

Green Spaces - An Invaluable Resource for Urban Ecosystem

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Abstract—Green space is an invaluable resource of urban eco system in many dimensions. The Green space, directly or indirectly influences different aspects of eco system viz. climate, water, and energy. The Green space classified as Trees, green belts and waterways are important public spaces in most of the cities. They nullify the negative effects of rapid urbanization on human health and well-being. Green areas also enable numerous ecosystem benefits, leading to environmental, social, aesthetic and economic benefits to populace inhabiting urban areas. The environmental benefits of green spaces are very important, and should be viewed in the context of urban issues such as climate change, public health and nature conservation. Trees and greenbelts act as a sink for carbon dioxide to counteract the urban heat island effect of large built-up areas. It further contributes to improve the quality of life by providing important social and psychological benefits to human societies.

The rapid urbanization leads to quick depletion of green spaces in and around a city. Environmental degradation continues to be a major problem in many cities as the green spaces available are decreasing day by day. To ensure a sustainable future, planning and preservation of Green belts in and around urban area is inevitable. It will enhance urban biodiversity and help to maintain essential ecosystem services.

This paper will focus on different types of urban green spaces, its benefits extended to various areas such as natural conservation, increases biodiversity of flora and fauna, affecting urban climate by reduction of air temperature, urban heat islands, improving air quality, decreasing air pollution, carbon sequestration, noise reduction and cleaning up contaminants.

Keywords: Ecosystem services, green spaces, parks, biodiversity, urban heat island.

1. INTRODUCTION

Human being have appreciated greenery in their life and have physical and psychological dependency on nature. People depend on fresh air, natural attraction and landscape which enhance natural perception and social behavior. Green areas are invaluable resource which fulfills many functions that benefits quality of life in urban context. Presence of natural urban assets such as, public parks, green belts and its

components in urban context improve the quality of healthy living. It can provide social, economic, cultural and psychological services especially for the wellbeing of the urban dwellers and for tourists as well.

From recent past, eco systems around human beings are changing with urbanization. Due to the population growth and urbanization, density of human being is rapidly increasing in urban areas in comparison to rural areas. The increase in density leads to high rise structure and dominated by mass of concrete. The concrete jungle in urban areas have rapidly encroached green spaces and water bodies. Study says that in 2014, around 54% of the world's population was living in towns and cities, and this number is projected to increase to nearly 70% by the middle of the century. Due to rapid environmental degradation, ecosystems and natural landscape are changing drastically. The quality of the urban communities depends on how the urban green areas designed, managed, and protected. The need of hour is to create and maintain healthy and sustainable urban environments.

2. WHAT IS GREEN SPACE?

The first definition of urban green areas was given by American landscape architect Frederick Law Olmsted who was inspired by the public-open space movement in England by the Boston Park System in 19th century. Olmsted defined the approach of introducing the nature that begins with Central Parks in New York City as the "lungs of the city." After the Second World War, the open spaces that could not respond to the recreational needs of the people living in the community buildings were mentioned as urban green areas. After this period, in 1970s, Urban open spaces came to the forefront with green space features and led to the comprehensive definition of urban green areas by creating the landscape framework of the city.

In modern era urban Green spaces are defined as natural or semi natural ecosystems, which are partly or completely covered with grass, trees, shrubs, or other vegetation.

At micro level it consists of different green Elements like a single trees in streets or gardens, tree covers of different layers, lawns and grass, vertical gardens, bushes and shrubs, flower beds and ornamental plant arrangements etc, in different ownership. At macro level it consists of green corridors that follow transportation networks, urban parks and gardens, natural wild spaces, urban forest and community woodlands, cemeteries, playing fields and playgrounds, derelict and despoiled vacant land etc.

3. TYPES OF GREEN SPACES

Green spaces exist in a great variety of shapes, structures and types within urban fabric. Green spaces can be classified in different ways:

- According to usage patterns
(eg-active green spaces and passive green spaces)
- According to ecological function
(Eg-historic gardens, greenbelts surrounding the city, agricultural areas and buffer greens)
- According to recreational functions
(eg-parks, thematic parks and gardens, sports fields, playgrounds, natural and semi-natural areas, corridors)

Types of Urban green areas

Table 1: Typologies of Urban green areas

Amenity green spaces	Recreation Area	Green Area	Parks and Gardens Informal Recreation Areas Outdoor Sports Areas Play Areas
	Incidental Area Space	Green Area	Housing Green Space Other Incidental Space
	Private Green Area		Domestic Gardens
Functional green spaces	Productive Area	Green Area	Remnant Farmland City Farms Allotments
	Burial Grounds		Cemeteries Churchyards
	Institutional Grounds		School Grounds Other Institutional Grounds
Semi natural habitats	Wetland		Open/Running Water Marsh, Fen
	Woodland		Deciduous woodland Coniferous woodland Mixed woodland
	Other Habitats		Moor/Heath Grassland Disturbed Ground

Linear Green Areas	River and Canal Banks Transport Corridors (road, rail, cycleways and walking routes) Other linear features (e.g. cliffs)
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4. BENEFITS OF GREEN SPACES :

The benefits of good urban green spaces are diverse and wide ranging.

4.1 Environmental Benefits:

4.1.1 Ecological Benefits:

The increase in urban density is posing serious threats to ecological balance of ecosystem. To sustain ecological balance, urban green spaces play a vital role. Green spaces in urban area provide biodiversity to urban climate. Significant difference is seen while comparing urban and rural areas, in terms of solar input, rainfall pattern, solar radiation, air temperature, wind speed and relative humidity. These elements of climate are varying significantly due to depleting green spaces and urbanization. Green spaces like “wildlife corridors”, “urban forests”, vegetation around urban dweller and water bodies can maintain viable populations of different species. It improves ecological environment of the urban areas.

4.1.2 Pollution Control & Improving air quality:

Air and noise pollution are common phenomenon in urban areas. The presence of many motor vehicles in urban areas produces noise and air pollutants, which consists of tiny particles, known as particulate matter (PM), gases such as carbon monoxide (CO), nitrogen dioxide (NO2) and sulphur dioxide (SO2). Study shows that due to industrialization the amount of carbon dioxide in the atmosphere has increased by 40%, resulting in a gradual warming of the planet. Furthermore, emissions from factories are also combination of sulphur dioxide and nitrogen oxides. Poor air quality is a serious threat to human health, causing problems for the respiratory system and cardiovascular diseases. Trees and shrubs have multiple impacts on air quality. They can improve air quality by removing both particles and harmful gases from air by pores on leaves surface, also, particles stick to surface of leaves.

The green spaces are critical for the process of carbon sequestration. In this process, trees and plants take carbon dioxide from the atmosphere and around half of it is stored in their branches and roots, also, large amounts of carbon stored by the surrounding soils.

Noise pollution from traffic and other sources can be stressful and creates health problems for people in urban areas. Green spaces in urban area can largely reduce the levels of noise depending on their quantity, quality and the distance from the source of noise pollution. The presence of micro level urban

vegetation, vertical gardens results in overall reduction in air pollution and noise level.

4.1.3 Temperature and climate change:

Urban Heat Island (UHI) is one of the major problems in the 21st century as a consequence of urbanization and industrialization of human civilization. The UHI effect refers to the phenomenon where the temperature within a city is higher than that of the surrounding rural areas. The main source of UHI is the considerable amount of heat produced from urban structures, as they absorb and re-radiate solar radiations

Vegetation plays a crucial role in mitigating the urban heat island effect. Green spaces in urban areas are on average around 1°C cooler, during both the day and night time, than built-up regions in the same city, and this cooling effect can extend beyond the green space itself, into the surrounding urban areas. During the summer this may reduce the need for air conditioning, and associated energy use, in nearby buildings. Green spaces reduce the urban heat island (UHI) effect by providing shade and by cooling the air through the process of evapotranspiration. During evapotranspiration, the sun's energy is used to transfer water from the leaves of plants into the atmosphere. Therefore, adequate forest plantation, vegetation around urban dwellers house, water bodies can help to mitigate the situation.

4.1.4 Biodiversity & Nature conservation:

The ecological footprint of cities affects ecosystems indirectly from regional to global scales. The ecological functions within green spaces involve whole system of plants, animals, water, air, soil and human activities.

Green spaces can act as "wildlife Corridors", linking together larger parks, and providing linkage of urban and rural areas. It also functions as protection center for reproduction of species and conservation of plants, soil and water quality. Large parks and woodland regions are able to support the widest range of species, but even small areas of vegetation such as roundabouts, roadside verges and green roofs can also support a range of plants, insects and birds. For city dwellers, spending time in urban green spaces is their only regular opportunity to be surrounded by nature. Research suggests that people get more enjoyment from spending time in green space when they there is a high level of biodiversity enhancement in species, richness of plants, birds and invertebrates.

4.2 Economical and aesthetical Benefits:

4.2.1 Energy saving:

Plants improve air circulation, provide shade and they evapotranspire. This provides a cooling effect and help to lower air temperatures. Study shows that a park of 1.2 km by 1.0 km can produce an air temperature between the park and the surrounding city that is detectable up to 4 km away. A

study in Chicago has shown that increasing tree cover in the city by 10% may reduce the total energy for heating and cooling by 5 to 10%.

Trees and other vegetation help in evapotranspiration. In this process, loss of water from plants as vapor into the atmosphere, this consumes energy from solar radiation and increasing latent heat, resulting cooling the temperature of the air surrounding the leaf. Shading from trees, which help in preventing the warming of the surface and air which reduces demand of artificial cooling.

4.2.2 Property value:

Areas of the city with enough greenery are aesthetically pleasing and attractive to both residents and investors. Study shows that green spaces and landscaping increase property values and financial re-turns for land developers, of between 5% and 15% depending on the type of projects. Report shows that the beautification of Singapore and Malaysia with dominance of green spaces was one of the major factors that attracted significant foreign investments that assisted rapid economic growth.

4.3 Social and Psychological Benefits:

4.3.1 Recreation and Wellbeing:

Green spaces have been viewed as an important part of urban and community development rather than just as settings for recreation and leisure. It's a place for relaxation, which provides emotional warmth, social interactions and gathering. A study conducted in Helsinki, Finland, shows that nearly about (97%) city residents participate in some outdoor recreation during the year and half of the residents make outdoor visits on a daily basis or every second day.

4.3.2 Human Health:

People who were exposed to natural environment, the level of stress decreased rapidly as compared to people who were exposed to urban environment. A re-search conducted in Swedish cities showed that the more time people spend outdoors in urban green spaces, the less they are affected by stress. Urban green spaces can increase the physical and psychological wellbeing of urban citizens. Improvements in air quality and pollution, due to vegetation have a positive impact on physical health. The connection between people and nature is important for everyday enjoyment, work productivity and in general mental health.

4.3.3 Tourism:

Urban parks and water bodies provide recreational settings to local residents, also, attract visitors from different places. Green spaces adopted in the tourism industry. It can play an important role in attracting tourists to urban areas by enhancing the attractiveness of cities. There has been increasing attention to urban ecotourism, as nature travel and conservation in a city. The key principles of ecotourism

include minimizing impact, protecting biodiversity, building environmental awareness, and respecting local culture. Typically, the primary attractions for ecotourists are flora, fauna, and cultural heritage. The ecotourism is pivotal in sustenance of green spaces.

5. CONCLUSION

Globally, more people live in urban areas than in rural areas, with 55 % of the world's population residing in urban areas in 2018. In 1950, 30 % of the world's population was urban, and by 2050, 68 % of the world's population is projected to be urban. This means all countries of the world are becoming increasingly urbanized. To create a balance between urban and rural dwellers, strengthening of ecosystem by creating and developing green spaces is essential.

Green spaces such as domestic gardens, parks, woodlands, wetlands etc. provide a vital habitat for wildlife and help in ecological balance. The presence of green spaces can enhance the health and wellbeing of people by improving physical fitness and natural care, henceforth, improves quality of life in the urban areas.

Also, It is the place where people living in the city merge with nature. It is considered as a important social focal points where social needs are met.

As the world continues to urbanize, sustainable development depends increasingly on the successful management of urban growth. The development and sustainability of green spaces in and around the urban areas to be considered as one of the main contributor of urban growth.

Green Spaces - An Invaluable Resource for Urban Ecosystem influences Physical, psychological and economical aspects of urban life.

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