



International Journal of Humanities & Social Science Studies (IJHSSS)
A Peer-Reviewed Bi-monthly Bi-lingual Research Journal
ISSN: 2349-6959 (Online), ISSN: 2349-6711 (Print)
ISJN: A4372-3142 (Online) ISJN: A4372-3143 (Print)
Volume-IV, Issue-I, July 2017, Page No. 302-310
Published by Scholar Publications, Karimganj, Assam, India, 788711
Website: <http://www.ijhsss.com>

Urban Forestry: Importance, Strategy, and Planning in Indian Context

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Abstract

The urban areas in both developing and developed countries are emerging as a major form of human settlement. India is experiencing a massive trend towards urbanization. Such rapid urbanization led to massive unplanned geographical expansion of cities which ultimately led to the destruction of natural ecosystem and increase the gap between people and environment. Urban green or urban forestry is one of the prime ways to bridge the gap between city dwellers and environment in one hand and sustainable development in other. The biggest challenge for urban development is not only to ensure urban green but also to maintain the existing green cover. Trees have instrumental roles to play in greening the landscape, cleaning the air, reducing energy use, capturing storm water, mitigating urban heat island effect and preventing soil erosion etc. Need for taking care of the aesthetic and recreational aspects of people is being increasingly felt in semi-urban and urban areas.

Key Words: Urbanization, Ecosystem, Urban Green, Urban forestry, Green cover.

I. Introduction: Urban forestry is defined as the art, science, and technology of managing trees, forests, and natural systems in and around cities, suburbs, and towns for the health and well-being of all people. ^[11] Urban forestry or urban green is a new and still-developing research field. It constitutes creation, planning and management of urban woodlands as well as trees in streets and parks. Due to rapid urbanization and population growth, all the available open spaces are gradually being covered up. Trees in urban system provide a variety of ecosystem services including biodiversity conservation, removal of atmospheric pollutants, oxygen generation, noise reduction, mitigation of urban heat island effect, microclimate regulation, stabilization of soil, groundwater recharge, prevention of soil erosion and carbon sequestration. Urban Forestry and Urban Greening concentrates on all tree-dominated (as joint together in the urban forest) as well as other green resources in and around urban areas, such as woodlands, public and private urban parks and gardens, urban nature areas, street tree and square plantations, botanical gardens and cemeteries.

The key to defining urban green is to define urban land. The term “urban” connotes areas with population of more than 5,000; density exceeding 400 persons per sq. km., and where

75 percent of the male workers are engaged in non-agricultural professions. In India, urban population increased from about 17 per cent in 1950 to 29 per cent in 2007 (Rajashekariah, 2007). The Planning Commission of the Government of India estimates that about 40 per cent of the country's population will be residing in urban areas by 2030. According to McKinsey Global Institute's latest report (2010) on India's urbanization 68 cities in India will have population of 1 million plus by 2030, up from 42 today. As city grow in numbers, spatial extent and density, their environmental and ecological footprints increase. Urban expansion that takes place in forests, wetlands and agricultural systems leads to habitat clearing, degradation and fragmentation of the landscapes. Urban lifestyles, which tend to be consumptive, requiring great natural resources and generating increasing amounts of waste also lead to increased levels of air, water and soil pollution.

II. Objectives of the Study:

- To evaluate the social and economic value of urban green.
- To examine the ecological importance of urban green.
- To analyze the present status of urban forestry or urban green cover in India (some major cities).
- To study the challenges for the India's urban green cover and possible ways or methods of increasing urban forest cover or urban greenery (i.e. urban forestry programmes).

III. Methodology: The present study is based on qualitative and quantitative approaches. Secondary data were collected from various sources such as Census, reports from State Government and Municipal Corporation, reports from various NGOs. Simple cartographic techniques were employed to facilitate visual interpretation.

IV. Importance Of Urban Green: Urban green is important for city's health not only ecological but also for social, aesthetic and cultural value.

Ecological Benefits:

- Trees purify the polluted air by absorbing large amount pollutants like carbon-di-oxide, sulphur-di-oxides by their leaves and releasing oxygen.
- Trees produce a healthy urban environment by providing clean air, water and soil. Broad leaves trapped aerosols and small particles and acts as dust filters. Tree covers absorb rain water and allow the drained water to percolate into the soil thus maintaining ground water table and reduces runoff.
- Trees and shrubs control air temperature extremes by obstructing solar radiation to fall directly on soil and tone down solar radiation into their own use. According to a study, vegetation has been shown to lower wall surface temperatures by 17°C, which led to a reduced air conditioner use by an average of 50%.
- By lowering air temperatures, they reduce microclimatic effects and improve the urban climate. Trees influence thermal comfort, energy use, and air quality by providing shade, transpiring moisture, and reducing wind speeds.

- Trees can reduce the intensity of noise by absorbing and scattering them. Leaves and stems reduce transmitted sound primarily by scattering it, while the ground absorbs sound.

Social Benefits:

- Urban trees enhance the beauty and environmental quotient of city and are among the most important features contributing to the aesthetic quality of residential streets and community parks.
- Urban trees can reduce stress and improved physical health for urban residents and can be of real benefit to health. Exercises and walk in urban parks or green pavements can change moods and reduce stress.
- Well-designed green spaces contribute to social justice by creating opportunities for people of all ages to interact.
- Urban green spaces can enhance cultural activities by providing venues for local festivals, civic celebrations, political gatherings and theatrical performances.
- Urban green environment encourages exercise and provides safe play space for children.

Economic Benefits:

- Landscaping with trees—in yards, in parks and greenways, along streets, and in shopping centers—can increase property values and commercial benefits (Anderson and Cordell 1988; Corrill et al. 1978; Donovan and Butry 2008; Dwyer et al. 1992; Wolf 2003, 2004).
- Urban forest offers significant benefits in reducing building air-conditioning demand and reducing energy consumption. Thus it saves money directly and saves coal indirectly.
- Furthermore, environmental benefits obtained from trees cannot be calculated in terms of money returns. According to a study, urban trees in the conterminous United States remove some 784,000 tons of air pollution annually, with a value of \$3.8 billion (Nowak et al. 2006) and currently store 770 million tons of carbon, valued at \$14.3 billion.^[9]

V. Urban Green Status: India At A Glance: According to Census of India (2011), 31.16% of the country's population resided in urban areas. In absolute terms, it was accounted for 37 crore population. Unplanned, unauthorized, haphazard urban expansions lead to a large amount of agricultural land being converted to urban use, mostly in the peri-urban areas. Cities like Varanasi, Chandigarh, Jaipur, Bhopal, Allahabad and Noida have more than the WHO prescribed norm of 9 sqm whereas cities like Bengaluru, Ludhiana and Amritsar have less than the norm ranging from 1% to 5%.^[15]

Greater Noida is a city located in the Gautam Budh Nagar district of the northern state of Uttar Pradesh and come under the purview of National Capital Region (NCR) of India. Greater Noida Master Plan has provided ample space for urban greens with most of the

residential sectors earmarking large chunks of land under green provides 278sqm per capita green space for its residents. (Table:-1)

New Delhi, the capital city of India, has grown to be one of the greenest capitals in the world. Department of Environment and Forests of NCT, Delhi has been mainly responsible for increasing the green cover of the city from 30 km² to 300 km² during last 10 years, despite of acute biotic pressure. [3] The city has some well-maintained parks and gardens like Lodhi Garden, Mughal Garden, Deer Park, Budha Jayanti Samarak Park, Indraprashtha Park and The Garden of Five Senses. [15]

Total area of the Gandhinagar capital project of Gujarat state is around 57 km². By the year 2005, tree cover of the city was 57.13% of the total geographical area amounting to 32.56 km². [4] Important parks or gardens are Indora Nature Park, Sarita Udhyan, Children’s Park, Sector 28 Garden, Punit Van, Gulab Udhyan etc.

Chandigarh city was built as a replacement of Lahore city, the capital of undivided Punjab which went to Pakistan during 1947. [3] The city has more than 35% of its geographical area under forest and tree cover, making it one of the greenest cities of India. [2] Important parks/gardens are Rose Garden, Bougainvillea Garden, Garden of Fragrance, Shanti Kunj, Hibiscus Garden, Botanical Garden and Leisure Valley.

Bangalore city is known as the Garden City of India due to the large number of parks and private gardens, roadside & avenue trees and the magnificent Lalbagh & Cubbon Park. [3] The city has around 705 parks spread across the city in the form of small and medium sized parks as well as large parks. Estimated crown cover of the city is about 19.9 % of the geographical area. [14] This amounts to per capita green space availability to around 17 m². (Table:-1)





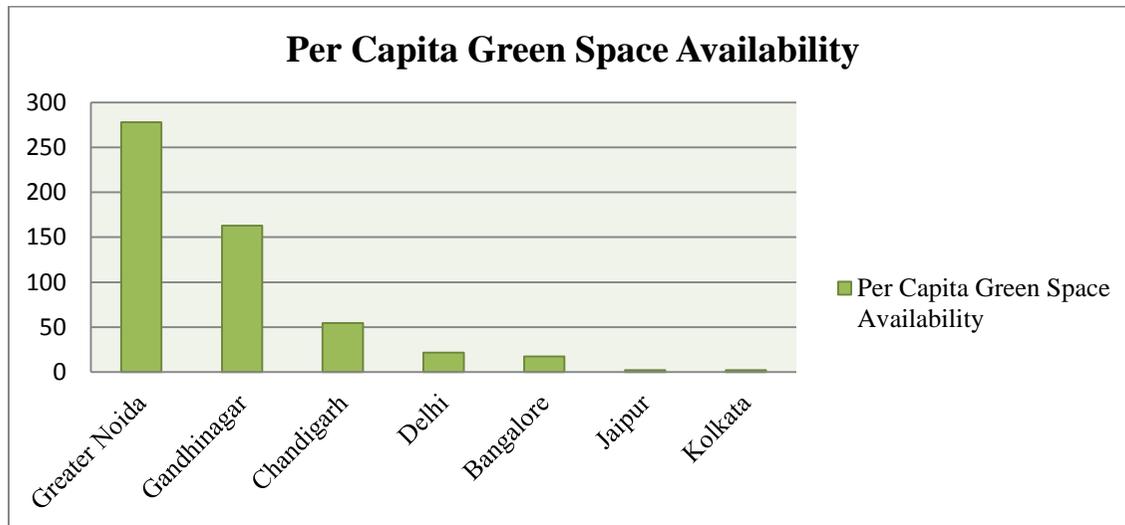
Pic-1: Panoramic view of Green Urban Street. (Source: Wikipedia, wirally.com, quora.com) Kolkata, the ‘City of Palaces’ is known for huge British palaces and buildings and adjacent parks and private gardens, roadside & avenue trees and the magnificent Maidan in front of Victoria Memorial Hall. At present, Kolkata has urban green spaces ranging between 1 to 2 per cent. Kolkata has only 2 m² green per capita according to the The Asian Green City Index, 2011.

Table-1: Some Important Indian Cities with Per Capita Green Space.

CITY	PER CAPITA GREEN SPACE (sqm/inhabitant)
Greater Noida	278.00
Gandhinagar	162.80
Chandigarh	54.45
Delhi	21.52
Bangalore	17.32
Jaipur	2.30
Kolkata	2.00

*Source: Urban Green Guidelines, 2014 (TCPO,GoI,MoUD).

<http://www.censusindia.gov.in/> and The Asian Green City Index, 2011.



The situation is so concerning as compared to the other cities. International minimum standard suggested by World Health Organization (WHO) and adopted by the publications of United Nations Food and Agriculture Organization (FAO) is a minimum availability of 9 m² green open space per city dweller. So the city's urban green cover is inadequate and now reducing drastically. Unplanned extension of the newly built residential area is chiefly responsible for the mockery of urban green cover. If this situation persist then per capita green space availability in the city would further decrease.

VI. Constraints in Urban Forestry: Most of the Indian cities have been facing much threat to its green space. In fact the open spaces are the first casualty in the reckless drive for intensive building operations and most of the Indian cities grew up without a plan.

- ◆ The shortages of green space as most of the spaces are utilized for residential or business purposes due to huge population pressure. Such unplanned development leads to the shortage of open green space. So, it is very difficult to expand urban green cover.
- ◆ Unequal spatial distribution of green space. Several areas of the city have absolutely no parks while majority of the total green space are concentrated in some select ward areas.
- ◆ Increase of built up area and increasing population density leading to congested living.
- ◆ Urban forests can be greatly affected by natural catastrophic events such as norwester, cyclone etc., which can result in broken branches or uprooted trees among other impacts (Greenberg and McNab 1998, Irland 2000, Proulx and Greene 2001, Valinger and Fridman 1997). Such events can cause damage to people and property.
- ◆ The factors responsible for loss of urban forestry are lack of funding, weak linkages with other resource management programs, and improper planning that fails to consider the surrounding ecosystem, the community, and the regional context.

VII. Strategy and Planning: Urban forests are basically a human constructed and dominated ecosystem, thus the role played by human beings in the urban green is critical. Rich biodiversity can exist in cities by adapting the following means.

- ◆ Proper planning for long term maintenance of trees.
- ◆ Initiatives to extend urban green cover, such as engagement of NGOs, civil society, media and corporate groups are necessary to extend urban green cover.
- ◆ The cities have to adopt tree management ordinances and policies. There should be strict punishment against the violations of the ordinance such as fines and/or jail.
- ◆ Species are selected by considering climate, soil type and topography. In recent times, trees are largely planted for their high growth rate and decorative appearance.
- ◆ Need to plant trees that provide multiple benefits to individual and society, particularly in house compounds for providing edible pods, flowers, fruits, leaves etc. like *Mangifera indica*, *Moringa oleifera*, *Tamarindus indica*, *Bauhina purpurea*, *Syzygium cumini* etc. and in median strips between roads for shades and ground water recharge like *Alstonia scholaris*, *Thespesia populnea*, *Terminalia catappa* etc.
- ◆ Need to identify hazardous trees regularly. Trees with defective trunks, roots, or branches can fall, and there is a possible risk of property damage or even risk of personal injury. In such cases, those hazardous trees should be removed.



Pic-2: An arborist specializes in the care of trees. (Source: USDA)



Pic-3: Rooftop Plantation (Source: WRT for the Philadelphia Water Department)

- ◆ Rooftop plantation is recently developed idea for increasing urban green cover. Green roofs not only retain rainwater but also reduce city’s average temperatures during the summer.



Pic-4: Avenue Plantation



Pic-5: Riverside Beautification (Source: TCPO,GoI, MoUD)

- ◆ Riverside beautification as well as tree plantation can solve the problem of lack of space. Tree plantation on the shores of river or water channel can increase the urban green cover and provide space for city dwellers.

VIII. Conclusion: So it is clear from the above discussion that before the city expands further a proper plan for greening in the city especially with respect to land availability in the form of parks and gardens, forest patches and road side plantation should be in place. In addition to avoid illegal diversion of green cover of the city for taking up developmental works or otherwise a legal framework should be in place. And therefore plan for urban forestry should be integrated into overall planning of the urban areas in advance otherwise greening of the urbanized area becomes more difficult once the settlement takes place. A better and healthy urban environment is need of the hour and an essential part of our future survival. To achieve this, there is a greater need to involved planners, developers and policy makes to make profound policies for dealing with urban issues like urban forestry, conservation of biodiversity etc.

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