



GROWTH OF THE CITY CHENNAI

Based on Urban ecology

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Abstract: "A city should be built to give its inhabitants security and happiness." – Aristotle (Greek philosopher & scientist) . The English word "city" - from the Latin *civitas*, a highly organized community; city-state , (Wikipedia 2014),(UN-Habitat 2014) . The city planning is to elevate the 'quality of life' by making it 'widely inclusive' (spatially as well as socially) with the sustaining knowledge about the critical systems of the city . Chennai city one of the four metropolis of India , bounded by the coromandel coast on the east is the biggest commercial , cultural, economic & educational centre in South India is also the capital of the state of Tamil Nadu. The birth of the City , dates back to 1639 on the establishment of the British east India company in Chennai. The City is experiencing rapid urbanization in the recent times due to the uncontrolled growth of expansion which in turn is affecting the urban ecology. Urban ecology is a multidisciplinary approach to improving living conditions for the human population in cities, referring to the ecological functions." This paper explores about the "Growth of the City – Chennai (on terms of Urban ecology) , studies about the theoretical models of Urban development as the background study along with the parameters of urbanization , and compares it with Chennai city on the same.

Index Terms – Growth of Chennai City , Urban Ecology ,Theoretical models of Urban Development ,Urban Morphology.

I. INTRODUCTION:

The English word "city" - from the Latin *civitas*, a highly organized community; city-state , (Wikipedia 2014),(UN-Habitat 2014) . A city is basically a group of people and a number of permanent structures within a limited geographical area, which is organized to facilitate the interchange of goods and services among its residents and with the outside world .The settlements grow into villages & the villages transforms into cities . Cities appeared while a large number of people live together, in a specific geographic location thereby leading to the Creation of urban areas. **City /Urban growth is defined as the rate at which the population of an urban area increases.** Growth was mainly interstitial, filling up every square yard of vacant land left between buildings .With the advent of the elevator and the steel frame, the vertical growth of skyscrapers began. Suburbs spread out horizontally along streetcar and bus lines and around suburban railroad stations, surrounded by wide-open spaces.



Moscow City, 1893



Moscow City, At Present (2021)

1.1 OBJECTIVES :

The main objective of this paper is to understand the importance of the Urban ecology , which will help us in recreating a Chennai city which is efficient incase of the managing the resources available , as well creating a sustainable city understanding the issues which the Chennai city has faced over the past few decades .

1.2 STATEMENT OF THE PROBLEM :

As a result of the rapid Urbanization, the Chennai city experiences a poor quality of life with the increasing built up areas & decreasing wetland areas . As a major factor of discomfort for city the living conditions are highly Disturbed due to higher temperatures. The temperature at the heart or the center of the city is noted to be higher than its surroundings or the sub – urban area . The urban areas experience higher temperature than the rural areas as the built fabric stores the absorbed incident solar radiation and anthropogenic heat released from vehicles and equipments, resulting in the formation of heat pockets that are termed as “Urban Heat Island” (UHI).

Chennai city - Urbanisation growth – built areas vs Wet land areas (1980-2010)

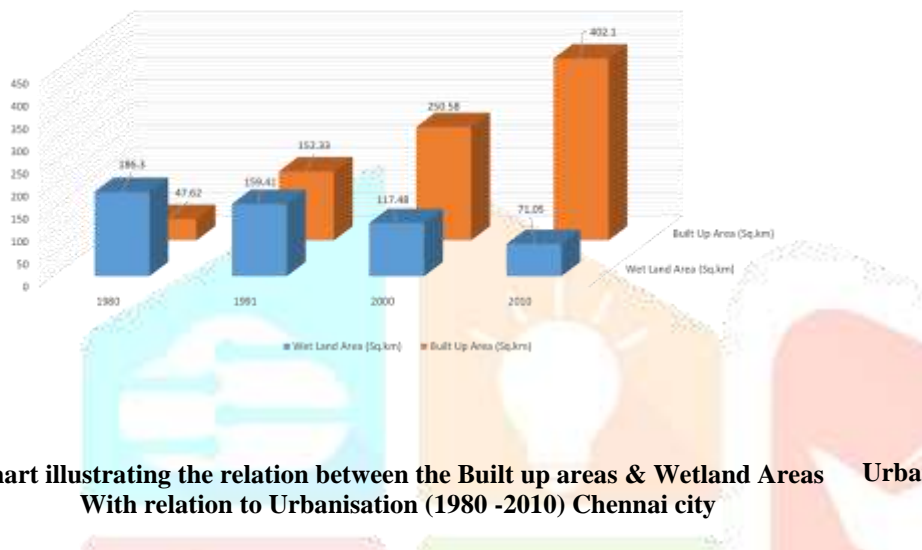
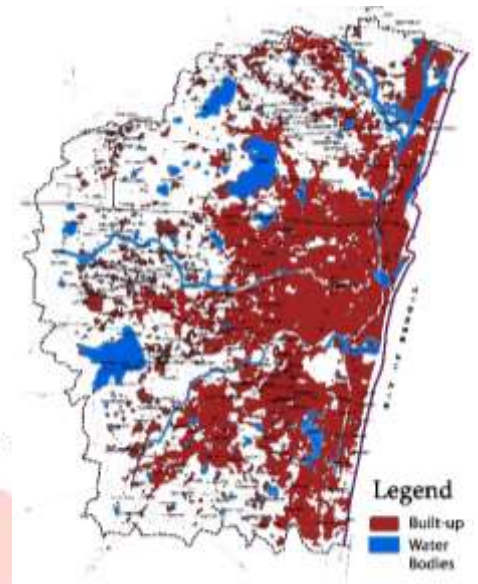
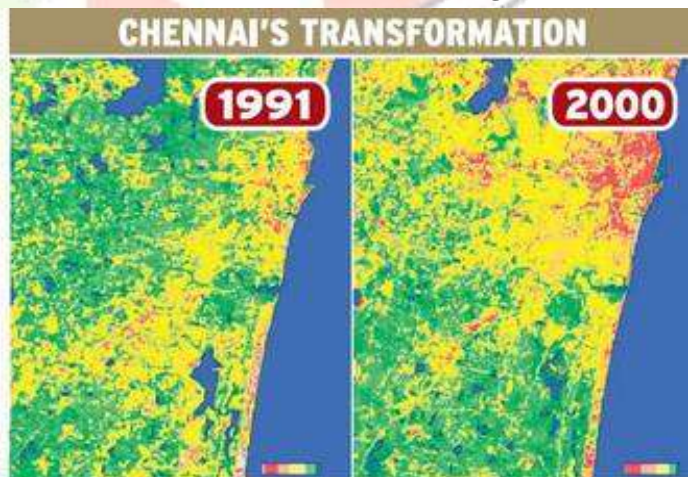


Chart illustrating the relation between the Built up areas & Wetland Areas With relation to Urbanisation (1980 -2010) Chennai city



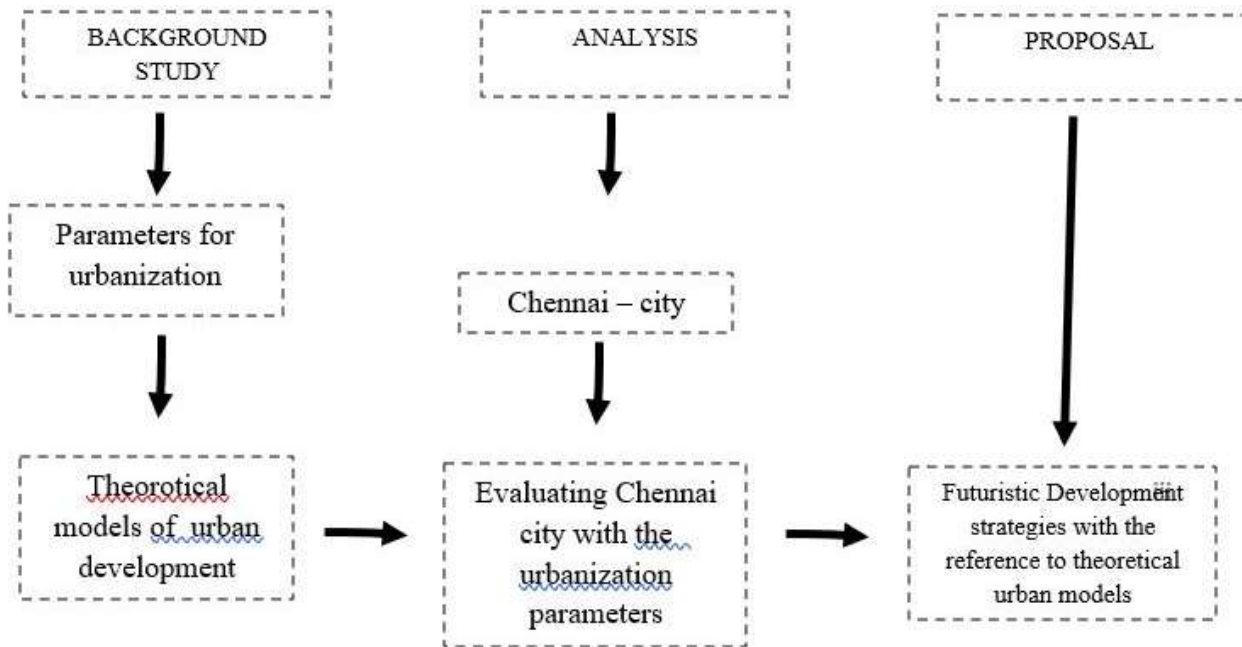
Urbanisation Map showing the Built up areas & Water bodies (2010) Chennai city
SOURCE : Google Earth



GREEN COVER (%)		SNAPSHOT OF SATELLITE IMAGERY		HOT SPOTS IN 1991:	
CHENNAI	9.5	● Urban heat island pockets, indicated in red colour, have increased significantly.	● The reduction in blue colour points to vanishing water bodies.	● George Town and Triplicane, industrial areas in Guindy, transportation nodes such as the Harbour area and Airport, and commerical hub of Purasawalkam.	
DELHI	20.2	● Green spaces have also diminished to a great extent and the increase in urban sprawl is shown in yellow.			
BENGALURU	19				
KOLKATA	15				
				HOT SPOTS IN 2000:	
				High density residential neighbourhoods such as Adyar, Mylapore and most parts of north Chennai.	

Article from The Hindu : How to regain green cover by Ajai Sreevatsan & Deepa H Ramakrishnan
CHENNAI, OCTOBER 03, 2011

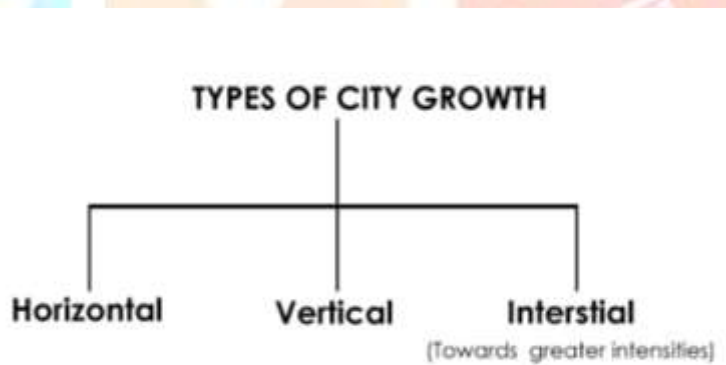
1.4. RESEARCH METHODOLOGY :



II. CITY GROWTH & TYPES:

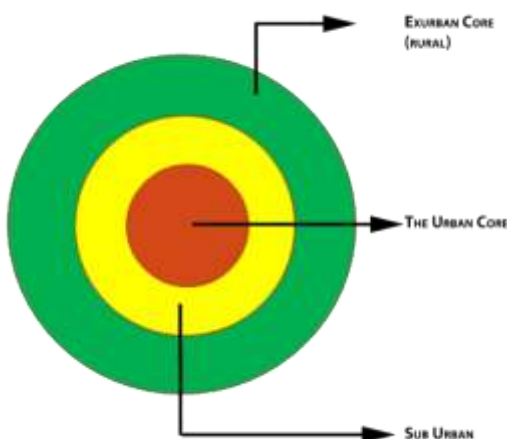
City /Urban growth is defined as the rate at which the population of an urban area increases . According to urbanist Hans Blumenfeld, cities can grow in any of three ways:

- Outward (expanding horizontally)
- Upward (expanding vertically)
- Toward greater density (expanding interstitially)



Types of City Growth by Urbanist Hans Blumenfeld

2.1 FUNCTIONAL SECTORS OF THE CITY :



Functional Sectors of the City :

Urban Core :

The urban core or the inner city is in the central municipality.

Sub - Urb :

The suburbs are all of the continuous urbanization that extends beyond the core municipality

Exurban:

Exurban refers to non-rural development that is within a metropolitan area,

Central Business District (CBD) :

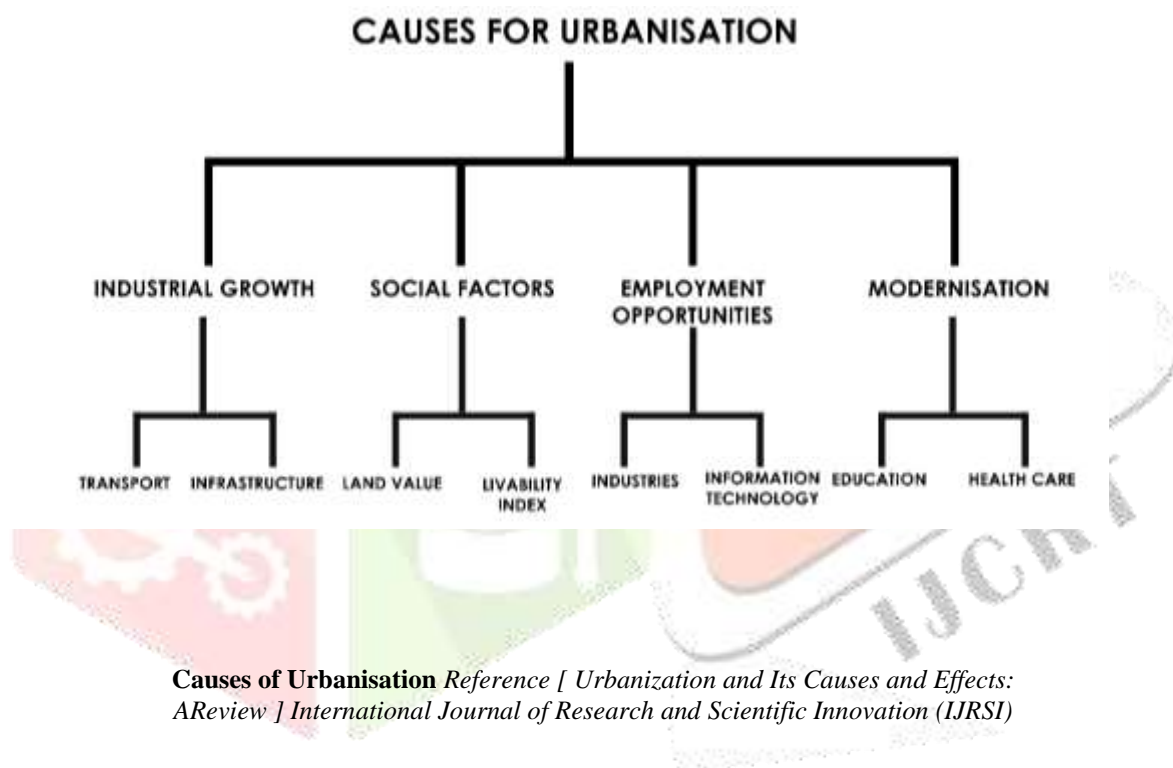
The CBD is the focal point of a city and serves as It's commercial, office, retail, and cultural center. It also usually is the center point for transportation networks.

2.2 CONDITIONS FOR A IDEAL CITY :

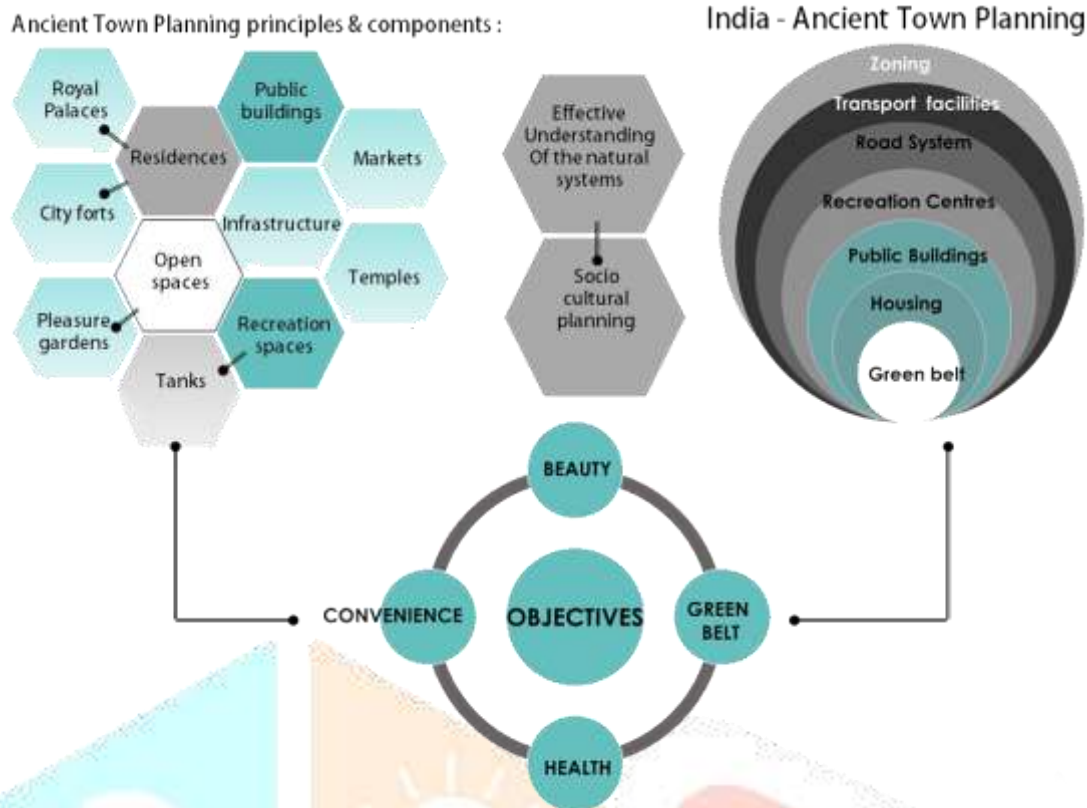
- Availability of natural advantages
- Availability of electric power
- Available means of communication
- Climatic conditions
- Contours of area
- Development of surrounding area
- Drainage of area
- Available facility of sewage disposal
- Soil fertility
- Frequency of floods
- Growths of trees
- Nature of soil
- Position of streams and lakes
- Water resources, etc.

(Reference : Introduction to Town Planning , Prof. S.K. Patil, www.skpatil.com)

2.2 PARAMETERS FOR CITY GROWTH :



2.3 ANCIENT CITY PLANNING (INDIAN):



2.4 URBAN ECOLOGY :

According to Sukopp & Wittig (1998), the term 'Urban Ecology' (in German Stadtökologie) can be defined in two ways :

(I) NATURAL SCIENCES :

Within the natural sciences, urban ecology addresses biological patterns and associated environmental processes in urban areas, as a subdiscipline of biology and ecology. In this sense, urban ecology endeavours to analyse the relationships between plant and animal populations and their communities as well as their relationships to environmental factors including human influences. From this perspective, the research is unconstrained by anthropocentric evaluations.

(II) ANTHROPOCENTRIC PERSPECTIVE :

Here, urban ecology is understood as a multidisciplinary approach to improving living conditions for the human population in cities, referring to the ecological function.

Urban Ecology - Definitions and Concepts by Wilfried R Endlicher (January 2007)

2.5 THEORIES OF URBAN MORPHOLOGY /URBAN DEVELOPMENT :

To recreate the Chennai city's Development , Urban development Theoretical Models have been grouped into the categories like Physical , Socio cultural , Functional & Ecological .

2.5.1 PHYSICAL DEVELOPMENT :

2.5.1.1 VERTICAL DEVELOPMENT :

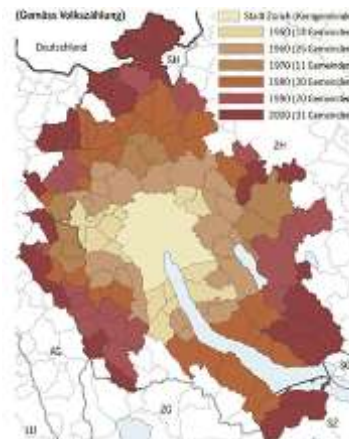
Cities which are seen with Multi storied buildings where the land is less & Costly. Eg : Hong Kong city.



Skyline of Hongkong City

2.5.1.2 HORIZONTAL DEVELOPMENT :

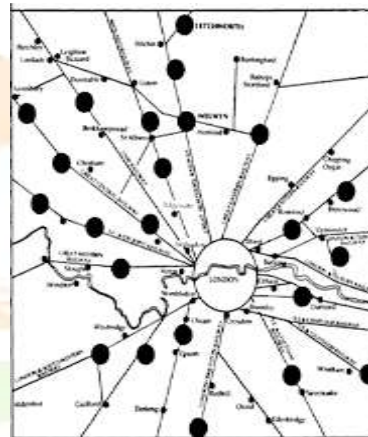
Cities developing horizontally in all directions . It is possible where Land is available at plenty with nominal costs.
Eg. Zurich City & Berlin City.



Zurich City

2.5.1.3 SCATTERED DEVELOPMENT :

Concept in urban planning that refers essentially to miniature Metropolitan areas on the fringe.
Eg : London City.



London City

2.5.2 FUNCTIONAL DEVELOPMENT :

2.5.2.1 GRID IRON PLANNING :

- Growth is controlled by Suitable Rules & Regulations.
 - Rational distribution of various blocks.
 - Orderly Growth avoids clashing of many activities in Normal City.
- Eg : Chandigarh City by Ar.Le Corbusier.



Grid Iron City -Chandigarh City

2.5.2.2 RADIAL RADIO CENTRIC CITY :

- RADIO – CENTRIC : Radiate Outward from a Common Centre.
- Geographical possibility of spreading in all directions.
- Inner Outer rings linked by radiating roads.
- Core has business area.

- The city grew in a pattern of rings and radials that marked Moscow's growth from Ancient Time to modern Layout. Eg. Moscow City & Washington Dc.



Radio Centric City - Moscow City

2.5.2.3 LINEAR CITY – RIBBON DEVELOPMENT :

- The city expanding along the spine of Transport
- The Linear City Concept is a conscious form of Urban Development with Urban Development with Housing and industry Growing along the Highway between Cities Contained by the Continuous Open space of the Rural Country Side.

Eg : Linear Plan of Navi Mumbai



Linear City - Mumbai City

2.5.3 SOCIO-ECONOMIC DEVELOPMENT :

2.5.3.1 TEMPLE PLANNING :

- Placing the Temple Complex at the Centre with Concentric Rectangle pattern of streets around.
- Based on caste and occupational hierarchies.



Madurai City – Temple Planning

Eg : Srirangam Town Plan , Hampi Town Planning.

2.5.3.2 VASTU PLANNING :

- Based on the vastu planning.
Eg : Plan of Old city of Jaipur based on Vaastu Planning.



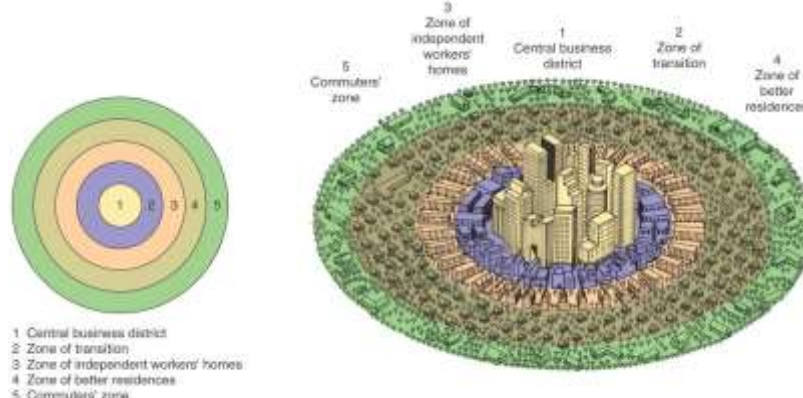
Old Jaipur City -Vaastu Planning

2.5.4 ECOLOGICAL THEORITICAL DEVELOPMENTS:

Urban geographers have made important contributions in the field of spatial transformations that have been witnessed by urban landscapes in the material and symbolic aspects during the twentieth and twenty-first centuries. Some of the landmarked attempts in this direction were the analyses of urban morphology done by Burgess, Hoyt, Harris and Ullman. Although cities at present have changed significantly since the models were developed; yet they are frequently cited in debates of urban morphology even if to dismiss their continued relevance. It is true that to a large extent each city possesses a distinctive combination of various types of land uses, but to some degree a common pattern is can be traced. The models provided by Burgess, Hoyt, Harris and Ullman, today are part of the philosophy of urban geography and one needs to discuss them in order to understand the basic foundations of this field.

2.6.4.1 CONCENTRIC ZONE MODEL:

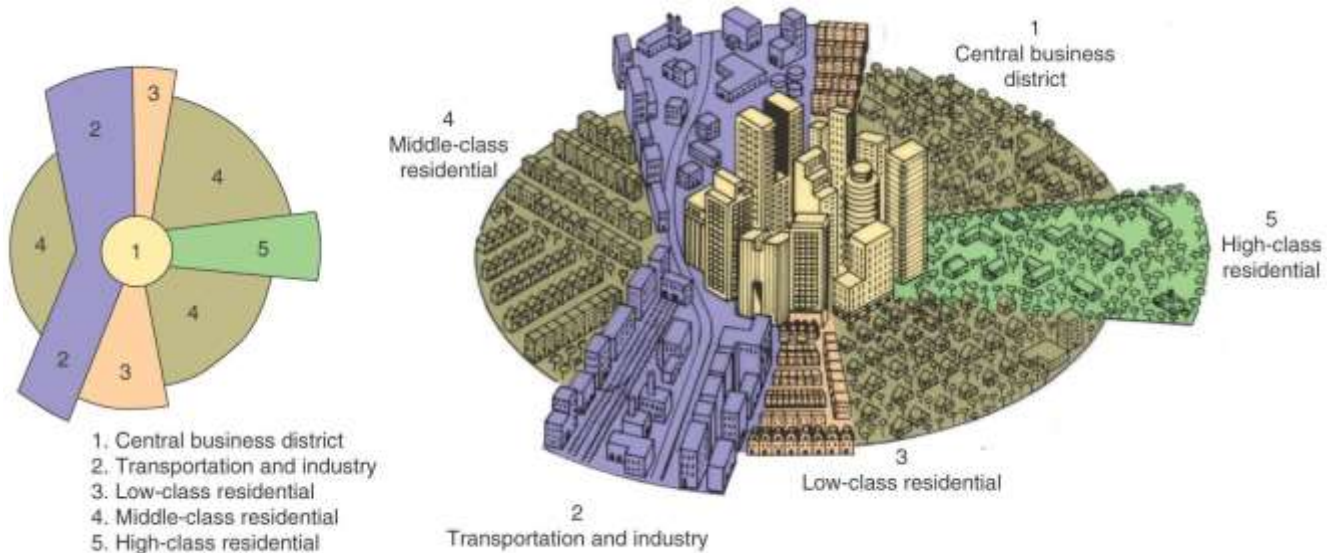
- One of the earliest theoretical models to explain urban social structures was developed by sociologist Ernest Burgess in 1925.
- Based off assumption that CBD is center of city and home values/rents increase as distance from city increase.
- This concentric ring model depicts urban land usage in concentric rings: the Central Business District (or CBD) was in the middle of the model, and the city expanded in rings with different land uses .
- Zone 1 - Central Business District (CBD)- Center of transportation to allow commuting. High cost of land leads to skyscrapers. Most government institutions, businesses, stadiums, and restaurants chose this area to build on due to its accessibility.
- Zone 2 – (Zone of Transition) Contains industrial eras and poorer-quality housing. Large percentage of people rent as they most often are immigrants or single individuals.
- Zone 3 – (Zone of Independent Workers Homes) Primarily occupied by members of the working class. Contains modest older houses rented by stable, working class families.
- Zone 4 – (Zone of better residence) Newer and more spacious houses occupied mostly by families in the middle-class. There are a lot of condominiums in this area and residents are less likely to rent.
- Zone 5 – (Commuter's Zone) Located beyond the build-up area of the city. Mostly upper class residents live in this area .



Models of Urban Development : Concentric Model Model (1925)

2.6.4.2 SECTOR MODEL / HOYT MODEL:

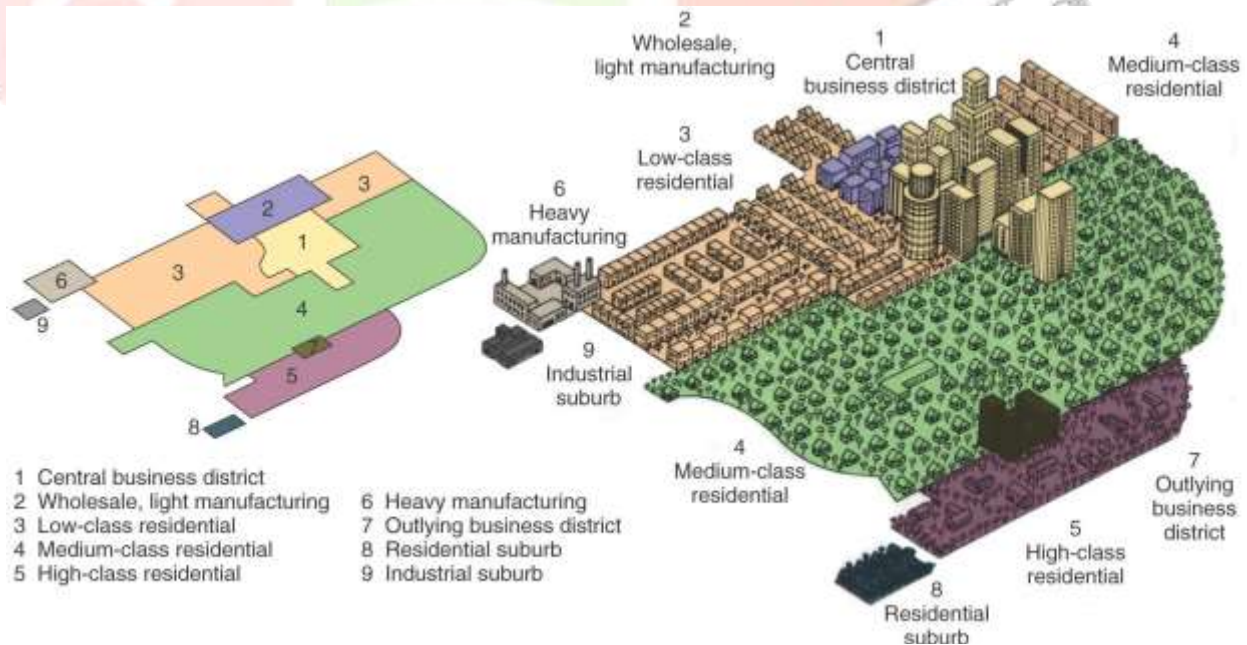
- The sector model / Hoyt model. Was proposed in 1939 by land Homer Hoyt.
- CBD – Central Business District is placed at the center. Sectors and the partial rings of land use/activities take place. This area is often known as downtown and has high rise buildings.
- Industry – Industries are represented in the form of a sector radiating out from the center. These forms sector because of the presence of a transport linkage along which the activities grew. Presence of railway line, river or road would attract similar activity, and thus a continuous corridor or “sector” will develop. Apart from the industries this area also serves as a residential area for lower class workers. Living conditions are bad because of proximity to industries.
- Different sectors grow out in wedge shaped areas away from CBD.



Models of Urban Development : sector Model / Hoyt Model(1939)

2.6.4.3 MULTIPLE NUCLEI MODEL :

- It was developed by Chauncy Harris and Edward Ullman in 1945
- Theorized in 1949 to account for growing importance of car and sprawl of urban areas.
- Creation of different nuclei that support each other Business districts to support suburbs .



Models of Urban Development : Multi Nuclei Model(1945)

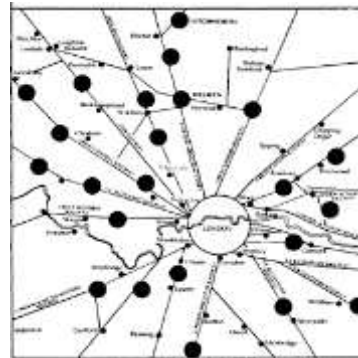
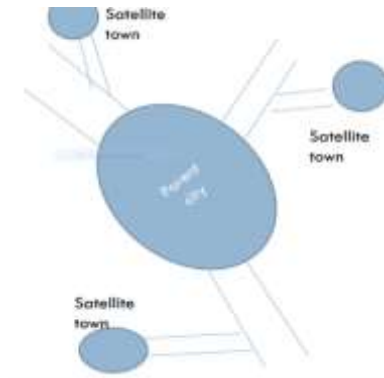
2.6.4.3 SATELLITE TOWN :

- A satellite town or satellite city is a concept in urban planning that refers essentially to smaller metropolitan areas , are mostly independent of, larger metropolitan areas ,offering opportunities to preserve the natural environment, often to improve the surrounding countryside.
- Have all the necessary amenities and facilities present within their limits except for a few purposes like employment and sometimes education, depend on the main city .

- Transportation network connect the various satellite townships to the main city so that travelling to the main city for work is not an issue.

Why a satellite Town ?

- Severe uncontrolled growth of urban population.
- increase in the demand for infrastructure facilities and amenities , land shortage , housing for all , inadequate
- Transportation etc.
- Challenges in management of essential infrastructure like water supply , Sewerage , Drainage , solid waste disposal.
- Need for decentralization of activities to reduce the burden on the cities.



Models of Urban Development : Satellite town (1945) ; Concept of Satellite Town seen in the London City

2.6. 4.3 GARDEN CITY / HOWARD GARDEN CITY :

- Developed by Sir Ebenezer Howard (1902)
- Inspired by the idea of ideal/Utopian cities
- “Garden cities allowed a genuine celebration and renewal of nature, even within an essentially urban industrial economy.”
- an alternative for overcrowded and polluted industrial cities of that century.

FEATURES OF GARDEN CITY:

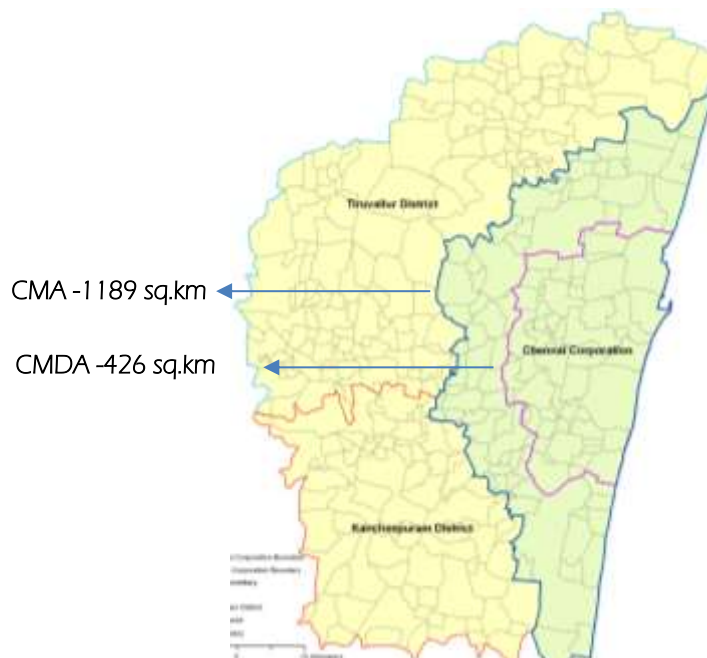
- Contains open spaces and gardens around all the dwelling houses and factories .
- It is a city owned by all citizens on a co-operative basis
- Its is an independent entity having its own civic life and affording all daily needs with adequate spaces for schools and other functional purposes.
- A self sufficient unit having its own industries & surrounded by periphery by a green belt.

3.CHENNAI

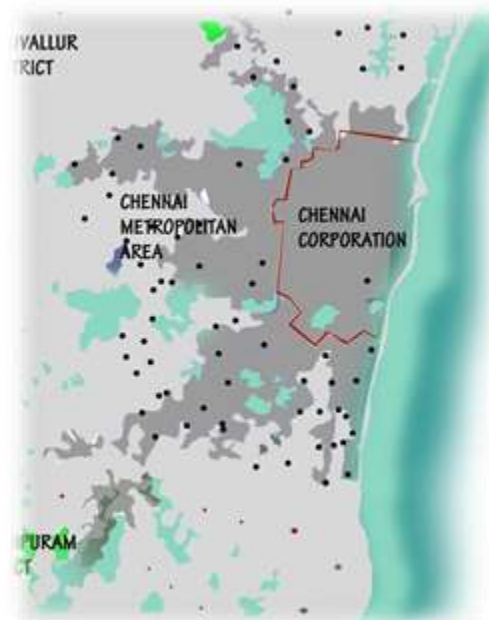
‘Madras’ was officially changed to Chennai in the year 1996. The Chennai city so called "**Detroit of India**" for its automobile industry is located on the coromandel coast in Southern India with latitude between between 12_50'49" and 13_17'24", and longitude between 79_59'53" and 80_20'12".Chennai lies on the thermal equator and is also coastal, which prevents extreme variation in seasonal temperature. For most of the year, the weather is hot and humid .



Location of Chennai in the thermal equator



Chennai – CMDA & CMA



CHENNAI CITY & CMA

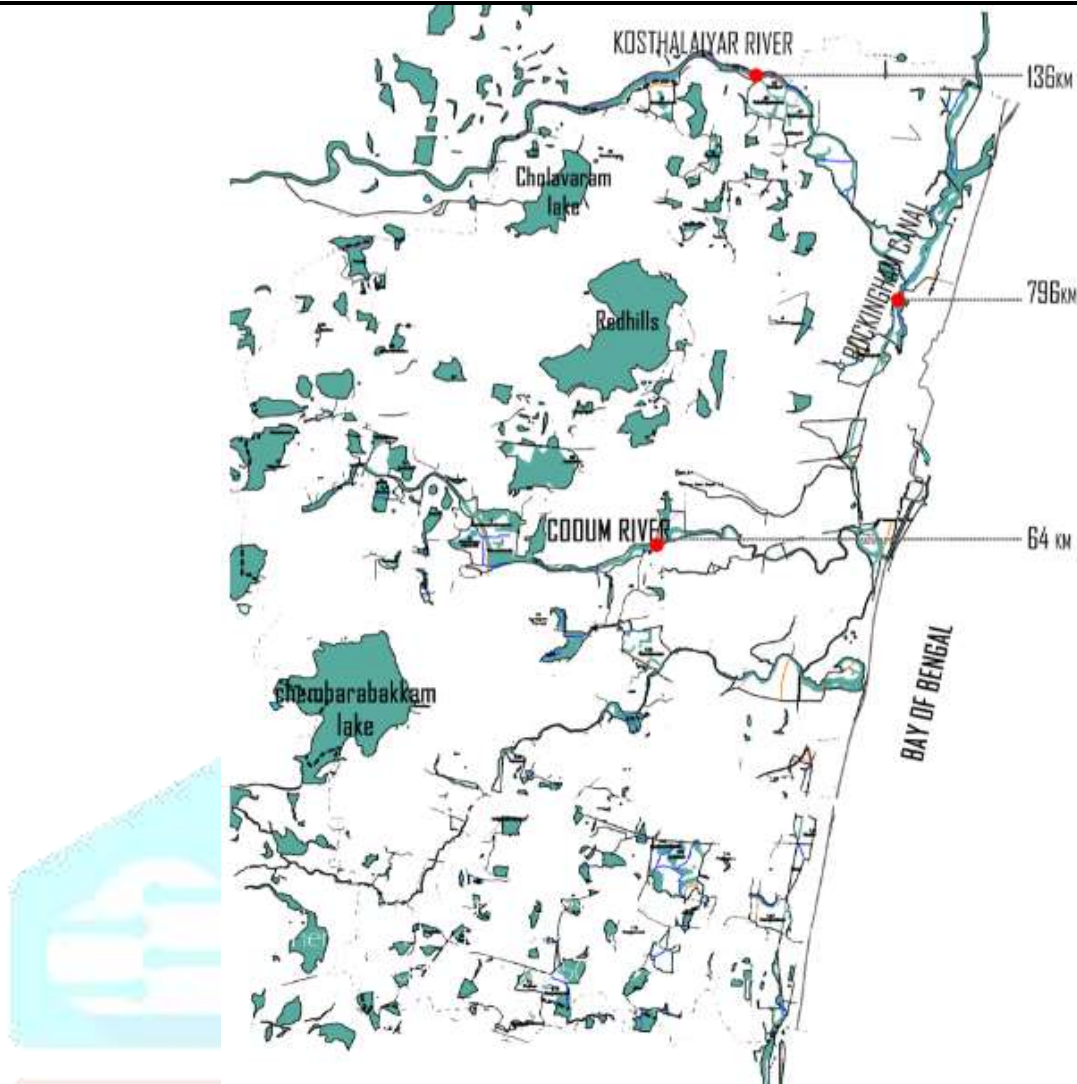
- The Chennai City covers 176 Sq.km
- The extent of CMA is 1189 Sq.km
- population - 7.04 million as per 2001 census
- CMA comprises the area covered by Chennai City Corporation (Chennai District), 16 Municipalities, 20 Town Panchayats and 214 villages forming part of 10 Panchayat Unions in Tiruvallur and Kanchipuram Districts.



Chennai location map along the state & districts

CHENNAI PROFILE

- City Rank :4th Rank
- Cmda area : 429 sq.m
- CMA Area : 1189 sq.m
- City population : 4.9 Million
- Population density : 26553 person per sq.m
- Zones : 15 zones
- Slums : 1270 (40%)
- Temperature : 20 – 40 Deg Celsius
- Monsoon - South west & North East Monsoon.
- Climate – Hot & Humid Climate

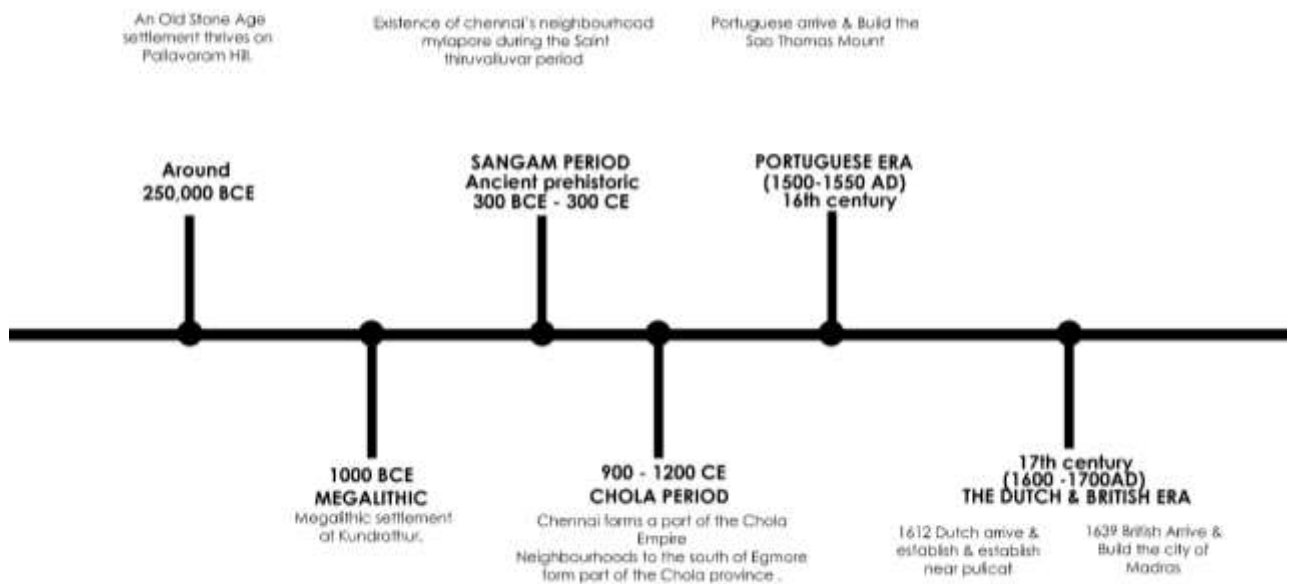


WATERBODIES MAP OF CHENNAI CITY

3.1 EVOLUTION OF CHENNAI :

3.1.1 IN TERMS OF THE RULERS & REIGNS:

The evolution of Chennai dates back to 2,50,000 BCE where the area around Chennai had been part of successive South Indian kingdoms through centuries. The recorded history of the city began in the colonial times, specifically with the arrival of British East India Company and the establishment of Fort St. George in 1644. On Chennai's way to become a major naval



TIMELINE OF CHENNAI CITY

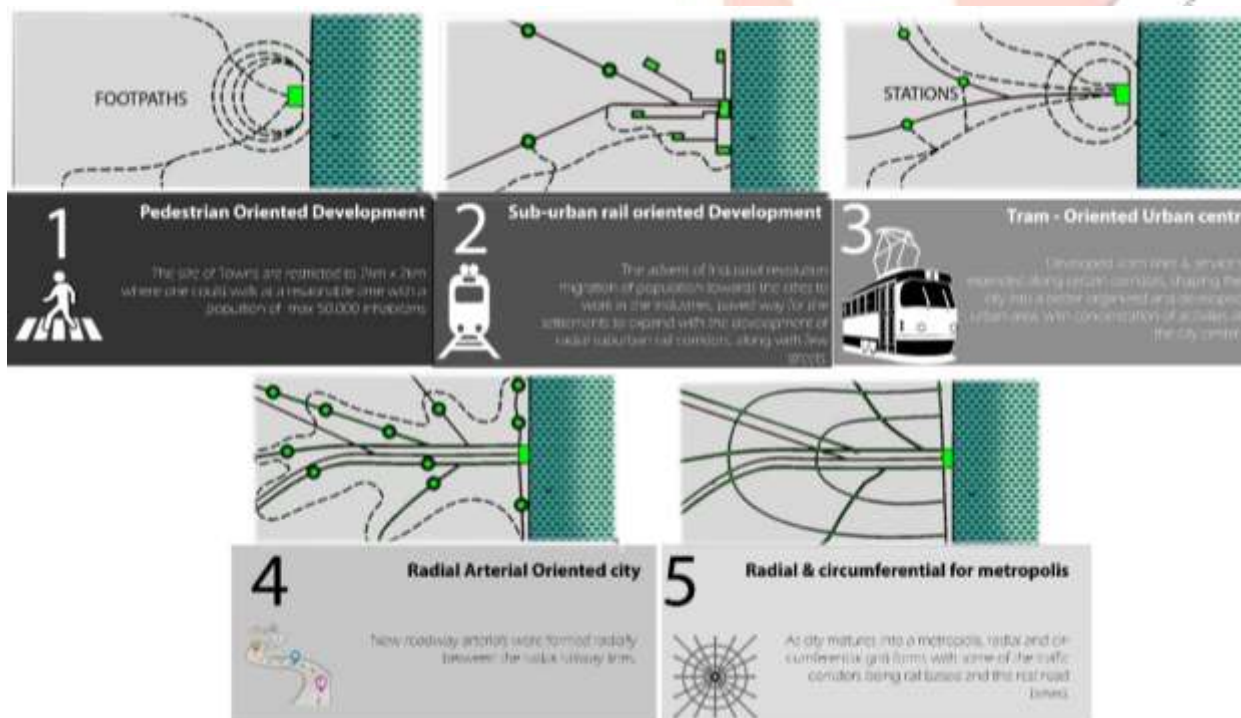
port and presidency city by late eighteenth century. Following the independence of India, Chennai became the capital of Tamil Nadu and an important centre of regional politics that tended to bank on the Dravidian identity of the populace.



SUBDIVISIONS OF CHENNAI CITY

3.1.2 INTERMS OF TRANSPORTATION :

The current structure of Chennai is a result of transportation, the growth started with the villages with the people travelling through the towns whose areas are restricted to a size of 2 Km x 2 Km where only 50,000 inhabitants lived. The second stage of growth started with the flinch of industrial revolution where the Sub – Urban Rail Oriented Development influenced the migration of population towards the cities to work in the industries, thereby paving the way for settlements to expand with the development of rail sub urban rail corridors along with fewer streets. The third stage with Tram where lines & services extended along the certain corridors alone shaping the city into a better organized and developed urban area, with concentration of activities at the City Centre.



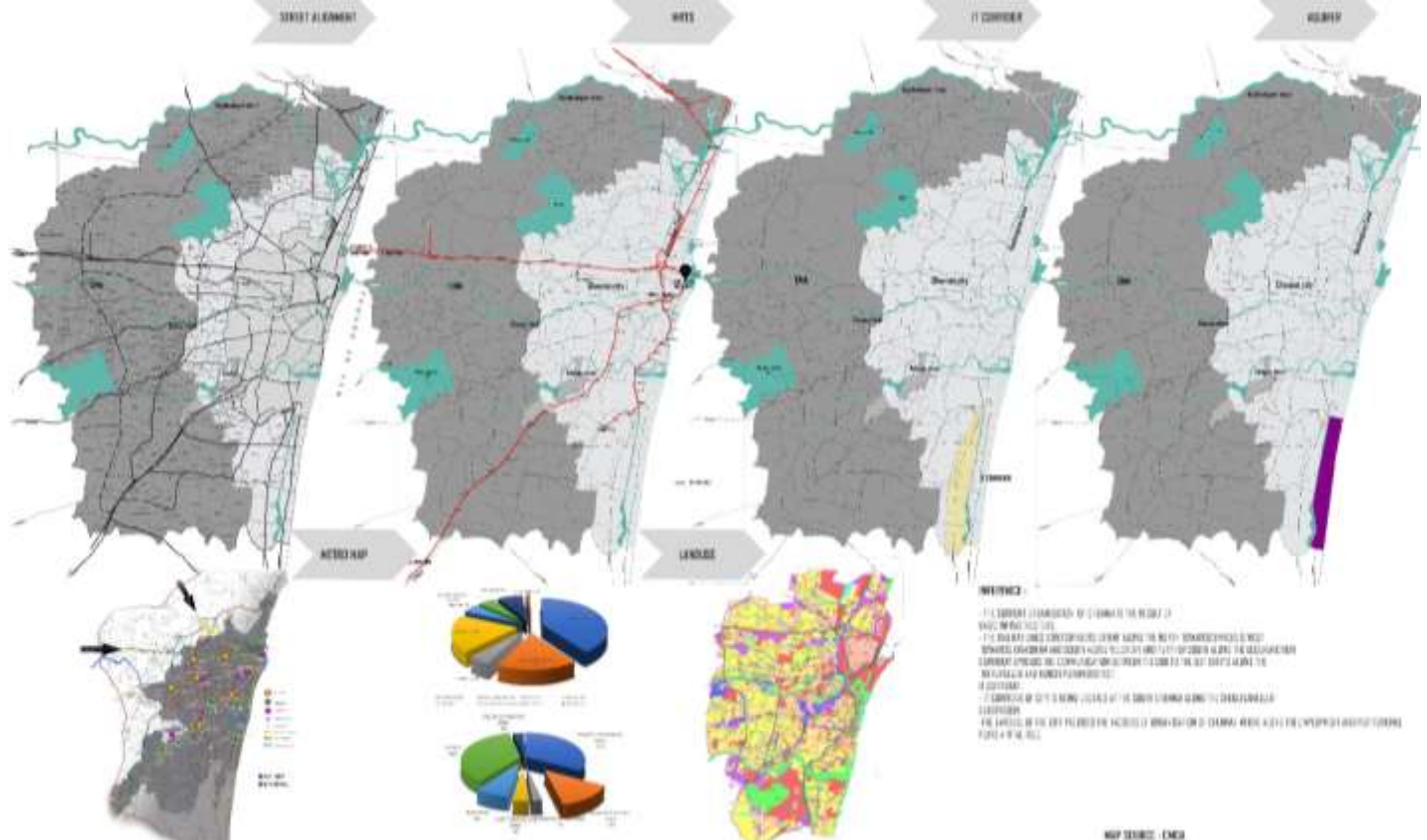
GROWTH OF CHENNAI - TRANSPORTATION

The later stage through the Roadways where the arterial roads were formed radially between the Railway Lines. The fifth stage or the final stage is where the City Matures into a Metropolis, radial & circumferential grid forms with some of the traffic corridors being rail based and the rest road based.



EVOLUTION OF THE CHENNAI CITY

3.1.3 ANALYSIS OF GROWTH PATTERN IN CHENNAI CITY :



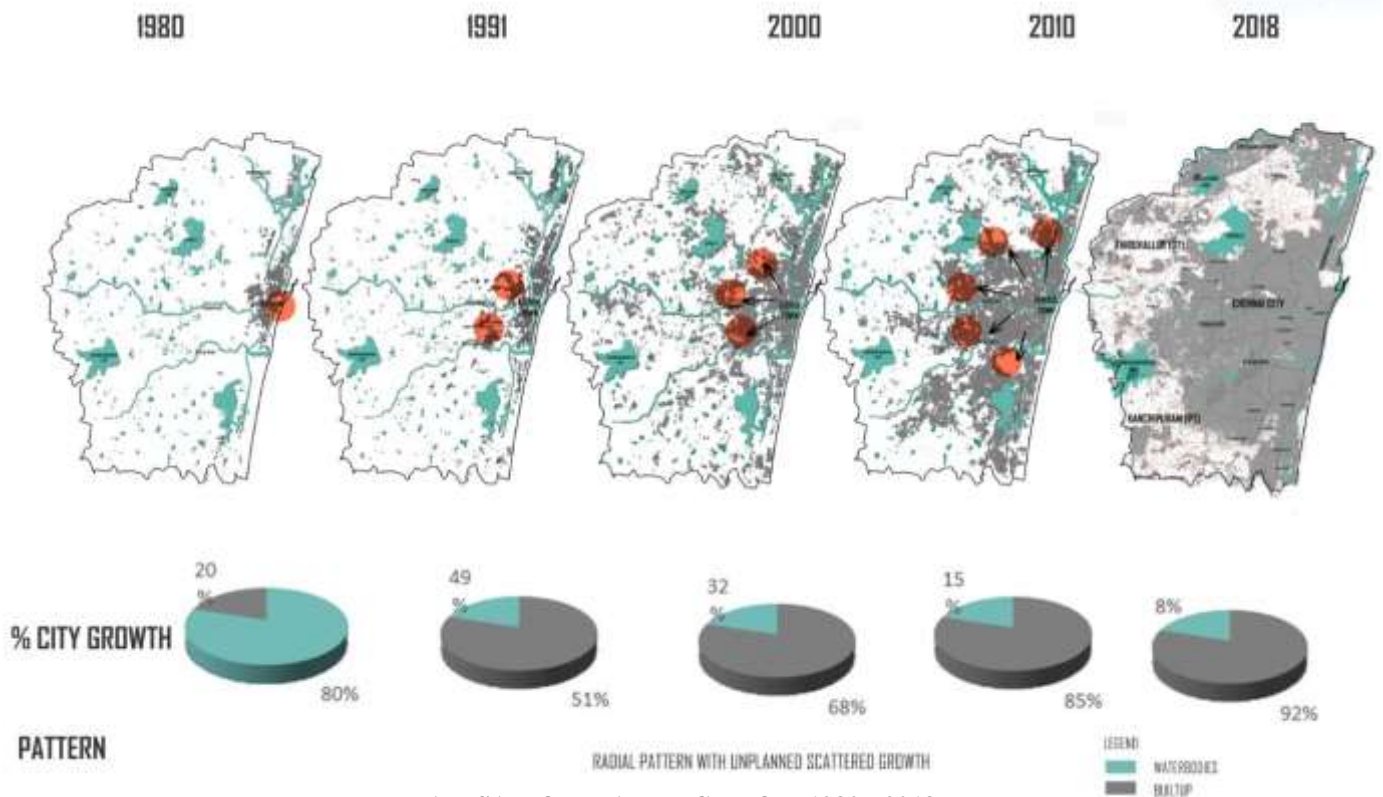
ANALYSIS OF GROWTH PATTERN IN CHENNAI CITY

The current urbanization of Chennai is the result of basic infrastructure .The railway lines stretching its extent along the north towards Ennore & West towards Arakonam and South along Velachery and further south along the guduvanchery corridor spreads the communication between the CBD to the outskirts along the Thiruvallur & Kanchipuram District .

IT CORRIDOR :

IT corridor of City is being located at the South Chennai along the Sholliganallur sub division.

The landuse of the City predicts the factors of Urbanisation of Chennai where along the employmental and institutional plays a vital role.



3.1.4 PREDICTION OF GROWTH PATTERN IN CHENNAI CITY IN TERMS OF ECOLOGY :

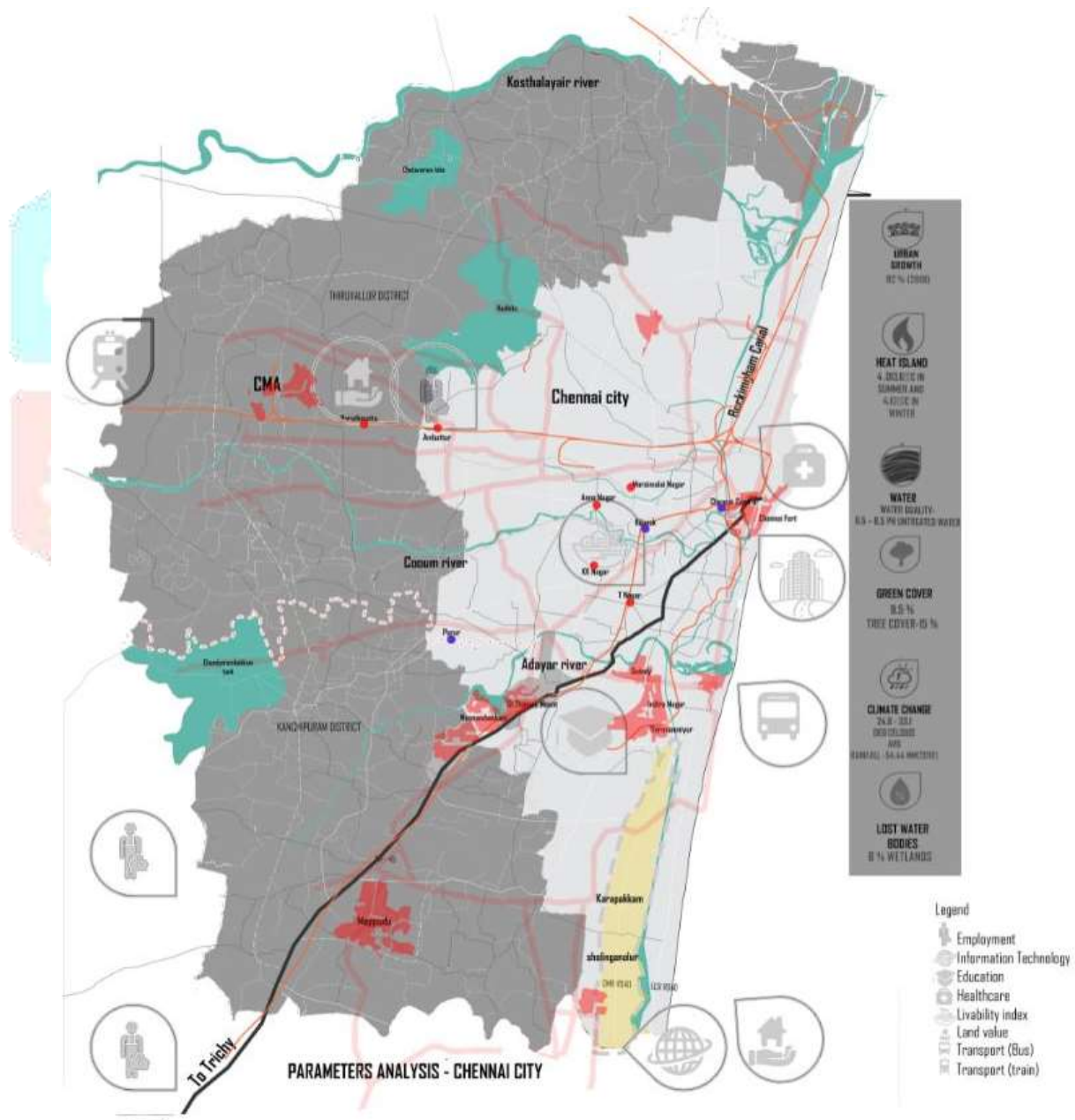
The concept of livability is simple : it assesses which locations around the world the best & worst living conditions. -“The Global Livability Index “. To evaluate the Chennai city ecological conditions , the global Livability Index parameters are taken into consideration and compared with developed cities .The parameters of global livability Index Parameters include ecological factors like carrying capacity , air quality ,water quality & open space along basic amenities like health care , education , health care & infrastructure.



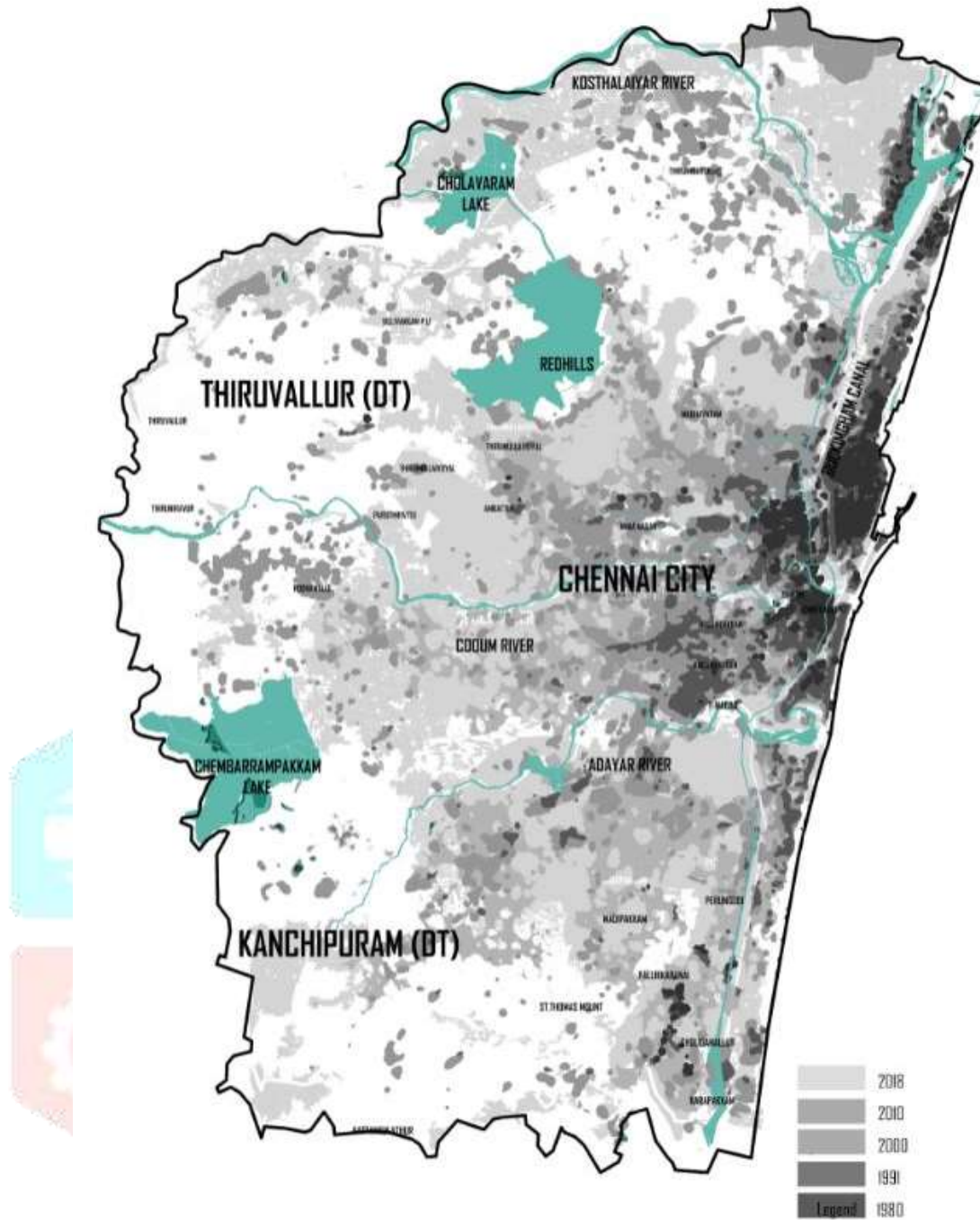
	NEW YORK US	LONDON UK	EUROPE SWEDEN	INDIA CHENNAI
1 CARRYING CAPACITY	2,570people / km ²	1510people/sq.km	24people/sq.km	28.553ple/sq.km
2 HEALTH CARE	90.7%	81.2%	76.01%	70%
3 EDUCATION	74%	63%	90%	80.2%
4 INFRASTRUCTURE	D grade	83%	9.4 / 10	193 RANK IN INDIA
5 ENVIRONMENT				
AIR QUALITY	85%	35.82%	84.18%	33.27%
WATER QUALITY	51.63%	56.54%	95%	4%
OPEN SPACE	15-25%	47%	15-20%	8-11%

REFERENCE : GLOBAL LIVABILITY INDEX PARAMETERS & ANALYSIS

COMPARATIVE ANALYSIS OF VARIOUS DEVELOPING COUNTRIES WITH RESPECT TO CHENNAI

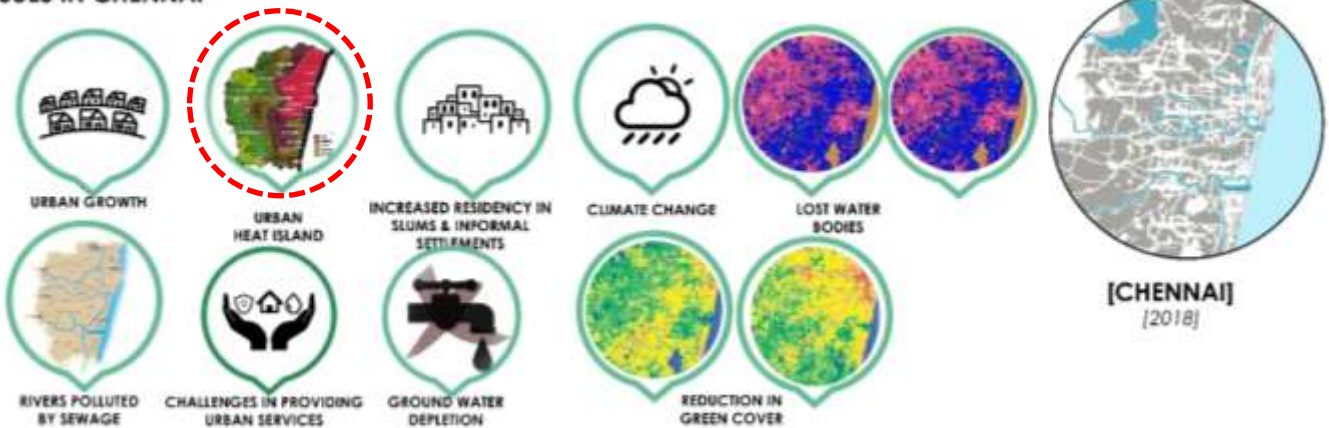


EVALUATING THE PARAMETERS OF URBAN GROWTH - CHENNAI CITY



URBANISATION 1980 - 2018 (CHENNAI CITY)

ISSUES IN CHENNAI

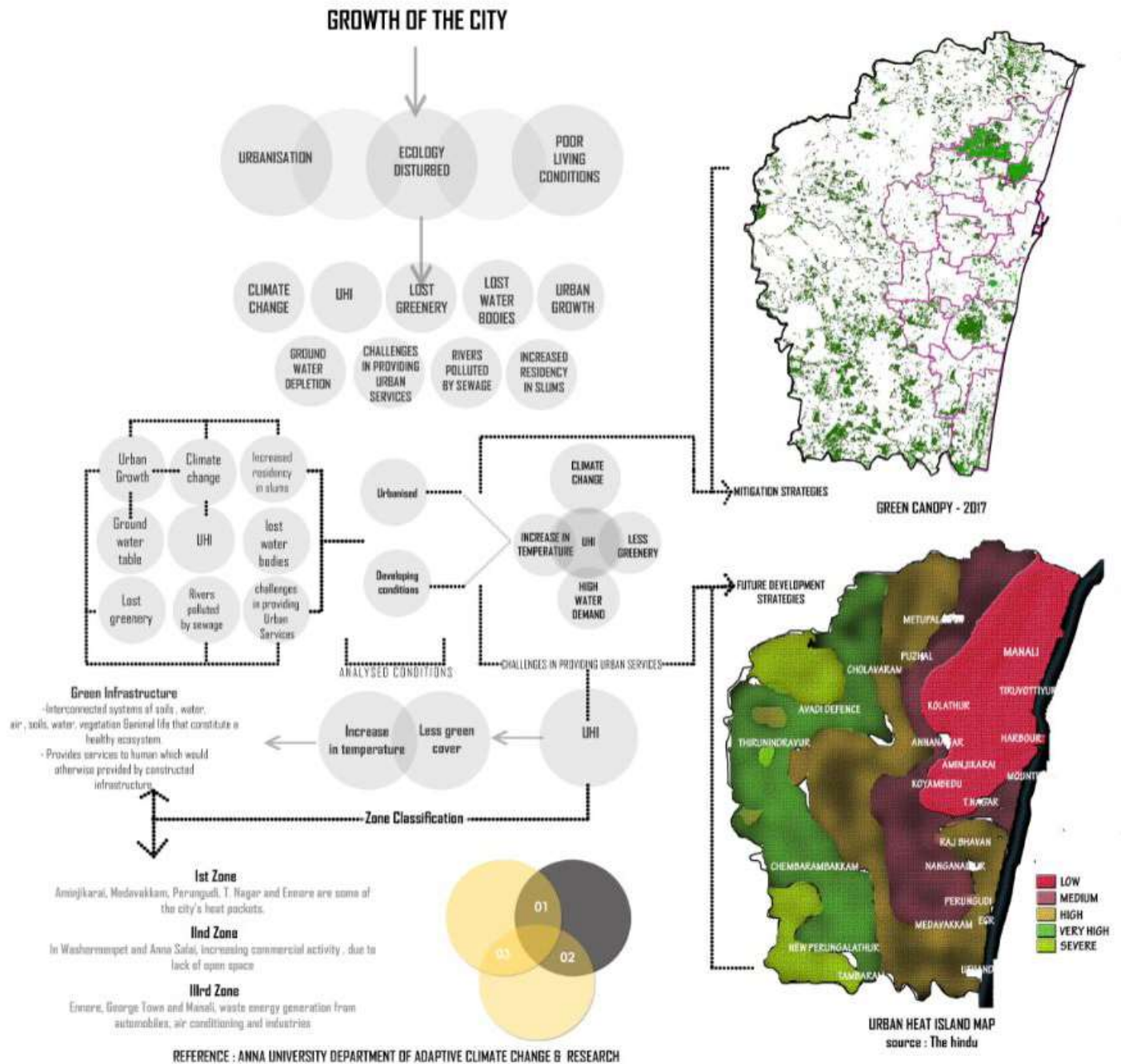


RESULTS OF URBANISATION – ISSUES IN CHENNAI

4.0 URBAN HEAT ISLAND :

The City had grown with poor living conditions where the ecological conditions of the environment are highly disturbed resulting on climate change , Urban Heat Island , Lost greenery , Lost water bodies , Urban growth , Ground Water depletion , challenges in providing Urban Services , Rivers are polluted by the sewage & increased residency in Slums.

As a major factor of discomfort for city the living conditions are highly Disturbed due to higher temperatures. The temperature at the heart or the center of the city is noted to be higher than its surroundings or the sub – urban area . The urban areas experience higher temperature than the rural areas as the built fabric stores the absorbed incident solar radiation and anthropogenic heat released from vehicles and equipments, resulting in the formation of heat pockets that are termed as “Urban Heat Island” (UHI).



METHODOLOGY OF THE PROPOSAL – GROWTH OF THE CHENNAI CITY-URBAN HEAT ISLAND

Considering the Urban heat Island effect , there are two strategies one for the developing city & another for the Developed City , The developed City cannot be rebuilt where it can improved with mitigative strategies and another where the decentralized city can be developed with considering the ecological considerations & sustainable measures in transportation .

The classification of Zones based on Urban Heat Island is been according to the Anna University Department of Adaptive Climate change & Research ,

4.1 CLASSIFICATION OF ZONES ON URBAN HEAT ISLAND :

ZONE 1 : AMINJIKARAI , MEDAVAKKAM & T NAGAR AND ENNORE are Some of the City’s Hea pockets .(due to Traffic Emissions)

ZONE 2 :WASHERMENPET & SAIDAPET increasing commercial activity and almost no open space has led to a rise in temperature levels in the range of 32.5 degree Celsius and 34.5 degree Celsius in the early morning hours .

ZONE 3 : ENNORE , MANALI & GEORGE TOWN (Heat from Industries)

4.1.1 1ST ZONE ON URBAN HEAT ISLAND CLASSIFICATION :

1ST ZONE :

Aminjikarai, Medavakkam, Perungudi, T. Nagar and Ennore are some of the city's heat pockets. (due to traffic emissions)



WHY T.NAGAR ??

- The centre of the city(cbd)
- A medium density residential area with few parks and a very high traffic emissions.
- Temperature emitted by traffic in t.nagar - 33 deg C
- Diurnal temperature in t.nagar - 6.95 deg C

ENNORE

Ennore a neighbourhood of Chennai along the northern part of Chennai. Its recent merge with Chennai city is a high industrial area, also a high traffic area with clusters of automobile industries with lack of green spaces and densely developed residential development which is highly known for mainly thermal power stations, fertilizer factories, industrial parts and coal yards.

AMINJIKARAI

Aminjikarai, originally Aminadikarai, is one of the oldest neighbourhoods in Chennai, Tamil Nadu, India. The arterial Poramboaltee High Road (NH 4) runs through it, one of the oldest settlements in Chennai - densely populated - increasing slum settlements.

T- NAGAR:

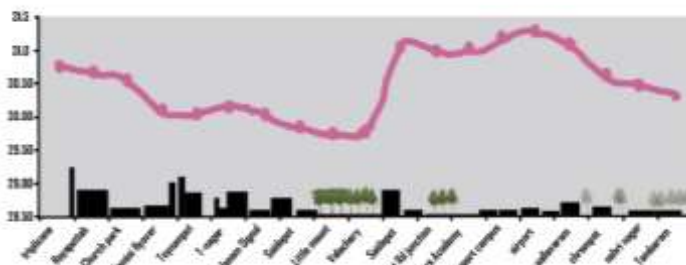
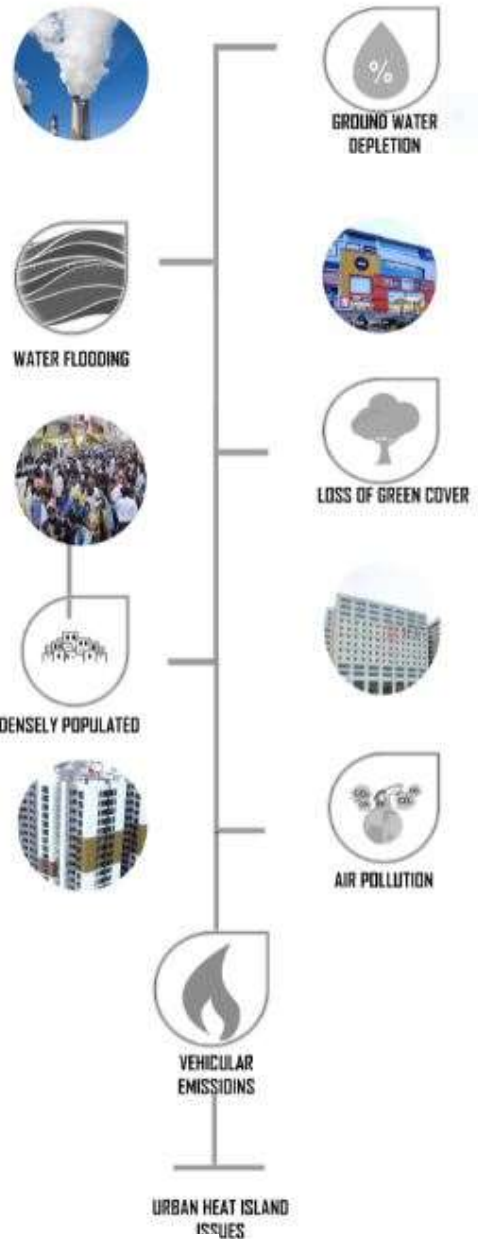
Theagaraya Nagar commonly known as T. Nagar, is an affluent commercial and residential neighbourhood in Chennai. It is a known commercial hub, residential and central CBD. In spite of its structured spatial planning, it has failed location and

PERUNGUDI:

Perungudi is a neighbourhood of Chennai, situated about 10 kilometres (6.2 mi) from the popular town centre of Adyar. It is bordered on two sides by the old Mahabalipuram Road and the Perungudi lake. It is situated on the Old Mahabalipuram IT Expressway right in middle of an Information Technology (IT) Estate. Perungudi is increasingly being preferred as a residential locality by software engineers. As of its dense development, with high traffic emissions and large waste dumpyards.

MEDAVAKKAM:

It is a residential locality- INCREASING REAL ESTATE DEVELOPMENTS.



UHI CHENNAI PROFILE

4.1.2 IIND ZONE ON URBAN HEAT ISLAND CLASSIFICATION :

IIND ZONE :

Washermenpet and Saidapet increasing commercial activity and almost no open space has led to a rise in temperature levels in the range of 32.5 degree Celsius and 34.5 degree Celsius in the early morning hours.



WHY SAIDAPET ??

- Saidapet is a neighbourhood in Chennai (Madras).
- is known for its dense and cluttered developments
- known for its Intermodal Transit connectivity
- highly dense populated close to central CBD T-Nagar
- has a rich history of owned arcaet Nawab.



OLD WASHERMENPET

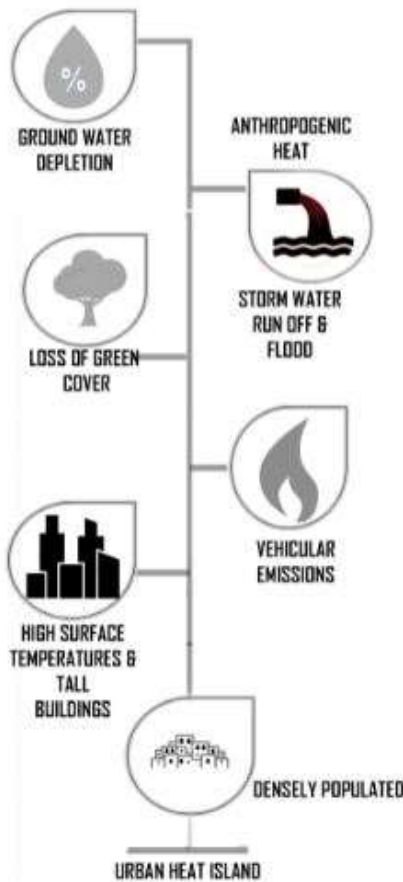
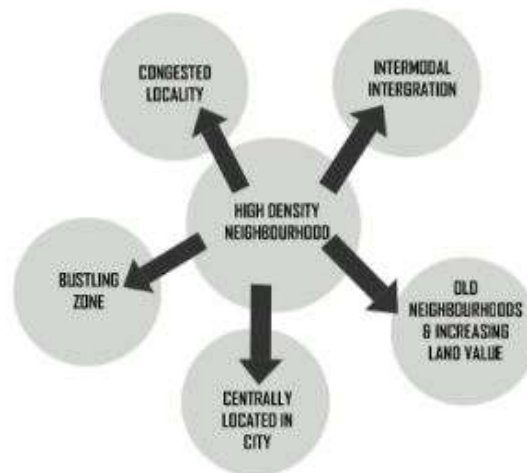
Old Washermenpet is a city situated on the east coast of the southern India. It is located north of Parrys corner and adjacent to Royaparam. Washermenpet is famous for its jewelry shops and matchbox industries, many of which are centered on two main arterial roads: T.H Road and G.A Road.



SAIDAPET

- Saidapet is a neighbourhood in Chennai (Madras).
- is known for its dense and cluttered developments
- known for its Intermodal Transit connectivity
- highly dense populated close to central CBD T-Nagar
- has a rich history of owned arcaet Nawab.

CONDITIONS IN ZONE - II AREAS



SAIDAPET

4.1.3 IIIrd ZONE ON URBAN HEAT ISLAND CLASSIFICATION :



5. PROPOSAL :

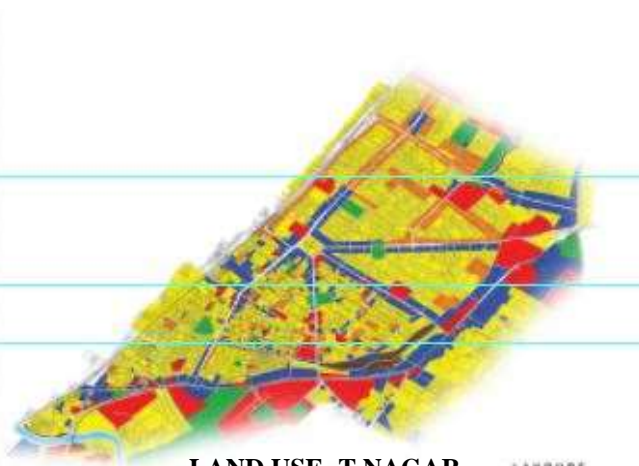
5.1.1 PROPOSAL FOR DEVELOPED CITY THROUGH GREEN INFRASTRUCTURE:



T-NAGAR

T.NAGAR

- A medium density residential area with few parks and a very high traffic emissions.
- Temperature emitted by traffic in t nagar – UHI 30 deg C
- Diurnal temperature in t nagar – 6.95 deg C



LAND USE -T NAGAR LANDUSE



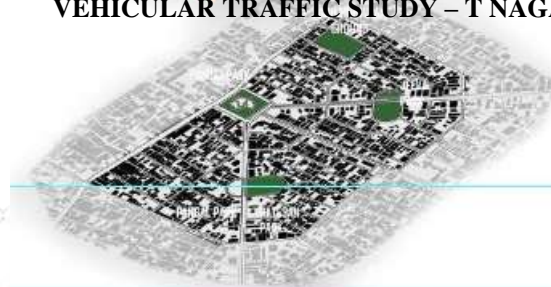
TRANSEPT ANALYSIS – T NAGAR



VEHICULAR TRAFFIC STUDY – T NAGAR



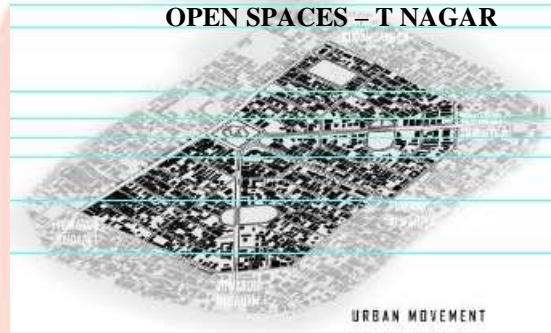
FIGURE & GROUND – T NAGAR



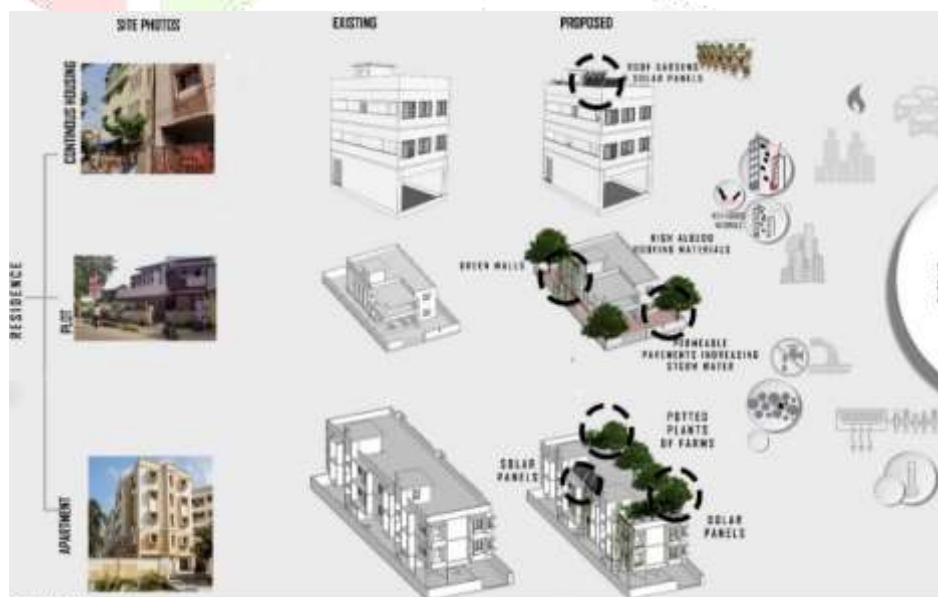
OPEN SPACES – T NAGAR



SATELLITE IMAGE – T NAGAR



URBAN MOVEMENT – T NAGAR



IDENTIFIED CONDITIONS IN EXISTING T-NAGAR



PROPOSED STRATEGIES FOR IMPROVING CONDITIONS IN T-NAGAR

GREEN INFRASTRUCTURE PROPOSAL – RELATING TO TYPOLOGIES IN THE RESIDENCE :

Green infrastructure is a cost-effective, resilient approach to managing wet weather impacts that provides many community benefits .It uses Vegetation , Soils & Other elements & practices to restore some of the natural processes required to manage water and create healthier urban environments.

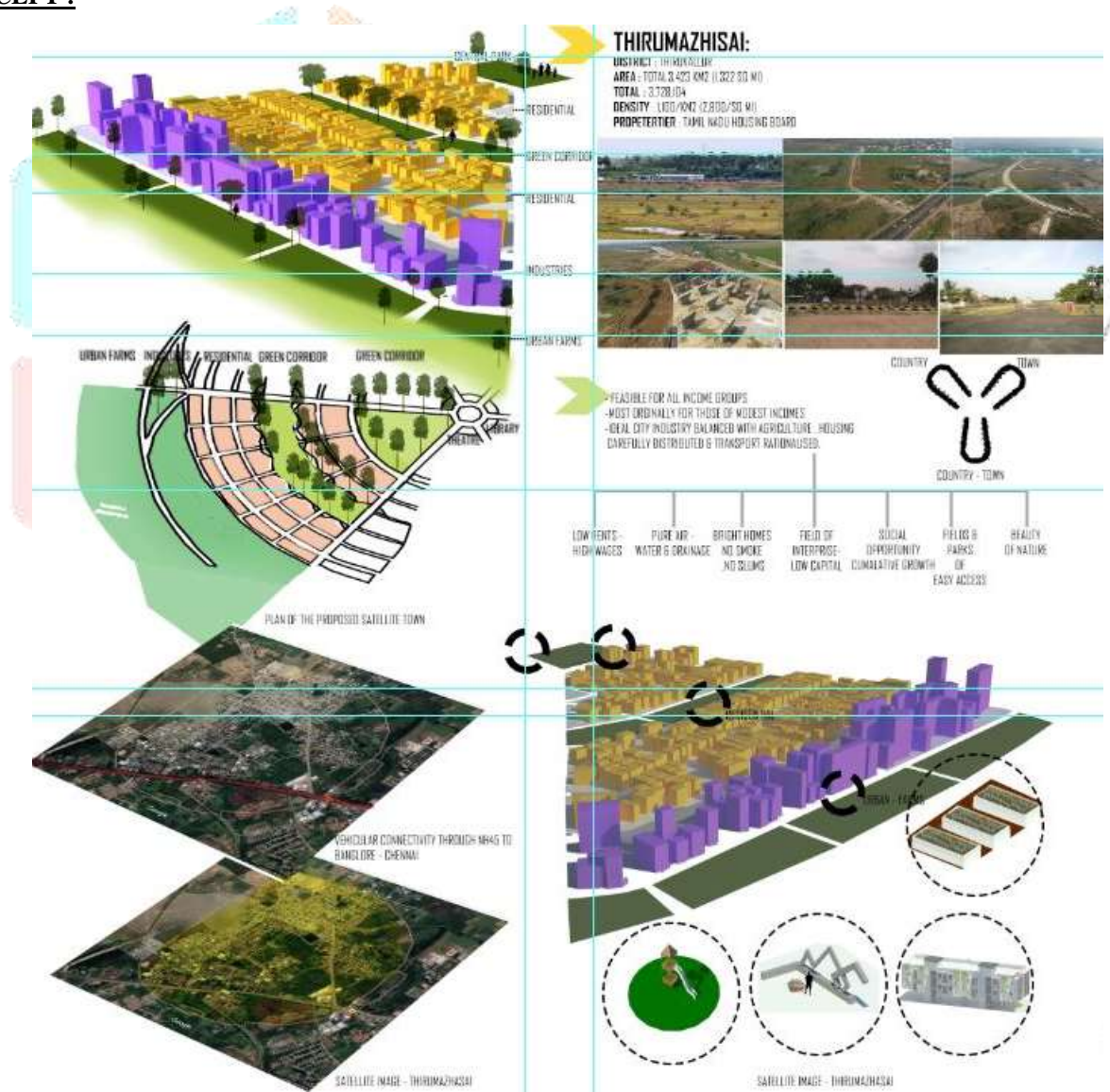
EXISTING CONDITIONS IDENTIFIED :

- 1.Lack of Pedestrian Zones
- 2.High Density
- 3.Tall buildings
- 4.Stormwater Run off
- 5.Low Albedo Materials like Concrete & Asphalt
- 6.Ground water depletion
- 7.Flood Prone areas
- 8.High Surface Temperatures

PROPOSED CONDITIONS :

- 1.Permeable Materials
- 2.Green walls
- 3.Solar Panels
- 4.Green Roofs
- 5.Green Parking Lots
- 6.Application of the permeable Pavements
- 7.High albedo Paving & Wall Materials
- 8.Shaded pedestrian pathways.

5.1.1 PROPOSAL FOR DEVELOPING CITY THROUGH DECENTRALISATION BASED ON SATELLITE TOWN CONCEPT :



PROPOSAL CASE - THIRUMAZHISAI



PROPOSED SECTION AT THIRUMAZHISAI

Thirumazhisai is located on the western corridor a suburb of Chennai Metropolitan City, India, located in Thiruvallur district of Tamil Nadu. Thirumazhisai .

Further the western , northern & Southern Parts of Chennai are still getting developed so through decentralization of separate growing areas through the connectivity of major highway NH 45 to banglore & Chennai . A satellite town concept is being proposed for the growing cities in Chennai through major connectivity network of roadways & Railway line.



PROPOSED SECTION AT THIRUMAZHISAI

ACKNOWLEDGMENT

I WOULD LIKE THANK TO MY MOTHER FOR BEING MY EXTENSIVE SUPPORT TO CARRYOUT MY RESEARCH AND MY HUSBAND YASER FOR BEING MY CRITIC & SUPPORT . I WOULD ALSO LIKE TO THANK TO ALL THE OTHER AUTHORS WHO HAD INSPIRED ME TO PRODUCE THIS WORK.

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