

URBAN PATTERN AND CHARACTERISTICS OF DIFFERENT TOWNS IN TAMILNADU

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Abstract - This study is about how patterns and characteristics were made by history and also about the transformation of development and urban growth in the current condition of the cities. It will explain the planning pattern and also the planning principles used during the ancient and modern periods and how they were implemented in these towns. In the ancient period, planning was based on permanent shastras, which were classified as Dandaka, Sarvatobhadra, Nandyavarta, Padmaka, Swasthika Prastara, Karmuka, and Chaturmukha. Later in the development of modern planning principles, they evolved and are classified as the concentric model, the sector model, a combination of the concentric and sector models, and the nuclei model. These planning concepts are different from the ancient ones.

Key Words: ancient planning, modern planning, urban pattern and characteristics, population

1. INTRODUCTION

Urbanization is a dynamic process that profoundly influences the social, economic, and environmental landscape of cities and towns. In India, the phenomenon of urbanization has gained significant momentum, driven by rapid population growth, migration, and economic development. Tamil Nadu, a southern state renowned for its rich cultural heritage and historical significance, presents a unique case study for understanding the complexities of urban patterns and characteristics across its diverse towns.

In Tamil Nadu, some of the oldest settlements (Srirangam, Thanjavur, Kumbakonam, and George Town) have unique characteristics of urban patterns, and this study mentioned the details of aspects such as street patterns, land use activities, and the transformation of those areas. The settlement is based on the needs of the people and describes cultural, economic, or social factors. This paper aims to analyse the pattern and characteristics and the development of towns that create any issues in a particular area.

This research focuses on four distinct towns: Thanjavur, Kumbakonam, George Town (Chennai), and Srirangam (Trichy). Each of these towns embodies unique urban characteristics shaped by historical, geographical, and

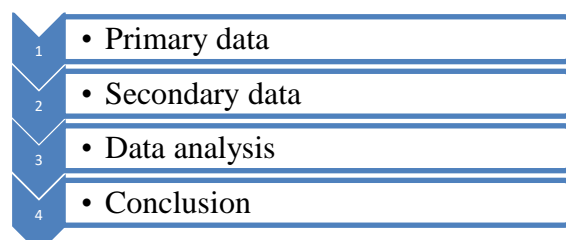
socio-economic factors. Thanjavur, known for its UNESCO World Heritage Sites and vibrant cultural traditions, showcases a blend of historical architecture and modern urban development. Kumbakonam, often referred to as the 'Temple Town', reflects its identity through its numerous temples and rich religious heritage, influencing its spatial layout and community life.

George Town, located in the bustling metropolis of Chennai, represents a microcosm of urban challenges and opportunities, characterized by its colonial-era architecture and diverse population. Srirangam, with its renowned temple complex, offers insights into the interrelationship between religious practices and urban form, demonstrating how spiritual significance shapes the urban environment.

By examining the urban patterns and characteristics of these towns, this study aims to contribute to the understanding of urban development in Tamil Nadu. It will explore the historical evolution, spatial organization, and socio-cultural dynamics that define each town's unique identity. Urban settlement patterns are shaped by a range of factors, including physical geography, historical development, economic activity, and social and cultural factors.

Ancient town planning practices in India were characterized by a strong emphasis on layout, architecture, infrastructure, and social organization. Town planning during the medieval period in India was influenced by various dynasties and empires that ruled different regions of the subcontinent. Understanding the factors that contribute to the spatial distribution of towns in Tamil Nadu, considering historical, geographical, and demographic factors.

2. Methodology



1.1 URBAN PATTERN

- Urban pattern refers to the spatial arrangement and organization of various elements within an urban area, including land use, infrastructure, buildings, and public spaces. It encompasses how these components are distributed, interact, and function within a city or town. Understanding urban patterns is essential for urban planning and development, as they can influence social, economic, and environmental outcomes.
- Elements of Urban Patterns
 - Land Use
 - Street Layout
 - Building Density
 - Open Spaces
 - Zoning
 - Infrastructure
 - Social and Economic Patterns
 - Historical Influences
- Urban patterns and characteristics in Tamil Nadu can vary significantly across different zones, influenced by factors like geography, history, culture, and economic development. Here's an overview of some key urban patterns and characteristics in various zones of Tamil Nadu, along with their relationship to urban growth:
- Geographical Zones**
 - Coastal Zones**
 - Interior Zones**
 - Rural Zones**

For this study, the towns selected represent a diverse geographical spread to capture varying urban patterns across Tamil Nadu. **George Town (Chennai)** is a prime example from the **coastal zone**, where rapid urbanization, high population density, and commercial growth shape its urban form. On the other hand, **Thanjavur** and **Kumbakonam**, both in the **interior zone with rural characteristic**, provide insights into towns where traditional layouts coexist with modern development, influenced by agriculture and heritage. **Srirangam (Trichy)**, also in the **interior zone**, brings a unique twist with its focus on religious tourism, reflecting how spiritual and cultural significance impacts urban growth.

2.1 ANCIENT PLANNING:

- Ancient cities** were usually located on the banks of **rivers**, especially Ganges and their tributaries, essentially for ritualistic and sanitary purposes, including communications with other cities using water. This concept in fact helped to foster and encourage commerce which ultimately favored establishment of townships. **Mohenjo-Daro and Harappa**, which are the only two' out-standing cities belonging to Indus Valley Civilization have

resemblance to the planning concepts, of both the **ancient and modern towns and cities of India**.

- There are eight different types of towns and villages according to the shapes:

2.1.1. VEDIC PLANNING PRINCIPLES

Dandaka

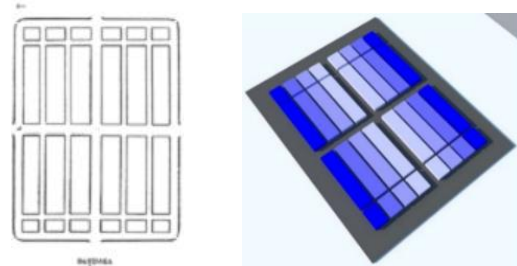


Figure 2.1

- Streets are straight and cross each other at right angles at the centre.
- Has 4 gates on four sides.
- Rectangular / square.
- Width of the street varies from one - five danda.
- 2 transverse street at the extremities.
- Have single row of houses.
- The village offices located in the east.
- The female deity/ chamadevata - located outside the village and the male deities in the northern portion.

Sarvatobhadra

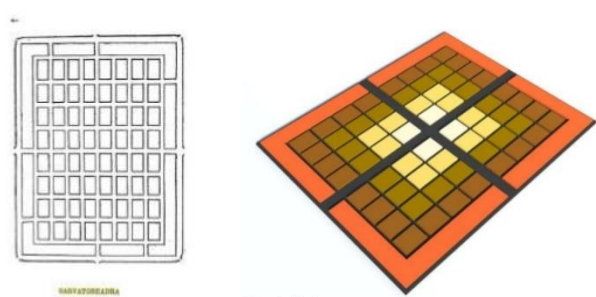


Figure 2.2

- This type of town plan is applicable to larger villages and towns, which have to be constructed on a square sites.
- According to this plan, the whole town should be fully occupied by houses of various descriptions and inhabited by all classes of people.
- The temple dominates the village.

Nandyavarta

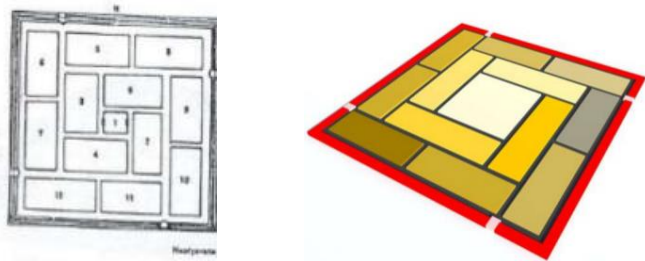


Figure 2.3

- Commonly used for the construction of towns and not for villages.
- It is generally adopted for the sites either circular or square in shape.
- 3000 – 4000 houses.
- The streets run parallel to the central adjoining streets with the temple of the presiding deity in the center of the town.
- “Nandyavarta” is the name of a flower, the form of which is followed.

Padmaka

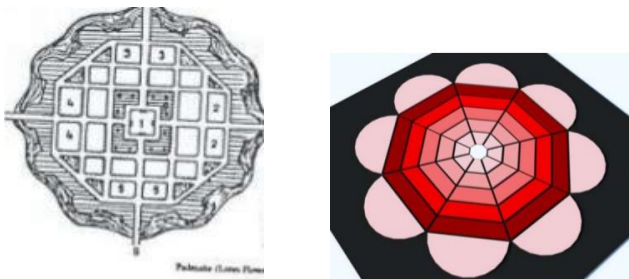


Figure 2.4

- This type of plan was practiced for building of the towns with fortress all round.
- The pattern of the plan resembles the petals of lotus radiating outwards from the center.
- The city used to be practically an island surrounded by water, having no scope for expansion.

Swastika

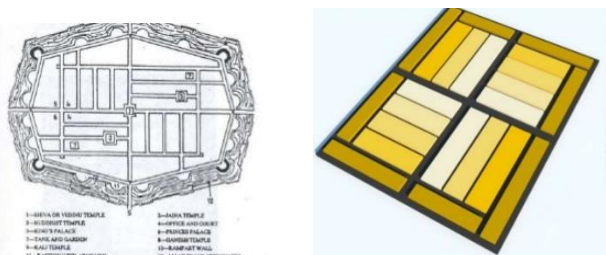


Figure 2.5

- Contemplates some diagonal streets dividing the site into rectangular plots.
- The site need not be marked out into a square or rectangle and it may be of any shape.
- A rampart wall surrounds the town, with a moat at its foot filled with water.
- 2 main streets cross each other at the center, running S to N and W to E.

Prastara

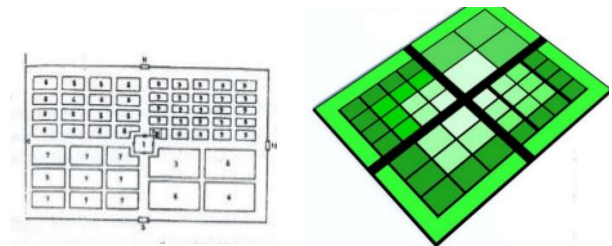


Figure 2.6

- The site may be either square or rectangular but not triangular or circular.
- The sites are set apart for the poor, the middle class, the rich and the very rich, the sizes of the sites increasing according to the capacity of each to purchase or build upon.
- The main roads are much wider compared to those of other patterns.
- The town may or may not be surrounded by a fort.

Karmuka

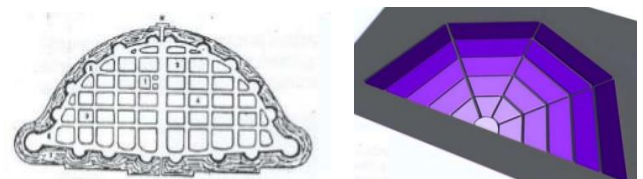


Figure 2.7

- Suitable for the place where the site of the town is in the form of a bow or semi-circular or parabolic and mostly applied for towns located on the seashore or riverbanks.
- The main streets of the town run from N to S or E to W and the cross streets run at right-angles to them, dividing the whole area into blocks.
- The presiding deity, commonly a female deity, is installed in the temple build in any convenient place.

Chaturmukha

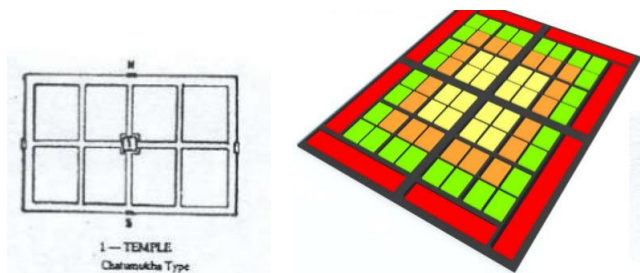


Figure 2.8

- Applicable to all towns starting from the largest town to the smallest village.
- The site may be either square or rectangular having four faces.
- The town is laid out east to west lengthwise, with four main streets.
- The temple of the presiding deity will be always at the center.

2.1.2 MODERN PLANNING

Concentric model:

- Ernest Burgess (1925) developed the well-known “concentric zone model,” based on the idea that the city has a single center from which growth proceeds outward.
- His model—which featured Chicago and other modern cities—portrayed the city center as containing the central business district; outside of this, a zone (or ring) containing the factory district; then a zone of workers’ residences; then a zone of middle- and upper-class residences; and, finally, an outer zone of commuters.

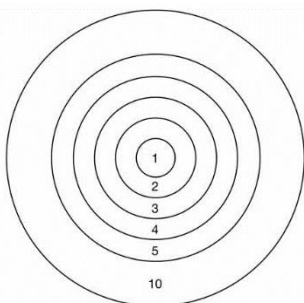


Figure 2.9

The concentric zone model consists of several rings:

1. City center.

2. Factory district.
3. Retrogressing neighborhoods.
4. Workers’ residences.
5. Middle-class residences and
6. Commuters (redrawn from Burgess 1925:51).

Sector model:

- A second model, developed by the economist Homer Hoyt (1939), was the “sector model,” today regarded as complementary to Burgess’s concentric zone model.
- Thus, sectors of specific kinds of land use could grow outward as pie-shape wedges, crosscutting Burgess’s concentric rings.

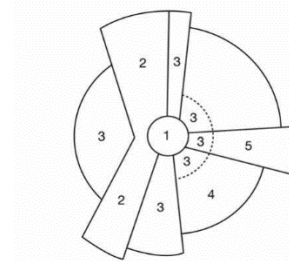


Figure 2.10

The sector model:

1. City center.
2. Manufacturing district.
3. Low-status residences.
4. Medium-status residences.
5. High-status residences (redrawn from harris and ullman 1945).

Concentric and Sector model:

- The value of both the concentric and sector models, later geographers some times combined them (figure 1.3), as Mann did (1965:96) to describe a British city.
- Idealized diagram of a British city that combines the principles of both the concentric zone model and the sector model:
 1. City center.
 2. Transitional zone.
 3. Small houses in sector b, large old houses in sector a.
 4. Post-1918 residences, with post-1945 growth primarily on the periphery
 5. Commuting-distance villages; sector a, middle class; sector b, lower middle class; sector c, working class; and sector d,

industrial and lowest working class (redrawn from Mann 1965:96).

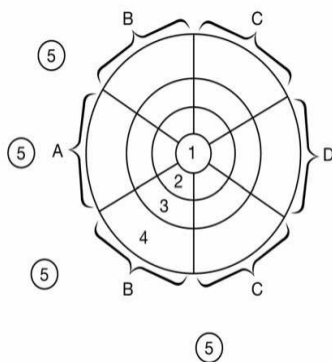


Figure 2.11

Multiple nuclei model:

- A third model, developed by geographers Chauncy D. Harris and Edward L. Ullman (1945), was the “multiple nuclei model,” which shows, as its name implies, that (a) a city can develop multiple nuclei and absorb pre-existing nuclei and (b) as a city grows, it can become decentralized and develop distinct manufacturing areas with specialized occupations and diverse personnel.

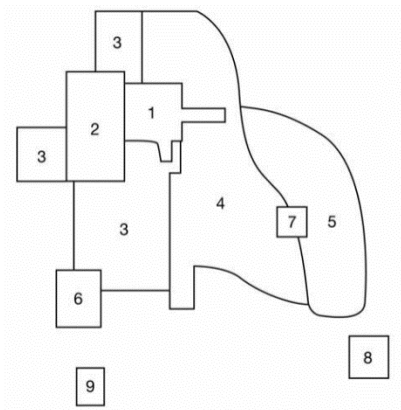


Figure 2.12

The multiple nuclei model:

- Central business district;
- Wholesale light manufacturing.
- Lower-status residences.
- Medium-status residences.
- Higher-status residences.
- Heavy manufacturing.
- Outlying business district.
- Residential suburb and
- Industrial suburb.

3. DATA ANALYSIS

3.1 GEORGE TOWN, CHENNAI

- George Town is one of the oldest settlements in Chennai, developed during the 17th century and is located in the northern part of the city.
- The total extent of George Town area is 4.5 sq. km., with a very high population density of 46,058 persons per sq. km. as per 2011 Census.
- The settlement is bordered by four major roads, namely, the Old Jail Road on the North and South by the General Hospital Road. The Western side is bordered by the Wall Tax Road (Chennai Central Station) and the East by the Rajaji Salai.
- The neighborhood is covered by the Buckingham Canal on the West, the Cooum River near the South of the settlement forming great hub for transportation and water resource during the early ages.
- George Town is an historical area of Chennai city from where its expansion began in the 1640s. It extends from the Bay of Bengal in the east to Park town on the west. The Fort St. George is on the south, to Royapuram in the north. The Fort St. George houses the Tamil Nadu Legislative Assembly and the Secretariat.
- During the colonial period, the area in and around Muthialpet was renamed as “George Town” by the British in 1911, in honour of King George V when he was crowned as the Emperor of India. George Town is one of the names used for Muthialpet. It has the landmark “Parry building”, which the locality is called “Parry's Corner. The area is also called Broadway, named a main thoroughfare in Muthialpet.
- The first of the city of Madras began here, near the fort, Fort St George began in 1640 as a fortified warehouse for the English East India Company. It was built by Francis Day.
- The township of native people that began to grow up around it was called the Black Town by the British. As the city grew, this area became the base for development and construction activities, meeting the needs of people for their livelihood and rulers’ administrative comforts. With the construction of one of India's major ports in the area, Madras became an important naval base for the British.

3.1.1 EVOLUTION OF GEORGE TOWN

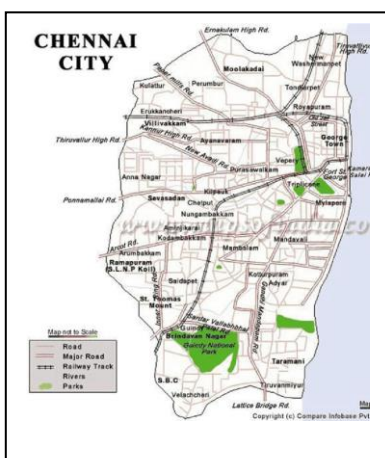
LOCATION:



INDIA



TAMIL NADU



CHENNAI

- The settlement is covered by railway lines connecting various parts within the city and other states. The study area comprises of Beach Station and near the border is the historical

Central Railway Station is located. Along the east of the study area is the Chennai Port Trust, one of the major contributors to export and import of goods for the state.

- The settlement was formed after the British Empire constructed the Fort St. George and it was the first settlement and adjoining neighborhood of the city of Madras. Over the years, due to internal and external migration of various groups of people, George Town remained the first and foremost place opted for by the settlers, in order to serve Chennai city. Taking into consideration the road network design and alignment, it may be said from the architectural perspective that George Town is one of the planned and developed areas for catering to a small population (Muthialpet 2015).

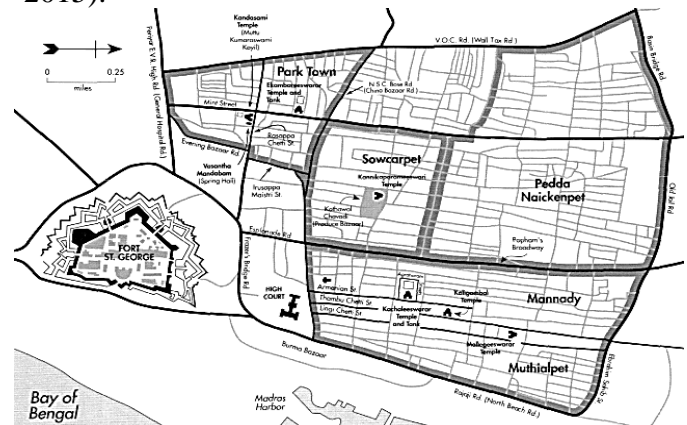


Figure 3.1

- George Town is comes under modern town, it follows grid pattern and the streets are linear and connected with major streets to minor lanes.

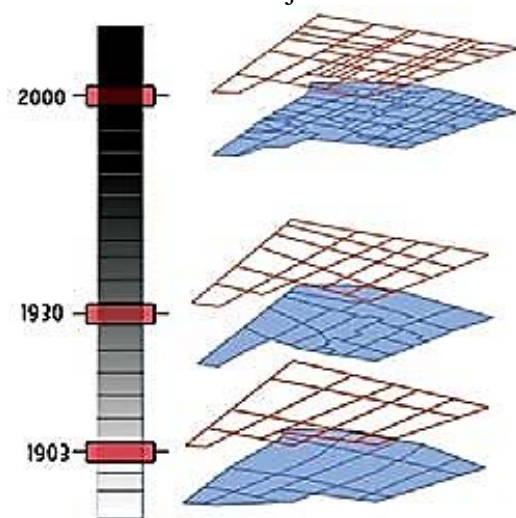


Figure 3.2

Evolution of road network in George Town



Well connected to transit - it has railway station, metro station and bus route



Figure 3.3

3.1.2 POPULATION DATA:

Year	Total Population (in thousands)	Density (Population / sq. km.)	Number of Households
1991	217,874	41,899	39,460
2001	215,306	41,405	40,692
2011	239,503	46,058	51,352

Table 3.1

3.1.3 LANDUSE

Commercial (Blue): The unit that incorporates shops. If there is small extent of residential use within the building (around 10 percent of total floor area), the building will still be considered as commercial as its major character (more than 60 percent) is commercial. Units which are used as warehouses also come under this category.

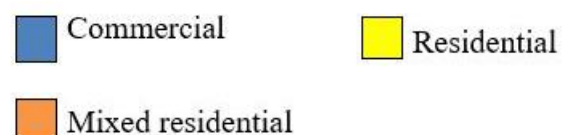
Mixed residential (Orange): A unit would be considered as mixed residential if more than 40 percent of the area has residential activities and remaining as commercial.

Residential (Yellow): A unit which is used only for residential purposes is regarded as residential.

Others: Buildings where no shopping and residential activities exist, and these are used for other purposes like religion related activities or unused spaces; service buildings such as association offices, etc.; and commercial spaces which are not used for trade related activities like hospitals, and hotels come under this category.



Figure 3.3



- George Town remained as the Central Business District (CBD) of the city till the early 20th century due to increase in the modes of access, for instance, rail and road transport, which led to change in the mobility patterns in terms to commuting and movement of suburban and rural dwellers. Over the years, however, the CBD status of George Town has gradually expanded towards the southern parts of the city.

3.1.4 PATTERN AND DENSITY

- George Town is also famous for is crowded and densely packed structures, Where a lot of activities happen throughout the day.
- Picture here, also shows clearly that this area lacks open spaces and green spaces and how dangerous the location becomes when any fire accidents or disaster happen.
- There is no scope for the people to move out to any safer locations even in the case of natural calamities.

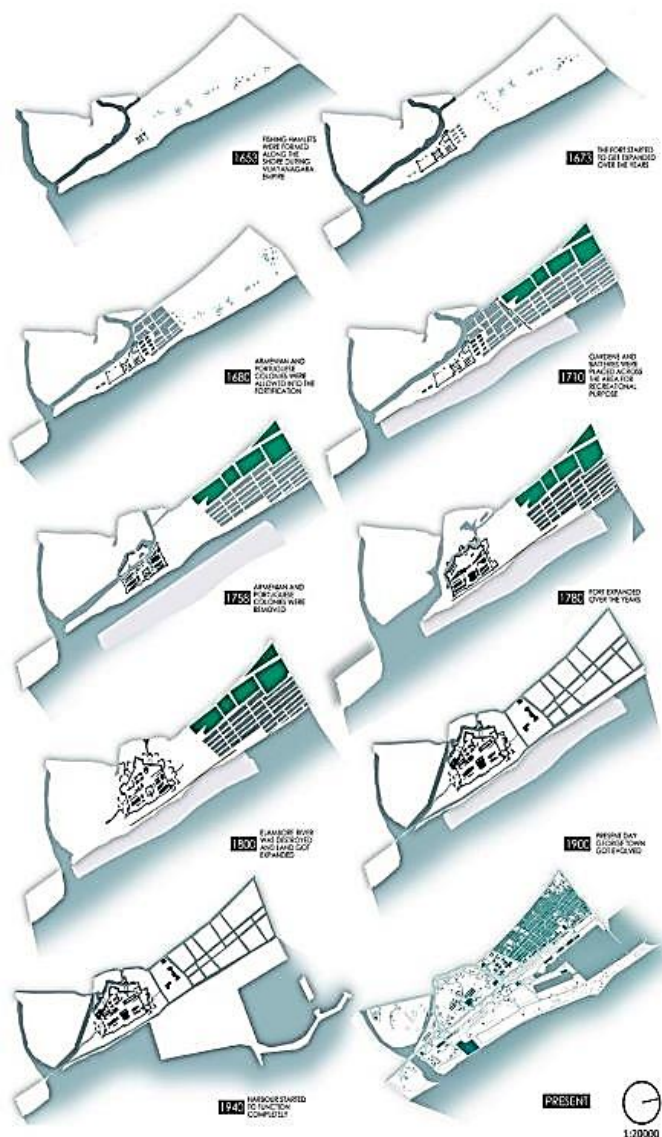


Figure 3.4

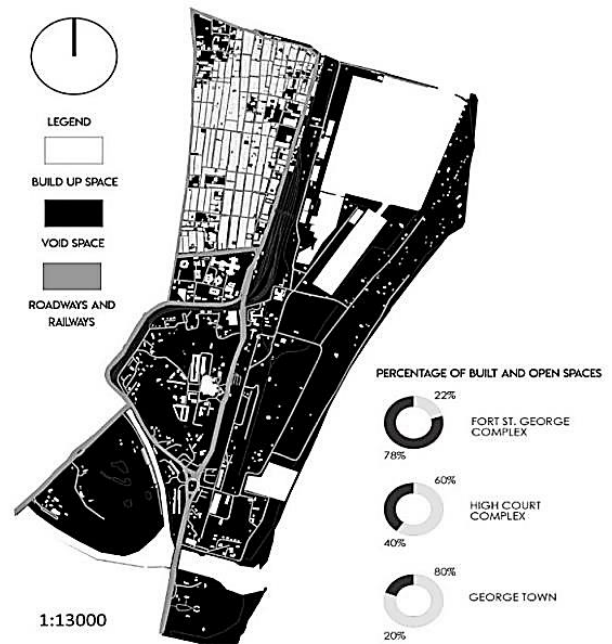







Figure 3.5

3.1.5 HEIGHT OF THE BUILDING

- Though the building height varies from one storey to 8 storey, the average height is only between 3 to 5 stories. More than 80 percent of the buildings fall under this category.
- The buildings are placed next to next, therefore there is no proper ventilation and lighting. All such structures go for cut out and sit outs in it to get the ventilation and light in the required amount.
- The streets are so narrow so that light which enter into the street also get deflected and cannot be able to reach the lower most floor.



Figure 3.6

S.No	Problem description	Image description
1	The high density of buildings developed over the years, did not give opportunity for parks and playgrounds, hence a huge lack of recreational facilities is found in the area. Only 0.14 per cent of the total area is available as parks and playgrounds.	 George Town Area
2	Narrow roads - Totally 479 streets are found in George Town, out of which 449 streets have less than 10 m road width and nearly 130 streets less than 5 m.	 South Mint road (left) & Venkatachala street (right)
3	Corporation report states that less than 1 per cent of the buildings are legally built in the Sowcarpet area in George Town (Deccan Chronicle 2016). It was found that in the entire area more than 90 per cent of the buildings had no front setbacks and had no more than the allowed height with 100 per cent plot coverage.	 Edapalayam street
4	Parking violations - Most of the streets are encroached by on-street parking thus reducing the street width.	 Thambu chetty street
5	On-street loading and unloading.	 Annapillai street


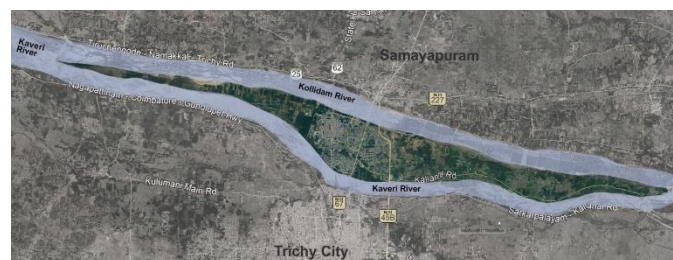
6	Unsafe emergency evacuation during hazardous events like fire because of continuous buildings with narrow lanes.	 Sowcarpet
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Table 3.2

3.2 SRIRANGAM

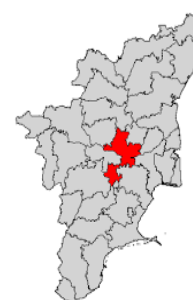
Srirangam in Tiruchirapalli (or Trichy) has been selected for the purpose of this study. The town exists in the city of Trichy, as an island formed by the river Kaveri (Cauvery) into two branches - Kollidam (Coleroon) and Kaveri (Cauvery). The Srirangam Municipality exists as part of Tiruchirapalli city today, which is the main commercial centre in proximity to the temple town, as it was in colonial times.



LOCATION



INDIA



TAMIL NADU



TRICHY



SRIRANGAM



3.2.1 EVOLUTION OF SRIRANGAM

The temple town of Srirangam has a unique mythological as well as historical story, one that is often a blend of myth and fact. It holds a unique place as the largest functional Vishnu temple complex in the world. One of the myths that revolve around the situation of the temple is that the deity of the temple is in fact an idol of Lord Vishnu in a reclining position that Lord Ram is believed to have performed poojas on. As a token of love, Lord Ram gifted the idol to Vibhishana, the brother of Raavana, to take back to Sri Lanka. However, there was a condition attached which stated that Vibhishana was not to set the idol on earth and if he did so, the idol would set itself in the spot permanently. During his travels, Vibhishana, with the idol, came upon the banks of the river Kaveri during the Utsavam., wherein he was required to perform poojas for the lord for which he placed the idol on the banks of the river. When the Utsavam was over, Vibhishana tried to lift the idol, but it refused to move. A heartbroken Vibhishana begged Lord Vishnu to come along, but he refused. The Lord however promised Vibhishana that he would bless him by always facing the direction of his home, Sri Lanka i.e. South. The deity in Sri Ranganathaswamy Temple is in fact the only idol in India to face the south direction. The Ranganathaswamy Temple is the chief temple of the Vaishnavites, a Hindu faction that worships Lord Vishnu.

3.2.2 EVOLUTION OF SETTLEMENT IN SRIRANGAM

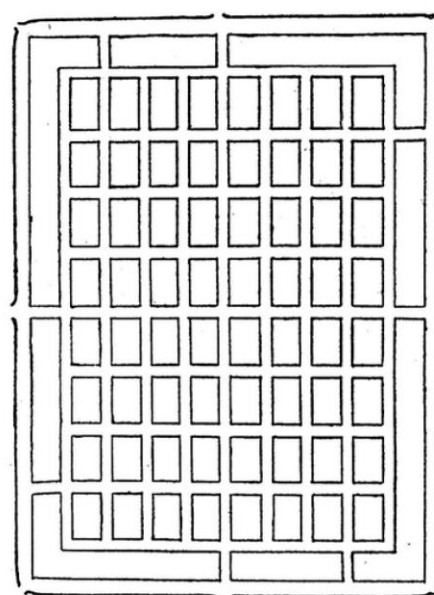


Figure 3.7

Beginning of Rule	Dynasty / Rulers
2nd Century C.E.	Cholas
Early to mid 13th Century C.E.	Hoysalas
Late 13th Century C.E.	Pandiyas
Early 14th Century C.E.	Mohammedans under Malik Kafur, general of Ala-ud-Din Khilji
14th Century C.E.	Vijayanagara rulers
16th Century C.E.	Naik rules of Madura
1741	Marathas
1744	Nawabs of Arcot
1749 - 1761	Carnatic Wars
1763	Treaty of Paris - placed under the rule of Nawab of Carnatic
1790	Failed attempt at siege by Tipu Sultan
1801	Ceded to British

Table 3.3

3.2.3 PATTERN AND PLANNING CONCEPT



Sarvatobadhra concept

Figure 3.8

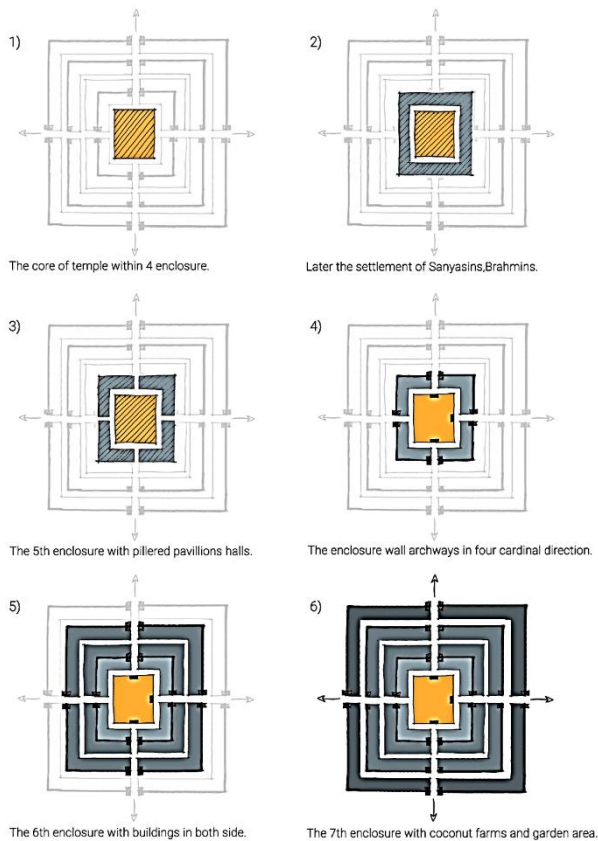


Figure 3.9

3.2.4 PLANNING OF SRIRANGAM

- Sarvatobadhra Town Plannig is followed to plan this temple complex. It is one of the Ancient India town planning schemes.
- It is oblong or square. The village may be divided into interlineal chambers after Manduka or Sthandila.
- In the centre should be located the temple dedicated to the Triad Brahma, Vishnu or Siva.
- The number of car-streets (rathya) in it varies from one to five with a boulevard going round the village. The internal streets are lined with a single row of houses while a double row of houses ranges along the outer streets.
- The core of temple was built around 500AD by Killivalavan Cholan and it is dedicated to Lord Vishnu.
- Later the settlement of sanyasins, Brahmins started to settle around the temple in irregular way and kings decided to make this temple as temple town in 1100 AD.
- The Fifth enclosure is dedicated to pillared pavilions and pillared halls and they are belongs to temple.

- Soon after, the Fifth enclosure is occupied by inhabitants of the town and vanished the uniqueness.
- The buildings was covered with wall to protect them and to maintain order in occupational hierarchy.
- The enclosure wall is connected to the entrance archways which is placed in four cardinal direction.
- In the sixth enclosure they have buildings in both side and maintained the street in middle of both the houses and the same enclosure wall and entrance archway was laid.
- The final evolution of walled town is seventh enclosure which has more green cover than another enclosure, because it has more coconut farms and garden area.

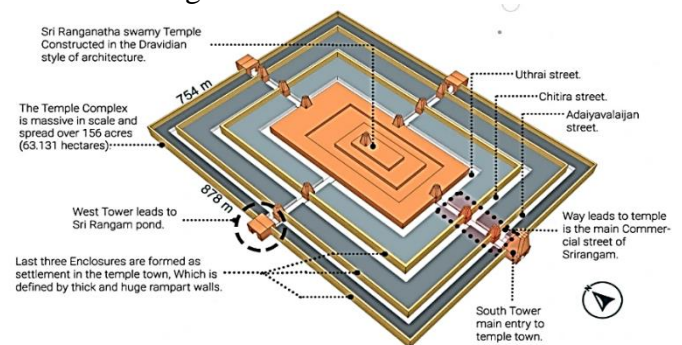


Figure 3.10

3.2.5 URBAN CHARACTER OF SRIRANGAM:

- The temple town has 3 settlement enclosure and temple complex at center. The orientation of the temple entrance were perfect to each poles.
- The organization of space in this town is based on centralized organization, Which gives an emphasis to the temple at center of town.
- The Indian Caste System is originated from the 28 occupational system and it is historically one of the main dimensions where people in India are socially differentiated through class, religion, region, tribe, gender, and language. The caste system divides Hindus into four main categories – Brahmins, Kshatriyas, Vaishyas and the Shudras.
- The planning of this started with small gabghagha in middle of river where the islet is already formed, so the king of 5CE in that region erected the main structure and developed the town.
- The entrance archway placed in all axial sides of town entrance except west entry to the

temple. Archway in south is the main way for pedestrians and other 2 wheelers. The massive structure is paled in the way to enter walled town to protect from any external affairs.

- Temple is not only a place of worship in srirangam, here temple act as a cultural center also.

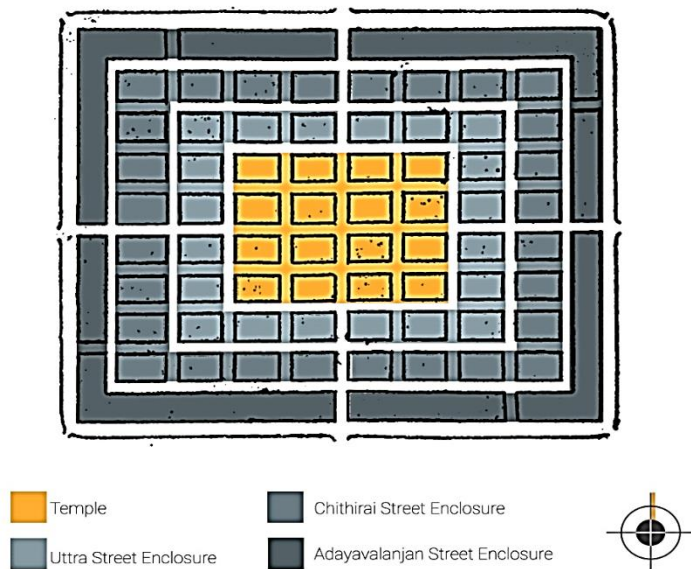


Figure 3.11

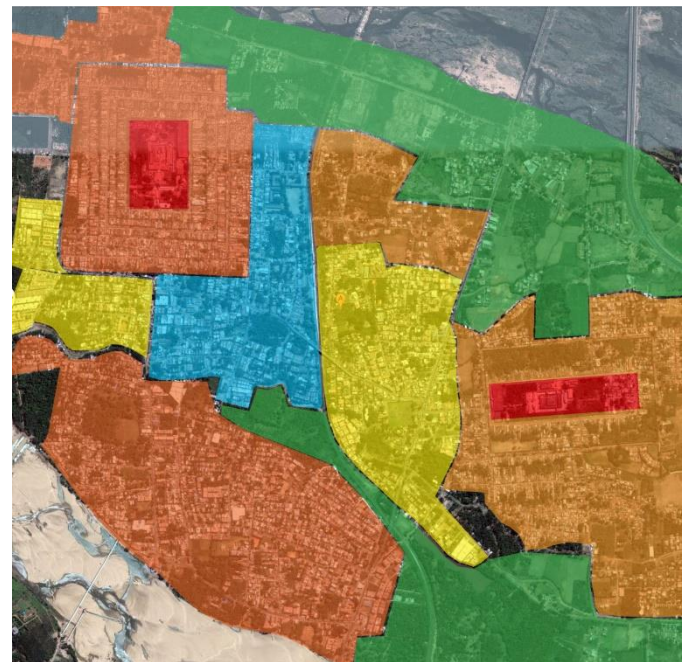
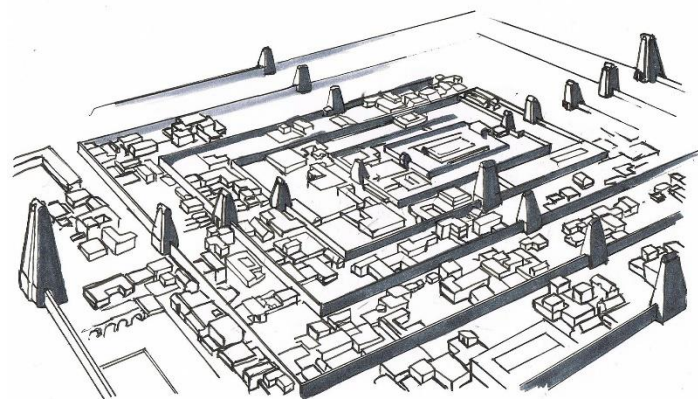


Figure 3.12



3.2.6 LANDUSE

- According to TCC-city corporate plan-it has a open spaces of79% includes agricultural and water bodies area.
- Butterfly Park-. It is a tropical butterfly conservatory located in the Upper anaicut reserve forests in Srirangam with an extent of 25 acres. This park has 27 plant varieties corresponding to 27 stars (Nakshatras).
- The public building and commercial Land use are placed between two major temples for better proximity.

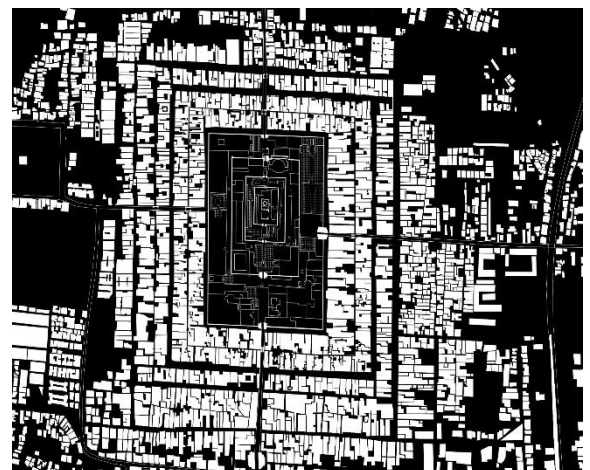


Figure 3.13

3.2.7 POPULATION DATA

Year	Total Population (in thousands)
1991	NA
2001	174,689
2011	210,361

Table 3.4

AREA UNDER REGULATION



URBAN GRAIN

Development control regulations – after TPS



3.3 THANJAVUR

- Thanjavur is an ancient city located in the state of Tamil Nadu, Southern India, formerly known as Tanjore. This city is considered to be one of the most important hubs of architecture, art and culture of southern India.
- It is the location of many of the Chola temples, declared as World Heritage Monuments. The diversity of Thanjavur results from the change in rule of dynasty, and as a effect, the change of urban form.
- Thanjavur town is made of 4 streets, known as Raja Veethi (North, South, East, and West) and the extension from northern side is place known as Karanthatangudi, separated by a small stream or a river, Vadavaru. This has existed since the Chola period. The oldtown of Thanjavur was mainly the area encompassing the old bus stand, Keelavaasal and Karanthatangudi.
- The Statistics shown below represents the current population dynamics and the percentage of Landuse in 2011.
- According to the 2011 Census, there are currently 2,40,271 people in Thanjavur. The Statistics gives a good overview of the current Thanjavur.

LOCATION



INDIA





TAMILNADU



THANJAVUR

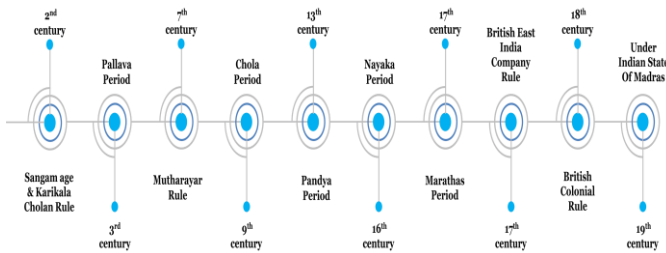


BIG FORT

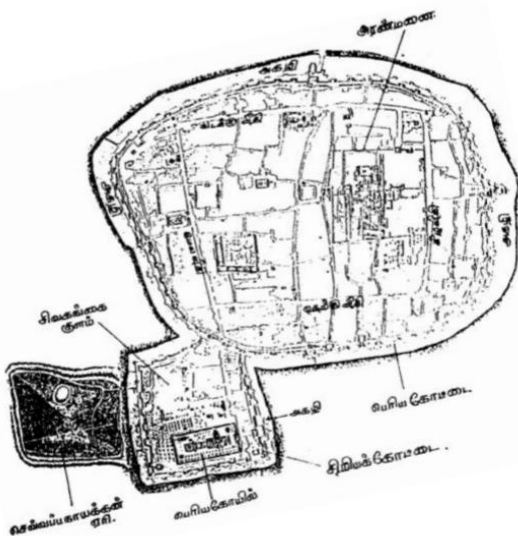
S.NO	Problem Description	Image Description
1	The neighbouring streets in Srirangam to experience the cascading impact of traffic on Sathara Veedhi.	 Sathara Veedhi
2	Traffic and parking congestion in Amma mandapam road that affect the vehicular movement	 Amma mandapam road

3.3.1 EVOLUTION OF THANJAVUR

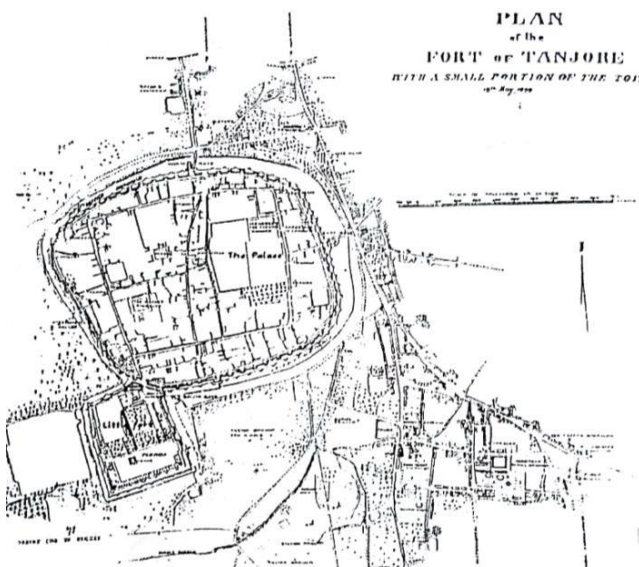
- The original historic town of Thanjavur of Chola period was completely demolished by the Pandiya king in 13th century and could not regain its glory until the emergence of Nayak dynasty in 16th century. Sevvappa Nayak, the founder of hanjavur Nayak dynasty was the one who planned and built the fortified town of Thanjavur, from which originated the present Thanjavur (Balasubramanian Kudavayil, 2012).



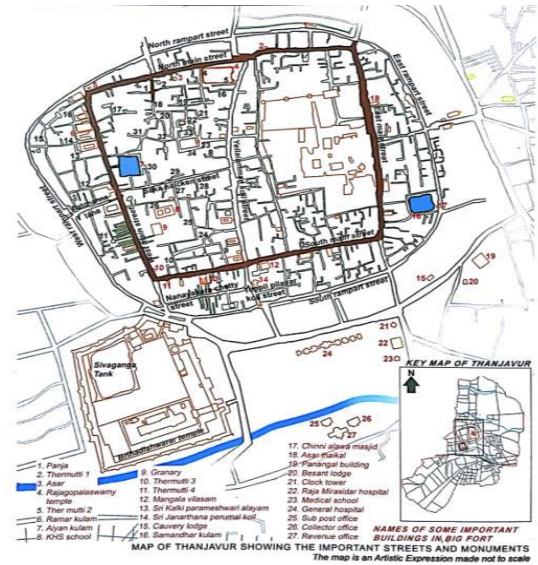
Timeline 1



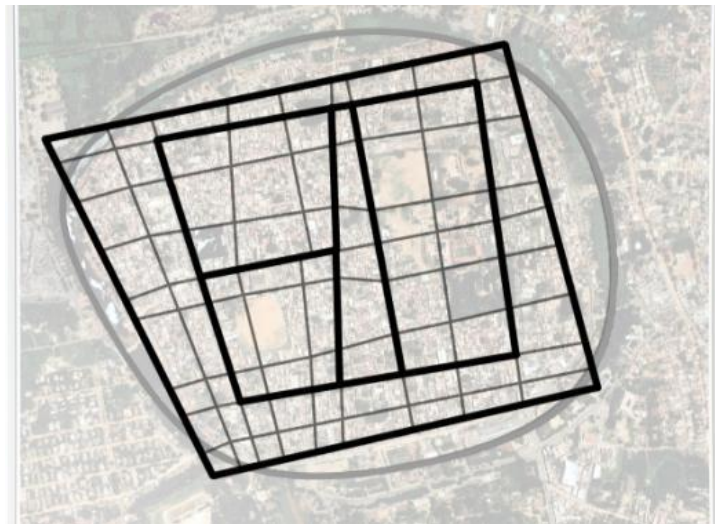
During 1790



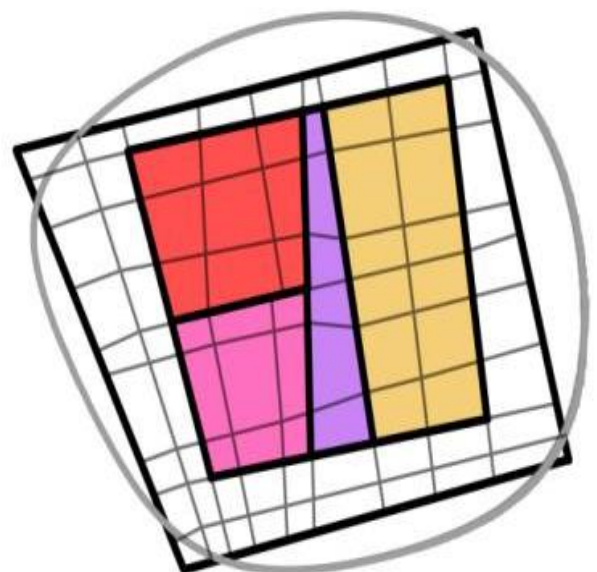
During 1859



3.3.2 STREET PATTERN AND NETWORK



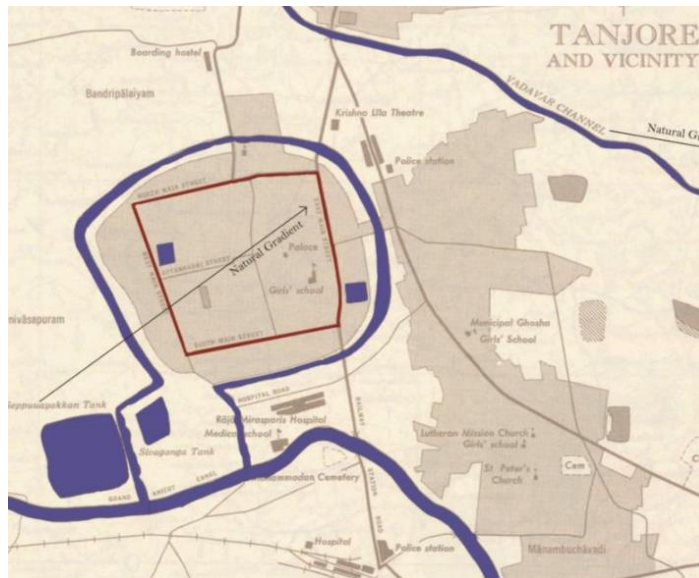
a) Evolution of street patterns



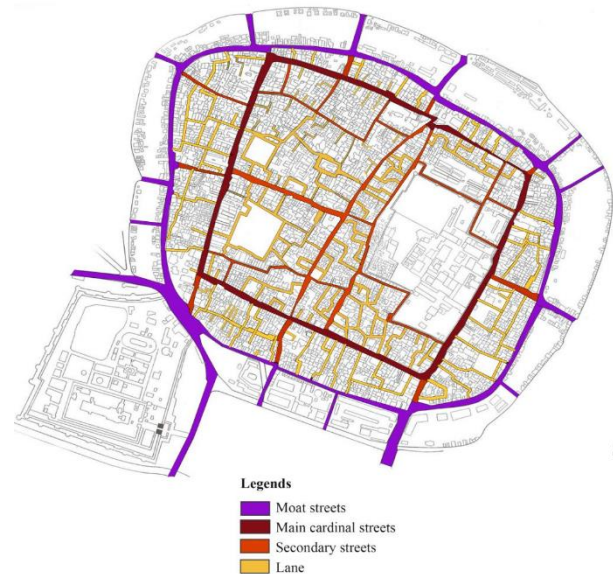
b)

(a) - The overlay of the 9 x 9 grid pattern distorted to suit the topography of the fortified town.

(b) - The graphical representation of the outer square, central core and the encircling circular moat.



Major paths and circulation



PEDESTRIAN LANE

Because of the high land value, these pedestrian lanes are formed closer to the main commercial street. These lanes are used by the property holders and act as a private and enclosed zone. They are used to communicate with the main street. The width of the lane is around 1 to 1.5 meters. They act as a major front street to many of the buildings, which are closely packed.

RESIDENTIAL SHARED STREETS

These are the low-volume residential streets: they are very narrow and run across the contour levels. These narrow, interconnected residential streets are the places where children used to play. people share their door fronts with the streets, and a variety of activities take place, and these streets are around 2 to 3.5 meter wide and suitable for two-wheeler transportation.

WEST MAIN STREET

This is the historic street where the commercial characters congregate. This street has the characteristics of Temple Street and its activities. This street holds the chariot procession during the festive times and has heavy traffic flow due to the various diversities and its width is 7.3 meters.

WEST RAMPART STREET

These ramparts are the streets along the fortification wall that act as an outer connecting route to the neighbourhoods. These streets were used as monitoring streets during the historic periods, so the width of the streets had to accommodate the movement of soldiers with horses and pedestrians. These ramparts now serve as a district for urban characters with slum houses. The width of the street is 4 to 5 meters.



- Main Cardinal streets such as East main street, West main street, North main street and South main street.
- Moat Streets or Ramparts which are running parallel to the cardinal streets to its exterior .
- Secondary Streets which connect two main streets
- Lanes which branches out of the secondary streets
- Bye -lanes which branches out from the lanes.

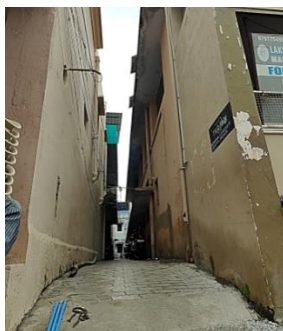


Mixed Use : Those are mostly of industrial and residential combined which employed about 100 workers. These industries produce jewels, coins, food items, handicrafts, musical instruments and clothing.

Commercial : The land utility range for the commercial has not changed over the years but the location of the major commercial has changed due to the Old Bus Stand. The major commercial sale are jewellery, printing presses, hotels, stationaries and groceries. Occupation of the people also depend need on the commercial activity.

Public and Semi Public : The Palace complex for tourist spots and few Administration Buildings for official and civic works. Other services like bus stand, banks, conventional centres, museums and exhibition centres also present within the study area.

Open Spaces & Water Bodies : Few open spaces for parking or for future expansion are present with the water bodies in and around the area as temple lake and moat are found.



Pedestrian lane



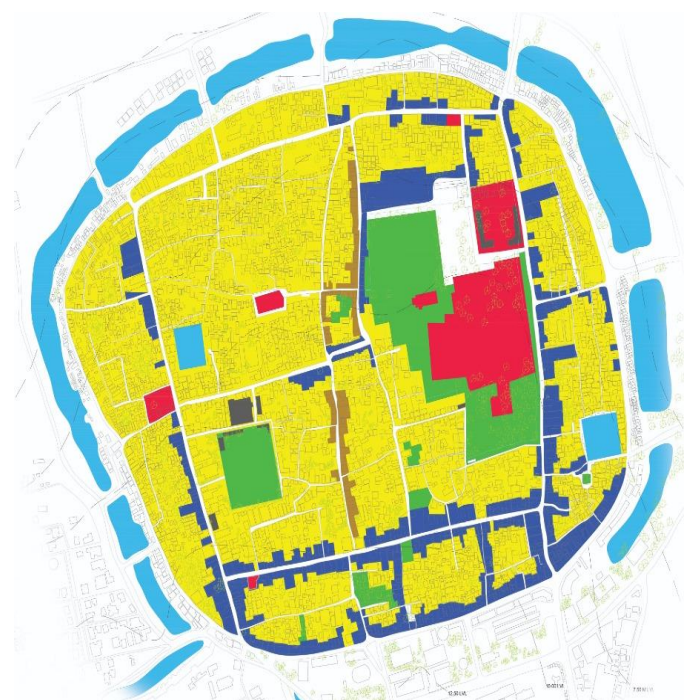
Residential shared streets



West main street



West rampart street



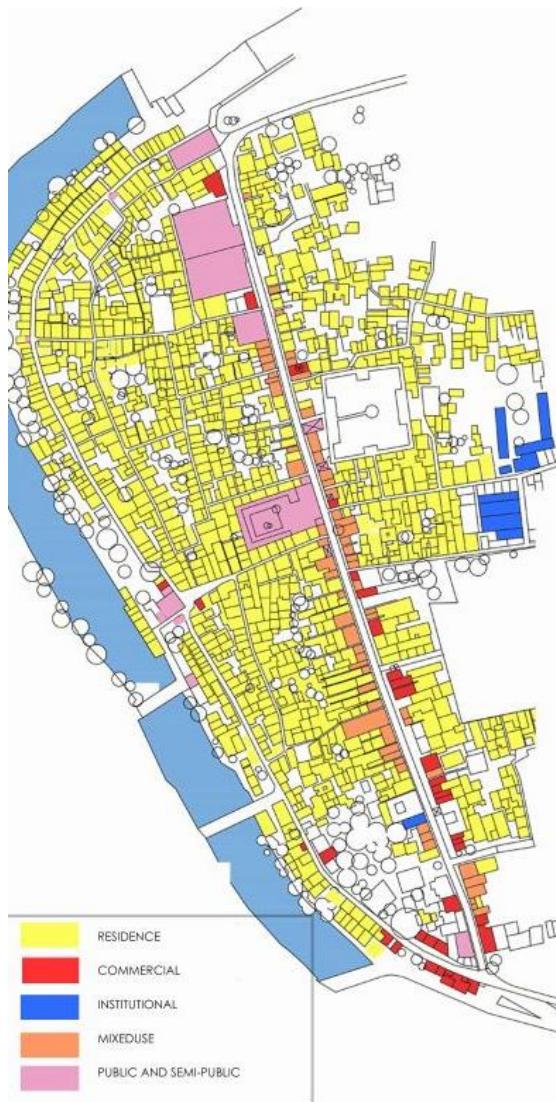
3.3.3 LANDUSE

Residential : The evolution of the town indicates that the area within the fortified walls were utilized majority for residential Even though few residential have changed into commercials due to the presence of the old bus stand, still the residential remains the major zone.

Institutional : There few buildings maintained for the schools, also the Tamil Nadu University Library and the government school within the palace complex are institutional existence. There are also other small schools use old buildings for classes.



LANDUSE OF WEST MAIN STREET



- When examining the land use pattern of West Main Street, the mixed use category is crucial. There is a quiet minimum of commercial land use that has been traced.
- The main reason for this is that the neighbourhood streets, such as South Main Street and its rampart, serve as a major commercial centre, eliminating the need for another commercial use. Some commercial uses, such as parcel services, medical shops, or garages, necessitate a substantial amount of parking for loading and unloading.
- Mixed-use buildings contribute more to residential and commercial uses, assisting in socioeconomic development. The main street is then lined with temples and schools, lending it a distinct character.

- The inner streets of the west main side are completely residential, and the residents get their basic needs from nearby pettishops. There have been no notable changes in these areas over the last three decades. Inside the main street, the landuse pattern remains unchanged.

3.3.4 ACTIVITY

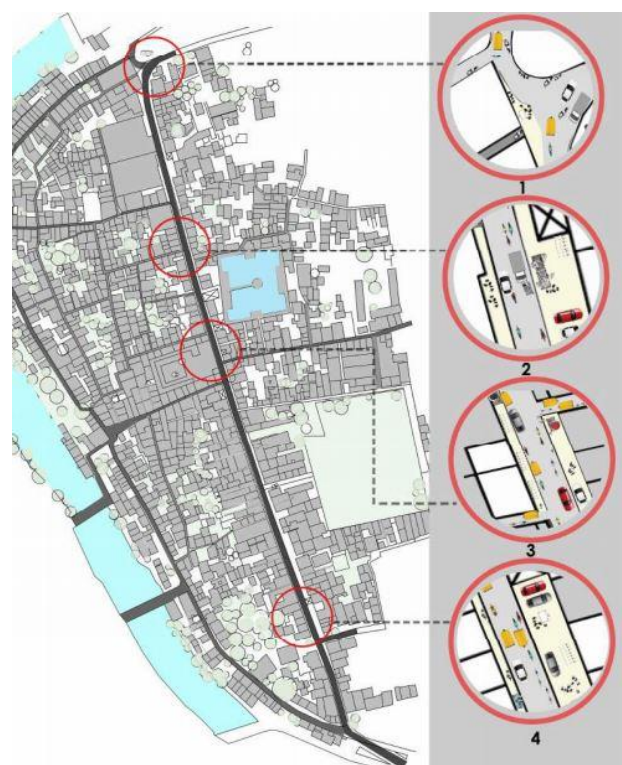
Permanent activity on west main street:

- Moolaanjaneyar temple node (6:00am-8:00am) temple and vegetable vendors.
- Series of temple (navaneetha krishna temple, Bangaru kamaktshi temple, and moolaanjaneyar temple) makes the place more active by fruit, flowers and vegetable vendors.
- Sakka nayakan street main intersection node from the west main street that leads the major activities for schools and commercial activities.
- Busiest activity of west main street which inter connect with south main street with lot of commercial activities.

Temporary activity on west main street:



Muthu pallaku





Ther thiruvizha



Pachchai kaali & paval

3.3.5 FIGURE AND GROUND






COARSE GRAIN

- Coarse grains fabric type are mostly evolved to fulfil the need of people in the town.
- The presence of temple complex in west main street which make the coarse grain fabric of the west moat region.
- It has more open spaces.
- This coarse grain circle is less populated with more open spaces. This makes the buildings aerated. So these circle have less density and high spacing.

FINE GRAIN

- The west main street fine grain circle consist of several small blocks in close proximity, within each block are several buildings, most with narrow frontages, frequent store fronts, and minimal setbacks from the street, streets and opportunities to turn corners are frequent and as a result.
- These fine grain type are mostly evolved to fulfill the commercial needs of the street. This circle is the most busiest in west main street.
- The buildings of this fine grain circle includes mixed-use development, commercial shops from (G-G+3) government, temple and residences.

S.NO	Problem description	Image description
1	Narrow lane with dead-end will create.	 <p>Thanjavur big fort. Source- google map (2023)</p>
2	Unsafe emergency evacuation during hazardous events like fire because of continuous buildings with narrow lanes.	 <p>Ramaiyar lane, west main street, Thanjavur</p>
3	Encroachment in west rampart road will destroy the identity of moat. The moat has more significant value.	 <p>West rampart street</p>
4	The lane has dead end which leads to create a pedestrian traffic	

problem in future. Because of people in and out movement inside the single lane which has 1.5m width.



3.4 KUMBAKONAM

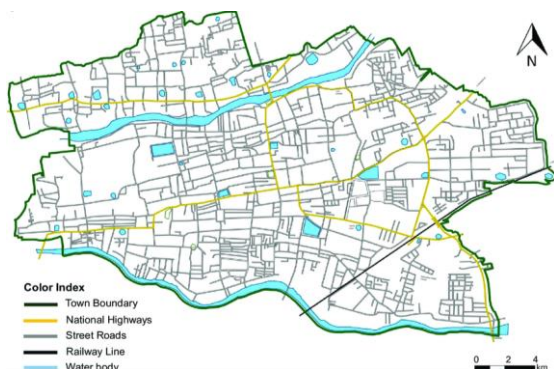
Kumbakonam is an important taluk in Thanjavur District. It is generally called as temple town. Kumbakonam Taluk is located at 100 58'N to 10.970 N Latitude and 790 25'E to 790 42'E Longitude. Kumbakonam is a deltaic region. It lies in the region called the "Old Delta" comprises of the North Western taluk of Thanjavur District.



LOCATION



INDIA TAMIL NADU THANJAVUR



KUMBAKONAM

3.4.1 HISTORY AND EVOLUTION OF KUMBAKONAM

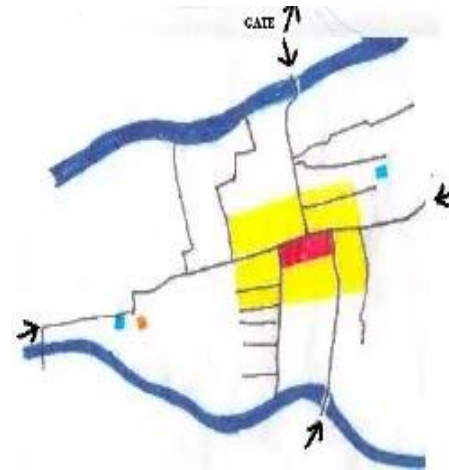
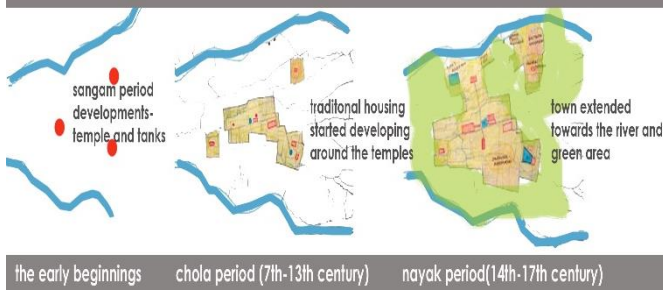
- Kumbakonam, a historical town in Tamilnadu state in India was chosen for our study area.
- The town consists of 45 municipal administrative wards, which are included, with approximately 500 streets.
- Mythologically Kumbakonam assumed its origin, centered around the Kumbeshwara temple, the two holy tanks of Mahamakam and Pottvamarai, and the Bandurai temple.
- The evolution of the city was marked by the rise of temple settlements.
- There are nine Siva temples and five Vaishna temples. The two Siva temples (Nageshwara temple and Kasi Vishwanatha temple) and one Vaishnava temple (Sarangapani) formed the nuclei of Saiva and Vaishnava settlements.
- The initial brick structures were converted to stone vimanas and nuclei of huge temple complexes, which grew steadily in size from chola period and gained additional subsidiary shrines and enclosures with tall gopurams, during the Vijayanagara and Nayaka period. During the Vijayanagara-Nayaka period, vaishnavasim gained importance and Sarangapani temple became the centre of this major settlement. Another one Vaishna temple is Chakrapani temple.
- Chakrapani temple its residential area came into existence along with several Vasihnava mathams.

	Time line	Contributions
Sangham period	300 B.C to 300 A.D	
Pallava and pandya period	300 A.D to 500 A.D	Excavation of tanks
Chola period	900 A.D - 1200 A.D	Shiva temples
Vijaynagar and Nayak Period	1400 A.D- 1800 A.D	Vaishnavite Temple
Pandya revival and Muslim rule	1200 A.D - 1400 A.D	
British Rule Independence and Democracy	1800 A.D - Present	Acquired cultural Name – Cambridge of South India

Timeline 2

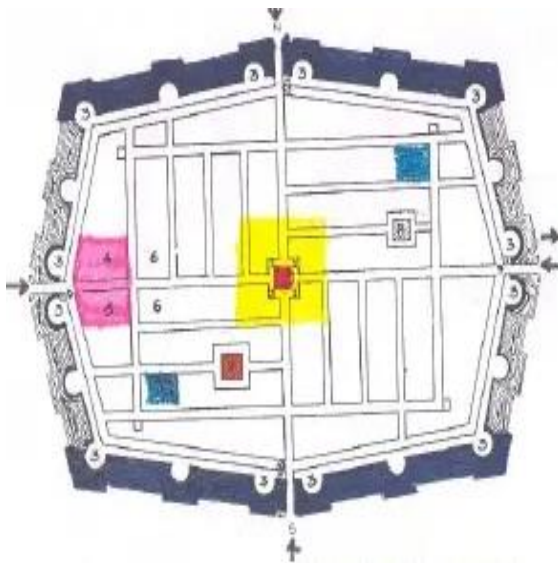
3.4.2 EVOLUTION OF KUMBAKONAM

KUMBAKONAM- settlement pattern evolution from Sangam period

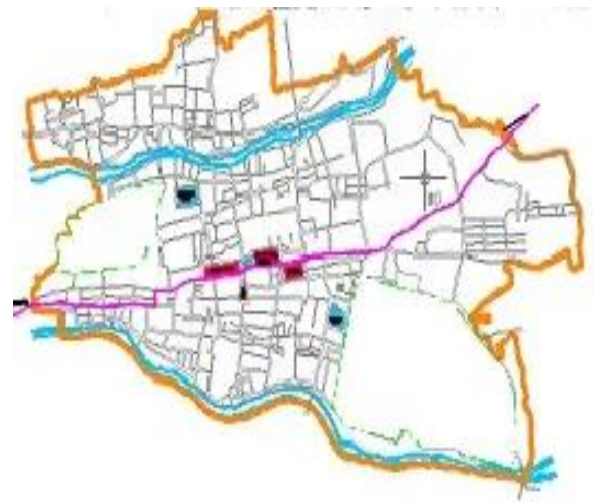


3.4.3 PLANNING PRINCIPLE

The abstract form of planning



Derived from Swasthik form



Urban form

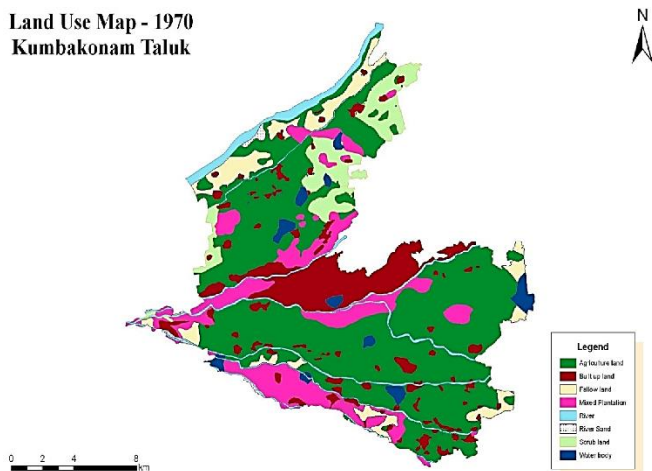


The Main spines and the institutions

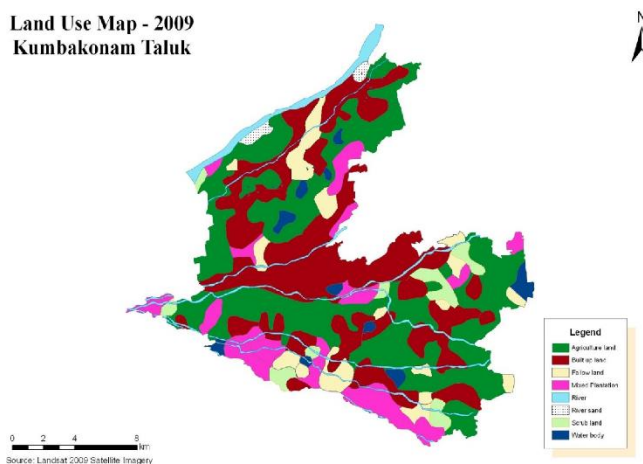
- The temple city has been conceived with the underlying canonical principles in its overall structure.
- The plan contemplates the Swastika mandala, a diagram that allows the flexibility to be marked out into a square, or rectangle or it may be of any shape.
- The diagram suggests that the town to be surrounded by a rampart wall, with a moat at its foot filled with water.
- Two main streets cross each other at the center, running North south and East west.
- The resultant quadrants would follow a street network in the swastika pattern, with the principal streets in each running in one cardinal direction.
- The central location of the main Siva or Vishnu temple, the presence of a Jain temple in the SW quadrant, the palace in the west and the kalyani are also comparable to this temple city.

3.4.4 LANDUSE

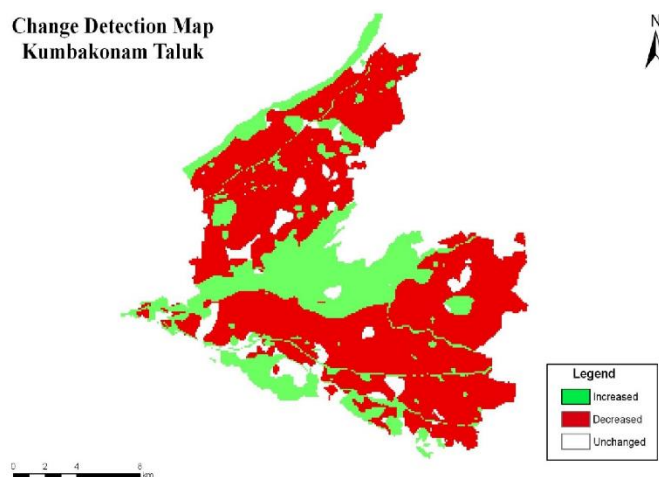
Land Use Map - 1970
Kumbakonam Taluk



Land Use Map - 2009
Kumbakonam Taluk



Change Detection Map
Kumbakonam Taluk



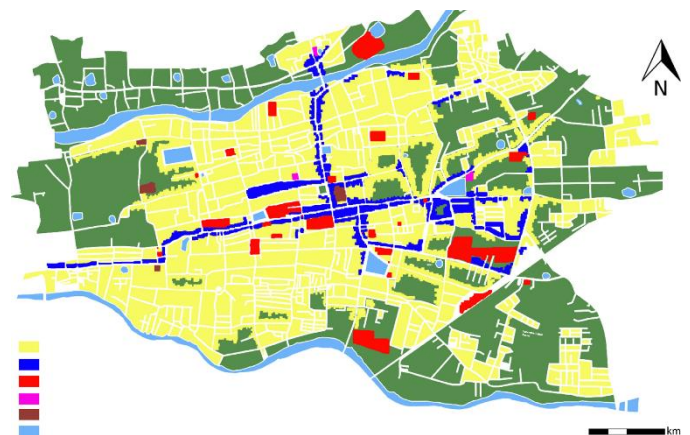
Kumbakonam is a special grade municipal town and the second largest town in the Thanjavur district in terms of its administrative status. The town comprises 45 wards and covers an area of 12.58 sq. km.

The robust characteristics of this town have been regularly associated with the similarity in its land use or development patterns. presents the land use pattern in Kumbakonam Town. The land use in this area is generally residential, with the commercial activities primarily located in the town center and along the

highways, Bazaar Street, TSR Big Street, Nageshwara Koil Street, and Mahamaham tank precincts.

The public and semi-public zones are located in the traditional core of the town along with temples, tanks, schools, and the town hall. The government offices and institution buildings are located to the east, where new buildings are also being developed.

LAND USE CATEGORY	AREA IN SQ. KM	AREA IN % 1970	AREA IN SQ. KM	AREA IN % 2009	CHANGES
AGRICULTURE LAND	149465540.40	51.49	107057697.99	36.85	14.64
BUILT UP LAND	40185587.90	13.84	96724176.06	33.32	-19.49
FALLOW LAND	19105080.10	6.60	21017490.82	7.26	-0.69
MIXED PLANTATION	38350208.70	13.21	30267733.28	10.42	2.79
RIVER	15140270.33	5.21	14933775.10	5.14	0.07
RIVER SAND	1064288.47	0.38	2220993.53	0.76	-0.6
SCRUB LAND	19413525.30	6.68	10502634.43	3.65	3.07
WATER BODY	7538211.65	2.59	7538211.65	2.59	0
TOTAL	290262712.86	100	290262712.86	100	0

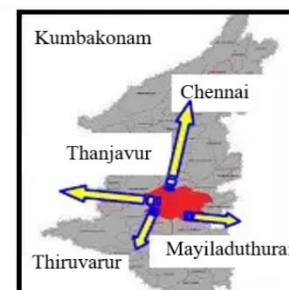


Landuse map, 2021

3.4.5 HIERARCHY OF STREET NETWORK

Regional connections

Kumbakonam, in Thanjavur district, is located at 10° 57' north latitude & 79° 23' longitude It is about 313kms from Chennai on the north, 40kms from Mayiladuthurai on the east, 40kms from Thiruvavur on the south & 40kms from Thanjavur on the west. Unlike other religious centers.



- The State highway acts as a main spine of Kumbakonam that runs through the ridge with all the secondary and tertiary streets meeting it.
- The major transformations are along this spine with G+3 structures.
- The street network responds to the topographical features and the network of canals.

- Though deeply ingrained to cosmological principles in the structuring of the town, the physical construct of it responds to the geographical context invariably.



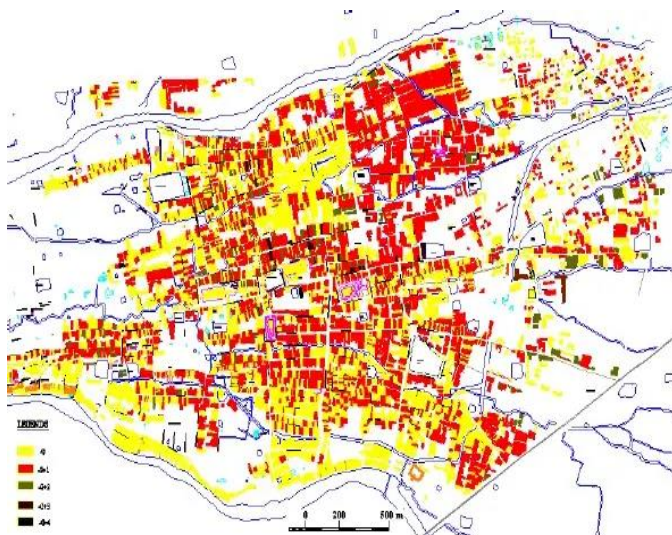
Existing structure in Kumbakonam

- The variety of schemes evolved includes redefining the historical street, the water edge of the town along Cauvery and Arasalar rivers, The exploited channels, tanks and tank beds and their relevance in the present day to proposing a new development to the eastern part of Kumbakonam.

3.4.6 BUILDING HEIGHTS

The entire fabric is predominantly high-rise structures, punctuated by the towering gopurams of the main temples. The residential fabric is of ground and G+1 structure. The major transformation zones are along the State highway, around Mahamakam, along the Cauvery river edge and the new road, lined with G+3 and above structures.

The religious institutions, matams, major government and educational institutions are ground and G+ 1,2,3 structure, due to the development of urbanization.



3.4.7 BUILD Vs OPEN

The city is generally characterized by contiguous built form. The new residential layouts and the colonial period establishments like office sand institutes are the plotted development. In the old city, the urban solids are the built, enclosing the voids that are the Kulam, streets, canals etc. whereas in the newer parts of the city, urban voids encase the urban solid .

The voids of the temples, enclosed by the urban solids, in the traditional core of the city emphasizes the hierarchy of the solid contained within.

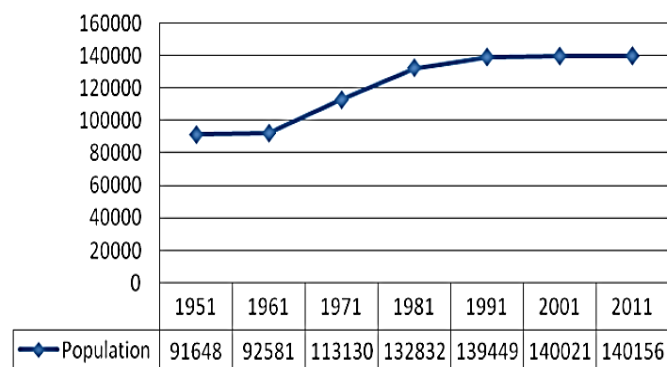
In the old city, streets are defined by the lining of urban solids (the built), and the resultant backyard spaces are formed along the canals. The traditional fabric is more dense than the later settlements, with less wide roads within the settlement.

In the newer areas the developments are plotted type with the footprints of the institutions being much larger in scale than the residential buildings.




3.4.8 POPULATION DATA


There is a gradual increase in population from the year 1951 but still the percentage of growth is only 4.3% from 1991 to 2001. Geographical constraints in the area because of the two rivers is the main reason for the slow progress of population growth in the town.



3.4.9 OVERALL ACTIVITIES IN STREETS

Area	Activity
Ayikulam road	Lodging, Hardware
Dr. Moorthi road	General Shopping Nehru Market
Chakkarapani south street	Godowns, Wholesale Markets
Kumbeshwarar North Street	Brass Stainless Steel Vessels
TSR Big Street	Jewelery, Banks, Financial Services
Head Post Office Road	Automobiles, Lodging
Town Hall Road	General Shopping
Thanjavur Road	Textiles
Kamarajar Market	Vegetables

S.NO	Problem description	Image description
1	Due to the commercial activity in between the core of town traffic congestion is happen at any time.	 <p>Kumbakonam main street</p>

2	Urbanization led to changes in the built heritage which are gradually decaying the heritage character of the city.	 <p>Gandhi Adigal Salai</p>
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4.1 CONCLUSIONS

In conclusion, this research sheds light on the distinct urban designs and architectural characteristics of Thanjavur, Kumbakonam, George Town (Chennai), and Srirangam, highlighting the significant influence of historical context, cultural heritage, and socio-economic factors on their development. By addressing the existing research gaps through a comprehensive comparative analysis, this study underscores the importance of understanding local contexts in shaping sustainable urban environments. The findings provide valuable insights for architects and urban planners, emphasizing the need for design strategies that respect and preserve cultural identity while accommodating modern needs. Furthermore, the research opens avenues for future exploration, particularly regarding the integration of contemporary architectural practices with traditional forms and sustainable urban design in historically rich areas.

Through the study, the transformation of urban development will affect the urban pattern and the characteristics of different towns, which will reduce the historical significance of the particular space.

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