008)	(0.008)	(0.006)	(0.006)	(0.006)	(0.006)
Pop. size (ln)	0.486	0.472	0.591	0.536	-0.637*	-0.651*	-0.578†	-0.637*
	(0.417)	(0.421)	(0.450)	(0.459)	(0.308)	(0.295)	(0.331)	(0.320)
Constant	-5.185	-5.286	-6.346	-5.925	7.413*	7.309*	6.782†	7.230†
	(4.829)	(4.865)	(5.206)	(5.301)	(3.583)	(3.427)	(3.836)	(3.704)
Observations	609	609	595	595	609	609	595	595
R-squared	0.042	0.061	0.045	0.061	0.067	0.103	0.068	0.101
Number of district	203	203	199	199	203	203	199	199

District fixed effects OLS regressions of civic participation, measured by membership in civic and political groups (1-4) and average number of proposals to local governments (5-8), on the perceptions of air and water quality change. Robust standard errors in parentheses. ***p<0.001, **p<0.01, *p<0.05, †p<0.1. The regressions control for the average level of education, natural logarithm (ln) of economic situation, the extent of agriculture, ln night lights, and ln population size.