Environment management in India: Policies, practices and future needs

*Paper prepared for the Shastri Indo-Canadian Institute, New Delhi*

Indira Khurana, PhD

**INDIA’S ACHIEVEMENTS**

Post economic reforms, the gross development product (GNP) improved from an average of about 5.7 per cent in the 1980s to an average of about 6.5 per cent in the Eighth and Ninth Plan periods, making India one of the ten fastest growing developing countries (1), where the dismantling of the industrial licensing system, free investments by foreign companies, lowering of import tariffs on capital goods all contributed (2).

Encouraging progress was also made in other sectors. The percentage of the population in poverty continued to decline, even if not as much as was targeted. Population growth decelerated below 2 per cent for the first time in four decades. Literacy increased from 52 per cent in 1991 to 65 per cent in 2001 with improvement evident in all states. Software services, entertainment and information technology-enabled services emerged as new sources of strength, creating confidence about India’s potential to be competitive in the world economy (3).

**THE OTHER SIDE**

However, the picture is not all rosy and are clouded by other features which give cause for concern. The economy is currently in a decelerating phase and urgent steps are needed to arrest the deceleration and restore momentum. Although employment growth has almost kept pace with labour force growth, the incidence of unemployment on current daily status basis is relatively high, at above 7 per cent. More than half of the children between 1-5 years in rural areas are under-nourished, with girl children suffering even more severe malnutrition. The infant mortality rate has stagnated at 72 per 1000 for the last several years. As many as 60 per cent of rural households and 20 per cent urban households do not have power connection. Only 60 per cent of urban households have taps within their homes, and far fewer have latrines inside the house. The decline in the juvenile sex ratio over the last decade, visible in the data from Census 2001, is an indication that the Constitutional assurance of freedom and equality for women is still far from being fulfilled (4).

**Environmental Costs**

This development has also come at a price. Rapid population growth coupled with rapid industrialisation has caused severe environmental degradation and pollution with local, national, regional and global impacts. According to a World Bank study, between 1975 and 1995, as India’s GDP doubled, industrial and vehicular pollution load went up between 4 and 8 times respectively (5).

Deterioration in urban environment, increase in slum population, and in air, river, and water pollution has vastly affected the quality of life of the urban poor. The air quality of major cities indicate that ambient levels of nitrous oxides, sulphur dioxide, lead and suspended particulate matter are often higher than World Health Organisation and Indian
standards (6). Other harmful substances like ozone are not even monitored. Land and forest degradation in the rural areas, and overexploitation of groundwater is seriously threatening sustainability of food production (7).

ENVIRONMENTAL DEGRADATION, POVERTY AND ECONOMIC DEVELOPMENT
The strong linkage between environment degradation, poverty and economic development is now an established fact. It has been more or less accepted now that it is not always the poor who are the greatest polluters responsible for a degraded environment. Urbanisation and industrialisation and unsustainable use of natural resources have all contributed to serious environmental problems (See Box: The Small Industries Pollution Problem).

Conventional thinking on environment blamed the poor for overexploitation of natural resources, as poverty and environment were considered linked in a ‘downward spiral,’ in which poor people, forced to overuse the environmental resources for their daily survival, are further impoverished by the degradation of these resources. Population growth and economic change (which often bypasses the poor, or reduces their access to natural resources) were also seen to contribute to this process. It was therefore believed that poverty needs to be eradicated in developing countries before they can turn their attention to environmental protection.

The perception of the ‘vicious circle’ as characterising the environmental degradation and poverty in countries is vulnerable to criticism on several counts. It is a simplistic, exaggerated and misleading thesis. In the past, when poverty levels were much higher in developing countries, there was not much environmental degradation. Now that poverty levels are declining significantly, it does not seem plausible to attribute environmental degradation to poverty. Evidently other factors play a more important role.

The poor should be viewed as the victims rather than the perpetrators of environment damage. As they are dependent on nature for livelihood, they are very vulnerable to natural calamities, environmental degradation and ecological disasters, which are often humanmade, such as Bhopal Gas Tragedy, and pollution caused in the river Yamuna by industries and upstream rich farmers. Thus the belief that all economic development alleviates poverty is not entirely true. There are cases of destructive development which aggravate poverty and contribute to environmental degradation at the same time. Probably the first victim of any environmental degradation are the women among the poor. A fuelwood crisis as a result of deforestation, for example, forces village women to travel for miles in search of wood. This involves waste of energy and time which women could have devoted to more remunerative work. They have to bring water for cooking and washing from great distances. Fodder scarcity also affects women first: the care of livestock is their responsibility. This burden on women in turn has an impact on girl children. When the mothers’ time is spent on fetching fuel food and drinking water, girl children are kept at home and discouraged from attending school. They have to look after younger children, sweep the house and do the household chores.
There is enough empirical evidence to establish that environmental conservation must go hand in hand with economic development because any economic development which destroys the environment will create more poverty, unemployment and diseases and thus cannot be called even economic development. It may just be transfer of resources from the poor to the rich. Environmentally destructive economic development will impoverish the poor even further and destroy their livelihood resource base. Therefore the environmental concern in the developing world must go ‘beyond pretty trees and tigers’ and must link it with peoples’ lives and well being.

**Urban Utopia?**
While rural populations suffer from an increasingly degrading natural resource base, in urban areas, populations face environmental challenges of a different kind.

There is mounting evidence that increasing pressures on urban environments is taking its toll on the quality of life of urban population. Although economic deprivation may be less acute in urban areas than in the rural, the deleterious effects of non-economic factors may indeed be more pervasive. Urban population growth is much higher than the rate of population growth, and already about 29 per cent of India’s population lives in urban areas, frequently in deplorable conditions (8).

**HUMAN SECURITY**
Human security and better quality of life depends on several factors, all of them linked to the environment. These include:
- Water security for consumption and livelihood purposes;
- Food and nutrition security;
- Health security;
- Livelihood security;
- Ecological security; and,
- Social security

These linkages make the issue of environment protection all the more serious in India. The environmental problems facing India are different from those facing the affluent countries and are more immediate. Air and water pollution, soil degradation, deforestation, desertification, shrinking wetlands, inadequate public health and sanitation, indoor pollution in rural areas, growing water scarcity, falling groundwater tables, the lack of minimum flow in rivers, and overextraction of water for irrigation purposes are some of the environmental problems that need to be addressed first before any poverty alleviation programme can meet with success or human security achieved.

Thus environmental management and economic development are mutually supportive aspects of same agenda, indeed two sides of the same coin. A poor environment undermines development, while inadequate development results in lack of resources for environmental protection.

**ENVIRONMENT PROTECTION IN INDIA**
The regulatory and institutional decision-making framework for environmental protection in India is embodied in nine major acts of the Indian Parliament. These are: the Water (Prevention and Control of Pollution) Act of 1974 which established the Central Pollution Control Board (CPCB) and State Pollution Control Boards (SPCBs); the Air (Prevention and Control of Pollution) Act of 1977 which added the monitoring of air emissions to the responsibilities of the various Boards; the Environment (Protection) Act of 1986; the Forest (Conservation) Act of 1980, amended in 1988; the Motor Vehicle Act of 1938, amended in 1988; the Public Liability Insurance Act of 1991; and Notifications on the Coastal Regulation Zone, 1991; and Environmental Impact Assessment of Development Projects, in 1994, the National Environment Appellate Authority Act, 1997.

Most of the above Acts and Notifications are aimed at strengthening the command-and-control regime. New initiatives, especially in the form of a mix of regulations and legislation, fiscal incentives for technology acquisition, voluntary agreements, educational programs and information campaigns are required. Although the government has introduced some of these measures, more is required because the regulatory structure of a central authority, the ministry of environment and forests (and other ministries) and the Central Pollution Control Board linked to state-level implementation agencies have proved to be largely unsuccessful in effectively managing the protection of the environment.

An assessment of India's environmental management system suggests that weaknesses are evident at every administrative level at the center, state and district. Further, despite aid under specific investment projects, more needs to be done in the area of industrial pollution, particularly air emissions, coastal zone management, urban land use including the citing of industries, and mitigating environmental degradation in the mining sector (9).

**Tightening Up Belts**

In 1993, the government, through the ministry of environment and forests issued the Environment Action Program - India (EAP), developed after consultations with other ministries, states and NGOs. The EAP identified seven environmental priorities for India:

(a) conservation and sustainable utilisation of biodiversity in selected ecosystems including forests, mangroves, wetland, coral reefs, mountain ecosystems;
(b) afforestation, wastelands development and conservation of soil and moisture and ensuring that water sources are not polluted;
(c) control of industrial and related pollution with an accent on the reduction and or management of wastes, particularly hazardous wastes;
(d) improving access to clean technologies;
(e) tackling urban environmental issues;
(f) an alternative energy plan; and,
(g) strengthening scientific understanding of environmental issues, as well as strengthening structures for training at different levels, orientation and creating environmental awareness.
A 1996 study indicated that (a) despite a strong legal framework and various ministries at the center, departments and boards at the state level; and local agencies involved in environmental management, implementation remains weak. Institutional capacity building to strengthen monitoring, enforcement, and compliance with existing laws can have a high payoff; and (b) the government alone cannot be responsible for environmental management, stronger efforts have to be made to involve the large non-governmental organisation community in programs ranging from biodiversity conservation to alternative energy programs. The study also recognised that this cooperation will require transparent policies and practices such as early involvement in the environmental impact assessment process, access to information, and actions to increase involvement through public participatory processes (10).

MOVING AHEAD
In the Approach Paper to the Tenth Five Year Plan for the period 2002-2007, the government has recognised that mere economic growth is not enough and that development must be defined in broader terms of human being enhancement (11). The Tenth Plan has thus outlined a set of monitorable targets to achieve its objectives:

- Reduction of poverty ratio by 5 percentage points by 2007 and by 15 percentage points by 2012;
- Providing gainful high-quality employment to the labour force over the tenth Plan period;
- All children in school by 2003; all children to complete 5 years of schooling by 2007;
- Reduction of gender gaps in literacy and wages rates by at least 50 per cent by 2007.
- Reduction in decadal rate of population growth between 2001 and 2011 to 16.2 per cent
- Increase in literacy rate to 75 per cent with in the Plan period;
- Reduction of Infant Mortality Rate (IMR) to 45 per 1000 live births by 2007 and to 28 by 2012.
- Increase in forest and tree cover to 25 per cent by 2007 and 33 per cent by 2012.
- All villages to have sustained access to portable drinking water within the Plan period.
- Cleaning of major polluted rivers by 2007 and other notified stretches by 2012 (12).

As indicated, these targets relate to good environmental performance and governance, highlighting how cross-cutting environment management issues are.

Approach to the Tenth Plan
The basic objective of the Tenth Plan is to bring about all round enhancement of human well being by eradicating poverty through adopting well conceived development strategies in which environmental concerns are posited as the vital aspects. environmental management and economic development are mutually supportive aspects of the same agenda. A poor environment undermines development, while inadequate development results in a lack of resources for environmental protection.
Environmental conservation must go hand in hand with economic development because any economic development which destroys the environment will create more poverty, unemployment and disease. Environmentally destructive economic development will impoverish the poor even further and destroy their livelihood resource base. Environmental concern must be linked to people’s lives and well being, impact as these do various aspects of human existence that include health and livelihood amongst others. Air pollution, soil degradation, deforestation, desertification, shrinking wetlands. Inadequate public health and sanitation, indoor pollution in rural areas, growing water scarcity, falling ground water tables, the lack of minimum flow in the rivers and over extraction of water for irrigation purposes are some of the environmental problems that need to be addressed first before any poverty alleviation programme can meet with success.

Based on the objectives of the *Approach Paper To The Tenth Five Year plan 2002-2007*, the ministry of environment and forests prepared a strategy for the period and for the year 2002-2003.

**MINISTRY OF ENVIRONMENT AND FORESTS**
The ministry of environment and forests is charged with the responsibility of planning, promoting, coordination and overseeing the implementation of various environmental and forestry programmes. Responsibilities include environmental management to promote health considerations, focus on poverty alleviation by enhancing access of the poor to natural resources for livelihood and heightening awareness regarding environmentally sound living process by focusing on nature-human synergy.

The ministry has been designated as the nodal agency in the country for the United Nations Environment Programme (UNEP), International Centre for Integrated Mountain development (ICIMOD) and looks after the follow-up of the United Nations’ Conference on Environment and Development (UNCED).

The objectives are supported by a set of legislative and regulatory measures aiming at preservation, conservation and protection of environment as indicated above.

The activities of this ministry can be broadly divided into four sub-sectors namely environment, forestry and wildlife, National Afforestation and Ecodevelopment Board (NAEB) and the National River Conservation Directorate (NRCD).

**Strategy for the tenth five year plan**
The ministry has identified the following strategy to meet the objectives of the Tenth Plan:

(a) To promote ‘sustainable development’ by emphasising the intrinsic linkage between environment management and socio-economic development of the people, through increased access to natural capital which is an essential component of reducing poverty. The emphasis will be on creating an enabling
environment in terms of policies, institutions which support the over-arching objective of poverty reduction

(b) To mainstream environment issues in the developmental strategy, a multi-pronged approach will be followed which will include the incorporation of environment in the curriculum, sharpening the mechanism for the environmental auditing of the development activities, creating heightened awareness, broad-basing community involvement and to forging a coordinated effort with corporate and public sector in environmental management

(c) To input environmental concerns in the developmental scenarios by treating environment as a cross-sectoral issue

(d) To take concrete steps for increasing forest/tree cover from the existing level of 19.37 per cent to 25 per cent by 2007 and 33 per cent by 2012. While striving for this goal the thrust will be given to:
(1) increasing productivity;
(2) efficient management of resources; and,
(3) focus on the local needs and location specific strategies in terms of species selection and management of resources.

(e) Cleaning of major polluted rivers by 2007 and other notified stretches by 2012. In order to have efficient, smooth and time bound attainment of the goal, a holistic and integrated approach of addressing not only the intercepting sewers and sewage treatment plants which currently constituted the core of the Plan, but also other components as internal sewage, solid waste management and toilets with the participation of states, public and local bodies. The focus will on be treating the town as a unit by way of convergence of various schemes.

(f) Major changes in the institutional framework with a view to make it responsive and accountable to perceived needs of people

(g) Involvement of youth in environmental education, through a National Green Corps scheme to be implemented in all educational institutions covering class 8\textsuperscript{th} to 12\textsuperscript{th} class. (13)

**Thrust Areas**
The thrust areas under the environmental sector for the Tenth Plan will be environmental impact assessment and abatement of pollution; ecological survey; conservation and eco-regeneration; environmental education, awareness and people’s participation; environmental research and training; and, national river conservation.

Under forestry, the thrust on sustainable management of forestry resources with people’s participation initiated during the Eighth Plan and carried through the Ninth Plan will be further strengthen during the Tenth Plan period. The programmes/schemes will focus on farm forestry, measures to sustain joint forest management, take care of the rights and interests of the tribal population living in and around the forests, review of the subsidies in the sale of non timber forest produce (NTFP) and promote bamboo cultivation and coastal shelter belt plantations for prevention of natural calamities.

The wildlife programmes/schemes will focus on strengthening and enhancing the protective area networking through suitable policy framework and management plans;
settlement of right and relocation of villages; promotion of eco-development by giving priority to national parks and sanctuaries having higher biodiversity and high threats; timely payments of compensation against the depredation by wildlife; control of poaching; taxidermy and illegal trade in wildlife species; and, promotion of wildlife tourism.

The Tenth Plan thrusts for research and education segment will be on watershed management, desert development, medicinal plants, coastal areas, bamboos and agro forestry and biodiversity conservation. Added emphasis will be given to educational and training programmes (14).

**Activity Profile**

The principal objective of environment sector for the Tenth Five Year Plan is to integrate the objectives of the policies stressed by the Planning Commission and to take cognizance of long term developmental perspectives related to industrialisation, power generation, transportation, agriculture, irrigation and other economic activities. Some of these goals have been identified as indicated below.

**Environment**

*A. Industrial pollution control*

It is proposed to ensure that large and medium polluting industrial units and stand alone polluting small scale industrial units (SSIs) install and operate pollution control devices and meet the norms. It will be ensured that small industries located in clusters and in industrial estates are covered under common effluent treatment plants (CETPs). Siting of pollution industries will be insisted to conform to the zoning plan which would be integrated with state industrial policy. Action plans will be effectively implemented to reduce pollution in all the critically polluted areas.

*B. Water pollution control*

Most of the rivers, streams, and large stretches of the coastal marine environment in India are highly polluted with municipal waste, waste generated from industry, chemical agents from fertilisers, pesticides from crop protection, and silt from degraded catchments. Untreated sewage and other non-industrial wastes account for four times as much pollution as industrial effluent. In the major cities, less than 50 per cent of the total wastewater generated is collected and less than one-fourth is treated. The consequence of such pollution is high levels of waterborne diseases which account for two-thirds of all illnesses in India with a significant loss in productivity. Although there is a Coastal Regulation Zone Notification designed to protect the coastal marine ecosystems, implementation is weak and marine pollution continues largely unabated (15).

Close monitoring of the discharge of industrial effluents into waterbodies will be enforced. A comprehensive plan is proposed to be prepared for setting up of sewage treatment facilities in 1,591 towns having populations more than 20,000). Overextraction of groundwater will be regulated. Areas of groundwater pollution will be identified and a plan will be implemented to contain this.
C. Air pollution control

Air quality in India's major cities indicate that ambient levels of nitrous oxides, sulphur dioxide, lead and suspended particulate matter are often higher than World Health Organization and Indian standards. Sulfur dioxide levels in nine of the country's major cities exceed national standards. Other harmful substances such as ozone are not monitored. Major contributors to air pollution problems in India include thermal power stations, industrial factories, vehicles, and the use of non-commercial fuels such as coal briquettes, animal dung and trash by large sections of the population. The negative environmental effects from increased fossil fuel use will likely increase as India seeks to meet the energy demands of its expanding economy. Coal will play a predominant role in this expansion. The major pollutants from coal exploitation include the principal greenhouse gases (GHGs), particulate air emissions, coal mining runoff and wastes, and coal ash solid wastes which pose a large-scale disposal problem (16).

In view of the fact that cooperation of the state government is an essential factor in successfully implementing pollution control programmes, it is proposed to work with the state government for preparing location specific plans for reducing automobile pollution, and prevention of burning of biomass/garbage or any other material (except approved fuel) in the cities and towns to reduce secondary sources of air pollution. It is also proposed to set up a national network of air pollution monitoring stations for the parameters notified in respect of ambient air quality standards and for parameters for which standards have been prescribed for various sources. A database of pollutants releases into the air from different sources will be built up.

D. Strengthening of central and state pollution controls board

The board targets/activities proposed under the above are the training of officers, upgradation of laboratories, capacity building in state pollution control boards / pollution control centres of the Northeast and in the new states of Uttranchal, Chattisgarh and Jharkhand.

Economic instruments for prevention and control of pollution will be evolved. To implement the various economic instruments, specific proposals will be formulated keeping in view the relevant considerations which may require a separate set up.

E. Environmental impact of human health

Environmental studies will be initiated to assess the impact of various pollutants on human health. Measures will be taken to control/eliminate major source of pollutants which have an adverse effect on human health. Phasing out of highly polluting obsolete technologies is also envisaged during the Tenth Plan period.

F. Hazardous substance management

Comprehensive national chemical profiles are proposed to be prepared. Emergency response centers will be established in all industrial pockets with a large number of accident hazards units as also inventorisation of isolated storage of hazardous chemicals. Some of the other goals set for the Tenth Plan include effective implementation of the
Public Liability Insurance Act; preparation of database on risk-prone areas; setting up of hard hazardous-based disposal facilities in all states where significant quantities of hazardous waste are being generated; establishment of sub-regional training centres for implementation of the Basel Convention, setting up of custom laboratories and capacity building of custom officers for checking contraband trade in hazardous chemicals/waste; implementation of environmentally sound practices in ship dismantling and proper management of biomedical wastes; municipal solid waste; plastic waste; and, chemical waste.

G. Soil contamination and environmental degradation
Contaminated sites are proposed to be identified and soil remediation plans will be prepared. Reclamation of degraded areas is another programme envisaged.

H. Environmental impact assessment (EIA)
Capacity building will be undertaken for decentralised EIA of projects and monitoring of compliance of clearance condition. Detailed shoreline management plans and Coastal Zone Management plans are proposed to be prepared as also strengthening of state coastal zone management authorities. Plans for conservation of sensitive ecosystems will be prepared and implemented. Scoping of mega projects and strategic EIA for specific sectors will be undertaken.

I. Ecological survey, conservation and ecogeneration
Ongoing programmes are proposed to be strengthened and a status paper on achievement indicating the extent to which efforts have yielded the results will be brought out. Added efforts will be made to conserve biodiversity for ecological security including proper evaluation of environmental risks associated with transgenic crops. The overall objective will be to set an example/model highlighting India’s achievement in conserving ecologically sensitive area such as mangroves, coral reefs, wetlands and representative ecosystems through biosphere reserves.

J. Awareness, education, training and research
Comprehensive packages are proposed to be developed on critical issues making them effective so that messages reach citizens like the pulse polio programme. Schools and colleges are proposed to be covered for participation in environmental programmes. On-the-job trainings are proposed. Sustainable relationships with R and D institutions and academia will be developed for programme formulation and execution.

H. Environmental law and policy
The main theme will be revamping of environmental laws for ensuring their effective implementation, training of judicial officers in environmental laws and strengthening of enforcement mechanism (17).

Forestry
Forests are natural assets and provide a variety of benefits to the economy. Though the recorded forest area is about 23 per cent of the geographical area of the country much of this is degraded. There forests are therefore unable to play an important role in
environmental sustainability and in meeting the forest produce needs of the people, industry and other sectors.

The problem and constraints in forestry development include lack of awareness about multiple roles and benefits of forests; especially its role in drought-proofing and prevention of soil and water runoff; no linkage between management and livelihood security of the people; low level of technology; inadequate research and extension; weak planning capability, wastage in harvesting and processing; market imperfections; overemphasis on government involvement and control; low level of people’s participation and NGOs involvement; lack of private sector participation; unwanted restrictions on felling, transport and marketing of forest produce grown by the people; lack of inter-sectoral coordination; and, conflicting roles of public forest administration.

Existing policy, laws, rules, regulations and executive orders should be reviewed for removing constraints in holistic development of forestry with people’s participation. Areas where action by government is needed and where the government programmes have not been up to the mark include:

- Focus on farm forestry which has been surprisingly diluted since 1991 despite its enormous potential, especially in agriculturally backward areas.
- Measures to sustain JFM beyond the project period have not been conceptualised. These relate to: building one-to-one correspondence between user groups and forest patch through a new forest settlement, recognition of JFM groups in law and linking them with statutory panchayats, and integrating the activities of such groups with other income generating programmes such as watersheds and marketing of NTFPs.
- Protecting women’s traditional usufruct rights and enabling women’s group to collect and market NTFPs has been proved to be viable and cost effective strategy not only for women’s empowerment but also for renewal of forests. It is important to acknowledge and recognise women as managers, food gatherers, wage earners and producers. Forestry development policies must be developed accordingly.
- Continuing subsidies on government auctions of wood and bamboo to industries, which act as a disincentive to industry to pay a remunerative price to farmers. Governments need to examine the pattern of subsidy to forest based industries and wipe out that subsidy in a time-bound manner so as to improve valuation of forests.
- The tariff structure on forest-based products such as timber and pulp keeping in view the incentive effect on farmers.
- Poor understanding of the social implications of technology; old style plantations still continue to be funded despite the 1988 policy. Forest technology should be changed by shifting attention from timber to floor management and production of more gatherable biomass.
- Classification of bamboo as NTFP thereby providing rights to tribal population and other forest dwellers over this resource. Bamboo harvesting policy systematically maximises dry bamboo output for paper mills rather than green bamboo output for artisans. In fact the present practices ban felling of green
bamboo. Streamlining the procedure for making green bamboo available directly to artisans.

- Gregarious flowering of bamboo is expected from 2003 onwards. This will result in mass mortality of bamboo, fire, increase of rodents, famines and unrest in tribal areas. Emergency plan should be formulated to face the calamity.
- Forest fire prevention and control should be given top priority to reduce losses and emission of greenhouse gases.
- Conservation and development of medicinal plants should be given priority to meet the local crude drug requirements and for export.
- Agroforestry, mountain, watershed development, river valleys, arid areas, wastelands afforestation programme should be given priority.
- Research and technological development must increase productivity, production of new products, value addition, improved marketing, export and productive employment generation.
- Promotion of coastal shelterbelts plantations for prevention of natural calamities.
- An integrated system for addressing issues of animal welfare, including ecology, safety and commercial exploitation will need to be evolved (18).

Targets to bring greater areas under forest protection have been set for the five year periods 2002-2007 and 2007-2012. It has been proposed that the forest cover of the country should be increased to 25 per cent by 2007 and 33 per cent by 2012. This would mean bringing up extensive tracts of land under tree cover which would require a substantial investment both by the government and private sector.

The main elements of the strategy for 10th plan will include convergence of afforestation schemes to avoid duplicity and canalise smooth flow of funds; introduction of multi cropping system and promotion of agro forestry/ farm forestry; increased role and involvement of private sector in plantation; removing of bottlenecks and reviewing felling and transit rules and standardisation of cost norms under afforestation schemes. It also includes provision of quality planting material, infusion of improved and innovative technologies in nursery plantation, suitable protection against forest fires, pest attack and other diseases, strengthening of JFM net work for greater involvement of people and sustaining such programmes, strengthening of monitoring mechanism through establishment of IT network, development and sustainable management of NTFPs including medicinal plants, review of state monopoly on NTFPs, revival of working plans, strengthening of human resource planning and management and evolving Sustainable Forest Management (SFM) instrumentations (19).

**Wildlife**

Security of soil, sustenance of water regimes and activation of weather regimes as well as moderation of environmental adversities of modern age depend upon the health of natural ecosystems. The benefits from conservation of natural areas are not readily quantifiable as they flow to the local communities and the country somewhat intangibly and are often taken for granted. The value of effective conservation of natural areas must hence not be linked with direct fiscal benefits. Environmental well-being and food security cannot be ensured in the long run without the care of natural areas. Efforts and
initiatives from the side of the communities for revival of natural areas thus need to be supported.

Challenges of wildlife conservation arise from population pressure, adverse impact of industrialisation as well as the lately increasing threats from illegal wildlife trade. Conservation of wildlife and its habitat outside the protected areas particularly in the context of critically endangered species is a challenge which the conservation efforts must address. Such efforts are equally needed for long ranging mega-herbivores like elephants and major predators like tiger and leopard.

For the protection and conserving the wildlife, people’s support has an important role. Therefore bio-resource ameliorative and livelihood supplementing participatory eco-development measures are required for local communities with a view to reducing their dependence upon protected areas. The problem of wildlife damage to human life and property need to be effectively mitigated by special management measures and expeditions and reasonable ex-gratia financial relief. Also, it is necessary to settle expeditiously the rights of local communities including voluntary relocation of habitations to alternative sites outside the protected areas. Such measures would ensure the participatory support of the people for conservation. To fructify this objective, larger investments backed by attitudinal change would be essential. Poaching of wild animals due to lucrative clandestine trade in wildlife produce has become a major threat to wildlife conservation. Steps to be undertaken in this regard include filling up of vacant posts in the wildlife sector; reorganisation of field information in and around the protected areas; provision of infrastructure; capacity building; and, intelligence work. Education and awareness building measures as well as research and training have great role to play in making the conservation measures more effective.

The following thrust areas need high priority and enhanced allocation during the Tenth Plan:

A. Mitigation of human wildlife conflict
As regards settlement of rights and relocation of an estimated number of 10 million people living inside protected areas, it is not possible to the shift entire population, both, on account of resource requirement and unwillingness of the people to move out. For the time being relocation would be on voluntary basis with greater priority being given to national parks and important sanctuaries.

B. Eco-development
Eco-development process in atleast 15,000 villages under the Tenth Plan period will be initiated. Priority will be given to national parks and sanctuaries having higher biodiversities and higher threats.

C. Depredation of Wildlife
Wildlife depredation on human life and property is a major factor of alienation of local community from wildlife conservation. In 1999-2000 alone, 179 human deaths have been caused by elephants. The situation in mountainous regions is very grave. Timely payment
of compensation against depredation by wildlife will go a long way in eliciting local support.

D. Habitat improvement
One of the most important part of the successful wildlife management is habitat improvement and its orientation as per the needs of wildlife along with strict fire control measures and devices in the protected areas. This has been identified as a priority item in the Tenth Plan.

E. Control of poaching
Poaching of wild animals and its lucrative clandestine trade has become a major threat for conservation of wildlife. In the year 2000-2001 only, about 74, 270 and 41 cases of tiger, panther and elephant poaching respectively have been reported. The actual number of poached animals may be even higher as all the cases poaching are not reported. The important steps to be undertaken in this regard are filling up of vacant posts in wildlife sector, reorganisation of field formations in an around protected areas, capacity building and intelligence network, development of wildlife forensic system, establishment of wildlife crime unit, provision of essential equipment and amenities to staff and provision for anti-poaching camps and strike forces.

F. Education and awareness
Considering the crucial role of education, awareness and publicity in wildlife conservation, it is essential to provide adequate funds for these programs in the Tenth Plan.

G. Research and training
Research and training inputs need to be strengthened in the wildlife sector. The Wildlife Institute of India is proposed to be strengthened during the Tenth Plan period.

H. Research and Education
Under the environment research programme, the focus will be on the identified thrust areas which include alternatives to chemical pesticides and fertilisers; biotechnologies/microbiologies for treatment of industrial effluents; development of pollution related instrument; waste minimization and reuse; development of biodegradable plastics; and health and toxicology, amongst others.

In the ecosystem research scheme, it is proposed to take up studies relating to conservation, assessment of the impact of human activities on the biosphere, climate change and interrelationships between humans and biological resources.

Under the Eastern and Western ghats scheme emphasis will be on location-specific and problem solving research. Efforts will be made to conserve, protect and enhance the biodiversity in Eastern and Western Ghat. Endeavors will be made for tackling the hotspots of pollution by development of biological and other interventions for prevention and control of pollution including waste recycling. Special attention is proposed to be given on human-animal interaction on the boundaries of wildlife sanctuaries, national parks, biosphere reserves and world heritage cites. Attention will also be given to
rehabilitation of mixed areas and over burdened dumps in the Eastern and Western ghats as also on strengthening of R&D on endemic fauna and climate change.

The Ministry had identified about 21 thrust areas which will guide the selection of research projects during the Tenth Plan period. Some of the important areas of thrust are development of biological and other interventions for pollution preventing and control including waste recycling; development of strategies for prevention and/or of pollution; clean technologies for sustainable production patterns; restoration of degraded ecosystems; conservation and enhancement of biological diversity; climate change; health and toxicology; research on landuse and landuse changes; mining; impact of developmental activities on drinking water; river conservation and maintenance of their pristine state; research on mountain ecosystem, islands and coastal zones; research on environmental legislation; socio-economic issues (20).

**National river conservation directorate (NRCD)**

With a view of improving the sustainability of the river and lake cleaning programmes, a number of initiatives are proposed to be taken up in an integrated and holistic approach. The focus will be on large towns and include a decentralised approach for sewage interception, development of demonstration level models in small colonies for the total treatment of sewage and its disposal, promotion of root zone treatment / formulation of wetland technology, tackling more aggressively the non-point source of pollution, utilisation of treated sewage after disinfecting, adoption of a more effective river front development approach involving universities and colleges in the monitoring of water quality in rivers and lakes, approval of projects only after firm commitment from local bodies/state Governments for meeting the operation and maintenance costs. Strengthening of state Level institutional arrangements for effective and timely implementation of the programmes, assessment of minimum floor requirements in different rivers to ensure minimum floor regimes in critical structures of all rivers and formulation of a legislation for River Regulation Zone on the lines of Coastal Regulation Zones, are some of the important elements of the proposed strategy (21).

The ministry has also identified capacity building in environmental economics as one of the priority areas of environmental management. It is currently implementing the ‘India Environmental Management Capacity Building Technical Assistance Project’ with World Bank assistance. The objective of this programme is to increase the capacity for the application of economic principles and tools to environmental management in India across the full range of issues such as priority setting, cost-benefit analysis of alternative policies for pollution control, resources management, and biodiversity conservation. To achieve these objectives this programme is being implemented through selected core institutions like Madras School of Economics, Chennai; Indira Gandhi Institute of Development Research, Mumbai; Indian Statistical Institute Calcutta; and Institute of Economic Growth, New Delhi (22).

The Environmental Economics Research Committee (EERC) formed to identify research themes has identified several themes which will stress on the application of economic principles. The areas identified include
1. Environment and natural resource management
a) Land Use and Management
b) Environmental Aspects of Air
c) Water Resource Management
d) Biodiversity

2. Environmental pollution and policy design for control
a) Air, water and solid waste
b) Valuation of damages
c) Methods and costs of control
d) Economic and Fiscal Incentives

3. Economics of Green Initiative
a) Pollution Reduction at Source (23).

DONOR PRIORITIES IN ENVIRONMENTAL RESEARCH AND MANAGEMENT

Several environment-related programmes have been funded by donors on the basis of priorities identified by them. Some of these include the United Nations Development Programme, Asian Development Bank, the International Human Development Programme and Winrock International India.

The United Nations Development Programme (UNDP)
The UNDP addresses the challenge of protection and regeneration of the environment, vital for sustainable human development by focusing on local priorities as well as global environmental issues. It supports such measures like mobilising and building the capacities of local communities and other stakeholders, and development and promotion of technologies that help conserve use of natural resources.

The focus of UNDP-supported programmes is natural resources management, environment and energy, multi-level capacity building for decision-making, mainstreaming environment into the development process, and information dissemination and advocacy.

UNDP's environment strategy targets three types of interventions: biodiversity conservation, natural resources management and clean energy technology promotion.

1. For biodiversity conservation, the UNDP supports the setting up of management models for protected areas in which the development rights of communities receive as much attention as the process of conservation. The medicinal plants sub-programme demonstrates the conservation and sustainable utilisation of medicinal plants through the revitalisation of traditional practices for primary health care within local communities. For forest conservation, the UNDP has been supporting the government’s forest development programme including community forest management.
2. In water management, UNDP supports interventions and campaigns through its Small Grants Facility to promote appropriate techniques, methods and practices for sustainable use of water. Integrated management of water resources involving participatory planning and management of water is the key aspect of these endeavours. Successful examples of micro-watersheds in Rajasthan illustrate the efficacy of this approach.

3. Providing clean energy services in remote rural areas using renewable energy technologies such as solar with civil society partners and biomass is a major focus area.

4. Management of environment-related development problems which include air and water pollution, and domestic and industrial waste management. The UNDP is also involved in rating different industrial sectors for their environmental performance.

5. Capacity building at various levels - government, private sector, women’s groups, NGOs, all associated with decision-making processes in the area of natural resources and in environmental education.

6. Sustainable Development Network Programme (SDNP) to make relevant information on sustainable development readily available to decision-makers.

7. Helping the ministry to meet the control measures as specified in the Montreal Protocol, which has set out a time schedule for freeze and reduction of ozone depleting substances.

8. UNDP is the lead implementing agency for the Global Environment Facility (GEF) in India. With nearly 15 ongoing projects, India is the second largest recipient of GEF funding. Biodiversity and climate change are the key focal areas for UNDP-GEF with an emphasis mainly on technical assistance and capacity building. Apart from global environmental considerations, GEF projects strongly reflect national priorities, and are implemented in close collaboration with the Government. Some of the important UNDP-GEF projects include:

   - Optimising development of small hydel resources in the hilly regions of India
   - National Biodiversity Strategy and Action Plan, one of the world’s largest environment planning exercises that aims to develop a series of plans and programmes relating to ecological security and livelihoods of people most dependent on natural resources
   - National Communication, a mandatory report to be submitted to the UN Framework Convention on Climate Change (UNFCCC) (24).

The Asian Development Bank (ADB)
ADB’s environment strategy supports (i) improving the urban environment by focusing on air pollution programs, solid waste management, water supply, and sanitation services; (ii) awareness raising; (iii) energy efficiency with concomitant environmental benefits; and, (iv) natural resource management and biodiversity conservation.

The International Human Development Programme (IHDP)
IHDP is an international, interdisciplinary and non-governmental research programme, aiming at "the development and integration of research on the human dimensions of global environmental change.

The Indian National Scientific Committee of the IHDP has identified several priority areas for research. These include:
(i) Impacts of tourism on natural resources in ecologically fragile cultural landscape in the Ganga watershed of the Garhwal Himalaya
(ii) Climate change and food security: human adaptive strategies
(iii) Natural resource management and sustainable livelihood concerns of traditional societies in the mangrove ecosystem of the Sunderbans
(iv) Climate change mitigation through alternate renewable energy sources: societal dimensions
(v) Case study on impacts of urbanisation and industrial transformation (25).

Winrock International India
In India, the Climate Change (CLC) Program at Winrock International India is addressing this critical issue by working at the intersections clean energy and environment and natural resources management programs. Winrock is working to find solutions that can address various local and global climate change concerns while simultaneously contributing to environment-friendly economic growth and sustainable development of the poor. Activities include preparing Greenhouse Gas (GHG) emissions inventories, examining financing options and mechanisms for implementing GHG mitigation projects, designing abatement strategies and policies, developing mitigation projects, analyzing climate change impacts, and assessing adaptation strategies (26).

NGO'S PRIORITIES IN THE ENVIRONMENT SECTOR

There are several leading non-governmental organisations in India working on different issues in environment, identified on the basis of perceived need, and where they have developed expertise. Given below are just a sample of many.

Centre for Science and Environment (CSE), New Delhi
The Centre for Science and Environment is one of India’s leading environmental NGOs with a deep interest in sustainable natural resource management. CSE’s strategy is one of ‘knowledge based activism.’

Today when India faces double environmental threat – of ‘ecological poverty’ and extensive land degradation, on one hand, and rapidly growing toxification and pollution arising out of industrialisation and economic growth, on the other – the centre is trying to advocate solutions to deal with both the problems. Apart from its work on natural resource management issues, it has major campaigns on air and water pollution, on the threats posed to public health by the changing environment, and a project to bring about transparency in the industrial sector by rating the environmental performance of Indian
firms. The project is expected to lead not only to increased transparency but also to reduction of corruption in pollution control inspection (27).

CSE is currently working on the following policy-related issues:

a) Policies dealing with pollution control and prevention
b) Policies for sustainable and participatory natural resource management (issues that lie at the interface of natural resource management and people’s participation, particularly in the areas of water management, wildlife, biodiversity conservation and forests); issues that lie at the interface of poverty and environment
c) Policies for an equitable framework to manage the global environmental resources;
d) Policies dealing with issues that lie at the interface of environment and health (the programme includes a plan to set up a laboratory to monitor air, water and pesticide pollution); and,
e) Policies for sustainable industrialisation (28).

Underlying these priority areas, CSE has been strongly advocating for science for ecological security’ (Anil Agarwal, mimeo). CSE feels strongly that while India has emphasised science for food and defence security, there is a need to address ecological issues through better science.

Development Alternatives (DA)

DA, a New Delhi-based NGO is committed to the research, development and implementation of appropriate technology for agriculture, building, paper making and handlooms which support the principles of sustainable development (29).

The Indira Gandhi Institute of Development Research (IGIDR)

IGIDR is an advanced research institute established by the Reserve Bank of India for carrying out research on development issues from a multi-disciplinary points of view. The aims and objectives of the Institute are to promote and conduct research on development (in its economic, technological, social, political and ecological aspects) from a broad inter-disciplinary perspective; to gain insights into the process of development and alternative policy options and to disseminate the knowledge so gained. The broad areas of research relating to the environment include:

- Economic reforms and macroeconomic policies
- International trade and exchange rates
- Agricultural economics, food policy
- Poverty, safety nets, public distribution systems, rural development
- Energy and infrastructure
- Environmental studies
- Climate change issues
- Rural pollution and health (30).

Foundation for the Revitalisation of Local Health Traditions
Based in Bangalore, this organisation is committed towards revitalising of Indian traditional medicine systems so as to utilise the best traditional knowledge and practices related to prevention, simple cures and promotive health in millions of rural and urban homes; promote effective national programmes for conservation and sustainable utilisation of medicinal plants and other natural resources; promote effective community-based enterprises that can provide income and employment to thousands of rural women and men through cultivation and sustainable collection of medicinal plants as well as manufacture of herbal products based on our medical heritage; undertake effective research programmes that help India make original contributions to the world of medicine from the knowledge base of indigenous medical systems and make effective interventions, which help invigorate institutions as well as social traditions, and people-to-people processes that transmit traditional medical wisdom.

The focus of the work is a) conservation of medicinal plants, and, b) revitalisation of local health traditions (31).

**Tata Energy Research Institute (TERI), New Delhi**

TERI, based in New Delhi is an organisation that believes that efficient utilisation of energy, sustainable use of natural resources, large-scale adoption of renewable energy technologies and reduction of all forms of waste will move the process of development towards sustainability.

Some of the areas of focus of the organisation include the following:

a) Issues of national and international environmental governance and urban local governance (32).

b) Environmental and energy policy research to ensure efficient and sustainable management of, and equitable access to, resources. The key thematic areas of research include local and global environmental studies; energy economics, modeling and policy analysis; special analysis using geographical information systems; natural resource accounting; and urban infrastructure and transport systems (33).

c) To study the environmental dimensions of various economic activities and resource-use patterns and explore strategies to mitigate the adverse effects on the environment. To study the relations between energy and environment in urban, industrial, and rural settings through field service, experiments, quantitative modeling, and economic analysis. The organisation is also engaged in regional and urban environmental management plans, environmental impact assessment studies, corporate environmental initiatives and an environmental rating system for the municipal sector, human exposure and health studies, environmental management of the mining and power sectors, waste management, and dissemination of environmental information (34).

d) The organisation is also undertaking research and outlining policy initiatives to promote effective and equitable solutions to global and environmental challenges, taking into account the concerns of developing countries. In the field of global climate change, the centre prepares GHG (Greenhouse gas) inventories, assesses the impact of climate change, analysis mitigation options, examines national and international policy, and helps
build capacity among government, industry, and civil society to address global environmental issues (35).

e) To identify, analyse, and prioritise policy options with regard to energy and the environment by quantitative modeling of energy-economy-environment linkages, economic and statistical analysis of energy and related data, and the use of geographical information systems (36).

f) Research in environmental security issues that pose potential social and economic threats at local and regional levels (37).

g) Integration of the long-term goal of sustainable natural resource management with the immediate objectives of rapid economic growth and poverty alleviation, looking into the dynamic interaction between socioeconomic processes and natural resources (38).

h) To draw a sustainable and environmentally sound transport system (39).

i) To facilitate wider diffusion of energy-efficient and environmentally sound technologies (40).

j) Areas of activities in the Northeast include identification of the factors responsible for the degradation of natural resources in the region and evolve measures to arrest them; preparation of a comprehensive database on natural resources; study of the demand and supply of commercial and non-commercial fuels especially in the domestic sector; development and implementation of interventions that lead to efficient use of natural resources and check the process of degradation; infrastructural development including R&D and training facilities for sustainable utilisation of natural resources; capacity and network building (41).

---

**Box: The Small Industries Pollution Problem**

Integrating Environmental Management in Small Industries of India  
**Dr. C. M D’Souza**  
*La Trobe University, Australia*

The role of small industries in the economy is significant. But despite their importance, small industries pollute and are faced with numerous problems including technical and financial issues, and legislative and regulative compliance.

In India, industrial pollution is regarded the worst among the many environmental impacts that are causing damage through excessive exploitation of resources and degradation of the environment. The Bhopal tragedy clearly demonstrated one of the world’s worst industrial accidents. The significance of this accident, however, extends well beyond avoiding such a disaster and a need to move beyond just polluting the environment. Since the legacy of Bhopal, large manufacturing houses in India have all
committed themselves to the environmental movement. However, the crux of the problem is the pollution generated by small and medium industries. Although they are promoted in a large way by the Indian government and play an important role within the economy with their prime role and vast scope in employment, the unsafe environmental practices of these industries for a long time have gone unnoticed, even when research has indicated that they are the worst polluters.

Industrialisation is the central dynamic force for most countries and has been a key growth objective of India’s planned economy, with heavy investments being made in this sector. Labour productivity is highest in manufacturing industries; this has assisted in raising national income at a faster pace. Small units play an important role in the Indian economy, as they are labour intensive and create job opportunities. A 1999 report indicates that about 3 million SSI units employing nearly 16.7 million persons account for 35 per cent of India’s total exports and about 40 per cent of industrial manufacture. The importance of industrialisation in economic development is crucial for a growing economy with a large population like India, so prosperity through industrialisation has been a long-term strategy for the Indian government.

As industrialisation gathered momentum so did the increase in small-scale industries. Small companies are defined as those with less than US $180,000 in capital equipment. They offer a higher productivity of capital than capital intensive enterprises, as they have low investment per worker. They help in dispersal of industries, rural development, and the decentralisation of economic power. All this is required to increase and disperse economic growth.

Several policy initiatives and procedural simplifications have been undertaken by the government to support this sector, not only for employment generation but also to enhance their competitive strength. The government has also provided measures such as greater infrastructural support, more and easier availability of credit, lower rates of duty, technology up-gradation, assistance to build entrepreneurial talent, facilities for quality improvement, and export incentives.

The government’s prime role has been to encourage growth of these industries, often neglecting environmental considerations. Industrial effluent largely comes from the three million small- and medium-sized units that are scattered throughout the country, particularly in the production of paper, sugar, leather, and chemicals. Unfortunately, only about half the medium- to large-scale industries have partial or complete effluent treatment. Fourfold industrial growth from 1963 to 1991 resulted in six-fold growth in toxic releases. Heavy industries like iron and steel producers contribute nearly 70 percent of the toxic wastes released but only 20 per cent of industrial output. Industrial disposal of polluted effluent occurs via open drains into streams and reservoirs or through underground injection. Most industrial estates lack wastewater treatment systems.

Small industries lack environmental commitment, technical expertise in environmental management, and the financial capabilities to address environmental problems. Nor do they have standards or effective treatment opportunities and services. Small industries
also lack additional space for pollution control facilities. There are difficulties in obtaining the technical assistance of knowledgeable consultants. Since most of the units are dispersed, they find it difficult to come together for a joint or common treatment plant. The concern of depressed profit margins and decline in competitiveness prevents these units from using pollution control measures. More emphasis is laid on new investments, production, and other return oriented opportunities. Soft loans for pollution control measures are not lucrative. There are subsidies offered for investments in pollution control as incentives, but the impact of these incentives on these units is little or nothing, for they do not alter the cost-benefit analysis in favour of pollution control investments.

Regulatory compliance has been a major issue for these units. Environmental legislation in India, although seemingly as tough as that in major developed nations, is not well enforced. High levels of pollution elicit a formal regulatory response in the form of inspections, but these inspections appear to have no impact on the emissions. Inspections are probably ineffective in bringing about desired changes in behaviour because of bureaucratic or other problems, including the probability that enforcement is low and that the penalty for non-compliance is not stringent enough to act as a deterrent.

A point worth noting is that the mandate of the Central Pollution Control Board (CPCB) is to set environmental standards for all plants in India, lay down ambient standards, and coordinate the activities of the State Pollution Control Boards (SPCBs). Unfortunately, the implementation of environmental laws and their enforcement are decentralized and so is the responsibility of the SPCBs. This is another haphazard method of addressing the issue. In addition, pollution laws have achieved little success. The courts have been slow to respond to enforcement actions sought by state pollution boards. The boards themselves have been poorly funded and charges of corruption have been regular and widespread.

References

1. Approach Paper To The Tenth Five Year plan 2002-2007, Planning Commission, Government of India, p 1
3. Approach Paper To The Tenth Five Year plan 2002-2007, Planning Commission, Government of India p 1
27. www.cseindia.org
28. www.cseindia.org
29. www.devalt.org
30. www.igidr.ac.in
31. www.friht-india.org
33. TERI Annual Report, 2000/2001, p 31
34. TERI Annual Report, 2000/2001, p 32
35. TERI Annual Report, 2000/2001, p 32
41. TERI Annual Report, 2000/2001, p 87

Box: The Small Industries Pollution Problem