Report of the Working Group on

ENVIRONMENT & ENVIRONMENTAL REGULATORY MECHANISMS

In Environment & Forests

for the Eleventh Five Year Plan (2007-2012)

Government of India
PLANNING COMMISSION
New Delhi

(August, 2007)

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CHAPTER 1

1.0 Environmental Policies

The Ministry of Environment and Forests is primarily concerned with the implementation of policies and programmes relating to conservation of the country's natural resources including lakes and rivers, its bio-diversity, forests and wildlife, ensuring the welfare of animals and prevention and abatement of pollution.

The broad objectives of the Ministry are:

- Conservation and survey of flora, fauna, forests and wildlife,
- Prevention and control of pollution,
- Afforestation and regeneration of degraded areas,
- Protection of the environment, and
- Ensuring the welfare of animals.

These objectives are well supported by a set of legislative and regulatory measures, aimed at the preservation, conservation and protection of the environment. Besides the legislative measures, a National Conservation Strategy and Policy Statement on Environment and Development, 1992, National Forest Policy, 1988, a Policy Statement on Abatement of Pollution, 1992 and a National Environment Policy, 2006 have also been evolved.

During the 11th Five-Year Plan, the National Environment Policies stated objectives and principles are to be realized through concrete actions in different areas relating to the key environmental challenges faced. These challenges are intrinsically connected with the state of environmental resources, such as, land, water, air and the flora & fauna. The drivers of environmental degradation are population growth, inappropriate technology and consumption choices, intensive agriculture, accelerated industrial and urbanization. A large number of actions/schemes are currently underway and in place during the 9th and 10th Five-year plans. Some new schemes would need to be prepared and implemented during the 11th plan.

The Working Group (**Annexure-1**) on Environment and Environmental Regulatory Mechanisms for the Environment and Forest sector for the 11th Five Year Plan set up Six sub groups (**Annexure-2**) to examine and recommend possible strategies and approaches. A sub group was set up for each of the thematic areas: Air pollution, Water pollution, Land degradation, Solid Waste Management, International Cooperation and Regulatory Regimes.

The reports of the respective Sub- Groups have been integrated and presented under the caption Environmental Policy, Regulatory Mechanism and Assessment, International and Bilateral Agreement, initiatives and achievements, schemes and programmes and recommendations in this reports.

The following framework already exists for environmental conservation, protection and sustainable development, which is elaborated in the policies, regulations and programmes of the Ministry of Environment and Forests.

1.1 The National Environment Policy: The National Environment Policy seeks to extend the coverage and fill in gaps that still exist, in the light of present knowledge and accumulated experience. It does not displace, but builds on the earlier policies. The National Environment Policy, 2006 (NEP) enunciates the following key principles: -

i. **Human Beings are at the Centre of Sustainable Development Concerns: -** Human beings are at the centre of the concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature.

ii. **The Right to Development:** The right to development must be fulfilled, so as to equitably meet developmental and environmental needs of the present and future generations.

iii. **Environmental Protection is an Integral part of the Development Process:** In order to achieve sustainable development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it.

iv. **The Precautionary Approach:** Where there are credible threats of serious or irreversible damage to key environmental resources, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.

v. **Economic Efficiency:** In various public actions for environmental conservation, economic efficiency would be sought to be realized. This Principle requires that the services of environmental resources be given economic value, and such value to count equally with the economic values of other goods and services, in the analysis of alternative courses of action.

Further, the NEP states the following in respect of the thematic areas of air, water and solid waste management and land degradation

1. The primary efforts during the Eleventh five year plan period will be to develop science based air quality management system and strengthen regulatory, institutional and enforcement mechanisms with adequate resources and skilled human power to achieve the clean air target as defined by the National Ambient Air Quality Standards.

2. Although the rivers possess significant natural capacity to assimilate and render harmless many pollutants, the existing pollution inflows in many cases substantially exceed such natural capacities. Pollution loads are similarly linked to pricing policies leading to inefficient use of agricultural chemicals and municipal and industrial water use.

3. Management of industrial and municipal wastes is the major cause of soil pollution and is a serious challenge in terms of magnitude and resources required.

4. If the fundamental basis of livelihoods for the vast majority of our people is not to be irreparably damaged, it is essential that the relevant fiscal, tariffs, and sectoral policies take explicit account of their impacts on land degradation,

5. India is committed to making a positive contribution to international efforts and to stimulate partnership of different stakeholders including the investment community and international development partnerships in harnessing their respective resources and strength for environmental management.

1.2 Other Policies

The "Policy Statement for abatement of pollution, 1992" and "National Conservation Strategy and the Policy Statement on Environment & Development, 1992" emphasizes pollution prevention / abatement, and promotion of cleaner technologies to reduce industrial pollutants. The National Water Policy, 2002 contains provisions for developing, conserving, sustainable utilization and management of important water resources and the need to be governed by national perspectives.

The proximate causes of land degradation are driven by implicit and explicit subsidies for water, power, fertilizer and pesticides. Grazing lands are usually common property resources, and insufficient empowerment of local institutions for their management leads to overexploitation of the biomass base. The absence of conducive policies and persistence of certain regulatory practices reduce people's incentives for afforestation, and leads to reduced levels of green cover.

CHAPTER 2

2.0 Regulatory Mechanism and Assessment

The present legislative framework is broadly contained in the umbrella Environment (Protection) Act, 1986; the Water (Prevention and Control of Pollution) Act, 1974; the Water Cess Act, 1977; and the Air (Prevention Control of Pollution) Act, 1981. The law in respect of management of forests and bio-diversity is contained in the Indian Forest Act, 1927; the Forest (Conservation) Act, 1980; the Wild Life (Protection) Act, 1972 and the Bio-diversity Act, 2002.

The Environment Protection Act empowers the Government to set national standards for ambient environmental quality and controlling discharges to regulate industrial locations, to prescribe procedure for hazardous substance management and to collect and disseminate information regarding environmental pollution.

The Water (Prevention and Control of Pollution) Act, 1974 as amended deals comprehensively with water issues. It empowers the Government to constitute Pollution Control Boards to maintain the wholesomeness of national water bodies. It provides for a "Consent" procedure to prevent and control water pollution and empowers State Boards to monitor compliance. Water Cess Act, 1977 was adopted to strengthen the Pollution Control Boards financially, to promote water conservation. This Act empowers the Central Government to impose a Cess on water abstracted from natural resources by industries and local authorities.

2.1 The following rules under the Environment (Protection) Act, 1986 further complement the provisions under the Act: -

- The Environment (Protection) Rules, 1986
- The Manufacture, Storage and import of Hazardous Chemical Rules, 1989 amended 2000
- The Hazardous Wastes (Management & Handling) Rules, 1989 amended 2000, 2003
- The Manufacture, Use, Import, Export and Storage of Hazardous micro-organisms Genetically engineered organisms or cells Rules, 1989
- The Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996
- The Bio – Medical Waste (Management and Handling) Rules, 1998 as amended 2000 and 2003.
- The Ozone Depleting Substances (Regulation) Control Rules, 2000

The review of the current regulatory framework reveals some inadequacies that may undermine effective environmental management and planning. Cross cutting nature of various issues, inter ministerial jurisdiction and lack of unified authority to deal with environmental management for all pollution sources impedes holistic planning and enforcement of standards.

CHAPTER 3

3.0 Existing Schemes and Programmes

There are various centrally sponsored and central sector schemes undertaken for Pollution Abatement. The major objectives of these schemes are to ensure pollution abatement through various means such as assessment and monitoring of air and water quality, introduction of cleaner technologies for resource conservation, setting up of Common Effluent Treatment Plant (CETPs) in cluster of small scale units, research and development, upgradation of laboratories etc.

3.1 The major activities initiated under the various schemes on pollution abatement are briefly summarized below:

(i) Central Pollution Control Board

The CPCB undertakes the projects and programmes through various institutions, research organizations relating to assessment and monitoring of air and water quality. For this purpose, a wide network of monitoring stations has been established. During the 10^{th} Five Year Plan, the activities initiated include preparation of air quality management plan for sixteen cities and source apportionment studies for six identified cities, creation of environmental data bank, performance evaluation of Common Effluent Treatment Plants (CETPs) and programmes for capacity building and awareness.

(ii) Industrial Pollution Abatement through Preventive Strategies

The scheme consists of three components namely; Environmental Audit, Adoption of Clean Technology in Small Scale Industries and Environmental Statistics. The objective of the scheme is to assist small scale industries in adoption of cleaner production practices and reduction in waste generation. Under this programme, studies have been initiated in preparation of environmental audit statements in various sectors, mapping of Sutlej river basin in Himachal Pradesh for environmental management and technology related studies.

(iii) Establishment of Environment Protection Authorities and Environment Commission and Tribunal

Under this programme, Authorities have been constituted as per various orders of Hon'ble Supreme Court for environmental compliance and enforcement of various activities. Three Authorities namely;

- **National Environmental Appellate Authority (NEAA)** under National Environment Appellate Authority Act, 1977 to hear appeal with respect to industries, operations or processes;

- **Loss of Ecology (Prevention and Payment of Compensation) Authority** for the State of Tamil Nadu to deal with pollution created by the tanneries and other polluting industries in Tamil Nadu;
- **Environment Pollution (Prevention and Control) Authority (EPCA)** for the National Capital Region for compliance relating to environmental standards, emission or discharge of pollutants, steps to control vehicular pollution, restriction of industries etc.

(iv) Assistance for Abatement of Pollution and Environment Policy & Law

This scheme is to strengthen various State Pollution Control Boards (SPCBs) and the State Environment Departments for enforcing the statutory provisions for initiating pollution abatement measures, upgradation of facilities for analysis, capacity building etc. Under the scheme, most of the State Boards were provided funds for strengthening the laboratories and to undertake various research projects as well.

(v) Clean Technology

The objective of the scheme is to provide support to introduction of cleaner production and cleaner technologies through setting up of demonstration projects and initiation of relevant R&D activities. Some of the programmes undertaken include Life Cycle Assessment (LCA) Studies in certain sectors like Pulp & Paper, Coal Based Thermal Power Plants, Carrying Capacity Studies in River basins. Bio remediation of Railadevi Lake, Maharashtra and recycling of marble slurry waste in Rajsthan are some of the studies sponsored for clean technology.

(vi) Creation of Management Structure for Management Substances

Under the scheme, the activities are carried out under three thrust areas namely; chemical safety, chemical accident prevention and sound management of hazardous waste and municipal solid wastes. The activities initiated accordingly, include preparation of off site emergency plans, setting up of emergency response center, establishment of Common Treatment, Storage and Disposal Facilities (TSDF) for industrial hazardous wastes. Preparation of hazardous analysis report etc.

(vii) Environmental Impact Assessment

Environmental Impact Assessment (EIA) is one of the important management tools for incorporating environmental concerns in the development projects at the planning stage. Environmental clearance has been made mandatory since January, 1994 and Ministry had undertaken re-engineering of environmental clearance process. A new notification on environmental impact assessment thereafter has been issued in September, 2006 which replaces the earlier notification of 1994. Under the new notification, the developmental activities have been categorized into Category 'A' and Category 'B' based on potential impacts instead of investment criteria. During the last two years, large number of projects has been granted environmental clearance.

A number of studies have been planned for demarcation of sensitive areas in coastal stretches for evolving integrated Coastal Zone Management Plan.

(viii) Common Effluent Treatment Plant (CETP)

The objective of this scheme is to provide financial assistance to the small scale industries in clusters to establish/upgrade Common Effluent Treatment Plants (CETPs) for enabling them to comply with environmental discharge standards. The funding pattern for CETP is as follows:

- State subsidy : 25% of the total project cost
- Central subsidy : 25% of the total project cost
- Entrepreneurs contribution : 20% of the project cost
- Loan from financial institutions : 30% of the project cost

The programme is spread all over the country and the funds from the Centre are routed through respective State Pollution Control Boards.

(ix) Taj Protection Mission

In compliance with the orders of Hon'ble Supreme Court of September, 1996, the Planning Commission estimated an amount of Rs. 600 crores on a 50-50% (Centre-State) matching basis to implement various schemes relating to protection of Taj Mahal. In the first phase, 10 schemes were identified relating to uninterrupted power supply around Agra, augmentation of water supply, improvement of drainage, management of solid waste etc. with an estimated cost of Rs. 222.21 crores. The Centre has released its share of Rs. 111 crores. A post project evaluation study for the projects implemented under the scheme has been sponsored to NEERI, Nagpur.

3.2 The following table provides the scheme-wise details with respect to the 10th Five Year Plan outlay:

S. No.	Name of the Scheme	10th Plan Outlay (Rs. in Crores)
1.	Central Pollution Control Board	110.00
2.	Industrial Pollution Abatement through Preventive Strategies	05.00
3.	Establishment of Environmental Protection Authorities and Tribunals	21.00
4.	Assistance for Abatement of Pollution and Environmental Policy and Law	20.00
5.	Clean Technologies	10.00
6.	Creation of Management Structure for Hazardous Substances	35.00
7.	Environmental Impact Assessment	13.00
8.	Common Effluent Treatment Plant	25.00
9.	Taj Protection Mission	111.00

CHAPTER-4

4.0 Air Pollution and Air Quality Management

The maintenance and improvement of Air Quality is a major environmental challenge in the backdrop of various developmental activities. The air quality, therefore, has been a major concern particularly in urban and industrial sites and their surrounding regions. The contribution of various air pollutants could be attributed to vehicular emission exhaust, developmental activities, operations of DG sets, re-suspension of dust and burning of fuel for domestic purposes. The management of indoor pollution is also an emerging challenge.

The Ministry of Environment Forests (MoEF) has adopted a comprehensive National Environmental Policy (NEP) 2006, based on overarching guiding principles that include among others right to development, environmental protection as an integral part of the development process, environmental standards setting, the precautionary principle and polluter pay principle, preventive action, economic efficiency, and equity. For abatement of pollution in general and air quality management in particular, various actions have been suggested which inter-alia include an integrated approach to strengthening of monitoring and enforcement of emissions standards for both point and non point sources, preparation of action plans for cities to address air pollution, promotion of R&D, formulation of national strategy for urban transport and energy conservation.

In confirmation with the goals of the National Environment Policy, the primary efforts during the eleventh five year plan period need to be develop science based air quality management system and strengthen regulatory, institutional and enforcement mechanisms with adequate resources and skilled human power to achieve the clean air target as defined by the National Ambient Air Quality Standards. Currently, the provisions of the Air (Prevention and Control of Pollution) Act, 1981 and the Environment (Protection) Act, 1986 govern the air quality management and air pollution control.

4.1 Over View of Current Air Quality trends and challenges

(i) Status of air quality monitoring

The Central Pollution Control Board (CPCB) monitors ambient air quality in the country at 328 stations covering 115 cities/towns in 28 states and 4 Union Territories (i) to determine the status and trend in ambient air quality; (ii) to ascertain compliance of air quality standards (iii) to assess health hazard (iv) to continue the ongoing process of producing periodic evaluation on air pollution situation in urban and industrial areas; (v) to obtain the knowledge necessary for developing preventive and corrective measures; (vi) to understand the natural cleansing process through pollution dilution, dispersion, wind movement, dry deposition, precipitation and chemical transformation of the pollution generated.

Under this programme, sulphur dioxide (SO_2), oxides of nitrogen as NO_2, suspended particulate matter (PM) and respirable particulate matter (RSPM/PM10) have been identified for

regular monitoring at all locations. The additional parameters, such as, respirable lead and toxic trace metals, hydrogen sulphide (H_2S), Ammonia (NH3) and polycyclic aromatic hydrocarbons are also being monitored at selected locations.

(ii) Trends in criteria pollutants and the emerging challenges

The air quality monitoring carried out over the last decade bears out that some criteria pollutants have begun to stabilize, and even decline in some cities while some pollutants have begun to show rising trend. In some of these cities, particulate levels though still high, have begun to decline. In the rest, the levels have begun to stabilize. The sustained intervention has helped to make a distinct impact on the air quality in the metro cities.

(iii) Particulates continue to remain the key concern: SPM shows persistently high levels in most cities and declining trends in some. The finer and respirable particles of size less than 10 micron (PM10) have higher share of particles from combustion and vehicular sources and have reached elevated levels. But in the key metro cities where implementation of control measures has gathered momentum, the levels have stabilized and even declined.

(iv) Gaseous pollutants: Some gaseous pollutants have stabilized and even begun to decline: SO_2 levels have declined substantially in major cities as a direct result of the various measures such as improved fuel quality and stringent vehicular emission norms in transport sectors and industry.

(v) Carbon monoxide (CO): Capacity to monitor CO on a nationwide scale is still inadequate for want of automatic monitoring stations. It is monitored on a limited scale in certain metro cities. In Delhi, the CO levels have begun to decline despite the phenomenal increase in vehicle numbers. CO is emitted predominantly from petrol vehicles.

(vi) The newer concerns: Nitrogen dioxides (NO_2): The available NO_2 data shows that this is emerging as the challenge, at least in the bigger cities. Though their levels are generally low compared to the levels of particulates and annual average levels are below the standards in most cases, the levels show a mixed trend, with increase in certain cities.

(vii) Ozone: There is an urgent need to develop capacity for ozone monitoring which is very limited presently. The current data base does not provide a conclusive picture. Given the fact that ozone is a very harmful pollutant and both NOx and VOCs levels that contribute to its formations are rising and, ozone is expected to be the problem in coming years and, therefore, its prevalence needs to be scientifically assessed.

(viii) Air toxics: There is a need to initiate a programme for monitoring of toxic air pollutants covering wide range of Volatile Organic Compounds (VOCs) including benzene, toluene, xylene, a range of PAHs among others to assess their levels and develop risk reduction programme.

4.2 Non attainment cities and industrial areas

The major sources of air pollution ,in the non-attainment cities, in terms of SPM are motor vehicles, industries, power plants, incinerators, generator sets, re-suspension of road dust and biomass burning used for captive power generation and a very large number of area sources.

It is generally observed that the contribution from vehicular pollution to overall ambient air quality is about 65-70%. The tightening of the mass emissions standards and lowering of sulphur content of fuels, have resulted in decrease in pollution load from vehicular fleet. The Euro-II emissions standards for new vehicles have been introduced in the country from April, 2005 and Euro-III in eleven major cities from April, 2005 as prescribed in the Auto Fuel Policy road map for vehicular emission norms. The phasing out of old vehicles, implementation of alternative fuels programmes, blending of bio-fuels (currently at 5%) have also helped in control of vehicular pollution in major cities.

Currently there are 24 critically polluted industrial areas where industries, refineries, thermal power plants, chemical plants among others are the dominant pollution sources. The small-scale units dominate the downstream in these areas and contribute significantly to the pollution load. It is observed that without Pollution Control Devices, the SPM load from thermal power plants is 82%, from cement industry 7%, sugar industry 10% and others 1%. Similar trend is observed for SO_2 load from various industries, 89% contribution from thermal power plants, 3% from oil refineries, 2% from Sulphuric Acid plants and so on. The steps taken in industrial pollution control include use of beneficiated coal in thermal power plants, upgradation of technology, the implementation of the Charter for Corporate Responsibility for Environmental Protection (CREP) among others.

4.3 Air Quality Management

(i) Ambient air quality standards

Under the provisions of the Environment (Protection) Act, 1986, the national ambient air quality standards for the criteria pollutants (TSPM, PM10, SO2, NO2) have been notified. These standards are based on land use and are different for residential, industrial and sensitive areas. These standards need to be reviewed based on health consideration to protect sensitive population with margin of safety.

There is further need for review of national ambient air quality standards to set standards for new pollutants of concerns, including PM2.5, ozone and air toxics. CPCB has initiated the process to adopt standards for hitherto unregulated pollutants. These include PM2.5, and some air toxics like benzene, benzo(a)pyrene which is taken as a measure for a range of PAH in the air. These initiatives along with a standard for ozone need to be expedited urgently. Globally, the emerging science is consistently bringing down the safe threshold of pollution especially the particulate, the cause of major concern.

(ii) Assessment of air pollution sources

Presently, with a view to ascertain contribution to RSPM from various sources of pollution, Source Apportionment Studies have been initiated in six cities including Delhi, Pune, Bangalore, Chennai, Kanpur and Mumbai in coordination with the Central Pollution Control Board and various technical institutions and IITs. The objectives frame work for Source Apportionment Studies include preparation of emission inventory, emission profile, monitoring of ambient air quality, assessment of data and its authentication and source apportionment of RSPM (PM_{10}) using factor analysis and receptor modelling. Application of Chemical Mass

Balance (CMB-8), Receptor model and ISC dispersion model have been included in the study. The results of these studies would help in preparation of city specific Action Plans for management of air quality.

Keeping in view the above, the management of ambient air quality system, therefore, would require a reliable database consisting of information on sources of emission, the local/regional meteorological conditions, air quality etc. The other inputs required would be GIS based Decision Support System (DSS). The predictions for ambient air quality are generally based on modelling of air pollutants and their transportation through models such as Gaussian Model, Industrial Source Complex Short Term (ISCST 3) Model, Box Model, Plume Model and Gradient Transport Model etc.

4.4 Health Risk Assessment

Comprehensively designed health assessment studies are needed to understand the magnitude of health risk, and make regulations responsive and dynamic to reduce health risks.. More robust local data would help to evolve necessary action and enable decision- making process.

Ministry of Environment and Forests has initiated a few projects and constituted a committee to review the current status of environmental health. An Environmental Health Cell has been set up, which is formulating and implementing health impact related projects. A vision statement on environment and human health released by the MoEF in July 2003 states air pollution and health effects and stresses on the need for environmental health risk assessments studies due to air pollution. Environmental epidemiological studies have been initiated in 11 areas. These studies are at various stages and would help in further refining the standards that have been notified and for development of future standards.

4.5 Assessment of Regulations and Institutional Framework

In view of the enormity of the challenge that air quality management would face given the rapid growth in economy, accelerated pace of industrialization, and motorization, and growing scale of private participation in the implementation of the control measures, organization of studies and research, and regulation building would play a very critical role in the years to come.

The Environment protection Act of 1986 is an umbrella legislation that has broadened the ambit of power of the central government with respect to environmental management. Under the Sec 3 of this Act, schedule I lists the standards for emissions and discharge from industries, Schedule II lists general standards for discharge and effluents, schedule III lists ambient air quality standards and schedule IV lists standards for emissions of smoke, vapour etc from motor vehicles. The EPA Act provides a framework for the Central Environment Ministry to coordinate activities of various Central and State authorities.

Multiplicity of authorities both at the Central and State levels with no clear process to harness science to support policy making, presents serious challenge. Under the current regulatory framework, the authority to manage and control industrial pollution directly rests with the MoEF and the pollution control boards. But few other Ministries and Central Government

agencies contribute either directly or indirectly to the process of determining norms and standards for emissions and fuel quality for vehicles, transportation measures and indeed for setting overall policies for ambient air quality. In practice, implementation of the regulations related to the vehicular pollution, a significant contributor to the ambient air pollution, does not fall within the jurisdiction of the CPCB and SPCBs. Thus the lack of unified authority to deal emissions standards for all pollution sources impedes holistic air quality planning, and enforcement of the ambient air quality standards. This requires urgent review.

City specific action planning process has already begun in India with 16 identified cities based on SPM levels and has shown good results. CPCB coordinates with the State governments to prepare city action plans. State level Coordination Committees have been formed to supervise monitoring of the implementation of these plans. Also under the aegis of the Auto Fuel Policy, key polluted cities of India qualify for early introduction of tighter emissions standards for vehicles and fuels.

This city based action planning has proved to be effective in improving local planning, implementation and also in controlling pollution levels. It is therefore recommended that this model be developed further as the foundation of a more robust air quality planning exercise nationwide. The cities are at different stages of progress. Though many of these cities are working with common strategies, the constraints and barriers are unique to each of these cities that require case by case approach.

4.5 Training and Capacity Building and Regulatory Action

Currently, the capacity building programmes include organisation of the training, strengthening of training facilities and workshops etc. There are a few agencies / institutes which impart short-term courses. But this is not adequate. Training and capacity building would require specific focus to be able to support regulatory development, monitoring, scientific studies and research for rule making. Special attention needs to be given to technical training for capacity building linked with air quality monitoring, instrumentation, laboratory analysis, calibration and quality audits among others.

4.6 Recommendations

During the 11th Five Year Plan, the endeavor in air quality management would be to integrate and consolidate the existing Plan, Programmes and activities at the National level, city level and pockets of critically polluted industrial areas. For this purpose, following thrust areas for National Air Quality Planning (NAQP) have been identified:

Air Quality Monitoring

- Air Quality Monitoring being the backbone for air quality management and priority actions, following activities need to be considered;
    - The monitoring network need to be expanded from the current 328 stations to about 1000 stations including introduction of monitoring in new cities and intensification of monitoring in major cities where monitoring is already carried out;

- The coverage for additional parameters need to be initiated and expanded through continuous and real time monitoring of $PM_{2.5}$, Ozone, VOC, PAH etc. to about 15 cities per year, so as to cover the 76 non-compliant cities over a period of five years;
- In addition to criteria pollutants (SPM, RSPM, NOx, SO_2) for source monitoring, VOC, BTX need to be introduced for developing necessary control measures;
- Compulsory source monitoring need to be introduced in all critically polluted areas and hazardous industrial units and a transparent central data base may be created based on monitoring results;
- GIS based decision support system may be introduced for scientific management of air pollution alongwith networking of existing manual/continuous monitoring stations.

Air Quality Standards

- Review of the current National Ambient standards should be undertaken and standards for additional pollutants (Ozone, PM_{10} and air toxics) need to be introduced with necessary monitoring capacity;
- Both concentration and emission load based standards should be developed for various industrial sources. The new standards need to be based on health considerations to protect sensitive population with a margin of safety. The supplementary standards may be introduced for protection of vegetation and property.

Scientific Studies

- The CPCB may undertake multi-city studies on air pollution inventory and source profiling, source apportionment, air quality modeling on an on-going process basis to assess trend in sources of pollution, pollution load and assess the impact of various abatement measures on air quality to strengthen the city specific Action Plans;
- A rigorous methodology and scientific protocol need to be developed to initiate health studies based on time series epidemiological data and exposure levels for proper health risk assessment due to air quality. The study should include specific reference to risk factor associated with poor socio economic conditions.

Clean Air Action Plan for Cities

- The identified non-compliant cities should prepare a comprehensive action plan covering criteria pollutants, air toxics and hazardous air pollutants along with necessary priority investments required. The Action Plan may be a combination of local, State and Central actions and emission controls needed for the area to bring about compliance with National Ambient Air Quality Standards;
- It is recommended that the Action Plan should define the target reduction, control measures, schedules and time tables for compliance that are necessary for the area to meet air quality standards;

- The action plan may be prepared based on inventory of emissions, source apportionment and modeling to demonstrate that the measures selected have reduced the emission to meet the standard;
- The Air Quality Action Plans may be periodically reviewed by the Ministry in consultation with CPCB and SPCB to incorporate new regulatory requirements at the Central and State level, new information for change in the attainment status.

Vehicular Pollution Control

- The road map proposed in Auto Fuel Policy may be accelerated and tightened to cover wider urban areas, particularly the 35 million plus cities in addition to 11 cities already brought under Euro-III emission standards. These may include key State capitals in the priority areas with introduction of Euro-IV emission standards.
- As emissions depend on fuel quality, ultra low sulphur diesel along with advanced emission control technology should be implemented concurrently by avoiding use of harmful additives and stoppage of adulteration of fuel;
- The programme for alternate fuel may be implemented and expanded by introduction of advanced vehicular technologies including hybrid technology, rationalization of taxes etc.;
- The programme on bio-fuel may be promoted and encouraged while avoiding the conflicts of use of wasteland with other competing demands;
- The in-use vehicle inspection programme may be strengthened and implemented as they constitute major part of the vehicular population.

Industrial Pollution Control

- The existing standards would be reviewed and new ones introduced based on best available technology and their economic feasibility. In the first stage, the major polluting industries like petrochemicals, refineries, pesticides, pharmaceuticals and others would be considered;
- The industries should be advised to provide rigorous data base, which would be audited by respective SPCBs for further action, if non-compliance is observed. This may be supplemented by independent monitoring and supervision by competent third party;
- The technologies for clean fuel and fuel substitution in combustion processes in industries may be encouraged for air pollution control;
- Source monitoring need to be effectively followed for reduction in target and penalty in case of default.

Fiscal Incentives

- Specific programmes would need to be designed and implemented for tax incentives to promote clean technologies, clean fuels in industrial and transport sector;

- Dis-incentive should be integrated into industrial activity to discourage operation of polluting units, vehicles etc.;
- Studies should be undertaken for promotion of alternative fuelled vehicles, use of public transport. The results of source apportionment studies should be incorporated in various programmes;
- The existing sectoral policies should be integrated for synergy on pollution control.

Quality Assurance and Quality Control

- Quality Assurance(QA) and Quality Control (QC) being prerequisites for improved results, the CPCB and its Zonal Offices should be strengthened for QA/QC, calibrations of facilities for air pollution analysis, network audits, data review etc. alongwith capacity building necessary for such activities;
- The Central Pollution Control Board (CPCB) could continue to be responsible for comprehensive National Air Quality Programme alongwith the respective State Pollution Control Boards at State level.

Training and Capacity Building

- Keeping in view the scientific requirements for air quality monitoring, data analysis, handling of instruments etc., it is recommended that institutional mechanism be created for medium to long term training and capacity building in these areas including calibration, quality audit, laboratory analysis, regulation development etc.;
- An institutional network and protocol need to be evolved to engage the research and educational institutions, scientific agencies, recognized laboratories and public agencies to share scientific information and experience;
- International experience in the areas of air pollution abatement and trans-boundary movement should be shared through participation in work shops, seminars etc. and dialogue be initiated with Environmental Regulatory Authorities in other countries to assess good regulatory models and harness science.

Indoor Pollution

- In pursuance of the National Environment Policy and the National Programme for dissemination of information, improved fuel wood stoves, solar cookers, which are suited to local cooking practices and bio-mass resources should be accelerated;
- The local Panchayat and Municipal agencies should be involved for wider reach of best technologies.

CHAPTER 5

5.0 Water Pollution and Abatement Measures

The ultimate goal of combating water pollution is to restore the quality of water in all the natural water bodies to a level which can support human use and functions of the ecosystems that depend directly or indirectly on them. In order to achieve this goal, providing adequate collection, transportation, treatment and disposal facilities for wastewater and solid wastes from all the urban centres of the country, and combating water scarcity by reducing water demand, rain water harvesting and recycling and reuse of wastewater, is considered essential.

The Water (Prevention & Control of Pollution) Act, 1974 as amended deals comprehensively with water issues. It empowers the Government to constitute Pollution Control Boards to maintain the wholesomeness of natural water bodies. It enables Central and State Pollution Control Boards to implement prescribed standards, monitor compliance and penalize violators of the Act. It provides for a system to grant 'consent' for the prevention and control of water pollution.

Water Cess Act, 1977 empowers the Central Government to impose a Cess on water abstracted from natural resources by industries and local authorities.

5.1 Performance during the Tenth Plan

(i) Control Domestic Sewage Pollution

While industrial effluents are significantly regulated under the law, discharge of untreated domestic wastewater continues to be the major cause of water quality degradation. As per the latest report (CPCB, 2006), 423 class I cities and 498 class II towns of the country with a population of about 206 million (as per 2001 Census) generate about 33,000 million liters per day (mld) of wastewater. However, the treatment capacity exists for only about 7000 mld. Since, responsibility of providing collection and treatment of wastes lies with local bodies and they do not have adequate resources to perform this function, Ministry of Environment and Forests, Govt. of India has taken up an ambitious programme called National River Conservation Plan (NRCP) to restore water quality in different rivers of the country. Under the National River Action Plan (NARP), in the first phase, the GAP (Ganga Action Plan), 29 towns were selected along the River Ganga. Subsequently, other rivers were included in the programme and 160 towns were identified where sewage treatment facilities are being developed under NRCP, out of which 74 towns are located on Ganga, 21 on Yamuna, 12 on Damodar, 6 on Godavari, 9 on Cauvery, 4 each on Tungbhadra and Satlej Rivers, 3 each on Subarnrekha, Betwa, Wainganga, Brahmini, Chambal, Gomti Rivers, 2 on Krishna River and one each on Sabarmati, Khan, Kshipra, Narmada and Mahanadi Rivers. However, the total treatment capacity so far created including efforts under NRCP is only about 7000 mld, which is only about 21% of the sewage generated. Thus, massive efforts are required on collection and treatment of wastewater. Until the entire wastewater is properly collected and treated before disposal into the environment, the problem of water quality degradation can not be addressed adequately. Another Working Group

(Working Group for Conservation of Rivers and lakes) is looking into the requirement for domestic wastewater treatment during 11th Plan.

(ii) Water Quality Monitoring

Central Pollution Control Board has been monitoring water quality viz. physical parameters, nutrients, major ions, and organic and pathogenic pollution of all the important water bodies in the country. During the 10th Plan, the monitoring program was strengthened and stations increased from 570 to 1019. New parameters viz. some toxic metals and chlorinated pesticides were included. Based on the monitoring results, 86 polluted water stretches in the country, which require, priority actions were identified. Water Quality Assessment Authority (WQAA) is created to integrate the water quality monitoring efforts by various agencies in the country. A uniform water quality monitoring protocol was developed and notified. In a World Bank funded Hydrology Project of the Ministry of Water Resources, CPCB is being involved for integration of all the agencies monitoring water quality in the country, train them develop a data centre for dissemination of water quality information in a useful manner.

(iii) Dissemination of Water Quality Information

In order to involve public in monitoring and decision making, it was important to make the information easily accessible. As a step to achieve this goal, Central Pollution Control Board has established a web-based environmental data bank (EDB) through which, different environmental data including water quality data is disseminated.

(iv) Control of Pollution from Large and Medium Industries

Apart from 'command and control' approach adopted to regulate industrial pollution under Water (Prevention and Control of Pollution) Act, 1974, by the concerned State Pollution Control Boards/ Pollution Control Committees, several initiatives are taken to prevent/minimize the industrial pollution. The Central Pollution Control Board selected 17 categories of major polluting industries for priority action for compliance of standards through SPCBs. The Ministry of Environment and Forests, Govt. of India with the help of CPCB has formulated the Charter on Corporate Responsibility on Environment Protection (CREP) in respect of 17 categories of highly polluting industries in collaboration with the concerned industries and has implemented the same Charter identifies environmental concerns and priority areas of Government and facilitates the industries to plan in advance the required investment for pollution control with bank guarantee by the concerned industry indicating the commitment to the action plan. Several fiscal incentives have been provided for control of pollution, Environmental audit and eco-mark are some more initiatives taken by the Ministry of Environment and Forests.

(v) Control of Pollution from Small Scale Industries

There are about 3.5 million small-scale industries and about 2000 industrial estates in India. Mindful of the key role played by SSI units and the constraints in complying with pollution control norms individually by these units, the Ministry of Environment and Forestry has initiated a financial support scheme to promote common facilities for treatment of effluents generated from SSI units located in clusters. Under this scheme 88 CETPs having total treatment capacity of 560 MLD have been set-up by the 10th Plan period covering more than 10,000

polluting industries. Considering the coverage of large number of industries and the amount of pollution load handled by them, it is important to continue this scheme during 11th Plan period. It is also important to ensure the O&M of the CETPs to use them effectively during 11th Plan period.

(vi) Adoption of Clean Technology

The technologies, which are energy efficient, resources efficient and less polluting come under this category. The Ministry of Environment & Forests is promoting such technologies in various sectors of industries. During 10th Plan period, efforts were made to promote clean technologies in paper industries, chlor-alkali, thermal power plants, refineries, iron and steel plants and textile industries. During 11th Plan, it is suggested that such technologies may be promoted in other sectors like distilleries, electroplating and tanneries etc.

(vii) Environmental Audit

The concept of environmental auditing in industrial units in India was formally introduced in March 1992 with the overall objective of minimizing consumption of resources and promoting use of clean technologies in industrial production to minimize generation of wastes. It was made mandatory to submit Annual Environmental Statements for the industries after thorough consultation with the SPCBs/PCCs. During 10th Plan, a number of workshops, seminars and training programmers were organized all over the country by CPCB for different agencies for Environment audit. CPCB also carried out audit studies in 125 selected polluting industries in the country. It is suggested that this exercise may be further strengthened and made more effective during the 11th Plan period.

(viii) Environmental Impact Assessment

The Government's policy to conserve the environment while undertaking any developmental activity has made it necessary to introduce the environmental aspects into planning and development. A new development project requires the Ministry of Environment and Forests appraisal and clearance before it is implemented. The basic objectives of Environmental Impact Assessment are to identify, predict and evaluate the likely economic, environmental and social impacts of any developmental activity and to prepare an action plan for remedy as a part of the overall Environmental Management Plan. The Government of India through a notification in the year 1994 made it mandatory to obtain environmental clearance for certain categories of industries and projects. In the year 2006, a revised notification has been issued and additional activities like building/housing complexes have been included in the ambit of environmental clearance. During the 11th Plan period, it is suggested to make the EIA more effective through adoption of procedures provided in the new Notification.

(ix) Eco-Mark

Rapid industrialization, unplanned urbanization and changing consumption patterns in the race to achieve better living standards, are leading to a large number of environmental stresses. It is amply clear that regulatory actions by pollution control agencies alone cannot restore the environment to its pristine state. Pro-active and promotional roles should also be geared up in harmony with the overall environmental protection strategy. The time has come for consumers to

take the lead in prompting manufacturers to adopt clean and eco-friendly technologies and environmentally-safe disposal of used products, alongwith preventive and mitigative approaches. To increase consumer awareness, the Government of India launched the eco-labelling scheme known as `Ecomark' in 1991 for easy identification of environment-friendly products. Any product which is made, used or disposed of in a way that significantly reduces the harm it would otherwise cause to the environment, could be considered as Environment-Friendly Product. The criteria follow a cradle-to-grave approach, i.e. from raw material extraction, to manufacturing, and to disposal. The 'Ecomark' label is awarded to consumer goods which meet the specified environmental criteria and the quality requirements of Indian Standards. Any product with the Ecomark will be the right environmental choice. It is suggested that such schemes during the 11th Five Year Plan may be promoted more effectively.

5.2. New Schemes and programmes for the 11th Plan

It is suggested that some of the key areas need to be strengthened further during the 11th Plan for improvement in water quality. Following areas may be considered in this regard.

(i) Strengthening of the Water Quality Monitoring Programme

In order to generate information on all important pollutants like pesticides, organics and other toxicants and all important water bodies, the present network needs further strengthening. It is important to increase the number of monitoring locations from present 1000 to 2500 during 11th Plan and start measuring micro-pollutants at selected locations. It is also suggested to install automatic water quality monitoring stations on some important water bodies in order to get real time data of some of the important parameters.

(ii) Develop capacity for monitoring of Persistent Organic Pollutants

The thrust needs to be on developing capacity to monitoring all the important water bodies for pesticides to identify the contaminated water bodies and to plan remedial measures. During the 10th Plan, a beginning is already made by the CPCB by setting a trace organics laboratory. Such efforts during the Eleventh Plan need to be strengthened.

(iii) Pollution control in small-scale industries

The scheme on setting up Common Effluent Treatment Plants (CETPs) for clusters of small-scale industries may continue. Apart from establishing new CETPs, it is very important to ensure that the existing CETPs work effectively. As per a survey carried out by the CPCB, a large number of CETPs are reported to have not been working satisfactorily. A mechanism requires to be developed to make these CETPs self sustaining. In this respect, the existing CETPs need to be evaluated and upgraded from time to time. In addition, it is also suggested that efforts may also continue on identification and promotion of pollution prevention technologies in SSIs**.**

(iv) Strengthen Source Monitoring

Presently, source monitoring is carried out through manual sampling of outlets of a polluting source. In order to avoid errors in sampling, it is important that automatic monitors with locking system having data loggers are installed at the outlets to get un-biased results of the

quality of the treated wastewater. It is suggested that such monitors are installed during the 11th Plan at some of the large polluting sources including industries. Based on the experience, this could be replicated further.

(v) Development and implementation of viable models of public-private partnerships

As indicated earlier, sewage is the major cause of water quality degradation in India. A massive investment is needed to address the entire sewage problem of the country and the 'polluter-pays principle' needs to be implemented to control pollution. In case of sewage, the citizens of the concerned cities are responsible for sewage generation and, therefore it should be their responsibility to bear the cost of sewage collection and treatment. It is suggested that such models are developed during the 11th Plan involving private agency for collection and treatment of sewage on chargeable basis. Based on the success such models could be replicated further.

(vi) Schemes for use of treated wastewater

Since, there is no dilution available in the receiving water bodies, it is important that no wastewater is discharged which does not meet the designated best use standards, even after treatment. Schemes may, therefore, be worked out to use the wastewater generated for irrigation and other purposes. Use of wastewater for irrigation is expected to benefit in a number of ways resulting in saving of nutrients, besides saving of water and avoidance of pollution.

(vii) New Approaches to Water Pollution Control

It is suggested that approaches to water pollution control that focus on wastewater minimization, in-plant refinement of raw materials and production processes, recycling of waste products, etc., should be given priority over traditional end-of-pipe treatments. Besides the Water CESS Act, efforts may also be made to introduce and implement the Zero discharge concept, aimed at enhancing recycling and reuse of effluent discharges.

5.3 Research and Development

Following main areas of research are recommended as thrust areas during the 11th Plan:

(i) Reliable Indicators of Pathogens in Water

Measurement of coliform has been traditionally used as a standard procedure to measure presence of pathogens. This method has many drawbacks and is open to criticism. In India, the water quality monitoring results of last over 25 years indicate that coliform is a single parameter not in compliance with the desired water quality requirement. A large number of sewage treatment facilities have been developed under the Ganga Action Plan and the National River Action Plan. Still these rivers are not able to achieve the desired coliform level. It is also observed that these rivers are extensively used for outdoor bathing without any observable adverse effect on human health. In such a case, it is important that some alternate indicators of pathogens for Indian water bodies are identified, so that reliable indicators of pathogens could be used as tool to monitor water quality.

(ii) Measurement of Micro Pollutants

In the recent past, several episodes of pesticide pollution have been reported in the media. Measurement of pesticides is a sophisticated exercise and needs several repetitions to be sure about the findings. In view of inadequate knowledge on magnitude of pesticides and toxic metals residues in the environment including water, such episodes are likely to be repealed in future. In such situation, it is important that measurement techniques which are simple and could be used on routine basis, are developed during the 11th Plan.

(iii) Development of low cost technology for water and wastewater treatment

Discharge of untreated wastewater is the main cause of water quality degradation. The untreated wastewater is mainly contributed by the urban centers and small-scale industries due to paucity of resources. In order to achieve water quality goals in the country it is important to address these polluting sources. Thus, development of low-cost technology is of crucial importance in the country and should be promoted during the 11th Five Year Plan.

(iv) Development of Clean Technology for Production

Cleaner production is being promoted all over the world and is one of the main areas of attention in the NEP, 2006. It aims to eliminate or minimize pollution, ultimately promoting the judicious use of renewable energy and materials. It is suggested that R&D activities are initiated to introduce newer technologies of production in the line of clean production.

(v) Assessment of Non-point Sources of Pollution

Although fairly good knowledge exists in our country on nature and magnitude of point sources of pollution, however, similar knowledge with respect to non-point sources is not available. This is the cause of some concern in the implementation of various schemes for control of pollution. It is, therefore, important that simple methods are available to estimate or measure the nature and magnitude of non-point pollution loads. It is suggested that R&D activities are taken up during the Eleventh Plan on this aspect.

(vi) Indicators of Water Quality

A water body could have a large number of pollutants present. Measurement of all the pollutants may be impracticable and unviable. Thus, some indicators are identified and used to summarise a large number of pollutants e.g. toxicity summaries of all the toxicants, conductivity summaries of all the in-organic dissolved solids, BOD summaries of all the biodegradable organic substances etc. Such indicators are expected to be useful for routine monitoring in environmental laboratories. It is suggested that such indicators are developed for reliable information on water quality.

(vii) Efficient use of Resources

Efficient use of resources is one of the important components of the NEP, 2006. It is also suggested that R&D activities are taken up to find newer methods of increasing efficiency in

using resources including raw material, water and energy in industries, water use in agriculture and house-holds etc.

(viii) Development and Propagation of Methods to Conserve Water

As water is getting scarce, it is necessary to conserve it at every stage. Although a large number of methods are available, still there is large scope for undertaking research to find newer and efficient methods to conserve water.

CHAPTER 6

6.0 Solid Waste Management

Management of industrial and municipal waste is the major cause of soil pollution and is a serious challenge in terms of magnitude and resources required. Rapid urbanization and exponential growth of industries and has led to the generation of large quantities of solid wastes. It has been estimated that country generates about 1.2 million tons of MSW per day besides, 4.4 million tons of hazardous waste per year and 2.25 million tons of plastic waste per year, of which approximately 60% is recycled**.**

A substantial amount of these wastes are potentially hazardous to the environment and the living organisms including human beings. The indiscriminate disposal of these wastes has led to extensive pollution of both land and water bodies and leaching of chemicals from waste dump sites, has been reported to have contaminated the ground water.

A set of rules under the Environment (Protection) Act, 1986 for proper management of hazardous wastes, municipal solid wastes, plastics and biomedical waste have been notified and amended from time to time.

6.1 Performance during the Tenth Plan

The Ministry has a comprehensive scheme for creation of infrastructure for management of hazardous substances. This scheme is intended to facilitate implementation of the rules on handling and safe disposal of hazardous chemicals and wastes. It also provides for training, creation of awareness and R&D activities.

Partial financial assistance is being provided for setting up of Common Treatment Storage and Disposal Facilities (TSDF) including incinerators for hazardous wastes, municipal solid waste and biomedical waste. Financial support has also been provided to the SPCBs/ PCCs including CPCB for strengthening of the infrastructure to facilitate compilation of information regarding the implementation of the Rules.

The Ministry has so far supported setting up of five Common Treatment, Storage and Disposal Facilities (CTSDF) (one in Maharashtra (TTC-Belapur), two in Gujarat (Anklesher and Surat), one in Andhra Pradesh (Ranga Reddy District) and one in West Bengal) for hazardous wastes. The other States viz. Karnataka, Tamil Nadu, Orissa, Goa, Delhi and Haryana are in the process of setting up such facilities.

The State Governments and the union territory administrations have republished the notifications on plastics in their official gazette. States like Uttar Pradesh, Himachal Pradesh Maharashtra and Delhi have published separate set of regulations in the form of Non-Biodegradable Garbage Control Acts.

The Ministry of Non-Conventional Energy Sources (MNES) has formulated a National Programme on Energy Recovery from Urban and Industrial Wastes. The Ministry of

Environment & Forests has been associated in the formulation and implementation of the National Programme.

The Ministry of Urban Development under the Jawaharlal Nehru Urban Renewal Mission has formulated schemes relating to urban development including low cost sanitation and solid waste management in selected towns under the scheme of the Integrated Development of small and medium towns. The MoEF alongwith the CPCB has also supported projects on implementation of Municipal Solid Waste Rules in one identified city/town in each State. This includes setting up of a regional facility for management of municipal solid wastes. Such efforts during the 11th Plan need to be continued; also such projects have been initiated.

Financial Assistance has also been provided to carry out studies on waste minimization in the small and medium scale enterprises. A scheme to assist the Small and Medium Scale Enterprises (SMEs) in adoption of cleaner production practices and reduction in waste generation has also been in place. 118 Waste Minimization Circles have been established in 41 sectors covering about 600 SMEs.

6.2 Recommendations for the 11th Plan

Following broad recommendations are given for Solid Waste Management during the 11th Five Year Plan:

(a) Provide a policy framework to encourage reuse and recycling, waste reduction, minimization and clean production and develop, implement strategies for recycle, reuse and reprocessing through promotion of relevant technologies and use of incentive based instruments.

(b) Enhance Central assistance to implementing agencies under the existing schemes as the provisions available during the 10th Plan have not been adequate to meet the requirement of the infrastructure to be created for management of hazardous substances during the 10th Plan.

(c) Develop and implement viable models for setting up and operating Common Treatment Storage Disposal Facility (CTSDF).

(d) Provide legal recognition and strengthen the informal sector system for collection and recycling of various materials, in particular enhance their capacity and provide access to appropriate technology and institutional finance for multi-stakeholders' project for collection, treatment and disposal of new waste streams like e-wastes, organic wastes etc.

(e) Provide assistance including fiscal incentives for developing technologies for waste minimisation & clean production process and R & D for developed technologies to modify them to suit local requirements and conditions.

(f) Assist setting up of demonstration plant for waste processing technologies to work out environmental costs and maintenance of environmental quality.

Specific recommendations on the Municipal Solid Waste, Bio-Medical Waste, Used Lead Acid Batteries' Waste, Utilisation of Fly Ash, Management of Plastic Wastes etc. are further elaborated in the Chapter on Recommendations for the 11th Plan.

CHAPTER 7

7.0 Land Degradation: Management of Degraded Lands

The land serves as storage for water and nutrients required for plants and other living micro-macro-organisms. The demand for food, energy and other human requirements depends upon the preservation and improvement of the productivity of land. The land resources are limited in India which has about 18% of world's population.

The degradation of land, through soil erosion, alkali-salinization, water logging, pollution, and reduction in organic matter content has several proximate and underlying causes. The proximate causes include:

- Loss of forest and tree cover (leading to erosion by surface water run-off and winds),
- Unsustainable grazing,
- Excessive use of irrigation (in many cases without proper drainage, leading to leaching of sodium and potassium salts),
- Improper use of agricultural chemicals (leading to accumulation of toxic chemicals in the soil),
- Diversion of animal wastes for domestic fuel (leading to reduction in soil nitrogen and organic matter),
- Burning of bio-mass in fields (leading and reduction in organic matter), and
- Disposal of industrial and domestic wastes on productive land.

In the absence of comprehensive and periodic scientific surveys, estimates have been made on the basis of localized surveys and studies. Recently, the National Bureau of Soil Survey and Land Use Planning (NBSS&LUP), Nagpur has published a report in 2005. According to this report, 146.82 million hectare area is reported to be suffering from various kinds of land degradation which include:

- Water erosion - 93.68 million ha,
- Wind erosion - 9.48 million ha,
- Water logging/flooding - 14.30 million ha,
- Salinity/alkalinity - 5.94 million ha,
- Soil acidity - 16.04 million ha, and
- Complex problem - 7.38 million ha.

The proximate causes of land degradation are driven by implicit and explicit subsidies for water, power, fertilizer and pesticides. Grazing lands are usually common property resources, and insufficient empowerment of local institutions for their management leads to

overexploitation of the biomass base. The absence of conducive policies and persistence of certain regulatory practices reduces people's incentives for afforestation, and leads to reduced levels of green cover.

The National Environment Policy 2006, therefore, categorically states as below:

> "It is essential that the relevant fiscal, tariffs, and sectoral policies take explicit account of their unintentional impacts on land degradation, if the fundamental basis of livelihoods for the vast majority of our people is not to be irreparably damaged."

7.1 Regulatory Mechanism

Following numerous laws govern the ownership and use of lands. The underlying principle of most of these laws is that the State is superior authority in regulating all activities – ownership, use and alienation – related to the land. This has had serious implications for wastelands, and has also discouraged peoples' efforts for regeneration. The laws are also inadequate to prevent encroachment of common lands, and some laws are misused to validate these encroachments. The following forests and land protection laws are in force in the Country:

- Easement Act, 1884;
- Land Acquisition Act, 1894;
- Indian Forest Act, 1927;
- The Wildlife (Protection) Act, 1972;
- Forest (Conservation) Act, 1980;
- The Environment (Protection) Act, 1986;
- National Forest Policy, 1988;
- The Panchayati Raj Act, 1994; and
- Several State laws on the pricing and contracting of non timber forest produce.

7.2 Specific Initiatives and Strategy for Improving Degraded Lands

In order to improve degraded lands, National Environment Policy, 2006 has identified the following specific initiatives:

a) To encourage adoption of science-based, and traditional sustainable land use practices, through research and development, extension of knowledge, pilot scale demonstrations, and large scale dissemination, including farmer's training, and where necessary, access to institutional finance:

As most of the watersheds developed do not reach full potential in terms of agricultural production, greater investments under watershed development, rain harvesting and natural resources conservation are recommended. For expansion of watershed development, greater attention is required to obtain full potential in terms of agricultural production and, therefore, promotion of farming system approach should be made an integral part of the watershed development programme for rainfed areas. Particularly the areas like improvement in crop production technology, improvement in supply of quality inputs like seeds, fertilizers, machinery, varietals diversification and technology transfer should be included as integral part of

the watershed development programme being implemented by the Ministry of Agriculture. This will ensure full agricultural development in the treated areas under the watershed. Proactive intervention may be required rather than normal extension approach. This approach should be considered as an integral component in the XI Five Year Plan.

b) To promote reclamation of wasteland and degraded forest land, through formulation and adoption of multi stakeholder partnerships, involving the land owning agency, local communities, and investors:

Most of the watersheds developed do not reach full potential in terms of agriculture production and are not properly maintained because the community involvement gets waned after the initial development stage. Community involvement in watershed planning and design has typically been low; and distributional problems are persistent, arising from existing inequalities in land distribution or because of ill-defined rights and encroachment. This needs to be tackled in the Eleventh Five Year Plan by greater involvement of community right from the planning stage to the execution stage and during the maintenance stage. The Private sector, in this context, also needs to be encouraged to take up and adopt new watershed areas within the overall framework of the integrated watershed approach. This may accelerate the area coverage under watershed development.

c) To prepare and implement thematic action plans incorporating watershed management strategies, for arresting and reversing desertification, and expanding green cover:

To achieve the above objective, it is recommended that the wastelands and degraded lands, which are either unutilized or under utilized, are brought under productive uses by development and distribution of such lands to landless for productive uses for their economic upliftment or community plantations are taken up on such lands.

In this regard, the Soil and Land Resource Mapping may be conducted at regular intervals and spatial digital information system on land use inventory may be prepared for each State, so that resource allocation & monitoring is based on a reliable database.

d) To promote sustainable alternatives to shifting cultivation where it is no longer ecologically viable, ensuring that the cultural and social organizations of the local people are not disrupted:

Keeping the above objective in view, it is suggested that diversion of agriculture land for non-agricultural purposes, like urbanization, industrialization etc. should be carefully/cautiously made. The National Land Use and Conservation Board (NLCB) and State Land Use Board (SLUB) may in this regard, consider taking preventive measures on conversion of agricultural land.

e) To encourage agro-forestry, organic farming, environmentally sustainable cropping patterns, and adoption of efficient irrigation techniques:

To improve the farming practices, there is a need to develop a spatial information system for soil health using the advanced technology of Geographical Information System (GIS) and Global Positioning System (GPS) as well as satellite mapping and soil analysis on ground. The dissemination of soil information in the form of soil health cards is very vital information for the farmer. A few States have commenced preparation of soil health cards recently. With the improvement in technology, this could be taken up on a larger scale on a country wide basis, during the 11^{th} Plan.

7.3 Schemes/ Programmes

Various Watershed Development Programmes are being implemented by Ministries, namely, the Ministry of Agriculture, Ministry of Rural Development and Ministry of Environment & Forests for development of degraded lands. Important among these programmes are:

(i) National Watershed Development Project for Rainfed Areas (NWDPRA),

(ii) Soil Conservation for Enhancing Productivity of Degraded Lands in the Catchments of River Valley Project & Food Prone River (RVP & FPR),

(iii) Reclamation of Alkali Soil (RAS),

(iv) Watershed Development Project in Shifting Cultivation Areas (WDPSCA),

(v) Drought Prone Area Programme (DPAP),

(vi) Integrated Wasteland Development Programme (IWDP) and National Afforestation & Eco – Development Project (NAEP).

In addition to above, two Externally Aided Projects (EAPs), namely, Indo German Bilateral Project on Watershed Management (IGBP – WM) and World Bank Assisted Project on Sodic Land Reclamation, Uttar Pradesh are being implemented with technical and financial assistance of external agencies. Since inception upto March 2005, an area of 28.533 million ha has been developed with an expenditure of Rs. 14577.32 crore.

In this context, the Working Group on Watershed Development, Rainfed Farming and Natural Resource Management for the Tenth Plan set up by the Planning Commission has worked out the cost for treatment of degraded land in successive Five Year Plan.

CHAPTER 8

8.0 International Cooperation

India has participated in major international events on the environment since 1972. The country has signed and ratified a number of key multilateral agreements on environment issues in recognition of, the trans-boundary nature of several environmental problems, impact on chemical industry and trade and has made efforts to comply with its commitments. Efforts have been made to network and enhance environmental cooperation by participating in regional and bilateral programmes. The need to enhance our own capacity to comply with our commitments and enable flow of resources is clearly evident.

8.1 Performance during the 10th Plan

- A programme on conservation of wetlands was initiated in 1987 with the basic objective of assessment of wetland resources identification of wetlands of national importance, promotion of R & D activities and formulation and implementation of management action plans of identified wetlands. A national wetland committee has been constituted.
- **T**he Hazardous Waste (management and Handling) Rules, 1989 have been amended in 2000 and 2003 to incorporate the obligations under the Basel Convention.
- With the coming into force of Kyoto protocol in February 2005, the GOI has set up the National CDM Authority. The Authority evaluates and recommends CDM projects for post country approval. As on 1st December 2006, 447 projects have been accorded host country approval.
- A Country Programme was initiated for phasing out of Ozone Depleting Substances (ODS). A separate cell was established with the objective of interacting with all stakeholders and ensure smooth transition of the phasing out of ODS and to promote non-ODS technologies both in production and consumption sector. So far funds aggregating to US$ 137 million for over 349 ODS projects have been received from the Multilateral Fund. In 1995, full exemption from payment of Customs and Excise duties was granted on capital goods acquired to implement ODS phase out projects funded by the Multilateral Fund. This exemption was extended to new projects based on non-ODS technologies in 1996.
- The Ozone Depleting Substances (Regulation and Control) Rules 2000 under the Environment (Protection) Act, 1986 was notified to regulate and control ODS. The Rules provide the necessary legal back up and indicate a specific time frame for the phase out of ODS.
- India has enacted the Biological Diversity Act in 2002 and also framed Biological Diversity Rules in 2004. The Act primarily addresses access to genetic resources and associated traditional knowledge so as to ensure equitable sharing of benefits arising out of the use of these resources and knowledge to the country and the people as provided for in the CBD. A large-scale exercise has been completed for providing inputs towards a

national biodiversity strategy and action plan. The Ministry has constituted an Expert Core Group on Biodiversity.

- A national capacity needs assessment to identify country level priorities and needs for capacity building under the UNCCD has been launched with UNDP.
- Project proposal for preparation of the National Implementation Plan (NIP) for management of POPs has been communicated to GEF for funding.
- The three essential components of the SAICM include an (1) Overarching Policy Strategy (2) Global Plan of Action and (3) a Dubai Declaration. A SAICM Trust Fund has been established to enable implementation. India has decided to contribute US$ 100,000 to the fund.
- India submitted an alternate approach, called "Environmental Project approach" to the CTE which clearly identified environmental benefits and eliminates, dual or /and multiple uses. The approach brings in synergy between environmental goods and services and was supported by the developing countries.
- India also proposed that longer time frames for compliance should be accorded to products of interest to developing country Members so as to maintain opportunities for their exports.

8.2 International Agreements

Following are the International treaties/conventions/declarations on environment management to which India is a party.

- United Nations Conference on the Human Environment – Stockholm 1972;
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), 1975;
- Ramsar Convention, 1971, 1975;
- The Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes, 1989;
- United Nations Conference on Environment and Development (UNCED), 1992, 2002;
    - Agenda – 21
    - Rio Declaration
    - Millennium Development Goals
- Framework Convention on Climate Change (FCCC), 1992;
    - Kyoto Protocol, 1997
- The Vienna Convention, 1985;
    - Montreal Protocol on Ozone depleting substances, 1992;
- Convention on Biological Diversity, 1992;
    - Cartagena Protocol on Biosafety, Ratified on 17th January, 2003;

- Convention to Combat Desertification, 1996;
- Rotterdam Convention on Prior Informed Consent Procedure for certain Hazardous Chemicals in International Trade, 2002;
- Stockholm Convention on Persistent Organic Pollutants (POPs), 2001;
- Chemical Weapons Convention, 2005;
- Strategic Approach to International Chemicals Management (SAICM), 2006;
- WTO Agreement;

8.3 Bilateral Cooperation

(a) Advisory Services in Environmental Management (ASEM)

The GTZ and the Ministry of Environment and Forests of the Government of India (MoEF) have established a new structure called the Advisory Services in Environmental Management (ASEM) to address various identified environmental concerns. The new structure is within the scope of the bilateral negotiations between the Republic of India and the Federal Republic of Germany held on September 5, 1996.

(b) Canada – India Environmental Institutional Strengthening Project

Canada – India Environmental Institutional Strengthening Project is a Five-year project funded by Canadian International Development Agency (CIDA) with assistance grant of Canadian Dollar 4.73 million (Revised Budget Canadian Dollar 3.983 million) by virtue of Interdepartmental Administrative Agreement signed by Environment Canada and CIDA in 2000.

(c) Asia Pacific Partnership on Clean Development & Climate Change

The partnership aims at developing, deploying and transferring cleaner, more efficient technologies to meet nationally designed strategies for pollution reduction, energy security and climate change concerns consistent with the principles of the UNFCCC.

The recommendations of the Working Group for the 11th Plan are elaborated in the chapter on recommendations of this report.

CHAPTER 9

9.0 Summary and Conclusions

Keeping in view the emerging areas of concern and gaps identified and the initiatives & achievements so far, recommendations made have been grouped under the 4 thematic areas, namely, Air pollution, water pollution, solid waste management, land degradation and International Cooperation as well as Regulatory Mechanism.

9.1 Air Pollution and Air Quality Management

The Ministry of Environment and Forests may review the current National Ambient standards and monitoring protocol including standards for additional pollutants like Ozone, $PM_{2.5}$ and air toxics and strengthen necessary monitoring capacity. It is proposed to further develop, target reduction, priority areas for intervention, control measures, in the Clean Air Action Plan (CAAP) for various cities. CAAP will include provisions for health studies, inventory of emissions, source apportionment and modeling to demonstrate that the measures selected by the state have reduced emissions to meet the standard. To facilitate an integrated approach to air quality management, it is suggested that all pollution sources (industrial, vehicular, and area sources) may be regulated with the objective of attaining the health based air quality standards.

The activities recommended for the 11^{th} Five Year Plan are as follows:-

(i) Schemes and programmes for augmenting Ambient Air Quality Monitoring

For comprehensive assessment of the ambient air quality status, the monitoring network may be expanded from the current 326 stations to 1000 stations including introduction of monitoring in new cities and intensification of monitoring in major cities where monitoring is already carried out. The coverage for additional parameters may be initiated and expanded through continuous and real time monitoring of $PM_{2.5}$, Ozone, VOC, PAH etc. to about 15 cities per year, so as to cover the 76 non-compliant cities over a period of five years.

(ii) R&D and Scientific Studies to support Air Pollution Control Policies

Multi-city studies on air pollution inventory and source profiling, source apportionment and modeling should be carried out. Assessment of the impact of various abatement measures on air quality may also be undertaken.

(iii) Specific Schemes for Health Assessment

Specific schemes may be initiated for health assessment and exposure studies based on rigorous methodology and scientific protocol, time series epidemiological data for proper health risk assessment related to air quality. The study may include specific reference to risk factor associated with poor socio economic conditions.

(iv) Develop and Strengthen schemes for Quality Assurance and Quality Control

Quality Assurance(QA) and Quality Control (QC) being prerequisites for improved results of air quality monitoring, the CPCB and its Zonal Offices may be strengthened for QA/QC, calibrations of facilities for air pollution analysis, network audits, data review etc. along with capacity building necessary for such activities.

(v) Strengthening existing schemes to control industrial emissions

The existing schemes may be strengthened and expanded to promote best available technology, based on their economic feasibility especially in the major polluting industries. This may be supplemented by independent monitoring and supervision by competent third party. Source monitoring and emissions load based standards may be effectively followed for setting reduction target and effective penalty in case of default.

(vi) Specific programme and Studies for Tax Incentives

Specific programme and studies be initiated to design tax incentives for early introduction of tighter vehicle and fuels standards, improvement in fuel economy of vehicles, for promotion of alternative fuelled vehicles and use of public transport and clean technology in industries. Disincentives should be designed to discourage polluting activities and polluting technologies and vehicles.

(vii) Develop Air Pollution Management plan

Develop air pollution management plan for small-scale industries including emission load estimation from small-scale industry and control strategies. Identify and promote pollution prevention technologies**.**

(viii) Strengthen Source Monitoring

For source monitoring, along with the criteria pollutants (including SPM, NOx, SO_2), monitoring of other pollutants VOC, and BTX may also be introduced for developing necessary control measures. Concurrently, compulsory source monitoring may be introduced in all critically polluted areas and hazardous industrial units and a transparent central data base may be created based on monitoring results. Additionally, GIS based decision support system may be introduced for scientific management of air pollution alongwith networking of existing manual/continuous monitoring stations. Both concentration and emission load based standards may be developed for various industrial sources.

(ix) Schemes for Indoor Pollution

In pursuance of the National Environment Policy and the National Programme for dissemination, information improved fuel wood stoves, solar cookers, which are suited to local cooking practices and bio-mass resources may be encouraged. The local Panchayat and Municipal agencies may be involved for wider reach of best technologies.

9.2 Water Pollution and Abatement Measures

Although sewage is one of the major pollutants in water bodies, industrial water pollution remains the focus of the MOEF policies and programs. Following are the programs suggested for the 11th Plan:-

(i) Strengthen Water Quality Monitoring Programme

In order to generate information on all important pollutants like pesticides, organics and other toxicants and all important water bodies, the present network needs further strengthening. It is important to increase the number of monitoring locations from the present 1000 to 2500 during the 11th Plan and start measuring micro-pollutants at selected locations.

(ii) Develop capacity for monitoring of Persistent Organic Pollutants

The thrust may be to monitor all the water bodies for pesticides to identify the contaminated water bodies and plan remedial measures.

(iii) Schemes for use of treated Wastewater

Since, there is no dilution available in the receiving water bodies, it is important that no wastewater is discharged which does not meet the designated best use standards even after treatment. In this context, schemes for recycling and reuse of treated waste water may be promoted.

(iv) New Approaches to Water Pollution Control

Approaches to water pollution control that focuses on wastewater minimization, in-plant refinement of raw materials and production processes, recycling of waste products, etc., may be given priority over traditional end-of-pipe treatments. Besides the Water Cess Act, efforts need to be made to introduce and implement the Zero discharge concepts, which would enhance recycle and reuse of effluent discharge.

(v) Research and Development

Following main areas of research may be focused during the 11th Plan:

- Reliable indicators of pathogens in water
- Measurement of micro pollutants
- Development of low cost technology for water and wastewater treatment
- Development of clean technology for production
- Assessment of non-point sources of pollution
- Indicators of water quality
- Efficient use of resources
- Development and propagation of methods to conserve water

9.3 Solid Waste Management

In addition to the recommendation contained in the Chapter on Solid Waste Management, the following area specific recommendations are also made for the projects and programmes of 11th Five Year Plan.

(i) Municipal Solid Waste

(a) Continue support to demonstration projects, one in each state, initiated during the 10th plan, in the 11th Plan and considered a second project in bigger states on demand.

(b) Plan and develop, Municipal Solid Waste disposal facilities, scientifically designed landfills, Integrated Solid Waste Management facility, on the basis of population, quantum of waste generation and waste characteristics. Encourage waste segregation into bio-degradable and non-biodegradable, at appropriate sites involving communities, NGOs and implementing agencies.

(c) Continue support to training programs of all stake holders, research and technology interventions projects for treatment technologies, Waste to energy and composting , etc.

(d) Develop technical guidelines viz for scientific landfills etc., and

(e) Encourage Municipal bodies to participate in CDM through capacity building including investment for identifying and preparing CDM projects based on waste management.

(ii) Bio-medical Waste

(a) Facilitate establishment of more common and shared facilities.

(b) Provide financial assistance for conduct of training Programmes for the medical professionals, paramedical professionals and other staff working in the health care institutions including awareness programmes through media and other sources for general public, involving the local communities and NGOs

(iii) Used Lead Acid Batteries Waste

(a) Enable establishing of collection systems and centers.

(b) Promote studies on EST for used Lead Acid Battery recycling and Funding R&D studies for lead smelting technologies in secondary lead smelters.

(c) Facilitate and monitor take back of used lead acid batteries by registered recyclers.

(iv) Fly-ash Utilization

(a) Support R&D, Assessment and application of available technologies for fly ash utilization & management.

(b) Facilitate collection and transportation of fly ash.

(v) Management of Plastic Wastes

(a) Support R&D, Assessment and application of available technologies for plastic waste utilization & management and providing incentives to pilot projects for waste plastic utilization and replication and field application of successful R&D

(vi) Waste Minimization and Cleaner Production Processes.

(a) Integration of waste minimization and cleaner production schemes and enlarge scope of R&D studies by including additional sectors.

(b) Plan and fund Demonstration projects through State Pollution Control Boards

9.4 Land Degradation: Management of Degraded Land

The Ministry of Agriculture, the Ministry of Rural Development and the Ministry of Environment & Forests are the ministries involved in drawing up & implementing the programmes for development of degraded land. Following are the programmes identified / requiring augmentation in the 11th plan:

(a) A concentrated effort is required to expedite the on-going projects of irrigation that involves 13.4 million hectares of potential land under irrigation. About 14 million hectare can be brought under irrigation in command areas of completed projects that lie un-irrigated due to lack of field channels, silting of reservoirs and similar problems.

(b) Community involved in watershed planning and design has typically been low; and distributional problems are persistent, arising from existing inequalities in land distribution or because of ill-defined rights and encroachment. This needs to be tackled in the Eleventh Plan by greater involvement of community right from the planning stage to the execution stage and during the maintenance stage.

(c) The wastelands and degraded lands, which are either unutilized or under utilized, should be brought under productive uses by development and distribution of such lands to landless for productive uses for their economic upliftment or community plantations projects may be tried.

(d) Encourage adoption of science-based, and traditional sustainable land use practices, through research and development, extension of knowledge, pilot scale demonstrations, and large scale dissemination, including farmer's training, and where necessary, access to institutional finance.

(d) Promote reclamation of wasteland and degraded forestland, through formulation and adoption of multi-stakeholder partnerships, involving the land owning agency, local communities, and investors.

(f) Prepare and implement thematic action plans incorporating watershed management strategies, for arresting and reversing desertification, and expanding green cover.

(g) Promote sustainable alternatives to shifting cultivation where it is no longer ecologically viable, ensuring that the culture and social organisation of the local people are not disrupted.

(h) Encourage agro-forestry, organic farming, environmentally sustainable cropping patterns, and adoption of efficient irrigation techniques.

(i) Intensive water and moisture conservation through practices based on traditional and science based knowledge, and relying on traditional infrastructure.

(j) Enhancing and expanding green cover based on local species.

(k) Reviewing the agronomic practices in dry areas, and promoting agricultural practices and varieties, which are well adapted to the arid ecosystem.

9.5 International Cooperation

(i) Cross Cutting Measures

(a) **It is proposed to set up a permanent mechanism to ensure compliance of our obligations under various Conventions**. This would maximize capacity and resources to enhance and enable implementation of our commitments under Multilateral Environmental Agreements (MEA) and mobilize and utilize national, bilateral and multi lateral resources to fulfill commitments under MEA's.

(b) **Enhance cooperation and provide leadership in the region** to address issues of environment management under MEA's (SAARC, ASEAN, NAAM). Create climate for pro active participation rather than reactive in MEA negotiations and amendments.

(c) **Encourage Research, Development and Documentation of issues and technology arising and likely to arise from Multilateral Agreements/ Negotiations**. In this context, the existing legislations in order to incorporate evolving international regimes to enable compliance needs to be reviewed. A chemical convention cell may also be considered to be set up to ensure timely compilation and yearly submissions under various Chemicals and Wastes Conventions. An exclusive website for Chemical Conventions also may be launched and maintained.

(ii) Recommendations on Specific Conventions and Treaties

The Basel Convention

a) An action plan for efficient, cost effective recycling and disposal strategy for electrical and electronic waste may be drawn up.

b) Recommendations of the Expert Committee on Ship Breaking may be implemented.

c) Basel Ban and Basel Protocol may be examined further for ratification and Amendments to exclude recyclables from the Hazardous Waste (Management and Handling) Rules, 1989, amended 2000, 2003 may be notified.

The Rotterdam Convention (PIC)

a) A new legislation or amendment to existing legislations to implement the provisions / obligation of the Convention may be notified.

b) A study to document the status of 41 chemicals now covered under the convention may be conducted and a National Action Plan for implementation drawn up.

The Stockholm Convention (POPs)

a) The National Implementation Plan (NIP) preparation may be completed by 2008 and Investment projects drawn up in parallel.

b) A Status report of new POPs, POPs covered under OSPAR & LRTAP in the country be also got prepared.

Strategic Approach to Integrated Chemicals Management (SAICM)

a) A work plan prioritizing the activities in the Global Action Plan (GPA) for the country may be drawn up and an Inter-ministerial Coordination Committee established to ensure timely action and implementation.

Climate Change

a) It is suggested to:

- Bulkily identify key vulnerabilities for India to climate change, in particular impacts on water resources, forests, coastal areas, agriculture, and health.
- Assess the need for adaptation to future climate change, and the scope for incorporating these in relevant programmes, including watershed management, coastal zone planning and regulation, forestry management, agricultural technologies and practices, and health programmes.
- Bulkily encourage Indian Industry and municipal bodies to participate in the Clean Development Mechanism (CDM) through capacity building for identifying and preparing CDM projects, including investment.
- Participate in voluntary partnerships with other countries both developed and developing, to address the challenges of sustainable development and climate change, consistent with the provisions of the UN Framework Convention on Climate Change and provide assistance to ozone depleting solvents consuming industries particularly the CTC and those engaged in servicing ODS based refrigeration equipment and promotion small and medium enterprises.

WTO Agreement

On the issue of reduction/elimination of tariff and non-tariff barriers to environmental goods and services, India's suggestion of "Environmental Project Approach" (against List Approach) needs to be pursued vigorously, as the approach brings in synergy between environmental goods and services. Environmental measures should be based on the criteria of sound science, transparency and equity and the same should not be used restrict market access of developing countries. Participation of developing countries in developing these environmental measures needs to be ensured. Provision of technical and financial assistance, on concessional and preferential terms, to mitigate any adverse effects of environmental measures on market

access of developing countries and suitable amendment of TRIPS Agreement, by Inclusion of "disclosure requirements" in the patent applications, to make it compatible with the CBD needs to be pursued.

Provisions may be made for a new scheme to enable timely contribution to the trust funds of the conventions related to hazardous substances, establishment of an implementation cell including cost of participation in meetings.

9.6 Regulatory Mechanism

(i) **A detailed study to assess the strengths, weaknesses, opportunities and powers of the SPCBs and CPCB may be undertaken**. Based on the assessment, a feasibility study to deepen, reform and strengthen the environment regulatory institutions may also be undertaken. The outcome of the study after review shall be introduced in a phased manner.

(ii) **Institutional and existing regulatory review:** This may be initiated during the 11th plan to implement the following recommendations. The recommendations on the regulatory measures are of cross cutting nature and are relevant to all the thematic areas. These include:

(a) **Restructure Regulatory Institutions:** It is necessary to strengthen regulatory institutions urgently. In this connection, the strengthening of the environment regulatory institution requires to be achieved by strengthening the role and authority of municipalities and Panchyati Raj Institutions (PRIs). The base of the regulatory institution must start at the municipal level to tackle the pollution created by municipal, transport and infrastructure sources.

(b) **Expand regulatory programme:** The existing regulatory programmes may be expanded to include diverse sources of pollution. Apart from rigorously regulating the large industrial establishments, the regulation may extend to small and medium scale enterprises, municipal sources of pollution (including landfill sites and wastewater treatment plants), commercial establishments generating wastes and pollution, transport sector, construction activities etc. The regulation may also extend to product, packaging and disposal regulation.

(c) **Expand regulatory toolkit:** The New toolkits may involve a mix of command and control, economic incentives and disincentives as well as market and society-based instruments. A need to augment financial penalty as a tool of deterrence for non-compliance in the existing regulatory regime is also felt. In case of SMEs, a package of tools comprising of focused enforcement, financial incentives, outreach and compliance assistance shall be introduced. Economic instruments can be best applied in case of product, packaging and disposal regulation. Economic instrument like resource pricing and pollution taxes are also extremely useful tools. But to do this will require change in the existing concentration standards to load-based standards and assessment of the assimilative capacity of the discharge media.

(d) **Policies to promote Public Private Partnerships (PPP) in the areas of Management of Urban Liquid and Solid Wastes:** The municipal sector requires investments worth several thousand crores of rupees for creating requisite infrastructure for municipal water supply and to cope with the mounting domestic sewage and garbage. So far, government support has not been enough to meet the requirements. To save the already stressed cities/towns as well as water bodies from further decay and deterioration, alternatives to government support, such as Public Private Partnership (PPP), one such alternative, through which investment in this sector can be sought shall be explored.

(e) **Policies/regulations to encourage use of alternative and pro-active approaches such as Market-based and Economic Instruments, Voluntary Environmental Agreements and Beyond the Compliance Initiatives :** Alternative strategy which includes promotional tools like Market-Based Instruments and Economic Instruments, voluntary adoption of Environment and Occupational Health and Safety Management Systems (as per ISO 14001 & OHSAS 18001), cleaner production/ fuels, life cycle approach, design for environment etc. may be explored. The government policies may be oriented in this regard to promote voluntary/ market-based approaches.

(f) **Revisiting Environmental Taxes:** During the last three decades of the evolution of environmental policy in India, stress has been laid on pollution control. Improving the resource consumption efficiency would require appropriate 'resource pricing' and appropriate 'environmental taxes'. Pricing can be influenced either directly via taxes or charges, or indirectly via regulatory constraints or tradable permits. The latter options tend to involve high administrative and monitoring costs and are therefore unlikely to work effectively in India. Hence, the choice seems to favour direct pricing of ecologically important input factors and taxing and controlling pollution and use of polluting inputs. These may be explored.

The high water consumption in Indian industry is directly related to the lower water price. The water cess in India is Rs 0.10-0.40/m^3. Low water price is probably the single most important factor influencing the water pollution from Indian industry. To recycle wastewater and reuse it within the plants increase the water price as a practical option. Designing 'full-cost water pricing' could be achieving with/without hurting industrial growth. The Government giving equivalent tax reliefs in some areas similar neutral price and tax structure could be introduced to reduce other resource consumption intensities and pollution. If such green taxes are introduced in a revenue-neutral manner, an ecological tax reform could be achieved without the imposition of additional taxes. It is expected to result in gradually driving wasteful technologies, resource consumption patterns out of the market. During the 11^{th} Plan, pilot test pollution taxes and resource consumption taxes in some very polluted river stretch could be experimented.

(g) **Improve and expand Regulatory Standards:** The existing regulatory standards need to keep pace with changing technology and the assimilative capacity of the environment or the diverse nature of the source of pollution. There is therefore an

urgent need to develop and implement load-based standards which are in tune with the assimilative capacity of the local environment.

During the 11th Five Year Plan, a review of the existing regulatory standards needs to be undertaken to move towards load-based standards. Standards must also recognize the difference between old and new establishments and small and large establishments.

Regulations also need to be formulated to regulate products and chemicals packaging. There is also a need to introduce product and packaging standards by initiating the process by regulating products containing heavy metals and hazardous chemicals.

(h) **Develop programmes to give environment Protection a priority in the Union Budget and all Key Government Policies:** Clean technologies and environment-friendly products and processes should be promoted through appropriate prioritization /incentivisation in the Union Budget. All key government policies should also have strong component of environmental safeguards and scrutiny. Environmental protection and social development should in fact be part of all ventures of economic progress.

(i) **Structured approach for Environmental Policy/Law making and Review of Existing Acts/ Regulations:** The Environmental law making process should have a uniform and structured approach. This will not only be important from the view point of ensuring transparency, accountability, consistency, efficiency and effectiveness but also help in achieving the overall objective of improved compliance. The structured approach known as "Regulatory Impact Assessment" (RIA) should take into account: i) Options to law making ii) Cost benefit analysis iii) Stakeholder involvement, iv) Enforcement and Compliance. Existing acts/ rules should also be reviewed at regular intervals through RIA and their effectiveness should be checked.

(j) **Public-Private partnerships**: Enabling provisions in the existing laws and regulations (including local/ municipal laws) should allow PPP for creating environmental infrastructure like sewage treatment plants, water supply systems and 'waste to energy' projects. The municipal sector could also be incentivised through tax concessions/ holidays for making it lucrative.

(k) **EPA, Water Act & Air Act:** Under these legislations, it is suggested to provide for creation of an Expert Body (comprising of Economists, Ecologists, Planners, Anthropologists and other social scientists) to aid and advise the authorities under these legislations to assess the cost of ecological restoration and improvement and recover the same from those engaged in developmental activities. Also creation of Community Monitoring

Cells- to subject samples for analysis and for reporting deviations, if any, may also be considered.

(l) **Environment Management Service:** Creation of a pool and cadre of professional manpower as visualized in the National Conservation Strategy and Policy Statement on Environment & Development, 1992 may be considered.

(m) **NCEPC (National Committee on Environment Planning and Coordination):** As early as in the 4th Plan document, the need for establishing a national body to bring about greater coherence and coordination in Environmental Policies and Programmes and to integrate environmental concerns in the plans for economic development was made. Need for the reestablishing such a body during the Eleventh Plan may be considered.

(n) **Capacity Building in Environmental Laws:** This is another requirement which requires attention during the Eleventh Plan. Building the legal capacity in the Environment Management Service, Activists, Adjudicators, Academics, Media and the Civil Society through specially designed curricula and tools of training, may be given a fresh thought and avenues for its implementation further explored.

(iii) While the general recommendations of the Working Group in various thematic areas are detailed above, the projected requirements against some of the important schemes for the 11th Plan as against the outlays for the Tenth Plan are given in the following table. These are only indicative estimates subject to further review by the Minister of Environment & Forests.

S. No.	Name of the Scheme	Objective	10th Plan Outlay (Rs. in crores)	Proposed outlay for XIth plan (Rs.in crores)
1.	**Prevention of Air & water Pollution**			
(i)	Assistance for abatement of pollution and environment policy & law	Reimbursement of upto 80% of water cess collected by the States/UTs.	20.00	22.00
(ii)	Establishment of Environment Authorities and Environmental Commission & Tribunal	Providing Grant-in-aid to National Environment Appellate Authority, Loss of Ecology Authority	18.80	15.05
(iii)	Central Pollution Control Board	Supporting CPCB to undertake air and water quality monitoring	147.90	225.00
(iv)	Promotion of common effluent treatment plants	To treat the effluent emanating from the clusters of compatible small-scale industries.	20.27	20.00
(v)	Other schemes (Industrial Pollution Abatement through Preventive Strategies)	Prevention of pollution through activities like waste minimization/CT in SSI, environmental audit and environmental management system.	4.60	15.00
(vi)	Assistance for	Supporting State Pollution	21.00	16.35

S. No.	Name of the Scheme	Objective	10th Plan Outlay (Rs. in crores)	Proposed outlay for XIth plan (Rs.in crores)
	Pollution Abatement	Control Boards and State Environmental Departments for infrastructure development, salary support for technical staff in certain areas		
(vii)	Development and Promotion of clean technology	1. Development and Promotion of Clean Technologies 2. Development of tools and techniques for pollution prevention. 3. Formulation of strategies for sustainable development.	12.50	16.50
2.	**Hazardous Substances Management**	Support infrastructure for disposal of 1. Hazardous waste 2. Municipal Solid waste	37 .00	51
3.	**Environmental Education, Information, Research, Training & Awareness**			
(i)	Research & Development		24.00	20.00
(ii)	Environmental Information Systems		19.80	27.00
(iii)	Centre of Excellence		55.00	37.5
(iv)	Environmental Education, Training and Awareness		125.00	150.00
(v)	National Natural Resources Management System (NNRMS)	To examine and identify the key issues in the management of Bio-resources and Environment using Remote Sensing	23.50	50.00
4.	**International cooperation Activities and other projects**			
(i)	Adaptation and Capacity Building project on Climate Change	To undertake climate change capacity building activities to enable the stakeholders to mainstream climate change concerns in the formulations of developmental strategies, risk assessment and adaptation to address consequences of climate change as well as to enhance awareness and encourage	30	13.25

S. No.	Name of the Scheme	Objective	10th Plan Outlay (Rs. in crores)	Proposed outlay for XIth plan (Rs.in crores)
		friendly development process. The scheme also addresses India's commitment under the UNFCCC and enhancement of international cooperation in pursuance of objectives of UNFCCC.		
5.	**National River Conservation Plan**		1199.96	1320.00
6.	**National Afforestation and Eco-development Programme**			
(i)	National Afforestation and Eco-development Programme	Support for implementation of schemes relating to Afforestation and eco-development, including monitoring and evaluation, communication and awareness generation	106.00	62.20
(ii)	Eco development forces		42	47.00

NOMENCLATURE/ABBREVIATIONS

ASEM : Advisory Services in Environmental Management
CBD : Convention on Bio-Diversity
CDM : Clean Development Mechanism
CETPs : Common Effluent Treatment Plants
CIDA : Canadian International Development Agency
CO : Carbon Monoxide
CPCB : Central Pollution Control Board
CREP : Corporate Responsibility for Environment Protection
CTSDF : Common Treatment, Storage and Disposal Facilities
DSS : Decision Support System
EIA : Environmental Impact Assessment
EPA : Environment (Protection) Act, 1986
EPCA : Environment Pollution (Prevention and Control) Authority
GAP : Ganga Action Plan
GEF : Global Environment Facility
GIS : Geographical Information System
H_2S : Hydrogen Sulphide
ISCST : Industrial Source Complex Short Term
ISO : International Standards Organization
LCA : Life Cycle Analysis
LRTAP : Long Range Transportation of Air Pollution
MEA : Multilateral Environmental Agreements
MLD : Million Litres Per Day
MNES : Ministry of Non-Conventional Energy Sources
MoEF : Ministry of Environment and Forests
MSW : Municipal Solid Waste
NEP : National Environment Policy

NEAA : National Environment Appellate Authority

NO_x : Nitrogen Oxides

NRCP : National River Conservation Plan

NRAP : National River Action Plan

ODS : Ozone Depleting Substances

OSPAR : Convention for Protection of Marine Environment for the North East Atlantic

PAH : Poly Aromatic Hydrocarbons

PCC : Pollution Control Committee

PIC : Prior Informed Consent

POP : Persistent Organic Pollutant

PPP : Public Private Partnership

QA : Quality Assurance

QC : Quality Control

RIA : Regulatory Impact Assessment

RSPM : Respirable Suspended Particulate Matter

SAICM : Strategic Approach to Integrated Chemicals Management

SMEs : Small and Medium Scale Entreprises

SO_2 : Sulphur Dioxide

SPCB : State Pollution Control Board

SPM : Suspended Particulate Matter

SSI : Small Scale Industries

UNDP : United Nations Development Programme

UNFCCC : United Nations Framework Convention for Climate Change

VOC : Volatile Organic Compound

WTO : World Trade Organization

WQAA : Water Quality Assessment Authority

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ANNEXURE-I

M-13033/1/2006-E&F
Planning Commission
(Environment & Forests Unit)

Yojana Bhavan, Sansad Marg,
New Delhi, Dated 21st August, 2006

Subject: Constitution of the **Working Group on Environment and Environmental Regulatory Mechanisms** for the Environment & Forests Sector for the Eleventh Five-Year Plan (2007-2012).

It has been decided to set up a Working Group on Environment and Environmental Regulatory Mechanisms for the Environment & Forests Sector for the Eleventh Five-Year Plan. The composition of the Working Group will be as under:

1. Secretary, Min of Environment & Forests, New Delhi	Chairman
2. Principal Adviser (E&F), Planning Commission	Member
3. Shri Naresh Dayal, Special Secretary, MoEF	Member
4. Shri R. Chandramohan, Joint Secretary (CCI), MoEF	Member Secretary
5. Shri Jagdish Kishwan, IG Forest, (FC) MoEF	Member
6. Joint Secretary dealing with environment issues, MoEF	Member
7. Joint Secretary, Ministry of Non conventional Energy Resources	Member
8. Joint Secretary, Ministry of Women and Child Development	Member
9. Representative of Ministry of Transport	Member
10. Representative of Ministry of Industries	Member
11. Representative of Ministry of Urban Development	Member
12. Representative of Ministry of Agriculture	Member
13. Representative of Ministry of Petroleum	Member
14. Representative of Ministry of Science & Technology	Member
15. Chairman, CPCB, New Delhi	Member
16. Prof. Dilip Biswas, Ex-Chairman, CPCB	Member
17. Secretary, Environment Dept, Govt. of Maharashtra	Member
18. Dr. S K Wate, Dy Dir & Head EIRA, NEERI	Member
19. Dr. S.R. Shetye, Director, National Institute of Oceanography, Goa	Member
20. Chairman, Rajasthan State Poll. Control Board	Member

21. Chairman, West Bengal State Poll. Control Board	Member
22. Chairman, Tamil Nadu State Poll. Control Board	Member
23. Shri K.P. Nyati, Head, Environment, CII, New Delhi	Member
24. Ms. Rita Roy Choudhury, FICCI	Member
25. Dr. N. H. Ravindranath, IISc Bangalore	Member
26. Prof. M. K. Ramesh NLSIU, Bangalore	Member
27. Representative from CSE, New Delhi	Member
28. Prof. Shekhar Singh, IIPA, New Delhi	Member
29. Dr. Pratap Narayan, Director, CAZRI, Jodhpur	Member
30. Shri P N Asari, Advisor (E & F), Planning Commission	Member
31. Shri M. Ravindranath, Joint Adviser (E&F), Planning Commission	Member Convener
32. Shri Somnath Nayak, Nagarika Seva Trust, Karnataka	Member
33. Shri Srikanth Nadhmuni, E-Government Foundation, Bangalore	Member
34. Shri Anupam Misra, Gandhi Peace Foundation, New Delhi	Member
35. Shri Ravi Agarwal, Director, Toxic Links, New Delhi	Member
36. Economic Adviser, MoEF, New Delhi	Member

Terms of Reference of the Working Group will be as follows:

1. Review of the existing schemes/programmes of the Ministry of E & F in Environment Sector and suggest ways to improve the efficiency of delivery through administrative, programmatic and resource interventions.
2. Evaluate the sustainability concerns in the developmental planning processes in the country and suggest ways to integrate environmental concerns with it. The evaluation would include review of the existing policy/approach and take into account the weaknesses in institutional, legislative, regulatory and enforcement structure. *Specifically evaluate the role of local bodies, which have the responsibility for management of local natural resources, in promoting sustainable development.*
3. Examine ways of creating positive incentives for sustainable management of natural resources through payment of service charges following the Costa Rica model for payment of service charges for watershed conservation services.
4. For the imperative need for integrating environment in development planning, policy and decision-making, the Committee may focus, *inter alia*, on the following items:
5. Strategies for integrating environmental concerns into development planning for achieving sustainable development along with poverty alleviation.
6. Strategy for strengthening the monitoring and addressing the problems of air pollution, water pollution, noise pollution and safe disposal of hazardous waste, etc.

7. People's access to environmental information, especially in the context of the Right to Information Act.
8. People's participation with involvement of NGOs and Corporate social responsibility for a national campaign on environmental awareness and education.
9. Enhancing of usefulness of State and Central level environmental administration including Pollution Control Boards/Committees.
10. Review the efficacy of the present environmental regulatory mechanisms such as various authorities created under environmental laws and recommend ways to inculcate a culture of voluntary environmental compliance in place of clearance systems.
11. Review and recommendations for strengthening the present mechanisms for implementation of global commitments like Kyoto Protocol, Montreal Protocol, UNCCD etc.
12. Recommend the policy and programme interventions with corresponding outcomes, deliverables, physical targets, measurable indicators and financial requirements for the sector adopting the concept of zero-based budget.
13. To include any other issue, which the Working Group considers important
14. Official members of the Working Group will be paid TA/DA by their respective Departments as per the rules of entitlement applicable to them. The non-official members will be paid TA/DA by the Planning Commission as per SR 190 (a) for attending meetings of the Working Group.
15. The Working Group will submit its report to the Planning Commission by 31.10.2006.
16. Shri M. Ravindranath, Joint Adviser (E&F), Room No. 301, Yojana Bhavan (Tel No. **23096536**) will be the Nodal Officer for this Working Group for all further communications.

Dr S K Khanduri
Director (Forestry)

Copy forwarded to: **All Members of the Working Group.**

ANNEXURE- II

Planning Commission
(E&F Division)

Yojana Bhawan, Sansad Marg,
New Delhi-110 001, the 1st August, 2007.

ORDER

Subject: Constitution of Sub-Group under Working Group on Environment and Environmental Regulatory Mechanisms.

The first meeting of the Working Group on Environment and Environmental Regulatory Mechanisms was held under the Chairmanship of the Secretary (E&F) at 11.00 AM on 23.10.2006 in Conference Room No. 403, Paryavaran Bhawan, CGO Complex, Lodi Road, New Delhi – 110 003.

After analysing the scope of each of the terms of reference, the Working Group identified the following six thematic areas for detailed consideration of the Working Group.

1. Air Pollution
2. Water Pollution
3. Solid Wastes including hazardous wastes
4. Land degradation
5. International Cooperation
6. Regulatory Systems

The Working Group constituted the following Sub-Groups for making its recommendations on the thematic areas assigned to it.

Air Pollution

1.	Shri K.A. Mathew, Chairman, TNPCB	-	Chairman
2.	Smt. Sharwaree Gokhale, Secretary, Environment Govt. of Maharashtra	-	Member
3.	Dr. B. Sengupta, Member Secretary, CPCB	-	Member
4.	Dr. S.K. Wate, Dy. Director & Head, NEERI	-	Member
5.	Joint Secretary, Ministry of Surface Transport & High Ways, (incharge of vehicular norms) (MVR)	-	Member
6.	Dr. Anumita Ray Chaudhury, representative of CSE	-	Member
7.	Dr. Nalini Bhat, Director, MOEF	-	Nodal Officer

Water Pollution

1.	Shri Dilip Biswas, Ex-Chairman, CPCB	-	Chairman
2.	Shri K.P. Nyati, Head Environment CII New Delhi	-	Member
3.	Shri V.K. Jain, Principal Scientific Officer Ministry of Non-Conventional Energy Resources, New Delhi	-	Member
4.	Representative of Ministry of Urban Development	-	Member
5.	Dr. N.H. Rabindranath IISc, Bangalore	-	Member
6.	Representative of WBPCB	-	Member
7.	Dr. R.C. Trivedi, Additional Director, CPCB	-	Nodal Officer

Solid Wastes incuding Hazardous Waste

1.	Smt. Sharwaree Gokhale, Secretary, Environment Govt. of Maharashtra	-	Chairperson
2.	Ms. Rita Roy Choudhury, FICCI, New Delhi	-	Member
3.	Dr. Pratap Narayan, Director, CAZRI, Jodhpur	-	Member
4.	Shri Ravi Agarwal, Director, Toxic Links	-	Member
5.	Dr. A.B. Akolkar, Additional Director, CPCB	-	Member
6.	Shri Somnath Nayak, Nagarika Seva Trust, Karnataka.	-	Member
7.	Dr. Indrani Chandrasekharan, Director, MOEF	-	Member
8.	Representative of Ministry of Urban Development	-	Member
9.	Dr. Lakshmi Raghupathi, Addl. Director, MOEF	-	Nodal Officer

Land Degradation

1.	Chairman, WBPCB, Kolkatta	-	Chairman
2.	Ms. Parul Debidas, JS, Ministry of Women and Child Development, New Delhi	-	Member
3.	Shri Lalit Kumar Tewari, Jt. Commissioner, Ministry of Agriculture, New Delhi	-	Member
4.	Chairman, Rajasthan Pollution Control Board	-	Member
5.	Shri Anupam Misra, Gandhi Peace Foundation, New Delhi	-	Member
6.	Dr. Pratap Narayan, Director, CAZRI, Jodhpur	-	Member
7.	Shri N.K. Verma, Addl. Director, CPCB	-	Nodal Officer

International Cooperation

1.	Shri Naresh Dayal, Special Secretary, MOEF	-	Chairman
2.	Shri J.M. Mauskar, Joint Secretary (PA-II)	-	Member
3.	Prof. M.K. Ramesh, NLSIU, Bangalore	-	Member
4.	Dr. N.H. Rabindranath IISc, Bangalore	-	Member
5.	Shri R.S. Ahlawat, Economic Adviser, MOEF	-	Member
6.	Shri Ravi Agarwal, Director, Toxic Links	-	Member
7.	Dr. Indrani Chandrasekharan, Director, MOEF	-	Nodal Officer

Regulatory Mechanisms

1.	Principal Adviser (E & F), Planning Commission	-	Chairman
2.	Shri J.M. Mauskar, Joint Secretary (PA-II)	-	Member
3.	Shri Dilip Biswas, Ex-Chairman, CPCB	-	Member
4.	Prof. M.K. Ramesh, NLSIU, Bangalore	-	Member
5.	Shri K.P. Nyati, Head Environment CII, New Delhi	-	Member
6.	Ms. Rita Roy Choudhury, FICCI, New Delhi	-	Member
7.	Shri Somnath Nayak, Nagarika Seva Trust, Karnataka.	-	Member
8.	Shri Ishwer Singh, Senior Law Officer, CPCB	-	Member
9.	Member Secretary, Rajasthan State Pollution Control Board.	-	Member
10.	Dr. G.V. Subramanium, Director (IA), MOEF	-	Nodal Officer

Non-official Members of the Sub-Groups will be eligible for TA/DA reimbursement from Planning Commission as per Rules.

(M. Ravindranath)
Jt. Adviser (E & F)

ANNEXURE-III

REPORT OF THE SUB-GROUP ON AIR POLLUTION

1.1 SETTING AIR QUALITY GOALS FOR ELEVENTH FIVE YEAR PLAN

The current pace of economic growth present enormous challenge as risk factors related to environmental degradation, urbanization, motorization, and industrialization will continue to overwhelm Indian cities if accelerated steps are not taken to mitigate the growing air pollution impacts. The air shed of different urban regions and the fast growing urban population will come under severe pressure with serious public health consequences. This will make enormous demand on the regulatory, monitoring and enforcement capacity of the Union and state governments to prevent and control air pollution.

The Ministry of Environment Forests (MoEF) has adopted a comprehensive National Environmental Policy (NEP) 2006, is based on overarching guiding principles that includes among others right to development, environmental protection as an integral part of the development process, environmental standards setting, the precautionary principle and polluter pays principle, preventive action, economic efficiency, and equity. For abatement of pollution in general and air quality management in particular, various actions have been suggested which inter-alia include an integrated approach to strengthening of monitoring and enforcement of emissions standards for both point and non point sources, preparation of action plans for cities to address air pollution, promotion of R&D, formulation of national strategy for urban transport and energy conservation. In confirmation with the goals of the National Environment Policy, the primary efforts during the eleventh five year plan period will be to develop science based air quality management system and strengthen regulatory, institutional and enforcement mechanisms with adequate resources and skilled human power to achieve the clean air target as defined by the National Ambient Air Quality Standards.

- Air quality in all non compliant cities and industrial areas should meet national ambient air quality standards and proliferation of new pollution hotspots should be prevented
- Minimize adverse impact on human health and evoke precautionary principle
- Structure and function of ecosystem is maintained and protected
- National air quality planning and city action plans will ensure compliance and meeting with the air quality targets

1.2. The following areas have been evaluated to chart a roadmap to achieve the stated goals during the plan period.

- Assessment of the current air quality status and the emerging challenges

- Assessment of the current deficiencies in regulation development, enforcement and compliance systems
- Assessment of the Laws that may be necessary to address these concerns in this thematic area.
- Review of the authority and responsibilities of the regulatory systems to see how these can retain their independence and harness science through R&D, scientific and other expert bodies
- Policy integration
- Package of schemes / programmes in the thrust areas
- Capacity building and dissemination for addressing environmental concerns.

1.3. The key programmatic deliverables will be identified in the following areas of concern:

A. Outdoor air pollution
B. Indoor air pollution

2. OVER VIEW OF CURRENT AIR QUALITY TRENDS AND CHALLENGES

2.1. Status of air quality monitoring

The Central Pollution Control Board monitors ambient air quality in the country at 315 stations covering 115 cities/towns in 28 states and 4 Union Territories i) to determine the status and trend in ambient air quality; ii) to ascertain whether the prescribed ambient air quality standards are violated and to assess health hazard and damage to materials; iii) to continue ongoing process of producing periodic evaluation on air pollution situation in urban and industrial areas; iv) to obtain and knowledge necessary for developing preventive and corrective measures; v) To understand the natural cleansing process through pollution dilution, dispersion, wind movement, dry deposition, precipitation and chemical transformation of pollution generated.

Under this programme, sulphur dioxide (SO_2), oxides of nitrogen as NO_2, suspended particulate matter (PM) and respirable particulate matter (RSPM/PM10) have been identified for regular monitoring at all locations. The additional parameters such as respirable lead and toxic trace metals, hydrogen sulphide (H_2S), Ammonia (NH3) and polycyclic aromatic hydrocarbons are also being monitored at selected locations. The monitoring of meteorological parameters such as wind speed and direction, relative humidity and temperature was also integrated with the monitoring of air quality. The air pollution monitoring is carried out for 24 hours (4 hourly sampling for gaseous pollutants and 8 hourly sampling for particulate matter) with a frequency of twice a week, to have 104 observations in a year.

NAMP being a nationwide network involves several agencies such as Central pollution control board, state pollution control board, pollution control committees, National Environment Engineering Research Institute (NEERI). CPCB coordinates with these agencies to ensure uniformity, consistency of air quality data, and provides technical and financial support to them for operating the monitoring stations.

The air quality generated at the monitoring stations are transmitted to CPCB where these are checked scrutinized, compiled, processed and analyzed statistically to get the information on the monthly and annual minimum, maximum and mean values of concentration of pollutants. As NAMP is being operated through various monitoring agencies, a large number of personnel and equipments are involved in the sampling, chemical analysis, data reporting etc. This increases the probability of personal biases, reflecting in the data. Hence it is pertinent to mention that the data be considered as indicative and not absolute.

2.1.1. Trends in criteria pollutants and the emerging challenges

The air quality monitoring carried out over the last decade bears out that some criteria pollutants have begun to stabilize, and even decline in some cities while some pollutants have begun to show rising trend. In some of these cities particulate levels though still high, have begun to decline. In the rest the levels have begun to stabilize. This is the time for the next stage of intervention to ensure that these and other cities are able to build momentum for more effective impact. The sustained intervention has helped to make a distinct impact on the air quality in the metro cities.

Particulates continue to remain the key concern : SPM shows persistently high levels in most cities and declining trends in some. While more than two-third cities monitored have TSPM levels above the standards, about half have critical levels. Since TSPM consists of all possible dust particles with considerable contribution of top soil, wind blow dust, their concentration in the Northern and Western cities are very high.

The finer and respirable particles of size less than 10 micron (PM10) have higher share of particles from combustion and vehicular sources have reached critical levels in more than 57 per cent of the cities monitored. But in the key metro cities where implementation of control measures has gathered momentum the levels have stabilised and even declined. But even after stabilisation their levels have remained elevated and may rise again if stronger control measures are not initiated. The finer particles of size less than 2.5 micron which are more dangerous from health perspective also show very high levels from the limited monitoring in Delhi, Mumbai and Kolkata. There is need for urgent expansion of the monitoring facilities for PM2.5 for proper risk assessment and regulations in Indian cities.

Gaseous pollutants: Some gaseous pollutants have stabilized and even begun to decline: SO_2 levels have declined substantially in all cities of India as a direct result of the various measures initiated to change the fuel mix in industry and transport sectors. Sulphur content in diesel has been lowered, LPG has replaced coal substantially in the domestic sector, fuel substitution in industrial sector along with cleaner coals has helped to lower this gaseous emissions. However, caution should be exercised while interpreting the low levels of SO_2 as the limited data shows that there could be high propensity for this as to transform into sulphate particles in the air after going through atmospheric transformation. As data available from Kanpur shows that low ambient concentration of SO_2 persists despite high level of SO_2 emissions in the city but at the same time high level of sulphates have been noted (secondary particulates).

Carbon monoxide (CO): Capacity to monitor CO on a nationwide scale is still inadequate for want of automatic monitoring stations. It is monitored on a limited scale in metro cities. In Delhi the CO levels have begun to decline despite the phenomenal increase in vehicle numbers. CO is emitted predominantly from petrol vehicles. This bears out the impact of the improvements in petrol vehicle technology. But further reductions are needed to meet the clean air target.

Lead: Air borne Lead is another success story in India. Cities have recorded nearly instant reduction of 70 per cent after the unleaded petrol was phased in and the complete switch over was achieved in 2000.

The newer concerns: Nitrogen dioxides (NO_2): The available NO_2 data shows that this is emerging as the challenge of the future at least in the bigger cities. Though their levels are generally low compared to the levels of particulates and annual average levels are below the standards in most cases, the levels show a steady rising trend. Increased trends have been noted in Delhi, Kolkata, Pune, Bangalore, Dhanbad, Howrah, among others. In some of these cities the levels have even exceeded standards. High levels are more pronounced at traffic intersections. Unlike other pollutants NOx has a more complex lifecycle. Apart from being a very harmful pollutant as a primary pollutant, it reacts with volatile organic compounds in the air and forms a whole range of secondary pollutants including nitrates and ozone that make the photochemical smog. Precise strategies are therefore needed to control NOx which may turn out to be a problem in the future.

Ozone: There is an urgent need to develop capacity for ozone monitoring which is very limited presently. The current database does not provide a conclusive picture. Given the fact that ozone is a very harmful pollutant and both NOx and VOCs levels that contribute to its formations are rising and climate is conducive, ozone is expected to be the problem of the coming years and therefore its prevalence should be immediately assessed. The adverse impact of ozone on agriculture and vegetation in the rural and peri urban areas are very severe as is evident from the studies conducted by the Banaras Hindu University.

Air toxics: India will require a special air toxic programme to assess their levels and develop risk reduction programme. Air toxics cover a wide range of VOCs including benzene, toluene, xylene, a range of PAHs among others. These pollutants can be very harmful even in trace amount. Air toxics even in small trace amounts can cause cancer, birth defects and damage the immune system as well as cause adverse environmental impacts.

Problem of hazardous pollutants in industrial sectors: Monitoring of the industrial pollution will require special focus especially with the new thrust on developing special economic zone and given the proliferation of small scale industries and mining activities.

2.2. Non attainment cities and industrial areas

Based on the NAMP data CPCB has identified list of polluted cities in which the prescribed National Ambient Air Quality Standards are violated. Cities without monitoring facilities and cities with inadequate data are not considered. Currently there are 76 non compliant cities. The problem of air pollution is no longer confined to metro cities. Even smaller cities have

become pollution hotspots. Therefore, a nationwide air quality planning strategy is needed to stop further proliferation of air pollution hotspots and at the same time lower pollution levels in the non-attainment cities.

The major sources of air pollution in the non-attainment cities are motor vehicles industries, power plants, incinerators, generator sets, re-suspension of road dust and biomass burning used for captive power generation and a very large number of area sources.

It is generally observed that the contribution from vehicular pollution to overall ambient air quality is about 65-70%. with the tightening of the mass emissions standards and lowering of sulphur content of fuels, resulting in decrease in pollution load from vehicular fleet. The Euro-II emissions standards for new vehicles have been introduced in the country from April, 2005 and Euro-III in thirteen major cities from April, 2005 as prescribed in the Auto Fuel Policy road map for vehicular emission norms. The phasing out of old vehicles, implementation of alternative fuels programmes, blending of bio-fuels (currently at 5%) have also helped in control of vehicular pollution in major cities. The introduction of CNG in Delhi was a milestone in vehicular pollution control and is being extended to other cities as well depending on the availability of the fuel. However, control measures will have to be tightened significantly as the rapidly growing vehicle numbers can negate these improvements.

Currently there are 24 critically polluted industrial areas where industries, refineries, thermal power plants, chemical plants among others are the dominant pollution sources. The small-scale units dominate the downstream in these areas and contribute significantly to the pollution load. It is observed that without Pollution Control Devices, the SPM load from thermal power plants is 82%, from cement industry 7%, sugar industry 10% and others 1%. Similar trend is observed for SO_2 load from various industries, -- 89% contribution from thermal power plants, 3% from oil refineries, 2% from Sulphuric Acid plants and so on. The steps taken in industrial pollution control include use of beneficiated coal in thermal power plants, upgradation of technology, the implementation of Charter for Corporate Responsibility for Environmental Protection (CREP) among others. A more composite control and compliance strategy will be needed to control industrial pollution. Moreover, the industrial areas and the special economic zones will require total air shed management in addition to source specific regulations.

3. AIR QUALITY MANAGEMENT

3.1. Ambient air quality standards

India has taken early steps to introduce national ambient air quality standards. The national ambient air quality standards for the criteria pollutants (TSPM, PM10, SO2, NO2) for 24 hours and annual average levels, CO have standards for eight hourly averages. But adequate regulatory framework has not been developed to ensure that air quality targets are set for the non-compliant regions to guide implementation plans and air quality standards are met.

Moreover, the current Indian standards are land-use based and are different for residential, industrial and sensitive areas. This should be reviewed as keeping norms more

lenient for industrial areas can expose a very large population to serious risks. Standards should be based on health consideration to protect sensitive population with margin of safety.

There is further need of review of national ambient air quality standards to set standards for new pollutants of concerns including PM2.5, ozone and air toxics. CPCB has initiated the process to adopt standards for hitherto unregulated pollutants. These include PM2.5, and some air toxic like benzene, benzo(a)pyrene which is taken as a measure for a range of PAH in the air. These initiatives along with a standard for ozone should be expedited urgently. In addition to these standards for all criteria pollutants for industrial sources should be implemented rigorously. Globally, the emerging science is consistently bringing down the safe threshold of pollution especially the particulate, the cause of major concern in India. Till the time new standards are set the new WHO guidelines issued in 2005 will be the reference for regulation. In cities where the particulate levels are close to the standards these needs further tightening to reduce exposure to non-threshold pollutants like particulate pollution.

3.2. Assessment of air pollution sources

Presently, with a view to ascertain contribution to RSPM from various sources of pollution, Source Apportionment Studies have been initiated in six cities including Delhi, Pune, Bangalore, Chennai, Kanpur, in coordination with the Central Pollution Control Board and various technical institutions and IITs. The objectives of the frame work for Source Apportionment Studies include preparation of emission inventory, emission profile, monitoring of ambient air quality, assessment of data and its authentication and source apportionment of RSPM (PM_{10}) using factor analysis and receptor modelling. Application of Chemical Mass Balance (CMB-8), Receptor model and ISC dispersion model have been included in the study. The results of these studies would help in preparation of city specific Action Plans for management of air quality.

It is however, important to extend the scope of pollution inventory and source apportionment studies, and dispersion modeling to include other pollutants of concern – NOx, and VOCs. Plan provisions must include a comprehensive, accurate, current inventory of actual emissions from all sources and standardized methodology and protocol.

Keeping in view the above, the management of ambient air quality system, therefore, would require a reliable database consisting of information on sources of emission, the local/regional meteorological conditions, air quality etc. The other inputs required would be GIS based Decision Support System (DSS). The predictions for ambient air quality are generally based on modelling of air pollutants and their transportation through models such as Gaussian Model, Industrial Source Complex Short Term (ISCST 3) Model, Box Model, Plume Model and Gradient Transport Model etc.

3.3. Health risk assessment

Comprehensively designed health assessment studies are needed in India to understand the magnitude of health risk, and make regulations responsive and dynamic to reduce health

risks. The prevailing scientific evidences have begun to propel action in Indian cities. More robust local data will help to compel necessary action and enable decision- making process.

Ministry of Environment and Forests (MoEF) has initiated a few projects and constituted a committee on environmental health to review the current status of environmental health. An environmental cell has been constituted which is responsible for implementing the recommendations of the committee and formulation of related projects. A vision statement on environment and human health released by the MoEF in July 2003 states air pollution and health effects and stressed on the need for environmental health risk assessments studies due to air pollution. Environmental epidemiological studies have been initiated 11 areas. A project on studying benzene exposure and adverse health outcomes has also been commissioned. Studies on national environmental health profile and comparative health risk assessments in nine cities have been commissioned through different institutions. CPCB has initiated epidemiological studies for assessing the health impacts of air quality and also commissioned studies to Chittaranjan Cancer Research Institute. These studies are at various stages and would help in further refining the standards that have been notified and for development of future standards.

Initiate multi-city studies (time series epidemiological studies and exposure studies) with wide scale and scope, and establish rigorous methodology and scientific protocol and conduct them in a manner that they have policy relevance. Special attention should be paid to the special risk factors associated with poor socio economic conditions that add to the susceptibility of a certain section of the population, effect of very high levels of pollution that are unique to Indian cities and the effect of mixture of pollution. Include toxicity indicators of different pollutants especially particulates in risk assessment. In the meantime, the regulatory development should make use of the evidences from toxicological and epidemiological research that exist globally and in limited scale in India for preventive action and policy making. Include health costs and benefit studies.

Design air quality monitoring and disease databases to enable health assessment: The strength of the epidemiological studies would lie in using daily air pollution concentrations that are widely, consistently and nearly completely recorded. Moreover, health impact assessment of exposure to air pollution from specific sources like vehicular fumes should be based on air pollution measurement specially designed for that source. The concerned regulatory agencies should define the ways the indicators of ill health can be measured and documented to assess public health impacts and economic impact of air pollution. Coordinate with the relevant agencies to develop strong baseline data on diseases and mortality. Improve the surveillance and registration of key acute and chronic diseases associated with air pollution for accurate quantification of potential health impacts. This will require strong coordination among the agencies to develop protocols to enable comprehensive and dynamic databases. Transparent access to these databases is critical to enable good assessment.

4. ASSESSMENT OF REGULATIONS AND INSTITUTIONAL FRAMEWORK

In view of the enormity of the challenge that air quality management will face given the rapid growth in economy, accelerated pace of industrialization, and motorization, and growing scale of private participation in the implementation of the control measures, organization of

studies and research, institution and regulation building will play a very critical role in the years to come. Urgent reforms are needed to create strong, independent, autonomous regulatory authority for regulation development for air quality management, enforcement and compliance.

Currently, the provisions of the Air (Prevention and Control of Pollution) Act, 1981, and the Environment (Protection) Act, 1986 govern the air quality management and air pollution control. As per Section 16 (2h) of the Air (Prevention and Control of Pollution) Act, 1981, the CPCB is required to advise the central government with regard to any matter related to pollution control and lay down standards for the quality of air among others. The main function of the central board is to improve the quality of air and to prevent control or abate air pollution in the country. It is further required to collect, compile and publish technical and statistical data relating to air pollution and the measures devised for its effective prevention, control or abatement and prepare manuals, codes or guides relating to prevention, control or abatement of air pollution and collect and disseminate information in respect of matters relating to air pollution and raise mass awareness.

Under the Air Act, 1981, the CPCB notifies ambient air quality standards for various pollutants. The CPCB and SPCB prepare a list of non-attainment areas. CPCB also provides details about the type of pollutants exceeding in those areas and prime reasons in broad heads, like industries, vehicles etc. The Environment protection Act of 1986 is an umbrella legislation and a powerful Act that has broadened the ambit of power of the central government with respect to environmental management. Under the sec 3 of this Act schedule I lists the standards for emissions and discharge from industries, Schedule II lists general standards for discharge and effluents, schedule III lists ambient air quality standards and schedule IV lists standards for emissions of smoke, vapour etc from motor vehicles. The EPA Act provides a framework for the central environment ministry to coordinate activities of various central and state authorities.

The review of the current regulatory framework reveals some fundamental inadequacies that may undermine effective air quality management and planning. These are as follow:

Multiplicity of authority both at central and state levels with no clear process to harness science to support policy making presents serious challenge. Under the current regulatory framework the authority to manage and control industrial pollution directly rests with the MoEF and the pollution control boards. But few other ministries and central government agencies contribute either directly or indirectly to the process of determining norms and standards for emissions and fuel quality for vehicles, transportation measures and indeed for setting overall policies for ambient air quality. The report of the expert committee on auto fuel policy observed that, “the existing system lacks coherent and integrated institutional mechanism”. The Planning Commissions, the apex planning body in India, in its report on the *Evaluation study on functioning of state pollution control boards* has stated that the SPCBs have been reduced to only Industrial Pollution Control Boards. In practice, implementation of the regulations related to the vehicular pollution, a significant contributor to the ambient air pollution does not fall within the jurisdiction of the CPCB and SPCBs. Thus the lack of unified authority to deal emissions standards for all pollution sources impedes holistic air quality planning, and enforcement of the ambient air quality standards. This requires urgent review and correction.

Urgent reforms are needed to empower the environment regulatory authority to take unified decisions on air quality standards, accountability and compliance. The central pollution control board/MOEF should be the nodal authority with respect to setting of all types of environmental standards – point source, mobile source and area source and monitoring of their implementation. These agencies should be able to work more autonomously but with strong interface with the other concerned line agencies and with accountability.

As part of the reform and reorganisation of these institutions separate policy groups should be created and strengthened within these institutions to deal with scientific and technical research, research and development, enforcement and compliance. These groups should be strengthened with adequate skills and personnel. It should strengthen its science advisory structure and consolidate the current fragmentary advisory structure. The role and responsibilities of these various groups should be clearly ascertained. Build partnership with other scientific and research agencies to bring new scientific information onto the regulatory agenda continuously and organise rigorous peer review of all scientific studies related to standards setting process.

5. CITY ACTION PLANS

City based action planning process has already begun in India and shown good results. CPCB has begun to coordinate with the state governments to prepare city action plans. State level coordination committees have been formed to supervise monitoring of the implementation of these plans. Among these eight cities are being directly monitored by the Environment pollution (Prevention and Control) Authority under the directions of the Supreme Court. CPCB provides the technical support to this initiative. Also under the aegis of the Auto Fuel Policy key polluted cities of India qualify for early introduction of tighter emissions standards for vehicles and fuels. Successive tightening of the emissions standards for vehicles along with local policy measures directed at industry, power plants and other local sources of pollution has influenced the pollution levels in these cities.

This city based action planning has proved to be effective in improving local planning, implementation and also the pollution levels. It is therefore recommended that this model be developed further as the foundation of a more robust air quality planning exercise nationwide. The cities are at different stages of progress. Though many of these cities are working with common strategies, the constraints and barriers are unique to each of these cities that require case by case approach. At the same time there is a great scope of experience sharing as all these cities are trying to address many of the common problems in their unique way.

The key approach could be to develop Clean Air Action Plan (CAAP) as the central organizing element in the air quality management. The CAAP will define the combination of local, state, and central action and emission controls needed for an area to bring about compliance with the National Ambient Air Quality Standards. It will provide the basic link between state regulations, central supervision of state actions, and central enforcement. In addition to addressing criteria pollutants, CAAP will also require states to address air toxics and hazardous industrial air pollutants.

The cities will produce a single comprehensive CAAP covering criteria pollutants, air toxic and hazardous pollutants. The CAAP will be monitored according to the set milestones and

timeline determined for the responsible implementation agency. This will be periodically reviewed to reflect new regulatory requirements at the state and the Centre, new information, or change in attainment status. CAAP will have provision for public consultation. The action plan must be implemented in a time bound manner. The cities must identify and prioritise areas for focused implementation. This will help to leverage maximum change.

Regulatory system for reporting, monitoring and compliance will have to be developed for effective implementation of CAAP. Presently, some cities have adopted the model of setting up of a Task Force with representations from the concerned state agencies under the aegis of the SPCB. This structure will have to be further developed for effective coordination but with effective authority and accountability.

Properly structured CAAP will become the basis of financing the city action plan with dedicated state and central funds.

6. TOOLS FOR COMPLIANCE AND ENFORCEMENT

The current legislative system has conferred enforcement agencies with necessary punitive powers to restrict any activity that can harm the environment. The central authority CPCB can issue directives to order closure of industries for non-compliance or stop supply of power and water to the defaulting units. No industrial pollution causing activity can come up without the permission of the concerned state pollution control boards. The current system will have to be assessed to make compliance more effective. Penalties should work as true deterrent.

Time has come to broad base enforcement mechanism with inbuilt accountability. The quantum of central assistance to states for implementation of the city action plan and its future augmentation should be linked to the progress in implementation of verifiable pollution control measures.

6.1. Application of fiscal measures

Adoption and implementation economic instruments to improve enforcement and also speed up transition to good environmental practices and clean technologies should an important thrust area during the plan period. This will complement command and control measures. Fiscal measures, based on polluter pay principle, can broaden the revenue base, create alternative sources of revenue for the government, industries can cut cost and recover cost of improvement quickly, and consumer choice can be influenced towards cleaner technologies and sustainable transportation choices. MoEF had taken the initiative to commission a study to the Madras School of Economics and National Public Finance and Policy to give a “Proposal to levy taxes on polluting inputs and output”. But in the forthcoming plan period specific programme and studies should be initiated to design tax incentives for early introduction of tighter vehicle and fuels standards, improvement in fuel economy of vehicles, for promotion of alternative fuelled vehicles and use of public transport and clean technology in industries. Disincentive should be designed discourage polluting activities and polluting technologies and vehicles.

7. TRAINING AND CAPACITY BUILDING FOR REGULATORY ACTION

Currently, the training component in CPCB's programmes includes organisation of the training programme and strengthening of training facilities and sponsorship of training and workshops. A few nodal agencies as nodal training institute which impart short-term courses. But this is not adequate. Training and capacity building will require specific focus to be able to support regulatory development monitoring and scientific studies and research for rule making. Training and capacity building should be conceived organised and executed to support development of regulations and enforcement. Consider the specific technical and scientific needs of the regulatory development. Develop strategies to build skills within the regulatory agency for its own research, monitoring, data generation, regulatory impact assessment, compliance assurance, public consultation, and related tasks. Special attention to be paid to technical training for skill building linked with air quality monitoring, instrumentation, laboratory analysis, calibration and quality audits among others.

8. RECOMMENDATIONS

A. Outdoor air pollution

During the eleventh fiver year plan all existing and the proposed projects will be consolidated for composite planning at the national level, city level and in critically polluted industrial areas. These plans including all the thrust areas will be defined comprehensively and in a unified manner for efficient planning, resource allocation, implementation and effective impact on air quality. The central programme will be reorganised under National air quality planning (NAQP), the city based programme as Clean Air Action Plan (CAAP) for cities and Pollution Control and Prevention in Industrial Areas.

8.1 National air quality planning (NAQP)

- The central authority CPCB will continue to be responsible for comprehensive national air quality programme (NAQP) covering all criteria pollutants, air toxics and hazardous pollutants and their regulations. CPCB along with the SPCBs will assess non-attainment areas and define the pollution reduction targets and setting of emission standards for all sources to enable compliance with the National Ambient Air Quality Standards. It will also provide the basic link between state regulations, Central supervision of state actions, and central enforcement. For the effective functioning, the NAQP will be periodically reviewed to reflect the emerging science and health evidences and new regulatory requirements at the state and the Centre and change in attainment status of cities. NAQP will be implemented in a time bound manner.

  The key thrust areas of NAQP during the eleventh plan will be as follow:

8.1.1. Air quality monitoring

- **Targets for ambient monitoring:**
  - Initiate and expand continuous and real time monitoring of PM2.5, ozone, VOCs, PAH, secondary pollutants – sulphates and nitrates in about 15 cities per year so that all current 76 non compliant cities can be covered over a period of five years.

- The entire monitoring network will be expanded from the current 315 stations to 1000 stations that will include introduction of monitoring in new cities and also intensification of monitoring in the major cities where monitoring has already begun. Expansion of the monitoring network will be implemented as per the criteria adopted by CPCB.

- **Targets for source monitoring:**
  - In addition to including criteria pollutants (SPM, NOx, SO2) for source monitoring, VOC, BTX and toxic heavy metals will be included to develop control measures.
  - Pollution load from the industrial sources will be estimated for setting of verifiable time bound reduction targets.
  - Compulsory source monitoring should be introduced in all critically air polluting areas and hazardous industrial units and a transparent central database should be created based on data from this monitoring.
- **GIS based Decision Support System (DSS):** Introduce GIS based Decision Support System (DSS) for scientific management of air pollution
- **Networking of monitoring stations:** Networking of existing manual and continuous air quality monitoring stations and data transmission on a daily basis from these stations to environmental data bank established in CPCB; Use this for health alert and pollution emergency measures. A central database for source monitoring will be established. Both on site off site pollution emergency plans should be implemented.

8.1.2. Air quality standards

- **Targets for review and setting of new ambient air quality standards:**
  - Review the current national ambient air quality standards every five years and set new standards for the new pollutants and develop monitoring capacity (ozone, PM2.5, and air toxics).
  - Till the time new standards are set for new pollutants follow the relevant 2005 WHO guidelines. The Standards should be based on health considerations to protect sensitive populations, vegetation and property with margin of safety. Discontinue with the practice of land-use based air quality standards.
  - Both concentration and emissions load based standards should be developed for industrial emissions sources.
  - The stringency of the source-wise emissions standards for different pollution sources will be tightened to meet the clean air target. Tighter vehicular standards that are currently limited to 11 cities should be expanded to all critically polluted cities.

8.1.3. Assess pollution to set and monitor city-wise air pollution reduction targets

Targets for pollution source assessment, health assessment and setting of air pollution reduction targets:

- CPCB will undertake multi-city studies on air pollution inventory and source profiling, source apportionment, air quality modelling on an ongoing basis to assess the trend in sources of pollution, pollution load, set air quality targets, and assess the impact of action on air quality to further strengthen city action plans.
- These studies will cover RSPM, NOx, and air toxics. It will also undertake micro meteorological study including advanced air quality modelling.
- Initiate multi-city health studies (time series epidemiological studies and exposure studies) with wide geographic and population coverage for proper risk assessment. Establish rigorous methodology and scientific protocol and conduct them in a manner that they have policy relevance. Consider the special risk factors associated with poor socio economic conditions, and effect of very high levels of pollution unique to Indian cities.
- Initiate health costs and economic costs and benefit studies. Coordinate with relevant agencies for preparation of exhaustive disease database on acute and chronic diseases.
- All these technical research projects will be conceived with clear milestones to keep them dynamic to continuously feed the rule making process. These studies can be conducted in partnership with key scientific and research organisations.
- CPCB will be responsible for the development of standardised methodology and protocol for all studies. CPCB will be the nodal authority to coordinate and provide and enable scientific oversight to all activities related to emissions factor development for all sources (point, mobile and area) that are to be used for policy making.

8.1.4. Quality control and quality assurance

- CPCB and all its zonal offices will strengthen the technical capacity for quality control and quality assurance, calibration facilities for air pollution analysis, network audits, data review and management, development of laboratory facilities and skill. Detailed protocol for audits should be developed and milestones set for time bound implementation.

- All zonal and SPCB laboratories will develop technical capacity for calibration and auditing of monitoring stations located within its area of influence and obtain accreditation certification. Also make investment in mobile lab for effective operation. A schedule of audit should be followed. An independent evaluation committee will be set up for monitoring of these systems.
- CPCB should undertake equipment evaluation and selection to assist SPCBs.

8. 2. Clean Air Action Plan (CAAPC) for cities

- **Clean Air Action Plan (CAAP):** It is proposed that for a comprehensive approach towards city-wise implementation, and to guide efficient allocation of Central and State funds Clean Air Action Plan (CAAP) for cities is taken as the basis of planning and funding. The CAAP will define the key thrust areas for priority investment. It will also

identify the combination of local, state, and central actions and emission controls needed for an area to bring about compliance with the National Ambient Air Quality Standards.

- The cities will produce a single comprehensive CAAP covering criteria pollutants, air toxics and hazardous air pollutants. The CAAP will be periodically reviewed to reflect new regulatory requirements at the state and the Centre, new information, or change in status attainment status. CAAP will have provision for effective public participation.
- CAAP will identify priority interventions to reduce the pollution impact of i) rapid growth in vehicle numbers and the attendant problem of pollution and congestion; and ii) industrialisation (both large and small-scale industries), iii) Other important local area sources. The CAAP will define the target reduction, and related control measures, and schedules and timetables for compliance that are necessary for the area to meet the standards. CAAP should be prepared with effective public participation and include provisions for health studies, inventory of emissions, source apportionment and modelling to demonstrate that the measures selected by the state have reduced emissions to meet the standard. The plans must also require major sources of air pollution to meet stricter emission control requirements in non-attainment areas than are required in areas that meet the national health based standards.

- **CAAP will focus on the following thrust areas:**

Vehicular pollution

- Accelerate and tighten the auto fuel policy road map to phase in the tighter emissions standards to cover wider urban regions. Out of the 35 million plus cities 13 cities have already implemented Euro III emissions standards. Of the remaining 22 cities, eleven more cities have critical pollution levels. These including the key state capitals should be included in the priority list for the introduction of Euro IV emissions standards. Ultra-low sulphur diesel along with advanced emissions control technologies should be implemented along side. Use of harmful fuel additives should be prevented. Fiscal incentive should be announced for introduction of vehicles meeting tighter emissions before time to speed up the transition.
- Implement and expand alternative fuelled vehicles and advanced vehicles programmes including CNG, LPG, battery operated, hybrids with targeted market development. Differential tax policies to keep them competitive will be critical. Create programmatic linkages with clean/renewable fuels programmes like hydrogen vehicle programme etc administered by other ministries to set clear milestones for their implementation.
- Bio fuels programme will require active encouragement. But these programmes will require safeguards against the use of wastelands that can be in conflict with the local biomass based livelihood resources.
- Pollution reduction imperative of public transportation projects and travel demand management projects should be established and emphasised. Specific proposals – fiscal and regulatory -- should be planned and implemented to restrain rapid increase in personal vehicles and their usage. Detailed time bound plan for building of public transport should be an integral part of the city action plan with a target to meet

increased share of travel demand. National Urban Transport Policy and Jawaharlal Nehru National Urban Renewal Mission have special focus on development of public transport including both bus and rail based mass rapid transit systems. CAAP should integrate these projects and Central grants should be specified for these projects. Other traffic restraint measures like parking policy, transportation related tax policies along with plans for non-motorised transport and pedestrianisation should be included in the plan.

- Strengthen and implement in-use vehicle inspection programme in a time bound manner. Review the current in-use emissions standards to tighten the hydrocarbon and CO norms for in-use petrol and CNG vehicles, tighten smoke density norms for diesel vehicles and test them on loaded node procedure, initiate pilot project to test in-use particulate matter emissions from in-use diesel vehicles, and introduce in-use NOx measurements. Set up centralised vehicles inspection centres with substantially upgraded test procedures, test equipment, auditing etc to improve authenticity of tests and compliance with the programme.
- Management of transit traffic and phasing out of old vehicles. Realignment of highways and expressways to divert non destined traffic.
- Implement fuel economy standards for vehicles and implement incentive measures like fuel efficiency labelling. The Energy Policy has already recommended 50 per cent improvement in fuel economy of vehicles.
- Strategy for combating fuel adulteration should be taken up as an urgent measure. Improve test methods for fuel quality inspection, effective use of chemical markers, make list of defaulters public, impose stringent penalty and fine upstream on producer, supplier and retailer as a unified system, and make oil companies responsible for the quality of the fuel at the retail outlet.

Industry

- Estimate and set emissions load reduction targets based on source monitoring of criteria, and hazardous air pollutants in major air polluting industrial sectors like pesticides, pharmaceuticals, dye and dye intermediates, refineries, petro-chemicals, among others.
- All industrial units will be governed by rigorous data reporting requirements, which will be audited by the SPCBs for further action. Independent monitoring and supervision will be initiated. The process should be transparent for public accountability.
- Set technology forcing standards to implement clean and energy efficient technology programmes in industries. Identify hazardous chemicals that have the potential for substitution such as mercury etc.
- Implement clean fuel and fuel substitution programme. Policies should enable clean coal technology and fuel substitution programme in all coal based industries. Develop a time bound programme for all power plants for monitoring and implementation.
- Set stringent sulphur standards for industrial fuels.

- Develop air pollution management plan for small-scale industries. Develop emissions load estimation from small-scale industry and control strategies. Identify and promote pollution prevention technologies.
- Source monitoring will be the basis of reduction target and penalty.

8.3. Tools for compliance and enforcement

- **For polluting sources:** Develop tools for compliance that act as effective deterrent. Build in the principle that the cost of penalty should be higher than the cost of compliance. Maintain transparency in the data reporting system for the polluting sources to establish public accountability.
- **For implementation of city action plan**: The quantum of central assistance to states for implementation of the city action plan, CAAP, should be augmented but its future augmentation should be linked with the progress in implementation of pollution control measures. For this verifiable benchmark and monitoring system will be developed. Introduce elements of incentive and disincentives.

8.3.1 Application of fiscal measures

- Undertake specific programmes to design and implement tax incentives to promote clean technologies, clean fuels, in industrial and transportation sectors and encourage sustainable transportation choices. These measures should specifically target phasing in of tighter vehicle and fuels standards; promotion of alternative fuelled vehicles; use of public transport; clean technology and fuel substitution in industries; and improvement in fuel economy of vehicles. Disincentive should be designed to discourage polluting activities and polluting technologies and vehicles. Adoption and implementation economic instruments to improve enforcement and also speed up transition to good environmental practices and clean technologies should an important thrust area during the plan period.

8.4. Regulations and regulatory powers

Urgent reforms are needed to empower the environment regulatory authority to take unified decisions on air quality standards, accountability and compliance. The central pollution control board/MOEF should be the nodal authority with respect to setting of all types of environmental standards – point source, mobile source and area source and monitoring of their implementation.

The pollution control boards should be able to work more autonomously, independently but with a strong interface with the other implementation agencies. The nodal authority will be responsible for coordinating and monitoring of the relevant programmes that are being administered by other ministries at the centre, and that of the other line departments and municipal agencies at local levels.

CPCB will also be responsible for oversight of the state pollution control boards. Also the pollution control boards should be reformed and reorganised to constitute specific and well-defined policy groups with appropriate skills and adequate personnel to deal with

scientific and technical studies, research and development, policy development, and enforcement.

Strengthen and consolidate the current fragmentary science advisory structure and clearly establish the role and responsibilities of the science advisory groups. Build protocol to work with other scientific and research agencies to bring new scientific information onto the regulatory agenda continuously. Establish norms for peer review.

At the city level create a permanent task force with representation from the concerned departments and municipal agencies under the aegis of the SPCB that will monitor implementation of CAAP, provide the scientific guidance, and impose penalty for non-compliance. In industrial areas *panchayats* should be involved in the monitoring of compliance.

8.5. Training and capacity building

- It is recommended that a dedicated institution be created for medium to longer term technical training and skill building related to air quality monitoring, instrumentation, laboratory analysis, calibration, quality audits, and regulation development based on the available scientific information.
- Develop institutional network and a formal protocol to engage with the research/educational institutions, scientific agencies and scientific community, laboratories, public agencies to source credible science and information and field experience to build capacity of staff and for training of the staff and the trainers to support regulatory action.
- CPCB along with the concerned agencies should initiate curriculum development, guidance material for regulatory development, use traditional method of learning and also newer methods involving information and communication technology, distance learning etc. Also link training with information management. Create benchmark for quality assessment. Assess training needs and resources at the central state and local levels.
- International cooperation with key regulatory authorities to assess good regulatory models and harness science

B. Indoor air pollution

NEP has recommended that the national programmes of dissemination of improved fuel wood stoves, and solar cookers, suited to local cooking practices and biomass resources should be accelerated. In this regard CPCB and SPCB can involve *panchayats* and municipal agencies to monitor personal exposure to indoor air pollution in urban and rural households and provide support to the implementation of control strategies.

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Annexure-IV

REPORT OF THE SUB-GROUP ON WATER POLLUTION

Water Pollution Control in 11th Five Year Plan

1. Introduction

Water is the most essential natural resource for life next to air and is likely to become a critical scarce resource in many region of the country in the coming decades. Water is a resource which cannot be produced or added as and when required by any technological means. The total fresh and sea water content of the earth is essentially fixed. Although man has been able to modify to a certain extent, the pattern of availability of the fresh water supplies with respect to time and space, the total availability basically has remained the same possibly over millions of years. Thus it becomes very important that this precious resource is used judiciously.

Existing Policies and Regulations

2.1 Policies

2.1.1 Conservation' Provisions in India's Constitution

The Forty Second Amendment to the Constitution in 1976 underscored the importance of 'green thinking'. Article 48A enjoins the State to protect and improve the environment and safeguard the forests and wildlife in the country. Further, Article 51A(g) states that the "fundamental duty of every citizen is to protect and improve the natural environment including forests, lakes, rivers and wildlife and to have compassion for living creatures".

The Government of India has articulated three policy statements namely, "Policy Statement for Abatement of Pollution, 1992", "National Conservation Strategy and the Policy Statement on Environment & Development, 1992" as well as the "National Environment Policy of 2006". The Policy Statement for Abatement of Pollution has made provisions for the so-called 'reactive' approach alone. Although it proposed a comprehensive approach "to integrate environmental and economic aspects in development planning, preventive aspects for pollution abatement and promotion of technological inputs to reduce industrial pollutants, and through reliance upon public cooperation in securing the clean environment". However during last decade, a number of issues and new challenges have emerged in environment sector. Thus Govt of India has pronounced National Environment Policy 2006. This policy covers a large number of issues including the issues related to international commitments.

2.1.2 Policy Statement for Abatement of Pollution (1992) has suggested developing relevant legislation and regulation, fiscal incentives, voluntary agreements and educational programs and information campaigns. It emphasizes the need for integration by incorporating environmental considerations into decision making at all levels by adopting frameworks namely, pollution prevention at source, application of best practicable solution, ensure polluter pays for control of

pollution, focus on heavily polluted areas and river stretches and involve public in decision-making.

2.1.3 The National Conservation Strategy and Policy Statement on Environment and Development, 1992 aimed at "integrating environmental concerns with developmental imperatives…. [to] meet the challenges….by redirecting the thrust of our developmental process so that the basic needs of our people could be fulfilled by making judicious and sustainable use of natural resources." The priorities mentioned in this policy document include the sustainable use of land and water resources, prevention and control of pollution and preservation of biodiversity.

2.1.4 The National Environment Policy, 206 contains provisions for conserving national resources, protection of wild life and ecosystems, prevention of pollution, reuse and recycling of wastewater, adoption of clean technology, application of 'polluter pay principle' and amendment in the existing law from criminal to civil suit provisions. The policy focuses more on the international policies, agreements and conventions.

2.1.5 The National Water Policy, 2002 contains provisions for developing, conserving, sustainable utilizing and managing this important water resources and need to be governed by national perspectives. Concern due to water logging, ingress of soil salinity and over–exploitation of groundwater will be addressed on the basis of common policies and strategies. The policy includes improvements in existing strategies, innovation of new techniques to eliminate the pollution of surface and groundwater resources to improve water quality. It has emphasized on water resource planning, development of institutional mechanism, water allocation, groundwater development and participatory approach to water resource management. Regular water quality monitoring programme for both surface and groundwater will be undertaken with particular emphasis on pollution control at source.

2.2 Regulations

2.2.1 Legal Provisions for Water Quality Management

India has also witnessed passage of a variety of environmental laws on prevention of pollution in water as well as a host of environmental regulations.

The Government policy to protect the Environment while undertaking any developmental activity has made it mandatory to introduce the environmental aspects into planning and development process. The Government of India through notification in 1994 made it mandatory to take environmental clearance for certain categories of industries and projects under EPA, 1986. The conservation of water resources expressed in the Constitution is embodied in the following regulations:

2.2.2 The Water (Prevention & Control of Pollution) Act, 1974 as amended deals comprehensively with water issues. It empowers the Government to constitute Pollution Control Boards to maintain the wholesomeness of national water bodies. It enables Central and State Pollution Control Boards to prescribe standards and has provisions for monitoring & compliance

and penal provisions against the violators of the Act. It provides the permit system i.e. "Consent" procedure to prevent and control of water pollution. The Act empowers State Boards to issue directions to the defaulters.

2.2.3 Water Cess Act, 1977 was adopted to strengthen the Pollution Control Boards financially to promote water conservation. This Act empowers the Central Government to impose a Cess on water abstracted from natural resources by industries and local authorities.

2.2.4 Environment (Protection) Act, 1986 has a broad coverage in which 'Environment' includes water, air and land and there exists an interrelationship among water, air, land, human beings and other creatures. It empowers to take measures in protecting and improving the quality of the environment through preventing, controlling and abating environmental pollution. The Government is authorized to set national standards for ambient environmental quality and controlling discharges to regulate industrial locations, to prescribe procedure for hazardous substance management and to collect and disseminate information regarding environmental pollution. The Act provides for severe penalties for those who fail to comply with or contravenes any provision of the Act.

2.2.5 The Manufacture, Storage, Import of Hazardous Chemicals Rules, 1989 and its amendments under EPA, 1986 has identified the responsibilities of various stakeholders for management of chemicals and containment of spillage. The Hazardous Wastes (Management and Handling) Rules, 1989 and its subsequent Amendment 2000 were created to provide 'cradle-to grave' or comprehensive guidance to the generators, transporters and operators of disposal facilities among others, and monitoring norms for State governments. The Municipal Wastes (Management & Handling) Rules, 1999 fix responsibilities to every municipalities responsible for the collection, segregation, storage, transportation and disposal of municipal wastes. The Bio-medical waste (Management & Handling) Rules, 1998 are likewise directed at institutions that generate and handle bio-medical wastes in any form.

2.2.6 Water Quality Assessment Authority was constituted under section 3 of Environment Protection Act, 1986 to protect water quality, regulate water abstraction and maintain minimum flows in different rivers to sustain various beneficial uses.

2.3 Initiatives

2.3.1 Development and Implementation of Effluent Standards and Water quality criteria

The approach adopted to regulate pollution from industrial and domestic sectors is through laying down of standards for various environmental pollutants discharged from industries. The permissible limit set for various pollution parameters is a binding for compliance. All the State Pollution Control Boards (SPCBs) adopt the control of pollution at source through the 'command and control' type of measures. The CPCB has developed Industry Specific Minimum National Standards (MINAS) in 1977-78(CPCB 1977). The policy statement on Abatement of Pollution (MOEF 1992), suggested for replacing the existing 'concentration' based standards by 'mass' based standards. This approach aimed at setting specific limit to encourage the minimization of waste, recycling and reuse of water and the conservation of natural

resources, particularly water. Under MINAS, it has evolved effluent standards for several categories of industries. No SPCB is permitted to relax the MINAS. They may, however, make standards more stringent. These standards have been notified under EPA, 1986 by the Government of India. Government has also notified the Environmental Laboratories and Government Analysts under this Act to strengthen the institutional requirements for monitoring.

2.3.2 National River Action Plan (NRAP)

Widespread discharge of untreated sewage and industrial effluents into natural water bodies is deteriorating the quality of surface water as well as ground water and causing damage to the aquatic ecosystems. Principal drinking water supply sources of cities and towns are becoming polluted resulting in increased incidences of water borne diseases, increased cost on health and increased cost of drinking water treatment. Under the National River Action Plan, certain stretches of major rivers with high intermediate levels of pollution were identified by the CPCB. Sewage collection and treatment works are being created to reduce the pollution load of these river stretches. In the first phase, the GAP (Ganga Action Plan), 29 towns were selected along the Ganga River. At present 157 towns are being considered under NRAP out of which about 74 towns are located on Ganga River, 21 on Yamuna River, 12 on Damodar River, 6 on Godavari River, 9 on Cauvery River, 4 each on Tungbhadra and Satlej Rivers, 3 each on Subarnrekha, Betwa, Wainganga, Brahmini, Chambal, Gomti Rivers, 2 on Krishma River and one each on Sabarmati, Khan, Kshipra, Narmada and Mahanadi Rivers.

2.3.3 Environment Impact Assessment

The Government's policy to promote the environment while undertaking any developmental activity has made it necessary to introduce the environmental aspects into planning and development. A new development project requires Ministry of Environment and Forest's appraisal & clearance before it is approved by the Planning Commission. Similarly, in case of any major industrial project requiring licence from the Ministry of Industry, the Licensing Committee will grant licence only after the Ministry of Environment and Forests has reviewed the project to ensure that suitable provisions for protecting environment have been made. The basic objective of Environmental Impact Assessment (EIA) is to identify, predict and evaluate the likely economic, environmental and social impact of any developmental activities and to prepare an action plan for remedy as a part of the overall Environmental Management Plan (EMP). The Govt. of India through a notification in 1994 made obtaining environmental clearance mandatory for certain categories of industries & projects under Environment (Protection) Act, 1986.

2.3.4 Special Drive for 17 categories of polluting industries

The Central Pollution Control Board selected 17 categories of major polluting industries for priority action and directed the State Boards to ensure compliance of standards in these industries. Accordingly, most of the State Boards amended the consent order of all the industries in these categories so that no defaulting unit shall have consent of the Board.

2.3.5 Pollution Control in Small-Scale Industries

In India, over 3.5 million small-scale industries and about 2000 industrial estates exist. Though small-scale industry as a unit may not be severely polluting, but a cluster of these industries may severely pollute the environment. There are certain industrial estates which are critically polluting the environment. Since small-scale industries are not having adequate resources, space or skilled manpower to treat their wastewater, Govt of India initiated a scheme of common effluent treatment plants (CETPs). These CETPs are partially funded by Govt. of India and State Govt. and partially by the industries themselves.

2.3.6 Charters on Corporate Responsibility on Environment Protection

Ministry of Environment and Forests, Govt of India with the help of CPCB has formulated charters on Corporate Responsibility on Environmental Protection (CREP) in respect of 17 categories of highly polluting industries in collaboration with the concerned industries. Charters identify environmental concern and priority areas of Government and facilitate the industries to plan in advance the required investment for completeness of the pollution control systems. For the 17 categories of highly polluting industries, time bound actions have been proposed in the charters and bank guarantee are to be furnished by the concerned units indicating the commitment to the action plan.

2.3.7 Special Drives for Industries Discharging into Rivers and Lakes

On Instance of MoEF, Central Pollution Control Board with the help of State Pollution Control Boards in the country has identified industries which are directly discharging wastewaters into the rivers and lakes. Special time targeted action plans were prepared for these industries to follow. Intensive monitoring is being done to ensure the compliance with the time targets.

2.3.8 Incentives for Control of Pollution

Besides the regulatory mechanism the government has also introduced major economic incentives for pollution abatement in India, not as alternative to regulation but only as supplementary measures. The Water Cess Act 1977 empower the state pollution control boards to levy a water cess on local authorities supplying water to consumers and on industries on consumption of water in certain specified activities. The Act also provides for a rebate on the water cess payable if the concerned local authority or industry installs a plant to treat sewage or trade effluent. A rebate of 25% on the water cess payable has been provided to those industries that do not exceed the prescribed quantity and also comply with the effluent standards prescribed under the Water Act 1974 and the Environment Protection Act 1986.

Supported by recent legislative, administrative and judicial initiatives, environmental regulation in India become very powerful. The new regulations cover hazardous wastes and chemicals, hazardous micro-organisms and transportation of toxic chemicals. Stringent penalties were introduced in the older pollution control laws. The licensing regime is supplemented by "citizen suits" provision together with a statutory "right to information", now enable an

aggrieved citizen to directly prosecute a polluter after examining the government records and data. Rules have been notified for environmental auditing of all the industries which may cause water or air pollution or generate solid or hazardous wastes. Mandatory worker's participation in plant safety and stringent penalties on high level management for the breach of factory safety regulation are expected to reduce industrial accidents. Vesting of enormous administrative power in the enforcing agencies is also an encouraging step towards improvement of environment. . It also includes adoption of clean technology, conservation of resources, change of concentration based standards to mass based standards, incentives for pollution control, public participation, environmental auditing and Eco-mark on environment friendly products.

3. Existing Water Quality Status

The summarised finding of water quality monitoring carried out by CPCB for the last 25 years, are presented here. The main observations findings with respect to physical parameters, nutrients, major ions, organic and pathogenic pollution in the water bodies are given below:

3.1 Physical parameters

The physical parameters such as temperature, pH, and turbidity are found within the acceptable limit. However in some pockets like problem areas of Gujarat (Ankleshwar and Vapi), Andhra Pradesh (Patancheru), Madhya Pradesh (Ratlam and Nagda) the rivers are having low pH due to discharge of acidic effluents from industrial activities. The quality of Bandi river in Rajasthan at Pali is alkaline (pH is about 10).The turbidity in monsoon period rises significantly in almost all surface water bodies due to erosion of soil in the catchment.

3.2 Nutrients

There are two sources of nutrients in the water bodies. These are point and non point sources. The point sources are treated and untreated wastewaters generated from domestic and industrial activities through drains or sewers. Whereas the non-point sources of nutrients are mainly generated from agricultural activities and unsewered sanitation. The monitoring results indicate that nutrients especially nitrate is increasing in groundwater’s. The surface waters in many parts of the country especially near large urban centres are getting eutrophicated. In such stretches of water bodies, the diurnal variation in dissolved oxygen is quite large. The dissolved oxygen during day time increases to super saturation level (sometimes as high as 300% saturation) whereas at night at the some places the dissolved oxygen goes as low as zero mg/l.

3.3 Major Ions

The major ions are measured to validate the monitoring results. Generally their concentration reflects the level of salinity in water. Also the ratio of different ions reflects the geology and soil type in the catchment of a water body. The monitoring results indicate that the ionic concentration in groundwater is generally higher than the surface water. Similarly the water bodies receiving return flow from the irrigated areas usually have high salt concentration. The water bodies in peninsular region have more hardness problem. The surface and groundwaters in the hilly areas generally contains low salts.

3.4 Organic Pollution

The Organic pollution as measured through BOD and COD is relatively high in water bodies located near large urban centres. This results in depletion of oxygen in these stretches of water bodies. The rivers and lakes in hilly part of the country are not affected significantly by such pollution. Also the groundwaters are mostly free from organic pollution. Although, Dissolved Oxygen measurement may not reflect, such conclusion, due to the fact that the Dissolved Oxygen is measured during day time when the photosynthetic effects are prominent.

3.5 Pathogenic Pollution

The pathogenic pollution still the major water pollutant in Indian water bodies and cause for water borne disease. Most of the surface waters are contaminated and containing high levels of coliform bacteria, which are indicators of pathogenic pollution. Although, the groundwaters were considered safe in the past, are also not spared and showing presence of coliform. Although, the coliform is considered as indicator of pathogen universally, recent studies indicate the presence of coliforms of soil and litter origin raised a doubt on their reliability as indicators of pathogen. Moreover, the measurement technique used for coliform estimation is also not very precise. In such circumstances organic pollution reflected in terms of BOD is the single most reliable parameter for assessing health of a water body. In the present paper, BOD is used for presenting water quality status of the national water bodies

Taking BOD as indicator of organic pollution an attempt is made to estimate the riverine length under different level of pollution. The state wise and river basin wise riverine length under different level of pollution is given in figures 16 & 17 respectively. The different level of pollution with respect to organic pollution parameter is given below:

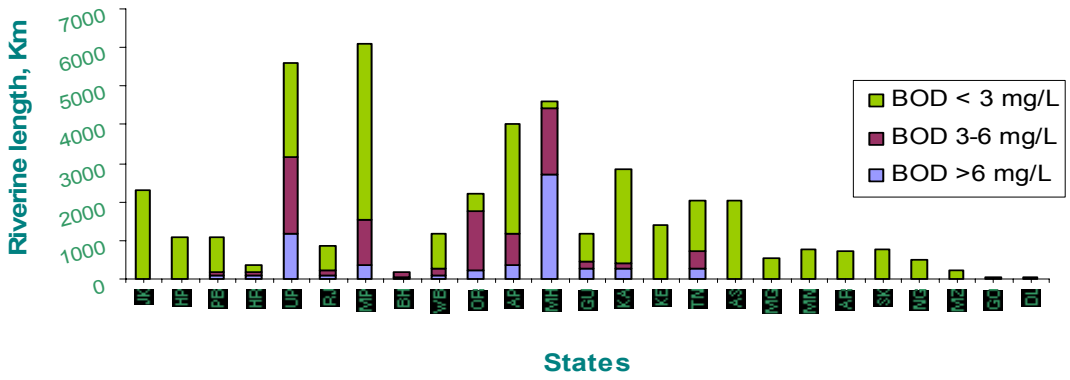
High Pollution	:	BOD > 6 mg/l
Moderate Pollution	:	BOD = 3-6 mg/l
Relatively clean	:	BOD < 3 mg/l

On the basis of last 10 years water quality monitoring results, the estimated riverine length having different level of pollution is given below in Table 1. The riverine length under different range of BOD for various states is presented in Figure 2.

Table 1 : Riverine length having different level of pollution

S.NO.	Level of Pollution	Riverine Length km	Riverine Length percentage
1	High pollution	6086	14
2	Moderate pollution	8691	19
3	Relatively clean	30242	67

Figure 2 : Total riverine length under different water quality status



4. Water Quality Threats

There are two major threats to water quality i.e. over-exploitation and. pollution Both these threats are briefly explained here:

4.1 Over-exploitation

The rainfall, which is the only source of freshwater is un-evenly distributed in time and space in India. A major part of the flow (about 69% to 96%) in majority of rivers occurs in a short duration of monsoon period. In the remaining dry period all uses of water are being sustained by the dry weather flow, which is just 5% to 30% of total flow or abstraction of groundwater. Abstraction of groundwater in the catchment of a river further reduces flow of the river. The ever-increasing demand of water for agricultural, industrial and domestic activities, the water resources are over-exploited. This is resulting in shrinking or even drying up of many water bodies (both groundwater and surface water bodies) for considerable period in a year. Discharging wastewaters even after treatment in such water bodies results in serious water quality problems and maintaining targeted water quality is very difficult. While setting Minimal National Standards (MINAS), which are implemented all over the country for regulation of pollution, it was envisaged that at least 10 times dilution was available in the receiving water bodies. Unfortunately, in majority of the cases such dilution is not available for considerable time in a year leading to water quality degradation. If objectives of Water Act, 1974 or EPA, 1986 are to be fulfilled, minimum level of water needs to be maintained.

4.2 Pollution

4.2.1 Pathogenic pollution

One of the major water quality threat is water borne diseases. This is mainly due to inadequate arrangements for transport and treatment of domestic wastewaters - a major portion of the wastewater generated from human settlements is not properly transported and treated before discharging into natural waters. This results in contamination of both surface and ground waters. Moreover, contribution of pathogens through diffuse sources is also quite significant.

Thus, most of the surface water bodies and many groundwater sources are contaminated. Many people especially children are affected by diarrhea, dysentery, cholera, typhoid, polio and many other enteric diseases, which are water borne in nature. A large population of the country still uses water directly for drinking or contact use without any treatment, thus, exposed to water borne diseases. This is the single major cause for mortality due to water pollution. India has about 72% population living in rural areas. Most of the rural people use groundwater from open dug wells for drinking and other domestic uses. They also use surface water like rivers, lakes or village-ponds for bathing, washing and cleaning. Many rural people also use lake/river/pond water directly for drinking and domestic use without treatment and thus exposed to pathogens.

4.2.2 Salinity

There are number of cases where salinity is increasing in both surface waters and groundwater. The increase in groundwater salinity is mainly due to increased irrigation activities or seawater intrusion in coastal areas. The salinity in surface water is increasing mainly due to discharges of industrial wastewaters or agricultural return water. The salinity impaired the fitness of water for drinking or irrigation. It may also affect the ecosystem in surface waters.

4.2.3 Specific threat to Surface Waters

Oxygen depletion

As indicated above a large portion of wastewater is discharged into watercourses without any treatment. A major portion of it is originated from domestic sources. Such wastewater contains high amount of organic matter. The industries also discharge effluents containing high organic matter e.g. agro-based industries. This organic matter when oxidised in water through microbial activities, consumed dissolved oxygen. Since water has limited availability of oxygen, if consumption exceeds the availability, oxygen depletion is resulted and survival of aquatic life becomes difficult.

In many water bodies massive input of organic matter sets off a progressive series of chemical and biological events in the downstream water. The stretch is characterised by high bacterial population, cloudy appearance high BOD and strong disagreeable odour - all indicating general depletion of oxygen. Masses of gaseous sludge rising from the bottom are often noticed floating near the surface of the water. During monsoon due to flood the sludge deposited in such stretches is flushed and stay in suspension, causing rise in oxygen uptake in the downstream. Due to such sudden oxygen depletion, heavy fish mortality occurs every year during first flushing after onset of monsoon.

Eutrophication

The discharge of domestic wastewater, agricultural return water or run-off water and many industrial effluents contribute nutrients like phosphates and nitrates. These nutrients promote excess growth of algae in water bodies leading to a state called eutrophication. In eutrophicated water body during day-time water get supersaturated with oxygen, however during

night time due to respiratory consumption the oxygen is depleted to a large extent. This results in large diurnal change in dissolved oxygen. This is not desirable for balanced aquatic ecosystem.

Toxicity

Due to discharge of toxic effluents from many industries and increased use of chemicals in agriculture and their subsequent contribution to the water bodies, many water bodies in the country are polluted due to presence of toxic substances. Presence of toxic substance impairs the water quality by making it unfit for human consumption, aquatic life and irrigation. Presence of organic pollutants (mostly organochloro compounds and some persistent toxic substances in water bodies) is also becoming an important water quality issue because of their carcinogenic character. They enter water bodies through point sources, non-point sources as well as through long-range atmospheric transportation. The process of bio-accumulation and bio- magnification of these organic pollutants in fresh water eco-systems is of great importance.

Ecological Health

A large number of areas in our aquatic environment support rare species and ecologically very sensitive. They need special protection. Since, the Water Act, 1974 provides for maintenance and restoration of "wholesomeness" of aquatic resources, which is directly related to ecological health of the water bodies, it is important that ecological health of the water bodies is given first priority in the water quality goal. In India, such efforts are reflected in the policy planning and legal framework for water quality protection, which are explained later in this paper.

4.2.4 Specific Threats to Groundwaters

Geogenic Pollution

The geogenic problem is mainly due to high levels of following contaminants:

a) Fluoride about 20 States (in about 200 districts)affected by high fluoride level.

b) Arsenic 9 districts of WB and 3 districts of Bihar and 1 of UP

c) Salinity: salinity is increasing mostly in intense irrigation command areas, industrial areas.

d) Sea water intrusion: Due to over-exploitation of groundwater along the coasts, the sea water is getting intruded and contaminate the groundwater. This problem is emerging in many coastal states.

Man-made Pollution

The man-made pollutants are mainly due to urban, industrial and agricultural activities.

Urban Wastes

The fast urbanization is resulting in generation of very large amount of wastes. Due to paucity of resources the wastes are not being collected, treated or disposed. This is resulting in

accumulation of wastes in the urban areas, percolating into the ground and polluting the groundwater. The main contaminants are: Nitrates and Pathogens

As per the recent studies carried out by CPCB in metro-cities of India, these pollutants are main concern in urban groundwater.

Industrial Wastes

The industrial activities are also growing very fast. A large number of industries especially small-scale do not have proper collection, treatment and disposal arrangement for the waste they generate. This is resulting in accumulation of solid and liquid wastes in the industrial areas. They also emit air pollution, which deposit in nearby areas. During rain all these pollutants either percolate into ground and pollute the groundwater or get into the surface water sources and pollute them. Such cases are emerging in many industrial areas like Pali, Jodhpur, Balotra (Raj), Ratlam (MP), Ahmedabad, Jetpur (Guj), North Arcot (TN).

Agricultural Pollution

To feed the growing population, efforts are being made to increase the agriculture production. In order to achieve that apart from other efforts use of chemical fertilizers and pesticides have increased steeply in the recent past. The fertilizer consumption has increased from about 0.5 million tons/year in early sixties to 16.8 million tons/year in 2003. Similarly pesticides consumption has increased from 434 tons/year to over 1 lakh tons/year in the same period. Residues of these chemicals percolate into the ground and pollute it. Such residues are detected in many groundwater samples in the recent past.

5. Major causes for water quality degradation

5.1 Point Sources of Pollution

5.1.1 Domestic Wastewater

Discharge of untreated domestic wastewater is predominant source of pollution of aquatic resources in India. Urban centers contribute most of the sewage generation in the country. The smaller towns and rural areas do not contribute significant amounts of sewage due to low water supply & under developed conditions. The wastewater generated in these areas normally percolates in the soil or evaporates. CPCB, carry out regular inventory of water supply, wastewater generation, collection and disposal in class-I cities and class_II towns of the country. As per the latest report (CPCB, 2006), 423 class I cities and 498 class II towns of the country harboring population of about 206 million (as per 2001 Census) generate about 33000 million litre per day (mld) of wastewater. It was observed that most of the cities do not have adequate organized water supply, as well as wastewater collection and treatment facilities. Out of 33,000 mld of wastewater only about 7000 mld of wastewater gets some kind of treatment. It was also observed that Maharashtra, Delhi, Uttar Pradesh, West Bengal and Gujarat are the major contributors of wastewater (63%). The facilities constructed to treat wastewater also do not function properly in many cases.

5.1.2 Industrial Wastewater

It is estimated that the total wastewater generated from all major industrial sources is about 15,438 mld out of which treatment facilities are available for about 9000 mld of wastewater. The remaining wastewater is mostly generated from small scale industries, majority of them are located in congested residential areas and hence can not have individual treatment plant. Agro based industries like distilleries, Sugar mills, paper mills are major contributors of organic pollution, whereas the industries generating chemical pollution can be divided in two categories i.e. i) those which generate high TDS bearing wastes like pharmaceuticals, rayon plants, chemicals, caustic soda, soap and detergents, smelters etc. (ii) those which generates toxic wastes e.g. pesticides, smelter, inorganic chemicals, organic chemicals, steel plants, pharmaceuticals and tanneries etc.

5.2 Non-Point Sources of Pollution

5.2.1 Rural and Slum Population

Rural and slum population, which is lacking the piped water supply and sewered sanitation facilities, uses open field for defecation, with a few using pit-latrines or septic-tanks. Much of the bathing and washing (clothes, utensils etc.) shall be in or near the water-body reducing abstraction and transport of water but causing in-situ non-point pollution. Generation of liquid effluents would be minimal and all wastewater generated shall soak into the nearby land.

5.2.2 Wastewaters and Pollutants from Unsewered Towns

A large number of the cities/towns either do not have any sewerage system or the sewerage system is overloaded or defunct, resulting in large amount of wastewater uncollected. The bulk of pollution shall get retained on land to percolate, leach or get washed-off to streams or groundwater.

5.2.3 Industrial Pollutants

There are large number of small scale industries being promoted by government to generate employment and economy. Many of such industries have come-up as clusters in out country. Due to lack of knowledge, resources and many times will these industries do not have proper treatment for their wastewater. Many of such industries are even located in residential areas. Their solid wastes and sludge get scattered-around or dumped in unlined pits and effluents flow to streams through storm-drains or stagnate in depressions to percolate, leach or get washed-off during next rainy season. Even some of the large and medium industries also do not have proper disposal arrangements for their wastes and thus find its way into water courses.

5.2.4 Pollutants in Agricultural Run-off and Drainage Waters

Application of chemicals like fertilizers and pesticides in agriculture is increasing steeply for increasing the agricultural production. Residues of these chemicals can be transported to water courses through surface run-off during heavy rains and through percolation to the

groundwater and pollute them. Drainage waters from irrigated agricultural land are always high in salts, since they also have to carry the salts originally contained in the trans- evaporated fraction of the irrigation water. In many parts of our country soil salinity is increasing due to irrigation.

5.2.5 Deposition of Air- Pollutants

Atmospheric pollutants may deposit directly on surface waters. Also the pollutants depositing on vegetation and soils may get leached or washed- over to water bodies.

6. Setting Water Quality Goals for 11th Five Year Plan

The ultimate goal should be to restore the quality of water in all the natural water bodies to a level which can support the human uses and functions of the ecosystems depend directly or indirectly on them. In order to achieve such a goal it is important to address following main issues:

Provide adequate collection, transportation, treatment and disposal facilities for wastewater and solid wastes from all the urban centers of the country.
Combating water scarcity by reducing water demand, rain water harvesting and recycling and reuse of wastewater.

Achieving the above two goals is a massive task requires a large resource inputs, policy interventions, regulatory measures and inter-sectoral efforts.

7. Major Guiding Principles for 11th Plan

7.1 Combating Water scarcity problem

Incentives for Water conservation

If water is available in abundance, there is a usually tendency to use it carelessly. Along with the measures towards pollution abatement it is imperative to further intensify our efforts for conservation of water to prevent water scarcity in surface water sources and ground water depletion. At present the consumer has little incentive to conserve water, as water tariffs are very low. In addition to appropriate pricing of water to reduce water demand in the household sector, there is a need to develop and implement such cost-effective water appliances as low-flow cisterns and faucets and formulate citizen forum groups to encourage and raise awareness on water conservation. Price of water should reflect its scarcity value and environmental costs. It is very important to reduce water use through pricing. The need is to develop surface irrigation sources and take measures for rainwater harvesting and preventing water run-offs. The amount unit area run-off from various basins of India very widely reflects the spatial distribution of annual rainfall. Moreover, the rivers of the country carry about 80% during the monsoon months of June-September and generally in excess of 90% during the period of June-November. Hence, the run-off can be tapped by building appropriate water harvesting structures in the lower reaches to trap the water. However, there are certain constraints associated with rainwater harvesting in

terms of the capacity of soil to absorb large quantities of water in a shorter time frame, quality of the harvested water for drinking water purpose, and the cost involved with building such harvesting structures. There is no doubt that water harvesting is a highly desirable solution but it is an iota solution to a holistic problem of water scarcity.

Measures to Conserve Water

Following measures may be considered for combating water scarcity in 11th Plan:

- Traditional Practices for Water Conservation
- Suggested Water Conservation Measures
- Surface Storage
- Conservation of rain water
- Ground water conservation
- Artificial recharge
- Percolation tank method
- Catchment area protection (CAP)
- Inter-basin transfer of water
- Adoption of drip sprinkler irrigation
- Management of growing pattern
- Selection of crop varieties
- Nutritional management
- Role of Antitranspirants
- Reducing evapotranspiration
- Reducing evaporation
- Recycling of wastewater
- Conservation of water in domestic use

7.2 Wastewater as a resource

Since, there is no dilution available in the receiving water bodies, it is important that no wastewater is discharges into them even after treatment. The efforts should be to use entire wastewater after proper treatment. There are many cases where the sewage or industrial wastewater is treated and used for various inferior uses. Many companies are coming in this business. Focus should be to promote such business. This will benefit the water quality in many ways:

1. reduce pollution
2. save water
3. save nutrients
4. reduce over-exploitation of water resources

7.2.1 Wastewater Use in Agriculture

The incorporation of wastewater use planning into national water resource and agricultural planning is important, especially where dilution water in the receiving water bodies shortages exist. This is not only to protect sources of high quality waters but also to minimize wastewater treatment costs, safeguard public health and to obtain the maximum agricultural and aquacultural benefit from the nutrients that wastewater contains. Since in most of the urban centres, treatment plants either do not exist or not adequate. Wastewater use may well help reduce costs, especially if it is envisaged before new treatment works are built, because the standards of effluents required for various types of use may result in costs lower than those for normal environmental protection. The use of wastewater has been practiced in many parts of the country for centuries. Unfortunately, this form of unplanned and, in many instances unconscious, reuse is performed without any consideration of adequate health safeguards, environmentally sound practices or basic agronomic and on-farm principles. Authorities, particularly the Ministries of Health and Agriculture, should investigate current wastewater reuse practices and take gradual steps for upgrading health and agronomic practices. The implementation of an inter-sectoral institutional framework is the next step that should be taken. This entity should be able to deal with technological, health and environmental, economic and financial, and socio-cultural issues. It should also assign responsibilities and should create capacity for operation and maintenance of treatment, distribution and irrigation systems, as well as for monitoring, surveillance and the enforcement of effluent standards and codes of practice. In places with little or no experience on planned reuse, it is advisable to implement and to operate a pilot project.

7.3 Prevent pollution rather than control.

Past experience has shown that remedial actions to clean up polluted water bodies are generally much more expensive than applying measures to prevent pollution from occurring. Although wastewater treatment facilities have been installed and improved over the years in many parts of the country, water pollution remains a problem. In some situations, the introduction of improved wastewater treatment has only led to increased pollution from other media, such as wastewater sludge. The most logical approach is to prevent the production of wastes that require treatment. Thus, approaches to water pollution control that focus on wastewater minimisation, in-plant refinement of raw materials and production processes, recycling of waste products, etc., should be given priority over traditional end-of-pipe treatments. For water pollution originates from diffuse sources, such as agricultural use of fertilisers, which cannot be controlled by the approach mentioned above. Instead, the principle of "best environmental practice" should be applied to minimise non-point source pollution.

7.4 Apply the polluter-pays-principle:

The polluter-pays-principle, where the costs of pollution prevention, control and reduction measures are borne by the polluter, is not a new concept but has not yet been fully implemented, despite the fact that it is widely recognized that the perception of water as a free commodity can no longer be maintained. The principle is an economic instrument that is aimed at affecting behavior, i.e. by encouraging and inducing behavior that puts less strain on the environment. Examples of attempts to apply this principle include financial charges on sewage generated by urban population, industrial waste-water discharges and special taxes on pesticides.

The difficulty or reluctance encountered in implementing the polluter-pays-principle is probably due to its social and economic implications. Full application of the principle would upset existing subsidized programmes (implemented for social reasons) for supply of water and removal of wastewater in India. Nevertheless, even if the full implementation of the polluter-pays-principle is not feasible at present, it should be maintained as the ultimate goal.

7.5 Balance economic and regulatory instruments:

Until now, regulatory instruments have been heavily relied upon. Economic instruments, typically in the form of wastewater discharge fees and fines, have been introduced to a lesser extent. Compared with economic instruments, the advantages of the regulatory approach to water pollution control is that it offers a reasonable degree of predictability about the reduction of pollution, i.e. it offers control to authorities over what environmental goals can be achieved and when they can be achieved. A major disadvantage of the regulatory approach is its economic inefficiency. Economic instruments have the advantages of providing incentives to polluters to modify their behaviour in support of pollution control and of providing revenue to finance pollution control activities. In addition, they are much better suited to combating nonpoint sources of pollution. The setting of prices and charges are crucial to the success of economic instruments. If charges are too low, polluters may opt to pollute and to pay, whereas if charges are too high they may inhibit economic development. Against this background it seems appropriate, therefore, to apply a mixture of regulatory and economic instruments for controlling water pollution. In our country financial resources and institutional capacity are very limited, the most important criteria for balancing economic and regulatory instruments should be cost-effectiveness and administrative feasibility.

7.6 Establish mechanisms for cross-sectoral integration:

Since water quality management is related to many sectors, their involvement is very crucial in implementing various policies and regulations. The most important ones are: Ministry of Water Resources, Central Water Commission, Central Ground Water Board, State ground Water departments, State Irrigation/Water Resources Departments, Rajiv Gandhi Drinking Water Mission, State Public Health Departments, Water Supply Authorities, Ministry of Industries, Ministry of Power, Ministry of Urban Development, Jawaharlal Nehru National Urban Renewal Programme and Ministry of Agriculture. In order to ensure the co-ordination of water pollution control efforts within water-related sectors, a formal mechanisms and means of co-operation and information exchange need to be established. Such mechanisms should:

- Allow decision makers from different sectors to influence water pollution policy.
- Urge them to put forward ideas and plans from their own sector with impacts on water quality.
- Allow them to comment on ideas and plans put forward by other sectors. For example, a permanent committee with representatives from the involved sectors could be established. The functions and responsibilities of the cross-sectoral body would typically include at least the following:
- Co-ordination of policy formulation on water pollution control.
- Setting of national water quality criteria and standards, and their supporting regulations.

- Review and co-ordination of development plans that affect water quality.
- Resolution of conflicts between different states and government bodies regarding water pollution issues that cannot be resolved at a lower level.

7.7 Encourage participatory approach with involvement of all relevant stakeholders:

The participatory approach involves raising awareness of the importance of water pollution control among policy-makers and the general public. Decisions should be taken with full public consultation and with the involvement of groups affected by the planning and implementation of water pollution control activities. This means, for example, that the public should be kept continuously informed, be given opportunities to express their views, knowledge and priorities, and it should be apparent that their views have been taken into account. Various methods exist to implement public participation, such as interviews, public information sessions and hearings, expert panel hearings and site visits. The most appropriate method for each situation should take account of local social, political, historical, cultural and other factors. Public participation may take time but it increases public support for the final decision or result and, ideally, contributes to the convergence of the views of the public, governmental authorities and industry on environmental priorities and on water pollution control measures.

7.8 Give open access to information on water pollution:

This principle is directly related to the principle of involvement of the general public in the monitoring, decision-making process, because a precondition for participation is free access to information held by public authorities. Open access to information helps to stimulate understanding, discussions and suggestions for solutions of water quality problems.

7.9 Promote interstate co-operation on water pollution control:

Trans-boundary water pollution, typically encountered in large rivers, requires interstate co-operation and co-ordination of efforts in order to be effective. Lack of recognition of this fact may lead to wasteful investments in pollution load reductions in one state if, due to lack of cooperation, measures are introduced upstream (Delhi-Haryana case) that have counteractive effects. Permanent interstate bodies with representatives from riparian states can be established, with the objective of strengthening interstate co-operation on the pollution control of the shared water resources.

7.10 Economic Instrument for Pollution Control:

Besides the 'command and control' regulatory mechanism the government has also introduced major economic incentives for pollution abatement in India, not as alternative to regulation but only as a supplementary measure. The Water Cess Act was introduced in 1977, empowering the state pollution control boards to levy a cess on local authorities supplying water to consumers and on consumption of water for certain specified activities. The Act also provides for a rebate on the cess payable if the person or local authority concerned installs a plant to treat sewage or trade effluent. Besides the Water Cess Act, efforts have to be made to introduce and

implement the Zero discharge concepts, which would enhance recycle and reuse of effluent discharge.

7.11 Waste minimization and clean technologies

It may be noted that by recycling techniques the waste concentrations may increase, however the total load remain the same. The concentration of waste strength would help the economical conversion of spent wash to biofertilizer. Waste strength reduction can be achieved by adopting in plant control measures such as reduction of spillages of wastes, elimination of process failures, use of proper equipment for handling and dry cleaning techniques etc. This is often termed as clean technologies; it does not add to the cost of production, in fact industry gains from it.

Innovation in pollution prevention/waste minimization efforts on the part of the industries needs to be sternly promoted. Pollution prevention/ waste minimization, in our country at least, is done only for product quality improvement, energy saving or other economic reasons and any reduction in pollution is only incidental.

All organic wastes are best source of energy. A number of anaerobic technologies are now available for treatment of organic industrial effluents. Spent wash, black liquor (pulp mill), dairy effluents, sugar factory effluents and press mud etc. are some of the organic wastes tried for energy recovery. The energy recovery will incidentally solve the air pollution problem, as biogas is a cleaner fuel compared to baggasse, rice husk or coal. It is essential to introduce energy audit in all the industries so hat cost-benefit ratio can be established in each case.

Bio-fertilizers are now prepared from organic rich wastes by admixing filler materials. Spent wash is converted to manure by addition of press mud, bagasse cillo, agricultural residues etc. In this technology the entire liquor effluent is converted into solid mass and it can be termed as "Zero-discharge" technology.

8. Financing Waste Management

8.1 Effluent Tax

Today there is no provision for collection and treatment of about 22000 mld of wastewater. With fast urbanization this quantity will be about 40,000 mld by the end of 11^{th} Plan. Each mld cost about Rs. 1 crore for establishing treatment facilities and about 4 crores for collection facilities in larger cities. This makes total requirement of funds in the tune of more than one lakh crores just for establishing facilities. The operation and maintenance may be another about 10% of the above cost every year. Funding of such schemes from exchequer's fund in order to achieve the goals, as is being done today under NRCP, would be detrimental to the economy of the country. The present approach of financing the waste management is neither adequate nor effective in tackling the massive problem water quality degradation. Thus the approach needs to be changed. The major part of the cost on waste management should be born by the urban population according to 'polluter pay principle'.

It can be applied to any dischargers, cities or industries, with two benefits; it induces waste reduction and treatment and can provide a source of revenue for financing wastewater

treatment investments. Municipal wastewater treatment is a particularly costly and long-term undertaking so that sound strategic planning and policies for treatment are of special importance. Pricing and demand management are important instruments for encouraging efficient domestic and industrial water-use practices and for reducing wastewater volumes and loads. Water and sewerage fees can induce urban organisations to adopt water-saving technologies, including water recycling and reuse systems, and to minimise or eliminate waste products that would otherwise end up in the effluent stream. In addition to price based incentives, demand management programmes should include educational and technical components, such as water conservation campaigns, advice to consumers, and promotion, distribution or sale of water-saving devices like "six-litre" toilets which use less than half the volume of water per flush than a standard toilet.

8.2 Beneficiaries

It is also important to consider the beneficiaries. The waste management benefits following:

- Local citizens
- Protection of environment
- Protection of Public health
- Protection of water resources – water supply, irrigation, other uses
- Protection of industrial use
- Enhanced Property values
- Enhanced tourism

All the beneficiaries should be involved in waste management. A mechanism can be evolved for coordination with all the beneficiaries to get their cooperation.

9. Selection of Technology

Technology selection eventually depends upon wastewater characteristics and on the treatment objectives as translated into desired effluent quality. The latter depends on the expected use of the receiving waters. Effluent quality control is typically aimed at public health protection (for outdoor bathing, irrigation, water supply), preservation of the oxygen content in the water, prevention of eutrophication, prevention of sedimentation, preventing toxic compounds from entering the water and food chains, and promotion of water reuse. The selection of technology may take into account the technical and financial feasibility of wastewater treatment.

In densely populated areas the sanitary collection, treatment and disposal of wastewater flows are essential to control the transmission of waterborne diseases. Non-mechanised wastewater treatment by stabilisation ponds, constructed wetlands or aquaculture using macrophytes can, to a large extent, provide adequate secondary and tertiary treatment. As the biological processes are not intensified by mechanical equipment, large land areas are required to provide sufficient retention time to allow for a high degree of contaminant removal.

9.2 Alternative simpler technology

Another issue that there are a number of drains in the cities/towns which carry diluted sewage and it is not ideal for recovery of biogas energy for making the treatment plant self sufficient in energy and, therefore, the treatment upto secondary or tertiary level is of little consequence. Simpler option of treatment may prove to be cost effective in such conditions.

The water carriage system with low cost waste water treatment is considered to be the best system to take care of domestic sewage. There is scope to reduce the cost of the material used for laying down the sewers. Use of low volume flushing tanks will help in reducing waste water volume and thereby cost of sewerage and sewage treatment. For low income housing colonies either two pit pour flush water seal latrines or a shallow sewer could a possible option. Co-operative group housing societies, multi storied housing complexes, big hotels etc. need to set up appropriate on-site waste water treatment facilities for recycling of waste water for gardening and other non-domestic uses to the extent feasible. Renovation of existing drainage system, which currently acts as open sewers, and dovetailing the renovated drainage system to appropriate forestry programme or tree plantation, will reduce sewage treatment cost. The options which are available for cost effective and environmentally compatible sewage treatment include land treatment, oxidation pond, aerated lagoon, duck-weed pond, rotating biological contractors, up-flow anaerobic sludge blanket system and root zone treatment.

Top layer of soil under the vegetative cover maintains micro-environment within which soil flora and fauna decompose the organic matter. Thus, top layer of soil can be utilized for the treatment of domestic sewage and variety of biodegradable waste waters. Land treatment can tolerate fluctuation in loading more readily than conventional processes. This technology is well established in U.S.A., Canada, Australia, U.K. and also attempted in China and few other developing countries including India. The Central Pollution Control Board has evolved guidelines on application of this technology in Indian condition.

The use of biotechnology could be another option for waste treatment under NRCD particularly with respect to organic pollution. Inorganic pollutants like nitrogen, phosphorus and heavy metals can also be removed by this technology.

10. Tackling special problems of Arsenic and Fluoride pollution

A various serious problem of presence of toxic pollutants –Arsenic and Fluoride- in ground water due to natural reasons has been observed in various regions of the country. The situation is of grave concern because the inhabitants of the affected areas do not have access to any alternate source of drinking water. The problem of presence of Arsenic in ground water has been detected in some areas of West Bengal, Bihar, Jharkhand and U.P. The problem of presence of Flouride in ground water is spread over large part of country but it is generally localized. In such areas groundwater use must be minimized. Efforts should be made to promote use of surface water in such areas. Rain water harvesting and storage should be promoted at mass scale in such areas. The right to safe drinking water is so important that the problem needs redress from Central Government as a natural crisis.

11. Research and Development

a) Reliable indicators of pathogens in water

b) Measurement of micropollutants

c) Development of low cost technology for water and wastewater treatment

d) Development of clean technology for production

e) Assessment of non-point sources of pollution

f) Indicators of water quality

g) Efficient use of resources

h) Development and propagation of methods to conserve water

12. Conclusions

The existing policies and regulations on water stress focus on conservation, polluter pay principle, integration of environment with development and regulation of pollution. Several initiatives are taken to improve water quality of national aquatic resources. The major water quality threats are on account of over-exploitation of water resources coupled with various kinds of pollution. The major cause of water quality degradation is discharge of untreated wastewater generated from urban and industrial sources. Non-point sources of pollution also contribute significant pollution during rainy season. Fast urbanization is resulting in steep growth of waste generation. Due to inadequate resources available with local bodies the waste management is not adequately addressed. Also present approach of supporting local bodies in establishing waste management facilities is not adequate to tackle the massive problem of waste management and water scarcity. Hence it is important to change the approach in accordance with the National Environment Policy, 2006. These changes in approach include adoption of polluter pay principle, balancing regulatory and economic instrument for pollution control, adoption of decentralized waste management, involvement of public-private partnership in waste management, focus prevention of pollution rather control, apply polluter-pays-principle to augment the financial resources for waste management, promotion of public-private partnership, balance economic and regulatory instruments, encouraging participatory approach, adoption of economic instruments for water conservation and wastewater management, adoption of clean technologies, low cost technologies, involvement of beneficiaries in waste management, combating water scarcity by conservation measures and rain water harvesting, and focused research in identified priority areas. It is also necessary to put emphasis on use of wastewater for irrigation, which has many benefits apart from reducing pollution of water resources.

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Annexure-V

REPORT OF THE SUB-GROUP ON LAND DEGRADATION

1.0 Introduction

The land serves as storage for water and nutrients required for plants and other living micro-macro-organisms. The demand for food, energy and other human requirements depends upon the preservation and improvement of the productivity of land. The land resources are limited in India which has about 18% of world's population.

The degradation of land, through soil erosion, alkali-salinization, water logging, pollution, and reduction in organic matter content has several proximate and underlying causes. The proximate causes include:

- Loss of forest and tree cover (leading to erosion by surface water run-off and winds),
- Unsustainable grazing,
- Excessive use of irrigation (in many cases without proper drainage, leading to leaching of sodium and potassium salts),
- Improper use of agricultural chemicals (leading to accumulation of toxic chemicals in the soil),
- Diversion of animal wastes for domestic fuel (leading to reduction in soil nitrogen and organic matter), and
- Disposal of industrial and domestic wastes on productive land.

The problems of land degradation are prevalent in many forms throughout the country. In most cases, a combination of such problem exits.

2.0 Status of Degraded Lands

The degraded land can be broadly categorized for the activities concerning XI five year plan, as below:

	Category		Activity
(i)	Urban area	-	To monitoring & to manage effluent disposal
(ii)	Agricultural area	-	To ensure adherence to agriculture as per land use map
(iii)	Industrial area	-	To develop national strategy for solid waste disposal with special reference to landfill
(iv)	Forest area	-	To increase forest cover with a target of 33%

In absence of comprehensive and periodic scientific surveys, estimates have been made on the basis of localized surveys and studies. Recently, (2005) National Bureau of Soil Survey

and Land Use Planning (NBSS&LUP), Nagpur of ICAR has published that 146.82 million hectare area is reported to be suffering from various kinds of land degradation. It include:

Water erosion 93.68 million ha,

Wind erosion 9.48 million ha,

Water logging/flooding 14.30 million ha,

Salinity/alkalinity 5.94 million ha,

Soil acidity 16.04 million ha, and

Complex problem 7.38 million ha.

The state-wise details of extent of various kind of lands degradation are given in Annexure-A.

Land degradation in India whether due to pressure of settlement or desire to exploit natural resources is caused primarily by biotic intervention except when nature takes its own turn. In order to address the situation and to make a significant impact, one should aim at the following:

Arid to semi arid tropics (Rajasthan to Western Bengal): This area requires comprehensive water shed management practices. Attempts have been made in the past with visible results.

Himalayan uphill: This requires careful land use study, afforestation and effective river control measures.

Gangetic and other alluvial planes: River control, flood control in comprehensive manner has not been done, though attempts have been made sporadically for some river valleys mainly with focus on power generation but with significant supporting measures for catchment areas.

Delta and Coastal Area: There is visible lack in coordination and standardization of measures adopted so far. Successful innovative technology can be applied to bring about effective transformation.

Wasteland: Mapping is available. Land use policy and its implementation are of priority.

3.0 Review of Existing Policies

The proximate causes of land degradation are driven by implicit and explicit subsidies for water, power, fertilizer and pesticides. Grazing lands are usually common property resources, and insufficient empowerment of local institutions for their management leads to overexploitation of the biomass base. The absence of conducive policies and persistence of certain regulatory practices reduces people's incentives for afforestation, and leads to reduced levels of green cover.

It is essential that the relevant fiscal, tariffs, and sectoral policies take explicit account of their unintentional impacts on land degradation, if the fundamental basis of livelihoods for the vast majority of our people is not to be irreparably damaged.

4.0 Economic/Scientific Instruments for Improving Degraded Land

In order to improve degraded lands, in addition to such policy review, the following specific initiatives have been identified:

- To encourage adoption of science-based, and traditional sustainable land use practices, through research and development, extension of knowledge, pilot scale demonstrations, and large scale dissemination, including farmer's training, and where necessary, access to institutional finance.
- To promote reclamation of wasteland and degraded forest land, through formulation and adoption of multi stakeholder partnerships, involving the land owning agency, local communities, and investors.
- To prepare and implement thematic action plans incorporating watershed management strategies, for arresting and reversing desertification, and expanding green cover.
- To promote sustainable alternatives to shifting cultivation where it is no longer ecologically viable, ensuring that the cultural and social organizations of the local people are not disrupted.
- To encourage agro-forestry, organic farming, environmentally sustainable cropping patterns, and adoption of efficient irrigation techniques.

5.0 Existing Programmes for Development of Degraded Land

The various programmes are being implemented for the development of degraded lands including rainfed areas. The main schemes and programmes are:

- Centrally Sponsored Programmes (subsumed under micro management of Agriculture (MMA)):
- Soil Conservation for Enhancing the Productivity of Degraded Lands in the Catchments of River Valley Project & Food Prone River (RVP & FPR),
- Reclamation of Alkali Soil (RAS),
- State Land Use Board (SLUB)

Central Sector Schemes:

- All India Soil & Land Use Survey (AIS & LUS),
- Soil Conservation Training Centre, Damodar Valley Corporation, Hazaribag,
- National Land Use & Conservation Board (NLCB)

Central Assistance to State Plan*:*

- Watershed Development Project for Shifting Cultivation Area (WDPSCA)

Externally Aided Projects (EAPs):

- Indo German Bilateral Project on Watershed Management (IGBPWM)

World Bank Assisted Project on Sodic Land Reclamation, Uttar Pradesh

Various Watershed Development Programmes are being implemented by mainly three Ministries, namely, Ministry of Agriculture, Ministry of Rural Development & Ministry of Environment & Forests for development of degraded lands. These programmes are mainly, (i) National Watershed Development Project for Rainfed Areas (NWDPRA), (ii) Soil Conservation for Enhancing Productivity of Degraded Lands in the Catchments of RiverValley Project & Food Prone River (RVP & FPR), (iii) Reclamation of Alkali Soil (RAS), (iv) Watershed Development Project in Shifting Cultivation Areas (WDPSCA), (v) Drought Prone Area Programme (DPAP), (vi) Integrated Wasteland Development Programme (IWDP) and National Afforestation & Eco – Development Project (NAEP). In addition to above, two Externally Aided Projects (EAPs), namely, Indo German Bilateral Project on Watershed Management (IGBP – WM) and World Bank Assisted Project on Sodic Land Reclamation, Uttar Pradesh are being implemented with technical and financial assistance of external agencies. Since inception upto March 2005, an area of 28.533 million ha has been developed with an expenditure of Rs. 14577.32 crore. The details of scheme – wise achievements made upto IX Five Year Plan, during first three years (2002-05) of X Plan and since inception upto March 2005 are given in Annexure-B.

6.0 Perspective Plan for Development of Degraded Lands

The working Group on Watershed Development, Rainfed Farming and Natural Resource Management for X plan constituted by Planning Commission has assessed that 88.5 million ha would need development. The estimated cost for the development over a period from 2002 to 2022 would be Rs. 72750 crore. Approximately, 12.00 million ha of degraded lands is likely to be treated during X Plan period and thus, about 76.50 million ha of degraded lands will remain to be treated in the beginning of XI Plan. The details are at Annexure – C.

7.0 Issues and Strategy for XI Plan:

According to the Working Group on Watershed Development, Rainfed Farming and Natural Resource Management for the Tenth Plan set up by the Planning Commission, the total cost of treatment of 88.5 million ha of degraded land that would require treatment by the Thirteenth Plan would come to around Rs. 72,750 crore. At current level of prices, the requirement of funds for developing these areas would be about Rs. 136042 crore. Approximately, 12.00 million ha of degraded lands is likely to be treated during X Plan period and thus, about 76.50 million ha of degraded lands will remain to be treated in the beginning of XI Plan. As the pace of watershed development needs to be accelerated in the XI Five Year Plan, a 20 million ha of degraded land has been projected for treatment. At current level (2006-07) of prices, a fund of amount Rs. 26200 crore would be needed for developing these areas. The major issues & strategies for sustainable development of degraded land would be:

There are lot many unfinished projects of irrigation that involve 13.4 million hectare of potential. A concentrated effort is required to expedite such ongoing but unfinished projects. Similarly, about 14 million hectare can be brought under irrigation in command areas of completed projects that lie un-irrigated due to lack of field channels, silting of reservoirs and similar problems. Priority may be given to such works.

Most of the watersheds developed do not reach full potential in terms of agriculture production and are not properly maintained because the community involvement is wanted after the initial development stage. Community involved in watershed planning and design has typically been low; and distributional problems are persistent, arising from existing inequalities in land distribution or because of ill-defined rights and encroachment. This needs to be tackled in the Eleventh Plan by greater involvement of community right from the planning stage to the execution stage and during the maintenance stage.

As most of the watersheds developed do not reach full potential in terms of agricultural production, greater investments under watershed development, rain harvesting and natural resources conservation are recommended. For expansion of watershed development, greater attention is required to obtain full potential in terms of agricultural production and, therefore, promotion of farming system approach should be made an integral part of the watershed development programme for rainfed areas. Particularly the areas like improvement in crop production technology, improvement in supply of quality inputs like seeds, fertilizers, machinery, varietals diversification and technology transfer should be included as integral part of the watershed development programme being implemented by the Ministry of Agriculture. This will ensure full agricultural development in the treated areas under the watershed. Proactive intervention may be required rather than normal extension approach. This approach should be considered as an integral component in the XI Five Year Plan.

The wastelands and degraded lands, which are either unutilized or under utilized, should be brought under productive uses by development and distribution of such lands to landless for productive uses for their economic upliftment or some community plantations may be tried.

Planning Commission have recommended in their Mid Term Appraisal, a provision of subsidies on water conservation techniques in the regions displaying acute water stress, i.e. over-exploited and dark blocks, particularly in low rainfall regions. The provision for farm ponds and other rain harvesting structures as well as micro irrigation devices may be considered for providing 50% subsidy in the rainfed areas.

Private sector may be encouraged to take up and adopt new watershed areas within the overall framework of the integrated watershed approach. A model like 20% contribution from the beneficiary farmers, 40% contribution from the private sector and 40% contribution from the Government may be considered in this regard. This may accelerate the area coverage under watershed development.

Soil and Land Resource Mapping should be conducted at an interval of every 10 years and spatial digital information system on land use inventory should be prepared for each State so that resources allocation & monitoring is based on a reliable database.

The food grains production in recent years is plateauing and the responsiveness of NPK fertilizers is declining which indicates malfunctioning of the soil system. It indicates declining of the soil productivity and calls for nurturing of soil health including identification and application of micronutrients. There is a need to develop a spatial information system for soil health using

the advanced technology of Geographical Information System (GIS) and Global Positioning System (GPS) as well as satellite mapping and soil analysis on ground. All India Soil and Land Use Survey organization under the Department of Agriculture & Cooperation (DAC) has the capacity to undertake this project. The dissemination of soil information in the form of soil health cards is very vital information for the farmer. A few States have started preparation of soil health cards recently. With the improvement in technology, this can be taken up on a large scale and a project on spatial information system for soil health cards may be taken up on a countrywide basis in the XI Plan.

Diversion of agriculture land for non-agricultural purposes, like urbanization, industrialization etc. should be carefully/cautiously made. NLCB and SLUB may be suitably reactivated/ strengthened to take preventive measures on conversion of agriculture land and to take lead in generating awareness and maintaining soil database.

Reference:

The document entitled "Programmes & Achievements of Natural Resources Management Division", November 2005, published by Ministry of Agriculture, Deptt. of Agriculture & Cooperation, Natural Resource Management Division.

The document entitled "National Environment Policy 2006", published by Ministry of Environment & Forests, New Delhi

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ANNEXURE-A

State-wise extent of various kinds of Land Degradation in India
(As per NBSS&LUP-ICAR-2005)

(Area in thousand hectares)

S.N.	Name of the States	Water Erosion	Wind Erosion	Water Logging	Salinity/ Alkalinity	Soil Acidity	Complex Problem	Degraded Area	Geogra-phical Area	Degraded Area (%)
1.	Andhra Pradesh	11518	0	1896	517	905	156	14992	27505	54.5
2.	Arunachal Pradesh	2372	0	176	0	1955	0	4503	8374	53.8
3.	Assam	688	0	37	0	612	876	2213	7844	28.2
4.	Bihar + Jharkhand	3024	0	2001	229	1029	0	6283	17387	36.1
5.	Goa	60	0	76	0	2	24	162	370	43.9
6.	Gujarat	5207	443	523	294	0	1666	8133	19602	41.5
7.	Haryana	315	536	146	256	0	214	1467	4421	33.2
8.	Himachal Pradesh	2718	0	1303	0	157	0	4178	5567	75.0
9.	Jammu & Kashmir	5460	1360	200	0	0	0	7020	22224	31.6
10.	Karnataka	5810	0	941	110	58	712	7631	19179	39.8
11.	Kerala	76	0	2098	0	138	296	2608	3886	67.1
12.	MP & Chhatisgarh	17883	0	359	46	6796	1126	26210	44345	59.1
13.	Maharashtra	11179	0	0	1056	517	303	13055	30771	42.4
14.	Manipur	133	0	111	0	481	227	952	2233	42.6
15.	Mizoram	137	0	0	0	1050	694	1881	2108	89.2
16.	Meghalaya	137	0	7	0	1030	34	1208	2243	53.9
17.	Nagaland	390	0	0	0	127	478	995	1658	60.0
18.	Orissa	5028	0	681	75	263	75	6122	15571	39.3
19.	Punjab	372	282	338	288	0	0	1280	5036	25.4
20.	Rajasthan	3137	6650	53	1418	0	110	11368	34224	33.2
21.	Sikkim	158	0	0	0	76	0	234	710	33.0
22.	Tamil Nadu	4926	0	96	96	78	138	5334	13006	41.0
23.	Tripura	121	0	191	0	203	113	628	1049	59.9
24.	UP & Uttaranchal	11392	212	2350	1370	0	0	15324	29441	52.0
25.	West Bengal	1197	0	710	170	556	119	2752	8875	31.0
26.	Delhi	55	0	6	10	0	11	82	148	55.4
27.	A & N Islands	187	0	0	9	0	9	205	825	24.8
28.	Chandigarh	0	0	0	0	0	0	0	0	0.00
29.	D & N Haveli	0	0	0	0	0	0	0	0	0.00
30.	Daman & Diu	0	0	0	0	0	0	0	0	0.00
31.	Lakshadweep	0	0	0	0	0	0	0	0	0.00
32.	Pondicherry	0	0	0	0	0	0	0	0	0.00
Grand Total		93680	9483	14299	5944	16033	7381	146820	328602	
Grand Total (Million ha)		93.68	9.48	14.30	5.94	16.03	7.38	146.82	328.60	

ANNEXURE-B

Degraded Lands Developed under various Watershed Development Programmes, since inception upto March, 2005

(Area in Lakh ha and Expenditure in Rs. Crore)

S. No.	Ministry/Scheme and year of start	Area treated and Expenditure since inception upto IX Plan		Area treated and Expenditure in first 3 years of X Plan (2002-05)		Total area treated and Expenditure since inception upto March 2005	
		Area	Expr.	Area	Expr.	Area	Expr.
(A)	Ministry of Agriculture, Department of Agriculture & Corporation						
1.	NWDPRA (1990-91)	69.79	1877.74	9.55	519.82	79.34	2397.56
2.	RVP & FPR (1962 & 81)	54.88	1516.26	5.99	377.91	60.87	1894.17
3.	WDPSCA (1974-75)	2.58	166.27	0.60	60.16	3.18	226.43
4.	RAS (1985-86)	5.81	76.39	0.78	20.25	6.59	96.64
5.	EAPs	15.00	2071.01	8.63	2685.25	23.63	4756.26
	Sub Total	148.06	5707.67	25.55	3663.39	173.61	9371.06
(B)	Ministry of Rural Development						
1.	DPAP (1973-74)	13.79	897.67	12.50	844.39	26.29	1742.06
2.	DDP (1977-78)	6.70	686.02	8.00	614.99	14.70	1301.01
3.	IWDP (1988-89)	37.36	461.26	24.60	848.94	61.96	1310.20
	Sub total	57.85	2044.45	45.10	2308.92	102.95	4353.37
(C)	Ministry of Environment & Forests						
1.	NAEP (1989-90)	4.76	383.82	4.01	469.07	8.77	852.89
	TOTAL (A+B+C)	210.67	8135.94	74.66	6441.38	285.33	14577.32

Details of abbreviations:

NWDPRA - National Watershed Development Project for Rainfed Areas
RVP & FPR - River Valley Project & Flood Prone River
WDPSCA - Watershed Development Project for Shifting Cultivation Areas
RAS - Reclamation of Alkali Soil
EAP - Externally Aided Projects
DPAP - Drought Prone Area Programme
DDP - Desert Development Programme
IWDP - Integrated Wasteland Development Project
NAEP - National Afforestation and Eco – Development Projects

ANNEXURE-C

Projected Treatment of Degraded Lands under various Watershed Development Programmes and funds requirement with cost sharing during the next four five year plans

(**Amount in Rs. Crore)**

Five Year Plan	**Projected area to be covered (Million ha)**	**Estimated unit cost of treatment (Rs./ha.)**	**Total cost on average**	**Cost sharing Ratio***	**Cost sharing by**		
					Centre	**States**	**By People**
X Plan (2002-07)	15.0	5000-7000	9000	50:25:25	4500	2250	2250
XI Plan (2007-12)	20.0	6000-8000	14000	40:30:30	5600	4200	4200
XII Plan (2012-17)	25.0	7500-9500	21250	30:30:40	6375	6375	8500
XIII Plan (2017-22)	28.5	9000-11000	28500	25:25:50	7125	7125	24250
Total	88.50		72750		23600	19950	29200

* Cost – Sharing ratio between Centre, States and People/Community.

ANNEXURE-VI

REPORT OF THE SUB-GROUP ON SOLID WASTE INCLUDING HAZARDOUS WASTE

Executive Summary

The rapid urbanization and exponential growth of industries and has lead to the release of huge quantities of solid wastes into the environment. A substantial amount of these wastes are potentially hazardous to the environment and the living organisms including human beings. Owing to the indiscriminate disposal of these wastes on land and water bodies, has lead to extensive pollution of both land and water bodies. Environment problems such as leaching of chemicals from waste dump sites contaminating the ground water. Potential risk to human health due to contamination of surface and ground water supply have been invariably associated with the chemicals leaching out of wastes dump sites. The irreversible damages to environment and human health due to indiscriminate waste disposal triggered the mechanism to establish a system for safe disposal of such wastes.

The Environment (Protection) Act, 1986 was enacted to provide a single focus for all environmental issues and to plug the loopholes in the earlier enactments. The section 3 (2) (vi) and (vii) gives the responsibility to the Central Government to lay down procedures and safeguards for handling hazardous substances. The rules made under this act for safe handling and disposal of wastes have facilitated in establishing a system for the management of solid wastes including the hazardous wastes. However, there a need to redefine the policies and regulations from time to time to improve the existing system and provide a more effective management of the wastes. One of the major areas of focus is to reduce the waste generation and also plan for reuse and recycling.

The Sub-group will attempt to assess the present situation and provide inputs for the strengthening the existing mechanisms and plan for the future activities.

I. Introduction:

Urbanization and accelerated pace of industrial growth and extensive use of chemicals has lead to the release of huge quantities of solid wastes into the environment. A substantial amount of these wastes are potentially hazardous to the environment and the living organisms including human beings. Owing to the indiscriminate discharge of these wastes on land and water bodies, has lead to extensive pollution of both land and water bodies. Potential risk to human health due to contamination of surface and ground water supply have been invariably associated with the chemicals leaching out of wastes dump sites. The irreversible damages to environment and human health due to indiscriminate waste disposal triggered the mechanism to establish a system for safe disposal of such wastes.

The Environment (Protection) Act, 1986 was enacted to provide a single focus for all environmental issues and to plug the loopholes in the earlier enactments. The section 3 (2) (vi) and (vii) gives the responsibility to the Central Government to lay down procedures and safeguards for handling hazardous substances. The hazardous substances include the hazardous chemicals, the hazardous wastes and the hazardous microorganisms. The Ministry of Environment & Forests is a nodal agency for the implementation of this Act and the regulations are notified therender.

The increasing generation of solid wastes are causing environmental concerns. Indiscriminate disposal of hazardous waste generated created several environmental problems such as leaching of hazardous constituent into the groundwater leading to contamination of the ground water and subsequent entry into the food chain resulting in adverse health impact. In order to arrest the damage to health and environment proper treatment and disposal of hazardous waste was envisaged to be the primary task, accordingly the Hazardous Management & Handling Rules were promulgated in 1989 and the guidelines for management of hazardous wastes were published in 1991 to provide for the procedures to be adopted for safe treatment and disposal of hazardous waste. This was followed by notifying the regulations on Biomedical Waste and Municipal Solid waste to provide a complete system for management of waste generated from various sources. Regulations were also framed for recycled plastic and lead acid batteries to prevent the indiscriminate disposal and irregular recycling practices to protect the environment and health of the people.

2. Policy Integration:

The National Environment Policy (NEP) 2006 brought out by Ministry of Environment & Forests (MoE&F) is a comprehensive document which was formulated after careful consideration of all the environmental issues. The policy is based on the overarching principles which includes environmental protection as an integral part of the development process and provides for the preventive actions through precautionary principles, economic efficiency and conservation of resources. The following aspects of the policy have a direct bearing on the waste management:

- Precautionary principle through Pollution Prevention strategies.
- Polluter Pays Principle.
- Assessment of the production and consumption pattern

- Cost benefit Analysis
- Internalization of Environmental Costs
- Efficiency in use of resources
- Cost Minimization
- Waste Minimization & Cleaner production
- Multi-stake holder participation
- Strategies and actions have been proposed.

3. Regulatory Mechanism in the Thematic Area:

The Environment (Protection) Act, 1986 empowers the Central Government to formulate rules for the protection and safeguard the environment. The specific regulations that address handling and disposal of wastes are as follows:

- The Hazardous Waste (Management and Handling) Rules, 1989 as amended in 2000 and 2003.
- Biomedical Wastes (Management & Handling) Rules, 1998 as amended in 2000 and 2003.
- Recycled Plastic Manufacture and Usage Rules, 1999.
- Dumping and disposal of Fly ash discharged from coal and lignite waste thermal power plants on land, 1999 as amended in 2003.
- Municipal Solid Wastes (Management & Handling) Rules, 2000.
- Batteries (Management & Handling) Rules, 2001.

The Hazardous Waste (Management & Handling) Rules, 1989 notified under the Environment (Protection) Act, 1986. These rules provide control for the generation, collection, treatment, transport, storage and disposal of hazardous wastes. The import of hazardous wastes from other countries purely dumping and disposal in the country is not permitted under these rules. The principal objective of these regulations is to establish a control mechanism for the management of hazardous wastes. The agencies responsible for implementation of these rules have been notified.

To regulate the management and handling of Municipal Solid Wastes the Ministry of Environment and Forests notified the Municipal Solid Wastes (Management and Handling) Rules, 2000. vide S.O. 908(E) the 25th September, 2000.

The Ministry of Environment and Forests issued the Recycled Plastics Manufacture and Usage Rules 1999, under the Environment (Protection) Act, 1986 for regulating and managing plastic bags. As per this rules no vendor shall use carry bags and containers of recycled plastics for storing, carrying and/or packaging of foodstuffs. Minimum thickness of Carry bags made of virgin or recycled plastics be more than 20 microns. The prescribed authorities for enforcement have been notified. These rules were further amended in 2003.

The Biomedical Wastes (M&H) Rules, 1998 provides fro regulating the wastes generated by the health care institutions. Segregation at source has been made mandatory under these rules. The rules provide the treatment disposal options and also encourage common waste treatment disposal facility.

The Batteries (M&H) Rules, 2001 were promulgated specifically to channelize the used lead acid batteries to recyclers using environmentally sound technology and are complying with the environmental norms. The rules promote recycling was encourage and Environmentally Sound management (ESM).

The above regulations are intended to control the activities pertaining to waste generation both industrial as well as municipal. Any non-compliance and contravention to these regulations is punishable under Section 15 of the Environment Protection Rules.

4. Schemes and Programmes in the Thematic Area:

The HSM Division in the MoEF has a comprehensive scheme for creation of the management structure for hazardous substances which includes hazardous and other wastes. This scheme is intended to facilitate the implementation of the various rules pertaining to handling management and safe disposal of chemicals wastes and microorganisms. It also facilitates in creation of infrastructure/information base including human resource development for hazardous substances management. The main objective of the scheme is to prescribe procedure for proper handling of waste. It also provides for training, creation of awareness and R&D programmes in respect of the activities for management of wastes.

Hazardous Wastes Management

The major industries generating huge quantity of hazardous waste and adequate land available for disposable they may opt to have a facility set up within the industry premises for treatment, storage and disposal of hazardous waste generated by the unit. While it is convenient to have common Treatment Storage Disposal Facility for catering to a number of medium and small scale industries or industrial cluster, the concept of Treatment Storage Disposal Facility (TSDF) was envisaged as one of the best options for containment of Hazardous Wastes. TSDF are set up on Public-Private Partnership basis on Build Operate Own principles. This provision has also been incorporated in the Hazardous Waste Rules [(Rule 8, Sections (1) to (8)] as amended in 2003.

The Ministry of Environment & Forests now provides financial assistance for setting up of a Treatment Storage and Disposal Facilities (TSDF) as common treatment disposal facilities under the Central scheme. The Ministry can provide a grant to the tune of Rs.2 crores for each of the facilities with a proportionate contribution from the State Government supplemented with additional contributions from the proponents, entrepreneurs and financial institutions. Under this scheme, financial assistance has been provided for setting up of common facilities in the states of Maharashtra, Andhra Pradesh, Gujarat and West Bengal.

Municipal Solid Waste Management

Municipal Solid Waste (MSW) was one of major cause of concern for pollution of water and soil. Present practices of disposal of these wastes are predominantly on land. It has been estimated that country generates about 1.20 000 MT of MSW per day. In case of municipal solid waste, responsibility of management rests with the local bodies. Management of MSW was being done under the State civic rules and in the year 2000, municipal Solid Wastes (Management and Handling) Rules are promulgated. Grants have been disbursed to Local bodies by the Ministry of Urban Development, Government of India under the 12th Finance Commission and Jawaharlal Urban Renewable programme. The Ministry of Urban Development co-ordinates the programmes in consultation with other concerned Ministries such as Ministry of Environment and Forests, Ministry of Non-renewable Energy and Ministry of Agriculture.

Ministry of Environment & Forests and CPCB are providing financial support to the States for setting up of demonstration project on cost sharing basis for the management of Municipal Solid Wastes (MSW). Such projects have already been taken up in the State of West Bengal, UT of Chandigarh, Tamil Nadu, Nagaland, Himachal Pradesh, Andhra Pradesh, Sikkim, Maharashtra and Tripura with partial assistance from CPCB and in Kerala, Gujrarat with partial assistance from the Ministry. Ministry has also provided financial support to all the SPCBs/ PCCs including CPCB for strengthening of infrastructure to facilitate them in the compilation of information regarding the implementation of the Rules. The total outlay in the tenth plan for this project is 976.27 Lakhs.

The Ministry of Environment & Forests has supported a research project on GIS based study to evolve zero waste management plan in selected municipalities of Southern districts of Tamil Nadu to Madurai Kamaraj University, Madurai. Similarly, CPCB has conducted studies on the estimation of landfill gases in collaboration with IARI and NEERI to estimate the quantity of methane emission. CPCB sponsored a project to NEERI on "Assessment of Status of Municipal Solid Wastes Management in Metro Cities and State Capitals" with a view to establish a database on National level for selected 59 cities. CPCB undertook detailed studies on the characterization of compost quality and its application on agricultural crops in collaboration with IARI and a study on the assessment of health status of conservancy staff and other community associated with handling of solid waste management was carried out by the CPCB with the collaboration of Chittaranjan Cancer Research Institute, Kolkota and Sri. Ramchandra Medical College, Chennai.

Plastic Waste Management

The State Governments and the union territory administrations have republished the notifications in their official gazette. States like Uttar Pradesh, Himachal Pradesh and Delhi have published separate set of rules in the form of non- biodegradable garbage control acts.

The Government has taken various initiatives like the constitution of a Task force for the management of plastic wastes, Justice Ranganath Misra Committee on Plastic waste management and the follow up on the implementation of these rules with various state governments.

Waste Minimization

A Central Scheme for providing financial Assistance to carry out studies on waste minimization in the small and medium scale enterprises. Waste Minimization is one of the preventive strategies to address the problem of industrial pollution. The objective of the scheme is to assist the Small and Medium Scale Enterprises (SMEs) in adoption of cleaner production practices and reduction in waste generation. The activities being pursued under this include the following:

- Establishing and running Waste Minimization Circles (WMCs) in clusters of SMEs.
- Capacity building in the area of Waste Minimization/Cleaner Production through training.
- Waste Minimization demonstration studies in selected industrial sectors.
- Preparation of sector specific technical manuals on waste reduction, reuse and recycling.
- Awareness programmes and preparation of compendium of success stories on cleaner production/waste minimization.

Under this Scheme, so far 118 Waste Minimization Circles have been established in 41 sectors and about 600 SMEs have been benefited. As per the information furnished by NPC, the aggregate environmental benefits (estimated in percentage terms) from WMCs established so far are as follows:

Reduction in Water Consumption	:	10 - 35%
Reduction in Electricity Consumption	:	15 - 20%
Reduction in fossil fuel Consumption	:	10 - 20%
Reduction in Raw Material & Chemical Consumption	:	10 - 20%
Reduction in Wastewater Generation	:	10 - 30%
Reduction in Air Emissions	:	5 - 10%
Reduction in Solid Waste generation	:	5 - 20%
Yield improvement	:	2 - 5%

There are 30-40 industrial sectors operating under the small & medium scale units of which 8 industrial sectors were prioritized for 11th Plan namely: (1) Brick Kilns/Roof Tiling, Bulk Drug/Pharma, Charcaol for Activated Carbon Production, Electroplating, Foundry & Forging, Steel Rolling Mills, Tannery, Textile Dying & processing. Additional sectors need to be covered in the 12th plan period.

4.5 Activities of Other Ministries

Ministry of Urban Development (MUD)

MUD has formulated schemes relating to urban development, water supply and sanitation and urban environment sector and these are:

- Accelerated Urban Water Supply Programme

- Low cost sanitation scheme
- Scheme for providing solid waste management in the selected towns having air fields of Indian Air Force
- Integrated Development of small and medium towns
- Mega city scheme

Ministry of Agriculture

Ministry of Agriculture formulated a scheme on Balanced Use of Fertilizer. The main components of the scheme are to strengthen the soil-testing programme in the country and to encourage production and promotion of urban biodegradable waste into compost through mechanized composting. For the purpose of setting up of compost plants, to process a minimum of 100 tonnes of garbage per day, a grant of Rs.50.0 lakhs is provided. The choice of technology is left to the discretion/decision of the States/ entrepreneurs.

Ministry of Non-Conventional Energy Sources (MNES)

MNES has formulated a National Programme on Energy Recovery from Urban and Industrial Wastes. The main objectives of the programme include:

(a) To create conducive conditions and environment, with fiscal and financial regime, to help promote, develop, demonstrate and disseminate utilization of wastes for recovery of energy and resources

(b) To help improve the waste management practices through adoption of renewable energy technologies for processing and treatment of wastes prior to disposal; and,

(c) To promote setting up of projects on recovery of energy from wastes of renewable nature from Urban and Industrial sectors.

5. Technology and R & D

The present scheme has a provision to assign developmental studies under which R&D studies are conducted by identified institutions with a commitment to propagate technologies developed by them. The R&D studies were linked with a bench scale and field demonstration activities. The major objectives of the studies were to reduce the toxic potential of the waste and also reduce the waste generation process by adopting the principle of pollution prevention. The highly toxic waste stream were selected for carrying out developmental studies in the initial stages. Subsequently, the application of waste minimization and utilization of the waste by reuse, reprocessing and recycling of the waste. Effectively the waste generated by an industry was destined to be a resource for another. Due to lack of expertise available in the field and the non-availability of volunteers for testing the technologies there has been a very slow progress made in this area. In addition to this, the problems faced in implementation of these technologies were also due to resistance from the public. The R&D has also been applied for utilization of organic and municipal solid waste which were not hazardous wherein there has been a greater acceptance. The non-hazardous industrial waste which are high volume low toxicity such as fly ash, have been visualized from the point of view their utilization by adopting the world wide

technologies available. The other industrial waste stream such as red mud, phophogypsm etc. have not been regulated under any of the laws.

Technology Advisory Group (TAG)

MoUD has set up a Technology Advisory Group to provide technical assistance to urban local bodies for adopting the suggested technologies.

6. Information Dissemination through Awareness & Training

Under the present scheme, a component for training of personnel at different levels and from the concerned agencies has been envisaged which includes the awareness programme to be conducted by the implementing authorities.

7. Recommendations:

General recommendations:

During the XI Five Year Plan there is need to develop and implement viable models for integrating the activities in all related areas so avoid gaps and overlaps. The primary principle of preventive action needs to be adopted in the areas of waste management and to reduce the generation of wastes.

Public Private Partnerships (PPP) to be encouraged for setting up and operating Common Treatment Storage Disposal Facilities (CTSDF) for all wastes including, urban solid wastes, toxic and hazardous waste, industrial and biomedical wastes. A system should be established on payment by users to enforce the mechanism of Polluter Pays Principle (3P). Setting up and operating sanitary landfills, through competitive bids.

Development and implementation strategies for clean up of pre-existing toxic and hazardous waste dumps sites. The legacy Sites in particular, those located in and around the industrial areas and townships, due to indiscriminate dumping of hazardous and toxic wastes needs to be taken up on priority for assessment and evaluation. A remediation plan needs to be worked out for clean up of such legacy sites and reclamation of such lands for future, sustainable use.

3R Principle – Reduce, Reuse and Recycle. Encourage recycling, reuse, considering waste as a resource and reduce the wastes destined for disposal. Strengthen the capacities for channelization of the wastes through organized segregation, recycling, and reuse of municipal solid wastes, hazardous wastes and plastic wastes. Institutionalize the systems for collection and segregation of the recyclables. Develop and implement strategies for recycle, reuse, and final disposal of benign wastes, through promotion of relevant technologies, and use of incentive based instruments.

Promote organic farming of traditional crop varieties through research in and dissemination of techniques for land reclamation, exposure to agricultural chemicals, facilitating

marketing of organic produce in India and abroad, including by development of transparent, voluntary, science-based labeling schemes.

Legal Status for informal sector and environmental compliance. There is a huge informal sector carrying out various operations especially the recycling industries which are mostly in the informal sectors. Such units are least aware of the hazard potentials of their operations and the need for compliance with the environmental regulations. There is a need to give legal status and recognition to such operations in view of the fact that recycling needs to be encouraged. Keeping in view the employment potential and economics of such operations there is need to strengthen the informal sectors. There is need to facilitate them to enhance their capacity and provide access to appropriate technologies for environmentally sound recycling.

Augmentation of the existing Schemes and new schemes. Central To enhance the central assistance under the existing schemes and enlarge the scope of related activities within the schemes. Also introduce new schemes wherever necessary.

Review of the Legislations and regulations. To review the existing legislation for assessment of the gaps and overlaps and make suitable amendments. Facilitate implementation by publishing guidelines.

To identify Centres of Excellence in the existing educational and research institutions, Universities etc. for carrying out the tasks for research and development activities. To identify new institutions for carrying out training and awareness programmes.

7.2 Specific recommendations:

Hazardous Waste

- To strengthen the State Pollution Control Boards, facilitating them in development of technical skills.
- To identify organizations and agencies for carrying out the field level activities.
- To identify institutions for carrying out R&D activities that could be applied in the field directly.
- Strengthening of laboratories for carrying out analytical work.
- Develop and implement viable models of public-private partnerships for setting up and operating common Treatment Storage Disposal Facilities (CTSDF) for toxic and hazardous waste, industrial and biomedical wastes, on payment by users.
- Develop and implement strategies for clean up of pre-existing toxic and hazardous waste dumps, in particular, in industrial areas, and reclamation of such lands for future, sustainable use.
- Give legal recognition to, and strengthen the informal sector systems for collection and recycling of various materials; in particular enhance their capacity and provide access to appropriate technologies and institutional finance.
- Provide subsidy or tax exemption to waste management activities.

- Sales and service tax exemption for recyclable waste that are recycled in and environmentally sound manner.
- Facilitate demonstration projects and provide subsidies for application of new technologies such as Plasma technology for more efficient and environment friendly disposal of hazardous wastes.

Municipal Solid Waste

- Continuation of demonstration projects which are being given one project to one state during the 10th plan period for the demonstration of MSW Rules will continue in the 11th Plan period also. A second project will also be considered in bigger states depending upon the need.
- Municipal Solid Waste disposal facility to be planned and developed on the basis of the population, quantum of the waste generation and the waste characteristics.
- Planned disposal facilities to be developed in the form of scientifically designed landfills.
- Waste segregation into bio-degradable and non-biodegradable wastes at appropriate sites.
- Waste Disposal to be in a phased manner along with plantation.
- Training programmes for all the stake holders to continue.
- Area specific research projects and projects on the policy review and quantification will be considered.
- Area based MSW management and Integrated Solid Waste Management approach will be given importance during the 11th plan period.
- Technology interventions for treatment technologies. Waste to energy and composting projects.
- The Ministry to devise the technical guidelines for the development of scientific landfills.
- Encourage Municipal bodies to participate in CDM through capacity building including investment for identifying and preparing CDM projects based on waste management.
- To involve communities, NGOs and participatory agencies.

Bio-medical Waste

- To facilitate in establishing more common and shared facilities.
- Specific Training Programmes to be funded and organized for the medical professionals, paramedical professionals and other staff working in the health care institutions.
- Special Training Programmes for Safai Karamcharis.
- Awareness programmes to be organized through media and other sources for general public.
- To involve local communities and NGOs.

Used Lead Acid Batteries Waste

- To facilitate in establishing collection centres.
- To promote studies on Environmentally Sound Technologies for used Lead Acid Battery recycling.
- Funding R&D studies for lead smelting technologies in secondary lead smelters.
- Facilitate and monitor take back of used lead acid batteries to registered recyclers.
- To involve local communities and NGOs.
- To organize planned Training programmes for retailers and distributors.
- Awareness programme for consumers, users and general public.

Fly-ash utilization

- R&D for fly ash utilization & management.
- Assessment and application of available technologies for fly ash utilization.
- To strengthen the implementing agencies.
- To facilitate in collection and transportation of fly ash to units manufacturing fly ash products.

Management of Plastic Wastes

- R&D for waste plastic utilization & management
- Assessment and application of available technologies for waste plastics utilization
- Incentivize pilot projects for waste plastic utilization and replication and field application of successful R&D

Waste Minimization and Cleaner Production Processes.

- Integration of waste minimization and cleaner production schemes
- Enlarge scope of R&D studies for additional sectors
- Planning and funding of Demonstration projects through SPCBs

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ANNEXURE-VII

REPORT OF THE SUB-GROUP ON INTERNATIONAL COOPERATION

I. **Introduction**

India has participated in major international events on the environment since 1972. The country has signed and ratified a number of key multilateral agreements on environment issues in recognition of, the transboundary nature of several environmental problems, impact on chemical industry and trade and has made efforts to comply with its commitments. Efforts have been made to network and enhance environmental cooperation by participating in regional and bilateral programmes. The need to enhance our own capacity to comply with our commitments and enable flow of resources is clearly evident.

International treaties/conventions/declarations on environment management:

a. United Nations Conference on the Human Environment – Stockholm 1972
b. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), 1975
c. Ramsar Convention, 1971, 1975
d. The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes, 1989
e. United Nations Conference on Environment and Development (UNCED), 1992, 2002
   - Agenda – 21
   - Rio Declaration
   - Millennium Development Goals
f. Framework Convention on Climate Change (FCCC), 1992
   - Kyoto Protocol, 1997
g. The Vienna Convention, 1985
   - Montreal Protocol on Ozone depleting substances, 1992
h. Convention on Biological Diversity, 1992
- Cartagena Protocol on Biosafety, Ratified on 17th January, 2003.
i. Convention to Combat Desertification, 1996
j. Rotterdam Convention on Prior Informed Consent Procedure for certain Hazardous Chemicals in International Trade, 2002
k. Stockholm Convention on Persistent Organic Pollutants (POPs), 2001
l. Chemical Weapons Convention, 2005
m. Strategic Approach to International Chemicals Management (SAICM), 2006.
   WTO Agreement

With a view to examine and recommend possible strategies and approaches in the area of international cooperation a sub group was set up (Schedule-1) under the Working Group on Environment and Environmental Regulatory Mechanisms for Environment and Forest sector for the 11th Five Year Plan.

II. Policy

1. The National Environment Policy

The National Environment Policy, 2006 (NEP) notified recently after the approval of the cabinet clearly states that the NEP is intended to be a statement of India's commitment to making a positive contribution to international efforts and that there is a need for balance and harmony between economic social and environmental needs of the country. The policy also seeks to stimulate partnership of different stakeholders including the investment community and international development partnerships in harnessing their respective resources and strength for environmental management. In chapter on Strategies and Actions on page – 50 para 5.9 international cooperation following steps have been identified.

a) Avail of multilateral and bilateral cooperation programs, for capacity building for environmental management, particularly in relation to commitments under multilateral instruments.

b) Participate in mechanisms and arrangements under multilateral agreements for enhancing flows of resources for sustainable development.

c) Provide assistance to other developing countries, in particular for scientific and technical capacity building for environmental management.

With respect to climate change on page – 41 the NEP states that large changes in precipitation patterns, ecosystems, agricultural potential, forests, water resources, coastal and marine resources, besides increase in range of several disease vectors would result. Large-scale resources would clearly be required for adaptation measures for climate change impacts, if catastrophic human misery is to be avoided.

2. International Agreements

(a) United Nations Conference on the Human Environment – Stockholm 1972.

The United Nations Conference on the Human Environment, met at Stockholm in June, 1972, and considered the need for a common outlook and for common principles to inspire and guide the peoples of the world in the preservation and enhancement of the human environment.

The Conference calls upon Governments and peoples to exert common efforts for the preservation and improvement of the human environment, for the benefit of all the people and for their posterity 16 principles were enunciated.

(b) Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), 1975

CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) is an international agreement which aim's to ensure that international trade in specimens of wild animals and plants does not threaten their survival. CITES relies on the national authority of parties to issue Export / Import permissions/ permits. Regulations to this effect are in place in the country.

(c) Ramsar Convention, 1971

Ramsar Convention on Wetland provides a framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. It was adopted in the Iranian city of Ramsar in 1971 and came into force in 1975. There are presently 153 contracting parties to the convention, with 1634 wetland sites, totally 145.6 million hec., designated for inclusion in the Ramsar list of wetlands of international importance. There does not exists a formal system of wetland regulation outside the international commitments made in respect of Ramsar sites.

A programme on conservation of wetlands was initiated in 1987 with the basic objective assessment of wetland resources identification of wetlands of national importance, promotion of R & D activities and formulation and implementation of management action plans of identified wetlands. A national wetland committee has been constituted.

(d) The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes, 1989, (signed and ratified in 1992)

The central goal of the Basel Convention is "environmentally sound management" (ESM), of hazardous wastes with a view to protect human health and the environment by minimizing hazardous waste production where ever possible. ESM encompasses an "integrated life-cycle approach", which involves strong controls through generation of hazardous waste to its storage, transport, treatment, reuse, recycling, recovery and final disposal.

The main objectives of the Convention are:

- to reduce transboundary movements of hazardous wastes and other wastes to a minimum consistent with their environmentally sound management;
- to treat and dispose of hazardous wastes and other wastes as close as possible to their source of generation in an environmentally sound manner;
- to minimize the generation of hazardous wastes and other wastes (in terms both of quantity and potential hazard).

The Hazardous Waste (management and Handling) Rules , 1989 have been amended in 2000 and 2003 to incorporate the obligations under the Basel Convention.

(e) United Nations Conference on Environment and Development (UNCED), 1992

(i) Agenda – 21

Agenda 21 addresses the pressing problems of today and also aims at preparing the world for the challenges to the next century. It reflects a global consensus and political commitment at the highest level on development and environment cooperation. Its successful implementation is first and foremost the responsibility of Governments. National strategies, plans, policies and processes are crucial in achieving this.

(ii) Rio Declaration

The declaration reaffirms the decisions of the United Nations Conference on the Human Environment, adopted at Stockholm on 16 June, 1972, and seeks to build upon it;

With the goal of establishing a new and equitable global partnership through the creation of new levels of cooperation among States, key sectors of societies and people,

Working towards international agreements which respect the interests of all and protect the integrity of the global environmental and development system, and

To Recognize the integral and interdependent nature of the Earth, our home. The Conference also adopted 27 principles.

(iii) Millennium Development Goals

The eight Millennium Development Goals (MDGs) – which range from halving extreme poverty to halting the spread of HIV/AIDS and providing universal primary education, all by the target date of 2015 – form a blueprint agreed to by all the world's countries and all the world's leading development institutions. They have galvanized unprecedented efforts to meet the needs of the world's poorest. Following are the goals :-

- Eradicate extreme poverty and hunger
- achieve universal primary education
- promote gender equality and empower women
- reduce child mortality
- improve maternal health
- combat HIV/AIDS, malaria and other diseases
- Ensure environmental sustainability
- develop a global partnership for development

(f) Framework Convention on Climate Change (FCCC), 1992

The Convention on Climate Change, which entered into force on 21 March 1994, sets an overall framework for intergovernmental efforts to tackle the challenge posed by climate change. It recognizes that the climate system is a shared resource whose stability can be affected by industrial and other emissions of carbon dioxide and other greenhouse gases. The Convention enjoys near universal membership, with 189 countries having ratified.

Under the Convention, governments are required to:

- gather and share information on greenhouse gas emissions, national policies and best practices

- launch national strategies for addressing greenhouse gas emissions and adapting to expected impacts, including the provision of financial and technological support to developing countries , and
- cooperate in preparing for adaptation to the impacts of climate change Kyoto Protocol, 1997.

The text of the Protocol was adopted at the third session of the Conference of the Parties to the UNFCCC in Kyoto, Japan, on 11 December 1997. It entered into force on 16 February 2005. This international agreement, builds on the United Nations Framework Convention on Climate Change and sets legally binding targets and timetables for cutting the greenhouse-gas emissions of industrialized countries.

With the coming into force of Kyoto protocol in February, 2005 the GOI has set up the National CDM Authority. The Authority evaluates and recommends CDM projects for post country approval. As on 1st December 2006, 447 projects have been accorded host country approval.

(g) Vienna Convention, 1985

The Vienna Convention for the Protection of the Ozone Layer (1985), which outlines states' responsibilities for protecting human health and the environment against the adverse effects of ozone depletion, established a framework under which the Montreal Protocol was negotiated.

Montreal Protocol on Ozone depleting substances

India became a party to the Montreal Protocol on Substances that Deplete the Ozone Layer in September, 1992 and ratified the Copenhagen, Montreal and Beijing Amendments in March, 2003.

The Montreal Protocol on Substances that Deplete the Ozone Layer is an international agreement designed to protect the stratospheric ozone layer and stipulates that the production and consumption of compounds that deplete ozone in the stratosphere – chlorofluorocarbons (CFCs), halons, carbon tetrachloride, and methyl chloroform – are to be phased out by 2010 by developing countries. Scientific theory and evidence suggest that, once emitted to the atmosphere, these compounds could significantly deplete the stratospheric ozone layer that shields the planet from damaging UV – B radiation.

A Country Programme was initiated for phasing out of Ozone Depleting Substances (ODS). A separate cell was established with the objective of interacting with all stakeholders and ensure smooth transition of the phasing out of ODS and to promote non-ODS technologies both in production and consumption sector. So far funds aggregating to US$ 137 million for over 349 ODS projects have been received from the Multilateral Fund.
In 1995, full exemption from payment of Customs and Excise duties was granted on capital goods acquired to implement ODS phase out projects funded by the Multilateral Fund. In 1996, this benefit of exemption from Customs and Excise duty was also extended to new projects

based on non-ODS technologies. The Ozone Depleting Substances (Regulation and Control) Rules 2000 under the Environment (Protection) Act, 1986 was notified to regulate and control ODS. The Rules provide the necessary legal back up and indicate a specific time frame for the phase out of ODS. Ozone Cell has conducted workshops for training Customs and Enforcement officials in implementation of regulations.

(h) Convention on Biological Diversity, 1992

The objectives of this Convention are the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding.

Pursuant to the signing of the Convention and adopting a wide-ranging extensive and intensive consultative process with all stakeholders spread over a period of almost eight years, India has enacted the Biological Diversity Act in 2002 and also framed Biological Diversity Rules in 2004. The Act primarily addresses access to genetic resources and associated traditional knowledge so as to ensure equitable sharing of benefits arising out of the use of these resources and knowledge to the country and the people as provided for in the CBD.

A large scale exercise has been completed for providing inputs towards a national biodiversity strategy and action plan. These inputs are to be reviewed with reference to the objectives and principles of the NEP for preparation of a National Biodiversity Action Plan. Preparation of People's Biodiversity Registers (PBRs) for documenting information on biodiversity and associated traditional knowledge at the local level has been mandated by the Biological Diversity Act and Rules. Preparation of PBRs alongwith an Indian Biodiversity Information System (IBIS) would facilitate effective implementation of the Biological Diversity Act and Rules.

Cartagena Protocol on Biosafety, Ratified on 17th January, 2003

The Protocol is one of the tools for implementing the Convention, especially with regard to the provisions to regulate, manage or control risks associated with transfer, handling and use of LMOs that may have adverse effects on the conservation and sustainable use of biodiversity, focusing on their transboudary movement. The CBD Strategic Plan which was adopted by the sixth meeting of the Conference of the Parties (COP), contains a number of strategic objectives related to the Protocol including, among others, to ensure that by the year 2010:

- The Cartagena Protocol on Biosafety is widely implemented
- Every Party has a regulatory framework in place and functioning to implement it
- All Parties have available adequate capacity as well as increased resources and technology transfer to implement it, and that
- Every Party to the Cartagena Protocol on Biosafety is promoting and facilitating public awareness, education and participation in support of the protocol.

An Expert Core Group on Biodiversity has been constituted by the Ministry

(i) Convention to Combat Desertification, 1996

The objective of this Convention is to combat desertification and mitigate the effects of drought in countries experiencing serious drought and /or desertification, particularly in Africa, through effective action at all levels, supported by international cooperation and partnership arrangements, in the framework of an integrated approach which is consistent with Agenda 21, with a view to contributing to the achievement of sustainable development in affected areas.

Achieving this objective will involve long-term integrated strategies that focus simultaneously, in affected areas, in improved productivity of land, and the rehabilitation, conservation and sustainable management of land and water resources, leading to improved living conditions, in particular at the community level.

A national self capacity needs assessment to identify country level priorities and needs for capacity building has been launched with UNDP.

(j) Rotterdam Convention on Prior Informed Consent Procedure for certain Hazardous

Chemicals in International Trade, 2002 (Ratified on 24th May, 2005)

The Rotterdam Convention is designed to promote shared responsibility and cooperative efforts among Parties in the international trade of certain hazardous chemicals, in order to protect human health and the environment from potential harm and to contribute to their environmentally sound use by facilitating information exchange about their characteristics, providing for a national decision-making process on their import and export and disseminating these decisions to Parties.

The Convention enables the countries to monitor and control trade in certain hazardous chemicals. It does not recommend banning of trade or use of specific chemicals but enables importing Parties to make informed decisions regarding chemicals they want to receive and those they cannot manage safely. It prescribes labeling and providing of information on potential health and environmental effects to promote the safe use of these chemicals.

(k) Stockholm Convention on Persistent Organic Pollutants (POPs), 2001 (Signed in May, 2002, ratified in September, 2005).

The Stockholm Convention is a global treaty to protect human health and the environment from Persistent Organic Pollutants (POPs) was was adopted at Stockholm on 22-23 May 2001 and entered into force on 17 May 2004. . The Convention on Persistent Organic Pollutants signed by India on 14 May 2002, focuses on reducing and eliminating the production /use and release of 12 highly hazardous substances (industrial chemicals and pesticides). Commonly known as the "Dirty Dozen" by the United Nations Environment Programme (UNEP), they include 8 pesticides (aldrin, chlordance, DDT, dieldrin, endrin, heptachlor, mirex and toxaphene); 2

industrial chemicals (poly chlorinated biphenyls or PCBs and hexachlorobenzene) and 2 unintended byproducts (poly chlorinated dibenzo-p-dioxins and dibenzo furans, (referred to as dioxins and furans).

Project proposal for preparation of the National Implementation Plan (NIP) has been communicated to GEF for funding.

(l) Chemical Weapons Convention

Chemical Weapons Convention is a universal non-discriminatory, multilateral, Disarmament Treaty that bans the development, production, acquisition, transfer, use and stockpile of all chemical weapons. The Treaty puts all the States Parties on an equal footing. Countries having stockpiles of chemical weapons are required to declare and destroy them in a specified time frame and those who produce and use chemicals that can be conveniently converted into chemical weapons have to be open and transparent about the use they put these chemicals to. India signed and ratified the Convention in January, 1993 and September 1996 respectively. The CWC Act, 2000 was passed by the Parliament to enable implementation of the obligation under the convention.

(m) Strategic Approach to International Chemicals Management (SAICM), 2006.

The SAICM process commenced with the UNEP Governing Council adopting a decision in its 7th Special Session held in February, 2002 stressing the need to develop further a Strategic Approach to International Chemicals Management (SAICM). The SAICM initiative was also endorsed by the Johannesburg Summit, in September, 2002 in its plan of implementation, which set a goal of minimizing significant adverse effects from the production and use of chemicals on human health and the environment by 2020. The Johannesburg Plan of implementation also set a target of 2005 for completion of the SAICM process. SAICM is a voluntary global agreement.

The three essential components of the SAICM include an (1) Overarching Policy Strategy (2) Global Plan Of Action and (3) a Dubai Declaration.

A SAICM Trust Fund has been established to enable implementation. India has decided to contribute US$ 100,000 to the fund.

(n) WTO Agreement

The WTO has no specific agreement dealing with the environment. But a number of WTO agreements include provisions dealing with environmental concerns. Environment issues have also been addressed in GATT Article XX (b) and (g) as part of general exceptions. Post Uruguay Round in 1994, a Committee on Trade and Environment (CTE) was established in the WTO with the broad mandate to promote an understanding of the relationship between trade measures and environmental measures for achieving sustainable development.

The Doha Ministerial Conference, 2001 adopted a declaration para 31 & 32 of which deals with trade and environment.

Action Taken

India believes that trade and environment should be mutually supportive with the objective of achieving sustainable development. Identification of environmental goods has been at the core of the negotiation process so far. Developed countries have adopted "list approach" for seeking tariff reduction on environmental goods. India submitted an alternate approach, called “Environmental Project approach" to the CTE which clearly identified environmental benefits and eliminates, dual or /and multiple uses. The approach brings in synergy between environmental goods and services and was supported by the developing countries.

India also proposed that longer time frames for compliance should be accorded to products of interest to developing country Members so as to maintain opportunities for their exports.

Trips agreement and Convention on Biological Diversity (CBD)

India, and other developing countries, has been raising the issue of protection of traditional knowledge and the relationship between the CBD and the TRIPS Agreement for the last few years in the WTO. India along with other developing countries has demanded inclusion of “disclosure requirements” in the patent applications. For that a proposal to amend the TRIPS Agreement (by inserting Article 29bis) was submitted to the Trade Negotiations Committee (TNC) and to the General Council on 31st May 2006.

3. Bilateral Cooperation

Advisory Services in Environmental Management (ASEM)

In the Environment Sector, GTZ and the Ministry of Environment and Forests of the Government of India (MoEF) have established a new structure called Advisory Services in Environmental Management (ASEM) to address to various identified environmental concerns. The new structure is within the scope of the bilateral negotiations between the Republic of India and the Federal Republic of Germany held on September 5, 1996 in pursuance of the Agreement of 31 December 1971 between the two Governments regarding Technical Cooperation as amended by the Arrangements of 8th February/1st March 1979.

(b) Canada – India Environmental Institutional Strengthening Project IN / 29021

Canada – India Environmental Institutional Strengthening Project is a Five-year project funded by Canadian International Development Agency (CIDA) with assistance grant of Canadian Dollar 4.73 million (Revised Budget Canadian Dollar 3.983 million by virtue of Interdepartmental Administrative Agreement signed by Environment Canada and CIDA during year 2000

(c) Asia Pacific Partnership on clean development & climate

The partnership aims at developing, deploying and transferring cleaner, more efficient technologies to meet nationally designed strategies for pollution reduction, energy security and climate change concerns consistent with the principles of the UNFCCC.

III. Regulatory Mechanism

Three Acts and seven set of Rules in place in the area of environment management are relevant which are as follows:-

- The Wild Life Protection Act, 1972 amended 2002
- Environment (Protection) Act, 1986
- The Environment (Protection) Rules, 1986
- The Manufacture, Storage and import of Hazardous Chemical Rules, 1989 amended 2000
- The Hazardous Wastes (Management & Handling) Rules, 1989 amended 2000, 2003
- The Manufacture, Use, Import, Export and Storage of Hazardous micro-organisms Genetically engineered organisms or cells Rules, 1989
- The Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996
- The Bio – Medical Waste (Management and Handling) Rules, 1998 as amended 2000 and 2003
- The Ozone Depleting Substances (Regulation) Control Rules, 2000
- Biological Diversity Act, 2002

IV Schemes / Programmes

Following 5 on-going schemes can cover some of the activities that need to be undertaken under the conventions :-

S.No.	Name of the Scheme	Objective	10th Plan Outlay
1.	Hazardous Substances Management	Support infrastructure for disposal of Hazardous waste Municipal Solid waste	35 crores
2.	Development and Promotion of clean technology	Development and Promotion of Clean Technologies Development of tools and techniques for pollution prevention. Formulation of strategies for sustainable development.	25 crores
3.	National Natural Resources Management System (NNRMS)	To examine and identify the key issues in the management of Bio-resources and Environment using Remote Sensing	5 crores
4.	Biodiversity Conservation Scheme	Support to institutions including National Biodiversity Authority for the conservation of Biodiversity. GEF-World Bank Capacity building	12 crores

		project on Bio-safety.	
5.	Adaptation and Capacity Building project on Climate Change	To undertake climate change capacity building activities to enable the stakeholders to mainstream climate change concerns in the formulations of developmental strategies, risk assessment and adaptation to address consequences of climate change as well as to enhance awareness and encourage friendly development process. The scheme also addresses India's commitment under the UNFCCC and enhancement of international cooperation in pursuance of objectives of UNFCCC.	30 crores

V. Information, R & D and Technology

Access to environmental information is a principal means by which environmental conscious stakeholders can evaluate compliance of environmental standards, legal requirements and compliance to international environmental regimes.

Key & critical Areas of Research

- Improved understanding of the exposure, sensitivity, adaptability and vulnerability of physical, ecological and social systems to climate change at regional and local level.
- Evaluation of climate mitigation options in the context of development, sustainability and equity at regional, national and global level in different sectors (energy and non-energy).
- To develop sustainable and equitable international protocols, mechanisms and financial arrangements to promote mitigation and adaptation to achieve the goals of Article 2 of the UNFCCC.

Climate Change and Adaptation: Some of the critical areas of research are:

- Generation of high resolution regional climate change scenarios and investigating its impact on the Indian monsoon and on extreme climate event
- Generation of future GHG emission , vulnerability including Agriculture and adaptation scenarios for India
- To study the impact of climate change on the water resources, drought and flood, forests and natural ecosystems, human health etc. and to develop adaptation strategies.
- Integrated model development for assessment of impacts on energy sector including energy and infrastructure and urban policy Infrastructure response

VI. Awareness

Enhancing environmental awareness is essential to harmonise patterns of individual behaviour with the requirements of environmental conservation. Awareness involves internalization of environmentally responsible behaviour and enhanced understanding of impacts of irresponsible actions to public health, living conditions, sanitation etc.

Action Plan

Develop and operate an online, real time, publicly accessible environmental information system to provide all relevant information on key environmental resources and parameters, including ambient quality, aswell as major point sources of pollution, and make archival data available in convenient format.

Further promote the use of Remote Sensing data to provide valuable inputs on the extent and quality of forests, wildlife habitats, biodiversity, wastelands, wetlands, groundwater, deserts, rivers, etc., and monitor pollution and its impacts.

Prepare and implement a strategy for enhancing environmental awareness among the general public, and special groups, by professional production and airing of information products through diverse media catering to the different target groups.

Conduct National workshops on Conventions to secure national interest in partnership with industry

VII. Recommendations

A. General

- Set up a permanent mechanism to ensure compliance of our obligations under various Conventions.
- Maximize capacity and resources to enhance and enable implementation of our commitments under MEA's.
- Mobilise and utilize national, bilateral and multi lateral resources to fulfill commitments under MEA's.
- Enhance cooperation and provide leadership in the region to address issues of environment management under MEA's (SAARC, ASEAN, NAAM).
- Create climate for pro active participation rather than reactive in MEA negotiations and amendments.
- Encourage Research, Development and Documentation of issues and technology arising and likely to arise from Multilateral Agreements / Negotiations etc.
- Review the body of existing legislations in order to incorporate evolving international regimes to enable compliance.
- A chemical convention cell be established to ensure timely compilation and yearly submissions.
- An exclusive website for chemical convention be launched and maintained.

B. Specific

1. Bio Diversity

a) Ensure the conservation of biodiversity and human health when dealing with Living Micro Organisms (LMO's) in transboundary movement in a manner consistent with the Bio Safety Protocol.

b) Review the regulatory processes for LMOs so that all relevant scientific knowledge and international regimes are taken into account, and ecological, health, and economic concerns are adequately addressed.

c) Periodically review the National Bio-safety Guidelines, and Bio-safety Operations Manual to ensure that these are based on current scientific knowledge and international understanding.

(d) We may support the development of People's Biodiversity Register and Indian Biodiversity Information System (IBIS) during the Eleventh plan. Towards this, the National Biodiversity Authority has prepared draft proposals and projected a cost of approx. Rs. 3.50 crores or preparation of PBRs and Rs. 4.85 crores for the pilot project on IBIS.

(e) The Patent Act, 1970 provisions needs to be harmonized with the Biodiversity Conservation Act in particular to enable local communities holding traditional knowledge of use of such biological materials to benefit from providing access to such knowledge.

(f) Revision of guidelines for wetland conservation and management scheme alongwith sustainable regulatory regime is required.

2. Climate Change

a) Adherence to the principle of common but differentiated responsibilities and respective capabilities of different countries in respect of both mitigation of GHGs, and adaptation measures.

b) Reliance on multilateral approaches, as opposed to bilateral or plurilateral or unilateral measures.

c) Equal per-capita entitlements of global environmental resources to all countries.

d) Over-riding priority of the right to development.

e) Identify key vulnerabilities of India to climate change, in particular impacts on water resources, forests, coastal areas, agriculture, and health.

f) Assess the need for adaptation to future climate change, and the scope for incorporating these in relevant programmes, including watershed management, coastal zone planning and regulation, forestry management, agricultural technologies and practices, and health programmes.

g) Encourage Indian Industry and municipal bodies to participate in the Clean Development Mechanism (CDM) through capacity building for identifying and preparing CDM projects, including investment.

h) Participate in voluntary partnerships with other countries both developed and developing, to address the challenges of sustainable development and climate change, consistent with the provisions of the UN Framework Convention on Climate Change.

(i) Provide assistance to ozone depleting solvents consuming industries particularly the CTC and those engaged in servicing ODS based refrigeration equipment and promotion small and medium enterprises.

3. Hazardous Wastes

- An action plan for efficient, cost effective recycling and disposal strategy for electrical and electronic waste be drawn up
- Recommendations in the Expert Committee Report on ship breaking be implemented
- Basel ban and Basel Protocol be studied for ratification.
- Amendments to exclude recyclables from the Hazardous Waste (Management and Handling) Rules, 1989, amended 2000, 2003.

4. PIC

- A legislation or amendments to existing legislations to implement the provisions / obligation of the convention be notified.
- A study to document status of 41 chemicals now covered be conducted.
- A National Action Plan for implementation be drawn up.

5. POP

- National Implementation Plan preparation be completed by 2008.
- Investment projects be drawn up in parallel.
- Status of new POPs, POP's covered under OSPAR & LRTAP in the country be got prepared.

6. SAICM

- A work plan prioritizing the activities in the Global Action Plan{ GPA} for the country be drawn up.
- An Inter-ministerial Coordination Committee be established to ensure timely action and implementation.

7. WTO Agreement

- On the issue of reduction/elimination of tariff and non-tariff barriers to environmental goods and services, India's suggestion of "Environmental Project Approach" (against List Approach) needs to be pursued vigorously, as the approach brings in synergy between environmental goods and services.

- Environmental measures should be based on the criteria of sound science, transparency and equity and the same should not be used restrict market access of developing countries. Participation of developing countries in developing these environmental measures needs to be ensured.
- Provision of technical and financial assistance, on concessional and preferential terms, to mitigate any adverse effects of environmental measures on market access of developing countries.
- Suitable amendment of TRIPS Agreement, by Inclusion of "disclosure requirements" in the patent applications, to make it compatible with the CBD.

ANNEXURE-VIII

REPORT OF THE SUB-GROUP ON REGULATORY MECHANISM

Restructure regulatory institutions

Strengthening of the regulatory institution is urgently required if we are to stop and reverse the levels of pollution and natural resource degradation in the country. The base of the regulatory institution must start at the municipal level to tackle the pollution created by municipal, transport and infrastructure sources. Similar institution is required in rural areas to regulate overuse of groundwater, promote environmentally sound agricultural practices, promote sound waste disposal and proper sanitation practices. Strengthening of the environment regulatory institution can be achieved by strengthening the role and authority of municipalities and Panchyati Raj Institutions (PRIs).

We need to strengthen SPCBs and CPCB not only to meet the existing mandate but also to expand their scope of monitoring and regulation. The strengthening agenda must go hand in hand with the reform agenda – the agenda to reform the existing institutional structure. We should seriously think about converting SPCBs into autonomous agencies and CPCB into oversight agency.

It is proposed that during the 11th Five Year Plan, a detailed study to assess the status, strength and weakness and regulatory demand-supply gap of the SPCBs and CPCB must be undertaken. Based on this assessment report, a feasibility study to deepen, reform and strengthen the environment regulatory institution should be undertaken. The outcome the study should then be introduced in the phased-wise manner.

Expand regulatory programme

The existing regulatory programme needs to be expanded to include diverse sources of pollution. Apart from rigorously regulating the large industrial establishments, the regulation must extend to small and medium scale enterprises, municipal sources of pollution (including landfill sites and wastewater treatment plants), commercial establishments generating wastes and pollution, transport sector, construction activities etc. The regulation must also extend to product, packaging and disposal regulation.

Expand regulatory toolkit

Regulations need not be command and control alone. In fact, we need to have different regulatory regimes to suit diverse and different sources of pollution. We need to introduce new toolkits involving a mix of command and control, economic, market and society-based instruments to regulate and control pollution. It is important to note that in case of negative externalities, credible threat of enforcement and penalties is the most essential tool. Other

regulatory instruments are designed to supplement the command and control and not to replace it.

To start with, we need to add financial penalty as a tool of deterrence for non-compliance in the existing regulatory regime. In repeated non-compliance cases only, closure notice or criminal case should be filed. In the rest, proportionate financial penalty should be charged. It is important to note that till the point the amount of financial penalty is lower than the cost of compliance, non-compliance will flourish. Therefore, the financial penalty and hence the cost of non-compliance must be higher than the cost of compliance to become an effective tool.

For SMEs, we need to introduce a package of tools comprising of focussed enforcement, financial incentives, outreach and compliance assistance.
Economic instruments can be best applied in case of product, packaging and disposal regulation. Economic instrument like resource pricing and pollution taxes are also extremely useful tools. But to do this will require change in the existing concentration standards to load-based standards and assessment of the assimilative capacity of the discharge media. During the 11th Plan, we can pilot test pollution taxes and resource consumption taxes in some very polluted river stretch. For instance, we can test it on industries and municipalities discharging wastewater in Yamuna.

For large-scale industries, market-based instruments like, voluntary compliance programme coupled with public rating projects will be most effective. For highly rated companies, incentive systems can be introduced to push further improvements.

Revisiting Environmental Taxes

During the last three decades of evolving environmental policy in India, the name of the game was and currently is pollution control. The regulatory approach has assumed the generation of industrial waste as an inevitability, which should be treated and disposed – this is the command and control solution to pollution. Frankly, there is nothing wrong with this approach.

Improving the resource consumption efficiency would require appropriate 'resource pricing' and appropriate 'environmental taxes'. Pricing can be influenced either directly via taxes or charges, or indirectly via regulatory constraints or tradeable permits. The latter options tend to involve high administrative and monitoring costs and are therefore unlikely to work effectively in India. Hence, the choice seems to favour direct pricing of ecologically important input factors and taxing and controlling pollution and use of polluting inputs. Taxing chlorine and mercury is certainly much easier than monitoring chlorine emissions and monitoring mercury in effluents of chlor-alkali plants.

Pricing ecologically important input factors and taxing pollution

The high water consumption in Indian industry is directly related to the lower water price. The water cess in India is Rs 0.10-0.40 /m3. It is Rs. 90/ m3 in the UK; Rs. 76/ m3 in Canada; Rs. 21/ m3 in the US. It is therefore not surprising that water productivity in the UK is US$ 443.7/ m3, whereas it is just US$ 7.5/ m3 in India. Pathetically low water price is probably the single most important factor influencing the water pollution from Indian industry. If we

really want wastewater to be recycled and reused within the plants; increasing the water price is the only practical option. By designing 'burden neutral water price' we can do this without hurting industrial growth. Government can give equivalent tax relief in some area. Similar neutral price and tax structure can be introduced to reduce other resource consumption intensities and pollution. If such green taxes were introduced in a revenue-neutral manner, we would have an ecological tax reform rather than the imposition of additional taxes. It would result in gradually driving wasteful technologies, resource consumption patterns out of the market.

Improve and expand regulatory standards

The existing regulatory standards are not in tune with the changing technology or the assimilative capacity of the environment or the diverse nature of the source of pollution. Our regulatory standards are first-generation standards and needs massive changes. Today, even if individual industries are able to meet the regulatory standards, the total pollution generated by all industries will still overwhelm the natural environment. This is because the cumulative loads are becoming far higher than the assimilative capacity of the environment. This is the precise reason why most Indian rivers are polluted and so is the air of most Indian cities. There is therefore an urgent need to develop and implement load-based standards that is in tune with the assimilative capacity of the local environment. This would be the most beneficial standard.

Today conventional indicators of pollution are no more sufficient. Regulations must shift to monitoring and regulating toxins. For instance, we must quickly setup mercury emission standards for all plant using coal. Similarly, we must also set standards for SOx for power plants using imported coal with higher sulphur content.

There is an urgent need to introduce product and packaging standards. We can start by regulating products containing heavy metals and hazardous chemicals. We also need to develop packaging standards. In most developed world, the role of chemical regulation has been given to the environment regulatory authority. We need to do the same. For instance, Indian paints still use lead and Trichloroethylene is still widely used as solvent.

During the 11th Five Year Plan we must review our existing regulatory standards and move towards load-based standards. Standards must also recognize the difference between old and new establishments and small and large establishments. Flexibility must also be given to the state regulators to introduce strict standards in case the assimilative capacity of the environment is being exceeded. We must also move towards formulating systems to regulate products, chemicals and packaging.

Environment Protection should be a priority in the Union Budget and all Key Government Policies

Clean technologies and environment-friendly products and processes should be promoted through appropriate prioritization/ incentivisation in the Union Budget. All key government policies should also have strong component of environmental safeguards and scrutiny. Environmental protection and social development should in fact be part of all ventures of economic progress

Structured approach for Environmental Policy/ Law making and Review of Existing Acts/ Regulations

Environmental law making process should have a uniform and structured approach in every case. This will not only be important from the view point of ensuring transparency, accountability, consistency, efficiency and effectiveness but also help in achieving the overall objective of improved compliance. The structured approach knows as "Regulatory Impact Assessment" (RIA) should take into account: i) Options to law making ii) Cost benefit analysis iii) Stakeholder involvement, iv) Enforcement and Compliance. Existing acts/ rules should also be reviewed at regular intervals through RIA and their effectiveness should be checked.

Policies to promote Public Private Partnerships (PPP) in the areas of Municipal Water Supply and Management of Urban Liquid and Solid Wastes

The municipal sector requires investments worth several thousand crores of rupees for creating requisite infrastructure for municipal water supply and to cope with the mounting domestic sewage and garbage. So far, government support was not enough to meet the requirements. If we want to save our already stressed cities/ towns as well as water bodies from further decay and deterioration, we need to think of alternatives to government support. Public Private Partnership (PPP) can be one such alternative through which investment in this sector can be sought.

It is also suggested that enabling provisions in the existing laws and regulations (including local/ municipal laws) are to be ensured to allow PPP for creating environmental infrastructure like sewage treatment plants, water supply systems and 'waste to energy' projects. The municipal sector could also be incentivised through tax concessions/ holidays for making it lucrative.

Policies/ regulations to encourage use of alternative and pro-active approaches such as Market-based and Economic Instruments, Voluntary Environmental Agreements and Beyond the Compliance Initiatives

The alternative strategy includes promotion of tools like Market-Based Instruments and Economic Instruments, voluntary adoption of Environment and Occupational Health and Safety Management Systems (as per ISO 14001 & OHSAS 18001), green procurement, clearer production/ fuels, life cycle approach, product stewardship, design for environment etc. The government policies should orient in this regard to promote the voluntary/ market-based approaches. This would not only put less stress on the government exchequer/ machinery for enforcement but benefit the society/ environment as a whole.

Policy and Law-review & reform

This is an imperative need.

- to ensure policy, legislation and implementation follow a seamless & logical path;
- to accommodate & internalize judicial pronouncements and international commitments;
- to bring in cohesion, overcome overlaps, avoid inconsistencies, conflicts and contradictions;

- to make sectoral approach give way to an integrated , coordinated and holistic approach- both in law-making and law enforcement (-forest, Wildlife and Biodiversity laws);
- to restore primacy to EPA and to make it a truly an overarching and umbrella law to guide, steer , enable and facilitate better environmental governance;
- to reform laws as to make them absorb the Constitutional spirit of decentralized governance(- role for local bodies- both in administration and justice dispensation-

Recommendation of the Law Commission for "Nyaya Panchayats" and for the constitution of "Environmental Courts" etc.),governance as a participation and a participatory process(- administration of 5th and 6th Scheduled Areas,PESA,1996 etc.); ensure people's participation(- the model of Community Monitoring and Implementation practised in some of the western systems as to Pollution control- extendable to Natural Resource management etc.); explore feasibility of introduction of Economic instruments; involvement of Voluntary Groups, Expert Bodies , Research Institutions in governance(-models of the kind provided by CITES etc.);fulfil international obligations(- Ramsar Convention etc.) and explore scope for Public-Private Partnership etc. and to repeal outdated laws and legal provisions(- like, the "Right to Pollute" under Indian Easements Act) etc. ;factor in social, cultural and ecological concerns(- like meeting basic needs and livelihood requirements, addressing questions of identity ,ecological cultural traditions and ecological integrity) etc.; to ensure policies and laws would remain in dynamic ferment and to codify and consolidate the existing corpus of Environment and environment-related laws.

Legislation-specific recommendations :(-by way of illustration- not to be considered as exhaustive set of recommendations)

EPA,Water Act & Air Act:

- Ensure EPA as the real overarching law, as to inform and influence all developmental decisions and absorb the content and intent of the decision given by the Supreme Court, way back in early nineteen nineties, in Tarun Bharat Sangh, Alwar vs.State of Rajasthan.
- Recast and reclassify all the Rules, Notifications and Authorities created under EPA.
- Make provision for creation of an Expert Body(- comprising of Economists, Ecologists, Planners, Anthropologists and other social scientists) to aid and advice the authorities under these legislations to assess the cost of ecological restoration and improvement and recover the same from those engaged in developmental activities(- this is to overcome the existing lacuna in the law, highlighted by a series of decisions given by the higher judiciary, especially the Gujarat High Court, in which the Courts started levying monitory penalties in an arbitrary fashion)
- Re-design EIA law as to facilitate developmental activities that do not do violence to Ecological integrity and not the other way round.
- Clearly stipulate the qualifications for the Chairman of the Pollution Control Boards- to minimize scope for political appointments(- this has, indeed , been the matter of contention in a no. of judicial pronouncements);

- Make provision for creation of Community Monitoring Cells- to subject samples for analysis and report deviances.

Biodiversity -Related Laws:

In the light of series of orders passed by the S.C (T.N.Godaverman's case), new and not so new legislative efforts (PESA, S.C, Protection of Forest Rights Bill, Biodiversity Act, PPVFRA etc.) need exists to re-look, revamp, reform and align existing Forest and Wild Life legislations-This is all the more urgently necessary as there are enough indications of the emerging IPR Regime overwhelming all the Green-laws currently in force in India.

Environmental Governance

There is need to revamp the scheme and structure of Pollution Control Boards(- which were originally not designed to take on the functions of various bodies constituted under EPA Rules, Notifications and Authorities) and Forest and Wildlife Authorities (- which, need have to deal with issues referred under Biodiversity-related laws- Forest Village communities to be part of Administration);Communities to be engaged in Monitoring activities and in enforcement, in a limited way; creating avenues for the utilization of the talents of Voluntary Groups, Research Institutions and Corporate entities.

Environment Management Service

Creation of a pool and cadre of professional manpower (-as visualized in The National Conservation Strategy and Policy Statement on Environment & Development, 1992)

NCEPC (-National Committee on Environment Planning and Coordination)

As early as in the 4th Plan Document, the need for establishing a national body to bring about greater coherence and coordination in Environmental Policies and Programmes and to integrate environmental concerns in the plans for economic development, was made. Need for the reappearance of such a body now than at any other time, requires no emphasis.

Capacity –Building in environmental Laws

This is yet another imperative need. Building the legal capacity in the Environment Management Service, Activists, Adjudicators, Academics, Media and the Civil Society through specially designed curricula and tools of training, requires a fresh thought and explore avenues for implementation.

State of Environment report

This is required to be entrusted to an independent Research and Academic Institution. To be prepared annually, it should, while reflecting the realities and serving as a tool for training, be a document strategizing corrections and refinements required for better governance for the subsequent year. Such a publication is a must as that would, besides satisfying the requirements of Right to Information Act, provide the much needed access to authentic environmental information and over a period of time gives a clear picture as to the progress or otherwise made concerning Environmental Management in India.

Legal Cell equipped with Environmental Legal Professionals

Within MoEF- this was in existence in early Nineteen Eighties-ironically, it does not exist now when there is a flurry of activity in both the law-making and litigation front.

Environment Justice Delivery

Scrapping the Environment Tribunal Act and Environment Appellate Authority Act and enacting a law to constitute Environmental Courts, at the regional level, as recommended by the National Law Commission deserves serious consideration. Time, it is submitted, is ripe for such a thought and action.

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