ENVIRONMENTAL MONITORING & REPORTING IN CITIES

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Delhi – 110032
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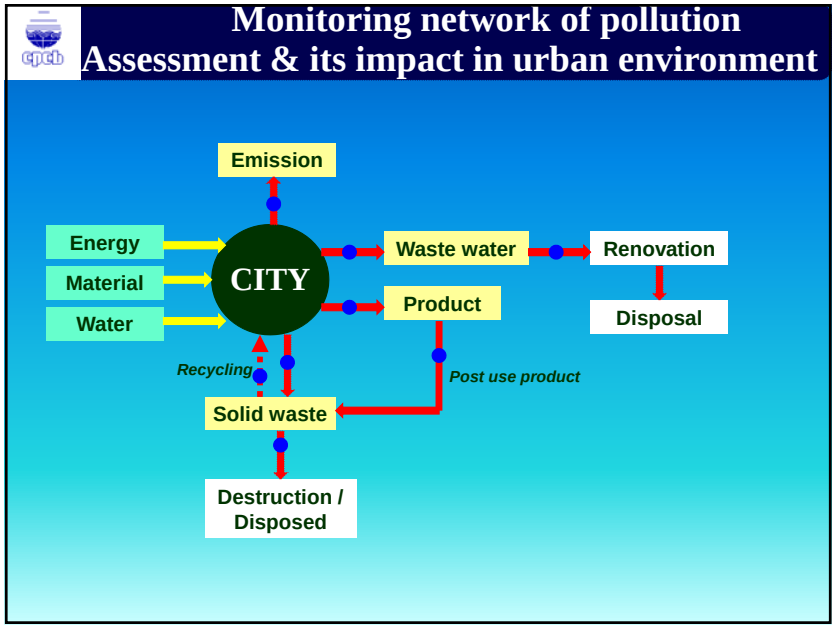
What is monitoring?

Monitoring is a programme for a systematic observation in order to draw inference (prediction) about the experiment or the phenomena for which it is designed


Monitoring network of pollution
Assessment & its impact in urban environment
Emission
Energy
Material
Water
CITY
Waste water
Renovation
Disposal
Product
Recycling
Post use product
Solid waste
Destruction /
Disposed


Monitoring &
Reporting - Air
Pollution

Air pollution in India

Sources

- Anthropogenic: power plants, factories, waste incinerators, furnaces, motor vehicles, marine vessels, aircraft, fumes, nuclear weapons
- Natural: dust, methane emitted by the digestion of food by animals, radon gas from radioactive decay within the Earth's crust, smoke and carbon monoxide from wildfires, volcanic activity

Reasons

- Quality of fuel (coal, diesel, petrol, fuel oil)
- Process technology (specially in s.S.I.)
- Siting of industries specially industrial estates
- No pollution preventive step taken (early stage of industrialisation)
- Predominance of 2-stroke vehicles
- Uncontrolled growth of vehicle population
- Inadequate pollution prevention and control system in small/ medium scale industry (s.M.S)
- Poor compliance of standard in S.M.S

National Ambient Air Quality Monitoring Programme (NAMP)

NAMP

To assess present and anticipated air pollution in India continuous air quality survey/monitoring programs has been set up by CPCB in collaboration with SPCB, PCCs, UTs & NEERI. This nation-wide network of ambient air quality monitoring is named National Air Quality Monitoring Programme (NAMP)

Monitoring Stations under NAMP

- NAMP was started in 1984 - 85
- Sanctioned stations – 482

  Total Operating Stations – 355 (26states, 136cities, 5UT)

Monitoring agencies

- CPCB in Delhi
- SPCBs/PCCs in respective states/UTs
- NEERI in six cities

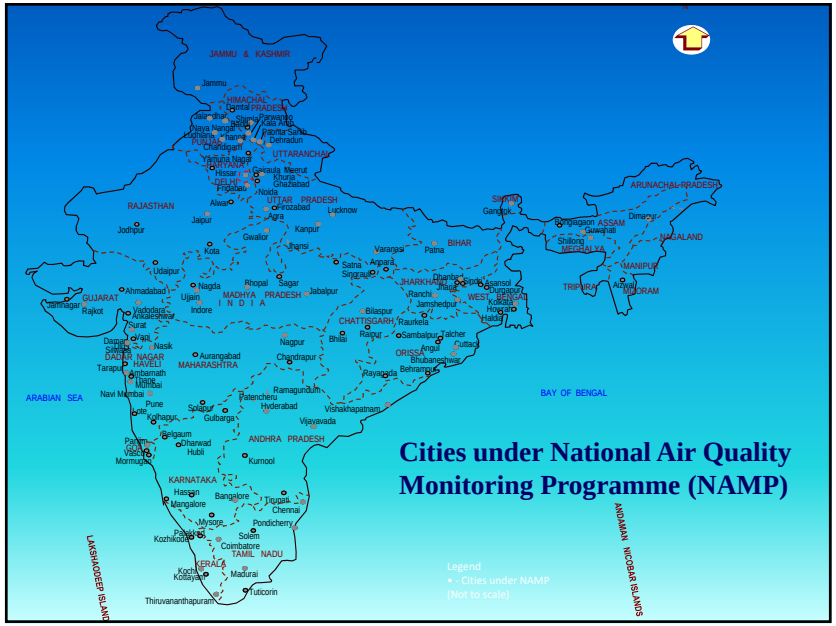
NAMP…contd.

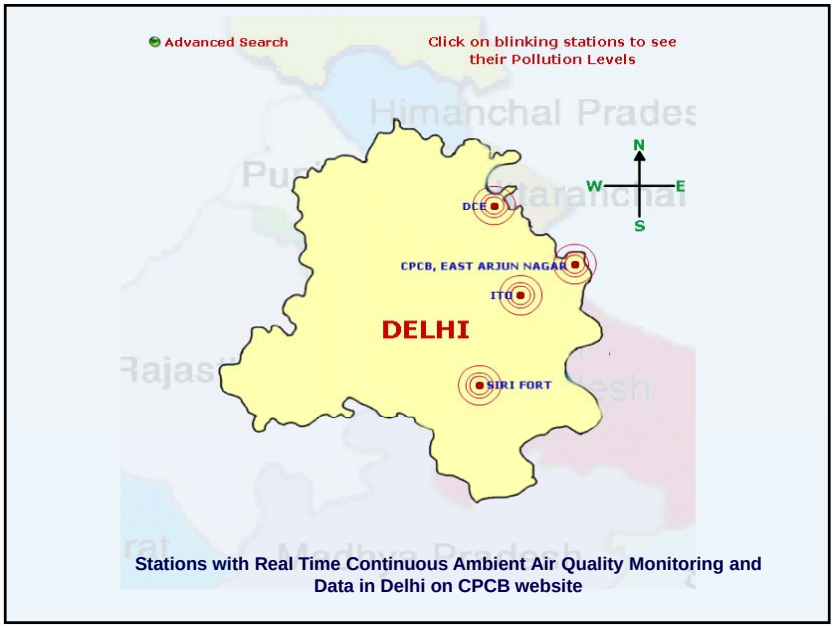
Objectives of NAMP

- To determine status and trends of ambient air quality
- To ascertain whether the prescribed ambient air quality standards are violated
- To Identify Non-attainment cities
- To obtain the knowledge and understanding necessary for developing preventive and corrective measures

Parameters monitored

- Regular Monitoring of SO2, NO2, RSPM, SPM
- Additional Monitoring of Ammonia, CO, Ozone, PM2.5, BTX, PAHs in Delhi and other selected cities
- Meteorological monitoring wrt wind speed and direction, temperature and relative humidity (Also, Mixing height in Delhi)
- Monitoring of pollutants done for 24 hours (4-hourly gaseous pollutants, 8 hourly-PM), twice a week, 104 days a year





Stations with Real Time Continuous Ambient Air Quality Monitoring and Data in Delhi on CPCB website

Air Quality Monitoring (Delhi)

Monitoring using Mobile Van

Manual Monitoring

Continuous analyzers

Analysis facility in CPCB

Guidelines for monitoring

Background Information to be Collected
- Sources and Emissions
- Health and Demographic Information
- Meteorological Information
- Topographical Information
- Previous Air Quality Information

Components of monitoring
- Number and Distribution of Monitoring Locations
- Recommended Minimum Number of Stations, Population-wise (Source: IS : 5182 (Part 14), 2000)

Selection of site for monitoring station
- Representative Site
- Site should be away from major pollution sources
- Site should be away from absorbing surfaces
- It is expected to remain a representative site over a long time and no land use changes, re-buildings etc. are foreseen in near future

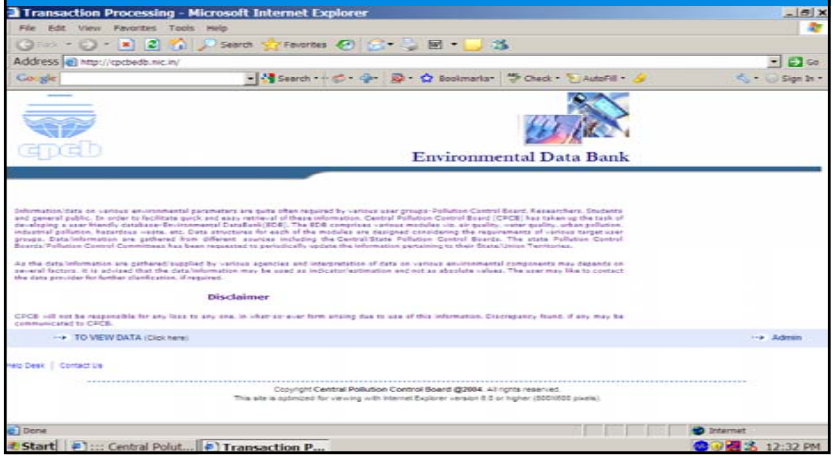
Physical requirement – as per standard

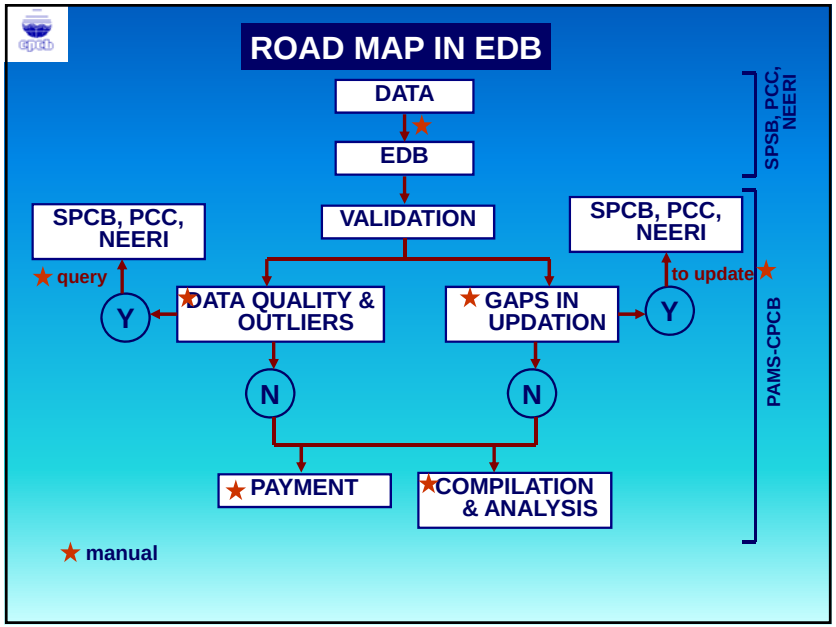
Measurement method – as per CPCB guidelines

Laboratory requirement
- Financial Requirements
- Manpower Requirement
- Quality assurance and Quality Control

Data dissipating – through EDB

Such large amount of data is handled by Environmental data Bank. It
- Expedites data dissemination
- Yields monthly, yearly averages, no of days monitored, min, max, SD values





NAMP…contd.

Data reporting

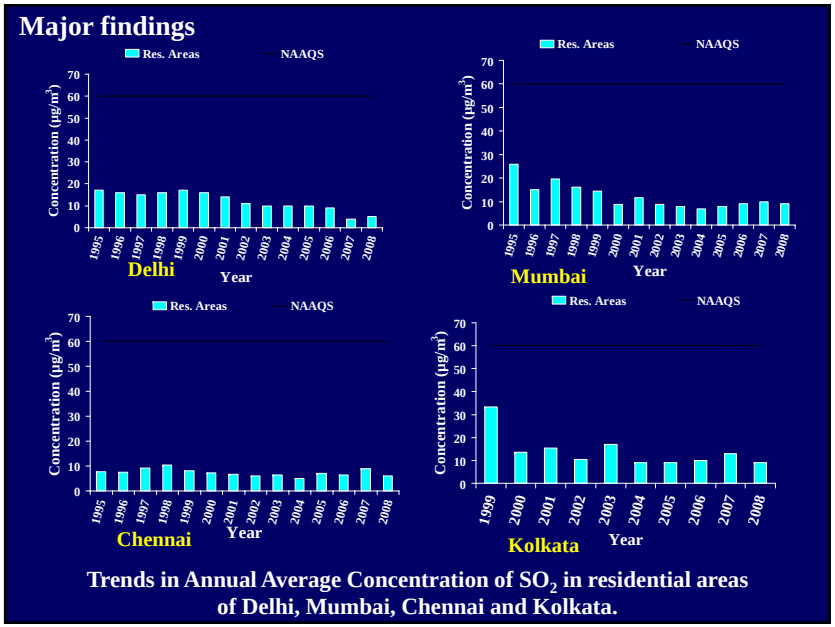
- Data is published in the form of reports on air quality trends and air quality status reports is published every year. Data is also made available on CPCB website.
- Standards are in the form of 24 hourly average and annual average concentration
- Percentage violation of NAAQS (24 hourly average) is determined
- Air Quality in terms of Low, Moderate, High and Critical levels is determined by calculating an exceedence factor

$$\text{Exceedence Factor} = \frac{\text{Observed Annual Mean Concentration of a Criterion Pollutant}}{\text{Annual Standard for the Respective Pollutant and Area Class}}$$

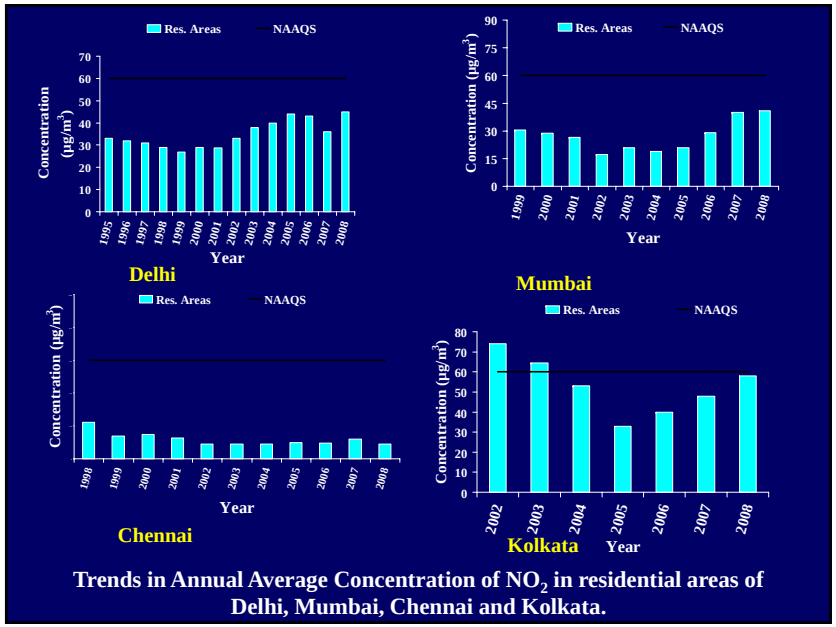
The Four Air Quality Categories are:

- Critical Pollution (C): When EF is more than 1.5;
- High Pollution (H): When EF is between 1.0 - 1.5;
- Moderate Pollution (M): When EF is between 0.5 - 1.0;
- Low Pollution (L): When the EF is less than 0.5.

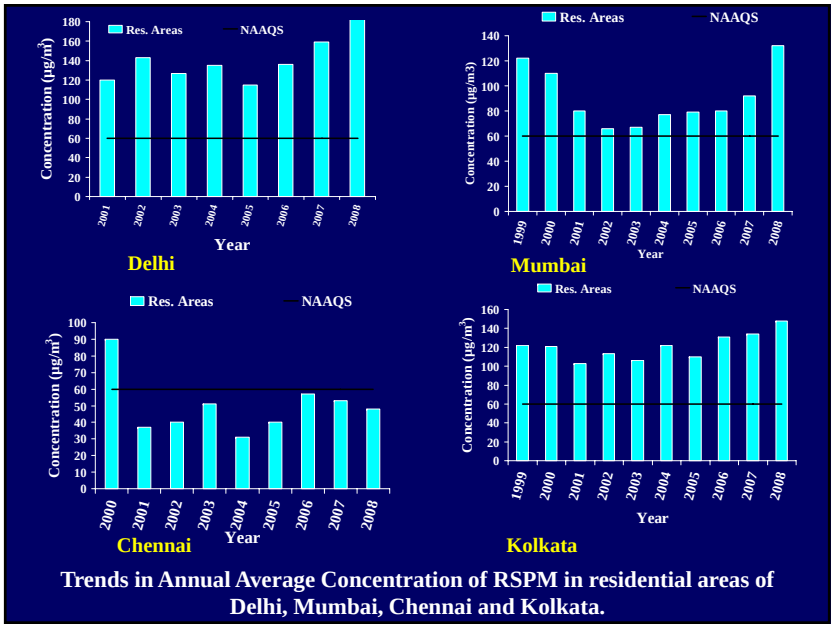
Major findings



Trends in Annual Average Concentration of SO_2 in residential areas of Delhi, Mumbai, Chennai and Kolkata.



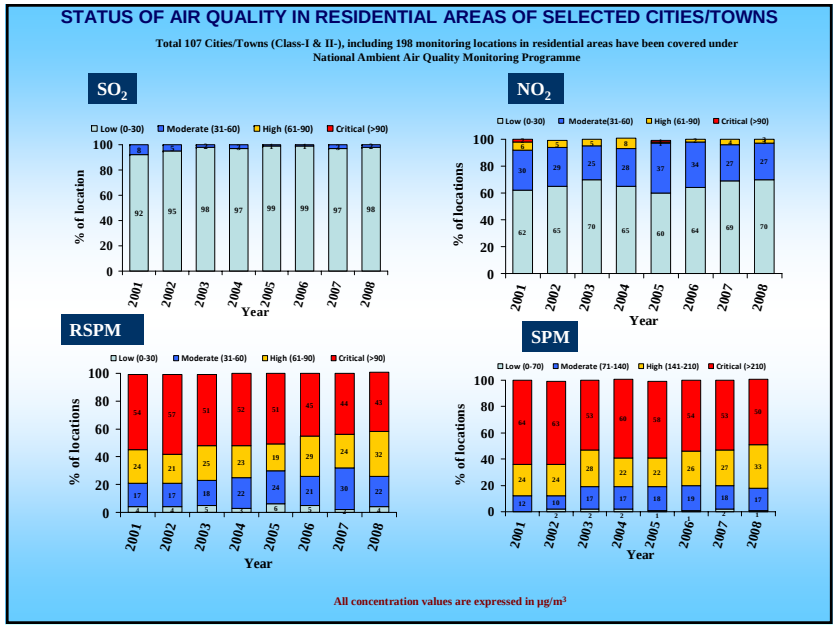
Trends in Annual Average Concentration of NO_2 in residential areas of Delhi, Mumbai, Chennai and Kolkata.

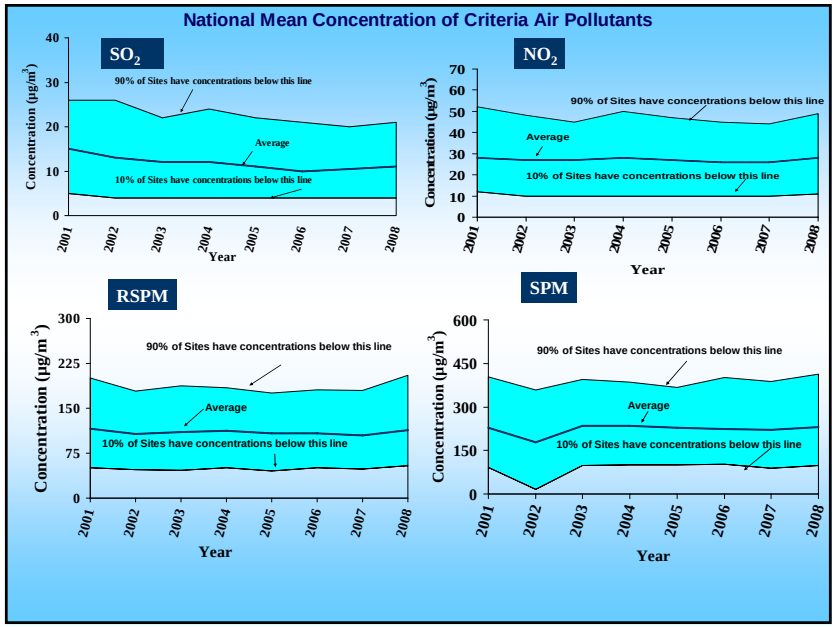


Trends in Annual Average Concentration of RSPM in residential areas of Delhi, Mumbai, Chennai and Kolkata.

States with high conc. of criteria pollutants during 2008

Parameters		States (Cities)
1. SO2 (residential	-	Maharashtra (Chandrapur- SRO , Bapat nagar)
		Uttar Pradesh (Khurja- Ahir Para)
SO2 (Industrial)	-	Uttar Pradesh (Khurja- CGCRI)
		Maharashtra (Greater Mumbai- Dombivalli, MIDC)
2. NO_2 (residential)	-	Delhi (Town Hall)
	-	West Bengal (Kolkata- Moulali)
NO_2 (Industrial)	-	West Bengal (Howra- Bandha Ghat)
	-	West Bengal (Durgapur- Dew India Limited)
3. RSPM (residential)	-	Delhi (Town Hall)
	-	Punjab (Ludhiana- PPCB office building)
RSPM (Industrial)	-	Punjab (Ludhiana- Rita Sewing Machine)
	-	Madhya Pradesh (Satna- Sub Divisional Office)
4. SPM (residential)	-	Uttar Pradesh (Meerut- Begam Bridge)
	-	Uttar Pradesh (Meerut- Thana Railway Road)
SPM (Industrial)	-	Delhi (Mayapuri Industrial Ares)
	-	Uttar Pradesh (Firozabad- CDGI)


STATUS OF AIR QUALITY IN RESIDENTIAL AREAS OF SELECTED CITIES/TOWNS
Total 107 Cities/Towns (Class-I & II-), including 198 monitoring locations in residential areas have been covered under National Ambient Air Quality Monitoring Programme
SO2
NO2
RSPM
SPM
Low (0-30)
Moderate (31-60)
High (61-90)
Critical (>90)
Low (0-70)
Moderate (71-140)
High (141-210)
Critical (>210)
% of location
% of locations
Year
All concentration values are expressed in µg/m³


National Mean Concentration of Criteria Air Pollutants
SO2
NO2
RSPM
SPM
Concentration (µg/m3)
90% of Sites have concentrations below this line
Average
10% of Sites have concentrations below this line
Year

NAMP…contd.

Utilisation of Data

- Non-attainment cities are identified and concerned SPCBs/PCCs formulate action plans to control air pollution.
- Reviewing NAAQS
- Epidemiological Studies
- Policy Levels Decision making at Central and State Govt. level, replying to Parliament Questions, VIP queries etc
- MSc, MTech, PhD students in their thesis work
- Air Quality Data is presented in International Conferences, Seminars, Symposiums in the form of Research papers etc.

NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS)

Pollutant	Time Weighted Average	Concentration in Ambient Air			Method of Measurement
		Industrial Area	Residential, Rural and other Areas	Sensitive Area	
Sulphur Dioxide (SO_2)	Annual Average*	80 µg/m³	60 µg/m³	15 µg/m³	1. Improved West and Gaeke Method 2. Ultraviolet Fluorescence
	24 Hours Average**	120 µg/m³	80 µg/m³	30 µg/m³	
Oxides of Nitrogen as NO_2	Annual Average*	80 µg/m³	60 µg/m³	15 µg/m³	1. Jacob & Hochheiser modified (NaOH-$NaAsO_2$) Method 2. Gas Phase Chemiluminiscence
	24 Hours Average**	120 µg/m³	80 µg/m³	30 µg/m³	
Suspended Particulate Matter (SPM)	Annual Average*	360 µg/m³	140 µg/m³	70 µg/m³	High Volume Sampling (Average flow rate not less than 1.1m³/minute)
	24 Hours Average**	500 µg/m³	200 µg/m³	100 µg/m³	
Respirable Particulate Matter (Size less than 10µm) (RPM)	Annual Average*	120 µg/m³	60 µg/m³	50 µg/m³	Respirable Particulate Matter Sampler
	24 Hours Average**	150 µg/m³	100 µg/m³	75 µg/m³	
Lead (Pb)	Annual Average*	1.0 µg/m³	0.75 µg/m³	0.50 µg/m³	AAS Method after sampling using EPM 2000 or equivalent filter paper
	24 Hour Average**	1.5 µg/m³	1.0 µg/m³	0.75 µg/m³	
Carbon Monoxide (CO)	8 Hours Average**	5.0 mg/m³	2.0 mg/m³	1.0 mg/m³	Non dispersive Infrared Spectroscopy
	1 Hour Average	10.0mg/m³	4.0 mg/m³	2.0 mg/m³	
Ammonia (NH_3)	Annual Average*	0.1 mg/m³			-
	24 Hour Average**	0.4 mg/m³			

Annual Arithmetic mean of minimum 104 measurements in a year twice a week 24 hourly at uniform interval, 24 hourly/8 hourly values should be met 98% of the time in a year. However, 2% of the time, it may exceed but not on two consecutive days. **OTE** National Ambient Air Quality Standard : The levels of air quality necessary with an adequate margin of safety, to protect the public health, vegetation and property. Whenever and wherever two consecutive values exceed the limit specified above for the respective category, it would be considered adequate reason to institute regular/continuous monitoring and further investigations.The State Government / State Board shall notify the sensitive and other areas in the respective states within a period of six months fr date of notification of National Ambient Air Quality Standards.

NAMP NETWORK 2009 - at a glance

A. Total no. of station sanctioned	-	**483**
1. Total no. of operating stations	-	**355**
a. No. of state/UT covered	-	26 states, 5 UT
b. No. of cities covered	-	136
2. No. of stations to be operationalized	-	**132**
B. Total no. of Metro cities	-	**35** (Agra, Ahmedabad, Allahabad, Amritser, Asansol , Bangalore, Bhopal, Chennai, Coimbatoure, Dhanbad, Delhi, Faridabad, Hyderabad, Jaipur, Jabalpur, Jamshedpur, Indore, Kanpur, Kochi,Kolkatta, Lucknow, Ludhiana, Madurai, Meerut, Mumbai, Nagpur, Nasik, Patna, Pune, Rajkot, Surat, Vadodara, Varanasi, Vijayvada, Vishakapatnam)
Total no. of operating stations in metro cities	-	**143**
No. of stations in Industrial Areas	-	49
No. of stations in Residential Areas	-	88
No. of stations in Sensitive Areas	-	6
C. Target on XIth five year plan	-	**700**
New proposed stations	-	88
D. Parameters monitored (104 observation/year)	-	
1. Criteria pollutants	-	SOx, NOx, RSPM, SPM
2. Additional parameters	-	PAH, H2S, Toxic trace metals, NH_3 – Hydrabad, Delhi, Mumbai, Nagpur, Chennai, Kolkata CO, Ozone, $PM_{2.5}$, C_6H_6 – Delhi
E. Non Attainment Cities		
1. Total non-attainment cities		
No. of cities in 2005	-	72 (23 States)
No. of cities in 2008 (latest)	-	88 (24 States)

National Water Quality Monitoring Programme

- **CPCB in collaboration with concerned SPCBs/PCCs established a nationwide network of water quality monitoring comprising 1429 stations in 27 States and 6 Union Territories. The monitoring is done on monthly or quarterly basis in surface waters and on half yearly basis in case of ground water.**
- **The monitoring network covers 293 Rivers, 94 Lakes, 9 Tanks, 41 Ponds, 15 Creeks/Seawater, 23 Canals, 18 Drains and 411 Wells.**
- **Among the 1429 stations, 810 are on rivers, 102 on lakes, 18 on drains, 23 on canals, 9 on tank, 15 on creeks/seawater, 41 on pond and 411 are groundwater stations.**

- Present Monitoring Network-1429 Stations
- States & Union Territories Covered-27 States and 6 Union Territories
- States & Union Territories not covered- Arunachal Pradesh and Andaman & Nicobar Islands
- Water Body Wise Monitoring Network
- Monitoring Network

River	Lake	Tank	Pond	Canal	Creek/ Sea water	Drain	Well
293	94	9	41	23	15	18	411

- Monitoring Stations

River	Lake	Tank	Pond	Canal	Creek/ Sea water	Drain	Well	Total
810	102	9	41	23	15	18	411	1429

- Parameters-9 Core- PH, Temperature, Conductivity, Dissolved Oxygen, BOD, Nitrate, Nitrite, Faecal Coliform and Total Coliform
- Frequency-Once a month

Water Quality Monitoring Objectives

- ✓ **For rational planning of pollution control strategies and their prioritisation;**
- ✓ **To assess nature and extent of pollution control needed in different water bodies or their part;**
- ✓ **To evaluate effectiveness of pollution control measures already is existence;**
- ✓ **To evaluate water quality trend over a period of time;**
- ✓ **To assess assimilative capacity of a water body thereby reducing cost on pollution control;**
- ✓ **To understand the environmental fate of different pollutants.**
- ✓ **To assess the fitness of water for different uses.**

26

Criteria for selection of Monitoring Stations

Rivers

- Water intake point for community water supply in city/town.
- Presence of large/medium or clusture of small water polluting industries.
- Places of religious bathing (organised).
- Source of river to get indication of its pristine quality.
- Filling up long unrepresented gaps between existing monitoring stations.
- Large section of irrigated area upstream.
- Flow rate / discharge being critical in lean period.
- Downstream of big cities.
- Confluence of tributaries and main river.
- Inter State boundaries

B. Lake / Reservoir / Pond / Tank

- Water abstraction point
- Organised bathing
- In the vicinity of significant out fall
- Recreational spots

C. Canal

- Irrigation off-take
- Downstream of pollution outfall
- Drinking water intake point

D. Ground Water

- Drinking water sources located in in sanitary conditions and prone to sewage contamination, preferably in shallow aquifer in the vicinity of septic tanks, sewage treatment plant, oxidation pond, cess pools, garbage dump site etc.
- Tube-wells, hand pumps or dug-wells located in industrial areas and prone to contamination and are in use.

Parameters Measured

Field Parameters

Sl. No.	Parameter
1	Weather
2	Approximate Depth of main stream
3	Colour and Intensity
4	Odor
5	Visible Effluent discharge
6	Human Activities around station
7	Station Detail
8	Temperature
9	Dissolved Oxygen

Core Parameters

Sl. No.	Parameter
1	pH
2	Conductivity
3	BOD
4	Nitrate-N
5	Nitrite-N
6	Faecal Coliform
7	Total Coliform

Biomonitoring

Sl. No.	Parameter
1	Saprobity Index
2	Diversity Index
3	P/R Ratio

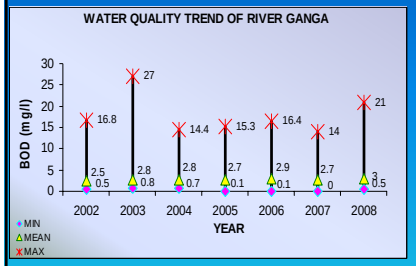
General Parameters

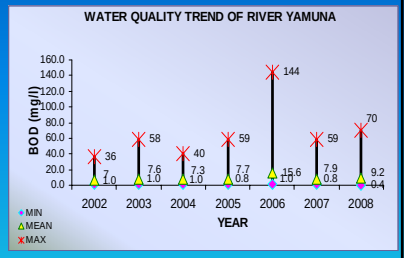
Sl. No.	Parameter
1	Turbidity, NTU
2	P. Alkalinity, as $CaCO_3$
3	Total Alkalinity, as $CaCO_3$
4	Chlorides, mg/L
5	COD, mg/L
6	Total Kjeldahl-N, as N mg/L
7	Ammonia-N, as N mg/L
8	Hardness, as $CaCO_3$
9	Calcium, as $CaCO_3$
10	Sulphate, mg/L
11	Sodium, mg/L
12	Total Dissolved Solids, mg/L
13	Total Fixed Solids, mg/L
14	Total Suspended Solid, mg/L
15	Phosphate
16	Boron, mg/L
17	Magnesium, as $CaCO_3$
18	Potassium, mg/L
19	Fluoride, mg/L

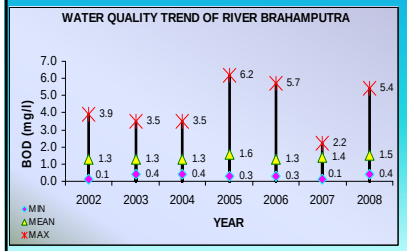
Micro- Pollutants in Water & Sediment (Proposed)

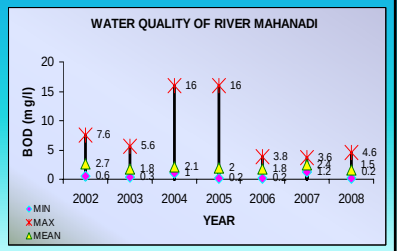
Sl. No.	Parameter
1.	Arsenic, ug/L
2.	Cadmium, ug/L
3.	Copper, ug/L
4.	Lead, ug/L
5.	Chromium (Total), ug/L
6.	Nickel, ug/L
7.	Zinc, ug/L
8.	Mercury, ug/L
9.	Iron (Total), ug/L
10	Cyanide, ug/L
11.	Pesticide 1. Alpha, Beta, and Gama BHC (Lindane) (Total), ug/L 2. OPDDT, PPDDT, DDT (Total),ug/L 3. Alpha and Beta Endosulphan, ug/L 4. Dieldrin, ug/L 5. Aldrin, ug/L 6. Carbaryl Corbamat, ug/L 7. Malathian, Methyl, Parathian, Anilphos, ug/L 8. Chloropyriphos, 2.4-D, ug/L

Reporting

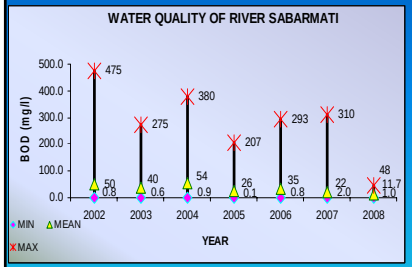


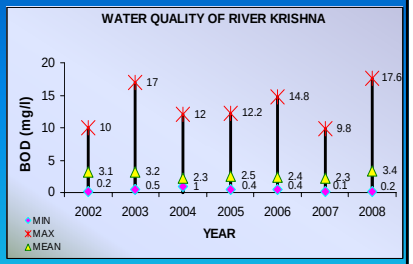


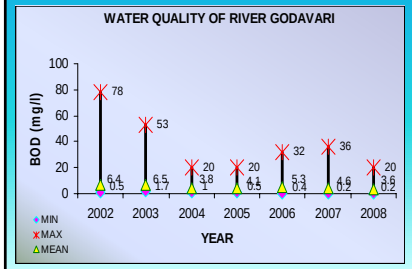


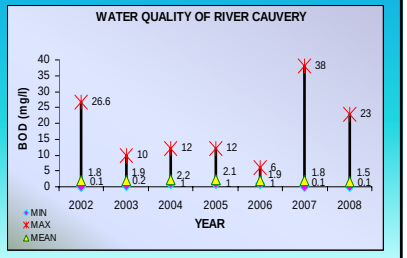


Reporting…contd.









Data dissipation - Environmental Data Bank

- Information/data on various environmental parameters are quite often required by various user groups-Pollution Control Boards, Researchers, Students and general public.
- In order to facilitate quick and easy retrieval of these information, Central Pollution Control Board (CPCB) has taken up the task of developing a user friendly database-Environmental Data Bank (EDB).
- The EDB comprises module on water quality.
- Data structure of the water quality module is designed considering the requirements of various target user groups.
- Data/information are gathered from different sources including the Central/State Pollution Control Boards.
- The state Pollution Control Boards/Pollution Control Committees are entering the data periodically to update the information pertaining to the monitoring stations being operated in State/Union Territories.
- The water quality data entered by various agencies depends on several factors, hence it is advised that the data/information may be used as indicative/estimation and not as absolute values as disclaimer.
- The user may like to contact the data provider for further clarification, if required.

Monitoring & Reporting

- There are 234 STPs exist in country;
- In order to assess their performance, a standardized questionnaire was prepared and circulated to all the agencies responsible for operation of STPs. Data has also been collected through Zonal Offices of CPCB;
- The observation was mainly based on the questionnaire which was prepared by CPCB (Central pollution control board) and circulated to all the agencies or SPCBs (State Pollution Control Board) which are responsible for the compliance and reporting;
- The data collected through questionnaire and from other sources was compiled and reported in the form CPCB publication.

Status of Municipal Wastewater Generation and treatment capacity of Metropolitan Cities

- There are 35 metropolitan cities (more than 10 Lacs population), 15,644 Millions Liter Per Day (MLD) of sewage is generated from these metropolitan cities. The treatment capacity exists for 8040 MLD i.e. 51% is treatment capacity is created
- Among the Metropolitan cities, Delhi has the maximum treatment capacity that is 2330 MLD (30% of the total treatment capacity of metropolitan cities)
- Next to Delhi, Mumbai has the capacity of 2130 MLD, which is 26% of total capacity in metropolitan cities
- Delhi and Mumbai therefore in combination have 55% of treatment capacity of the metropolitan cities
- Some cities such as Hyderabad, Vadodara, Chennai and Ludhiana and Ahmadabad, treatment capacity meets the volume of generation
- Cities like Delhi, Dhanbad have more than 50% capacity, rest of the cities have the capacity less than 50%

Status of sewage generation and treatment capacity in metropolitan cities

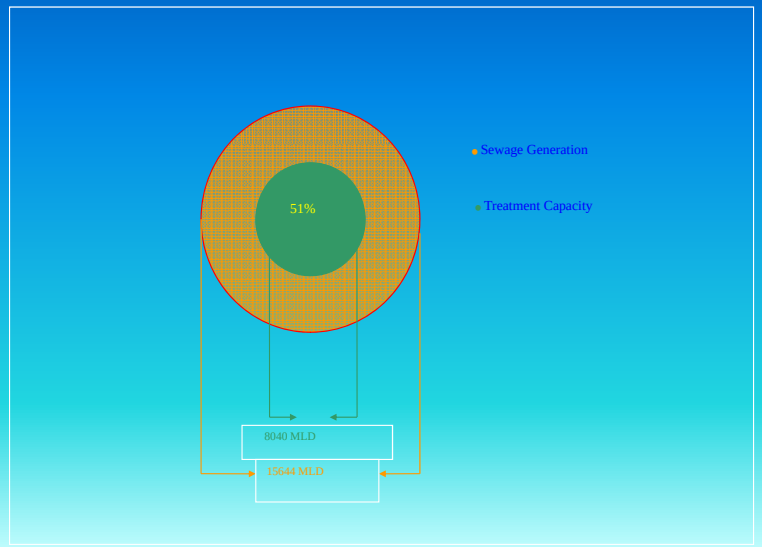
S.No.	Name of the city	Sewage generation (in MLD)	Sewage Treatment Capacity (in MLD)	Percent of treatment capacity
1	Hyderabad	426.21	593	100
2	Vishakhapatnam	134.99	-	-
3	Vijayawada	128.39	-	-
4	Patna	279.14	105	37
5	Delhi	3800	2330	61
6	Ahmadabad	472	488	96
7	Surat	432	202	46
8	Rajkot	108.8	44.5	40
9	Vadodara	180	206	100
10	Bangalore	771.75	-	-
11	Indore	204	78	38
12	Bhopal	334.75	22	6
13	Jabalpur	143.34	-	-
14	Mumbai	2671	2130	80
15	Pune	474	305	64
16	Nagpur	380	100	26
17	Nasik	227.84	107.5	47
18	Ludhiana	235.2	311	100
19	Amritsar	192	-	-
20	Jaipur	451.71	54	11
21	Chennai	158	264	100
22	Kanpur	417.35	171	41
23	Lucknow	363.81	42	11

Status of sewage generation and treatment capacity in metropolitan cities …contd.

S.No.	Name of the city	Sewage generation (in MLD)	Sewage Treatment Capacity (in MLD)	Percent of treatment capacity
24	Agra	260.36	88	33
25	Kolkata	705.86	172	24
26	Faridabad	164	65	39
27	Jamshedpur	199.43	-	-
28	Asansol	147	-	-
29	Coimbatore	120	-	-
30	Madurai	97.93	-	-
31	Meerut	177.05	-	-
32	Varanasi	230.17	102	44
33	Allahabad	176	60	34
34	Kochi	188.4	-	-
35	Dhanbad	192	-	-
Total		15644	8040	51

Note: - Data not available
Source : Status of sewage treatment in India (CUPS/61/2005-06)- Central Pollution Control Board

Sewage generation and treatment capacity in Metropolitan Cities



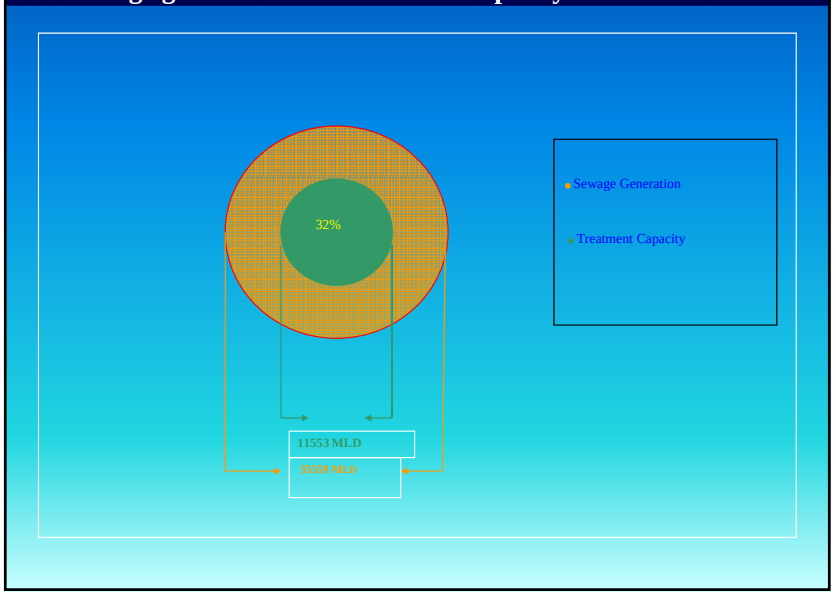
Status of Municipal Wastewater Generation and treatment capacity of Class-I Cities

- There are projected 497 Class-I Cities (having more than1 Lac Population) with respect to 2001 census (426 Cities as per 2001 Census).
- The population of Class-I Cities is projected 14.29 Crore.
- Nearly 52% cities (260 out of 497) cities are located in Andhra Pradesh, Maharashtra, Tamilnadu, Uttar Pradesh and West Bengal.
- The sewage generated in class-I cities estimated 35559.23 MLD.
- 93 % of total wastewater is generated in Class-I cities only.
- Total Sewage treatment Capacity of class-I cities is reported 11553.68 MLD, which is 32% of the sewage generation.
- Out of 11553.69 MLD sewage treatment capacity, 8040 MLD is treated in 35 Metropolitan cities i.e. 69%. This indicates that other than metropolitan cities, the capacity of 462 Class-I cities is only 31%.
- Actual sewage treatment due to inadequacy of the sewerage system shall be low compare to capacity.

State-wise sewage generation of Class-I Cities

S.No.	State/Union Territory	No. of Cities	Population (in Year 2008)	Sewage Generation (In MLD)	Sewage Treatment Capacity (in MLD)
1	Andaman & Nicobar	1	107200	12.9	-
2	Andhra Pradesh	47	20143050	1760.60	654
3	Assam	5	1417820	380.7	-
4	Bihar	23	5783554	1009.7	135.5
5	Chandigarh	1	994820	429.76	164.79
6	Chhattisgarh	7	2515100	350	69
7	Delhi	1	14858800	3800	2330
8	Gujarat	28	14678240	1680.92	782.5
9	Haryana	20	5494110	626.69	312
10	Himachal Pradesh	1	163490	28.94	35.63
11	Jammu & Kashmir	2	1910060	213.93	-
12	Jharkhand	14	4964171	830.47	-
13	Karnataka	33	15102373	1790.40	43.44
14	Kerala	8	3778516	575.17	-
15	Madhya Pradesh	25	10795000	1248.72	186.1
16	Maharashtra	50	40255170	9986.29	4225.25
17	Manipur	1	249870	26.74	-
18	Meghalaya	1	186030	20.84	-
19	Mizoram	1	282550	31.65	-
20	Nagaland	1	171810	19.24	-
21	Orissa	12	3335930	660.73	53
22	Pondicherry	2	504130	56.46	-
23	Punjab	19	6329860	1545.30	411
24	Rajasthan	24	9611490	1382.37	54
25	Tamilnadu	42	16852940	1077.21	333.42
26	Tripura	1	214327	24	-
27	Uttar Pradesh	61	25762280	3506.016	1240.13
28	Uttrakhand	6	1249380	176.97	18
29	West Bengal	60	19818471	2345.21	505.92
	Total	**497**	**14,29,61,474**	**35559.23**	**11553.68**

Sewage generation and treatment capacity in Class-I Cities



Status of Municipal Wastewater Generation and treatment capacity of class-II Cities

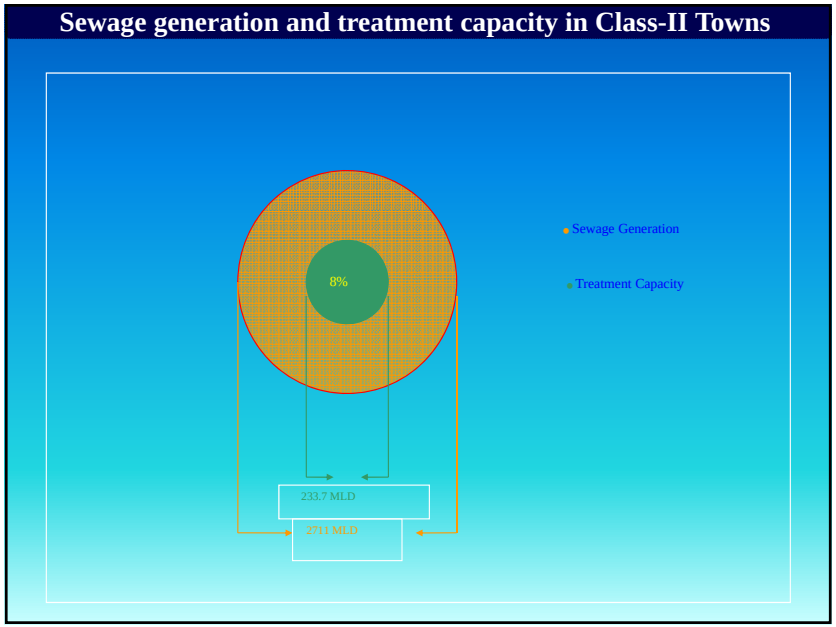
- **Number of cities projected are 415. (499 cities as per census 2001). The reduction is due to transformation of some Class-II cities (84 Nos) into Class-I cities.**
- **The class-II towns are mostly located in Andhra Pradesh, Maharashtra, Tamilnadu, Uttar Pradesh and Gujarat (total 225, nearly 50%)**
- **The total wastewater generated in class-II towns is 2711 MLD**
- **Total sewage treatment capacity in Class-II towns is 233.7 which is 8% of the total sewage generated**

State wise sewage generation in Class-II Towns

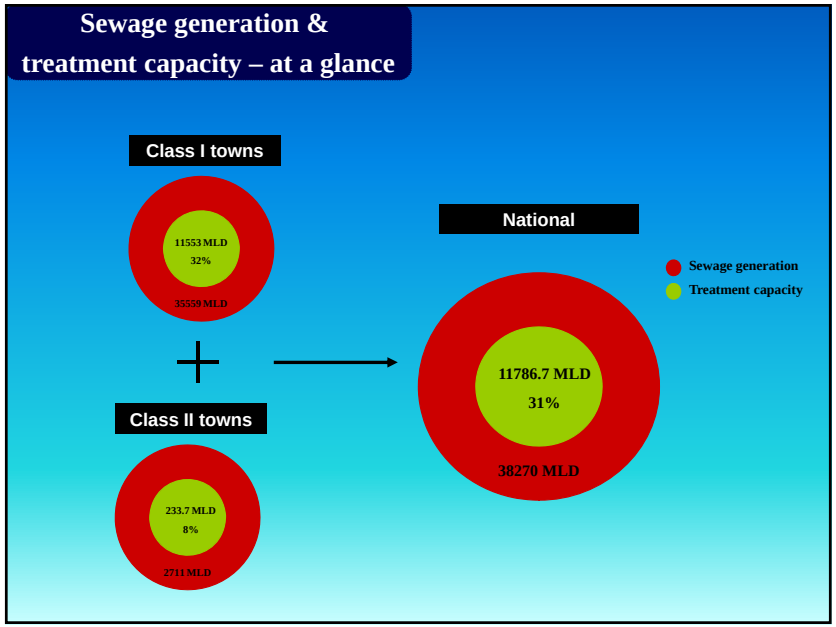
S.No.	State/Union Territory	Population in Year 2008	No of Class-II Towns	Sewage generation of Class-II Towns (in MLD)	Sewage Treatment Capacity (in MLD)
1	Andhra Pradesh	3448610	52	217.59	10.42
2	Assam	573290	8	6.46	-
3	Bihar	1113800	14	107.42	2
4	Chhattisgarh	566080	7	40.82	
5	Goa	295180	3	23.62	18.18
6	Gujarat	2180590	31	227.55	-
7	Haryana	544040	7	43.52	-
8	Jammu & Kashmir	244990	4	27.86	-
9	Jharkhand	826300	10	78.21	-
10	Karnataka	1800258	26	233.37	12.18
11	Kerala	1686660	26	231.32	-
12	Madhya Pradesh	1745050	23	130.9	9.00
13	Maharashtra	2503080	34	213.73	29
14	Meghalaya	81750	1	11.25	-
15	Nagaland	126520	1	1.36	-
16	Orissa	904510	12	78.42	-
17	Pondicherry	79690	1	7.984	-
18	Punjab	1109670	14	157.4	42.80
19	Rajasthan	1599260	21	147.79	-
20	Tamilnadu	3254950	42	184.67	29.3
21	Uttar Pradesh	3382520	46	345.7	12.61
22	Uttrakhand	152860	5	14.26	6.33
23	West Bengal	2004440	27	180.42	61.88
	Total	**30224098**	**415**	**2711.624**	**233.7**

Source: Questionnaire survey on 2007.
Status of sewage treatment in India (CUPS/61/2005-06)- ***Central Pollution Control Board***

Sewage generation and treatment capacity in Class-II Towns



Sewage generation & treatment capacity – at a glance



Municipal Solid Waste

Municipal Solid Waste

"Solid waste can be regarded as refuse or waste from any kind of source". But any refuse or waste can be economic resource to others.

- **BMW**
- **HW**
- **Mining**
- **Fly Ash**
- **Agriculture: Dairy, Agriculture residues**

Generation of Municipal Solid Waste (National Estimation)

- ✓ **Total Municipal Solid Waste Generation-**
  = 5, 73,838 tonnes per day
- ✓ **Collection of Municipal solid waste (60%)-**
  = 3, 43, 303 tonnes per day
- ✓ **Total municipal waste (inert waste) disposed to land fill-**
  = 1, 83, 360 tonnes per day

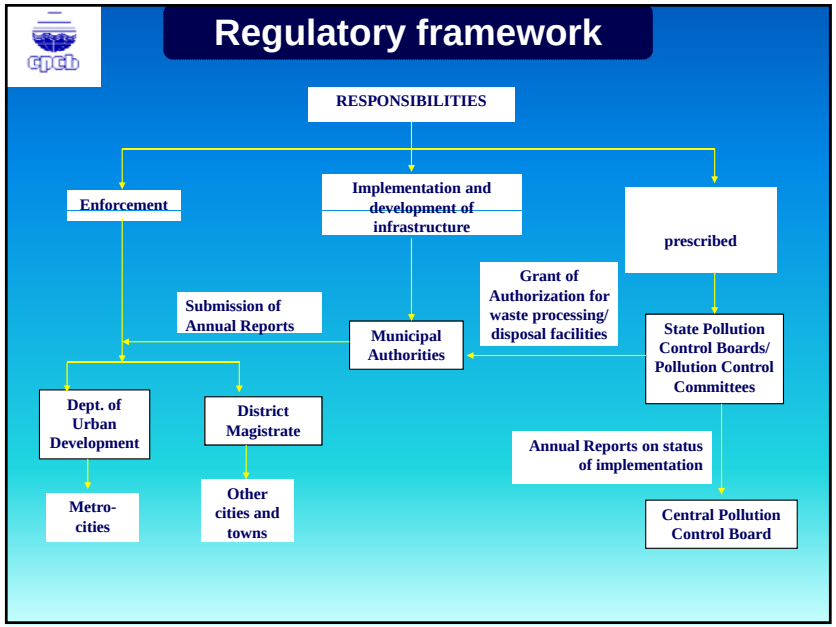
Implementation of four schedules in Rules (MSW Rules 2000)

- ➢ **Schedule I- Time Target for implementation**
- ➢ **Schedule II- Procedures for collections, segregation, storage, transport processing & disposal of SW**
- ➢ **Schedule –III- specifications for land fill sites.**
- ➢ **Schedule IV- Standards for composting, Leachates & incineration**

Present Status of Management

- Estimated waste generation is >1,00,000 MT/day
- Per capita waste generation ranges between 0.20 to 0.60 kg.
- Waste collection efficiency in bigger sized cities ranges from 70 to 90% and in small sized towns it is upto 50-60%.
- Local authorities spend less 5% of their budget on waste disposal and maximum cost is incurred on street sweeping and collection and transportation of waste.

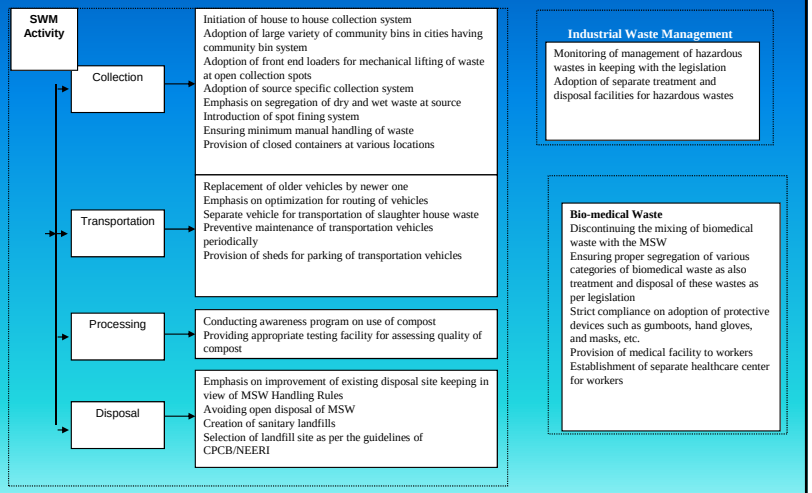
Regulatory framework



Regulatory framework…contd.

- Enacted "Municipal Solid Wastes (Management and Handling) Rules, 2000
- Rules lay emphasis on seeking participation of citizens in waste segregation, prohibiting littering of garbage, proper storage of waste and efficient transportation of waste for its processing and final disposal.
- Specifications to be followed for land filling to protect environmental pollution and adoption of appropriate waste processing technologies has been emphasized.
- The Rules are applicable to each town irrespective of its population.

Municipal Solid Waste Management



Indicative Action Plan for MSWM

Future course of action…..

- Cities having population > 1 million targeted for ensuring compliance with the rules.
- Set up reasonable number of demonstration facilities with Government financial support for the benefit of other local bodies.
- Re-set the “simplified” specifications on land filling particularly for smaller local bodies with due regard to prevention of pollution
- Creating awareness on adoption of appropriate technologies for waste processing considering quality and composition of waste.
- Encourage private entrepreneurship in setting up of waste processing and disposal facilities.