

Unbuilt Environment in Megacities: Open Spaces for Innovation Research and Design for Health

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Abstract—*Landscape spaces or “Unbuilt Environment” in an urban land provide lot of benefits to the citizens of the community. A good landscape of the community open spaces, adds to its restorative and therapeutic values leading to health. The aim of this paper is to find out the effects of urban landscaped spaces and strategies, on the health of the residents, community and the environment. . An extensive literature study helps to understand the “determinant of health” and how these are approached through the open spaces. The study also explores its effects on the mental, physical and social wellbeing of a person, family and community. It discusses the landscape features like gardens, public plaza, community gardens, sports facilities and play fields with their effects on the health of an individual. Through an online survey the reactions of the people to the landscape they live in was studied. The survey and the literature study come to conclude that landscape urban greens have a positive influence, on the health of individuals and must be treated innovatively for the benefit of all.*

1. INTRODUCTION

Man has always been in awe of built forms where he can prove his creativity. He rarely realizes the impact the unbuilt spaces create on him. The built forms take shape as skyscrapers while the unbuilt spaces are either left as natural forested lands or are shaped up to cater to the infrastructure and entertainment needs. The trends to design and develop these unbuilt spaces has been changing over a period of time. There is a sense of awareness about the potential these spaces have and hence there has been a need to have landscape consultants to design such unbuilt spaces. These open spaces have been proved time and again to have direct influence on the health of the individuals using it. A simple question arises to know how these unbuilt spaces and their treatment influences the health of the people and what could be the approaches and innovation to achieve the most from them. To understand this better, we need to understand what health means to all. As defined by WHO, “Health is defined as “a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity”. [24]

2. APPROACH AND METHOD

The approach to the research question begins with our determination of the parameters of health and factors influencing health. This is followed by a literature study to

understand the development of open spaces in the past and their impacts on people’s activities and health. A similar study of current trends and examples is done to comprehend the commendable examples of treatment of open areas. An online survey was done to understand the level of satisfaction the people had in terms of the landscape spaces they utilized and their feedback about the health benefits of such areas. A discussion on the direction to treat the unbuilt spaces is then done with references to multiple researches done in understanding the tangible and intangible benefits of the elements that enrich the open spaces.

As per the available data, there are various factors that influence the wellbeing of an individual, a family and a community. These factors are termed as determinants of health. “The ‘determinants of health’, were first referred to by Dahlgren and Whitehead in 1991 in their landmark paper “What can be done about inequalities in health”[12]The determinants of health are not just factors of wellbeing, like the environment or the landscape, but also personal and social setups. These factors are summarized in the Settlement Health maps [9] the health map(refer Fig. 1) indicates how the health and wellbeing are influenced by the surroundings and the conditions people live in. The treatment of the open spaces often determine how they behave and the activities they perform.

The planning of the buildings and their arrangement, the way they are connected with streets, the development of the streetscape makes the user choose their mode of commute. In places which have good pathways shaded with trees, the people often opt to walk. However in case devoid of any pedestrian movement path, the people are not comfortable and hence prefer the motorized vehicle. Similarly in Indian context , spaces which are well lit , clean , planted well are used in healthy manner while streets that are under lit, dirty and without beautiful planting tend to attract more garbage and filth. These also become the places to attend to nature calls and activities like spiting. Such spaces act as magnets to the pests and promote many diseases. In both cases, public health gets effected which could be addressed by effectively treating the unbuilt spaces.

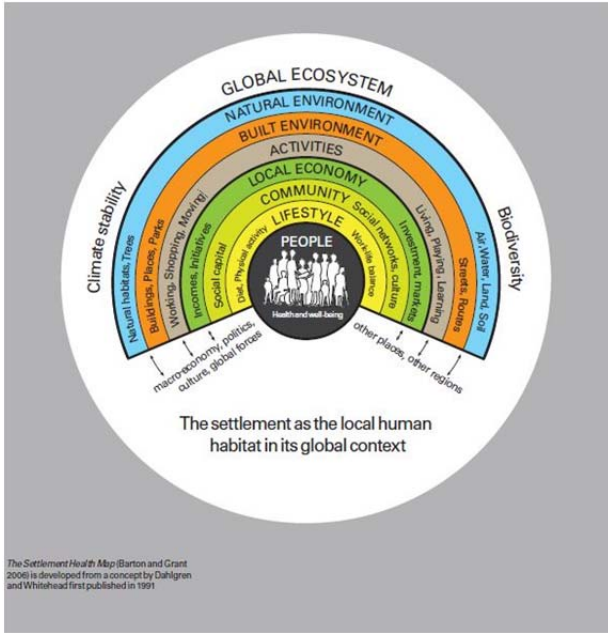


Fig. 1: Settlement Health Map [9]

The **health quotient** of a city is often compared to the health quotation of the villages and towns and it has been researched that the urban health quotient is poorer than the counterpart. This has been attributed to the extensive environmental degradation in the city as compared to the villages. Apart from this, the urban living is stressful and there are fewer chances to relieve that stress. The literature study reveals neural effects of urban upbringing and habitation on social stress processing in humans. “The findings contribute to our understanding of urban environmental risk for mental disorders and health in general. Further, they point to a new empirical approach for integrating social sciences, neurosciences and public policy to respond to the major health challenge of urbanization. [1][4]Lack of physical activity and consumption of vegetable supply loaded with pesticides has further lowered the health quotient of the cities, giving rise to many health issues.

There are numerous health issues in the megacities. As stated in a research paper by WHO “Obesity has reached epidemic proportions globally, with more than 1 billion adults overweight - at least 300 million of them clinically obese. Increased consumption of more energy-dense, nutrient poor foods with high levels of sugar and saturated fats, combined with reduced physical activity, have led to obesity rates that have risen three-fold or more since 1980 in some areas of North America, the United Kingdom, Eastern Europe, the Middle East, the Pacific Islands, Australasia and China. The obesity epidemic is not restricted to industrialized societies but is often faster in developing countries than in the developed world. Obesity and overweight pose a major risk for serious diet-related chronic diseases, including type 2 diabetes, cardiovascular disease, hypertension and stroke, and certain forms of cancer. The health consequences range from

increased risk of premature death, to serious chronic conditions that reduce the overall quality of life. [24]

There are many stress related mental and psychological health issues that are on the rise. Living in cramped up small apartments with unhealthy surrounding, amidst the evils of drug abuse and the greed for money, the youth of today are facing the brunt of city life. Even though the nutrition, infrastructure and socioeconomic setups, healthcare facilities are better than in rural setting, there is an increased risk of mental disorders like depressions and schizophrenia. Researches have shown that the lack of control, social threat and the fear of losing one’s social status strongly contribute to experiencing stress. These factors have been shown to affect the amygdala and the prefrontal cortex of the brain. Hence social stress may be the most important factor for the increased risk of mental disorders in urban areas. It may be experienced as social evaluative threat, or as chronic social stress, both of which are likely to occur as a direct consequence of high population densities in cities. [1]

3. SURVEY

An online survey was done to understand the opinions and expectations of the people. The survey team of 54 consisted of people ranging from age group of 15 to 75 and consisted of people for all types of profession as well as homemakers. They all belonged to a mid-size city to megacity in India and abroad. An online form filled up by all consisted of questionnaire and comment section regarding their feedback and opinions about the landscaped spaces around them, the amenities and their effect on health.

Do you think adequate trees and plants are being planted in your neighborhood streets.

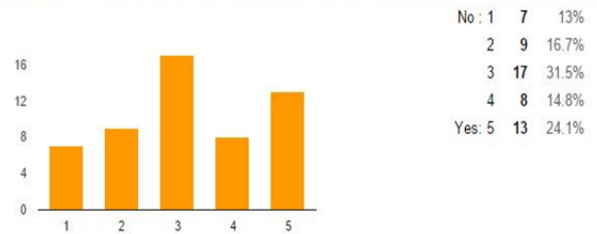


Fig. 2: Level of satisfaction with current plantation

Do you think waterbodies, fountains and lakes in our vicinity, effect our health.

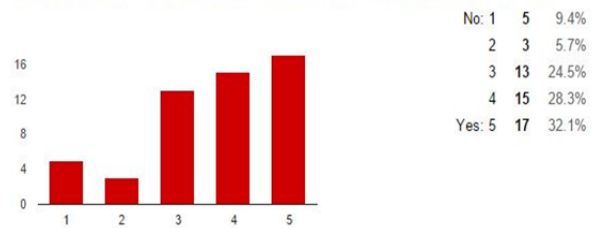


Fig. 3: Significance of water bodies on health

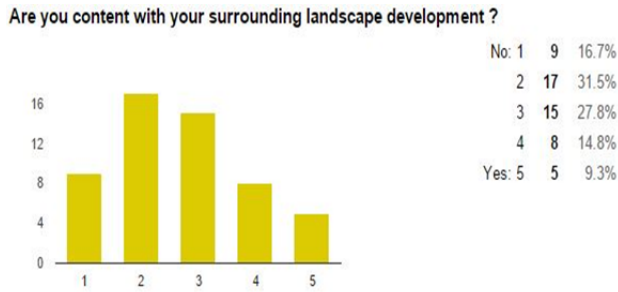


Fig. 4: Satisfaction with current landscape



Fig. 5: Opinion about better health with better open space

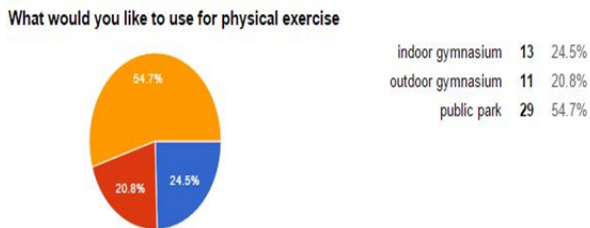


Fig. 6: Choice of physical activity for health benefits

The survey indicated the following facts

- 50 % of the people had a landscaped area or a garden in reach.
- 42 % of the residents were dissatisfied with the development around their houses and expected a better planning, design and maintenance of the surroundings in terms of better drainages, more open spaces, public parks and jogging tracks, better planting and more amenities for physical activity
- 14% felt that breathing issues and problems could be solved if adequate usable green spaces could be provided.
- 48 % felt that obesity and stress could be avoided if proper landscaped spaces were provided and more sports activity could be promoted.
- 10% People felt that adequate green environment gave comfort from loneliness and monotony

- 10% felt that good landscape open spaces increase the immunity from diseases and improved concentration in children.
- 12% benefited by availability of fresh fruits and vegetables from the garden

The survey clearly shows that the city dwellers appreciate and understand the perceptible and imperceptible benefits of open space and gardens, on their health.

4. UNBUILT ENVIRONMENTS IN PAST AND PRESENT

History tells us that the cities were bustling places interspersed with serene calm gardens, organized streets and forested lands or orchards. Although gardening and development of open spaces occurred right from the Harappan civilization in India, the importance of gardening has travelled through the time. Organized gardens with concepts of “Char Bagh” lead us to have monumental gardens like Nishat Bagh, ChameShahi, Shalimar Bagh, Pinjore gardens as good examples of the structured Mughal gardens. These gardens and all the individual gardens had a great impact on the people activities. The characteristic of these gardens consisted of large open structured gardens with water bodies. There were walks around the park with clusters of native large trees that provided shade also. There were orchards and forested areas as well. [2] The orchard connected the people emotionally to the nature when they saw the fruit bearing trees. The garden promoted the small ecosystems and flora fauna flourished. Personal gardens imbibed a healthy feeling in mind and body. It was considered a good exercise and refreshing to have walks in gardens buzzing with birds and butterflies. Kids had privilege to climb trees and be amidst nature. Backyard vegetable gardens provided ample fresh organic vegetables that were healthier. The level of physical involvement with nature was extremely high and tremendously beneficial to the health of the residents.

During the 19th and 20th. century, focus and development shifted to the public open spaces, where wide streets with avenue trees, public plaza and fountains adorned the city. Lutyens Delhi and Le Corbusier ‘Chandigarh reflected such planning and were appreciated well. Social interactions improved since many places became favorite day activity and picnics destinations. In Delhi, many public parks like Nehru Park and Buddha Jayanti Park had many recreational activities planned within them.

Today as the cities slowly grows into Megacities with tall structure, busy highways and gentrification of central business districts, the openness and the greenery is fast depleting. This has led to a massive infrastructure development and reduced green pockets. Large land parcels are now turning into parking lots, roads and amenity areas. Pollution levels are alarmingly high. The unbuilt spaces in most developing countries are struggling with the massive construction dumps and garbage

disposal issues. Lack of proper solid waste management has led to large landfill areas on the periphery of the city limits. The natural water bodies are shrinking into narrow garbage filled drains. At present the unbuilt spaces in megacities are turning into negative areas that are forcing people to confine to their built structures or commute in vehicles. The connection with the nature is fast breaking. These negative areas are adding to the health concerns, with a substantial rises of infectious disease especially in developing countries. The designed gardens in residential colonies which are the only respite for the resident are a mere eye wash. Built on 90% of basement tops, these are actually terrace gardens that do not added any substantial benefit to the nature. The trees over the basements are ornamentals and do not provide the necessary shade to reduce the heat island effects. The landscapes are heavily dependent on the irrigation adding to the woes of depleting water table.

5. DISCUSSION AND DIRECTION

Today we need to examine and understand the possibilities with which the unbuilt open spaces can be handled for the health benefits of the community. "Integrated landscape-led design has the power to transform a place into somewhere which is highly functional and has strong character and beauty." [1] The landscape profession can bring vision, imagination and technical rigor to a project, regardless of scale. At the highest level, landscape architects have direct influence on planning reform and environmental policy, where they have promoted new ways to make best use of the land.

The unbuilt spaces in a city can be categorized into

- Public realm projects that include the public plaza and parks, infrastructures like streetscapes, highways, green belts, water bodies and large forested areas or environmentally sensitive zones like wetlands.
- Semi Private use areas like developer parks and residential park, community gardens and park lots
- Private gardens.

Each of these areas needs to be designed sustainably to support the health and wellbeing of the people. The streetscape need to be optimized with well-connected and lit pedestrian pathways that are shaded with trees. Researches have proved the benefits that the trees in the urban scape provide. New York City which is one of the largest megacities, home to an estimated 8. 2 million people (US Census Bureau, 2006) is extremely urban in its environment but has ample trees and open spaces. The U. S. Forest Service completed a UFORE (now called iTree Eco) survey and analysis of NYC's entire urban forest in 1996, and estimated that it contained 5. 2 million trees. The most interesting findings were the environmental benefits the urban forest was delivering to New Yorkers. The urban forest worked to remove 1998 tons of air pollution each year at an annual value of \$10. 6 million. [7] This study suggested that urban tree

plantation enhanced the air quality and influenced the health of the city dwellers. It is also accepted that street trees have substantial restorative value. Considerable research has illustrated the capacity that 'nature' has, to aid recovery from mental fatigue, and this concept is extended to the urban forest. [6] The positive emotions needed to recover from mental fatigue were identified in response specifically to street trees by Sheets and Manzer [17] who found that "subjects reported more positive feelings when viewing tree-lined city streets; they felt friendlier, more cooperative, less sad and less depressed." Street trees can have demonstrable effects upon other aspects of human health and wellbeing. [11] In lieu of the above researches, we can conclude that a set of trees in the urban setting would aid in the health of the resident community. In addition to the street trees, the green belts and other government lands could be developed into orchards which in turn create environment to sustain the native ecology. Opportunities of camping grounds and excursion sites could be integrated with the green belts and buffer greens to stimulate environmental benefits and public health.

Similarly the gardens and parks in the walkable ranges of the people is likely to improve the physical and mental health. Research paper on "Health effects of Viewing landscapes" [13] quantifies the effects of various types of landscape elements. The study identified the landscape types used in environmental psychology studies that examine the effects of visual exposure to such landscapes on human health. Although the landscapes used in such studies were described loosely and in coarse categories, mainly reflecting a broad "nature" versus "urban" dichotomy, it provided a positive direction to emphasize the development of the open spaces. [13] Findings from several studies have converged in indicating that simply viewing certain types of nature and garden scenes significantly ameliorates stress within only five minutes or less. [22]. Considering the pressure on land and growing urban sprawl, it is indeed a challenge for the planner to identify the land for public parks. Few case studies show how the reclaimed sites were utilized to develop and enhance the areas for the welfare of the common people resulting in betterment of their health. Looking at case study of Eden park in London, Land Use Consultants (LUC), the landscape designer and master planner of Eden, created 'the living theatre of plants and people', and saw the potential to realize something special within a former china clay pit. They positioned the buildings and designed the bold new landforms to balance the cut and fill. Their landscape design is 'of the site'. The quarried-out pit was spiraled with mining tracks and a mass of incoherent shapes, whose memory was used to transform a big, ugly hole into a legible place. [12].

The redevelopment of the New York City Highline created a healthy landscaped area within a dense city by assimilating an old infrastructure setup of railway track. This has attracted a good amount of foot fall with people taking a mile long walk or just enjoying the sun on the day beds amidst nature.

Taking cue from above case studies, the public gardens have to be designed such that they reduce the stress levels of the individuals. Therapeutic gardens or restorative gardens that have been prevalent in history need to be integrated in today's planning. "While designing gardens, it is important to note that sunlight can have distinctly healthful influences on many patients, but negative effects on others. In one study, 25% of the people interviewed in healthcare gardens mentioned sunlight as a garden quality that helped foster improved mood and restoration (Cooper Marcus & Barnes, 1999). Sunlight also plays a key role in enabling humans to benefit from intake of vitamin D. Gardens tend to ameliorate stress effectively if they contain verdant foliage, flowers, non-turbulent water, park-like qualities (grassy spaces with scattered trees), nature sounds such as birds, breezes, and water, and visible wildlife[20]). Incorporating these features into a garden, in concert with information about garden uses and users, will provide restorative benefits to garden users. Research-based evidence exists to show that there are four restorative components that can reduce stress and thereby improve other health outcomes. The semi-private parks developed within gated colonies should focus on having distinct zones or areas that provide the following restorative components.

- **Social support:** Social support could come from the interactive public plaza, town squares, landscape seating that promote interaction amidst users.
- **Sense of control:** The sense of control can happen when the unbuilt spaces are organised, neatly planted, human in scale and provide a sense of security.
- **Physical movement and exercise:** The physical movements and the exercise can be encouraged by provisions of play courts and outdoor activity zones, jogging and cycling tracks and skate parks and roller blade rinks.
- **Access to nature and other positive distractions:** The access to nature and other positive distraction should target at creating sustainable and ecologically friendly nature reserves that sustain the flora and fauna of the region. The use of water ponds, reflecting pool and geysers in the public parks can also add to the much needed link with the nature. [4]

The private gardens should have in addition, vegetable gardens where the physical activity can be integrated with a profitable and satisfying vegetable produce. Such products are organic, free from pesticides and healthier for the consumers. As concluded by research having a garden of your own or a garden immediately adjacent to your apartment has a significantly positive impact on stress. With respect to stress reduction, having your own verdant garden seems to be more important than visiting urban open green spaces. [21]In high-rise apartment buildings resident are being encouraged to create green terraces and vertical gardens to achieve that proximity to the greens. Container gardens and hanging

gardens are often added as visual treats that contribute to the health of the user. Community parks and community vegetable patches create many opportunities for social comfort, exercise and positive distraction.

Activities and provisions to promote physical and sporting activities need to be provided. To promote cycling, adequate cycle tracks should be provided. Large public parks and smaller pocket parks should have multiactivity play systems for kids and outdoor gymnasium equipment's. Found in a research, 70% or more of participants find exercising outdoors is more beneficial for health than exercising indoors, 80% of participants find exercise more enjoyable when outdoors than indoors. [5].

6. CONCLUSION

There has been a fair understanding of the impacts of the unbuilt spaces on the public health. We need to integrate these spaces with the built forms so that they provide similar comfort and health benefits. Studies have proved that these open spaces are essential for the physical social and mental health and hence appropriate directions and approach may be made during city planning and detailed planning to help the community to achieve a healthier lifestyle. Megacities need to reclaim waste lands and transform them to more attractive landscape spaces in terms of viewing, experiencing generating revenue and environmentally responsive areas that eventually lead to a healthy community.

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