

# Ecological, Social and Environmental Dimensions of the Urban Forest –A Study on Urban Forest in Delhi

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**Abstract**—With the rapid rate of urbanization, cities are continuously expanding into the forests area and green cover is reducing at a fast pace. Hence, attempts to increase green cover within city limits are being made through planning guidelines and policies. The intent of the paper is to highlight the significance of Urban forest and understand their ecological, social and environmental dimensions.

## 1. INTRODUCTION

Urban forests go far beyond just improving the aesthetics in urban landscapes. They help improve living conditions by countering environmental pollution. They help create quieter cities by acting as sound barriers between homes and roads (& railway lines). They help conserve biodiversity while providing niches for a wide variety animals, birds, insects and other creatures. One very important role (if recognized and worked upon) that urban forests play is to provide the children an opportunity to connect with and learn about natural phenomenon even while growing up in an urbanized setting where most of the things are put together artificially. This exposure can help them take better decisions in the wide when they move on to acquire important positions in the society.

## 2. COMPONENTS OF URBAN FOREST

### 2.1 Parks and greenbelts

Urban parks are traditionally one of the most obvious forms of urban forest. Parks are threatened by buildings, spontaneous settlements, vandalism, environmental stress and restricted government funds. It is more and more acknowledged that many parks can only be preserved and managed through the commitment of residents and innovative management approaches.

Greenbelts can have multiple uses and functions, such as improving environmental quality, providing recreation, and serving as an alternative transportation route (bicycle and foot paths).

### 2.2 Street trees

Due to inadequate planting space and the high cost of protecting individual trees, collision and vandalism have destroyed many street trees. On the other hand, sufficient innovative techniques are available that increases the survival rate and longevity of street trees.

### 2.3 Trees in urban farming

Trees in urban farming have only recently received more attention under the umbrella of urban agricultural initiatives. Agroforestry gardens are probably the most significant urban green space in tropical developing countries. Some tree species require little space and can be manipulated into shape by training or coppicing.

### 2.4 Protected areas

Protected areas are natural or reconstructed habitats that receive some level of ecological protection in order to preserve their ecological or biological functions. Although urban forests may contain less biological diversity than rural woodlands, they still play a significant role in conservation of biodiversity. For instance, Delhi ridge houses rich biodiversity and hence is being protected.

## 3. BENEFITS OF URBAN FOREST

### 3.1 Ecological

Trees help in purifying air by absorbing particulate matter and carbon dioxide gas from the polluted air. This further reduces greenhouse effect and offers a healthy living system to both humans and animals. Secondly, they offer habitat to a wide range of fauna. Hence trees in urban areas lead to wildlife creation and conservation. This maintains biodiversity index in the cities.

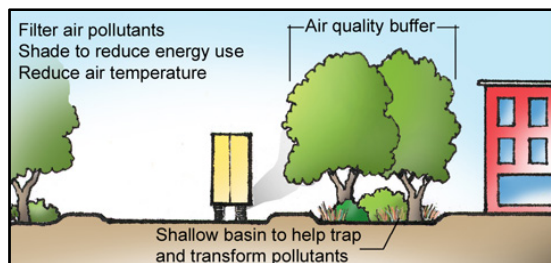


Fig. 1: Vegetation cover improve air quality

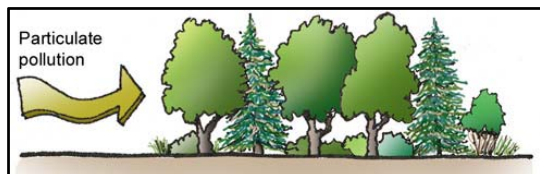


Fig. 2: 65 to 600ft wide buffer may reduce particulate pollution by 40 to 75 percent

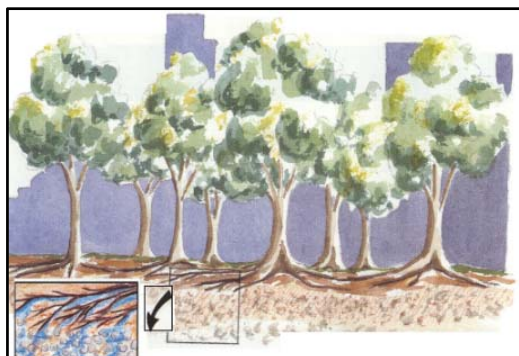


Fig. 3: Tree roots hold soil in place and increase water infiltration

Urban forests offer a wide range of ecological services. They reduce the rate of run off and hence lead to ground water recharge. They hold the soil and prevent soil erosion. Besides this, they also help in slope stabilization and prevent soil erosion on sloping landforms.

### 3.2 Social

Restorative power of nature has profoundly positive impacts on an individual's behavior and functioning. It helps communities to flourish. Nature helps us recover from mental fatigue (information overload) - our attention is restored and we become comfortable. Hence, urban forest establishes our link back with nature. They are ideal learning ground for young minds. They also fulfill our recreational needs. Different forms, colors and textures changing with each season offer a dynamic character to our society and create different moods.

### 3.4 Environmental

Trees provide shade and hence reduce Urban Heat Island effect. This plays a crucial role in large paved plazas in urban

areas. They also act as wind barriers. Windbreaks reduce cold winter winds and protect people and buildings. When trees are planted with effective width vegetation can considerably reduce the noise pollution. How effectively plants control sound level is determined by sound itself, the *planting* involved and climatic conditions. Plants control sound by absorption of sound waves by leaves, branches, twigs of trees and shrubs.

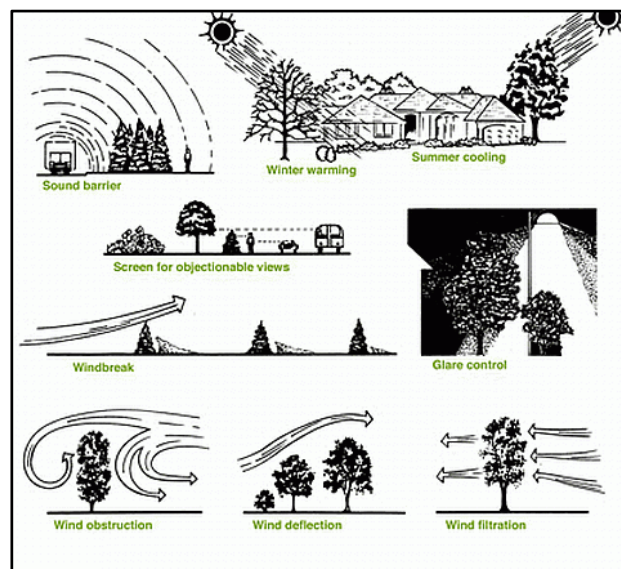


Fig. 4: Benefits of trees in urban areas

## 4. STRATEGY FOR IMPROVEMENT OF GREEN COVER

Identification of areas for afforestation by concerned agencies/ public & proper planning of plantation activities should be done by planning agencies. Site preparation for plantation is a critical process as the success of plantation depends on site preparation to a great extent. Also, selection of species suited to the site should be done. For this soil condition should be well studied and local existing vegetation should be taken into account.

Leaving of sufficient space, i.e. atleast 6 ft x 6 ft around the tree trunks along the avenues to protect them from choking due to tiling and black topping. Proper protection of plants from biotic interference by putting fencing and tree guards should be done.

Post Plantation care plays a very important role, particularly the maintenance & regular watering and regular monitoring.

**Tree Selection Considerations.** Climate, soil type, and topography are the first criteria for any site. Secondly, urban environment and species characteristics (native vs. non-native / invasive, hardness, form at maturity, maintenance requirements, etc.) should be thought of before deciding plant species for a site.

Society's desire to have trees in its cities must be accompanied by an explicit recognition that trees, like people, have certain requirements for growth. Planners, designers, landscape architects, engineers and elected officials, those people responsible for management of urban environment, must understand and incorporate these requirements at an early stage in development and/or redevelopment of urban areas.

## 5. URBAN FOREST IN DELHI

The urban footprint of Delhi is continuously becoming more prominent. 21.3 % of Delhi's land is under roads. Delhi has come up with climate change agenda of which urban forestry is an important component. As a unique initiative Delhi Parks and Garden Society has been established to involve citizens in management of green spaces and it has succeeded in this endeavor to a large extent.

While a lot has been done, even more work still awaits. Availability of expertise in creation and management of urban green spaces is scarce as traditional forestry has to be blended with architecture and aesthetics to add value to the city's appeal.

As per *Forest Research Institute of India, Dehradun*, one hectare of woodland (about 1,000 trees) absorbs 3.7 tons of carbon dioxide from atmosphere and gives out 2.5 tons of oxygen per day. A full grown Peepal tree is for instance, estimated to give 600 kg of oxygen in 24 hours. This very well explains the need to increase green cover.

In Delhi, forest cover is 170.17 sq. km. in 1483 sq. km. of Geographic Area. Out of this, 98 sq. km. is tree cover, there are fourteen City Forests and Ridge Land. Delhi ridge constitutes 6% of the geographical area. The city forests cover an area of 300 hectares, they are developed & managed by Department of Forest & Wildlife. Besides this, Delhi has about 14500 big and small parks, which are managed by various government agencies. Each of these parks has at least ten big trees on an average and contributes significantly to the green cover of Delhi.

### The Agencies Involved are

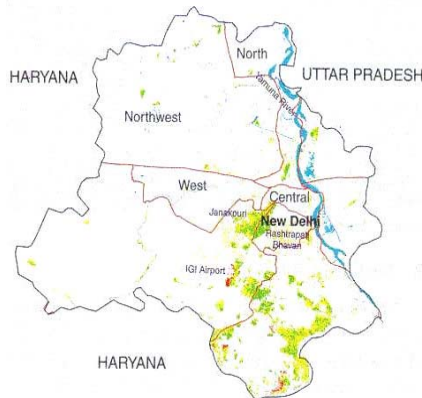
Forest and Wildlife, DDA, MCD, Eco Task Force, PWD (Hort.)

DSIDC, Development Deptt., NDMC, CPWD, Delhi Jal Board

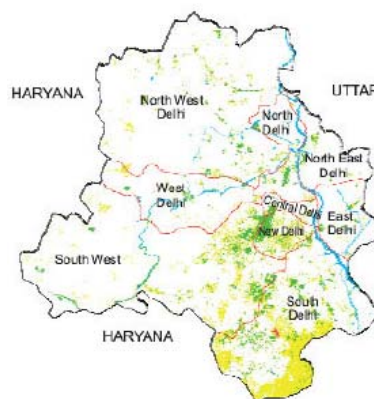
Airport Authority of India, IFCD, Delhi Cantonment Board, DTC, Health Department, Indraprastha Generation company Limited

As we compare in the plans above, there has been increase in the green cover in the national capital of our country. The increased awareness in past few years has brought about this transformation. The present scenario calls for even more attention and developmental measures for urban forests. The issues like encroachment on Delhi ridge land should be looked

into more carefully and appropriate action should be taken at the earliest possible. On the other hand, efforts like Aravalli Biodiversity park on south ridge area, should be appreciated and people be made more aware of the green lungs of the city. This also preserves the native species of flora and fauna in the region.



Plan of Delhi, 1999



Plan of Delhi, 2003

Fig. 5: Spatial expansion of green cover in Delhi

Unique aspect of the notified forest in Delhi is that Ridge Land of total 7784 Ha of land has been notified as Reserved Forests under section 4 of Indian Forest Act 1927. Northern Ridge consists of 87 Ha. Central Ridge consists of 864 Ha. South Central Ridge consists of 626 Ha. 7 Ha of the notified ridge forest land is in Nanakpura South Central Ridge. Southern Ridge Notified Forest consists of 6200 Ha. Protection & Enrichment plantation in the ridge land has been the main agenda.

Forest Department has been distributing more than 5 lakhs saplings of various species annually free of cost. Department has also established large areas of nurseries in the city to meet the requirement of saplings. Saplings mainly of Neem, Jamun, Bel, Peepal, Gular, Amaltas, Gulmohar, Papri, Jungle Jilebi, Sheesham, Burgad, Tamrind, Semal, Lagerstremia, Arjun etc species are raised in the departmental nurseries. For the

plantation on the ridge land ridge spp. such as Ronge, Dhak, Ber, Pasendu etc are judiciously mixed with other species such as Neem, Sheesham, Bargad, Peepal etc has been taken up.

Selection of plant species is done based on the use of the area. For instance, for road side plantation, species like Ashoka, Neem, citrus species, banyan, etc are preferred as they have high value of Air Pollution Tolerance Index (APTI). Species with high value of APTI can withstand pollution and survive in harsh conditions.

The slower growing species would generally be appropriate in situations where sustained environmental benefits are required such as roadside planting. The level of maintenance which is likely to be kept up, has to be considered which is especially important on road side plantation. **The lowest degree of maintenance** is usually possible in areas treated with native species of trees only. . Native plants will be the best choice for this. Generally, **native plants** develop extensive root systems, will be best suited to a location's environment and require less maintenance. Shape adds another dimension to the ornamental quality of a plant composition. It also aids in characterizing the relationship between or among plants in the composition. Plant selection follows an organized process. The criteria used in the process integrate function, aesthetic preferences, adaptability of a species to the site, and the management required to ensure establishment and subsequent performance.

## 6. CONCLUSION

Urban forest is an important part of the Delhi as it accounts for various environmental, ecological and recreational uses in the urban settings. It leads to a healthy co-existence of nature and man. Hence, land demarcation for urban forest should be done at an initial stage so that it is properly designed and developed along with the surrounding development. The planners, architects, engineers and all those involved in decision making should be responsible enough to incorporate the concept of urban forest in their plans and programs.

## REFERENCES

- [1] Cecil C. Konijnendijk, Kjell Nilsson, Thomas B. Randrup and Jasper Schipperijn with Hardoy and Satterthwaite, Urban Forests and Trees
- [2] Peter J. Trowbridg, Nina L. Bassuk, Trees in the Urban Landscape
- [3] Published paper – Growing the Urban Forest by James Urban
- [4] McPherson 1994; McPherson & Rowntree 1993, Simpson & McPherson 1996; Coder 1996 and Wolfe 1999, Urban Forestry reports
- [5] Liisa Tyrväinen Stephan Pauleit Klaus Seeland · Sjerp de Vries, Benefits and Uses of Urban Forests and Trees