

**MATERIAL FOR  
STUDY VISIT OF THE DEPARTMENT  
RELATED PARLIAMENTARY STANDING  
COMMITTEE ON SCIENCE AND  
TECHNOLOGY, ENVIRONMENT AND  
FORESTS TO BENGALURU  
ON FEBRUARY 04-05, 2016**



**MINISTRY OF ENVIRONMENT & FORESTS,  
GOVT. OF INDIA**

**MATERIAL FOR  
STUDY VISIT OF THE DEPARTMENT RELATED  
PARLIAMENTARY STANDING COMMITTEE ON SCIENCE AND  
TECHNOLOGY, ENVIRONMENT AND FORESTS TO BENGALURU  
ON FEBRUARY 04-05, 2016**

## **1.0 Bengaluru City**

Bengaluru city is the capital of Karnataka, located on the Deccan Plateau in the south-eastern part of Karnataka. Bengaluru is known for its pleasant climate throughout the year, located at a height of over 3,000 feet (914.4 m) above sea level. It is known as the Silicon Valley of India because of its position as the nation's leading Information technology (IT) exporter. It is located at 12° 58' 12" N, 77° 33' 36" E and covers an area of 2,196 km<sup>2</sup>. The majority of the city of Bengaluru lies in the Bengaluru Urban District and the surrounding rural areas are a part of the Bengaluru Rural District.

### **1.1. Population and Density**

The population of the Karnataka State has increased 15.6% to reach 6.10 crore since 2001, though Karnataka retains the 9<sup>th</sup> place in the country. As much as 3.74 crore people or over two-thirds of the State's population live in rural areas. Urban population has increased by 4.68 per cent in the last decade. The Sex Ratio in Karnataka is 1000 males for every 968 females.

The population of Bengaluru district has gone up to 96.21 lakh. Bengaluru also has the dubious credit of having the highest density of 4,381 people per sq km, followed by Mysore with 476, while Kodagu has the least density of people at 135 per sq km. Out of the total Bengaluru population for 2011 census, 90.94 % (87,49,944) lives in urban regions of district and remaining 9.06 % (8,71,607) population of Bengaluru districts lives in rural areas of villages.

### **1.2 Industrial Areas**

The Karnataka Industrial Areas Development Board (KIADB) is a statutory body, constituted under Section 5 of Karnataka Industrial Areas Development Act, (KIAD Act) - 1966, which provides for expeditious acquisition of lands for industrial and infrastructure purposes. KIADB has so far developed 157 industrial areas in the 29 districts of the State an extent of 55,957 acres. In Bengaluru 28 industrial areas are located in which 11 industrial areas are located in Bengaluru Rural districts.

## **2.0 Highly Polluting Industries**

There are total 304 industries operating under the 17 category of highly polluting industries in the state of Karnataka as on March 31, 2014. These industries are required to comply with the provisions of the Water Act, the Air Act and the

provisions of the Environmental (Protection) Act. The industrial activities are categorised as Red, Orange and Green based on the process involved and pollution load generated with respect to effluent, emission and hazardous wastes. Number of industries operating under 17, Red, Orange and Green Category located in Karnataka and is given below:

City	17 category	Red	Orange	Green	Total (R+O+G)
Bengaluru	304	3572	4515	13094	21,181

Source: KSPCB as on 31.3.2014

## 2.1 Environmental Surveillance Squad (ESS) Programme

The Central Pollution Control Board (CPCB) under Environmental Surveillance Squad (ESS) programme carry out surprise inspections of industrial units, wherein the 17 categories of highly polluting industries such as distilleries, pulp & paper industries, tanneries, pesticide formulation, drug industries etc. are inspected through computerized random number generation system. This comprehensive programme of environmental surveillance ensures installation and regular operation of the effluent / emission control facilities in polluting industries. Under ESS twenty (20) numbers of industries were inspected in Karnataka and directions issued under Section 18 (1) (b) of Water Act and Section 5 of EPA since from 2011 to 2015. The details are as follows;

### Industries inspected under ESS in Karnataka

No of Industries Inspected	Direction under Section		General letter for improvement
	18 (1) (b) of Water Act	5 of EPA	
20	2	6	12

## 3.0 Common Effluent Treatment Plants

The Small Scale Industries are unable to put up the treatment systems individually, the concept of CETP's is envisaged to benefit such industries in treating its effluent before disposal whether it is in stream, land, sewerage system or in sea. CETPs are set up in the industrial estates where there are clusters of small scale industrial units (SSIs) and where many polluting industries are located. There are Nine (9) CETPs are operating with a total capacity of 2230 KLD in Karnataka.

### 3.1 General Status of CETP:

- Two separate treatment system for treatment of High TDS Effluents and Low TDS effluents.
- There is no tertiary treatment to achieve Zero Discharge by utilising treated water in the member industries.

## 4.0 Sewage Treatment Plants

The total sewage generated in Class I and Class II cities of Karnataka is 2023.77 MLD, of which treatment capacity is available for only 55.62 MLD, equal to only 3% of the sewage generation. The quantity of sewage water generation is higher than the industrial wastewater. It is absolutely necessary that providing the STP in all the local bodies be made mandatory, to prevent sewage entry into the nearby water bodies /lakes.

Out of 219 local bodies including Bangalore in the State, only 55 STPs have been established so far. Further the sewage is entering into the water bodies including rivers.

### 4.1 Sewage Treatment Plants in Bengaluru City

The K & C Valley and V Valley were the first primary treatment plants established during 1970 to 1980. Subsequently, the treatment plants were upgraded to Secondary treatment. Third treatment plant was established at Hebbal. Latter, two Tertiary level treatment plants were established for recycling of wastewater under Cauvery Water Supply Scheme (CWSS) Stage II, Stage III and Indo French Protocol i.e. prior to CWSS Stage IV Phase I.

There was rapid growth in the city forcing the BWSSB to augment water to an extent of 270 MLD from the River Cauvery. The project was taken up under CWSS Stage IV Phase I. The additional water supplied to the city in turn converts in to wastewater and there was necessity to convey and treat this additional wastewater. The total capacity of 721 MLD treatment plant is in operation by BWSSB.

In addition to above, there are 626 STPs are in operation which includes Apartments (331 Nos.), Tech Parks (123 nos.), Educational Institutions (15 Nos.), Hotels (42 Nos.), Commercial complexes (44 nos.), Hospitals (49 Nos.) and Layouts/gated communities (7 Nos.). The total capacities of the STPs of various categories are 108.7 MLD excluding STP operated by BWSSB.

### 4.2 General Status of STP / issues

- Discharge of untreated sewage is single most important cause for pollution of surface & ground water since there is a large gap between generation and treatment of domestic wastewater in India.
- Several sewage treatment plants are established under centrally funded National River Action Plan. However, their operation and maintenance is generally not satisfactory.
- The problem is not only of adequacy of treatment capacity but also operation and maintenance of treatment plants.
- In Bangalore due to untreated sewage entering to the water bodies i.e. Lakes, the lake water quality not meeting the standards, odour nuisance, mosquito menace, high foaming /froth formation etc.

- A case is filed by Mr. K. Sudhan, Advocate, Chennai on River Pollution (Cauvery & Thenpennai) at National Green Tribunal, Chennai due to untreated sewage discharge.

## 5.0 Bio Medical Waste Management

In the state of Karnataka, 26,927 Health Care Facilities (HCF) are identified as on March 2014, these units generate about 83.61 T/day of Bio-medical waste. Bengaluru has identified 4779 Health Care Facilities (HCF). The waste is being disposed by common/captive facility with respect to solid waste and by captive facility with respect to liquid waste. The Karnataka State Pollution Control Board (KSPCB) has issued Authorization to 29 Common Bio-Medical Waste Treatment Facilities in the State, out of which 20 are operational and 9 are in commissioning stage.

### 5.1 General Status of BMW Incinerators:

- Segregation of untreated bio-medical waste at facility against the provision of segregation of waste at source of generation as per BMW rules.
- Inadequate temperature at primary and secondary combustion chamber of incinerator as against the incinerator operating temperature of  $800 \pm 50$  °C and  $1050 \pm 50$  °C respectively.
- Poor implementation of automatic feeding system for charging of bio –medical wastes into incinerator to stop handling of manual charging.
- Inadequate effluent treatment system to treat the liquid waste generated from the facility.
- The CPCB has issued show-cause notice to two Common Bio Medical Waste Treatment Facilities under Section 65 of EPA for its non-compliance of standard and guidelines.

## 6.0 Hazardous Waste Management

There are 3,528 hazardous waste generating industries in Karnataka and the inventory of estimated HW Generation from Working Industries (assuming units are operating at 100% capacity) by KSPCB as on 31.03.2014 is given below:

### Hazardous Waste generation in Karnataka & Bengaluru

Region	No. of Industries	Land fillable (MT/A)	Recyclable (MT/A)	In-cinerable (MT/A)	Total Qty. (MT/A)
Karnataka	3528	61,062.84	1,20,594.78	61,692.82	2,43,350.44
Bengaluru Urban	1,866	14,921.93	31,803.34	19,333.73	66,059.00
Bengaluru Rural	280	3,983.47	2,671.26	2,858.72	9,513.45

## 6.1. Common Hazardous Waste Incinerators

There are 5 Nos. of Common Hazardous Waste Incineration facilities located and operating at in and around of Bengaluru city and also 5 Nos of industries have their own captive incinerator in Karnataka. Seven Cement plants have established co-processing of incinerable hazardous waste with the permission/authorization from CPCB/KSPCB.

The H.W. management during 2013-14 were:

- Co-processed in Cement kiln : 4548.67 MT
- Incinerated in common incinerators : 3281.73 MT
- Captive Incineration by the Industry : 1698.77 MT

**General Status of HW Incinerators** :*The performance assessment of the common hazardous waste incinerator operating in Karnataka was monitored for its compliance with respect to emission standards notified under the Environmental (Protection) Act, 1986, the monitoring results reveals non –compliance of standards w.r.t Dioxins & Furans in most of the cases. The Karnataka State Pollution Control Board was informed to take appropriate action to comply emission standards.*

## 6.2. H.W. Secured Landfills

A Common Hazardous Waste Treatment, Storage and Disposal Facility (TSDF) is operating in a 93 acres at Dobaspet about 45 kms from Bengaluru, operated by Ramky Enviro Engineers Ltd. This TSDF is meant for land fillable hazardous waste only. This facility started receiving wastes from July 2008 onwards from member industries, which is directly landfilled / after stabilization in a Secured Land Fill (Cell 1) of 25.86 acres.

The total numbers of member industries are 614. The design capacity of TSDF is 40,000 MT per Annum for 20 years, but the facility is not receiving expected quantity. The quantity of hazardous wastes received since from inception to December 2015 was direct landfilling: 43,752 MT and landfill after treatment: 1,60,685 MT.

Second H.W. secured landfill facility, is approved at Harohalli industrial area for disposal of hazardous waste.

## 7.0 Municipal Solid Waste Management in Karnataka and Bengaluru

### 7.1. MSW Management in Karnataka

- There are 219 local bodies comprising of BBMP, 10 city corporations, 41 City Municipal Councils, 94 Town Panchayats and 5 notified area committees. It is

estimated that around 8697 MT of solid waste is generated per day in the State which includes substantial quantity of plastic waste (around 7%).

- An estimated quantity of around 5,197 MT of solid waste is generated in the 218 Local Bodies and collected about 4138 MT per day. In Karnataka, Most of the local bodies (205) have partially started house to house collection and some of the Local bodies (106) provided 2-bins for each house to collect bio-degradable and non-biodegradable separately.
- However, the segregated waste is not properly managed and is being mixed while transporting to processing facility, so the purpose of segregation at source is unsuccessful due to various reasons.

## 7.2. MSW Management in Bengaluru

- The Bengaluru Metropolitan Area is divided into 198 Revenue wards under the jurisdiction of Bengaluru Mahanagara Palike (BMP). Revenue wards are further divided into 294 health wards for proper management of the sanitation functions. Out of these, 112 are managed by BMP, while 182 wards have been assigned to private agencies on contract basis.
- An estimated quantity of around 3500 MT of solid waste is generated in the BBMP area and collected about 3150 MT per day. Disposal of plastic waste is a biggest challenge in the urban areas of the state including BBMP areas. Per capita domestic waste generation is ~ 350 gmpd. The segregation of waste at source is 10%.
- The house hold wastes contribute to about 54%, markets & functional hall contribute to about 20%, commercial establishment & institutions contribute to 17% and others 9% of total waste generation.
- In Bengaluru, hotel waste (organic) are being collected by M/s Nobel Xchange about 250 TPD to generate bio gas i.e. 20,904 NM<sup>3</sup> per day through bio-methanation technique. BBMP is setting 13 de-centralised bi-methanation plants, out of 4 have been made functional.
- BBMP has established 188 Dry waste collection centres and 7 sites identified for disposal of construction and demolition waste.
- BBMP has acquired the following sites for waste processing and land filling:
  1. Mavallipura - 100Acres
  2. Mandoor - 135 Acres
  3. Kannahalli - 29.10 Acres
  4. Kyalasanahalli - 46 Acres

\

## 8.0 E - Waste Management

Out of total 48 Units, there are 38 registered e-waste dismantlers & recyclers are in operation and their authorised quantity is 18,513 MTA. The various estimates made by different agencies/ projects differ in figures and hence no conformity of proper estimation

## 9.0 Ambient Air Quality Monitoring

Under National Ambient Air Quality Monitoring Programme (NAAQM), Ambient Air Quality is monitored at 21 locations in Karnataka. Bengaluru city is being monitored at six (6) locations for Suspended Particulate Matter (SPM), Respirable Suspended Particulate Matter (RSPM), Sulphur Dioxide ( $\text{SO}_2$ ), and Oxides of Nitrogen ( $\text{NO}_x$ ). And also, there are five Continuous Ambient Air Quality Monitoring Stations (CAAQMS) under operation in Bengaluru. Out of five, KSPCB has installed and commissioned two CAAQMS i.e. one at City Railway Station, Bengaluru and another at Nisarga Bhavan, Saneguruvanahalli, Bengaluru. Remaining three are established under Private Participation Project and operated by CPCB, the locations are Peenya, BTM Layout and Kadabeshnahalli.

These monitoring stations are equipped with various analysers as to measure about 15 pollutants namely Ammonia ( $\text{NH}_3$ ), Benzene ( $\text{C}_6\text{H}_6$ ), Carbon Monoxide (CO), Ethyl Benzene ( $\text{C}_8\text{H}_{10}$ ), M+P+O Xylene: Meta, Para & Ortho Xylene ( $\text{C}_8\text{H}_{10}$ ), Methane ( $\text{CH}_4$ ), Nitrogen Dioxide ( $\text{NO}_2$ ), Nitrous Oxide (NO), Oxides of Nitrogen ( $\text{NO}_x$ ), Non Methane Hydro Carbon (NMHC), Ozone ( $\text{O}_3$ ), Respirable Suspended Particulate Matter (RSPM), Sulphur dioxide ( $\text{SO}_2$ ), Toluene ( $\text{C}_6\text{H}_5\text{CH}_3$ ) & Total Hydro carbon (THC) and 7 meteorological parameters namely Barometric Pressure (BP), Relative Humidity (RH), Solar Radiation (SR), Temperature (Temp), Vertical Wind Speed (VWS) & Wind Direction (W DIR) having internationally approved techniques.

The data generated are transferred to Central Networking system then validated and compiled. The monitoring results of 2011-2014 figure reveals that the ambient air quality data with respect to Oxides of Nitrogen ( $\text{NO}_x$ ), Sulphur Dioxide ( $\text{SO}_2$ ), Ammonia ( $\text{NH}_3$ ) and Respirable Particulate Matter (RSPM) are well within the National Ambient Air Quality Standard limit (annual average) of  $40\mu\text{g}/\text{m}^3$ ,  $50\mu\text{g}/\text{m}^3$ ,  $100\mu\text{g}/\text{m}^3$  and  $60\mu\text{g}/\text{m}^3$  respectively. The concentrations of Carbon Monoxide (CO) and Ozone ( $\text{O}_3$ ) in the ambient air are found to be within the standard limit while compared with 8 Hourly average standard limits of  $2\text{mg}/\text{m}^3$  and  $100\mu\text{g}/\text{m}^3$ .

The monitoring results in Bengaluru during 2011-14 are as follow:

- Annual Average Concentration of Sulphur Dioxide ranges from  $3.0\mu\text{g}/\text{m}^3$  to  $15.1\mu\text{g}/\text{m}^3$  with an average of  $8.6\mu\text{g}/\text{m}^3$
- Annual Average Concentration of Nitrogen Dioxide ( $\text{NO}_x$ ) ranged from  $14.6\mu\text{g}/\text{m}^3$  to  $29.9\mu\text{g}/\text{m}^3$  with an average of  $20.8\mu\text{g}/\text{m}^3$



- Annual Average Concentration of Respirable Suspended Particulate Matter (RSPM) ranges from 42.4  $\mu\text{g}/\text{m}^3$  to 72.4  $\mu\text{g}/\text{m}^3$  in Bengaluru with an average of 57.7  $\mu\text{g}/\text{m}^3$
- The Annual Average Concentration of Ammonia is ranging from 4.6  $\mu\text{g}/\text{m}^3$  to 18.7  $\mu\text{g}/\text{m}^3$  at Peenya in Bengaluru
- Annual Average Concentration of Ozone ranges from 25.3  $\mu\text{g}/\text{m}^3$  to 78.2  $\mu\text{g}/\text{m}^3$  in Bengaluru with an average of 39.8  $\mu\text{g}/\text{m}^3$
- Annual Average Concentration of Carbon Monoxide ranges from 535.1  $\mu\text{g}/\text{m}^3$  to 2025.1  $\mu\text{g}/\text{m}^3$  in Bengaluru with an average of 991.5  $\mu\text{g}/\text{m}^3$

## 10.0 Critically / Severely Polluted Area

The industrial clusters/ area having aggregated Comprehensive Environmental Pollution Index (CEPI) scores 70 and above are considered as critically polluted clusters / areas and between 60 to 70 considered as Severely Polluted Areas and shall be kept under surveillance and pollution control measures should be effectively implemented. Accordingly, in the state of Karnataka the following two industrial clusters were declared as critically polluted area i.e. Bhadravathi with CEPI score of 72.33 & Baikampady Industrial Cluster, Mangalore with CEPI Score of 73.68 and other three industrial clusters namely 1. Raichur, 2. Bidar and 3. Peenya were declared as severely polluted areas.

The Peenya Industrial area (CEPI 65.11) is one of the old industrial area in Bengaluru which houses many small electroplating and surface treatment units in clusters. This industrial area is vulnerable for ground water contamination due to inadequate treatment facilities. The KSPCB has taken steps to mitigate pollution from such units by prohibiting the establishment of new units and issuing consents for the industries that possess required wastewater treatment facilities.

## 11.0 Vehicular Population in Bengaluru

Bengaluru led to an increase in the vehicular population with an annual growth rate of 7-10%. The personalized modes of transport have grown at a tremendous rate and two wheelers along with the cars almost comprise 90% of the total registered vehicular population in the city. Two wheelers constitute more than 70% of the total volume, while cars comprise 15%, autos 4% and the remaining 8% includes other vehicles such as buses, vans and tempos. Travel speed has dropped to 15 kmph during the peak hours. Insufficient or no parking spaces for vehicles in Bengaluru.

### Vehicle Population in Bengaluru City (up to 31-03-2015)

Two Wheelers	L.M.V	A/R	H.T.V	H.G.V	Others	Total
3841139 (69.1%)	1141455 (20.5%)	149944 (2.7%)	108845 (2.0%)	73462 (1.3%)	244885 (4.4%)	5559730

The transport department of Karnataka is implementing emission norms stipulated to the vehicles as per the notification of the Ministry of Road Transport and Highways, Government of India, by issuing PUC certificate and monitoring of

pollution through 268 emission testing centres in Bengaluru and total of 607 online emission checking centers in Karnataka.

Air quality assessment, emission inventory and source apportionment study for Bengaluru city was carried out to measure the baseline air pollutants and air toxic levels at different parts of Bengaluru, which includes hot spots on kerb sides as well.

## 12.0 Other Environmental Issues in Bengaluru

- 1. Peenya Industrial Area :** The Peenya Industrial area (CEPI 65.11) is one of the old industrial area in Bengaluru, which houses many small electroplating and surface treatment units in clusters. This industrial area is vulnerable for ground water contamination due to in adequate treatment facilities. The KSPCB has taken steps to mitigate pollution from such units by prohibiting the establishment of new units and issuing consents for the industries that possess required wastewater treatment facilities. Assessment of Ground water condition and remediation needs to be taken up on priority.
- 2. Municipal Solid Waste Management in Bengaluru City:** It is observed serious non-compliance on BBMP in the management of Municipal Solid Waste and Public complaints have been made on the water pollutions, air pollutions and spillage of waste during the transport etc. on Mavalipura site. The BBMP has to ensure 100% processing of waste being generated in the Bengaluru city.
- 3. Sewage Treatment Plant:** The total sewage generated in Class I and Class II cities of Karnataka is 2023.77 MLD, of which treatment capacity is available for only 55.62 MLD, equal to only 3% of the sewage generation. Discharge of untreated sewage is single most important cause for pollution of surface & ground water since there is a large gap between generation and treatment of domestic wastewater.

\*\*\*\*\*