

PART THREE:**THE POLICY AND ADMINISTRATIVE CONTEXT**

INDIA'S ENVIRONMENTAL POLICIES AND PROGRAMMES: THE QUEST FOR SUSTAINABLE DEVELOPMENT**O.P. Dwivedi****INTRODUCTION**

The end of the Cold War has given humanity an opportunity for a fundamental rethinking about the nature of relations among nations; that rethinking ought to be directed to make our planet safer because we are still facing a planetary-proportion threat of ecological disaster and poverty. But we live in a world where poverty prevents at least one-fourth of humanity from receiving even the basic human needs (adequate food, safe and sufficient water, primary health, education, and shelter). As long as the economic disparity remains, stress on the environment continues because for the poor their struggle for survival overrides any concern for environmental preservation. This conflict is not only world-wide, but we see it within nation states. The situation in India reflects this conflict. That is why the struggle for sustainable development in India is a daunting one.

I. SUSTAINABLE DEVELOPMENT: BACKGROUND, CONCEPT AND ISSUES IN GENERAL

Since the release of the Brundtland Commission report, "Our Common Future", the concept of 'sustainable development' has captured the world's attention and has emerged as the new ecumenical political ideology. The term was defined by the Brundtland Commission as "...development that meets the needs of the present without compromising the ability of future generations to meet their

own needs”.¹ The definition contains two key concepts: (1) the concept of needs, in particular the essential needs of the world's poor, to which overriding priority should be given; and (2) limitations imposed by the state of technology and social organisation on the environment's ability to meet present and future needs. But it is not clear who, among North and South, is going to determine the “needs” of the present generations; and how we are going to ascertain the “ability” of future generations? The answer to these questions from the North will be different from that of the South.

Sustainable Development

Development or economic progress has always produced, as a side effect, the degradation of the environment. The more the material progress in general, the more deterioration. The concept of sustainable development has fundamentally change the nature and scope of debate about the environment and its relationship to development. As the Brundtland Commission stated: “We have in the past been concerned about the impacts of economic growth upon the environment. We are now forced to concern ourselves with the impacts of ecological stress...upon our economic prospects”.²

For the first time, those in the field of economic development and environmental management appear to agree over the need to save our planet and to create an environmental stewardship. The World Bank in its 1992 World Development Report, *Development and the Environment* writes: “Sustainable development is development that lasts. A specific concern is that those who enjoy the fruits of economic development today may be making future generations worse off by excessively degrading the earth's resources and polluting the earth's environment.”³ Although this definition is not comprehensive, nevertheless, for the first time the World Bank has acknowledged that “meeting the needs of the poor in this generation is an essential aspect of sustainably meeting the needs of subsequent generations”.⁴

The concept of development which hitherto used to be exclusively associated with economic growth has thus been expanded to include specifically the environmental perspective. The integration however is better captured in the concept of environmentally sound and sustainable development (ESSD). The concept requires that a country must believe in maintaining a balance

between its human resources and its natural heritage, so that its people may live in ecological harmony. Such an explicit policy may engender the necessary interconnection and coordination between various sectors in that government.

Cultural Context of Sustainable Development in India

In India, ever since the program of industrial development was ushered by Pandit Jawaharlal Nehru, there has been a question of viability and sustainability of the process of industrialisation with the attendant materialism/consumerism. The Gandhian view of human progress de-emphasises materialism-without-limit. Rather it banks on moral progress and spiritual attainment of each and every human-being. This he called *Sarvodaya*. His view drew from India's rich cultural and spiritual legacy which emphasises the concept of *Vashudhavi Kutumbakam* (all the people and creatures living on earth are members of the extended family of humans).

Sustainable development from Gandhian perspective, ought to include the upliftment (both spiritual and material) of all, without exploitation and destruction of others. Indeed, the philosophy of *sarvodaya* is intimately linked with the concept of *Loka Sangrahamevapi* (to secure welfare of all by ones' deeds).⁵ How to achieve a development which brings welfare to all without harming others and destroying the environment is a challenge before India. Can a socially just and culturally acceptable sustainable development be achieved when the nation is confronting two major crises: population growth and continuation of poverty?

II. POPULATION GROWTH AND ENVIRONMENTAL DEGRADATION

In the case of India, two issues are always mentioned with respect to their impact on the environment: (a) population pressures and (b) continuing poverty. Demography, when taken as the size of the population and its rate of growth, is considered as a principal factor in environmental degradation. The faster the population increase, the greater the depletion of natural resources and environmental degradation.

But reduction in population increase, if that is the answer, cannot be achieved even by some authoritarian measures. For example, when Mrs. Indira Gandhi ordered vasectomy operations to reduce India's population during her emergency rule in 1975-1977, her government was repudiated immediately in a General Election of 1977. Later no political party in India would dare to raise this issue again. Even in China, population control methods have worked very slowly. Demographers have estimated that "even in the unlikely event that we managed to immediately reduce world fertility to a level of simple replacement (of the order of two children per couple) and maintain this level in the future, the world population, due to the effects of its present age distribution and to the expected increase in life-expectancy, would continue to grow for approximately a century before levelling off at a level which would almost double the present figure."⁶

We know, however, from our past experience that a high density of population does not always cause the same proportion of environmental degradation as we have seen in some sparsely populated nations. For example, if one compares the population density of the United States or Australia with India or China during this century, there has been comparatively, more environmental degradation per capita in the U.S. and Australia compared to India and China over the same period. It is not being suggested here that the density of population of a country does not contribute to environmental damage, but instead of over-emphasising population as the key factor in environmental degradation, we should look at for other factors. That culprit is poverty. The problem of environmental degradation should be approached not purely from a demographic standpoint.

Poverty and Pollution

In June 1972, when Mrs. Indira Gandhi addressed the UN sponsored Human Environment Conference, she asserted that "it is an over-simplification to blame all of the world's problems on increasing population. Countries with but a small fraction of the world population consume the bulk of the world's production of minerals, fossil fuels and so on".⁷ She asked further: "On the one hand the rich look askance at our continuing poverty – on the other, they warn us against their own methods.

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We do not wish to impoverish the environment any further and yet we cannot for a moment forget the grim poverty of large numbers of people. Are not poverty and need the greatest polluters?"⁸

It is obvious that not much has changed during the past twenty years since Mrs. Gandhi made that statement. Developing nations are still struggling to overcome poverty, hunger, and disease. Poverty and the needs of developing nations are yet to be addressed appropriately despite four decades of developmental efforts. When the international aid program started in the mid-1950s, it was assumed that in a relatively few years the basic human needs (food, living conditions, health, and education) and social justice would be met. But this did not happen. For hundreds of millions of people life remains a constant struggle for survival. Sustainable environment for them can become a concern only when poverty is eradicated and living conditions become tolerable. As Shridath Ramphal, former Secretary General of the Commonwealth of Nations and a member of the Brundtland Commission noted:

If poverty is not tackled, it will be extremely difficult to achieve agreement on solutions to major environmental problems. Mass poverty, in itself unacceptable and unnecessary, both adds to and is made worse by environmental stress...That is why the global policy dialogue must integrate environment and development.⁹

Although consumption pressure is dependent on a number of people making demands, it is intensified by the quality of such consumption. It has been estimated that every birth in the North puts as much pressure on resources as tens of births in the South. Just as poverty must be eradicated in the South, the life style in the North will have to be modified.

Nature of the Problem: Link Between Environment and Development¹⁰

During the two environmental decades (1972-1992), the major challenge before the government of India has been how to strike a balance between the urgent need to secure basic needs (food sufficiency, improve health and provide water for drinking, and shelter) and the need for environmental sustainability. Although various institutional and legal mechanisms were initiated, the pressures of a growing population, and generally weak system of environmental law enforcement have added to the seemingly intractability of the problem.

The Government of India was forced to acknowledge through its Policy Statement for Abatement of Pollution (1992) that “the state of the environment continues to deteriorate”.¹¹ India’s response to environmental problems is being watched by nations the world over. If India is able to prevent the deterioration of her environment as well as poverty, it will be an example for others in the Third |World to follow. The major environmental concerns of India today are the results of continuing poverty, growing population (including human settlements and movements), and the side-effects of enhanced industrial activities. India’s people are very impatient when it comes to improving their living conditions. They would not hesitate to put more demands on the environment if the short gains could ensure fulfilment of their daily basic needs.

Population in India has become a major source of environmental degradation because it now exceeds the country’s carrying capacity. Its population of 844 million in 1992 is increasing at the rate of 2.11 percent annually, which means about 17 million people are added each year. In addition, India has probably the largest cattle population on earth, about 500 million domesticated animals which have only 13 million hectares for grazing. The increasing population of both human beings and animals is putting tremendous pressure on the environment. In the race for survival, both animals and human-beings suffer. For example, over 250 million children, women and men of India suffer from under nutrition. The prospects for the future are grim indeed.

In addition to the alarming situation arising out of population pressure, India faces immense challenges from the side-effects of industrial development and human settlements.

(1) The forest cover is dwindling due to over-grazing and harvesting of trees for commercial and domestic-fuel purposes, and illegal encroachments. The actual forest cover in the country, according to the State of the Forest Report (1991), was 64.07 million hectares during 1987-88.¹² Most of the forest cover loss has occurred since independence. This has resulted not only in the extinction of rare plant and animal species, but has also contributed to soil erosion and floods.

(2) By the end of the 1980s, there were hundreds of large industries with only a few of them having any installed pollution abatement plants, with some of these non-functioning throughout the

year. In addition, there were many thousands of medium size industrial plants which did not have any pollution abating units. Although the situation improved significantly by 1995, the environmental damage has been done. Rivers and groundwater have become polluted. In the case of the River Ganga, the Government of India had to establish a special authority to monitor the water pollution-causing industries and to require them to install abatement units, as well as to require the local municipal authorities to install sewage treatment plants.

(3) In many cities, industrial activities are located in city cores close to the residential areas. Emissions from these industries are causing many respiratory diseases, aggravated by auto-emissions and population congestion. Unplanned an encroaching urbanisation is yet another environmental threat. India is actually facing a classic urban nightmare. In 1981, there were only 12 cities with over one million population, by 1991 this number has increased to 23. In 1951, India's urban population was 62 million, by 1981 this number had grown to 158 million, and by 1991 it grew to about 227 million. Of these, over 30 percent live in slums.¹³ When such a large number of people are concentrated in small unplanned spaces, they suffer not only from shortage of drinking water and sewer facilities but also from a host of other diseases.

(4) There is also the problem of environmental refugees from dam construction, mining and mineral exploration. An estimated 14.5 million people have been displaced, and among these only 3.9 million have been rehabilitated.¹⁴

(5) India is the largest producer and consumer of pesticides in South Asia. The most productive agricultural regions of the nation show a severe pesticide pollution problem. For example, "more than 665 people died in 1989-1990 because of pesticide poisoning, and thousands of cases of crippling resulting from pesticides have been recorded in the country".¹⁵

(6) Another worrisome problem is fertiliser pollution due to the intensive farming methods used in various parts of the country. Synthetic inorganic nutrients used generally escape to river basins, dams, and coaster waters causing algae growth, oxygen depletion, and related problems.

These are only some of the numerous environmental problems. Clearly India is facing double jeopardy with her attempt to industrialise as well as to face the challenge of poverty and growing population.

India's environmental problems are complex and the choices available are difficult. This requires a vision and an 'environmentally sound foresight' which should be reflected by formulating a proper environmental policy and translating it into institutions whose capabilities need to be enhanced so that they can function effectively as an integral part of the ESSD strategy.

We now consider in the next section a policy framework which may assist a nation like India with its objective of putting in place ESSD programs.

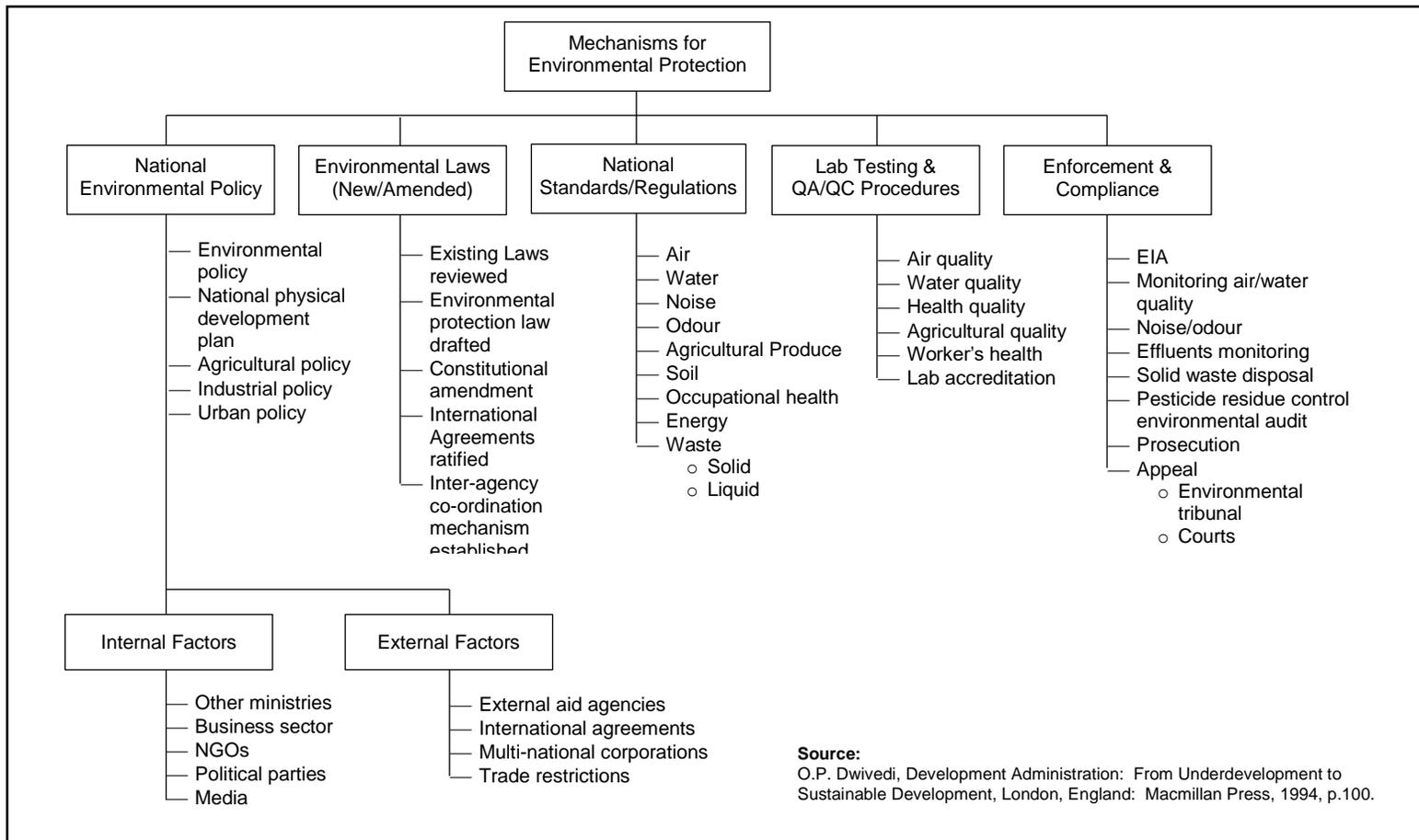
III. A FRAMEWORK FOR ENVIRONMENTALLY SOUND AND SUSTAINABLE DEVELOPMENT¹⁶

Each nation needs to bring the issue of ESSD from the margins to the mainstream of its political thinking and decision-making. A suggested framework (Cf. Figure 8.1) illustrates several interlocking mechanisms which should be considered by a country in its attempt to develop an integrated ESSD policy and pollution control strategy.

Policy Instruments

A country can utilise two types of policy instruments to attain its pollution control objectives: regulatory mechanism, or effluent charge strategy. The regulation-enforcement instrument requires that the authorities take the following four steps: set rules and regulations government the behaviour of industries in each of the sectors (including environmental audits, effluent control devices, maximum allowable limits on discharges, and so forth); establish a set of penalties for non-compliance; continually monitor the actions of targeted industries so that the instances of non-compliance can be detected with spot-checks and regular audits; and finally, make timely use of the judicial process in seeking the imposition of penalties on the defaulting industries.

Figure 8.1: National Framework for Environmental Policy and Management.



The effectiveness of this approach is based on the premise that even minor violations, if detected, would not be ignored by the enforcement authorities, that defaulting industries would first be given an opportunity to mend their ways before forced to pay major fines or injunctions, and that the enforcement authority has sufficient budget and human resources to enforce the law.

The *Effluent Charge Strategy* uses economic incentives such as effluent or emission charges. In order for this strategy to work, the enforcement authority ought to consider the following three steps: determine a set of charges or prices per unit of discharge of each polluting substance that is predicted to induce the necessary abatement actions on the part of polluters; continually monitor the level of discharges as well as establish a system of self-reporting with spot checks and environmental auditing mechanism; and levy the pollution charge over the reporting period. This approach provides a graduated incentive to industries by making pollution itself a cost of production. It also provides incentives for technological innovations.

Institutional Change

As the Brundtland Report indicated, environmental protection and management can no longer be safely left to weak and underfunded departments or to several departments with overlapping responsibilities. It is not enough to improve the quality and transparency of decision-making. The existing institutions and procedures must also be changed. Environmental considerations must be formally recognised as essential decision-making criteria within government and private sector organisations. To improve decision-making, all these partnerships must be strengthened and expanded.

Legislation Needed

To protect public health and the environment, effective laws should be passed and vigorously enforced. For example, through the Environmental Impact Assessment (EIA) process, governments should ensure that environmental factors are considered in decision-making. This can be done through the use of such regulatory mechanisms as bans, standards, guidelines, and permits.

National Environmental Standards

National standards pertaining to water, air, effluent emission, noise, waste, pesticide residues and odour should be established by all governments. It should be noted though that strengthened standards can only be achieved through increased investments from both public and private sectors as well as by concerted action on the part of the government regulatory agency.

Laboratory Testing and QA/QC Procedures

To monitor industrial emissions, effluents, and other polluting substances, a network of environmental laboratories is needed (both in public as well as in private sectors. To ensure that the procedures used by all the laboratories (especially those in the private sector, or even those operated by other ministries) are appropriate, and that properly calibrated analytical instruments are being used, there should be a proper accreditation programme to maintain the necessary quality assurance (QA) and quality control (QC) procedures. Without such a programme, prosecution of an environmentally-related offence may be difficult if the competency of the laboratory doing testing and analysis is in question.

Environmental Enforcement and Compliance

The success of enforcement and compliance strategy will depend on gathering sufficient evidence and information. The evidence in the form of a sample is generally sent to an accredited laboratory for analysis and testing. Enforcement involves regular inspection and monitoring to verify compliance, investigation of any violations, and applying measures to compel compliance. Prosecution and conviction is the final stage in the compliance strategy.

Environment Audit

Environmental audit is a basic management tool to be used by enterprises and commercial concerns to evaluate how well their management system and equipment are performing with respect to environmental laws and standards. It encourages industries to adopt low waste technologies (LWTs) and helps in minimisation of resource consumption. Environmental audit should be seen by industries as a part of their QA/QC process so that they can establish a “green edge” over their competitors in environmentally sensitive markets, both domestic and foreign.¹⁷ Governmental regulatory agencies should act as advisers to industries rather than enforcers; enforcement and compliance then becomes a joint responsibility.

Need for Public Participation in Decision-making

There is a growing recognition that the public has a right to information and that more direct citizen involvement will reduce conflict, enhance trust in agency decision and improve the quality of decision-making. Public involvement allows for raising of new issues and serves to counterbalance narrow agency biases.

Active participation is necessary to ensure that policies reflect public preferences. Procedural justice is necessary to foster public acceptance of government decisions.

Economic Instruments

Economic instruments that reflect environmental costs will encourage industry to take the environmental consequences of their actions into account. Possible measures include effluent taxes, tradable emission rights, deposit/refund systems and user charges. Sustainable development requires appropriate resource pricing and economic instruments to achieve environmental objectives. Used properly, these can ensure that the environment is more fully considered in production and consumption decisions made at all levels of society.

Strengthening Partnerships with Stakeholders

Better environmental decision-making requires cooperative efforts at all levels and with all the stakeholders. In addition to government, other stakeholders consist of the following groups: industry owners and operators, environmental non-governmental organisations (NGOs) and various community organisations, tribal and aboriginal communities, labour organisations, and various professional bodies. Each of these groups has an equal stake in the conversation, protection and sustainable use of the environment. The environmental NGOs are playing a crucial role in educating people about environmental issues. Business is an essential partner in the search for, and implementation of, effective solutions to environmental problems. Labour has an important role in changing the way decisions are made and in working with governments and the business community to achieve environmental objectives. Women, individually and through the many organisations of which they are a part, are also a key to changed decision-making. These partnerships will be essential in the long-term pursuit of achieving sustainable development.

IV. ASSESSING THE PERFORMANCE IN INDIA

The framework discussed in the previous section suggested that following mechanisms for an integrated environmental management policy and programs: (a) policy instruments, (b) institutional changes, (c) necessary legislation, (d) setting national environmental standards, (e) laboratory testing and QA/QC procedures, (f) mechanism for enforcement and compliance, (g) environmental audits, (h) need for public participation, (i) economic instruments, and (j) strengthening partnership with stakeholders. Let us see how India's policies and programs measure up against these factors.

Environmental Policy

Most of India's environmental policies and programs were introduced before the economic liberalisation policies in the early 1990s. The National Conservation Strategy and Policy Statement says: "The primary purpose of the strategy and the policy statement is to reinforce our traditional ethos and to build up a conservation society living in harmony with Nature and making frugal and efficient use of resources guided by the best available scientific knowledge".¹⁸ However, the capacity to transform this rhetoric into reality of building a conserver society against the onslaught of rapid economic growth will be difficult. Even when policies are translated into legislation, lack of appropriate research tools, financial resources, human management capabilities, and the time constraints to enforce measures result in administrative deficiency.¹⁹ In such circumstances, judicial remedies remain the only option available.

Institutional Changes

The Government of India established a Department of the Environment in 1980, then expanded its mandate in 1985 to include forests and giving it the status of the Ministry of Environment and Forests. A Central Pollution Control Board and State Pollution Control Boards were created to regulate pollution prevention activities. There are a number of government departments and ministries, including research organisations, which are involved in the environmental protection and conservation programs. The Ministry has initiated various legislative and administrative actions. However, environment is a state matter and the effectiveness of compliance, monitoring, and regulation depends much upon the machinery in the States. It is here where there appears to be bottleneck, and it is here where the real battle of ESSD is going to be fought.

Environmental Legislation

India's main environmental law is the *Environmental (Protection) Act* which was passed in 1986 after the Bhopal industrial tragedy. India's *Environmental (Protection) Act* is supported by two earlier pieces of legislation: the *Water (Prevention and Control of Pollution) Act* 1974 (with its amendment in 1988), and the *Air (Prevention and Control of Pollution) Act* 1981 (with amendment in 1988). There are other supporting laws such as the *Wildlife (Protection) Act* 1972 (amended in 1983, 1986, and 1991), the *Forest (Conservation) Act*, 1980 (amended in 1988), the *Public Liability Insurance Act* 1991, and the *Water (Prevention and Control of Pollution) Cess Act* 1977. These laws provide central and state governments with ample authority to control point source pollution. However, various institutional impediments (such as inadequate institutional capability, policy conflict, bribery, and undue emphasis on command and control in the administration of laws),²⁰ and the slow movement of cases through courts impede progress in this area.

National Environmental Standards

Under Part II, Section 3 of the Environment (Protection) Act of 1986, the central government has the authority to lay down standards "for the quality of the environment in its various aspects" and "for emission or discharge of environmental pollutants from various sources whatsoever". Further, the government is authorised to develop procedures and safeguards for handling of hazardous wastes.²¹ Effluent and emission standards have been specified for a variety of industries.

Laboratory Testing and QA/QC Procedures

The Environment (Protection) Act of 1986 empowers the central government to establish or recognise environmental laboratories and institutes.²² The Act further provides, under Section 23, the authority to the central government to delegate this power to the state government and other authorities. The federal government has designated more than 70 environmental laboratories throughout the country the analysis of water and air samples. However, two things remain to be done: (1) in order to have the same nation-wide QA/QC process, there should be a standard

procedure which must be followed by all such recognised laboratories with respect to testing, release of test-results, and protection of confidentiality; and (2) there should be a national training program in testing procedures for all technical and professional personnel in such environmental laboratories.

Mechanisms for Enforcement and Compliance

In India's case, several areas of environmental protection fall in the category of administrative traps. With the exception of solid and hazardous wastes, nuclear waste, and acid rain which are clearly in need of more regulation, the problem is not of numbers but of design and enforcement. It is not the absence of policy, but the inadequacy of its design as well as its enforcement that are at the core of the problem. In addition, there is a possibility that the compliance system may become excessively bureaucratic and administratively punishment-oriented. Under such circumstances, industries will have to seek court interference or to use other illegal methods to delay the compliance violations.

Environment Audits

On March 13, 1992, the Government of India through its gazette notification [No. GSR 329 (E)], modified the Environmental Protection Second Amendment Rules thereby requiring that any person carrying on an industrial activity (including operation and processing) shall submit an environmental audit report for the financial year ending on March 31st in the form prescribed to the State Pollution Control Boards. The form requires information such as quantity of raw material (per unit of product) used in the processing and manufacturing (including water used), quantity of pollutants generated in terms of air and water, the quantity of solid waste generated, and information on recycling and reuse of such waste. The basic thrust of this scheme is to promote environmental accountability at the point source level, adoption of low waste technology, and the minimisation of raw resource consumption. Out of hundreds of thousands of industries in operation in India, only 2995 submitted audit reports by December 1993.²³ As there was a widespread non-compliance, deadlines were extended a number of times.

Industries are against this requirement because they feel that the data may not remain confidential, or the data may be used by other regulatory agencies for prosecution.

The environment regulatory agencies of India have an extremely difficult task of assuring industries that their audit reports will not be used to instigate prosecution or litigation. There is also a lack of trained and qualified professional environmental auditors. Finally, the cost of hiring environmental auditors may be prohibitive to small industries as the fee may be between 75,000 to 200,000 *Rupees*. And even in those cases where audit reports have been filed, these “are not double-checked to find out whether the forms hold the correct data...the industries do not get any feedback”.²⁴

Economic Instruments

The thrust of India’s environmental policy is regulation and enforcement. However, various fiscal incentives have been provided to industries so that pollution from point sources can be controlled. According to the 1993-1994 Annual Report of the Ministry of Environment and Forests, industries may seek: (a) 100 percent depreciation allowance for installing pollution control devices; (b) lowering of custom and excise duties for goods and material used for pollution control programs; (c) financial assistance (for small-scale industries) for capital investment in effluent treatment plants; and (d) loans at substantially reduced rates of interest by banks for the instalment of pollution control systems.²⁵ However, the effect of these incentives has been minimal. Either industries are reluctant to seek loans and financial assistance due to the prevailing corruption-plagued decision-making practices of financial institutions, or they feel that they are better off by handling the situation through extra-legal manners until such time when the system of enforcement and compliance becomes universally tight. In addition to the availability of such incentives, the government is also considering instituting an effluent tax, resources-cess for industry, and implementation of environmental standards based on the production capacity of industries and resources used.

Strengthening Partnerships with Stakeholders

There is an erroneous perception in India that there are only two groups, governmental institutions and environmental NGOs who ought to be recognised as the main stakeholders for the environmental protection and conservation. However, owners and operators of various industries are affected by government policies, rules and regulations. Further, India has a significant number of tribal areas. Tribal people who have been victimised by various developmental projects are now resisting changes. Deforestation, mining, and hydro-power projects are affecting their health, indigenous culture and their environment. In addition, one should not exclude cultural and religious organisations.

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The federal government policy statement on environment and development has acknowledged that NGOs, citizen groups and village level institution like forest panchayats and Gram Sabha “should be empowered with *locus standi* and support for mobilisation of public opinion and participation in development activities”. Further, a network among NGOs and interface between them and governments is needed “to work on community involvement, providing information on environmental surveillance and monitoring, transmitting development in science and appropriate technology to the people at large”.²⁶ In addition, the role of women’s organisation related to the environmental protection is being encouraged. One of the most celebrated examples of public participation and NGO activity is the Sardar Sarovar Dam controversy which the Narmada Bachao Andolan (movement to save Narmada River) under the leadership of Ms. Medha Patkar has undertaken. In almost every area of environmental protection, the government’s decision-making process has rarely been participatory. When people face bureaucratic hurdles and insensitivity on the part of governmental machinery, they use the instrument of *satyagraha*. Local groups (such as *Van Samitis* – forest committees in Palamau, *Van Suraksha Samiti* – forest protection committee in Tehri Garhwal, or *Kerala Sastra Sabitya Parishad* – which took the cause of save Silent Valley) are taking serious interest in the protection and conservation of their surrounding environment.

The role of environmental NGOs in India has been steadily growing and their numbers are increasing. In 1989, according to the World Wildlife Federation (WWF) India, there were 908 NGOs and voluntary organisations registered for work on environmental related causes.²⁷ Notwithstanding a healthy growth of NGOs working in the environmental field, they are yet to be accepted by governmental machinery as equal partners simply because some of them have aligned themselves with the existing adversarial political process. At the same time, environmental NGOs are generally distrustful about actions of environmental ministry/department officials because from their viewpoint, governmental machinery is inflexible and unimaginative and most government officers do not show commitment to the cause of environmental conservation and protection. There is a need for both sides to work closely.

CONCLUSIONS

India has ample legislative and administrative authority to handle various environmental problems. Enforcement and compliance remain the biggest challenge before the federal and state governments. Inter-ministerial jurisdictional conflicts, and the lack of proper coordination and cooperation among the government ministries plague the system.

A framework for sustainable development and environmental management, as discussed in an earlier section of this paper ought to vary from country to country. For example, in the case of countries such as India and China, it has to be charted against the backdrop of tremendous population pressure which in turn has given rise to deforestation, soil erosion, the silting of rivers and streams, and desertification. Development for such nations will have to become synonymous with environmental protection and conservation. Sustainable social and economic development calls for a determined fight against poverty, which is related to population pressure. Thus, at the national level, developing nations should consider establishing a national population policy which recognises the interaction between population and the environment. This framework would call for action on three fronts: evaluating the environmental implications of population growth and its urban/rural mix, assessing the environmental impact of the public's use of natural resources, and considering human-centred development measures (such as fulfilling basic needs and upgrading the status of women) as an integral part of development policies.

It should be noted that the state of the environment of a nation cannot be isolated from the state of the world environment and economic development. It is a closed circle. Developing nations are acutely aware of the fact that poverty is the greatest threat to the quality of the environment anywhere. The poor not only suffer extensively from the environmental damage caused by their rich cousins, but they themselves are also the cause of environmental decline. Environmental degradation and economic deprivation are interrelated. No country or a group of nations can tackle the world-wide problem of environmental pollution single-handedly. We live in a world of shared and interacting environmental resources. It is imperative for us to believe in the right of all people anywhere on earth to have access to a quality environment.

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One thing is clear about the environmental crisis in India; during the past two environmental decades, especially since the 1984 Bhopal disaster, there has been a steady and growing awareness among the elites about the ecological challenges facing the country. This has been followed by an impressive growth of institution seeking to deal with the problems of pollution and environmental conservation both at the national and provincial levels. At the same time, the mounting pressures of population, expanding urbanisation, and the growing base of poverty have led to the ecologically unsustainable exploitation of natural resources which is threatening the fragile balance between ecology and humanity in India. Although India is not alone in this challenge, nevertheless, its problems will have to be tackled by its own people. The real challenge before India is how to meet the basic needs of its growing population on an overburdened land, and leave a legacy for its future generation so that they may also enjoy the bounty of nature which the present generation is recklessly exploiting. The hitherto unimaginative developmental strategies and largely imported developmental schemes will have to be replaced by environmentally sound and sustainable development. India must search for ways to usher in the *Environmental Sarvodaya* so that the problem of waste becomes manageable as the nation prepares to enter the Twenty-first Century. For this, the country would do well not only by borrowing from its rich cultural heritage and traditional conservation ethos, but also by learning from the experience of industrialised nations, as well as looking for a way ahead keeping in harmony with environmental imperatives of the land.

ENDNOTES

1. World Commission on Environment and Development, Our Common Future (New York: Oxford University Press, 1987), p.43.
2. World Commission on Environment and Development, p.5.
3. World Bank, World Development Report 1992: Development and the Environment (New York: Oxford University Press, 1992), p.34

4. World Bank, p.8.
5. The source of this term is Gita, verse 20, chapter: Loka-sangrahamevapi sampasyan kartum arhusi. The concept has been explained by Tilak in his commentary on Gita: the word 'Loka' has a comprehensive meaning which includes both humanity and the entire cosmos while 'Sangraha' means "maintaining, feeding, protecting, and defending it [Loka] in a proper way, without allowing it to be destroyed". Bal Gangadhar Tilak, Shri Bhagavad-Gita Rahasva (Poona, India: Tilak Brothers, 1902), p.927.
6. Anna Cabre, "Population Growth and Environmental Degradation," All of Us (Barcelona, Spain: Centre UNESCO de Catalunya, November 1992), p.2.
7. Mrs. Indira Gandhi, Address at the UN Conference on Human Environment, Stockholm, Sweden, delivered on 14 June 1972. Government of India, Agenda Notes for NCEPC Meeting (New Delhi: Department of Science and Technology, 28-29 July 1972), p.2.
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INTERGOVERNMENTAL RELATIONS WITH RESPECT TO WASTE MANAGEMENT IN KANPUR

R.B. Jain, O.P. Dwivedi and A.K. Biswal

INTRODUCTION

Not long ago, both domestic and industrial wastes were considered as residuals meant to be discarded. However, perceptions have changed during the last few years. One of the major environmental issues facing a developing nation like India is how to manage industrial and commercial wastes. For example, the mega cities of India produce huge quantities of waste some of which may contain toxic and hazardous materials. The incident (November 13, 1994) of poisonous emissions from burning of waste material believed to be cyanide, by a rag picker in East Delhi, which made about 500 people ill and caused four deaths illustrates how lethal material gets into garbage.¹

This paper is an analysis and review of various policies, rules and regulations which govern the process of waste management in India with particular emphasis on industrial wastes. It also examines the area of conflict and cooperation arising among different levels of government. Reviewing the policies of the federal government of India in this respect and the relative role of state governments and local authorities (with a focus on the state of Uttar Pradesh and the industrial city of Kanpur as a case study), the paper makes a strong plea for a more rigorous coordinated effort at various levels including the national government, state government, urban local bodies, international agencies, the community and the private sector in order to tackle the problem of waste management. Intergovernmental cooperation is most essential for achieving the goals of environmental-friendly waste management. [For background to the issue of sustainable development and environmental management in India see papers by Dwivedi, Achteell and Coates in this volume].

I. POLICIES AND LEGISLATIONS ON ENVIRONMENT PROTECTION AND POLLUTION CONTROL IN INDIA

To protect the environment from pollution due to various sources, there is no dearth of laws, regulations, policies and enabling legislation in India. In the Constitution of India, there are some specific provisions² on environmental protection. Besides there are acts like the *Water (Prevention and Control of Pollution) Act* 1974, the *Water (Prevention and Control of Pollution) Cess Act* 1977, the *Air (Prevention and Control of Pollution) Act* 1981, the *Environmental (Protection) Act* 1986, and a series of Rules thereunder including the *Manufacture, Storage and Import of Hazardous Chemicals Rules* 1989, and the *Public Liability Insurance Act* 1991. Most of these acts deal with industrial pollution and industrial effluents. In another act, the *Factories Amendment Act* 1987, there is a provision by which Site Appraisal Committees set up by the state governments scrutinise all applications for new hazardous plants as well as expansion of existing plants, to assess the risks to the surrounding environment.³ The *Environment (Protection) Act* 1986 is another enabling legislation with a broad sweep to prevent, control and abate all types of environmental pollution. It defines procedures and safeguards for the manufacture and handling of hazardous substances.⁴ The *Water (prevention and Control of Pollution) Act* 1979 established the Central Board for the Prevention and Control of Water Pollution as well as similar boards in all twenty-five states.⁵ Under the Act, the state boards are empowered to formulate and enforce standards related to industrial effluents. The Central Board performs similar functions in the union territories and coordinates activities among the state boards.

The government of India, while setting lofty objectives for rapid industrial growth and development in its statement on Industrial Policy (1991), has categorically stated that the pursuit of these objectives will be tempered by the need to preserve the environment and ensure the efficient use of available resources.⁶ The government of the state of Uttar Pradesh also placed similar emphasis on environmental protection and pollution control in its Industrial Policy of 1994 as:

...considering the importance of environment, special efforts will be made for protecting the ecological balance and environment while promoting industrialisation. Directorate of Environment will also play the role of friend and guide. It is in this context that a Working Group has been constituted under the chairmanship of Director, Environment. This Working Group has representatives from industrial organisations. The Pollution Control Board and the Directorate of Environment shall effectively publicise information pertaining to prevention of pollution. Accreditation shall be given to private institutions so that the objective of keeping the environment clean is fulfilled and industrialists too are not unnecessarily harassed.⁷

As in many other countries, the problem lies in the implementation of these policies. An official in the Office of the Directorate of Industries, Kanpur, remarked that “no work is done on the implementation level no matter how much policies are made each year”.⁸ There are many policies which are respected more in violation than in practice by the industries due to governmental apathy. The government of India is conscious about the problem of implementation but the remedial measures taken are simply inadequate.

II. INTERGOVERNMENTAL ASPECTS OF WASTE MANAGEMENT IN INDIA

Crucial to effective implementation is proper coordination among the different government agencies. In this paper the roles of the federal government of India, the state government of Uttar Pradesh and the municipal government of Kanpur in controlling industrial pollution are discussed. Also, comment is made on policies with regards to industrial technology, programs on research and development (R&D), various incentive programs influencing locational decisions and investment priorities with particular emphasis on Uttar Pradesh and the city of Kanpur. These do impact the generation as well as the management of industrial wastes.

Role of the Government of India

The federal structure of India has made the central government more responsible and accountable in environmental protection and pollution control than the states and the union territories. Through the Ministry of Environment and Forests (MEF) and the Central Pollution Control Board (CPCB), the federal government plays a vital role in safeguarding the quality of the environment. The main objectives of the MEF are “conservation and survey of flora, fauna, forests and wildlife; afforestation and regeneration of degraded areas and protection of environment”.⁹ The MEF manages its function of prevention and control of pollution primarily through the activities of the CPCB. The Ministry, through its Environmental Impact Assessment (EIA) responsibilities, has developed guidelines for the preparation of EIA statements. By this process various projects are either approved or rejected on the basis of some set standards. In the language of the MEF:

While according environmental clearance necessary safeguards for pollution control, energy conservation, wastewater recycling and adoption of clean technology were stipulated for avoiding adverse impact on the environment.¹⁰

In the case of industrial pollution, the MEF sets “time bound targets for compliance of pollution control requirements in highly polluting industries”.¹¹ The central government also provides assistance to the State Pollution Control Boards (SPCBs) and state/union territory Departments of Environment for “strengthening their manpower and procurement of scientific equipment”.¹²

According to an Additional District Magistrate of Kanpur,¹³ most of Kanpur’s industrial waste is dumped untreated into the Pandu River, which meets the Ganga downstream from Kanpur. Despite the fact that this waste enters the Ganga downstream, it is still recognised as Kanpur’s responsibility. The city, or more specifically, the District Magistrate, is responsible for ensuring that court decisions related to industrial polluters are complied with. The concerned courts, in turn, receive recommendations from the Uttar Pradesh Pollution Control Board (UPPCB) that a particular industry be closed.

Central Pollution Control Board

Being the principal pollution control organ of the MEF, the CPCB is at the apex of the pollution control bureaucracy. The CPCB’s objectives are “to promote cleanliness of wells and streams in different areas of the states by prevention, control and abatement of water” and “to improve the quality of air and to prevent, control or abate air pollution in the country”.¹⁴

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The activities of the CPCB include”

- (i) setting minimum standards for ambient air and water quality
- (ii) providing technical advice to SPCBs
- (iii) coordinating the activities of the SPCBs
- (iv) training SPCB personnel
- (v) formulating action programs at the national level for dealing with problem areas and problem industries
- (vi) developing methodologies for monitoring
- (vii) publishing documents, including comprehensive industry-specific documents which provide information on issues such as available technology, costs and regulations disseminating information to SPCBs for action, and
- (viii) providing technical information to initiatives such as the Ganga Action Plan.¹⁵

The CPCB carries out these functions as Central Board at the national level and as the state board for the states and union territories.

National Waste Management Council

Realising the need to establish a focal organisation to coordinate activities of various sectors of the economy, the government of India constituted the National Waste Management Council (NWMC) in 1990. The objectives of the NWMC are to¹⁶:

- (i) promote and collect, collate and publish information regarding the availability of wastes, technologies for waste and markets for recoverable materials
- (ii) analyse information to overcome constraints to commercialisation of available technologies for both waste utilisation and waste minimisation and identify areas in which new technologies need to be developed

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- (iii) render advice to the government, industry and such other sectors as may seek their advice on the aspects of waste management and on incentives/disincentives needed to facilitate waste utilisation
- (iv) recommend R&D schemes for developing new technologies
- (v) advise government on fiscal//regulatory measures to promote waste utilisation, and
- (vi) promote of measures to create awareness among those concerned.

The setting up of a coordinative body like NWMC by the central government is a constructive step. Expressing its concern over the hazardous nature of various industrial wastes and lack of adequate control provisions, a sub-group of NWMC has suggested that “the industries should be encouraged to utilise wastes for recycling and reuse”. It further recommended the provisions of “tax incentives for this purpose to encourage investment in this area”.¹⁷

The Government of Uttar Pradesh and Control of Industrial Pollution

As in many federal countries, the implementation and enforcement of the environmental law and policy formulated by the central government of India is primarily the responsibility of the state governments. In this section, the role of the state in the enforcement of industrial pollution control regulation is examined within the context of the state of Uttar Pradesh.

Uttar Pradesh’s Department of Environment (DOE) and the UPPCB are instrumental in enforcing the pollution control measures as per the directive regulations of the central government. Their main function is to ensure that industries obey the regulations and use pollution control mechanisms. The central government assists with the funding of the DOE activities. Through UPPCB, the DOE issues no objection certificates to industries. The issuance of the certificate involves checking the plans for industrial units to ensure environmental considerations. The DOE operates its own research laboratories and provides advice to industry on how to meet environmental standards. It also organises conferences and seminars. The UPPCB implements central government regulations at the field level. Among its major functions are:

- issuing no objection certificates
- notification of effluent and emission standards
- development of treatment technologies
- instituting legal action against violators, and
- monitoring of air and water quality including quality of emissions/effluents.¹⁸

Enforcement of Pollution Control by the Government of Uttar Pradesh

The monitoring and inspection activities of UPPCB help in identifying industries which violate pollution control standards. A deadline for compliance is then generally set for those industries. In order to assist industries in complying, the UPPCB has technical consultants which will, for a fee, advise on technology change. If, after the deadline for compliance has passed, the defaulter's emission remain above the described standards, the UPPCB will initiate prosecution on its own behalf. The capital of Uttar Pradesh, Lucknow, has established a special 'environmental court' for this purpose.

According to the various acts, penalties upon prosecution can include closures, fines, and/or imprisonment.¹⁹ For example, for decades the holy river Ganga has been receiving millions of untreated domestic sewage from hundreds of towns and cities and toxic industrial effluents from thousands of industries, located along its 2,500 kilometre stretch. This once self-purifying river is slowly being turned into a toxic dump by highly polluting industries, as well as by municipalities along the Ganga Basin.²⁰ Taking the entire Ganga Basin area of Uttar Pradesh (excluding Kanpur) as an example, between 1987 and 1993, 860 industries were identified as "water polluting". Out of these, 191 did not respond to notices issued to them by UPPCB in September 1993 for submission of a report on pollution control status. These 'wilful defaulters' were subsequently ordered closed by the Supreme Court of India. Another 3 which did not make progress regarding installation of effluent treatment plants (ETPs) were directed to close. Therefore, a total of 234 industries were ordered closed. However, 142 subsequently installed ETPs and were permitted to reopen. Of the remaining 626 "water polluting" industries, 493 installed ETPs, of which 261 were able to meet standards and the remaining 232 being in default. These defaulters are required to meet standards either by technical upgrades or by proper operation and maintenance of ETPs.

Out of the remaining 133 industries, 66 are in the process of installing ETPs and 67 have remained closed.²¹ The judiciary in India is thus emerging as an important player enforcing compliance with environmental legislation and pollution control standards.

The City of Kanpur

Kanpur, the largest city of Uttar Pradesh and the state's business and industrial capital, is considered one of the highly polluted cities of India. It appears unable to deal with pollution despite the fact that, as one of India's larger and most industrialised cities, it has an extensive institutional infrastructure for industrial pollution control.

Central Pollution Control Board, Kanpur Zonal Office

The CPCB's Kanpur Zonal Office is the regional office of the CPCB for the states of Uttar Pradesh, Rajasthan and Madhya Pradesh.²² The Zonal Office, with a staff of 20, assists states in the implementation of national policies. It monitors emissions to the Ganga and other rivers, and provides general advice to industries on how to meet prescribed standards. The Kanpur Zonal Office has also been indirectly involved in Ganga Action Plan through the identification of 34 industries which were polluting the river. Twenty-two of these industries were Kanpur-based. Outside of its monitoring activities, the Kanpur Zonal Office does not play a direct role in the enforcement of environmental law, as this is the domain of the SPCBs. Furthermore, due to staffing and financial limitations, what monitoring and investigative activities the Zonal Office does perform are directed at large industries and industrial clusters to the neglect of small-scale industries (SSIs).²³

UPPCB Kanpur Regional Office

With a staff of 45, the Kanpur Regional Office of the UPPCB is responsible for the implementation of pollution control regulation in the Kanpur region.²⁴ The primary function of the Regional Office, which is one of thirty in Uttar Pradesh, is to carry out monitoring and inspections so as to ensure that ETPs are being properly operated and that effluent standards are met.

The role of the Regional Office includes ordering inspections, carrying out surprise inspections, and giving testimony in court related to allegations of default. When an industry is found to be in violation of pollution control regulation, the five district agencies empowered to implement environmental law are informed.

These are the electricity board, the water board, the superintendent of police, the industrial licensing authority, and the district magistrate. These agencies can effectively close an industry by, for example, disconnecting its power supply.

If the Regional Office is approached by an industry for advice on how to control pollution, advice is given for a nominal fee. The process usually begins with the testing of effluent to determine the level of pollution being generated before specific measures are recommended. The Regional Office also has at its disposal a technical advisory cell consisting of outside consultants. Despite the growing rate of industrialisation in the Kanpur region, the Regional Officer feels that the current system is efficient and effective in controlling pollution.²⁵

III. OTHER RELEVANT GOVERNMENT LEGISLATION

When analysing the role of the various levels of the government in environmental pollution control, one cannot forget the impact of policies. For example, policies potentially influence industrial technology and R&D programs, as well as the type of technologies adopted by industry. The government of India, in its Statement on Industrial Policy (1991), has made it clear that it “will continue to pursue a sound policy framework encompassing encouragement of entrepreneurship, development of indigenous technology through investment in R&D, bringing in new technology, dismantling of the regulatory system, development of the capital markets and increasing competitiveness for the benefit of the common man”.²⁶ Foreign investment and technology collaboration will be welcomed to obtain higher technology, to increase exports and to expand the production base.²⁷ According to the government, “foreign investment would bring attendant advantages of technology transfer, marketing expertise, introduction of modern managerial techniques and new possibilities for promotion of exports”.²⁸ Further, “in order to invite foreign investment in high priority industries requiring large investments and advanced technology, it has been decided to provide approval for direct foreign investment up to 51 percent foreign equity in such industries”.²⁹

“With a view to injecting the desired level of technological dynamism in Indian industry, the government will provide automatic approval for technology agreements related to high-priority industries within specified parameters. Indian companies will be free to negotiate the terms of technology transfer with their foreign counterparts according to their own commercial judgements”.³⁰

“Hence, in its industrial policies, the government of India is emphasising foreign investment and technology transfer as well as technology import. This no doubt will be vigorously pursued in the present atmosphere of rapid economic liberalisation. The assumption is that Indian industries, facing the competition and pressure of foreign technology import, will invest much more in R&D to develop indigenous competence”.³¹

The industrial technology policy of the government is bound to influence pollution control in the sense that some of the imported technologies may include those that reduce, recycle or treat wastes generated. The state of Uttar Pradesh has also devised its industrial policy with the aim of “creation of a healthy and progressive industrial environment” for “boosting the pace of industrial development”.³² Among the strategies are “encouragement to foreign capital investment in partnership with Indian industrialists for setting up of industries and developing infrastructural facilities, easy availability of institutional finance for setting up of an industry and their expansion, identification of priority sectors for industrial development and an incentive policy to promote such industries”.³³

In order to attract large industrial and commercial undertakings to the state, it has been proposed that special incentive be given to such units. As such, an “empowered committee has been constituted under the chairmanship of the Chief Secretary” of the state “to ensure timely release of sanctions for putting up an industry”. This committee has been authorised to consider special concessions to industrial units which have an investment of more than Rs 50 *crore* on a case-to-case basis.³⁴ Decisions shall be taken on the basis of location of the unit, employment potential and the possibilities of downstream projects, apart from the contribution to the general economic development of that area. Regarding foreign investment, the state government is in favour of encouraging foreign capital investment, with special emphasis being laid on attracting investment for developing infrastructural facilities.³⁵

“Optimum utilisation of existing investment by industrial units is the prime concern of the state government”. “A number of facilities/concessions have been provided to the sick units with reference to deferment of Trade tax, electricity dues, excise dues and payment of debt”.³⁶

In the city of Kanpur, R&D activities are being undertaken in some institutions like the Harcourt Butler Technological Institute (HBTI), the Indian Institute of Technology (IIT), the National Sugar Institute, the Central Leather Research Institute (CLRI), and the Government Textile Institute in the field of industrial waste technology.³⁷ Apart from HBTI and IIT, which are doing research for all kinds of industries, the institutions mentioned above are undertaking specialised research seeking cost-effective technological approaches to control pollution, minimise waste and treat the effluents. The Kanpur Branch of the National Environmental Engineering Research Institute (NEERI) is involved in hazardous waste facility siting.³⁸

Interestingly enough, despite the fact that there is no dearth of policies on environmental protection and industrial pollution control, officials concerned with industries are themselves sceptical about the government’s seriousness in translating these policies into action. Higher officials in the District Industrial Centre, Kanpur, and Directorate of Industries, Kanpur, take the general view that there is no visible work and sincere initiatives on the part of the government, either the union or the state. When pondering over these remarks, one is left wondering who is the government these bureaucrats refer to. Are they themselves not part of the government? Should they not feel responsible for the failure of the government in successfully abating pollution?

This scepticism among government officials has also been expressed regarding recent policy pronouncements on clean technologies. The third conference of Chief Ministers of the state governments held on September 17th, 1994 recommended that a national policy on clean technologies for power generation be enunciated. Such a policy could bring about a replacement of coal and other polluting fossil fuel-based technologies by sustainable renewable technologies.³⁹ It was agreed to take up demonstration projects for recovery of energy from urban, municipal, industrial and agricultural wastes and to provide the necessary budgetary allocations in state plan for this purpose.

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The ministers also agreed to issue suitable directives to concerned authorities, local bodies and industry associations to include energy recovery as an integral component of the waste disposal schemes and programmes for which the central government would also provide suitable technical and financial support.

With regard to the above recommendations, it was mentioned by yet another official in the Directorate of Industries, Kanpur, that although the policy was very good, the instructions given to the state government by the central government were not feasible. Due to practical problems relating to enforcement as well as the paucity of financial resources, objectives could not be achieved in the near future. Another higher official in the same Department was critical of the judiciary and the CPCB (Zonal Branch) for their orders to close industries without giving them the proper directions as to where to get the effluent control devices and the technical know-how to make them functional.⁴⁰ The official was also discouraged about the level of coordination among various departments and government organisations involved in pollution control. It was felt that there was a discernible apathy among them (i.e., to mutually interact and communicate with each other). The same official was of the opinion that inter-departmental relationship was in a state of confusion. The official was quite critical of the CPCB's inclusion of even smaller industries in the 17 categories of industries identified as responsible for causing pollution. When accusing the central government of sometimes formulating faulty and impractical policies, the official alleged that the state's policies were very much generalised without pinpointing priority areas.

There is plenty of evidence that notwithstanding the numerous environmental regulations and policies, the industrial waste pollution problems appear unaltered. There are several explanations. The overlap and duplication of supervisory powers generate confusion and conflicts among various departments and agencies concerned with the problem. In many places the central government has failed to bring coordination and harmonious division of functions among the various organisations responsible for pollution control and environmental protection. Practical advice and guidelines to industries to install required technologies for effluent control have been much less than satisfactory. Little attention has so far been given to the problem of developing suitable waste technologies⁴¹ for the industries. The lack of professional expertise in sector agencies has often resulted in the selection of unsuitable equipment and the application of technologies that not cost-effective.⁴¹

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There is also lack of coordination and direction in R&D efforts and inadequate incentives for technology transfer from the laboratories to industry. No enough funding is provided for pilot-scale demonstration of laboratory results. Low value is placed on technology transfer by scientific and technological personnel engaged in R&D work.⁴²

One of the leading experts in the area has suggested the following priority areas for a suggested plan of action:

- (a) a national Master Plan should be prepared to highlight important issues, identifying thrust areas, and develop a work programme along with the framework of technical and financial support needed to achieve it
- (b) appropriate technical guidelines for industrial waste management activities should be developed
- (c) demonstration of pilot projects at national and state level on proper design and operation of waste management systems should be established
- (d) adequate R&D activities to develop appropriate equipment and technology should be carried out vigorously, and
- (e) effective sector monitoring and planning at the national level, with continuous and systematic data collection, should be developed.⁴³

There is also a great need to clearly define the boundaries of responsibilities of various organs of the government related to the function of pollution control and industrial waste management so as to avoid the duplication and overlapping of jurisdiction and the resulting conflict and confusion.

CONCLUSION

This complex problem of industrial waste management and industrial pollution control represent a formidable challenge for the government at all levels in India due to technical, institutional, legal and such other constraints. The problem needs to be tackled by coordinated efforts among various levels of government and agencies if cost-effective solutions are to be found.

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There should be coordination in technology transfer, information dissemination, financial assistance and monitoring by the central and state governments, and regulation of industries. The state governments should be consulted on a regular basis by the central government in various policy and implementation matters on the management of waste and controlling pollution.

In the field of technology, emphasis should be given to low waste technologies. With its vast technical manpower and scientific skill, India is capable of technological innovations in the area of industrial waste management.⁴⁴

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INSTITUTIONAL IMPEDIMENTS TO THE USE OF LOW WASTE TECHNOLOGIES: A CASE STUDY OF INDUSTRIAL WASTE MANAGEMENT IN INDIA

E. Achtehl

INTRODUCTION

It has been said that India's environmental problems can be classified into two broad categories. The first refers to problems arising as negative effects of the process of development and the second refers to those arising from conditions of poverty and underdevelopment.¹ It has also been argued that in order to overcome these interrelated problems, a concerted effort at integrating environmental considerations into decision making at all levels is essential.² In other words, it is necessary to "harmonise economic development and environmental imperatives."³ This is because "environmental conservation is, in fact, the very basis of all development."⁴

The purpose of this study is to demonstrate that although the groundwork for a movement towards sustainable development has been laid in India, there is a serious gap in implementation due to various institutional impediments. This paper looks specifically at the non-nuclear industrial waste management component of sustainable development. In this area, despite an ostensibly stringent framework of pollution control regulation as well as a policy agenda stressing the use of low waste technologies (LWTs), the problem of industrial pollution is worsening. This work, which is based on an analysis of primary and secondary documentation, as well as personal interviews and participant observation carried out in India from August to November 1994, will focus specifically on the institutional impediments to the adoption of LWTs.

I. THE PROBLEM OF INDUSTRIAL WASTE IN INDIA

While India faces a myriad of pressing environmental problems,⁵ this work focuses on the problem of industrial waste management. Under the current program of economic liberalisation, intended partially to overcome the problem of international debt and encourage foreign investment, India's significant industrial sector is likely to grow at a faster rate. These "strides in industrialisation" have brought "unwanted and unanticipated consequences."⁶ Migrants leave environmentally bankrupt rural areas and seek work in poorly regulated, polluting, and accident-prone industries. These industries not only contribute to the devastation in the countryside, through effluent and the demand for natural resources, but also to the problem of "unplanned and encroaching urbanisation." India is "facing a classic urban nightmare,"⁷ with all that this entails, including conflict over limited services and employment opportunities.

In 1990, India's National Waste Management Council (NWMC) reported that due to "outdated technology" and "an unsystematic and hazardous way of (industrial waste) management" India has been experiencing "serious environmental degradation."⁸ In 1993, the Government of India's Environment Action Programme gave an indication as to the environmental impacts of the country's high levels of industrial waste generation. High values of carbon monoxide, sulphur dioxide, and suspended particulate matter in cities and towns are indications of industrial pollution. Besides the obvious health and environmental impacts, the almost intolerable levels of air pollution in India's cities are wreaking havoc on the country's renowned architectural heritage.⁹ Low dissolved oxygen, high biochemical oxygen demand, ammonia, and heavy metals have been recorded along India's principal river stretches.¹⁰ In 1994, the Government of India was compelled to identify nineteen river stretches as "grossly polluted" under the National River Action Plan.¹¹ A survey undertaken by the Central Pollution Control Board (CPCB) of 241 Class II cities (population under 100,000) in 17 states "indicates that on an average, 90 percent of the water supply is polluted. Only 1.6 percent of the polluted wastewater gets treated."¹² In 1991 the World Bank reported that:

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industrial sources, although comparatively smaller in volume, compared to municipal discharges, continue to contribute over one third of the total load of pollutants into rivers and other water bodies. About half of this load originates from large and medium scale industries, especially those in the chemical and related sectors. Sources of water pollution are particularly worrisome given the periodic water shortages in the country and already large impact of industrial sources of pollution on the quality of surface waters and groundwater reservoirs.¹³

The scarcity of safe drinking water has resulted in “water riots” in several cities¹⁴ and could contribute to the problem of environmental refugees. An analysis of the causes of these high levels of air and water pollution concluded that “the conventional end-of-pipe control technologies have not been able to curb pollution to the desired effect, nor able to achieve reduction in energy utilisation per unit of output.”¹⁵ Therefore, a policy shift towards the promotion of LWTs, which is consistent with the goals of sustainable development, was deemed necessary.

Although the barriers to sustainable development in both developed and developing countries are many, the problems in developing areas are of a primarily “institutional” type. Atkinson defines institutions as:

configurations or networks of organisational capabilities (assemblies of personal, material, symbolic, and informational resources available for collective action) that are deployed according to rules and norms that structure individual participation, govern appropriate behaviour, and limit the range of acceptable outcomes.¹⁶

In essence, an institution is a conglomeration of people, rules, and organisation.¹⁷ An institutional impediment, then, refers to an inadequacy on the part of one or more of these constituents parts which renders an institution incapable of fulfilling its assigned mandate. In India there are numerous problems related to the realisation of sustainable development which fall into the category of “institutional impediments”. Before identifying the institutional impediments to the use of LWTs, an overview of environmental policy for LWT is presented.

II. RECENT INITIATIVES ON LOW WASTE TECHNOLOGY

The problem of industrial pollution in India is in part the result of unplanned and overly rapid industrialisation, as well as too great an emphasis on pollution control rather than prevention through waste minimisation. In response to this problem recognition, there exists in India a broad policy agenda for LWTs. As such, the LWT approach to industrial waste management is promoted by different environmental actors, including government agencies, international lenders, research institutes, non-governmental organisations (NGOs), and industrial organisations.

Given its position at the top of the environmental policy hierarchy, the Central Government plays a pivotal role in the promotion of LWTs in industrial development. The low waste approach is indicated in various policies and programs for environmental protection. For example, the Ganga Action Plan (GAP), launched in 1986 in response to findings that this important national river was being irreparably damaged by municipal and industrial waste, has seen the construction of 28 electric crematoria and the release of 36,000 turtles into the river near Varanasi which, “besides maintaining the river ecology also aids in pollution abatement by feeding on dead decaying detritus and other organic material.”¹⁸ However, the emphasis of the GAP is clearly on treatment rather than reduction of waste. The overall objective is to arrest the degradation of the Ganga through interception, diversion, and treatment of domestic sewage and “prevention of toxic and industrial chemical wastes from identified grossly polluting industrial units entering into the river”.¹⁹ The GAP has emphasised development of infrastructure for effluent treatment as well as monitoring of “grossly polluting industries” discharging effluents into the Ganga and its tributaries. An effort at public awareness and education has also been undertaken.²⁰

Published one and a half years after the United Nation’s Conference on Environment and Development (UNCED), and expanding upon ideas initially framed in the Policy Statement on Abatement of Pollution 1992 and the National Conservation Strategy and Policy Statement on Environment and Development 1992, India’s Environment Action Programme (EAP) “attempts to integrate concerns for conservation, sustainable development and human welfare with (India’s) quest for a dynamic economy exemplified in the ongoing process of economic reforms.”²¹

This objective is particularly crucial as the country “moves into a trajectory of high economic growth.” Some important “priority” areas focused upon by the EAP are “control of industrial and related pollution with an accent on the reduction and/or management of wastes, particularly hazardous wastes” and “improving access to clean technologies.”²² Despite addressing the issue of LWTs for effective industrial waste management, the EAP provides no indication as to how actual implementation will occur, how the initiatives will be financed, or when tangible results might be expected.²³

Like the Government of India (GOI), international lenders, including the World Bank (WB), the United Nations, and the Asian Development Bank, profess a strong commitment to the promotion of LWTs in industrial development. An industrial waste management initiative sponsored by the WB, the Industrial Pollution Prevention Project (1994), serves as an excellent example. The overall objective and specific goals of the project are essentially the same as an earlier ostensibly successful initiative, the Industrial Pollution Control Project (1991).²⁴ The Industrial Pollution Prevention Project’s emphasis on a preventative approach encompassing clean technologies and waste minimisation, as opposed to curative measures, entails the establishment of a Central Clearing House for Clean Technologies to be located at the headquarters of the National Environmental Engineering Research Institute (NEERI), Nagpur, “outreach” to minimisation circles”.²⁵ However, despite the sheer volume of capital being made available and the potentially positive environmental impact, none of the industries visited by the author in Kanpur had ever heard of the WB’s Industrial Pollution Control Project or Industrial Pollution Prevention Project, or any other forms of assistance for waste management initiatives. According to the Secretary, Industrial Pollution Control and Rehabilitation of Sick Units, making greater use of the funding made available through these projects is that they have more professional, active, and sophisticated chambers of commerce than Uttar Pradesh.²⁶

Research institutes and NGOs also play an important role in the development and promotion of LWTs in India. For example the NEERI makes a considerable contribution to environmental research and development (R&D) in India.²⁷

On the request of the CPCB, NEERI has started developing an information package on cleaner technologies. This is in recognition of the fact that “adoption and promotion of cleaner technologies in India is considerably impeded by lack of exchange of information between various interest groups on opportunities for pollution reduction.”²⁸ Also, in 1992, under the WB Industrial Pollution Control Project, NEERI held a workshop on LWTs which helped influence the Ministry of Environment and Forest’s (MEF) policy emphasis on pollution prevention.²⁹

In terms of NGO involvement in LWT promotion, Delhi-based Development Alternatives (DA) is active primarily in the area of appropriate rural technology. DA has also done work with small-scale textile dyeing and electroplating units in the Delhi area in the interest of reducing water consumption and has its own plant which produces hand-made paper from scrap paper and cloth.³⁰ Located in Delhi, the Indian Environmental Society (IES) emphasises environmental awareness-raising, education, and training, as well as the promotion of low waste technologies. The group has established recycling centres which produce construction bricks from industrial marble slurry, as well as greeting cards made from waste paper. These products are sold to provide income for rag-pickers as well as to sustain IES activities.³¹

Efforts are also being made by industrial organisations in terms of promotion of LWTs. The Confederation of Indian Industry (CII), with 3,000 member companies, has as its principal objective the provision of consulting services to industry on a number of issues, including customs and excise, environment, quality, technology, and so forth.³² The overriding objective of the CII’s Environment Management Division is the promotion of cleaner production and responsible entrepreneurship among industries in India.³³ These objectives have been pursued through a number of activities, including: publication of case studies from Indian enterprises that demonstrate that “environment protection makes sound business sense”,³⁴ “enterprise level training programmes” to motivate workers and management to strive towards waste minimisation;³⁵ and the organisation in 1993 of a training program on “Environmental Audit and Waste Minimisation” for Central and State Pollution Control Board personnel.³⁶ The CII has also identified a number of barriers to the achievement of these objectives.³⁷

From this overview it seems apparent that the waste minimisation approach to industrial production is clearly recognised in India as advantageous in the interests of environmentally sound industrial development. However, as will be shown in the next section, despite this broad policy agenda, barriers exist to the effective implementation of the waste minimisation approach.

III. INSTITUTIONAL IMPEDIMENTS TO THE ADOPTION OF LOW WASTE TECHNOLOGIES

India's environmental problems, including the industrial waste crisis, have grown despite what appears to be a sophisticated environmental policy agenda and numerous environmental regulations. In fact, over the years "more than two dozen laws have been enacted to protect India's environment." These laws "cover all aspects of the environment – from pollution to conservation, from deforestation to nuclear waste."³⁸ A common observation, however, relates to the ineffectiveness of the regulatory regime in controlling, let alone arresting environmental degradation. For example, regarding the fight to control vehicular air pollution in Delhi, it has been remarked that "despite a plethora of laws, and organisations empowered to implement them, the situation has continued to worsen."³⁹ This leads one to conclude that there are problems with the effectiveness of the mechanisms of enforcement and compliance. In response to the analysis of the causes of air and water pollution quoted above, the promotion of waste minimisation through improved access to LWTs has been identified as a "priority area" by the GOI. However, in practice the focus remains decidedly end-of-pipe (EOP). This gap between regulation and enforcement, between policy and reality, is the result of various institutional impediments.

In India the waste minimisation approach has thus far been limited primarily to liquid waste management.⁴⁰ Examples of waste reduction, reuse, recycling, and by-product recovery in the textile, tannery, metal finishing, beverage, pulp and paper, and distillery industries have been documented.

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As a result of studies conducted by the NEERI, the NWMC, as well as other organisations, “the elements of cleaner technology are now being integrated by (the) MEF with the bilateral funding agency programmes.”⁴¹ However, the approach of government remains predominantly “reactive, repair oriented and media specific”, with emphasis placed primarily on “EOP treatment.”⁴² Furthermore, industry remains unaware or unconvinced of the advantages of the low waste approach.

The potential for waste minimisation and of inducing a “cleaner industrial culture” in developing countries like India is “both enormous and desirable.”⁴³ In fact, studies have shown that in India, a “20 percent reduction in waste generation is possible through simple house-keeping measures requiring no or marginal investments.”⁴⁴ However, despite the fact that cleaner industrial production provides opportunities for increased profitability and greater environmental soundness, and that there are supporting policies and programmes for its promotion, the waste minimisation approach and use of LWTs has not effectively taken off in India. This is due to various institutional impediments to sustainable development, including ineffective information dissemination; managerial turnover and other bureaucratic dysfunctions; intellectual property rights; emphasis on command and control; and absent or misdirected incentives.

Ineffective Information Dissemination

Earlier it was shown that there exists in India extensive knowledge about LWTs and the waste minimisation approach to industrial production. However, knowledge does not automatically translate into awareness or utilisation. A proactive stance both on the part of those possessing information and those requiring it is essential if policy implementation is to occur. One of the principal barriers to the adoption of the waste minimisation approach and LWTs in India is the ineffective dissemination of relevant information. The point was reiterated by several respondents that the institutional structure in place for information diffusion is not effective.⁴⁵

For the Head of the CIIs Environment Management Division, the Environmental Information System (ENVIS) provides a great deal of information related to cleaner industrial production but is ineffective in informing industry because no one knows that the service exists.⁴⁶ This point was confirmed by a Joint Secretary with the MEF in New Delhi who noted that the ENVIS system has no connection with industry or industrial organisations.⁴⁷

Also, despite best efforts, acting as the waste-minimisation mentors for industry in India is beyond the mandate and capacity of industry-related organisations like the CII. Furthermore, NEERI has extensive waste-minimisation information “on-line”, including 510 case studies from fourteen industrial sectors.⁴⁸ However, it is unclear how this information might be accessed by or of use to small-scale industries (SSIs). One of the most substantial barriers to the adoption of LWTs in India is related to attitude and perception on the part of industry. Financial constraints are often presented as the primary reason for continued reliance on EOP pollution control. It is automatically assumed that the costs of switching to a low waste approach outweigh any possible benefits.⁴⁹ Therefore, there is resistance to considering alternate approaches to production.⁵⁰ This misperception regarding costs and the consequent attitudinal barrier is one of the many results of inadequate information dissemination. In fact, a lack of information can go so far as to result in confusion in understanding the difference between cleaner production techniques and technologies.⁵¹ This can generate further myths regarding the costs of the low waste approach. For example, housekeeping, one of the most effective waste minimisation “techniques”, requires almost no financial investment or dependence on alternate technology.

For many, this attitudinal barrier could be mitigated if information was more effectively disseminated. One means cited for this is greater use of demonstration projects.⁵² However, it is also important to note what is often at the root of ineffective information dissemination. Bureaucratic malaise can be a barrier. For example, while in Kanpur it was suggested by the Head of NEERI’s Kanpur Zonal Laboratory that the author travel to Nagpur, a distance of 1,000 kilometres, to obtain two clean technology documents from NEERI’s head office. A similar response to an interested industry would most likely end that industry’s search efforts. This attitude of indifference on the part of such a senior bureaucrat is consistent with Jain’s observation that in many cases “public administration in India has lost any conception of the value of time.”⁵³ The attitudes and behaviour of civil servants, then, may act as institutional impediments to sustainable development.

Managerial Turnover and Other Bureaucratic Dysfunctions

Besides bureaucratic corruption, which has implications for the enforcement of pollution control regulation, the bureaucracy in India suffers from other dysfunctions which often render it ineffective in the implementation of public policy. For example, a short time after the commencement of field research in India, this author observed that in many cases, top civil servants were newcomers to their influential posts.⁵⁴ This phenomenon of rapid managerial turnover is a characteristic of public administration in India that has implications for effective implementation of policy, such as that related to LWTs.

In theory, managerial turnover is a product of one of India's important administrative principles. That is:

the policy-making organ of the government must have no permanent cadre of officers but must instead be manned by personnel who are taken on fixed-term deputation from implementation levels so as to project field realities fully into the process of policy making.⁵⁵

However, it is also important to note that in practice "the civil service of the country has become politicized over time."⁵⁶ Therefore, as Maheshwari observes:

matters like postings, transfers, and promotions are decided by the executive, and as such, the politically appointed ministers increasingly look to these as handy devices of reward and punishment. Careerism in the civil service makes its members receptive to the signals of ministers. As a result, there is a growing political interference in administration and, as often as not, both the civil servant and the politician have learned to accommodate each other in a wide variety of matters. Consequently, civil service ethics in India is under heavy stress.⁵⁷

It would appear as well that under these conditions policy implementation takes a back seat to political manoeuvring. Shifting political alliances and resulting transfers mean that top officials, called "birds of passage" by Maheshwari,⁵⁸ are often unaware of the reasoning behind or implementation plan for particular policies. This was evidenced several times in India when senior bureaucrats were compelled to call in subordinates to explain not only the intricacies but the broad goals of certain initiatives.

Referring to the problem of policy implantation in India, Jain observes that "non-performance has never been ground for disciplinary action. The result is a psychology of evasion wherever possible, even years-long delays in implementation of major decisions."⁵⁹

Therefore, “despite the existence of a huge administrative machine” in India, “nothing seems to get done.”⁶⁰

Inaction on the part of bureaucracy has serious implications. As noted by Maheshwari, “public administration is the acknowledged instrument of development in India which imparts special significance to it in the society.”⁶¹ Therefore, one might assume that given the vital role of the government, if meaningful steps are not taken towards policy implementation then reorientation towards the use of LWTs in industrial production will not occur.

Intellectual Property Rights

Besides ineffective dissemination of information, caused in part by a somewhat unmotivated bureaucracy, an impediment to the adoption of LWTs in India is intellectual property rights (IPRs).

In 1992 the GOI stated that:

with new and additional funding support and transfer of environmentally sound technologies from the developed countries, we will be in a position to augment our capacity to deal with environmental problems.⁶²

However, as a result of the completion of the Uruguay Round of the General Agreement on Tariffs and Trade (GATT), and associated emphasis on the protection of IPRs, the transfer of LWTs may be hindered.

The term “intellectual property rights” refers to the “legal expression of privileges granted by the State for the use, frequently exclusive”, of the creations of the human intellect.⁶³ A patent is the “exclusive right to make, use or sell a particular application of a new idea.”⁶⁴ Patents, which are “both reward for, and public recognition of a significant intellectual achievement,”⁶⁵ are the legal form of IPRs. The basic rationale behind the pressure for IPR protection is the fear on the part of technology producers of piracy, which lessens the return on their initial R&D investment. With increased international trade and a concomitant increase in the cross-border flow of goods and services, concern over IPR protection has also increased. Therefore:

in the post-Uruguay Round period, Intellectual Property Right protection is deemed to constitute an important component of an environment conducive to international transfer of technology, including foreign direct investment.⁶⁶

As such, IPR protection has become an enshrined component of the world trading system.

That IPRs can act as a potential barrier to the transfer of environmentally sound technologies was originally pointed out to the author by the Secretary of the DOE, Uttar Pradesh. According to the Secretary, although the process of economic liberalisation, beginning in earnest in 1991, has allowed foreign interest to invest more freely in India, for various reasons the advanced countries are not yet totally satisfied with the program. One important reason is that India is perceived as not yet having developed an institutional framework adequate enough to ensure the protection of IPRs.⁶⁷

In order to allay the fears of transnational corporations, which are a major source of technology supply under India's liberalised economy, as well as other foreign technology exporters, India is reported to be taking steps in strengthening its IPR regime.⁶⁸ This is particularly important with regards to the United States, which has shown interest in the area of environmental technology transfer to India, but which is also one of the most cautious with regard to IPR protection.⁶⁹ However, the U.S. remains unconvinced that India is cognizant of the need to protect IPRs.⁷⁰

It should be noted that IPRs, in a climate of global competition, may have the potential to bolster indigenous technological innovation. As argued by Dwivedi, Nef, and Vanderkop: the politico-administrative systems "in the periphery" tend to exhibit a series of systematic characteristics which inhibit technological development and development in general. Among these, the imitative, ritualistic, formalistic, corruption-plagued, uncoordinated and generally deficient nature of the Third World state constitute the fundamental barrier to technological development.⁷¹

Thus Gadgil laments India's "continual borrowing of technology, without investing in innovation."⁷² In fact, only 10 percent of the world's R&D expenditures are incurred by developing countries like India.⁷³ Perhaps a greater focus on expenditures in this area, over expensive imported technology or curative environmental measures, would help augment India's self-reliance.⁷⁴

Emphasis on Command and Control

The tendency in India to "legislate away" problems, in particular those related to environmental protection,⁷⁵ has the effect of pushing the costs of enforcement beyond the ability of enforcing agencies to fulfill their responsibilities. This curative approach also avoids tackling the root causes of problems.

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Several times in India respondents used the example of child labour laws, which effectively outlaw the means of subsistence for a large portion of India's children without providing alternatives or addressing the causes of child labour and poverty. In the realm of industrial pollution control, however, there exist barriers to the movement away from the curative, "command and control" approach to environmental regulation towards the implementation of a more preventative, "polluter pays" alternative.

First, the regulatory approach is seen as easier than a "polluter pays" or "economic instruments" approach. As pointed out by a senior bureaucrat in the Uttar Pradesh DOE, a "polluter pays" system requires the formulating of a gradation to determine the rates that polluters will pay in accordance with the toxicity of their waste, type of industrial activity, and so forth.⁷⁶ This process is considered too cumbersome and complex by authorities who would rather deal with the issue through the formulation of new laws. The problem, of course, is that with increased regulation there is also an increased regulatory burden and enforcement challenge.

Another barrier is that there exists no coherent strategy regarding the use of economic instruments for environmental protection.⁷⁷ This is because officially it is not yet known whether economic instruments are more effective than a regulatory approach. The economic instruments approach is new everywhere and no one has enough experience to provide definitive answers. More studies are therefore being recommended.

However, the reliance on command and control often works to the advantage of polluting industries. For example, often when an industry is ordered to close it can, by virtue of its access to sophisticated legal assistance, obtain a stay and thereby continue operating. In this sense, polluting industries are seen to "take shelter" under the very courts charged with closing them.⁷⁸ Eventually, the case against a known polluter maybe dismissed due to the lengthy legal process involved and the "intense backlog of cases".⁷⁹ As pointed out somewhat hopelessly by an Additional District Magistrate of Kanpur, "no amount of law is going to help people when the chief motive is profiteering and, due to a lack of awareness, there is no civic sense."⁸⁰

Absent or Misdirected Incentives

Although it has been argued that a common misperception related to LWTs is its ostensibly high cost, it should be noted that financial constraints do play a role in impeding their adoption. These financial constraints are often the result of absent or misdirected incentives.

According to the Head of the CII's Environment Management Division, the MEF's various policy pronouncements on LWTs are merely statements of intent. Despite these policy prescriptions, there exists no incentives, subsidies, soft loans, or action plan for the movement towards cleaner production.⁸¹ What incentives do exist for industry are often misdirected, running counter to the interests of waste minimisation. The Incentives made available by the GOI (Table 9.1) are primarily for curative, pollution *control* measures.⁸² Thus, in India the orientation of government subsidies is toward EOP. This orientation no doubt helps determine the technology choice of industry. Due to a lack of incentives, industries are not compelled to ascertain where clean technologies are available.⁸³ Furthermore, with regards to EOP-oriented incentives, the MEF gives no indication as to how industries are made aware of them or to what extent they are utilised. Indeed, industries in Kanpur claimed no knowledge of government subsidies for pollution control or prevention measures. The WB concluded in 1991 that "the effect of these (EOP) incentives has been marginal so far."⁸⁴

Another disincentive identified is the failure to implement legal measures for pollution control. This aggravates the cost difference between traditional or EOP technologies and cleaner technologies.⁸⁵ Also, the use of LWTs by industry is not mandatory in regulatory terms.⁸⁶ As pointed out by a Senior Environmental Chemist with DA, regulations should be in place to prescribe the use of appropriate technologies so as to avoid expensive retrofitting.⁸⁷ In relation to this issue, the Head of the CII's Environment Management Division pointed to a policy conflict arising out of misdirected incentives. It was noted that the GOI provides subsidies for the establishment of small-scale industries.⁸⁸ This is part of the government's strategy to promote industrial growth. As stated by the GOI:

appropriate incentives and the design of investments in infrastructure development will be used to promote the dispersal of industry particularly to rural and backward areas.⁸⁹

Table 9.1 Fiscal Incentives for Industrial Pollution Control in India.

Fiscal Incentives For Industrial Pollution Control In India ⁹⁰
<ul style="list-style-type: none"> ○ 100 percent depreciation allowance for installation of pollution control devices ○ Custom duty at reduced rates of 35 percent plus 5 percent auxiliary charges levied on equipment and spares for pollution control ○ Custom duty at the reduced rate of 25 percent and full exemption from additional duty for kits required for conversion of petrol driven vehicles to compressed natural gas driven vehicles ○ Excise duty at a reduced rate of 5 percent on manufactured goods that are used for pollution control ○ Excise duty exemption for bricks and blocks manufactured of fly-ash and phosphogypsum ○ Exemption under section 35 CCB of the Income Tax Act to assesses who make contributions to organisations which carry out natural resource conservation programs ○ Financial assistance towards capital investment up to 25 percent or Rs 50 <i>laks</i> (whichever is less) to small scale industries for establishment of common effluent treatment plants ○ Provision of loans at reduced rates of interest by financial institutions for installation of pollution control equipment

Although subsidies may be available for common effluent treatment plants under such schemes, use of LWTs is not required. In its program to encourage industrialisation through subsidisation, then, we see a conflict with environmental protection. In Gujarat, then, we see a conflict with environmental protection. In Gujarat, for example, the state government has moved to denotify a wildlife sanctuary to make room for industry. As noted by one observer, “ironically enough, industrialists will find themselves eligible for special incentives should they choose to locate in the (sanctuary) area” as it is classified as an especially “backward area considered in greatest need of industrial attention.”⁹¹ As stated by the WB:

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the pricing, trade, fiscal (taxes and subsidies), and monetary (interest/exchange rate) policies adopted to promote industrialisation have an impact on the nature and volumes of industrial pollution. While promoting industrial transformation, these policies have unintended effects on the environment that need to be understood and addressed.⁹²

At the heart of this subsidy-driven policy conflict is the environment versus development debate. As argued by the Director of the National Institute of Public Finance and Policy, it is necessary to balance the costs and benefits of industrial development in “backward” areas. Some environmental and social costs are necessary for the sake of growth.⁹³ Citing the example of the recent “development” of a poor hill area of Himachel Pradesh which now possesses both previously non-existent basic facilities and industrial pollution, the Director opined that romantic ideas about preserving certain areas intact are unfair to the poor. There is a need for a certain level of tolerance for pollution and the local people, rather than urban-based environmentalists, should be allowed to decide what is most in their interests. It is interesting how this attitude of the necessity to do battle against poverty at almost any cost has undermined environmental policy in India since the time of Indira Gandhi’s historic pronouncement in Stockholm in 1972.⁹⁴ What is also clear is that development initiatives and incentives which conflict with environmental protection have not overcome mass poverty and are foreclosing India’s future.

TOWARDS MORE EFFECTIVE INDUSTRIAL WASTE MANAGEMENT IN INDIA

“Cleaner industrial production is critical to sustainable development”⁹⁵ and as such it is accorded special emphasis in India’s environmental policy. The main argument of this study has been that India possesses a comprehensive policy agenda favouring the use of LWTs, but because of inadequacies or dysfunctions in terms of human resources, rules, or organisation (institutional impediments), effective industrial waste management is not being achieved.

The gap between sustainable development policy and reality is clearly illustrated when the extent of apparent organisational involvement in waste minimisation is juxtaposed with the state of India's environment in general and use of LWTs in particular. The institutional impediments at the root of the reality gap include: the ineffective dissemination and utilisation of gathered information; managerial turnover and other bureaucratic dysfunctions; intellectual property rights and the associated perception on the part of the global community that India institutions are too weak to adequately protect them; an over-emphasis on the command and control approach to environmental protection; and the realisation of perceived financial constraints due to incentives which are either absent or in conflict with the promotion of LWTs or general environmental protection. Clearly, mitigation of these barriers is necessary before the adoption of LWTs and the waste minimisation approach can truly take off in India.

A current debate in India is related to whether the country's recent reorientation towards a more market-centred approach to industrial development will, in the long term, mitigate the institutional impediments to sustainable development or sound the death knell of the country's already ravaged environment. In 1994 the WB noted that:

as the economy liberalises and industrial growth accelerates, the potential impact of industrial activity on the environment may further stress the natural resource base of the country and impact the welfare of the population.⁹⁶

Many respondents interviewed in India reiterated this sentiment regarding the potentially detrimental environmental and social impacts of liberalisation.⁹⁷ However, many also support the policy, arguing that it will actually benefit the environment and the interests of industrial waste management. For example, it is argued by the proponents of liberalisation that through the freeing of regulations it will be easier to access clean technologies. As stated by the GOI, by eliminating "cobwebs of unnecessary bureaucratic control" in areas such as foreign technology transfer, it is acknowledging that "the Indian entrepreneur has now come of age" and is thus in a position to enter freely into "commercial technology relationships with foreign technology suppliers."⁹⁸ However, it is important to recall that the issue of IPRs discussed earlier may hamper some of the progress made in improving access to LWTs. At any rate, it is clear that the liberalisation of the India economy is a foregone conclusion. Therefore, it is necessary that optimum use be made of the opportunities that this new reality affords.

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This paper has focused primarily on the inadequacies and dysfunctions of government and its institutions in achieving effective industrial waste management in India. Frequently, government leaders in India show an extreme lack of political will, invoking newspaper headlines, denouncing it as “Leaderless, Rudderless”.⁹⁹ The government is also accurately described as recalcitrant or even corrupt. However, these descriptions are necessarily qualified by the recognition that government cannot be held entirely accountable for environmental decline. Responsibility also rests with industry and citizenry.

As noted by one respondent, no country in the world provides an ideal model for a policy regime or institutional framework that is totally conducive to the employment of clean technologies in industry.¹⁰⁰ Therefore, besides rectification of the institutional impediments outlined in this study, the achievement of effective industrial waste management in India necessitates the fostering of a cleaner industrial culture. Even more fundamentally, however, is the need to develop a greater “civic sense” among the general populace in tandem with more responsible entrepreneurship.

In terms of industry, “a new corporate etiquette”¹⁰¹ would entail the recognition of environmental responsibility as a process whereby industry is continuously seeking to improve its environmental performance. This would challenge the standard practice of simply trying to achieve a benchmark or opting for a best available technology by actually going beyond what is required.¹⁰² However, essential in conjunction with this is a reconsideration among the populace regarding “the customary shunting of all civic responsibility onto the Government.”¹⁰³ To quote the Commissioner (Land and Projects) of the Delhi Development Authority, “You can’t expect the government to clean up your backyard... We have to change. We have to do it ourselves.”¹⁰⁴ A first step towards greater social responsibility and a cleaner industrial culture would be to address the “traditional Indian custom” of littering¹⁰⁵ and place emphasis on the “now endangered tendency” of recycling.¹⁰⁶ The achievement of sustainable development and the minimisation of industrial waste in India requires emphasis not only on institutional strengthening and technology improvement, but also on changing public behaviour.

ENDNOTES

1. Government of India, National Conservation Strategy and Policy Statement on Environment and Development (New Delhi: Ministry of Environment and Forests, 1992), p.2.
2. Government of India, Policy Statement for Abatement of Pollution (New Delhi: Ministry of Environment and Forests, 1992), p.4.
3. Government of India, Policy Statement, p.4.
4. Government of India, National Conservation Strategy, p.5.
5. For further background on the causes, nature, and extent of India's environmental problems, see for example O.P. Dwivedi and B. Kishore, "Protecting the Environment From Pollution: A Review of India's Legal and Institutional Mechanisms," Asian Survey 22, No.9 (1982): pp.894-911; A. Agarwal and S. Nairain, The State of India's Environment, 1984-85: The Second Citizen's Report (New Delhi: Centre for Science and Technology, 1985); and, Government of India, Traditions, Concerns and Efforts in India Report prepared for UNCED in Rio de Janeiro, June 1992 (Ahmedabad: Centre for Environmental Education, 1992).
6. United Nations Conference on Environment and Development (UNCED), Nations of the Earth Report (Geneva: UNCED, 1992), p.209.
7. O.P. Dwivedi and R. Khator, "India's Environmental Policy, Programs, and Politics," Environmental Policies in the Third World: A Comparative Analysis eds. O.P. Dwivedi and Dharendra K. Vajpeyi (Westport, Conn.: Greenwood Press, 1995), p.49.
8. Government of India, "Industrial Waste Management: Report of Sub-Group II," Constituted by the National Waste Management Council (New Delhi: Ministry of Environment and Forests, 1990), p.1.
9. International concern has been generated in light of the noticeable deterioration of the Taj Mahal in Agra, Uttar Pradesh, over the past years. Legal history was made in 1993 when the Supreme Court of India ordered the closure of 212 industrial units in and around Agra which were found to be wilful defaulters of air emission standards and thus assumed to be direct contributors to the deterioration of this historic monument. See M.C. Mehta, "Taj Trapezium: A Wonder Under Smog," The Hindu Survey of the Environment, 1994 (Madras: The Hindu, 1994), pp.59-63.

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10. Government of India, Environmental Action Programme (New Delhi: Ministry of Environment and Forests, 1993), p.106.
11. Government of India, National River Action Plan (New Delhi: Ministry of Environment and Forests, 1994), p.38.
12. Government of India, National River Action Plan, p.21.
13. World Bank, India, Industrial Pollution Control Project Staff Appraisal Report, Industry and Finance Division, Asia Technical Department 7 May 1991: p.1.
14. The Hindu Survey of the Environment 1994, p.85.
15. Government of India, Environment Action Programme, p.106.
16. M.M. Atkinson, Governing Canada: Institutions and Public Policy (Toronto: Harcourt Bruce Jovanovitch Canada Inc., 1993), p.7.
17. Atkinson, p.6.
18. Government of India, National River Action Plan, p.71.
19. Government of India, Environment Action Programme, p.64.
20. Government of India, Environment Action Programme, p.63. The total cost of the first phase of the GAP, to be completed by March 1995, is Rs 450 crores. Government of India, "Ganga Action Plan: Achievements," (New Delhi: Ministry of Environment and Forests, n.d.), p.3.
21. Government of India, Environment Action Programme, preface (n.p.).
22. Government of India, Environment Action Programme, p.14.
23. In the opinion of a Programme Officer with UNIDO in New Delhi, interviewed 11 Oct. 1994, the GOI is adept at writing current and sophisticated policy statements, employing all the latest buzzwords (i.e., "clean technologies"), however, implementation is a farce.

24. The goals and objectives of the project are to be achieved through institutional, investment, and technical assistance components. The institutional component (US \$25.5 million) seeks to overcome the weaknesses of the Central and specified SPCBs through efforts to strengthen their monitoring and enforcement capabilities. The investment component (US \$300 million) is meant to finance individual waste minimisation projects undertaken by enterprises, the construction of common effluent treatment plants at industrial clusters, and demonstration projects. Finally, the technical assistance component (US \$4.5 million) is intended to assist the MEF in evaluating problems, including an organisational assessment of the SPCBs, and developing solutions to these problems; and to assist industries in undertaking feasibility studies for pollution control investments. At a total project cost of US \$330 million, the implementation period is 1994 to 2001.
25. World Bank, p.93. Waste minimisation circles are analogous to “quality circles”. Industrial managers and workers participate in brainstorming sessions to formulate means to reduce waste and improve efficiency. Through its emphasis on available skills and in-house knowledge, the idea has great merit. As pointed out in an interview with the Deputy Director, Pollution Control, National Productivity Council, some of the most relevant suggestions for waste minimisation come from the shop floor, as workers know the plant and the process inside out and are thus in an ideal position to identify areas where housekeeping can be improved or waste reduced. Furthermore, a scientist with the Toxic Waste Management Division, NEERI, remarked that this type of bottom-up innovation is often more successful and more readily accepted by workers than change imposed from the top. What these comments, as well as the “brainstorming” approach fail to address, however, is worker reluctance to identify areas for waste minimisation and efficiency improvement due to concerns regarding job security.
26. From an interview conducted at the office of the Secretary, DOE, Lucknow, 28 Oct., 1994.
27. Headquartered in Nagpur, NEERI has zonal laboratories located in Ahmedabad, Bombay, Calcutta, Delhi, Hyderabad, Jaipur, Kanpur, Kochi, and Madras; an overall staff of 735; and budget for 1992-93 of over Rs 10 *crores*. National Environmental Engineering Research Institute, NEERI 93 (Nagpur: National Environmental Engineering Research Institute, 1993), *passim*.
28. NEERI, p.117.

29. NEERI, p.118.
30. From an interview with a Senior Environmental Chemist, Development Alternatives, 1 Nov., 1994.
31. From an interview with President and Founder, India Environmental Society, 3 Oct., 1994.
32. Confederation of Indian Industry, "CII: India's Industrial Reference," (New Delhi: Confederation of Indian Industry, n.d.).
33. Confederation of Indian Industry, "CII Initiatives on Implementation of Agenda 21 Items," (New Delhi: Confederation of Indian Industry, 1993), passim.
34. Confederation of Indian Industry, "CII Initiatives", p.3.
35. Confederation of Indian Industry, "CII Initiatives", p.5. According to CII, since its inception in 1992 the Environment Management Division has organised over 100 training programmes workshops, clinics, seminars, etc., both to create awareness and to train industry personnel in specific areas of environment management. Of these nearly 75 were devoted to "environment Audit" as a management tool for minimising wastes and conserving resources. The focus was on reducing consumption of input resources per unit of product output.
36. Government of India, Annual Report 1993-94 (New Delhi: Ministry of Environment and Forests, 1994), p.51.
37. K. P. Nyati, "Cleaner Industrial Production in Developing Countries: Prospects, Barriers, and Strategies," Presented to the Organisation of Economic Cooperation and Development's Workshop on Development Assistance and Technical Cooperation for Cleaner Industrial Production in Developing Countries, Hannover, 28-30 Sept. 1994.
38. Dwivedi and Khator, p.53. In an interview conducted in New Delhi on 20 Oct. 1994, an Assistant Resident Representative with the United Nations Development Program commented that India had no shortage of environmental laws given the country's tendency to legislate away problems. In an interview held 26 Oct. 1994, in Kanpur, an Additional District Magistrate of Kanpur remarked that pollution continues despite the fact that India is full of laws.
39. The Hindu Survey of the Environment 1994, p.39.

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40. Asian and Pacific Centre for Transfer of Technology, Asia Pacific Tech Monitor (New Delhi: Asian and Pacific Centre for Transfer of Technology, March-April 1994), p.17.
41. Asian and Pacific Centre for Transfer of Technology, (March-April 1994), p.18.
42. Asian and Pacific Centre for Transfer of Technology, March-April 1994), p.17.
43. Nyati, p.6.
44. Nyati, p.6.
45. For example, in an interview held in New Delhi, 4 Oct. 1994, the Head of the CII's Environment Management Division cited the absence of a proactive information dissemination mechanism as comprising a major barrier to cleaner industrial production in India. For the Secretary of the DOE, interviewed in Lucknow, Oct. 28, 1994, a lack of information results in a lack of awareness on the part of industry regarding LWTs. In other words, as appeared to be the case in Kanpur, industry is not even aware that there is a problem, let alone a solution. This is particularly true of SSIs.
46. From an interview held in New Delhi, 4 Oct., 1994. The Environmental Information System (ENVIS) is an India-wide network of centres which provide information on a broad range of environmental issues to any interested party. Besides the focal point located in the MEF, there are 17 subject specific centres located in different areas of the country (including Environmentally Sound and Appropriate Technology) which carry out activities in information collection, storage, retrieval, and dissemination. Government of India, Annual Report 1993-94, p.94.
47. From an interview conducted in New Delhi 12 Oct. 1994.
48. Asian and Pacific Centre for Transfer of Technology, (March-April), p.19.
49. From an interview with the Senior Deputy Director (Pollution Control), National Productivity Council, New Delhi, 18 Oct. 1994.
50. As noted by NEERI: "There is a certain perceived risk that discourages entrepreneurs from adoption (of) the relatively new concept of cleaner technologies... The major problem in promotion of cleaner technologies in India relates to lack of appropriate information and resulting misconceptions." Government of India, Environment Action Programme, pp.188-189.

51. Nyati, p.9.
52. See for example, Asian and Pacific Centre for Transfer of Technology, (March-April), p.18. Also, in an interview in New Delhi, 4 Oct. 1994, the Head of the CII's Environment Management Division spoke of the lack of demonstration projects as an important barrier to the adoption of LWTs in India. As noted by a Senior Environmental Chemist with Development Alternatives, industries will not act simply for the betterment of the environment. Thus it is necessary to clearly demonstrate and make obvious the financial benefits of adopting LWTs.
53. R.B. Jain, "Public Service Accountability in India," Public Service Accountability: A Comparative Perspective, eds. J. Jabbar and O.P. Dwivedi (West Hartford, CT: Kumarian Press Inc., 1989), p.134.
54. For example, the Chief Administrator of Kanpur, interviewed 26 Aug. 1994, was at his post for four months before being ousted; the Secretary of the Ministry of Regional Development, UP, interviewed 1 Sept. 1994 in Lucknow, had held several top positions, including Secretary of Industry, in the past two years; the Secretary, DOE, who is also the Chairman, UPPCB, interviewed in Lucknow 28 Oct. 1994, had only come into these portfolios in the past months; and both the Director and Deputy Director of the DOE's Environment Directorate, interviewed in Lucknow 28 Oct. 1994, acknowledged being new to their positions.
55. S. Maheswari, "India," Public Administration in the Third World: An International Handbook, ed. V. Subramaniam (New York: Greenwood Press, 1990), p.47.
56. Maheswari, p.56.
57. Maheswari, p.56.
58. Maheswari, p.57.
59. Jain, p.125.
60. Jain, p.134.

61. Maheswari, p.62.
62. Government of India, National Conservation Strategy, p.32.
63. Asian and Pacific Centre for Transfer of Technology, Asia Pacific Tech Monitor (New Delhi: Asian and Pacific Centre for Transfer of Technology, May-June 1994), p.4.
64. Asian and Pacific Centre for Transfer of Technology, May-June 1994), p.5.
65. Asian and Pacific Centre for Transfer of Technology, May-June 1994), p.4.
66. Asian and Pacific Centre for Transfer of Technology, May-June 1994), p.6.
67. From an interview conducted in Lucknow, 28 Oct. 1994.
68. Asian and Pacific Centre for Transfer of Technology, (May-June), p.45. Steps include a proposed amendment to the Patent Act, which would increase the period of patent protection from seven years to 14 years in the case of pharmaceuticals and processed foods and 20 years in other cases. The APCIT states that the reason IPRs operate well in developed countries is that there “the rationale for patent protection is clear.” Asian and Pacific Centre for Transfer of Technology, (May-June), p.5.
69. Asian and Pacific Centre for Transfer of Technology, May-June 1994), p.10.
70. Asian and Pacific Centre for Transfer of Technology, May-June 1994), p.45.
71. O.P. Dwivedi, J. Nef and J. Vanderkop, “Science, Technology, and Underdevelopment,” Canadian Journal of Development Studies XV, No.2 (1990): p.236.
72. M. Gadgil, “Biodiversity: Reckoning with Life,” The Hindu Survey of the Environment 1994 (Madras: The Hindu, 1994), p.25.
73. Asian and Pacific Centre for Transfer of Technology, May-June 1994), p.8.
74. It is recognised that in a country like India where simple survival is a very real concern for millions of people, industrial R&D, like environmental initiatives, may be seen as a luxury. As noted by one author, the technological dependency of poorer countries on the developed countries arises out of the fact that the former “do not have the resources to embark on a technology development programme.” Asian and Pacific Centre for Transfer of Technology, May-June 1994), p.8. However, it is important to note that India already possesses a sophisticated scientific and R&D infrastructure. A prime example is the Ministry of Non-Conventional Energy Sources, with extensive activities in the areas of solar and wind power. Government of India, Annual Report, passim. Waste minimisation is not a uniquely Western concept to which “advanced” interests can claim ownership. Therefore, greater advantage, for the sake of pollution prevention and economic advancement, should be made of India’s indigenous capabilities in this area.

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75. Stated in an interview with an Assistant Resident Representative, UNDP, New Delhi, 20 Oct. 1994.
76. From a meeting at the DOE, Lucknow, 28 Oct. 1994.
77. From an interview with the Director, National Institute of Public Finance and Policy, New Delhi, 20 Oct. 1994.
78. Stated in an interview with an Additional District Magistrate, Kanpur, 26 Oct. 1994.
79. N. Alveres, "Pollution Battles: Limited Legal Redress," The Hindu Survey of the Environment 1994 (Madras: The Hindu, 1994), p.55.
80. From an interview held in Kanpur, 26 Oct. 1994.
81. From an interview held in New Delhi, 4 Oct. 1994.
82. As noted by the APCTT, "The approach of Government (in India to industrial waste management) has been reactive, repair oriented and media specific... Financial incentives are available mainly for an EOP treatment. No financial incentives are yet available for use of cleaner technologies." Asian and Pacific Centre for Transfer of Technology, May-June 1994), p.17. The CII reports lobbying efforts on its part to have waste recovery and waste utilisation technologies, i.e., LWTs, subject to 100 percent depreciation, as is currently the case with EOP technologies. Confederation of India Industries, "CII Initiatives", p.8. Also, in 1991 the MEF began the annual presentation of National Awards for the Prevention and Control of Pollution to encourage industries to take steps in these areas. Government of India, Annual Report, p.93.

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83. From an interview with the Head, Environmental Management Division, CII, in New Delhi, 4 Oct. 1994.
84. World Bank, p.10. As part of its Industrial Pollution Prevention Project, the WB emphasises the necessity of shifting from concentration-based to load-based effluent standards. This would strengthen incentives for the adoption of cleaner technologies and “remove the incentive for polluters to dilute effluents by adding water”, a practice witnessed in Kanpur. World Bank, p.4.
85. Government of India, Environment Action Programme, p.189.
86. From an interview with the Senior Deputy Director, (Pollution Control), National Productivity Council, New Delhi, 18 Oct. 1994.
87. From an interview in New Delhi, 1 Nov. 1994.
88. From an interview in New Delhi, 4 Oct. 1994.
89. Government of India, Statement on Industrial Policy 1991 (New Delhi: India Indian Investment Centre, 1991), p.15.

90. Adapted from Government of India, Annual Report, p.53.
91. P. Nambiar, “Gujarat’s Wildlife in Peril: In the Name of Industry,” The Hindu Survey of the Environment 1994 (Madras: The Hindu, 1994), p.151.
92. World Bank, p.3.
93. From an interview held in New Delhi, 20 Oct. 1994.
94. At the 1972 United Nation’s Conference on the Human Environment, then Prime Minister Indira Gandhi asked “are not poverty and need the greeters polluters?” Dwivedi and Khator, p.22.
95. Nyati, p.13.
96. World Bank, p.1.

97. Social impacts of liberalisation are important to note. Wolpert, for example, observes that one of the immediate impacts of India's structural adjustment was "rampant inflation", which saw the price of "many vital necessities" rise by fifteen percent. Furthermore, "more educated Indians found themselves unemployed, as a capitalist free-enterprise economy replaced Socialism" and "Washington nodded warm approval of Manmohan Singh's budget." Wolpert, A New History of India, p.443. Other consequences have included mass unemployment and the termination of indigenous industries. Also, some authors have attributed the resurgence of virulent Hindu nationalism to the social upheaval caused by liberalisation. See for example, James Chiriyankandath, "India: The Crisis of Secularism," Annual Editions: Third World 94/95, ed. Robert J. Griffiths, (Guilford, CT: The Dushkin Publishing Group Inc., 1994).
98. Government of India, Statement on Industrial Policy, p.13, p.9.
99. From a headline in The Times of India 6 Oct. 1994: p.1.
100. From an interview with the Head, Environment Management Division, CII, New Delhi, 4 Oct. 1994.
101. Nambiar, p.151.
102. From an interview with the Head, Environment Management Division, CII, New Delhi, 4 Oct. 1994.
103. A. Joseph, "Urban Garbage: Recognising the Removers," The Hindu Survey of the Environment 1994 (Madras: The Hindu, 1994), p.186.
104. "Our Filthy Cities: Can We Clean the Mess?", India Today, 13 Oct. 1994: p.79.
105. "Our Filthy Cities", p.77.
106. Joseph, p.185.

**ADMINISTRATION FOR SUSTAINABLE DEVELOPMENT IN INDIA WITH
REFERENCE TO WASTE MANAGEMENT: POLICIES AND PROGRAMMES****L. Coates****INTRODUCTION**

Over the past twenty years, the administration of environmental planning and management has become an important area of concern in India. Growing preoccupation with the environment stems from the realisation that industrial development and the drive towards modernisation have resulted in the depletion of the natural resource base on which humanity's present and future development depends. In India, the threefold pressures of poverty, enhanced industrial activity and burgeoning population render the task a formidable one. In India, people can no longer lay waste to an area and more on. There is nowhere to "move on" to.

This paper considers the management of environmental waste in India within the context of Sustainable Development (SD). India's success in pursuing SD is dependent on how skilfully and optimally its natural resources are conserved and utilised. The organisation of government administration and management plays a crucial role. The incisive distribution of government finances, the creation and enforcement of guidelines and the ability to influence the impact of citizens on the environment, are among the more important tasks that depend on effective administration.

I. INDIA'S CHALLENGE FOR SUSTAINABLE DEVELOPMENT

In India, environmental problems are perceived as rooted in the lack of development, or the struggle to overcome conditions of poverty. India has adopted rapid industrialisation as the quickest route to the economic well-being of its people. The objectives of industrial policy as stated in India's Environment Action Programme include expansion of opportunities for gainful employment, reduction of social and economic disparities and removal of poverty.¹ The expansion in the industrial sector has been towards capital and energy intensive sectors, which are also the most polluting. Enormous increases in population have only compounded pressures on the environment. As of the March 1991 census, the population of India was 844 million. This figure is increasing by 2.1 percent, or 17 million people each year.² In the absence of environmental stewardship, sustainable methods of resource exploitation, clean technologies and proper waste management, industrial development reinforces underdevelopment and compromises the long-term ability of the natural environment to provide goods and services.

II. THE ADMINISTRATION OF SOLID WASTE IN INDIA

In India there has been too little regard accorded to the costs of waste generation and waste disposal. If industrial development is to be sustainable, it is essential that the process of converting natural resources into productive goods be made efficient, both in terms of garnering a higher output from the same material inputs and minimising waste.

Cleaner production in industry has been defined by the United Nations Environment Programme (UNEP) as the conceptual and procedural approach that must be taken to ensure that all phases of the life cycle of a product are addressed with the objective of prevention or minimisation of short and long term risks to humans and to the environment.

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A report from the Indian Institute of Public Administration, Centre for Urban Studies states: “the major sources of pollution in most of [India’s] small and medium cities continue to be largely domestic and non-commercial”.³ A more immediate challenge is the development of skilled and informed management systems to deal with present waste output. This paper will concentrate on the efforts by the Indian administration to forge new means to address the problems around the management of Indian municipal solid waste.

A review of policy, legislative and planning initiatives by the Indian government in the field of waste management will indicate the presence of institutional, legislative, socio-economic and technical constraints to the management of urban solid waste. It will be shown that policies for waste management programmes must give equal importance to both socio-economic and technical hardware aspects if planning, implementation and monitoring of solid waste are to be successful. The paper will include recommendations to increase effective and efficient procedures for solid waste management (SWM).

The Nature of the Problem

India generates around 25 million tonnes of municipal solid waste a year, the impact of which is described as literally burying urban areas in garbage.⁴ The urban waste problem in India is an outcome of rapid and massive increase in urban population that has taken place over the last 20 years, the change in quantities and nature of consumptive goods, and lack of policy, planning and management capabilities to adequately address the problem.

India is gradually changing from a predominantly rural society to one with a substantial urban population. India’s urban population according to the 1991 Census was 217 million and is predicted to increase to 340 million by 2000 A.D.⁵ This latest increase in urban population would amount to almost 50 percent over nine year, accounting for 1/4 of India’s predicted total population. Demographic changes in India are occurring largely due to the structural transformation of the Indian economy and shifts of labour and capital from rural to urban activities. Agriculture which accounted for roughly 55 percent of the Gross Domestic Product (GDP) in 1950-51 has declined to 32 percent in 1990-91.⁶ Thus, urbanisation is not a transitory phenomenon, but is seen to reflect permanent structural changes that have occurred since independence.

There are 23 cities in India with a population of greater than one million, four of which have a population exceeding five million. Together the cities with population of more than a million account for half of India's urban population.⁷ On the basis of size alone, the challenge to municipal administration in providing adequate services and infrastructure for urban solid waste is immense. Three factors exacerbate the problem.

- (a) The accumulated backlog in urban housing along with a rapidly increasing population of urban poor have resulted in the proliferation of slums and squatter settlements. A high incidence of marginal employment and urban poverty implies that the poor cannot afford to pay for housing and urban services with the result that these services have deteriorated further.
- (b) The weak financial and organisational base of urban local bodies has led to subsidised and inequitable supply of urban services and land, and to haphazard growth. Lack of effective control over changes in land-use has encouraged unplanned and often illegal urban sprawl.
- (c) The gap between demand and supply of infrastructural services has been continuously widening. Increasing pressures of population, particularly the skewed distribution of urban population in mega-cities, and the escalating per capita cost of providing urban services, account for the deterioration of infrastructure services and amenities.⁸ Approximately 33 percent of the total urban population have no access to sanitary facilities. They use open drains, roadside berms and vacant spaces for defecation and disposal of solid wastes.⁹ Those areas not served are largely unincorporated settlements or unplanned slum communities inaccessible to formal collection and disposal techniques, and all without political influence to demand services, due to their constituency as new rural migrants and poor people in general. With slum populations estimated at 49 million in 1990¹⁰, increased occupation of urban land with ever growing numbers of people living in extreme poverty further aggravates congestion, over-crowding and high levels of pollution. Lack of infrastructure for water, sewerage, drainage and general environmental sanitation services add to the spread of infectious diseases and epidemics.

Project planners are now seeking approaches to objectively assess overall system efficiency in the delivery of services. The urgency of the task is obvious. One must remember however, "it is not even enough to plan for coverage' of the population with facilities, there has to be a plan for sustainable functioning of the facilities."¹¹

Institutional Framework for SWM

According to the Indian Constitution, care for public health and sanitation is to be dispensed by the state. The management (i.e., the collection and disposal) of solid waste, however, is generally under the direction of municipal corporations empowered by the state. Yet the role of municipal governments accorded the responsibility of providing water supply, wastewater disposal, refuse pickup, public health, and shelter for the poor is ignored in national and state strategies for sustainable development.

Strategies for sustainable development at national and state levels have focused on the application of both mandatory and coercive means for cleaning up existing pollution and preventing the occurrence of new pollution. The treatment, transportation and disposal of wastes, and any steps taken to reduce, re-use, or recycle wastes fall on the municipalities.

Institutionally, in most municipalities, SWM is entrusted to a multipurpose inspectorate in either the Health or Revenue Department. Powers to issue notices and to undertake legal proceedings are delegated by the Municipal Health Commissioner, usually a medical doctor. Since environmental problems have grown more complex and proper management necessitates specialisation and expert input from diverse areas, concern has developed over the control of SWM by the Health Officer/Division alone. Vesting the authority in this sector ensures that municipal managers are aware of the severe health problems that may result from inaction, but there is concern that the means for efficient collection and safe disposal of waste may not be given the same weight. In other countries, responsibility for refuse operations lies with the public works unit of municipal government, and is managed by engineers. Awareness of the health issues related to the presence of solid waste is important but relegating waste to the Health Department may be providing insufficient impetus for other departments to work with them.¹² The administration of SWM may benefit from intersectoral and interdepartmental collaboration in waste-related issues and the creation of a local department responsible solely for the mixed yet related aspects of municipal solid waste.

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Although the municipal government is responsible for laying down laws, acts and lists of obligatory and discretionary duties with regard to solid waste management, many of these regulations are currently outdated in India. For example, the city of Kanpur is governed by an Act from 1932. By-laws on matters such as drainage, disposal of high soil and waste (hazardous and non-hazardous) have fallen into disuse, and legislation for reducing, recycling and recovering wastes, integral to meeting objectives for sustainable development, is virtually non-existent. Legislation at the municipal level, by way of Acts and provision, are regarded as scattered *ad hoc* routine provisions without the necessary focus on the overall view of human environment and the need of mitigating the dangers to which the citizens are exposed.¹³

The presence of outdated institutional structures and obsolete and disjointed legislation for administering SWM is reflected in waste collection and disposal practices.

III. OPERATIONAL IMPEDIMENTS TO SOUND SOLID WASTE MANAGEMENT PRACTICES

Financial Uncertainty

Municipalities perceive themselves to be without the financial support to access human and technical resources for collection and disposal of wastes. In Bangalore, India's fifth largest city, five million people dispose about 2,000 tonnes of solid waste per day. The Bangalore city corporation, entrusted with the responsibility of waste disposal is so short of manpower, machines and vehicles that it is equipped to handle and recycle only one fourth of what is generated. The rest is dumped indiscriminately around the city spreading disease and pollution.¹⁴

Prohibitive costs associated with acquiring new landfills and lack of space for disposing of current wastes is at the root of dumping municipal solid waste in and around Indian cities.

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Officially, landfill is specified for dealing with 90 percent of solid waste.¹⁵ Forces of modernisation and intensive land use for development have precipitated concomitant rises in land values. The result is that municipalities suffer from an inability to secure (low-cost) landfill sites for waste disposal. Research on volume reduction of solid waste for alleviating disposal problems in India has concentrated on various types of incineration. Yet Dr. B. Sundraresan, former Director of the National Environmental Engineering Research Institute (NEERI) in Madras asserts:

Incineration is not a solution as far as garbage disposal in Madras is concerned. Over 50 percent of the garbage is organic and hence it cannot be used for energy generation.¹⁶

Incineration is rejected as an overall solution to the storage and treatment of waste on the grounds that calorific value from vegetable/putrescible matter in most Indian urban solid waste is sufficiently low. Instead of enabling energy or cost recovery by burning wastes, "supplementary fuel may be necessary for at least part of the incineration process."¹⁷ Though incineration displaces costs incurred by land space requirements for landfill, the density of wastes in Indian urban refuse results in negligible economic gains from incineration.

Financing for solid waste operations comes from general revenues or taxes collected as general property taxes, sewer and water taxes and a variety of municipal fees. It is estimated that between 40 to 60 percent of the municipal budgets are used to provide the SWM service.¹⁸ However, the real cost of municipal SWM is not well understood because of lack of proper cost accounting. Municipal cost items having to do with water and sanitation are generally aggregated to the extent that labour and equipment used to provide solid waste services are not distinguished. The same municipal workers perform other functions such as drain cleaning and street sweeping.

Cost reduction in the delivery of SWM has not been given serious attention since budget shortfalls are usually made up through a reduction in service or subsidies from state government. Small and medium-sized cities depend on provincial or state governments for financing solid waste operations and infrastructure. Traditionally the approach to financing has been that state governments provide capital funding for new equipment, and the municipality finances the operations from its traditional revenue base. Municipal governments have neither the capability nor the time to deal with questions surrounding efficient allocation of resources.

The Indian Institute of Public Administration observes:

An understanding of the trade-offs between labour and capital and economies of scale elude municipal management in favour of having to deal with daily crises and operational difficulties.¹⁹

Inefficiency of Service

In India, the service that exists for SWM is generally inefficient with much of the refuse left uncollected. The reasons include inadequate or inappropriate equipment, lack of labour motivation and cultural issues. The result is often sewers clogged by uncollected waste, health problems because of disease vectors around dump sites and general dissatisfaction with municipal operations.

Work Practices and Worker Management

Methods for handling waste have not been adjusted to adequately address the current socio-economic realities of waste output in contemporary cities. Solid waste operations tend to be inefficient, employing a large number of workers protected by unions and provided with complete benefits.²⁰ Generally one to three people per 1,000 of the general population are involved in sanitation work. Public disinterest in sanitation and insufficient financial support by state governments contribute to worker management problems. From a technical standpoint, municipal departments responsible for addressing issues of solid waste are

ill-equipped and they do not usually have any means of keeping themselves abreast of modern developments in this field. There are no arrangements for orientation and training of the existing staff to undertake conscious pollution control measures.²¹

Municipal workers often must clean up the refuse by hand, using baskets which are passed up to collection trucks for loading. Various categories of solid domestic and commercial waste are mixed together at dump sites, posing a hazard to conservancy workers. In some cities truck crews do not have shovels necessary for cleaning the area around communal bins. In others, workers are not supplied with protective clothing or if they are, it is often sold for its cash value. Half hearted attempts on the part of municipal crews and truck staff to load waste around communal bins have been documented. Lack of appropriate equipment, lack of will on the part of workers, and lack of enforcement by the city all contribute to ineffective SWM.

Municipal house collection by waste conservancy staff is rare in urban centres and is unlikely to become widespread given the chronic shortage of funds and trained personnel. Thus, the process of municipal collection begins at 'primary dumps' or concrete bins and containers to which households and commercial enterprises bring their waste daily. In cities with a population greater than one million, often more than 10,000 primary disposal units are known to exist, many of which are unofficial.

The phenomenon of large scale dumping of collected wastes is a further consequence of ineffective SWM practices. Disposal of collected wastes is generally at dump sites located in vacant land near the city. These sites are merely dumps not controlled landfills. At these dumps, no daily cover is applied and little equipment is available to work and compact the waste. In some cases the dumping is done illegally. Although in most urban areas there are municipal codes prohibiting indiscriminate dumping of refuse, little is done to enforce them. Municipal employees and the authorities have other priorities, especially in poor and peri-urban communities where most of these problems occur.

Cultural Issues

Status associated with working in SWM is low in India. Municipal workers come from the 'untouchable' class. Other castes disdain this type of work. Clear norms exist as to what social classes are to work in various jobs such as sweeper, truck loader, driver, supervisor and management. Because of these norms, there is limited flexibility in carrying out a wider range of duties. This clearly restricts the options that municipal management has for human resource allocation.

There is little public concern for the care of public areas such as streets, sidewalks and public toilets. Most urban residents feel that the maintenance of these common areas is the responsibility of the municipality alone. Indiscriminate dumping or neglect when placing refuse around collection points outside the home makes residents loathe walking directly to the bin and over old waste to place their refuse. Residents are described as merely 'approaching the dump' to dispose of waste, with the result that there is often as much refuse dropped outside the communal bins as inside. This has been said to discourage workers from cleaning up since it demonstrates a lack of pride on the community's part (for contrast, see Rahman and Prasad in this volume).

Low Waste Options

There is a growing recognition that neighbourhood level garbage collection, managed in collaboration with the residents, is often the cheapest and most effective solution to SWM. This is particularly true if there is reclamation of the wastes through composting or other means at the neighbourhood level. The constituents of domestic wastes that are often recycled include paper, textiles, metals, glass, rubber and plastics. An active secondary market exists for recycling these scrap materials.

In 30 percent of cities without formal municipal waste management, for reason such as inaccessibility of streets to municipal collection equipment and limited equipment and staff, a large and competitive informal market has developed for reuse and recycling of wastes. The unskilled and uneducated generate income through waste picking. The recovery of wastes such as paper, plastics and metals by waste pickers who sell these to dealers, wholesalers or directly in the open market accounts for roughly one to two percent of the workforce in urban centres.²² The recycling effort at present, is often organised to the disadvantage of the waste pickers and to the benefit of the municipality and middlemen. The pickers, mostly women and children, are paid little but toil at informal urban dumps and landfills over long hours with few rights and no benefits.

In most Indian cities, the impact of this type of recycling is not well understood by municipal officials, nor is it well documented. However there is some estimation that voluntary reclamation accounts for 20 to 25 percent of all solid wastes.²³ When considering the degree to which municipal authorities are unable to keep pace with urban waste collection and disposal needs, recycling of waste through picking alleviates some stress on an already overburdened system.

Local levels of government have been accused of maintaining a bias in favour of expensive projects for the procurement and maintenance of equipment, institutional strengthening and reform of management system operations to the neglect of cheaper, culturally specific alternatives that could entail formalising parts of the informal waste economy and attempting improved conditions for itinerant workers. The task of SWM as described by the Chief Finance Officer of the Calcutta Municipal Corporation (CMC) is one of “planning and administration with a bit of economics and engineering”.²⁴

In cities where waste pickers recover roughly 15 percent of waste from primary dumps, and in the case of Bangalore City where they number 25,000 with an added 4,000 wholesalers and dealers, the municipality relies heavily on these informal activities to ease the burden of SWM practices.

Where synthetic wastes could be reduced by 20-40 percent through source separation, the remaining organic and inert wastes provide the means to effect low-cost, low-technology, and high resource recovery systems of SWM through the adoption of composting or vermiculture production.²⁵ Organic wastes and coal fly ash constitute 80 percent of landfill in India, and if composted, can both reduce the pressure on the current need for locating and maintaining landfill sites while forming the basis for horticultural industries, through use as fertilizers in agricultural production. Biomass can be converted into methane and burned for heat and power if separated from other rubbish through composting. Research in the area of composting indicates that where initiatives are kept small and decentralised, wastes are more readily decomposed. Flintoff claims that:

in present Indian conditions diseconomy of scale applies to composting and that unit costs of compost production increase as plant capacity rises and mechanisation is increased. Thus to achieve the lowest production cost, a policy of encouraging multiple small manually operated plants should be followed.²⁶

Municipal policy measures for actualising decentralised composting are of recent origin. Suggested locations for compost sites at city parks, community gardens and golf courses,²⁷ indicate an effort to search for local sites that could decrease the costs incurred from hauling wastes long distances, setting up new landfills in costly areas, and supplying conservancy staff to manage landfills. Solutions for decentralised composting in open city spaces usually reserved for leisure or recreation may seem politically naïve. However, this is probably a recognition of the magnitude of the SWM solutions, such as incineration or centralised composting mechanisms, hitherto inefficient and troublesome for municipal authorities to operate and maintain.

Inappropriate Technology

“By and large, the fact that capital is more limited in India than in most industrialised countries actually demands a more profound knowledge of the nature of environmental problems and their cause, to allow limited resources to be used to best effect; only with large capital resources can conventional solutions be implemented which apply uniform standards”.²⁸

In the past, benefits to developing countries such as India, from transfers of ‘expertise’ from industrialised countries were thought to emanate from technological or ‘ready-made’ schemes modelled on western innovations and thinking. In the field of SWM, the wide use of modern collection equipment, such as mechanised, self-emptying trailers, compactor trucks, and disposal methods such as incineration have been tempting to Indian municipal waste managers, as a means for abating waste problems.

Technologies carry with them built-in decisions that reflect markets, level of economic development, attitudes, and technical cultures of their place of origin. Efficiency of the transfer process is dependent on the skills and knowledge in the receiving country. India has attempted experiments with new as well as old waste handling and disposal technologies, successful elsewhere, only to find that they are not viable for institutional, social, financial and technical reasons. In some municipal garages solid waste handling equipment can be found either under repair or permanently disabled. This is the result of lack of expertise for maintenance and repairs, or lack of resources.

India installed a dozen composting plants during the late 1970s and 1980s. Only two or four are still in operation. The reasons for this include inattention to daily operational details, as well as lack of funding provided for equipment and maintenance by the municipalities and states.²⁹ The notion that composting does not require much attention, that it is a ‘natural’ process, is common among municipal administrators. However, changes in refuse composition over the years, frequent breakdown of trucks and mechanical separation of equipment have all contributed to the failure of these plants.

Lessons from failures of SWM technology such as incineration, composting plants, and anaerobic digestion systems need to be documented as a lesson for future planners. Ultimately, all technology must fit the socio-economic conditions of the receiving country if it is to be effectively utilised.

IV. ADMINISTRATIVE REFORMS FOR SOLID WASTE MANAGEMENT IN INDIA

“If the root of such difference between the West and the South is culture, then should not ‘culture’ be the foundation upon which one should build alternate models of development?... What is being suggested is that the ‘power to shape ideas and events’ which has so far lain with the West, needs to be shared now. This is nowhere more evident than in the field of environmental management”.³⁰

The introduction of new capital equipment, no matter how efficient, will not substantially alter the current climate for SWM in India. Rather than focusing on a single problem, interdisciplinary approaches to the cooperation and organisation of institutional, cultural, economic and technical aspects of solid waste issues must be addressed. Research and experimentation are necessary.

Research and Development

Little research and Development of SWM equipment suitable to various local conditions appears to have been done by either national or international companies that make collection equipment. Unquestionably, changes in design could improve the efficiency of much equipment being operated in Indian municipalities. Links between private manufacturing companies and municipalities could be developed in order to create a line of collection vehicle, refuse bins and other associated equipment suited to local conditions, and designed to work in conjunction with each other. Since the development of better technology depends on many factors such as overall technological development in India and investment capability of city municipalities, system improvements immediately possible are those that can be obtained by utilising existing resources to the best effect.

Improved Planning and Organisation

The adoption of appropriate collection and disposal methods for urban solid waste is, in part, dependent on the creation of local, regional and national physical development plans and surveys for monitoring the location, kind and quantities of waste being produced from various activities. Without this baseline information, it is impossible to adequately treat and dispose of the waste produced daily in urban centres.

In the city of Kanpur, a physical and chemical plan was drawn up in 1972 by the India Institute of Technology. The authors analysed waste samples both in terms of content and quantity from each ward or zone in the city. Wastes were analysed in terms of compostable matter. The city of Kanpur updated the study in 1990. The update outlined plans for treatment of the waste. Most Indian cities have yet to publish initial, much less updated blueprints of the nature and source of urban solid waste.³¹

Unplanned collection depots, routing systems and ad hoc planning of landfill sites results in chronic lack of vehicles for collection and transportation of waste to landfills, long distances over which garbage is hauled for dumping, improper treatment of disposed waste and reduction in overall efficiency of the system. Clearly planning procedures need to be developed for optimal utilisation of resources, creation of a long-term planning horizon, ability to analyze the system as a whole, and rational selection of alternate disposal sites.³²

Improved SWM Accounting Systems

SWM cost accounting systems need to be improved. Where based on micro-computers and software, more accurate financial forecasting and efficient deployment of financial as well as labour and material resources could be monitored. Current approaches to financing SWM have not been developed since taxes augmented with state and federal funds have been relied on for this purpose. Independent, locally operated accounting systems are imperative if accountability and efficiency of service are to become a part of municipal SWM.

Federal and State Level Assistance

Assistance to cities from the state and centre governments for improved systems of SWM should come in the form of enhanced institutional and infrastructural support. These higher levels of government should take on a role of providing guidance, software and training to municipal officials, as opposed to simply allotting finances to be used for 'best effect'. Thus far only limited financial assistance has been provided and institutional development has been left to the municipalities themselves.

Municipal Level Training

The provision of training to municipal sanitation workers, managers, engineers and health officials on sound approaches to waste management is as important as any financial or technical support in the field of SWM.

The capacity to manage urban growth and to implement technological and programme changes is dependent on the capacity to make autonomous and sensible decisions. Building this capacity will take time and requires specialised and interdisciplinary training in the areas of science and social science. Training programmes for management level workers would enhance knowledge and skills in developing SWM strategies for optimal planning and operation in micro-level implementation. Training programmes that emphasise operations monitoring, such as accounting systems and modern computer based planning techniques, might assist municipal managers not only with SWM, but also in delivering other essential services such as sewers and water management as well.

Integration of Non-conventional Approaches to SWM

- (1) Despite changes in financing, training, planning and legislation for SWM, the chronic lack of space for the dumping of solid wastes, increased costs associated with acquiring new landfill as well as obscure and distant locations for secondary sites, may force municipalities to consider more sustainable alternatives to traditional methods of SWM. The integration of non-conventional goals in SWM would entail:
 - (2) Support for informal activities of waste recovery and recycling
 - (3) Promoting and exploring means to increase separation of wastes at the source to reduce hand picking and increase efficiency of recycling
 - (4) Developing community/private sector/municipal partnerships for waste recycling, and
 - (5) Increasing public awareness of the need to reduce and recycle waste and of the benefits of separation.³³

What is first required is an economic evaluation of recycling and reclamation. The impact of reclamation and recycling of waste, with specific regard to pickers, on the waste stream, and the potential for organising, improving and expanding these activities to meet a broader set of urban objectives needs to be more fully addressed. Such an evaluation could aid in determining the true economic potential of recycling while incorporating social and ecological goals into the SWM process. The total turnover of the recycling operation has been estimated by Bose and Blore at well over Rs 60 million a year.³⁴ Others estimate the size to be over Rs 200 million (or \$7 million U.S.).

The privatisation of SWM services deserves exploration. The participation by the private sector in the delivery of SWM services is an approach recently gaining ground in industrialised countries. There is evidence to suggest that it might be a more efficient means of collection than current municipally controlled operations. Both institutional resistance and public suspicion exists in relation to privatisation of SWM. Where the public feels that refuse collection is a municipal service and should be provided at little or no cost, municipal officials fear the wrath of municipal waste unions that oppose the use of private contractors. Moreover, there is a lack of established firms in India capable of providing this service. A pilot project followed by an in-depth evaluation would be useful.

There is also a need to experiment with different composting systems. There is growing recognition that neighbourhood level garbage collection (whether private, public or mixed), managed in collaboration with the residents, is often the cheapest and most effective solution to SWM. This is particularly true if there is reclamation of the wastes through composting of organic wastes in specific, and on a representative scale, would require an integrated approach to SWM and the involvement of a broad range of social actors. Cities would need the cooperation of municipal departments and private corporations to devote required land for such operations. Cooperation on the part of planning departments is critical to locating and managing of composting sites. Separation of wet and dry wastes by domestic and commercial actors would aid in reducing sorting time, as well as reduce health hazards for sanitation worker or waste pickers that may be recruited to collect and sort wastes. The successful implementation of this form of SWM demands an active role from municipal managers an genuine interest on behalf of the public.

Community Involvement and Public Education

Public participation is necessary in dealing with solid waste problems. Participation in decision-making at the local level is more often rhetoric than reality. Ensuring community participation in SWM issues depends on building awareness and a sense of community ownership through involvement and mobilisation around such issues as the building and placement of commercial waste bins. More than simply telling people about the importance of hygiene and sanitation, individuals from the locality should be trained for the implementation of awareness and education programmes (Cf. Rahman and Prasad in this volume.)

CONCLUSION

In order for economic activity to be environmentally sustainable, certain conditions need to be adhered to concerning the use of renewable and non-renewable resources, the emission of wastes and associated environmental impacts. The first principle of sustainable development is that these conditions have absolute priority over Gross National Product (GNP) growth.³⁵

Underdevelopment is often touted as the main cause for inefficiency in India's systems for solid waste management. As improvement in the overall economy occurs, other incremental improvements should follow. Lack of attention to these issues will result in an increase in the dramatic difference between service to prosperous neighbourhoods and that available to the poor, and levels of morbidity and mortality. It is vital that long-term strategies be developed and that investments be made so that municipal officials are not overcome by the crisis-like nature of current SWM problems. In order to close the gap between precept and practice of SWM, greater coherence and enforcement of policy, management training, decentralised decision making and public involvement must be sought. The solutions can only come from an understanding of the technical, socio-cultural, political and economic context surrounding these concerns, and the limitations these conditions place on available options.

ENDNOTES

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