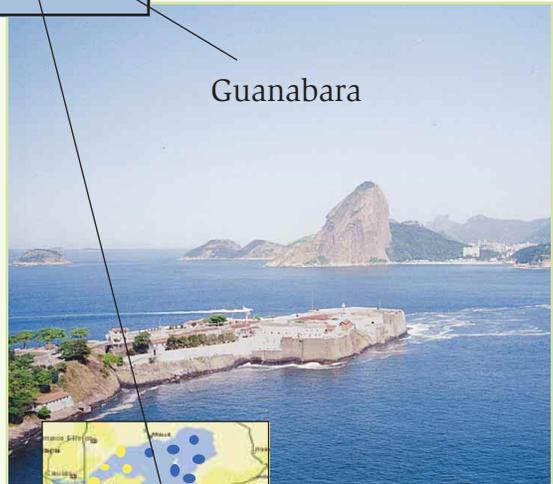


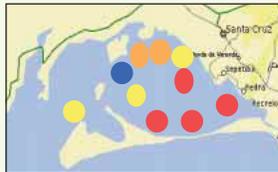
SePETiba



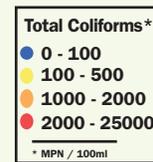
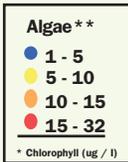
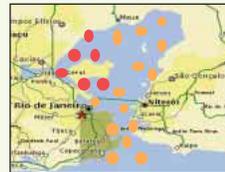
Guanabara



1970



1990



The Bays of Rio: FEEMA's Challenge

Source: Nélio Ricardo Aguiar, 3WayNet Assessoria de Propaganda e Marketing; Nilo Lima Fotografia
Map provided by www.mapquest.com

Managing and Sustaining Reform

From the top of Corcovado Mountain, Rio de Janeiro is a breathtaking study in contradictions. The view sweeps from Ipanema's luxury apartments and golden beaches in the south to the storied entrance to Guanabara Bay in the east. Yet the scene also includes the mountainside shanties of the Favela Roçinha and the industrial suburb of São Cristóvão, both part of the "other" Rio—the crowded, polluted, poor communities that are home to most of the city's people.

The top floor of the tallest building in São Cristóvão houses FEEMA, Rio State's environmental protection agency. On many mornings, FEEMA's staff cannot even see nearby Guanabara Bay because the smog is too dense. Nor would a close-up view of the bay provide a pleasing spectacle in any case, as its inshore waters are brown and effectively dead, starved of oxygen by organic pollution from sewage and industrial waste. Once a showcase for Rio's beauty, Guanabara now languishes as a dirty backwater. South of the city, Sepetiba Bay appears to be headed in the same direction.

Rio's air and water pollution seriously threaten its intended future as a center for world business and tourism, and its environmental decline has saddled the region's people with increased illness, the loss of once-thriving fisheries, and fewer recreational opportunities. Rio's environment has deteriorated for many reasons, but FEEMA's declining effectiveness ranks high on the list.¹ In the 1980s, the agency suffered from a loss of political support, reduced budgets, and an obsolete administrative system.

One afternoon in 1996, an impromptu street celebration marked the beginning of a new era for the agency. Employees applauded as a truck pulled away, carrying the archaic minicomputer that had housed the agency's central records. Served by a small priesthood of technicians who generated occasional reports, the machine had been effectively off-limits to the departments charged with environmental planning, factory inspections, and enforcement. Most records had been shelved in moldering folders or desultorily entered into a stand-alone PC that remained the exclusive province of a departmental manager. So the agency had operated for a decade, with minimal coordination and internal communication.

As the minicomputer-laden truck departed, a new networked PC system began operating upstairs, symbolizing a fundamental change in the agency's approach. The network allowed departments to store their records in a common database that any unit could tap. The system reflected the agency's fresh approach to regulation: FEEMA's new president insisted on moving beyond legalistic, end-of-pipe regulation to strategies that reflected assessments of overall benefits and costs for Rio State.

Responding to the new mandate, agency managers began asking for reports that combined information from different departments. The effectiveness of the agency's technical staff increased as the networked database enabled them to analyze emissions trends, community complaints, inspection reports, and readings from air and water monitoring stations, such as those in Guanabara and Sepetiba Bays. The agency's new geographic information system made a contribution by instantly combining maps of water quality, air quality, population centers, and pollution sources, allowing staff members to identify the worst environmental problems and polluters.

Of course, FEEMA's renewal stemmed from far more than the technical fix offered by networked PCs. Like their counterparts in Ciudad Juárez, Mexico, FEEMA's leaders emphasized community participation in planning and implementing regulations—which in turn required public education on environmental quality, goals, progress, and the regulatory status of major sources of pollution. With its new system, FEEMA was well positioned to supply this information in compelling, graphical formats. To capitalize on public involvement, the agency began considering a polluter rating system like Indonesia's PROPER program.

FEEMA also focused on a more productive relationship with the business community. The agency had traditionally regulated through

continuous low-level negotiations with factory managers. In the new approach, FEEMA's president met with industry leaders to develop a consensus on environmental objectives for the state. Progressive CEOs supported this approach, because they envisioned Rio as an environmentally friendly headquarters city for international business. FEEMA's managers also negotiated commitments from industry groups that entailed collective responsibility for failure to meet pollution control objectives. Since the agency was better equipped to provide information on the condition of the environment and priorities for action, the business community listened to its proposals with enhanced respect.

FEEMA's third outreach effort focused on developing closer relationships with the World Bank and other international agencies. Like FEEMA, those institutions had begun shifting from a focus on end-of-pipe regulation to promotion of flexible regulatory instruments, government-industry cooperation, and the use of benefit-cost analysis to determine priorities. The Bank and other institutions provided financial and technical support for the agency's new information system, helped develop action plans, and sponsored specific projects for reducing air and water pollution in Rio de Janeiro State.

Environmental reform in Rio resembles many other renewal initiatives, in which regulators are using decentralized information technology to assess their options and develop cost-effective programs based on multiple sources of data. New technology has cut the cost of gathering, processing, and distributing this information, enabling regulators to mediate environmental agreements between communities and businesses more effectively. More cooperative relationships have, in turn, encouraged stronger political support for environmental policy reforms.²

6.1 The Contribution of Information Systems

Timely, accurate, and well-packaged information is critical to the new approach. To illustrate an effective environmental information system, consider a hypothetical case of river pollution. Emissions from diverse activities along the river—a large factory, numerous small ones, a farming district, and a riverside community—cause water to decline in quality as it moves downstream.

Because staff skills and time are limited, the local environmental agency focuses on accurately tracking critical water pollutants rather than maintaining an unwieldy catalog of all possible emissions data.

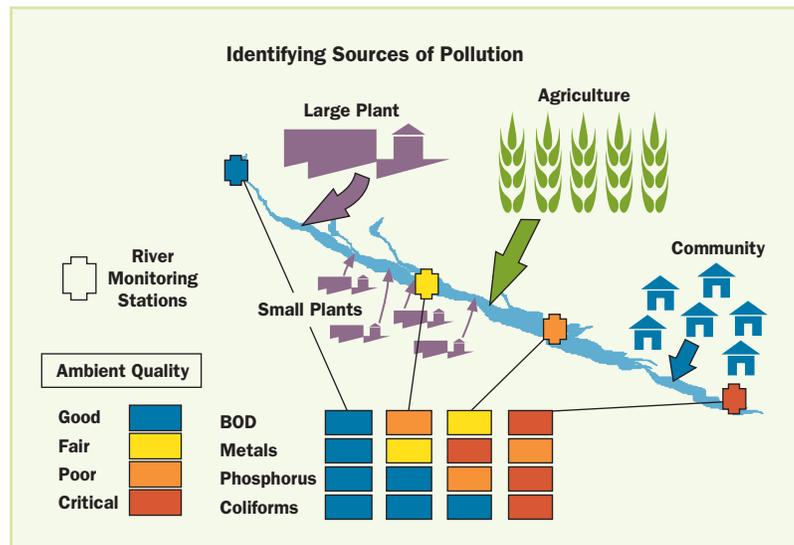
The agency’s priorities include heavy metals, fecal coliforms, biological oxygen demand (BOD), and phosphorus (Figure 6.1): The first two pollutants pose serious threats to human health, while the latter two damage ecosystems.

The agency requires all plants along the river to submit periodic reports, certified by outside auditors, on emissions of these substances. The reports are usually accurate because the agency blacklists dishonest auditors, putting them out of business. The agency uses random, surprise inspections to keep the probability of discovering false reports high.

Monitoring devices in the river further confirm the reported emissions and measure their impact. This effort feeds standard, user-friendly database software and relies on a dispersion model, built by the agency’s technical team, that tracks pollution using data on the river’s flow rate, volume, temperature, and other factors.

The first upstream monitor in Figure 6.1 records no significant pollution (all ratings are blue). Regulators know that a large food-processing plant downstream dumps a heavy BOD load into the river, and farther downstream a complex of small tanneries and textile mills reports substantial emissions of heavy metals and additional BOD. A second river monitor shows that these discharges significantly affect water quality, and the information system rates BOD or-

Figure 6.1 Monitoring Pollution



ange and metals yellow. Below the industrial area several large farms abut the river; a third monitor reveals a heavy phosphorus load from fertilizer runoff, and the system rates that element orange. The monitor also indicates that the river has assimilated some BOD, so its rating improves to yellow, while the rating for metals becomes red.

Finally, the river flows past a community that discharges untreated sewage laden with BOD, fecal coliforms, and phosphorus from household detergents. The fourth monitoring station rates BOD and coliforms red, although metals improve to orange because some have settled to the bottom, later to appear in the tissues of fish. The rating for phosphorus becomes red from the combination of agricultural runoff and community wastewater.

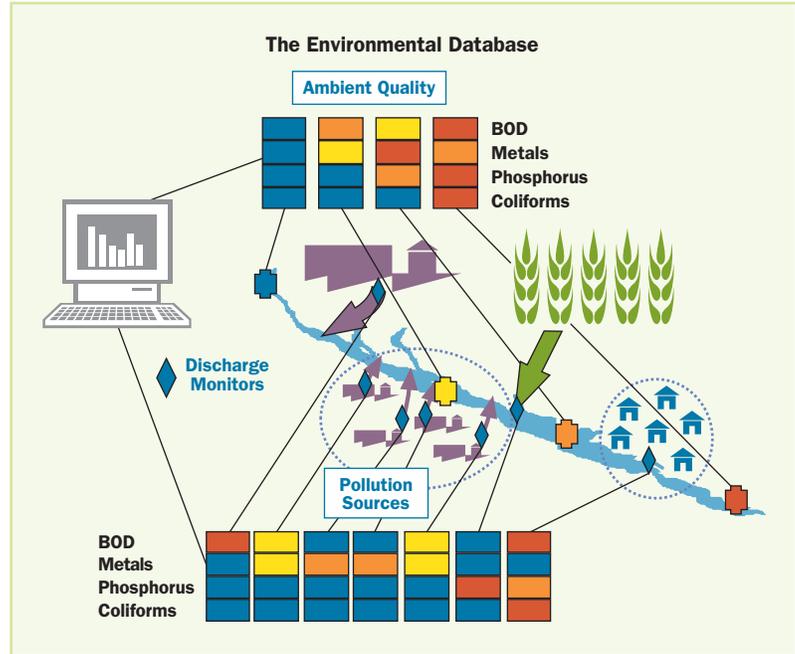
As the river leaves the monitored area, it is for all practical purposes dead. Contaminated by pathogens, its water is dangerous to drink or swim in, its dissolved oxygen level is too low to support many species of fish, the metals content is too high for people to safely consume any fish that remain, and algae affect the water's color and odor. Communities farther downstream will bear heavy costs from this pollution.

The agency has now met its first three responsibilities: identifying major pollution sources, monitoring their effluent, and analyzing the effect on environmental quality. The computer system links to a geographic information system that enables users to call up tables and maps that report ambient quality at each point on the river, along with information about polluters' characteristics, emissions and compliance status (Figure 6.2).

Choosing a Plan of Action

Although data on pollution sources and ambient quality provide critical information, policymakers must further analyze the results to determine their most cost-effective response. Toward that end, the agency's technical team uses the database and the best available models to estimate pollution-related damage to human health and losses of aquatic life, recreational amenities, and economic output. The team also uses the characteristics of polluters to identify those that can respond rapidly and at low cost to tighter regulation (Figure 6.3).

Taking these factors into account, policymakers then develop a strategy that identifies the pollutants to be regulated, ambient quality goals, a timetable for reaching them, and appropriate regulatory instruments: pollution charges, tradable permits, or emissions stan-

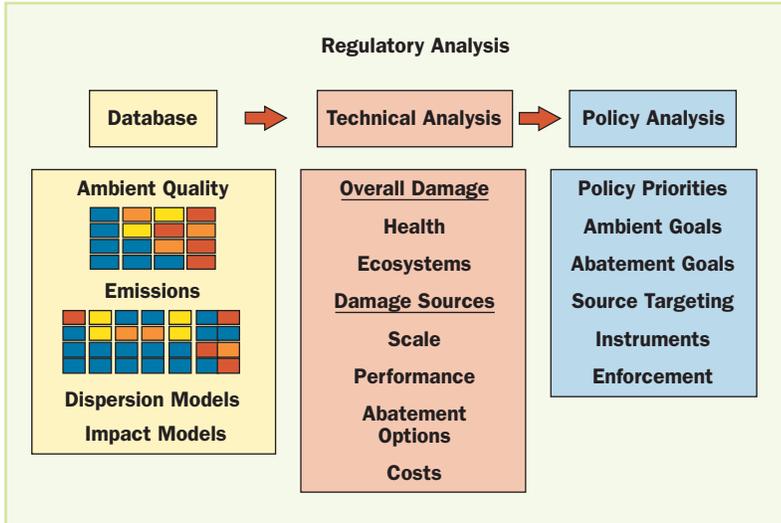
Figure 6.2 Data Collection

dards. The regulators must also decide which sources to target, taking note of factories' importance as local employers and other politically sensitive issues. In practice, the regulators know that their effectiveness depends on constant feedback and long-term support from all the groups affected by regulation.

6.2 Creating Coalitions for Change

Credibility is the irreplaceable currency of regulation, as regulators' political influence and budgetary support will plummet if the public believes that an agency is corrupt or incompetent. Polluters will also resist regulation more easily if credibility falls, and the news media will discount information provided by the agency.

Environmental reformers have discovered three keys to maintaining the precious asset of credibility: focus, transparency, and community participation. For resource-strapped agencies in developing countries, focus provides the best protection against operational failure and loss of reputation. Agencies can avoid serious trouble if they target a small group of serious polluters, limit regulation to a few critical pollutants, effectively measure these pollutants as well

Figure 6.3 Analysis

as regulatory compliance, and publicly document their activities. Agencies whose ambitions outrun their resources may look good for awhile, but their credibility will fade as factual errors and misjudgments accumulate on the public record.

Transparency provides the second key to credibility because it prevents corruption. Corruption at higher levels of management can fester for a long time without detection, and even if managers are honest, secrecy may tempt individual inspectors to take payoffs that may dwarf their salaries. Without public information, communities have no way of knowing whether regulators are doing their job. The solution to the secrecy problem is clear: consistent, unbiased disclosure of polluters' emissions, local environmental impacts, inspection results, and enforcement actions. Chapter 3 has discussed innovative disclosure programs in several Asian and Latin American countries; Box 6.1 describes the process that ensures credibility for Indonesia's PROPER rating system.

Earlier policy experiments in Brazil illustrate the importance of information integrity in pollution disclosure programs. During the late 1970s, the pollution control agencies of Rio and São Paulo States attempted to pressure the most serious polluters by announcing their names to the media. Both agencies were sued by the firms whose names were published. In São Paulo, CETESB's program survived the court challenge because it could provide solid evidence to

Box 6.1 PROPER: Building Credibility

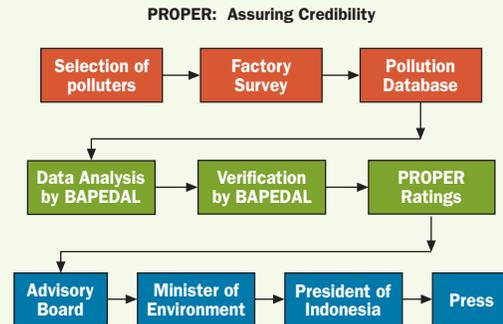
Indonesia's public rating system for polluters has significantly reduced emissions and attracted strong popular support. Still, the program was delayed a year, until mid-1995, because BAPEDAL's leaders realized that it would succeed only if the public understood the ratings, trusted the underlying information, and believed in the honesty of PROPER's managers.

The ratings strategy relied on public communication. By summarizing complex information in a single five-color rating scheme, PROPER allowed the public to compare polluters across many locations and industry sectors. The ratings also made it easy for the media to show which factories complied with regulations and which did not.

Data integrity presented a significant challenge. The agency had relatively little experience with collecting, verifying, and analyzing large amounts of information, so PROPER had some false starts before the Minister of the Environment was satisfied with the rating system. Finally, with the assistance of technical teams from the World Bank, Canada, Australia and the United States, BAPEDAL developed a reliable system for monitoring, recording, and analyzing water emissions from a pilot sample of factories.

To enhance credibility with all stakeholders, BAPEDAL developed a careful process for

Figure B6.1 Steps in Developing PROPER



Source: Shakeb Afsah; BAPEDAL

vetting the ratings through three checkpoints: an advisory board, with representatives from academia, industry, other government agencies and environmental NGOs; the Environment Minister; and finally the President himself (Figure B6.1). The first ratings emerged from these checks unscathed, and their effect on the business community was compounded by the knowledge that the President of Indonesia had approved them.

These careful measures have paid off. PROPER has maintained its reputation for consistency and objectivity, and the public has continued to support it despite Indonesia's political and financial crisis.

support its claims. After the court rejected the lawsuit, most black-listed firms quickly reduced pollution enough to remove themselves from the spotlight. In Rio, by contrast, FEEMA's data were too weak to withstand the court challenge. The lawsuit succeeded, and the Rio disclosure program collapsed.³

Widespread participation also builds public credibility. Politics and the theater share an important trait: Once actors have appeared onstage, their existence becomes part of the drama. The audience assigns them a role that cannot be vacated without comment or jus-

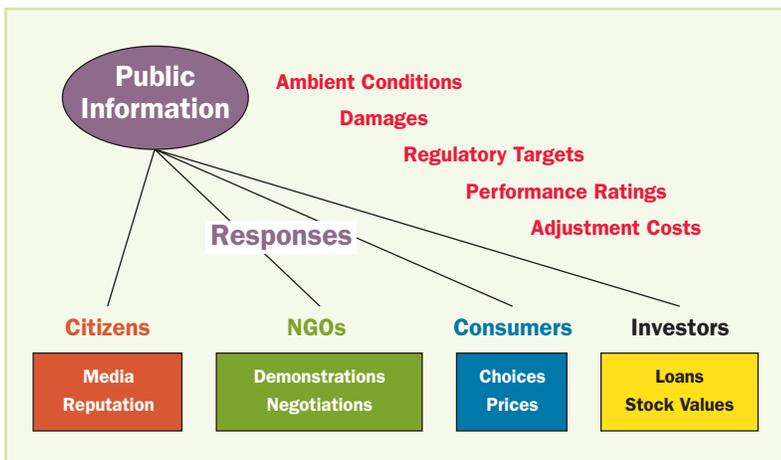
tification. Successful environmental reformers exploit this principle by crowding the public stage with leaders from communities that confront major pollution problems. Once these leaders come on-stage, political opponents of environmental reform can no longer ignore them, and their presence helps insure that the agency itself will not be co-opted by special interests. Despite the importance of expanded community participation, however, not all regulators may welcome it. Power is seldom ceded willingly, and reformers' most difficult task may be persuading some of their own colleagues to support participatory approaches.

An effective regulatory system promotes two-way communication with participants. As communities and markets gain access to environmental information, pressure through many new channels can prompt polluters to reduce their emissions (Figure 6.4). Feedback from the public is also critical: Effective regulators must understand and act upon communities' environmental concerns. Toward this end, Mexico's Environment Ministry is establishing community centers that automatically log, categorize, and route citizens' complaints about pollution to the appropriate authorities. Such systems allow regulators to identify areas with serious problems, and also enable citizens to monitor responses to their complaints.

6.3 The Politics of Sustaining Reform

Environmental reforms are often difficult to sustain. As governments change, high-level sympathy for environmental regulation

Figure 6.4 Reactions to Public Information



may wax and wane. Even if they support existing programs, politically appointed environment ministers seldom enter office with deep knowledge of pollution problems. To remain effective, agency staff members must continually sell their programs, developing political skills and long-term budgetary strategies along with technical competence.

Securing the Budget

Traditional public-finance theory acknowledges that pollution charges and fines provide useful incentives to reduce emissions, but it also holds that regulators should remit revenues to the regional or national government. By drawing on all tax and penalty revenues, the government can fund social, educational, or environmental programs with the highest benefit-cost ratios.

If the government had perfect foresight, Platonic neutrality, and seamless administrative efficiency, no one could quarrel with this approach. Spending would encompass not only current programs but also long-term investment, and public planners would assure stability in the flow of funds. Unfortunately, many regulators, especially those in developing countries, do not inhabit such a world: The political process is quirky, unstable, and prone to sudden crises that drain available budgets.

Regulators also face continual challenges from threatened interests. While some industrialists have strategic vision and support effective regulation, others remain fixated on the short-run bottom line. The most recalcitrant will lobby their political allies for cut-backs in regulators' budgets, and may be joined by some labor leaders who view stricter pollution control as a threat to jobs.

Confronted daily by these realities, regulators often attempt to retain control over pollution charges and fines because they are secure funding sources. Retaining some control also gives regulators stronger incentives to collect fines from polluters. Agencies' desire to keep revenues out of central hands sits well with local politicians and business leaders, who want to see local payments used to support local environmental programs. Environmental reformers must often heed these views because hostile businesses and politicians can block new programs.

Colombia's pollution charge program moved forward when regulators, industrialists, and public sewerage authorities agreed to use part of the revenues to support the regional regulatory agencies, and to invest the rest in local environmental projects (Box 6.2). Although traditional public-finance theory does not support such an approach,

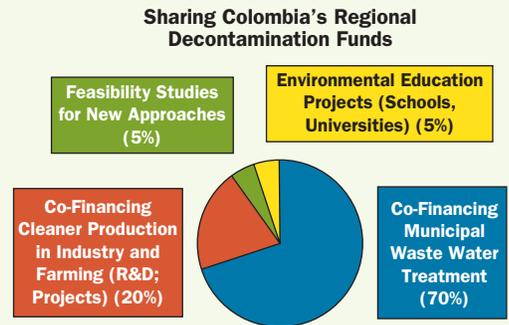
Box 6.2 Sharing the Funds in Colombia

Chapter 2 described Colombia's new regulatory system, which charges polluters for each unit of emissions. Under the standards-based system, regional environmental agencies had legal authority to fine plants that failed to comply with regulations. Reality often dictated otherwise, however, because enforcement procedures were cumbersome and susceptible to legal delaying tactics. The new pollution charge system jettisons criminal sanctions: Plants are free to pollute and pay, but the charges are high enough to affect managers' cost calculations significantly.

When the program first took shape in Colombia's Environment Ministry, the design team focused on technical issues, working to estimate abatement costs and set charges that would reduce pollution significantly without bankrupting polluters. However, once the team moved to the field, it quickly found that political issues eclipsed technical ones. Polluters themselves defined a central concern: Once they paid, who would get the money? The regional agencies laid claim to some of the funds, because they wanted financial insulation from the political funding cycle. Local business and public works managers accepted that idea but refused to countenance remitting the balance to the national treasury. They weren't impressed by the argument that charges would automatically improve the environment by encouraging cost-minimizing plants to reduce pollution. Instead, they viewed the charges as a financial sacrifice they would bear only if the revenues were used to fund local investments in cleaner manufacturing and wastewater treatment.

Without support from industrialists and public works managers, the charge program stood no chance of implementation. Tough negotiations loomed, and the regional environmental agencies enlisted community-based or-

Figure B6.2 Using Pollution Charge Revenues



Source: Colombian Environment Ministry

ganizations as allies on their side of the table. Finally, representatives from the Environment Ministry team, regional agencies, industrialists, public works managers, and community organizations hammered out a mutually agreeable solution. The new charge program would support "regional decontamination funds" used for local environmental projects, after some portion was diverted to fund agency budgets. Figure B6.2 summarizes the Environment Ministry's recommendations for use of the funds, which most regional authorities have followed.

Public finance theory does not countenance the diversion of charge revenues to purely environmental projects, but in reality the program designers had no choice: no regional funds, no program. The ministry team accepted the package and, in an ingenious twist, enlisted one of Colombia's top commercial banks to collect the pollution charges (for a percentage fee), administer the funds to get maximum interest, and disburse them to approved projects. That solution unburdened the local agencies, which had little expertise in billing, collecting, and disbursing, while it encouraged private-sector polluters to pay in order to preserve their credit ratings.

the program's strengths have clearly outweighed this conceptual "flaw." 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.

However, accepting political reality does not imply uncritical acceptance of any funding scheme. The designers of Colombia's system have stressed the application of clear benefit-cost criteria to local financing of pollution reduction projects. Useful projects may include public wastewater treatment facilities and support for improved environmental management in small and medium enterprises (Chapter 4). Subsidized loans to private firms for end-of-pipe abatement are probably ill-advised in most cases. Numerous international studies have shown that large firms often gain access to the funds simply because their staffs can produce good technical proposals. Yet such firms will generally clean up anyway, if pollution charges or other instruments provide the right incentives.⁴

Success Stories

Three countries where regulators have adopted new programs illustrate the political aspects of successful reform.⁵

The Colombian pollution charge program has developed strong coalitions of stakeholders in many of its administrative regions. As described in Chapter 2, regulators in each region mediate negotiations between industries and communities on pollution reduction targets and schedules for raising charges if the targets are not met. This participatory approach has created strong community support for the program and has helped insulate it from its political and bureaucratic opponents.

To reinforce community support, the program's promoters are also pushing for a complementary public disclosure program like Indonesia's PROPER. They view it as a powerful vehicle for environmental education as well as a means of addressing public distrust of governmental institutions. The program's promoters also believe that more-precise knowledge of local pollution sources will mobilize communities to confront polluters informally, as well as negotiate with them formally over pollution targets and charges.

In Indonesia, where developers of PROPER also relied on community support, some environmental NGOs initially feared that the program's use of the media would co-opt their traditional role as community advocates. To ensure NGO support, BAPEDAL, Indonesia's environmental agency, invited NGO leaders to join the advisory group that reviewed industry ratings before they were publicly an-

nounced. The NGOs accepted, principally because they had a long-standing relationship with BAPEDAL's Deputy for Pollution Control.

BAPEDAL also enlisted support for PROPER from progressive business leaders. Program designers were well aware that large, technically sophisticated companies like PT Indah Kiat could earn good ratings from PROPER (Chapter 3), and they expected CEOs of such firms to support the program as a source of competitive advantage. But the PROPER team also went out of its way to avoid antagonizing firms whose ratings were initially subpar, by precisely identifying the reasons for the poor ratings, suggesting actions to improve them, and offering a grace period before formally announcing the ratings. Agency officials also met regularly with company managers to address their concerns. To further ensure long-term support, an endorsement from Indonesia's President accompanied PROPER's initial ratings, and the Vice President publicly announced the highest-rated factories as part of Indonesia's Earth Day activities.

The developers of Philippines' EcoWatch disclosure program pursued a similar political strategy. The nation's President formally announced EcoWatch along with leaders of the Philippines Business Association, who encouraged association members to participate in the program. The President reiterated his support in speeches and public announcements, and the program allowed poorly rated factories a grace period before public disclosure.

6.4 Living with Change

Politics remains the art of the possible, and no reform of environmental policy can anticipate all untoward events. Political turmoil is a fact of life in many developing countries, and sudden crises or larger political forces can undermine even successful programs with solid support. In Ciudad Juárez, a decision by the Mexican Government to end subsidies for propane undermined a successful program to induce small-scale brick makers to switch to cleaner fuels. Indonesia's financial crisis has made imported pollution-control inputs more expensive and forced cuts in regulators' budgets, reversing some of the gains made under PROPER.

Nevertheless, many well-packaged reforms have proven remarkably durable in the face of rapid political change, including all three programs discussed in this chapter (Box 6.3). We credit much of this survival to the political entrepreneurship of the programs' designers, and to their respect for three fundamental principles of innovative regulation: focus, transparency, and community participation.

Box 6.3 Sustaining Reforms in the Face of Political Change

Environmental policy reforms remain vulnerable to political change until they are fully institutionalized. Figure B6.3 illustrates how expanding elections in developing countries have increased the pace of political change. Nevertheless, as the following examples show, strong programs with wide popular appeal have repeatedly survived turnover in national governments.

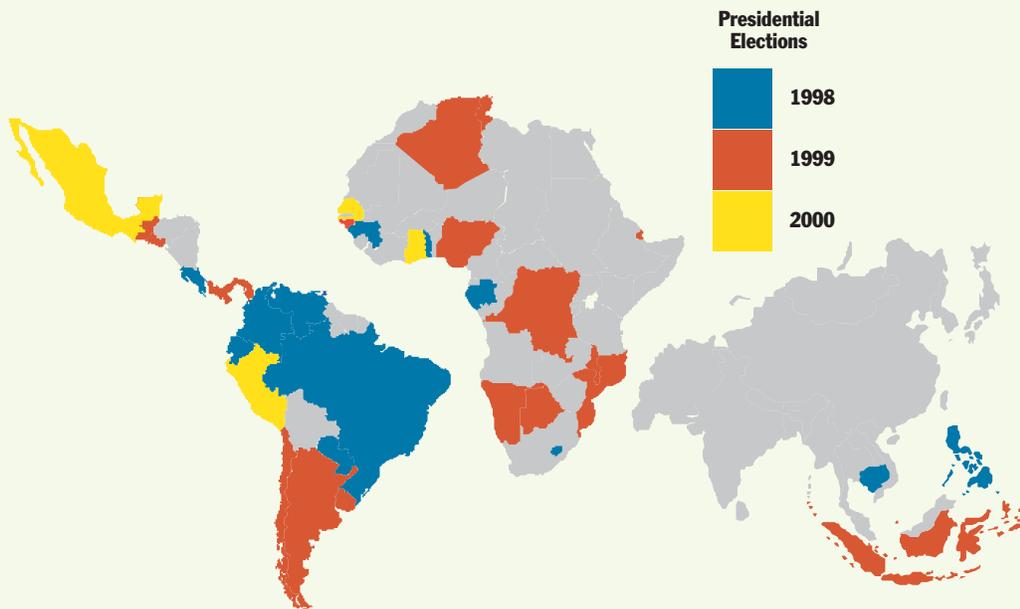
Colombia

In 1993, Colombia's Congress established the Ministry of Environment and the "polluter pays" concept as a fundamental principle of Colombian law. In 1997 the Ministry's Office of

Economic Analysis translated this principle into policy by establishing a nationwide pollution charge program. Implementation began when CORNARE, a regional agency near Medellín, started billing local factories for emissions in 1998.

The program has since operated under three different environment ministers: Jose Vicente Mogollon (1996–1997), Eduardo Verano de la Rosa (1997–1998), and Juan Mayr Maldonado (1998–present). The latter took office when Andres Pastrana Arango of the Conservative Party defeated Horacio Serpa of the Liberal Party to win the presidency. Although the

Figure B6.3 Elections in Developing Countries



Source: IFES (1999)

Box 6.3 (Continued)

national administration has changed, support for pollution charges continues because the program's local constituencies remain politically potent.

Indonesia

In 1993, BAPEDAL's Deputy for Pollution Control proposed PROPER to Indonesia's Environment Minister, Sarwono Kusumaatmadja. After careful development, the program moved to pilot implementation in mid-1995, and was considered a major policy success of the Suharto government. Then in mid-1997, Indonesia's financial and political crisis hit. During the ensuing turbulence PROPER has operated under two new environment ministers: Wijoyo Sudarsono and Sergir Panangian. The BAPEDAL Deputy who developed PROPER has left the agency, and it has endured budget cuts along with other environmental programs. Nevertheless, popular support for the program remains strong and it continues to operate. Original plans to rate 2,000 factories by the year 2000 now look ambitious, but the program expects to have ratings for some 500 factories by the end of 1999.

Philippines

Many countries watched the development of PROPER, but none more closely than the neighboring Philippines. In 1996, Secretary Victor Ramos of the Department of Environment and Natural Resources (DENR) launched a similar program, called EcoWatch. President Fidel Ramos publicly supported the program, which began by focusing on organic water pollution in the national capital region. Within 18 months EcoWatch coverage expanded from 52 to 83 major polluters, and their regulatory compliance rate jumped from 8 percent to 58 percent. This successful introduction attracted widespread support from the media, community leaders, and environmental NGOs.

After the 1998 elections, DENR Secretary Ramos left office along with President Ramos, and President-elect Jose Ejercito Estrada appointed Antonio Cerilles as the new Secretary of DENR. After taking stock, the new administration decided to continue EcoWatch because many of its constituents supported the program. DENR now plans a rapid expansion of EcoWatch to cover major polluters throughout the country.

References

- Hanrahan, D., M. Keene, D. Shaman, and D. Wheeler, 1998, "Developing Partnerships for Effective Pollution Management," *Environment Matters at the World Bank*, Annual Review.
- IFES (International Foundation for Election Systems), 1999, "IFES Elections Calendar," available at <http://www.ifes.org/eleccl.htm>.
- Lovei, M., 1995, "Financing Pollution Abatement: Theory and Practice," World Bank Environment Department Paper, No. 28.
- Von Amsberg, J., 1996, Brazil: Managing Environmental Pollution in the State of Rio de Janeiro, World Bank, Brazil Department, Report No. 15488-BR, August.

- , 1997, Brazil: Managing Pollution Problems, The Brown Environmental Agenda, World Bank, Brazil Department, Report No. 16635-BR, June.
- World Bank, 1999, *Pollution Prevention and Abatement Handbook (Preliminary Version)*, available at <http://wbln0018.worldbank.org/essd/PMExt.nsf>.
- Wheeler, D., 1997, "Information in Pollution Management: The New Model," in Von Amsberg (1997).

End Notes

1. For a comprehensive discussion of FEEMA's problems, see Von Amsberg (1996).
2. For further discussion of the new approach, see Hanrahan, Keene, Shaman, and Wheeler (1998) and World Bank (1999).
3. Interviews with staff members of CETESB and FEEMA.
4. For a detailed discussion of this issue, see Lovei (1995).
5. These cases are drawn from the authors' collaborative experience with environmental agencies in Colombia, Indonesia, and Philippines.