

SMARTGREEN URBANISM: Ahmedabad City's Perspective

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Abstract—This research aims at understanding the significance of green spaces in the city we need to identify the three types of spaces which are primarily Lakes, waste lands or scrub lands and urban agriculture. These help in a number of ways like flood control or even draught, improving the environment and also the quality of life. The existing green spaces are also to be looked into for conservation and up-gradation along with the understanding of the eco system.

For Re-establishing the concept of green spaces development and management, with greater dependence on smart local community participation, with concern on the livability of local environments, a greater emphasis on creating public spaces for people is required to enjoy the city of the future, to be sustainable.

1. INTRODUCTION

Green Urbanism as can be perceived from the terms relates the green of the city, town or even the local community with the urbanizing effects. Beatley, in his revolutionary book 'Green Urbanism: learning from European cities' has mentioned that the vision of green urbanism includes the programs, policies and creative design ideas for urban renewal and environment sustainability. According to Beatley, cities that exemplify green urbanism are:

- Cities that strive to live within their ecological limits, fundamentally reduce their ecological footprints, and acknowledge their connections with and impacts on other cities and communities and the larger planet.
- Cities that are green and that are designed for and function in ways analogous to nature.
- Cities that strive to achieve a circular rather than a linear metabolism, which nurtures and develops positive symbiotic relationships with and between its hinterland (whether that be regional, national, or international).
- Cities that strive toward local and regional self-sufficiency and take full advantage of and nurture local/regional food production, economy, power production, and many other activities that sustain and support their populations.

- Cities that facilitate and encourage more sustainable, healthful lifestyles.
- Cities that emphasize a high quality of life and the creation of highly livable neighborhoods and communities.

The world is fast moving towards being urban where more than 50% of the world population will be living in the so called urban areas where the people will have all the infrastructure and facilities. These urban spaces are growing without any discretion and forms. In this respect the old heritage cities or places which were also dense in the built form are losing their identity and the heritage is at stake. The more people pour in in these places the more pressure is created on the infrastructure and the Quality of living and in turn the sustainability of these cities or towns is at stake. More pressure is on the environment to survive as the ever increasing trend of urbanization is eating up the eco system. All these leads to the development of a more holistic and sustainable approach to the urban planning which leads to the concept of Green Urbanism or Eco-Cities, these are smart, sustainable and secure which fits into today's context of India where The Prime Minister of India proposed the making of 100 smart cities, out of which most of them will be brownfield development which makes the project even more challenging.

With increasing population and area comes the problem of pollution, infrastructure, sustainability, public transport, renewal energy, green and open spaces.. Green Network is focused on four dimensions: environment, health promotion, social commitment and occupational health and safety. Greenbelts make cities more livable, affordable and transit-friendly. Cities need to make their energy smarter: more efficient, reliable and green.

The open spaces may it be green or blue (lakes, ponds, etc.) are being encroached and built upon. This is hampering the environment and has to be addressed in a more holistic way to improve the quality of living.

Creating green is the call of the hour which may be addressed by terrace garden or creating the green spaces along the roads where bioswales can also be added to cater to the storm water during the monsoons. The lakes can be developed into large green pouches which go along with the nature and creating inclusive places. Networking these green spaces which is in accordance to the heritage of the place adds to the value.

2. BENEFITS AND TYPES OF OPEN SPACE

Green Space Types and Definitions		
Type	Definition	Primary Purpose
Parks and Gardens	Includes urban parks, country parks and formal gardens.	<ul style="list-style-type: none"> informal recreation community events.
Natural and Seminalural Greenspaces	Includes woodlands, urban forestry, scrub, grasslands (e.g. downlands, commons, meadows), wetlands, open and running water and wastelands.	<ul style="list-style-type: none"> wildlife conservation, biodiversity environmental education and awareness activities.
Green Corridors	Includes towpaths along canals and riverbanks, cycleways, rights of way and disused railway lines.	<ul style="list-style-type: none"> walking, cycling or horse riding leisure purposes or travel opportunities for wildlife migration.
Amenity Greenspace	Greenspace Most commonly but not exclusively found in housing areas. Includes informal recreation spaces, greenspaces in and around housing and village greens.	<ul style="list-style-type: none"> informal activities close to home or work enhancement of the appearance of residential or other areas equipped play areas
Provision for children and young people	Areas designed primarily for play and social interaction involving children and young people.	<ul style="list-style-type: none"> ball courts outdoor basketball hoop areas skateboard areas teenage shelters and 'hangouts'
Outdoor Sports Facilities	Natural or artificial surfaces either publicly or privately owned used for sport and recreation. Includes school playing fields.	<ul style="list-style-type: none"> outdoor sports pitches tennis courts bowls greens golf courses athletics tracks grass playing fields water sports facilities
Allotments and Community Gardens	Opportunities for those people who wish to do so to grow their own produce as part of the long term promotion of sustainability, health and social inclusion. May also include urban farms.	<ul style="list-style-type: none"> growing vegetables and other root crops <p>N.B. does not include private gardens</p>
Cemeteries & Churchyards	Cemeteries and churchyards including disused churchyards and other burial grounds.	<ul style="list-style-type: none"> quiet contemplation burial of the dead wildlife conservation promotion of biodiversity

A. Social benefits	B. Aesthetic benefits	C. Psychological	D. Economic	E. Structuring development	F. Ecological process
<ul style="list-style-type: none"> Interaction between man and nature, enjoyment, recreation etc. 	<ul style="list-style-type: none"> Preserve natural beauty; improve ugliness, buffering unpleasant view and disturbing spaces, visual relief from manmade cityscapes 	<ul style="list-style-type: none"> Maintain emotional well being 	<ul style="list-style-type: none"> Spatial improvements are linked to cities economic future through development. 	<ul style="list-style-type: none"> Buffer between conflicting land use 	<ul style="list-style-type: none"> Adequate amount of carefully located spaces are necessary for the improved management and use of our essential natural resources, air and water

3. METHODS/ IDEAS

A sustainable green city is primarily based on the pillars of urban planning and transport, water and biodiversity, energy and materials and socio-cultural features. And for creating a smart city the major components that are to be considered are Smart living, Smart people, Smart energy, Smart mobility, Smart environment, Smart economy and smart governance. The green adds to the locality in a number of ways whose catchment is even broader than imaginable. The green spaces

can cater to reduce temperature, encourage walking or even bicycling, acts as a screener for storms or winds, provides shades, increases the aesthetic value of the place and in turn adds to economy generation, recharges ground water and also binds the soil so that the soil is not lost or even stops landslides, food is also produced, cuts off noise and acts as noise screener, cuts off ultra violet rays, purifies the air and gives fresh air to breath, improves health of people and absorbs greenhouse gases .

4. AHMEDABAD CITY ANALYSIS

Ahmedabad is having an area of 464 sq. meters and located at an altitude of 49 meters. The climate is hot and dry type. The old city which is walled city was the old Ahmedabad but its ever increasing facade is reaching the villages now. A number of people co-exist here who belongs to different religion, caste and creed. They are losing the sense of place because of urbanization. The city is fast urbanizing as is evident from the increasing municipal area. The sub urban have been recently taken into the municipal area. But the major concern which lies is the ever decreasing green spaces. The people are losing their share of openness. The overall condition of Ahmedabad is depleting in terms of green open spaces. Though there are a few mill lands lying vacant but those have not been developed into something like inclusive playscape. The roads are full of private vehicles and trees are less. The lack of community level parks is easily noticed. The lakes for which Ahmedabad was previously known are getting extinct in the hands of Urbanization. In 2001 there were 137 lakes but there are only 72 lakes left now. Some of being encroached others being built upon, which happened due to the lack of regulation and awareness. The social Inclusion is also hampered because of the lack of spaces where people can interact or feel equal. The reduction in green cover also gives rise to the increased carbon footprint. The proposed DMIC corridor passes through Ahmedabad which makes it at high potential for environmental hazard but also have a potential of increase in economy.

List of Initiative taken by various agencies for Enhancement of Urban Green Spaces.		
Issue	Initiatives	Initiative taken by
Lack of tree cover or canopy within city. Scheme of motivating for tree plantation.	Canopy Plantation -A Livelihood Enhancement Programme with Forest Conservation. Purpose & priorities of the initiative strengthening the people forestry linkages.	State Government Initiative

Maintenance of existing Parks	There are about 100 parks in the city of Ahmedabad. Private agencies like Mother Dairy, Amul and Dairy Den work on leasehold basis with the Corporation for the development and maintenance of these parks. In turn, they grim through their profit margins from advertisements and sale of their products.	Private Agencies Initiatives
Identifying statistics of tree through Tree Census. (1 tree for each 9 Amdawadi's)	For its 60 lakh citizens, the city has only 6.17 lakh trees. Number of trees in the city increased from 3.48 lakh in 2005, to 6.17 lakh primarily due to the inclusion of new areas within city limits. Central zone with areas like Jamalpur, Kalupur, Madhupura, Girdharnagar, Dudheshwar, has the least number of trees at 30,584. Zone wise no. of trees West Zone – 1.12 lakh South Zone – 1.05 lakh North Zone – 86,524 East Zone – 85,858 Rapidly turning into a construction jungle, needs around 24 lakh trees to get 15% green cover, says (AMC)	Initiative by AMC
Lack of trees as a Buffer zone in Industrial Premises of Ahmedabad City.	Ahmedabad: Synthetic trees insertion in Industrial area a invention by club of Gujarat Science City .Gujarat, which is industrially advanced, needs synthetic trees to increase the oxygen level in its polluted cities. These 'trees' absorb carbon 1,000 times faster and release oxygen.	Initiative by club of Gujarat Science City
To increase per capita green space for Ahmedabad Citizen by 3 sq.m./ person	Sabarmati River Front Development: The Riverfront Development reclaims the banks of the Sabarmati, making the entire stretch of river publicly accessible. Land reclaimed by riverfront development will largely be allocated for free and open public use; more than 85% of riverfront land will become public infrastructure, recreational parks, sports facilities, and vast new gardens.	Initiative By AMC

- Materials used for construction has to be reviewed so that it dosent harm the environment

At present, AMC and AUDA manage parks and open spaces within their respective jurisdiction. AMC has a dedicated parks and gardens department which looks into the implementation and maintenance of parks within its administrative boundaries. AUDA has environment department that does the implementation within its administrative boundaries. Maintenance of existing parks and open spaces is as important as increasing provision of new parks and open spaces. Broadly, some of existing parks and open spaces are in need of up gradation / refurbishment. Ideally, a quality audit should be carried out for each Individual Park and open space to correctly assess the usability of this amenity. Presently, AMC has dedicated funding allocated for maintenance of parks and open spaces within its administrative boundaries. AUDA has no dedicated funding allocated for the implementation and maintenance of parks and open spaces within its boundaries. AUDA has formed partnerships with the private sector for the implementation and maintenance of parks and open spaces within its boundaries.

5. CASE STUDIES

Case Study: BANSIDHAR GARDEN, VASNA, Ahmedabad

Bansidhar garden measuring 5 acres is situated on final plot no. 226+227 of Town Planning Scheme no. 22 (Vasna-south). The area included in Town Planning Scheme no. 22 is on the western bank of river Sabarmati in the southern part of west zone of Ahmedabad Municipal Corporation. The plot of Bansidhar Garden is surrounded by totally residential development of higher middle class to higher class. This area is developed as a exclusive residential pocket since last twenty to twenty five years. The plot for the garden is rectangular in shape with T.P. Roads on east and west. Its northern and southern boundary shared by residential societies.

Development of the garden

The Parks and Garden Department, AMC have developed Bansidhar Garden before fifteen years. As there is no landscape designer or Architect in the department; senior officers of the department have prepared the design of the Bansidhar Garden like in the case of all gardens developed by department. In 1997-98, the boundaries along the roads on north and south were renovated by constructing compound wall up to the height of two feet from the ground level and fixing chain-link fencing on the compound wall. The aim of providing chain-link fencing was to offer a picturesque view of garden from the outside. Also the inner part of the garden redeveloped by dividing the plot in six parts. Earlier it was divided in more than fifteen smaller pieces, which was creating difficulties in cutting the lawn by machine. The main entrance of the garden is in the middle of the eastern

The city can be revived in terms of green by implementing the following and hence move Ahmedabad towards being smart:

- Planting trees along the roads and making it mandatory. Involvement of communities for maintainence can also be promoted
- Small size trees in the road dividers to cut off noise and decrease pollution and addition of bio swells to purify storm water and directing them to lakes will be an added advantage.
- Making it mandatory to plant trees in every open spaces be it parking or space between two buildings
- Where space is not available roof top gardening has to be carried out

boundary. There is also one wicket gate on the rear boundary, so that visitors can enter from both the sides of the garden. About ten meter wide strip along the side boundary is kept for the afforestation in which half of the plot is provided for children's playing equipments. A beautiful water fountain surrounded by attractive flowering plants is constructed in the middle of the central lawn plot. A jogging track has also been provided along the periphery of the central lawn area. Due to decay of the old playing equipments, new playing equipments for children are installed in the play area. A nice sitting platform covered by R.C.C slab (gazebo) is constructed in the central part of the garden, in which cement concrete benches are provided. Earlier water was directly supplied from the nearby tube well station. The supply of water was inadequate. Recently before two months new bore was constructed in the garden, which provide water supply to the garden. A drinking water stand at the left of the entrance gate has also been constructed in the garden recently from the budget allocated by local MLA. Some seating benches are also provided from the budget of Councilor and MLA. There are four gardener and labourers in the garden for the maintenance of the garden. Security is provided round the clock for the safety and security of the visitors as well as playing equipments, plants and other furniture of the garden.

RESULTS ACHIEVED

- It has been emerged as a getaway for the people living nearby yearning to get a good place for relaxation and recreation.
- Though there are some issues towards the maintenance and under development of the garden, it caters to hundreds of children, health conscious people and elders for jogging, yoga and laughing exercise in the morning and recreational, leisure and playing activities in the evening.
- It is mostly used by the people from the surrounding residential societies and they feel as a garden in their courtyard.

LESSONS LEARNT

- Municipal Corporation can provide good garden on its own.
- If Municipal Corporation can bring fund from the budget of Councilor, MLA or MP that can be helpful in the provision of additional facilities in the garden.
- Without involvement of architect or landscape designer it is difficult to achieve better result in the field of garden designing, which is very important in the present context.

Case Study: CHANDRASHEKHAR AZAD GARDEN, Ahmedabad

RESULTS ACHIEVED

- Since its formation this garden is extensively used by different groups of people.

- It provides opportunities for socializing, to relax, to play and to keep fit by jogging and Yoga to hundreds of people from its surrounding.

- It was maintained by annual maintenance contract.

6. LESSONS LEARNT

- The initiative of contract system for the maintenance of gardens can give good result where human resources are inadequate.
- The activities being carried on contract basis, ULBs can monitor the process strictly and terminate the contract if the work carried out is not satisfactorily.
- Contract system requires strict monitoring to achieve better results.

Case Study: ASHWINI PARK, BODAKDEV, Ahmedabad

Ashwini Park is situated on final plot no. 260 of Town Planning Scheme Bodakdev no. 1/B. The area of Ashwini Park is 3873 sq.mt. Town planning Scheme Bodakdev no. 1/B covers the area on east of Sarkhej !Gandhinagar Highway surrounded by Town Planning Scheme Vejalpur no. 6 on south, Town Planning Scheme Vastrapur no. 1 on east and Town Planning Scheme Thaltej no. 2 on north. The surrounding area of Ashwini Park is developed almost as a residential area of upper middle class to upper class people. It is on the junction of 12 mt. wide T.P.Scheme roads.

Strategies adopted

For the day-to-day maintenance of plantation and landscaping of the garden, along with regular watering, security of the park and maintaining healthy environment in the park, AUDA has made the agreement for partnership in September 2002 with leading co-operative organisation Mother Dairy (AMUL) for the maintenance of 25 gardens situated at different location in AUDA area. Ashwini Park is one of these 25 gardens maintained by Mother Dairy. Salient features of the contract according to the agreement are:

Sustainability

In order to sustain the garden maintenance, the Mother Dairy was desirous of constructing a booth within the garden plot to store and sell whole range of products being marketed by them, from this Booth. To support the financial viability of the garden maintenance, AUDA agreed to permit Mother Dairy to construct a Booth in the garden at a place mutually decided and agreed upon by both the parties for storing and selling the products from this Booth.

Ownership Rights

Mother Dairy is permitted access to the garden plot for the purpose of beautifying & maintaining the garden and using it for storing & selling their products from the booth in the garden to the public. This permission does not create any

tenancy or proprietary rights or any other interest in the garden, which remains continue to be of the exclusive ownership, control and possession of the AUDA.

Duration

The duration of partnership is for five years. At the end of the fifth year, the same can be extended, if mutually agreed.

Approval and construction of kiosk

Mother Dairy submitted a detailed plan of kiosk to AUDA for the approval and they are responsible for the complete construction of the kiosk. They are not allowed to do any sort of construction within the garden without approval of the Chief Executive Authority, AUDA. For the purpose of implementing the plan, Mother Dairy can take financial and administrative support from other persons and also employ experts for implementing the same. However, AUDA holds the Mother Dairy responsible for the compliance of agreement and all such action by other persons is the exclusive responsibility of the Mother Dairy.

Maintenance of garden

Mother Dairy is exclusively responsible for the construction of Milk Booth and maintenance of the garden and they have to bear all the capital and recurring expenses as may be required. They have to manage for supply of water & electricity for maintenance of the garden. Protection and maintenance of all the above facilities in the garden is the sole responsibility of the Mother Dairy. Mother Dairy has to ensure that the garden is improved both in visual terms as well as agronomical / horticulture terms. They have to ensure that the quality of grass in the garden is upgraded and it is well groomed. The hedges have to be maintained in a symmetrical well-defined manner. The flowerbeds have to be properly maintained and good quality seasonable flower plants are to be grown and landscape of the garden as well as the walkways are to be improved, as also the landscape sitting arrangement within the garden. The garden should be kept spotlessly clean and should have the provision of adequate number of litterbins. Modern infrastructure for substituting flow irrigation with sprinkler irrigation should also be introduced in a phase manner to ensure economy in energy cost in water consumption and maximizing productivity. The basic idea is to ensure that the aesthetic as well as the ambience inside the garden get upgraded and garden become an extremely beautiful and nice place for the citizen of Ahmedabad to come, shop, relax and enjoy. AUDA intends to develop this project to promote environment, development activities and increase recreational facilities for children and common mass. AUDA has provided a small level amusement park for children as a part of garden development. Mother Dairy has to maintain the same including repairing whenever require as well as coloring every year. Mother Dairy has to ensure that the garden is open to the entire public during its visiting hours without any discrimination of cast, creed and religion. The visiting hours

are 6.00 am morning to 9.00 pm night, with recess time between 2.00 pm to 4.00 pm.

Legal aspect

Mother Dairy has to ensure compliance with all requirements of law and also with the agreement. They should take proper safety precautions for the use of facility or any other service provided in the garden. If Mother Dairy wants to get relieved of the responsibility of maintenance of garden, it will have to submit notice, three months prior to the date of stopping the work of maintenance of garden. If at any point of time, AUDA comes to the conclusion that there is a breach of the agreement or that for any other reason, it is expeditious in public interest to revoke the arrangement, it will be entitled to do so without paying any compensation whatsoever to the Mother Dairy. In case of legal dispute arising between AUDA and Mother Dairy, Ahmedabad is the jurisdiction.

RESULTS ACHIEVED

- The innovative model of such type of partnership for the maintenance of public gardens has been proven effective in AUDA area.
- Residents of Bodakdev area get the beautiful well-maintained gardens in their neighborhood.

LESSONS LEARNT

- Maintenance of public gardens can be sustainable with such type of partnership model.
- ULB can minimize recurring expenditure for the maintenance of public gardens through public-private partnership approach.
- ULB can act as facilitator for the maintenance of public gardens.

7. SMART CITIES

Smart cities can be categorized in three flavors:

1. New Cities Built Smart from the Start(Greenfield):Like Songdo in South Korea or Masdar City in Abu Dhabi, these are purpose-built, designed to attract businesses and residents with a master plan that uses IT systems to deliver world-class services.
2. Existing Cities with Retrofits and Upgrades(Brownfield):Cities like Manchester, U.K., and Monterrey, Mexico, are using technology-based initiatives to create new economic opportunities, improve education and ultimately retain and retrain their populations.
3. 'Non-Cities': Non-cities can be campuses, company towns and even amusement parks. The Saudi Aramco national oil company, for example, provides extensive services to

its 350,000 employees, including public safety, education and healthcare.

8. CONCLUSION

Quality of Life of Ahmedabad city can be Improved to more livable and environment friendly along with inclusive and sustainability in mind. Ahmedabad may revive as a green city where the rush for building might consider the foremost need of greeneries at every available nook and corner of the city, where buildings could be mimicked as pavilions in a garden. Moreover the latest trend of being enlisted in the smart city list also pushes the boundaries to build another model of smart city where the prospect is on green urbanism, thus not only on the IT sector but also taking the nature along. The greenery-based conceptual model with green urbanism thus can be implemented to secure a healthy sustainable future for the urban populations of Ahmedabad as well as other cities in Gujarat and can be extended to whole of India.

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