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# Fragile Convergence: Understanding Variation in the Enforcement of China's Industrial Pollution Law

BENJAMIN VAN ROOIJ and CARLOS WING-HUNG LO

*Official statistics and independent survey data show that in the last decade China has witnessed a remarkable change in its enforcement of environmental pollution violations, moving toward more formalistic and coercive law enforcement with more enforcement cases as well as higher fines. The data also show that there is considerable regional variation with coastal areas having more and higher punishments than those inland. This article explores these findings, seeking to understand the explanation and meaning of these temporal and regional variation patterns. The study shows how enforcement varies when there is a convergence of governmental, social, and economic institutional forces. The article argues that the basis for such convergence has been fragile, as national pressures have lacked consistency and local community and government support evaporates when dominant sources of income are at stake.*

## I. INTRODUCTION

China's pollution is severe; it affects the health and income of millions of Chinese citizens (OECD 2007; World Bank and SEPA 2007). It also poses a regional and global threat, especially now that China has become the world's largest emitter of greenhouse gases (GHG) responsible for global climate change (MNP 2007). Since 1978, China has gradually instituted a system of environmental law meant to control and prevent pollution, increasingly acknowledging the importance of environmental protection. While the legislation is thought to have improved, the effect of law is limited, largely because it is insufficiently and ineffectively enforced. The academic literature

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presents a bleak picture of systemic problems of fragmented authority structure undermining effective enforcement in China.

Most studies argue that the root of enforcement problems lies with the institutional arrangement in which the local governments pay and directly manage China's main local environmental enforcement authorities, the Environmental Protection Bureaus (EPBs). Local governments have consistently undermined pollution enforcement in order to protect local economic interests (e.g., Ma and Ortolano 2000; Zhang 2002; Jahiel 1998, 1997; Tang, Lo, and Fryxell 2003; Sinkule and Ortolano 1995; Tang, Lo, Cheung, and Lo 1997; Swanson, Kuhn, and Xu 2001; Van Rooij 2006b). Studies further find that EPBs lack authority, administrative rank (*jibie*), and financial and human resources (Jahiel 1997, 1998; Chan, Cheung, and Lo 1993; Tilt 2007; Ma and Ortolano 2000; Sinkule and Ortolano 1995; Tang et al. 1997; Van Rooij 2003, 2006b). They show that local EPBs suffer from weak internal management processes (Van Rooij 2003, 2006b) as well as the risk-averse nature of their enforcement agents who are afraid to upset powerful regulated actors or other government officials (Ma and Ortolano 2000; Van Rooij 2006b). These problems are only exacerbated when EPBs do not receive support from local communities and environmental groups' efforts (Dasgupta et al. 2000; World Bank 1997; Van Rooij 2006b; Warwick and Ortolano 2007; Wang 2000; Lo and Leung 2000; Tilt 2007; Lo and Fryxell 2005), or when they face powerful enterprises that try their best to undermine enforcement action (Van Rooij 2006b). Finally, agency commitment to regulatory control is uncertain because the legitimacy of environmental policy and regulation is not always fully recognized by enforcement officials (e.g., Chan et al. 1995).

Yet the presented picture of pollution enforcement in China drawn from the existing body of research is not complete because it is a static image that is not able to account for temporal and regional variation. Research conducted in developed Organization of Economic Cooperation and Development (OECD) countries shows that regulatory enforcement cannot be captured in static and homogeneous terms, as enforcement arrangements display remarkable temporal, regional, and sectoral variation. In most OECD countries, regulatory and enforcement practices are diverse both among and within national jurisdictions with a variety of mixtures of formalistic and discretionary arrangements, persuasion and punishment, and state and decentered approaches (cf. Bardach and Kagan 1982; Black 2002; Vogel 1986; Sparrow 2000). While some studies have sought to understand what the optimal mixtures of such arrangements are for given settings (e.g., Braithwaite 2002; Ayres and Braithwaite 1992; Kagan and Scholz 1984; Gray and Scholz 1993; Becker 1968; May and Winter 1999), others have analyzed how and why variation exists (e.g., Vogel 1986; Gormley 1997, 1998).

The latter body of work shows that variation in regulatory enforcement in OECD countries exists due to a combination of institutional factors. These include local political and interest group pressures, economic conditions, the

number, severity, and visibility of the violations, the costs of compliance, the preponderance of regulated enterprises, the administrative capacity of local regulators, and individual choices of agents in the exercise of discretion. (cf. Hunter and Waterman 1996; Kagan 1994; Lipsky 1980; Wilson 1989; Hutter 1997; Gunningham 1987; Shover, Clelland, and Lynxwiler 1984, 1986; Hawkins 2002). The existing literature also shows that changes in regulatory enforcement in OECD countries are not necessarily the outcome of a well-conceived plan in which policy makers and regulators use findings about optimal arrangements. Change in enforcement also occurs in a more haphazard fashion as a result of political, civic, and economic forces that are unleashed following disasters, regulatory scandals, electoral change, or economic crisis (Kagan 1994; Sparrow 2000).

Gunningham, Kagan, and Thornton's (2003) study of beyond-compliance at pulp mills in several OECD countries provides an important point of departure to understand how regulatory change occurs. The authors argue that regulation became increasingly effective in influencing mills to clean up, even at considerable costs. Their study shows how this change occurred when regulatory, social, and market forces "converged" by mutually reinforcing one another and thus strengthening their synergetic effects on regulated plants. Blackman and Bannister's (1998) study of brick kiln pollution regulation in Mexico shows how a similar convergence of regulatory, social, and market forces strongly strengthened the effects of environmental regulation. Regulatory variation over time, we can thus learn, occurs when there is a convergence of regulatory, social, and market forces in the institutional environment. Similarly, regulatory enforcement variation takes place when the combined interactions between variables that affect enforcement strengthen one another, leading to certain changes in the way regulation is enforced.

This article seeks to analyze variation of pollution enforcement in China over time and region. The goal is to complement the academic portrayal of pollution enforcement in China while also providing a non-OECD account of regulatory enforcement change and variation that contributes to general regulatory theory. The article answers four questions. First, what temporal and regional variation exists in the enforcement of industrial pollution laws and regulations? Second, how can such variation be explained? Third, what does such variation and its explanation mean when compared to the current static image of pollution enforcement in China? Fourth, how is the variation in China comparable to and different from that described in the literature about the developed OECD countries?

This article argues that there is much more variation in the enforcement of pollution laws in China than currently portrayed in the academic literature. It observes enforcement variation patterns both in changes over time as well as in geographical differences. It notes that a combination of institutional factors can account for such variation. Such factors include central government support, community pressure, local government commitment,

enforcement capacity, regulated firm characteristics, and general economic conditions. The article demonstrates that a convergence of these factors across the nation can explain a trend toward a more coercive and formalistic style of enforcement. It warns, however, that the basis for such convergence has been fragile, as national pressures have lacked consistency and local community and government support evaporates when dominant sources of income are at stake, reflected in the different pace and intensity of the development trend.

The article uses three sets of data: official environmental national and provincial data about enforcement and environmental management (1998–2006); surveys conducted amongst EPB enforcement officials in three localities; and data obtained through fieldwork at the grassroots level in Yunnan, Sichuan, and Guangdong provinces. Each set of data has inherent limitations due to trade-offs between the level of validity and detail, on the one hand, and the representativeness, on the other. By combining these three sets of data, such trade-offs can be significantly reduced through the resulting complementary and triangulation effects. The validity of the official data is a noteworthy limitation, as it is likely biased toward positive reporting. Considering that the governmental data are used here in a relative manner comparing developments over time and region, such bias is likely less problematic because it influences both sides of the comparison. Moreover, the usage of two additional sets of data helps triangulate such bias.

The remainder of the article is divided into two sections followed by a conclusion. The first section discusses the temporal and regional variation found in official data and surveys. The second section analyzes how these variations can be explained, looking at how institutional forces affecting enforcement interact with each other and possibly combine in a convergence toward a certain type of enforcement. The conclusion first looks at what these findings mean for the current bleak but static picture of law enforcement in China. It ends with an overview of the findings and consideration of the comparative and theoretical implications.

## II. TEMPORAL AND REGIONAL VARIATION IN POLLUTION ENFORCEMENT

Temporal and regional variation in pollution enforcement in China is evident in official statistics on environment protection. China's top environmental regulator, the Ministry of Environmental Protection (MEP), until 2008 known as the State Environmental Protection Administration (SEPA), publishes annual data about the state of the environment and environmental regulation. MEP collects these data mainly through its local EPBs. The present study uses the SEPA data from 1998 to 2006.

Table 1 contains an overview of annual aggregate national data about the number of administrative sanctions against pollution violators, the number of such cases in relation to amount of pollution,<sup>1</sup> the average penalty per

Table 1. SEPA National Pollution Enforcement Data (Source: SEPA 1999–2007)

Year	1998	1999	2000	2001	2002	2003	2004	2005	2006
Enforcement cases	39754	53101	55209	71089	100103	92818	80079	93265	92404
Cases in relation to 5 main pollution indicators	3,3	6,5	7,3	9,7	15,3	15,2	15,8	17,5	16,1
Fine per case	NA	NA	NA	3377	3017	3546	5747	6868	10427
Criminal cases	NA	NA	NA	5	4	1	4	2	4
Closed or moved enterprises	13630	9175	19498	6574	8184	11499	13348	10777	10030

administrative case, the number of criminal cases, and the number of factories forced to close.

The table shows that China has had a remarkable increase in the number of administrative sanctions and the average fine per case. When comparing the number of administrative sanctions between 1998 and 2006, we see a 132 percent increase and a 383 percent increase, respectively, when the number of sanctions is made relative to the amount of industrial pollution.<sup>2</sup> Similarly, there was a 208 percent increase in the average fine per case when comparing the numbers from 2001 and 2006.

Table 1 further shows a clear trend in the number of administrative sanctions issued in relation to pollution due to a sharp increase in cases over most of the period with less increase in 2004, a slight decrease in 2003, and a major decrease in 2006. It shows an even clearer trend for the average administrative fine per case, which has since 2002 increased continually, only slightly in 2003, but strongly through 2006.

The data about the number of enterprises that were closed or forced to move, due to continuing violations of pollution standards and failure to meet deadlines for clean up, do not indicate any trend. As Table 1 shows, the number of closed or moved factories is highly volatile, with a peak in 2000 and a lowest point in 2003.

The temporal variations, observed in the official statistics about the number of cases and the level of fines, are, to a certain extent, confirmed by a longitudinal study conducted in Guangzhou city. Here the authors have conducted two surveys of law enforcement agents about the style of enforcement and the effectiveness of such enforcement action. The enforcement styles were operationalized in five enforcement style elements (formal, coercive, educational, accommodation, and prioritization),<sup>3</sup> with respondents being asked the same questions in 2000 and in 2006. Comparing the 2000 and 2006 data, it was found that respondents in 2006 reported greater reliance on a formalist style with stronger emphasis on coercion (Lo, Fryxell, and Van Rooij forthcoming). Such a combination stresses adherence to rather rigid legal requirements and may be expressed through firm implementation dead-

lines, specific environmental standards linked to clear penalties, a reluctance to consider mitigating circumstances, and a strong propensity to impose—or signal the imposition of—sanction for noncompliance (Braithwaite, Walker, and Grabovsky 1987; Gormley 1998; Hawkins 1984; Kagan 1994). In particular, the increased perceived use of the coercive style corresponds to the official data, which show an increased number of sanctions and a higher fine per case over the same period.

The SEPA reports also contain data about the number of administrative sanctions and the average fine per case for each of China’s thirty-two provinces. These data allow us to detect regional variation of pollution law enforcement. An analysis of all data over 2001, 2003, and 2006, shows first of all that there is much regional variation. These data show that the lowest number of sanctions related to pollution is 0.3 while the highest is 179.3. The variation becomes pronounced when looking at the standard deviation of 26.7, which is higher than the average number of sanctions of 18.8. The same applies to the average fine per case, which is at its lowest RMB687.9 (or US\$101) and at its maximum RMB32,500 (or US\$4,685), with a standard deviation of 5,539.4 compared to a mean of 5,954.6.

One way of understanding regional variation is by looking at how enforcement is carried out in different geographical areas of China. Table 2 below shows regional variation by grouping provincial level scores in China’s seven regions of the years 2001, 2003, and 2006 showing sanctions in relation to pollution and showing the average sanction per case.

These data show that there is much regional variation, with some regions issuing a larger number and more stringent sanctions than others. First, one observes that eastern and southern provinces have more administrative sanctions and higher fines than northwestern, southwestern, western, and central provinces. China’s northeastern provinces produce mixed results, as they score highest in number of sanctions but lowest in the average fine per case. This table shows that coastal areas issue more and, to a certain extent, also higher administrative sanctions than inland areas. There seems, then, to be some kind of linkage between enforcement performance and socio-economic conditions, which are markedly different in these coastal areas from those

Table 2.

Region	Adm Sanction / Pollution	Average Penalty
Central	12,0	4358,6
East	36,7	8261,7
North East	48,4	2891,6
North West	5,8	6004,9
South	17,5	10197,7
South West	3,2	3871,5
West	7,5	5738,8

inland. Looking at how the provinces—and not the regions—fare, it is noteworthy to see that of the most active ten enforcers, three are provincial level municipalities: Beijing, Shanghai, and Tianjin. Of China's ten most stringent enforcers in terms of fines, there are also three provincial level municipalities: Shanghai, Chongqing, and Tianjin. Urban centers thus seem to be more active and coercive when compared to normal provinces with large rural areas.

Fieldwork data comparing the enforcement performance of municipal EPBs in Guangdong and all district-level EPBs in Guangzhou permits us to look at how varied even the grassroots level in one city can be.<sup>4</sup> First of all, there are noteworthy differences in how well the EPBs are said to enforce the law, based on how they have been evaluated by their superiors in the municipal-level EPB. Second, there are large differences in what enforcement officials agents say are the main priorities and strategies of enforcement and obstacles they encounter in enforcement practice.

### III. EXPLAINING ENFORCEMENT VARIATION

It is crucial to ask why variation exists. From the regulatory literature discussed in the introduction we see that variation can be explained by a number of institutional factors in the regulatory environment. These factors include the content and intent of central-level policy and law, community pressure from the participation of social organizations and local citizens, local government commitment, enforcement capacity, the characteristics of the regulated actor, and the general economic conditions (cf. Hunter and Waterman 1996; Kagan 1994; Lipsky 1980; Wilson 1989; Hutter 1997; Gunningham 1987; Shover, Clelland, and Lynxwiler 1984, 1986; Hawkins 2002). The literature further warns that these factors should not be studied in isolation but in their mutual interaction, as they may converge in the trend of development causing a certain style in how regulation works and how it is enforced (Gunningham, Kagan, and Thornton 2003; Blackman and Bannister 1998). The following sections will analyze how these institutional factors have interacted to shape environmental law enforcement variation in China.

#### A. CENTRAL-LEVEL POLICY AND LAW DEVELOPMENTS DURING THE 9TH AND 10TH FIVE-YEAR PLANS (1996–2006)

Increasing central-level leadership commitment for environmental protection is a first explanation for the trend observed toward more formal and stringent enforcement. Since 1996, China's central-level leaders have expressed increased attention to environmental protection. The 9th Five-Year Plan (1996–2000) promised to rein in “aggravating pollution and ecological damage.” The 10th Five-Year Plan (for 2001–2006) in 2000 emphasized that further improvements in industrial productivity were to be sought in parallel

with environmental performance. During this period the central-level authorities increased the financial resources from 0.73 percent to 0.93 percent to 1.2 percent of expected GDP in the 8th, 9th, and 10th Five-Year Plans, respectively (National Environmental Protection Administration 2001; OECD 2007). Such increased budgets will ultimately help improve enforcement capacity at the local level and will also aid firms wanting to invest in pollution abatement. Meanwhile, the status of the chief of the SEPA was upgraded in 1998 to the ministerial rank (Lo and Leung 2000); more recently, SEPA was converted into a full ministry when the MEP was established in 2008. The elevated bureaucratic rank at the central level is likely to improve the authority and thus the capacity of local environmental authorities. Another key development in more recent times is the adoption of the Environmental Quality Administrative Leadership Accountability System. This represents a systematic attempt to hold local leading government officials responsible for the overall environmental quality of their jurisdictions by incorporating it as a key criterion in their performance evaluations (Lo and Tang 2006). The central authorities have also become committed to more formalistic and consistent enforcement following China's accession to the World Trade Organization, which can help to explain why formalism has become a more popular enforcement style, as was found in the Guangzhou surveys (Ferris and Zhang 2003; Lo and Leung 2000).

The regime of Chinese environmental law reflects the changes in the central government's commitment toward environmental protection. China has since 1996 gradually tightened and strengthened its pollution-related legislation. In the laws made during this period there are changes directly related to enforcement, including the introduction of criminal sanctions, higher maximum administrative sanctions and minimum sanctions, and clearer procedures for administrative enforcement (Van Rooij 2002, 2006b; Alford and Liebman 2001). The new laws, especially those promulgated after 2004 also provide greater opportunities for pollution victims to apply legal pressure on polluters to end pollution and pay compensation, in addition to taking administrative action against EPBs that fail to perform their enforcement tasks. For example, the 2008 Water Pollution Prevention and Control Law allows for collective law suits against polluters and reverses the burden of proof for causation in favor of the pollution victim. Therefore, there is increasingly a stronger legal basis that can help explain stricter and more formal law enforcement.

Changes in central-level policy have not only affected legislation but also local enforcement, thus partly explaining the variation found above. The most direct form of influence occurred through the organization of nationwide law enforcement campaigns, which have been widely organized since 1996. During such campaigns, national-level departments cooperate, often under direct support and guidance of the highest leaders, to organize a national effort to detect and punish certain violations of pollution law (Editorial 2001; Ross [1998] 2000; Van Rooij 2002, 2006b; Brettell 2003;

Economy 2004). During such campaigns local EPBs are found to increase the number of inspections and hit harder on violations. In the years 2003–2005, for instance, a total of over 1.3 million companies were inspected during campaigns, of which over 16,000 enterprises were closed, and 8,000 were ordered to suspend production (OECD 2006). When comparing this to the total number of enterprises closed in the same period, one can see that about half of them were closed in campaigns. Similarly, the immense rise in the number of enterprises closed or relocated in 2000 originated when a major campaign directed at major industrial polluters ended, forcing all noncompliant firms to be closed down (Van Rooij 2002).

Regional variation of central-level pressure for stricter enforcement can also be detected since central pressure for tightening up regulatory enforcement has been far heavier on coastal regions than inland areas. Most notably, the Pearl River Delta Region (Lo and Fryxell 2005; Lo and Tang 2006) and the Huai River Region (Economy 2004), both notorious for lax enforcement, were prioritized by the central authorities for extra scrutiny during campaign-driven action. As a result, the more developed coastal region has consistently recorded a larger number of factories being closed down in each of these campaigns than the inland region (e.g., Editorial 2001).

Changes in the central-level polity are thus one explanation for the trend toward more coercive and formal enforcement found in the official statistics and in the surveys. As shown above, these central-level changes interact with other institutional forces influencing enforcement, as these changes affect social support, local government commitment, EPB organizational capacity, and regulated enterprises. At the same time, as discussed in detail below, it is clear that the increased central-level commitment for the environment comes at a time when regulated actors are increasingly detached from governmental institutions and when the economy is growing rapidly and diversifying. These interactions indicate a convergence of institutional forces shaping enforcement.

The effect of changes at the central level on the observed law enforcement trend also has limitations, however. First, central-level commitment has been inconsistent, as high-growth policies combined with growth targets, regardless of environmental concerns, have concurrently been promoted (Economy 2007). Similarly, central-policy pressure has been on and off, especially in the enforcement campaigns, which only apply temporary pressure for enforcement work against selected pollution violations and as a result undermine the campaigns' long-term effects (Van Rooij 2006b). Finally, there continues to be much evidence that China's central policy and law can be obstructed by local governments, as detailed further below.

## B. COMMUNITY PRESSURE

While the number of sanctions and the value of fines grew, the number of complaints about pollution lodged to EPBs also increased (by over 140

percent in the period 2000–2006). The official provincial level aggregate data also indicate that provinces with more complaints have higher sanctions and higher fines, thus providing a possible explanation for geographical variation. They also show that coastal areas generally receive more complaints (when controlled for industrial pollution) than inland areas. We can use the provincial level aggregate data of 2001, 2003, and 2006, about complaints, fines, and the number of sanctions, to calculate whether in this period the indicated correlation between complaints and law enforcement work is significant. Such calculation shows that complaints do indeed correlate significantly to the number of sanctions (Pearsons correlation 0.316, Sig. 0.017) and the average fine per case (Pearsons correlation 0.305, Sig. 0.012). Complaints by local communities are thus a second explanation for enforcement variation.

Our survey and fieldwork data provide a more detailed view of how social pressures affect enforcement. They show, on the one hand, similar to the official data that enforcement work benefits from activism from local communities affected by the pollution. Community complaints help EPBs pressed for resources inside the bureaucracy and often obstructed by regulated enterprises when seeking information about violations of law. In the 1990s, for example, the Guangzhou EPB was able to act on increasing popular complaints against vehicular pollution to convince the municipal government to adopt a total ban on nonlead petrol (Lo and Leung 2000). This is especially the case for those enforcement bureaus that mainly use a reactive enforcement strategy when they carry out inspections following citizen complaints. In Kunming and in Chengdu, EPBs used such reactive strategy at first to deal with resource capacity problems. In doing so they have been spurred by national stimuli, applied, in part, through the enforcement campaigns since 2002 when local experiments with local communities in the detection of violations of law were promoted nationally (Van Rooij 2006a).

Social pressures do not only have positive effects on law enforcement. The authoritarian political setting of China has always made the enforcement agencies skeptical of the goodwill of societal support and enforcement officials uncomfortable or nervous about performing their duties under community pressure (Lo and Leung 2000). Survey data from Guangzhou (in Guangdong province in the south), Chengdu (in Sichuan province in the west), and Dalian (in Liaoning province in the northeast) suggest that there is variation in how social support affects enforcement. While there was a slightly positive and significant relation between social support and perceived enforcement effectiveness in Chengdu, social support had a negative impact on enforcement effectiveness in Dalian and Guangzhou (Lo, Fryxell, and Wong 2006).

The negative effect of social pressures on law enforcement has several explanations. First, in recent years there seems to have been a shift in enforcement strategy from more reactive to more proactive. Agents in Kunming, for

instance, have indicated that their bureau now relies more on proactive inspections at prioritized firms instead of merely waiting for complaints (Van Rooij 2006b). In such conditions, pressure from society no longer directly drives enforcement because it no longer largely depends on public support for detection of violations. Second, enforcement officials interviewed in Guangzhou have felt discouraged by community and media critique about their work, as they felt such critique was not based on a proper understanding of their enforcement work and the context in which it takes place. Another negative element of community pressure is that it may steer agents away from the most important violations and regular enforcement duties to those that are most visible and with the most direct effect, such as noise pollution violations from restaurants (cf. Dasgupta and Wheeler 1997; Dasgupta et al. 2000). The survey mentioned above (Lo, Fryxell, and Wong 2006) offers a similar explanation for the mixed effects of social pressures. An analysis of the survey data found that social pressure stimulates enforcement when local governmental support is lacking; however, when the local government already supports the EPB, additional social support in the form of external intervention has generated an adverse effect on the proper deployment of scarce enforcement resources, as reported by the enforcement teams of Guangzhou EPB (Lo, Fryxell, and Wong 2006). In short, environmental protection agencies and their enforcement officials would feel tremendous pressure to meet rising public expectations in front of greater societal support for tightening up enforcement, which is still a daunting task with a lot of difficulties for obtaining additional resources from the government and securing stronger bureaucratic cooperation. Nevertheless, individual enforcement officials of Guangzhou EPB have basically agreed that a more environmentally aware community and a supporting public have helped to create a more hostile environment for enterprises continue their pollution-generating operations.

Social pressures, even when they are positive, do not always occur and require certain conditions. The official statistics show there is a strong significant correlation between complaints and per capita gross domestic product (GDP) (Pearsons correlation 0.587, Sig. [two tailed] 0.000), showing that people in localities with improved material conditions are more likely to complain in the quest for better quality of life. Apart from income levels, the economic independence of citizens matters. Fieldwork in Kunming shows that citizens do not complain about pollution when they are directly and indirectly dependent on the factory involved as a major source of income (Van Rooij 2006b). As a result, one large factory with a central role in the local economy in the area researched could continue nightly pollution violations because the EPB was unable to detect these while citizens who knew about the violations failed to complain effectively to the EPB. Apart from these economic conditions, citizens face a range of legal, political, and social obstacles that prevent them from playing an active role to support enforcement officials. Such obstacles include a lack of information and awareness, a

lack of expert support and advice, and direct opposition by local governments and enterprises (Van Rooij forthcoming).

Social pressures interact with the other institutional forces, creating a convergence that shapes enforcement. As we have seen, social pressures help overcome EPB capacity deficiencies, and social pressures also influence the local government to act and the local enterprises to abate their pollution. At the same time, social pressures occur under certain economic conditions and when citizens can use new legal and political possibilities awarded by central-level commitment for the environment.

### C. LOCAL GOVERNMENT COMMITMENT

Variation can also be explained by local government commitment. In China's administrative arrangements, local governments have had an influential role on pollution enforcement, partly because they directly pay the EPB and appoint its leadership, and partly because they have the authority over the most coercive sanctions (forced closures or permit revocations). The existing literature has consistently pointed out that local governments have been known to protect local economic and sometimes personal interests instead of stimulating pollution law enforcement. One reason we witness a more coercive and formal enforcement style may be that local governments have become less protectionist. If this is so, differences in local government commitment can also explain regional variation.

In the last decade, local governments have become more committed to the environment, investing more in environmental protection, and providing stronger support for local EPBs. The prime examples are State Environmental Protection Model Cities, such as the coastal cities of Dalian, Zhuhai, and Xiamen, whose governments boast strong environmental reputations matched with environmental spending and support. Even traditionally progrowth cities such as Guangzhou, Wuhan, and Chengdu have become more environmentally friendly, increasing their spending on environmental protection (Lo, Fryxell, and Wong 2006; Lo and Fryxell 2005), and introducing proenvironment rhetoric in their general policy plans. For example, the Guangzhou municipal government embraced the designation of "green model city" as a priority in its 10th Five-Year Plan. Over recent years, some local governments have even introduced local environmental regulations that are more stringent than those at the center. An example is Kunming whose Dianchi Lake Protection Regulations of 2002 outdid the Water Pollution Prevention and Control Law of that time by prohibiting water discharges beyond the standards—which were not formally illegal but merely required payment of discharge fees—and by implementing regulations requiring that enterprises be ordered to halt production if they continued to exceed discharge standards (Van Rooij 2006b).

The increased local commitment to environmental protection can be related both to increasing central government pressure on the environmental

performance of local governments through enforcement campaigns (organized since 1996) (Van Rooij 2006b, 2002) as well as through the environmental quality administrative leadership accountability system (introduced in 1997) (Lo and Tang 2006). Mounting social pressure, through petitions, collective action, and social disturbances about pollution (Van Rooij forthcoming) have also put tremendous pressure on local governments to take the environment more seriously.

Here, we again see that an interaction is taking place in which different institutional factors strengthen one another and converge in support for formalistic and coercive law enforcement. In this case, local government support interacts with central-level commitment, and social pressures; it also interacts, as we will see below, with a separation between local government and local enterprises occurring in certain economic conditions, strengthening the EPBs' organizational capacity.

Fieldwork research demonstrates the diverse influence of local governments on enforcement. Informants in EPBs in some of Guangzhou's districts said that local protectionism and the practice of enterprises using personal connections with government leaders to get less stringent treatment, were things of the past and that more formalistic enforcement according to the book was now more common practice. Informants in EPBs of other Guangzhou districts, however, reported that local protectionism and favoritism of enterprises with government connections continued. Local research in Kunming also shows diversity, with the municipal government generally supporting stricter law enforcement and closures of enterprises, while still allowing some factories to continue operation that were unable to comply with the law but that were an important source of local income.

#### D. ORGANIZATIONAL CAPACITY

Changes and differences in organizational capacity also explain variation in enforcement. A central element in such organizational capacity is the number of enforcement staff EPBs have. The national data also show that since 1998 there has been a steady increase in EPB personnel concurrent with the rise in administrative cases and sanctions. The data also show that coastal areas generally have more EPB staff (when controlled for industrial pollution) than inland areas. These data further seem to indicate that EPBs with more staff have produced more administrative enforcement cases (when controlled for the severity of pollution). An analysis of the provincial-level aggregate data of 2001, 2003, and 2006 confirms that enforcement variation is, to a certain extent, linked to the number of staff, as there is a significant correlation between EPB staff and the number of sanctions issued (Pearsons correlation 0.415, Sig. [two tailed] 0.000). There was no significant relation between the number of staff and the average fine per case. This seems logical, as more staff is especially necessary for detecting violations and not for issuing higher fines against violations found.

EPB capacity has also improved over the last years, as EPBs have developed a series of efficiency mechanisms to deal with staff shortages. By doing so they have improved their capacity to detect violations of law, which can help explain the rise in the number of cases handled. First, as mentioned above, they have used reactive enforcement strategies to involve the general public in order to detect violations. They have done so by offering rewards for valid information about illegal discharges and by prioritizing enforcement capacity on those violations that have aroused public criticism. Second, EPBs in Guangzhou and Kunming, for instance, have introduced prioritization mechanisms, using lists of high-risk possible violators that are to receive more frequent inspections, while excluding other enterprises. Third, some EPBs, again ranging from Guangzhou to Kunming, have installed continuous compliance monitoring equipment in some of the regulated enterprises, allowing complete information about the enterprise's main pollution discharges without having to spend staff resources.

Organizational capacity thus interacts with the other factors studied, most notably central-level commitment, social pressures, local government support, and, as we will see below, changes in state-enterprise relations and certain economic conditions. These interactions converge to shape formalistic and coercive enforcement.

Limited organizational capacity continues to place a burden on enforcement, despite the increase in staff and efficiency. Interviews with district-level enforcement agents in Guangzhou and Kunming conducted in 2004 and 2007 show that most staff in most EPBs are no match for the sheer number of enterprises that require inspections, especially in rural areas where a limited number of agents has to cover a large geographical area. Respondents in some of the EPBs also complain that enforcement staff are not properly educated and lack knowledge of law and environmental protection, even though national statistics show a 33.2 percent increase in the number of higher-educated EPB staff members. Apart from human resources, many respondents related that their EPB lacked essential material resources such as vehicle support and monitoring equipment, thus obstructing their inspection capacity. Perhaps one of the explanations why resources continue to be inadequate, despite the rise in staff and the increase in efficiency, is that enforcement duties have become increasingly weighty, with the establishment of more and smaller enterprises spread out over a larger region, as respondents from several Guangzhou district EPBs complained. The pressure for resources is exacerbated by recent measures to make the EPB less dependent on irregular sources of income from pollution fees and fines as well as by measures that limit the EPB's ability to hire staff outside of the official staff quota (*bianzhi*) each bureau is assigned. These measures have limited EPB resources and staff, especially in regions where they have relatively little government support (Lo and Tang 2006).

## E. THE ROLE OF REGULATED ACTORS

Variation in pollution enforcement is also related to changes and differences in the type and number of regulated enterprises as well as in their attitudes toward enforcement officials. Since the late 1990s state-owned enterprises or collectively owned enterprises (Township and Village Enterprises TVEs) have, to some extent, privatized or disappeared in many parts of China. Enterprises that continue to remain state-owned are often large-scale enterprises. This privatization has had a positive effect on law enforcement; enterprises are now less closely connected to the government, and in the privatization wave many outdated, heavily polluting enterprises were closed (Lo and Tang 2006). In the past, EPBs had to enter difficult negotiations with state-owned enterprises to get them to comply with the law. In addition, research from Guangzhou shows that changes in the local government commitment along with pressure from the center to control pollution through the administrative responsibility system have made it easier for EPBs to regulate the still existing state-owned enterprises (Lo and Tang 2006). The growth in the number of enterprises from 165,080 in the 1998 to 323,793 in 2007 (China National Bureau of Statistics 2008) can also explain the increased number of administrative cases in this period. More enterprises further means that the local dependence on a small group of powerful enterprises decreases, making it easier to take stern action against the many smaller and less protected enterprises. Here it is interesting to note that coastal areas have far larger numbers of industrial enterprises than inland areas (Donald and Benewick 2005).

Local fieldwork further shows that some enterprises have become more responsive to state regulation, as attitudes of management have changed. Several managers of industrial enterprises interviewed in the Kunming region admitted that their companies had difficulty complying with the law and controlling their pollution. Nevertheless, they stressed that they had in recent years invested much in order to improve their compliance, as they had noted that both the law and its enforcement had become stricter, and they expected that this would continue (Van Rooij 2006b). If these Kunming enterprises represent a wider trend, enforcement work is likely to become more effective, especially if a consistent level of deterrence through formal and coercive sanctions is combined with education to stimulate willing enterprises to comply.

Here again interactions between the influence of the regulated actor and the other factors shaping enforcement can be observed. The regulated actor's influence on enforcement interacts with increased central-level commitment, social support, local government commitment, and certain economic conditions, to be discussed in the next section.

Other enterprise-related developments have a less positive effect on enforcement. As the number of enterprises has increased, enforcement agents have had trouble inspecting such a larger number of enterprises, especially

since their number of enforcement staff did not keep up with the number of regulated enterprises. In Guangzhou for instance, EPBs with twelve agents have had to regulate over 16,000 polluting enterprises (2004 and 2005 figures) and cover a larger geographic area. At the same time, the increase in the number of smaller enterprises may explain why the number of enforcement cases has grown; there are simply more enterprises to inspect and fine.

In addition, whereas in the past EPBs had had overly cooperative, capture-like relations with enterprises, nowadays the relation with enterprises has become much more adversarial. EPBs have had more difficulty in obtaining accurate and trustworthy data about pollution from privatized enterprises than from state-owned companies in the past (Lo and Tang 2006). Research from Chengdu, Kunming, and Guangzhou further demonstrates that enterprises have become masters at evading inspections. They do so by organizing their production at night, cutting costs, as environmental installations are temporarily switched off when the EPB is unlikely, and often unable, to notice. Enterprises have also meddled with the around-the-clock compliance-monitoring equipment, for instance, by building secret discharge pipes around the pipes connected to the monitoring installations. Enterprise personnel has also tried to stall or refuse EPB agents entrance to their premises, sometimes buying time to quickly destroy evidence of illegal production or to switch on their environmental installations. That this has developed into adversarial relations is most clearly evidenced by enforcement agents in district EPBs in Guangzhou who told stories about how they feared for their personal safety when inspecting enterprises, noting that they have been threatened or have even suffered physical abuse by factory workers.<sup>5</sup> The adversarial relation between enforcement agents and enterprises coincides well with a tougher and more formalistic approach to law enforcement. Mindful of the proper enforcement procedure, enterprises have started to take legal action to block regulatory enforcement. Most notably, the former chief of the Guangzhou enforcement team has told us that individual enterprises have now adopted the tactics of taking the violation charges to the judicial courts for review in order to buy time for continuing their polluting operation and delay the penalties.<sup>6</sup>

#### F. ECONOMIC CONDITIONS

Throughout the explanations offered above about why enforcement variation has occurred and exists in China are issues relating to economic conditions. This is affirmed by the official statistics where we see that the growth in the number of cases and the average fine concurred with a steady growth in per capita GDP. At the same time, we see that coastal regions have higher levels of per capita GDP than inland regions (China National Bureau of Statistics 2007). When looking more closely at the provincial-level aggregate data of 2001, 2003, and 2006, we see that there is a strong correlation between the average fine per case and the per capita GDP (Pearsons correlation 0.436, Sig. [two tailed] 0.000). As we have seen, the same data show that per capita

GDP strongly correlates with the number of complaints (Pearsons correlation 0.587, Sig. [two tailed] 0.000). This, of course, helps to explain why coastal areas and major urban centers are generally more punitive than inland and rural areas.

Not only the level of per capita GDP but also the structure of the local economy is an important factor explaining variation. Local research in Kunming shows that enterprises that are dominant local employers were more difficult to regulate, as there was less local commitment from local communities and local governments for strict enforcement action. Lacking community and governmental support, the local EPB had difficulty in detecting violations of law and punishing those that were detected. Such dominant employers are more likely to exist in relatively homogenous economies, with largely rural and few industrial sources of income. As we saw above, in many areas of China such homogenous structures are changing as urbanization, small-scale industrializing, and the development of a service sector produce a more heterogeneous economy where dominant employers are less likely to play an important role.

The changing structure of the Chinese economy thus has a varied impact on pollution enforcement. On the one hand, enforcement is easier when the economy is becoming more heterogeneous with less dominant employers and a clearer separation between state and enterprises. The economy plays a central role in the interaction of the institutional factors shaping enforcement, affecting central-level commitment, social pressures, local government support, and the response of regulated actors. On the other hand, enforcement is more difficult now that the number of enterprises has increased, with more smaller enterprises seeking every possible means to cut costs due to the increasing competition.

#### IV. CONCLUSION

There is considerable variation in pollution enforcement in China both in time and place, most likely much more than could be discussed in the confines of this article. A study of this variation presents a different picture of law enforcement than that presented in the existing literature, as it seems to have become more stringent and formalistic in the period 2001–2006, especially in certain coastal and urban regions. The article has also highlighted how such variation in enforcement can be explained by variation in the institutional forces that shape enforcement, as summarized in Table 3.

This is an important finding that questions the bleak and static picture presented in most existing studies. Some critical observations are warranted, though. First, one should question whether more stringent and more formal enforcement is necessarily good and effective. Here it is important to note that an important goal of law enforcement is to improve compliance, and that deterrent enforcement does not necessarily improve compliance, as it can

Table 3. Summary of Temporal and Regional Variation of Pollution Law Enforcement

	<b>Temporal Variation: 2000–2006</b>	<b>Regional Variation: Coastal Versus Inland</b>
1. Central Government	Increased budget, stricter laws, tightened local control, more nationwide enforcement campaigns	Greater national pressure for environmental protection (EP) in coastal than inland region
2. Community Action	More citizen complaints, more protest and activism	More prevalence in coastal than inland region
3. Local Government	Signs of commitment to EP, less local protectionism	Occur in both coastal and inland region
4. Organizational Capacity	Increased number of enforcement officials, officials with higher education	More observable in coastal than inland region
5. Regulated Actor	More firms on the whole, more privatized firms, fewer state-owned enterprises	Coastal regions have more firms than inland regions
6. Economy	GDP growth, heterogeneous economy	Stronger economic growth and economic heterogeneity in coastal than inland region

easily lead to goal displacement when numbers and punishment become more important than decreasing pollution and to opposition by regulated actors who find the enforcement unreasonable. Second, the trend noticed is relative to itself, meaning that compared to the past there are more cases and higher fines. This does not mean, however, that law enforcement has become strong enough to create more compliance. Here it is interesting to note that the average fine per case is still only a little over RMB10,000 (or US\$1,464). Third, the trend observed has many limitations, as we found all factors supporting this trend required certain conditions and often had inherent limitations restricting their sustained positive influence on the noted enforcement trend.

The study shows the usefulness of the concept of regulatory convergence to understand enforcement variation in China. Similar to studies about pollution regulation from OECD countries (Gunningham, Kagan, and Thornton 2003), enforcement variation in China can be explained when there are a number of institutional forces at play. Such forces are likely to have a stronger influence on how the law is enforced when they are mutually interacting and when there is a convergent development between them. Table 3 below summarizes the interactions discussed in this article.

Table 4 shows how these institutional forces interact in such a way that they strengthen one another, causing a convergence in the forces that shape pollution law enforcement to become more coercive and formal. Table 4, however,

Table 4. Summary of Interactions Between Institutional Forces Shaping Enforcement and Limitations for Each Force

	<b>Interactions</b>	<b>Limitations</b>
1. Central Government	2,3,5,6	Inconsistent, still limited support for EP
2. Social Press	1,3,4,5,6	Capacity limited to regulated actors and violations
3. Local Government	1,2,4,5,6	Bias in activism, unrealistic expectations, not always suitable
4. Organizational Capacity	1,2,3	Local protectionism continues, commitment limited
5. Regulated Actor	1,2,3,6	Adversarial relations, larger number undermines enforcement
6. Economy	1,2,3,5	Homogenous local economies undermine community and state support

also demonstrates that each of the forces at play has its own inherent limitations, which restricts and potentially undermines their influence on enforcement and in shaping the convergence found. These limitations show that China's convergence is still fragile. In sum, this article has demonstrated that, similar to the West, when enforcement has been more punitive and formal, this has been the result of a convergence of the development trends of political, social, and economic forces. The case of China, however, forces a closer and more refined look at the forces that can explain variation as well as situations where they converge to create a stronger trend-like effect.

This study, then, has several theoretical implications. First, the Chinese case shows that the broad portrayal of economic, social, and regulatory converging forces requires more detail. As we have seen in China, the converging trend of development among these forces included the creation of a more stringent regulatory framework in the national policy, increasing local community pressure, greater local government commitment, stronger EPB organizational capacity, the diminishing influence of regulated enterprises, and better performance and improved structure of the local economy, which have all contributed to more stringent and formalistic enforcement. There is a strong interrelation between these factors, as all influence one another and none would have the effect it has without the others.

A second refinement derived from the current study is that a convergence of forces influencing regulation may not necessarily be mono-directional and steady. Chinese regulatory convergence is a fragile affair; the favorable interplay between social, political, and economic conditions remains rather exceptional, and, even when it happens, it can easily unravel when one condition changes. When this happens, a different convergence can start, where, for instance, economic conditions converge *negatively* with national government support, community pressure, local government commitment, agency

capacity, and enterprise collaboration. This may cause a negative spiral that undermines pollution law enforcement.

As a third contribution, the present study shows that regulatory convergence is a tricky process that can have different outcomes, both positive and negative. Convergence occurs especially in conditions where the converging forces are strongly interdependent. When this is the case, steering of the regulatory system becomes difficult and risky; one small change may have a large effect when causing a convergence, while steering of one factor against an ongoing convergence may prove futile.

Compared to OECD settings, regulatory enforcement in China operates in fuzzy governance settings in which public and private, state and society, formal and informal, and even regulator and regulated cannot always be clearly distinguished. It is in these fluid institutional contexts that interrelations between local and national social, political, and economic conditions shape the way enforcement functions and changes. It is unexpected, yet hopeful, that even in these circumstances, a regulatory convergence toward more stringent and formal law enforcement could occur, albeit a fragile one.

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#### NOTES

1. The amount of pollution is calculated using a set of five main air, water, and solid waste pollution indicators as published in the China Environmental Statistical report.
2. Here the number of sanctions is divided by the sum of five main air, water, and solid waste pollution indicators. Such case/pollution ratio is used to show how the number of cases developed apart from the development of pollution and thus indirectly the number of violations.
3. For details of the study's methodology, we refer to Lo, Fryxell, and Van Rooij (forthcoming) and Lo and Fryxell (2003, 2005).
4. Based on interviews with enforcement staff of enforcement teams in all Guangzhou district EPBs, conducted between 2004 and 2007.
5. Based on interviews with enforcement staff of enforcement teams in all Guangzhou district and county city EPBs conducted between 2004 and 2007.
6. Based on an interview conducted in 2007.

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