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Successful Models of Implementation of Environmental Policies and Programmes in States

Submitted to

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Acronyms

AAQ	Ambient Air Quality
BMW	Bio Medical Waste
CBMWTSDF	Common Bio Medical Waste Treatment Storage and Disposal Facility
CEPI	Comprehensive Environmental Pollution Index
CETP	Combined/Common Effluent Treatment Plant
CGWB	Central Ground Water Board
CHWTSDF	Common Hazardous Waste Treatment Storage and Disposal Facility
CPCB	Central Pollution Control Board
EPI	Environmental Performance Index
HW	Hazardous Waste
ICT	Information and Communication Technology
MoEF	Ministry of Environment and Forests
MSW	Municipal Solid Waste
NAAQS	National Ambient Air Quality Standard
NWMP	National Water Quality Monitoring Programme
PPP	Public Private Partnership
SPCB	State Pollution Control Board
SWMP	State Water Quality Monitoring Programme

Executive Summary

Planning Commission commissioned a study to identify and assess the *Successful Models of Implementation of Environmental Policies and Programmes in States* to:

1. Assess the status of implementation of environmental policies and programmes by States
2. Enumerate the factors for successful implementation
3. Recommend measures for efficient implementation by States
4. Recommend measures to remove critical infrastructural gaps

PRESTELS, a leading environmental and safety consultancy, was appointed to conduct the study at behest of the Planning Commission. The scope of this study is restricted to policies, regulations and programs implemented at the state level by the State Pollution Control Boards or the state environmental department. We also focus on environmental pollution related matters and exclude natural resource management, biodiversity, and climate change from our review. A major limitation of the study is lack of primary or secondary data to make the assessment and provide recommendations. Eight out of 35 states and Union Territories responded to the questionnaires sent by the planning commission and PRESTELS and Maharashtra PCB also provided feedback through an in-depth interview. PRESTELS also relied on publically available secondary data and reports in the assessment. Given the above limitation of the information, the recommendations of this study are generic.

Table 1 below describes examples of successful programs and policies at the state levels that we have identified. We have organized these in three broad themes: ICT and technology, resource management, and regulatory and government structure.

While systematic assessment of factors responsible for success of the programs listed in the table below is not possible using data and information accessible, some unifying themes emerge as follows:

1. **Better resource management:** overcoming resource constraints by use of ICT, technology, outsourcing, and collaborating with other government departments.
2. **Process re-engineering:** The processes are modified to maximize their impact on environmental protection. For example, Rajasthan prioritize prosecution of gross violators where the justice can be swift. Gujarat has provided incentives for objective and honest third party audit of environmental statements. The key elements of modified process seem to be less reliance on human involvement, collaboration with other agencies and industry, and integrating ICT with logical checks / intervention by the department.
3. **Political will:** A key and arguably the most critical factor identified was that of political will measured in terms of questions posed by legislative assembly to the SPCBs, activism of NGOs, and role of media.
4. **Consumer centric approaches:** All successful models have a strong undercurrent of key stakeholder involvement such as the industrial organizations and research community.
5. **Reliance on science and technology:** Successful programs have included more recent pollution control technologies and research tools.

Table 1- Successful programs and policies and State level

#	States	Successful Models	Description
Use of ICT and Technology			
1	**TN**	**Online continuous monitoring or Air Pollution**	TNPCB has initiated the CARE AIR programme (Centre for Assessing Real Time Air Quality) for monitoring all the industrial emissions in real time and analyse the trend of emissions. Some key features are: • Data is reported online every 10 seconds • Data validation by the software. • Alarm Value is set as per NAAQS • Exceedance triggers off an Email and SMS to the industrial unit
2	**Gujarat**	**Xtended Green Node software, online consent management**	GPCB developed web-based software application–XGN–for the day to day operations. Besides the primary use for consent management, it has e-communication through SMS, e-Talk, e-Message Box and Alerts. Queries in the form of SMS & immediate replies results in speedier disposals. XGN enables legal actions like show cause notices, closure directions & revocation orders. It also facilitates online payment of consent fees and Water Cess. Revenue of GPCB increased from 28 Crores to 76 Crores in the first two years of operation. The programme is a recipient of the National e-governance Award 2010 for Re-Engineering of Processes. This system has been replicated and being used by other states including HP, Uttaranchal, Goa, Andhra Pradesh and Madhya Pradesh.
3	**Maharashtra**	**GPS system to track BMW vehicles**	MPCB has implemented a GPS based vehicle tracking system in the BMW transportation vehicles to ascertain the real time, geographical position of the movement of the vehicles. This has lead to significant improvement of waste collection efficiency due to more stringent monitoring. Adoption of PPP model has increased accountability.
Resource Management			
4	**Maharashtra, Gujarat**	**Third Party Outsourcing**	MPCB has outsourced Air Quality Monitoring to educational institutions which have improved the monitoring efficiency as well as objectivity. GPCB also has a third party monitoring scheme for industrial effluent quality monitoring. Gujarat also has third-party environmental audit scheme, wherein industries from the most polluting sectors must retain an approved auditor to report pollution readings to the GPCB and to recommend improvements to industry practices. This scheme is in addition to the regular GPCB inspection system. To strengthen this scheme and make it more transparent GPCB implemented a pilot that modified the scheme so that the auditors were paid from a central pool, rather than directly by the firms, and randomly assigned to each industry, rather than being chosen by the industry. Back-checks by independent local technical university was also done

#	States	Successful Models	Description
5	**Punjab, AP**	**CETP with Zero discharge**	PPCB has been instrumental in facilitating the installation of Zero Liquid Discharge (ZLD) in 8 large/ medium scale electroplating industries. All the small scale electroplating industries (approx. 550 no.) have also joined to establish a Combined Effluent Treatment Plant (CETP), based on zero liquid discharge technology. In Andhra Pradesh, the APPCB has promoted ZLD for pharmaceutical industries in clusters around Hyderabad city
Regulatory and Governance Structure			
6	**AP**	**Single Window clearance**	The Andhra Pradesh Industrial single window clearance Act, 2002 came into effect from 2002. Similar facility is made available by Government of Maharashtra and Gujarat. Single window clearance has resulted in ease of application as well as speedier processing f applications (mainly due to their completeness) by State PCBs
7	**Tamil Nadu**	**Subsidy for Petrol to LPG switch to autos**	TNPCB is offering a subsidy of Rs.3000/- per LPG Auto to encourage switching over from Petrol to LPG. This has so far resulted in 8525 Autos making the switch
8	**Gujarat, AP**	**Extended consent to operate to ISO 14001 firms**	Both Andhra Pradesh and Gujarat have a policy for extension of the period for consent to operate for ISO 14001 certified industries.
9	**Karnataka, Andhra Pradesh**	**Local and regional level boards and authorities for environmental protection and management**	KPCB and APCB have constituted sector specific bodies such as biodiversity board, lake development authority, district coastal zone authority. This organizational structure has lead to better management of pollution control.
10	**Maharashtra**	**Collaboration with other agencies for pollution monitoring**	Cities of Chennai, Delhi, Bangalore and Kolkata have piloted schemes in collaboration with transport department and society of Indian automobile manufacturers for PUC enforcement. PUC emission test results are sent to a central system where the clearance to print the PUC is given only if the standards are met. MPCB has initiated a Water Quality Monitoring Network in Maharashtra with other agencies such as Groundwater Survey and Development Agency (GSDA), Central Ground Water Board. Such network has enabled MPCB to more than double the number of sampling locations and obtains reliable data.
11	**Goa**	**Policies for the hotel and tourism Industry**	GPCB has implemented mandatory regulations for on-site treatment of organic waste generated from star rated hotels. The requirement of obtaining consent to operate under the air and water acts have been extended to various tourist establishments such as floating casinos, cruise boats etc.
12	**Madhya Pradesh, Andhra Pradesh**	**Green Tax for old vehicles**	MPPCB has proposed implementation of Green Tax on old vehicles for control of vehicular pollution in urban areas and phasing out of old vehicles. APPCB has also implemented green tax on old commercial vehicles.

Based on identification of some critical factors believes to be responsible for success of environmental policies and programs, we have identified a general approach which States can adopt for successful implementation of policies and programs as follows:

1. Prioritize implementation of Environmental Programs and Policies of the States.
2. Conduct back ground research and planning
3. Use of ICT and modern research/technology tools
4. Involve stakeholders in design and implementation

A critical requirement of the report is to provide a road map to address gaps in scaling up successful programs to other states. As a main recommendation of this draft report, we suggest that the overall findings be discussed in a workshop that include experts from SPCBs, CPCB, MoEF and Planning Commission to recommend more specific steps for replication and scaling up of programs. Such a workshop can also help in identifying reasons or factors critical for success. The findings from this workshop will be a key input to the final report and to conclude the study successfully.

1. INTRODUCTION

1.1 Research Questions

The initial terms of Reference for the study – 'Successful Models of Implementation of Environmental Policies and Programmes in States' specified the following key tasks -

Task 1 - To assess the status of implementation by States, Policies and Programmes on Environment so as to identify successful Endeavour/models

a) What are environment related policies and programmes calling for the State level implementation

b) Which are the States where the state of implementation of (a) above is better than the rest?

Task 2 - To enumerate the reasons/causes that has led to successful implementation models so as to replicate the successful model in other States

c) What are the instances of successful implementation of Environment related Policies and Programmes in the States identified in (b) above

d) What are possible reasons, causes, traits that have led to the successful implementation in (c) above?

Task 3- To recommend measures for efficient implementation by States of environmental policies and programmes of (Sectoral Ministries) keeping in mind various constraints at the grass root level

e) What aspects of (d) above are replicable in other States?

f) What are other aspects that can be adopted by States keeping in mind various constraints at grass-root level?

g) List of feasible recommendations to enable efficient implementation by States of Environmental policies and programmes

Task 4- To recommend measures to remove critical infrastructural gaps under at a time bound programme

h) What are the most critical infrastructural gaps that hinder effective implementation of Environmental policies and programs at the state level?

i) List of recommended priority for removal of infrastructural gap under a time bound program.

1.2 Scope of this review

Based on the initial terms of reference and subsequent discussions held with the Planning Commission in September 2011, the scope of this study is restricted to policies, regulations and programs implemented at the State level by the State Pollution Control Boards or the state environmental department. We exclude national policies or regulations that are routinely implemented by the States except any innovating or successful implementation of these policies that States themselves identify. We also focus on environmental pollution related matters and exclude natural resource management, biodiversity, and climate change from our review.

1.3 Limitation of the study

A major limitation of the study is lack of relevant and complete information to make robust recommendations. We have instead been forced to rely more on secondary sources of information (data and reports) available on public websites. Only 8 out of 35 States and Union Territories responded to our questionnaires in spite of several reminders including a letter directly from the Planning Commission. In absence of primary data, we relied on CEPI and EPI indices to identify better performing States including Maharashtra, Tamil Nadu, Gujarat, Andhra Pradesh and Karnataka. Other States such as Punjab who contributed success stories with us are also reviewed. Only Maharashtra provided additional information over phone and in person. While several attempts were made to have telephonic discussions with other State Pollution Control Boards, including Gujarat, Tamil Nadu and Andhra Pradesh, the boards were not comfortable conveying information over the phone. Karnataka and Punjab pollution control boards have responded to Questionnaires circulated earlier.

Given the above limitation of the information we have, the recommendations of this study are more generic in nature. We have attempted to identify the critical factors for success. We believe that a discussion of these preliminary findings in a workshop setting may provide further specific insight into critical factors for success and how to scale up the successful models. We have proposed a workshop of key SPCBs, CPCB, MoEF, and Planning Commission personnel to discuss these findings.

1.4 Organization of the report

This report has been organised in two main sections. Section I Presents the summary of the analysis and findings based on secondary research as well as feedback received from questionnaires and interviews. Recommendations for replication of best practices have also been elaborated in this section.

Section II elaborates on the detailed State wise analysis done based on the Environmental Performance Index (EPI) and the Comprehensive Environmental Pollution Index (CEPI) scores.

2. SUMMARY OF PERFORMANCE OF STATES

This chapter presents the summary of the findings from the analysis of EPI and CEPI scores of States as well as successful models of implementation of pollution control by States.

2.1 Top performing States based on EPI and CEPI scores

The States with better performance in enforcement of pollution control norms in Water, Air and Waste have been listed in Table 1 below. These States were considered for further study to understand the critical factors for success and making recommendations for scaling up.

Table 2 -States with better/above average performance in enforcement of key pollution control norms

	Water	**Air**	**Waste Management**					
States	Water Pollution EPI + CEPI)	Air Pollution EPI + CEPI)	Waste (EPI + CEPI)	MSW Rules (EPI)	Hazardous Waste Rules (EPI)	Bio-Medical Waste Rules (EPI)	Plastics Rules	Batteries Rules,
Andhra Pradesh	✓	✓	✓	·	✓	✓·		
Chandigarh	·	·	✓	✓	✓	✓		
Goa	✓	✓			×	✓	✓	
Gujarat	×	✓	×	✓				
Haryana	✓	×	✓	·	✓			
Karnataka		✓		×	✓			✓
Maharashtra	✓			✓		✓	✓	
Pondicherry		✓	✓		✓	✓	✓	
Tamil Nadu	·	✓				✓		

✓ - Top performer

× - Bottom performer

Key Observations

- Andhra Pradesh is a top performing State with consistent performance in water, air and waste pollution control. The 5 industrial clusters in AP under the CEPI study have an average CEPI score of 63.15 which is a better performance than other States with similar number of industrial clusters.

- States such as Haryana which has good performance in Water pollution control and Hazardous waste management has poor performance in air pollution control with an EPI ranking of 19. The average CEPI score of the 2 industrial clusters is also very high (74.49)
- Gujarat which has better performance in Air pollution control and MSW has below average performance in water pollution control and overall waste management with EPI rank of 18 (See Table 5)[1].
- In the States with more than four industrial clusters the States of Andhra Pradesh, Madhya Pradesh, Jharkhand and Karnataka are performing relatively better than other lesser industrialised States in pollution control with Average CEPI scores being less than 70 (See table 5)
- There is lack of adequate data on performance of States in Noise pollution control, enforcement of Batteries (Management and Handling) Rules, 2001 and The Plastics (Manufacture, Usage and Waste Management) Rules. However data posted on the websites of the SPCB's indicate that Karnataka has been proactive in initiating enforcement of the Batteries Rules and States /UT's of Maharashtra, Goa and Chandigarh have been proactive in initiating enforcement of the Plastics rules along with a few other States not included in the list above.

From the above shortlisted States, Maharashtra, Gujarat, Tamil Nadu, Andhra Pradesh and Karnataka were reviewed for successful models in pollution control. Besides the above States a few innovative models from other States have also been identified. The following chapters discuss these successful models and the scope for replication in other States.

2.2 Identifying Successful Models of Implementation of Policies and Programs

Our extensive web review identified a few examples of successful models of implementation, but most of these were typically on pilot scale and lacked information on the factors critical for success or indicators we can use to recommend improvements or address the gaps. The only feasible solution was to conduct interviews with the States. Given the lack of response to previous questionnaires which were detailed and quantitative in nature, we designed shorter and qualitative questionnaires. With help of Planning Commission we distributed the questionnaire to the shortlisted states and followed up with several telephone follow up calls. We could only visit Maharashtra State PCB in person. However, the rest did not volunteer any information on phone. Subsequently, after the draft report was shared with the State PCB's, we have received feedback from a few states including Andhra Pradesh, Madhya Pradesh, Goa and Tripura. The feedback received has been incorporated into this report as far as possible.

In spite of the above limitations, we have identified a few innovative and successful programmes and policies as described below. We have categorized these examples in five groups: (a) Use of ICT; (b) Water and Air Quality Monitoring systems; (c) State level Policies and Regulations; (d) Sector Specific Action Plans; and (e) Organisational and Resource Management.

[1] Gujarat as a highly industrialized state has been considered in this list as it is a top performer in Air pollution control and MSW.

2.2.1 Use of ICT

2.2.1.1 Web Based applications for consent management and monitoring

The use of ICT is seen in a few key areas of management by SPCB's, predominantly for consent management. ICT is used in varying degrees, ranging from online applications for consent to establish and operate, posting of status of consents granted or rejected, payment of consent fees and applicable cess, and submission of environmental statements.

XGN – Xtended Green Node developed by Gujarat Pollution Control Board

The Gujarat Pollution Control Board has developed and first implemented a software application - XGN – Xtended Green Node in 2008 which is a web enabled software for the day to day operations at any State Pollution Control Boards in India. This system has been replicated and is now being used by other States including H.P., Uttaranchal, Goa, Andhra Pradesh and Madhya Pradesh.

Besides the primary use for consent management, it has e- Communication Modules including SMS, e-Talk, e-Message Box & Alerts. Queries in the form of SMS & immediate reflection of replies results into speedier disposals. XGN enables legal actions like show cause notices, closure directions & revocation orders.

It also facilitates online payment of consent fees and Water Cess. Revenue of GPCB increased from 28 Crores to 76 Crores in the first two years of operation. The programme is a recipient of the National e-governance Award 2010 for Re-Engineering of Processes.

2.2.1.2 GPS for management of Bio-medical waste

The Maharashtra Pollution Control Board has implemented a GPS based vehicle tracking system in the BMW transportation vehicles of CBMWTSDF to ascertain the real time, geographical position of the movement of the vehicles. This has lead to significant improvement of waste collection efficiency due to more stringent monitoring. Adoption of PPP model in the CBMWTSDF has increased accountability in BMW management.

2.2.1.3 ICT for Monitoring Vehicular Emission

Computerized and networked PUC's are in operation or in planning stage in several cities including Chennai, Delhi, Bangalore and Kolkata. Pilots have been implemented successfully in Delhi. Once a vehicle is tested, the emission values are sent to a central system where the clearance will be given to print the PUC only if the values match the standard values. Networked systems will reduce human error in measurement and monitoring. The programme has been implemented by the Transport Departments in collaboration with Society of Indian Automobile Manufacturers.

2.2.2 Water and Air Quality Monitoring

Interventions in water and air quality monitoring include use of integrated approaches to monitoring, use of technology for real time monitoring and third party participation through audits and monitoring. The interventions by different States have been described below.

2.2.2.1 Integrated Water Quality Monitoring Network

MPCB has initiated a Water Quality Monitoring Network in Maharashtra with other agencies such as Groundwater Survey and Development Agency (GSDA), Central Ground Water Board. Apart from NWMP and SWMP programmes, under the Hydrology Project there are 6 regional laboratories namely Aurangabad, Nagpur, Nasik, Pune, Thane and Kolhapur where 93 stations are monitored monthly. GSDA and CGWB is monitoring groundwater in 35 districts at around 1400 villages.

Based on the monitoring data documented, actions plans have been developed for about 5 river basins jointly which will be implemented in collaboration with the district Collectors and Regional Offices.

2.2.2.2 Third Party Monitoring

MPCB has outsourced Air Quality Monitoring to educational institutions, which has led to increase in the monitoring efficiency as well as objectivity.

In Gujarat, a third party monitoring scheme has been launched by GPCB for industrial effluent quality monitoring. The inspection and sampling of industrial units is carried out by identified external agencies such as Engineering Colleges/Institutes with high credibility & technical strength. The monitoring will cover but not be restricted to the following points -

- Pumping sumps (wells) and manholes of the underground drainage system,
- CETP (at different stages)
- Streams passing through the identified cluster, etc.

2.2.2.3 Third Party Audit Scheme[2]

In 1996, the Gujarat high court ordered the Gujarat Pollution Control Board (GPCB) to set up a third-party environmental audit scheme, wherein industries from the most polluting sectors must retain an auditor to report pollution readings to the GPCB and to recommend improvements to industry practices. This scheme is in addition to the regular GPCB inspection system, which, due to insufficient manpower, does not inspect industries with the mandated frequency.

While the scheme was designed with all the usual safeguards, in this scheme the Auditors were still paid for by the industry leading to the fundamental conflict of interest which was highlighted by the chief justice, that consultants are still paid by, and therefore loyal to, the industries they audit. To strengthen this scheme and make it more transparent GPCB implemented a pilot that modified the scheme on an experimental basis. Auditors were paid from a central pool, rather than directly by the firms, and randomly assigned to each industry, rather than being chosen by the industry. Back-checks involving an independent team from a local technical university, taking the same pollution measurements as the auditor shortly after the audit visit were performed to ensure the validity of the audit report. Auditor's payments were based partly on their accuracy, as measured by the back-checks. The original high court order permitted all these changes and had even specifically proposed

[2] http://www.indianexpress.com/news/making-environmental-audits-honest/827310/

back-checks, though they had fallen out of the scheme over time. The difference in the reports submitted by the auditors working under the improved scheme, relative to under the traditional scheme, is striking. Auditors with incentives to be independent reported significantly and consistently higher pollution readings.

2.2.2.4 Real time industrial emission monitoring, CARE AIR Programme, Tamil Nadu

TNPCB has initiated the CARE AIR programme (Centre for Assessing Real Time Air Quality) for monitoring all the industrial emissions in Tamil Nadu on real time basis and to analyse the trend of emissions into the atmosphere. Some of the salient features are –

- This data is reported online every 10 seconds to the CARE AIR Centres
- Emission/Ambient Air quality data received online to the Centre is validated by the software.
- Alarm Value is set as per National Ambient Air Quality Standards / Emission Standards. Alarm is indicated as hoot and also as blinking signal in the screen.
- Exceedance of Standards triggers off an Email, SMS to the CEO and nodal officer of the Industry.

Real time continuous stack & ambient air quality monitoring systems are being implemented by other States such as Maharashtra, Andhra Pradesh and Madhya Pradesh in specific highly polluting industries such as Cement plants and thermal power plants.

2.2.3 Regulatory, Policy and financial Interventions

2.2.3.1 Pilot Emissions Trading Schemes in Gujarat, Maharashtra and Tamil Nadu[3]

India is to launch its first emissions trading scheme (ETS), an air-pollution reduction pilot programme in three States that may go national in future. The industrial States of Tamil Nadu, Gujarat and Maharashtra volunteered to take part in the scheme, which was officially launched by the Ministry of Environment and Forests on 23 March, 2011.

In its pilot phase, the scheme will target only suspended particulate matter (SPM) – emitted by industrial units in regional 'clusters' – but the government hopes to later include other air pollutants, such as sulphur dioxide (SO2) and nitrogen oxides. Participating industrial entities will begin installing continuous emissions monitoring systems with the assistance of state pollution control boards.

The pilot emissions trading scheme will cover 1,000 industries in close proximity to the largest metro areas in Gujarat, Maharashtra and Tamil Nadu. The industries will be selected by geographic area, sector and parameters like boiler capacity and fuel type that are indicative of capacity for pollution emissions. State Pollution Control Boards will determine the precise criteria for eligibility, and mandate / enforce the emissions trading scheme as the only form of regulation for particulate matter for all industries deemed eligible. The pilot scope will include a significant fraction of large particulate emitters in each metro area covered, which are a small share of all industries in each state.

[3] http://www.environmental-finance.com/news/view/1678

An ETS for air pollution would have the benefit of enabling lower pollution levels at lower overall costs of compliance. It would allow the regulator to set a cap on the aggregate level of pollution permitted and then allow a self-regulating mechanism to ensure that pollution does not exceed this cap. He said caps might also be set for individual units, so that excessive pollution by any one unit is discouraged.

Tamil Nadu Pollution Control Board CARE AIR program which is a continuous emission monitoring programme is a key prerequisite for emissions trading.

2.2.3.2 The A.P. Industrial single window clearance Act, 2002

The Andhra Pradesh Industrial single window clearance Act, 2002 was came into effect from 03.08.2002.

Single Window Clearances is a One Stop Shop for speedy processing and issue of various approvals/clearances/permissions required to set up the Industrial undertaking at Single Point with set time limits and deemed provisions if the competent authority fails to issue the clearance within the set time. The Act came into force with effect from 22nd June 2002. The CFE applications of SSI Units are filed at District Industries Centre (DIC) of concerned districts through single window clearances. Medium and Large Scale industries are filed at Commissioner of Industries (COI) Hyderabad. The DIC/COI forward the applications along with consent fee in the form of DD to respective Regional Office of APPCB for processing. The applications are verified and examined at field level. The applications are placed before CFE Committees existing at different levels to examine and recommend for the issue of CFE order. Similar facility is made available by Government of Maharashtra and Gujarat.

2.2.3.3 Consent fee to operate based on pollution load

Karnataka state pollution control board is in the process of formulating consent fee structure for consent to operate on the basis of pollution load under Water and Air Act rather than only size of investment especially from industries coming under red category. This kind of policy implementation has a replication value and hence can be considered as successful.

2.2.3.4 Subsidy scheme for LPG Autos in Tamil Nadu

Tamil Nadu Pollution Control Board is offering a subsidy of Rs.3000/- per LPG Auto as a measure of encouragement for switching over from Petrol to LPG. So far 8525 Autos have been converted into LPG Autos.[4]

2.2.3.5 Karnataka State government policy on mining, KSMP 2008

Initiated by KSPCB for control of pollution in mining industry**,** where environmental protection fees Rs. 84,000/- per hectare for mining in non-forest land is charged.

2.2.3.6 ISO policy for consent management

Both Andhra Pradesh and Gujarat have a policy for extension of the period for consent to operate for ISO 14001 certified industries.

[4] HOME, PROHIBITION AND EXCISE DEPARTMENT, MOTOR VEHICLES ACTS – ADMINISTRATION, POLICY NOTE 2011-2012, http://www.tn.gov.in/policynotes/pdf/home_transport.pdf

2.2.3.7 Green tax on old vehicles in Madhya Pradesh and Andhra Pradesh

For control of vehicular pollution in urban areas, phasing out of old vehicles through implementation of Green Tax has been proposed by the MPPCB. The board has prepared a comprehensive plan of green tax rates for phasing out/discouraging the use of old polluting vehicles. The plan is under consideration by the State government.

The AP State Govt. has also implemented green taxation on old commercial vehicles.

2.2.3.8 Pollution Control Measures for the tourism and hotel industry in Goa

- The GSPCB has made it compulsory for all star hotels (3,4 and 5 star hotels) operating in the State, to install Organic Waste Convertor within their premises to treat the bio-degradable waste generated by them.
- All the hotels having 25 rooms and more , located in areas not covered under centralised sewerage systems are compulsorily required to install a STP of appropriate size to treat the domestic sewage generated by them
- All the floating casinos, cruise boats , etc. operating in the inland waters within the territorial jurisdiction of Goa are required to register with the GSPCB and obtain Consent to Operate under the Air and Water Act and treat the sewage generated by them befor discharging the same into the river.

2.2.4 Sector Specific Actions

Maharashtra: River basin action plans

Based on the monitoring data documented under the integrated water quality monitoring network, Maharashtra State PCB has formulated actions plans for about 5 river basins jointly which will be implemented in collaboration with the district Collectors and Regional Offices.

Gujarat: Air Action Plans

Air Action plans for air pollution control have been prepared for 7 cities in Gujarat and an industry specific action plan has been prepared for Vapi industrial area. The action plans include measures for vehicular pollution control thorough measures for new and in-use vehicles, policies for fuel efficiency and mitigating adulteration, programmes for industrial pollution control and implementation fiscal incentives/disincentives.[5]

Punjab, Andhra Pradesh: Zero Liquid Discharge

The Punjab Pollution control board has been instrumental in facilitating the installation of Zero Liquid Discharge (ZLD) in 8 large/ medium scale electroplating industries installed. All the small scale electroplating industries (approx. 550 no.) have also joined to establish a Combined Effluent Treatment Plant (CETP), based on zero liquid discharge technology.

[5] http://gpcb.gov.in/index.htm

Andhra Pradesh State Board has promoted implementation of zero liquid discharge mainly for pharmaceutical industries which are located in clusters of industrial estates in and around Hyderabad city from the year 2009 onwards.

Madhya Pradesh: Disposal of non-recyclable polythene waste

The Madhya Pradesh PCB has taken special initiatives for the collection and disposal of non recyclable polythene waste from towns in MP through Implementation of a joint venture by the MPPCB, local self governments, NGO's and Cement Industries of MP. The non recyclable polythene waste is collected through NGO's at pre-defined rates and transported to cement plants where the waste is used as a co-fuel in the cement kilns. The process has been found to be safe with respect to emission parameters of Dioxin and Furan.

Madhya Pradesh: Waste Heat Recovery from high temperature flue gases

It has been made mandatory in MP for all industries releasing flue gases at temperatures above 500 degrees Celsius to install waste heat recovery systems. Till date about 19.5 MW power generations has started.

2.2.5 Organizational and Resource Management

As a management approach, Maharashtra PCB is now adopting a sectoral approach rather than a geographical approach to management and monitoring of pollution control from industries in the States. This approach is better able to harness the skills and resources of MPCB staff.

The State of Andhra Pradesh has a consistently better performance across water, air and waste pollution control. While there are not any significant State level policies and programmes that stand out, the improved performance can be attributed to efficiency in implementation of regulations, resource management, monitoring and documentation of pollution control. The AP PCB has been pro-active in provision and facilitation of common infrastructure facilities in the field of wastewater, hazardous waste, bio-medical waste and e-waste. All the three CETPs in Andhra Pradesh have been operating under PPP model from as far back as 1989.

Karnataka Pollution Control Board and AP pollution control board have both constituted sector specific bodies such as biodiversity board, lake development authority and a district environmental authority integrated solid waste management Board etc. This organizational structure has lead to better management of pollution control in the States. All the shortlisted States have recognised private labs for analysis of water quality and industrial effluents

3. ENUMERATING REASONS FOR SUCCESS

In Section 2.2, we have identified and grouped a few examples of successful implementation we have gathered based on web review, literature review and telephonic and personal conversations. Because of the nature of information we have access to, we can qualitatively identify common reasons for success.

3.1 Resource Management

All State PCB and environmental department can face resource constraints in terms of money, man power and access to technical knowledge. Most boards are overloaded with administrative duties which make enforcement and/or research a sub-priority. However, in successful models, a key factor is always efficient resource management – using the available resources to the best effect.

Typically, this is achieved by using ICT which not only automates the operations but also bring transparency and objectivity. We also find examples where one or few nodal officers are made in-charge of the entire process. This results in subject matter expertise of the nodal person over time (learning from doing). Adequate money and time is assigned to start up activities that include developing plans, conducting brain storming meetings, interacting with industry stakeholders, checking international models, and others. However, it is not clear if such investments in start up activities are at the cost of other programs within the boards, given resources are limited. Boards also seem to be outsourcing some of their operations such as monitoring to universities and institutes. Boards have involved outside auditors to increase the confidence on the environmental statements submitted by industries. Outsourcing seems to have enabled the boards to concentrate on their core functions in a better way. Another example is collaboration with other government agencies to share resources. For example, Maharashtra PCB has access to data from over 1400 water monitoring stations, majority of which belong to other departments.

- River water quality is being monitored by Central Water Commission, Irrigation Department and APPCB and also other transboundry states. A combined Committee / Board of all the three Departments is required to take important steps for taking any decisions at the time of planning.

- Ground water is being monitored by Central Ground Water Department, State Ground Water Department, Hydrology Project and partially by APPCB. A combined Committee / Board of all the three Departments is required to take important steps for taking any decisions at the time of planning. – AP comments

3.2 Process Re-engineering

We find that most efficient programs are implemented by modifying and improving typical processes. For example, Rajasthan prioritize prosecution of gross violators where the justice can be swift. Gujarat has provided incentives for objective and honest third party audit of environmental statements. Maharashtra is collaborating with other government agencies to have integrated water quality monitoring. Consent management systems are evolving to bring a automation with clearer instructions for the industry. The key elements of modified process seem to be less reliance on human involvement, collaboration with other agencies and industry, and integrating ICT with logical checks / intervention by the department.

3.3 Political Will

In our informal conversation, a key and arguably the most critical factor identified was that of political will. For example, several States have been proactive in banning plastics or have anti noise pollution drives which are mostly driven by activism of NGOs or media perception than scientific assessment of environmental externalities posed by these pollutants. This clearly indicates that the political interpretation of environmental concerns often drive the program at the State level, determining their success rate. For example, Karnataka board has been successful in organizational changes by establishing district level coastal zone management offices, which may not have been possible without political support. Gujarat has stringent third party audit requirement which is borne out of compulsion of a high court order but later improved with a desire for objective and accurate auditing. Karnataka also has a mining policy which imposes cess on mining. The question whether the cess is enough or not is secondary to the fact that the political scenario in Karnataka resulted in such a policy. The desire for industrial development (arguably key political concern) has prompted to single window clearance of projects in States such as AP, Maharashtra and Gujarat. However, a double dividend of this is also better consent management from PCBs.

3.4 Consumer centric approaches

All successful models have a strong undercurrent of stakeholder involvement. The industry and research community is more involved in successful models. For example, TN online air quality monitoring saw several industries agreeing to such monitoring and the board is providing them real time information/feedback on any instance of standard exceedance. Consent management systems have been designed to reduce the time for consent, provide clear information of requirements and tracking of the application. This is not only to streamline process, but also to empower the consumer. For example, in Gujarat such online systems have resulted in significant increase in the revenue for the state, which indicates the consumer preference for the scheme. Some examples of successful models involve use of market based approaches. For example, there is an emission trading scheme being designed for SPM trading amongst clusters to reduce pollution at an optimal cost to the consumer/industry.

3.5 Reliance on science and technology

With advent in pollution control technology and environmental sciences, the boards are also able to apply these in successful models. For example, Punjab has been able to achieve zero discharge from CETP of tanning units in Ludhiana. Maharashtra systematically analyzed the monitoring data to develop action plans for river basins and air pollution action plan for cities and industrial clusters. PCBs have attempted to assess the impact of its action on pollution load by analyzing monitoring data. Pollution boards are using market based approaches such as emission trading with help of renowned institutes from India and abroad. Online monitoring by TN PCB also indicates a successful use of technology.

4. RECOMMENDATIONS FOR IMPROVED EFFICIENCY

We identified 5 general categories of reasons of factors we believe are responsible for successful implementation of environmental programs and policies by the States: (a) Resource Management; (b) Process Re-engineering; (c) Political Will; (d) Consumer centric approaches; and (e) Reliance on scientific and technology. All these, may be with the exception of Political Will, are in control of SPCBs; and thus, replicable in other States. Below we describe a general approach of States can adopt these successful policies. Then, based on successful models elsewhere, we recommend specific programs for scale up elsewhere.

4.1 General Recommendations for Replication

4.1.1 Prioritize Implementation of Environmental Programs and Policies

The biggest constraint in replication of one or many successful models is that of resource management. More for one program will mean less for others. Therefore, any scale up necessarily must be preceded by a thorough assessment of pollution control priorities by the States. The prioritization can be based on the environmental health concerns, effect of regulatory process on industrial development objectives, state specific ecological or natural resource conservation needs, and national / international priorities.

4.1.2 Conduct back ground research and planning

Success of a program will be proportionate to the evidence based planning that goes in it. Analyzing available environmental data, review of relevant reports, papers, articles, review of international best practices, brain storming meeting with industry and research institutions, and others are of key importance. Considering that most successful models we have reviewed are on pilot scale, we recommend that a learning report be produced for all of them for other States to review. The planning stage can also involve other SPCBs who may have the necessary experience or expertise with the programs.

4.1.3 Use of ICT

Almost all successful programs have relied on use of ICT to address the resource constraints, improve transparency and efficiency of the system. Although the application of ICT is still limited, the promise is clear. A successful program will use ICT as a backbone. It is however appreciated that implementation of ICT would require allocation of funds and resources, which smaller Pollution control boards may not have access to at the present and will require support for the same.

4.1.4 Involve stakeholders in design and implementation

We believe that involving industries and research institutions in design and implementation phases is critical for efficient implementation of the programs. A program developed in consultation with industry not only can benefit from technological knowledge of the industry but also from buy-in of the industry which will result in better compliance. The command and control approach is seen to

be effectively modified in successful models. Research institution can help in generate scientific evidence to support program implementation as well as provide much needed man-power support to SPCBs.

4.2 Specific Recommendation for Scaling Up

On the basis of successful models of implementation, we recommend the following models for scale up to other States.

4.2.1 Streamlining Consent Management

Consent management procedures need to be standardised and streamlined in all States. Use of ICT for consent management is an effective tool to increase efficiency and transparency in consent management. GPCB's XGN application can be reviewed for replicability in all States.

4.2.2 Consent Fee Structure based on Pollution Load

Developing a consent fee structure based on pollution load, rather than only investment size can be used as an effective tool to regulate total emissions. This may mark a paradigm shift from command and control to a taxation system which penalizes polluter on the basis of pollution and not on the basis of his operation which may include extensive pollution control devices. Such a shift will also put the onus of monitoring on the industry and provide incentives not only to monitor but also reduce pollution. We further recommend that the fee be assessed every year on the basis of pollutant loading in the environment.

4.2.3 Third party monitoring and audits

The issues related with shortage of staff and accountability can be tackled to a large extent by engaging with identified agencies and institutions for the purpose of auditing and monitoring. Gujarat case study has demonstrated that although external auditors may have perverse incentives to aid industries, a proper regime of incentives, back checks by SPCB will effectively tackle this problem. We recommend that third parties be selected randomly and their performance be re-validated by other external agencies on sample basis. SPCBs can be the final check which further conducts random checks. Use of ICT can also be beneficial.

4.2.4 Adoption of PPP models in management of CETP's

Interaction with SPCB's, suggest that PPP models can be implemented for CETP's as is done for bio medical waste and Hazardous waste management. This recommendation is in line with our general recommendation to involve industry as a stakeholder in design and implementation of programs. Punjab case study can be used as a template by other States.

4.2.5 Integrating Knowledge and Data of different agencies and institutions

A strong knowledge and data network provides the base for developing effective management and pollution control strategies. We find that other agencies such as hydrology department, remote sensing/GIS organizations, water resource department have common objectives of environmental protection and often have resources that SPCBs can tap into. It may be beneficial to involve these agencies in design stages to understand what data or knowledge they can contribute along with aid

in implementation. This strategy is critical for smaller PCB's which face constraints of manpower and other resources as cited in the feedback received from Tripura.

4.2.6 Market based approaches

Our overall assessment of available resources, indicate that a market based approach to pollution control may not only be more efficient than command and control but it can also result in better environmental protection. While some pilot systems such as emission trading, taxing mining, and consent fee based on pollution load are existing, the predominant regulatory policy remains command and control. The effectiveness of the pilot market based approaches should be studied in detail before scaling them up to other States.

4.2.7 Recommendations to Remove Critical Gaps

We mainly find gaps in manpower and monetary resources, developing programs in evidence based manner, and policy support for innovating strategies. While it will be ambitious for this study to develop a road map f bridging these gaps without additional research, we suggest the following general approach.

4.2.8 Gaps in Resources

SPCBs are performing several functions such as administration, consent management, research and development, and enforcement. In our assessment, even senior scientists in the SPCBs are involved in administrative and operations tasks such as consent management. This is a waste of resource because "comparative advantage" of people is not being used. A more effective strategy is for a person to handle one aspect of SPCBs functions and develop his/her skills in that over time. A second strategy would be to invest heavily in ICT as a capability multiplier. SPCBs may also reengineer most of their routine processes such that the involvement of personnel from SPCBs is minimal while the onus of compliance shifts more towards the industry (through proper incentives). A fourth strategy may be outsourcing routine operations to third parties with a proper system of oversight and transparency. SPCBs can use society as a watchdog by making most of consent management available on the web.

4.2.9 Gaps in Evidence Based Program Design and Implementation

We also strongly recommend a separate division who evaluates the effectiveness of the programs and continually improve the programs in an evidence based manner. This group may include outside experts and be independent of the project/program implementation group. Such evaluation will go a long way in understanding resource need as well as better utilization of available resources. We find that most successful programs have heuristically done a program evaluation, but this process should be institutionalized.

A second strategy is to make the available data and information more readily available and useful for any policy analysis. If our own experience with the study is an indicator, then most of the relevant and required data is inaccessible. Maharashtra demonstrated how routine monitoring data can be effectively used to develop action plans. However, this is only one use of data. Creation of an integrated database of consent management, annual environmental statements, ambient air/water quality monitoring, routine pollution monitoring, noise pollution, etc will help in design, implementation, evaluation, and improvement of the programs.

4.2.10 Gaps in Policy Support

We have seen examples of a few pilot programs that have potential for success. These specifically include emission trading, consent fee based on pollution load, third party auditing of environmental statements, online pollution monitoring, and others. Such programs mark a paradigm shift in regulatory policy and enforcement. However, we have not found any policy or guidelines for the process. Some States, e.g. Rajasthan, have enacted policies or vision document for fighting climate change. Some States have a policy for single window clearance (e.g., AP, Maharashtra). Some States have special plastic waste rules (e.g. Maharashtra and HP). However, it was unclear what motivated these policies and how these state level policies fit in the national vision for environmental protection. We believe that policy is a cornerstone that drives design or a policy. However, we were unable to find such a support for most of the programs listed here. Therefore a recommendation is for each state to have their own policy and vision document about how they envision protecting their state of environment. The policy document should be further developed in to a road map with clear time bound goals for implementation of specific objectives. Then the third step can be design and prioritization of key programs to achieve the objectives.

5. CONCLUSION

This report has identified States that are more successful in environmental protection using EPI and CEPI indices. From a subset of States where we could find online documentation and who responded to our questionnaires, we identify and describe successful models of implementation of environmental policies and programs. Based on our literature and web review of reports and discussion with a few SPCB officials, we were able to assess the general themes or reasons necessary for success. We also recommended general and specific steps for improving the efficiency of performance predominantly based on our own understanding from a birds eye perspective. Finally, we make recommendations to bridge three types of gaps which may result in better scaling up of successful programs in other States.

We recommend that the overall findings be discussed in a workshop that include experts from SPCBs, CPCB, MoEF and planning commission to recommend more specific steps for replication and scaling up of programs. Such workshop can also help in identifying reasons or factors critical for success. The finding from this workshop will be a key input to the final report and to conclude the study successfully.

APPENDIX A: Assessment of Implementation of Environmental Policies and Programs

In this section we evaluate the environmental performance of the States based on the Environmental Performance Index (EPI) scores for Water, Air and Waste developed by the Planning Commission and performance of Industrial clusters based on Comprehensive Environmental Pollution Index (CEPI).

A.1 EPI Performance of States

A.1.1 EPI for Water Pollution Control

The EPI score for water pollution takes into consideration the following indicators –

1. % Treatment Capacity for the Sewerage Generated
2. % Violations in Water Quality of Rivers monitored based on Dissolved Oxygen (DO) and Coliform parameters
3. % Ground Water Exploration

The cumulative EPI score is an average of the scores achieved in each of the above indicators. As seen in Table 3 the average EPI score across all States is 0.53 with the top performing States of Himachal Pradesh, Goa and Maharashtra, Haryana having EPI score more than 0.6. The bottom performers having EPI scores below 0.47 are Delhi, Punjab, Rajasthan and Nagaland. Figure 1, 2, and 3 depict the performance of the States for the sewage treatment capacity, dissolved oxygen violations, and total coliform violations. Based on above, the main findings are:

- The average sewerage treatment capacity is 23.86 % with the following States having the highest treatment capacity – Himachal Pradesh (100%), Goa (84.51%) Maharashtra (72%). The North-Eastern States, Kerala, Assam and Jharkhand have 0% treatment capacity while the state of J&K, Orissa and Rajasthan have less than 10% treatment capacity. Data was not available for five union territories and for Arunachal Pradesh.
- The average % of DO violations is 7 % with the maximum violations seen in Delhi (68%), Gujarat (21 %) Uttar Pradesh (19%)
- The Average % of Coliform Violations is 20.5% with the maximum violations seen in Delhi (100%) Haryana (100%) West Bengal (92%), Uttarakhand (70%) UP (59%).
- The levels of Dissolved Oxygen (DO) below the prescribed limits and presence of Total Coliform above acceptable values can be attributed largely to the discharge of partially treated or untreated waste water into water bodies.
- The data above also indicates that in spite of having sewerage treatment capacity of more than 50% States /UT such as Haryana and Delhi have high percentages of DO and Coliform violations.

- CPCB report state '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 do not function properly and remain closed most of the time due to improper design and poor maintenance, together with a non-technical and unskilled approach.'[6]

Table 3-State Water EPI Scores

State/UT	Water EPI score	Water EPI rank
Himachal Pradesh	0.7561	1
Goa	0.7143	2
Maharashtra	0.6722	3
Haryana	0.6071	4
A. Pradesh	0.5873	5
Tamil Nadu	0.5661	6
Pondicherry	0.5625	7
Chhattisgarh	0.5593	8
West Bengal	0.5413	9
UP	0.5393	10
Gujarat	0.5383	11
Uttarakhand	0.5375	12
Karnataka	0.5353	13
M. Pradesh	0.5320	14
Bihar	0.5288	15
Orissa	0.5273	16
Jharkhand	0.5125	17
Manipur	0.5125	17
Mizoram	0.5125	17
Sikkim	0.5125	17
Tripura	0.5125	17
Assam	0.5057	18
J&K	0.4943	19
Kerala	0.4892	20
Meghalaya	0.4863	21
Nagaland	0.4688	22
Rajasthan	0.4543	23
Punjab	0.4501	24
Delhi	0.3073	25
Average Score	**0.5353**	

[6] Evaluation of Operation and Maintenance of Sewage Treatment Plants , 2007, CPCB, www.cpcb.nic.in

Figure 1. *Percentage Sewage Treatment Capacity in States*

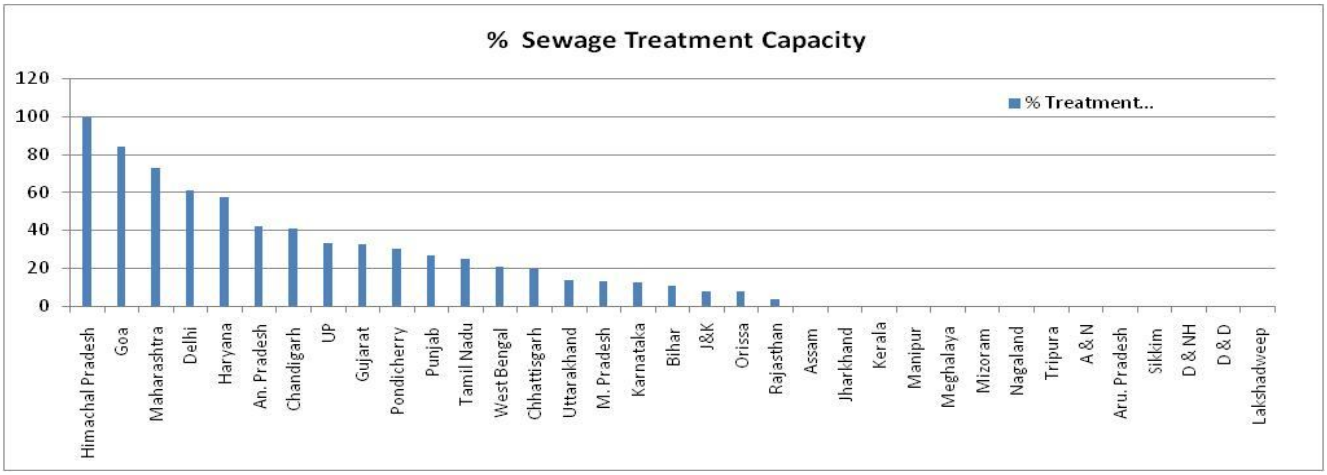


Figure 2. *Dissolved Oxygen Violations in States Rivers*

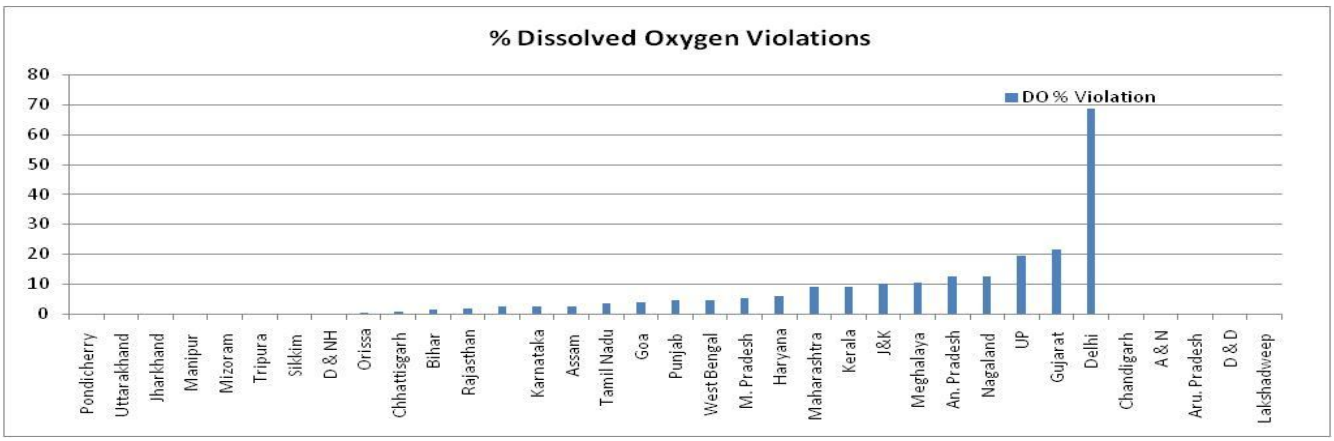
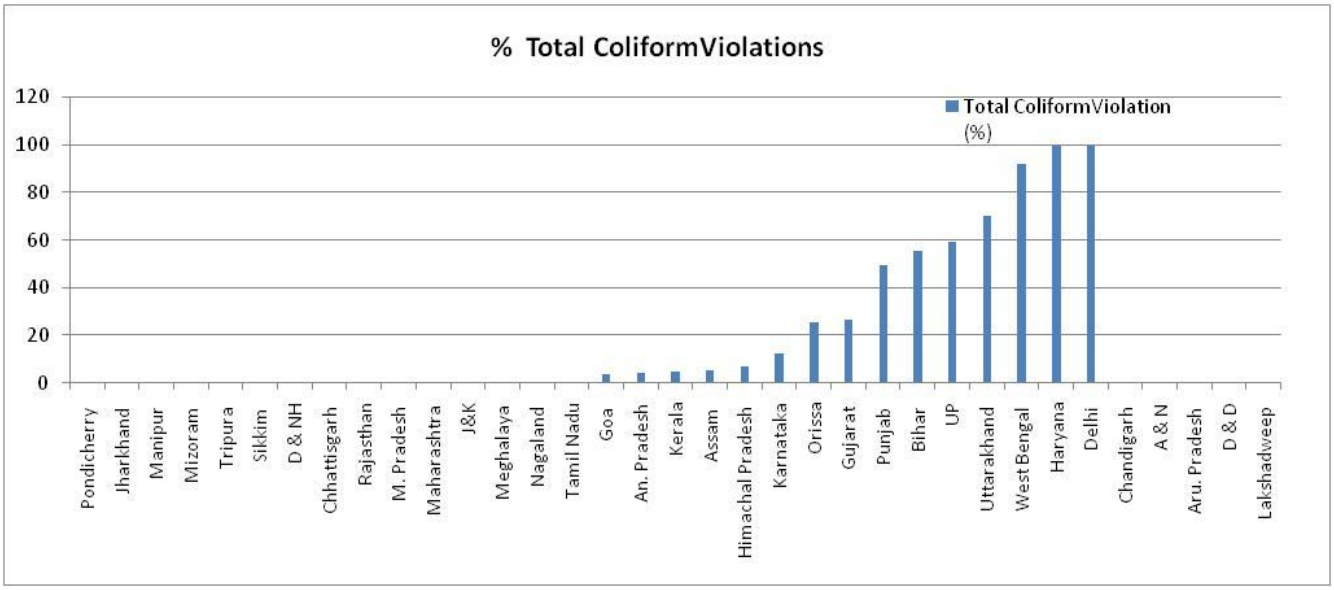


Figure 3. *Total Coliform Violations in States Rivers*



A.1.2 EPI for Air Pollution Control

The EPI score for Air pollution control is based on the state performance in the following air quality indicators.

1. SOX
2. NOX
3. RSPM

Table 4 lists the cumulative EPI scores of the States for Air Pollution Control. Adequate Data was not available for the States of Bihar, J&K, D&NH Daman & Diu Punjab, Aru.Pradesh, Sikkim, Tripura (H), A & Nicobar and Lakshadweep. Figures 4, 5 and 6 depict the levels of SOx, NOx, and RSPM pollution in the States.

- The average performance across States is and EPI score of 0.826 with The States /UT's of Mizoram, Kerala, Pondicherry and Goa are the top performers with and EPI score of 1.
- The other north- eastern States , Tamil Nadu and Karnataka also perform well with EPI scores above 0.9
- The States of Delhi, West Bengal, UP and Haryana are the bottom performers with EPI scores below 0. 78
- In the SOX, all States have levels below the maximum of 50 prescribed in the NAAQMs with an average of 7 µg/cum with
- Maharashtra, Jharkhand, Chhattisgarh and Uttarakhand having levels over 15.
- NOX levels in most States conform to the NAAQS with Maharashtra, Chhattisgarh, Delhi and West Bengal having levels above the NAAQS.
- RSPM levels in most States are higher than the NAAQS with Jharkhand, Haryana, UP, Punjab and Delhi recording the highest levels. Only Mizoram, Kerala, Pondicherry and Goa have RSPM within the NAAQS limits.
- The presence of SOX can be attributed largely to emissions from industrial sources. CPCB reports indicate that across the country SOX is predominant in industrial areas with lower levels in residential areas.
- The presence of NOX in residential areas is much higher than in Industrial areas. Vehicular emissions are one of the major sources of NOX pollution in residential areas.
- While both industrial areas and residential areas record significant levels of RSPM. Residential areas record higher critical and high levels of RSPM. ' The reason for high particulate matter levels may be vehicles, engine gen-sets, small scale industries, biomass incineration, re-suspension of traffic dust, commercial and domestic use of fuels, etc.'[7]

[7] National Ambient Air Quality Status 2008, CPCB

Table 4-States Air EPI Score

State/UT	Air EPI score	Air EPI rank
Kerala	1.000	1
Goa	1.000	1
Mizoram	1.000	1
Pondicherry	1.000	1
Tamil Nadu	0.961	2
Nagaland	0.944	3
Meghalaya	0.941	4
Karnataka	0.911	5
Manipur	0.905	6
Orissa	0.902	7
A. Pradesh	0.897	8
Gujarat	0.894	9
Assam	0.891	10
Chandigarh	0.877	11
Himachal Pradesh	0.869	12
Maharashtra	0.853	13
Uttarakhand	0.848	14
M. Pradesh	0.829	15
Rajasthan	0.821	16
Jharkhand	0.789	17
Chhattisgarh	0.783	18
Haryana	0.778	19
UP	0.777	20
West Bengal	0.739	21
Delhi	0.669	22
D & NH	0.213	
D & D	0.208	
Average	0.826	

Figure 4. *SOx levels monitored in States AAQ*

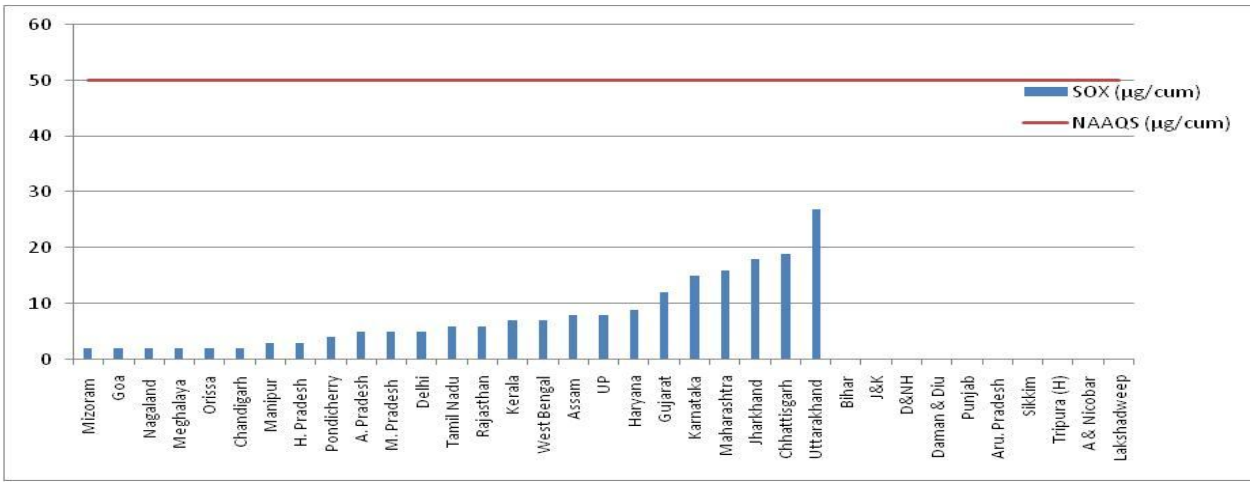


Figure 5. *NOx levels monitored in States AAQ*

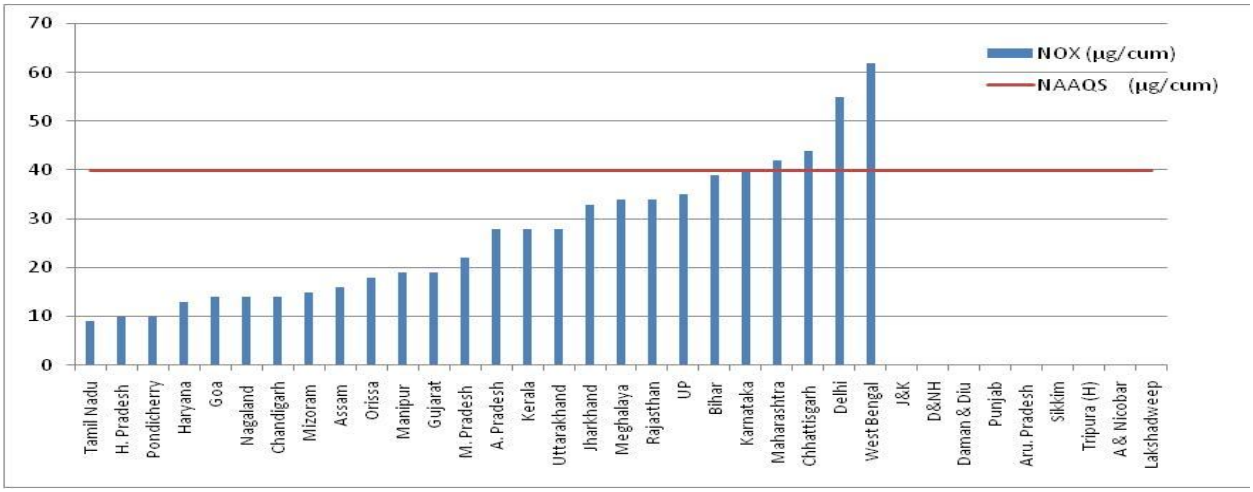
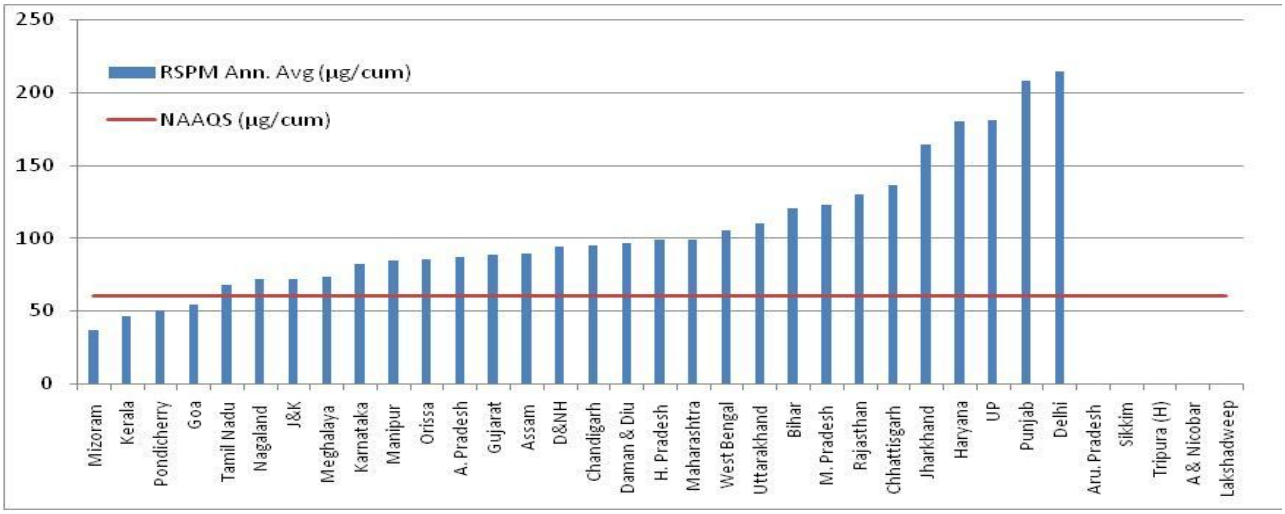


Figure 6. *RSPM levels monitored in States*



A.1.3 EPI for Waste Management

The EPI score for States in Waste Management is based on the performance of States in the following indicators:

1. % Collection Efficiency of Municipal Solid Waste
2. % Treatment Efficiency of Hazardous Waste
3. % Treatment of Bio-Medical waste

As can be seen from Table 5, the average EPI score is 0.584 with the States /UT of Chandigarh, Sikkim Haryana and Andhra Pradesh being the top performers with EPI scores above 0.86. The States /UT of J& K, Assam, Tripura and Nagaland being the bottom performers with EPI scores of less than 0.3. Figures 7, 8 and 9 depict the performance of States in terms of collection efficiency of MSW, and treatment efficiency of biomedical water and hazardous waste. We find that:

- In Collection Efficiency of municipal Solid waste Chandigarh, Meghalaya, Jharkhand, Gujarat, Sikkim, Maharashtra, West Bengal are the top performers with collection efficiency of over 70%. The average across all States is 59%
- In Treatment Efficiency of Hazardous Waste the States of M. Pradesh, H.Pradesh, Uttarakand, Chandigarh, Haryana, Pondicherry, Karnataka, West Bengal and Punjab with an efficiency of over 95 %. The average across States in 52 %.
- It is to be noted that only 10 States have TSDF for Hazardous Waste.
- In treatment of Biomedical Waste, the average treatment across all States in 67 % with the States of Chandigarh Tamil Nadu Maharashtra Manipur Meghalaya Delhi Goa Sikkim A & Nicobar Lakshadweep, treating 100% of the BMW generated.
- Gujarat, Maharashtra, Andhra Pradesh Chhattisgarh Rajasthan West Bengal and Tamil Nadu together generate 80.29 % of country's total HW.
- Common TSDF located in Andhra Pradesh, Himachal Pradesh, Madhya Pradesh and Uttar Pradesh are having surplus capacities to handle the present quantities of land disposable waste generated in these respective States while the common TSDF located in Gujarat, Maharashtra, Punjab, Rajasthan, Tamil Nadu and West Bengal do not have adequate capacities to accommodate the present quantities of land disposable HW.[8]

Table 5-States Waste EPI scores

State/UT	Waste EPI Score	Waste EPI Rank
Chandigarh	0.9900	1
Sikkim	0.9000	2
Haryana	0.8633	3
A. Pradesh	0.8603	4
A & N	0.8600	5
Lakshadweep	0.8500	6

[8] National Inventory of Hazardous Wastes Generating Industries & Hazardous Waste Management in India February 2009, Central Pollution Control Board , Hazardous Waste management Division, Delhi, www.cpcb.nic.in

State/UT	Waste EPI Score	Waste EPI Rank
Punjab	0.8486	7
Pondicherry	0.8400	8
Uttarakhand	0.8229	9
Tamil Nadu	0.7444	10
Karnataka	0.6733	11
Himachal Pradesh	0.6733	12
West Bengal	0.6617	13
M. Pradesh	0.6333	14
Maharashtra	0.6267	15
Meghalaya	0.6167	16
Kerala	0.6100	17
Gujarat	0.5847	18
UP	0.5600	19
Delhi	0.5500	20
Goa	0.5500	20
Aru. Pradesh	0.5000	21
Manipur	0.5000	21
Chhattisgarh	0.4997	22
Rajasthan	0.4380	23
Orissa	0.4184	24
Bihar	0.4041	25
Mizoram	0.3568	26
Jharkhand	0.3567	27
D & NH	0.3300	28
D & D	0.3100	29
J&K	0.2968	30
Assam	0.2688	31
Tripura	0.2472	32
Nagaland	0.1833	33
Average	**0.584**	

Figure 7. *Municipal Solid Waste Collection Efficiency in States*

Figure 8. *% Bio-Medical Waste Treated in States*

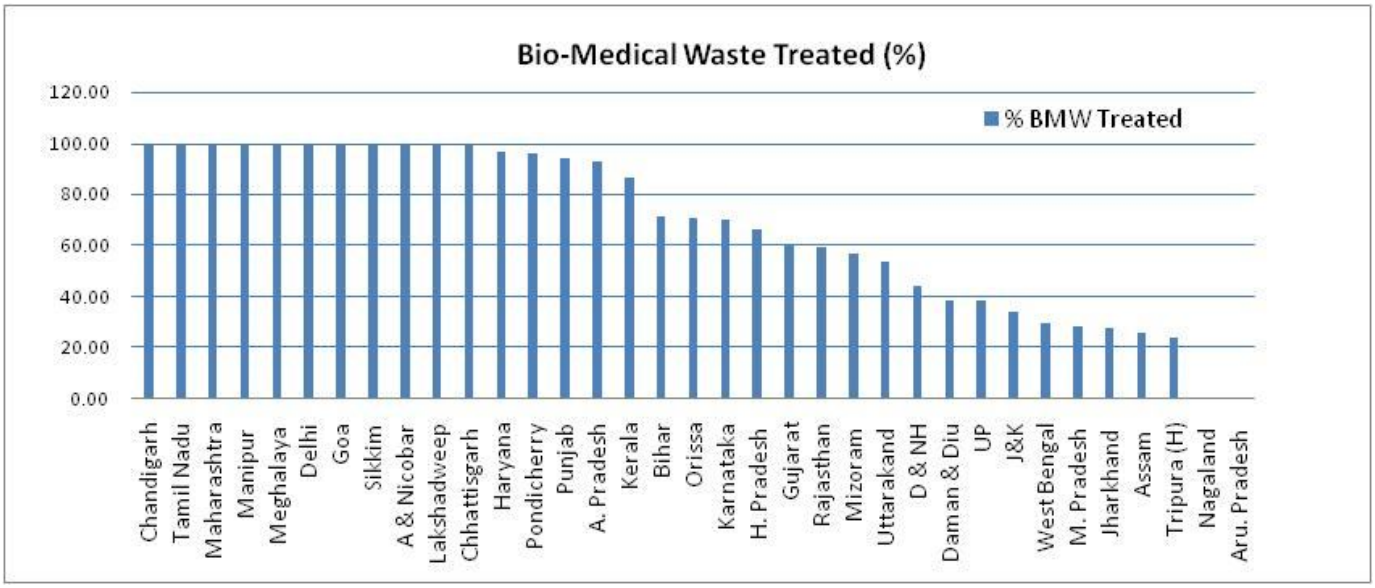


Figure 9. *Hazardous Waste Treatment Efficiency in States (%)*

A.2 CEPI Performance of Industrial Cluster

A.2.1 Introduction to CEPI

The data presented under this section has been sources from the Study – 'Comprehensive Environmental Assessment of Industrial Clusters' Central Pollution Control Board, 2009 [9]. The main objective of the above study was identify polluted industrial clusters or areas in order to take concerted action and to centrally monitor them at the national level to improve the current status of their environmental components such as air and water quality data, ecological damage, and visual

[9] Environmental Assessment of Industrial Clusters' , Central Pollution Control Board, 2009, www.cpcb.nic.in

environmental conditions. A total of 88 industrial areas or clusters were selected by the Central Pollution Control Board (CPCB) in consultation with the Ministry of Environment & Forests Government of India for the study.

A Comprehensive Environmental Pollution Index (CEPI), which is a rational number to characterize the environmental quality at a given location following the algorithm of source, pathway and receptor was developed. The index captures the various health dimensions of environment including air, water and land. Under this review the 88 industrial Clusters have been organised and analysed by States and the following CEPI parameters have been reviewed.

1. Sub-Index Score for Air Environment (Air Index)
2. Sub-Index Score for Surface Water Environment (Water Index)
3. Sub-Index Score for Soil and Ground Water Environment (Land Index)
4. Aggregated Environment Score (Aggregated CEPI Index)

The Sub-Index scores and the Aggregates CEPI score are out of a maximum of 100. Lower the score, better is the performance of the industrial cluster. The CPCB Study has classified the industrial clusters Based on the Aggregate CEPI Scores the into the following categories: (a) CEPI score > 70 : Critically Polluted Industrial Clusters; and (b) CEPI score between 60 and 70 : Severely Polluted; and (c) CEPI score < 70 : Moderately Polluted as reported in Table 6.

A.2.2 CEPI scores of industrial clusters

In table5, we present the Cumulative CEPI performance of Industrial clusters in States in increasing order of the State Average of the Aggregated CEPI score. The details of the 88 industrial clusters are presented in Annexure 1. The main findings are:

- Of the total 88 industrial clusters, 43 are Critically Polluted and 33 are Severely Polluted.
- Highly industrialised States of Uttar Pradesh, Maharashtra, Gujarat, Tamil Nadu, Andhra Pradesh, Karnataka, have moderate to high average CEPI scores.
- The States of Andhra Pradesh, Madhya Pradesh, Jharkhand and Karnataka while having more than four industrial clusters are performing relatively better than other lesser industrialised States in pollution control with Average CEPI scores less than 70.
- The States /UT's of Delhi , Orissa, Haryana, Kerala and Rajasthan, while have lesser number of industrial clusters are the bottom performers with the highest average CEPI scores

Table 6 - State Wise CEPI scores for Industrial Clusters[10]

State	Total No. of Industrial Cluster	Critically Polluted (CEPI > 70)	Severely Polluted (CEPI b/w 60 and 70)	Moderately Polluted (CEPI < 60)	Average of Agg. CEPI Score	Min of Agg. CEPI Score	Max ofAgg. CEPI Score	Status of Action Plans for Critical Areas
Assam	2.00			2.00	45.41	44.55	46.26	
Uttarakhand	2.00		1.00	1.00	57.69	54.37	61.01	
Bihar	2.00		1.00	1.00	61.21	55.12	67.30	
A. Pradesh	5.00	2.00	1.00	2.00	63.15	56.56	70.82	Prepared for 2
M. Pradesh	5.00	1.00	3.00	1.00	65.28	54.63	71.26	
Chhattisgarh	3.00	1.00	1.00	1.00	66.34	50.57	83.00	
Himachal Pradesh	3.00		3.00		67.22	63.83	69.07	
Jharkhand	5.00	1.00	4.00		67.93	64.47	78.63	
Karnataka	5.00	2.00	3.00		69.37	65.11	73.68	
UP	12.00	6.00	3.00	3.00	69.49	49.09	87.37	
Tamil Nadu	7.00	4.00	2.00	1.00	71.64	58.19	81.79	Prepared for 2
West Bengal	4.00	3.00	1.00		72.18	68.26	75.43	
Punjab	4.00	2.00	2.00		72.58	64.98	81.66	
Maharashtra	8.00	5.00	3.00		73.75	66.06	83.88	Prepared for --
Gujarat	9.00	6.00	3.00		74.34	66.76	88.50	Prepared for --
Haryana	2.00	2.00			74.49	71.9	77.07	

[10] This Table has been compiled from data sourced from the report 'Environmental Assessment of Industrial Clusters' , Central Pollution Control Board, 2009, www.cpcb.nic.in

State	Total No. of Industrial Cluster	Critically Polluted (CEPI > 70)	Severely Polluted (CEPI b/w 60 and 70)	Moderately Polluted (CEPI < 60)	Average of Agg. CEPI Score	Min of Agg. CEPI Score	Max ofAgg. CEPI Score	Status of Action Plans for Critical Areas
						1		
Rajasthan	4.00	3.00	1.00		74.66	66.82	82.91	
Orissa	4.00	3.00	1.00		74.67	69.26	82.09	
Kerala	1.00	1.00			75.08	75.08	75.08	
Delhi	1.00	1.00			79.54	79.54	79.54	
Aru. Pradesh								
Goa								
J&K								
Manipur								
Meghalaya								
Mizoram								
Nagaland								
Sikkim								
Tripura								
Grand Total/Averages	**88.00**	**43.00**	**33.00**	**12.00**	**69.69**	**49.09**	**87.37**	

A.3 Performance of States based on combined EPI and CEPI score

A.3.1 EPI and CEPI Assessment for Water Pollution Control

Table 7 presents the EPI score and rank of States along with the Average Water sub-index CEPI score and score of Factor D for water pollution control. The States have been organized in increasing order of the Average Water Sub-Index score. The top and bottom performing States have been highlighted in green and orange colors respectively as: (a) Top performing States in Water Pollution Abatement (Green): Water EPI > 0.57 and Average CEPI < 53 and/or Water 'D' ≤11.5 and (b) Bottom/Poor performing States in Water Pollution Abatement (Orange): Avg. CEPI > 57, Water EPI < 0. 53, Water D ≥ 12. We find that:

- The States of Andhra Pradesh, Himachal Pradesh, Haryana and Maharashtra are the top performers in Water Pollution Control. . It should be noted that Haryana has however a high

degree of coliform violation in water quality monitoring. Goa is also a top performer based on EPI scores

- The States of Jharkhand, Punjab, West Bengal, Gujarat, Orissa, Rajasthan, Kerala and Delhi are the bottom performers. The North eastern States and J&K also have poor performance based on EPI scores

Table 7 -State Water EPI and Water Sub-Index CEPI scores

No.	State/UT	Water EPI score	Water EPI rank	No. of CEPI Industrial Clusters	Average of Water Sub-Index	Min of Water	Max of Water	Average of Water D
3	Assam	0.5057	18	2	33.63	32.75	34.50	10.00
28	Uttarakhand	0.5375	12	2	44.63	41.25	48.00	10.00
5	Chhattisgarh	0.5593	8	3	44.67	35.00	57.00	11.67
4	Bihar	0.5288	15	2	47.75	44.00	51.50	12.50
1	A. Pradesh	0.5873	5	5	50.40	41.50	59.00	12.00
13	Karnataka	0.5353	13	5	51.15	46.00	57.75	10.00
10	Himachal Pradesh	0.7561	1	3	52.17	47.50	54.50	15.00
15	M. Pradesh	0.5320	14	5	52.40	38.50	57.50	12.00
12	Jharkhand	0.5125	17	5	53.80	49.00	59.00	13.00
27	UP	0.5393	10	12	55.46	33.50	75.25	12.50
22	Punjab	0.4501	24	4	57.50	52.00	66.00	12.50
9	Haryana	0.6071	4	2	57.75	56.50	59.00	10.00
25	Tamil Nadu	0.5661	6	7	57.75	47.25	65.25	12.86
16	Maharashtra	0.6722	3	8	58.41	50.75	67.50	10.63
29	West Bengal	0.5413	9	4	58.44	54.50	64.50	12.50
8	Gujarat	0.5383	11	9	58.50	46.75	74.50	13.33
21	Orissa	0.5273	16	4	60.13	56.50	69.00	13.75
23	Rajasthan	0.4543	23	4	62.63	52.00	69.00	13.75
14	Kerala	0.4892	20	1	64.00	64.00	64.00	10.00
6	Delhi	0.3073	25	1	69.00	69.00	69.00	15.00
7	Goa	0.7143	2					
35	Pondicherry	0.5625	7					
17	Manipur	0.5125	17					
19	Mizoram	0.5125	17					
24	Sikkim	0.5125	17					
26	Tripura	0.5125	17					
11	J&K	0.4943	19					
18	Meghalaya	0.4863	21					
20	Nagaland	0.4688	22					
2	Aru. Pradesh							
30	A & N							
31	Chandigarh							
32	D & D							
33	D & NH							
34	Lakshadweep							

A.3.2 EPI and CEPI Assessment for Air Pollution Control

Table 8 presents the State Air EPI score and rank of States along with the Average Air Sub-index CEPI score and score for Factor D for Air Pollution Control. The States have been organized in increasing order of the Average Air Sub-Index score. The top and bottom performing States have been highlighted in green and orange colours respectively as: (a) **Top performing States in Air Pollution Abatement (Green):** If Air EPI> 0. 88 and Air CEPI < 50 and /or Air D score ≤ 11; (b) **Bottom/Poor performing States in Air Pollution Abatement (Orange):** Air EPI < 0.82, Air CEPI > 52, or Average of Air D ≥ 12. The main findings are:

- The States of Assam, Andhra Pradesh, Tamil Nadu and Gujarat are the top performers in Air Pollution Control.
- Based on EPI scores Goa, Pondicherry, Manipur, Mizoram, Meghalaya and Nagaland also perform well on air quality environment.
- The States of Jharkhand, Punjab, West Bengal, Chattisgarh, Rajasthan, Haryana, Kerala and Delhi are the bottom performers.

Table 8 -State Air EPI and Air Sub-Index CEPI scores

No.	State/UT	Air EPI score	Air EPI rank	No. of CEPI Industrial Clusters	Average of Air sub-index	Min of Air	Max of Air	Average of Air D
3	Assam	0.891	10	2	35.5	32.0	39.0	10.0
28	Uttarakhand	0.848	14	2	47.9	44.0	51.8	10.0
1	A. Pradesh	0.897	8	5	49.0	41.5	57.0	10.0
4	Bihar	0.500		2	49.5	43.5	55.5	12.5
15	M. Pradesh	0.829	15	5	49.7	44.5	59.0	13.0
6	Delhi	0.669	22	1	52.1	52.1	52.1	10.0
12	Jharkhand	0.789	17	5	52.6	44.0	64.5	12.0
29	West Bengal	0.739	21	4	54.7	49.5	58.4	11.3
10	Himachal Pradesh	0.869	12	3	55.3	53.0	56.8	11.7
5	Chhattisgarh	0.783	18	3	55.8	44.0	67.0	11.7
27	UP	0.777	20	12	57.0	42.0	70.5	11.7
14	Kerala	1.000	1	1	57.0	57.0	57.0	15.0
25	Tamil Nadu	0.961	2	7	57.1	46.0	69.3	10.7
23	Rajasthan	0.821	16	4	57.5	52.0	71.0	10.0
22	Punjab	0.096		4	58.3	51.0	68.0	11.3
8	Gujarat	0.894	9	9	58.3	45.5	74.0	10.0
9	Haryana	0.778	19	2	59.6	55.8	63.5	10.0
13	Karnataka	0.911	5	5	60.0	56.8	62.8	11.0
21	Orissa	0.902	7	4	60.0	54.0	64.0	13.8
16	Maharashtra	0.853	13	8	61.7	55.0	70.8	10.6
2	Aru. Pradesh	0.000						
7	Goa	1.000	1					

No.	State/UT	Air EPI score	Air EPI rank	No. of CEPI Industrial Clusters	Average of Air sub-index	Min of Air	Max of Air	Average of Air D
17	Manipur	0.905	6					
18	Meghalaya	0.941	4					
19	Mizoram	1.000	1					
20	Nagaland	0.944	3					
31	Chandigarh	0.877	11					
35	Pondicherry	1.000	1					
	J&K, Skkim, Tripura, A&N, D&NH, D&D, Lakshadweep, Pondicherry	NA	NA	NA	NA	NA	NA	NA

A.3.3 EPI and CEPI Assessment for Land (Waste) Pollution Control

Table 9 presents the State Waste Management EPI score and rank of States along with the average Land Sub-index CEPI score and score for Factor D for Land Pollution Control. The States have been organized in increasing order of the Average Land Sub-Index score. The top and bottom performing States have been highlighted in green and orange colors respectively as: (a) Top performing States in Land Pollution Abatement (green): If Waste EPI> 0. 7 and Land CEPI < 52 and /or Air D score < 11; and (b) Bottom/Poor performing States in Land Pollution Abatement (Orange): Waste EPI < 0.5, Land CEPI > 54, or Land D > 12.

The main findings are:

- The States of Andhra Pradesh and Haryana are the top performers
- Based on EPI scores alone Sikkim, A&N, Chandigarh, Lakshadweep and, Pondicherry perform well on waste management.
- The States of Bihar, Jharkhand, Punjab, West Bengal, Orissa, Chhattisgarh, Rajasthan, Gujarat, Punjab and Delhi are the bottom performers.
- Based on EPI scores alone, J&K, Mizoram, Nagaland, Tripura, D&NH and D&D are also poor performers in waste management.

Table 9 -Waste EPI scores and Land sub-index CEPI scores

No.	State/UT	Waste EPI Score	Waste EPI Rank	No. of CEPI Industrial Clusters	Average of Land	Min of Land	Max of Land	Average of Land D
3	Assam	0.2688	31	2	36.25	34.50	38.00	10.00
28	Uttarakhand	0.8229	9	2	42.13	40.00	44.25	10.00
13	Karnataka	0.6733	11	5	46.00	42.00	54.00	10.00
4	Bihar	0.4041	25	2	48.00	44.50	51.50	12.50
1	A. Pradesh	0.8603	4	5	48.20	43.00	55.00	12.00

No.	State/UT	Waste EPI Score	Waste EPI Rank	No. of CEPI Industrial Clusters	Average of Land	Min of Land	Max of Land	Average of Land D
15	M. Pradesh	0.6333	14	5	50.40	42.00	56.00	12.00
10	Himachal Pradesh	0.6733	12	3	51.33	48.50	54.50	15.00
5	Chhattisgarh	0.4997	22	3	51.67	33.50	72.50	11.67
27	UP	0.5600	19	12	52.27	36.50	71.50	12.50
25	Tamil Nadu	0.7444	10	7	53.29	43.50	64.00	13.57
12	Jharkhand	0.3567	27	5	53.70	42.00	65.50	14.00
14	Kerala	0.6100	17	1	54.00	54.00	54.00	10.00
23	Rajasthan	0.4380	23	4	54.00	50.50	59.50	13.75
16	Maharashtra	0.6267	15	8	54.06	46.00	66.50	10.63
29	West Bengal	0.6617	13	4	54.63	47.50	63.50	12.50
21	Orissa	0.4184	24	4	57.19	48.00	65.75	13.75
22	Punjab	0.8486	7	4	58.31	52.00	64.75	12.50
8	Gujarat	0.5847	18	9	58.67	45.50	75.75	13.89
9	Haryana	0.8633	3	2	60.88	59.00	62.75	10.00
6	Delhi	0.5500	20	1	65.25	65.25	65.25	15.00
2	Aru. Pradesh	0.5000	21					
7	Goa	0.5500	20					
11	J&K	0.2968	30					
17	Manipur	0.5000	21					
18	Meghalaya	0.6167	16					
19	Mizoram	0.3568	26					
20	Nagaland	0.1833	33					
24	Sikkim	0.9000	2					
26	Tripura	0.2472	32					
30	A & N	0.8600	5					
31	Chandigarh	0.9900	1					
32	D & NH	0.3300	28					
33	D & D	0.3100	29					
34	Lakshadweep	0.8500	6					
35	Pondicherry	0.8400	8					

A.4 Performance of SPCB's in implementation of Environmental Acts and Rules

Based on the above analysis, a preliminary evaluation of the implementation of Environmental Acts and Regulations by States has been done. The table below summaries the implementation of environmental acts and rules by State Pollution Control Boards.

Table 10 - Implementation of Environmental Acts and Rules

Act/Rule	Key Actions required by State Pollution Control Boards for implementation	Top Performing States	Bottom performing States	Remarks on Performance and Implementation by States [11]
The Water (Prevention and Control of Pollution) Act, 1974, amended 1988 The Water (Prevention and Control of Pollution) Rules, 1975	• Categorisation and inventory of polluting industries in the States by Green, Orange and Red • Consent Management – To establish and to operate • Water quality monitoring (surface and ground water) • Domestic Sewage and Industrial effluent monitoring and management • Establishment of laboratories/ recognition of laboratories • Evolving technologies for treatment and disposal of sewage and effluents • Penalisation of Defaulters • Preparation of Actions Plans for critically polluted Industries under CEPI	Andhra Pradesh, Himachal Pradesh, Haryana and Maharashtra (EPI +CEPI) Goa (EPI)	Punjab, West Bengal, Gujarat, Orissa, Rajasthan, Kerala and Delhi (EPI+CEPI) The North eastern States and J&K (EPI)	• Being the First pollution control act, this act is being implemented by all States with varying success. Support from CPCB through implementation of NWQMP • CPCB study indicates poor performance of CETP's in most State. CPCB has revised the scheme for implementation of CETP's recently. • The management of domestic sewage requires immediate priority action. • APPCB has taken pro-active actions for pollution control in lakes and urban tanks. • KSPCB Mobile Immersion tanks mounted on trucks/tractors for Ganesh Festival
The Water (Prevention and Control of Pollution)Cess Act, 1977, amended 1992 ,and Rules , 1978	• Testing and monitoring of water meters • Inspection of water supply installation • And waste water treatment systems • Collection of Cess • Penalisation of Defaulters • Preparation of Actions Plans for critically polluted Industries under CEPI	TBD	TBD	• GPCB has extended online E-Governance programme 'Online XGN' to facilitate various applicants to file their Water Cess Returns under the Water Cess Act, 1977 compulsory online with effect from 1.9.2009.
The Air (Prevention and Control of Pollution) Act	• Categorisation and inventory of polluting industries in the States • Consent Management – To establish and	Assam, Andhra Pradesh, Tamil Nadu , Karnataka	Jharkhand, Punjab, West Bengal, Chhattisgarh,	• Vehicular Emissions are a major contributor to NOX and RSPM. • Among the Metro cities, Chennai is a top

[11] All the information in this section has been sourced from the websites of the respective SPCB's websites, Annual Reports, CPCB Reports and few news article.

Act/Rule	Key Actions required by State Pollution Control Boards for implementation	Top Performing States	Bottom performing States	Remarks on Performance and Implementation by States [11]
1981, amended 1987	to operate • Air quality monitoring • Air Pollution management • Vehicular Emission control management • Evolving technologies • Inspection and monitoring of air emissions from industries • Establishment of laboratories/ recognition of laboratories • Penalisation of Defaulters	and Gujarat (EPI +CEPI) Goa, Pondicherry, Manipur, Mizoram, Meghalaya and Nagaland (EPI)	Rajasthan, Haryana, Kerala and Delhi (EPI +CEPI)	performer with one of the lowest levels of SOX, NOX and RSPM. **Initiatives by States** • Tamil Nadu Pollution Control Board has agreed to offer a subsidy of Rs.3000/- for conversion of petrol driven auto rickshaws in Chennai to LPG. • Computerized and networked PUC's are in operation or in planning stage in several Cities including Chennai, Delhi, Bangalore, Kolkata • Stone Crusher Notification Dated 18.12.1997 and amendments by Haryana PCB for Norms for siting of stone crushers in Haryana
Municipal Solid Wastes (Management & Handling) Rules, 2000	• Collection, storage, segregation, transportation, processing and disposal of municipal solid wastes • Granting Authorisation for Solid Waste Treatment Facilities • State Board or the Committee to monitor the compliance of the standards regarding ground water, ambient air, leachate quality and the compost quality including incineration standards as specified under Schedules II, III and IV of the act .	Chandigarh, Meghalaya, Jharkhand, Gujarat, Sikkim, Maharashtra, West Bengal	Kerala, Karnataka, Himachal Pradesh	• Average Collection efficiency across States is 59%. **Initiatives by States** • Maharashtra – MPCB - Construction and Demolition and De-silting Waste (Management and Disposal) Rules 2006 • Andhra Pradesh, Kerala, Maharashtra, Rajasthan, Karnataka, Lakshadweep, Goa Gujarat taking initiatives in MSW management through Composting, Landfills, Waste to Energy projects.
The Recycled Plastics Manufacture and Usage Rules, 1999 The Plastics(Manufacture, Usage and Waste	• Receipt of applications and granting of Registration for Manufacturer's of plastic carry bags • Monitoring Manufacturer's Facilities	TBD	TBD	**Initiatives by States** • Goa, Delhi, Pondicherry, Rajasthan, Maharashtra, Kerala, Meghalaya, Nagaland, Himachal Pradesh, Haryana have issued additional state policies –e.g. Maharashtra non-biodegradable Garbage(Control) Ordinance, 2006 –Carry

Act/Rule	Key Actions required by State Pollution Control Boards for implementation	Top Performing States	Bottom performing States	Remarks on Performance and Implementation by States [11]
Management) Rules,2009				bags to be 50 microns • Many States have issued banning of plastic bags in specified zones. • To explore possibility of use of plastic waste in road construction, HP State Pollution Control Board took initiative and organized demonstration on use of plastic waste in road construction by replacing 10-15% of bitumen by waste plastic/ polythene.in collaboration with Public Works Department and MC Shimla
Hazardous Waste (Management, Handling and Trans boundary Movement) Rules, 2008	• Hazardous Waste Management & Monitoring • Authorizising HW Transporters, Treatment, Disposal, Recycling facilities • Registration of Recyclers/Reprocesses of Hazardous Waste • Inventory and details of CHWTSDF • Monitoring and performance evaluation of Common Hazardous Waste Treatment, Storage and Disposal Facilities	M. Pradesh, Andhra Pradesh, H. Pradesh, Uttarakand, Chandigarh, Haryana Pondicherry, Karnataka, West Bengal, Punjab	Rajasthan, Maharashtra, Gujarat, Tamil Nadu, UP	• Only 10 state have treatment facilities for HWM • Average treatment efficiency across States is 52 % • Gujarat, Maharashtra, Andhra Pradesh Chhattisgarh Rajasthan West Bengal and Tamil Nadu together generate 80.29 % of country's total HW. • Common TSDF located in Gujarat, Maharashtra, Punjab, Rajasthan, Tamilnadu and West Bengal do not have adequate capacities to accommodate the present quantities of land disposable HW **Initiatives by States** • Maharashtra –MPCB – Online database /inventory of hazardous waste generators • Andhra Pradesh – First state to set up Treatment Storage Disposal Facility
The Bio-Medical Waste (Management and Handling) Rules, 1998	• Inventory of BMW generators – Health care establishments • Receipt and Grant of authorization for	Chandigarh Tamil Nadu Maharashtra Manipur	Tripura, Assam, Jharkhand, West Bengal, Madhya	• In Treatment of Biomedical Waste, the average treatment across all States in 67 %

Act/Rule	Key Actions required by State Pollution Control Boards for implementation	Top Performing States	Bottom performing States	Remarks on Performance and Implementation by States [11]
	generators, , collection, receiving, storage, transporting, treating, disposing and/or handling bio-medical waste • Authorisation, Monitoring and performance evaluation of Common Bio-medical treatment Facilities	Meghalaya, Delhi Goa Sikkim A & Nicobar Lakshadweep, (treating 100% of the BMW generated) Punjab, Andhra Pradesh , Haryana, Pondicherry, Chattisgarh have more than 90% treantment	Pradesh (treating less than 40 % of BMW generated in state)	**Initiatives by States** • Maharashtra Actions – MPCB, Real time Online tracking of transportation of BMW using GPS • Andhra Pradesh – First state to set up Common Bio Medical Waste Treatment Facility
Batteries (Management and Handling) Rules, 2001	• Assure Compliance of the said rules • Registrations of Dealers • Registration of Recyclers • Receipt of half yearly /annual returns from Importers ,Dealers, Recyclers and Bulk Consumers • Monitor Compliance of Recyclers	TBD	TBD	**Initiatives by States** Karnataka has been pro-active in implementation of this rule having undertaken inventory of battery handling units including importers, consumers, lead recyclers etc.
The Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996	• Be a member of the State Crisis Group and take part in enforcement of duties	TBD	TBD	**Initiatives by States –** The Madhya Pradesh Pollution Control Board hosts the State Crisis Group information on its website M.P. Factories (Control of Industrial Major Accident Hazard) Rules, 1996
The Manufacture, Storage and import of Hazardous Chemical Rules, 1989	• Inspect the Industrial Activity atleast once in a calendar year • Enforcement of directions and procedures in respect of isolated storage of hazardous chemicals, regarding - • Notification of major accidents as per	TBD	TBD	TBD

Act/Rule	Key Actions required by State Pollution Control Boards for implementation	Top Performing States	Bottom performing States	Remarks on Performance and Implementation by States [11]
	Rules 5(1) and 5(2). • Notification of sites as per Rules 7 to 9. • Safety reports in respect of isolated storages as per Rule 10 to 12. • Preparation of on-site emergency plans as per Rule 13. • Import of hazardous Chemicals and enforcement of directions and procedures on import of hazardous chemicals as per Rule 18.			
Noise Pollution (Regulation and Control) Rules, 2000	• Monitoring and Documentation of noise pollution	TBD	TBD	**Initiatives by States** Many SPCB's specifically monitor noise pollution levels during festivals such as Diwali, Ganesh Chaturti, Duserra, Navrari etc.

APPENDIX B: Environmental Policies and Regulations Reviewed

Water Pollution Control

1. The Water (Prevention and Control of Pollution) Act, 1974, amended 1988
2. The Water (Prevention and Control of Pollution) Rules, 1975
3. The Water (Prevention and Control of Pollution) Cess Act, 1977, amended 1992 ,
4. The Water (Prevention and Control of Pollution) Cess Rules, 1978

Air Pollution Control

1. The Air (Prevention and Control of Pollution) Act 1981, amended 1987

Waste Management and Land Pollution Control

The majority of these rules come under the provision of The Environment (Protection) Act, 1986, amended 1991

1. Municipal Solid Wastes (Management & Handling) Rules, 2000.
2. Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2008.
3. The Hazardous Wastes (Management, Handling and Transboundary Movement) Rules,2009,Notification
4. E-waste Management and Handling Rules 2011
5. Bio-Medical Waste (Management & Handling) Rules, 1998, and Amendment Rules 2000.
6. Plastic Waste (Management & Handling) Rules, 2011.
7. The Recycled Plastics Manufacture and Usage Rules, 1999
8. Batteries (Management and Handling) Rules, 2001

Other Rules (considered but not core focus)

1. Manufacture, Storage and Import of Hazardous Chemical Rules, 1989
2. The Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996
3. The Noise Pollution (Regulation & Control) Rules, 2000.

Table 11 - Role of SPCB and CPCB in implementation of environmental Acts and Rules

Act/Rule	Key Actions required by State Pollution Control Boards for implementation	Means of Verification	CPCB role in implementation
The Water (Prevention and Control of Pollution) Act, 1974, amended 1988 The Water (Prevention and Control of Pollution) Rules, 1975	• Categorisation and inventory of polluting industries in the States by Green, Orange and Red • Consent Management – To establish and to operate • Water quality monitoring (surface and ground water) • Domestic Sewage and Industrial effluent monitoring and management • Establishment of laboratories/ recognition of laboratories • Evolving technologies for treatment and disposal of sewage and effluents • Penalisation of Defaulters • Preparation of Actions Plans for critically polluted Industries under CEPI	• Reports under, GEMS and MINARS, NWMP • Data base/Inventory of industries • No. of Consents to establish and Operate issued • Annual Reports • State of the Environment Reports	• Partial Financing for CETP's • Monitoring support under GEMS, MINARS, Yamuna Action Plan (YAP), NWQMP, Coastal Ocean Monitoring And Prediction System • Capacity Building • Establishing Standards
The Water (Prevention and Control of Pollution)Cess Act, 1977, amended 1992 ,and Rules , 1978	• Testing and monitoring of water meters • Inspection of water supply installation • And waste water treatment systems • Collection of Cess • Penalisation of Defaulters • Preparation of Actions Plans for critically polluted Industries under CEPI	• Financial Audit reports • Annual Reports	
The Air (Prevention and Control of Pollution) Act	• Categorisation and inventory of polluting industries in the States • Consent Management – To establish and to operate	• Monitoring • Reports under the NAMP • Data base/Inventory of	• Specifying NAAQS Standards • National Air Quality

Act/Rule	Key Actions required by State Pollution Control Boards for implementation	Means of Verification	CPCB role in implementation
1981, amended 1987	• Air quality monitoring • Air Pollution management • Vehicular Emission control management • Evolving technologies • Inspection and monitoring of air emissions from industries • Establishment of laboratories/ recognition of laboratories • Penalisation of Defaulters	industries • No. of Consents to establish and Operate issued • Annual Reports • State of the Environment Reports	Monitoring Programme
Municipal Solid Wastes (Management & Handling) Rules, 2000	• Collection, storage, segregation, transportation, processing and disposal of municipal solid wastes • Granting Authorisation for Solid Waste Treatment Facilities • State Board or the Committee to monitor the compliance of the standards regarding ground water, ambient air, leachate quality and the compost quality including incineration standards as specified under Schedules II, III and IV of the act .	• Annual report on MSW in format prescribed in the Act • Annual review report of the SPCB in format prescribed in the Act	• Specifying Standards • Recommending Technologies • Central Pollution Control Board prepares the consolidated annual review report on management of municipal solid wastes • Demonstration projects have been implemented in a few States • Review and monitoring of Facilities and Projects implemented by State
The Recycled Plastics Manufacture and Usage Rules, 1999	• Receipt of applications and granting of Registration for Manufacturer's of plastic carry bags • Monitoring Manufacturer's Facilities	• Database of registered manufacturers/Recyclers	• Specifying Standards

Act/Rule	Key Actions required by State Pollution Control Boards for implementation	Means of Verification	CPCB role in implementation
The Plastics(Manufacture, Usage and Waste Management) Rules,2009			
Hazardous Waste (Management, Handling and Trans boundary Movement) Rules, 2008	• Hazardous Waste Management & Monitoring • Authorizising HW Transporters, Treatment, Disposal, Recycling facilities • Registration of Recyclers/Reprocesses of Hazardous Waste • Inventory and details of CHWTSDF • Monitoring and performance evaluation of Common Hazardous Waste Treatment, Storage and Disposal Facilities	• Annual Reports on HWM in prescribed format • Monitoring reports of Facilities • Databases of all concerned Suppliers/Providers/Facilities	• Technology and Financial Support • Review and monitoring of Treatment Facilities
The Bio-Medical Waste (Management and Handling) Rules, 1998	• Inventory of BMW generators – Health care establishments • Receipt and Grant of authorization for generators, , collection, receiving, storage, transporting, treating, disposing and/or handling bio-medical waste • Authorisation, Monitoring and performance evaluation of Common Bio-medical treatment Facilities	• Database of BMW generators • Annual reports in prescribed format	• Technology and Financial Support • Review and monitoring of Treatment Facilities
Batteries (Management and Handling) Rules, 2001	• Assure Compliance of the said rules • Registrations of Dealers • Registration of Recyclers • Receipt of half yearly /annual returns from Importers ,Dealers, Recyclers and Bulk Consumers • Monitor Compliance of Recyclers	• Data base of registered dealers/recyclers • Half Yearly /Annual returns • Annual Reports	• Registration of Importers • Monitoring and Financial Auditing
The Chemical Accidents (Emergency Planning,	• Be a member of the State Crisis Group and take part in enforcement of duties	• Reports of the State Crisis Group	• Be a key member of the Central Crisis Group and

Act/Rule	Key Actions required by State Pollution Control Boards for implementation	Means of Verification	CPCB role in implementation
Preparedness and Response) Rules, 1996			enforce the rules
The Manufacture, Storage and import of Hazardous Chemical Rules, 1989	• Inspect the Industrial Activity at least once in a calendar year • Enforcement of directions and procedures in respect of isolated storage of hazardous chemicals, regarding - ✓ Notification of major accidents as per Rules 5(1) and 5(2). ✓ Notification of sites as per Rules 7 to 9. ✓ Safety reports in respect of isolated storages as per Rule 10 to 12. ✓ Preparation of on-site emergency plans as per Rule 13. • Import of hazardous Chemicals and enforcement of directions and procedures on import of hazardous chemicals as per Rule 18.	• Inspection Reports • No. of Authorisations and site notifications	• Enforcement of Rules especially w.r.t. import of Hazardous Chemicals
Noise Pollution (Regulation and Control) Rules, 2000	• Monitoring and Documentation of noise pollution	• Monitoring Reports	• Specifying Standards

APPENDIX C: CEPI SCORES OF INDUSTRIAL CLUSTERS BY STATES

#	State	Industrial Cluster /Area	Air	Air 'D'	Water	Water D	Land	Land D	Aggregate CEPI Score	CEPI_Aggreagte	Category – CP, MP, SP
1	A. Pradesh	Kathedan (Andhra Pradesh)	44.5	10	47	15	45.5	15	57.73	An_Wn_Ln	MP
2	A. Pradesh	Kukatpalli (Andhra Pradesh)	41.5	10	47	15	43.5	15	56.56	An_Wn_Ln	MP
3	A. Pradesh	Patancheru- -Bollaram (Andhra Pradesh)	50	10	59	10	54	10	70.07	As_Ws_Ls	CP
4	A. Pradesh	Vijaywada (Andhra Pradesh)	52	10	41.5	10	43	10	60.57	As_Wn_Ln	SP
5	A. Pradesh	Vishakhapatnam (AndhraPradesh)	57	10	57.5	10	55	10	70.82	As_Ws_Ls	CP
6	Assam	Burnihat (Assam)	39	10	34.5	10	34.5	10	46.26	An_Wn_Ln	MP
7	Assam	Digboi (Assam)	32	10	32.75	10	38	10	44.55	An_Wn_Ln	MP
8	Bihar	Hajipur (Bihar)	43.5	15	44	15	44.5	15	55.12	An_Wn_Ln	MP
9	Bihar	Singhbhum, West (Bihar)	55.5	10	51.5	10	51.5	10	67.3	As_Ws_Ls	SP
10	Chhattisgarh	Bhillai- Durg (Chhatisgarh)	44	10	35	10	33.5	10	50.57	An_Wn_Ln	MP
11	Chhattisgarh	Raipur (Chhatisgarh)	67	15	57	15	72.5	15	65.45	As_Wn_Ln	SP
12	Chhattisgarh	Korba	56.5	10	42	10	49	10	83	Ac_Ws_Lc	CP
13	Delhi	Nazafgarh drain basin (including Anand, Parvat, Naraina, Okhla and Wazirpur), Delhi	52.13	10	69	15	65.25	15	79.54	As_Wc_Lc	CP
14	Gujarat	Ahmedabad (Gujarat)	62.75	10	58	15	58	15	75.28	Ac_Ws_Ls	CP
15	Gujarat	Ankleshwar	72	10	72.75	10	75.75	10	88.5	Ac_Wc_Lc	CP
16	Gujarat	Bhavnagar (Gujarat)	54.5	10	57.5	15	57.75	15	70.99	As_Ws_Ls	CP
17	Gujarat	Junagarh (Gujarat)	53.25	10	52.5	15	59.5	15	70.82	As_Ws_Ls	CP
18	Gujarat	Rajkot (Gujarat)	45.5	10	54.5	15	55.5	15	66.76	An_Ws_Ls	SP
19	Gujarat	Surat (Gujarat)	46	10	46.75	15	45.5	15	66.91	As_Wn_Ln	SP
20	Gujarat	Vadodara (Gujarat)	57	10	48	10	48	15	66.91	As_Wn_Ln	SP
21	Gujarat	Vapi	74	10	74.5	10	72	10	88.09	Ac_Wc_Lc	CP

#	State	Industrial Cluster /Area	Air	Air 'D'	Water	Water D	Land	Land D	Aggregate CEPI Score	CEPI_Aggreagte	Category – CP, MP, SP
22	Gujarat	Vatva (Gujarat)	60	10	62	15	56	15	74.77	Ac_Wc_Ls	CP
23	Haryana	Faridabad (Haryana)	63.5	10	59	10	62.75	10	77.07	Ac_Ws_Lc	CP
24	Haryana	Panipat (Haryana)	55.75	10	56.5	10	59	10	71.91	As_Ws_Ls	CP
25	Himachal Pradesh	Baddi (Himachal Pradesh)	56	10	54.5	15	54.5	15	69.07	As_Ws_Ls	SP
26	Himachal Pradesh	Kala Amb (Himachal Pradesh)	56.75	10	54.5	15	51	15	68.77	As_Ws_Ls	SP
27	Himachal Pradesh	Parwanoo (Himachal Pradesh)	53	15	47.5	15	48.5	15	63.83	As_Wn_Ln	SP
	J&K										
28	Jharkhand	Bada Jamtara (Jharkhand)	48	15	52.5	15	52.5	15	64.47	An_Ws_Ls	SP
29	Jharkhand	Dhanbad (Jharkhand)	64.5	15	59	15	65.5	15	78.63	Ac_Ws_Lc	CP
30	Jharkhand	Jamshedpur (Jharkhand)	55.75	10	55.5	10	42	10	66.06	As_Ws_Ln	SP
31	Jharkhand	Ramgarh (Jharkhand)	44	10	53	15	54.5	15	65.11	An_Ws_Ls	SP
32	Jharkhand	Saraikela (Jharkhand)	50.5	10	49	10	54	15	65.38	As_Wn_Ls	SP
33	Karnataka	Bhadravati (Karnataka)	62.75	10	56.5	10	45.5	10	72.33	Ac_Ws_Ln	CP
34	Karnataka	Bidar (Karnataka)	58.75	10	49	10	44	10	67.64	As_Wn_Ln	SP
35	Karnataka	Mangalore (Karnataka)	61.75	15	57.75	10	54	10	73.68	Ac_Ws_Ls	CP
36	Karnataka	Pinia (Karnataka)	56.75	10	46	10	42	10	65.11	As_Wn_Ln	SP
37	Karnataka	Raichur (Karnataka)	59.75	10	46.5	10	44.5	10	68.07	As_Wn_Ln	SP
38	Kerala	Cochin, Greater (Kerala)	57	15	64	10	54	10	75.08	As_Wc_Ls	CP
39	M. Pradesh	Dewas (Madhya Pradesh)	51.5	15	57.5	15	51.5	15	68.77	As_Ws_Ls	SP
40	M. Pradesh	Gwalior (Madhya Pradesh)	45.88	15	38.5	10	42	10	54.63	An_Wn_Ln	MP
41	M. Pradesh	Indore (Madhya Pradesh)	59	15	57.5	15	52	15	71.26	As_Ws_Ls	CP
42	M. Pradesh	Nagda -Ratlam (Madhya Pradesh)	44.5	10	54.5	10	56	10	66.67	An_Ws_Ls	SP
43	M. Pradesh	Pitampur (Madhya Pradesh)	47.75	10	54	10	50.5	10	65.09	An_Ws_Ls	SP
44	Maharashtra	Aurangabad (Maharashtra)	64.75	10	60.5	5	59.5	5	77.44	Ac_Wc_Ls	CP
45	Maharashtra	Chembur (Maharashtra)	70.75	10	67.5	15	66.5	15	69.19	As_Ws_Ln	SP

#	State	Industrial Cluster /Area	Air	Air 'D'	Water	Water D	Land	Land D	Aggregate CEPI Score	CEPI_Aggreagte	Category – CP, MP, SP
46	Maharashtra	Dombivalli (Maharashtra)	59.75	10	50.75	10	46	10	78.41	Ac_Wc_Ls	CP
47	Maharashtra	Nashik (Maharashtra)	66	15	63.5	10	57.5	10	69.25	As_Ws_Ls	SP
48	Maharashtra	Navi Mumbai (Maharashtra)	55	10	57.5	10	50.25	10	73.77	Ac_Ws_Ls	CP
49	Maharashtra	Pimpari-Chinchwad (Maharashtra)	61	10	59	10	55.5	10	66.06	As_Ws_Ln	SP
50	Maharashtra	Tarapur (Maharashtra)	55.25	10	52.5	10	46	10	72.01	Ac_Ws_Ls	CP
51	Maharashtra	Chandrapur	60.75	10	56	15	51.25	15	83.88	Ac_Wc_Lc	CP
52	Orissa	Angul Talcher (Orissa)	64	15	69	15	65.75	15	82.09	Ac_Wc_Lc	CP
53	Orissa	Ib Valley (Orissa)	61	15	56.5	15	59	15	74	Ac_Ws_Ls	CP
54	Orissa	Jharsuguda (Orissa)	61	15	56.5	15	56	15	73.34	Ac_Ws_Ls	CP
55	Orissa	Paradeep (Orissa)	54	10	58.5	10	48	10	69.26	As_Ws_Ln	SP
56	Punjab	Batala (Punjab)	51	15	56.5	15	54.5	15	68.59	As_Ws_Ls	SP
57	Punjab	Jalandhar (Punjab)	52	10	52	10	52	10	64.98	As_Ws_Ls	SP
58	Punjab	Ludhiana (Punjab)	68	10	66	10	64.75	10	81.66	Ac_Wc_Lc	CP
59	Punjab	Mandi Gobind Garh (Punjab)	62	10	55.5	15	62	15	75.08	Ac_Ws_Lc	CP
60	Rajasthan	Jaipur (Rajasthan)	71	10	69	15	59.5	15	66.82	As_Ws_Ls	SP
61	Rajasthan	Jodhpur (Rajasthan)	55	15	52	15	50.5	15	75.19	As_Wc_Ls	CP
62	Rajasthan	Pali (Rajasthan)	52	5	65.5	10	54	10	73.73	As_Wc_Ls	CP
63	Rajasthan	Bhiwadi	52	10	64	15	52	15	82.91	Ac_Wc_Ls	CP
64	Tamil Nadu	Coimbatore (Tamil Nadu)	62.25	10	58.75	10	45.5	10	72.38	Ac_Ws_Ln	CP
65	Tamil Nadu	Cuddalore (Tamilnadu)	47.38	10	47.25	15	43.5	15	77.45	As_Wc_Lc	CP
66	Tamil Nadu	Erode (Tamil Nadu)	56.75	10	50.75	10	53	10	58.19	An_Wn_Ln	MP
67	Tamil Nadu	Manali (Tamilnadu)	54	10	65.25	15	64	15	76.32	Ac_Ws_Ls	CP
68	Tamil Nadu	Mettur (Tamilnadu)	64	15	59	10	58	15	66.98	An_Ws_Ln	SP
69	Tamil Nadu	Tirupur (Tamil Nadu)	46	10	58	15	46.5	15	68.38	As_Ws_Ls	SP
70	Tamil Nadu	Vellore (North Arcot) (Tamilnadu)	69.25	10	65.25	15	62.5	15	81.79	Ac_Wc_Lc	CP
71	UP	Agra (Uttar Pradesh)	59	10	63.75	10	59.5	10	76.48	As_Wc_Ls	CP

#	State	Industrial Cluster /Area	Air	Air 'D'	Water	Water D	Land	Land D	Aggregate CEPI Score	CEPI_Aggreagte	Category – CP, MP, SP
72	UP	Aligarh (Uttar Pradesh)	53	10	48	15	48	15	63.83	As_Wn_Ln	SP
73	UP	Bulandsahar-Khurza (Uttar Pradesh)	42	10	33.5	15	36.5	15	49.09	An_Wn_Ln	MP
74	UP	Ferozabad (Uttar Pradesh)	49	15	47	15	47.75	15	60.51	An_Wn_Ln	SP
75	UP	Kanpur (Uttar Pradesh)	68.5	15	75.25	10	71.5	10	78.09	Ac_Wc_Ls	CP
76	UP	Mathura (Uttar Pradesh)	66	15	63.5	15	56	15	59.98	An_Wn_Ln	MP
77	UP	Meerut (Uttar Pradesh)	48	10	48	10	48	10	59.38	As_Wn_Ln	MP
78	UP	Moradabad (Uttar Pradesh)	50	10	47.5	10	39.5	10	64.71	As_Wn_Ln	SP
79	UP	Noida (Uttar Pradesh)	54	10	49	10	47.5	10	78.9	Ac_Wc_Lc	CP
80	UP	Singrauli (Uttar Pradesh)	65.75	10	64	15	60	15	81.73	Ac_Wc_Ls	CP
81	UP	Varansi-Mirzapur (Uttar Pradesh)	70.5	15	64	15	59.5	15	73.79	As_Wc_Ls	CP
82	UP	Ghaziabad	58	10	62	10	53.5	10	87.37	Ac_Wc_Lc	CP
83	Uttarakhand	Haridwar (Uttarakhand)	51.75	10	48	10	40	10	61.01	As_Wn_Ln	SP
84	Uttarakhand	Udhamsingh Nagar (Uttarakhand)	44	10	41.25	10	44.25	10	54.37	An_Wn_Ln	MP
85	West Bengal	Asansole (West Bengal)	58.38	15	56.25	15	50.5	15	70.2	As_Ws_Ls	CP
86	West Bengal	Durgapur (West Bengal)	49.5	10	58.5	10	47.5	10	68.26	An_Ws_Ln	SP
87	West Bengal	Haldia (West Bengal)	53.75	10	64.5	10	57	10	75.43	As_Wc_Ls	CP
88	West Bengal	Howrah (West Bengal)	57	10	54.5	15	63.5	15	74.84	As_Ws_Lc	CP

APPENDIX D: EPI Scores for Water, Air, Waste Management

EPI Calculation for Water

Sl No	State/UT	Sewage Gen. (MLD)	% Treatment Capacity	Score	Rivers Monitored	DO % Violation	Score	Total Coliform Violation (%)	Count	Score2	% Ground water exploitation	Score3	Final Avg. Score	Rank
1	An. Pradesh	1636	42.43	0.424	16	12.3	0.877	4.16	288	0.048	45	1	0.587	5
2	Aru. Pradesh										0.04	1	0.000	
3	Assam	423.8	0	0	31	2.51	0.9749	5.31	188	0.048	22	1	0.506	18
4	Bihar	1278	10.76	0.108	9	1.5	0.985	55.6	135	0.022	39	1	0.529	15
5	Chhattisgarh	356.5	19.35	0.194	8	0.67	0.9933	0	132	0.05	20	1	0.559	8
6	Delhi	3800	61.32	0.613	1	68.4	0.316	100	38	0	170	0.3	0.307	25
7	Goa	21.5	84.51	0.845	13	3.7	0.963	3.7	27	0.049	27	1	0.714	2
8	Gujarat	2376	32.95	0.329	23	21.3	0.787	26.46	257	0.037	76	1	0.5383	11
9	Haryana	541	57.67	0.577	2	5.88	0.9412	100	31	0	109	0.91	0.607	4
10	Himachal Pradesh	29	100	1	11	2.26	0.9774	7.14	126	0.047	30	1	0.756	1
11	J&K	193.7	7.74	0.077	5	10	0.9	0	0	0	14	1	0.494	19
12	Jharkhand	645.8	0	0	13	0	1	0	58	0.05	21	1	0.513	17
13	Karnataka	1888	12.24	0.122	19	2.5	0.975	12.5	272	0.044	70	1	0.535	13
14	Kerala	721.2	0	0	45	9.12	0.9088	4.91	285	0.048	47	1	0.489	20
15	M. Pradesh	1430	13.01	0.13	30	5.2	0.948	0	238	0.05	48	1	0.532	14
16	Maharashtra	5883	72.89	0.729	30	9.04	0.9096	0	567	0.05	48	1	0.672	3
17	Manipur	26.7	0	0	6	0	1	0	10	0.05	0.65	1	0.513	17
18	Meghalaya	24.3	0	0	5	10.5	0.895	0	19	0.05	0.18	1	0.486	21
19	Mizoram	29.6	0	0	2	0	1	0	16	0.05	0.9	1	0.513	17
20	Nagaland	23.9	0	0	3	12.5	0.875	0	0	0	3	1	0.469	22
21	Orissa	692.2	7.66	0.077	21	0.47	0.9953	25.7	214	0.037	18	1	0.527	16
22	Punjab	1685	26.93	0.269	4	4.35	0.9565	49.57	115	0.025	145	0.55	0.450	24
23	Rajasthan	1510	3.58	0.036	4	1.9	0.981	0	52	0.05	125	0.75	0.454	23
24	Sikkim				4	0	1	0	99	0.05	16	1	0.513	17
25	Tamil Nadu	1348	24.81	0.248	5	3.38	0.9662	0.38	265	0.05	85	1	0.566	6

Sl No	State/UT	Sewage Gen. (MLD)	% Treatment Capacity	Score	Rivers Monitored	DO % Violation	Score	Total Coliform Violation (%)	Count	Score2	% Ground water exploitation	Score3	Final Avg. Score	Rank
26	Tripura	24.4	0	0	2	0	1	0	15	0.05	9	1	0.513	17
27	UP	3747	33.04	0.33	14	19.3	0.807	59.4	352	0.02	70	1	0.539	10
28	Uttarakhand	180.9	13.54	0.135	2	0	1	70.2	47	0.015	66	1	0.5375	12
29	West Bengal	2762	20.56	0.206	8	4.5	0.955	92.3	156	0.004	42	1	0.541	9
30	A & N	12.9	0	0							4	1		
31	Chandigarh	402	40.99	0.41							0	1		
32	D & NH				1	0	1	0	0	0	14	1		
33	D & D										107	0.93		
34	Lakshadweep										63	1		
35	Pondicherry	66	30	0.3	4	0	1	0	0	0	105	0.95	0.563	7

EPI Calculation for Air

Sl No	State/UT	SOX (µg/cum)	NAAQS (µg/cum)	Score	NOX (µg/cum)	NAAQS (µg/cum)	Score	RSPM Ann. Avg (µg/cum)	NAAQS (µg/cum)	Score	Average Score *	Rank
1	A. Pradesh	5	50	1	28	40	1	87	60	0.69	0.897	***8***
2	Aru. Pradesh		50	0		40	0		60	0.00	0.000	
3	Assam	8	50	1	16	40	1	89	60	0.67	0.891	***10***
4	Bihar		50	0	39	40	1	120	60	0.50	0.500	
5	Chhattisgarh	19	50	1	44	40	0.9091	136	60	0.44	0.783	***18***
6	Delhi	5	50	1	55	40	0.7273	214	60	0.28	0.669	***22***
7	Goa	2	50	1	14	40	1	54	60	1.00	1.000	***1***
8	Gujarat	12	50	1	19	40	1	88	60	0.68	0.894	***9***
9	Haryana	9	50	1	13	40	1	180	60	0.33	0.778	***19***
10	H. Pradesh	3	50	1	10	40	1	99	60	0.61	0.869	***12***
11	J&K		50	0		40	0	72	60	0.83	0.278	
12	Jharkhand	18	50	1	33	40	1	164	60	0.37	0.789	***17***
13	Karnataka	15	50	1	40	40	1	82	60	0.73	0.911	***5***

Sl No	State/UT	SOX (µg/cum)	NAAQS (µg/cum)	Score	NOX (µg/cum)	NAAQS (µg/cum)	Score	RSPM Ann. Avg (µg/cum)	NAAQS (µg/cum)	Score	Average Score *	Rank
14	Kerala	7	50	1	28	40	1	46	60	1.00	1.000	***1***
15	M. Pradesh	5	50	1	22	40	1	123	60	0.49	0.829	***15***
16	Maharashtra	16	50	1	42	40	0.9524	99	60	0.61	0.853	***13***
17	Manipur	3	50	1	19	40	1	84	60	0.71	0.905	***6***
18	Meghalaya	2	50	1	34	40	1	73	60	0.82	0.941	***4***
19	Mizoram	2	50	1	15	40	1	37	60	1.00	1.000	***1***
20	Nagaland	2	50	1	14	40	1	72	60	0.83	0.944	***3***
21	Orissa	2	50	1	18	40	1	85	60	0.71	0.902	***7***
22	Punjab		50	0		40	0	208	60	0.29	0.096	
23	Rajasthan	6	50	1	34	40	1	130	60	0.46	0.821	***16***
24	Sikkim		50	0		40	0		60	0.00	0.000	
25	Tamil Nadu	6	50	1	9	40	1	68	60	0.88	0.961	***2***
26	Tripura (H)		50	0		40	0		60	0.00	0.000	
27	UP	8	50	1	35	40	1	181	60	0.33	0.777	***20***
28	Uttarakhand	27	50	1	28	40	1	110	60	0.55	0.848	***14***
29	West Bengal	7	50	1	62	40	0.6452	105	60	0.57	0.739	***21***
30	A & Nicobar		50	0		40	0		60	0.00	0.000	
31	Chandigarh	2	50	1	14	40	1	95	60	0.63	0.877	***11***
32	D&NH		50	0		40	0	94	60	0.64	0.213	
33	Daman & Diu		50	0		40	0	96	60	0.63	0.208	
34	Lakshadweep		50	0		40	0		60	0.00	0.000	
35	Pondicherry	4	50	1	10	40	1	50	60	1.00	1.000	***1***

EPI Calculation for Waste Handling

Sl No	State/UT	MSW Generation (TPD)	MSW Collection (TPD)	Collection Efficiency (%)	Score	Hazardous Waste Generation (MTA)	landfillable	Capacity of TSDF (MTA)	Treatment Efficiency (%)	Score	BMW Gen. (kg/day)	BMW Treated (kg/day)	% BMW Treated	Score	Norm. Score	Average Score	RANK
31	Chandigarh	380*	370*	97.36	**0.97**	9736*	3938*	3938**	100.00	**1.00**	1029*	1025*	100.00	**1.00**		0.990	***1***
25	Tamil Nadu	12504*	11626*	60.00	**0.60**	258647	157909	100000	63.33	**0.63**	16047*	16047*	100.00	**1.00**		0.744	***10***
16	Maharashtra	19204*		70.00	**0.70**	1229556*	568135	100153*	18.00	**0.18**	72500*	86700*	100.00	**1.00**		0.627	***15***
17	Manipur	109		50.00	**0.50**	252	NA	NA	0.00	**0.00**	30559	30559	100.00	**1.00**		0.500	***22***
18	Meghalaya	205*	174*	84.87	**0.85**	1920*	19	0	0.00	**0.00**	1000*	1000*	100.00	**1.00**		0.617	***16***
6	Delhi	7356		65.00	**0.65**	5281	3338	0	0.00	**0.00**	8880	8880	100.00	**1.00**		0.550	***20***
7	Goa	362		65.00	**0.65**	12098*	10763	0	0.00	**0.00**	1180*	1074	100.00	**1.00**		0.550	***20***
24	Sikkim	26		70.00	**0.70**	NA	NA	NA		**1.00**	1057	1057	100.00	**1.00**		0.900	***2***
30	A & Nicobar	35		58.00	**0.58**	NA	NA	NA		**1.00**	964	964	100.00	**1.00**		0.860	***4***
34	Lakshadweep	8		55.00	**0.55**	0	0	0		**1.00**	45	45	100.00	**1.00**		0.850	***6***
5	Chhattisgarh	1256		50.00	**0.50**	295387	5277	0	0.00	**0.00**	2609	2607	99.92	**1.00**		0.500	***22***
9	Haryana	537*		62.00	**0.62**	22000		22000	100.00	**1.00**	6245*	6041	96.73	**0.97**		0.863	***3***
35	Pondicherry	380*		56.00	**0.56**	34768*	137*	**136667***	100.00	**1.00**	3923*	3755	95.71	**0.96**		0.840	***8***
22	Punjab	2793*		65.00	**0.65**	117913	13601	13000	95.58	**0.96**	5942*	5548*	93.96	**0.94**		0.849	***7***
1	A. Pradesh	11861		65.00	**0.65**	556319	211442	350000	165.53	**1.00**	13000	12100	93.08	**0.93**		0.860	***4***
14	Kerala	8338*	1739*	20.85	**0.21**	76010*	59591	45370*	76.00	**0.76**	55425*	47806*	86.25	**0.86**		0.610	***17***
4	Bihar	3212		50.00	**0.50**	3439	3357	0	0.00	**0.00**	3280	2336	71.22	**0.71**		0.404	***27***
21	Orissa	1986		55.00	**0.55**	96830	74351	0	0.00	**0.00**	4382	3091	70.52	**0.71**		0.418	***26***
13	Karnataka	6500*	2100*	32.30	**0.32**	76565*	18366	76565*	100.00	**1.00**	60000*	42000*	70.00	**0.70**		0.673	***11***
10	H. Pradesh	275*	100*	36.36	**0.36**	171834*	35519	50000	140.77	**1.00**	1145*	756*	66.02	**0.66**		0.673	***11***
8	Gujarat	8998	6744*	75.00	**0.75**	1792789*	1107128	447401	40.41	**0.40**	25000*	15000*	60.00	**0.60**		0.585	***18***
23	Rajasthan	5153		60.00	**0.60**	272871	165107	20000	12.11	**0.12**	31399	18620	59.30	**0.59**		0.438	***25***
19	Mizoram	102*	51.3*	50.00	**0.50**	137*	90	0	0.00	**0.00**	316*	180*	56.96	**0.57**		0.357	***28***
28	Uttarakand	676		65.00	**0.65**	**15000**	**6250**	**8000**	128.00	**1.28**	2212	1191	53.86	**0.54**		0.823	***9***
32	D & NH	16		55.00	**0.55**	36995	18497.5	0	0.00	**0.00**	4500	2000	44.44	**0.44**		0.330	***30***
33	Daman & Diu	24		55.00	**0.55**	36995	18497.5	0	0.00	**0.00**	5200	2000	38.46	**0.38**		0.310	***31***

Sl No	State/UT	MSW Generation (TPD)	MSW Collection (TPD)	Collection Efficiency (%)	Score	Hazardous Waste Generation (MTA)	landfillable	Capacity of TSDF (MTA)	Treatment Efficiency (%)	Score	BMW Gen. (kg/day)	BMW Treated (kg/day)	% BMW Treated	Score	Norm. Score	Average Score	RANK
27	UP	7598		62.00	**0.62**	169294	36370	24617	67.68	**0.68**	35222	13500	38.33	**0.38**		0.560	***19***
11	J&K	1207		55.00	**0.55**	16954	9946	0	0.00	**0.00**	1281	436	34.04	**0.34**		0.297	***32***
29	West Bengal	13007		70.00	**0.70**	259776*	120597*	120596*	99.50	**1.00**	23498*	6913*	29.41	**0.29**		0.662	***13***
15	M. Pradesh	4500*		62.00	**0.62**	167890*	34945	90000	257.55	**1.00**	9522*	2681*	28.15	**0.28**		0.633	***14***
12	Jharkhand	914*	718*	78.55	**0.79**	247012*	23135	0	0.00	**0.00**	28976*	8097*	27.94	**0.28**		0.357	***28***
3	Assam	688		55.00	**0.55**	10732	3252	0	0.00	**0.00**	3974	1019	25.65	**0.26**		0.269	***33***
26	Tripura (H)	218		50.01	**0.50**	267	0	0		**0.00**	**2000***	483	24.15	**0.24**		0.247	***34***
20	Nagaland	58		55.00	**0.55**	72*	60*	0	0.00	**0.00**	700	0	0.00	**0.00**		0.183	***35***
2	Aru. Pradesh	77		50.00	**0.50**	0	NA	NA		**1.00**	1369	0	0.00	**0.00**		0.500	***22***

APPENDIX E: Interview/Dialogue with State Pollution Control Boards

Interaction with State Pollution Control Boards was done through questionnaires sent through e-mail, telephonic dialogue as well as personal visits, however with partial success.

Questionnaire circulated through mail and responses received

A detailed set of questionnaire was sent to all the States with repeated reminders between January 2010 and March 2011, out of which about eight SPCB's sent responses. The States /UT's that responded include Karnataka, Puducherry, Rajasthan, Tripura, Punjab, Meghalaya, Kerala, and Lakshadweep. The questionnaire sought to derive qualitative as well as quantitative information from the State Pollution Control boards. Of the SPCB's which responded, most have not responded to many of the questions, many of the responses are not relevant.

The questionnaire formats are given in Appendix E. The responses received from the SPCB's is summarised below.

Responses to Questionnaires

Part A: Successful models in pollution control

Q.1 Have there been notable instances of successful implementation of the environmental legislation, policies or programs by your PCB/PCC? Please list these. While listing the instances include comments on the size of impact, possibility of replication in other PCBs/PCCs and future development anticipated.

Summary of responses received

We asked States and UTs to list the programmes or policies which they believe are best implemented and thus a success story. In Table 1 below we have organized the responses by the States and action areas. As the table indicates the most is done in pollution control which is one of the most important duties of SPCB. Puducherry and Rajasthan have achieved success with banning the plastic bags that typically clog the sewerage system and an ecological hazard in many ways. Puducherry also has success in good solid waste management where as Punjab has several projects for effluent treatment to minimize the water pollution. Tripura has concentrated on air pollution and noise pollution control.

Interestingly, Karnataka and Punjab both have economics incentives for pollution prevention instead of typical command and control approach. While Karnataka imposes a fee for mining, Punjab is taking bank guarantees for compliance. Puducherry and Tripura have also created data and knowledge base for environmental protection. Karnataka has appointed special officers for each coastal district to enforce CRZ norms.

Overall, there is marked difference in what is successful at State levels. It ranges from designing a policy for environmental protection in Rajasthan to a micro project of CETP for bag tanning units in Punjab. Success as understood by the States is often good implementation and desirable effects but unfortunately no baseline is established against which such impacts are measured to quality the level of success.

Table No. 1. Notable instances of successful implementation of environmental policies and programmes

	Karnataka	Puducherry	Rajasthan	Tripura	Punjab	Meghalaya
Personnel	Establishment of District officers in the coastal districts for implementation of CRZ notification 1991					
Economic	Imposing Environmental protection fee @ Rs. 84,000 per hectare for mining in non-forest land:				Taking bank guarantees from industries as an assurance for compliance of environmental laws	
Data, Information, and Knowledge base		• Database of red category industries • Draft action plan on combating climate change		Being first state to have completed the zoning atlas		
Pollution Control		Imposed ban on usage of plastic carry bags, disposal cups and plates of lesser than 51 micron Integrated solid waste management facility Common Biomedical treatment plant	Considerable decrease in the instances of blockage of gutters, sewers and drains due to enforcement of ban on plastic carry bags	• Ensuring almost 100% fixed chimney in Brick fields. • Achieved success in bringing down noise level during Diwali.	• Achievement of Zero liquid discharge by large and medium electroplating industries. CETP units for leather tanning units of Jalandhar. • CETP for bag tanning units of Ludhiana Segregation on high TDS effluent and its treatment by the	

	Karnataka	Puducherry	Rajasthan	Tripura	Punjab	Meghalaya
					Pharmaceuticals units located at Derra Bassi, Distt. Mohali. • Common TSDF at village Nimbua, Distt. Mohali.	
Reduction, reuse, recycle		Co processing of FRP waste in cement kiln			Recovery of Ferrous sulphate from wastewater of acid pickling units in Ludhiana	
Infrastructure for Env Protection		Underground sewerage system in urban areas		Persuade health department for Bio medical waste management infrastructure		
Regulatory and Policy			First state where state environment policy has been formulated for 2010 and promulgated			
Energy and Climate Change		Draft action plan on combating climate change			• Use of Pet coke as a fuel. • Use of pulverized coal in re-rolling mills in Mandi, Gobindgarh and Khanna area.	

Q. 2. Are there any known instances of successful implementation of environmental policies or programs in other PCBs/PCCs, which you may like to replicate in your State/UT? Please list these along with the name of the States /UTs to which they apply.

Summary of responses received

Five States have given the specific information regarding the successful models of implementation of other States they would like to replicate as reported below.

Computerized consent management: Tripura and Meghalaya have identified computerized consent management system being implemented by Tamil Nadu and some other States to be replicated in their States.

Categorization of industry on basis of pollution control measures and consent fee according to pollution load: Karnataka proposed that other States follow its model of industry classification on the basis of pollution control measures and the actions taken for environmental protection. They also suggested that other States can impose consent fee on the red category industries on the basis of pollution load instead of investments.

Third part audit of environmental statements: Punjab wishes to follow Gujarat government's model to conduct third party audit of environmental statements prepared by the industries.

Real time online air quality monitoring: Trupira and Pudducherry both identified that they would like to replicate Tamilnadu's online air quality monitoring system.

Independence of environmental department: Meghalaya has identified that SPCB must be under administrative control of environmental ministries and not any other department or ministry which can affect smooth and objective functioning. For example, Meghalaya SPCB comes under administrative control of Public Health Engineering.

Part B: Environmental Implementation Status

Implementation of Existing Regulations

Q.1. Comment on the implementation status of the Environmental Regulations and the Policies of the Central Government in the State/UT.

Summary of responses

Various acts, regulations, policies, and rules already exist at central and state levels for environmental protection like the Water Act, Air Act, Environmental Protection Act and rules like hazardous waste management, biomedical waste management, municipal solid waste management, noise pollution control rules, etc. (*Refer to Appendix A*) .Listed in the table below are a few of the relevant responses received .

Table No.2. Implementation status of the environmental regulation and the policies under central government/UT

	Karnataka	Puducherry	Rajasthan
Regulatory and Policy	• Recommendations include that reduction, reuse and recycling be made a part of MSW 2000 rules with specific targets for waste reduction. • Have formed specific recommendations for management of plastic waste, demolition waste and packing waste • Recommend capacity building programme for Bio-medical waste Rules 1998	• Pudducherry PCB implements their policies in consultation with south zone CPCB. helps in getting expert advice on matters where state may not have adequate resources. • Legislative initiatives such as imposing ban on establishment/enhancement of polluting units like M.S. ingots, Ferro alloys, Carbides and Potassium Chlorates	• Concentrates on prosecuting hazardous/chemical industries because of inefficiency in the legal system • Suggests fine based mechanism for smaller/lesser polluting industries.

Q. 2 . What specific steps are being taken by the PCB/PCC to strengthen the implementation of the Environmental Regulations and the Policies of the Central Government?

Summary of responses

Table 3 lists the responses received from the SPCB's on their respective initiatives.

Table No. 3. Steps taken to strengthen Implementation of environmental regulation and the policies under central government/UT

	Karnataka	Kerala	Puducherry	Punjab	Meghalya
Personnel		For effective pollution control and policy implementation networking with Police dept., Tax dept., district collector etc.	Nominating officers and staff for training programme, workshops, seminars etc.		Nominating officers and staff for training programme, workshops, seminars etc.
Economic		Integrated clearance system			
Data, Information, and Knowledge base	1. Collaboration with Environmental management and policy research Institute 2. Formation of Eco clubs			Separate action plan made for critically polluted area and monitored through different state government department	

	Karnataka	Kerala	Puducherry	Punjab	Meghalya
Pollution Control		1. Common hazardous waste disposal facility have been set up 2. Common biomedical waste treatment facility 3. A MSW plant at Kozhikode		1. Installation of three STP's 2. New proposals for CETP's	
Reduction, reuse, recycle					
Infrastructure for Env Protection	Formation of 1. Biodiversity Board 2. Lake development authority 3. Establishment of District environmental authority		1.Recruitment of technical man power and upgrading the laboratory		
Regulatory and Policy			1. Central government policies are being incorporate into the state government policies.		1.Enforcement of MSW rules by Municipal authorities but no monitoring 2. Enforcement of plastic bags control of pollution act 2001

	Karnataka	Kerala	Puducherry	Punjab	Meghalya
Energy and Climate Change	1. State coordination committee on climate change and national action plan				

Status and infrastructure of the Board/Committee

Q.3. Please provide details of the current technical and non-technical manpower and the infrastructure available with the Board.

We got limited information particularly for status and infrastructure of the board or the committee.

Table 4 lists the number of technical and non-technical staff in the SPCB's which responded to the question.

Table 4 – Staff Details

	Karnataka	Rajasthan	Tripura	Meghalya
Technical Staff (Engg., Scientific)	83+64		07	32
Non Technical staff (administrative)	154		12	43
Total	301	350	19	75

Q.4. Please provide the budgetary details of the board/committee in terms of: a) Revenue generated by the board/committee b) Grants allotted by State or other grants c) Expenditure on various heads for the last 2 years.

The budgetary provision of the state pollution control boards is fulfilled by state government and central government. The SPCB's generate revenues from industrial establishment through consent fees, water cess, environmental clearance for different projects, laboratory testing etc. The primary source of

grants is the central pollution control board. Funding is utilized for specific pollution control projects, monitoring of air and water, hazardous/chemical waste management, construction sewage treatment plants, environmental education, awareness programmes, etc.

The following table gives the gives the overall grants allotted, revenue generated and the expenditure in last two years as provided by the SPCB's.

Table 5 - Statement of grants, revenue and expenditure of SPCB's.

	Karnataka	Kerala	Puducherry	Rajasthan	Tripura	Punjab	Shilong	Bihar	Meghalya
Grant allotted 2008-09		Rs. 21,10,20,291/-			Rs. 73.50 lacks	Rs. 2718.00 Lacks			Rs. 1,20,00,000/-
2009-10	State plan schemes- Rs. 711.08 lacks Central sponsored scheme- Rs. 1194.08 lacks	Rs. 34,27,34,615/-			Rs. 77.007 lacks	Rs. 3295.00 Lacks			Rs. 1,45,00,000/-
Revenue generated 2008-09		Rs. 19,18,23,291/-			Rs. 51.223 lacks	Rs. 2382.88 Lacks			Rs. 96, 83, 875/-
2009-10		Rs.31,30,06,615/-			Rs. 36.565 lacks	Rs. 2408.32 Lacks			Rs. 2,06,07,209/-
Expenditure 2008-09		total Rs. 11,63,21,131/-				Rs. 1395.76 Lacks			Rs. 1,50,04,628/-

	Karnataka	Kerala	Puducherry	Rajasthan	Tripura	Punjab	Shilong	Bihar	Meghalya
Expenditure 2009-10	State- Rs. 630.31lacks Central-Rs. 8330.31	total Rs. 12,63,07,507/-				Rs. 2408.32 Lacks			Rs. 2,99,60,240/-

Execution of programs

Q.5. Which Environmental Programs are being run by the Board? What targets have been achieved so far and what are the targets set for the future? What are the budgetary provisions and utilizations for these programs? How are these programs being implemented and monitored?

The Table below lists some of the state specific actions and programs implemented by the SPCB's.

Table 6 - State level programs

	Karnataka	Kerala (EMAK and Plan Scheme)	Puducherry	Rajasthan	Punjab	Lakshadweep
Personnel		1.Generation of trained manpower 2.Development of Materials				
Economic						
Data, Information, and Knowledge base		1.Environment education and awareness 2.Preparation of SoE report and environment atlas 3. Public awareness	1. Environmental Awareness Programme 2. Environmental Information System		1. National green corps programme2. National environmental Awareness campaign 3.Environment Information System 4. Status survey regarding	1. Celebration of important environment days and awareness programmes through MoEF.

	Karnataka	Kerala (EMAK and Plan Scheme)	Puducherry	Rajasthan	Punjab	Lakshadweep
		4. Survey and Investigation, Training, Waste & Air Quality Directory			management of Municipal Solid Waste, Biomedical Waste and Plastic Waste in Punjab	
Data, Information, and Knowledge base		1.Environment education and awareness 2. Preparation of SoE report and environment atlas 3. Public awareness 4. Survey and Investigation, Training, Waste & Air Quality Directory	1. Environmental Awareness Programme 2. Environmental Information System		1. National green corps programme2. National environmental Awareness campaign 3.Environment Information System 4. Status survey regarding management of Municipal Solid Waste, Biomedical Waste and Plastic Waste in Punjab	1. Celebration of important environment days and awareness programmes through MoEF
Pollution Control	1. National river conservation Plan 2. national Lake conservation programme 3. Establishment of common treatment and disposal	1. Air and water quality monitoring 2.Environment impact assessment 3. specific subject training (Bio-medical waste management, HW Mngt, MSW Mngt,E-waste & Plastic waste Mgmt. 4. Research on pollution sources, Common waste management facility,	1. National Water Quality Monitoring Programme (NWMP) 2. National Air Monitoring Programme (NAMP)	1. NRCP Environmental Improvement/Conservation Progam in River Chambal at Kota town of Rajashtan 2. NLCP Environmental Improvement/conservation program		1. management of non-biodegradable waste and bio-degradable waste through panchayat raj institutions 2. Bio toilets technology developed by DRDO is adopted to avoid ground water contamination

	Karnataka	Kerala (EMAK and Plan Scheme)	Puducherry	Rajasthan	Punjab	Lakshadweep
	facilities	river water quality surveillance centre, research on pollution technologies, investigation of pollution sources, Waste management by local bodies, Periyar river action plan, Ambient monitoring stations, **Incentives for pollution control,**				
Reduction, reuse, recycle						
Infrastructure for Environment Protection		1.Implementation of dynamic website, computerization, accessories and software 2. Purchase of office equipments, electrical items 3. Purchase of lab/field equipments/Consumables 4. Purchase of books, Furniture /furnishing of office, Purchase of land and building,				1. Installation of desalination plant at Karvatti 1 lakh liters of water per day capacity. All the houses are 12000 are being provided with RWH structures with 10000 its capacity

	Karnataka	Kerala (EMAK and Plan Scheme)	Puducherry	Rajasthan	Punjab	Lakshadweep
		environmental training institute, Augmentation of infrastructure				
Regulatory and Policy						
Energy and Climate Change					Preparation of state level strategy and action plan on climate change	Smokeless chulhas are distributed to all the families through panchayat subsidy at 15% on battery operated vehicles for fuel conservation installation of solar power plants, use of CFL/LED, solar fish driers etc.

Telephonic Dialogue /Personal Meeting

Based on the analysis of the performance of States with respect to EPI and CEPI scores, a few SPCB's were shortlisted for detailed dialogue on successful models in pollution control. These included Maharashtra, Andhra Pradesh, Tamil Nadu and Gujarat. While personal meetings were held with MPCB, attempts at telephonic discussion were made with the States of Andhra Pradesh, Gujarat and Tamil Nadu in the first and second week of December 2011.

A standard format for discussion was developed which is given in Annexure E

The responses received from respective SPCB's is summarised below.

Summary of Responses

Maharashtra

Personal meeting were held with the Chairman Mr. J.S. Sahni, and Dr. Ajay Deshpande, Joint Director (PAMS) of MPCB in the first week of December 2011, to discuss the successful models implemented in pollution control.

The feedback received is briefly summarised below.

a) GPS for management of Bio-medical waste

The Maharashtra Pollution Control Board has implemented a GPS based vehicle tracking system in the BMW transportation vehicles of CBMWTSDF to ascertain the real time, geographical position of the movement of the vehicles. This has lead to significant improvement of waste collection efficiency due to more stringent monitoring. Adoption of PPP model in the CBMWTSDF has increased accountability in BMW management.

b) Integrated Water Quality Monitoring Network

MPCB has initiated a Water Quality Monitoring Network in Maharashtra with other agencies such as Groundwater Survey and Development Agency (GSDA), Central Ground Water Board. Apart from NWMP and SWMP programmes, under the Hydrology Project there are 6 regional laboratories namely Aurangabad, Nagpur, Nashik, Pune, Thane and Kolhapur where 93 stations are monitored monthly. GSDA and CGWB is monitoring groundwater in 35 districts at around 1400 villages.

Based on the monitoring data documented under the integrated water quality monitoring network, Maharashtra State PCB has formulated actions plans for about 5 river basins jointly which will be implemented in collaboration with the district Collectors and Regional Offices.

c) Third Party Monitoring

MPCB has outsourced Air Quality Monitoring to educational institutions which has led to increase in the monitoring efficiency as well as objectivity

Andhra Pradesh

Several calls were made to APPCB during the first and second week of December 2011. A brief conversation was had with Member Secretary. On their request an email explaining the need for a telephonic discussion was also sent.

The feedback received was that they would be uncomfortable discussing over the phone and requested that a personal visit be made.

Tamil Nadu

Several calls were made to TNPCB during the first and second week of December 2011. A brief conversation was had with Member Secretary where they expressed that they would prefer a face to face meeting and would not be able to have a discussion over the phone.

Gujarat

While several calls were made to GPCB during the first and second week of December 2011, we were unable to have a conversation with either the member secretary or the chairman as the concerned people were unavailable to talk over the phone.

APPENDIX F: Questionnaire Formats and Interview Guides Developed

Preliminary questionnaire format circulated to all States

Questionnaire I

Part A: Successful models in pollution control

1. Have there been notable instances of successful implementation of the environmental legislation, policies or programs by your PCB/PCC? Please list these. While listing the instances include comments on the size of impact, possibility of replication in other PCBs/PCCs and future development anticipated.

2. Are there any known instances of successful implementation of environmental policies or programs in other PCBs/PCCs, which you may like to replicate in your State/UT? Please list these along with the name of the States /UTs to which they apply.

Part B: Implementation status of environmental regulations and policies

1. Comment on the implementation status of the Environmental Regulations and the Policies of the Central Government in the State/UT.

2. What specific steps are being taken by the PCB/PCC to strengthen the implementation of the Environmental Regulations and the Policies of the Central Government?

Status and infrastructure of the Board/Committee

3. Please provide details of the current technical and non-technical manpower and the infrastructure available with the Board.

4. Please provide the budgetary details of the board/committee in terms of: a) Revenue generated by the board/committee b) Grants allotted by State or other grants c) Expenditure on various heads for the last 2 years.

Execution of programs

5. Which Environmental Programs are being run by the Board? What targets have been achieved so far and what are the targets set for the future? What are the budgetary provisions and utilizations for these programs? How are these programs being implemented and monitored?

Questionnaire II: Specific Information Details

<table>
<tr><td>1</td><td>Number of Pollution Control Board offices in the State:</td></tr>
<tr><td>2</td><td>Number of total industries in the State
<table>
<tr><td></td><td>Large</td><td>Medium</td><td>Small</td></tr>
<tr><td>Red</td><td></td><td></td><td></td></tr>
<tr><td>Orange</td><td></td><td></td><td></td></tr>
<tr><td>Green</td><td></td><td></td><td></td></tr>
</table>
.</td></tr>
<tr><td>3</td><td>Number of consented industries in the State
<table>
<tr><td></td><td>Large</td><td>Medium</td><td>Small</td></tr>
<tr><td>Red</td><td></td><td></td><td></td></tr>
<tr><td>Orange</td><td></td><td></td><td></td></tr>
<tr><td>Green</td><td></td><td></td><td></td></tr>
</table>
.</td></tr>
<tr><td>4</td><td>Total wastewater consented
a. Industrial effluent:
b. Domestic effluent (from industries):
c. Municipal sewage-sullage:</td></tr>
<tr><td>5</td><td>Total consented stacks
a. Boiler:
b. Process:
c. DG Sets:</td></tr>
<tr><td>6</td><td>Annual budget of the State (in Rs. Crores):</td></tr>
<tr><td>7</td><td>Annual budget of the SPCB Rs. (in Rs. Crores):</td></tr>
<tr><td>8</td><td>Annual expenditure of the SPCB on staff (in Rs. Crores):</td></tr>
<tr><td>9</td><td>Number of court-cases pending in the courts filed by SPCB:</td></tr>
<tr><td>10</td><td>Number of directions issued by SPCB
a. under section 33A of Water (P & CP) Act, 1974:
b. under section 31A of Air (P & CP) Act, 1981:
c. under section 5 of Env (P) Act, 1986:</td></tr>
<tr><td>11</td><td>Amount of water cess collected and sent to the Central Government in previous year (in Rs. Crores):</td></tr>
<tr><td>12</td><td>Number of official monitoring points for
a. Surface waters rivers:
b. AAQ:</td></tr>
</table>

13	Common facilities in the State a. Number of CETP: b. Number of CHWTSDF: c. Number of municipal STPs: d. Number of MSW sites :
14	Number of Board meetings conducted last year:
15	Qualification of Member Secretary (like Engineering/ Science/ Administrative/ Law):
16	Whether Chairman is full time or part time?
17	Comment on efforts of SPCB for R & D, if any
18	Comment on efforts of SPCB for publications/ dissemination of information/ arranging training to staff/ participating in holding workshops-seminar- symposia, if any
19	Number of LAQs/ LCQs/Parliamentary Questions last year related to the Pollution Control Board.
20	Comment on success indicators/awards/appreciation/recognition, if any
21	Comment on plans for future improvement, if any
22	Any other remarks or comments, if any

Questionnaire on Implementation of specific environmental programmes

Key Programmes / Thematic Areas	**Does your STATE/UT have "significant" activities in the following areas (significant = substantial budget allocation)?**	**List interventions that you believe are well implemented and can provide lessons for other States to emulate. Please list names where you have improved or successfully adopted central program or have created a new state policies/regulations**	**Give specific area/ location of the activity. When did the programme start?**	**What are the required funds and funding agency?**	**Which are the participatory bodies / partnerships, etc?**	**Please describe the programme – objective/ activity/ function/ key features?**	**What are the strengths/ advantages/reasons of success ?**	**What are the Weaknesses?**	**What are the Opportunities for improvements?**	**What are the risk factors that may cause the programme to fail? What are the critical support factors – institutional, fiscal, technical, etc?**
1. Pollution control/monitoring/reduction related										
a. Water pollution (drinking/sewage/industrial/coastal)										
b. Air Pollution/Vehicular pollution problems										
c.Noise Pollution										
d.Solid waste management										
e.Land degradation										

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f. Other if any										
2. Regulatory Compliance related										
a. Environmental, Costal, Forest clearances										
b. Annual Environmental statements										
c. stock monitoring / enforecement										
3. Environmental Education, Awareness, Research										
a. seminars, workshops										

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b. training programmes										
c. national green corps										
d. environmental promotion, awareness campaigns										
e. R&D, research grants, policy research etc										
4. Rural area development										
a. agriculture (organic farming) etc										
b. use of biomass for energy										

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c. khadi udyog										
d. eco-friendly products										
5. Energy										
a. energy conservation										
b. Non-renewable energy projects										
c. CDM projects										
6. Urban area development										
a. hazardous waste management										
b. plastic waste										

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management										
c. landfill management										
7. Rainwater harvesting										
8. Eco-housing / Green Building										
9. Co-operative work with NGO, Consultancies or any other agencies										
10. any other environmental programme.										

Interview guides for shortlisted State Pollution Control Boards – November 2011

Consent Mechanism

1. What is status of inventory/database of polluting industries in the state by category? Have all the polluting industries been inventoried?

2. Would you say that you have exceeded your expectations in consent management procedure – consent to establish and consent to operate – compared to other States or compared to your own SPCB's benchmark? Why? Why not? You can think on the following lines for (examples not exhaustive list)

    a. Time taken (seek quantitative info on time taken compared to their benchmark/expectations)
    b. use of technology / IT
    c. Verification procedures
    d. Staffing and resource planning within SPCB
    e. Involvement of industrial groups, others

3. Is there a system for tracking the consent status for each establishment? i.e CFE, CFO – new and renewal.

4. Has any innovative strategy or policy been implemented for consent management? If state identifies their consent management as a successful strategy that goes beyond what national "norms would expect", then ask the following:

    a. If your model of consent management is to be emulated by other States , what would be your recommendations? Below are some examples but you can add others
        i. Resources, staffing, budgetary
        ii. Training & capacity building
        iii. Stakeholder / industry involvement
        iv. Use of IT
        v. Communication, Transparency etc
        vi. regulatory and policy support needed for success
    b. If you can improve your consent management further, what would you like to achieve? What do you need to achieve this?
    c. Right now you have identified the consent management as a success, however, can you identify some of the risk factors in future that may compromise this procedure? What is this scenario? What can be done to avoid it?

Water Pollution Control

1. Monitoring and Laboratory network
    a. How many ETF and STF are there in the state?

    b. How many of the water testing facilities/ equipment are operational? Are the number of Labs and testing facilities/equipment adequate? Are there recognised private labs? How many

c. Under the central schemes what is the subdivision in role of the centre and the state?

d. Which water quality parameters are monitored – monthly/quarterly /half yearly and yearly? Anything additional you monitor than whats mandated by central laws?

e. Are the parameters monitored and frequency of the same adequate for assessing pollution control from industrial effluents etc? – Are heavy metals and pesticides in the water quality monitored regularly – at what interval?

2. Management and Efficiency of CETP's
    a. Who is responsible for operation and maintenance in key industrial areas? Who are the key stakeholders?
    b. What is the mode of operation and maintenance?
    c. Are there any examples of successful models in operation and maintenance of CETP's?

3. If a state has critically polluted areas: In your critically polluted areas, have you taken any special action or running any special program for water pollution control? If yes, please get details on
    a. Success indicator… is it working? How do you know?
    b. Resources, staff, budgets
    c. Techn0logy
    d. Capacity building / Training
    e. Stakeholder involvement
    f. Policy/regulatory support from state government

    What is the trend on penalisation of defaulters? Any special policy, act, regulation that goes beyond national laws? Any strategy in prosecution?

4. Would you say that your SPCB performance in monitoring water pollution exceeds what is needed under central acts OR typical norm in other States or your own performance? Why? Why not? You can think on the following lines for (examples not exhaustive list)
    a. Use of technology / IT
    b. Verification procedures
    c. Staffing and resource planning within SPCB
    d. Involvement of industrial groups, others

5. If state identifies their Water pollution control as a successful strategy that goes beyond what national "norms would expect", then ask the following:

    a. If your model of water pollution control is to be emulated by other States , what would be your recommendations? Below are some examples but you can add others
        i. Resources, staffing, budgetary
        ii. Training & capacity building
        iii. Stakeholder / industry involvement
        iv. Use of IT

v. Communication, Transparency etc
vi. regulatory and policy support needed for success
vii. Incentive mechanisms
viii. Technical/ Advisory support to industries

b. If you can improve the water pollution control further, what would you like to achieve? What do you need to achieve this?

c. Right now you have identified water pollution control as a success, however, can you identify some of the risk factors in future that may compromise this procedure? What is this scenario? What can be done to avoid it?

Air Pollution Control

1. How many of the testing facilities are operational? Are the number of Labs and testing facilities/equipment adequate?

2. Under the central NAMP what is the subdivision in role of the centre and the state?

3. How many red category industries have Continuous AAMS and Continuous stack monitoring systems? Do industries have self monitoring?

4. What is the trend on penalisation of defaulters? Any special policy, act, regulation that goes beyond national laws? Any strategy in prosecution?

5. What are the strategies employed for curbing air pollution in residential areas as well as in industrial areas?
6. Are there any incentives for good performers?
7. If a state has critically polluted areas: In your critically polluted areas, have you taken any special action or running any special program for air pollution control? If yes, please get details on
    a. Success indicator… is it working? How do you know?
    b. Resources, staff, budgets
    c. Techn0logy
    d. Capacity building / Training
    e. Stakeholder involvement
    f. Policy/regulatory support from state government

8. Vehicular Emission Control strategies employed
    a. How many CAAQMS are operational? How many are in the pipeline? – What will be the advantage and how will the data be used for enforcement? Are there networked emission checking /PUC centres?
    b. How do you deal with any exceeding AQ limits?
    c. Any financial and policy level incentives or initiatives that exceed central laws or requirement?
    d. Is there any scheme or program to help improve AAQ in transport sector or industrial sector? Please get details. How can we replicate?

9. Would you say that your SPCB performance in monitoring air pollution exceeds what is needed under central acts OR typical norm in other States or your own performance? Why? Why not? You can think on the following lines for (examples not exhaustive list)
    a. use of technology / IT
    b. Verification procedures
    c. Staffing and resource planning within SPCB
    d. Involvement of industrial groups, others

10. If state identifies their Air pollution control as a successful strategy that goes beyond what national "norms would expect", then ask the following:

    a. If your model of air pollution control is to be emulated by other States , what would be your recommendations? Below are some examples but you can add others
        i. Resources, staffing, budgetary
        ii. Training & capacity building
        iii. Stakeholder / industry involvement
        iv. Use of IT
        v. Communication, Transparency etc
        vi. regulatory and policy support needed for success

    b. If you can improve your air pollution control further, what would you like to achieve? What do you need to achieve this?

    c. Right now you have identified the air pollution control as a success, however, can you identify some of the risk factors in future that may compromise this procedure? What is this scenario? What can be done to avoid it?

Municipal Solid Waste Management

1. What is the SPCB's pro-active role in MSW management? How do SPCB and Municipality work together on this? Any mechanism? – Communication, specific roles, etc

2. Are the Solid Waste Management treatment/disposal facilities inspected at regular intervals – at what frequency? Are the annual review reports prepared and submitted as required?

3. Have any pilots in MSW management been implemented by CPCB?

4. What type and capacity of treatment facilities are in the pipeline?

5. Is there any scheme or program or a state level policy/rule that has been successful in SWM? Get details? Why is it successful? What resources are needed? How was it done? How can we replicate to other States.

Hazardous Waste Management

1. What is the status of authorizisation of HW Transporters, Treatment, Disposal, Recycling facilities? Is there a database of all service providers? How many Recyclers/Reprocesses of Hazardous Waste are registered?

2. What is the frequency of Monitoring and performance evaluation of Common Hazardous Waste Treatment, Storage and Disposal Facilities?

3. What is the procedure for disposal of Hazardous Waste which exceeds the treatment capacity?

4. Are new common HWTF in the pipe line?

5. Are the annual review reports prepared and submitted as required?

6. If a state has critically polluted areas: In your critically polluted areas, have you taken any special action or running any special program for Hazardous Waste Management? If yes, please get details on

    a. Success indicator… is it working? How do you know?
    b. Resources, staff, budgets
    c. Technology
    d. Capacity building / Training
    e. Stakeholder involvement
    f. Policy/regulatory support from state government

7. Would you say that your SPCB performance in HWM exceeds what is needed under central acts OR typical norm in other States or your own performance? Why? Why not? You can think on the following lines for (examples not exhaustive list)

    a. Use of technology / IT
    b. Verification procedures
    c. Staffing and resource planning within SPCB
    d. Involvement of industrial groups, others
    e. Involvement of Private agencies

8. If state identifies their HWM as a successful strategy that goes beyond what national "norms would expect", then ask the following:

    a. If your model of HWM is to be emulated by other States , what would be your recommendations? Below are some examples but you can add others
        vii. Resources, staffing, budgetary
        viii. Training & capacity building
        ix. Stakeholder / industry involvement
        x. Use of IT
        xi. Communication, Transparency etc
        xii. regulatory and policy support needed for success

    d. If you can improve your HWM further, what would you like to achieve? What do you need to achieve this?

    e. Right now you have identified the air pollution control as a success, however, can you identify some of the risk factors in future that may compromise this procedure? What is this scenario? What can be done to avoid it?

BMW Management

1. What is the status of grant of authorization for generators, collection, receiving, storage, transporting, treating, disposing and/or handling bio-medical waste?

2. What is the frequency of monitoring and performance evaluation of Common Bio-medical treatment Facilities?

3. Are new common BMWTF in the pipe line?

4. What is done with the present BMW for which treatment facility is short?

5. Are the annual review reports prepared and submitted as required?

6. Would you say that your SPCB performance in Biomedical Waste Management exceeds what is needed under central acts OR typical norm in other States or your own performance? Why? Why not? You can think on the following lines for (examples not exhaustive list)

    a. Use of technology / IT
    b. Verification procedures
    c. Staffing and resource planning within SPCB
    d. Involvement of Stakeholders – Medical institutions, Clinics, Labs etc.

7. If state identifies their BWM as a successful strategy that goes beyond what national "norms would expect", then ask the following:

    a. If your model of BMW management is to be emulated by other States , what would be your recommendations? Below are some examples but you can add others
        i. Resources, staffing, budgetary
        ii. Training & capacity building
        iii. Stakeholder / industry involvement
        iv. Use of IT
        v. Communication, Transparency etc
        vi. regulatory and policy support needed for success

    b. If you can improve your BMW management, what would you like to achieve? What do you need to achieve this?

    c. Right now you have identified the BMW management as a success, however, can you identify some of the risk factors in future that may compromise this procedure? What is this scenario? What can be done to avoid it?

Critically Polluted Industries

1. What is the status of preparation/implementation of action plans for critically polluted industries identified in the CEPI study?

2. Are any innovative strategies, policies, technology proposed?

3. If yes, please get details on

    a. Success indicator… is it working? How do you know?
    b. Resources, staff, budgets
    c. Techn0logy
    d. Capacity building / Training
    e. Stakeholder involvement
    f. Policy/regulatory support from state government

4. If your model of CAP is to be emulated by other States , what would be your recommendations? Below are some examples but you can add others

    a. Resources, staffing, budgetary
    b. Training & capacity building
    c. Stakeholder / industry involvement
    d. Use of IT
    e. Communication, Transparency etc
    f. regulatory and policy support needed for success

5. If you can improve your CAP further, what would you like to achieve? What do you need to achieve this?

6. Right now you have identified the CAP as a success, however, can you identify some of the risk factors in future that may compromise this procedure? What is this scenario? What can be done to avoid it?

Comments on management of Battery waste, E- Waste?

Indentify if any successful models exists. If yes, seek more info on them as per above