



## GREEN CITY DEVELOPMENT

<sup>1</sup>Ar. Ketu Patel, <sup>2</sup>Ar. Meera Chatwani, <sup>3</sup>Ar. Mayank Patel

<sup>1</sup>Student of Master's in Urban & Regional Planning, <sup>2</sup>Professor & Dean, <sup>3</sup>Assistant Professor

<sup>1</sup> Institute of Architecture,

<sup>1</sup> Hemchandracharya North Gujarat University, Patan, Gujarat, India

**Abstract:** India's contribution towards unsustainability is very low as compared to other major contributor countries. But the challenges persistent to the rapid urbanization in India and the huge share of global population can threaten the global sustainability. So there is a need to ingrain sustainability in India.

The paper tries to put forth the need of the sustainable urban development in India. The urbanization in India has led to (un)sustainable situation. It provides the proven benefits of economic growth and development, but it also brings the social and environmental challenges.

Various challenges associated with sustainability, spatial planning, governance, deficiencies and execution has been discussed in this paper. As challenges lie in the ability to cope, the later part of the paper confers the sustainable development approaches in India.

It has been studied under the antecedent of legal provisioning, various policies and programs, institutional arrangements, technological solutions, frameworks and measurement systems for a better present and future.

**Index Terms – Introduction, Green City, Proposal, Conclusion.**

### I. INTRODUCTION

India has seen a great transformation after independence and the pace of the development increased in last two decades. There is a shift from the traditional rural community to the modern urban community resulting in the urban drift. This rising urbanization comes with the benefits of economic development. Urbanization is closely related with industrialization; modernization and rationalization (Urbanization).

Urban centers are the places of opportunities, knowledge banks, innovations, creativities and their commercialization. They pull the human capital and talent for the economic sustenance. Beyond economic growth, urbanization can also give rise to social equity by eroding the distinctions between caste and creed which is strongly present in rural society (Ramanathan). 1990's sectoral reforms across various sectors (industries, agriculture, investment, trade, infrastructure, banking and finance) opened up India's market to international competitions.

This expanded domestic capital markets, eliminated barrier to trades resulting to 5.7% growth rates during 1991-2000 and 7.2% during 2001-2010. However, rapid urbanization is unsustainable as it brings social and environmental challenges. Urban areas are exploiting resources at high par.

Unplanned urban growth causes strained infrastructure, growth of slums, environmental degradation, traffic problems and high cost of living. India's huge population, vast and diverse land mass and poverty induced rural-urban migration has put up burden on the administrative leaders, policy makers and planners, which in turn leads to the inadequate governance. To overcome the challenges, the path of intelligent and sustainable urban development will drive the economic growth which is socially inclusive and environment friendly.

India has already stepped in evolving a framework for sustainable development. The latter part of the paper highlights legal provisioning, various policies and programs, institutional arrangements, technological solutions and measurement systems for a better present and future.

### 2. GREEN CITY

#### 2.1 The Indian Green Building Council (IGBC):

##### About

The Indian Green Building Council (IGBC), part of the Confederation of Indian Industry (CII) was formed in the year 2001. The vision of the council is, "To enable a sustainable built environment for all and facilitate India to be one of the global leaders in the sustainable built environment by 2025".

The council offers a wide array of services which include developing new green building rating programmers, certification services and green building training programmers. The council also organizes Green Building Congress, its annual flagship event on green buildings.

The council is committee-based, member-driven and consensus-focused. All the stakeholders of construction industry comprising of architects, developers, product manufacturers, corporate, Government, academia and nodal agencies participate in the council activities through local chapters. The council also closely works with several State Governments, Central Government, World Green Building Council, bilateral multi-lateral agencies in promoting green building concepts in the country.

## 2.2 Scope of IGBC Green Cities Rating System

Projects shall meet the following criteria to qualify for IGBC Green Cities Rating:

1. Any upcoming large scale Development (Greenfield Development or Brownfield Development or Combination) with a minimum area of 250 Ha and minimum gross population density of 125 persons per hectare (pph)
2. The city shall generate employment opportunities (direct and indirect employment) for at least 20% of the total population
3. The city shall have following social infrastructure facilities:
  1. Education facilities
  2. Healthcare facilities
  3. Socio Cultural facilities
  4. Recreational facilities
  5. Sports Facilities

## 2.3 Benefits of Green Cities

### Efficient Land Use

Green Cities promote effective land use by encouraging land use mix and higher densities to ensure compact development. These planning concepts are gaining prime importance offering multiple benefits as mentioned below:

- Higher density and compact development
- Promote transit oriented development
- Preservation and Restoration of Water Bodies & Eco-sensitive zones
- Offer a variety of housing typologies
- Reduces distances between home and workplaces
- Pedestrian and bicycle-friendly environments
- Enhanced community bonding in neighbourhoods

### Efficient Mobility

Green City increases opportunities for bicycling, pedestrian friendly network, reduction in the number of automobile trips, promoting public transportation and use of vehicles with alternative fuels. In a nutshell, efficient transportation planning enable cities to accommodate all modes of travel, including walking, bicycling and public transportation which are vital parts of reducing the carbon footprint in cities.

### Efficient City Infrastructure

Efficient use of infrastructure limits the usage of natural resources by incorporating best practices such as:

- **Water Efficiency:** Green City would result in potable water savings to the tune of 30-40% by adopting practices such as rain water harvesting, treatment & reuse of waste water, storm water management, etc.
- **Energy Efficiency:** Power generation using various renewable energy technologies and Green concepts can significantly reduce the power supply demand of the city leading to energy savings to the tune of 20-30%.
- **Solid Waste Management:** Waste management in Green Cities takes into account planning and implementation of efficient systems for collection, transportation, treatment, recycling and reuse or disposal of municipal solid waste. Green Cities aim to achieve zero waste discharge to landfill sites.

### Enhanced Quality of Life

Reduced commuting time, accessible recreational spaces, increase in green cover, continuous environmental monitoring shall enhance the quality of life thereby making the city healthier and liveable.

## 2.4 What Is a Green City?

A green and sustainable city is a community of residents, neighbours, workers, and visitors who strive together to balance ecological, economic, and social needs to ensure a clean, healthy and safe environment for all members of society and for generations to come. The green city means a way to increase the sustainability of urbanized areas.

It is a concept of urban planning relying on the ecosystem services that green infrastructure can supply. In essence, this concept includes the characteristics of all the urban concepts described previously (city meeting with nature, restoring the values of urban ecosystem, minimizing resource and energy consumption, and taking advantage of the ecosystem services of the blue-green natural components.

## 2.5 Why Become a Green and Sustainable City?

To ensure a viable future, the City must take a leadership role and address the impacts placed on the environment by urbanization and a growing. These impacts include air and water pollution, climate change, and habitat loss.

A green city improves the environment, ensures rich biodiversity, reduces air pollution, ensures water storage, dampens noise and help cooling down in warm periods. Green is also essential for a climate-proof and sustainable environment.

## 3. PROPOSAL

### Dholera Green City, Gujarat

What Is Dholera Sir?

Dholera Special Investment Region (DSIR) Is A Greenfield Industrial City Planned and Located Approximately 100 Km South West of Ahmedabad. The Government of Gujarat Has Created a Legislative Framework for The Formation of a Special Investment Region Act 2009. Under The Act, A Regional Development Authority for DSIR Has Been Established.

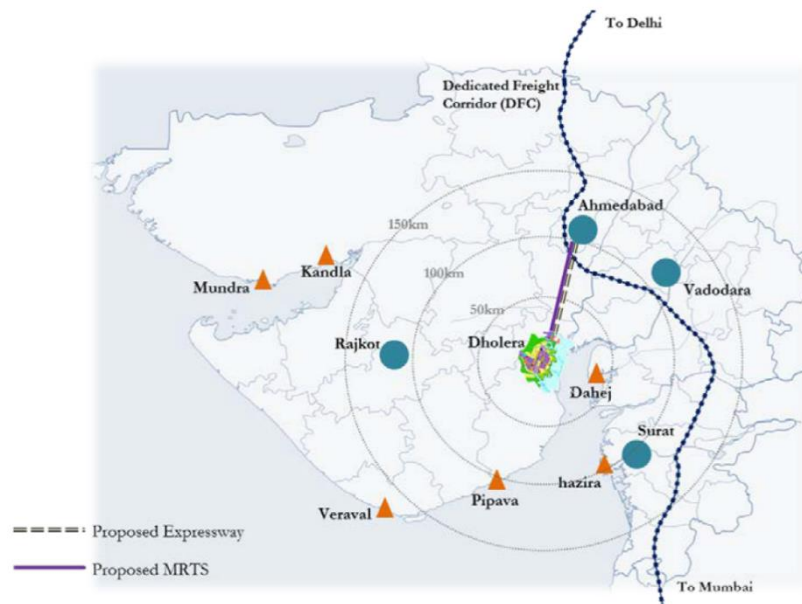


Figure 1.0

### 3.1 Project Background – DSIR Phase I

The Development Plan for DSIR has been prepared and sanctioned by DSIRDA. Phase-I constitutes TP1 and TP2 covering 153 sq km.

Apart from urban development, overall trunk and external infrastructure will be developed to support the development at DSIR. These include the following:

#### Overall Trunk Infrastructure Projects

- Roads and services/utilities
- Raw water transmission line from source
- Wastewater treatment and recycle
- Solid waste management
- Power T&D network
- Information Communication Technology (ICT) network
- Administrative and Business Centre of Dholera (ABCD)

#### External Infrastructure Projects

- River bonding for flood management
- Ahmedabad – Dholera Expressway
- Ahmedabad – Dholera MRTS
- Freight rail from DSIR to Bhimnath for connection to DFC
- Dholera International Airport

Dholera's immediate City development area of approximately 5,600 acres is expected to be operational by 2019, while the full city is expected to be developed by 2030.

Dholera Industrial City is envisaged to be a world-class destination with excellent infrastructure. The city will provide opportunities for the setting up of manufacturing units, which will in turn help in increasing the industrial output of the country and create jobs (800,000+). All of this, while aiming to provide an environment to work, live, learn and play. Dholera SIR is a planned smart, sustainable community, which will be the role model for future cities in India. The Sanctioned Development Plan of Dholera Industrial City comprises of a total land area of 920 sq km.

The 920 sq km of the Dholera Industrial City area has a total developable area of about 580 sq km since one third of the area falls within the Coastal Regulation Zone (CRZ) boundary where development is restricted and is as per CRZ norms. Out of the 580 sq km the prime agricultural land has been preserved and a total area of about 422 sq km has been set for urban development, which has been translated into six town-planning schemes and will be developed in three phases over a period of 30 years.

### 3.2 Connectivity Infrastructure

#### Rail

MRTS is planned which will connect DSIR with Ahmedabad

Dedicated Freight Corridor (DFC) is 1.5 hours from DSIR

Dholera Railway Station proposed in DSIR

#### Road

Currently, two lane State Highway being expanded to 4 lanes

A dedicated 6 lane access controlled expressway connecting Ahmedabad & Dholera is proposed and design work has been completed for the same

### Air

Proposed Dholera International Airport will be located in close proximity to the Northern boundary of DSIR Environment Clearance from MoEF and site clearance from MoCA have been obtained for developing an International Airport at Dholera

Bhavnagar Domestic Airport and Ahmedabad International Airport are 2 hours from DSIR

### Sea

Pipavav is the closest port to DSIR, which is approximately 200 km away

Pipavav has a range of cargo handling capabilities such as Container, Bulk, Capital Goods, Liquid, Gas, etc.

DSIR is also well connected to the major ports of Mundra and Kandla

## 3.3 Project Highlights & Opportunities

### Dholera Sir: Highlights

- A self-governed economic region enjoying full support of the government and full potential for private sector participation
- Logistic support of the Delhi-Mumbai Dedicated Freight Corridor linked with efficient rail and road network.
- To be linked with Ahmedabad city by Metro Rail System
- Proximity to sea port, closeness to international airport
- Premium civic amenities
- Close to Gujarat International Finance City (GIFT)
- Close to Petroleum, Chemicals & Petrochemicals Investment Region (PCPIR)
- Autonomy in operations
- Flexibility in decisions
- Single window clearance
- Dispute Resolution mechanism

### Opportunities in Sir

- To build industrial parks, townships, knowledge cities
- In building its infrastructure: road, rail, healthcare, water, sanitation, tourism, and hospitality
- Set up a metro rail system and a international airport
- Potential for development as a multi-modal transportation hub due to lesser distance to all the northern Indian States.
- Build a world-class transport service foreign markets

## 3.4 Development Plan

The Draft Development Plan aspires to build a modern metropolis with world-class infrastructure and a high standard of living that is both economically and socially balanced. This strategy's cornerstones are the application of a sustainable approach to critical areas like transportation, waste recycling, general urban form, and resource efficiency.

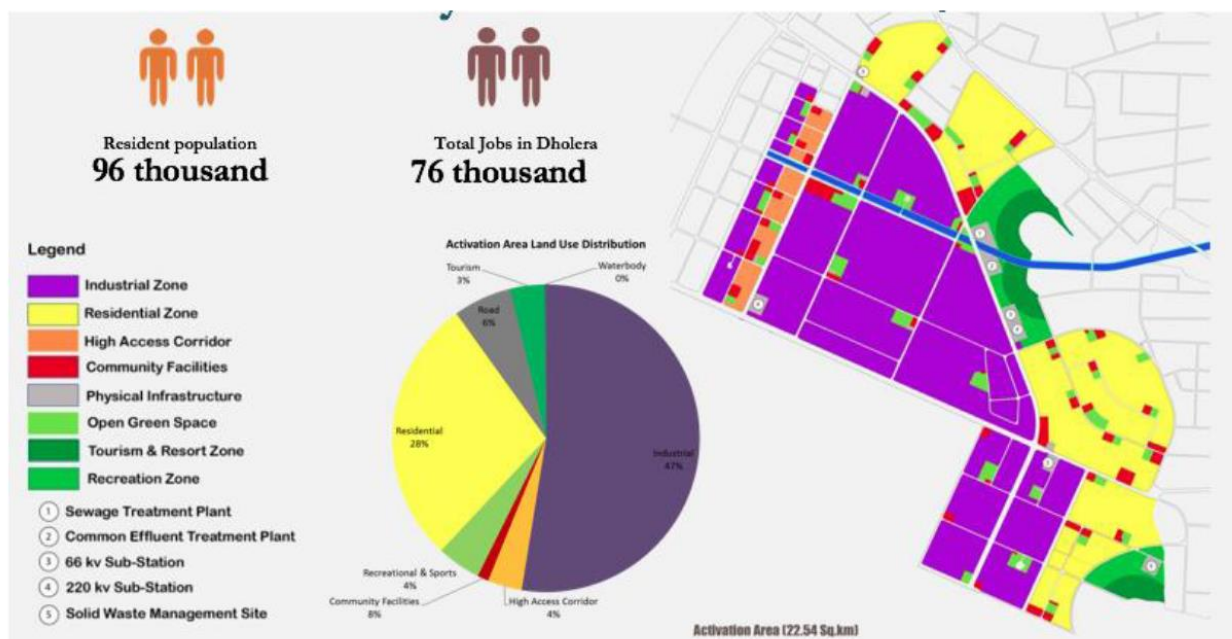
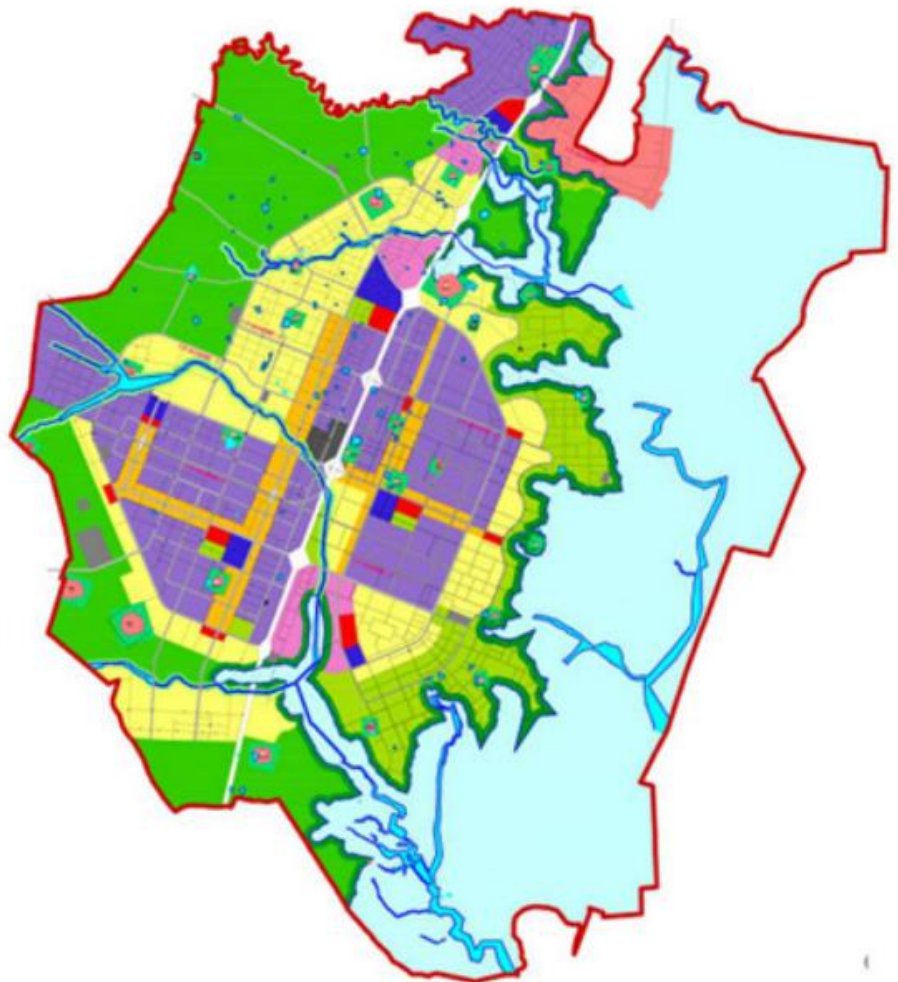


Figure 2

**LEGEND**

	DSIRDA BOUNDARY
	T P SCHEME BOUNDARY
	GAMTAL
	RIVER /CANAL
	TALAV / LAKE
	DP PROPOSED ROADS
	T P SCHEME ROADS
	COASTAL REGULATION ZONE
	GREEN SPACE
	RECREATION,SPORTS AND ENTERTAINMENT ZONE
	TOURISM: RESORTS
	VILLAGE BUFFER
	AGRICULTURE ZONE
	STRATEGIC INFRASTRUCTURE ZONE
	CITY CENTRE
	LOGISTICS
	HIGH ACCESS CORRIDOR
	RESIDENTIAL ZONE
	SOLAR PARK
	PUBLIC FACILITIES ZONE
	KNOWLEDGE AND I.T. ZONE
	INDUSTRIAL ZONE



### 3.5 Green City Development Propose Elements

Figure 3

#### Green Roofs

A flat or slightly inclined roof may have a layer of flora grown on top of a waterproofing system, known as a "green roof." Vegetative or eco-roofs are other names for green roofs. Extensive, intensive, and semi-intensive are the three basic subcategories.

#### Outdoor Green Walls

A green wall is a vertical built structure intentionally covered by vegetation. A vertically applied growing media, such as soil or substitute substrate, is included in green walls. Because there is a space of air between the plants and the wall, living green walls provide as additional insulation. They also reduce noise levels by reflecting, refracting and absorbing acoustic energy.

#### Green Houses

A greenhouse is a building with glass walls and a glass roof. Greenhouses are used to grow plants, such as fruits and tropical flowers. A greenhouse maintains a cosy interior temperature year-round. The greenhouse receives daytime sunlight, which warms the air and the plants inside.

#### Green Space

a natural setting (land that is fully covered with trees, shrubs, grass). Parks and community gardens are a couple of instances of green space. Urban heat island effect, a phenomenon brought on by heat being trapped in densely populated regions, is reduced by green spaces in cities. Towns and cities can experience the urban heat island effect, which is a result of human activity.

#### Green Corridors (Or Green Paths)

Green paths are a network of linear spaces that were designed, planned, and managed for a variety of uses, including recreation and biodiversity conservation at the same time. They also serve aesthetic and cultural purposes, as well as any other function that is appropriate for the sustainable use of the area. Greenways are linear, multipurpose landscapes that offer a variety of socio-ecological advantages.

#### The Green And Blue Corridors

The blue-green corridor is a cutting-edge strategy employed in cities all over the world to link decisions made about waterways to those made about the nearby lands. It is also a method for waterways management that recognizes how our human health and wellness is dependent on natural and ecosystem services.

#### Bicycle Lanes

cycling is just using your bicycle as a transportation method throughout your city. For example, instead of going by car or taking the train you could just hop on your bike and start pedalling.

#### Urban Forest

The woodlands, clusters of trees, and individual trees that can be found in urban and peri-urban areas are together referred to as urban forests. They therefore consist of street trees, woods, trees in parks, and trees in deserted areas.

**Urban Farms**

Growing, processing, and distributing food in or near urban areas is known as urban farming or urban gardening. Production, distribution, and marketing of food and other goods within the boundaries of a metropolitan region are broadly referred to as urban farming.

**Green Belts**

An metropolitan area's surrounding natural, undeveloped, and/or agricultural regions are referred to as a "greenbelt" in general. These lands may include open spaces, parks, farms and ranches, wildlands, or a combination thereof—as designated by cities, counties, special districts, the main purpose for which Green Belts were created was to prevent urban sprawl, especially the ribbon development along roads,

**Green Energy**

Green energy is that which comes from natural sources, such as the sun. The term "clean energy" refers to energy sources that do not emit airborne pollutants, whereas the term "renewable energy" refers to energy that is obtained from sources that are constantly renewed, such as hydropower, wind power, or solar energy.

**4. CONCLUSION**

Urban greening is often thought of as a tool for aligning developmental and environmental goals, but it is also a tool for magnifying the city. It exposes and expands almost invisible dimensions of our hyperlocal environment. The green city movement is the future of civic design. Today's green cities have taken on a challenging task to mitigate the effects of climate change and they're completed that goal remarkably. Green building practises, waste management strategies, and energy-positive structures are quickly replacing the status quo. This is optimistic for expanding this technology, especially in regions where urbanization is taking place quickly. Given that the region's population densities are anticipated to increase greatly over the ensuing decades, scale economies may significantly lower the costs of making the switch to green technology, encouraging their widespread adoption.

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