

Part I

Executive summary

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One of the mandates of the UNEP (United Nations Environment Programme) is to produce a global state of the environment report in 2002. As part of this larger initiative, the UNEP, Bangkok, has undertaken the SEAMCAP (strengthening environmental assessment and monitoring and capabilities for Asia and the Pacific) project to produce the state of the environment reports at the national, sub-regional, and regional levels. The objectives of the report are to increase the awareness and understanding of environmental trends and conditions, to provide a foundation for improved decision-making at all levels, and to facilitate the measurement of progress towards sustainability.

The state of the environment report prepared for India broadly covers the five priority issues pertaining to the environment, identified by the Government of India as per the UNEP guidelines. In addition, other issues addressing economic and social development are also included. The five priority issues are (1) land degradation, (2) biodiversity, (3) air pollution with special reference to vehicular pollution in cities, (4) management of fresh water resources, and (5) hazardous waste management with special reference to municipal solid waste management. The report on priority issues was prepared following the PSIR (pressure-state-impact-response) framework. The various issues are discussed in different chapters of the report.

Land degradation

Land degradation, which occurs through the natural and man-made processes of wind erosion, water erosion, and water-logging, has been identified as one of the priority concerns in India. The result of such a degradation is the loss of invaluable nutrients and lower food grain production. Poor land use practices and management are responsible for the rapid land degradation in India. Various strategies need to be developed by the Government of India including policy intervention, promoting research and stakeholder participation, and technological intervention to check land degradation. The strategies identified are as follows.

- A well-defined integrated land use policy should be developed. Rural fuelwood wood, grazing and fodder policies also need to be developed.
- A national land use commission should be instituted to lay down such policies, implementation strategies and monitoring guidelines.
- A correct assessment of the nature and extent of the existing degraded land needs to be carried out.
- The adoption of land use according to the land capability classes (USDA classification modified to suit Indian conditions) will ensure that land is put to appropriate use.
- A balanced use of organic manures, chemical fertilisers, bio-fertilisers, and other agrochemicals will ensure sustainability

and increased productivity. Hence, research is needed on (1) optimum level of SOM (soil organic matter), (2) the implications for nutrient balance on climate change and a doubling of CO₂, and (3) the relationship between biomass production, organic matter production, and long-term carbon storage.

- Clear property rights or tenure security should be developed with the help of local land users. Community participation is essential for any technology development so that experience or knowledge of local people can be utilized.

Biodiversity

Loss of biodiversity is of great concern to India since many plant and animal species are severely threatened by a destruction of their habitat and an over-exploitation of resources. A large number of species are either endangered or on the verge of extinction, both of which can be attributed to a lack of policy and institutional mechanisms including comprehensive policy guidelines for biodiversity conservation, biodiversity legislation, participation of communities, and a clear perspective on intellectual property rights leading to international patents on Indian biodiversity. Strategies and actions required to protect the India's rich bio-wealth are as follows.

- Most of the legal provisions focus on the use and exploitation of biological resources rather than their conservation. Even the Wild Life Protection Act 1972, focussed on protection and not conservation. Hence a greater thrust should be given to conservation.
- A comprehensive legislation on biodiversity conservation and uses should be promulgated.
- Formulation of policies for the protection of wetlands, grasslands, and sacred groves significant from the point of view of biodiversity.

- A biodiversity bill should be immediately passed but the Biodiversity Act / Bill should not override the provisions of Wildlife Protection act.
- The country needs to urgently finalise a comprehensive biodiversity strategy and action plan that will provide an overall assessment of the current state of India's biodiversity and concrete steps, mechanisms, and guidelines to develop institutional structures for its implementation.
- There should be a continuous monitoring of biodiversity use in order to review the results of the implementation of policies and programmes.
- There is a need to document biodiversity resources.

Air pollution with specific reference to vehicular pollution

Air pollution in India can broadly be attributed to rapid industrialisation, energy production, urbanisation, commercialisation, and an increase in the number of motorised vehicles. Vehicles are a major source of pollutants in cities and towns. Apart from the sheer numbers, other factors contributing to the increasing vehicular pollution in urban areas include the types of engines used, age of vehicles, density of traffic, road conditions, and the status of automotive technologies and traffic management systems. Some of the recommendations made to reduce air pollution are as follows:

- Vehicular pollution control in metropolitan cities and other cities deserves top priority. Strategies which need to be adopted include the promotion of public transport and mass rapid transport systems together with traffic planning and management. In addition, taxes on fuels and vehicles, stringent emission norms and fuel quality specifications, promotion of

cleaner fuels such as CNG, replacement of two-stroke engines, and a strengthening of the inspection and maintenance (I & M) system.

- Measures to be taken to control industrial air pollution including promotion of cleaner technologies, strengthening of emission standards, introducing economic incentives, and strengthening of the monitoring and reporting system. Emphasis should be given to waste minimisation and utilisation. Appropriate siting of industries will help to minimise the impacts of activities on ecosystems and human health.
- A comprehensive urban air quality management strategy should be formulated using information related to urban planning, ambient air quality, an emission inventory, and air quality dispersion models. Strengthening the monitoring network and institutional capabilities would facilitate an improvement in the enforcement mechanism.
- Use of cleaner fuels such as LPG in households would reduce indoor air pollution.
- Epidemiological studies should be undertaken to develop dose-response relationships, which will help in developing appropriate air quality standards.
- Economic instruments need to be put in place to encourage industries to adopt cleaner technologies and other conservation practices and to discourage the over-utilisation of natural resources.

Fresh water management

The availability of fresh water is going to be the most pressing problem in India over the coming decades. The stress on water resources is a result of multiple factors namely urban growth, increased industrial activities, intensive farming, and the overuse of fertilisers and other chemicals in agricultural production. Untreated water from urban settlements and

industrial activities, and run-off from agricultural land carrying chemicals, are primarily responsible for the deterioration of water quality and the contamination of lakes, rivers, and groundwater aquifers.

The Government of India formulated the National Water Policy in 1987 to provide top priority to drinking water supply and undertook the National River Action Plan to clean up polluted river stretches. An action plan consisting of the following measures to increase the availability of fresh water in India, is needed.

- Emphasis should be given to adopting a river basin approach or sub-basin-based approach, which integrates all aspects of water management namely water allocation, pollution control, protection of water resources, and mobilisation of financial resources.
- Each state should prepare water policies. The National Water Policy of 1987 also needs to be revised urgently. Groundwater legislation needs to be promulgated in all states to promote sustainable water uses and development. Incentives under the Water Cess Act have to be made more attractive.
- Emphasis should be given to rainwater harvesting to increasing water resource availability. Watershed development must be adopted more rigorously. People's participation is the essential prerequisite for watershed development and to this end, public education and training to local people is to be provided.
- An appropriate tariff structure for water services will have to be evolved to encourage wise usage. There is also a need to develop and implement cost-effective water appliances such as low-flow cisterns and faucets.
- Technological intervention is required to enhance effective treatment of wastewater. Adoption of cleaner technologies by the industry would help to safeguard surface water bodies.

- Data on water supply and sanitation for both urban and rural areas need to be collected to formulate strategies and prioritise the action plan. Similarly, information on water consumption and effluent discharge patterns for industries would help to benchmark resource consumption and increase the productivity levels per unit of water consumed.
- The availability of utilisable water resources, demand levels and consumption patterns needs to be analysed for different basins. Such an analysis would help in developing a Water Zoning Atlas to guide decisions related to the siting of industries and other economic activities.

Hazardous waste management

There has been a significant increase in the quantities of municipal solid wastes and hazardous waste generated in India over the last few decades. The largest quantities of hazardous waste are generated by the following industries: petrochemicals, pharmaceuticals, pesticides, paints and dyes, petroleum, fertilisers, asbestos, caustic soda, inorganic chemicals, and general engineering. The rate of generation of solid waste in urban centres has outpaced population growth in recent years with the wastes normally disposed in low-lying areas of the city's outskirts.

The Government has promulgated various rules and guidelines on the management and handling of hazardous waste. These rules are implemented through the State Pollution Control Boards (SPCBs) and Pollution Control Committees in states and the union territories. The following strategies are recommended for improving the management of hazardous and solid waste.

- Ensure the scientific management of hazardous waste including its generation, segregation, transportation, treatment and disposal. The strategy should also target waste minimisation/reduction as its primary focus.
- More efforts towards quantifying and characterising the volume of waste generated by industries. Training and building the capacity of SPCB officials are required to prepare such an inventory of waste.
- Comprehensive environmental and social assessments of hazardous waste management operations are needed to minimise the impacts of waste on human health and the ecosystem.
- Develop an adequate infrastructure for the proper treatment and disposal of hazardous waste. Opportunities for setting up such facilities at the state level, addressing the willingness-to-pay issues by the participating industries, type of ownership, financial mechanisms to finance such ventures, and the extent of private sector participation need to be addressed to ensure that such facilities come into existence.
- Give urgent attention to reducing the generation of solid waste at source through mandatory standards and regulation, fee and tax incentives, and education and voluntary compliance.
- Develop technologies for waste collection, treatment, and disposal in order to ensure proper solid waste management. Community waste bins must be provided at convenient places to systematise the collection process. Private enterprises and NGOs should be actively involved in waste collection and its recycling.
- Governmental standards must be set up not only for disposal of waste on land but also for cleaning up contaminated soils and groundwater.