

Compliance to Environmental Regulations: The Indian Context

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Abstract

Theoretical exposition of the trade-environment linkage (in the form of Environment Kuznets Curve) has been extensive. While one set of studies show that with the increase in per capita income environmental degradation would decline, the other set of studies has shown that no such trend exists for developing countries. Though environmental laws are in place, firms display a very low level of compliance in developing countries. This article brings out the low level of compliance to environmental regulations in India while trying to identify the main causes.

Key words: compliance; environment; India; command and control; market instruments

JEL classification: N55; O53; Q21

1. Introduction

The effectiveness or compliance of environmental regulations is dependent on the cost of mitigation, the comprehensiveness of the law in relation to the level of development of the society, and the ability of the industry in question to bear the costs of mitigation, the punitive measures, and the probability of detection of violation.

Industries that are resource-intensive like chemicals, iron and steel, non-ferrous metals, non-metallic minerals, and pulp and paper can potentially involve relatively large negative externalities and face high compliance costs requiring high initial investment in both cleaner production processes and end-of-pipe equipment (Luken, 1997) to restrict pollution. Small-scale industries in decreasing order of actual pollution generation in India are engineering, paper and board mills, textiles, organic chemicals, tanneries, pharmaceuticals, dye and dye intermediaries, soaps and deter-

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gents, paints, varnishes, and petrochemicals, edible oil, and vanaspati (Kathuria, 2001).

From the manufacturing of a product to the generation and disposal of waste and the reporting of release of hazardous wastes, environmental regulations impact the entire value chain (McKinney, 1998). Smaller firms could face higher costs of compliance as they need not benefit from the economies of scale in end-of-pipe pollution control and may lack the financial capacity to install adequate process technology. According to an estimate by Robert Kennedy, Chairman and CEO of Union Carbide, the environmental expenditures in the chemical industry to mitigate the pollution externalities may be as high as 3-4% of production costs (Dean, 1995). Also, smaller firms not having market power would hardly be able to invest to reduce pollution if other competing firms do not.

Very high compliance costs could rule out compliance in many cases. In the 1990s a study conducted by the White House Council on Environmental Quality (CEQ) estimated that in the U.S., compliance to air pollution limits by industrial sources was as low as 35%. In the United Kingdom the reported rate of non-compliance to water quality standards was around 48-83% with the effective rate of compliance being even lower (Heyes, 1998, 2000). A World Bank study estimated that in the year 2000, the investment made by the industry in the U.S. for pollution abatement was to the tune of US \$20-30 billion (at 1991 prices), an amount that firms in developing countries may not be willing to spend (Luken, 1997). President Bush's 2003 budget request for OSHA (workplace safety and health) compliance is \$430 million (American Society of Safety Engineers, 2002). According to a study by the National Association of Manufacturers (NAM), U.S. manufacturers paid totally \$28 million in the year 2000 to comply with federal workplace regulations. Firms spent nearly \$1,700 per employee in compliance costs. For smaller businesses the cost stood at \$2,500 per employee (American Society of Safety Engineers, 2002). Thus the costs of compliance could be large enough to discourage firms with little investment capacity from investing in compliance equipment. Despite the large investment required, compliance in the U.S. is relatively better because of the fear of civil litigation, which is quite common.

Over-ambitious laws raise the cost of mitigation of pollution, rendering them ineffective. A firm's level of compliance is influenced by many factors. Positive incentives in the process of pollution reduction, like lowered per unit costs, tax breaks, investment subsidy, etc., could bring about greater compliance. Market-based instruments have proven to be more effective than "Command and Control" methods in the abatement of pollution. If the probability of detection of polluting firms is low and penalties are perceived to be insignificant, the level of non-compliance may be very high. Lack of monitoring activities of the government, even when other conditions suit compliance begets non-compliance, rendering the environmental regulations ineffective. This is particularly true when the firms in the industry compete and have little market since non-adherence on the part of some firms would give them an unassailable advantage in the market.

Becker (1968) in his economic analysis of crime found that firms greatly re-

sponded to the probability of detection and the severity of punishment if detected and convicted. Fines are treated as costs of doing business, and it is assumed that polluters minimize the sum of expected compliance costs and expected penalties. Environmental economists have suggested that effectiveness of environmental regulations could be enhanced either by raising the penalty and increasing monitoring activities to raise the probability of being caught or by changing legal rules to increase the probability of conviction. This insight is no doubt true when industries collectively can afford mitigation costs.

However, economists like Helland (1997) and Cohen (1998) have documented evidences of high compliance despite very low penalties. This could be because of economic incentives like cost subsidies in the form of tax breaks and special financing given to firms. It could also be because the government chooses to work via property rights. It could also be the case where the firms are risk averse and choose to comply. According to Cohen, it may be possible that the expected penalty for non-compliance may not be as low as it appears on the surface. Also, informal community pressure and social norms might operate to yield significant levels of compliance even without the threat of penalties. What is not emphasized in the literature is that some compliance is likely, sometimes even compliance over and above that specified in the law when the firm in question has much market power, which allows it both to pass on costs to consumers and to subtract a part from the high profits of such firms.

A government's goal is to achieve the highest level of compliance given the limited financial, information, and manpower resources. Sometimes it has been seen that the government pursues a policy of "maximising compliance" rather than "maximising social welfare" (Heyes, 1998). Attempting to maximise compliance would ignore the costs totally, while to maximise welfare the agency would have to balance the costs against the benefits of compliance. The enforcement agency can try to impose very high penalties, but this could in certain situations result in additional enforcement costs as firms try to evade, challenge enforcement actions in court, etc. A case in point is the "Superfund" of the U.S. It has been estimated that for every dollar collected from polluting firms, 50 cents would be spent towards enforcement costs (Heyes, 1998). Cohen (1998) in the advanced country context states that when the pollution is particularly damaging, as in the case of hazardous wastes, and the regulator can be certain of legal and public support for persecution, the agency can adopt an approach of low monitoring/probability of detection and very high penalties.

The level of non-compliance has been seen to be significantly higher in developing countries. Dasgupta (1996) explains that, there exists an empirical relationship between per capita income and the environmental quality. Quoting a World Bank study he says that, the relationship assumes a bell-shaped curve. As the income per head increases, the environment quality initially deteriorates and then improves. According to Dasgupta, developing countries emphasize more on material well-being. Therefore, in the early stages of development, levels of compliance are low, and pollution is an acceptable side-effect of economic growth. However, when

a country has attained a sufficiently high standard of living, environmental legislation is passed, institutions for the protection of the environment are installed, compliance enforced, and the environment quality improves. This has been further emphasised by the Environmental Kuznets Curve (EKC). The EKC plots the relationship between environmental indicators and per capita income of countries. The EKC hypothesis suggests that the pollutant levels per capita rise as per capita income rises; then the relationship reverses after some threshold level of income. Studies examining the EKC hypothesis in developing countries have, however, found mixed results (Jha, 1999).

According to Morris (2002), societies which show gross violation of the law in general also show poor compliance on environmental law in particular. As peoples' income rise above a certain level, their need to be concerned about other aspects of life, like relationships, clean environment, fairness, access to public facilities, pollution, etc., increases. While below this level, the struggle is for survival. Quoting the examples of the U.S. in the 1920s and China today, he says that the early years of industrialisation in these countries was more corruption-ridden and prone to governance failures than the post-transformation era. In case of severe income inequalities persisting in the state, state and public institutions may be corrupt, pandering to the upper class. The route to greater compliance, therefore, lies in growth and development, in taking people above a certain level of income. Failure in governance can be corrected to a great extent by setting up correct institutional arrangements, rules, and incentives for economic behaviour. Morris concludes by saying that a more egalitarian income distribution could make governance functional and effective.

Section 2 of the paper gives an overview of the extent of compliance in the Indian context, while Section 3 identifies the reasons for such a low level of compliance. Measures for improving compliance using market-based instruments are suggested in Section 4.

2. Compliance: The Indian Context

The earliest efforts made to control pollution in India date back to the nineteenth century. In the pre-independence period, pollution and environmental degradation were addressed in a very general manner, mostly as a response to nuisance, negligence, and liability. The post-independence era saw a spate of legislation with the active intervention of the judiciary in the nineties. But their effectiveness in having the desired effect of mitigating pollution was minimal.

2.1 Legislative Efforts

The post-independence era saw a plethora of acts being enacted to control pollution. The beginning of government efforts to regulate pollution started with the enactment of The Wildlife Protection Act in 1972 (Kathuria, 2001). Some of the landmark acts were the Water (Prevention and Control of Pollution) Act of 1974, the

Air Act and the Umbrella Act, or The Environment Protection Act (EPA), of 1986 (MoEF, 2003).

Despite the exhaustive legislative efforts made for pollution control, the level of compliance is quite poor. The quality of natural resources like water and air continues to deteriorate. According to the Asian Development Bank, the cost of pollution in India in 1992 was estimated at 6% of GDP (Jha, 1999). According to another study sponsored by the World Bank, urban air pollution costs India US \$1.3 billion a year; water degradation leads to health costs amounting to US \$5.7 million every year (Martin, 2002).

The Water (Prevention and Control of Pollution) Act of 1974 was brought about with the objective of empowering the Central and State Pollution Control Boards to prevent, control, and abate water pollution. Water quality continues to deteriorate in the country. Twenty percent of the total burden of diseases—specifically, diarrhoea and dysentery—in developing countries is water borne. According to a report by the Ministry of Rural Development, about 1.5 million children under the age of 5 years die each year due to water related diseases, and the country loses over 200 million man days of work a year because of these water borne diseases (Parikh, 1999). The 1998 UN Human Development Report (HDR) estimated that Asia's rivers on an average contain lead levels twenty times in excess of those in European/North American countries. They also estimated that Asian rivers carry 50 times as many bacteria from human excrement as in the case of European/North American countries (Jha, 1999).

India suffers from a disproportionately heavy health burden of urban air pollution by international comparison. When expressed in monetary values, health damage averages up to 9% of GDP per capita in India (Lvovsky, 1998). While peak effects of air pollution were observed among people of 65 and above in developed countries like the U.S.; in Delhi the peak effects were reported in the 15-44 age groups (Lvovsky, 1998). According to a World Bank study, in the year 1995, air pollution might have accounted for some 40,350 premature deaths, 19,805 thousand hospital admissions, and 1,201 million minor illnesses (Parikh, 1999). The study states that in the next couple of years the number of premature deaths would increase by 28%, hospital admissions and illnesses by 30%. In a study, evaluating the existing pollution control laws conducted by the National Law School of India, Bangalore, experts have stated that the principal legislation is repetitious and poorly drafted. The laws are not backed by policy pronouncements and seem more ad hoc. The study DISHA (Directions, Innovations and Strategies for Harnessing Action), conducted by a group of researchers at Tata Energy Research Institute (TERI), have the following to say:

...Environmental performance among Indian corporates is typically ad hoc and restricted to compliance aspects, and even these are not fully addressed....

Also, "...while pollution norms are being tightened, a key lacuna remains weak enforcement, especially in the small and medium sector" (Times of India, 2001).

2.2 Judicial Efforts

In the post-independence era, especially after the Bhopal Gas Tragedy of 1984, the Indian judiciary has played a proactive role in the enforcement of rules relating to environmental protection. The Courts have interpreted Article 32 and Fundamental Right to Life and Personal Liberty of Article 21 to include the right to pollution-free air and water. The interpretation runs as follows:

“The Supreme Court ... is free to devise any procedure appropriate for the particular purpose of the proceeding, namely, enforcement of a fundamental right and under Art. 32(2) the Court has the implicit power to issue whatever direction, order or writ is necessary in a given case, including all incidental or ancillary power necessary to secure enforcement of the fundamental right. The power of the Court is not only injunctive in ambit, that is, preventing the infringement of a fundamental right, but it is also remedial in scope and provides relief against a breach of the fundamental right already committed...” (AIR 1987 Supreme Court 1086), (Manohar, 2002).

Growing awareness of the public has led to a series of Public Interest Litigations (PILs), wherein individuals as the last resort have sought redressal from the Courts against pollution and their related effects. In some states, “Green Benches” have been created to deliver faster judgements on already delayed cases pertaining to the environment. But these again have proved to be only partially effective in bringing about justice and thereby better compliance.

3. Causes for Poor Compliance to Environmental Regulations

Most of the Environmental Acts and Rules in India are procedural and have typically taken punitive measures or with the extreme punitive measure of closure, no clear policy guidelines. The approach adopted by the pollution control bodies may be conveniently called “Command and Control” (CAC) (Curmally, 2002) where laws exhibit a preventive rather than a proactive role. The “command” being the laying down of standards and pollution limits, while the “control” being the power to withdraw water or power supply of erring units, the imposition of penalties and fines, or even imprisonment. However for the CAC method to be effective in controlling pollution, certain criteria need to be met by the State and Central regulatory bodies. These include having large infrastructure facilities like laboratories for testing of samples, a thorough understanding of environmental problems, and good monitoring and enforcement capabilities. Curmally (2002) points out that the working of the Pollution Control Boards (PCBs) in India falls much short of the fulfillment of the above criteria, and so the effectiveness of the CAC method in controlling pollution is minimal. The factors leading to poor compliance are discussed below.

3.1 Lack of Flexibility, Over-Ambitiousness of Law and Standards

The CAC approach adopted by the PCBs offers little flexibility to firms, as all firms are required to make the same efforts for compliance. According to a World Bank Country Study conducted in 1995, the Minimum National Standards (MINAS) fixed by the Central PCB ensured maximum technically feasible effluent reduction. The formulation of laws and standards is also over-ambitious. In such a scenario the levels of compliance of the firms would be low.

Incentives for adoption of better pollution abatement technologies are few. Absolute standards have to be adhered to. These standards are usually neither technology based nor performance based, nor are they related to the volume of pollution being generated. Thus even with strict enforcement, the environment quality may continue to deteriorate (Planning Commission, 2001-02). A case in point is the standards set for the distillery units. The distillery units were notified that they could have a maximum Biochemical Oxygen Demand (BOD) pollution load of 30 mg/litre for discharge. Their association, however, argued that with the available technology achieving the set targets would be infeasible (Kathuria, 2001).

Over-ambitious standards discourage firms from making investments in pollution abatement technologies. The standards have been rarely revised since their inception by the regulatory agencies. The strict implementation of such over-ambitious laws and standards involve great costs for the regulatory agencies (in this case the fund-starved PCBs). In case of high marginal abatement costs, the firms might feel compelled to keep pollution abatement equipment idle due to lack of any economic incentives (Planning Commission, 2001-02).

3.2 Weak Enforcement

The primary tool adopted by the PCBs for enforcing environmental compliance has been inspection. Inspections are initially undertaken during the time of granting Operating Consent and again only when there are emergencies, complaints, or disasters (Curmally, 2002). Enforcement by the PCBs is weak, and, more than often, environment management degenerates into crisis management. Therefore the impact of non-existent or merely formal inspection on enforcement draws a very weak response from firms towards compliance. When inspectors find violations, they typically threaten fines, which are small, or closure. Closure would be such a large burden that the unit has strong incentives to ensure that closure does not take place. Hence when warned and asked to do better, the unit would not. Large and frequent violations in turn make the task of inspection frequent. Had the fines been significant but affordable, then PCBs could have done with fewer inspections.

The PCBs themselves have shown much reluctance in implementing the laws, though with the EPA, the PCBs have been armed with discretionary powers to take stern steps against policies/laws not being implemented. An example in this case is of the Supreme Court Judgement delivered by Justice Kuldip Singh ordering a closure of all mines within a 5 km radius of Badkal Lake and Surajkund (a tourist place) after a report submitted by NEERI on the pollution caused by mining. Mining ac-

tivities had been going on without any consent stipulated under the Air Act. There was total violation of the Mines Act of 1952 and the Explosive Act. The judgement was delivered on a Public Interest Petition filed by M. C. Mehta alleging that the Harayana State PCB had failed to enforce norms and policies (AIR 1996 Supreme Court 1977) (Manohar, 2002). A judgement delivered by Justice Kripal on water pollution in Delhi from untreated sewage and industrial waste reads as follows: "...Non-accountability has possibly led to lack of effort on the part of employees concerned. They are perhaps sanguine in their belief that non-performance is not frowned upon by the government or by the heads of the organizations and no harm will befall them" (AIR 1996 Supreme Court 594) (Manohar, 2002).

In many cases the polluters are left off the hook because of the pressure exerted by powerful political groups (Curmally, 2002). This has resulted in gross violation of the law with a large number of industries operating devoid of proper anti-pollution measures. An example to illustrate the same is that of the States of Assam, Tamilnadu, Karnataka, Gujarat, Kerala, Punjab, and Harayana, where a significant proportion of units discharging effluents do not have effluent treatment plants. In Assam, Himachal Pradesh, and Bihar, where effluent treatment plants do exist, the laid-down standards are not complied with and the equipment lays idle in some cases (Planning Commission, 2001-2002). According to the Central PCB, in 1995, out of 8,432 large and medium industries in the country, only 59% had installed appropriate measures to treat wastewater. Over two million small-scale industries, which contribute to over half the pollution, were ignored by policy makers (Parikh, 1999).

3.3 Poor Monitoring

Lack of technically skilled manpower leads to improper monitoring, as scientific assessment of the level of pollution generated by firms becomes difficult. Moreover since exemplary punishment is not possible, as said before, monitoring cannot be focused and case-based. That is the option of focusing a few cases of violations about which uncontested evidence can be built; to obtain convictions is not possible. Thus resources are diluted and they always appear to be inadequate. In crucial areas such as special skills there is deficiency.

According to the EPA, the State PCBs are required to have a technically competent Board of Members, a well-qualified core group of technicians and administrators to monitor and control pollution at the field level, and a network of field offices to facilitate the process. In the case of the Andhra Pradesh PCB, out of 15 members, 9 were from the bureaucracy with no technical members. In Maharashtra, out of 13 members, 6 were from the bureaucracy with 2 technical. In contrast was the PCB of Goa that had 15 members, out of which 10 were technical and 3 from the bureaucracy.

Many-a-times scientific, engineering, and laboratory staff are employed for inspections. In Andhra Pradesh, one technical person is required to monitor one hundred units; in Himachal Pradesh and Kerala there were 12 and 14 persons for the

same task (Planning Commission, 2001-2002). The Arunachal State PCB has no staff of its own and is run by the personnel of the State Department of Environment and Forests. This situation has arisen because the Central Government has not laid down any norms for determining the staffing pattern of the State Boards with respect to coverage of pollution units. Thus the shortage is purely man-made. The vacancy ratio (against the sanctioned strength) is as high as 65% in Karnataka and as low as -8.87% in Madhya Pradesh.

Often State PCBs employ contract employees, which results in lowered monitoring due to lower motivation levels (these employees are not paid standard benefits and allowances of the Government). A judgement delivered by Justice Kripal on water pollution in Delhi from untreated sewage and industrial waste reads as follows:

...Keeping Delhi clean is not an easy task, but then it is not an impossible one either. What is required is initiative, selfless zeal and dedication and professional pride, elements which are sadly lacking here. (AIR 1996 Supreme Court 594) (Manohar, 2002)

Frequent change of Chairmen has also hampered the working of the PCBs. The Uttar Pradesh State PCB has accommodated 24 Chairmen in the last 24 years.

3.4 Lack of Effective Punitive Measures

As mentioned before, there is lack of an effective punitive and deterrent mechanism in case of non-compliance. The penalties that are imposed on the firms in case of non-compliance are extremely low and irrespective of the extent of compliance and the quantity and quality of emissions. A case in point is the penalty charged for an offence under the Water (Prevention and Control of Pollution) Act of 1974. A defaulting firm, irrespective of the extent of pollution, faces a fine of only Rs. 10,000 or imprisonment up to three months, which is bailable (MoEF, 2002). Levels of penalties are fixed and are not based on the extent of mitigation that is actually involved. However in the U.S., the years of imprisonment for violators continues to increase. Penalties imposed can be as high as \$50,000 per day (McKinney, 1998). In India, the State PCBs can only file a case against the erring firm.

The Court can impose stringent punishments, like imprisonment of 18 months to 6 years plus fines. But the problem of pendency of court cases compounds the problem. In the year 1997-98, an average of 47.57% of pollution cases filed in the Courts were pending. The highest being that of the state of Assam (100%) and the lowest being that of Andhra Pradesh (23.08%) (Planning Commission, 2001-2002).

With justice delayed, justice is denied. At Mavoor in the southern state of Kerala, the villagers have been fighting a legal battle against the pollution of Chaliyar River by a rayon factory for 35 years (Martin, 2002). In Rajasthan, only two convictions have been obtained despite nearly 7,000 cases filed in court against air and water polluters. Scarce inspectors, corrupt officials, and lenient courts aid the process of non-compliance (Dasgupta et al., 1997).

3.5 Paucity of Funds

The fifth major constraint is the paucity of funds. The Central PCB in 1984 initiated National Ambient Air Quality Monitoring (NAAQM) to monitor air pollution in 290 stations all over India. The study found that a low level of funding was one of the important factors behind poor monitoring. Similar was the conclusion with the Water Quality Monitoring (WQM) study carried out (Planning Commission, 2001-02). Due to paucity of funds, the PCBs lack adequate infrastructure facilities like laboratories and monitoring equipment, required for the execution of their responsibilities. An example in this regard is that of the Bihar PCB that does not have a single laboratory to test the effluent samples (Curmally, 2002). A judgement delivered by Justice Kripal on water pollution in Delhi from untreated sewage and industrial waste reads as follows:

...The Municipal Corporation of India ... and the New Delhi Municipal Council ... are wholly remiss in the discharge of their duties under law ... at the same time the authorities entrusted with the work of pollution control cannot be permitted to sit back with folded hands on the pretext that they have no financial or other means to control pollution and protect the environment.... (AIR 1996 Supreme Court 594) (Manohar, 2002)

In case of funds being made available, a major chunk is spent on maintenance expenses, with administrative expenses constituting 57% of the total budget (83% of the administrative expenses is on salary). Less than 1% of total expenditure is spent on training, despite HRD being one of the important responsibilities of State PCBs (Planning Commission, 2001-02).

The monitoring and enforcement activities of PCBs are funded through government grants and revenue, collected under the Water Cess reimbursement, consent fee, sample testing fee, fines, etc. There are vast variations in the financial positions of State PCBs. Some State PCBs are heavily dependent on Government grants while the others are forced to rely on their own insufficient resources. Only a few are self-reliant. For example, PCBs of states like Kerala, with one of the lowest per unit staff ratios, depends primarily on government grants (70.84%), while states like Bihar have to generate 94.4% of the total revenue requirements on their own (Planning Commission, 2001-02). The flip side being SPCBs that do generate revenue surpluses are faced with the constraint of spending restrictions imposed by the State Governments (Planning Commission, 2001-02). A case in point is that of the Uttar Pradesh PCB, that had accumulated a surplus of Rs. 29.77 crores by the end of the financial year 1997-98. The PCBs of Tripura and Mizoram had accumulated revenue surpluses to the extent of 90% and 48% respectively of the total revenue (Planning Commission, 2001-02). However, the possibility that these surpluses are notional/fictional is very high.

Thus such varying patterns across State Boards have resulted in horizontally inequitable treatment of industrial units and their pollution.

3.6 Incentive to Invest?

Another major cause for poor compliance is the “race to the bottom” approach adopted by states to attract investments. Since states do not enjoy the freedom to lower environmental standards, they compensate for the same through lax enforcement in their bid to attract investments. Enforcement of environmental standards remains merely on paper with firms taking advantage of the lax enforcement. This results in wide variations in enforcement across states. A small-scale unit may end up paying Rs.7500 as consent fees to the Madhya Pradesh PCB and Rs.2000 for the same to the Kerala PCB. These inter-state variations are sometimes due to political interferences; they act as an incentive to firms to locate where there is minimal enforcement, resulting in the creation of states that can suitably be called “pollution havens” (Curmally, 2002).

4. Measures for Improving Compliance

Regulatory approaches like CAC are the most favored by policy makers because of the apparent certainty of outcome and because bureaucracies in most cases cannot think of anything else. But these measures are inflexible, involve huge costs, and are successful only when properly implemented. In addition, the probability of success is low. Alternatively a combination of approaches may be more viable. All over the world, countries have resorted to market-based instruments and voluntary approaches to improve compliance (Kathuria, 2001). Some of these measures as researched in literature are discussed below. Adoption of a mix of them and shift from the CAC approach might lead to better compliance.

4.1 Public Performance Audit

As Friemann points out, “Taking care of the social and ecological consequences of corporate activities, even if they promise no immediate financial gains, may turn out to be an element of a modern far-sighted management strategy for a variety of reasons” (Heyes, 1998).

BAPEDAL, Indonesia’s Environment Impact Management Agency, faced an uphill battle in regulating industrial pollution due to its limited monitoring and enforcement capacity. In 1993, in order to improve compliance, they developed PROPER (Programme for Pollution Control, Evaluation and Rating) (similar to Scorecard in the U.S.) and focused on improving compliance in water pollution (Kathuria, 2001). This new programme was designed to receive pollution data from factories and analyse and rate their environmental performance. The data was collected through surveys, followed by rigorous environmental performance. The ratings were then disseminated to the public. A computerized model was developed, wherein the information on each factory was collapsed into a single performance rating.

It was the first government programme to publish a single index of industrial

performance. Through this initiative, they sought to tap the growing power of the media and the public opinion in promoting cleaner industries. BAPEDAL hoped that these public performance ratings would add two allies to the pollution reduction effort: the local communities, who would pressurize nearby factories with poor ratings to improve, and the financial markets that might react adversely to firms with low ratings. Such measures where there is no explicit tangible punishment could work when the firms in question have market power.

Using this method, in the first two years, the number of large and medium-sized firms in compliance increased by 50%. Another major factor was the pressure from the firm's clients, especially the large international corporations, to be ISO 14001 compliant. Drawing on similar lines, the Philippines launched a similar programme called EcoWatch in 1997. Colombia and Mexico were to adapt a similar methodology (Afsah, 1995). Such public performance ratings are known as Public Performance Audits. Such audits increase the transparency and accountability of firms. It also induces improvements from firms whose poor performance would otherwise require costly enforcement activity or litigation (Afsah, 1997). Economists Badrinath and Bolster have estimated that 86% of the penalty for environmental prosecution in the U.S. is reputational (Heyes, 1998).

In India, a similar exercise was carried out by the Centre for Science and Environment called the Green Rating Project (GRP). The aim of the project was to rate the Indian companies on the base of their environmental performance. The first ratings were released in 1999, comprising of 31 large firms of the Indian pulp and paper industry. Before the GRP started, only one company had an environment policy as part of its operations. But when the companies got associated with the GRP, eight other companies also adopted an environment policy. When one of the largest paper producing companies refused to provide the required information, it was decided to rate it last and the same was communicated to the head of the company. Within a week the head promised all co-operation. Such is the pressure exerted by a public performance audit on the firm to clean up (Kathuria, 2001).

4.2 Community Pressure

Firms are more likely to co-operate with regulatory authorities when they realize they are in the group of firms that receive more stringent regulatory inspection, because of the nature of the surrounding community that exerts direct and indirect pressure on them (Helland, 1997).

Bangladesh is densely populated with limited environmental absorptive capacity. This makes industrial pollution a serious problem. Industrial facilities in pollution-intensive sectors as pulp, chemicals, fertilizers, and cement discharge their wastes into rivers which serve downstream populations. With a very weak institutional infrastructure, the Bangladeshis search for a cost-effective measure has led them to non-traditional measures like community-pressure for cleanup.

A survey was conducted among public sector enterprises from the fertilizer and wood pulp industry in Bangladesh. The firms were of varying ages, evenly distrib-

uted between urban and rural settings and managed by the Bangladesh Chemical Industries Corporation (BCIL). It was seen that with very little assistance from national regulators, villages in Bangladesh through community pressure had negotiated agreements for cleanup and compensation when polluters were identifiable and employment alternatives were not too scarce. The limited industrialization of Bangladesh and its industrial structure that has fewer highly polluting industries makes for functionality of this approach.

The strength of such an informal regulatory system raises a prospect for cost-effective pollution reduction in developing countries like India, where infrastructure facilities and compliance is low (Huq, 1993).

4.3 Capital Markets: Incentive for Compliance

In a trade-off between the costs and benefits of pollution control, profit-maximizing firms choose not to invest their resources in pollution abatement if the expected penalty is less than the investment. In such a situation, the role of markets and communities in creating incentives for pollution control becomes significant. Studies suggest that regulators are now releasing information to markets (investors) regarding the firm's environmental performance to enhance the incentives for pollution control (Lanoie, 1997). This has been successful in the case of water pollution reduction, with large polluting firms reacting swiftly to release of such information. This happens perhaps for two reasons. Investors in general are unable to separate their roles as citizens and owners of stock. Or the market takes account of the risks due to environmental problems or problems with the law far more than do managers. Where firms have a large investor base or customer base in countries with "the good life" and hence values the environment, this expresses itself through the market.

Unanticipated events or new information may lead capital markets to revise their expectations regarding the profitability of an enterprise. Markets are more likely to revise their estimates of the value of a firm only to the extent that the information leads them to revise their expectations regarding future production costs (including the pollution control costs) or the ability of the firm to generate revenues at the levels originally expected. This information may pertain to a single enterprise (individual information) or may allow a comparison of environmental performance across firms (collective information). Individual information may lead consumer groups to boycott goods produced by the firm, thereby leading to a revision of the expectations on future revenues. Collective information provides an alternative to consumers who want to substitute away from the firms with a bad environmental performance. Empirical studies have shown that collective information has a greater impact on expectations of future revenues than individual information. Evidences from American and Canadian studies suggest that capital markets react strongly to the release of information, with large polluters affected more than the small polluters (Lanoie, 1997).

In an empirical study on the public disclosure strategy adopted by the Province

of British Columbia, Foulon concluded that regulation and information were two important weapons in a regulator's arsenal. The Ministry of Environment, British Columbia, publicizes the names of firms falling short of adequate environmental performance twice in a year. The paper industry is a major contributor to British Columbia's economic activity and is one of the most polluting sources. Foulon researched the pollution generated and compliance of 23 pulp and paper plants. He concluded that the presence of clear and strong standards accompanied by a significant penalty system would be highly effective in reducing pollution. Public disclosures supplement by creating additional strong incentives for pollution control (Foulon, 1999).

A study of the capital markets of Argentina, China, Mexico, and the Philippines has shown that capital markets in a developing economy increase a firm's market value to the announcement of rewards and explicit recognition of superior environmental performance. The capital markets have decreased a firm's value in reaction to citizens' complaints. The results suggest that environmental regulators in developing countries could explicitly harness market forces by introducing structured programmes of information release on firm's environmental performance and empower communities and stakeholders through environmental education programmes. The net result would be that fewer resources would be required to be devoted to the enforcement of regulations and more for the dissemination of information, enabling the stakeholders to make an informed decision (Dasgupta, 1997). This is something that we in India can successfully adopt at least for large firms that are actively traded in stock markets.

4.4 Pollution Levy

One way to improve compliance is to treat pollution control as an economic issue. In case emissions exceed the given standard, a fee is charged on the amount exceeded in the form of a pollution levy. No levy is paid by factories whose effluent concentrations are equal to, or below the relevant standards. A good example is that of China's water pollution levy. In China's regulatory system, effluents that exceed official standards are not treated as legal violations. Article 18 of China's Environment Protection Law states:

“...in cases where the discharge of pollutants exceeds the limit set by the state, a compensation fee or levy shall be charged according to the quantities and concentration of the pollutants released.” (Dasgupta et al. 1997)

The water pollution levy is assessed on the effluents that exceed established discharge standards for pollutant concentration in waste water. The Chinese discharge standards are not uniform across firms, as is the case with Indian standards, but vary across pollutants, industrial sectors, age of plant, and the quality of intended use of water. The effective levy rate goes up sharply with discharge volume. Local areas can impose stricter standards and higher levy rates if required. Pollutant-specific levies are calculated by multiplying a unit fee, the volume of waste wa-

ter discharged, and the ratio of effluent concentration to the standard concentration. For firms with multiple pollutant streams, the maximum concentration ratio is used for assessment of levy (Dasgupta et al., 1997).

Cost-minimizing and budget-constrained firms would be motivated to reduce pollution to the point where the expected levy rate is equal to the marginal cost of abatement. Increases in levy would increase the probability of compliance. In this kind of a system, the inspectors have considerable discretion in the identification of factories as non-compliant and in the strictness of their enforcement, measured as the effective levy rate applied to the excess discharges. This method could be used in industries where the monitoring and enforcement is relatively effective.

4.5 Emissions Trading

The U.S. Clean Air Act is a good example to illustrate emissions trading, a market-based method. The U.S. Clean Air Act, like the Indian Air Act, relies upon the CAC approach to control emissions, albeit with a lot of flexibility. The highest allowable concentration of each conventional pollutant is set. The controlling authority selects the most commonly used technology and calculates the amount of reduction achievable as the basis for setting the emission standard. Any source choosing to reduce emissions at any discharge point more than required by its emission standard can apply to the authorities for certification of the excess control as an *Emission Reduction Credit* (ERC) or a *Tradable Permit*. This ERC is transferable and can be used by the firm to satisfy emission standards at other discharge points or can even be sold. Thus the ERC acts as a currency in emission trading, a positive economic incentive for the firm. This scores over the conventional CAC method as it allows the firm enough flexibility to choose the mix of control among the discharge points as long as the overall emission reduction requirements are satisfied. Such measures also provide for innovation in abatement technology and bring about dynamic efficiency (Palmer, 1995).

This programme in the U.S. has led to substantial reduction in costs of compliance and at the same time improving compliance. Most estimates place the accumulated savings at over \$10 billion (Stavins, 2000). Other areas in which tradable permits have been successfully implemented are the Acid Rain Control Programme aimed at SO₂ emission reduction (Palmer, 1995) and air pollution reduction in Chile (Kathuria, 2001). This method can be successfully used to reduce the water pollution generated by the dye-manufacturers in Gujarat. At present the polluted water is collected at the Common Effluent Treatment Plants (CETPs) for treatment before it is discharged into the water bodies. A flat fee is charged. In the process, the higher polluters are subsidized by the ones with lower levels of pollution. This imbalance can be corrected with the introduction of tradable permits. This is just one instance of how tradable permits can help. This method can be tried out in industries where the monitoring and enforcement are relatively better.

5. Conclusion

Environmental non-compliance, as seen from literature, could be due to the costs of mitigation itself being very high, the laws being so ambitious that they raise the costs of mitigation, or the probability of being caught being so low that firms prefer to stay non-compliant.

Three scenarios emerge in the context of a developing country like India. Environmental non-compliance on the part of firms could be due to:

1. The costs of mitigating pollution being economically so high that compliance is not feasible.
2. The costs of mitigation being economically viable but the law being over-ambitious, resulting in high marginal abatement costs and therefore poor compliance.
3. The costs of mitigation being affordable, the law being realistic, but the probability of being caught and the punitive measures being so low that they fail to deter non-compliance. Also, the absence of economic incentives, which dissuades firms from complying, persists.

Further research on improving compliance can be conducted keeping in mind the above three scenarios. This would help the policy makers formulate laws in the future that would bring about better compliance.

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