

## Urban green in Delhi: A temporal analysis (1995-2016)

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### Abstract

Cities are human settlements usually known as indicator of the process of urbanization is much more than just buildings and people. The most “livable” cities in different parts of the world are not only known for their cityscapes but also for their urban green spaces. It would not be wrong in saying that in present times, due to their characteristics and potentials, urban green spaces have become one of the key foundations for the sustainable development of cities. They are crucial for providing a good quality of life within urban areas. They can be termed as ‘lungs’ of cities as they contribute to city dweller’s physical and mental health by providing places for informal recreation in the form of playground for children, spaces for walking, cycling, socializing, exercising and also provide breathing spaces to stress out from the bustling city life. Therefore, these spaces are often multi-functional as they are used in many different ways. The city dwellers appreciate these functions - social, psychological, health, aesthetic, ecological and economic - of urban green spaces. To make city dwellers aware of the importance of green space one needs to know the extent of such spaces in the city and the purpose or use of these spaces.

In the above framework, the present paper has tried to map the available green space in the city of Delhi; one of the greenest capitals in the world. The author has also explored the changes that have occurred in the last twenty years in the urban green of Delhi. This has been done just to understand how the green spaces in Delhi have changed during this period.

**Keywords:** Urban Green, Urban Settlements, Delhi, GIS techniques

### Introduction

Cities are human settlements usually known as indicator of the process of urbanization; they are not just buildings and people but also include green spaces as their integral Cities are human settlements usually known as indicator of the process of urbanization is much more than just buildings and people. The most “livable” cities in different parts of the world are not only known for their cityscapes but also for their urban green spaces. Examples can be cited of Hyde Park in London, Central Park in New York, the Bukit Timah Nature Preserve in Singapore, Phoenix Park in Dublin and so on. It would not be wrong in saying that in present times, due to their characteristics and potentials, urban green spaces have become one of the key foundations for the sustainable development of cities. They are crucial for providing a good quality of life within urban areas. They can be termed as ‘lungs’ of cities as they contribute to city dweller’s physical and mental health by providing places for informal recreation in the form of playground for children, spaces for walking, cycling, socializing, exercising and also provide breathing spaces to stress out from the bustling city life.

URGE (2002) defines, urban green as the public and private open spaces in urban areas, primarily covered by vegetation, which are directly (e.g. active or passive recreation) or indirectly (e.g. positive influence on the urban environment) available for the users. They are areas of vegetation set apart for recreational or aesthetic purposes in an otherwise urban environment. Green space

usually includes parks, domestic and community gardens, woodland, and cemeteries, etc. These spaces are often multi-functional as they are used in many different ways. They include not only areas to which the public have physical access, but also visual access, for example, in the way green spaces provide settings for buildings, communities and everyday activities. The city dwellers appreciate these functions - social, psychological, health, aesthetic, ecological and economic - of urban green spaces.

In the above framework, the present paper has tried to map the available green space in the city of Delhi; one of the greenest capitals in the world. The author has also explored the changes that have occurred in the last twenty years in the urban green of Delhi. For this purpose the mapping has been done using GIS techniques.

### Methodology Adopted

To understand the importance of urban green, the paper starts with a thorough review of literature on urban green. In the second section the spatial coverage of green spaces in Delhi have been mapped and analyzed for 1995 and 2016. The gap of twenty years have been taken to understand the changes that have occurred in the land cover of Delhi as the process of liberalization has gained momentum. For this purpose Delhi has been divided into four zones viz. North, South, East, and Central. This classification is based on the zones of Delhi Municipal Corporation. The only difference between these zoning is that in this paper Delhi Cantt and NDMC area have been

merged in the Central zone. The mapping has been done with the help of GIS techniques. The change detection has been done through Arc GIS whereby the operation of overlaying is applied to both the satellite imageries of the Delhi. This overlay operation further analyzes the change in vegetation and built-up area in past twenty years. Conclusions are presented in the last section.

**Review of Literature**

Urban areas though marked by huge population concentration, lack in social cohesion. The large number of industries and automobiles deteriorates the quality of air and water making people prone to various life threatening diseases. Building of huge infrastructures leads to the destruction of natural habitats and biodiversity. As a result today’s cities have become hub of many environmental and health related problems. Green spaces in such cities provide a fresh breath of air by not only improving physical, mental, social and environmental health but also help in mitigating climate change by enriching urban ecosystems.

**Analysis and Discussion**

Delhi is one of the greenest capitals in the world. 20% of geographical area is under green cover. The Municipal Corporation of Delhi (MCD) Reports, 2017, states that Delhi has approximately 15,000 parks which constitute 20% of green cover in Delhi. Total number of parks in three civic agencies (South, East and North Municipal Corporations) is 14,864 which are spread in about 5162.72 acres. In South Corporation there are 6,818 parks spread over an area of 2,202 acres in which 500 with open gyms and 100 parks with swings and play stations. In North Corporation there are 5,944 parks spread over an area of 2125.47 acres in which 50 with open gyms and 863 parks with swings and play stations. In East Corporation there are 2,097 parks spread over an area of 835.25 acres in which 30 with open gyms and 20 parks with swings and play stations.

**Changes in Urban Green in Delhi (1995-2016):**

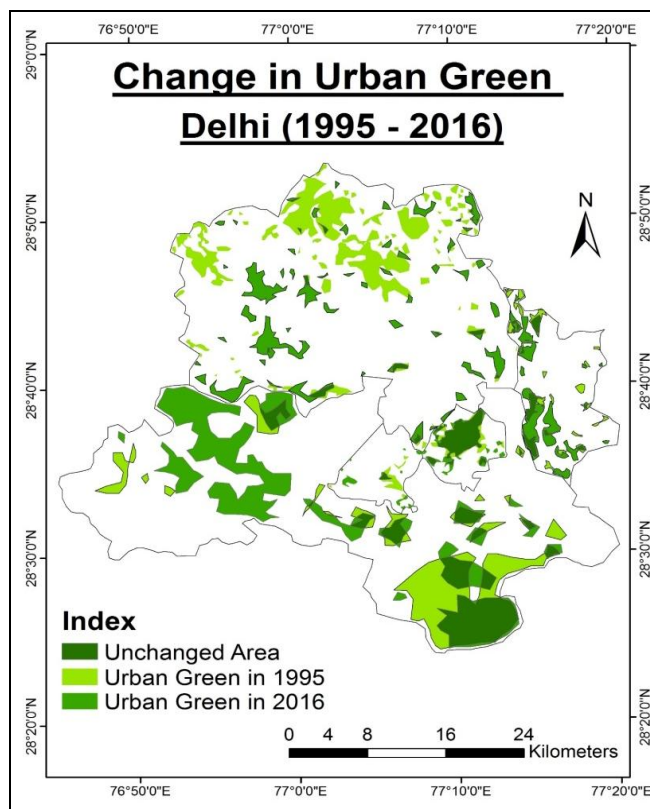
Delhi has the Geographical area of 1484 Km<sup>2</sup>. The Recorded Forest is 85 sq. (5.73%). Total Forest and Tree Cover in Delhi is 19.97% of the Geographical area. Forest Cover constitutes 11.88% and the Tree Cover constitutes 8.09 % of its geographical area. Decadal growth of the urban population in NCT of Delhi is 31.80% between 1995 and 2016. Despite very high rate of increase of population and associated developmental activities, forest cover in Delhi has increased from 1.48% in 1995 to 19.97% in 2016.

To ensure sustainable level of green space to provide desirable high quality environmental conditions to the urban citizens, a multipronged strategy has been adopted for greening in Delhi. To have proper legal control, Delhi there is a special act in the form of Delhi Preservation of Tree Act,1994 ( DPTA,1994) which is applicable in the NCT of Delhi in respect of all the tree irrespective of its ownership and the ownership of the land on which it is standing. Delhi Preservation of Tree Act, 1994 defines tree in its section 2(i) as “tree” means any woody plant whose branches spring from and are supported upon a

trunk or body and whose trunk or body is not less than five centimeters in diameter at a height of 30 cm from the ground level and is not less than 1 m in height from the ground level.” To discourage the illicit / illegal felling of trees department has established Tree Help Line where any informer informs about such cases and follow up action is being taken. This has proved to be very useful in information gathering on illicit felling.

To boost the greening efforts further 18 Greening Agencies have been identified which mainly consists of Government Agencies and Municipal bodies. Some of these greening agencies are Municipal Corporation of Delhi, Delhi Development Department, Public Works Department, Central Public Works Department, Delhi Parks & Garden Society, NDMC, Education Department, Transport Department, Flood Control Department, Development Department, Delhi Metro Rail Corporation etc. These agencies have been allotted certain target annually for plantation which has been done by them using their own resources. Many of them have their own nurseries and infrastructure for carrying out plantation on their land. Forest Department has been coordinating the greening activities.

These parks and garden are playing important role in greening of the city and are used by the urban population for the recreational and educational purposes. Further, Delhi Development Authority, DDA with the assistance of technical experts has established two Biodiversity Parks in Delhi namely Yamuna Biodiversity Park and Aravali Biodiversity Parks and which is important component of Green Delhi.



**Fig 1:** Changes in Urban Green in Delhi (1995-2016)

### Urban Green in South Delhi Municipal Corporation (1995-2016)

Spread over an area of 2,202 acres there are 6,823 parks in this zone. Out of which 3,127 are ornamental park 220 Children Park and 3.476 other parks. This zone has the highest number of green space comprising of Delhi Ridge, known as ‘lungs of Delhi’.

In 1995 the Green areas during were - Delhi Ridge, Kalindi kunj, Jahapanah city forest, Deer park, Sanjay van, Tughlaqabad fort. While in 2016 the notable parks are - Garden of five senses, Indraprastha Park, Kalindi kunj, Nehru Park, Jahapanah city forest, Deer park, Sanjay van, Tughlaqabad fort, South Delhi ridge, Hauz Khas. Urban green space in South Delhi has seen a shift of urban green from south to south west Delhi consisting of the southern ridge (6,200 hectares). It is the biggest area of the Delhi Ridge. This municipal zone is the greenest of all the three and has great importance as an urban green space in Delhi.

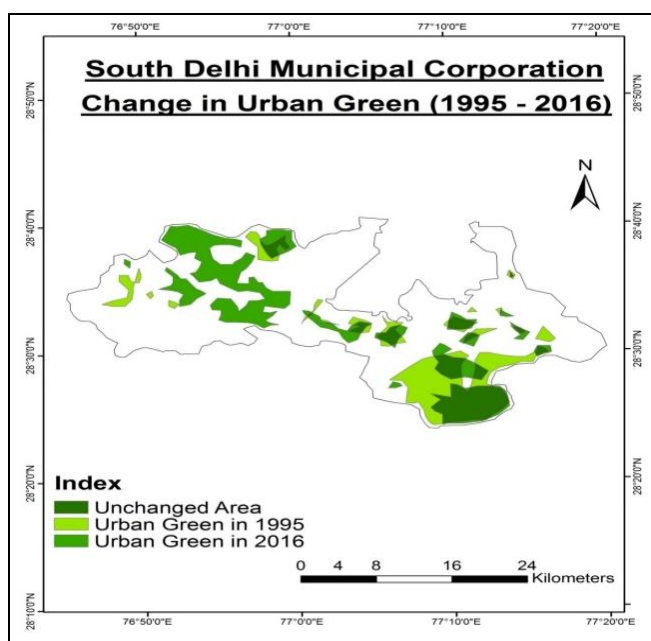


Fig 2

The change came into effect due to various policies and programmes initiated by the government. Also community awareness regarding the need and importance of urban green spaces is a factor. To boost the greening efforts further 18 Greening Agencies have been identified which mainly consists of Government Agencies and Municipal bodies. Some of these greening agencies are :- Municipal Corporation of Delhi, Delhi Development Department, Public Works Department, Central Public Works Department, Delhi Parks & Garden Society, NDMC, Education Department, Transport Department, Flood Control Department, Development Department, Delhi Metro Rail Corporation etc. These agencies have been allotted certain target annually for plantation which has been done by them using their own resources. Many of them have their own nurseries and infrastructure for carrying out plantation on their land.

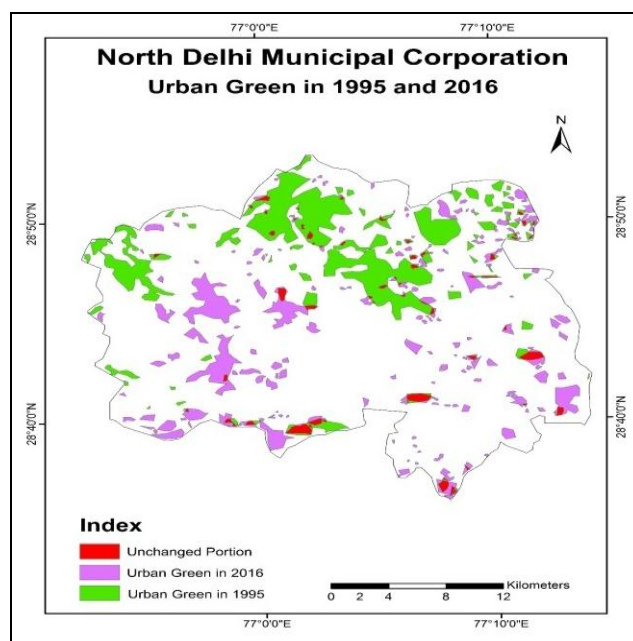


Fig 3

### Urban Green in North Delhi Municipal Corporation (1995-2016)

The North Municipal Delhi Corporation (NDMC) incorporates the northern part of Delhi and is bounded by NCTD/Haryana boundary in the north, the river Yamuna towards the east, Outer Ring Road towards the south and NH-1 in the south. The zone has very large coverage green coverage in the form of orchards, forest & farm lands. The sub-city covers a green belt of an area of 1920 hectare., all along the northern boundary of sub-city. The other are under recreational/green use i.e. 941 hectare is in the form of district parks, community parks, road side green etc.

In 1995 the places of North Delhi which had green spaces in 1995 are: the places in and around Rohini region, Badlipur, Azadpur, Shalimar Bagh and Model Town region. The Trinagar region shows of a lot of vegetation. Due to the presence of parks in the Shastri Nagar and Kamla Nagar regions, green spaces exist in these areas.

In 2016, the areas around outer Ring Road viz. Saraswati Nagar, Sakurbasti. Regions around Rithala viz. Sector 5, Sector 7, and Naharpur have good amount of green spaces. The University of Delhi has good amount of green spaces. Also Roop Nagar, Kamla Nagar are rich in parks and lawns. Adarsh Nagar, Mangolpuri, Udyog Nagar are some other places with good chunk of green spaces.

It's clear from the map, green spaces have relatively come down in number as those of previous decade. A lot has changed from the times of 1995 North Delhi to the present North Delhi, due to population growth and urbanization, the green spaces have decreased in area. New green spaces have come up in the Pitampura region. Shakur Basti and Udyog Nagar too has its share of green spaces in 2016. Civil Lines which is a planned and posh area has vegetation integrated into its landscape. The only green spaces that remain intact from 1995 to 2016 are the areas of Trinagar, Shastri Nagar and Kamla Nagar

where the parks are still maintained. All other areas where green spaces existed have been take up by buildings, settlements or infrastructure like Malls, that are shrooming all over he place for reccreational purposes or to cater to consumerism.

**Urban Green in East Delhi Municipal Corporation (1995-2016)**

Spread over an area of 835.25 acres there are 2,097 parks in this zone. Out of which 970 are ornamental park 114 Children Park and 1,013 other parks. 131 parks are targeted to be developed as model parks in 2017-18.

The prominent green spaces in East Delhi in the year 1995 are - Mukund vihar, Amar Vihar and Sadatpur in Karwal Nagar. In South Central region Laxmi Nagar, Kishan Kunj and Pandav Nagar were prominent green space areas. South Gandhi Nagar and Trilokpuri region. Preet Vihar and Nirman Vihar region shows a lot of vegetation in its different wards the places around Vishwas Nagar and I.P Extension had little vegetation scattered in its different parts.

Major green spaces in East Delhi during the year 2016 are as follows:

Akshardham, Gazipur district park, Mayur vihar phase-1 ext. Areas around the Subhash Mohalla, Kailash Nagar, Kuashikpuri, Murad Nagar, Trilokpuri, Taj Enclave Road. Shashi Graden, Silver park, Indra Gandhi Mahila Park, Smriti Van are some of the small parks in the East Delhi. Some of the recently made parks include S.H. Rajesh Pilot Memorial park, D.D.A parks, Prakriti Metro Park, Delhi I.T Park. Restricted Forest area is present at the Yamuna bank.

A lot has changed in the past time from 1995 to 2016. There is an increase in the forest area of the East Delhi due to the success of the schemes and the efforts of the peoples of East Delhi. Many schools and organizations have come together and made the East Delhi greener then before. New green parks have been made and the older parks are developed and repaired for the public use and greenery. NGOs and government took the steps to make the East Delhi green and bring it to make it compete with North and South Delhi. Today, there are almost 2040 parks in the East Delhi, including the big parks, forest and the smallest parks of the society. The only Green space that in unchanged is the Restricted Forests of the East Delhi.

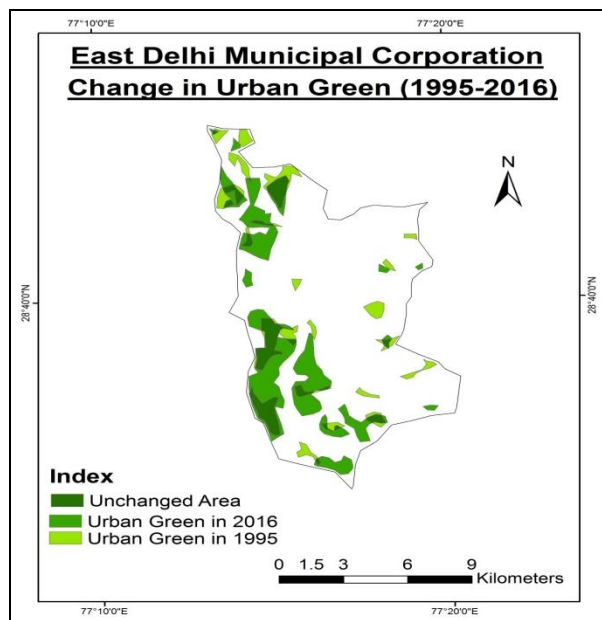


Fig 4

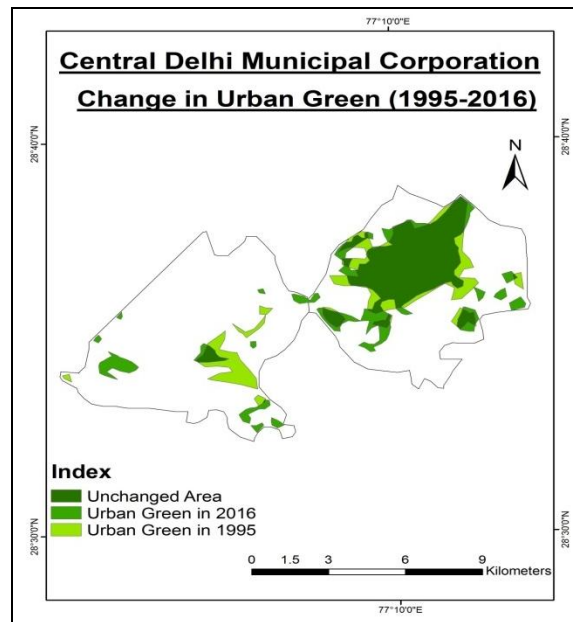


Fig 5

**Urban Green in Central Delhi Municipal Corporation (1995-2016)**

Central Delhi is home to some to some of the finest residential, shopping, & business centers of the city, an administrative district of National Capital Region. River in the east, by the district of North Delhi in the north, West Delhi & South-West Delhi to the west, New Delhi to the south, & East Delhi to the east. The Lutyen's bungalow Zone located in Central Delhi is regarded as a heritage area. The entire area is characterized by huge bungalows and lush green lawns.

In 1995, the places in and around Rashtrapati Bhavan, Central Secretariat and Parliament of India had a lot of vegetation cover. Pusa Hill Forest, Buddha Jayanti Park, Southern Ridge Forest, Talkotra Garden, Mahavir

Vanasthali Park and the places around Delhi cantonment and University of Delhi were the prominent vegetation covers in northern part of Central Delhi. In the southern part of Central Delhi, Subroto Park and its surrounding areas had some green spaces. While in 2016 the major green spaces in Central Delhi were C.R. Park, Mahavir Park, India Gate, few areas of Central Secretariat and Parliament of India, and University Of Delhi. Particularly the North-East Part of Central Delhi has large portion of green cover in the form of parks. In the comparison with New Delhi Municipal Corporation, Delhi Cantonment has lesser green space due to more official and residential areas.

Urban green in the Central Delhi have shown a decrease in the past years. There is a heavy decrease in the Central

Delhi. Green cover of Delhi has been used for development purposes, as a result of which there is degradation of the ecological balance of the city. A large portion of this green belt has been used for the development of malls, hotels, roads. Some major causes of the reduction of the Central Delhi of green spaces are as follow: rapid urbanization, expansion of roads, and expansion of residential and commercial buildings.

### Conclusions

It can be inferred that the NDMC region and the Central Delhi region has shown a decrease in the urban green spaces, these two regions are the oldest & highest populated regions of Delhi, and due to human activities the green spaces of the place have started diminishing. Though a major portion of Central Delhi has the most posh areas with green neighborhood and gardens in and around India Gate and Rashtrapati Bhawan, the other areas have been victims to urbanization. Expansion of roads and construction of building has led to the decrease in urban green space. The NDMC has the North Campus of Delhi University, though the campus is quite green, the areas around the campus where facilities for students have been established like lodging, restaurants, and other coaching institution have consumed the green space. The commercialization of the places has led to shrinking green space. Areas like Rohini, Rithala, and Pitampura are residential areas and housing facilities continue to grow in place of green areas.

On the contrary, the southern and eastern region have seen an increase in the amount of green spaces. It is due to the efforts of the citizens and concerned authorities alike. Community awareness programs were initiated to give a boost to green spaces. Municipal Corporation of Delhi, Delhi Development Department, Public Works Department, Central Public Works Department, Delhi Parks and Garden Society, NDMC, Education Department, Transport Department, Flood Control Department, Development Department, Delhi Metro Rail Corporation etc. These agencies have been allotted certain target annually for plantation which has been done by them using their own resources. The Delhi ridge which is the largest green space in Delhi is situated in South Delhi and an effort to preserve the green area has been put. Sanctuaries like Asola Bhatti Wildlife Sanctuary often conduct awareness programmes in order to promote the importance of urban green spaces.

Urban green spaces are rightfully regarded as the lungs of a city. The urban green space provides benefits to the urban dwellers' and services to the ecosystem. Urban green space provides the social cohesion among the urban people. Therefore, for all these reasons the urban green should be conserved and more importantly creation of more urban green spaces should be promoted. Delhi is one of the megacities of the world and with increasing population and pollution; it has become thereby necessary to have urban green spaces in Delhi. With rapid growth of urbanization and infrastructural development around the CBD of Delhi has cause a lot of deforestation in a span of twenty years that is from 1995-2016. Hence the need of urban green is must. To conclude it can be said that green spaces in a megacity like Delhi makes it

ecologically inclusive, promotes a sustainable environment and provides both health and aesthetic benefits for the city dwellers.

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