

## Environmental Concerns in National Capital Territory of Delhi, India

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### Abstract

After Independence, the city of Delhi became a major center of commerce, industry and education. The rapid urbanization of Delhi along with the level of growth in economic activities in the city and its surrounding areas stressed the natural environment significantly. Among the environmental problems, air pollution, water pollution, loss of biodiversity, municipal waste and noise pollution are major environmental challenges that the city is facing. The city suffers from air pollution caused by transportation, road dust, industries and pollutant emissions. Noise pollution comes mainly from industries, transportation, aircraft etc. Water pollution and lack of adequate solid waste treatment facilities have caused serious damage to the river on whose banks Delhi grew, the Yamuna. Several steps have been taken in the recent past to improve the environment condition which includes massive focus on afforestation, universal use of CNG by commercial vehicles, ban on plastic use, better management of solid waste, treatment of waste water and improvement of sewage system etc. But still many challenges remain to contain the environmental pollution. This paper summarizes the major environmental concerns and the present status of pollution in NCT of Delhi.

**Keywords:** Environmental concerns; Pollution; Atmosphere; Hazardous wastes

### Introduction

Environment of any city is the asset of that city and for a city like Delhi-NCR, the significance of a clean and pleasing environment is as beneficial as it can be. Delhi being hub of political, social, economic and other national/international affairs of India portrays the image of India to the world. Being the national capital, plethora of national and international migration takes place from and to Delhi resulting in increasing pollution stress on natural resources viz. Air Water and Land. The overutilization of these resources makes Delhi prone to all types of pollution making lives of people difficult here. With Delhi expanding its boundaries each day and National Capital Region (NCR) getting to nearby states, the whole effect is quite evident in this area. Proper water use techniques need to be brought in place to make Delhi efficient and making water available to its masses. First step in this direction can be controlling water pollution levels. Similar stress needs to be made to control rising air pollution levels. Noise pollution and Land degradation too makes Delhi unviable and unsustainable. Delhi as a sustainable city needs proper planning and operation to make it as pleasing as cities of the world.

### Air environment

The air pollution levels in Delhi are strikingly high and the transport sector is a major contributor. Besides the transport sector, domestic and power sectors are also major sources of air pollution in the capital. Nearly 421.84 tons of CO, 110.45 tons NO<sub>x</sub>, 184.37 tons HC and 12.77 tons particulate matter is released in Delhi's atmosphere per day (Department of Environment and Forests, 2010).

The CO emission has dipped drastically post-CNG use [1]; SPM and RSPM have increased, SO<sub>2</sub> has declined marginally and NO<sub>2</sub> is still high over 1997-2011 [2]. The composition of pollutants have changed with the introduction of CNG, new pollution standards and phasing out of old vehicles. The concentration of CO, SO<sub>2</sub> and PAHs has declined, while NO<sub>x</sub> and SPM increased [3-5]. The rise in NO<sub>x</sub> is attributed to CNG use and SPM to the diesel vehicles' growth.

The Central Pollution Control Board has been monitoring ambient air quality at six locations in Delhi under NAAMP for the past many

years. (Figures 1-4) Year-wise annual mean ambient air quality levels in Delhi during 1997 to 2014 is presented in the following table: (Table 1) The values for 1997 to 2010 are of the monitoring stations of CPCB while the values of 2011 to 2014 are of the monitoring station network developed by Delhi Pollution Control Committee. DPCC presently monitors air quality through six online continuous ambient air quality monitoring stations at 6 locations. The stations can be classified in two categories i.e. residential Puram RK, Mandir Marg & Punjabi Bagh and hot spots I.G.I Airport and Anand Vihar. Civil Lines is also influenced by traffic emissions [6] (Table 2).

Increasing levels of air pollution are responsible for higher incidence rate of respiratory diseases, cancer, and heart diseases in the capital. Various studies carried out for Delhi reflect the correlation between air pollution and health impacts. A study by AIIMS reconfirmed the point that respiratory symptoms are more frequent amongst people residing in highly polluted areas. To tackle the problem of air pollution, a number of measures have been taken in the past, such as switching to cleaner fuels, tightening vehicular emission limits, phasing out of old vehicles and maintenance of in-use vehicles, closing or relocating polluting industries, plantation activities etc. However, a lot more still needs to be done if the capital desires to breathe clean air.

### Water environment

With the population of Delhi increasing from 0.4 million in 1911 to 18.24 million in 2015, there is an ever increasing pressure on the water resources. Improvement in living standards and access to sanitation

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Received November 27, 2015; Accepted December 14, 2015; Published December 21, 2015

**Citation:** Singh SS, Singh SK, Garg S (2015) Environmental Concerns in National Capital Territory of Delhi, India. J Climatol Weather Forecasting 3: 147. doi:10.4172/2332-2594.1000147

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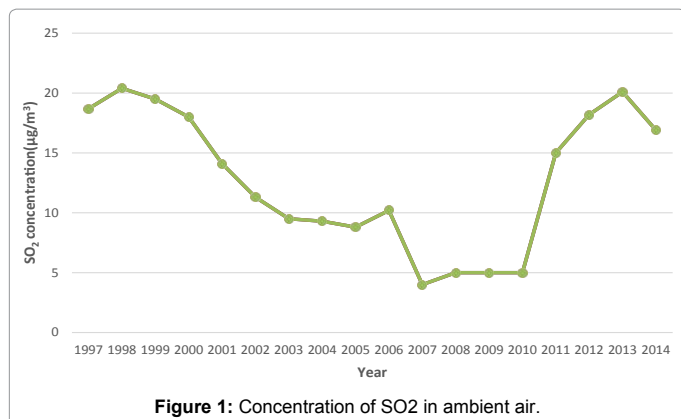


Figure 1: Concentration of SO<sub>2</sub> in ambient air.

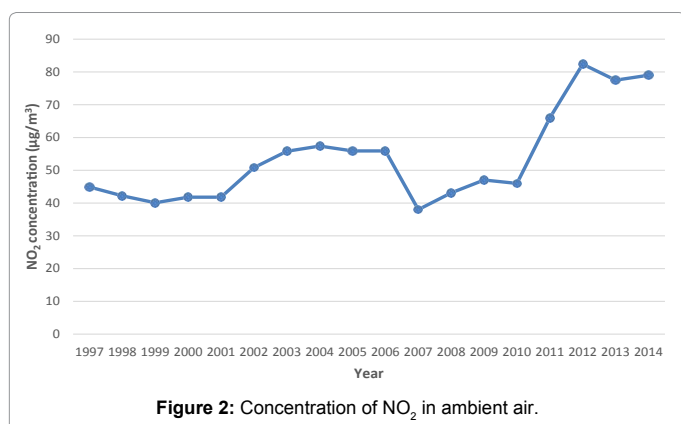


Figure 2: Concentration of NO<sub>2</sub> in ambient air.

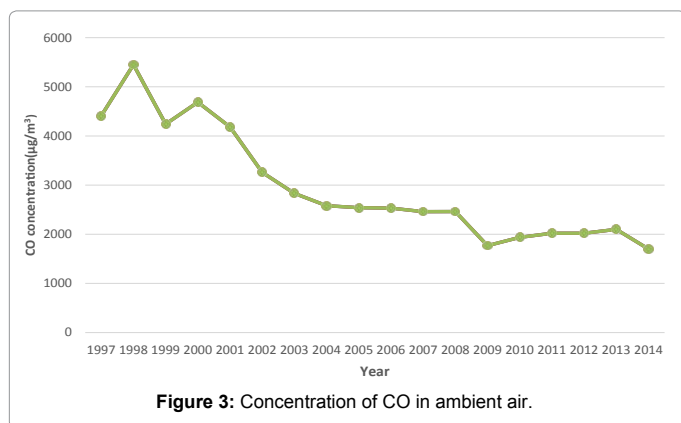


Figure 3: Concentration of CO in ambient air.

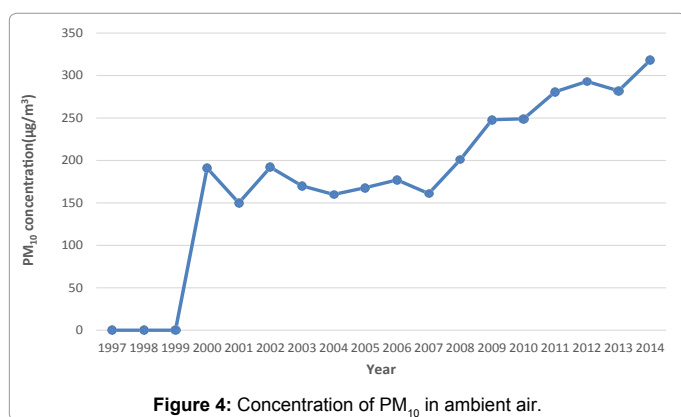


Figure 4: Concentration of PM<sub>10</sub> in ambient air.

| S. No | Years           | Ambient Air Quality (µg/M <sup>3</sup> ) |                 |             |                          |
|-------|-----------------|--|-----------------|-------------|--------------------------|
|       |                 | So <sub>2</sub>                          | No <sub>2</sub> | Co          | Rspm (Pm <sub>10</sub> ) |
| 1     | 1997            | 18.7                                     | 44.9            | 4410        | --                       |
| 2     | 1998            | 20.4                                     | 42.2            | 5450        | --                       |
| 3     | 1999            | 19.5                                     | 40.1            | 4241        | --                       |
| 4     | 2000            | 18.0                                     | 41.8            | 4686        | 191                      |
| 5     | 2001            | 14.1                                     | 41.8            | 4183        | 150                      |
| 6     | 2002            | 11.3                                     | 50.8            | 3258        | 192                      |
| 7     | 2003            | 9.5                                      | 55.8            | 2831        | 170                      |
| 8     | 2004            | 9.3                                      | 57.4            | 2581        | 160                      |
| 9     | 2005            | 8.8                                      | 55.9            | 2541        | 168                      |
| 10    | 2006            | 10.2                                     | 55.9            | 2531        | 177                      |
| 11    | 2007            | 4.0                                      | 38.0            | 2460        | 161                      |
| 12    | 2008            | 5.0                                      | 43.1            | 2461        | 201                      |
| 13    | 2009            | 5.0                                      | 47.03           | 1768        | 248                      |
| 14    | 2010            | 5.0                                      | 46.0            | 1937        | 249                      |
| 15    | 2011            | 15.0                                     | 66.0            | 2020        | 281                      |
| 16    | 2012            | 18.2                                     | 82.4            | 2020        | 293                      |
| 17    | 2013            | 20.1                                     | 77.5            | 2100        | 282                      |
| 18    | 2014            | 16.9                                     | 79.0            | 1700        | 318                      |
|       | <b>Standard</b> | <b>50</b>                                | <b>40</b>       | <b>2000</b> | <b>60</b>                |

Table 1: Year-Wise Annual Mean Ambient Air Quality Levels in Delhi During 1997 To 2014.

|              |      |       |     |     |    |      |
|--------------|------|-------|-----|-----|----|------|
| R. K. Puram  | 13.6 | 51.6  | 263 | 140 | 41 | 1.45 |
| Mandirmarg   | 12.5 | 87.4  | 203 | 125 | 51 | 1.28 |
| Punjabi Bagh | 17.3 | 106.4 | 248 | 139 | 39 | 1.86 |
| Igi Airport  | 17.7 | 66.8  | 289 | 176 | 85 | 1.48 |
| Anandvihar   | 20.4 | 84.5  | 583 | 191 | 32 | 1.73 |
| Civil Lines  | 19.7 | 79.4  | 318 | 141 | 96 | 2.64 |

Table 2: Annual Average of Critical Pollutants at Six Stations in Delhi (In µg/M<sup>3</sup>) For the Year 2014.

facilities increases the per capita water demand levels. For sustainable development of Delhi, it is essential to ensure adequate supply of water in terms of reliability, quality and quantity. Although Delhi has an average water availability of 225 lpcd, the distribution is not uniform. Some areas get 24 hrs. Water supplies, whereas some get hardly 1-2 hr. water supply in a day.

Delhi depends on river Yamuna and partially on river Ganga for its share of raw water. Surface water contributes to over 86% of Delhi's total water supply. Yamuna, a perennial river, provides the major share of this water supply. Urban agglomeration of NCT Delhi is the major contributor of pollution load in Yamuna followed by Agra and Mathura. The stretch between Wazirabad Barrage and Chambal River confluence is critically polluted and there is significant fluctuation in dissolved oxygen level from nil to critically low levels. This reflects presence of organic pollution load and persistence of eutrophic conditions in the river. Pollution load in the river Yamuna added from various sources like industries and domestic and long dry season, has virtually converted it into a nala. Najafgarh drain along with its 70 sub-drains is the biggest polluter of the river.

DPCC has been conducting monthly water quality monitoring of river Yamuna (at 9 locations) and major drains (24 drains) falling into river Yamuna. Recent water quality monitoring reports of river Yamuna indicate that the water quality parameters, BOD & DO, are in the desirable/prescribed norms, with respect to Water Quality criteria of "C" class, at Palla, which is upstream of Wazirabad Barrage.

However, the water quality of River Yamuna at the downstream of Wazirabad barrage after confluence of Nazafgarh Drain is not meeting the desirable/prescribed norms.

The annual average of DO has ranged from 0.20 mg/l at Shahdara (Downstream) to 8.48 mg/l at Palla. The annual average of BOD has ranged from 1.99 mg/l at Palla to 60.33 mg/l at KhajuriPantoolpul. The water quality standards for DO and BOD as per CPCB norms are 4 mg/l and 3 mg/l respectively for class 'C' of river water. The water quality monitoring results in Delhi stretch clearly indicates river water is grossly polluted (Table 3).

Water quality monitoring results of the drains indicate that most of the drains are not meeting the standards with respect to Bio-chemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD) and Total Suspended Solids (TSS) (Table 4).

| S. No. | Locations              | Ph (Mg/L) | Cod (Mg/L) | Bod (Mg/L) | Do (Mg/L) |
|--------|------------------------|-----------|------------|------------|-----------|
|        | Water Quality Criteria | 6.0- 9.0  |            | 3 (Max)    | 4 (Min)   |
| 1      | Palla                  | 7.63      | 14         | 1.99       | 8.48      |
| 2      | Surghat                | 7.5       | 22.66      | 4.51       | 5.78      |
| 3      | Khajuri Pantool Pool   | 7.40      | 200.33     | 60.33      | Nil       |
| 4      | Kudesia Ghat           | 7.45      | 125.67     | 37.00      | Nil       |
| 5      | Ito Bridge             | 7.53      | 100.67     | 31.80      | Nil       |
| 6      | Nizamudin Bridge       | 7.30      | 88.70      | 27.10      | 1.00      |
| 7      | Agra Canal Okhla       | 7.50      | 96.20      | 29.90      | 0.90      |
| 8      | Shahdara (Down Stream) | 7.45      | 138.67     | 38.80      | 0.20      |
| 9      | Agra Canal Jaitpur     | 7.45      | 108.83     | 28.83      | 0.60      |

**Table 3:** Annual Average Water Quality of River Yamuna at Different Locations: April 2014 to March 2015.

| S. No | Drains                           | Ph      | Tss (Mg/L) | Cod (Mg/L) | Bod (Mg/L) |
|-------|----------------------------------|---------|------------|------------|------------|
| 1     | Najafgarh Drain                  | 7.39    | 269.67     | 241.00     | 70.75      |
| 2     | Metcalf House Drain              | 7.53    | 113.17     | 85.58      | 24.00      |
| 3     | Khyber Pass Drain                | 7.51    | 40.17      | 42         | 10.30      |
| 4     | Sweeper Colony Drain             | 7.33    | 55.83      | 100.83     | 27.42      |
| 5     | Magazine Road Drain              | 7.39    | 212.83     | 298.33     | 87.92      |
| 6     | Isbt Drain                       | 7.40    | 148.00     | 283.33     | 87.92      |
| 7     | Tonga Stand Drain                | 7.55    | 161.33     | 333.50     | 114.17     |
| 8     | Moat Drain                       | No Flow | No Flow    | No Flow    | No Flow    |
| 9     | Civil Mill Drain                 | 7.42    | 167        | 302        | 94.42      |
| 10    | Power House Drain                | 7.43    | 268.33     | 350.17     | 117.83     |
| 11    | Sen Nursing Home Drain           | 7.48    | 302        | 389.33     | 132.08     |
| 12    | Drain No. 12a                    | No Flow | No Flow    | No Flow    | No Flow    |
| 13    | Drain No. 14                     | 7.54    | 58.67      | 45.67      | 11.97      |
| 14    | Barapulla Drain                  | 7.37    | 163.67     | 164.50     | 49.08      |
| 15    | Maharani Bagh Drain              | 7.25    | 454.67     | 395.50     | 135        |
| 16    | Kalkaji Drain                    | No Flow | No Flow    | No Flow    | No Flow    |
| 17    | Saritavihar Drain (Mathura Road) | 7.34    | 272.00     | 438.00     | 146.67     |
| 18    | Tehkhand Drain                   | 7.34    | 289.67     | 470.08     | 150        |
| 19    | Tuglakabad Drain                 | 7.34    | 265.67     | 314.75     | 98.83      |
| 20    | Drain Near Lpg Bottling Plant    | No Flow | No Flow    | No Flow    | No Flow    |
| 21    | Drain Near Saritavihar Bridge    | 7.43    | 102.00     | 130.17     | 39         |
| 22    | Shahdara Drain                   | 7.44    | 376.33     | 509.67     | 151.67     |
| 23    | Sahibabad Drain                  | 7.31    | 606.33     | 817.58     | 271.67     |
| 24    | Indrapuri Drain                  | 7.42    | 355.33     | 476.33     | 128.42     |

**Table 4:** Annual Average Water Quality of Drains at Different Locations in Delhi: April 2014 To March 2015.

As per CPCB, the contribution of pollution load from NCR & non-NCR states are in the proportion of 80:20, i.e. over 3/4<sup>th</sup> of the pollution load in River Yamuna is contributed by the NCR [7].

Besides surface water sources, groundwater contributes a substantial quantity of water supply in Delhi. Inadequate and intermittent supply of piped water has led to unchecked exploitation of the groundwater resource. A comparison of existing groundwater levels in different administrative blocks with levels in 1960 shows a decline of 2-30 m. Levels in Alipur and Kanjhawala blocks have declined 2-6 m, in the Najafgarh block by 10m, and in the Mehrauli block by 20 m. In addition to quantity, the quality of groundwater is also deteriorating and in several places it has been found to be unfit for human consumption.

### Municipal and hazardous wastes

Solid waste includes commercial and residential waste generated in municipal or notified areas. As per the data available with DPCC records, solid waste generation in Delhi was around 8360 MTD. This is expected to increase due to economic and population growth. 700 MGD sewage is also generated, which generates organic sludge. Municipal waste of Delhi is disposed in three landfill sites namely Bhalswa GT Road, Ghazipur and Okhla.

Hazardous waste means any waste which by reason of any of its physical, chemical, reactive, toxic, flammable, explosive or corrosive characteristics causes danger or is likely to cause danger to health or environment. The most critical hazardous waste generated in Delhi is from small-scale enterprises such as pickling units, electroplating units, anodizing units, and sludge from CETPs.

Bio-Medical Waste (BMW) means any waste, which generated during the diagnosis, treatment or immunization of human being or animals or in research activities. With the increase in the number of hospitals and nursing homes in Delhi, hospital waste has become another area of concern. This waste is sent to common biomedical waste facilities in the city. Delhi is having 3 CBWTF operators who collect the waste from HCEs of Delhi and dispose the BMW after its treatment.

Electronic Waste, means any waste, which is generated due to product obsolescence and discarded electronic items, and may include data processing, telecommunications or entertainment in private households and businesses. The quantity of e-waste generated in the city is going to be much higher than hazardous waste and healthcare waste and thus requires proper management.

The most acceptable strategy for solid waste management in Delhi would be to categorize waste streams as biodegradable, recyclables, and inert matter to maximize recovery and minimize the quantity of waste generation. Efforts should also be made towards reclaiming and redeveloping the abandoned and filled landfill sites.

### Forest

The vegetation cover is imperative for balanced atmospheric temperature and sustenance of life. As per the reports of Forests Survey of India (2011), total area of forest and tree cover was 40 and 111 km<sup>2</sup> respectively in 2001 that increased to 120 and 176.2 km<sup>2</sup> in 2011 [8]. Total vegetative cover doubled in a decade from 10% to 19.97% on account of substantial increase in tree cover under the Green Action Plan of Delhi Government. Open forests have coverage share of 119.96 km<sup>2</sup> and dense forests are merely 6 km<sup>2</sup> [9]. The National Forest Policy, 1988 provides that a minimum of 1/3rd of the total land area of the country should be under forest or tree cover. Taking this into view, the

Govt. of NCT of Delhi is making all endeavors to meet the national goal as set by the Central Govt. and is constantly adding to the green cover of the State [8] (Table 5).

The forest and tree cover area increased to 297.81 km<sup>2</sup> in 2013 increasing thereby the share of forests in the total area to 20.08 per cent. Of the total 297.81 km<sup>2</sup> of forest area in NCT of Delhi, nearly 272 km<sup>2</sup> has been added during the period 1999 to 2013 [8] (Table 6).

South Delhi district has the highest forest cover area at 79.02 sq. km, South West Delhi has 44.63 sq. km, that of North West Delhi is 16.50 sq. km and New Delhi has 16.31 sq. km. The lowest forest cover is in North West Delhi of 3.75 sq. Km.

Composition of forests in terms of its density is shown in Chart. Out of the total geographical area of NCT of Delhi, very dense forest is spread over 0.45 percent, moderately dense forest is spread over 3.33 percent, open forest is spread over 8.34 percent and scrub is spread over 0.15%, which is almost negligible [8] (Figure 5).

Delhi has 42 city forests. Fifteen city forests are in South-West district, Ten in North-West district, five each are in North-East and South districts, three each in East and North districts and one in West district.

### Noise environment

The major contributors to noise pollution are industries, vehicular traffic, festivals, construction activities, diesel generating sets etc. Use of high sound loudspeakers during festivals and many social gatherings in public place directly increases the noise pollution in the affected areas.

Noise levels in Delhi exceed permissible levels in all areas except industrial areas according to a study by Delhi Pollution Control Committee in 1996. Another study carried out by CPCB in Delhi during 2006 revealed that during daytime ambient noise levels exceeded the prescribed residential area standard at all the locations. The ambient

noise levels in commercial and industrial locations were below their respective standard values.

The ambient noise levels permitted by Central Pollution Control Board for different areas:-

(Table 7) [10-14]. Noise levels observed at 40 different residential locations have been tabulated below. The data shows ambient noise levels being exceeded in all the selected residential areas. (Day time standard for residential area 55dB (A), Night time standard for residential area 45dB (A), All values in Leq dB (A)) [14-17] (Table 8).

### Discussion and Recommendations

Growing urbanization and migration of population in search for better employment opportunities to Delhi is constantly putting pressure on city's limited environmental resources. Though the green cover has increased in past several years due to massive plantation drives and awareness schemes, other assets like lakes, groundwater, river etc. are under constant threat due to their over exploitation. To make an informed, scientific decision about saving these natural and environmental resources and to retain them to their closest pristine form, urgent measures are required. Measures like easing out transportation services are needed to deal with problems pertaining to air pollution. Initiatives by government of Delhi to only ply those private vehicles on road which have even numbers on dates having even count and same with odd is a noble step which needs to be executed with few exceptions. Waste management is one such area which needs to be dealt with care and urgency. Segregation while collection should be the desired practice for municipal authorities. Different colour bags should be assigned for different kind of wastes which can be directly sent to processing plants. Principle of Recycle and Reuse should be adopted which can help Delhi get rid of tons of pollutants. Zero net waste should be the objective which can only be attained if proper care is taken of the waste. For increasing and maintaining the forest cover, the horticulture department should make proper road map. Large scale plantation drive and maintenance of existing plants should be done. This can be helpful in dealing with the menace of Air pollution. To deal with pollution of river Yamuna in Delhi, one needs to take care of all

| S. No. | Year | Forest and Tree Cover | Absolute Increase in Area | % of Total Area |
|--------|------|-----------------------|---------------------------|-----------------|
| 1.     | 1993 | 22                    | --                        | 1.48            |
| 2.     | 1995 | 26                    | 4                         | 1.75            |
| 3.     | 1997 | 26                    | --                        | 1.75            |
| 4.     | 1999 | 88                    | 62                        | 5.93            |
| 5.     | 2001 | 151                   | 63                        | 10.2            |
| 6.     | 2003 | 268                   | 117                       | 18.07           |
| 7.     | 2005 | 283                   | 15                        | 19.09           |
| 8.     | 2009 | 299.58                | 16.58                     | 20.20           |
| 9.     | 2011 | 296.20                | -3.38                     | 19.97           |
| 10.    | 2013 | 297.81                | 1.61                      | 20.08           |

Table 5: Forest and Tree Cover Area of Delhi 1993-2013.

| Sl. No. | Districts        | Geographical Area | Forest Cover Area | % of Geographical Area |
|---------|------------------|-------------------|-------------------|------------------------|
| 1.      | Central Delhi    | 25                | 5.05              | 20.20                  |
| 2.      | East Delhi       | 64                | 3.05              | 04.77                  |
| 3.      | New Delhi        | 35                | 16.31             | 46.60                  |
| 4.      | North Delhi      | 59                | 4.81              | 8.15                   |
| 5.      | North East Delhi | 60                | 4.02              | 6.70                   |
| 6.      | North West Delhi | 440               | 16.50             | 3.75                   |
| 7.      | South Delhi      | 250               | 79.02             | 31.61                  |
| 8.      | South-West Delhi | 421               | 44.63             | 10.60                  |
| 9.      | West Delhi       | 129               | 6.42              | 04.98                  |
|         | <b>Total</b>     | <b>1483</b>       | <b>179.81</b>     | <b>12.12</b>           |

Table 6: District-Wise Forest Cover in Delhi-2013 (Sq. Km).

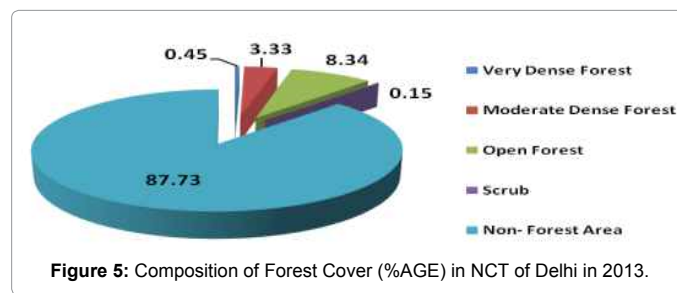


Figure 5: Composition of Forest Cover (%AGE) in NCT of Delhi in 2013.

| S. No. | Area             | Leq/Db (A) |               |
|--------|------------------|------------|---------------|
|        |                  | Day Time * | Night Time ** |
| 1.     | Industrial Area  | 75         | 70            |
| 2.     | Commercial Area  | 65         | 55            |
| 3.     | Residential Area | 55         | 45            |
| 4.     | Silence Zone***  | 50         | 40            |

Notes: \*Day Time-6 Am To 10 Pm  
 \*\*Night Time-10 Pm to 6 Am  
 \*\*\* Silence Zone is an Area Comprising Not Less Than 100 Meters around Hospitals, Educational Institutions, Courts, Religious Places or Any Other Areas Which Is Declared as Such by Competent Authority.

Table 7: Prescribed Ambient Noise Standards.



| Ambient Noise Levels Observed at Different Locations in Delhi |                 |                  |                    |                  |                    |                  |                    |                  |                    |                  |                    |                  |                    |                  |                    |                  |                    |
|---|-----------------|------------------|--------------------|------------------|--------------------|------------------|--------------------|------------------|--------------------|------------------|--------------------|------------------|--------------------|------------------|--------------------|------------------|--------------------|
| S.No.   | Locations       | June(2008)       |                    | July (2008)      |                    | August (2008)    |                    | Sep. (2008)      |                    | Oct. (2008)      |                    | Nov. (2008)      |                    | Dec. (2008)      |                    | Jan. (2009)      |                    |
|   |                 | Noise (Day Time) | Noise (Night Time) | Noise (Day Time) | Noise (Night Time) | Noise (Day Time) | Noise (Night Time) | Noise (Day Time) | Noise (Night Time) | Noise (Day Time) | Noise (Night Time) | Noise (Day Time) | Noise (Night Time) | Noise (Day Time) | Noise (Night Time) | Noise (Day Time) | Noise (Night Time) |
| 1   | Adarsh Nagar    | 62.3             | 53                 | 61.6             | 52.2               | 62.9             | 52.4               | 62.7             | 55.1               | 63.4             | 55.8               | 59.1             | 47.1               | 61.2             | 52.5               | 60.5             | 51                 |
| 2   | Anand Vihar     | 63.1             | 57.5               | 62.5             | 55.9               | 63               | 56                 | 64.3             | 54.4               | 62.7             | 53.9               | 62               | 56                 | 61.6             | 52.7               | 60.4             | 53.3               |
| 3   | Ashok Vihar     | 61.7             | 52.6               | 61.3             | 62.2               | 60.2             | 51.5               | 61.4             | 55.1               | **               | **                 | 61.3             | 50.9               | 60.4             | 51.9               | 60.1             | 50.1               |
| 4   | Badli           | 58.7             | 49.1               | 57.1             | 50.9               | 57.4             | 50.6               | 63               | 55.8               | **               | **                 | 61.4             | 57.2               | 59.6             | 51                 | 60.6             | 54                 |
| 5   | Braham Puri     | 59.6             | 54                 | 57.7             | 53.6               | 56.6             | 51.5               | 59               | 54.2               | **               | **                 | 59.6             | 52.2               | 60.4             | 54.6               | 59.9             | 53.7               |
| 6   | Daryaganj       | 64               | 57.4               | 62.3             | 52.5               | 63.7             | 56.8               | 62.2             | 53.4               | **               | **                 | 62.1             | 52.5               | 62.8             | 56.2               | 60.6             | 55.8               |
| 7   | Defence Colony  | 60.1             | 53.8               | 60.9             | 55.2               | 60               | 54.3               | 63               | 57.1               | 64               | 57.4               | 61.6             | 55.6               | 60.3             | 54.3               | 59.8             | 53.7               |
| 8   | Dwaraka         | 60.9             | 52.3               | 59.2             | 51.3               | 61.2             | 52.1               | 62.9             | 55.9               | **               | **                 | 59               | 51.1               | 59.3             | 55.8               | 58.1             | 54.5               |
| 9   | Greater Kailash | 63.1             | 62.2               | 61.8             | 56                 | 63.9             | 62.6               | 62.7             | 57                 | 61.5             | 55.9               | 61.7             | 53.1               | 62.8             | 55.5               | 59.2             | 49.7               |
| 10  | Inder Puri      | 59.4             | 55.9               | 59.1             | 53.8               | 59.6             | 54.6               | 62               | 57.9               | **               | **                 | 60.6             | 55.2               | 61.7             | 53.3               | 60.2             | 53.1               |
| 11  | Janak Puri      | 62.7             | 55.1               | 61.9             | 55.6               | 61.2             | 53.9               | 62.9             | 56.1               | **               | **                 | 62.5             | 60.5               | 62.8             | 57.6               | 59.4             | 53.1               |
| 12  | Karawal Nagar   | 62.2             | 53.2               | 62.4             | 52.9               | 61.4             | 52.5               | 63.9             | 57.7               | 62.9             | 56.3               | 60.5             | 54.7               | 63               | 61.2               | 61.2             | 60.8               |
| 13  | Karol Bagh      | 62.9             | 61.3               | 62.4             | 60.6               | 62               | 61                 | 62.9             | 54.4               |                  |                    | 61.8             | 56.4               | 62.8             | 54.9               | 64               | 57.4               |
| 14  | Kondli          | 60               | 50.3               | 60.1             | 51.1               | 60.4             | 54.2               | 62.4             | 56.8               | 62.2             | 54.7               | 62.2             | 54                 | 64.4             | 54                 | 60.8             | 48.3               |
| 15  | Lajpat Nagar    | 63.6             | 61.8               | 64.6             | 62.3               | 63.6             | 61.5               | 62.5             | 55.9               | 61.9             | 55.5               | 63.1             | 53.1               | 61.3             | 55.1               | 61.2             | 51.9               |
| 16  | Lawrence Road   | 59               | 50.9               | 59.7             | 52.2               | 59.1             | 52.6               | 62.4             | 53.2               | **               | **                 | 61.4             | 56.8               | 62.3             | 56.5               | 62.4             | 49                 |
| 17  | Mandawali       | 61.7             | 56.5               | 63.2             | 56.6               | 62.4             | 55.1               | 62               | 57.2               | 61.6             | 54.2               | 63               | 56.9               | 59.3             | 51.3               | 60.9             | 52.7               |
| 18  | Mangol Puri     | 62.8             | 56.2               | 61.6             | 55.9               | 62.5             | 55.9               | 63.6             | 56.8               | **               | **                 | 61.4             | 56.8               | 61.3             | 54.3               | 62.6             | 57.6               |
| 19  | Meera Bagh      | 60               | 52                 | 59.4             | 51.6               | 60.2             | 52                 | 61.4             | 54.8               | **               | **                 | 61               | 56.9               | 62.8             | 56.2               | 60.5             | 52.5               |
| 20  | Mehrauli        | 61.3             | 55.1               | 62.3             | 58                 | 62.7             | 53.4               | 63.9             | 54.3               | 61.1             | 51.2               | 60.5             | 56.8               | 60.9             | 57.8               | 62.7             | 55.4               |
| 21  | Moti Bagh       | 59.3             | 52.4               | 58.2             | 52.2               | 58.7             | 51.8               | 62.1             | 53                 | 61.6             | 52.9               | 62.4             | 51.3               | 58.7             | 52.2               | 58.6             | 47.7               |
| 22  | Moti Nagar      | 61.2             | 57.8               | 60.9             | 54.2               | 61.9             | 57.9               | 61               | 52.5               |                  |                    | 62.9             | 54.8               | 62.9             | 54.8               | 59.5             | 53.5               |
| 23  | Mukherji Nagar  | 61.7             | 55.5               | 61               | 56.2               | 62.2             | 55.9               | 64.8             | 56.4               | 61.6             | 50.7               | 61.8             | 53.8               | 61.1             | 55.6               | 62.8             | 56.2               |
| 24  | Nand Nagri      | 60.6             | 55.8               | 59.7             | 55                 | 60.3             | 55.4               | 61.9             | 53.9               | 61.4             | 56.1               | 62.4             | 55.7               | 60.6             | 55.8               | 59.4             | 55.9               |
| 25  | Naraouji Nagar  | 60.5             | 52.6               | 60.5             | 55.6               | 60.9             | 53.7               | 61.9             | 56.1               | 62.6             | 51.6               | 62.9             | 56.6               | 60.7             | 52.8               | 59.6             | 51.6               |
| 26  | New Friends Col | 60.1             | 53.2               | 62.8             | 56.5               | 62.2             | 53.5               | 62.9             | 55.2               | 63.1             | 55.6               | 61.8             | 56.7               | 61.3             | 56.2               | 59.2             | 53.5               |
| 27  | Pahar Ganj      | 63.6             | 60.4               | 63.1             | 57.6               | 67               | 59.1               | 63.8             | 59.2               | **               | **                 | 61.9             | 55.4               | 62.7             | 60.1               | 62.6             | 57.6               |
| 28  | Paschim Vihar   | 57.4             | 51.7               | 57.9             | 54.1               | 59.2             | 51.8               | 61.3             | 53.9               | **               | **                 | 62.2             | 54.7               | 57.8             | 51.4               | 59.9             | 48.4               |
| 29  | Patel Nagar     | 57.6             | 48.7               | 59.6             | 52.3               | 58               | 48.6               | 61.7             | 55.4               | **               | **                 | 62.1             | 55.5               | 56.8             | 48.3               | 60.2             | 50.5               |
| 30  | Prehladpur      | 63               | 59.1               | 59.4             | 54.5               | 62.4             | 57                 | 61.9             | 56.1               | 61.6             | 52.9               | 62.8             | 52.8               | 60.5             | 57.6               | 61.7             | 56.5               |
| 31  | R.K. Puram      | 60.2             | 55.7               | 60.4             | 57.1               | 60.6             | 55.5               | 62               | 55.6               | 63.1             | 55                 | 59               | 51.6               | 59.6             | 53.4               | 58.7             | 49.1               |
| 32  | Rajpura Road    | 62.1             | 52.5               | 60.2             | 52.3               | 62.4             | 52.8               | 63.8             | 57.2               | 63.3             | 53                 | 59.2             | 52.7               | 60.2             | 51.6               | 57.6             | 48.7               |
| 33  | Rana Pratap Bag | 61               | 51.4               | 60.3             | 50.8               | 61.8             | 52.9               | 63.6             | 56.8               | **               | **                 | 62.4             | 52.1               | 60.6             | 51.2               | 59.3             | 52.4               |
| 34  | Rohini          | 64               | 54.3               | 61.1             | 53.5               | 62.3             | 53.4               | 63.5             | 54.7               | **               | **                 | 61.7             | 56.8               | 63.3             | 53.9               | 64               | 57.4               |
| 35  | Sarita Vihar    | 69               | 59.1               | 60.4             | 51.7               | 67.2             | 58                 | 62.8             | 54.3               | 63.3             | 56.5               | 63               | 55.5               | 60.5             | 52                 | 63.6             | 54.3               |
| 36  | Shalimar Bagh   | 62.6             | 57.6               | 63.3             | 57.6               | 61.7             | 54.8               | 63.8             | 54.3               | **               | **                 | 62               | 54.8               | 62.4             | 55.2               | 61.7             | 55.7               |
| 37  | Shanti Vihar    | 61.3             | 55.1               | 65.9             | 56                 | 59.7             | 48.3               | 63.1             | 59.2               | **               | **                 | 63               | 55.5               | 58.6             | 47.7               | 59.1             | 47.5               |
| 38  | Tilak Nagar     | 62.1             | 54.9               | 61.5             | 54.5               | 62.2             | 54.9               | 65               | 55.6               | **               | **                 | 60.5             | 53.9               | 59.4             | 53.5               | 59.2             | 48.4               |
| 39  | Tughlakabad     | **               | **                 | **               | **                 | **               | **                 | **               | **                 | **               | **                 | 62.2             | 52.6               | 61               | 52.5               | 61.3             | 48.5               |
| 40  | Vasant Kunj     | 62.9             | 58.6               | 63.5             | 58.9               | 61.7             | 56.6               | 61.8             | 56.8               | 61.6             | 55.2               | 63.5             | 58.9               | 61.9             | 54.9               | 59.5             | 55.8               |
| 41  | Yamuna Vihar    | 59.6             | 51.6               | 59.9             | 51.3               | 60.1             | 52.5               | 62.7             | 51.8               | 63               | 53.9               | 63.8             | 51.3               | 58.6             | 51.2               | 59.9             | 51.1               |
|   | Min             | 57.4             | 48.7               | 57.1             | 50.8               | 56.6             | 48.3               | 59               | 51.8               | 61.1             | 50.7               | 59               | 47.1               | 56.8             | 47.7               | 57.6             | 47.5               |
|   | Max             | 69               | 62.2               | 65.9             | 62.3               | 67.2             | 62.6               | 65               | 59.2               | 64               | 57.4               | 63.8             | 60.5               | 64.4             | 61.2               | 64               | 60.8               |
|   | Average         | 61.473           | 54.96              | 61.02            | 54.81              | 61.413           | 54.47              | 62.6625          | 55.53              | 62.38            | 54.42              | 61.69            | 54.5               | 60.9             | 54.1               | 60.54            | 60.54              |

\*\*Data not available

Table 8: Delhi Pollution Control Committee, Government of N.C.T. Delhi.

the drains falling out in Yamuna. Interceptor drains should be made to process waste water reaching Yamuna. Any wastewater reaching Yamuna should be processed beforehand so that sanctity and water quality of Yamuna improves. Recreational models should be developed near Yamuna which will help build connection of Yamuna with residents of Delhi. Conclusively, joint efforts need to be made on part of government machinery and citizenry which will enable overcome the environmental concerns of Delhi.

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