GROWTH OF THE CITY CHENNAI

Based on Urban ecology

T.M.A HAJEE HAFILA BANU, SIVAGANESH. P, S.BHAKYASRI
Assistant Professor, Architect, Architect

ARCHITECTURE & PLANNING
AALIM MUHAMMED SALEGH ACADEMY OF ARCHITECTURE, CHENNAI, INDIA.

SHIVA ARCHITECTS, T.KALLUPATTI, MADURAI, INDIA
SM CONSTRUCTIONS, CHENNAI, INDIA

Abstract: "A city should be built to give its inhabitants security and happiness." – Aristotle (Greek philosopher & scientist). The English word “city” - from the Latin cīvitās, 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 cīvitās, 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. 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 in case of 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 the 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).

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

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:

![Diagram of Causes for Urbanisation]

2.3 ANCIENT CITY PLANNING (INDIAN):

Ancient Town Planning principles & components:

- Royal Palaces
- Public buildings
- Residences
- City forts
- Infrastructure
- Markets
- Open spaces
- Temples
- Pleasure gardens
- Recreation spaces
- Tanks

India - Ancient Town Planning

- Zoning
- Transport facilities
- Road System
- Recreation Centres
- Public Buildings
- Housing
- Green belt

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.


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.

2.5.1.3 **SCATTERED DEVELOPMENT**: Concept in urban planning that refers essentially to miniature Metropolitan areas on the fringe. Eg : 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.

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 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:

Models of Urban Development: Concentric Model Model (1925)
• 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 transport 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
- It 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
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 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
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
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.

3.1.2 TERMS 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.

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.

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.
3.1.3 ANALYSIS OF GROWTH PATTERN IN CHENNAI CITY:

**EVOLUTION OF THE CHENNAI CITY**

**3.1.3 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.
COMPARATIVE ANALYSIS OF VARIOUS DEVELOPING COUNTRIES WITH RESPECT TO CHENNAI

<table>
<thead>
<tr>
<th>Parameters</th>
<th>New York US</th>
<th>London UK</th>
<th>Europe Sweden</th>
<th>India Chennai</th>
</tr>
</thead>
<tbody>
<tr>
<td>CARRYING CAPACITY</td>
<td>2,570 people/sq.km</td>
<td>1,150 people/sq.km</td>
<td>24 people/sq.km</td>
<td>29,953 people/sq.km</td>
</tr>
<tr>
<td>HEALTH CARE</td>
<td>90.7%</td>
<td>81.2%</td>
<td>76.0%</td>
<td>70%</td>
</tr>
<tr>
<td>EDUCATION</td>
<td>74%</td>
<td>63%</td>
<td>90%</td>
<td>80.2%</td>
</tr>
<tr>
<td>INFRASTRUCTURE</td>
<td>0 grade</td>
<td>93%</td>
<td>9.4 / 10</td>
<td>199 RANK IN INDIA</td>
</tr>
<tr>
<td>ENVIRONMENT</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AIR QUALITY</td>
<td>85%</td>
<td>35.62%</td>
<td>94.18%</td>
<td>33.27%</td>
</tr>
<tr>
<td>WATER QUALITY</td>
<td>51.03%</td>
<td>58.54%</td>
<td>95%</td>
<td>4%</td>
</tr>
<tr>
<td>OPEN SPACE</td>
<td>15-25%</td>
<td>47%</td>
<td>15-20%</td>
<td>8-11%</td>
</tr>
</tbody>
</table>

EVALUATING THE PARAMETERS OF URBAN GROWTH - CHENNAI CITY
URBANISATION 1980 - 2018 (CHENNAI CITY)

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 the 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).

4.1 CLASSIFICATION OF ZONES ON URBAN HEAT ISLAND:

ZONE 1: AMINJIKARAI, MEDAVAKKAM & T NAGAR AND ENNORE are some of the City’s Heat 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:

ZONE 1:

AnnaiKovai, 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 (C)
- A medium density residential area with few parks and a very high traffic emissions.
- Temperature varied by traffic in T.Nagar - UHI 30 deg C
- Diurnal temperature in T.Nagar - 8.05 deg C

ENNORE:

Ennore a neighborhood of Chennai along the northern part of Chennai is densely packed with commercial, tertiary and industrial uses. The area has a very high traffic density, which has led to a rise in temperatures.

AMINJIKARAI:

Aminjikarai, originally known as Aminjikarai, is one of the oldest neighborhoods in Chennai. Tamil Nadu, India. The main arterial Anna Salai passes through. It is one of the oldest settlements in Chennai, densely populated increasing years on years.

T.NAGAR:

T.Nagar, a neighborhood in the western part of Chennai. It is a high-density commercial and residential neighborhood. It is known for its commercial hub, residential and commercial developments. It has a very high traffic density, and

PERUNGUDI:

Perungudi is a neighborhood of Chennai situated about 76 kilometers (47 mi) from the popular state capital of Agra. It is bordered on the north by the Madras Highway, the Parsi Bazaar, and the People’s Park. It is situated on the OMR Mahabalipuram Trunk Expressway, north of the information Technology (IT) Estate

MEDAVAKKAM:

Medavakkam is a residential locality, increasing real estate development.

UHI CHENNAI PROFILE
4.1.2 IIInd ZONE ON URBAN HEAT ISLAND CLASSIFICATION:

**IIIND ZONE:**

Washermanpet 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).
- It is known for its dense and cluttered developments.
- Known for its transportation connectivity.
- Highly dense population close to central CBD, i.e., Tinga.
- Has a rich history of ancient art and culture.

**OLD WASHERMANPET**

Old Washermanpet is a city situated on the west coast of the southern India. It is located north of the Mysore border and adjacent to the river Noyah. Washermanpet is famous for its jewellers shops and auto-moto bus industries, many of which are centered on two main arterial roads, T.N Road, and G.A Road.

**SAIDAPET**

Saidapet is a neighborhood in Chennai (Madras).
- Known for its dense and cluttered developments.
- Known for its transportation connectivity.
- Highly dense population close to central CBD, i.e., Tinga.
- Has a rich history of ancient art and culture.

**CONDITIONS IN ZONE - II AREAS**

- Congested locality
- Intermodal integration
- Centralized location in the city
- Old neighborhoods and increasing land value
- Busting zone
- Urban heat island
- Densely populated
- High surface temperatures and tall buildings
- Storm water run-off and flood
- Anthropic heat
- Loss of green cover
- Ground water depletion
- Vehicular emissions

**SAIDAPET**
4.1.3 IIIrd ZONE ON URBAN HEAT ISLAND CLASSIFICATION:

PREVAILING ISSUES IN ZONE - II AREAS

GEORGE TOWN
- A mixed residential area in the old city with very high density and very high traffic with no vegetation with lot amount of small scale industries.

ENNORE
- The unplanned industrial development leads to loss of ecology and livelihood of the fishing communities with lot amount of small scale industries, fertiliser industries, industrial port and coal yards.

MANALI
- The unplanned industrial development with medium residential areas.

 CONDITIONS IN ZONE - II AREAS

1. Commercial Pockets
2. Over Congested
3. Mixed Industrial
4. Increasing Landvalue
5. Well Connected Intermodal Transport System

5. PROPOSAL:

5.1.1 PROPOSAL FOR DEVELOPED CITY THROUGH GREEN INFRASTRUCTURE:

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
- Di urinal temperature in t nagar – 6.95 deg C
LAND USE - T NAGAR

FIGURE & GROUND – T NAGAR

SATELLITE IMAGE – T NAGAR

UREN MOVEMENT – T NAGAR

TRANSCPT ANALYSIS – T NAGAR

VEHICULAR TRAFFIC STUDY – T NAGAR

OPEN SPACES – T NAGAR

IDENTIFIED CONDITIONS IN EXISTING T-NAGAR
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.

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
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.

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.

REFERENCE:

[2] D Karthigeyan , June 2016, Transformation of Chennai City as Nucleus of Regional Development through the Emergence of Sub-CBD’s.