Public Disclosure Authorized

POLICY RESEARCH WORKING PAPER 1672

Controlling Industrial Pollution

A New Paradigm

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Conventional discussions of pollution regulation in developing countries have been too shallow — devoting inordinate attention to the choice of instrument while ignoring the preconditions for applying any instrument effectively. They have also been too narrow — focusing only on the interaction of state and factory, and ignoring the role of the market and the community.

Summary findings

Afsah, Laplante, and Wheeler call for a revised model for the regulation of industrial pollution. They think the traditional emphasis on "appropriate instruments," while ultimately correct, is premature, because agencies in most developing countries have too many problems with information and transaction costs to implement any instruments comprehensively.

Once regulators have better information, more integrated information systems, more capacity for setting priorities, and a stronger public mandate, it will not be difficult for them to manage pollution more cost-effectively. Overhasty introduction of market-based instruments will not work and will probably discredit those potentially powerful regulatory tools.

The new model of regulation should relegate regulators to their proper place in the scheme of things. Factories' environmental performance is shaped by the interaction of agents with different incentives. The state should play a role in regulating pollution externalities, but the role of the community and market must also be recognized. In the authors' view, appropriate regulation in developing countries should incorporate five key features:

• *Information intensity.* Regulators need reliable data, integrated information systems, and the ability to set priorities that reflect relative costs and benefits. Markets and communities need timely, accurate, public information to assess factories' environmental performance.

• *Orchestration, not dictation.* Potentially high-leverage programs to add to the mix include community environmental education, public disclosure of factory performance ratings, and technical training programs for environmental personnel in polluting factories.

• *Community control.* This should be a current reality, not a goal of future programs. Strengthening central regulatory agencies should not empower them to impose uniform standards on heterogeneous communities under the guise of "efficiency." Local variations in regulation are legitimate.

• *Structured learning.* Agencies should initiate pilot projects and build larger programs as lessons from the pilot projects are absorbed.

• Adaptive instruments. Newly industrializing economies can experience rapid changes in ambient quality across air- and watersheds. Regulation should focus on adaptation to these rapid changes. Regulators should be empowered to counter environmental degradation by tightening existing regulations, but the system should also minimize disruption for investors. Adjustment rules should be transparent and linked to publicly available data on quality and emissions.

Produced by the Policy Research Dissemination Center

CONTROLLING INDUSTRIAL POLLUTION: A NEW PARADIGM

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1. Introduction

Factories in developing countries exhibit great variety in environmental performance despite the widely acknowledged weaknesses of the regulatory framework. Even in the poorest countries, some plants would satisfy OECD emissions standards. Similarly, a great variety in environmental performance is observed in developed economies.

These facts create a problem for conventional thinking about controlling industrial pollution. Given the weaknesses of the regulatory framework in developing countries, plants should treat the environment as a 'free' input and undertake no effort to control emissions. On the other hand, factories in societies with stronger regulatory agencies should generally be in compliance with the standards. Since neither conclusion is consistent with the facts, we must question the premises and develop a new paradigm for understanding the performance of industrial polluters.

Our current research is addressing this problem in six large developing countries. By establishing partnerships with environmental agencies in those countries, we have been able to observe regulator-polluter relationships at first hand.[2] Our experience as 'participant-analysts' has revealed the limitations of the conventional regulatory model, and suggested a number of significant directions for revision. This paper summarizes our findings to date, along with the potential implications for regulatory policy.

First, it is clear that the basic assumptions which support the model of 'optimal regulation' -- full information and zero transactions costs -- are not met in practice. This undermines the implementation of both traditional command-and-control regulation and economic instruments. Secondly, we find that the regulator is not the sole source of pressure on plants to improve their environmental performance. Local communities and market agents also play important roles. As an alternative to the traditional view, we therefore propose a model of interactions linking four agents: plant, state, community and market. This model focuses on the *process* that leads to efficient levels of pollution, rather than on *a priori identification* of the optimum point by state regulators.

To illustrate the main features of our model, we present findings from two recent studies. Our analysis of China's non-compliance fee (or levy) for water polluters highlights the effect of local conditions on the actual enforcement practices of regulatory agencies. When viewed through a non-traditional lens, practices commonly criticized as symptoms of 'inefficient administration' appear closer to optimal behavior. In a second study, we

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[2] The six countries are: Indonesia, Mexico, Brazil, China, Philippines and India. Our agency partners are **BAPEDAL** (National Pollution Control Agency), **Indonesia**; **INE** (Instituto Nacional de Ecologia), **Mexico**; **CETESB** (Pollution Control Agency of Sao Paulo State), **Brazil**; **FEEMA** (Pollution Control Agency of Rio de Janeiro State), **Brazil**; **NEPA** (National Environmental Protection Agency), **China**, Tianjin Environmental Protection Bureau, **China**; and **DENR** (Department of Environment and Natural Resources), **Philippines**. We are also collaborating with the Pollution Control Boards of eight Indian states in a nationwide survey of the environmental performance of Indian factories.

analyze Indonesia's recently-introduced program for public disclosure of environmental performance ratings for factories. There is no room for such a program in the traditional model, but we explain why it may strongly affect polluters in a world of multiple agents and multiple incentives.

Finally, we argue that the new paradigm has important implications for regulatory policy. Regulators lose their role as sole enforcers, but gain the potential for greater effectiveness through new policies which leverage the power of communities and markets. We suggest five key principles that can form the basis for structuring environmental agencies and their program design and implementation.
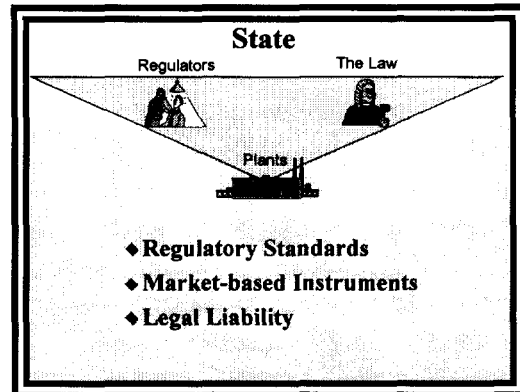

Figure 1a

2. The Traditional View of Regulation

Figure 1a presents the classic paradigm for analyzing pollution control issues. Here the State holds center stage, with two principal agents -- Regulators and The Law -- expected to set and enforce rules of environmental behavior. In keeping with this understanding of the problem, the policy analysis literature has focused on appropriate roles for 'ex ante' regulation (standards vs. market-based instruments) and 'ex post' liability claims by injured parties.

Figure 1b provides the conventional view from the perspective of environmental economics. Pollution (N) is measured on the horizontal axis and costs ($) are measured on the vertical axis. In this textbook view of the problem, the regulator can quantify the increase in Marginal Social Damage (MSD) as the pollution level rises. There is also sufficient information to quantify increases in Marginal Abatement Cost (MAC) as polluters reduce their emissions. The regulator determines 'optimum pollution' at point N*, where MSD = MAC.

The regulatory problem in this world is straightforward: Having determined N* with full information, the regulator seeks to attain it by using command-and-control (mandating factories not to pollute above a determined level) or market-based instruments (setting a pollution charge P*, or allowing factories to trade pollution permits within the limit N*). Able to enforce at will because transactions costs are zero, the regulator simply dictates the terms and the factories respond appropriately. By assumption, the central regulator is and should be the sole
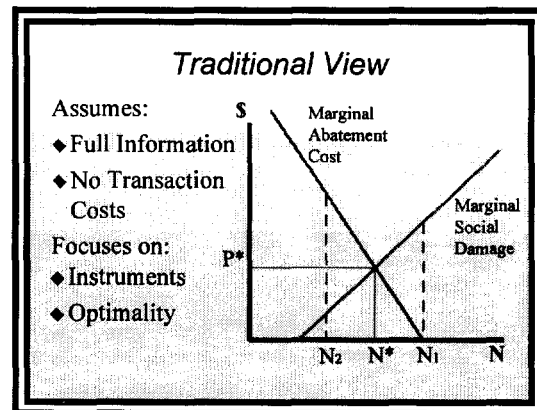

Figure 1b

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decision agent in such a world.

As environmental economists, we support the view that optimum pollution is an appropriate concept for regulation. We also believe (and are working with our partner agencies to demonstrate) that pollution charges and tradable pollution permits can be effective regulatory instruments *under the right conditions*. However, our research and field experience have convinced us that the conventional regulatory approach does not pay sufficient attention to defining the right conditions.

3. Strengthening the Foundations

Indeed, it would be impossible for us to defend some basic tenets of the conventional model to our agency partners. They would not know what to make of assumptions like 'full information' and 'zero transactions costs.' These are not just 'approximations' under developing-country conditions; they are dangerous chimeras which can divert attention and scarce resources from real agency problems to grandiose programs which have no chance of working. Let us be more specific:

3.1 Information and Transactions Costs

Our partner agencies are plagued by problems with:

- **Information**: Monitoring quality is frequently so poor that compliance with regulations is difficult to assess. Fragmentary data on factory emissions and ambient quality are often non-computerized, and closely held by separate agency units charged with different responsibilities. Information on abatement costs is almost never available.

- **Bureaucracy**: The air and water quality monitoring units frequently don't talk to each other, nor do they share information with those monitoring air and water emissions.

- **Human and technical resources**: Agencies generally have little capacity for assessing the net benefits of alternative programs and using the results to establish priorities for allocation of scarce resources. Few trained inspectors are available, and it is impossible to monitor more than a modest fraction of polluting factories.

- **Political support**: Serious enforcement frequently encounters potent political resistance.

To summarize, life in our partner agencies is one long encounter with limited information and high transactions costs.

3.2 First Things First

Under such conditions it is extremely difficult to implement any pollution control program, including market-based instruments. Indeed it would be pointless, and ultimately counterproductive, to advocate large-scale implementation of pollution charges or tradable permits under conditions which practically guarantee their failure. Near-term policy problems are more pressing and should be addressed first:

- Identification of the small group of serious polluters which the agency can regulate effectively with existing resources;
- Mobilization of political and community support for meaningful action;
- First-stage development of an integrated information system with good quality control;
- Establishment of ambient quality targets for polluted air- and watersheds; linkage to pollution reduction measures applied to target polluters;
- Use of simple cost-effectiveness principles in the reform of licensing and inspection procedures;
- Development of internal capacity for priority-setting using integrated information systems;
- Small-scale pilot experimentation with new regulatory instruments (charges, permits, public disclosure, etc.)

If successfully implemented, these "simple" steps will lay the necessary foundations for more sophisticated pollution control strategies. Without them we are likely to witness a demoralizing series of failures, as fancy programs attempt to lift off with no launching pad.

4. Broadening the Vision

We have argued above that a regulatory approach based on inappropriate assumptions about information and transactions costs has distracted policy analysts from the real implementation issues in developing-country agencies. At a more general level, we would also argue that the traditional view of regulation is misguided because its focus is too narrow. Conventional policy discussion has focused almost exclusively on interactions between the **State** and the **Plant**. However, our research has suggested powerful roles for two additional 'players': the **Community** and the **Market**.

4.1 The Community

Recent evidence from Asia, Latin America and North America suggests that neighboring communities can have a powerful influence on factories' environmental performance. Communities which are richer, better educated, and more organized find many ways of enforcing environmental norms. Where formal regulators are present, communities use the political process to influence the tightness of enforcement. Where formal regulators are absent or ineffective, 'informal regulation' is implemented through community groups or NGOs.
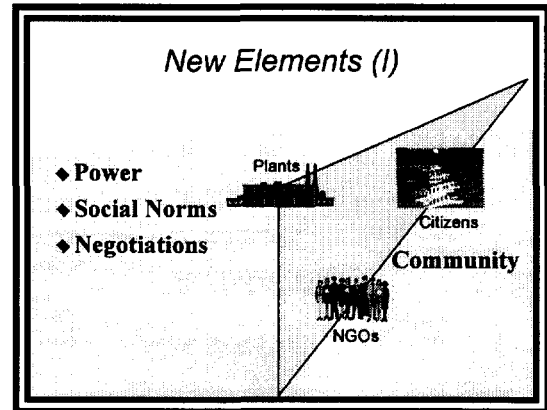

Figure 2

The agents of informal regulation vary from country to country -- local religious institutions, social organizations, community leaders, citizens' movements or politicians -- but the pattern is similar (Figure 2): Factories negotiate directly with local communities, responding to social norms and/or explicit or implicit threats of social, political or physical sanctions if they fail to reduce the damages caused by their emissions. In countries as different as China, Brazil, Indonesia and the US, much of the variation in factories' environmental performance is explained by inter-community variation in income, education and bargaining power.[3]

4.2 The Market

Factories operate in local, national and international markets, where many agents can affect revenues and costs (Figure 3). Environmental considerations now affect the decisions of many of these agents. In both industrial and developing countries, environmentalism in the middle and upper classes is a significant factor in consumer decisions. With the worldwide advent of environmental legislation, investors are also scrutinizing environmental performance. Among other factors, they have to weigh the

Figure 3

potential for financial losses from regulatory penalties and liability settlements. In recent years, the importance of investor interest has been increased by the growth of new stock markets and the internationalization of investment. For similar reasons, international and
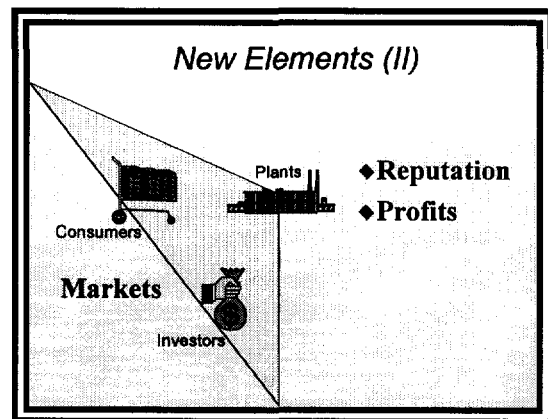
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[3] For evidence from Asia, see Pargal and Wheeler (1996), Hettige, Huq, Pargal and Wheeler (1996), Huq and Wheeler (1993), and Huq, Hartman and Wheeler (1996). Evidence from Brazil and Mexico can be found in Wheeler and Witzel (1995) and Hettige and Witzel (1996).

local suppliers of financing, industrial equipment, and engineering services are increasingly reluctant to do business with flagrant polluters.

Recent evidence from both the OECD and developing countries suggests that environmental reputation matters for firms whose expected costs or revenues are affected by judgments of environmental performance by customers, suppliers, and stockholders.[4] Many factors can affect firms' evaluation of their environmental reputation, including company size, export orientation, and multinational ownership. For reputationally-sensitive companies, public certification of good or bad performance may translate to large expected gains or losses over time.

4.3. Multiple Agents, Multiple Incentives: A New View of Regulation

Once the Community and the Market are introduced, we have a much richer and more robust model for explaining the observable variations in factories' environmental performance. Clean factories are perfectly plausible in poor countries, and the survival of dirty factories in rich countries is not hard to understand. In place of the paired State/Factory model of regulation, we therefore propose the 'Regulatory Triangle' which is depicted in Figure 4.
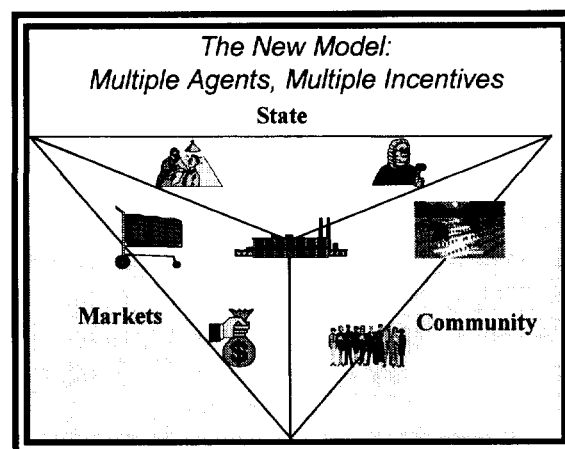

Figure 4

Once we introduce a world of multiple agents and multiple incentives, we must also rethink the regulator's appropriate role in pollution management. No longer is this role confined to producing, monitoring and enforcing rules and standards. Instead, the regulator can gain leverage through non-traditional programs which harness the power of communities and markets. Within the 'triangular' regulatory framework, for example, there is ample room for information-oriented approaches such as voluntary participation/compliance programs[5] and public disclosure of factories' environmental performance. A broader implication is that one size no longer 'fits all' for regulatory policy design: Optimal combinations of regulatory tools will depend on country-specific social, economic and institutional conditions.

What does this expanded view of regulation mean in practice? To draw out some of the implications, we will summarize the results of recent collaborative projects with the National Environmental Protection Agency of China (NEPA) and the National Pollution Control Agency of Indonesia (BAPEDAL).

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[4] See Arora and Cason (1994), Hamilton (1995), Hettige, et. al. (1995) and Laplante and Lanoie (1994).

[5] See Afsah, Laplante, and Makarim (1996) for a discussion of PROKASIH, Indonesia's river management program.

Case 1: China's Pollution Levy

China's pollution levy is one of the few economic instruments with a long, documented history of application in a developing country. Article 18 of China's Environmental Protection Law specifies that "in cases where the discharge of pollutants exceeds the limit set by the state, a compensation fee shall be charged according to the quantities and concentration of the pollutants released". At present, approximately 300,000 factories are monitored and potentially subject to levy collections by national, provincial and local regulators.

Although the levy experience has not previously been analyzed systematically, a number of case studies have suggested that the system is poorly administered, that enforcement is largely arbitrary, and that the system is ineffective in controlling pollution. We recently tested this view of the levy system in a collaborative project with NEPA and the Bank's Country Department EA2, using a new database which records the experience of 29 Chinese provinces and urban regions during the period 1987-1993.[6] We studied the water pollution levy because its implementation and impact were well-documented in the information available to us. Our econometric analysis focused on explaining variations in two province-level measures: Industrial emissions intensity (provincial emissions/output) for chemical oxygen demand (COD -- a common measure of organic water pollution) and the *effective* water pollution levy rate (provincial levy collections for above-standard wastewater discharge/total above-standard wastewater discharge). Differences in factory-level monitoring and enforcement can cause the *effective* levy rate to vary widely across provinces.

The official levy rate determined by the national government applies uniformly across China. However, Figure 5 shows that the *effective* levy rate varies significantly across provinces. More importantly, the pattern of variation is not random: Effective levies are much higher in urbanized/industrialized provinces of the country, particularly in the eastern coastal regions.

Figure 5

Large increases in the official levy since 1987 and significant variations in enforcement have also created a strongly-differentiated pattern of pollution intensities across provinces and over time. We have estimated that from 1987 to 1993, provincial COD intensities fell at a median rate of 50% and total COD discharges declined at a median rate of 22%.
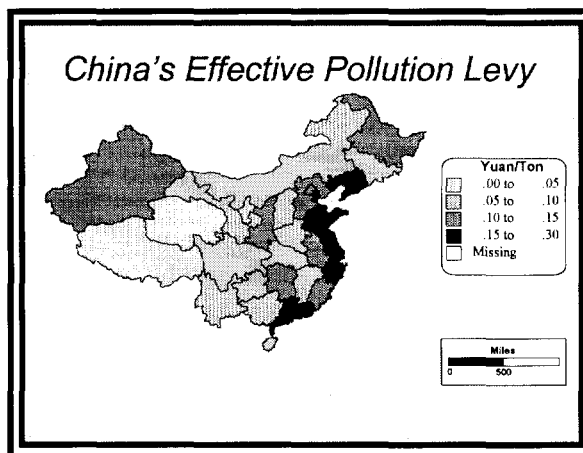
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[6] Wang and Wheeler (1996)

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Hence, contrary to the conventional wisdom, our results suggest that the water pollution levy has been neither arbitrarily administered nor ineffective in China. As shown in Figure 6, two sets of local factors make significant contributions to explaining variations in the effective levy. The first, reflecting the principles of environmental economics, is local valuation of pollution damage. This has three components: total pollution load; size of exposed population; and local income. The second is community capacity

Figure 6

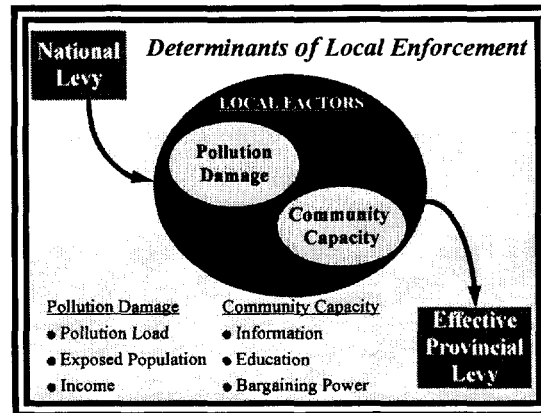to understand and act on local environmental problems, indexed by measures of information, education and bargaining power.[7]

Our results are consistent with the multiple-agent model. Lacking the appropriate information for determining optimal pollution levels in each province, the national government sets the official pollution levy at a 'reference level' and lets officials in each province trade off the costs and benefits of *effective implementation*. The implications of this result are very clear: The uniform implementation of uniform standards and/or levy rates is not optimal; local conditions determine what these should be.[8] Thus, while enabling national environmental authorities in developing countries is an important objective, institutional strengthening programs should also recognize that much of the action takes place (and rightly so) at local levels.

Case 2: Indonesia's Public Disclosure Program

Enforcement of formal regulation in Indonesia is currently weak, and the modest size of the regulatory budget assures that this weakness will persist in the near future. However, manufacturing is growing at over 10% annually, and the Indonesian Government recognizes the mounting risk of severe pollution damage. Faced with this dilemma, Indonesia's National Pollution Control Agency (BAPEDAL) has decided to initiate a program for rating and publicly disclosing the environmental performance of Indonesian factories. BAPEDAL hopes that pressure on factories from public disclosure will provide a low-cost substitute for formal enforcement of the regulations, and create incentives for the adoption of cleaner technologies.

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[7] Results of a similar nature have also been obseved in Canada and the United States. For more details, see Deily and Gray (1991), and Dion, Lanoie and Laplante (1996).

[8] Our results do not imply that current effective levies are optimal. Provincial regulators do not have all the requisite information, nor do they have the capacity for a full assessment of this information. In addition, constraints imposed by low levels of community education or organization may reduce the pressure on local regulators to enforce at optimal levels. However, our results do suggest that provincial effective levies reflect significant elements of self-interest, and are closer to optimum arrangements than has commonly been supposed.

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In late 1994, BAPEDAL invited us to participate in the design, implementation and analysis of the public disclosure program. The Bank's Policy Research Department and Country Department EA3 agreed to support the project. After six months of intensive work by the BAPEDAL/PRD team, Indonesia's Vice President Tri Sutrisno introduced the program to the public in June, 1995. It is called PROPER -- Program for Pollution Control, Evaluation and Rating (or PROPER).[9]

In PROPER, a polluter is assigned a color rating based on BAPEDAL's evaluation of its environmental performance (Figure 7). A Blue rating is given to factories which are in compliance with national regulatory standards; Gold is reserved for world-class performers, and Black for factories which have made no attempt to control pollution and are causing serious damage. Intermediate ratings are Red, for factories which have some pollution control but fall short of compliance; and Green, for factories whose emissions control

Figure 7

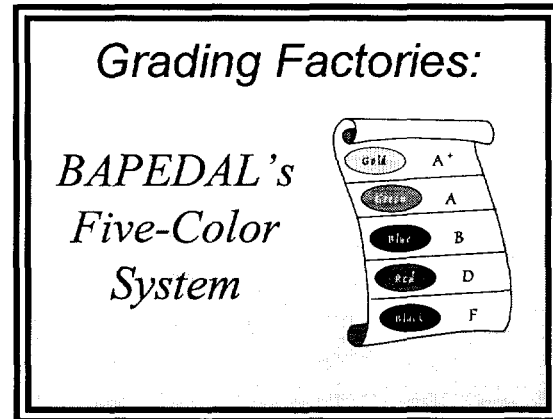and housekeeping procedures significantly exceed those needed for compliance.

Why might PROPER be expected to have a significant impact on pollution? We turn to the regulatory triangle model (Figure 8) for an explanation. First, while we have noted a pervasive pattern of 'informal regulation,' or **community** influence on polluters' behavior, our findings also suggest that information problems may distort communities' perceptions of their pollution problems. For example, it is often easy to see (and/or smell) the impact of organic water pollution or sulphur oxide air pollution. However, emissions of
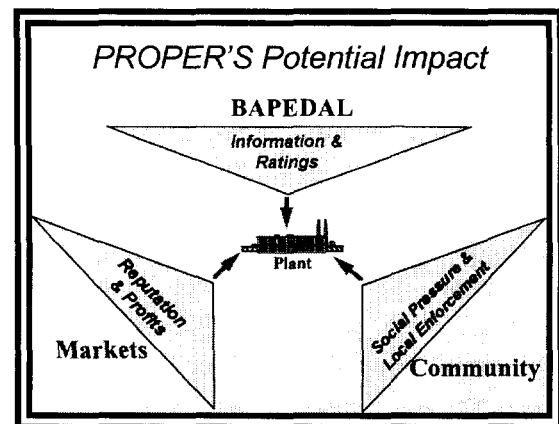
Figure 8

bioaccumulative metals and toxins are likely to escape notice. Even where pollutants are clearly visible, local communities frequently cannot gauge the severity of their long-run impact. In addition, communities downstream from polluting industrial complexes often have difficulty identifying individual culprits.

Public disclosure offers significant empowerment to local communities in this context. Armed with government-certified performance ratings, they are in a much stronger position to negotiate pollution control agreements with neighboring factories.

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[9] For more details, see Wheeler and Afsah (1996).

Secondly, from the **market** perspective, PROPER provides a novel application of 'incentive regulation' principles. Traditional regulation has been plagued by an important principal-agent problem: Regulators need good data about firms' performance, but firms have clear incentives to withhold such information. Incentive regulation follows traditional practice by penalizing non-compliance with regulatory standards. However, it also addresses the agency problem by rewarding superior performance. This improves the regulators' information by encouraging good performers to identify themselves. It also provides competitive incentives for superior performers to help the regulators identify poor performers, since the latter will be penalized by disclosure.
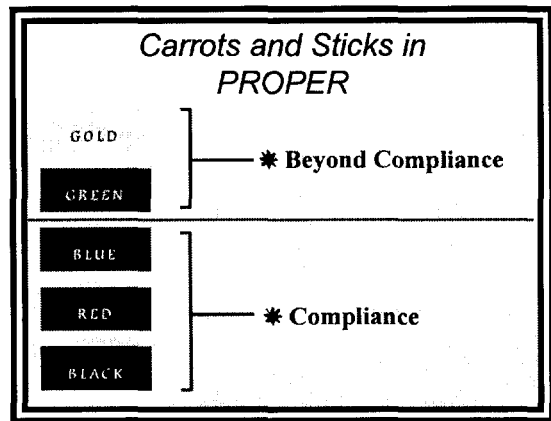
Carrots and Sticks in PROPER

GOLD
GREEN
— * Beyond Compliance

BLUE
RED
BLACK
— * Compliance

Figure 9

PROPER is expected to work in a similar manner. For non-compliant firms, BAPEDAL expects that that the program will provide an enforcement 'stick' which costs less than conventional procedures. The program also offers important 'carrots' in the form of Green and Gold ratings. BAPEDAL hopes many firms will conclude that the reputational value of Green or Gold status will warrant the costs associated with cleaner production. Moreover, it is important to note that because of PROPER, the Agency subjects itself to scrutiny and creates incentives to improve its performance through transparency. Hence, while an information release program may create incentives for polluters to improve on their environmental performance, it also creates incentives for the Agency to improve on its ability and capacity to collect and process information.

In the pilot phase of PROPER, 187 plants were rated. When the program was officially launched in June 1995, only the names of the five Green plants were publicly announced. The 121 plants rated as Red or Black were privately notified, and given until December 1995 to improve their performance. Full disclosure was implemented on December 29; the pilot-phase results are displayed in Figure 10. They suggest that PROPER's short-term impact as a 'stick' has been substantial. Before full disclosure in December, half the Black plants made successful efforts to upgrade their status, along with a substantial number of Red plants.

PROPER's Short-Term Impact

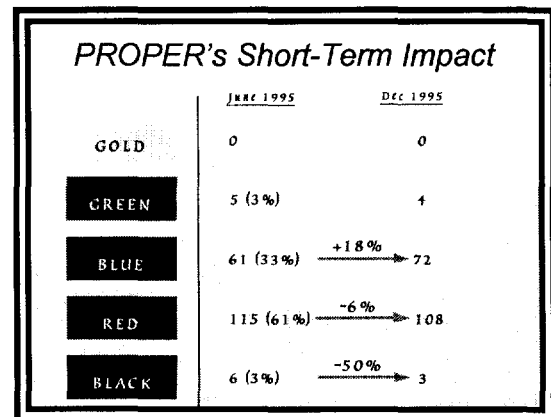|	June 1995	Dec 1995
GOLD	0	0
GREEN	5 (3%)	4
BLUE	61 (33%)	+18% → 72
RED	115 (61%)	-6% → 108
BLACK	6 (3%)	-50% → 3

Figure 10

No short-term impact is observable in the 'carrot' range, but this is not surprising. Attaining Green or Gold status will require longer-term investments, while rapid

installation of basic abatement equipment can be sufficient to promote escape from a Black rating.

Though preliminary, these results from PROPER suggest that industrial polluters respond to the incentives created by multiple agents. Since the state is not the sole actor, it is important for regulators to recognize that their role is not strictly limited to that of enforcer. In fact, they have access to a much larger set of instruments. Further research will be needed to determine the conditions under which these instruments will reinforce or substitute for one another.

5. Toward a New Paradigm

In this paper, we have emphasized two points of departure for a revised model of regulation. First, we think that the traditional emphasis on 'appropriate instruments,' while ultimately correct, is premature because most developing-country agencies have too many information and transactions cost problems to implement any instruments in a comprehensive manner.

Figure 11

First things first: Once regulators have higher-quality information, more integrated information systems, more internal capacity for priority-setting, and a stronger public mandate, it will not be difficult for them to manage pollution more cost-effectively. Overly-hasty introduction of market-based instruments will not work, and is likely to discredit these potentially-powerful regulatory tools.

Secondly, the new model of regulation should relegate the regulators to their proper place in the larger scheme of things. The environmental performance of factories is determined by the interactions of multiple agents, with multiple incentives. Although the **State** can and should have a continuing role in the regulation of pollution externalities, the importance of the **Community** and the **Market** must also be recognized.

When these two sets of factors are taken into account, a different model of regulation emerges. In our view, appropriate regulation for developing countries should incorporate five key features:

• **Information Intensity:** Effective pollution management by the **State** is impossible unless regulators have reliable data, integrated information systems and the capacity to set priorities which reflect comparative benefits and costs. **Markets** and **Communities** need timely, accurate, public information to make appropriate assessments of factories' environmental performance. An effective regulatory
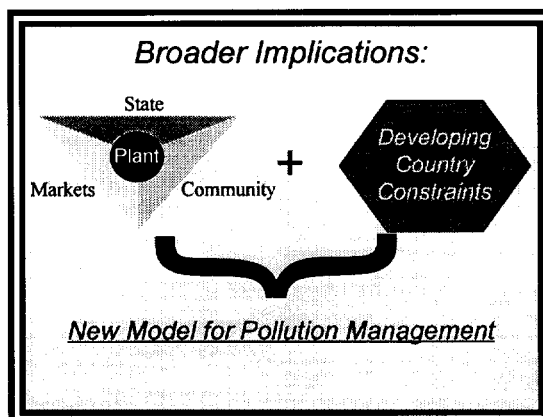
agency will therefore allocate fewer resources at the margin to conventional enforcement and more to the generation and distribution of appropriate information products.

- **Orchestration, not Dictation:** A pollution control agency is only one player in the environmental performance game. Agency activities which influence polluters *indirectly*, through other agents, may be as important as direct enforcement. Potentially high-leverage programs include community environmental education; public disclosure of factory performance ratings; voluntary, public agreements for pollution reduction by industry groups in environmentally-degraded regions; and technical training programs for environmental personnel in polluting factories.

- **Community Control:** This should be accepted as a current reality, not as the goal of future programs. And in fact, a substantial role for local communities is appropriate from the perspective of environmental economics. Regardless of the state of formal regulation, local 'informal regulation' is stronger in areas with higher pollution loads, larger affected populations and higher incomes. We also find independent effects for local education and bargaining strength. Taken together, our findings have three implications.

  1. Strengthening central regulatory agencies should not empower them to impose uniform standards on heterogeneous communities under the guise of 'administrative efficiency.' Much local variation in regulation is legitimate, and should be recognized as such.

  2. Regulatory agencies can play a key role in facilitating negotiations between local communities and neighboring factories. This role includes provision of reliable information on emissions and local ambient quality; technical advice on abatement alternatives; and the transfer of experience from other locations.

  3. Central regulators can use their authority to 'level the playing field' for communities which are excessively polluted because their lack of education, organization and bargaining power prevents them from negotiating effectively with local factories.

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- **Structured Learning:** Environmental policy reform is a complex business, which will inevitably be subject to many uncertainties. Because it is difficult to know exactly what will work in advance, reforms should emphasize structured learning. Rather than pre-committing to broad-based programs, agencies should initiate a variety of pilot projects and build larger programs as the lessons are absorbed (Figure 12)
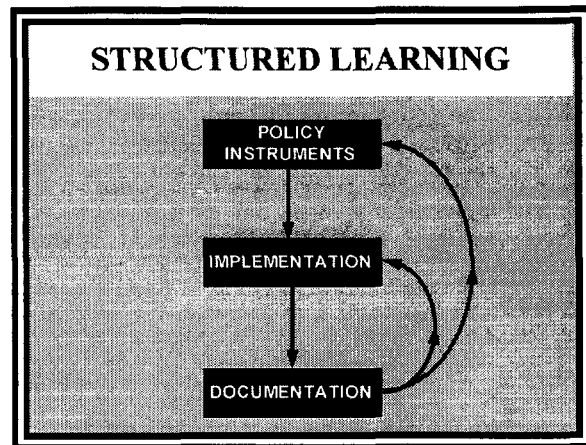

Figure 12

- **Adaptive Instruments:** Newly-industrializing economies can experience rapid changes in ambient quality across air- and watersheds. Since regulation should primarily serve environmental quality objectives, it should be focused on adaptation to these rapid changes. Regulators should be empowered to counter environmental degradation by tightening existing regulations. On the other hand, the system should minimize disruption for investors. Meeting both objectives implies:

  1. Transparent adjustment rules, linked to publicly-available data on ambient quality and emissions;

  2. Adjustment which is, to the extent politically possible, automatically triggered by deterioration of ambient quality below mandated levels;

  3. Adjustment lags sufficient for smooth adaptation by local economic agents.

6. Conclusion

Our view of pollution control has been fundamentally changed by our collaboration with regulatory agencies in developing countries. To summarize, we think that the conventional policy discussion is both too shallow and too narrow: Too shallow, because it devotes inordinate attention to instrument choice while ignoring the preconditions for applying any instrument effectively; too narrow because it continues to focus on the **State/Factory** interaction as the sole determinant of environmental performance.

In this paper, we have argued for a less heroic approach to new regulatory programs, and a broader model which includes the **Community** and the **Market** as major players in the determination of factories' environmental performance. Finally, we have summarized our current thinking in five key principles for agency reform: **Information intensity, orchestration, community power, structured learning, and adaptive instruments.**

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We hope that these ideas will help promote a richer policy dialogue with our partner countries, better project opportunities and, ultimately, better pollution management.

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