SUSTAINABLE CITIES AND GREEN URBANISM

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Abstract: Indian cities being the engines of economic growth have undergone a fast pace of urbanization. The consequence of this transformation into a 'concrete jungle' has led to stress on land, water, induced air pollution, urban heat island effects, decreased green cover, degraded the quality of life of the people thereby reducing the livability of the cities.
Sustainable and inclusive cities are the need of the hour for the conundrum of Indian cities. "Smart city mission" proposed by the Govt. of India as well as the Sustainable Development Goal targets the need for inclusive, safe, resilient and sustainable cities.
The Union Ministry of Housing and Urban affairs (MoHUA) launched the Livability index to rate 116 Indian cities in 2018, to measure quality of life in 99 smart cities, capital cities and those with a population of over one million. These measurement parameters includes local governance, education, employment, social infrastructure, health, safety, availability of physical infrastructure such as housing, open spaces, security, land use, energy, water resource, solid waste management, and pollution. These have been grouped into 15 categories, in turn a part of the four pillars of Comprehensive development of cities. The physical pillar of these, gains 45% weightage with reduction of pollution and open spaces as the significant features.
The current trends of urbanization have compromised green cover mainly in order to make land available for development. This paper is an attempt to bring out the significance of green cover in urbanism and aims to propagate management and increase of green cover as an important strategy thereby increasing the livability index of any city.

Keywords: Urban Green, Quality of Life, Livability Index, Green Cover Management, Retrofitting And Redevelopment With Urban Green.

Introduction: Indian cities are growing at a very fast pace and have been a significant contributor to the country economic development. As per the census 2011 about 32% of the country's population lives in urban areas contributing to about 70% of the total GDP. In response to high migration rates caused by increasing population pressures, urban centers in India have incresed both in numbers as well as in size. As a consequence urban centers have been malformed into a 'concrete jungle'. This process of urbanization has put stress on natural resources specially land and water, has induced air pollution, triggered the urban heat island effects, decreased the green cover and damaged the environmental and ecological assets, ultimately degrading the quality of life of the people reducing the livability of the cities. It may be noted that as per the 2015 'Global Livability Ranking' for 140 cities worldwide the two Indian cities, Delhi and Mumbai had been included with a poor ranking of 100 and 115 respectively. The ranking is based on parameters like stability, healthcare, culture, environment, education and infrastructure.

Sustainable and all-encompassing cities are the need of the hour for the problems faced by Indian cities. The same, along with application of 'Smart' Solutions to cities, has been targeted in the "Smart city mission" of Government of India. The 11th Sustainable Development Goal also calls for "inclusive, safe, resilient and sustainable" cities.

Quality of Life: Quality of life index is a study of key factors that determine the 'Degree of livability". It is a composite measure of social, environmental, economic and civic factors that directly determine the willingness of a citizen to reside in a city and hence, the potential of the city to attract human resources and consequently industry.

Quality of life is a subjective notion. People differ in their notion with different incomes, influences and cultures governing their decisions. The quality of life experienced by citizens living in a city is tied to their ability to access infrastructure (transportation, communication, water, and sanitation), food, clean air, affordable housing, meaningful employment, and green space and parks. The differential access of people within a city to the infrastructure and amenities highlights questions of equity. In this context sustainability is the ability to sustain the quality of life we value or to which we aspire. In operational terms it is often viewed as enhancing the economic, social, cultural and environmental well-being of current and future residents.

Livability of Indian Cities: Livability has been an important aspect of the western cities or the regions in the developed world for long now. Livability refers to an urban system that contributes to the physical, social and mental well being and personal development of all its inhabitants. It is about delightful and desirable urban spaces that offer and reflect cultural and sacred enrichment. Key principles that give substance to this theme are equity, dignity, accessibility, conviviality, participation and empowerment. The Indian context however, differs from the conventional sense of quality of life.

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In June 2017, Ministry of Housing and Urban Affairs Minister launched a set of 'Livability Standards' relevant to Indian cities, with 79 indicators in 15 categories for measuring institutional, social, economic and physical aspects that affect quality of life. These parameters includes local governance, education, employment, social infrastructure, health, safety, physical infrastructure such as housing, availability of open spaces, security, land use, energy, availability of water, solid waste management, pollution, etc. These have been grouped into 15 categories, in turn a part of the four pillars of Comprehensive Development of cities. The physical pillar of these, gains 45% weightage which deals with reduction of pollution and availability of open spaces along with management of solid & liquid waste and water supply. The category of Open spaces have been assessed by indicators - Per capita availability of green spaces (which includes extent to which urban greens and open spaces such as recreational spaces, organized greens and common spaces like flood plains, forest cover, vacant lands etc, are available in the city leading to a better urban environment) and per capita availability of public and recreational places (which includes denotes the extent to which recreational and public spaces are available in the city for recreation, social interaction and active physical activities). Concentration of SO_2; NO_2,PM_{10}, Noise levels, and Quality of water in public surface water bodies have been the indicators to assess the category of reduction of pollution. Transportation and mobility category puts stress on incorporation of public and non-motorized transport options. Recycling and reuse of the resources have been identified as indicators under various categories.

The livability index prepared in 2010 by CII has identified indexes for livability for Indian cities as Economic environment and standard of living, Socio cultural environment, education, health and medical standards, natural environment, public services, recreational possibilities, consumer goods and housing options. Under the index of natural environment the stress has been given on the history of natural calamities and general climate conditions as a measure to track effectiveness at reducing pollution to measure the environmental balance, along with ambient conditions (defined by noise and light pollution levels) to trace the enjoyment quotient, and "night sky viewing" (again derived by air and light pollution levels). The index of recreational possibilities stresses on the availability of parks and playgrounds along with other recreational facilities.

Significance of Green Cover: Green cover provides important environmental services especially in increasingly urbanized areas. As per World Health Organization, green spaces such as parks and sports fields as well as woods and natural meadows, wetlands or other ecosystems, represent a fundamental component of any urban ecosystem. Green spaces and other nature-based solutions offer innovative approaches to increase the quality of urban settings, enhance local resilience and promote sustainable lifestyles, improving both the health and the well-being of urban residents.

Unplanned and unsustainable urban development has led to severe environmental pressures. The green cover and ground water resources have been forced to give way to rapidly developing urban centers, cities thereby tending to be warmer than their surroundings. Increasing at a rate of 0.25 degrees to 2 degree F per decade, the Heat island effect within the urban cores of rapidly growing metropolitan regions may double within 50 years.

Some of the major causes of the Urban Heat Island Effect include Increase in the built-up area, anthropogenic activities, loss of tree cover and drying up of lakes and destruction of other natural features. In a city, due to the removal of vegetation and the presence of the hard surface cover, rainwater percolation into the soil is prevented. Mitigation can come in the form of green roof treatments. In addition to the aesthetics, the reduction of the green house gases and cooling of air, are the benefits of the various greening programs in the Metropolitan areas.

Green Cover as an Imperative Part of Green Urbanism: Intensive urbanization is creating a demanding stress on land as a resource. The need for availability of land for development of buildings, roads and infrastructure is swallowing up green areas and has been the cause of intensification of erosion, decrease in biodiversity and permanent fragmentation of habitats. The rural/ green belt has been getting lost with the increasing phenomenon of urban sprawl**.**

It has become imperative to enliven today's congested and polluted cities with a higher green cover through incorporation of conventional as well as upcoming innovative concepts in order to control the downward trend, thus achieving healthier society and environment. A sustainable city aim at creation of a resilient habitat for existing populations, without compromising the ability of future generations to experience the same and is designed with considerations to social, economic and environmental impacts. These cities are inhabited by people whom are dedicated towards minimization of required inputs of energy, water, food, waste, and output of heat, air pollution - CO_2, methane, and water pollution.

The idea of ecologically sensitive planning influenced the birth of New Urbanism in North America, puts emphasis on building the sense of stronger, social communities. Green cities create possibilities to apply environmentally friendly technologies as public transport, district heating as well as green buildings and green design concepts (e.g. Green Infrastructure). Professor Timothy Beatley in his book (Green urbanism: Lessons from European cities); defines Green Urbanism based on design qualities and characteristics. According to him, cities that correspond to the Green Urbanism idea cause minimal negative ecological footprints, functioning in ways analogous to nature and follow circular metabolism through e.g. recycling of waste and waste water treatment. Green, self sufficient in economy, regional food and energy production cities promote a more sustainable, healthful lifestyle for local communities.
Green Urbanism principles integrate various techniques to minimize the usage of water, energy and materials, which take into account above other things the location of cities and the local climate optimizing natural assets as well as sunlight and wind flow. In the field of Ecosystem, the techniques are used to maximize ecosystem sustainability through delivering new greenery to urban environment, increasing the biodiversity, climate change mitigation and urban water management (e.g. potable water resources management, grey water recycling, storm water management, irrigation).

Strategy adopted by Mueller community (USA) for Green Urbanism combines a few principles, namely protecting Air Quality (using low-emitting materials and green areas management-implementation of extensive vegetation, tree planting and open space preservation), mitigating Urban Heat Island (through

a well-thought-out hydrologic, landscape and building approaches), protecting the Night Sky, Light (minimizing light pollution, direct light downward, introducing vegetative cover) and Creating Green Buildings.

The urban planning task for the city of London is to stop the increasing pressure of a densely packed city on countryside by implementation of series of preserved green spaces around the city. The National Planning Policy Framework (2012) of the city identifies five purposes of the Green Belt: stop urban sprawl, prevent merging of neighboring cities, help in safeguarding of the countryside and cultural values of historic towns, and assist in urban regeneration.

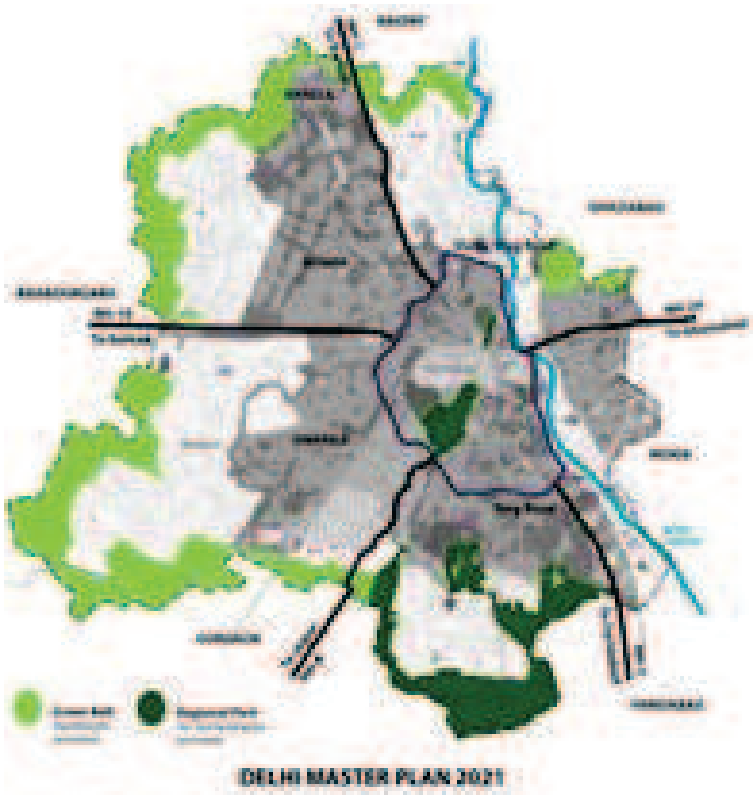

Figure 1: Green Belt Around City of Delhi as per MPD-2021

A similar concept has been adopted even in Master Plan of Delhi in which Green belt/ agriculture belt has been identified as one of the nine designated use zones which only regulated activities being permitted in the zone namely Forest, Agriculture use, Vegetation belt, Dairy Farms, Piggery, Poultry farms, Farm house, Wild life sanctuary, Bird sanctuary, Biodiversity Park, Veterinary Centre, Police Post, Fire Post, Plant Nursery, Orchard, Area for water-harvesting, Floriculture farm, Open Playground, Agro forestry, Amenity structures.

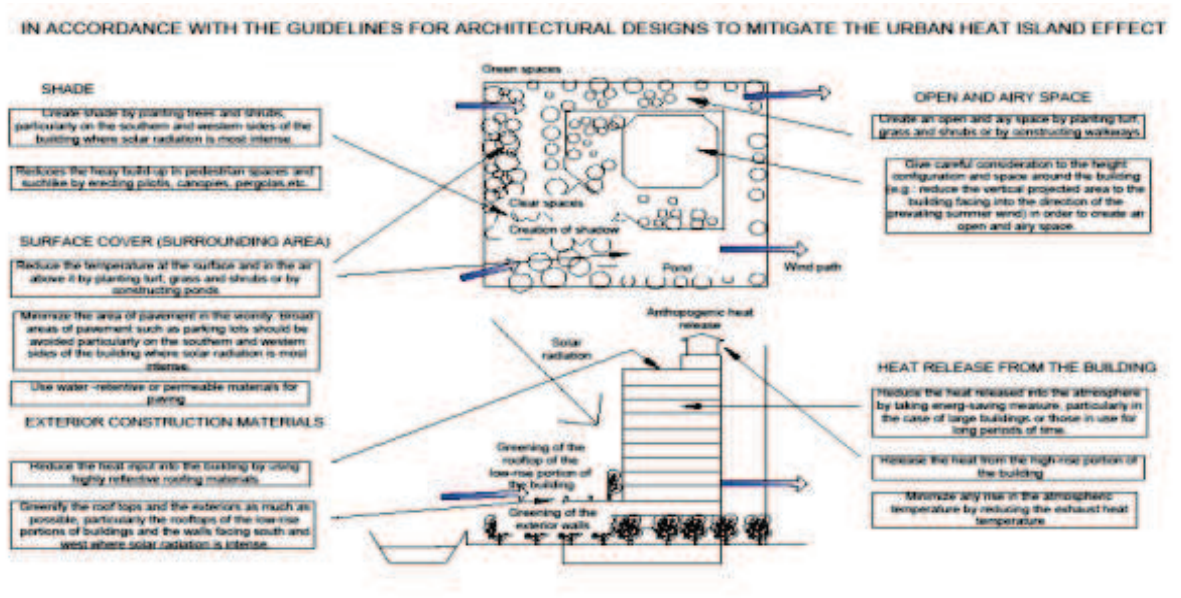

Figure 2: Mitigation of Urban Heat Island Effect
Source: (Global cool cities alliance)

Some recommendations have been made to strengthen the green cover in a city as a prime objective propagating the concept of green urbanism and sustainable cities, thereby increasing the livability index of any city.

Recommendations:

1. The demands for space in cities inhibits expansion of forested areas and leave the ecologically sensitive areas in small patches scattered at many places in the city. Initiative to be made to preserve, integrate and conserve the ecologically sensitive areas within the city limits with a holistic perspective. The initiative to create biodiversity parks and preservation of ecology of Yamuna floodplains of Delhi Development Authority can be taken as instances for such development. The ecologically sensitive areas therefore can be identified in the master plan/development plan and proposals of conservation to be well incorporated with the required guidelines.
2. Green roofs present the opportunity to expand the presence of vegetated surfaces by replacing impermeable surfaces in urban areas, thereby providing a reduction in peak summer urban heat island temperatures. It consists of vegetation and soil or a growing medium, planted over a waterproof membrane and can show up to 50% reduction in heat flux in the rooms below the garden (due to the evaporative cooling effect of a rooftop lawn garden). Studies have shown that under a green roof, indoor temperatures can go up to 3°C–4°C lower than outside temperatures of 25°C–30°C. Additionally, it contributes to the green cover of the area and also helps in pollution reduction. A thick buffer of green near the window can substantially reduce the noise and air pollution levels from the traffic outside. Green roof construction may be made a mandate for public and commercial building. Plantation of native species with a high potential for pollution reduction should be encouraged.
3. Greenbelts (allowing to follow the pattern of a compact city), have a beneficial effect on general health of inhabitants and vitality of urban ecosystems in the form of clean air, better quality of water, flood and drought protection, and wider accessibility of recreational grounds. In the same regrad, Delhi has set an example by preserving its agricultural belt by recognizing it as a part of the master plan. Stringent implementation of the norms and master plan recommendation should be enforced.
4. Green Infrastructure can be considered as bonding element, joining three Green Urbanism components (Energy and Materials, Ecosystem and Urban Planning) to deliver to city's environment biodiversity, help to reduce energy demands, GHG emissions, reduce and delay of storm-water runoff volumes, enhance groundwater re-charge, lower incidents of combined storm and sewer overflows (CSOs), improves air quality, human health and creates additional recreational space. A holistic

framework need to be formed to incorporated as a part all the government programs and policies for all relevant sectors including water, energy, green spaces, waste management, pollution mitigation etc.

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