
PUBLIC RATINGS OF INDUSTRY'S ENVIRONMENTAL PERFORMANCE: CHINA'S GREENWATCH PROGRAM¹

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SUMMARY

This paper describes a new incentive-based pollution control program in China, in which the environmental performance of industrial firms is rated and reported to the public. Firms are rated from best to worst using five colors — green, blue, yellow, red and black — and the ratings are disseminated to the public through the media. The impact on rated firms has been substantial, suggesting that public disclosure provides a significant incentive for industrial firms to improve their environmental performance.

The first two pilot programs in Zhenjiang and Hohhot are presented in this paper. The evidence to date suggests that public disclosure of environmental performance will be an important new component of China's system for pollution management. Implementation should be feasible in most of China, because technical and design issues are not overly complex, and the costs of design and implementation are not high in China, since most of the necessary information already exists in the records of provincial and local Environmental Protection Bureaus. The Zhenjiang and Hohhot experiences have suggested that for a successful implementation of disclosure, government support and involvement at all levels of China are critical, and timing of disclosure is also very important in this context.

1 INTRODUCTION

Public disclosure of firms' environmental performance has been characterized as the "third wave" of environmental regulation, after command-and-control and market-based approaches (Tietenberg, 1998). Its growing popularity stems from initial evidence that disclosure has reduced emissions in North America and Southeast Asia,² as well as the perception that it is a low-cost regulatory option because it does not require formal enforcement procedures. The potential for cost saving has particular appeal for developing countries'

environmental agencies, which have very limited resources for monitoring and enforcement of pollution regulations.

China's State Environmental Protection Agency (SEPA) has become interested in public disclosure because China's pollution problem remains severe, despite long-standing attempts to control it with traditional regulatory instruments. Chinese regulators have also been influenced by the rapid spread of pollution disclosure systems to other Asian countries after pilot programs were initiated by Indonesia and Philippines, in collaboration with the World Bank's Development

Research Group (DECRG) in 1995 (World Bank, 1999). At present, environmental agencies in Thailand, India and Vietnam are also working with the World Bank and other institutions to implement disclosure programs. From the Chinese perspective, rapid adoption of disclosure in North America, Western Europe and Australia has further enhanced its credibility.

As a result, China has begun pilot experiments with "third wave" regulation. Since late 1998, supported by the World Bank's Information Development Program, the authors have been working with China's State Environmental Protection Administration (SEPA) to establish Greenwatch, a public disclosure program for industrial polluters. Adapted from Indonesia's PROPER, the Greenwatch program rates industrial environmental performance from best to worst in five colors – green, blue, yellow, red and black. The ratings are disseminated to the public through the media. Two municipal-level pilot Greenwatch programs have been implemented, in Zhenjiang, Jiangsu Province, and Hohhot, Inner Mongolia. Reaction to the pilot programs has been positive, and Jiangsu has decided to promote province-wide implementation of Greenwatch. SEPA currently plans to launch pilot programs in other areas, in preparation for nationwide implementation of public disclosure.

This paper describes China's Greenwatch program and discusses the lessons learned to date, including the feasibility and desirability of national adoption. The remainder of the paper is organized as follows. Section 2 provides an introduction to public disclosure as a strategy for pollution control. In Section 3, we discuss the role of disclosure in China's approach to environmental management. Sections 4 and 5 discuss the Zhenjiang and Hohhot programs, respectively, while Section 6 discusses the implications of the Greenwatch experience.

2 PUBLIC DISCLOSURE: THE "THIRD WAVE" OF ENVIRONMENTAL REGULATION

The first phase of pollution control involved applying traditional legal remedies, such as emissions standards, to the regulated community. Over time, however, it became clear that these traditional regulatory approaches were excessively costly in some circumstances (Tietenberg 1985) and incapable of achieving the stipulated goals in others (Tietenberg 1995). Failures have been especially common in developing countries, where legal and regulatory institutions are often weak (Afsah, et al., 1996).

In response to these deficiencies, the second phase of pollution control focused on market-based approaches such as tradable permits, emission charges, deposit-refunds and performance bonds (Hahn 1989; OECD 1989; Tietenberg 1990; OECD 1994; OECD 1995). In some instances they have substituted for traditional remedies, but in most cases they have complimented them. In the OECD and Eastern Europe, these approaches have added both flexibility and improved cost-effectiveness to pollution control policy. Pollution charges have also contributed to improved environmental performance in developing Asia and Latin America, with particularly noteworthy examples in China (Wang and Wheeler, 2000), Philippines (World Bank, 1999), Malaysia (Vincent, 1993; Khalid and Braden, 1993; Jha et al., 1999), and Colombia (Arbeláez, 1998).

Even the addition of market-based approaches, however, has not fully solved the problem of pollution regulation. Regulatory systems remain overburdened by the sheer number of substances to be controlled. Neither staffs nor budgets are adequate for the task of regulating all of the potentially harmful substances that are emitted by firms and households. In many developing countries, these difficulties are compounded by the problems associated

with designing, implementing, monitoring and enforcing market-based regulations.

To counter these problems, the "third wave" of pollution control policy involves investment in the provision of information as a vehicle for making the community an active participant in the regulatory process. The timing of this increasing role for disclosure strategies seems to emanate from the perceived need for more regulatory tools (as described above); the falling cost of information collection, aggregation and dissemination; and the rising demand for environmental information from communities and markets. Rising benefits and falling costs have enhanced the appeal of public disclosure as a regulatory tool.

From a conceptual perspective, the starting point for thinking about information approaches to pollution control is the Coase Theorem (Coase 1960). In his landmark essay, Coase pointed out that pollution control situations have a certain symmetry. Inefficient pollution imposes costs on victims, which exceed the costs of controlling that pollution, so that the marginal social benefits of pollution control exceed its marginal costs. The existence of inefficient pollution damage therefore provides a motivation for the victims to take corrective action, even in the absence of any such incentives by the polluters.

Recently, economists have learned that the list of victims can be very large indeed, much larger than originally thought. The list of potential victims includes not only those harmed directly by the pollution, but also those who may be disturbed by it even if they are not directly affected. The fact that this "nonuse" value of pollution control can be quite large has become a familiar result to those conducting contingent value surveys. The pressure to control pollution therefore can arise from victims experiencing both use and nonuse damages.

One standard precondition for decentralized processes to work efficiently

is for the decision-makers to have full information. In the case of victims taking action to control pollution, this precondition is not likely to be met. Information about environmental risks is asymmetrically distributed. In a typical case the polluters and/or regulators, not the victims, hold the best knowledge about emission profiles. Furthermore, the polluters are unlikely to share the information with victims in the absence of outside pressure to do so. In addition, bureaucratic inertia and/or legal constraints have frequently prevented information sharing by regulators.

In this context, public disclosure provides a promising compliment to conventional regulation through several channels. The first is "informal regulation," or community pressure on polluters. Even low-income communities have proven willing and able to penalize polluters when information about their emissions is available. Abundant evidence from Asia and Latin America shows that neighboring communities can strongly influence factories' environmental performance (Pargal and Wheeler, 1996; Hettige, Huq et al., 1996; Huq and Wheeler, 1992; Hartman, Huq et al., 1997). Where formal regulators are present, communities use the political process to influence the strictness of enforcement. Where regulators are absent or ineffective, nongovernmental organizations and community groups apply pressure through a variety of channels, including religious institutions, social organizations, citizens' movements, and politicians. Although the channels vary from region to region, the pattern everywhere is similar: Factories negotiate directly with local actors in response to threats of social, political or physical sanctions if they fail to compensate the community or to reduce emissions.

Well-informed market agents can also play an important role in creating pressures for environmental protection. Bankers may refuse to extend credit because they

are worried about environmental liability; consumers may avoid the products of firms that are known to be heavy polluters. The evidence suggests that multinational firms are important players in this context. These firms operate under close scrutiny from consumers and environmental organizations in the high-income economies. Investors also appear to play an important role in encouraging clean production. Heavy emissions may signal that a firm's production techniques are inefficient. Investors also weigh potential financial losses from regulatory penalties and liability settlements. Numerous studies suggest that stock markets in both developed and developing countries react significantly to environmental news (Muoghalu et al., 1990; Lanoie and Laplante, 1994; Klassen and McLaughlin, 1996; Hamilton, 1995; Lanoie et al., 1997; Konar and Cohen, 1997; Dasgupta, et al., 1997).

To summarize, recent research suggests that public information about polluters can operate effectively through community and market channels that compliment the effect of formal regulation. During the past decade, a number of regulatory initiatives have attempted to exploit this potential to reduce pollution. In many cases, such programs have focused on toxic pollutants that are not covered by conventional regulation. Examples include the US Toxic Release Inventory; Canada's National Pollutant Release Inventory; the UK's Pollutant Inventory; Australia's National Pollutant Inventory (Tietenberg and Wheeler, 2001); and UN-sponsored Pollutant Release and Transfer Registers in Mexico, Egypt and the Czech Republic. Recently, the public disclosure approach has also been applied to water pollutants in Canada, Indonesia and Philippines, with similar programs planned in India, Thailand and Vietnam. China's pilot disclosure programs are unique in breadth, since they cover all major air, water and toxic pollutants.

3 INDUSTRIAL POLLUTION CONTROL IN CHINA

3.1 China's Industrial Pollution Problem

China's industrial growth has been extremely rapid during the period of economic reform. In the 1990's, the output of the country's millions of industrial enterprises has increased by more than 15% annually. Industry, China's largest productive sector, accounted for 47% of its gross domestic product and employed 17% of the country's total labor force in 1995. While industry has helped lift tens of millions of people out of poverty, its polluting emissions have also produced serious environmental damage. Recent research (Bolt, et al., 2001) suggests that China's air pollution problem is the worst in the world (Table 3.1). With over 300,000 premature deaths per year, China accounts for over 40% of the total for the developing world, more than twice the number for South Asia, which has a comparable population. Similar percentages characterize other measures of health damage. In Table 3.2, a translation of these results to economic costs suggests a GDP loss of 4% annually, over twice the estimate for India and much higher than losses for other major industrial economies in the developing world.

Chinese industry is a primary source of this problem. China's State Environmental Protection Administration (SEPA) estimates that in 1995, industrial pollution accounted for over 70% of the national total, including 70% for organic water pollution (COD, or chemical oxygen demand); 72% for sulfur dioxide emissions; and 75% for flue dust (a major component of suspended particulates).³ For this reason, SEPA has declared control of industrial pollution to be a top priority for Chinese regulators. During the past decade, conventional regulation has probably saved millions of lives by holding the growth rate of total emissions well below the growth

rate of industry (Dasgupta, Wang and Wheeler, 1997). However, the continuing severity of pollution has led the Chinese government to experiment with public pollution disclosure as a possible complement to existing measures.

3.2 The Role of Public Disclosure in Chinese Environmental Management

Public disclosure has two potentially important roles to play in China's system of regulating industrial pollution: strengthening of regulatory institutions and encouragement of public participation in regulation. In many cases, Chinese regulators already have the information needed for public rating of environmental performance. Many agencies receive regular, facility-level reports on EIA status, emissions, pollution control investments, field inspections and accidents. Some measures are explicitly tied to public participation. For example, EIA reports must include strong evidence of participation in project assessment by affected local communities. However, public disclosure also significantly raises the ante by pressuring regulators toward more accurate and timely record keeping. With its credibility on the line in a disclosure program, a regulatory agency has a strong incentive to maintain high internal standards. This is particularly true for emissions monitoring, which provides the foundation for an environmental performance rating system. Performance-based ratings also provide a valuable environmental management tool for enterprises, which in many cases have never undertaken a comprehensive assessment of their environmental performance.

The experiences of Hohhot Municipality and Zhenjiang City suggest that disclosure also changes the balance of environmental initiative between the private and public sectors. Prior to disclosure, enterprises in both areas generally resisted

regulators' attempts to monitor them more closely. After disclosure attracted widespread publicity through the news media, however, companies perceived an impact on their public image and the market image of their products. Enterprises that improved their performance immediately requested new monitoring reports so that their public ratings could be improved as well. Enterprises with poor ratings shifted from passive resistance to active solicitation of inspections, as a means of improving their performance ratings. At the same time, enterprises with good ratings felt continued pressure to maintain their environmental performance to avoid complaints from the public about backsliding.

3.3 The Feasibility of disclosure in China

3.3.1 Legal support

Chinese law provides ample precedent for the use of public disclosure to control pollution. For example, the Constitution of the PRC states that, "all rights in the PRC belong to the people. The people manage state affairs, economic and cultural affairs, and social affairs by various means in accordance with the law." For regulation, this principle accords the people the right to supervise the environmental work of state authorities, as well as discipline them for illegal behavior. In the Environmental Protection Law of the PRC, Article 6 prescribes that, "all units and individuals have the obligation to protect the environment, and have the right to impeach and accuse units and individuals that pollute and damage the environment;" Article 11 prescribes that "the competent administrative department of environmental protection under the State Council establishes monitoring systems, constitutes monitoring criteria, organizes monitoring networks with related departments, and strengthens management of environmental monitoring. The

competent administrative departments of environmental protection under the State Council, provincial and municipal governments shall regularly publicize environmental status reports." Similar provisions appear in China's Air Pollution Prevention and Control Law, Water Pollution Prevention and Control Law, Marine Environment Protection Law, and Environmental Noise Prevention and Control Law.

Information disclosure and public participation also feature prominently in government declarations, as well as international conventions signed by China. For example, in the Rio Declaration, signed during the United Nations Conference on Environment and Development in 1992, the 10th Principle prescribes that individuals should have access to government information about environmental hazards in their communities, and should be able to participate in decisions about regulation of these hazards. Another example is provided by the Chinese State Council's Decision on Several Issues Related to Environmental Protection, which encourages public participation in environmental regulation and defines an important role for the news media in publicizing actions that damage the environment.

3.3.2 Social support

In the information age, public opinion has proven to be a powerful force in every society. This force is best mobilized by the major print and broadcast media, since their content is easily understood by the public. Often, in fact, large enterprises seem more concerned about media pressure than about the authority of government regulators. In 1997, for example, the Chinese Central Television Program disclosed non-compliance by some polluters in the Huai River Basin. As a result, both the polluters and the local authorities came under great pressure to improve their performance. Public disclosure of polluters is a

natural compliment to continuing reform of political and economic institutions in China and the new emphasis on transparency in political life and economic management. Currently, environmental protection seems to rank high among the concerns of urban residents. In 1999, the Social Survey Institute of China (SSIC) surveyed the public-agenda priorities of households in Beijing, Shanghai, Tianjin, Guangzhou, Chongqing, Wuhan and other cities. The survey covered issues related to corruption, law enforcement, inflation, equity and environmental protection. Corruption was the primary concern, followed by environmental protection, with 66% of households rating the latter as very important. In light of such findings, it seems clear why public disclosure of environmental performance can be a potent force for change.

3.3.3 Technical support

Accurate information provides the essential foundation for public ratings of environmental performance. Accuracy, in turn, depends on the quality of information-gathering technology, and on the reliability of record-keeping by the authorities. After establishment of the national task force on environmental monitoring 20 years ago, China has been making significant progress on this front. At present, there are over 4,800 environmental monitoring units in China, employing over 60,000 people. The current system uses standardized monitoring equipment, deployed to cover both the ambient environment and polluting emissions. Over 3,600 environmental supervision units, with a working staff of over 26,000 people, oversee it.

3.3.4 Institutional precedents

Although comprehensive public disclosure is new in China, the government has previously recognized truly superior environmental performance. Since 1989,

SEPA and its predecessor (NEPA) have maintained a list of enterprises with excellent environmental performance. Enterprises are listed on the recommendation of provincial environmental protection bureaus, after vetting by a national Panel of Evaluation and Assessment whose representatives come from the national agency, the General Environmental Monitoring Station of China and other ministries. By 1997 this assessment had been conducted 6 times, and 500 enterprises had been awarded the title, 'Nationwide Advanced Enterprise on Environmental Protection.' Over time, numerous enterprises have been removed from the list for failure to maintain standards consistent with the award. However, over 180 enterprises have retained their excellent ratings.

4 PUBLIC DISCLOSURE IN ZHENJIANG

4.1 Program Design

Zhenjiang is a city located in Jiangsu Province, a southeast province and one of the richest areas in China. Zhenjiang's disclosure program reflects design principles that have proven successful in previous disclosure programs in Indonesia and the Philippines. First, the performance rating system should be simple and its implications easily understood and accepted by the public. Second, it should provide information on both superior and inferior performance. Finally, the ratings should be published in a form that is easily communicated by the broadcast and print media. All three principles are respected by the 5-color rating system (Table 4.1) of the Zhenjiang Environmental Information Disclosure Program. The system divides industrial firms' environmental performance into five symmetric categorical ratings, with two (black, red) denoting inferior performance; one (yellow) denoting compliance with national regulations but failure to comply with stricter local requirements; and two

ratings (blue, green) denoting superior performance. Because it recognizes three performance levels for firms that comply with national regulations, the system provides incentives for continuous improvement. Even for non-compliant firms, the system rewards efforts to improve by recognizing two levels of performance. The Zhenjiang program uses these incentives to promote the environmental objectives summarized in Table 4.2

4.2 Ratings Dimensions

The program's color-coded ratings are generated by a detailed accounting of environmental performance, whose major elements are summarized in Table 4.3. The ratings system draws on four principle sources of information: reports on industrial firms' polluting emissions; inspection reports on their environmental management; records of public complaints, regulatory actions and penalties; and surveys that record characteristics of the firms that are relevant for rating environmental performance.

4.2.1 Compliance with Regulations

The rating system incorporates six dimensions of environmental pollution: water, air, noise, solid waste, electromagnetic radiation, and radioactive contamination. It includes emissions information for 13 regulated air and water pollutants: chemical oxygen demand, suspended solids, oil, volatile hydroxybenzene, chromium, cyanide, lead, arsenic, mercury, cadmium, flue dust, industrial dust and sulfur dioxide. Pollutant discharges are rated by total quantity and concentration. Solid wastes are rated in three dimensions: production, disposal, and recycling.

4.2.2 Management behavior

This element involves a detailed accounting of behavior in several dimensions. Environmental management effort is

graded with respect to: timely payment of pollution discharge fees; implementation of the national Pollutant Discharge Reporting and Registering Program, the Standardized Waste Management Measure, and the Three Synchronizations Program⁴; and variables related to internal environmental monitoring, staff training, and internal document preparation. In addition, the rating system considers the firm's efficiency of resource use; its technological level (e.g., implementation of the national Cleaner Production Audit Program⁵); and the quality of its environmental management system.

4.2.3 Social impact

Indicators in this category include the firm's record with respect to public complaints, pollution accidents, illegal pollution, and administrative penalties.

4.3 Ratings Construction

The Zhenjiang rating system uses a series of yes/no questions to translate its multidimensional performance indicators into 5 color codes. Figure 4.1 shows how this is done, while Table 4.4 provides a detailed accounting by category. The first stage of the process involves selection of industrial firms for rating. Plants that volunteer are automatically included, while the rest are firms classified as large on the basis of plant size, production value and reported pollution discharge load. In the second stage, the Zhenjiang Environmental Protection Bureau uses its own records to develop information on the firms' polluting emissions. The Environmental Protection Bureau also surveys the firms to gather information for the indicators of management behavior and social impacts.

A distinctive feature of the ratings process is its "Inform-Respond-Check-Disclose" reciprocal mechanism, in which industrial firms can exchange comments about their ratings with the Environmental

Protection Bureau prior to disclosure. By reconsidering and rechecking at the firms' request, the Environmental Protection Bureau encourages (but is not required to gain) their acceptance of the final ratings, as well as promoting a more detailed environmental accounting by the firms themselves. After setting the ratings, the Environmental Protection Bureau sends them to the program's Steering Board for final checking and ratification prior to public disclosure. The deputy mayor in charge of environmental protection leads the Steering Board, and its members come from the Environmental Protection Bureau and other relevant administrative departments and institutions. Its main responsibility is to ratify the ratings and transmit them to the firms and the news media. To ensure accurate press reports, the Environmental Protection Bureau invites reporters to a detailed presentation of the program, including an explanation of the rating system and a demonstration of the computer program that is used for ratings development.

4.4 The Experience of Public Disclosure in Zhenjiang

4.4.1 Pilot Disclosure

The pilot program began in June, 1999, with selection and rating of 101 firms drawn from several industry sectors (Figure 4.2). During the pilot phase, the Zhenjiang Environmental Protection Bureau regularly reported its progress to the municipal government and the media. The firms were informed of their pilot ratings in 1998. Ten firms were de-listed during this initial period because of data quality, leaving 91 firms for disclosure. The latter accounted for 95% of polluting emissions in Zhenjiang, as well as 65% of the city's economic output.

Their pilot ratings, displayed in Table 4.3a, indicated widespread deficiencies, with 69% of the firms rated as Yellow, Red or Black. However, 31% demonstrated

superior performance even in the pilot disclosure period, and a few even earned the highest (Green) rating.

4.4.2 Public Disclosure

In May, 2000, the Zhenjiang municipal government officially recognized the program and issued a formal "Notice of Implementation of the Environmental Information Program in Zhenjiang City." The municipal government also presided over the first disclosure at a press conference on July 26th, 2000. Other participants included representatives of all 91 rated firms, the Program Steering Board, and deputies from the Jiangsu Province Environmental Protection Bureau and the Environmental Protection Bureaus of other cities in Jiangsu. The Steering Board publicly released the ratings, and the firms' representatives accepted and commented on them. For several days after the press conference, local newspapers and TV stations continually reported the event, the results of the first disclosure, and promises by poorly-rated firms to improve their environmental performance.

The results show that many firms chose to improve their environmental performance during the one-year grace period between pilot disclosure and public disclosure. The number of superior performers doubled, from 31% of the rated firms to 62% (Figure 4.3b). The pressure from public disclosure clearly reinforced another program, "One Control and Double Attainments (OCDA)", that was implemented in Zhenjiang during the period 1998-2000. The objectives of the latter program were total emissions within permitted limits and full compliance with local and national standards by enterprises in Zhenjiang City.

Industrial environmental performance in Zhenjiang improved significantly after combined implementation of OCDA and public disclosure. As a result, the disclosure program Steering Board announced its support for annual disclosures.

5 PUBLIC DISCLOSURE IN HOHHOT

5.1 Program Design

Hohhot is a city located in Inner Mongolia Autonomous District, a northern and poor area of China. The Hohhot public disclosure program focused on firms that met three criteria: major contributions to local pollution; management with some independence of action; and possible susceptibility to public pressure for improvement. To maximize the incentive effects of disclosure, the ratings standards were set to reveal a broad distribution of relative environmental performance in Hohhot.

5.2 Ratings Dimensions

Hohhot chose the same color rating categories as Zhenjiang, ranging from green (best performance) through blue, yellow and red, to black (worst performance). Specific grading criteria are summarized in Table 5.1.

5.3 Ratings Construction

In Hohhot, development of the ratings system proceeded in parallel with a series of meetings to build support for the concept from government agencies, the general public and the affected industry sectors. The assessment work utilized the data collected by the Environmental Supervision Station of Hohhot City for the year 1999. Ratings were developed during the period December, 1998 to December, 1999, and several review meetings were conducted prior to official disclosure in March, 2000. As in Zhenjiang, a pilot ratings exercise was undertaken in consultation with affected enterprises before the ratings were disclosed to the public.

5.4 The Experience of Public Disclosure in Hohhot

On March 24, 2000, the Hohhot City government convened a news conference to disclose the environmental

performance ratings to the public. Participants included the program development team, other government agencies, representatives from China's State Environmental Protection Administration (SEPA), and representatives from the 56 industrial enterprises and 51 other institutions that were rated. Media participants included Inner Mongolia TV, Hohhot City Economic TV, The Hohhot Daily, The Inner Mongolia Daily, The Hohhot Evening News, Hohhot People's Radio, and the Hohhot Journalist Station for China's Environmental Daily. Broadcast news programs featured stories about the disclosure for several days after the event.

As in the case of Zhenjiang, the evidence suggests that many polluters responded to the combined effect of pilot and public disclosure. After public disclosure, large, persistent polluters such as the Hohhot Power Plant and the Hohhot Cement Mill repeatedly sent deputies to the Hohhot Environmental Protection Bureaus to promise that they would increase pollution control to improve their ratings. As Figure 5.1 shows, the 56 industrial enterprises rated in Hohhot greatly improved their environmental performance during the period 1999 - 2000. Enterprises rated Good or better increased from 24% to 62%, and enterprises in the worst (Black) category decreased from 11% to 5%. As in Zhenjiang, this improvement undoubtedly reflects pressure from both the OCDA and public disclosure programs.

6 LESSONS LEARNED

Experiments with public pollution disclosure continue to expand in China. After observing the results in Hohhot and Zhenjiang, the Environmental Protection Bureau of Jiangsu Province has decided to implement disclosure in its 13 municipalities in the next a couple of years. The evidence to date suggests that public disclosure of

environmental performance will be an important new component of China's system for regulating pollution. Implementation should be feasible in most of China, because technical and design issues are not overly complex. The knowledge and expertise needed for a disclosure program are available in almost every city of China. With support from a national coordination center, there should be no technical barriers to implementation of disclosure in the entire country. The case studies suggest that the costs of design and implementation are not high in China, since most of the necessary information already exists in the records of provincial and local Environmental Protection Bureaus. However, it might well be appropriate for China's highly-varied regions to institute ratings criteria and procedures that reflect their special circumstances.

The Zhenjiang and Hohhot experiences have suggested a number of important lessons for successful implementation of disclosure. The first is that government support and involvement at all levels are critical. The case studies suggest that involvement of local government leaders is particularly important. Since most urban enterprises in China are still state-owned, successful disclosure depends on strong administrative and legal support. In the two case studies, city mayors supported the program after lobbying from the local Environmental Protection Bureau and expressions of support from the central government. Support from the local media was critical, as well as public pressure for a better environment.

Timing is also very important in this context. In both cities, the experience of pilot disclosure suggests that many enterprises will improve their performance prior to public disclosure if they are informed of their ratings and given sufficient time to invest in pollution control. For public disclosure itself, intervals of one year between public ratings may a reasonable balance between the loss

of public pressure over longer intervals and the higher cost of developing new ratings over shorter intervals.

Public disclosure clearly places unprecedented demands on environmental agencies' management information systems. Although there are substantial start-up costs, the agencies realize large long-run gains from much more flexible, current and well-documented information systems. In this dimension, the pressure for improved information management under public disclosure also yields substantial benefits for the information requirements of conventional regulation.

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2. For evidence on toxic emissions reduction in the US, see Konar and Cohen (1996) and Tietenberg and Wheeler (2001). The impact of disclosure on two water pollutants (biochemical oxygen demand and suspended solids) has been analyzed for Canada (Foulon, Lanoie and Laplante, 2000), Indonesia (Afsah and Vincent, 1997) and Philippines (World Bank, 1999).
3. Source: Environmental Yearbooks, China's State Environmental Protection Administration.
4. This program's purpose is to ensure that new construction projects include pollution abatement facilities that meet state emission and effluent standards. Under the program, a new industrial enterprise or one that wishes to expand or change its production process must register its plans with the local environmental protection bureau and design (first synchronization), construct (second synchronization), and begin to operate (third synchronization) pollution control facilities simultaneously with the principal part of the enterprise's production activities.
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	Europe & Central Asia	South Asia	Sub-Saharan Africa	Latin America & Caribbean	Middle East & North Africa	East Asia & Pacific	Developing Regions (DR)	World	DR/ World	China	China/ DR
Premature Death	80	160	60	60	30	360	750	820	91%	320	42%
Chronic Bronchitis	200	400	80	230	90	1,370	2,370	2,620	91%	1,190	50%
Lower Respiratory Infection	3,100	12,200	3,500	6,100	2,900	27,200	55,100	58,300	95%	22,500	41%
Hospital Admissions	100	240	60	130	60	730	1,320	1,440	92%	630	47%
Emergency Room Visits	1,900	4,800	1,100	2,600	1,100	14,400	25,900	28,200	92%	12,300	47%
Restricted Activity Days	369,400	752,600	153,000	431,200	174,600	2,579,900	4,460,700	4,915,600	91%	2,233,100	50%

Source: Bolt, et al. (2001)

Table 3.1: Comparative Health Damage from Particulate Air Pollution [No. People (in Thousands)]

Country	% of GDP
China	4.0
Mexico	2.6
Philippines	2.2
Pakistan	1.8
Turkey	1.8
India	1.7
Brazil	1.6
Egypt	1.6
Indonesia	1.3

Source: Bolt, et al. (2001)

Table 3.2: Economic Damage from Particulate Air Pollution

Compliance Status	Performance Level	Performance Criteria
Not in compliance	Black	Greatly exceeds pollutant emissions standards set by SEPA and causes serious damage.
	Red	Efforts don't meet pollutant emissions standards set by SEPA, or have a record of serious pollution incidents.
Warning	Yellow	Meets pollutant emissions standards set by SEPA, but fails to meet local Environmental Protection Bureau standards.
Compliance	Blue	Exceeds all emissions standards set by SEPA and the local Environmental Protection Bureau; demonstrates superior environmental management.
	Green	Meets all requirements for Blue, plus satisfaction of ISO 14000 environmental standards; extensive use of clean technology.

Table 4.1: Zhenjiang's 5-Color Rating Scheme for Polluters

Green Blue	Promote adoption of clean technology and advanced environmental management systems
Yellow Red Black	Create pressure for compliance with environmental regulations set by SEPA and local Environmental Protection Bureaus

Table 4.2: Policy Objectives

Category	Variables
Emissions of Regulated Pollutants	Concentration and total load
Management Variables	Management Effort
	Efficiency of Resource Use; Technology Level
	Environmental Management System
Social Impact Variables	Public Complaints
	Pollution Accident Record
	Record of Illegal Actions
	Administrative Penalty Record

Table 4.3: Elements of the Rating System

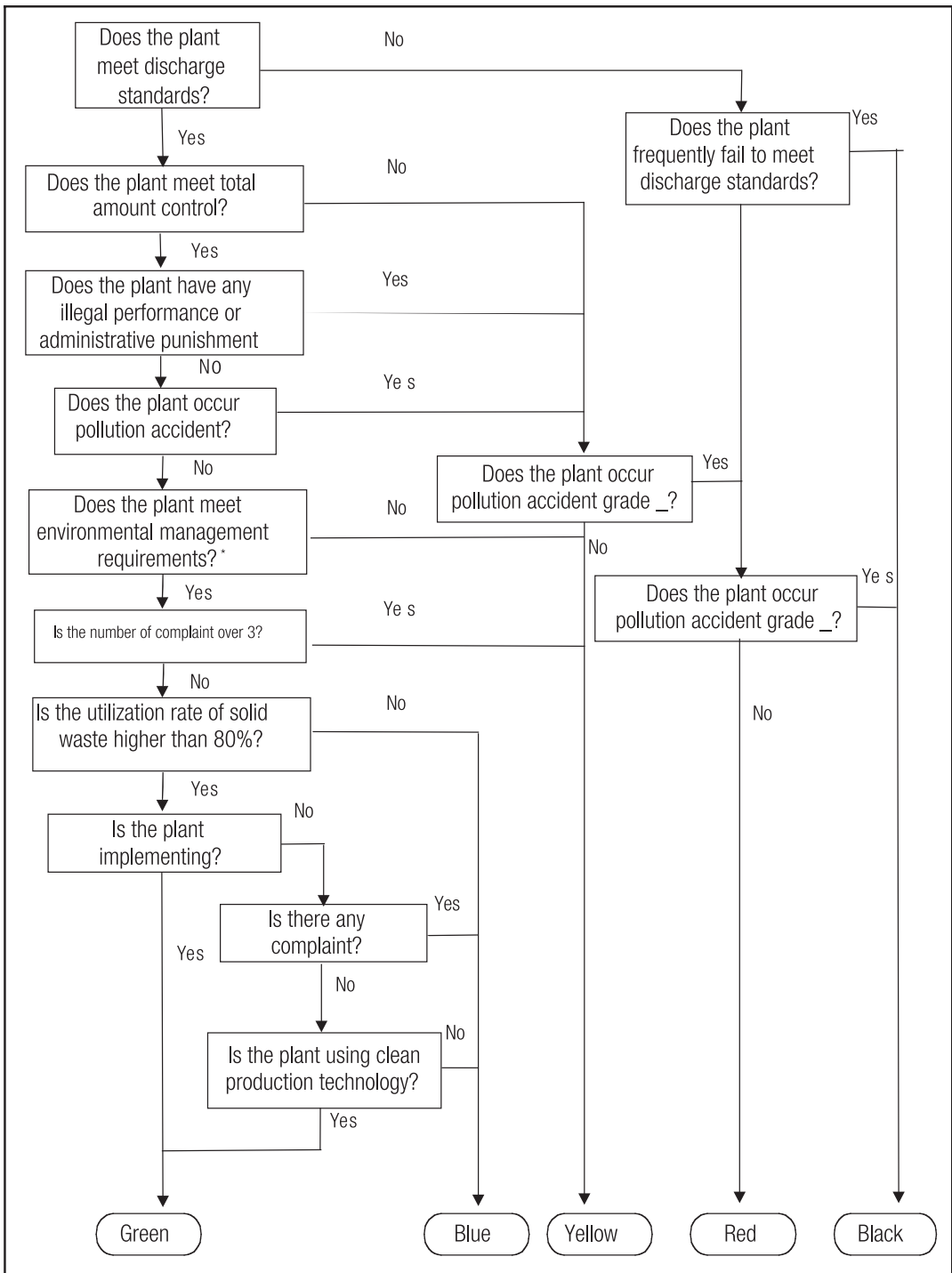


Figure 4.1: Ratings Determination in Zhenjiang

Indicator	Explanation
1 Discharge meeting the standard	For each outlet, either (a) more than 80% of the pollutants meet discharge standards or (b) on average, the concentrations of the main pollutants meet the discharge standards. The disposal rate for hazardous solid waste is 100%.
2 Frequently failing to meet the standard	More than 50% of the pollutants fail to meet standards.
3 Control of total pollutant discharge	(1) For firms holding a discharge permit, pollution discharge within the allowed limit; (2) For other firms, conformity with requirement 1 above ("discharge meeting the standard").
4 Illegal pollution	One or more instances of illegal pollution.
5 Pollution accident	Level 1: One or more pollution accidents, each of which imposes economic losses between RMB 1,000 yuan and RMB 10,000 yuan each occurrence. Level 2 (any of the following): (1) One pollution accident that imposes an economic loss between RMB 10,000 yuan and RMB 50,000 yuan; (2) Poisoning of employees ; (3) Pollution-induced conflict between the factory and the neighboring community; (4) Some environmental damage. Level 3 (any of the following): (1) One pollution accident that imposes an economic loss between RMB 50,000 yuan and RMB 100,000 yuan; (2) Radiation damage to employees; crippling of employees; (3) Poisoning of neighboring residents (4) Serious impact on social stability (5) Serious damage to the environment Level 4: One pollution accident that imposes an economic loss of RMB 100,000 yuan or more.
6 Timely payment of discharge fee	For eight months of the year, the discharge fee is paid within the stipulated twenty-day period. For the rest of the year, the fee is paid within two months.
7 Discharge reporting and registering	Regular reporting and registering for all firms; monthly emissions reports by firms holding pollutant discharge permits.
8 Outlet control standardization	Designated emissions outlets should be visible, reasonably configured, and convenient for monitoring.
9 Implementation of the Three Synchronizations and the stipulated procedures for construction projects	(1) Timely completion of the environmental protection pre-audit; (2) Ratification of the plant's EIA within the stipulated period; (3) Full Implementation of the "Management Measures for Environmental Protection of Construction Projects."
10 Environmental management	(1) Management structure; (2) Number of environmental protection personnel; (3) Implementation of systems and regulations such as the Post Responsibility System for Environmental Protection; System for the Operation and Management of Environmental Protection Facilities; System of Reporting Environmental Performance; and System for Management of Environmental Protection Documents.
11 Proper disposition of solid wastes	100% residual solid waste disposal and a solid-waste comprehensive utilization factor over 80%.
12 Public complaints	Validated complaints about pollution that has significant environmental impact.
13 Clean production	Completion of a clean production audit that meets advanced international and domestic standards.
15 ISO14000	ISO 14000 certificate awarded after passage of the qualification test.

Table 4.4: Explanation of Indicators

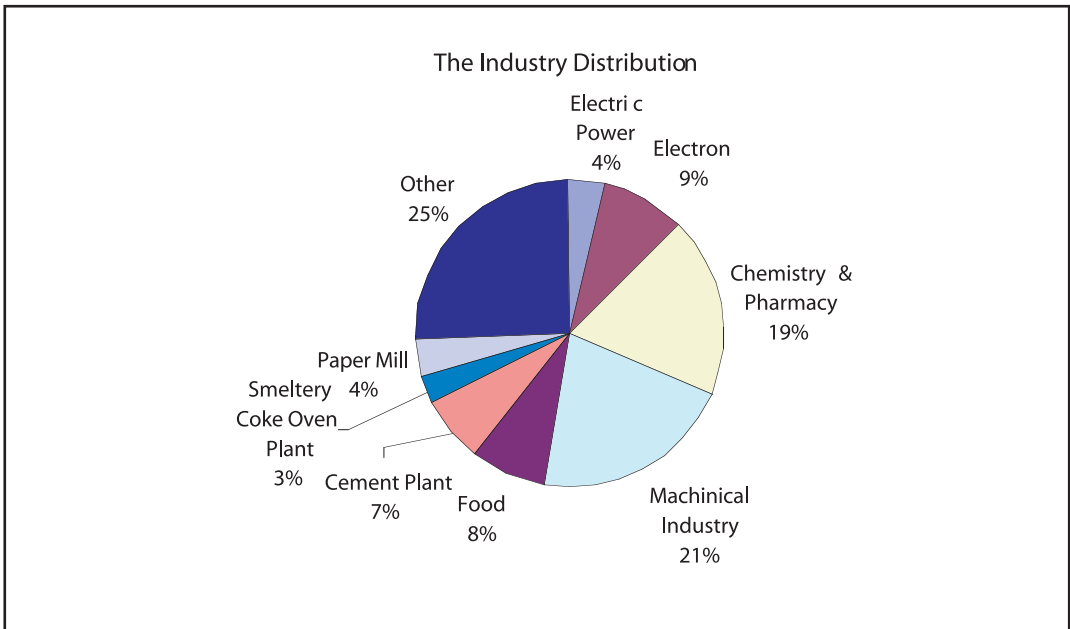
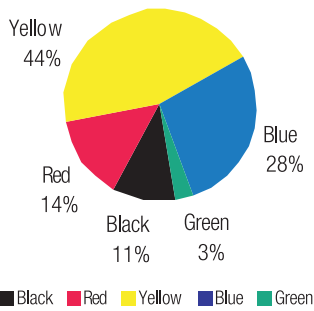


Figure 4.2: Sectoral Distribution of Pilot Firms in Zhenjiang

A. Pilot Internal Disclosure in June 1999
(1998 data)



B. Formal Disclosure in July 2000
(1999 data)

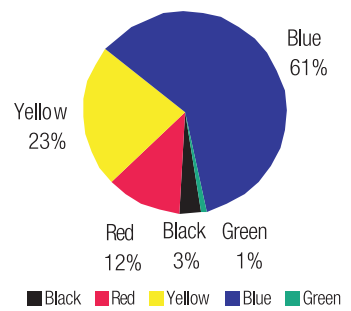
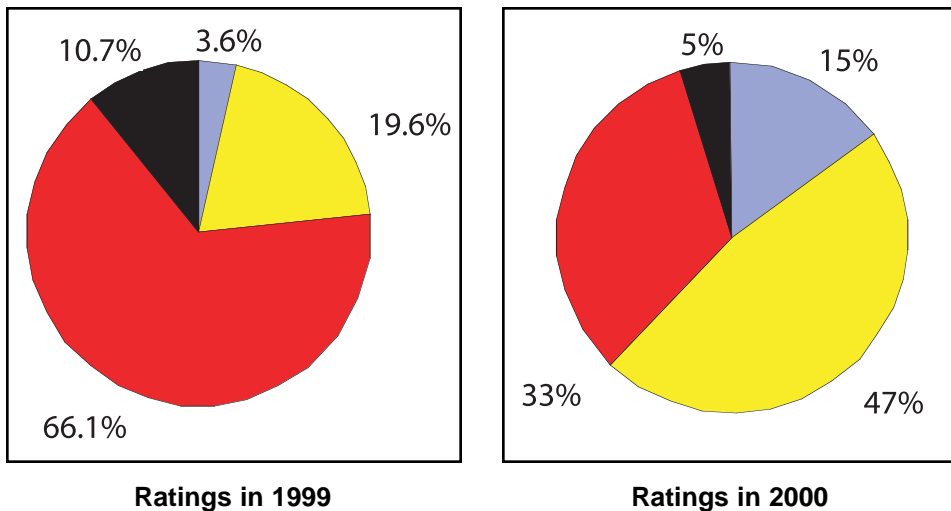


Figure 4.3: Environmental Performance Ratings in Zhenjiang

Table 5.1: Hohhot's Five-Color Rating Scheme for Polluters

Color Rating Formal Criteria:

- Black Very Poor Discharges of ashes, SO₂ and COD all exceed legal requirements
- Red Poor for the three pollutants — ashes, SO₂ and COD — discharges of one or two do not satisfy legal control requirements.
- Yellow Good Discharges of ashes, SO₂ and COD all satisfy legal control requirements.
- Blue Superior Discharges of ashes, sulfur dioxide (SO₂) and chemical oxygen demand (COD) are all less than 60% of the permitted limit.
- Green Excellent Certification by ISO14000.

**Figure 5.1: Environmental Performance Ratings in Hohhot**