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Local Enforcement of Pollution Control in Developing Countries: A Comparison of Guangzhou, Delhi, and Taipei*

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ABSTRACT

Environmental management typically involves multiple levels of government. Yet the intergovernmental context of environmental management in developing countries is seldom explored in the literature. This paper examines this issue by comparing the experiences in Guangzhou, Delhi, and Taipei, in which various types of unfavourable conditions create different problems for local regulatory enforcement. The study shows that, as commitment from the national government to local regulatory enforcement remains weak, the presence of local democratic institutions, legal remedies, and local environmental activism are key ingredients for checking against local enforcement slack. As legal remedies have various limitations, a bottom-up approach based on local flexibility, democratic processes, and environmental awareness and activism are more likely to bear fruit in the fight against pollution in developing countries.

In many developing countries, pollution control regulations are formulated at the national level, but their enforcement is the responsibility of local environmental protection bureaus. Although legally responsible for enforcing national regulations, these local bureaus belong to the local county or city governments, which often have different incentives and priorities from the central government. The national governments in many of these countries have legislated a wide array of pollution control regulations, but these regulations often fail to produce the desired results because of a lack of effective enforcement by local environmental protection bureaus. A critical policy question in these coun-

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tries is what factors affect the functioning of these local enforcement units.

Based mostly on experiences in advanced, industrialized countries, a sizeable literature has been published that identifies the major factors that affect the enforcement of environmental regulations by local agencies (Crepaz 1995; Harrison 1995; Ingram 1990; Magat and Viscusi 1990; May *et al.* 1996; Scholz *et al.* 1991; Scheberle 1997; Wood 1998). Nevertheless, little has been written about whether these factors apply to developing countries, which have very different political, socio-cultural, and economic systems from these advanced, industrialized countries. One indication of such neglect can be found in the *World Development Report* published by the World Bank in 1992 on "Development and the Environment," which covers a wide range of political, social, and economic issues about environmental protection in developing countries, but has only scant reference to the intergovernmental context of pollution regulation. Thus research is needed to examine whether factors that scholars identified as significant in advanced, industrialized countries are equally valid in the context of developing countries. In this paper, we examine these factors in the context of local pollution control in three major metropolitan areas in Asia – Guangzhou in mainland China, Delhi in India, and Taipei County in Taiwan.¹

These three cities are all located in fast growing areas, whose national governments have declared sustainable development as official goals and delegated most regulatory enforcement responsibilities to local authorities. All three cities are faced with various air, water, and noise pollution pressures created by increasing populations, industrial production, and numbers of automobiles. Yet the three cities differ in their overall records in pollution control, with Taipei County doing somewhat better than Guangzhou and Delhi. The three cities also differ in terms of political and legal institutions, degrees of local environmental activism, and their relationships with the national government. Thus the three cities provide diverse experiences for comparison.

Factors affecting local enforcement of environmental regulations

Many studies have attempted to identify factors responsible for effective local enforcement of pollution control regulations in the context of advanced, industrialized countries. Most of these factors are related to either the vertical or the horizontal dimension of intergovernmental relations. In the vertical dimension, two factors are often considered important – local flexibility in setting regulatory standards and procedures; and national support of local enforcement. In the horizontal

dimension, three factors are often considered important – democratic processes at the local level; judicial remedies for enforcement slack; and local environmental activism. Although these five factors may not exhaust all possibilities, they represent the major institutional and political variables identified in the literature as having significant influence on the local enforcement of pollution regulations.

1 Local flexibility in setting regulatory standards and procedures

Environmental measures fail in many countries because the central government tries to impose uniform measures on diverse locations. Uniform measures may be suitable for only some but not all locations because of diversities in social, economic, and physical circumstances (Ringquist 1993; Sabatier and Jenkins-Smith 1993). As shown in many studies in natural resource management, local communities are more effective than the central government in utilizing “information of specific time and place” (Blomquist 1992; Hayek 1948; Ostrom 1990) and in developing specific regulatory standards and procedures that suit their local circumstances (May *et al.* 1995). Thus local flexibility in setting regulatory standards and procedures is conducive to effective enforcement.

2 National support of local enforcement

Although local flexibility is important, separate local authorities may be incapable of solving all kinds of environmental problems; support from higher level governments may be needed. When the scope of a problem extends beyond one local jurisdiction, higher level authorities are also needed to coordinate actions across jurisdictions. Under certain circumstances, local governments may lack the organizational and technological capabilities or sufficient incentives to solve their own resource management problems. Substantial assistance from higher level authorities is often needed to strengthen the organizational and technological capabilities of local jurisdictions (Rabe 1997; Dafflon 1992; Lowry 1992).

3 Local democratic processes

Many pollution problems involve large numbers of individuals who suffer from spillover effects of actions by small numbers of individuals or firms. A few industrial plants, for instance, cause many serious water and air pollution problems, yet their effects are suffered by many individuals. A few polluters who are better organized and more resourceful

in pressing their case in the policy process can easily influence local government officials. Nevertheless, if local officials are subject to competitive electoral pressure, they need to be responsive to the diffuse public which is adversely affected by activities of the few polluters. Thus open, competitive electoral processes tend to be associated with stronger commitment from local officials to pollution regulation enforcement (Tang and Tang, 1999).

4 Judicial remedies for enforcement slack

Even though competitive electoral processes may exist, particular government policies may still be “captured” by special interest groups, especially when the policy is not a major electoral issue. Accessible judicial channels are needed to facilitate citizen challenges to administrative decisions that are disadvantageous to the diffuse public. Although the availability of judicial remedies may not entirely preclude the possible dominance of special interests in regulation formulation and implementation, they do facilitate the representation of diffuse interests in the process (McSpadden 1997).

5 Local environmental activism

Since many pollution problems at the local level are often suffered by the general public who are poorly organized, their interests will not be adequately represented unless well organized environmental groups exist that can effectively lobby local officials on behalf of the general public and seek legal remedies against regulatory slack. Thus local environmental activism is conducive to effective regulatory enforcement at the local level (John, 1994).

If all these five conditions exist in a local jurisdiction, that jurisdiction is likely to be more effective in enforcing pollution regulations than those without those conditions. Nevertheless, even in many advanced, industrialized countries, these conditions do not exist in all local jurisdictions (May *et al.* 1996).

In many developing countries, most local jurisdictions lack one or more of these conditions. For example, even though local authorities have the legal power to establish pollution control standards that are more stringent than the national ones, they seldom exercise such power. Local agencies may have little organizational resources to enforce even the less than stringent national standards, or local government leaders may be more responsive to the polluting industries than

the general public. Furthermore, a lack of representative and legal channels often makes the work of environmental groups difficult.

An interesting question becomes how different combinations of these five conditions affect the pattern of regulatory enforcement in different local jurisdictions in developing countries. The three local jurisdictions we examine in this paper represent three different combinations. Guangzhou represents a combination of most unfavourable factors – lack of national support, lack of local democratic processes, lack of judicial remedies, and lack of environmental activism. Delhi has local flexibility and legal remedies but limited local democracy and very limited national support and local environmental activism. Taipei has all favourable factors, except for sufficient legal channels for challenging enforcement slack.

Guangzhou

One of the largest cities in southern China, Guangzhou has experienced rapid economic growth since the beginning of the reform era in the late 1970s. During the same period, water, air, and other environmental resources in the city have been under tremendous stress from ever-increasing population and industrial production (Lo and Tang 1994).

The municipal authority in Guangzhou has played a relatively active role in environmental regulation. Shortly after passage of the Provisional Environmental Law by the National People's Congress in 1979, the municipal authority established a policy-making committee and administrative agencies responsible for enforcing environmental regulations. Guangzhou, for example, was one of the first cities in China to carry out environmental impact assessment (EIA). Even though Guangzhou is one of the more progressive Chinese cities in environmental protection, its regulatory enforcement efforts are subject to many unfavourable factors, as illustrated in several in-depth studies of its EIA process (Lo *et al.* 1997; Tang *et al.* 1997).

In China, basic legal rights and obligations regarding EIA are stated in the national Environmental Protection Law, but local authorities are responsible for establishing their own procedures for implementing EIA. In Guangzhou, proponents of development and construction projects are required to hire an authorized agent to prepare and submit EIA reports to the Environmental Protection Bureau and other concerned units. Each report must specify measures to ensure that environmental standards are met in the design, construction, and operation phases. The approval of the EIA report brings the project into the "three synchronizations" stage, in which the Environmental Protection

Bureau monitors whether environmental prescriptions specified in the EIA report are followed in the project design, construction, and completion phases.

Although the formal procedure for EIA in Guangzhou is comprehensive and well specified, its enforcement is unsatisfactory by many courts. As acknowledged by the Environmental Protection Bureau's own documents, the enforcement of EIA reports and regulations is often lax (Wu, 1994). Many government infrastructure projects were constructed without undergoing EIAs (Guangzhou Year Book Office, 1995).² The majority of golf courses and projects in newly developed districts and rural areas never conducted EIAs nor did they submit details about their environmental protection facilities to the Bureau.

In recent years, increasing numbers of construction projects have violated the "three synchronizations" requirements (Guangzhou Year Book Office, 1995). Many projects were able to delay installation of pollution control facilities until after deadlines. Some production plants failed to meet emission standards due to incomplete pollution treatment facilities, and in some cases, such problems persisted years after the project's completion.

Since local authorities in China are given considerable flexibility in adopting specific procedures when implementing national environmental policy mandates, ineffective enforcement of EIA regulations in Guangzhou is caused less by the lack of local flexibility than by other factors.

First, city-level environmental protection bureaus in China are legally responsible for implementing nationally mandated policies, but they are primarily an organ of the city government. Heads of the city bureaus are appointed by, and report to, the city's mayor. Financial resources for city bureaus are also provided at the local level. Like their counterparts in many other cities in China, officials in the Guangzhou Environmental Protection Bureau find it hard to enforce rules on development projects, unless they can secure cooperation from relevant government agencies. The bureau's capacity for effective enforcement is also constrained by its limited budget and personnel. The administrative unit responsible for enforcing the entire EIA procedure, has a staff of only eight, who evaluate several hundred EIA forms and reports per year.

Due to a lack of government funding, many local environmental protection bureaus in China are directly engaged in providing services to construction projects for fees. Construction project proponents, in Guangzhou, for example, may hire an outside agent or any of the two subsidiaries of the Environmental Protection Bureau to undertake an EIA on their behalf. In fact, about 70 percent of EIA reports in

Guangzhou have been prepared by these two subsidiaries. Although these subsidiaries are administratively and financially independent from the Environmental Protection Bureau, their involvement in preparing EIA reports creates potential conflicts of interest for the bureau.³

The lack of local democratic institutions is also an unfavourable factor for regulatory enforcement in Guangzhou. Without close public scrutiny, it is often easy for other government units to undermine the work of the Environmental Protection Bureau. For example, it is often difficult for the Bureau to impose restrictions or penalties on development projects that are supported or sponsored by senior government officials or other powerful government units. Sites for many major economic development projects in Guangzhou were determined by leading government officials before the Environmental Protection Bureau could initiate the EIA process.

The extent to which an environmental agency can effectively enforce environmental regulations frequently depends on the informal power relations among government officials and units. A major obstacle for effective enforcement of environmental regulations, for example, comes from the military and its service units and enterprises. Chan *et al.* (1993), for example, mentioned the difficulty the Guangzhou Municipal Environmental Protection Bureau encountered when it tried to undertake a site inspection of the Retired Air Force Personnel Recreation Club.

The EIA system is dominated entirely by government agencies, without any forum and provision for public participation or consultation. All decisions in the process are made solely by bureau officials; no institutional channels exist for the general public and those who are affected by the proposed project to express their opinions and to raise objections. Although laws in China provide for penalties or imprisonment for various environmental crimes, legal channels are seldom used for resolving environmental conflicts. Furthermore, no viable means exist for citizens to challenge government agencies' EIA decisions through legal channels.

In Guangzhou and other places in China, there have been sporadic complaints or protests by citizens against local polluting sources, but they hardly constitute a movement. In recent years, a number of government-approved environmental organizations have been formed at both the national and sub-national levels. Their activities, however, have been limited to promoting government-initiated programs. None of them has been actively involved in overseeing government policy making and implementation. There is no evidence that any of these groups are involved in overseeing the EIA process in Guangzhou.

Delhi

Delhi has the distinction of being India's capital and being "one of the world's fastest growing metropolitan centres" (Delhi Environmental Status Report, 1995, 2). In recent years, Delhi has also earned the dubious distinction of being the fourth most polluted city in the world (Report of the High Powered Committee, 1994). It is also among the six cities of India that have an "annual average total suspended particulate at least three times World Health Organization standards" (US-AEP Country Assessment, 1996, 3). Worse still, pollution problems have become more serious year after year. For example, the city produced 2,000 MT/D of pollutants in 1995 as compared with an average of 1,000 MT/D about a decade ago. Ambient air quality has shown a consistent downward trend in the past decade (Delhi Environmental Status Report, 1995).

A major source of air pollution in Delhi has been the ever-increasing number of automobiles that accounted for about 63 percent of air pollutants in 1990–91. Industrial and domestic sources accounted for the remaining 37 percent. National standards exist that limit pollutant emissions from these sources, and the Delhi government has, in many cases, established more stringent standards. National standards, for example, limit the emission of suspended solids from power plants to 100 mg per cubic meter, but Delhi permits only 30 mg per cubic meter. In the case of boilers, national standards allow anything between 800 to 1600 mg per cubic meter of particulate matter, but Delhi allows no more than 450 mg per cubic meter for any type of boiler.

Although these standards are high, their enforcement is known to be lax (Markandya and Shibli, 1995). Industrial compliance with air pollution restrictions appears to be rather low. For example, although about 10,000 industrial facilities were identified as producing air pollutants in 1993, only 390 of them were equipped with any pollution control devices (Delhi Environmental Status Report, 1995). Although vehicular pollution has been increasing dramatically in recent years, the city has yet to come up with effective measures to slow down, let alone reverse, the trend.

Similar to Guangzhou, local authorities in India are given considerable flexibility in adopting specific standards and procedures in regulatory enforcement. And there is complete delegation of enforcement authority from the Central Pollution Control Board (CPCB) to the Delhi Pollution Control Committee (DPCC). Ineffective enforcement of pollution regulations in Delhi is caused less by the lack of local flexibility than by other factors, one among which is the lack of national support.

In Delhi, the DPCC is legally responsible for enforcing national pollution control mandates. Although national subsidies are sometimes available on a project by project basis, most of DPCC's revenues come from the city's budget. With an annual allocation of 23 million rupees (about US\$450,000) from the city's budget in 1997-98, the enforcement capability of DPCC is seriously constrained. The enforcement wing of DPCC only has a strength of three Senior Environmental Engineers, 25 Junior Environmental Engineers, and 12 Assistant Environmental Engineers. Given the sheer magnitude of pollution activity in Delhi, such manpower falls far short of what is needed for effective enforcement.

Like India as a whole, Delhi has a long tradition of democracy. Although frequent suspension of the Executive and Metropolitan Councils and postponement of local elections have disrupted the democratic process in the city several times since independence in 1947, basic democratic institutions have been restored in the city since the adoption of the 73rd and 74th Amendments of the Constitution in 1992. These amendments require a reelection within six months after a local council is suspended. Although citizens and the media in the city have expressed increased concerns over worsening pollution problems, environmental issues are yet to become the ones on which elections are fought and lost in Delhi. No strong electoral pressure exists that would push the city government to undertake drastic pollution reduction efforts.

Called the most active judiciary in environmental matters, courts in India, and in Delhi in particular, provide convenient channels for representation of the ordinary citizen's grievances against pollution via public interest litigation (Ramachandran, 1997). Through such litigation, parties who are not the direct victims of a polluter can obtain standing in suits against the polluter. The right for non-victims to challenge an environmental ill in court was established during the legal reform era in the 1970s. Before that, tort law only allowed direct victims to initiate legal action against a polluter. Over the last couple of decades, public interest litigation has become the major instrument for the common person and other non-government entities to address environmental problems.

The Delhi High Court, for example, has ordered the relocation and closure of hundreds of polluting industries in the city, setting in motion an important process of pollution control in the city. Recent judgments by the Indian Supreme Court ordered the relocation of some 9,000 polluting industries to special industrial areas in the city as a means of reducing their ill-effects on the city's atmosphere. Such judgments directly challenged the Delhi government's failure to implement its

own Master Plan, which restricts polluting industries to designated areas in the city (Supreme Court of India: (1996) 4 Supreme Court Cases 750- M.C. Mehta versus Union of India and Others).

Although judicial activity has triggered increased government efforts in pollution control, its contribution to environmental protection remains controversial because the courts often fail to appreciate the administrative difficulties and various side-effects associated with their decisions. One may, for example, point out that when the Court made the industrial relocation judgments, it failed to consider the difficulties associated with the need to relocate labor together with the industries. Furthermore, by focusing on private companies, it left out the government-owned thermal power plants, which are a major source of pollution. Some also question the soundness of the judgments themselves, wondering if relocation was the only solution. Others argue that the court has gone beyond its legal duties by taking on administrative responsibilities itself.

Industrial pollution control has not been the explicit focus of environmental groups in Delhi. Yet there recently appears to be growing awareness among local people of pollution problems. For example, some residents' organizations have filed suits in the courts in an attempt to curb pollution from electric generators and form Diwali crackers. Nevertheless, many feel that the instrument of public interest litigation provides a means for speedy remedy to the ordinary citizen and has, thus, curbed the growth of environmental organizations in many areas.

Taipei

Taipei County is located in the northern tip of Taiwan, with 29 townships and the smaller boroughs surrounding the national capital, Taipei Municipality. The County has the highest population, factory, and automobile densities among its peers on the island. Industries in the County are mostly medium and small enterprises, which have limited financial resources and incentives for pollution control. Furthermore, many of these enterprises are non-registered, thus making it very difficult for government authorities to enforce pollution regulations on them.⁴ The environment of Taipei County has also suffered from poor urban planning dating back to the earlier stages of Taiwan's economic development. Throughout the County, numerous small factories are spread over residential communities, commercial areas, and agricultural districts, causing tensions between residents and factory owners over various pollution problems. All these characteristics have posed formidable challenges for pollution control. One can reasonably expect that just

to maintain the same level of environmental qualities as other counties, Taipei needs to apply considerably more efforts.

Similar to other local jurisdictions in Taiwan, Taipei County is legally required to enforce nationally determined pollution control regulations, and it is given considerable freedom in designing its own enforcement plans. The County has established an Environmental Protection Bureau (EPB) that has the largest number of employees among all counties on the island. Its budget (2,234 million NT Dollars, roughly US\$68 million) is the largest among its peer counties and cities, as high as 2.7 times the national average. Four percent of the county budget is devoted to environmental protection, ranking it the fifth highest nationwide (Urban and Housing Development Department, 1997). Taipei County is also known to be one of the strictest local jurisdictions in pollution control enforcement (Tang, 1998).⁵

Such strong enforcement efforts have produced relatively positive results. Although characterized by unfavorable industrial structures and urban landscape, Taipei County has an above-average environmental condition. According to 1997 statistics, Taipei County has a moderate degree of dustfall, fine air quality, average noise level, and good drinking water quality.⁶ These relatively positive results are made possible by several factors.

First, unlike Guangzhou and Delhi which receive little support from their respective national governments, Taipei County receives a substantial amount of subsidies from the national government – about 30 percent of its annual budget comes from the national government.⁷ Yet one can not attribute all positive environmental results in the County to such national subsidies because the County government itself has devoted considerable resources to its environmental protection establishment.

Local democratic processes have enhanced the County government's willingness to commit resources to environmental protection, because environmental issues have often become major campaign issues in elections for county magistrate. In the past few years, the magistrate's position was held by a member of the Democratic Progressive Party, which has been campaigning on a green platform ever since the Party's establishment in the 1980s. During the magisterial election in 1997, as garbage pollution issues caught the attention of the local media, all candidates in the race were forced to develop their own garbage management plans.

Being adjacent to the national capital, Taipei County is home to many environmental activists who have had over a decade of experience in organizing protests against various types of environmental problems.⁸ These activists are stern supporters of the Environmental Protec-

tion Bureau's strict enforcement practices. Ordinary residents in the County have also played an active role in pollution control enforcement. In the County, there is a toll-free hot line for individuals to file anonymous complaints against any polluting source. Once a complaint is received, an inspector will be sent to the polluting spot, who will then file a report through the administrative system. Inspection records are open for inspection by ordinary citizens. In 1996, the number of complaints in the County reached around 50,000 which was more than 43 percent of the national total (Environmental Protection Administration, 1997b).

The judicial system in Taiwan has so far played a relatively minor role in environmental protection. Unlike India, laws in Taiwan still have no provision for public interest litigation. Only direct victims of a polluter have the legal right to file suits against the polluter. Even when suits are actually filed in court, its ruling usually disfavors the alleged victims.⁹ In recent years, some environmental groups have tried to file motions in the Control Yuan as a means of challenging enforcement slackness of some government agencies.¹⁰ Even though these motions have seldom been approved by the Control Yuan, they did help to bring the public's attention to various administrative failures in regulatory enforcement, and to put considerable pressure on bureaucrats.

Comparisons of the Three Cases

Among the three cities examined, Guangzhou and Delhi have rather poor records in regulatory enforcement. In comparison, Taipei's enforcement records appear to be better. What accounts for this difference?

One possible explanation is that Taipei is economically more developed and has more resources for environmental protection than both Guangzhou and Delhi.¹¹ Furthermore, following Inglehart's (1997) argument, Guangzhou and Delhi are probably still at the modernization phase in which the dominant social values stress material progress and economic growth, whereas Taipei is closer to the post-modern phase in which the dominant social values stress quality of life issues. Thus, society in Taipei accords environmental protection a higher priority than that in Guangzhou and Delhi.

Although valid to a certain extent, such an explanation does not tell the whole story. As Tang (1998) found in a comparative study of counties in Taiwan, the Taipei County government is among the most progressive in Taiwan in terms of regulatory efforts. There are still many counties on the island that have been doing a dismal job in regulatory

TABLE 1: *The Three Cities Compared*

	<i>Local Flexibility</i>	<i>National Support</i>	<i>Local Democracy</i>	<i>Legal Remedies</i>	<i>Local Environmental Activism</i>
Guangzhou	Yes	No	No	No	No
Delhi	Yes	Very limited	limited	Yes	Very Limited
Taipei	Yes	Limited	Yes	Very limited	Yes

enforcement. The differences in enforcement efforts among local jurisdictions are less related to their underlying socio-economic conditions than to the characteristics of local democratic institutions and the environmental consciousness of their residents.

To account for the differences in enforcement efforts among Guangzhou, Delhi, and Taipei, one may refer to the five factors we have used as the basis for comparing the three places (see Table 1).

As shown in Table 1, in all three locations, there is local flexibility in terms of the local government's ability to tailor enforcement practices to its own circumstances. The problem in the case of Guangzhou and Delhi, however, is a lack of financial, technical, and personnel support from the national government. Such a problem is not uncommon in Asia in which many national governments, including the three studied in this article, have been quite enthusiastic about endorsing international agreements in pollution control and about developing wide arrays of pollution control regulations (Shubert, 1993). Lacking from many such national policy positions, however, is a realistic plan about how various regulations are to be effectively enforced at the local level.

The literature on advanced, industrialized countries focuses on the debate about the relative effectiveness of a coercive versus a cooperative form of intergovernmental policy mandates (May *et al.* 1996). The assumption is that once a national (or state) government has established a set of environmental regulations, it does have a strong intention to ensure that local governments faithfully implement the regulations. The controversial issue is whether this objective is better achieved by imposing detailed standards and procedures or by enhancing the local government's interest and capability in enforcement. Such issues, however, are less relevant to China and India and many other developing countries, in which the national government has adopted neither a coercive nor a cooperative form of intergovernmental policy mandates, but rather a form of neglect. In these countries, no serious efforts have been undertaken by the central government to ensure that nationally mandated standards are enforced effectively by the local agencies.

The central government in Taiwan, in comparison with China and India, has provided more support to local governments in their enforcement efforts. Yet the commitment of Taiwan's central government to environmental protection has remained quite limited. In 1996, for example, Taiwan's President announced a national policy for local governments to soften regulatory enforcement on polluting industries as a way to promote Taiwan's economic growth (Tang, 1998). While many counties have followed the policy by reducing their enforcement efforts, some counties, including Taipei, have chosen to deviate from such a policy and to maintain strict enforcement practices, at the risk of losing subsidies from the central government.

It appears that, at least for the time being, the hope for environmental improvement in many developing countries is not with strengthening top-down control in the intergovernmental management system, but with strengthening local inputs in environmental protection efforts. As illustrated in the case of Guangzhou, with neither strong democratic and legal institutions nor local environmental activism, it is difficult for the local authorities to maintain a rigorous regulatory enforcement regime. Without effective institutional channels for representing the environmental interests of the diffuse public, a local government in a developing country is more easily influenced by the well-organized development lobby in its regulatory enforcement (Tang and Tang 1999).

Delhi appears to be in a better position in comparison with Guangzhou because of the availability of judicial remedies for environmental ills. The case of Delhi shows that when there is a lack of heightened public concern about pollution issues, the electoral process may not induce increased government efforts in pollution control. Such a deficiency is partly compensated by the availability of public interest litigation such that ordinary citizens have an alternative channel for redressing their environmental grievances. While such an alternative channel may help to further the environmental cause, one can hardly expect it to solve all environmental problems. As illustrated in our case study, when the courts make a ruling and mandate corrective actions, they may fail to consider all the political and administrative ramifications of their decisions. Furthermore, as shown by the experience in the U.S., while the courts can be used by environmentalists to further their cause, they can also be used by development lobbies to block regulatory efforts by local authorities (Wise and O'Leary 1997).

The case of Taipei is closest to a bottom-up approach to environmental management, which is likely to be the most promising approach for developing countries. The democratization process in Taiwan since the mid-1980s has triggered a high level of environmental activism in Taipei. As democratic institutions are being consolidated within its

jurisdiction, environmental problems have become major electoral issues in the county, thus creating strong incentives for elected officials to devote resources to regulatory enforcement. Even though the legal system in Taiwan has remained unfriendly to the environmental cause, the county government has provided easy-to-access channels for ordinary citizens to check against administrative slackness in enforcement. A combination of local democratic processes and civic participation has thus created a relatively positive setting for regulatory enforcement.

Enforcing pollution control regulations is always difficult, in developing and developed countries alike (Rosenbaum 1998; World Bank 1992). As any single piece of regulation may potentially apply to thousands of individuals and firms, no amount of administrative resources would be sufficient to monitor the daily activities of all these entities and to sanction all violations. A higher level of compliance can be achieved only if other societal forces in the community supplement bureaucratic enforcement.

For example, if residents in a community have developed heightened concerns about pollution, businesses, especially the bigger ones, have an incentive to maintain a "green" reputation and thus are more likely to comply with pollution control regulations voluntarily. This is the case in Taipei where many larger businesses have undertaken special efforts to develop a "green" reputation. Furthermore, as citizens are actively utilizing government channels to complain against polluting sources, smaller businesses also feel the pressure to comply with pollution control regulations. In Guangzhou, environmental protection has yet to attain the same level of societal recognition as in Taipei. Indeed, according to a recent survey, even among employees in the Guangzhou Environmental Protection Bureau, most believe that economic development ought to be given a higher priority than environmental protection if there is a conflict between the two (Chan *et al.* 1995). When local officials tried to enforce pollution control regulations on factories, many operators questioned whether the officials actually had the authority to enforce them (Sinkule and Ortalono 1995). In recent years, government officials in Delhi began to appreciate the importance of public support in pollution control and have launched campaigns for increasing the public's awareness of pollution problems in the city. If successful, the campaigns would create a more favorable societal condition in the city for pollution control in the future.

Conclusion

Regulatory enforcement regimes in most developing countries work under less than ideal conditions. As shown by the experiences in Guangzhou, Delhi, and Taipei, various types of unfavorable conditions

create different types of problems for local regulatory enforcement. As commitment from the national government to local regulatory enforcement remains weak, the presence of local democratic institutions, legal remedies, and local environmental activism are key ingredients for checking against local enforcement slack. As legal remedies have various limitations, a bottom-up approach based on local flexibility, democratic processes, and environmental awareness and activism are more likely to bear fruit in the fight against pollution in developing countries.

NOTES

1. The research for this article is part of an ongoing effort to study and compare environmental politics and policy in different Asian countries. Besides this article, another article is being prepared that compares the institutions and politics of environmental impact assessment in mainland China, Hong Kong, and Taiwan.
2. Many bridges, for example, were constructed without undertaking EIAs, despite the large amounts of noise they generate.
3. Although it is difficult to identify the precise effect of such potential conflicts of interest, one may note that none of the EIA reports prepared by these subsidiaries have ever been rejected by the Environment Protection Bureau (Tang *et al.* 1997).
4. According to an estimate by the Taipei Environmental Protection Bureau, there are 27,000 registered factories in the county, while another 25,000 are non-registered. See the web page of Taipei County Government at <http://www.tphg.gov.tw/m/la13.htm>. Non-registered businesses are not eligible to receive government subsidies and technical support for investing in pollution control, and thus have less incentive to do so than those that are registered.
5. According to an analysis by Tang (1998), Taipei County has been the most vigorous local enforcer of national pollution control regulations. In 1997, the total amount of fines on violators increased 238 percent from the previous year, while the national average decreased 16 percent.
6. See Environmental Protection Administration (1997a) for statistics; and Tang (1998) for detailed analysis of those statistics.
7. Many capital-intensive projects such as incinerators and river pollution treatment facilities are fully subsidized by the central government. In addition, the central government provides grants to local bureaus for a variety of expenses such as overtime payment for night inspection and travel expenses.
8. For example, the most famous protests were those against the Fourth Nuclear Power Plant on the eastern coast of Taipei County. Those protests have lasted for more than a decade and fostered numerous environmental activists.
9. Recent examples include efforts by environmental groups to challenge government failures in preventing the illegal expansion of many golf courses, which are sources of various environmental problems (Tang and Tang, 1999). Most of these suits were ruled in favor of the golf-course developers.
10. The Control Yuan is a semi-judicial body responsible for, among other things, investigating official misconduct or improper policy. Once an impeachment motion (against an official) or a correction motion (against a policy) is approved by the Control Yuan, the case will be transferred to the Committee on Punishment against Public Officials, a judicial agency, for proper punishment.
11. As reported by *Asiaweek* in November, 1998, the figures for the GNP per capita of the three countries are as follows: China, US\$ 738; India, US\$ 387; and Taiwan, US\$13,303.

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