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Greening Industry Without Enforcement? An Assessment of the World Bank's Pollution Regulation Model for Developing Countries

BENJAMIN VAN ROOIJ

The best comparative and overview source now available for knowledge about pollution regulation in developing countries is the 2000 World Bank policy research report called Greening Industry. The World Bank finds that there is a new model for pollution regulation in lower- and middle-level income countries that is an alternative to "traditional" command and control regulation. The new model stresses flexible norms and nonstate pressures on regulated enterprises coming from communities and markets. This article presents an investigation into this new model. It finds that the prevalence of weak law enforcement may undermine the new model's potential to control pollution in developing countries. It also contends that social and market pressures only occur under certain circumstances often not found in lower- and middle-level income countries. Therefore, the article concludes that developing countries require smart mixes of various regulatory instruments appropriate in the given state and nonstate regulatory capacities, instead of contrasting state and non-state regulation.

I. INTRODUCTION

There is now a large, relatively coherent, body of multidisciplinary empirical and theoretical knowledge about pollution enforcement and compliance. This body of knowledge has been mainly developed by scholars looking at advanced industrialized countries. So far, the study of pollution regulation in lower- and middle-income industrializing countries has been fragmentary, often taking the form of policy reports, and largely case-based, with a corresponding lack of useful generalizations about

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enforcement and compliance in an industrializing context. Moreover, such reports and case studies have often made no reference to the existing body of knowledge derived from industrialized contexts. Given the importance of pollution control in industrializing countries, more accessible, comparative, and comprehensive knowledge about pollution law compliance and enforcement is necessary.

The best comparative and overview source available for such knowledge is the 2000 World Bank policy research report, *Greening Industry* (World Bank 2000), based on economic studies in several industrializing countries. The World Bank (or Bank) states that there is “widespread recognition that traditional pollution regulation is inappropriate for many developing countries” and that “regulatory institutions are often unable to enforce conventional discharge standards at the factory level” (ibid.: 2–3). At the same time, however, the report finds that “factories in many poor countries run cleaner than a decade ago and total emissions are actually falling in some areas where industry is growing rapidly” (ibid.: 1).

The World Bank attributes this success in pollution reduction to a new regulatory model for developing countries. This model departs from “traditional pollution regulation” and “command and control approaches” that centered on setting pollution standards implemented through enforcement. The Bank finds that such standards are too inflexible to be cost effective and that regulatory institutions have been unable to enforce them (World Bank 2000). In the Bank’s model, pollution regulation is more flexible and more focused on pollution reduction pressures that come from civil society and markets. Favored regulatory instruments in the new model include discharge fees, public disclosure, public education, and environmental management systems.¹ In the model, governmental regulatory agencies, while still responsible for legal compliance and enforcement, must also focus on providing information that enables communities and markets to pressure factories to change. Put in the Bank’s terms, regulators thus change from “dictators to mediators.”

Given the widespread agreement on the difficulty of enhancing traditional enforcement in a context of developing legal and governance systems, the idea that community- and market-based regulation may help decrease pollution is appealing. However, a more detailed query of the World Bank model for pollution regulation in developing countries casts some doubt on the possibilities for such success. The key question asks how regulators that have been shown to be weak law enforcers and often lack reliable information on pollution behavior can help communities and markets fulfill their purported roles for reducing pollution. A related question asks what the World Bank’s model of regulation offers to improve such monitoring and inspection activities, which it also deems an important element even in the new model.

The present article presents a critical analysis of the regulatory approach promoted by the World Bank. It concludes by finding that the continued

prevalence of weak law enforcement is likely to undermine the new model’s potential to control pollution in developing countries.

II. THE WORLD BANK MODEL

In reaction to what it believes are obsolete pollution techniques relying heavily on the state’s providing norms and the state’s enforcing such norms, the World Bank proposes a multifaceted approach. In such an approach the Bank emphasizes the importance of nonstate regulators, whether through communities or market actors. In addition, the Bank emphasizes the use of flexible instruments that allow the regulated industry the choice about whether and how to clean up, based on economic incentives and disincentives. Furthermore, the Bank emphasizes the usage of voluntary or semivoluntary instruments that stimulate the regulated industry to clean up, by showing how this is also in their own benefit, and by allowing a certain amount of self-regulation. Finally, the Bank also proposes reforms in state-led regulation, focusing on how to improve efficiency and political support. (World Bank 2000) The World Bank’s approaches and the specific measures proposed are captured below in Table 1.

The World Bank model can thus be divided into four basic modes of pollution control: market, social, voluntary, and state. For each of these modes the Bank report (2000) discusses two or three examples of reform measures or recommendations it proposes from the new model of pollution control, as listed in the table. While it seems that the separation between different modes of pollution control is clear, in fact there is much overlap between different modes, as they are mutually interdependent. As will be discussed in more detail below, voluntary, market, and social modes of control, for instance, rely on state control measures, while state modes of pollution control function better when accompanied by effective nonstate modes of control (Gunningham, Grabosky, and Sinclair 1998). As such, pollution control measures are often hybrid forms of multiple control modes (cf. Murray and Scott 2002). The remainder of this article will discuss each of these measures and recommendations in order to provide a critical analysis of the Bank’s new pollution regulation model.

Table 1. World Bank Measures to Improve Pollution Regulation in Developing Countries Divided by Modes of Pollution Control

Modes of Control	World Bank Proposed Measures of Pollution Control		
Market	Discharge Fees	Stock Market Pressure	Public Disclosure
Social	Social Pressure	Public Disclosure	Public Education
Voluntary	Environmental Management Systems	Persuasion	
State	Targeted Enforcement	Technical Innovations	Political Support

III. MARKET CONTROL MODES

A. DISCHARGE FEES

A first market-based aspect of the World Bank's pollution regulation model is the use of discharge fees. Compared with traditional pollution standards, which set an absolute limit to the amount of pollutants factories can emit and may often direct factories to use certain abatement measures, discharge fees are said to be more effective because they allow factories flexibility in choosing the level and method of abatement. The Bank discusses cases of the use of such discharge fees in Colombia, the Philippines, and China, arguing that they are an alternative to traditional command and control regulation.

The first case concerns pollution at the Rio Negro in Colombia. Community pressure for cleaner rivers, as the World Bank writes, led to "one of the world's most innovative programs for controlling pollution" (World Bank 2000: 27). The discharge fee model was based on a pilot developed by Corporación Autónoma Regional de las Cuencas de los Rios Negro y Nare (CORNARE), the main environmental regulatory agency in the Oriente Atioquendo region. CORNARE had a good relationship with local businesses and communities and had already worked with several large factories to install clean production mechanisms. After consulting with managers and communities, CORNARE set the initial target of a 50 percent reduction of organic discharges to the Rio Negro. Although there was protest, the total amount of biological oxygen demand (BOD), an organic waste indicator, fell by 52 percent, and total suspended solids (TSS), an air pollution indicator, fell 16 percent (World Bank 2000). The Bank reports, however, that factories responded in a varied manner. Only seven of the fifty-five regulated plants cut their BOD emissions while eight cut TSS emissions. Ultimately, the system was implemented in seven of Colombia's most populated regions.

The discharge fee schedule in Colombia is thus presented as an example of how such alternative regulation can lead to a decrease in pollution. Some questions remain, though. First, following Blackman (2006), one could argue that the success may well originate from the fact that with the CORNARE fee program there came more inspections and thus more pressure from law enforcement. It is difficult to ascertain to what extent it was this pressure or the fees themselves that led to clean-up. Second, the program only affected a limited number of plants, leaving most unaffected. The large reductions made at only a small number of plants seem to indicate that these are large plants. While such large plants may have been spurred to invest in pollution control, the program may not have provided adequate incentives at many smaller plants where the costs of abatement were higher or that were less sensitive to reputational gains from reductions (perhaps because they did not have widely recognized consumer brand names or were not in the supply chains of multinational firms that *are* sensitive to reputational effects).

The second case concerns a discharge fee system that was instituted to control pollution at Laguna Lake in the Philippines. In 1994, 1,481 factories occupied about 30 percent of the land in the region around Laguna Lake, the largest inland body of water in southeast Asia. These enterprises caused significant pollution, directly discharging their waste into the lake and its rivers. Given weak regulatory enforcement, only 8 percent of facilities were in compliance in 1994 (World Bank 2000).

In 1997, the Laguna Lake Development Authority (LLDA) started a new initiative to decrease pollution by introducing an environmental-user fee system. The World Bank studied LLDA's pilot project of twenty-one factories to see whether a fee-based system was more effective than traditional enforcement. The World Bank determined that the pilot project was successful, as it resulted in an 88 percent drop of BOD at the twenty-one firms (World Bank 2000). The Bank argues that fees were more successful because they brought continued costs for polluters instead of the low risk of sporadic legal action.

Again, just as with CORDARE in Colombia we can pose several questions: First, is the success attributable to the fee system or to the extra inspections that must have been organized to implement it? Second, was the selection of targeted enterprises influential? Were they not mainly enterprises that were susceptible to fees, that had the technical capacity to monitor their effluents, and that could afford the costs of abatement? Third, given the limited capacity for inspections by the LLDA, we can question what would happen if the project did not merely target twenty-one factories but was expanded to the 1,481 factories located around Laguna Lake.

The third case the World Bank uses to demonstrate the success of new discharge fee systems in developing countries is from China. In 1979, China instituted a nationwide system that levied fees from factories where pollution discharges exceeded certain standards. Recently, the system was changed to levy fees on all factory discharges. Using econometric analysis of officially published data of pollution combined with data concerning the levy of discharge fees, World Bank researchers concluded that the discharge fees were effective in controlling pollution in China (Wang and Wheeler 1996, 2000). These studies found that each 1 percent increase in levies led to a 0.8 percent drop in BOD industrial pollution and a 0.4 percent drop in intensity of suspended particulates. These findings are remarkable and seem inconsistent with the reality of the ongoing pollution problems that China still faces more than a decade since the research was carried out. The country has not been able to control its worst polluted water catchments, such as the Huai river where a concerted effort of more than ten years, starting in 1994, proved to be ineffective a decade later (Zhang 2004).

In addition, much analysis of China's pollution discharge fees system finds it is problematic in many ways. First of all, scholars have argued that the

original discharge fee system studied by the World Bank was inadequate because it was based on concentration rather than on total amounts of pollutants, and it was thus easily circumvented by diluting pollutants (Ma and Ortolano 2000). In addition, scholars have also argued that the original system lacked deterrent effect, as the fees were set at lower levels than the costs of abatement, mainly due to the influence of strong bargaining by industrial stakeholders and the fact that minimum standards had to apply throughout China, including its poorer regions (Jahiel 1998; Sinkule and Ortolano 1995; Wang 2000; Van Rooij 2002).

A second line of critique of China's pollution discharge system is that it has made law enforcement agents dependent on pollution, as the regulatory budgets came to rely on income from pollution discharge fees.² In one case, an Environmental Protection Bureau (EPB) even stopped its monitoring activities because it feared a local enterprise might be in compliance with the law, thus depriving the EPB of fee revenue (Ma and Ortolano 2000). A third problem has been the system's implementation. Case studies of industry behavior have found that enterprises have many ways of obstructing monitoring and inspections, for example, by secretly discharging at night and by tampering with monitoring equipment (Van Rooij 2006).

The difference between the data presented by the World Bank studies and the continuing pollution situation, combined with the problems in the fee system and its implementation, can be explained in two ways. The first is as Wang and Wheeler claim: that the negative findings about the pollution discharge fee system are based on anecdotal evidence from the worst cases (Wang and Wheeler 1996, 2000). The second explanation is that the data used by the World Bank studies are inaccurate and biased, based on Chinese government reports (which are written with a strong pressure to find improvement³) and on weak monitoring data that is due to the many ways factories have to obstruct inspections and monitoring and the limited inspection capacity of enforcement bureaus. Given that severe water pollution persists in China and that problems have been found with the discharge fee system in a wide variety of settings (wealthy and not-so-wealthy, very polluted and not-so-polluted), the second explanation seems more plausible.

A pollution discharge fee system may be appropriately viewed as an instrument to allow factories themselves to find flexible solutions to curb their pollution.⁴ In the cases presented by the World Bank, the discharge fees seem to have an effect. But this effect might have been the result of more targeted enforcement (in Colombia and the Philippines) or based on defective data (in China). Importantly, discharge fees may be an alternative to traditional standards that proscribe specific abatement efforts, but regulatory agencies must still be competent in program administration, verification, and enforcement in order to effectively monitor a factory's discharge of pollutants and to punish violators. Following Blackman and Harrington (2000) and Huppess and Kagan (1989), we can even wonder whether pollution discharge fees do

not demand even more regulatory capacity than traditional pollution regulation.⁵ In addition, discharge fees may be particularly problematic in the context of the Bank's new proposed regulatory model because they may undermine community pressure, given that they do not make clear how much pollution is legal or acceptable (cf. Gunningham, Grabosky, and Sinclair 1998).

In its presentation of the discharge fee system, the World Bank fails to fully account for the continuing problem of weak governmental regulatory capacity. It does not hesitate to blame the failure of traditional pollution control on the lack of capacity for monitoring and enforcement, stating that

Regulators have to monitor and analyze pollution from each plant, determine whether it has violated the rules, and institute legal proceedings in cases where violation is clear. These steps are not cheap, and many developing countries have been unable to implement them. (World Bank 2000: 28)

Yet the Bank presents discharge fee approaches as a cheaper and easier alternative, with only a brief admission that "As with traditional regulations effective monitoring and enforcement of pollution charges can be costly and time consuming" (ibid.: 36). The World Bank thus conflates flexibility and feasibility: the advantage of discharge fee systems lies in their flexibility and not their feasibility in developing countries known for weak enforcement, the original Achilles' heel.

B. STOCK MARKET PRESSURE

The World Bank's model for pollution regulation in developing countries also stresses the importance of another market-based type of pollution regulation: pressures on polluting firms from stock markets. For this finding the Bank report relies on Dasgupta, Laplante, and Nlandu's study (1997) of how environmental pollution incidents affect the values of stock in Argentina, Chile, the Philippines, and Mexico. This World Bank study found that news about good environmental performance of an industrial firm led to an increase in its market value (ibid.).

In the Philippines, for example, the news that the regulatory agency had recognized the San Miguel Corporation's commitment to environmental protection in the installation of abatement equipment led to a sharp rise of stock value (ibid.; World Bank 2000). Similarly, the study found that such market value decreased following news about citizen complaints or other negative publicity concerning pollution (Dasgupta, Laplante, and Nlandu 1997; World Bank 2000). The World Bank concludes that "capital markets everywhere are taking information about environmental performance into account and firms are responding by cleaning up" (2000: 62–63). Dasgupta, Laplante, and Nlandu conclude that "less resources should be devoted to the enforcement of regulations and more to the dissemination of information

which allows all stakeholders to make informed decisions” (1997: 3) These findings from developing countries echo conclusions in some (but not all) similar studies about the United States and Canada (Muoghalu, Robison, and Glascock 1990; Lanoie and Laplante 1994; Klassen and McLaughlin 1996; Hamilton 1995; Laplante, Lanoie, and Roy 1997).

Again, these findings offer hope for developing countries that suffer from industrial pollution and lack effective state enforcement. However, while there thus may be some validity and hope in these findings, there is some doubt as to their general applicability and to the circumstances under which markets do indeed help to regulate pollution. In addition, we can question whether they are alternatives and substitutes for command and control regulation or additions.

A first question is whether stock markets would respond to news about the environmental performance of all kinds of companies. One can imagine that firms that depend on good publicity because they market directly to consumers are much more susceptible to this effect than firms that do not cater to consumers. Second, one can question how much impact stock markets have in general on polluting industries in developing countries, many of which are either small enterprises or state-owned enterprises not traded in stock-markets. Third, markets and stockholders may have the opposite impact when faced with negative news about the economic performance of firms. Such news may lead to a drop in stock values and to pressure on a company to cut costs, even at the expense of its environmental performance. Fourth, the study found that bad news mainly came from citizens’ complaints. This raises the question, discussed above, that citizen action requires certain conditions, including limited dependence on polluting firms, a reasonable income, and higher level of education. Lacking such circumstances—which many countries do—news reporting will be limited, leaving the poor less protected from pollution and raising environmental justice issues (World Bank 2000).

Another set of questions arises from the persistent problem of weak law enforcement in developing countries. One should ask whether news about the environmental performance of firms in developing countries is trustworthy enough to accurately reflect firm performance. This question is especially important in contexts where monitoring and inspection capacity has proved to be weak. With news about environmental performance depending on state monitoring, stock market pressures following news about environmental performance should be viewed as an addition to command and control enforcement, not a substitute. Finally, markets mainly react negatively to bad environmental news if there is a real fear that it has a negative effect on the profitability of such enterprise. Potential penalties and thus a functioning law enforcement system are essential to sustain such a negative effect, as the Bank itself also recognizes (*ibid.*). Thus, as with community pressure, weak enforcement may also undermine the market’s ability to pressure polluting firms.

IV. SOCIAL CONTROL MODES

A. COMMUNITY PRESSURE

Apart from market-led regulation, the World Bank's model also stresses the use of society-based regulation. Society-based regulation means that social groups, whether local communities or nongovernmental organizations (NGOs), will assert pressure on polluting firms in order to get them to clean up (*ibid.*). There is much research quoted in the World Bank report suggesting that communities play an important role in pressuring factories to decrease pollution, also supported by studies about both Western (Levine 1994; Kagan, Gunningham, and Thornton 2003) and non-Western countries (Sonnenfeld 1998, 2002; Cribb 1990; Huq and Wheeler 1993; Carmen de Mello Lemos 1998; Chege Kamau 2005).

A fact less emphasized by the World Bank is that societal pressure can also lead to better law enforcement. In Juárez, Mexico, collective action, organized in part by NGOs, combined with the election of a new mayor led to a more concentrated enforcement effort (Blackman and Bannister 1998a, 1998b). Similarly in Cubatão, Brazil, local communities have tried to pressure agents to initiate stronger environmental enforcement against power local industries (Carmen de Mello Lemos 1998). Meanwhile, in India social groups have resorted to litigation to push for better environmental enforcement (Stuligross 1999). Similarly, Indonesian NGOs have tried to sue government officials for lax enforcement. Although they lost their case, the court accepted standing for NGO-type social organizations to initiate public interest litigation against the polluting firms (Sonnenfeld 1998; Cribb 1990).

Social pressure does not always happen, though. In some countries, the level of awareness about the effects of violations is too low to spark action until there has been a clear and visible sign of the effects such violations have. Resistance to industrial pollution was only triggered in Kenya, for example, after the effects on personal health and economic welfare were clear, with pollution discharges from a chemical factory that caused the "rusting and rotting of iron sheets of residential houses" (Chege Kamau 2005: 239).

Another obstacle to such pressure is economic dependence on polluting enterprises. In China, citizens living in remote rural areas where polluting enterprises were dominant sources of income did not pressure enterprises even though the pollution strongly affected them, while in the same region—but closer to an urban center—citizens who had alternative sources of income strongly pressured enterprises whose pollution seemingly had less effect on them (Van Rooij 2006). Similarly, a study of Bangladesh demonstrated that local communities were only able to force chemical fertilizer plants to invest in cleaner production in those cases where the community did not depend on such plants for their income (Huq and Wheeler 1993). In one of the three cases studied,

downstream villages had clearly identified the plant's discharges as the cause of fish kills, paddy-field damage, and health threats. Yet community pressure for change was only moderate, as the area is primarily non-industrial and offers few other factory jobs. (World Bank 2000: 12)

The finding that the local community will be less inclined to act against violations if regulated actors are dominant employers is also supported by evidence from Western countries (Kagan, Gunningham, and Thornton 2003).

Moreover, some groups have more success than others. Group income and level of education matter. A study on informal regulation in Indonesia and the United States found that richer communities are more effective in influencing regulated actors (Pargal et al. 1997). A related finding from Pargal and Wheeler's study of informal regulation in several developing countries is that "plants in poor less educated areas are about 15.4 times more water pollution intensive than plants in affluent well educated areas" (Pargal and Wheeler 1996: 1325–26; emphasis in original).

Social pressure often depends on a potent legal regime. Legal rules, procedures, and official findings provide benchmarks and triggers for citizen protest and mobilization (Gunningham, Kagan, and Thornton 2003). Even in economically advanced nations, it has been found that social pressures on small firms are minimal in the absence of direct enforced legal mandates that focus public attention on less visible but hazardous pollutants (Thornton, Kagan, and Gunningham 2009).

The limits to social pressure are to some extent recognized in the World Bank report. The report especially pays attention to the fact that wealthier communities have proven to be more successful in pressuring factories for improvement. It states that "employment concerns may lead poor communities to welcome industrial activity, but such communities may lack political influence and environmental information to negotiate effective pollution control agreements" (World Bank 2000: 75). The Bank suggests regulators seek to overcome this limitation through environmental education, educating communities on "the pollution risks they face" (*ibid.*). However, while a lack of environmental awareness may cause limited community action (as in the case of Kenya discussed above), in many other cases (such as those in China and Bangladesh above), communities are well aware of the effects of pollution on their lives but still fail to translate such knowledge into action because of their economic dependence.

In such cases, effective state law enforcement is essential. It is worth noting, however, that it is precisely in these contexts that such enforcement may be most challenging because economically weak communities may not be able or willing to assist in the detection and enforcement processes. For these types of situations, the role of NGOs that specialize in representing the interests of weak groups and initiating collective action that goes beyond the not-in-my-backyard type is essential. In addition, community pressure on enforcement authorities can only be effective if these authorities have

sufficient capacity to take the enforcement action the community sought in the first place (cf. O'Rourke 2004).

B. PUBLIC DISCLOSURE

In its new model for pollution regulation in developing countries, the World Bank thus emphasizes the positive effects that community and market pressures can have on the environmental performance of industrial firms. Based on this insight, the Bank argues that pollution regulators must adopt new roles in which they do not solely enforce the law, but rather seek to act as mediators helping communities and the market to assert as much pressure as possible. One of the ways they can do so is by installing public disclosure systems such as those first used in the United States (Tietenberg 1998; Hamilton 1995; Konar and Cohen 1997). The Bank strongly advocates the use of such systems, basing its analysis largely on Indonesia's Program for Pollution Control Evaluation and Rating (PROPER).

In the PROPER program, Bapedal, Indonesia's national pollution regulator, produced a rating system to rate the water pollution performance of 187 industrial firms, including medium- and large-scale polluters, in Sumatra, Java, and Kalimantan. According to Bapedal data, two-thirds of these factories were not in compliance at the time. Under the rating system, five categories were used to classify the performance of these firms, each designated by color: black (no pollution control effort, serious pollution), red (efforts but do not meet standards), blue (efforts meet the standards), green (above standards and good maintenance), and gold (clean technology, waste minimization, and pollution prevention) (Afsah, Laplante, and Wheeler 1997).

Following the classification, none of the regulated firms met the standards to be awarded the gold status, and only five were awarded green. The majority were in blue and red, while six firms received black status. Bapedal publicly rewarded the performance of the five green firms, and gave noncompliant firms in the red and black categories six months to clean up before full public disclosure. A year later, the black group had decreased by 83 percent, while 24 percent of the red firms also showed improvement and were awarded blue compliant status (Afsah, Blackman, and Ratunanda 2000; Afsah, Laplante, and Wheeler 1996, 1997; World Bank 2000). In total a 53 percent increase in compliance was thus achieved. All of this was done with a minimum of costs: the entire cost of PROPER was about \$300,000 over eighteen months (Afsah, Blackman, and Ratunanda 2000; Afsah, Laplante, and Wheeler 1996, 1997; World Bank 2000). Other countries where public disclosure has been tried include Brazil, the Philippines, Mexico, and Colombia (World Bank 2000).

PROPER's results are very promising and deserve further exploration, especially as to their usefulness in broader contexts. Again, however, several questions need to be answered. First, given the small selection of companies, one can question to what extent public disclosure or the targeted approach

helped to decrease pollution. Isolating a small number of firms enables a regulatory agency to concentrate its attention and increase pressure on those firms involved. Here, as in the cases of the discharge fees in Colombia and the Philippines, it is difficult to separate out this enhanced regulatory attention and the actual regulatory mechanism.

In addition, one can question whether Indonesia would be able to implement such a system for a larger range of enterprises without much greater investments in regulatory capacity, especially in monitoring (Lucas and Djati 2000). A related question then arises about the political will to include a larger range of enterprises in such a program. Some have criticized Indonesia's selection methods, claiming that they did not include highly polluting firms that were well-connected politically (Lucas and Djati 2000). Other criticism has centered on the fact that none of the factories labeled black, and thus identified as serious cases of noncompliance, were fined or prosecuted (Lucas and Djati 2000). While one could say that communities or markets will take care of such firms based on the public availability of the data, one also wonders about the signal communities and markets receive when known polluters and violators are punished with nothing more than bad publicity.

Another issue involves the question of whether public disclosure affects all kinds of polluting factories. As discussed in relation to market pressure above, larger, more consumer-oriented, and privately owned factories may be more susceptible to bad publicity than the small informal firms or state-owned enterprises found more often in developing countries. There is evidence that public disclosure only works for firms with a higher level of social responsiveness (Van de Bunt 1992; Braithwaite 1989), located in areas where there are communities able and willing to assert pressure.

A more fundamental question concerns the trustworthiness of the data used to evaluate whether firms are compliant or not and thus whether the system is effective. Public disclosure systems require flawless data about factory pollution behavior, not only because such data are used to pressure firms behaving badly but also because if public disclosure is done without sufficient evidence, shamed firms may sue regulatory agencies for slander. In Brazil, a public disclosure effort failed when a firm successfully sued the regulator for slander because the regulator could not produce evidence for the data on which the rating system was based (World Bank 2000). In the PROPER system, the compliance data have been gathered by a combination of inspections and self-reporting by industries (Afsah, Laplante, and Wheeler 1997). A first indication that these data may lack validity can be found in the World Bank report itself, which states that one of the well-performing green firms was later demoted to the black category after Bapedal had received complaints from neighboring communities about secret nightly discharges (World Bank 2000). One must wonder whether every one of the 187 firms, let alone each of the 2,000 firms that Indonesia has been planning to put under the PROPER system since 1998, has such

watchful communities willing to report such information to a government agency. Further doubt about the reliability of self-reported data, and even monitoring data assembled by regulators, comes from a study by Lucas and Djati (2000), who found that government officials doctored pollution data to show performance in a related pollution program in Indonesia and suggested that government officials were colluding with factories or were pressured for favorable treatment (*ibid.*). A weak point of public disclosure is thus the trustworthiness of the data on which it is based. Collecting valid data requires a well-functioning inspection system combined with sufficient community pressure, both of which have been challenging in many developing countries.⁶

The Bank again provides contradictory analysis here. On the one hand, it promotes public disclosure as an alternative method that helps increase pressure from communities and markets on polluting enterprises in developing countries where traditional regulation through state law enforcement has been weak: “Links among local communities, market agents and regulators have sparked several of the world’s most innovative experiments in environmental policy in countries where traditional regulation has failed. These creative programs harness the power of public information, enabling communities and markets to exert maximum pressure on polluters” (World Bank 2000: 58). On the other hand, the Bank acknowledges that “efficient enforcement of regulations will remain very important for its own sake, and because potential penalties provide an incentive for capital markets to react to public disclosure of non-compliance” (*ibid.*: 75). The question, then, is how effective public disclosure can be when state enforcement, both in terms of monitoring and punishment of violators, remains so challenging in developing countries.

V. VOLUNTARY CONTROL MODES

A. PERSUASION AND PUBLIC EDUCATION

The World Bank argues that polluting firms may become convinced to invest in abatement when they are made aware of the effects of their pollution and receive advice about efficient abatement techniques. In addition, social pressure can become more successful if the public is well-educated about the dangers of pollution. Public education and persuasion techniques are thus both society-led and voluntary measures.

The Bank uses the example of brick kilns in Juárez, Mexico, to illustrate these points (World Bank 2000). For many years, a large number of small brick kiln enterprises engaged in a highly polluting practice of making bricks from the burning of scrap waste. Because of the many jobs they created, they were favored by politicians and were very weakly regulated. In 1991, however, a new mayor was elected who banned the burning of scrap waste

and imposed fines and even jail sentences on some violators (Blackman and Bannister 1998b). Additional support to clean up the brick kilns came from local and also national NGOs, led by the Mexican Federation of Private Community Health and Development Associations (FEMAP), which played a major role in sparking further initiatives to educate the public and persuade the small enterprises to clean up. FEMAP worked with the local government to launch “an aggressive public campaign to educate the brick makers and their neighbors about the health risks from burning scrap” (World Bank 2000: 8).

Faced with this pressure, the brick makers were persuaded to think about switching to propane, and many did so after local propane suppliers offered free propane equipment to this large new set of clients. Local universities provided technical assistance to the small enterprises. As a result of these efforts, Juárez initially became cleaner between 1991 and 1993. However, changes in the price of propane, which rose due to removal of state subsidies, soon forced brick makers back to scrap burning. According to the World Bank (2000), “Bankruptcies and unemployment loomed as the remaining scrap-fired kilns easily undercut their cleaner competitors, and this seismic shock destroyed the community consensus that had supported the conversion to propane” (84). As a result, most of the clean factories resorted to their old polluting ways, burning scrap instead of propane. Due to the education campaign, however, companies did pay attention to the types of scrap burned, using cleaner materials as much as possible, and reducing use of tires, battery casing, and used motor oil.

The case of Juárez is interesting and offers several lessons. The educational and persuasive efforts of environmentally oriented politicians, NGOs, and technical experts can work to initiate change in long-held practices and reduce pollution (cf. Blackman 2000). Nevertheless, the results in Juárez were not sustained. When the costs of doing business in the more environmentally beneficial manner increased, the firms were able to revert to their former practices. Even amidst the stronger enforcement initiative and public education campaign, at least 30 percent of the firms never adopted the propane technology (Blackman and Bannister 1998b), and when the cost of propane rose they gained a competitive advantage over the cleaner firms.

From this we see that public education and persuasion need to be combined with law enforcement against the “bad apples” that refuse to be educated or persuaded and continue to illegally pollute the environment. In addition, we see that creating strong enough pressure on these bad apples is not easy, as even stricter enforcement was unable to deter them. Another lesson concerns the volatility of successes achieved, given the economic contexts of developing countries. To quote Blackman and Bannister (1998b), “The overarching lesson to be learned from the demise of the propane initiative is somewhat bracing: in volatile developing economies, voluntary based environmental initiatives among informal sector firms are bound to be fragile, even when well designed and well implemented” (23).

B. ENVIRONMENTAL MANAGEMENT SYSTEMS

Apart from direct persuasion techniques, the World Bank also proposes another form of voluntary regulation: the usage of environmental management systems (EMS). Such systems are in fact a form of self-regulation, relying on regulated actors to regulate and manage their own pollution, backed up by a certification system.

Typifying the EMS approach, the ISO 14001 system requires firms to take several steps in order to get certification: make an initial review of the main environmental concerns, establish priorities of action, make an environmental policy statement signed by the CEO, develop performance targets based on the policy statement, implement the EMS policy with defined procedures and responsibility, measure performance, and conduct management audits (Dasgupta, Hettige, and Wheeler 1997). The Bank promotes EMS based on its study on Mexico that found firms with EMS (ISO 14001-type internal management procedures) have better environmental performance than those without (*ibid.*). Some (but not all (i.e., Darnall and Sides 2008)) studies of the effects of ISO 14001 from industrialized countries also find that such systems are an important tool to enhance the environmental performance of firms (Potoski and Prakash 2005; Rondinelli and Vastag 2000; Coglianese and Nash 2001).

The Bank proposes that such EMS systems should be promoted not just for large firms but also for medium- and smaller-sized factories, which are often thought to lack the capacity for such systems. The Bank points to experiences in a pilot project in Guadalajara, Mexico, where eleven large firms helped twenty-two smaller factories to adopt EMS. After nine months of training, implementation, and review, fifteen of the small- and medium-sized firms had introduced basic EMS, 80 percent reported lower pollution, and 50 percent reported improved compliance and waste handling. Many firms further reported that their economic performance had improved (World Bank 1998). From the Guadalajara pilot project, the Bank concludes that aiding small- and medium-sized enterprises to introduce EMS is more effective and efficient than traditional regulation (World Bank 2000).

While these findings again offer hope, there are limits to the effects of EMS and ISO 14001 systems, especially in developing countries. First, there has been critique of EMS and ISO 14001 systems because they do not measure actual environmental performance (Rondinelli and Vastag 2000). EMS systems work well as a complement to traditional enforcement that can help firms identify problem areas and the most cost-effective means of abatement. In firms where improved environmental performance and cost savings can be achieved at the same time, such an approach is promising. In the case of firms where abatement is not cost effective and that are not otherwise predisposed to improve their pollution control, the real threat of law enforcement remains necessary.

Moreover, in order to verify the self-reporting EMS systems, credible data are necessary. To collect data EMS systems often, as in the case of ISO 14001, adopt deputized private party oversight organizations. However, as Metzenbaum (2001) notes, when discussing EMS in the West, self-review and deputized-review systems only work when “someone ‘checks the checkers’ and punishes lax reviewers and self-reporters sufficiently to motivate honesty and competence” (171). In developing countries with limited enforcement capacity, using EMS as a substitute rather than as a complement to traditional regulation risks instituting a system that looks effective but actually achieves little. In the Guadalajara case used by the Bank to demonstrate that EMS in small firms led to environmental improvement, it seems that the firms self-reported and there is no indication that there was any external verification (World Bank 1998). Finally, just as with most of the examples of other new measures described above, one can question in this case whether the success should be attributed to the EMS measures or to the fact that a small group of enterprises was targeted by a project supported by the World Bank.

VI. STATE CONTROL MODES

A. TARGETED LAW ENFORCEMENT

A central finding, not only in the World Bank’s report but also in other studies of pollution regulation in developing countries, is that state law enforcement has been weak due to budget constraints (Stuligross 1999; Darbinyan and Ashikyan 2002; Grenade-Nurse 1998; Ter-Nikoghosyan and Karamian 1998; Masilingi 1996; Agarwal 2004; McGuinness 2000; Sama 2005; Nonna 2002; Nolet 1998; World Bank 2000). Politicians often do not provide sufficient budget and staff allocations to enforcement bureaus. Budget constraints may be exacerbated by efforts to decentralize regulatory responsibility, as local governments may be even more limited in their funding capacity⁷ (Grenade-Nurse 1998; Nolet 1998). As an example, the Delhi Pollution Control Committee is funded from the city’s budget and has an annual budget of US\$450,000, which only allows it to recruit three senior environmental engineers, twenty-five junior environmental engineers, and twelve assistant environmental engineers. As Tang, Prakesh, and Tang observe, “Given the sheer magnitude of pollution activity in Delhi, such manpower falls short of what is needed for effective enforcement” (1998: 273). In Kenya, Chege-Kamau (2005) documents a severe shortage of the technical equipment required to monitor pollution. He describes inspection work at one polluting Kenyan firm thus: “The company administrator . . . has never seen inspectors themselves carrying any equipment, but rather, they just ‘go round, write their report and leave’” (233).

One of the solutions the Bank offers for dealing with tight budgets is to target enforcement work. One way of targeting is by instituting complaint-driven enforcement machinery. In many developing countries the lack of personnel and equipment has often forced regulators to enforce the law mainly for cases where there have been many complaints or much public outcry (World Bank 2000). The risk of such reactive law enforcement prioritization is that enforcement becomes biased, favoring cases involving more influential and richer complainants and more visible but not necessarily more harmful types of pollution (*ibid.*). Therefore, the Bank favors a different kind of proactive targeting where the regulator itself decides which kinds of enterprises to focus on. This idea originates from findings in studies about Western contexts concluding that prioritization, especially if combined with risk analysis, can be an effective tool to enhance enforcement (May and Winter 1999; Bardach and Kagan 1982; Helland 1998). In the developing world, the Bank points to the case of Rio de Janeiro's state environmental agency Fundacao Estadual de Meio Ambiente (FEEMA) in Brazil (World Bank 2000). In the 1990s, FEEMA developed a system of targeted enforcement in which polluters were assigned a letter (A, B, or C) according to the severity of their pollution. The categories were based on research that found that 60 percent of all local pollution could be controlled by controlling only fifty type A factories, while another 20 percent of the pollution was attributable to 150 type B plants. The other thousands of type C plants only amounted to 20 percent of the total pollution (*ibid.*). This prioritization strategy allowed the enforcement bureau to use its scarce administrative resources for the most polluting firms. The Bank sees this not only as a way to deal with scarce enforcement resources, but also as a flexible method of law enforcement that allows regulators to focus enforcement work on larger plants for which pollution abatement will be more cost effective (*ibid.*).

Indeed, prioritization of law enforcement work is an important tool for improving the impact of weak law enforcers in developing countries. In fact, some of the successes with discharge fees, public disclosure, and EMS in Colombia, the Philippines, Indonesia, China, and Mexico may actually be attributed, to some extent, to a more targeted approach of regulation. Yet, targeting is not as simple as it may seem. May and Winter (1999) have argued that it is difficult to establish the right priorities in advance. The effect of targeting can be undermined in developing countries where regulators often lack accurate information about the pollution circumstances of factories. A good illustration is the case of a large chemical fertilizer plant in western China. The provincial-level environmental protection bureau there had installed a system of priority inspections focusing largely on factories that failed to meet pollution discharge standards and that were to be inspected once every three months. This particular factory was listed as in compliance and, as a result, received a lenient treatment from the pollution regulatory authorities. The firm, however, had been able to cheat earlier inspection

efforts by discharging secretly at night, which the authorities were unable to find out because roads to the factory were dangerous in the dark and local communities were too dependent on the factory to report its violations (Van Rooij 2006).

Another difficulty for targeting is how to make it effective when regulatory officials are faced with pollution caused by a large amount of smaller and informal enterprises, as may often be the case in developing countries. Blackman's study of pollution regulation of informal enterprises in Mexico concludes that community-based monitoring in which other informal enterprises and community members have an incentive to ensure that their peers do not get an advantage by breaking the law may be successful for dealing with many smaller polluters, especially if their pollution is easily visible (Blackman 2000). China has similarly experimented with involving local communities in the monitoring of industries. In eastern China, especially in Jiangsu, Zhejiang, and Shanghai, there have been experiments to use the citizens to detect violations of environmental law. Local regulators have offered rewards of up to RMB5000 (US\$730) for true complaints about violations. The effect has been that regulators with only limited inspection personnel could make use of a large number of local amateur inspection agents. In some cases, local people have driven on motorcycles around factories at night in the hope that they would find violations and receive the reward.⁸

B. TECHNICAL INNOVATIONS IN ENFORCEMENT AND MONITORING

Apart from targeting, the World Bank promotes dealing with limited enforcement capacity through technological innovations, especially through the use of information technology systems. Again, the case of FEEMA in Brazil is used as an illustration. In 1996, it upgraded its computer system and installed a network system that enabled all FEEMA staff to share information and coordinate their work. The new system gave staff a better picture of how pollution originated, what the trends in emissions were, and how they were related to community complaints. The staff was able to focus their work on the worst polluters and thus enhance the targeting system (World Bank 2000).

A central element in such information systems is the use of continuous emission monitors (CEM). These are devices that are installed at polluting plants and that provide regulators with around-the-clock information about the factory's pollution. The Bank assumes that such CEM discharge monitors are in place enabling regulators to set up efficient monitoring systems that form the backbone both of traditional regulation as well as the alternatives discussed here (*ibid.*). In many developing countries such CEM may not be in place, however, simply because they are still too expensive (Blackman and Harrington 2000). In addition, even when they do exist, as is sometimes the case in China, for example, companies have been known to successfully tamper with them⁹ by installing new discharge pipes that

circumvent the monitoring equipment and are not easily detectable by enforcement agents (Van Rooij 2006).

C. ENHANCING POLITICAL SUPPORT

Finally, the World Bank attempts to address the problem of how regulators are to secure budgets and maintain or even increase political support. One way of securing local budgets is by remitting discharge fees to regulatory agencies, which can use them in part to finance their staff. The Bank is supportive of this practice, even though it runs against public finance theory that holds that the fees should be remitted to governments to fund various types programs, choosing those with the highest cost-benefit ratio. The Bank uses the example of Colombia, where pollution charges were used to support regulatory agencies involved: "Pollution charges represent a leap forward in regulatory efficiency for Colombia, and the local funding mechanism ensures some measure of long-term stability and effectiveness" (World Bank 2000: 132). The case of China, however, where most regulators have largely become dependent on discharge fees, suggests that this approach may be problematic, as the regulator comes to depend on pollution and not on clean production (Ma and Ortolano 2000).

The Bank further proposes that regulators should seek to enhance political support for their work, by enhancing their credibility through greater transparency, and by educating the general public, seeking participation from local communities, and strengthening ties with progressive business leaders (World Bank 2000). While enhancing political support for pollution regulation is critical, the World Bank's suggestions in this area remain relatively undeveloped. Indeed, while the possibility of getting political support through public education and community participation in developing countries is appealing, it has notable limitations. First, their local communities may be so dependent on local polluters that education may do little to get their support in battling such polluters, let alone their support for strengthening environmental enforcement more broadly. Second, in authoritarian developing countries, the overall political system may obstruct the effect local communities can have on their leaders. A study about community outreach efforts by environmental regulators in China found, for example, that the political system placed limits on citizens' ability to influence their government to support environmental protection (Lo and Leung 2000). Third, issues of agency credibility are a greater problem than portrayed in the Bank study. Pollution regulation is prone to corruption because polluters may have high financial interests at stake, regulators are underpaid, and there are few checks and balances on regulators' work. In addition, regulatory officials working in cultural contexts where corruption and favoritism-based values are more pervasive have a higher chance of engaging in corruptive practices themselves. While enhancing transparency may help, getting rid of corruption in such societies has so far proved to be an impossible task.

VII. CONCLUSION

The World Bank model for pollution regulation in developing countries promotes ideas, largely developed in the West (Gunningham, Grabosky, and Sinclair 1998; Tietenberg 1998), that give a greater role to communities and markets and that allow regulated enterprises more flexibility in finding the most cost-effective solution to their pollution problems. These ideas hold much promise, suggesting how innovation might lead to convergence of state, society, and market regulation of pollution in the developing world.

While recognizing the importance and the merits of these measures, this study concludes that the prevalence of weak law enforcement may undermine the new model's potential to control pollution in developing countries. First, all measures proposed require accurate and valid data about pollution discharges at the firm level, which is not available if state enforcement is weak. In addition, lacking such information, it has been difficult to ascertain whether some of the pilot projects the Bank discusses, such as PROPER in Indonesia, have been as successful as is claimed. Furthermore, some systems, such as discharge fees, market pressure, and marketable permits require punishment of violators, which the weak regulators have often been unable to do.

A second conclusion is that community pressure and market pressure only occur under certain circumstances and that public disclosure and public education cannot help in all such circumstances. The measures work for activist communities and for companies open to outside pressure and able and willing to invest in abatement. Especially when faced with locally dominant employers, a large number of small informal enterprises, or large state-owned enterprises—situations found often in developing countries—community and market pressure are less likely to occur. Indeed, in the economic conditions often found in developing country settings, markets and communities may be much more likely to oppose and undermine state pollution regulation. An additional question is whether the options discussed are sustainable or able to be implemented outside of the limited and especially targeted pilot projects that the Bank supported and then studied.

Community, market, and voluntary regulation form the core of the World Bank's new model of pollution regulation. While the Bank primarily promotes the new model as an alternative to command and control regulation, it does occasionally acknowledge the continued importance of state enforcement (World Bank 2000). The World Bank thus gives some attention to the question of how to strengthen state enforcement, with discussions of targeting, the use of information technology, and expanding political support. However, the Bank does not adequately deal with this central issue. If not properly addressed, enforcement weakness not only undermines traditional command and control regulation but also the alternatives promoted by the World Bank.

The Bank's new ideas continue to be contrasted with traditional command and control regulation, while there is actually much overlap between the two (Sinclair 1997). Contrasting the two is dangerous, as it may falsely give the impression that investing effort on state law enforcement is old-fashioned and no longer necessary. And this may be attractive to many: regulatory agencies in developing countries that are less pressured to produce good enforcement, polluting enterprises that may welcome forms of nonstate and self-regulation because sometimes they are paper tigers instead of real threats, local NGOs that gain bigger roles, national governments that see their responsibilities reduced, and international donors such as the World Bank that continue to push neo-liberal ideas based on a belief that markets should be left as unregulated as possible.

The World Bank model for pollution regulation in developing countries is strongly based on ideas including "greening of industry," "industrial ecology," and "sustainable industry," all arguing that it can be in the interest of industry to decrease its pollution (cf. Andrews 1998: 178). Further, it stresses the strength of the market and the obsolescence of command and control (cf. Sinclair 1997; Andrews 1998). These ideas were developed in the West in a specific situation where overregulation and unreasonable regulation in the 1970s was strongly attacked by neo-liberal governments and scholars in the 1980s and 1990s. Since the second half of the 1990s, however, a more synthesized approach has been taken by scholars stressing that command and control and self-regulation do not conflict but rather complement each other. In addition, there has been much study of the limits of different types of self-regulation and flexible regulation arrangements and the circumstances under which such approaches are applicable (Sinclair 1997; Andrews 1998; Gunningham, Grabosky, and Sinclair 1998). Unfortunately, these insights have not been incorporated into the World Bank's model. The model also fails to consider how regulatory mechanisms that first emerged in industrially developed countries can be effective in countries that suffer from authoritarianism, poverty, disregard for the law, corruption, and weak legal institutions.

It seems that just as Gunningham, Grabosky, and Sinclair argued for Western countries, developing countries require smart mixes of various regulatory instruments looking for appropriate stakeholders and win-win situations (1998; Blackman 2000), and that compliance with pollution regulation requires combined and interacting pressures from community, market, and state enforcement to bring about regulatory compliance (Gunningham, Kagan, and Thornton 2003). The question is how in the particular and varied circumstances of developing countries the right mixes of regulatory instruments can be made. A central issue here, left largely unanswered in the World Bank model, is how law enforcement and non-state regulatory methods are related and how the two can be altered to strengthen one another. While new strategies should continue to be explored, attention should remain to developmental pollution regulation's

weakest link: state law enforcement. A thorough investigation about how pollution law is enforced in developing countries thus remains necessary. While much work has already been done, it has either been carried out by regulators themselves lacking independence and analytical depth or it has remained too case-based. The challenge now is to integrate and deepen such work and combine it with the World Bank ideas discussed here and existing studies from Western countries.

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NOTES

1. The study also mentions larger macro-level measures such as trade reform and input prices. These measures will remain outside the scope of this article.
2. Gunningham, Grabosky, and Sinclair even note that “many tax and charge schemes that have been implemented across the globe are, in reality, revenue raising devices, not serious environmental policy instruments” (1998: 76).
3. Governmental statistics are generally unreliable in China (Holtz 2003).
4. There is even doubt of this point, as it has been difficult to set the right level of charges because of the complexity of costs and choices that polluters face, which may not be uniform and may be difficult to understand for policymakers. Second, charges for certain products lacking substitutes may be transferred to consumers with no environmental gains or with ineffectively high charges. Third, firms might not respond rationally to price signals, costs might simply be ignored. Fourth, pollution charges may be a signal that environmental degradation is legitimate (see Gunningham, Grabosky, and Sinclair 1998).
5. For a similar point, see Gunningham, Grabosky, and Sinclair (1998). It is interesting to note that another often-cited alternative instrument, marketable permits, has the same merits and challenges in developing countries. On paper, it is a flexible instrument that offers regulated enterprises freedom to decide what is the most cost-efficient manner to employ pollution control measures while assuring that the overall environmental quality in a certain area is guaranteed. However, discharge fees marketable permits require a well-functioning system of monitoring enterprise discharges, as well as a system to punish those that discharge more than is allowed by their tradable permit (see Blackman and Harrington 2000).
6. For an example of how even in 2003 Indonesia’s monitoring of polluting factories remained problematic, see Kurniawan (2003).
7. McCarthy and Zen (2003) further state that decentralization in Indonesia brought other enforcement problems, including lower status of enforcement officials, unclear authorities, difficulty in finding proper staff, less accountability surprisingly. For a good overview of the effects of decentralization and some critical comments, see Oxhorn (2004).
8. Interview with State Environmental Protection Agency official, Beijing, 30 May 2002.
9. Based on interviews with enforcement agents in Sichuan and Yunnan, carried out in the summer of 2002 and in the summer and autumn of 2004.

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