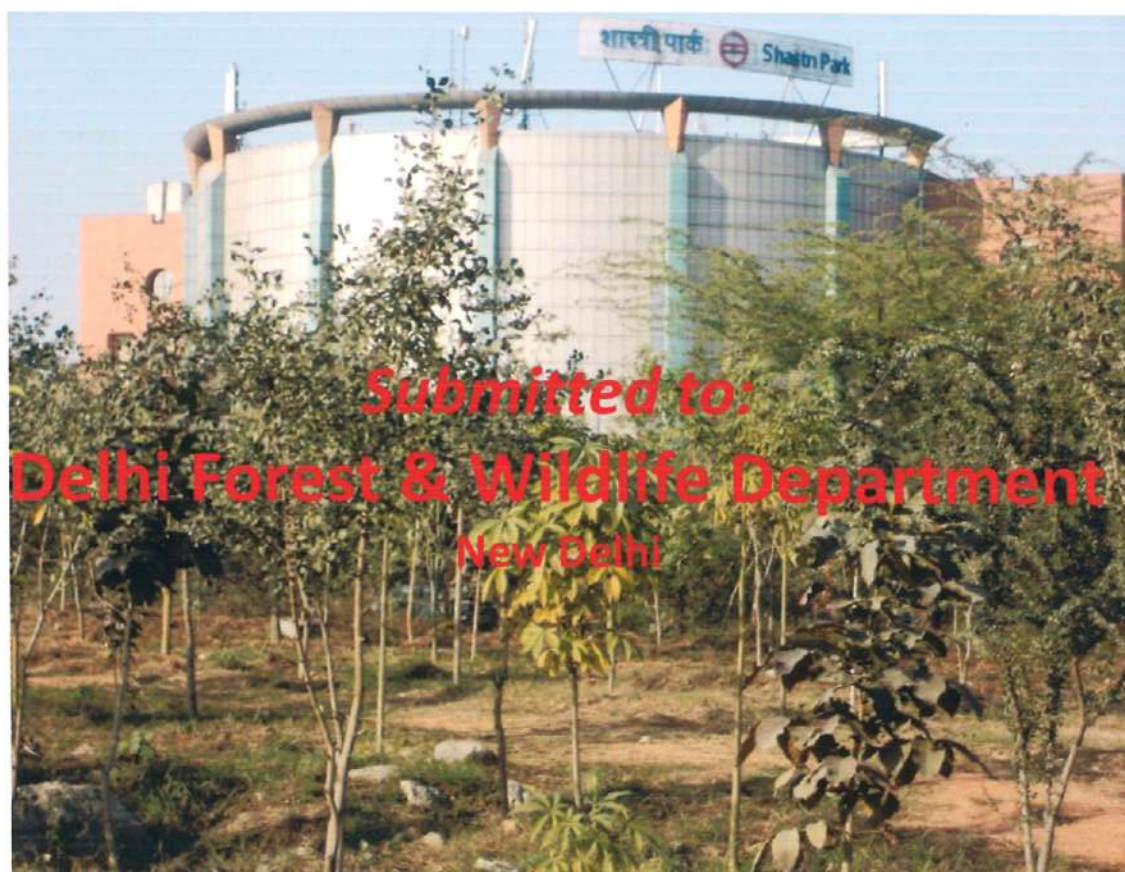


Third Party Monitoring & Evaluation of the Plantations Raised by Three Forest Divisions During 2009-10 to 2015-16

REPORT



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Executive Summary

The State of Delhi (National Capital of India), with 1483 sq. km geographical area and 16.79 million population (97.5% urban and 2.5% rural), is located in northern India along the banks of river Yamuna and lies between 28°22' and 28°54' north latitude and 76°48' and 77°23' east longitude. It is surrounded by Uttar Pradesh in the east and Haryana on the north, west and south. It is the most populous State of India with a 11,320 population density (persons/sq. km), 868 sex ratio (females/1000 males) and 86.21% literacy.

Physically, Delhi State can be divided into 4 segments – (i) Yamuna River, (ii) Yamuna Flood Plains, (iii) Ridge and (iv) Plains. The Ridge constitutes the most dominating physiographic feature of Delhi. It originates from the Aravali hills of Rajasthan and enters Delhi from the south. In Delhi, it has 4 zones (Northern Ridge, Central Ridge, South Central Ridge and Southern Ridge). The forests on Ridge are said lungs of Delhi.

The total forest and tree cover of Delhi State, which was 22 sq. km (1.48% of its geographical area) during 1993, has increased to 299.77 sq. km (20.22% of its geographical area) during 2015.

The forests of Delhi are being managed by different departments/agencies/organization. The forests under the control of Forest Department are being managed by 3 Forest Division (North, South and West) and each division is headed by a Dy. Conservator of Forests.

To enhance the quality of forest and tree cover as well as to increase the area under forest and tree cover, the Forest Department has raised plantations on forest areas, gram sabha lands and govt. lands.

Present study pertains to the 3rd party monitoring and evaluation (M&E) of plantations raised in the 3 Forest Divisions of Delhi during the last 7 years (2009-10 to 2015-16). But, it does not include the plantations raised by the Eco Task Force unit [132 INF BN (TA) ECO-RAJPUT] during the 4 years (2010-11 to 2013-14) because M&E of these plantations has already been done.

The main objectives of present study were to (i) Assess the quality of plantations in terms of survival, growth and protection, (ii) Identify the problems/constraints, if any, faced by the front line staff and (iii) Suggest measures in improving the quality of plantations.

For quantitative analysis, the secondary data was procured from the offices of Dy. Conservators of Forests of all the 3 Forest Divisions of Delhi State, Eco Task Force unit Delhi and Govt. web sites. The secondary data procured was tabulated and analyzed to get a clear picture of the year wise and site wise number of plants planted. From the analysis of secondary data, it was revealed that during the last 7 years (2009-10 to 2015-16) total 19.75 lakh plants were planted in the 3 Forest Divisions of Delhi of which 10.50 lakh plants were planted in South Delhi Forest Division, 4.64 lakh plants in North Delhi Forest Division and 4.61 lakh plants in West Delhi Forest Division.

For qualitative analysis, in each Forest Division, the plantation sites of all the 7 years were continuously serial numbered and the sites of serial number 1, 11, 21, 31, 41, 51, 61, ----- and so on were randomly selected for field survey. Efforts were made to select at least one site of each year. If sites of any year remained unselected, one site of that year was also randomly selected.

For obtaining the primary data of randomly selected plantation sites, field visits were carried out in January to March 2017 and the front line staff of the Delhi Forest Department and Eco Task Force unit accompanied the evaluators of AFC Delhi during the field visits.

In each randomly selected site, sample plots of 0.1 ha were laid. The number of sample plots were 4 in areas of less than 5 ha (<5500 plants), 6 in areas of 5 to 10 ha (5500 to 11000 plants) and 8 in areas of more than 10 ha (>11000 plants). The number of sample plots were adjusted depending on number of plants planted.

In each sample plot, surviving number of plants were counted, their height was measured and average survival and height of plantation site was calculated. In addition to this, quality of plantations in terms of technical parameters (site selection, choice of species, spacing of plants, planting technique, maintenance of plantations, status of natural regeneration, presence of fauna and avifauna and damage to plantations by frost, fire, disease, man and animal) and effectiveness of protection measures undertaken was assessed. Geo-coordinates and photo of each sample plot were also taken. Results of field surveys were tabulated and analyzed.

On the basis of Quantitative and Qualitative Analysis, the following conclusions were drawn:

- a. *Overall survival, growth and protection of plantations was very good.*
- b. *Uprooting of tall grasses, especially in Garhi Mandu city forest areas, was not in practice. It caused root competition for moisture resulting in poor growth of plants planted. Further, covering of plants against frost was also not in practice resulting in frost damage to plants.*
- c. *There was a lack of coordination between the Eco Task Force and Forest Divisions.*

On the basis of Quantitative and Qualitative Analysis, the constraints faced and the vast past experience, the following recommendations were made:

- *Provision of maintenance of plantations, for atleast 3 years, in all the schemes should be made.*
- *Boundary wall should be constructed around all the forests.*
- *The front line staff of concerned Forest Divisions should be involved in planning, technical execution and internal M&E of works done by the Eco Task Force.*
- *Uprooting of tall grasses, covering of small plants against frost and harrowing/ploughing of planted area, especially of Garhi Mandu city forest, should be done.*
- *Protection of plantations against man, animals and fire should be enhanced*

Introduction

1.1 Location

The State of Delhi (National Capital of India), with 1483 sq. km geographical area and 16.79 million population (97.5% urban and 2.5% rural), is located in northern India along the banks of river Yamuna and lies between 28°22' and 28°54' north latitude and 76°48' and 77°23' east longitude. It is surrounded by Uttar Pradesh in the east and the Haryana on the north, west and south (Fig. -1.1).



Fig. – 1.1: Map of Delhi State

1.2 Districts/Tehsils/Villages

Delhi State has 11 districts (North, North West, West, South West, South, South East, New Delhi, Central, North East, Shahdara and East) as shown in Fig. -1.1, 33 tehsils (3 tehsils in each district) and 357 villages.

1.3 Population

Delhi is the most populous State of India with a 11,320 population density (persons/sq. km), 868 sex ratio (females/1000 males) and 86.21% literacy (census 2011).

1.4 Physiography

Physically, Delhi State can be divided into 4 segments – (i) Yamuna River, (ii) Yamuna Flood Plains, (iii) Ridge and (iv) Plains.

The Yamuna River originates from the Yamnotri glacier in the Himalayas. In Delhi, it flows from north to south and divides Delhi into 2 parts. Major part of Delhi lies on the western bank of this river.

The Yamuna Flood Plains are somewhat low-lying and sandy areas and are subject to recurrent floods. These area are also called *Khadar*.

The Ridge constitutes the most dominating physiographic feature of Delhi. It originates from the Aravali hills of Rajasthan and enters Delhi from the south. In Delhi, it has 4 zones (Northern Ridge, Central Ridge, South Central Ridge and Southern Ridge). The Northern Ridge or Old Delhi denotes the hilly area near Delhi University. The Central Ridge or New Delhi stretches from just south of Sadar Bazar to Dhaula Kuan. The South Central Ridge or Mehrauli is centered on Sanjay Van near JNU. The Southern Ridge or Tughlakabad includes the Asola and Bhatti Wildlife Sanctuaries. The forests on Ridge are said lungs of Delhi.

Leaving aside the area of Yamuna River, Yamuna Flood plains and Ridge, the remaining area of Delhi is categorized as the Plains or *Bangar*. A major proportion of the area of Delhi is plain.

1.5 Forest Base

1.5.1 Forest Area

The forest area (recorded/notified) of Delhi State is 102 sq. km (78 sq. km reserved forests and 24 sq. km protected forests), which is 6.88% of its geographical area and 0.01% of India's forest area (ISFR, 2015). Details of the reserved and protected forests areas of Delhi State are as given in table- 1.1 and table- 1.2 respectively.

Table – 1.1: Reserved Forests Areas of Delhi State

Sr. No.	Name of Managing Agency/Department etc.	Reserved Forests Area in Ha				
		Northern Ridge	Central Ridge	South Central Ridge	Southern Ridge	Total Area
1	Forests Department	3	423		1938	2364
2	DDA	73	85	626	120	904
3	MCD	11	3			14
4	NDMC (Talkatora Garden)		25			25
5	CPWD (Buddha Jayanti Park & Mahavir Vansthali)		37			37

6	MHA (Wireless Station)		6			6
7	Army (Signal Regiment) B/W		202			202
8	Railways (Sardar Patel RS)		11			11
9	Areas allotted by L&DO		70			70
10	Sports Authority of India				32	32
11	Gaon Sabha & Others				4207	4207
Total Area		87	864	626	6200	7777

Source: http://delhi.gov.in/wps/wcm/connect/doi_forest/Forest/Home/Forests+of+Delhi/Recorded+Forest

Table – 1.2: Protected Forests Areas of Delhi State

Sr. No.	Name of Protected Forest Area and Managing Agency/Department etc.	Area in Acres
1	Mitraon (Forests)	105.00
2	Sultanpur (Forests)	120.00
3	Mukhmelpur (Forests)	133.00
4	Rajokhari (Forests)	600.00
5	Tughlakabad (Forests)	
6	District Park I/C Hauz khas Picnic Hut, Lake, Garden, etc (DDA)	400.00
7	City Forest (DDA)	800.00
8	Basant Nagar, Moradabad Pahari Area (DDA)	200.00
9	Vasant Vihar District Park (DDA)	20.00
10	Dhaura Kuan Complex (DDA)	200.00
11	Nehru University Afforestation (DDA)	200.00
12	District Park Gokulpuri (DDA)	7.50
13	District Park Jhilmil Taharpur (DDA)	20.00
14	Zonal Green Area Kalayanpuri, Trilokpuri, Khichripur, Ghazipur, etc. (DDA)	373.00
15	Orchard between sindhora Kalan, Nimri, Gulabi Bagh & Darbar Khan Nursery and Other Areas (DDA)	100.00

16	Area between Hill Road & Ludlow Castle Road (DDA/ L&DO)	17.00
17	Orchard in Wazirpur Near Bharat Nagar and Nimri Conoly (DDA)	120.00
18	Mayapuri Green Belt (DDA)	5.00
19	Hastsal Afforestation (DDA)	40.00
20	Area between Inderpura Narayana J.J. Colony (DDA)	32.00
21	Afforestation MP Green Area Tagor Garden (DDA)	55.26
22	Orchard Nangloi Sayed (DDA)	257.56
23	District Park Rohtak Road Co-operative Society (DDA)	35.00
24	Afforestation MP Green G-8 Tihar	65.00
25	Afforestation MP Green Area Najafgarh Drain (DDA)	54.58
26	District Park in between Pitampura Co-operative Society (DDA)	185.00
Total Area : 4144.90 Acres (1658 Ha)		

Source: http://delhi.gov.in/wps/wcm/connect/doit_forest/Forest/Home/Forests+of+Delhi/Recorded+Forest

1.5.2 Protected Areas

The 1882.80 ha Gaon Sabha land of villages Asola, Sahurpur and Maidan Garhi and 866.51 ha land of village Bhatti in Southern Ridge has been notified as Asola-Bhatti Wildlife Sanctuaries.

1.5.3 City Forests

The Department of Forests & Wildlife of Delhi State, over the years has raised plantations on the Gaon Sabha and other government lands and maintaining them as City Forests. Besides, 13 old City Forests, the Department during the year 2007-08 and 2008-09, has also developed 18 New City Forests. The location-wise details of the Old and New City Forests are as under:

i. Old City Forests

There are 13 Old City Forests maintained by the Department, namely, at Nasirpur (28.00 Ha), Alipur (19.50 Ha), Hauzrani (28.80 Ha), Mitraon (40.00 Ha), Sultanpur (48.00 Ha), Ghumenhera (32.00 Ha), Ghoga (10.40 Ha), Shahapur Garhi (08.00 Ha), Mamurpur (56.00 Ha), Jindpur (47.60 Ha), Mukhmelpur (53.00 Ha), Bawana (32.00 Ha) and Garhi Mandu (300.00 Ha.).

ii. New City Forests (2007-08)

The Department has undertaken creation of 9 New City Forests during 2007-08, namely, at Issapur (66.25 Ha), Rewla Khanpur (22.85 Ha), Kharkhari Jatmal (50.00 Ha), Sultanpur Dabbas (24.76 Ha), Mungeshpur (13.5 Ha), Qutabgarh (27.77 Ha), Hindon Cut Ghazipur (9.33 Ha), Harewali (24.80 Ha) and Mukhmelpur (19.43 Ha).

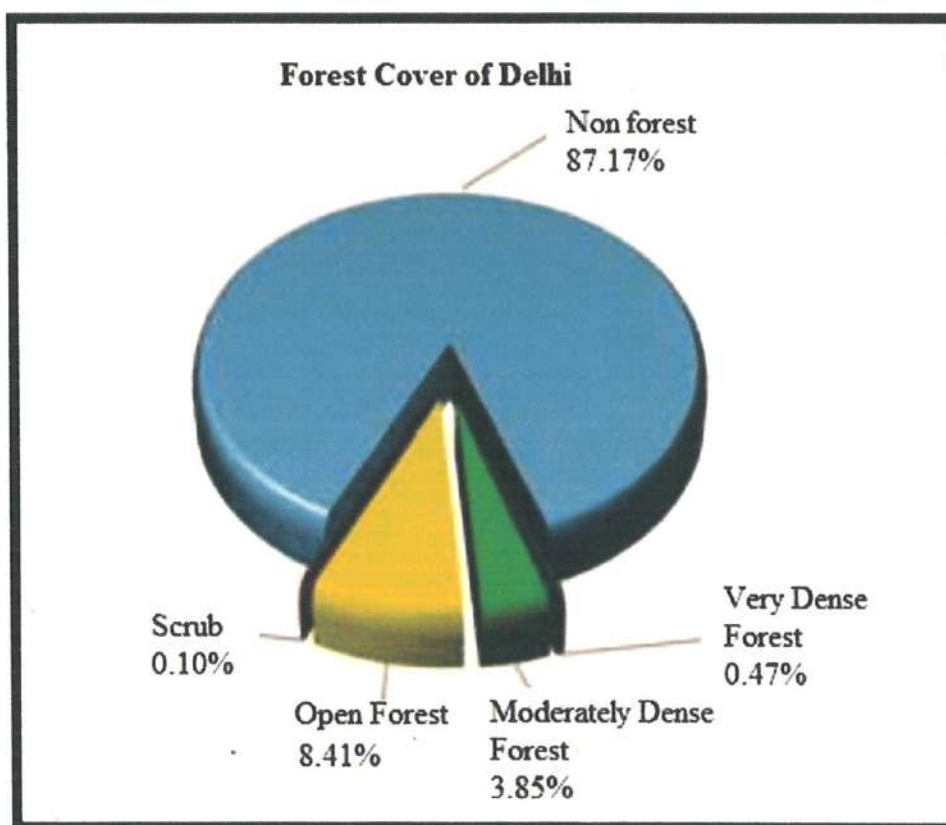
iii. New City Forests (2008-09)

During 2008-09, the Department had undertaken development of 9 New City Forests, namely, at Rewla Khanpur (20 Acre), Shikarpur (109 Acre), Rajokhari (15.5 Acre), Nazafgarh Drain (29.64 Acre), Qutubgarh (20 Acre), Mukhmelpur (13 Acre), Raj Vidya Kendra, Sahurpur (37Acre), Aya Nagar (25 Acre) and Burari Bund (8 km. of the slope of Burari Bund Road towards supplementary drain).

1.5.4 Forest Cover

All lands, more than one hectare (Ha) in area and with a tree canopy density of more than 10% irrespective of ownership and legal status, are termed as forest cover. Such lands may not necessarily be a recorded forest area. It also includes orchards, bamboo and palm.

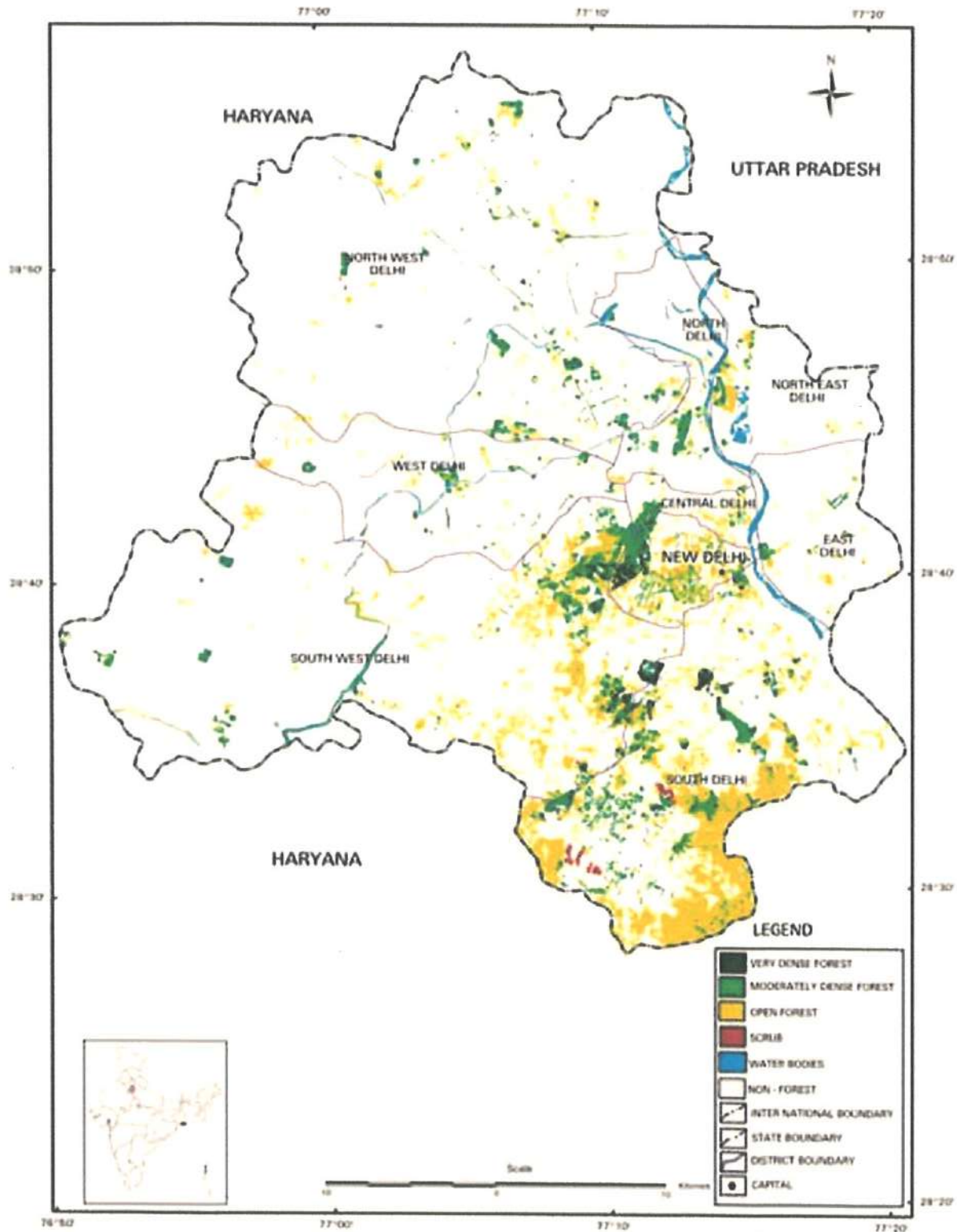
The forest cover in Delhi State is 188.77 sq. km, of which 124.68 sq. km is open forest, 57.15 sq. km is moderately dense forest and only 6.94 sq. km is very dense forest (ISFR, 2015). The percentage of very dense forest cover, moderately dense forest cover and open forest cover, etc. to the total geographical area of Delhi State is as given in Fig. – 1.2.



Source: ISFR, 2015

Fig. - 1.2: Forest Cover of Delhi State

The Forest Cover Map of Delhi State is as shown in Fig. - 1.3.



Source: ISFR, 2015

Fig. - 1.3: Forest Cover Map of Delhi State

1.5.5 Tree Cover

Tree cover comprises tree patches outside the recorded forest area exclusive of forest cover and less than the minimum mappable area of 1 ha. Such small patches comprising of block, linear and scattered trees are not delineated as forest cover during interpretation of satellite data. The tree cover in Delhi State is 111 sq. km (ISFR, 2015).

1.5.6 Forest and Tree Cover

The total forest and tree cover of Delhi State, which was 22 sq. km (1.48% of its geographical area) during 1993, has increased to 299.77 sq. km (20.22% of its geographical area) during 2015 as shown in table- 1.3.

Table- 1.3: Forest and Tree Cover of Delhi State

Sr. No.	Year of ISFR Report	Forest/Tree Cover (in sq. km)	% of Geographical Area
1	1993	22.00	1.48
2	1995	26.00	1.75
3	1997	26.00	1.75
4	1999	88.00	5.93
5	2001	151.00	10.2
6	2003	268.00	18.07
7	2005	283.00	19.09
8	2009	299.58	20.20
9	2011	296.20	19.97
10	2013	297.81	20.08
11	2015	299.77	20.22

Source: Forest Survey of India, Ministry of Environment and Forests, G.O.I.

1.5.7 Forest Types

According to Atlas Forest Types of India, 2011, the forests in Delhi State are of two types, viz. 6B/C2 Ravine Thorn Forests (57.67 sq. km) and Plantation/ Tree Outside Forests (118.95 sq. km).

1.5.8 Administrative Control

For administrative and technical control, the Department of Forests and Wildlife of Delhi State is divided into 3 Forest Divisions, viz. North Delhi Forest Division, South Delhi Forest Division and West Delhi Forest Division. Each Division is headed by a Dy. Conservator of Forests.

To enhance the quality of degraded forest cover (moderately dense forest cover, open forest cover and scrubs) as well as to increase the forest/tree cover, the three Forest Divisions have raised tree plantations on different sites located in Delhi.

1.6 Present Study

Present study pertains to the 3rd party monitoring and evaluation (M&E) of plantations raised in the 3 Forest Divisions of Delhi during the last 7 years (2009-10 to 2015-16). But, it does not include the plantations raised by the Eco Task Force unit [132 INF BN (TA) ECO-

RAJPUT] during the 4 years (2010-11 to 2013-14) because M&E of these plantations has already been done.

1.6.1 Objectives

The main objectives of present study are to:

- i. Assess the quality of plantations in terms of survival, growth and protection.
- ii. Identify the problems/constraints, if any, faced by the front line staff.
- iii. Suggest measures in improving the quality of plantations.

1.6.2 Scope

Present study would be of great use in future planning and implementation of afforestation programme in Delhi State as well as in other States of India.

Quantitative Analysis

2.1 Present Study

Present study pertains to the 3rd party monitoring and evaluation (M&E) of plantations raised in the 3 Forest Divisions of Delhi during the last 7 years (2009-10 to 2015-16). But, it does not include the plantations raised by the Eco Task Force unit [132 INF BN (TA) ECO-RAJPUT] during the 4 years (2010-11 to 2013-14) because M&E of these plantations has already been done.

2.2 Number of Plants Planted

The number of plants planted in the 3 Forest Divisions of Delhi State during the last 7 year (2009-10 to 2015-16) were as given in table- 2.1.

Table- 2.1: Number of Plants Planted

Year	No. of Plants planted in			
	North Delhi Forest Division	South Delhi Forest Division	West Delhi Forest Division	Total
2009-10	27298	73035	0	100333
2010-11	61935	59420	158760	280115
2011-12	89120	95022	40050	224192
2012-13	190699	18575	43000	252274
2013-14	31509	45131	45000	121640
2014-15	29745	90835	30363	150943
2015-16	33746	113650	6465	153861
Total	464052	495668	323638	1283358

Source: O/O Dy Conservators of Forests of North, South and West Forest Divisions

It is evident from table- 2.1 that during the last 7 years:

- Total 12.83 lakh plants were planted in the 3 Forest Divisions.
- Maximum (4.96 lakh) plants were planted in South Delhi Forest Division followed by 4.64 lakh plants in North Delhi Forest Division.
- Minimum (3.23 lakh) plants were planted in West Delhi Forest Division.

But, as explained in para- 2.3.2 and 2.3.3, some discrepancies were detected in the year wise number of plants planted in West Delhi and South Delhi Forest Divisions. The corrected figures of plants planted were as given in table- 2.7 of para- 2.4.

2.3 Location of Plants Planted

The site wise plants planted in the 3 Forest Divisions were as given below:

2.3.1 North Delhi Forest Division

Site wise plants planted in North Delhi Forest Division were as given in table- 2.2.

Table- 2.2: Site wise plants planted in North Delhi Forest Division

Table- 2.2: Site wise plants planted in North Deni Forest Division			
Sr. No.	Year	Name of Site	No. of Plants planted
1	2009-10	NH-1 road (Left & right side) (wazirabad to Mukarba Chowk)	11450
2		NH-1 road center Verge	15848
Sub-total			27298
3	2010-11	Garhi Mandu	39775
4		ITO Chungi Loop 1	930
5		“ Part 2	1650
6		“ Part 3	80
7		ITO Chungi Loop 2	1041
8		“ Part 4 & Part 5	1208
9		ITO Chungi Loop 3	950
10		“ Part 1	2100
11		ITO Chungi Loop 4	1245
12		“ Part 6	2956
13		Burari Supplementary Drain 3	10000
Sub-total			61935
14	2011-12	ITO Chungi Loop 1	50
15		“ Part 2	50
16		“ Part 3	82
17		ITO Chungi Loop 2	60
18		“ Part 4 & 5	15
19		ITO Chungi Loop 3	45

20		“ Part 1	280
21		ITO Chungi Loop 4	55
22		“ Part 6	150
23		Garhi Mandu Pocket B	25530
24		Garhi Mandu Pocket A	14317
25		Garhi Mandu Pocket A1	4560
26		Garhi Mandu Pocket E	4970
27		Garhi Mandu Pocket C	11906
28		Garhi Mandu Pocket D	15000
29		Saleem Garh Part II (Rahul Gandhi Birthday plantation site)	1610
30		Saleem Garh Loop No. 3 & Part No. III (Rickshaw pocket)	2000
31		Saleem Garh Loop No. 2 (C.M Pocket)	1650
32		Saleem Garh Loop No. 4 (MCD off)	2000
33		NH-1 road center Verge	3080
34		Backside of Raj Ghat Thermal Power	860
35		Saleem Garh water pipe line	850
Sub-total			89120
36	2012-13	Garhi Mandu Pocket B	10410
37		Garhi Mandu Pocket A	13831
38		Garhi Mandu Pocket A1	12248
39		Garhi Mandu Pocket E	1380
40		Garhi Mandu Pocket C	1850
41		Garhi Mandu Pocket D	2065
42		Garhi Mandu Pocket F & G	16101
43		Garhi Mandu Pocket G1	14035
44		Garhi Mandu Pocket M	18500

45		Garhi Mandu Pocket M 1	17008
46		Garhi Mandu Pocket M 2	17500
47		Garhi Mandu Pocket N	21100
48		Saleem Garh Loop No. 1 (C.S Pocket)	1480
49		Saleem Garh Loop No. 2 (C.M Pocket)	300
50		Saleem Garh Part II (Rahul Gandhi Birthday plantation site)	204
51		Saleem Garh Loop No. 3 & Part No. III (Rickshaw pocket)	195
52		“ Loop No. 4 and Part 4 (PWD office)	2380
53		Chauhan Patti	30500
54		Chat Pooja Ghat	4492
55		Back side of Millenium Bus Depot	2930
56		Front side of Millenium Bus Depot	590
57		NH-1 road Left and Right side	750
58		Saleem Garh Bye pass Line	850
Sub-total			190699
59	2013-14	Kondli STP Premises	2400
60		Kondli Bridge to Vashundra Bridge	4891
61		Garhi Mandu Pocket E	594
62		Garhi Mandu pocket M-2	3655
63		Garhi Mandu pocket M	4500
64		Garhi Mandu pocket A1	2800
65		Garhi Mandu pocket A2	1194
66		Garhi Mandu pocket B	10465
67		Saleem Garh Loop no. 2	500
68		Saleem Garh-Part –II	390
69		ITO Chungi Loop No.2	120

Sub-total			31509
70	2014-15	Kondli STP Premises	4578
71		Garhi Mandu Pkt B	1600
72		Garhi Mandu Pkt M	6950
73		ITO chungi Part I & II	2500
74		Signature Bridge	4500
75		Garhi Mandu Pkt G1	1315
76		Millennium Bus Depot	440
77		Garhi Mandu Pkt C	1000
78		Garhi Mandu Pkt D	850
79		Garhi Mandu Pkt M1	1992
80		Garhi Mandu Pkt C1	3900
81		ITO Chungi Loop No.2	120
Sub-total			29745
82	2015-16	Ghazipur drain (NGT order)	1206
83		Shastri Park near shastri Park colony	8100
84		Shastri Park near Metro station	10000
85		Shastri Park near Metro station	8800
86		Shastri Park near Metro station	3290
87		Taj Enclave	1600
88		Taj Enclave	750
Sub-total			33746
Total			464052

Source: O/o Dy Conservator of Forests of North Delhi Forest Division

It is evident from table- 2.2 that in North Delhi Forest Division:

- 464052 plants were planted on 88 sites.
- The year wise number of plants shown planted in table-2.1 match with the number of plants shown planted in table-2.2.

2.3.2 West Delhi Forest Division

Site wise plants planted in West Delhi Forest Division were as given in table- 2.3.

Table- 2.3: Site wise plants planted in West Delhi Forest Division

Table- 2.3: Site wise plants planted in West Demi Forest Division			
Sr. No.	Year	Name of Site	No. of Plants planted
1	2010-11	Kharkhari Jetmal-III	8000
2		Rewla Khanpur-I	36560
3		Rewla Khanpur-II	7200
4		Qutubgarh-I	22000
5		Jainpur	30000
6		Rangpuri	5000
7		Shikarpur Phase-I	50000
Sub-total			158760
8	2011-12	Mukhmelpur (DJB)	7800
9		Kharkhari Jetmal-IV	6250
10		Qutabgarh-III	6000
11		Harevil	15000
12		Ghumanhera	5000
Sub-total			40050
13	2012-13	Mukhmelpur A&D	8000
14		Rewla Khanpur-III	5600
15		Harevil	3750
16		Jaffarpur	4000
17		Ghumanhera	1250
18		Shikarpur Ph-II (at Jainpur)	20400
Sub-total			43000

19	2013-14	Mukhmelpur A&D	2000
20		Ghumanhera	20000
21		Ghumanhera	5000
22		Savda	18000
Sub-total			45000
23	2014-15	Ghumanhera NGT	5000
24		Kharkhari Jetmal	8200
25		Jhatikara	4200
26		Savda	4113
27		Alipur City Forest	1500
28		Harewali	2850
29		Mukhmelpur – Pkt-B	3000
30		Mukhmelpur – Pkt-E	1500
Sub-total			30363
31	2015-16	Malikpur	3000
32		Kharkhari	1750
33		Rithala	310
34		Alipur City Forest	1405
Sub-total			6465
Total			323638

Source: O/O Dy Conservator of Forests of West Delhi Forest Division

It is evident from table- 2.3 that in West Delhi Forest Division:

- i. 323638 plants were planted on 34 sites.
- ii. The year wise number of plants shown planted in table-2.1 match with the number of plants shown planted in table-2.3.

But, the West Delhi Forest Division has not taken into account the plantations (shown in table- 2.4) raised during 2015-16 in Ghitorni, Rajokari and Rangpuri areas by the Eco-Task Force unit [132 INF BN (TA) ECO-RAJPUT].

Table- 2.4: Site wise plants planted by Eco-Task Force during 2015-16

Sr. No.	Year	Name of Site	No. of Plants planted
35	2015-16	OR Living Hut Area	12280
36		Farm House Area	12646
37		Tube Well No.-2	15104
38		Johar Mandir Area	9970
39		Open Area	87844
Total			137844

Source: O/O Eco Task Force unit [132 INF BN (TA) ECO-RAJPUT], Delhi

Therefore, as evident from table- 2.3 and table- 2.4, total 461482 (323638 + 137844) plants were planted on 39 sites during last 7 years (2009-10 to 2015-16) in West Delhi Forest Division of which 144309 (6465 + 137844) plants were planted during 2015-16.

2.3.3 South Delhi Forest Division

Site wise plants planted in South Delhi Forest Division were as given in table- 2.5.

Table- 2.5: Site wise plants planted in South Delhi Forest Division

Sr. No.	Year	Name of Site	No. of Plants planted
1	2010-11	Delhi Ridge near O/o DCF South, Tughlakabad	7200
2		84 Acres on Gram Sabha land at village Jaunapur (Khasra No.-90/1 to 25, 97/1 to 25, 106/6 to 25, 113/1 to 15 and 114/1 to 26.	20000
3	2011-12	Khasra No.- 48, 49 & 50 Jaunapur	11350
4	2015-16	Dera Mandi	6000
5		Devli	7000
Total			51550

Source: O/O Dy Conservator of Forests of South Delhi Forest Division

It is evident from table- 2.5 that in South Delhi Forest Division:

- i. 51550 plants were planted on 5 sites.

- ii. But, the number of plants (495668) shown planted in table-2.1 does not match with the number of plants (51550) shown planted in table-2.5 resulting in a huge difference in number of plants.
- iii. This difference in number of plants was due to a poor coordination between the offices of Dy Conservator of Forests of South Delhi Forest Division and Eco Task Force, Delhi.

To get a clear picture of total plants planted in South Delhi Forest Division during the last 7 years (2009-10 to 2015-16), detailed information was obtained from the office of Eco Task Force, Delhi. The information of Eco Task Force, South Delhi Forest Division and M&E reports of AFC Delhi were compiled and analysed. The compiled and analysed information was as given in table- 2.6.

Table- 2.6: Total plants planted in South Delhi Forest Division

Table- 2.0. Total plants planted in South Delhi Forest Division				
Sr. No.	Year	Name of Site	No. of Plants planted	Source
1	2009-10	Old Asola Area	7200	O/o Eco Task Force, Delhi
2		Around Sanjay Nagar	6100	
3		Asola High Ground Area	13125	
4		Kikar Plot Area	18750	
5		Centre Zone-I	14250	
6		Teen Murti	17840	
7		Teen Murti-I	22500	
8		RP Post	1500	
9		Kholi Road Post	11250	
10		Open Area	37485	
Sub-total			150000	
11	2010-11	Delhi Ridge near O/o DCF South, Tughlakabad	7200	O/o South Delhi Forest Division
12		84 Acres on Gram Sabha land at village Jaunapur (Khasra No.-90/1 to 25, 97/1 to 25, 106/6 to 25, 113/1 to 15 and 114/1 to 26.	20000	
-		19 sites of Asola-Bhatti Wildlife Sanctuary under State Scheme. M&E of these sites has already been done by AFC Delhi during 2015.	154982	M&E report of AFC Delhi

Sub-total			182182	
13	2011-12	Khasra No.- 48, 49 & 50 Jaunapur	11350	O/o South Delhi Forest Division
-		25 sites of Asola-Bhatti Wildlife Sanctuary under State Scheme. M&E of these sites has already been done by AFC Delhi during 2015.	54000	M&E reports of AFC Delhi
-		7 sites of Asola-Bhatti Wildlife Sanctuary under CAMPA Scheme. M&E of these sites has already been done by AFC Delhi during 2015.	137,600	
Sub-total			202950	
-	2012-13	20 sites of Asola-Bhatti Wildlife Sanctuary under State Scheme. M&E of these sites has already been done by AFC Delhi during 2015.	54144	M&E reports of AFC Delhi
-		4 sites of Asola-Bhatti Wildlife Sanctuary under CAMPA Scheme. M&E of these sites has already been done by AFC Delhi during 2015	116992	
Sub-total			171136	
-	2013-14	12 sites of Asola-Bhatti Wildlife Sanctuary under State Scheme. M&E of these sites has already been done by AFC Delhi during 2015.	73535	M&E report of AFC Delhi
Sub-total			73535	
14	2014-15	New Factory Talab	5090	O/o Eco Task Force, Delhi
15		School Plot	2150	
16		Musa Khan Open Area	8950	
17		Old Project Gate	2700	
18		MGH Ground	2950	
19		Chakor Plot	2133	
20		Bhandara II, No.-I Pocket	1787	

21		Bandra II, No.-2 Pocket	6208	
22		Trimurty Bandh West Pocket	2030	
23		Trimurty Pocket No. 4	5908	
24		Jhirkhod Pocket No. 5	1750	
25		Centre Zone II, Pocket No. 9	560	
26		B Block Nala Pocket	1830	
27		Trimurty II, Pocket Shisham West	4660	
28		Open Patch, Bandra to Trimurty II	6257	
29		Asola-IV, A Pocket	2640	
30		Asola-IV, B Pocket	7722	
31		Asola-IV, E Pocket	3105	
32		Asola-IV, C Pocket	3850	
33		Asola-IV, D Pocket	2830	
34		Asola-IV, Open Area Zone-I	24620	
35		Asola-IV, Open Area Zone-II	11065	
36		Asola-IV, Open Area Zone-III	47168	
Sub-total			157963	
37	2015-16	Dera Mandi	6000	O/o South Delhi Forest Division
38		Devli	7000	
39		Asola Phase-V, Colony Area	12500	O/o Eco Task Force, Delhi
40		Asola Phase-V, Darbawala	11000	
41		Asola Phase-V, Gumbat Mandir Area	20500	
42		Asola Phase-V, T Point	32500	
43		Asola Phase-V, Down Area	23000	
Sub-total			112500	

Total	1050266	
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2.4 Corrected Figures of Number of Plants Planted

The corrected figures of year wise number of plants planted during the last 7 years in the 3 Forest Divisions of Delhi were as given in table- 2.7.

Table- 2.7: Corrected Figures of Number of Plants Planted

Year	No. of Plants planted in			
	North Delhi Forest Division	South Delhi Forest Division	West Delhi Forest Division	Total
2009-10	27298	150000	0	177298
2010-11	61935	182182	158760	402877
2011-12	89120	202950	40050	332120
2012-13	190699	171136	43000	404835
2013-14	31509	73535	45000	150044
2014-15	29745	157963	30363	218071
2015-16	33746	112500	144309	290555
Total	464052	1050266	461482	1975800

Therefore, it is evident from table- 2.7 that during the last 7 years:

- i. Total 19.75 lakh plants were planted in the 3 Forest Divisions of Delhi.*
- ii. Maximum (10.50 lakh) plants were planted in South Delhi Forest Division followed by 4.64 lakh plants in North Delhi Forest Division.*
- iii. Minimum (4.61 lakh) plants were planted in West Delhi Forest Division.*

Qualitative Analysis

3.1 Methodology Used

The methodology used in the present study was as given below:

a. Procurement of secondary data

Secondary data was procured from the offices of Dy. Conservators of Forests of all the 3 Forest Divisions of Delhi State, Eco Task Force unit and Govt. web sites.

b. Analysis of secondary data

The secondary data procured was tabulated and analyzed to get a clear picture of the year wise and site wise number of plants planted.

c. Selection of Plantation Sites

In each Forest Division, the plantation sites of all the 7 years were continuously serial numbered and the sites of serial number 1, 11, 21, 31, 41, 51, 61, ----- and so on were randomly selected for field survey. Efforts were made to select at least one site of each year. If sites of any year remained unselected, one site of that year was also randomly selected.

d. Field Survey

For obtaining the primary data of randomly selected plantation sites, field visits were carried out in January to March 2017 and the front line staff of the Delhi Forest Department and Eco Task Force unit accompanied the evaluators of AFC Delhi during the field visits.

In each randomly selected site, sample plots of 0.1 ha were laid. The number of sample plots were 4 in areas of less than 5 ha (<5500 plants), 6 in areas of 5 to 10 ha (5500 to 11000 plants) and 8 in areas of more than 10 ha (>11000 plants). The number of sample plots were adjusted depending on number of plants planted.

In each sample plot, surviving number of plants were counted, their height was measured and average survival and height of plantation site was calculated. In addition to this, quality of plantations in terms of technical parameters (site selection, choice of species, spacing of plants, planting technique, maintenance of plantations, status of natural regeneration, presence of fauna and avifauna and damage to plantations by frost, fire, disease, man and animal) and effectiveness of protection measures undertaken was assessed.

Geo-coordinates and photo of each sample plot were also taken.

e. Results of Field Surveys

Field surveys were conducted during January to March 2017 and the results of field surveys of North Forest Divisions, West Forest Division and South Forest Division were as given in table-3.1, table- 3.2 and table- 3.3 respectively.

Table-3.1: Results of Field Surveys of North Forest Division

Sr. No.	Year	Name of Plantation Sites	No. of Plants planted	Geo-coordinates of Sample Plots		Average		Remarks
				Latitudes (North)	Longitudes (East)	Survival % of Plantation	Height of Plantation	
1	2009-10	NH-1 road (Left & right side) (wazirabad to Mukarba Chowk)	11450	-	-	-	-	Plantation was damaged due to widening of road
11	2010-11	ITO Chungi Loop 4	1245	28°37'39"	77°16'18"	90	5.0	Well established, protected and excellent pole crop of Pilkhan, Arjun, Neem, Pipal, Mulberry, Sembale, Amla, Kusam, Ficus benzamina and Khajur.
				28°37'30"	77°16'18"			
				28°37'41"	77°16'16"			
				28°37'36"	77°16'18"			
21	2011-12	ITO Chungi Loop 4	55	28°37'38"	77°16'13"	81	5.0	Well established and excellent crop of Jamun, Bamboo, Kachnar, Shisham, Pipal and Palm. Damage to 9 plants due to human interference was observed, therefore, protection should be enhanced.
31	2011-12	Saleem Garh Loop No. 2 (C.M Pocket)	1650	28°39'08"	77°15'08"	92	5.5	Excellent plantation of Jamun, Shisham, Kachnar, Amaltas, Bahera, Moulery, Pipal, Palm and Bel, etc.
				28°38'08"	77°16'00"			
				28°39'07"	77°15'10"			
				28°39'06"	77°15'10"			
41	2012-13	Garhi	2065	28°41'40"	77°14'41"	72	1.5	Plantation was

		Mandu Pocket D		24°41'44''	77°14'44''			affected by fire, flood and tall grasses. Pruning of plants, singling of shoots, and jungle clearance should be done. Ploughing/harrowing should be done in moist soil to suppress weeds.
				28°41'47''	77°14'46''			
				28°41'45''	77°14'44.5''			
				28°41'37.6''	77°14'44.6''			
				28°41'43''	77°14'35''			
51	2012-13	Saleem Garh Loop No. 3 & Part No. III (Rickshaw pocket)	195	28°39'01''	77°15'05''	88	5.0	Main plantation of Jamun, Neem, Maulsery, Pilkhan, Kusam, Bahera, Amla, Bottle brush, Champa and Neem etc. was done during 2011-12. Plantation was very good and well protected. The plants planed during 2012-13 could not be identified.
61	2013-14	Garhi Mandu Pocket E	594	28°41'38''	77°14'27''	87	2.0	Very Good plantation, require single shooting and pruning.
				28°41'41''	77°14'35''			
71	2014-15	Garhi Mandu Pkt B	1600	28°41'22''	77°14'59''	85	0.75	Plantation was affected by frost and moisture deficiency. Watering and hoeing should be done to boost the growth of plants.
				28°41'24''	77°14'58''			
				28°41'26''	77°14'55''			
				28°41'26.7''	77°14'54.6''			
81	2014-15	ITO Chungi	120	28°37'45''	77°16'16''	89	4.0	Well protected and very good

		Loop No.2						plantation. The plantations of 2011-12, 2013-14 and 2014-15 were inter-mixed.
85	2015-16	Shastri Park near Metro station	8800	28°40'01''	77°15'02''	93	2.6	Well protected and maintained excellent plantation of Shisham, Amaltas, Bakain, Pilkhan, Pipal, Jungle jalebi, Papri, Arjun, Maulsari, Imli, Neem and Bahera, etc.
				28°40'02.6''	77°15'00.4''			
				28°40'04''	77°14'57.8''			
				28°40'05.2''	77°14'53.8''			
				28°40'06.5''	77°14'51.3''			
				28°40'04.3''	77°14'53''			
				28°40'05.3''	77°14'48.8''			
				28°40'02.3''	77°14'53.6''			



Saleem Garh Loop No. 3 & Part No. III (Rickshaw pocket) plantation of the year 2011-12



Garhi Mandu Pkt B plantation of the year 2014-15



Shastri Park near Metro station plantation of the year 2015-16

Table-3.2: Results of Field Surveys of West Forest Division

Sr. No.	Year	Name of Plantation Sites	No. of Plants planted	Geo-coordinates of Sample Plots		Average		Remarks
				Latitudes (North)	Longitudes (East)	Survival % of Plantation	Height of PLantation	
1	2010-11	Kharkhari Jetmal-III	8000	28°34'13''	76°56'37''	86	2.3	Well protected, established and very good plantation of Papri, Ailanthus, Shisham, Kikar, Jamun, Amaltas, Chamror Phali and Bakain, etc. Plants of Shisham and Kikar need pruning.
				28°34'22''	76°56'47''			
				28°34'16''	76°56'41''			
				28°34'23''	76°56'36''			
				28°34'23''	76°56'35''			
				28°34'27''	76°56'40''			

10	2011-12	Qutabgarh-III	6000	28°48'21''	76°57'46''	72	2.5	Except in saline and low lying patches, the plantation was very good, especially of Neem, Papri and Shisham. Ridge/mound planting technique should be applied in the saline and low lying patches.
				28°48'32''	76°57'45''			
				28°48'27''	76°57'45''			
				28°48'46''	76°57'55''			
				28°48'41''	76°57'56''			
				28°48'46''	76°58'56''			
13	2012-13	Mukhmelpur A&D	8000	28°47'06''	77°10'10''	91	3.1	Well protected and excellent plantation of Neem, Shisham, Jamun, Papri, Pilkhan, Beri, Bamboo and Cassia siamea, etc.
				28°47'09''	77°10'05''			
				28°47'33''	77°10'03''			
				28°47'11''	77°10'03''			
				28°47'06''	77°09'59''			
				28°47'07''	77°09'54''			
20	2013-14	Ghumanhera	20000	28°32'32''	76°53'05''	84	2.3	Except frost affected small patches, the plantation was very good in terms of survival, growth and protection.
				28°32'31''	76°55'04''			
				28°32'40''	76°54'58''			
				28°32'42''	76°54'59''			
				28°32'42''	76°54'56''			
				28°32'45''	76°53'57''			
				28°32'23''	76°55'05''			
				28°32'11''	76°55'10''			
24	2014-15	Kharkhari Jetmal	8200	28°34'40''	76°57'05''	73	1.3	Survival of plantation was very good but protection and maintenance was poor. Plantation must be protected and
				28°34'41''	76°57'04''			
				28°34'33''	76°56'47''			
				28°34'28''	76°56'51''			
				28°34'12''	76°56'33''			
				28°34'12''	76°56'32''			

								maintained otherwise the expenditure incurred in raising of plantation may go waste.
31	2015-16	Malikpur	3000	28°33'49''	76°53'40''	0	0	Plantation was totally fail.
				28°33'47''	76°53'41''			
36		Farm House Area (Ghitorni)	12646	28°29'57''	77°07'26''	76	0.6	Efforts were being made by the Eco-Task Force in protecting the plantation by brush wood fencing and enhancing the growth by tube well irrigation. But some of the plants in open areas were browsed due to huge pressure of Blue Bulls.
				28°29'55''	77°07'27''			
				28°29'50''	77°07'29''			
				28°29'26''	77°07'34''			



Mukhmelpur A&D plantation of the year 2012-13



Ghumanhera plantation of the year 2013-14



Kharkhari Jetmal plantation of the year 2014-15



Farm House Area (Ghitorni) plantation of the year 2015-16

Table-3.3: Results of Field Surveys of South Delhi Forest Division

Sr. No.	Year	Name of Plantation Sites	No. of Plants planted	Geo-coordinates of Sample Plots		Average		Remarks
				Latitudes (North)	Longitudes (East)	Survival % of Plantation	Height of Plantation	
1	2009-10	Old Asola Area	7200	28°26'20"	77°12'54"	73	2.5	Very Good survival, protection and maintenance of plantation.
				28°26'15"	77°12'57"			
				28°26'15"	77°13'03"			
				28°26'11"	77°13'04"			
				28°26'17"	77°13'03"			
				28°26'18"	77°12'59"			
11	2010-11	Delhi Ridge near O/o DCF South, Tughlakabad	7200	28°29'37"	77°15'56"	73	0.7	All the plants were brosed by Blu Bulls
				28°30'07"	77°15'51"			
				28°29'35"	77°15'53"			
				28°29'31"	77°15'53"			
				28°28'30"	77°15'57"			
				28°29'34"	77°15'56"			
13	2011-12	Khasra No.- 48, 49 & 50 Jaunapur	11350	28°27'41"	77°08'25"	87	3.5	Excellent survival, growth and protection of plantation of Shisham, Amaltas, Siris, Kikar, Bel, Papri, Jungle jalebi and Bamboo, etc.
				28°27'44"	77°08'21"			
				28°27'33"	77°08'09"			
				28°27'47"	77°08'15"			
				28°27'45"	77°08'13"			

				28°27'43'	77°08'13''			
				28°27'41'	77°08'20''			
				28°27'30'	77°08'11''			
				28°27'40'	77°08'27''			
14	2014-15	New Factory Talab Area	5090	28°25'40'	77°12'43''	73	2.7	Well protected and very good plantation of Shisham, Kikar, Beri, Jungle jalebi, Bar, Pipal and Karaunda, etc.
				28°25'29'	77°12'38''			
				28°25'28'	77°12'39''			
				28°25'23'	77°12'36''			
				28°25'26'	77°12'35''			
				28°25'27'	77°12'34''			
24	2014-15	Jhirkhod Pocket No. 5	1750	28°24'39'	77°11'47''	70	2.0	Good plantation except browsing of some plants.
				28°24'40'	77°11'49''			
				28°24'41'	77°11'50''			
				28°24'39'	77°11'42''			
31	2014-15	Asola phase IV Pocket E	3105	28°27'56'	77°13'15''	74	2.3	Very good plantation of Kikar, Jungle jalebi and Beri.
				28°27'52'	77°13'18''			
				28°27'48'	77°13'17''			
				28°27'52'	77°13'16''			
37	2015-16	Dera Mandi	6000	28°25'39'	77°11'09''	23	0.5	Poor plantation

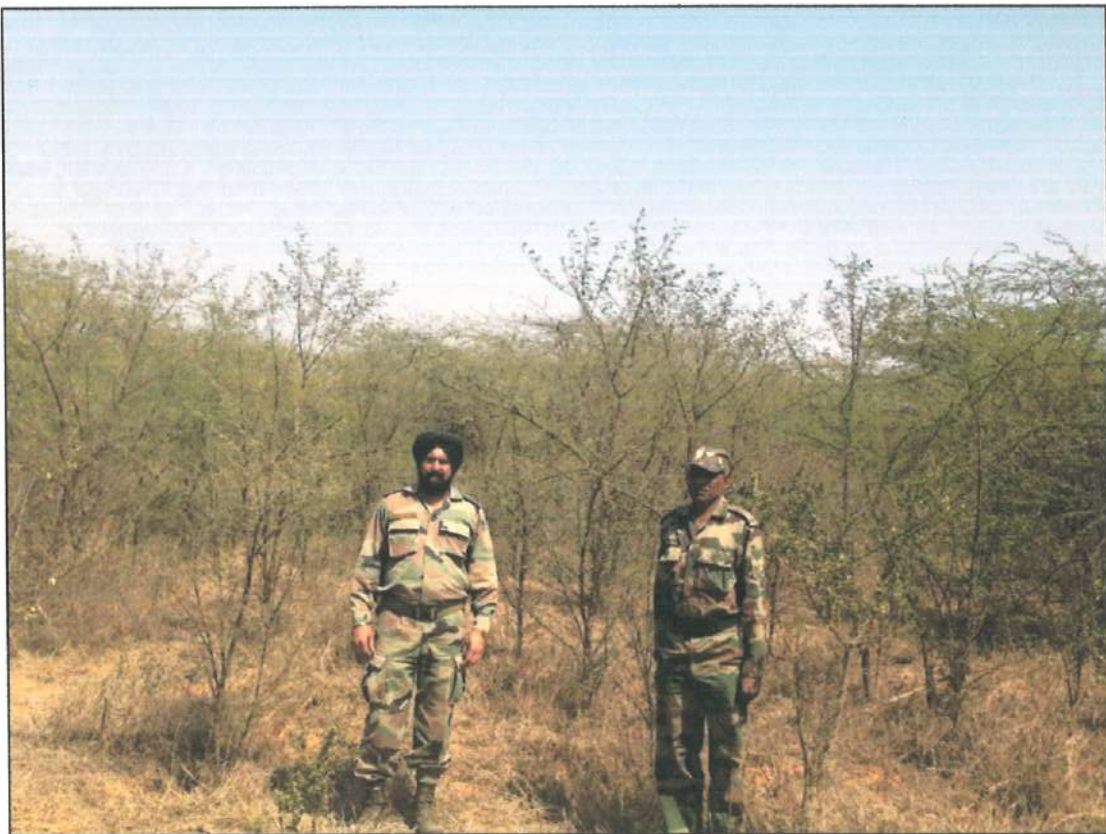
				28°25'37' ,	77°11'06''			due lack of maintenance
				28°25'36' ,	77°11'01''			
				28°25'33' ,	77°10'59''			
				28°25'31' ,	77°11'00''			
				28°25'31' ,	77°10'59''''			



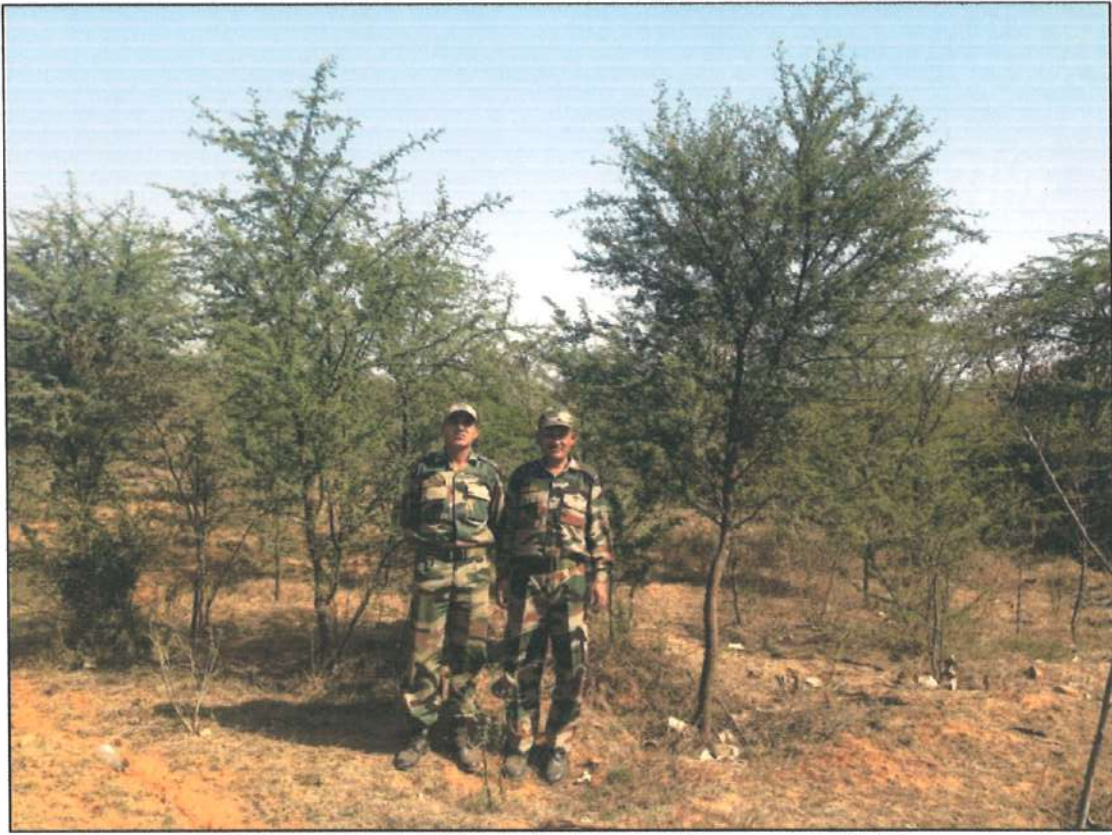
Old Asola Area plantation of the year 2009-10



Delhi Ridge near O/o DCF South, Tughlakabad plantation of the year 2010-11



Asola phase IV Pocket E plantation of the year 2014-15



Jhirkhod Pocket No. 5 plantation of the year 2014-15

Constraints Faced

4.1 Frontline Staff of Forest Department

Frontline staff of Forest Department has told that there is no provision of maintenance of plantations in some of the schemes, which results in poor survival, growth and protection of plantations.

4.2 Eco Task Force

Commanding Officer of Eco Task Force has told that the boundary wall of Ridge forests is incomplete, which results in encroachment of forest land.

Conclusions

On the basis of Quantitative and Qualitative Analysis, the following conclusions were drawn:

1. Overall survival, growth and protection of plantations was very good.
2. Uprooting of tall grasses, especially in Garhi Mandu city forest areas, was not in practice. It caused root competition for moisture resulting in poor growth of plants planted. Further, covering of plants against frost was also not in practice resulting in frost damage to plants.
3. There was a lack of coordination between the Eco Task Force and Forest Divisions.

Recommendations

On the basis of Quantitative and Qualitative Analysis, the constraints faced and the vast past experience, the following recommendations were made:

1. Provision of maintenance of plantations, for atleast 3 years, in all the schemes should be made.
2. Boundary wall should be constructed around all the forests.
3. The front line staff of concerned Forest Divisions should be involved in planning, technical execution and internal M&E of works done by the Eco Task Force.
4. Uprooting of tall grasses, covering of small plants against frost and harrowing/ploughing of planted area, especially of Garhi Mandu city forest, should be done.
5. Protection of plantations against man, animals and fire should be enhanced.
6. Instad of normal plantating the ridge/ mound planting technique should be applied in the saline and low lying patches.