

SUSTAINABLE DEVELOPMENT

# Pollution and Development: Lessons from the Latin American and East Asian Newly Industrializing Economies

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AUGUST 2002 · ISSUE BRIEF NO. 02-13



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## Introduction

What do we know about the relationship between pollution and economic development? There is some empirical evidence that the level of development, as measured by income per capita, can account for much of the variation in pollution levels. For example, Figure 1 illustrates a declining relationship between income and total suspended particulates (TSP), a pollutant that significantly harms human health, for a number of Latin American and East Asian countries. In this example, higher income appears unambiguously to lead to a better environment. In other cases, pollution has been found to rise with income and then fall, taking an inverted U shape most often referred to as an environmental Kuznets curve, implying that the environment gets worse as income rises and then gets better.

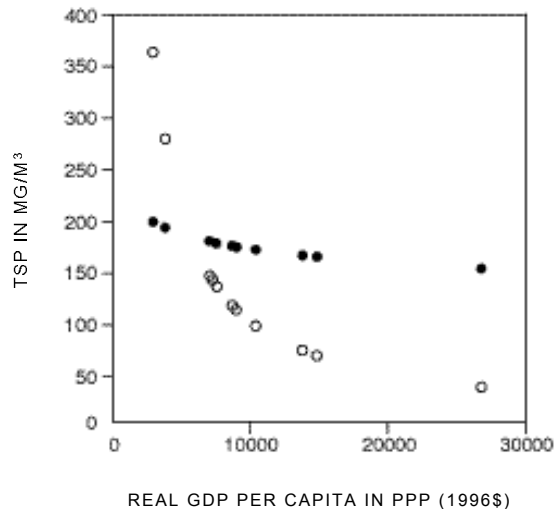
Relationships such as these suggest to some observers that the best way to take care of the environment is to take care of growth. But this conclusion is incomplete and unsatisfying. To begin with, these relationships are more or less a black box. They do not tell us either why governments and private actors acted to reduce pollution/emissions or how they did so. Figure 1 also shows that pollution-development linkages in the heavily urbanized and industrialized economies of Latin America are significantly less favorable than pollution-development linkages in the East Asian newly industrializing economies (NIEs). This indicates that differences in income alone are not sufficient to account for differences in the relationship between pollution and development, and it suggests that one or more “missing ingredients” are likely to be particularly important. In addition, not every environmental problem has the kind of favorable link to development indicated above.

Even where pollution does appear to decline with income, as in Figure 1, one cannot simply conclude that changes in income are sufficient to remedy environmental problems. Other empirical work on environmental Kuznet’s curves suggests that many, if not most, developing countries tend to fall short of the income levels needed for environmental improvements to occur. Moreover, the very nature of nonmarket environmental costs is they impose significant burdens on society without showing up in standard national income accounting figures. So even if pollution is declining with economic growth, a more pro-active environmental policy can have benefits well in excess of costs. This provides some justification for building effective environmental regulatory agencies in developing economies.

**FIGURE 1**

**PREDICTED VALUES  
OF CONCENTRATION OF  
TOTAL SUSPENDED  
PARTICULATES (TSP)  
IN URBAN AIR  
IN EAST ASIA AND  
LATIN AMERICA**

○ TSPEA  
● TSPLA



What do we know about the effectiveness of agency-building efforts and their impact on the relationship between pollution and development in developing countries, particularly since Rio? Unfortunately, most of the experiences show that environmental regulatory agencies in developing countries are weak, under-funded, and lacking in the administrative clout and technical capabilities to get polluters to clean up. But data shown in Table 1 on ambient air quality and wastewater emissions in 11 of these economies in Latin America and East Asia—economies where urban and industrial pollution are likely to be worst—reveals substantial variability in ambient environmental quality in these economies. In Singapore and Malaysia, the governments have been cleaning up the environment during high-speed urban industrial growth. Governments in Taiwan and South Korea that followed “grow first, clean up later” pollution management strategies are now amassing admirable records of industrial pollution control, while others—Mexico, Brazil, Indonesia, and China—have important, but only partial and incomplete, pollution reduction accomplishments. Only three of these 11 economies—Argentina, Chile, and Thailand—have failed to achieve much progress at all in industrial pollution management.

### ***Reasons for Differences in Environmental Performance***

What accounts for the differences in pollution-development outcomes in these 11 economies? I used an in-depth case study approach to answer this question (see Rock 2002 in Further Readings). In each case, I examined how four factors—(i) international market and international political pressures, (ii) the development of new ideas regarding the relationship between the environment and development, (iii) the nature of domestic politics, and (iv) the structure and institutions of the state—affected environmental policy change.

There is little doubt that the Latin American and East Asian NIEs face mounting international environmental market pressures to break the links between pollution and development. Most frequently, the new environmental market access requirements take the form of environmental certification (such as ISO 14000 certification and eco-labeling of products for sale in OECD markets). Although it is too early to tell whether these international environmental market pressures will ultimately affect behavior, there are some examples in my case studies where these pressures have been translated into manufacturing plant level investments in pollution abatement and prevention.

International environmental political pressures also have provoked environmental policy responses from governments in the Latin American and East Asian NIEs. Preparations for international environmental conferences required governments to produce position papers outlining the relationship between the environment and development in their economies. Preparation of these papers, along with the need to work out positions on environmental treaties such as the Montreal Protocol, has created some political space for those in and out of government who want to see more environmentally friendly pollution management policies.

International environmental NGOs also regularly lobby governments in these economies and international organizations working in those economies to sign “green” bilateral and multilateral agreements. Pressures from international aid donors affect domestic environmental policies by requiring environmental impact assessments for large infrastructure projects, providing loans for environmental capacity building, and integrating the environment into all aspects of lending.

But without a relatively coherent framework of new, policy-relevant knowledge, it is doubtful that international pressures to clean up the environment would have mattered. This suggests

TABLE 1

**AMBIENT AIR AND WATER QUALITY IN THE EAST ASIAN NIES (CIRCA 1995)**

Economy	Ambient Air Quality (TSP or PM10)	Organic Water Pollution Intensity of Industry	Real GDP per Capita (PPP\$)
Argentina	Capital Federal 70-90 mg/m <sup>3</sup> Mendoza 30-250 mg/m <sup>3</sup> Cordoba 80-192 mg/m <sup>3</sup> Palpala 209 mg/m <sup>3</sup>	NA	\$ 10,371
Brazil	Rio de Janeiro 139 mg/m <sup>3</sup> Sao Paulo 86 mg/m <sup>3</sup>	NA	\$ 6,912
Chile	Santiago 210 mg/m <sup>3</sup>	1.51 kgs/\$1,000 of IVA	\$ 8,677
China	Shanghai 246 mg/m <sup>3</sup> Beijing 377 mg/m <sup>3</sup>	8.06 kgs/\$1,000 of IVA	\$ 2,817
Indonesia	Jakarta 271 mg/m <sup>3</sup>	3.19 kgs/\$1,000 of IVA	\$ 3,655
Malaysia	Kuala Lumpur 85 mg/m <sup>3</sup>	1.66 kgs/\$1,000 of IVA	\$ 8,872
Mexico	Mexico City 279 mg/m <sup>3</sup>	.71 kgs/\$1,000 of IVA	\$ 7,429
Singapore	31 mg/m <sup>3</sup>	.42 kgs/\$1,000 of IVA	\$ 27,020
South Korea	Seoul 84 mg/m <sup>3</sup> Pusan 94 mg/m <sup>3</sup> Taegu 72 mg/m <sup>3</sup>	.68 kgs/\$1,000 of IVA	\$ 13,773
Taiwan	NA \$14,879 Taipei 64 mg/m <sup>3</sup>		
Thailand	Bangkok 223 mg/m <sup>3</sup>	1.94 kgs/\$1,000 IVA	\$ 7,074

Sources: Except for Taiwan, Singapore, and Argentina, air quality data are from World Bank (2000a). Taiwan data are from "Comparison of Air Quality with Other Countries," July 7, 2000, from [www.epa.gov.tw/english/offices/f/bluesky/bluesky3.htm](http://www.epa.gov.tw/english/offices/f/bluesky/bluesky3.htm). Singapore air quality data are from PCD (1980, 8-9). Argentina air quality data are from World Bank (1995, 10). Organic water pollution intensities of industrial value added (IVA) are calculated from organic water pollution and IVA data in World Bank (2000a). Real GDP per capita in PPP in 1996\$ are from Summers and Heston PWT6.0 (2002) and are downloaded from <http://pwt.econ.upenn.edu/>.

that a fundamental shift in ideas about the relationship between the environment and development played some role in movements toward improved pollution-development outcomes, at least in some of my case studies. Some evidence for this is reflected in a rather widespread acceptance, particularly in East Asia, of the need for governments, private sectors, and citizens to focus on sustainable development, rather than income growth. Concern for sustainable development has been reinforced by a growing body of empirical research on the human health costs of environmental degradation, cost-effective industrial pollution management policies, and potential win-win opportunities in pollution prevention and clean production.

Because the East Asian NIEs have historically been more open to trade, investment, and new ideas than their counterparts in Latin America, they have received more exposure to these international environmental pressures and new ideas. Thus, it is not surprising that public officials in ministries of industry, science, and technology institutes, and national standards agencies in East Asia are particularly sensitive to international pressures to clean up. Nor is it surprising that governments and business associations in East Asia appear more open to new ideas about the relationship between the environment and development than their counterparts in Latin America. Fortunately, there is some limited evidence that economic liberalization in the more historically closed Latin American economies is increasing the exposure of governments and businesses in this region to these same forces.

However, international pressures and new ideas by themselves were not sufficient to bring about significant environmental policy change in the East Asian NIEs. Much depended on the way governments, domestic firms, and other actors in civil society responded to those pressures. One important factor conditioning the responses in my case studies was the emergence of a larger, educated, and more affluent urban middle class.

In the early stages of development, when incomes per capita were low, most of the population was employed in agriculture, and the incidence of poverty was high, political leaders tended to be more concerned with economic development, poverty alleviation, and food security than with pollution. At this stage, lack of official interest in pollution was reinforced by the lack of popular pressures for a cleaner environment and the authoritarian predilections of governments that slowed the development of independent organizations in civil society. This was often reinforced by closed-door interactions between government and business that focused on economic growth, employment, and export earnings rather than the environment. But as incomes rose, education deepened and spread, a greater and broader sense of social well-being developed, and concern for the environment rose.

In most of my case studies, but not in Chile or Thailand, democratization was intimately related to these long-run changes in social values toward the environment. Where authoritarian governments gave way to democratic rule, the transition to democratic rule was accompanied by development of substantial environmental protest movements. While initially focused on resolving local environmental problems, these protest movements developed over time into national environmental NGOs that built substantial membership bases; undertook studies; published results; lobbied local government officials, legislatures, and executives; and supported particular candidates and parties for political office. Democratization also resulted in a freer press that reported environmental accidents, lamented the generally poor environmental quality, and clamored for a cleaner environment.

But even where civil society demands for environmental protection grew, those governments differed, sometimes quite substantially, in their ability to build effective traditional public sector command-and-control environmental agencies with the legal authorities, administrative clout, and the tools to effectively monitor and enforce emission and ambient standards. They also differed in their abilities to embed these new environmental agencies and environmental considerations in the broader public institutions charged with industrial and economic development.

Why have some governments among the Latin American and East Asian NIEs been so much better at these tasks than others? My case studies revealed three characteristics of governments mattered.

To begin with, government actors had to have some degree of insulation or autonomy from pressure groups in civil society that might impede their abilities to enact politically sensitive environmental policies. Because environmental policy change was both politically sensitive to and opposed by business interests that gained from the status quo, some degree of autonomy from business was particularly important to successful industrial pollution management. Effective governmental action was also easier when governments had more cohesive, technocratic, pragmatic, and goal-directed bureaucracies. When governmental bureaucracies lacked these characteristics, governmental decisionmaking was subject to patron/client ties or too much pressure from interest groups. Finally, institutionalized channels of communication between state actors and those in the private sector were particularly important because they allowed both the freer flow of information that policymakers needed if regulatory policies were to be effective and the building of trust that made environmental cleanup possible at reasonable cost.

### *International Comparisons*

My case studies reveal how each of the above factors affected pollution-development outcomes in the 11 countries in Table 1. In those economies with the best pollution-development results—Singapore, Malaysia, Taiwan, and South Korea (though the latter two economies achieved their success after a long history of accumulating industrial pollution)—strong, autonomous, pragmatic, technocratic, and goal-directed bureaucracies were critical to success. In addition, in all but Singapore, democracy or democratization and the growth of an urban middle class mattered, as newly empowered constituents in civil society pressed governments to clean up the environment. And, in all but South Korea, environmental agencies and environmental considerations were effectively integrated into decisionmaking by more powerful economic and industrial policy agencies.

Despite differences in levels of development and in the nature of politics and public institutions, it is clear that governments in these four economies used their autonomy, their strong technocratic and goal-directed bureaucracies, and their institutionalized channels of communication with the private sector to get polluters to clean up. Autonomy from organized groups, particularly organized business groups, enabled these governments to devise new environmental policies. Strong technocratic and goal-directed bureaucracies enhanced these governments' flexibility, making it possible for them to implement new policies. Institutionalized channels of communication with the private sector made it possible for them to draw on the trust gained by years of positive collaboration between government and the private sector so that reductions in emissions and improvements in ambient environmental quality did not threaten profitability or exports. This made it easier to sustain commitment to industrial environmental improvement.

When combined with growing public pressure to abate or clean up pollution—as in Malaysia, Taiwan, and South Korea—relatively quick improvement in ambient environmental quality occurred.

It is also important to note that the creation of tough, competent, pragmatic, and fair command-and-control environmental agencies with sufficient capacity and legal authorities to monitor and enforce new emissions standards was the sine qua non of success in each of these economies. It is equally important to note that none of these governments relied on market-based instruments to alter pollution-development outcomes. For the most part, traditional command-and-control environmental agencies were modeled on their counterparts in the OECD, particularly the U.S. Environmental Protection Agency. This suggests there may be fewer political, social, and cultural impediments to such transfers than previously thought.

The differences in industrial pollution control strategies were revealed in the manner in which the new environmental agencies interacted with each government's premier industrial policy agencies. Sometimes, as in Singapore and Malaysia, pollution control activities were mainstreamed into the promotional activities of powerful industrial promotion agencies. Other times, as in Taiwan, a strong environmental protection agency was created over the objections of those in industrial promotion agencies. But once it became clear to individuals in the industrial promotion agencies that the government was serious about cleaning up pollution, innovative actors in them learned how to work with the environmental protection agency to promote waste minimization and cleaner production.

Where public bureaucracies were less technocratic and goal oriented and governmental decisionmaking structures subject to more patron-client ties, particularly between government and business—as in Brazil, China, Indonesia, and Mexico—a pathway for limited environmental cleanup was open to environmental policy innovators who devised targeted solutions to particularly pressing environmental problems.

In Brazil, recently empowered technocrats in a state-level environmental agency built relationships with local community groups to clean up a particularly polluted city that attracted substantial public attention following democratization. In China, policy innovators in the State Environmental Protection Administration developed a unique public disclosure program that annually rated, ranked, and disclosed the environmental performance of the country's largest cities. This appears to have somewhat slowed environmental degradation in the face of very high-speed growth. In Indonesia, innovators in a notoriously weak environmental agency developed a unique public disclosure program that focused on the country's largest industrial wastewater polluters. Similarly, a mayor in a large city in Java took advantage of a well-publicized environmental accident to launch a city-level environmental monitoring and enforcement program that got polluters to begin making investments in pollution control.

The success of these programs depended on a range of factors. A minimum level of capacity in environmental agencies was necessary before innovation occurred. An ability of those in environmental agencies to attract the attention and continuing support of powerful political leaders also was important. Beyond that, successful innovations started small and focused on pressing environmental problems. Designers and implementers of these small and focused innovative policies also were quite good at anticipating and co-opting potential political opposition. These examples demonstrate that even weak environmental agencies in governments with limited abilities to devise and implement new policies can get at least some industrial polluters to abate their emissions. But when this combination of factors was missing, or when they were combined with

weak governments and politicized bureaucracies deeply penetrated by private interests—particularly business interests, as in Chile, Argentina, and Thailand—very little pollution reduction occurred despite rather high incomes or rapid economic growth.

What are the implications of these findings for the broader debates on the relationship between pollution and development? The current debates focus on disagreements about the environmental effects of globalization; whether poor countries should grow first and cleanup later; the advantages and disadvantages of market-based environmental instruments; and the efficacy of pleas to governments to enact tougher monitoring and enforcement programs, and to donors to provide more environmental aid. My case studies offer some insight into each of these issues.

Globalization, or openness to trade and investment in Singapore, Malaysia, Taiwan, and Korea, went hand in hand with significant improvement in ambient air quality and a noted absence of so-called pollution haven effects. But this did not happen because openness facilitated the adoption of newer, cleaner technologies, as supporters of globalization contend. It happened because governments in these economies made it clear to domestic and foreign investors and to producers for the local and export markets that unmitigated pollution simply would not be tolerated. In addition, because new environmental requirements were integrated into the existing industrial policy machinery, the mostly “end of pipe” environmental cleanup in these economies appears to have occurred with minimal cost to growth and exports. Evidence from Singapore and Malaysia demonstrates this can be the case even while a country is just starting to grow rapidly and increase its integration into the world economy. This suggests that countries need not follow “grow first, cleanup later” environmental strategies, even though those strategies, as evidenced by Taiwan and Korea, can work, and work quickly.

I also found little evidence to support the view that environmental agencies in developing countries can leap over costly command-and-control regulatory agencies to market-based instruments. None of my success stories relied on market-based instruments and the one country that attempted a leapfrogging strategy—Thailand—accomplished little, if any, environmental improvement.

Finally, my case studies show that simply pressing governments to develop the political will for tougher environmental programs, or helping those governments with environmental capacity building probably will not make much of a difference.

If politicians fear that abating pollution will undermine growth, the competitiveness of exports, or the country’s attractiveness to foreign investment, as found in several countries in Latin America, it is politically difficult for bureaucrats in new environmental agencies to develop the political will to impose significant duties on polluters. In addition, if politicians or bureaucrats are too beholden to business interests or too independent from popular group pressures to clean up the environment, it is difficult to develop the political will to toughen environmental regulations. In such political environments, more aid for environmental capacity building may not have much affect. This does not mean that donors should not fund environmental capacity building projects in developing countries. But donors might accomplish more if they augment capacity building projects with an implementation strategy that emphasized creating pockets of efficiency in environmental agencies, taking advantage of opportunities, and learning how to build support among the public and political elites for environmental cleanup, while also figuring out how to co-opt opponents.



## Further Readings

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