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INDUSTRIAL POLLUTION CONTROL POLICIES IN ASIA

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1. Introduction

1.1 Background

The fastest growing region in the world, Asia has witnessed a remarkable increase in the level of economic activity over the last quarter of a century. Inevitably this has been accompanied by increases in emissions of pollutants, with the industrial sector being responsible for both the largest increases in output as well as environmental pollution. In the early years of this economic take off, policy makers paid little attention to the environment. Economic growth was the priority and imposing any restraints on that growth was seen as erroneous. Of course some controls on emissions were in place, and some new ones were introduced, but the level of effort that went into environmental regulation remained very low. The same applied to investments in infrastructure to collect and treat industrial wastes. The public sector simply did not treat this as a priority category and the incentives or pressures on the private sector to undertake such investments remained weak or non-existent.

As the large economies in Asia have increased industrial output by orders of magnitude since the late 1960s, the realisation that environmental protection is not a luxury but a necessity has become clear to policy makers. As this survey shows, health concerns about industrial wastes in air, water and soil have increased substantially in recent years. As a result, governments have introduced a number of measures to control pollution and to treat industrial wastes. The underlying philosophy behind the measures has been a "command and control" one; polluters are required to adopt certain cleaner technologies, or to meet specified standards for emissions. But, as this survey shows, these measures have been much less successful as was hoped. Weak enforcement (few inspectors, small fines, and corruptible officials) as well widespread exemptions are responsible for this state of affairs. Furthermore, the polluter pay principle, under which the party responsible for generating the pollution should pay for any measures to reduce or eliminate it, has not been generally observed. In many instances polluters asked for and received subsidies to install cleaner technologies and to control and treat wastes. In following these policies, it is important to note that the Asian countries are only doing what has been the standard practice in many OECD countries. The latter were more successful in their strategy for a number of reasons, among which better enforcement and monitoring were the main ones.

More recently, policy makers in the OECD countries have turned increasingly to "market based instruments" for pollution control. These are measures that use fiscal incentives to obtain the desired reduction in emissions, rather than imposing rigid technological and physical constraints on the polluters. The main reason for this shift in the advanced economies has been the realisation that the command and control solutions were very costly in terms of resources. Making all polluters face the same regulations allowed for little flexibility in meeting a target level of environmental quality. In the US and elsewhere this became apparent as the environmental standards that had to be met rose, and as the cost of meeting those standards, in terms of less industrial activity and more unemployment became evident.

Initially the prevalent view was that market based instruments were too sophisticated to be used in less developed economies. After all, it was argued, they had not proved themselves in developed economies, it was argued, how could they be expected to work in circumstances where markets were less well developed? While there is some truth in the view that market based instruments for environmental regulation are evolving everywhere, rather than being applied for an established blueprint, there is no justification in the view that this evolution should not take place in developing countries at the same time as it takes place in developed countries. In some respects the imperative for using such instruments is even greater in the former. These countries can ill afford the higher costs of command and control strategies, and they have even less capacity for the larger enforcement infrastructure that command and control policies require. As this survey shows, many Asian societies are simply not accustomed to using litigation and court procedures to enforce pollution standards. As this survey also shows, there are some initial attempts to use and develop market based instruments for environmental regulation in Asia.

1.2 Structure of this review

This paper reviews the development of industrial pollution control policies in Asia over the last 25 years. In collecting the material for this survey, the authors have drawn on material collected in the countries themselves, particularly in India, the Philippines and Thailand, and from USAID's own programs and studies carried out in Asia. The survey evaluates the effectiveness of different instruments used for environmental regulation, and analyzes the factors that have influenced their effectiveness. It particularly examines the use of market based instruments and comments on their role in the country's industrial pollution control strategy in this region. Finally it offers some suggestions for ways of making pollution control more effective and more efficient.

Five countries have been selected for a detailed analysis of their policies. These are China, India, Malaysia, Philippines and Thailand. Sections 2 through 6 deal with each of them respectively Section 7 offers some general comments on the other countries in the region and includes some comparisons with the five listed above. Finally section 8 offers some conclusions and recommendations for policy reform in this area of environmental regulation.

It should be noted that the pollution control framework is in a state of flux in this part of the world, and that changes in policies are being made all the time. Hence it cannot be guaranteed that the measures reported here will still be in place in 1995, or that new policies will not have replaced existing ones. However, where changes are being actively considered, and where this is known, it has been pointed out.

2. Industrial Pollution Control Policy in China

2.1 Background

Manufacturing growth in China has been very high in the last 25 years. Between 1965 and 1990 total industrial production increased from $21 bn. to $155 bn., a factor of 7.4. This surge has been even greater than the overall growth in national income and has brought about heightened concern regarding the environmental effects of this structural change in the economy.

In terms of water pollution, the amount of both industrial and household wastewater discharged into the environment is 30-40 million tons per day in 1980. Almost 2% of the wastewater, about 0.7 million tons, are treated in wastewater treatment facilities of which there are between 35 and 40 in the nation. The rest of the wastewater is discharged into rivers, lakes or sea without any treatment.

Air pollution is also serious. The main source of energy in China is coal; it accounts for about 70% of total energy production. In 1988, coal consumption in China required the disposal of approximately 100 million tons of ash, fly ash, and sludge. Around 80% of total energy is consumed by industry. The efficiency rate in the use of energy is about 28% and is quite low compared with Japan (around 50%) and Europe (around 42%). More than half of the factories which use coal have neither a dust collector nor sulphur emission control equipment. Total sulfur dioxide emissions from China are approximately 18 million tons, with around 7 million tons produced from the power industry.

<u>An Example: Peking's Industrial Pollution</u>

There are some 5,700 industrial enterprises (excluding township and village enterprises) in Beijing, employing 1.7 million people. They produce about 1 million cubic meters per day of wastewater, contributing approximately 45 percent of the volume and 60 percent of the total water pollution load in the municipality. In addition, they produce 24 percent of the soot and dust emissions of the city, and 4 million tons of industrial solid wastes each year, of which 267,000 tons are toxic and hazardous. Half of these enterprises, producing 70 percent of the output, are in the most densely populated 5 percent of the land in the municipality. Most polluting industries are being moved out of these densely populated areas, and occasionally the moving costs are financed by the sale of the land. Others are simply being shut down.

The most common industrial approach to pollution control in Beijing has been through end-of-pipe technologies. By 1988 a total of 692 wastewater treatment plants had been installed in factories in Beijing. However, a survey showed that many of the EOP treatment systems were not being operated because of the high electricity demands and high operating costs. As a result, the municipality now favors a cost-effectiveness approach to the solution of individual industrial pollution problems. In many cases, this leads to pollution prevention at source through technical transformation, rather than EOP treatment.

2.2 Environmental Pol y in China

Chinese environmental policy received a great boost from the Stockholm Conference on the Human Environment in 1972. Following that conference, the 1978 Constitution of China made a firm commitment to environmental protection. Subsection 3 of Section XI of that constitution states that "the state protects environment and natural resources and it also prevents and eliminates pollution and other public nuisances". The Environmental Protection Law (Trial Enforcement), based on this constitution was promulgated in 1979.

Chinese environmental policy started from the Stockholm Conference on Human Environment in 1972. In the 1978 Constitution of China, Subsection 3 of Section XI states that "the state protects environment and natural resources and it also prevents and eliminates pollution and other public nuisances." The Environment Protection Law (Trial Enforcement), based on this constitution was promulgated in 1979. This law deals not only with pollution control but also with the conservation and rational use of natural resources. Subsequently other laws were enacted, for air (1985), water (1985), and toxic wastes (1989).

These legislations have been accompanied by a reorganization of the administrative structure of environmental protection. The National Environmental Protection Agency has been established and charged with overall responsibility for environmental protection and coordination.

Chinese environmental policy has been fashioned on a basically command and control approach. The policy toward individual firms consists mainly in urging them to adopt pollution control equipment at the time when they improve their equipment. The result is that existing policy applies only to firms that improve their technology. This implies that firms that delay technological improvements can continue to discharge pollutants into the environment. In this framework, effective pollution control can be achieved only when a large proportion of firms upgrade their equipment. Furthermore, in spite of the campaign for promotion of both economic development and environmental protection, it is considered acceptable that pollution control equipment should not be installed, not only before technological upgrading but also before its comprehensive utilization is effective.

China's municipal and provincial governments have pursued detailed specialized strategies for small industrial enterprises called Wuxiao Gongye. In southern Jiangsu Province, these enterprises are growing 15-20 percent per year and account for 45 percent of industrial output. They produce cement, iron and steel, chemical fertilizer, coal and machinery. These small factories have contributed significantly to the environmental problem since they rely mainly on indigenous technology. The local governments have attempted to regulate these enterprises through relocations, closures, changes in the production line, changes in raw materials, pretreatment and common treatment facilities, and in some cases financial incentives.

<u>Application of the Command and Control System</u>

There is no overall evaluation of how effective the command and control policies for

pollution control have been in China, although there are a number of studies that refer to continuing serious pollution problems, especially in the small scale industries. However, one case of a relatively successful control strategy has been the Pollution Discharge Permit System in Beijing. This has addressed water pollution problems from industrial enterprises in the city and achieved a reduction in COD discharges at a time when overall output from the enterprises was growing (see Box 1). However, what has not been assessed is the cost of the strategy, either in absolute terms or relative to other approaches that could have been pursued.

BOX 1

The Pollution Discharge Permit System in Beijing

In recent years, Beijing has introduced a range of environmental management systems for reducing industrial pollution, including the pollution discharge permit and fee system. Other systems address environmental impact assessment and quantitative reporting; the design, construction and operation of pollution abatement facilities in coordination with production units; deadline control; and annual "pragmatic" performance systems. Beijing has shown success in its development of strong regulatory (command and control) framework and environmental institutions, but has not widely incorporated market- based instruments in its efforts to reduce industrial pollution.

The pollutant discharge permit system is an approach that addresses phased pollution-loading reduction based on the results of environmental audits and pollution prevention - that is, clean technologies, reduced consumption of raw materials, energy efficiency, waste minimization, and EOP treatment only as needed. The Beijing Environmental Protection Bureau began by making an analysis of current pollution levels, goals, and required reductions. It then initiated detailed discussions with industrial enterprises to agree on reduction plans, involving a wide range of technical and managerial changes. Since Beijing focused on the control of heavy metals and major poisonous substances during the 1980's (and shows a 90 percent reduction in ambient levels of mercury, phenol, cyanogen, chromium, and arsenic), the pollutant discharge permit system was targeted on COD discharges (including organic BOD substances).

Investments are ranked using a ratio of COD reduction (measured in terms of COD discharge per unit of output) to 10,000 yuan investment, and the most cost effective approaches have consistently been new clean" or "whole process control" technologies, as opposed to EOP treatment. On average, for every 10,000 yuan investment, whole-process control technologies (which are often imported) eliminated as much as 5.9 tons per year of COD discharge, as opposed to 1.8 tons for EOP investments - a three-fold difference. Projected production increases are also part of the analysis, with the condition that pollution increases due to increased output must be offset

by further reductions in either by the same enterprise, or by other enterprises discharging pollutants into the same water area, or by other enterprises in the same subsector in the Beijing area.

The results between 1988 and 1990 for three of Beijing's largest chemical polluters were a 5 percent increase in output and a 6 percent (1,000 tons per year) decrease in COD discharges. It is projected that by 1995, total output will have risen by 50 percent, and COD discharges reduced by 16 percent. Comparable results are expected in other subsectors.

2.3 The Role of Economic Incentives in Pollution Control in China

Although the strategy for industrial pollution regulation in China is mainly a "command and control" one, there is some use of market based and fiscal incentives. The Environment Protection Law (EPL) adopted the principle of economic incentives in the form of carrots for the accomplishment of and sticks for failure in pollution control. Positive incentives, such as tax reductions or tax elimination for a certain period on the products of a firm that sets up systems to reuse wastes, are designed to encourage factories to take measures to conserve resources and protect the environment.

China has introduced effluent charges for discharges from industrial plants in a nationwide scheme. The Provisional Law on Effluent Charge was put into force in July 1982. The scheme defines norms for the discharge of many pollutants on a nationwide basis. Enterprises are then required to pay a fee for discharges up to the norm, with the fee varying according to the pollutant. The system's original purpose was to induce individual firms to reduce the amount of pollutants discharged at source through economic incentives.

Effectiveness of Market Based Incentives in China

Results from this system have been mixed. Even after a 40% increase in the fee level in 1991, it remained only about 0.1% of most enterprises' production cost. Clearly such a charge level is not enough to deter pollution.

Although the system uses charges and sets norms it is weak on the way in which these charges and norms are determined. To be effective, charges have to be set at levels that are high enough to make installation of pollution control equipment, or other methods of reducing emissions cost effective. In China this is not generally the case (Ueta, 1988). Charges tend to be even lower than the operating costs associated with industrial pretreatment. Finally, charge schemes are only effective to the extent that the enterprises are cost conscious and concerned to be profitable. In China, where most enterprises are state owned, sensitivity to policies that use such economic incentives is low because the firms are not accountable for their high costs.

There are a number of other difficulties with the system that have been identified. Firms are allowed to dilute pollutants into large amounts of water to reduce the concentration levels of pollutants below the standards. Some cities, such as Shen Yang, are considering the use of charge

schemes based on total discharges rather than concentrations but these are not in place yet. The charge scheme is also rather crude in its treatment of different pollutants. If there is more than one pollutant from the same overflow or stack, the amount of the charge is based only on the most poisonous material. Finally the use of norms that are uniform nationwide ignores the differences in environmental damages and assimilative capacity in different parts of the country.

The main benefit that the charge scheme has had is to provide revenue for pollution prevention and control, although even in this area there have been problems. In Beijing, for example, 8 percent of all enterprises were charged fees in 1988, raising a total of 30.5 mn. Yuan. This money is used partly to defray the administrative costs of the authority responsible for pollution control, partly to subsidize pollution control investment in individual firms and partly to support general research on development of appropriate pollution control technologies. The amounts going to administration can be quite high: in Shangai 43% went to cover administrative costs but in Canton it was less than 20%.

The use of funds for pollution prevention investments has been based on criteria that are not always clear. Some enterprises have discovered that they can benefit from the subsidies if they make nominal charge payments and have pursued this strategy. Others have obtained funds from this source, not for pollution prevention investments but investments of a more general nature. The government is particularly concerned about this issue and is reviewing the kinds of investments supported by the environmental funds.

2.4 Conclusions on Industrial Pollution Control Strategies in China

There is no careful study of the effectiveness of China's pollution control strategy at this time. It would a useful task to carry out such a study, which would show us where the major failures and successes have been and what reforms are needed. From the very partial picture available so far, it appears that some of the command and control policies have been successful but others have not. Zhou (1982) pointed out that China's environmental problems are the result of poor implementation of the environmental protection plans, which are part of the five year plans, and which detail targets that should be met in terms of pollution control. However, this begs the question of why the implementation was poor. Other sources suggest that it was due: in part to the shortage of financial resources in the state enterprises that were supposed to carry out the investments, in part to the poor enforcement of pollution control regulations, and in part to the inadequate formulation of those regulations[2]. Nevertheless, there have been some successes, as has been shown in this review.

As far as market based incentives are concerned, the system has yet to prove itself. The levels of charges are too low, the incentives they offer to enterprises too weak, and the use made of the revenues collected too poorly directed to have had a major positive impact on pollution levels in the country. For enterprises that are in the state sector, which still hold for most of the large ones,

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[2] In fact it has been suggested that the state, in trying to ease it financial burden, has encouraged firms to limit their pollution control investments, thus deliberately failing to enforce some of its own environmental controls.

financial incentives do not work in the same way as they do for private firms.

The theory of economic incentives is based on the assumption of a market economy. If a firm, faced with pollution charges, does not invest in pollution control equipment, the price of the commodity produced by the firm would increase making it less competitive in the market. However, China is not a market economy. For most goods there is excess demand. Therefore, even if the price of commodities produced by individual firms increase because of the pollution charge, the demand for these commodities will be in excess of current production level. In such as situation, firms have no incentive to adopt pollution control measures to cut costs and stay competitive. "The charge system in China cannot be effective as a policy of encouraging individual firms' environmental protection activity unless some supplementary measure is carried out to modify the planned economy and allow a more flexible price system" (Ueta, 1988).

3. Industrial Pollution Control Policy in India

3.1 Background

Like many other developing countries at similar stages of development, India is only recently awakening to the problems of industrial pollution. While Indian industrial growth dates back to the 19th century, the industrial landscape changed substantially after Independence in 1947. The Government of India, under the stewardship of Prime Minister Nehru and the Planning Commission chaired by Prof. Moholanobis, embarked upon industrialization as a vehicle for self-reliance under the auspices of the Five Year Plans. Basic industries, including heavy industries were set up by state- owned corporations, and private industrialists were given incentives in the non-reserved sectors. The policy of import-substitution along with tariff protection quickly led to rapid industrial growth. Industrial production quadrupled between 1965 to 1990, from US $22.21 billion to $85.77 billion--a growth rate of 3.9%.

Industrial and urban pollution in India has been increasing over the last few decades and have become very acute in recent years. The deaths of over 2,800 people in Bhopal from the methyl isocyanide gas leak at a Union Carbide pesticide plant in 1984 and the gas leak at the Sriram Food and Fertilizer plant in Delhi are only the most recent and egregious instances of the magnitude of the problem. The apparent laxity in enforcement of environmental laws has led to a strong citizen's movement, and citizens groups are frequently using the judicial system to force compliance with the environmental laws. In a very widely publicized case, a Supreme Court ruling in 1993 forced 212 industrial plants in and around Agra to close down due to the damage caused by them to human health and the Taj Mahal.

Status of Industrial Pollution

Provincial industrial output data shows that industrial activities are relatively concentrated in India, although less so than in Indonesia and China. Of the twenty five states, Gujarat, Tamil Nadu, West Bengal, Uttar Pradesh and Maharashtra are most industrialized. About half of the industrial value added in India comes from industries located in the largest urban centers. Bombay, India's leading financial and business center, has just over 1 percent of the country's population, but generates 10 percent of India's industrial jobs and handles more than a quarter of foreign trade (Carter and Ramankutty, 1993). It is often difficult to distinguish between observed environmental degradation caused by industrialization and by urbanization. Bombay, Calcutta and Delhi are some of the most polluted cities in Asia--air pollutant levels exceed WHO guidelines most of the time. WHO data shows that of the twelve cities worldwide that received the worst ranking for air pollution in 1988, two were in india: Calcutta and Delhi. (Three other Asian cities in this catagory are: Beijing, Jakarta, and Shenyang). Bombay, Calcutta and Delhi are among fifteen cities worldwide with the highest levels of particulate matter (Carter and Ramankutty, 1993).

Pollution is also a serious problem in other industrial cities such as Ahmedabad, Bangalore, Dhanbad, Durgapur and Howarth. The Union (Federal) government compiled a list of twenty two

environmentally sensitive (i.e. problem) areas and this includes Dhanbad (in Bihar). Durgapur and Howarth (both in West Bengal). According to data complied by the Central Pollution Control Board (CPCB), Bihar is the most polluted state, followed by West Bengal and Orissa.

Problem Areas

The Policy Statement for Abatement of Pollution, issues by the Government of India in 1992, identified the following problem areas in water and air pollution and noise nuisance.

Water Pollution

Water pollution was seen to be caused by four kinds of substances:

- waste generated from industrial processes
- chemical agents for fertilizers and pesticides
- traditional organic wastes
- silt from degraded catchments

The Policy Statement noted that while three-fourths by volume of the wastewater generated was from municipal sources, yet, industrial wastes, though small in volume, contributed over one half of the total pollutant load. The major portion of industrial wastes came from medium and large industries.

CPCB data shows that Damodar,the most polluted river, carries discharges from 43 major industries and scores of small scale units. It is estimated that in Delhi, 5 illion gallons of water containing DDT wastes are dumped into the Jamuna River daily. As many as 68 industrial units dump 1000 cu. m. of untreated water in the river Ganges (Ganga) every day. Industrial and municipal waste discharges have made segments of the Ganges, a sacred river whose water is used for drinking and bathing, unsuitable for bathing. The Ganges river carries indutrial waste and untreated sewage of 114 cities, each with 50,000 or more inhabitants. It may be mentioned that of India's 3,119 towns and cities, only eight have full sewage collection and treatment facilites and 209 have partial facilities (Brandon and Ramankutty, 1993).

Air Pollution

The Policy Statement noted that ambient air quality trends in major cities were showing levels of suspended particulate matter (SPM) much higher than the prescribed standards or limits, especially in the summer months. Levels of nitrogen oxide were also seen to be one the rise in urban centers due to increased vehicular emissions. As Table 1 shows, SPM levels exceed WHO standards on many days of the year in Calcutta and delhi. By contrast, sulfur dioxide standards are still relatively less frequently exceeded.

In Indian cities, use of leaded gasoline in motor vehicles has resulted in high level of lead in the environment in Ahmedabad, Bangalore and Calcutta. In terms of suspended particulate matter, Delhi is one of the two most polluted cities in Asia (the other being Bangkok) with Calcutta following very closely. Industrial pollution has contributed to high air pollution levels in many

Indian cities and are comparable to air pollution in Chinese cities. These levels are generally higher than those of large cities of more industrialized countries, such as Tokyo, Osaka, New York, London and Sao Paolo.

Table 1. Air Pollution in Selected Cities in India

	Sulfur Dioxide				Gravimetrically Determined Suspended Particulate Matter			
	Site Years	Number of days over 150 µg/cubic meter			Site Years	Number of days over 230 µg/cubic meter		
		Minimum	Average	Maximum		Minimum	Average	Maximum
India								
Bombay	13	0	3	32	12	23	100	207
Calcutta	8	0	25	85	8	189	268	330
Delhi	12	0	6	49	12	212	294	338

Note: Air quality in selected cities is given for the number of site years of observation (number of sites multiplied by the number of years of operation) for sulphur dioxide (SO_2) and suspended particulate matter (SPM). These data are presented for the minimum, the average, and the maximum number of days that the pollutant exceeded WHO guidelines for all years of observation (site years). WHO recommends that SO_2 exposure should not exceed 150 micrograms (µg) per cubic meter on more than seven days a year. Many reporting cities exceed this level on an average basis. This is of particular concern for young children and people at risk of respiratory illness. The health effects of SPM are in part dependent on the biological and chemical makeup and activity of the particles. Heavy metal particles can be especially toxic. In this table, gravimetrically determined suspended particulate matter measurements are shown and compared with the WHO guideline of 230 micrograms (µg) per cubic meter.

Source: World Resources Insutute, *World Resources 1990-91* (New York, 1990).

Source: World Resources Institute, *World Resources 1990-91* (cited in Panayotou, 1991)

Noise Nuisance

Data on noise pollution (which is generated by vehicular traffic and aircraft, industry, construction activities, etc.) are hard to get and are incomplete. The average level of noise pollution in Bombay, Calcutta, and Delhi is 90 dB. This is higher than the noise levels in Manila and Bangkok (Shin, et.al.).

3.2 Strategy for Industrial Poll tion Control in India

Indian industrial pollution control policy has, until recently, been based almost exclusively on a command and control approach. Standards, licences, fines, cease and desist orders have been used with moderated degrees of success to regulate emissions. A few market-based instruments, mostly in the form of rebates and depreciation allowances have also been used, but on a much smaller scale. In recent years, however, use of market based incentives is getting greater attention,

mainly in response to poor compliance with command and control measures.

Industrial pollution control legislation goes back as far as the Indian Penal Code of 1860, which has some sections relating to the environment (Pachauri, 1994). The modern era of pollution control may be considered to have begun in 1972, after the Conference on the Human Environment held in that year in Stockholm. The first piece of legislation explicitly directed at protecting the environment was the Water (Prevention and Control of Pollution) Act, enacted in 1974. This and other acts are discussed briefly below.

The Water (Prevention and Control of Pollution) Act

The main features of this Act are:

- The setting up of the Central Pollution Control Board and the State Pollution Control Boards.
- The State Boards to be empowered to demand information from any person in order to ensure compliance with the Act.
- Board authorized to close down certain activities if it is apprehended that pollution may occur or has occurred.
- The 1988 amendment to the Act requires that there should be no new discharge of trade effluent or sewage without permission of the State Boards.
- Non-compliance and some other acts of commission and omission punishable by imprisonment and fines.

The Air (Prevention and Control of Pollution) Act of 1981

The Central and State Pollution Boards established under the Water Act were empowered by the Air Act also to prevent, control, and abate air pollution. The main features of this Act are:

- The Central Board is to advise the central government on matters of air pollution, coordinate activities of the State Boards and specify desirable air quality standards. The State Boards have a similar role within their respective states.
- State governments are empowered to declare any area within the state an air pollution control area after consulting the State Boards. In such areas, the government can regulate or prohibit the use of certain fuels, material, or appliances which may cause air pollution. The operation of any industrial plant in that area also requires prior permission of the government.
- A Board may issue directions including closure, prohibition, or regulation of any industry, operation or process, stopping or control of water and power supply, and/or other services.

Environment Protection Act of 1986

A more comprehensive law providing for stringent penalties in the case of non- adoption of pollution control measures. Main features are:

- The Government or an authority designated is expected to lay down standards, regulations, and rules for enforcement of comprehensive measures for the prevention and control of all types of pollution, including air and noise pollution.

- The rule making powers broadly cover screening, testing, classification, standardization, powers of entry, inspection, examination, control, direction, closure or prosecution.
- A private citizen can also make a complaint to a court under the law for any violation of the Act.

All these Acts stipulate that non-compliance and other acts of commission and omission are punishable by imprisonment and fines.

Environmental Quality Standards and Environmental Protection Act (EPA) of 1986

The Ministry of Environment and Forests, under the EPA, 1986, has been empowered to impose standards for air and water quality. It frames minimum national standards which are binding for all industrial units throughout the country. These standards refer to the maximum limit of concentration of pollutants in the effluent and emission discharges. These standards cannot be relaxed but can be made more stringent by the SPCBs. The present standards are based on concentration of pollutants in the effluent and emissions discharges. However, mass based standards have recently been laid down to set specific limits to encourage the minimization of waste, promote recycling and reuse of materials as well as conservation of natural resources, particularly water.

Apart from the minimum national standards specified for industry specific emissions, the government through various legislations has also specified National Ambient Air Quality Standards, emission regulations, and emission limits for vehicles.

3.3 What Has Been Achieved Under the Pollution Control Strategy

The Central Pollution Control Board (CPCB), constituted in September 1974 under the Water Act, is the apex board under the Ministry of Environment and Forests, and coordinates and guides all State Pollution Control Boards (SPCBs). The standards and regulations for pollution control are framed by CPCB and the Ministry of Forests. Also, all twenty five states of the Union have SPCBs and are responsible for enforcing the regulations in their respective states.

The achievements under the various acts described above can be divided into those relating to the monitoring of environmental quality, enforcement of the legislative measures and overall effectiveness of the strategy.

Monitoring

As a result of the increased level of interest in environmental issues, and the strategy described above, India now has a fairly extensive monitoring system for air and water quality.

Air Quality Monitoring

The National Ambient Air Quality Monitoring Program (NAAQ) was started in 1984 with 28 stations spread over 7 cities. It now covers 290 stations in 99 major cities. Air quality monitoring at these stations is conducted by the respective State Boards with financial assistance from CPCB. Three basic parameters, namely, sulphur dioxide (SO2), nitrogen oxide (NOX), and suspended particulate matter (SPM), are monitored for 24 hours on alternate days.

Water Quality Monitoring

Inland Water Quality Monitoring (WQM) is currently being done under three major Programs:

Global Environmental Monitoring Systems (GEMS)
Monitoring of Indian National Aquatic Resources (MINARS)
Ganga Action Plan (GAP)

There are now480 WQM stations in the country, of which 51 are under the GEMS program, 402 under the MINARS program, and 27 under the GAP. In addition, recently nine Automatic Water Quality Monitoring Systems (AWQMS) were installed along the Ganga river and 2 along the Jamuna river to monitor water quality continuously.

Coastal Water Quality Monitoring

A monitoring network of 173 stations along the entire coast line of the country was established during the Seventh Five Year Plan.

Enforcement

Enforcement has been hampered by a lack of resources at the union and state levels. The number of industrial units are too numerous to be monitored by the administrative levels. However, in recent years, both government and the public (including NGOs) have taken a number of steps to improve the level of enforcement.

The government has constituted National Zonal Task Forces for the implementation of standards in industries like fertilizer, iron and steel, thermal power plants, cement, paper and pulp, and oil refineries. These Task Forces create a forum for industries and SPCBs to interact, disseminate the latest pollution control technologies to industries, and also inspect the pollution control systems and monitor the progress of implementation of standards.

The central government, in consultation with the states, has also evolved an action plan for controlling pollution from heavily polluting industries and critical areas. Nineteen such problem areas have been identified, surveyed and time targeted action plans have been framed out in consultation with the respective SPCBs. The heavily polluting industries that have been identified in the action plan are:

For Air Pollution Control: Cement, thermal power plants, iron and steel, fertilizer, zinc smelter, copper smelter, aluminum smelter and oil refineries.

For Water Pollution Control: Distilleries, fertilizer, paper and pulp, basic drugs, dyes and dye intermediaries, pesticides, oil refineries, petro-chemicals, tanneries, sugar and pharmaceuticals.

Finally, the judicial system has been stepping in taking over the role of the government and

control authorities in an attempt to regulate pollution. The Supreme Court of India has taken a number of landmark decisions, particularly shutting down hundreds of industrial plants, to enforce environmental compliance. The last few years have also seen an increase in the number of NGOs and other action groups fighting to close down polluting industries.

Effectiveness

There have not been many studies, thus far, to assess the effectiveness of the pollution control measures laid down by the government. Nonetheless, some aspects of effectiveness can be gleaned from two different sources:

- Study by the National Institute of Public Finance and Policy (1993)
- Data from the Central Pollution Control Board (1991-92- and 1992-93)

Study by National Institute of Public Finance and Policy

The major findings here were:

Air Quality

- Studied ambient levels of SPM, SO2 and NOx in four cities (Delhi, Bombay, Calcutta and Madras)
- Found that regulations were most effective in Madras, followed by Calcutta, Delhi and Bombay in that order.

The study, however, cautions against drawing any inferences about the effectiveness of legislations. They point out that although ambient air quality standards have been laid down by the CPCB under the Air Act of 1981, the actual enforcement measures, penalties, etc. authorized by this piece of legislation all relate to source specific emission standards and not ambient air quality. They therefore feel that it is quite possible that there is no violation of source specific standards at all and yet the ambient standards are violated, simply because the source specific standards have not been made consistent with the ambient standards in terms of the pollution causing activities.

Water Quality

The study focused on the parameters in terms of BOD and Coliform count and found that:

- Contrary to popular belief, extent of standard violation feel distinctly for the country as a whole in the post-regulation period

- The Acts have reduced BOD standard violations, but were ineffective in reducing coiform standard violations.

Data from CPCB
These data show that:

- Out of 1641 large and medium scale units in 18 polluting industries, just 117 comply with norms.
- About 70% of the 174 distilleries are not complying with the standards.
- Cement and pharmaceutical industries have the best record of compliance; about 70% and 78% respectively.
- Industry is responsible for about 40% of the total pollution, including one-half of the total pollutant load in water.
- Currently industry spends Rs. 800 crores ($266 mn.) annually on pollution control.

An overall assessment of the effectiveness, based on these two studies concluded that implementation and enforcement of the various legislative acts have not been totally successful (Pachauri, 1994). "When looking at actual air and water quality standards over the post-regulation period, it becomes evident that there has been no real improvement, and in some cases there has been a definite deterioration". This might, in part, be because the actual enforcement provisions of the control authorities relate to source pollution rather than ambient levels. This again points to the fact that there is a gap in the control regime, as it fails to link ambient and source standards in terms of the volume of polluting activities.

Finally it is important to note that very little attention has been paid to the efficiency of abatement, either in terms of minimizing the cost of achieving certain ambient standards, or comparing the social costs and benefits of abatement.

3.4 Use of Market Based Instruments

In addition to the framework presented above, the government has also provided a few fiscal incentives to industrial enterprises to meet pollution norms. Mostly these have taken the form of investment tax credits, accelerated depreciation alowances for pollution control equipment and rebates from excise and import duties for such equipment. Particular measures that have been introduced include[2]:

Accelerated Depreciation for Corporate Tax Computation

The Income Tax Act of 1961 allows deduction of a certain percentage of the written down actual cost of capital assets, net of any subsidies and concessions, from gross profit in computing the base for levy of Corporation Tax. In 1983, for the first time, a higher rate of depreciation of 30% for pollution control equipment was allowed. This was finally raised to 100% in the 1993-1994 budget.

[2] For details see Pachauri, 1994

Direct Tax Incentives

A provision introduced in 1982 in the Income Tax Act allows deduction of contributions made by tax payers to any institution dedicated to conservation of natural resources. Another direct tax provision exempts from capital gains tax any gains arising from transfer of building, land, machinery, etc., for establishing business in a new place and thereby reducing industrial congestion.

Rebate on Customs or Excise Duties and Sales Tax

In March 1989,the basic custom duty for some specified pollution equipment was reduced to a concessional rate of 35%. The countervailing duty was also eliminated for such items. In March 1992, the auxiliary duty was also reduced to 5%.

Since March 1992, a rebate has been allowed on excise duty over 5% for specified pollution control equipment. In addition to the rebates on customs and excise duties levied by the Central Government, rebates on states sales taxes have also been introduced by a number of states for specified pollution controlequipment.

Pollution assessing equipment worth a maximum of Rs. 30 million per annum and consumables worth Rs. 10 million can be imported without paying customs duty with ceiling on individual items being Rs. 1 million and Rs. 0.1 million respectively.

Import duty has also been reduced for equipment used in solar energy and wind operated power generation from 40% to 20%. Tariffs on selected energy-efficient products has also been reduced[3].

Excise duty on bagasse and jute based products has been abolished.

Recently the government has begun to look more closely into the use of market based instruments in other spheres. One area where there has been some success is the tanning industry. Traditionally a heavy polluter, the industry used to be controlled through effluent standards and specifications of technology (see Box 1 below). However, weak enforcement of existing firms (especially small ones) meant that pollution problems remained very severe in the areas where tanning is a major activity. The state authorities have attempted to tackle the problem with a mix of policies including demonstration of the cost effectiveness of primary treatment systems and the financing of collective treatment facilities through a mixture of grants and loans. These facilities would recover the cost of operations through charges on the tanneries that are obliged to deliver their waste to them. Systems of fair charges and cost sharing have been worked out and. It is hoped that the arrangement can be extend to other areas with the operations being run with by a private firm or by a cooperative.

[3] Asian Development Bank, 1993, p.110.

Box 2

Case Study: Pollution Control in Leather Tanning

The leather industry is the fourth largest foreign exchange earner in India. Tanning operations, due to a heavy concentration of organic constituents in their wastewater,contribute to the pollution of inland waterways. Considerable technical development has occurred in recent years in leather tanning, and cleaner processes are available. However, many obstacles remain to their widespread adoption.

Government policy is based on command and control type regulations. The effluent standards are: BOD: 30 mg/liter (max), suspended solids: 200 mg/liter. For new tanneries, provision for effluent treatment has been made mandatory before issuing licences. Environmental management of leather industries went into a fast track as a result of a Supreme Court verdict in 1987 (M.C. Mehta Vs. Union of India) where polluting tanneries were asked to install adequate treatment units or close down.

In Kanpur, the Upflow Anaerobic Sludge Blanket (UASB) bioreactor project treats composite wastes from tanneries which are mixed with domestic sewage to reduce BOD load. In Tamil Nadu, the State Pollution Control Board, Tamil Nadu Leather Development Corporation Limited (TALCO), UNIDO, and other organizations are setting up a number of Common Effluent Treatment plants throughout the state to process wastewater on a"fee or service" basis.

3.5 Conclusions

India has recognized its environmental problems as serious over the last 20 years and has implemented a framework of laws to deal with them. The command and control framework has been evaluated to some extent and, although there are some successes, there are also many areas where the measures have not been effective. Data from the Central Pollution Control Board show widespread failures in compliance. At the same time resources in monitoring have been increased and data are more available, which should help. The government is also stepping up its efforts to improve enforcement.

There is a real difficulty is assessing the effectiveness of measures from ambient quality data because the controls are on emissions, and there is no link between the emissions levels and ambient measures. Nevertheless the fact that several environmental quality measures have deteriorated in recent years implies the need for a more effective framework of pollution control.

The government is interested in introducing more market based instruments and is studying

the options at the present time. In February 1992 it issued a Policy Statement for Abatement of Pollution. In this statement it was noted that the state of the environment had continued to deteriorate. In view of this assessment of the current trend, the Policy Statement asserted that henceforth the emphasis of policy would shift from defining objectives to more practical concerns of implementation. To achieve the objectives, it was stated that maximum use would be made of a mix of instruments in the form of legislation and regulation, fiscal incentives, voluntary agreements, educational programs, and informational campaigns.

The reorientation in the choice of policy instruments for pollution control reflects a number of important developments both inside and outside India. Internally, the failures of the 'command and control' approach to development have become more and more visible over the years. The economic philosophy of current Indian government is based upon greater reliance on market forces and less on government regulation. Externally, the government has taken its lessons from the collapse of the command economies in Eastern Europe, the economic success of the market-based Asian economies, and the ever increasing use of market-based instruments for pollution control in other countries of the world.

The reformist government of Prime Minister Narasimha Rao has realized that a control oriented approach to environmental policy, as has been adopted by India thus far is not very effective in achieving set standards, nor very efficient in terms of pollution control costs, nor easy to implement. What seems necessary is to introduce a set of economic instruments to supplement the regulatory mechanism, which would enable the development and adoption of cost-effective technologies to reduce pollution and generate revenues to finance monitoring and enforcement.

4. Industrial Pollution Control Policy in Malaysia

4.1 Background

Malaysia's manufacturing output increased eightfold between 1970 and 1992. In 1992 it accounted for 29.3 per cent of the country's GDP, 44.1 per cent of exports and 20.3 per cent of employment. In the wake of this rapid industrial growth has come a series of pollution problems, the main among them being:

- suspended particulate discharges that cause air pollution;
- biological oxygen demand (BOD) discharges that cause water pollution; and
- toxicity discharges that affect all media.

Trends in manufacturing output and in the intensity of discharges show that particulate discharges increased in the initial phase of industrial growth but are now declining. BOD has declined consistently while toxic waste discharges have increased in recent years. A World Bank study has identified hazardous waste, reflecting the changing structure of the economy, as the principal industrial pollution problem in the coming years.

4.2 Industrial Pollution Control Strategy

The overall legal umbrella for pollution control in Malaysia is provided by an array of legislation. The Environmental Quality Act (EQA), 1974, contains the provisions regarding air pollution, noise pollution, degradation of land, pollution of inland waters and oil pollution. Fifteen regulations have been promulgated under the EQA, the latest of which are aimed at checking the increasing problem of hazardous waste.

The 1974 Act also created the Department of Environment (DOE) in the Ministry of Science and Technology with the responsibility of monitoring compliance to the legislation and taking steps to enforce it. The DOE carries out this responsibility with a staff of 490 (1991 figures), of which 290 have professional or sub-professional qualifications. Owing to increasing demand, DOE staff is now fully stretched. The command and control approach to control pursued by the government has placed great pressure on the DOE staff and has heightened the search for alternative approaches.

The strategy for industrial pollution control in Malaysia has been a reliance on command-and-control type intervention, including ambient standards for air and water pollution, and effluent/emissions standards. In recent years, however, the country has relied a little more on market based incentives, including fees, tax incentives, and deposit-refund systems, as well as on Environment Impact Assessment (EIA) requirement in an attempt to tackle pollution problems at an early stage.

<u>Effluent Standards</u>

The DOE has set a large number of ambient standards for air and water pollution, which do not appear to be excessively stringent and are similar to those in many East Asian economies. In

practice, policy makers work with emissions standards measured as pollution load. For air pollution, emissions standards are measured in tons of pollution load while water pollution standards in Malaysia are given as concentration ratios of effluents. The effluent concentration standards for waterin Malaysia are within international guidelines in general. For rubber and palm oil industry (which was the main source of water pollution in the past) the effluent standards, although adequate, are not as tough as those in Indonesia.

Standards have to be monitored. Monitoring is expensive and is done selectively in Malaysia. Palm oil and rubber sectors have good coverage with 42 and 33 percent respectively, ofthe firms being covered. Monitoring is focused on the larger polluters, which takes care of the bulk of emissions in these two sectors. Over 80 percent of the two sectors are in compliance. The rest of the industry is largely self-monitored. A public complaint system exists (811 such complaints were received in 1991, and increase of 24 percent over 1990), which triggers off investigations to determine whether standards are violated. This resulted in 45 prosecutions in 1991.

Effluent standards specified as concentration ratios require considerable resources for monitoring, since concentration standards can be met through dilution particularly if water is under-priced. Monitoring is effective in industries where polluters are clearly identified and point sources are few (as in the palm oil and rubber industry). However, for the industry as a whole, concentration standards are a very blunt instrument since monitoring on this scale would be prohibitively expensive.

An illustration of the difficulties in monitoring can be seen in the case of the industrial estate of Pasir Gudang. This rapidly growing estate is located in the state of Johor Bahru. The estate has only one officer in charge of monitoring pollution. Poorly trained, he cannot always determine whether standards are actually violated. He counts on the support of the DOE representative in Johor bahru who has many demands on his time.

Use of Environmentl Impact Assessment (EIA) in Malaysia

Malaysia has 39 prescribed activities requiring EIAs (mainly large scale energy, transportation, infrastructure, agro-industries and waste treatment and disposal projects) for which EIA is mandatory. The number of EIA reports reviewed by the DOE have increased from 11 in 1988 to 174 in 1991. Of the 334 reports received so far only 30 percent were rejected because of their potential damage to the environment. The review procedure has become more efficient over time as indicated in the decline in the review time from 6.6 months in 1988 to 4.3 months in 1991.

EIA's are a useful planning tool in addressing potentially serious problems at an early stage. Examples are locating industry away from centers of tourism or urban concentration and incorporating abatement technology in plant design rather than retrofitting, which is very costly. Malaysia has used EIA judiciously, having made them mandatory in only carefully selected sectors

and keeping the clearance time to a minimum[4]. A Bank study comments that the "judicious use of EIA has helped to avoid serious conflicts between the country's development and environmental objectives" (World Bank, 1993).

4.3 Market Based Incentives in Malaysia

Malaysia has introduced a system whereby polluters who exceed emissions limits can obtain a "contravention licence" and pay an associated fee in the form of an abatement charge. In 1992 a total of 81 contravention licences were issued for air pollution and 72 for water pollution. Forty percent of these went to the food processing industry. Water effluent fees amounted to RM138,000 ($50,100). Such a system is a mixture of a command system (involving licences) and a market based system (involving fees for pollution levels in excess of the limit). The amounts involved in the charges, however, appear to be quite small and there is no assessment of the overall effectiveness of the whole program.

One program that Malaysia has implemented and that has been studied in some depth is that of palm oil effluent. That the program has been a success in pollution terms is not in doubt; pollution loads have fallen from a level of 81,000 tons of BOD in 1978 to around 1,800 tons in the mid-1980s. Given its novel features, it is worth looking at this program in some detail.

Control of Palm Oil Effluent

Environmental Issues

Crude Palm Oil (CPO) mills in the early 1970's disposed of their waste by dumping it, untreated, into the nearest body of water. The environmental impact of the palm oil effluent (POME) was to cause serious water pollution in almost every major river basin in peninsular Malaysia. Untreated POME discharge depletes the oxygen concentration in freshwater as it decomposes. This in turn depletes the populations of fish, prawns, and other aquatic animals that provided a significant share of the protein in the diets of riverain Malay villages in the 1960's and 1970's. Other negative effects of the effluent discharges were: increase in toxicity and malodorous compounds in water, reduction in fish and crop harvests, contamination of sources of drinking water in rural areas and sites of intakes for municipal water supplies for most cities and towns, and creation of breeding grounds for disease-bearing mosquitos.

Strategy for Regulation

The Department for the Environment (DOE) announced the Environmental Quality (Prescribed Premises) (Crude Palm Oil) Regulations on July 7, 1977. The regulations required CPO mills to obtain a license and pay a license fee before they coud operate. In their applications, mills needed to describe their system for treating and discharging POME. The regulations also imposed standards on eight parameters of POME, the key parameter eing BOD (biological Oxygen demand,

[4] In contrast, EIA requirement in the Philippines is broad based, and it has been found that it can easily take over a year to get clearance.

a measure of oxygen-depleting potential). The license fee consisted of two parts--a flat processing fee and a variable effluent-related fee. The latter gave the DOE latitude to make the license fee equivalent to an effluent charge.

Implementation

In the first year (1978) of implementation of the system, the standard was set at 5,000 mg/l of BOD and was not mandatory, in recognition of the initial difficulties that would be faced by the industry. The effluent related license fee was set at US $3 per ton of BOD discharged up to the standard. In the following year, the BOD standard was made stricter (2,000 mg/l) and mandatory and progressive effluent charges were imposed to provide an incentive for establishment of waste treatment facilities. If the BOD concentration exceeded the prescribed standard, a surcharge was imposed equal to $100 per ton above the standard. The rates were set such that the annual fees for untreated discharge exceed at least the capital costs for building treatment facilities.

Evaluation

Despite a 50 percent increase in the number of palm oil mills between 1978 and 1982 and a steady increase in CPO production, the total BOD load released in public water bodies dropped steadily from 222 tons per day in 1978 to 58 tons in 1980, 19 tons in 1982, and 5 tons in 1984. Studies also show that these changes did not result in loss of competitiveness for the palm oil industry or production. During the period 1982-1986, Malaysia's palm oil export sector lost only 5 percent of the value of output as a result of environmental regulations that reduced allowable BOD discharges by 90 percent. The CPO sector lost even less--only about one percent of the value of production.

There were some efficiency losses. First, the charge was not set on the basis of marginal environmental damage costs, but based on the cost of capital investment in waste treatment facilities. Another source of inefficiency was the imposition of the charge on BOD load rather than volume of discharge. This might provide an incentive for intermedia substitution, from disposal in land to water, since the surcharge for land disposal was based on concentration. In terms of distributional effects, one study found large losses among primary input producers, the oil palm plantation sector, which bore over two-thirds of the total welfare losses of the industry.

Comments

A similar system is being implemented in Malaysia's rubber industry. The system for palm oil is still in effect, but has now lost part of its original rationale. Treatment facilities have become a licensing requirement and standard feature of palm oil mills. The surcharge for effluents above the standard is still enforced but is so low (having lost much of its real value to inflation) that it no longer acts as a compliance incentive and in any event is no longer necessary.

A study undertaken by the Palm Oil Research Institute of Malaysia (PORIM) concludes that palm oil effluent treatment costs are 3 to 6 percent of total mill processing cost, and about 0.7 and 1.4 percent of total cost of palm oil production. Given this low cost, it is not surprising that the majority of palm oil mills have installed treatment systems to reduce or avoid the payment of

effluent charges. It has been remarked that the effluent charges levied in violations of emissions standards applicable to the palm oil sector allow for cost variation in abatement and thus are effective.

4.4 Conclusions

The overall system of pollution control in Malaysia has not been evaluated. Although there are several indicators that even the command and control framework is having difficulties in terms of inspection and monitoring the evidence is patchy and the government is increasing its budgetary allocations in this area. The Sixth Plan (1990-1995) has made a firm commitment to safeguarding the environment.

In terms of fiscal incentives, the country has made a number of moves that are still being implemented and that will need some time before they can be evaluated. These include the contravention licences, as weli as a deposit refund system (under review) as well as a tax relief system for those who install or implement pollution measures (MIDA)[5]. The palm oil effluent case however, demonstrates very well what can be achieved with a charge system linked to a pollution standard and a technology guideline. This should provide some hope for similar attempts in other areas.

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[5] MIDA gives incentive s to encourage proper facilities for the storage, treatment, and disposal of hazardous wastes. "Pioneer" status incentive for 5 years will be availble to companies which are directly involved in the storage, treamen and disposal of toxic and hazardous wastes in an integrated manner. For these companies that are themselves waste generators and wish to establish facilitites to store,treat or dispose of their wastes, either on-site or off-site, they would be eligable for a special allowance at an initial rate of 40 percent and an annual rate of 20 percent for all capital expenditure. As a further incentive to industry, MIDA will also extend the current import duty and sales tax exeption scheme for machinery, equipment, raw materials, and components to them for the sttorage, treatment and disposal of hazardous wastes.

5. Industrial Pollution Control Policy in the Philippines

5.1 Background

The government of the Philippines has promoted industrialization ever since the 1950s, first by pursuing an import substitution strategy and later (from the 1980s) by emphasizing export-oriented production. In 1981 the government embarked on a structural adjustment program which has shaped its current approach to industrialization -- regional dispersion and rural based industrialization.

The industrial sector exhibits a wide range of diversity both in terms of the size of business establishments and in the activities undertaken. The latter range from the virtually monopolistic petroleum industry, characterized by large scale operations and low unemployment, to the food industry, which contributes the largest amount to manufacturing employment and where the enterprises range from the very large to the very small. Most industries, however, are dominated by a few large companies, many of which are concentrated in Metro Manila. At the same time there are a large number of small, diverse, often unregistered establishments that make up the informal industrial subsector.

Industrial Pollution

The National Environmental Protection Council (NEPC) classifies industry according to the extent of pollution they generate and the degree of hazard associated with their waste. The chemical and the petroleum industries are considered highly pollutive and extremely hazardous industries. The cement, iron and steel, and non-ferrous basic metals industries are also classified as highly pollutive, hazardous industries, as are sugar milling and refining, wine and spirits, textile spinning, weaving and finishing, leather processing, pulp and paper, and soaps, cleansing preparation and toiletries. Somewhat less pollutive, but extremely hazardous, industries include fertilize and pesticides, synthetic resins, plastic materials, paints, varnishes and lacquer, tires and tubes, and rubber products.

Industrial activity in the Philippines has a number of direct environmental impacts:

- Water pollution arises from the discharge of wastes that are high in BOD and total suspended solids. The few major water polluting industrial outfits are scattered about the country.
- Air pollution arises from emissions of gases and particulates.
- Toxic and hazardous waste arises from the discharge of wastewater containing heavy metals, solvents, and acid/alkali wastes, primarily from the growing electronic and metal finishing industries.
- Non- toxic solid waste arises from disposal of materials such as packaging.

In almost all cases, pollution levels have been incresing in the past twenty five years (where monitoring data are available). Particular concern is being expressed about lead and particulate levels in air (see Table 2) and several toxic elements in the water.

Table 2

AMBIENT AIR QUALITY IN THE PHILIPPINES, 1990
(Actual as a percentage of the standards)

POLLUTANT	PHILIPPINES STANDARD	WHO GUIDELINE
Particulates (PM10)	170%	110%-170%
Sulfur Dioxide	2%-53%	2%-27%
Carbon Monoxide	140%	46%
Nitrogen Dioxide	42%-250%	20%-120%
Ozone	<1%	<1%
Lead	17%-260%	26%-780%

Note: The table shows 1990 levels of major pollutants in the Metro Manila Area. The levels are shown as a percentage of the Philippines proposed ambient quality standards, as well as the WHO guidelines. Lead level and particulate levels are of key concern, where as sulfur dioxide levels are within acceptable bounds. Although ozone levels are also apparently within acceptable bounds, sample sizes have often been inadequate to draw definitive conclusions.

Source: World Bank, 1993.

The high level of industrial pollution in the country is attributable to several factors, including:

- Old plant and equipment. Technologies and processes employed in some industries are inefficient and outdated.
- Lack of know-how. The understanding of proper waste management and pollution reduction options is low.
- Weak enforcement of environmental standards and permits. Low rates of detection and enforcement result in low rates of compliance.
- Nascent community awareness and influence. In most regions of the country, public pressure is now just beginning to affect industry decision making, as evidenced by the increasing number of NGOs active in the urban/industrial environmental area.

5.2 Strategy for Industrial Pollution Control Saratégy in the Philippines

Broadly speaking, the regulatory framework for environmental management in the Philippines has three aspects[6].

1. Environmental Impact Statement (EIS) and Environmental Compliance Certificate (ECC).
2. Standards and rules (Command and Control).
3. Market-based incentives (MBI).

EIS and ECC

The Environmental Impact Assessment (EIS) system currently serves both regulatory and planning function. As a planning tool, its goal is to identify changes in project design that will reduce unacceptable environmental impacts by implementing the most cost-effective mitigation measures. But the EIS process also involves monitoring and evaluation following project implementation. In this sense, the Environmental Compliance Certificate (ECC), which certifies that the requirements of the EIS system have been met, is a regulatory tool used by DENR to ensure that firms continue to comply with anti-pollution laws.

Quantitative and Regulatory Standards

The second aspect of the regulatory framework is the set of quantitative and regulatory standards that apply to industries and to energy and transport sources with respect to their inputs and waste discharges. Other instruments used in this so-called "Command and Control" (CAC) approach are prohibitions, limits and other controls, and permits and licenses. Under this approach, the environmental protection agency is responsible for standard setting, prescribing and recommending specific control technologies, and monitoring and enforcing individual firms' compliance with the standards and prescribed controls. In the Philippines, these standards are often source specific and apply to a variety of pollutants and quality criteria.

These standards are comprised of the following components:

(1) Quantitative Ambient Standards - comprising the specific numerical ambient water and air quality targets for a given region at a given point in time (e.g., PM10 (24 hr.):150 μg/m3);

(2) Quantitative Effluent Standards - comprising the specific numerical standards for emissions to air, land or water for amy given emission source (e.g., SO2 emission from power plants (existing): 1.5g/Ncm); and,

(3) Quantitative Input Standards - comprising the specific numerical standards for production inputs (such as fuel quality) or industrial processes (such as technology

[6] Several voluntary schemes and corporate environemntal programs initiated by Philipine businesses have also been implementeed. See ARMDEV, 1993, for examples.

standards) (e.g., sulphur content in diesel: 1%).

Market Based Instruments

The third aspect involves the economic policy environment, which comprises the specific price signals (or policies that influence price signals) that may influence the selection of technologies and the levels of emissions. While current environment policy in the Philippines is dominated by a Command and Control regulatory framework, market based incentives are becoming more popular. The country's experience with such instruments is derived from: financial incentives (tax credits and income tax holidays), pollution charges (fees on mine wastes and tailings), industrial waste exchanges, a deposit refund system (soft drink bottles and containers), and a risk liability system.

5.3 Experience with the Pollution Control Strategy

Command and Control Framework

The Command and Control framework is achieving patchy success in the Philippines. The Department of Environment and Natural Resources (DENR) has certainly made a number of attempts to improve effective implementation (see below), but there is a lack of resources. Visits to DENR offices revealed problems of lack of equipment, trained personnel and facilities. DENR is making an effort to decentralize monitoring and enforcement functions at the regional level and is introducing a few innovative schemes, One such scheme was the initiated in 1991 and is known as the "dirty dozen scheme". By targeting the most polluting industrial units in each region, it aims to improve the enforcement of pollution control. During the period it has been in place, the program has had some notable successes in forcing firms to install control equipment under the threat of closure ("cease and desist") by the regional offices.

The current penalty system is based on points with various infringements having different weights. The following factors with their corresponding weights determine the penalty (TR&D, 1993):

- the duration of the violation -- days (6.5)
- the present resource condition (5.5)
- capacity of source of pollution (4.5)
- average deviation from effluent or emissions standards (3.5)

Industries are given three months to correct their violations before the fines are actually imposed. While the fines increase with the severity of the violation, the marginal rate of increase is constant. This feature tends to be regressive, in that increasingly pollutive firms pay relatively low increments in fines. It has been found, for example, that the larger firms in the tanning industry find it economical to pay the fine rather than comply with the standard.

In controlling pollution from industry, the regulations have achieved greater success in securing compliance from large firms in pollution intensive subsectors. But even for these firms.

DENR's attention (and its compliance statistics) has been mainly on getting them to install waste treatment systems or pollution control facilities rather than on ensuring that this equipment is operated properly.

The review of CAC environmental regulations in the Philippines is summarized in four general features of the system (World Bank, 1993).

First, the implicit policy goals are ambitious and they attempt comprehensive coverage across sources. The water and air quality standards apply to all industrial establishments and power generation facilities regardless of size or pollution intensity. Also, air and water quality regulations prescribe standards for a large number of parameters. For water quality, for instance, the effluent regulations prescribe effluent standards for 8 toxic substances and standards on 12 other parameters including BOD, COD, pH and color. In addition, firms producing strong industrial wastes (defined as the BOD concentrations exceeding 3,000 mg/l) are subject to separate and also uniform standards regarding the BOD concentrations of their discharges. Similarly, although the EIS system applies to environmentally-critical projects or projects in environmentally-critical areas, the manner in which the latter is defined means that in practice every investment project could be required to obtain an environmental compliance certificate.

Second, the regulatory framework relies on standards formulated in terms of discharges from individual sources, and these are typically uniform across different sources. For instance, the water quality regulations specify effluent standards (defined typically in terms of percentage reductions in pollutant concentrations) that apply to the discharges of each facility. For some parameters, the standards are more stringent for new plants than for existing facilities but within each category the same limit applies to all sources irrespective of type of industry or process. The same is true of the air quality standards that apply to stationary as well as transport sources.

Third, the policies currently in place to control pollution are all regulatory or command-and-control in nature. The air and water quality regulations as well as the EIS process specify emissions limits or mandate the use of specific control technologies. So, none of these regulations actually prices environmental damage (either through charges or the use of tradeable permits) and forces polluting firms and households to take account of those costs in their decisionmaking. Rather, the attempt to alter their behavior is made by regulators determining how stringent the limits on dischargers should be.

Fourth, some of the regulations currently in place to control pollution are faced with conflicting signals from other aspects of the sectoral policy regime. The most significant instance arises with regard to the pricing of fuels. The present system favors the use of diesel, fuel oil and domestic coal. This worsens the problems of PM10 emissions from trucks and jeepneys as well as from the use of high-sulfur fuel and more-polluting domestic coal in industries that generate their own power.

A recent World Bank study has pointed out that the Philippine regulatory structure cur- rently in place has no clear set of policy priorities underlying it. Most forms of industrial pollution are

subjected to a very broad set of regulations, while concurrently a large number of conflicting policy signals effectively renders these regulations ineffective in addressing the problems of greatest environmental significance. Also, given some of the economic costs and benefits associated with reducing pollution, the flaws of the existing system becomes clearer: the problems addressed by the existing regulations simply are not tackling the highest policy priorities.

Market Based Instruments

So far the MBIs have been implemented on a small scale and their impacts are under review. However, a USAID funded study looked at these instruments recently (RCG/Hagler Bailly, 1993). Its main findings, as well as those from a personal visit to the country, and meetings with DENR and other officials are summarized below.

Tax Incentives

Section 56 of the Environmental Code of the Philippines (PD 1152) provided tax incentives to encourage industry to install anti-pollution devices over a five-year period. These incentives, which expired in 1984, provided for:

- Exemption of up to 50% of the tariff duties for the importation of pollution control devices.
- Tax credits equivalent to 50% of the value of the tax and tariff duties that would have been paid had the pollution control equipment been imported.

Although this policy has not been formally assessed, some DENR officials feel that it was not successful because of implementation problems. Many companies used the incentives system as a loophole for securing tax exemptions and credits, even on equipment that was not used for pollution control.

Pollution Charge

The fee on mine wastes and tailings is the closest example of a pollution tax based on the "polluter-pays" principle in the Philippines. Under DAO 85, DENR imposes a fee of P0.05 per ton on mine wastes from metallic mines; P0.10 per ton on mine tailing from metallic mines for those using approved impoundments and those discharging to the sea by pipelines, launders, and tunnel; and P1.00 per ton on mine tailings discharged on impoundments not duly approved. Mines wastes and tailings puts to beneficial use (usually as filling materials for civil structures) are exempted from fines. This encourages recycling and diminishes damage to the environment.

However, current mining fees do not fully reflect the polluter- pays principle. First, the compensation that the Mine Wastes and Tailings Damages Evaluation Committee awards to claimants is drawn from the reserve fund (representing accrued mine wastes and tailing fees collected for compensation, etc.) without identifying which company caused the damage. As a result, cross subsidization is created. Second, the current fees do not take into account the need to maintain the long-term integrity of the impoundments. Third the compensation is only rewarded to private owners of damaged infrastructure, owners of private land, agricul- tural lessors and lessees, and share tenants; it excludes parties affected by pollution damage to common property.

Waste Exchange

The Industrial Waste Exchange Program (IWEP) was begun in 1987, in technical collaboration with McGill University of Canada. It was implemented for four years in the National Capital Region, Cebu, Cagayan de Oro, Albay, Batangas, Laguna, Benguet, Cavite, Davao, Iloilo, and Zamboanga del Sur. EMB assumed the role of an information center and an in- formation broker on this project.

Companies listed themselves as suppliers or buyers of waste in the Listing Form, which became the basis of an annual, publicly-available bulletin that contained a list of materials available for exchange. Interested buyers and suppliers sent letters of inquiry using the bulletin as a reference. IWEP then forwarded these letters to concerned companies. IWEP also offered such services as arranging for meetings, providing laboratory analysis, and disseminating technical information.

Unfortunately, IWEP was not sustained after its funding ran out. During discussions with industry, most participants claimed that they has not even heard of IWEP. A major reason why the project was not self-sustaining was that it was government-led, and industry was wary of submitting information to DENR. Of the country's 15,000 industrial firms listed in the last Bulletin (December 1990), only 593 listed themselves under "Materials Available" and 127 firms listed themselves under "Materials Wanted."

Deposit-Refund Systems

To date, the deposit-refund system has been used only for soft drink glass and plastic bottles in the Philippines. Initiatives have also been tried based on system whereby a portion of the fee collected was channelled back into investments aimed at environmental preservation. These systems established a precedent for fees charged and brought back to the environment.

Risk-Liability Systems

To date, the only experience with risk-liability systems in the Philippines is through the Environmental Guarantee Fund (EGF) as part of the implementation of the country's Environmental Impact Statement System. The EGF is a financial arrangement placed on the project proponent and allocated specifically for environmental activities (i.e., rehabilitation, monitoring and payment of damages). It is managed by a multisectoral group whose primary concern is to address impacts and issues pertaining to the operation of the project. The EGF is established in three parts:

(1) Multisectoral Monitoring Fund - periodic cash payments to cover all the expenses incurred by the monitoring team in conducting its monitoring activities.

(2) Trust Fund - trust account or performance bond that will be used to compensate aggrieved parties for any damages to life and property, and to finance environmental restoration and the rehabilitation of environmental quality caused by the project's operation, including its abandonment.

(3) Cash Fund - a joint account, managed by the EGF committee, used to implement

companies' environmental management and rehabilitation programs (these may include environmental maintenance and safety, ecosystems rehabilitation, environmental research, community-based environmental programs, environmental information campaigns and training, and the funding of periodic pollution management appraisals.)

There has been only limited application of the EGF. DENR/EMB reports that it has en- countered two major contentious issues in attempting to negotiate EGF arrangements: the basis for computing EGF amounts and the company's opportunity cost for the funds that are put in trust.

5.4 Conclusions

This survey has shown that the Philippines has many issues that need to be addressed before its pollution control strategy has been considered effective and efficient. First, resources in monitoring and enforcing regulations need to be increased substantially. Related to this fine levels have to raised as well. Second environmental regulations need to be integrated with other aspects of economic policy. Controlling pollution and devoting resources to cleaning up emissions that have actually been encouraged by the fuel pricing policy makes little sense. Third, the system of regulation needs to give market based instruments more of a role. Uniform standards are difficult to implement and, if successfully implemented, there are costly in terms of real resources[7]. The experience to date with MBIs has not been all that positive but that is partly because it was implemented in a very limited way and with many constraints and obstacles. In future a more comprehensive framework for MBIs in selected areas is needed, with strong political legal support and adequate financial resources to implement it successfully.

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[7] A feature of industrial pollution in the Philippines that has implications for the cost-effec- tiveness of alternative control policies is the heterogeneity of pollution sources in terms of costs of controlling discharges. These costs vary not only across subsectors, but even within the same industry across firms of different scales and with capital equipment of different vin- tages. For instance, within the textile and dyes industry, the average cost of installing second- ary wastewater treatment varied from about P5/kg of BOD for the lowest-cost firm to almost P45/kg for the firm with the highest costs.

The implications of the industrial structure in Philippines for industrial pollution control are twofold. First, because of the variation in control costs across firms, there would be sub- stantial savings in using market-based policies rather than regulatory instruments. The second implication, which follows from the great number of firms involved, is that measures to control pollution should economize on monitoring and enforcement requirement. This implies that policies should be based on more easily observable parameters such as output or input use (a second best option).

6. Industrial Pollution Control Policy in the Thailand

6.1 Background

Industrialization in Thailand, which began in the late fifties, progressed rapidly in the last three decades. At the end of 1969 there were approximately 600 factories (registered with the Department of Industrial work (DIW) in the whole kingdom. This number jumped to 19,691 by the end of 1979 and to 51,500 by the end of 1989 (TDRI, 1990). The number of polluting industries were only 211 in 1969, but had increased to 7,030 by 1979, and had reached 26,235 by 1989. This growth has been concentrated in the Bangkok Metropolitan Region (BMR) which accounts for 76 per cent of the countries manufacturing value added.

Parallel to this rapid rate of industrial and urban growth, environmental quality has severely deteriorated. Several commentators have suggested that environmental degradation in BMR is not so much a consequence of urban and industrial growth as it is the result of failure to supply urban and environmental infrastructure consistent with the pressures on the resource base resulting from economic growth. For example, during the 1980s, while industrial output of the BMR doubled, public infrastructure capacity--particularly sewage treatment, water supply, solid waste collection, and industrial waste treatment--to protect the environment remained almost unchanged.

The rapid growth of industrial pollution in Thailand in recent years is also a reflection of the structural change of industry away, from traditional food-processing industries, which generate biodegradable waste, toward large-scale, heavy industries, such as petrochemicals, which generate heavy metals and other hazardous wastes. It is projected that hazardous waste will grow from the current level of 1.9 to 5.8 MT by 2001. None of the 23 industrial estates currently have hazardous waste treatment facilities. There is only one industrial hazardous waste treatment center (at Bang Khuntien, discussed below) and the bulk of hazardous waste is dumped freely into rivers and landfills or stored in drums. It is estimated that in Thailand, 600,000 tons of hazardous waste annually find their way into Thailand's rivers and canals where they mix with much larger quantities of untreated sewage to make several canals and sections of Tachin and Chao Phrya rivers anaerobic for part of the year and a potential health hazard (Panayotou, 1991).

Given Thailand's relatively large size and the considerable assimilative capacity of its environment, the current level of industrialization and implied pollution load would not present a serious problem if it were evenly distributed throughout the country. While hazardous wastes would still be a problem, most other pollutants--especially biodegradable wastes--could be assimilated if widely distributed.

Unfortunately in Thailand (unlike Taiwan, for example), industry is highly concentrated in the BMR and its surrounding provinces, whose landscape, air and water bodies are receiving pollution levels far in excess of their assimilative capacity. Fifty-two percent of industries (76 per cent in terms of the GDP) are located in the BMR. This area also embraces twelve industrial estates out of twenty-three in 1989. Analysis of five heavily hazardous-waste producing industries

(including basic metal, fabricated product, transport equipment, electrical machinery and chemicals) showed that 10,152 out of 15,126 factories are located in the BMR area and employ about 88 percent of the total number of workers occupied in these five industries.

In terms of air pollution, about 30 percent of total emitted sulfur dioxide (SO2) is attributed to industrial activities and approximately 54 percent of industrial emissions of SO2 are released within BMR. SPM levels are the highest in Asia. Industry emits about 21% of SPM, which is slightly less than that from power plants, which emit 33%. Vehicle generated gases (lead, carbon monoxide, hydrocarbons, nitrogen oxides and particulates) are expected to double by the year 2000. Currently the levels of CO, SPM and lead exceed the WHO guidelines. It is also anticipated that in the near future acid rain might pose a serious environmental problem. Power and industrial sector are converting to use of coal, particularly lignite, and by the year 2006, 32% of electricity generating capacity will be fired by lignite.

Box 3 shows the increasing severity of health related damages resulting from industrial pollution. Environmentally related health cases from 2 per 100,000 people in 1978 to nearly 9 in 1987. As Table 3 demonstrates, the levels of emisissons will continue to rise over the next sixteen years. Unless significant pollution controls are undertaken, therefore, we will witness a mass deterioration in environmental damage, particularly to health.

Box 3. Industrial Pollution and Health in Thailand

Industrial activity in Thailand has resulted in increasing occupational exposure of workers to toxic chemicals. As a result, Thai workers have experienced significant occupationally linked health problems. A survey of five regional hospitals in 1983 found that over 7 percent of total poisoning cases were occupationally related. In 1984, an investigation into occupational disease showed that the average lead levels in the blood of workers in various tasks at a Thai battery plant was in the range of 12 to 48 milligrams per 100 milliliters -- implying that lead exposure in workers were 480 times greater than health standards. Since the study included less-exposed workers, such as administrative staff, in its sample group, the health risk may be even more extreme than indicated in the study.

Another study performed by the Ministry of Public Health showed that the incidence of environmentally related health cases increased from 2.00 cases per 100,000 people in 1978 to 8.88 per 100,000 in 1987. These results are summarized below.

Incidence of Occupational Disease per 100,000 workers, 1978-1987

	1978	1983	1987	Annual increase(%)
Insecticide poisoning	1.97	4.76	8.64	17.9
Lead poisoning	0.01	0.02	0.10	29.2
Manganese, Mercury and arsenic poisoning	0.01	0.01	0.04	16.7
Petroleum products poisoning	n.a.	n.a.	0.02	n.a

Source: Ministry of Public Health, Thailand.

Two caveats are in order. First, the studies do not indicate that adequate control groups were used to properly attribute all the impacts to the workplace. Lead ingestion, for example, is widespread, due to waterpipes, paint, and particulars from leaded gasoline. Second, improved diagnosis and reporting will appear as higher incidence. Therefore, these data are perhaps better used to illustrate the seriousness of the problems than to show detailed trends.

Source: Brandon and Ramakutty, 1993.

Table 3
Emissions Projection

Pollutant	Level in 2011	Increase (%)
SO2	3 MT	400
CO2	389 MT	450
HC	1.7 MT	100
NOx	2 MT	400
CO	8.4 MT	300 *
Lead	2,000 T	100
SPM	1.6 MT	200

* Thai government announced its decision to reduce lead in gasoline to .15 grams per liter.

A study by Thailand Development Research Institute shows some other features of Thai industrial pollution scenario:

- Overall industrial pollution is expected to quadruple within the next 15 to 20 years and to have an increasing impact on human health, property, and the quality of life.
- Industrial pollution is currently concentrated in the BMR and will continue to be in the foreseeable future. There are indications, however, that some of the worse polluters are moving outside Bangkok and into the satellite provinces of the BMR.
- The 1980s were characterized by an increase in output from textiles, leather, chemicals, basic metals, and petrochemicals. The economic forecast for these industries in the 1990s shows high growth potential.
- The structural changes in industry and in production materials are leading to the emergence of new types of pollution problems in Thailand. A shift isoccurring from traditional pollutants such as wastewater pollution in the form of biochemical oxygen demand (BOD) to more complex toxic pollutants including heavy metals, toxic air and water pollutants, and hazardous wastes.
- The Board of Investment has provided investors with privileges and incentive packages in order to draw foreign investment, but has not used environmental impact assessments (EIAs) or pollution intensity per unit of the GDP among its selection criteria for these target industries. By neglecting this, it has accelerated the production of hazardous industrial waste. An analysis of BOI promoted industries indicated that the proportion of investment approved for hazardous-waste-generating industries increased from 25 percent in 1987 to 55 percent in 1989.

6.2 Strategy for Industrial Pollution Control S ategy in Thailand

Industrial pollution control in Thailand is based mainly on command-and-control instruments such as standards, screening (through environmental impact assessment or EIAs), licenses, land use zoning, and fees backed by threat of fines and imprisonment in case of non-compliance. The government lays down effluent and ambient standards and waste treatment requirements. A potentially powerful tool is the environmental impact assessments (EIA) which is mandatory for new licenses.

It is generally believed that the current policy is ineffective and its lack of enforcement has contributed to serious environmental degradations[8]. There have been some instances of use of economic instruments, and there have been calls for greater use of these instruments in recent policy debates. (See below).

A change in government policy was initiated in 1971 when it set up Environmental Quality Committee after the public outcry over the pollution of Mae Klong river from sugar mill wastes. The concept of industrial pollution control was formulated under the Third Plan (1972-76). In the Fourth Plan (1977-1981), areas with high population density and heavy industrial concentration, such as BMR, were given priority in pollution control policy. The Fourth Plan also focused on deterioration of water quality, pollution from industrial plants, and noise pollution.

Legislative Framework

The Thai government has over time enacted several laws and regulations introducing effluent and emissions standards as well as ambient standards for various industrial pollutants. The key features of the legislations affecting industrial pollution are discussed below :

The Improvement and Conservation of National Environmental Quality Act of 1975 (NEQA): The Act, which was amended in 1978, created the National Environmental Board (NEB) and the Office of National Environment Board (ONEB) as its secretariat. The Act introduced the concept of environmental quality standards, the requirement for EIAs in industrial permitting, and the use of "emergency powers". It established two sets of policy guidelines on water pollution: one for inland waters and the other for marine coastal waters. EIA is considered the most powerful tool for environmental protection efforts of NEB.

The Public Health Act of 1941 (PHA):

While this legislation was enacted for prevention of diseases and provision of national health care, some sections provide legal authority for the prevention and abatement of water pollution. Under the act, environmental public nuisances embrace all sources of water, air, and noise pollution. The chief enforcement mechanisms are: abatement orders, judicial injunction, and criminal

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[8] The Department of Industrial Work (DIW) is in charge of administering the factory Act and other acts relating to the operation of factories nationwide. However, it had a staff of 143 in 1989 and has difficulty performing its operations and enforcement functions nationwide.

prosection. Abatement orde , prohibition orders, or closing orders can be made by court injunctions. PHA currently offers the most effective legal controls for general pollution.

The Factory Act of 1969 (FAC)

The FAC provides the legal basis for establishment and control of industrial plants, and the Ministry of Industry is vested with the power to administer FAC through ministerial regulations and notifications. The FAC was amended in 1975 to strengthen the environmental dimension of the original act. It is now the principal legislative mechanism for industrial wastewater pollution control, and allows the MOI to exercise the power to issue notifications for treatment of waste water and legal sanctions against violators. Monitoring and enforcement of this Act is done by Department of Industrial Works (DIW).

Investment Promotion Act of 1977

Section 19 of this Act has environmental protection measures. The Act requires all new factories to install wastewater treatment facilities.

Industrial Estates Act of 1979

This Act allows Industrial Estate Authority of Thailand (IEAT) sole responsibility for overseeing environmental control of registered industries within estates.

Institutional Framework

Policy formulation and planning at the central level is done by the Office of the National Economic and Social Development Board (ONESDB) in the Prime Minister's Office, and the Office of National Environment Board (ONEB), in the Ministry of Science, Technology, and Energy (MOSTE). ONEB coordinates governmental environmental management, while the standards are set by National Environmental Board (NEB).

The execution of laws and regulations is done by ONEB, DOH (part of the Ministry of Public Health), and the DIW (part of the Ministry of Industry). The enforcement of industrial pollution rests with DIW's Industrial Environment Division (IED). IED is responsible for EIA report approval, and for pollution control measures proposed in factory license applications.

The Role of Economic Incentives

As is clear from the above, the basic structure of environmental regulation in Thailand is a command and control one. There are, however some areas where economic incentives have been used as an instrument. One is the area of wastewater, where, as in India, collective treatment facilities have been set up, with firms being charged for use of the facilities, which is compulsory. A second in solid waste collection and recycling, where there is a growing private sector involvement in solid waste collection. Finally in the area of hazardous waste collection and treatment are to be financed from levies on polluters. Some details of these applications are given below. Although they are important, and make a contribution to the control of pollution, they are still a small component of the total framework of regulation. However, the ability of the public and private sectors to cooperate successfully in this way in tackling serious pollution problems is a

positive indication of what can be achieved.

The government is considering extending economic incentives to other areas, such as air and water pollution emissions, but this remains to be implemented.

Wastewater

Usually wastewater treatment is funded by the government. However, Thailand experimented with the "polluter pays principle" and charged the firms that pollute. The country's first central treatment facility for industrial wastewater treatment was set up in the seventies at the Mae Klong river which had been polluted by effluent from sugar mills. It was financed by charges levied on industrial users. The basis for sharing operating and maintenance cost has evolved over the years from one that originally considered only the quantity of sugar cane processed, to one that gives increasing weight to the quantity and waste loading characteristics of the wastewater.

In 1988, the Bang Khuntien Treatment Center was set up by the Ministry of Industry to deal with heavy metal contaminated wastewater that was generated by 200 small- and medium-scale electroplating factories scattered around Bangkok. Between September 1988 and May 1990, 8,300 tons of hazardous waste from 46 electroplating and about 20 other factories was treated. A standard fee of 450 baht per ton is charged to the factory with adjustments for type of waste and distance from treatment site. A "waste manifest system" is used to track the waste from the factory to the treatment facility to ensure no discharge along the way. A key element of the success of this operation is a contracting arrangement between the MOI and the factories involved to supply a given quantity of waste to the treatment center at an agreed upon cost which is sufficient to cover the facility's operating costs.

Solid Waste

In Bangkok, solid waste recycling takes place not at government initiative, but due to the entrepreneurial instincts of the city's scavengers and collection workers. Each collection worker receives on average, an extra 1,500 baht per month from recycling, which is a strong incentive for them to service their routes. Scavengers at disposal sites report that they earn 300- 500 baht a week. Kitchen wastes from large restaurants and hotels are often given to farmers for pig feed.

User charges in Thai urban areas are used to recover about 10 percent of costs of solid waste management. But a 1985 regulation enabled charges to be raised by 10 to 15 times. With these raised fees, the private sector is showing interest and the Bangkok Metropolitan Administration is already contracting private companies to collect solid waste (ADB, 1993)

Thailand is also considering a system of pollution taxes, but this remains to be implemented. However, the Industrial Finance Corporation of Thailand (IFCT) has a fund of $8 million per annum available for concessional financing for purchases of pollution abatement equipment. There is also an Environmental Fund, which was established for the same purpose in 1991, is financed by the government (US$20 million) and by a US$0.40 per liter tax on oil consumption.

Hazardous Wastes:

To control hazardous wastes from industrial sources, Thai government has established an Industrial Environmental Fund in early 1991 with counterpart contributions from Government and industry. In line with the "polluter pays" principle, the fund is expected to be financed from waste charges that would be estimated for each industry and later verified by environmental auditing. The charge would be set at a level that covers the cost of transport, treatment, and disposal of hazardous wastes and provides a margin for running the program. A charge of 1,000 baht per ton on the 600,000 tons of industrial hazardous wastes projected for 1991 would raise 600,000 million baht. This is only 0.3 percent of the GDP originating in the 17,000 industrial plants that generate hazardous wastes, or 1.5 percent of net profits. The proceeds would be used to establish and operate central treatment and disposal facilities for hazardous wastes collected from factories. Factories would deposit with the fund their waste charges for the entire year. Plants that attained lower waste per unit of output, as verified by accredited private environmental auditing firms, would then be eligible for rebates. The operation of the treatment and disposal facilities would be contracted out to private waste management firms through competitive bidding.

6.3 Effectiveness of the Pollution Control Strategy

Existing regulations and institutions, though appearing to be adequate on paper, have been largely ineffective in controlling industrial pollution. The factors contributing to this ineffectiveness range from diffusion of authority to lack of coordination and lax enforcement. Consider, for instance, the procedure for jointly implementing the Factory Act and the NEQA. The law requires that applications to the DIW for the establishment and operation of new factories above a certain size must be accompanied by an environmental impact assessment (EIA), which should be submitted for review to the NEB before licensing by the DIW. The NEB, in turn, conducts an internal review of the EIA, with no public participation (EIAs are treated as confidential) and recommends approval, modifications or disapproval to the DIW. The NEB is not vested with the authority to prevent implementation of projects with an unsatisfactory EIA or to monitor and to enforce its recommendations or the agreed EIA provisions; it can only recommend disapproval of a subsequent EIA submitted with a license renewal application. Even if the license is not renewed, the environmental damage caused by the failure to implement the earlier conditions remains.

Factory licensing often proves to be too blunt an instrument for industrial pollution control. The most notable application has been the case of a heavily polluting pineapple factory in Cha Am, whose license of operation was withdrawn after two years of ignoring warnings against wastewater dumping. However, this appears to be an exceptional case of applying the enclosure sanction. Violation of effluent standards by failing to treat waste does not carry fines but warnings, which rarely materialize, even following repeated violations.

The same difficulties hold for BOI-promoted investments and industrial estate projects under the IEAT, which also require prior approval of an environmental impact assessment (EIA) by the ONEB. IEAT's overall organization does not indicate a real commitment to environmental responsibility, despite the existence of a site office for waste analysis. IEAT does not have an environmental unit, and of the 23 industrial estates in operation in 1989, none are known to have an operating hazardous waste treatment facility. While all industrial estates report having waste water

treatment facilities, it is still not known how many actually operate, and at what level of treatment efficiency.

It is often argued that the problem is a lack of technical manpower and financial resources (e.g., White and Emani, 1990). This is true to some extent. For example, the Industrial Environment Division of the DIW has only 43 staff for some 50,000 industrial plants (one staff for 350 factories) and a budget of only 1,900 baht per factory. These resources are grossly inadequate for implementation of regulations, monitoring, and enforcement. One aslo needs to mention that the instruments selected by the government, i.e., inflexible effluent standards or waste treatment requirements, are also responsible for the current state of industrial pollution (TDRI, 1990).

6.4 Conclusions[9]

In Thailand, existing institutions and regulations for dealing with industrial pollution, designed under entirely different circumstances, are clearly inadequate for dealing with emerging industrial pollution problems. One problem is that existing institutions and regulations were put in place at a time when the country had less than 500 factories and was struggling to industrialize through generous incentives for import substitution. Thailand now has more than 50,000 factories and is one of the world's most rapid and successful export-oriented industrializing economies. In the 1960s, there were hardly any factories producing hazardous waste; today, 33 percent of all the factories in the country are hazardous-waste producers. Even in the 1970s there was hardly a river with a BOD load exceeding its assimilative capacity. Today, virtually every river in and around the BMR is at risk of becoming anaerobic.

The times have changed dramatically, but the institutions and regulations have changed only marginally. In addition, existing environmental regulations in Thailand, which are replicas of foreign regulations with a considerable time lag, have little grounding in Thai reality and culture and are, therefore, largely unenforceable. The fact that agencies responsible for their enforcement are not given the authority and the means for enforcement is symptomatic of this problem. Like many other developing countries that followed the environmental regulation example that developed countries set some 10 years to 15 years ago, Thailand based its environmental regulations on "command-and-control" standard-setting instruments. These instruments set inflexible effluent standards or waste treatment requirements coupled with sanctions for non-compliance, rather than setting flexible, market-based mechanisms and incentives (such as proper pricing, pollution charges), which are now increasingly being used by the developed countries. While the conventional view is that market-based mechanisms are not as suitable for developing countries as command-and-control mechanisms, the reality is that, ". . . for cultural reasons, the Thai society is not given to litigation, and courts are used only when everything else fails. Each of the major environmental regulations nonetheless stipulates a term of imprisonment and/or fine for a violation of that regulation. . . . " (White and Emani, 1990). In Thailand, very few environmental violations reach the courts, and fines are negligible in comparison to the benefits gleaned from violations. On

[9] The following comments draw on the discussions in TDRI, 1990.

the other hand, the imperatives of the market are laws that one can only ignore to one's peril. Therefore, internalizing industrial pollution through proper pricing and other market-based incentives is even more necessary and suitable for developing countries such as Thailand than for developed countries, especially if the objective is a measurable improvement of environmental quality.

There have been some tentative steps in Thailand with the use of economic incentives for pollution control. Financing collective treatment facilities through user fees appears to work. The enterprises are willing to cooperate in the arrangement and to share costs on an equitable basis. This instrument can and should be extended. However it cannot solve all pollution control problems. In some cases collective treatment is not the appropriate method; what is required is a charge on the polluter to encourage treatment or use of different inputs ate the plant level. In other cases the flexibility required for cost effective pollution control can be achieved most effectively through tradeable permits.

Thailand will have to spend a great deal of money on pollution control in the next decade or two. At present it spends only about 0.24 percent of GNP in investments in this area, compared to an average 1.2 percent in the OECD. Estimates indicate that expenditures will have to rise by 20-25 per cent annually to meet even modest environmental quality objectives. With such large levels of investment it is all the more important that efficient solution be implemented, so that reductions in emissions and improvements in environmental quality are brought about at least cost. This will require increasing use of market based instruments.

7. Use of Market Based Instruments in Other Asian Countries

The other countries in Asia, like the five discussed above, have relied mainly on command and control to regulate environmental pollution and manage natural resources. However, there are a number of applications of the use of market based instruments in these countries. This chapter looks briefly at those applications that are relevant to the industrial pollution control.

Bangladesh

To discourage the use of ozone depleting substances (ODS), Bangladesh has imposed a tax on the importation of such substances, as well as equipment and machinery using ODS. No further details of this scheme were available.

Bangladesh has a deposit refund scheme for soda bottles. It is an informal scheme introduced by retailers and without government intervention. Soft drink consumers leave a deposit with the retailer on purchase and get the money back on return. The system appears to work well. As in most developing countries, improper disposal of bottles is not a problem.

Indonesia

There is an unusual deposit refund scheme in Indonesia, under which forest concessionaires pay a deposit that is returned when the logged area has been reforested. However, as the fee is only a small fraction of the cost of replanting, the logger simply treats it as an additional cost and does not bother with the replanting. Even an increase of more than 100 percent would not be sufficient for the fee to have an incentive effect.

Indonesia has several other market based instruments that impact on the environment, such as national park fees. However, they do not appear to be any that relate directly to industrial pollution.

Korea

Korea has introduced a deposit refund scheme for a number of products which contribute to waste disposal problems. They include food and beverage containers, pesticide containers, batteries, tires, lubricant oils and plastics. As of mid-1992, the deposits totalled $16.9 mn. while refunds amounted to only $38,000. This suggests that the system provides a very weak incentive to recovery of waste products, the main reason being the low level at which the fees have been set.

Korea has also recently started a pollution charge scheme for major emissions. Details were not available for this survey, except that the revenues will be used to provide long term, low interest loans to stimulate pollution control investment in the private sector.

Singapore

A somewhat exceptional country in the Asian context, Singapore has introduced a

sophisticated system of auctionable permits for the consumption of ozone depleting substances (ODS). In this it offers the one example of the use of tradeable permits in Asia. Each quarter the national quota of ODS are allocated among importers and users, half on the basis of historic consumption and half through an auction. Importers and users must register to participate in a tender process conducted by sealed bid, in which each firm indicates the amount of ODS it would like to purchase and its offer price. Bids are then ranked by price and the lowest winning bid (i.e. the one that clears the market) serves as the quota price for the full allotment of ODS, including the 50 percent that was allotted on the basis of historic consumption. There is a sufficiently large number of bidders to establish competitive conditions, as indicated by the rapid increase in quota prices during the first few rounds of bidding -- i.e. before firms had made a serious effort at conservation and substitution. The auction allows the government to capture a sizeable portion of the quota rents, which can then be used to subsidize recycling services and the diffusion of alternative technologies.

8. Conclusions and Recommendations

An effective pollution control strategy needs a combination of command and control measures as well as market based instruments. It also requires the different instruments to be coordinated, and pricing decisions in the economy in general to be integrated with the pollution control strategy. In reviewing the experience of these Asian countries, one must conclude that none of these conditions are met. The command and control measures are sometimes misdirected and often too weakly enforced to be effective. In many cases the use of market based instruments could do a better job. But there will always be a need for CAC measures, and it is the responsibility of the government to ensure that adequate resources are made available for the monitoring and enforcement of emissions, for these to work. Paradoxically, it may be through the use of market based instruments such as charges and fees that enough resources will be mobilized for the CAC measures to be effectively implemented.

The few attempts at using MBIs in Asia cannot be said to present a picture of great success. While there have been a few cases of effective use of such measures, in many cases the applications have failed because the incentives were not strong enough (e.g. the taxes or charges were simply too low), and the commitment of the government to make the policy work was not really there. It would be useful, for policy makers to study the successes and see how they can be replicated in other areas. In doing this they need not restrict themselves to neighboring countries, or even to Asia. Lessons are transferable from all parts of the world and we do not have that many good examples of MBIs. In particular governments should look at ways in which (a) charges for emissions and (b) tradeable permit schemes can be introduced. Both these avoid the difficulties associated with subsidy schemes, where budgetary constraints and possible misuse of funds are real problems. If subsidies are justified they should come from revenues raised through charge and permit schemes. There is some evidence that this is happening, but there is much more potential for it to be extended.

If MBIs are to be adopted more widely, policy makers have to be convinced of their merits. This requires the kind of in-depth study referred to above, but it also requires key concerns of elected officials to be answered. These include (a) the distributional implications of the use of MBIs, (b) the implications on output and employment in the affected industries and (c) costs of implementing such measures and (d) the international trade implications of the measures. All these can be addressed, but doing so implies a careful study of one or more instruments to meet clearly stated objectives. Presenting the results of the research simply and clearly is also important.

Although most of the discussion in this review has been of pollution control strategies as enacted by the Departments or Ministries of the Environment, it is important to remember that market incentives which have environmental implications exist in other government departments as well. Governments can encourage or discourage pollution emissions through their pricing policies on energy inputs such a petroleum products and coal; on the pricing of electricity; on the delivery and collection of water; and on environmentally damaging inputs such as fertilizers and pesticides. Although it is true to say that none of these countries price these resources and inputs to fully reflect

their social costs, including environmental costs, they do vary considerably in the extent to which the prices deviate from the full social cost. As was pointed out in the review of the five countries, it is important to integrate such pricing decisions in the overall pollution control strategy. This appears generally not to be the case. There are even examples of governments subsidising emissions through price subsidies while making the polluter pay through end of pipe clean up (e.g. diesel subsidies). Integrated pollution control requires more inter-departmental cooperation than exists at present. One way in which this could be brought about is through an inter-ministerial council that would be responsible for the overall pollution control strategy and have the authority to make recommendations about taxation and pricing outside the narrow environmental domain.

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