

**PLANNING STRATEGIES FOR RURAL URBAN FRINGE
DEVELOPMENT OF ERNAKULAM CITY
A CASE OF KIZHAKAMBALAM**

THESIS REPORT

Submitted by

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MUP (2020 - 2022) BATCH

to

the APJ Abdul Kalam Technological University in partial fulfillment

of the requirements for the award of the

Post Graduate Degree of M. Planning in

Urban Planning



URBAN PLANNING

DEPARTMENT OF ARCHITECTURE

THANGAL KUNJU MUSALIAR COLLEGE OF ENGINEERING

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DEPARTMENT OF ARCHITECTURE
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CERTIFICATE

Certified that the Project entitled **“Planning Strategies for Rural Urban Fringe Development of Ernakulam City -A case of Kizhakambalam”** submitted by **Aswathi V (TKM20MUP004)** of MUP (2020-22) BATCH, in partial fulfillment of the requirements for the award of Post-Graduate Degree in Urban Planning, under the APJ Abdul Kalam Technological University is a bonafide work carried out by her under our guidance and supervision.

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I hereby declare that the project entitled “**Planning strategies for rural-urban fringe development of Ernakulam city -a case of Kizhakambalam**” is a bonafide record of the study done as part of thesis work under the supervision of Ar. Shahina Muthu.S during the **Fourth Semester M.Plan (2022)** Post Graduate Degree Course in the Department of Architecture, Thangal Kunju Musaliar College Of Engineering, Kollam. I declare that, to the best of my knowledge, the work reported herein does not form part of any other project report or thesis based on which a degree or award was conferred on an earlier occasion to any other candidate.

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ABSTRACT

The rapid urbanization trend in the global scenario leads to the congestion of urban space and demands more space for growth. This growth pattern results in the expansion of city to outskirts, and rural-urban fringe areas. The major impacts are reduced forestcover , loss of rural landscape, decreased water resources and demand for built pace .The fringe characteristics shift from primarily rural to largely urban over time .The unplanned development results in negative environmental consequences.This study focus on preparing strategies for the development of the Kizhakambalam fringe of Ernakulam city.

As one of India's second-tier metros with the quickest growth rate, Kochi serves as Kerala's commercial centre. Today, Ernakulam's growth is moving toward the city's eastern side. Infopark in Kakkanad, Growth of aluva city are some of the examples. As a result, the Kizhakambalam panchayat grows more rapidly. A variety of businesses and new establishments are drawn to this panchayat by the resources that are there. Therefore, appropriate development strategies must be devised to prevent dispersed growth. The growth trend of Ernakulam city is studied and identify the fringe area has more growth potential. To analyze the existing situation of fringe, a primary survey was conducted among households. Finally prepared the strategies to conserve the rural landscape of Kizhakambalam & to promote the healthy development of the fringe. The proposal for planned development of the Kizhakambalam fringe is aimed to protect the fringe from the negative effects of rapid urbanization trends.

Keywords – Rural-Urban fringe, Urbanization, Rural landscape.

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CHAPTER 1 INTRODUCTION

1.1 Background study

Rapid urbanization is a global trend. The urbanization of India is skewed toward major cities. The growth pattern of cities is affecting the character change of neighboring rural areas also.

Kochi is the commercial hub of Kerala, and one of the fastest-growing ,second-tier metros in India. Its headquarters is located at 'Kakkanad' in Thrikkakara municipality. Ernakulam district is 47.56% urbanized.

Rapid urban growth and urban sprawl lead to the movement of people to the fringe areas. Unplanned development in rural-urban fringes causes critical environmental consequences such as a decrease in forest cover, loss of rural landscape & pollution. Fringes have a high role in reducing the issues faced due to urbanization. Proper development strategies are needed in rural-urban fringes to Utilization of Land in the best possible manner, Save the degradation of ecology, create well planned Rural-urban fringe development & improve economically, and social status of people.

1.2 Need for the study

As the world becomes more urbanized, the rural-urban fringes are also growing. The issues faced by cities as a result of urbanization are addressed by nearby rural-urban fringes by meeting the demands. In the modern era of urban expansion , the fringe has great importance as it is undergoing most dynamic changes in space usage and activity mix. Proper development and planning are required for effective land utilization.

The urbanization of India is skewed toward major cities. Cities are spreading beyond their urban boundaries in terms of space. Kerala's commercial centre and one of India's second-tier metros with the highest growth is Kochi. its headquarters is located at 'Kakkanad' in Thrikkakara municipality. In 1971 the extent of the urban area in Ernakulam district was 217.90 sq km which was increased to 544.21 sq km in 1991. That is, the urban boundary is extending toward the outskirts. Kizhakambalam panchayat is a rural area which is located 10 km from Kakkanad and 11 km from Aluva. The growth of Kakkanad and Aluva is

spreading towards the eastern side in nowadays. this increases the growth of Kizhakambalam panchayat. A number of industries, new establishments are getting attracted to this panchayat due to the availability of resources. Thus in order to avoid scattered growth, proper development strategies have to be prepared.

The current development pattern of Ernakulam is towards the eastern side(towards kakkanad -kizhakambalam stretch). Currently more industries are established in Kizhakambalam due to its proximity to the Ernakulam side. These developments have both negative and positive impacts on their development. Kizhakambalam area needs properly planned development to protect the rural landscape and to avoid these hazardous growth patterns.

1.3 Aim

To develop strategies for rural fringe development of Kizhakambalam panchayat,the fringe of Ernakulam city.

1.4 Objectives

- To study the concept and the characteristics of Rural-urban fringe development.
- To identify the potential study area and analyse the existing development pattern of 'Kizhakkambalam'.
- To evaluate the planning attributes of Rural-urban fringe development through case studies.
- Identifying priority sectors and existing rural-urban linkages.
- To develop planning strategies for rural-urban fringe development in the Kizhakkambalam panchayat.

1.5 Scope

- The focus of the study is to understand the characteristics of rural-urban fringe, potentials, planning attributes, and current practices of the Kizhakkambalam fringe of Ernakulam city.
- Analyse case studies on similar cases.
- Identifying opportunities for rural-urban fringe development for Kizhakkambalam
- Identifying priority sectors and existing rural-urban linkages.
- Planned R-U Fringe for the protection of the environment.
- finding possibilities for developing Rural-urban fringe development in Kizhakkambalam.

1.6 Limitations

- The study of rural-urban fringe development concept globally is very vast.
- There is no universal definition for rural-urban fringe.it varies for different countries.
- The study focuses only on rural-urban fringe development in the Kizhakkambalam fringe of Ernakulam city.

1.7 Methodology

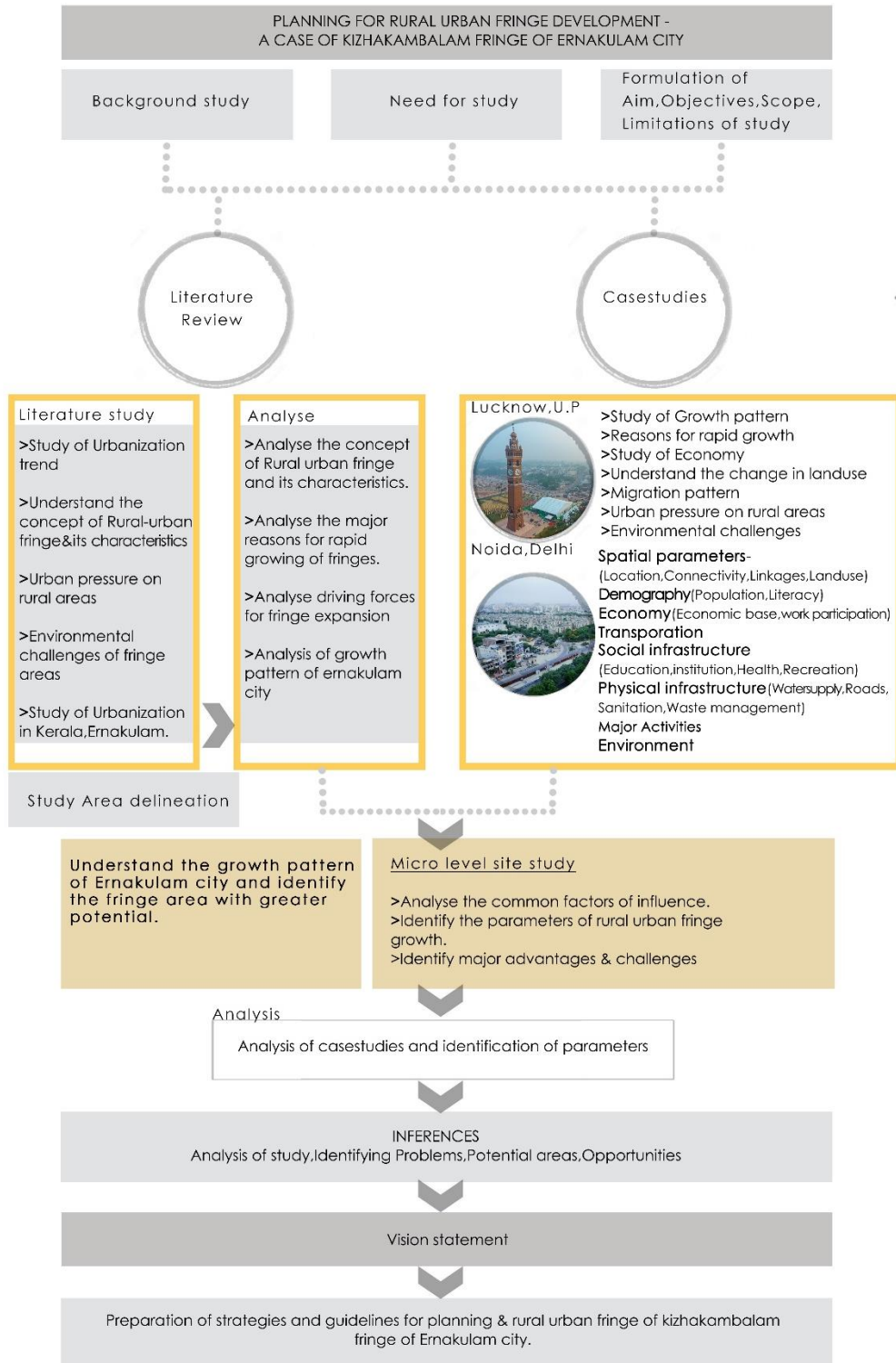


Figure 1 Methodology chart

CHAPTER 2 LITERATURE REVIEW

2.1 Urbanization trend - India

India's urbanization is neither unique nor exclusive, but rather a global phenomenon. Urbanization in India has progressed in the same way that it has elsewhere in the globe as a result of and as a result of economic change. One aspect of the change is the transition of employment from agriculture to urban-based industry and services. Another element is new industrial investments and service industry expansion in new locations.

As for the magnitude, in 1901, only 25 million people constituting 10.84 per cent of population lived in urban areas in India. In the 100 years since then, the urban population has grown 12 times and it is now around 285 million people constituting 28 per cent of the total population. In the following 20 years (2001-21), the urban population will nearly double itself to reach about 550 million. According to the (division, 1998), the urban population in the year 2025 will rise to 42.5 per cent (566 million). (K C Sivaramakrishnan, B N Singh, 2007)

2.2 Definition – rural urban fringe

Definition of Rural- Urban Fringe, An attempt to define has been made by foreign and Indian scholars. (Smith, Rural urban fringe, 1931) has highlighted the characteristics of the fringe area found between continuous built- up area and rural landscape in their own way.

Some Indian Scholars as (Singh) has called it as the rural land with urban phenomena.

(MMP) has defined 'rural urban fringe in the real sense is a narrow zone with varying width outside the political boundaries of an urban unit which is neither urban nor rural in character. It acts as a bridge between the two.

2.3 Types of rural urban fringe

The rural urban edge is a vibrant area. With the expansion of urban facilities, it changes its shape and limits. The fringe area is divided into two categories.

2.3.1 Primary urban fringe

This belt touches the outer administrative limit of the city. After development it witnesses rapid development of urban facilities and various activities.

2.3.2 Secondary urban fringe

Secondary urban fringe is an area extending outside the primary urban fringe. It has primarily rural characteristics which has developed slowly. Urban functions are less.

2.4 Characteristics - rural urban fringe

2.4.1 Land use characteristics

- There is constantly changing pattern of land use.
- Residential expansion is rapid.
- Farms are small with intensive crop production.
- Service and other public facilities are inadequate.
- Science and business parks development.
- Airport expansion.
- Speculative building is common.
- Industrial expansion

2.4.2 Social characteristics

2.4.2.1 segregation

Rural urban fringe also known as “ Greenfield site “ (undeveloped sites outside the existing built up urban area) which are favoured by large firms seeking locations for new developments such as headquarters, offices, housing and industrial estates. So there is functional and social segregation of land use.

2.4.2.2 Selective immigration

The rural urban fringe attracts middle class residents who form a small but powerful and economically important proportion of the city population. Service and other public facilities are inadequate in fringe region which lead to immigration.

2.4.2.3 Commuting

People living in fringe area commute daily to their place of work. This creates the dual problem of traffic congestion in the city . the city govt. is faced with the task of providing transport service handling peak load.

2.4.3 Rural-Urban Interactions and Linkages

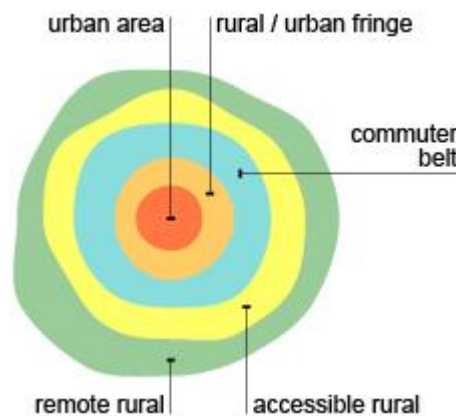


Figure 2 Rural-Urban Fringe

Source - Arise, L. (2021). *Rural-Urban Fringe*.

Studies of rural-urban interactions have documented regular flows of people, commodities, resources, and capital between urban centres and normally adjacent rural areas, revealing a general trend of consolidation as rural communities have become more dependent on urban areas for employment and service provision. The expansion of large-scale retail units like supermarkets, hypermarkets, and commercial centers, as well as the rationalization of public services, have both been linked to spatial concentration, with fewer larger units generally located in urban areas serving populations across a larger mixed rural and urban catchment area.

2.4.4 Problems of rural urban fringe

2.4.4.1 Land use problems

- The rural urban fringe is often used for dumping garbage and sewage of the city.
- Location of industries emitting noxious gases and generating chemical effluents.
- The fringe is zone of haphazard industrial and residential development.
- The fringe area suffer concentration of land ownership , speculation on land and rapidly rising land values.

2.4.4.2 Urban amenities and service problems

- Urban facilities such as water supply , sewerage etc. are for the most part are not available because the city provides this service only to the place within the municipality limits.
- Outside the municipality limits small town and revenue village lack administrative and financial infrastructure. 3) the fringe area served by poor public transport facilities.

2.4.4.3 Administrative problems

The administration has a difficult time dealing with the rural urban edge. The Indian territorial administrative structure was created before the phenomenon of rural urban fringe was recognised. The city ended abruptly when the municipal administration was founded in 1860, and its boundaries remained largely static over the decades due to a stable population between 1872 and 1930. Following independence, the city began rapidly expanding, resulting in a transition zone with both rural and urban characteristics. Gram panchayats are a cosmetic replacement for local government and are administratively and financially inefficient. As a result, there were numerous issues in the fringe area.

2.5 Rural urban fringe- driving forces

2.5.1 Demand for Low-Density Development

Access to jobs, open space amenities, lower crime rates, lower housing costs, better air quality, more flexible vehicle access, and desired isolation of residences from commercial and industrial activity are all potential benefits of lower density development on the city's fringes.

The most obvious advantage is that low-density development in rural areas has enabled many individuals, especially those who cannot afford city real estate, to purchase single-family houses because land costs are lower on the fringes than in the city.

2.5.2 Metropolitan Expansion

While rural people moved into metropolitan areas, the dense populations of central cities emptied out into the surrounding countryside. Retail centers and office parks have followed housing out to the urban fringe, greatly expanding commuting patterns. While growth in the metropolitan core dropped, adjacent nonmetropolitan counties have a higher rate of growth than metro core areas as people move even farther out in search of less expensive land for housing.

2.5.3 Dynamics of land-use Change

The dense populations of major cities emptied out into the surrounding countryside. Housing has followed retail areas and office parks out to the outskirts of town, dramatically extending travel patterns. While growth in the metropolitan centre has slowed, adjacent nonmetropolitan counties are growing faster than metro core areas as people move further out in pursuit of cheaper land.

2.5.4 Infrastructure

Infrastructure investments, such as roads, sewers, and water supply, can be one of the most important drivers of urbanization since they offer the necessary framework for

development. Infrastructure investment, on the other hand, has a dynamic that influences land-use change.

2.5.5 Employment, Economic Development, and Technology

Firms and residents will be able to disperse to rural areas led to advanced technology, and they will be more likely to relocate to lower-cost metropolitan areas as well as suburban and exurban areas within metros. Many New Economy businesses are relocating to suburban areas of cities since they are no longer economically or functionally connected to major metropolitan centers. The search for quality-of-life attributes is especially important for knowledge-based, New Economy enterprises when deciding where to locate. The relatively limited pool of highly qualified New Economy workers may work almost everywhere, giving them unparalleled flexibility in terms of where they live and work.

2.5.6 Population Growth and Household Formation

Population expansion has an impact on household formation and the demand for new housing land. Household size changes can have a greater impact on the housing sector and land demand than population growth.

2.6 Urban pressure on rural areas

New residents, new economic activity, new transportation infrastructure, tourists, and day trippers may all exert urban influence on rural locations. With more constructed areas, more population, and more activities, urban pressure results in the loss of rural regions. Urban pressure, on the other hand, builds up over time. Instead of a firm distinction between urban compactness and rural openness, a blurring of boundaries between urban and rural areas can be noticed over a longer period of time.

Agriculture characterizes the surroundings in rural areas. The urban pressure will have a negative influence on these agriculture fields. because it will have an impact on the landscape's and nature's production and consumption space There is a favourable impact

on increasing commerce on the marketing side of these products. It will help rural communities develop economically.

2.7 Environmental Changes in Rural urban fringe

Growth brings with it several of the environmental issues. Environmental consequences of expansion can have a variety of negative effects on local communities because the environment is related to other parts of society, such as public health and the economy.

2.7.1 Land Use and Soil Quality

Agricultural fields are lost more quickly in low-density development than in more compact urbanisation. Low-density development patterns result in more sensitive environmental lands being lost, such as wetlands, floodplains, critical habitat, aquifer recharge zones, stream corridors, and steep slopes. By incorporating such lands into open space and environmental protection zones, better planned, more compact settlement patterns can typically avoid converting such lands.

2.7.2 Wildlife Habitat

When development consumes marshes, woods, alpine, and desert terrain, it disturbs, pollutes, and destroys natural habitats for a variety of native species.

2.7.3 Water

Water pollution results from excessive use of water resources. Rivers flowing through urban centers frequently carry a substantial pollution load, ranging from raw sewage to household waste, industrial and chemical effluent, and most of it is harmful to human health.

2.7.4 Air Quality

Both planning and environmental regulation faults have resulted in health and environmental impacts.

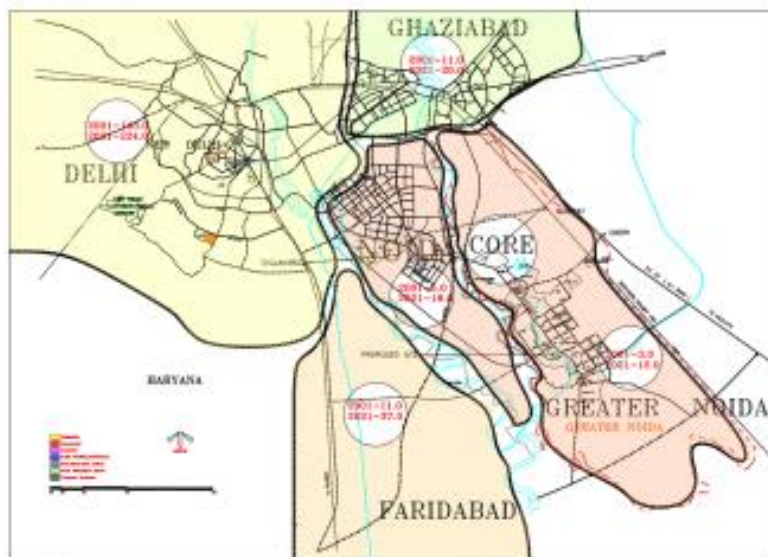
CHAPTER 3 CASESTUDY

3.1 Noida,delhi,india

3.1.1 Location

INDIA > UTTAR PRADESH > NOIDA

Noida is in the district of Gautam Buddha Nagar. It covers 81 revenue villages(20316 hectares of land). Noida lies along the eastern and Southern boundaries of Delhi.Noida for the New Okhla Industrial Development Authority is a city in India under the management of the New Okhla Industrial Development Authority (also called NOIDA).



Location map

Source : Greater Noida Industrial Development Authority

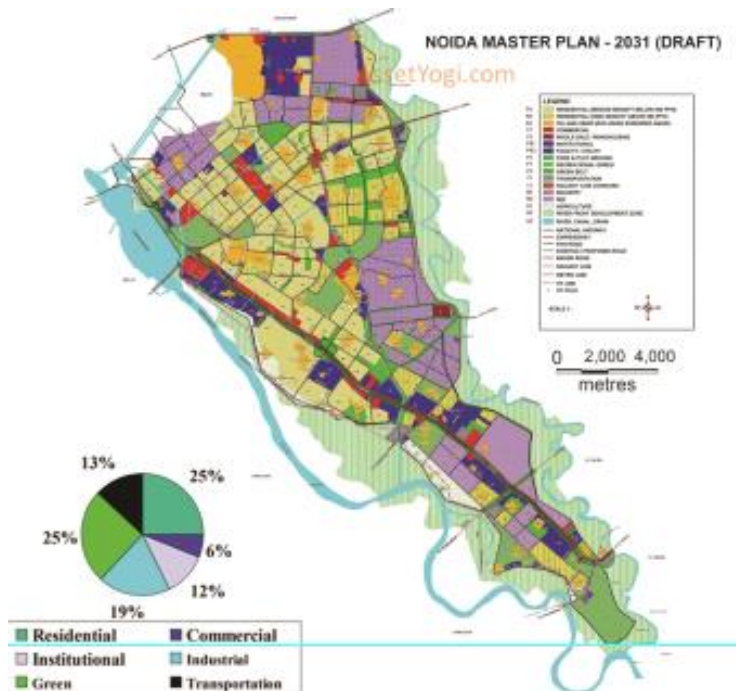
Area - 203 km² (78 sq mi)

Population - 642,381

Lucknow urban Agglomeration (LUA) includes Lucknow Municipal Corporation and Lucknow City.



CONCEPT PLAN FOR GREATER NOIDA 2021
Source : Delhi Development Authority



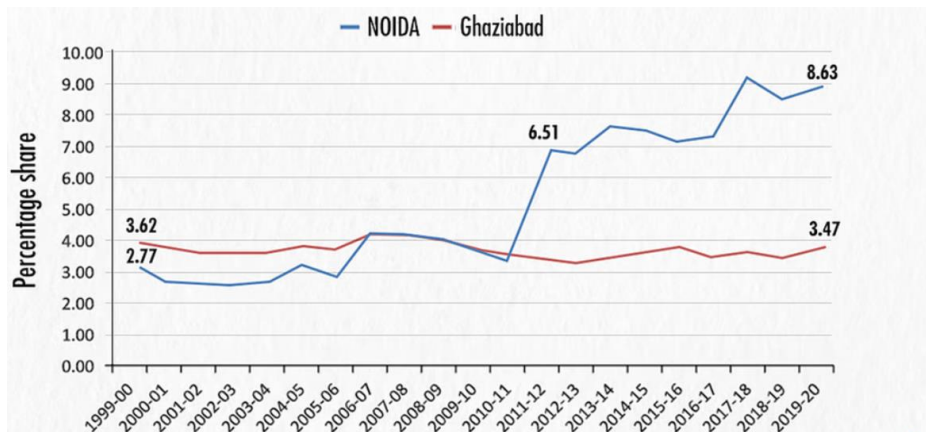
DRAFT DEVELOPMENT PLAN FOR GREATER NOIDA 2031
Source : Delhi Development Authority

3.1.2 Population

The total population residing within the Notified Area of Noida was , 81,003 in 1991. The population increased upto 3,05,058 in 2001 and about 6,42,381 in 2011. This increase In population is not surprising because the period represented the takeoff stage of the new town.

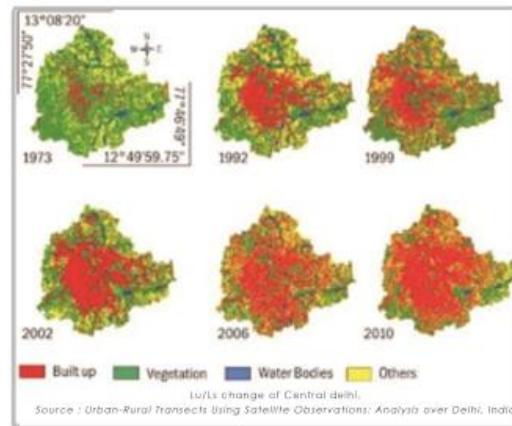
3.1.3 Economy

Noida presently an industrial and residential suburb of Delhi.Part of evolving conurbation extending from Delhi to Faridabad, Greater NOIDA, Bulandshahr, Meerut and Ghaziabad. Ultimately to become a self-contained industrial city with complimentary business, trade and commerce, residential, recreational and institutional activities.



Share of Economy of Two districts in the economy of Uttar Pradesh
Source : Directorate of Economics & statistics,Uttar Pradesh

3.1.4 Landuse change



Lu/Ls change of Central delhi.

Source : Urban-Rural Transects Using Satellite Observations: Analysis over Delhi, India

Landuse	2011	%	2021	%
Residential	3672	47.14	5334	35.65
Commercial	431	5.53	564	3.77
Pub&Semipub	985	12.65	1219	8.15
Industrial	1224	15.71	3001	20.05
Recreational	536	6.88	1513	10.11
Transportation	941	12.08	2211	14.77
Developed area	7789	100	13842	92.5
Agriculture	-	-	1001	6.69
Canal	-	-	121	0.81
Undeveloped area	-	-	1122	7.5
Total	100	100	100	100

LAND USE DISTRIBUTION
source: Delhi Development Authority

3.1.5 Growth potential

- Proximity to Delhi
- Development of Greater Noida and continuing growth of Faridabad and Ghaziabad lies into the vicinity of Noida.
- Agriculturally fertile hinterland
- Proposals for transportation infrastructure development.

- FNG Expressway Noida
- Greater Noida Expressway 21 Rail connection with Ghaziabad at one end and Tughlakabad at the other end.

3.1.6 Development strategies

Noida development strategies were based on the giving more stress towards the industrial area development, commercial area development, residential areas, land use concerns, development of public and semi-public areas, infrastructure, and also the development of transport related areas and finally environmental concerns. Some of the objectives for development of transportation related areas are:

- i) To enable the mobility of people and goods, and faster economic development and enhance social interactions.
- ii) To improve the accessibility of Noida particularly to and from the sub-region and there by promote the nodal functions of Noida

3.1.7 Inferences

From above casestudy,it is understood that the major reason for spread of growth to neighboring rural urban fringe is Urbanization.

Urbanization,Industrial expansion,congesion of cities results in migration of people to adjacent fringe areas.It also have the advantage of low landvalue,minimum expense,good atmosphere,and less pollution.

Noida facing rapid urbanisation with the growth of delhi and it extending outwards.Due to these uncontrollable development,Noida faces many negative impacts.As a solution to this,government planned for a satellite town near the Noida city to share the development and shifting overburden.As a part of this government created a planned city,Greater noida with proper planning & design.In Greater Noida, focus and emphasis was given on controlled planning,regulating unplanned development and on efficient development.maintenance of the city infrastructure.

3.2 Lucknow, India

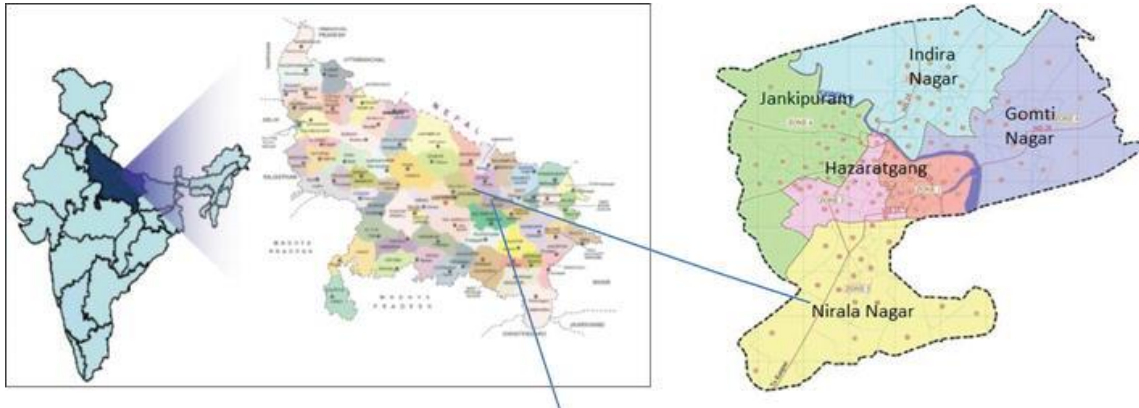


Figure 3 Location Map of Gomti Nagar and Lucknow municipal corporation

Source- Pradesh, G. o. (2006). City Development Plan. Lucknow.

The Gomti Nagar peri-urban area of Lucknow Municipal Corporation is the subject of this case study (LMC). Lucknow is the capital and fastest-growing metropolis in India's Uttar Pradesh state. The city is known for its traditional traditions and Nawabi culture. Gomti Nagar is in Lucknow Municipal Corporation's north-east corner. It is comprised of both residential and commercial areas. Along with dynamic residential growth, Gomti Nagar is one of the city's largest and most popular commercial locations.

With its sleek commercial complexes, large shopping malls, new residential real estate, and metro rail, Lucknow is gradually taking on the appearance of a modern city. The city has attracted a large number of migrants from the state's smaller towns and villages in search of education, employment, and higher-order services; as a result, it is estimated that an additional 100,000 people will arrive in the city every five years, requiring the incorporation of additional areas in the city. The agricultural lands next to the city's built-up areas are gradually being converted to urban use. However, some of the conversion is part of the planned expansion; the rest is haphazard and carried out by individuals.

Private developers investing on urban land for vested interests is resulting in haphazard, unplanned, and unlawful growth in the metropolis. As a result, the supply of serviced land for the public sector is shrinking. People's expectations and population growth in new

peri-urban neighbourhoods such as Nirala Nagar, Indira Nagar, Jankipuram, and Gomti Nagar are on the rise. Out of these peri-urban districts, Gomti Nagar is emerging as one of the city's most popular commercial locations, as well as a booming residential sector.

3.2.1 Location

Lucknow is the capital of Uttarpradesh, the largest populated state of India. It is located between 26° 30' N , 27° 10' N latitude and 80° 30' E , 81° 31' E longitude in the banks of river Gomati.



Location map

Source : Town & Country planning organization, Lucknow

Total number of wards - 40

Total Population - 28.80 lakh (2011 census)

Total area - 337.50 sq km

Lucknow urban Agglomeration (LUA) includes Lucknow Municipal Corporation and Lucknow City.

3.2.2 Land value

Gomti Nagar area witnessed a rise in property prices as development of Lucknow city started spreading outside its limits. The area being near to city limits experienced growth and soon captured the rising property prices. With the current property prices in the city rocketing toward sky, the land rate in the Chowk area is high as it is the center of the informal commercial market and the price varies 6000–9000 per sq. ft. While the land

rate are higher in Hazaratganj than the Chowk area because it has better infrastructure and comparatively new development than the Chowk so the land price over here are 7000–9000 per sq. ft. on main road area as there are virtually no place for further development of the rate of land, which are available are very high.

New area development, such as Indira Nagar, Nirala Nagar, and Gomti Nagar has lower land prices than the city and is more affordable. Land costs in Gomti Nagar might reach 6000 per sq.ft., whereas in Nirala Nagar they can reach 5000 per sq.ft. The infrastructure in new peri-urban areas is better than in older areas, with more open spaces and a better living environment at a more affordable price. This also shows that the old city centre areas are becoming increasingly congested for various reasons, and as a result, people are preferring to move outside the city centre to the periphery, which has a livable environment and is also accessible and affordable.

3.2.3 Status of infrastructure in Gomti Nagar,Lucknow city

Water supply - The River Gomti remains the city's primary source of water. Water is supplied to people in Gomti Nagar via a household water supply with a metered connection, and water is delivered for 3 hours in the morning and 2 hours in the evening. Houses that do not have access to municipal water supply have their own bore wells. Although a number of tube-wells have been bored to tap ground water.

Sewerage & Solid waste management - The majority of residences in Gomti Nagar have septic tanks, and only a few are connected to the sewer system. In the peri-urban region of Gomti Nagar, there is a door-to-door solid trash collection system. However, in other locations, household waste is frequently dumped on the streets. Some households have begun to call private collectors to arrange for the disposal of their trash at local dumps.

Public transportation - In Gomti Nagar, the road network is wide and efficient, allowing for optimal traffic flow. This was done in a planned manner, with the city's future growth in mind. Gomti Nagar, Jankipuram, Aliganj, Indira Nagar, Nirala Nagar, and Sahara city all have spacious streets. Internal roads are 10 metres wide, which is sufficient to handle the traffic flow generated during peak hours in these locations. Public sector

organizations such as the Lucknow Development Authority have been responsible for infrastructure development in the peri-urban areas of Gomti Nagar. The land acquisition act grants access to the land.

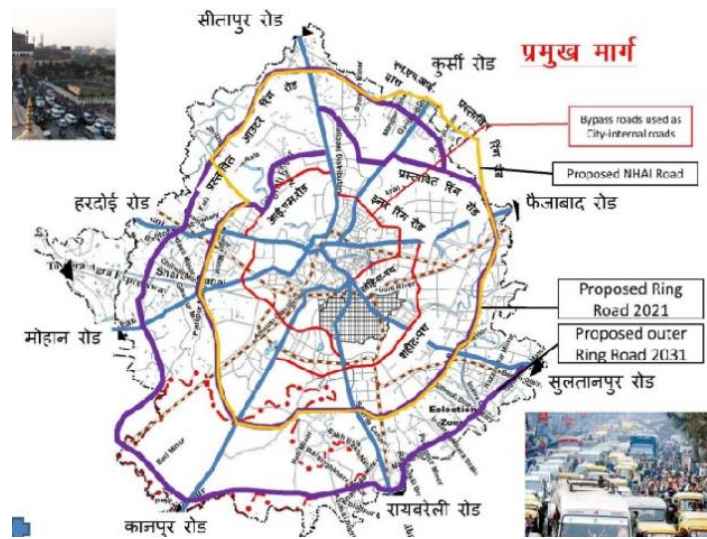


Figure 4 Major Road Network

Source- Town and Country Planning Deptt. Lucknow Master Plan-2031

3.2.4 Land use

Lucknow, according to the Master Plan 2021, covered 16,270 hectares in 2004-05. In comparison to 1987, when the entire area was estimated to be 9170 hectares, the total area in 2004-05 increased by 77.4 percent. Land use trends have been significant, particularly the fact that residential usage has increased considerably in comparison to all other uses. The Lucknow municipal corporation area contains the greatest concentration of developed land uses. It's worth noting that there are essentially no parks or institutional places in the old city. Despite the fact that the old city featured open grounds for recreation.

The continual change of agricultural land to non-agricultural land use poses a serious danger to the region's ecological sensitivity. The Lucknow region's belt contains rich alluvial soil that can produce food crops.

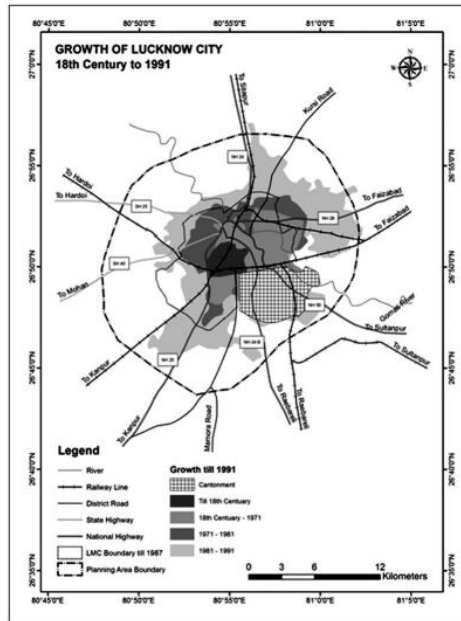


Figure 5 Growth from 18th Century till 1991

Source- Town and Country Planning Deptt. Lucknow Master Plan-2031

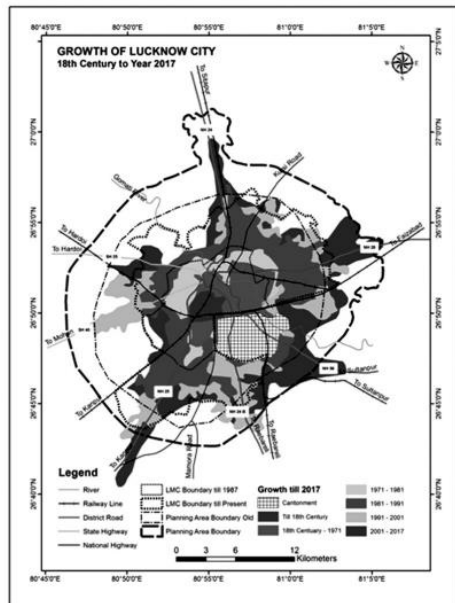


Figure 6 Growth from 18th century till date

Source- Town and Country Planning Deptt. Lucknow Master Plan-2031

Table 1 Analysis of sectors-Lucknow

ASPECT	ANALYSIS	ISSUES FACING
Growth Pattern	Was organic until 1991, when it became a ribbon development pattern (TOD), putting further strain on the primary transportation corridor's infrastructure.	<ul style="list-style-type: none"> • The burden and cost of providing services/infrastructure are both increased as a result of ribbon development. • The transportation sector is poorly funded to meet demand. • Land value speculation is a result of free market dynamics. • Due to a lack of monitoring, development has been uneven.
Rate of Sprawl	A total of 78 communities have been overtaken by sprawl and related activities, resulting in the acquisition of property for private colonisation and development.	
Change in Boundaries	Outside the municipal limits, there is a large built-up area of almost 110 square kilometres. As a result, jurisdictional and service issues, as well as illegal structures, have arisen.	

Topography	<p>The mango belt on the eastern side of the city, which is within the planning area, limits the amount of building that can be done.</p> <p>Until cross links were built, the River Gomti served as a barrier.</p>	
Transport	<p>Congested routes and inadequate road infrastructure. The narrow width and slow transit speed are typical of the city. The average trip length is growing from 6 kilometres to 9 kilometres.</p>	

Source- Author generated with reference to Town and Country Planning Deptt. Lucknow Master Plan-2031

The peri-urban sector of Lucknow has risen to prominence as one of the city's most well-planned developments, with new and expanded residential and commercial buildings. The city is rapidly growing and expanding its limits. The neighboring villages are frequently subjected to urbanization and pressure, depending on the direction and intensity of the city's growth. Natural population increase and, indirectly, the city's ability to generate economic potential in its location through migrant inflows stimulate a city's expansion.

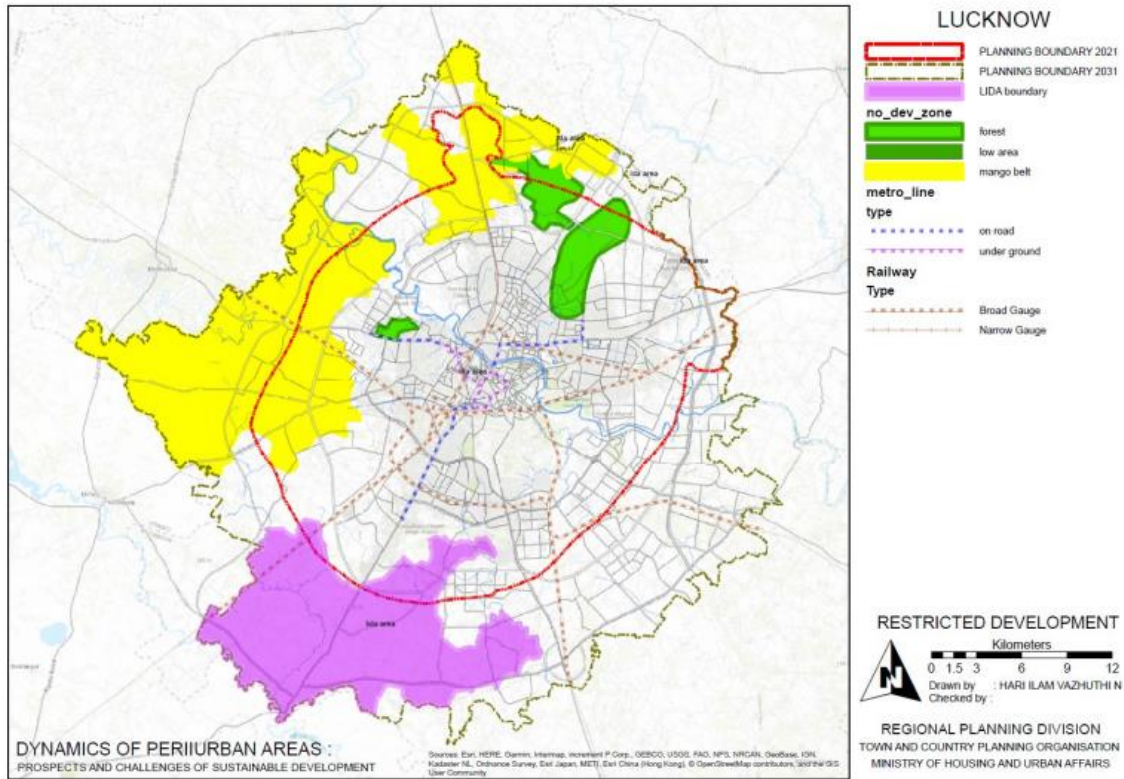


Figure 7 Restricted development map

Source- Town and country planning organization ministry of housing & urban affairs

3.2.5 Future Development

The presence of a legal mechanism, which facilitates action, autonomous central institution, and a regulated land market, and all these will make a planned development of the city without emergence of sprawl. This will ensure efficient utilization and equitable distribution of resources that enhance economic growth and secure environmental sustainability.

In the recent past, the LDA has been proactive in plan preparation and implementation. Not only the development plan proposals have been projected for implementation but also the servicing of land for residential development have been phased out in the plan document. As the organization is able to involve stakeholders of various kinds, its intentions to facilitate development come with the minimal delays and encumbrances. The city has intended to achieve a more efficient urban form, support, and promote

vitality of the urban economy, integrate urban poor into the urban fabric by providing them place to stay and live, plan for a sustainable urban environment in terms of better infrastructure, sanitation, open spaces, wide roads, and living places etc. and for this, the authority has started implementing plan for peri-urban Land and Infrastructure Development in Peri-Urban development so that they will become a potential place for growth and development. The inclusive planning and infrastructure development in Gomti Nagar has set an example to other Indian cities that the peri-urban area must have good accessibility with the other parts of the cities.

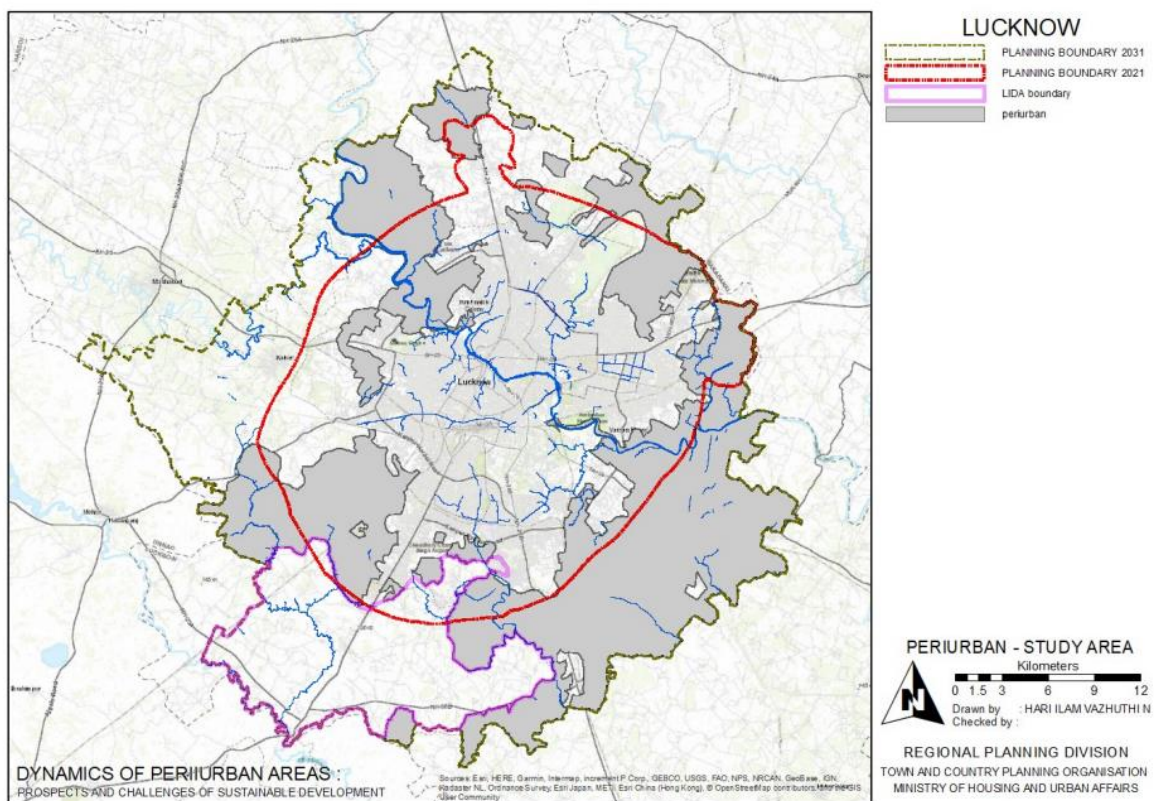


Figure 8 Peri urban study area

Source- Town and country planning organization ministry of housing & urban affairs

3.2.6 Measures taken by Lucknow government

- Various challenges in the city and on the fringes demand rapid action.

- The recommendations are made at both the city and the periphery levels.
- If the city is self-sufficient in terms of housing, people will be less likely to go outwards.

City level

- Developing the city's infrastructure and transportation facilities to prevent people from migrating outwards to the outskirts (open to built ratio is low)
- Water management and pollution control to combat decreasing water supplies and rising pollution levels.
- Modify/increase the FAR in response to the city's growing need.
- Developing vacant areas into recreational spaces because city lacks green spaces
- Lucknow has suggested an extended master plan for the developed fringes, as well as an outer ring road to improve the transportation network.
- For landowners and builders, a single-window approach is required that would handle the entire development and licensing process associated to land transactions.
- Monitoring and Management Body to ensure that programmes(Schemes) are implemented properly, reducing illegal construction and land value speculation.
- For fringe development, a holistic policy framework is essential, taking into account all demographic, social, geographical, economic, environmental, and governance elements.

Fringe level

- Development must be restricted to ecologically sensitive/unsuitable regions indicated in the Master Plan, such as Food Plains and Forests, and development must be based on suitable evaluation.
- To assure planned growth in the future, Diving the fringe regions into zones based on their potential to be developed.
- In the stages of development prescribed by Zonal Plans, infrastructure provisions will be extended to the fringe zone.

- Creating activity clusters on the outskirts of the city to aid compact development.
- Physical infrastructure should be included in the Master Plan for the fringe areas.
- Development along the corridors is regulated under the The ribbon Development Prevention Policy.
- To discourage unwanted development, high development charges will be imposed in high-potential locations along critical transportation corridors.
- A new cell in the Development Authority will be established to monitor and produce specific guidelines for fringe areas.
- Impose a proper land tax policy, which includes charging higher rates on unused land and lower rates on agricultural land. This will aid land speculation and stimulate agricultural production.

3.2.7 Summary

The infrastructure in new fringe areas is better than in older areas, with more open spaces and a better living environment at a more affordable price. The green belt on the eastern side of the city, which is within the planning area, limits the amount of building that can be done. The development in fringe areas controlled by taking adequate measures.

3.3 Comparative Analysis

	Noida,delhi,india	Lucknow,uttar pradesh,india
Area , population	203 sq.km - 6.4 Lakh Population	337 sq.km - 28.80 Lakh Population
Location peculiarity	<ul style="list-style-type: none"> Lies along the eastern and Southern boundaries of Delhi.The great advantage to the growth of the city is Its very proximity to the Delhi city. Noida has very fertile soil for agriculture. Urbanization leads to the city's expansion towards Noida and undergoes industrial expansion. 	<ul style="list-style-type: none"> Lucknow is the capital city of Uttar Pradesh and it has always been a multicultural city.It is located roughly in the centre of the state, on the Gomati River about 45 miles (72 km) northeast of Kanpur. The city is a marketplace for agricultural products, and its industries include food processing, manufacturing, handicrafts, and railroad shops.
Activity	Self-contained industrial city with complimentary business, trade and commerce, residential,	Self-contained industrial city with complimentary business, trade and commerce, cultural

	recreational and institutional activities.	and institutional activities.
Employment opportunity	<ul style="list-style-type: none"> • Noida is well connected to the Delhi city core and there are many employment opportunities avail in & around the city. • People from other rural areas are migrating to the city area for better employment & lifestyle opportunities. 	<ul style="list-style-type: none"> • Lucknow is a fastest growing job-creating cities in India.Lucknow's economy was formerly based on the tertiary sector and the majority of the workforce were employed as government servants. • Lucknow has promoted public-private partnerships in sectors such as electricity supply, roads, expressways, and educational ventures.
Distance to the city	Noida located at a distance of 28kms from Delhi city.	Lucknow is growing outwards radially and spreading to the neighbouring villages such as Malihabad, GosainGanj, MohanlalGan.
Time of travel	45 Minute.	Fringe areas are located in a

		radius of 20km from main city
Commuting to the core city	Commuting between the Noida and Delhi city is employment opportunities, Supply of goods & services.	Commuting between the City and fringe areas are employment opportunities, Supply of goods & services.
Growth pattern	<ul style="list-style-type: none"> • Noida growth pattern were based on the industrial area development, commercial area development, residential areas, development of public and semi-public areas, infrastructure, and also the development of transport related areas and finally environmental concerns. • The city was created under the UP Industrial Area Development Act, 	<ul style="list-style-type: none"> • Lucknow - Kanpur area has become an area of intense interaction reflected by changes in land use, mushroomed development in all sectors of the economy. It is also well connected with the railway network falling in the Northern and North Eastern railway zones. • The main development were based on the commercial development, development of public and semi public areas.The

	<p>1976 .The city has the highest per capita income in the whole National Capital Region. Noida is classified as a special economic zone (SEZ).The Noida Authority is among the richest civic bodies in the country.</p>	<p>expansion in the north and the north-eastern portions of the city took place after the construction of Dams on both side of the eliminating the possibilities of flood.</p>
Economy	<p>Noida was developed as an industrial city. In the last 10 years, Noida has also become a hub for software and technology. These companies are contributing to the city's economy with their software product development and service export in foreign currencies</p>	<p>The major industries in the Lucknow urban agglomeration include aeronautics, automotive, machine tools, distillery chemicals, furniture and Chikan embroidery. Lucknow is among the top cities of India by GDP. The economy is growing with contributions from the fields of IT, manufacturing and processing and medical/biotechnology.</p>
Infrastructure facilities	<ul style="list-style-type: none"> • Noida is considered to be India's greenest city with 	<ul style="list-style-type: none"> • Lucknow has got an extensive network of roads and railways

	<p>nearly 50% green cover.It is also ranked the cleanest city in medium category cities.</p> <ul style="list-style-type: none"> • Most of the land in Noida is not very fertile and the agricultural output is low. • Noida has well established road transport system(Expressway) and Better civic amenities. 	<p>and it has grown all around in a radius of 25 Km.</p> <ul style="list-style-type: none"> • The road network is primarily of radial pattern. Nine regional roads converge into the city from all • Directions linking Lucknow to Kanpur, Sultanpur, Kursi, Faizabad, Hardoi, Rae Bareilly, and Mohaan.
<p>Strategy adopted</p>	<ul style="list-style-type: none"> • Enable the mobility of people and goods, and faster economic development and enhance social interactions.Improve the accessibility of Noida particularly to and from the sub-region and there by 	<ul style="list-style-type: none"> • Developing the city's infrastructure and transportation facilities. • Developing vacant areas into recreational spaces because city lacks green spaces.

	<p>promote the nodal functions of Noida.</p> <ul style="list-style-type: none"> • Improve infrastructure facilities. 	
Result	<ul style="list-style-type: none"> • Planned greenest city with well-established infrastructure facilities. • Promote planned growth of the city 	<ul style="list-style-type: none"> • Planned mango belt for protection of existing green spaces. • Enhance infrastructure facilities.
Parameters identified	<p>Distance from core city, Infrastructure facilities, Availability of resources,</p>	<p>Availability of infrastructure facilities, protection of green cover.</p>

3.4 Parameters identified from casestudies which promote growth of fringe area.

LOCATION & REGIONAL LINKAGE
DISTANCE FROM THE CORE CITY, TIME OF TRAVEL
AVAILABILITY OF RESOURCES IN FRINGE AREA.
CHEAPER TO LIVE(COST OF LIVING) COMPARED TO MAIN CITY.
BETTER CONNECTIVITY TO MAIN CITY ENHANCE SOCIAL INTERACTION
BETTER EMPLOYMENT OPPORTUNITIES
ACCESSIBLE VACANT AREAS
CONNECTION & LINKAGE TO THE CORE CITY IN TERMS OF SUPPLY OF LABOUR,GOODS & SERVICES.
INTEGRATED INDUSTRIAL LANDUSE
EVOLVING TRANSPORTATION LINKAGES

CHAPTER 4 RURAL URBAN FRINGE DEVELOPMENT CONCEPTS IN KERALA CONTEXT

Kerala is located on India's southernmost point and is bordered on the west by the Lakshadweep Sea and on the east by the Western Ghats. It is comparable to the industrialized world in many dimensions of socioeconomic progress. Kerala has a high pace of urbanization despite a moderate rate of population growth. Kerala's settlement pattern is unique in that it includes both urban and rural areas.

Kerala is known for its diverse human habitat. The State's human settlement pattern is characterized by houses being built on individual plots distributed throughout the habitable area. Almost every other region of India has a nucleated built-up area surrounded by rural areas. However, Kerala exhibits an urban-rural continuum with a reasonably uniform distribution of dwelling units, as well as an urban-rural settlement pattern. In comparison to other parts of India, Kerala has a relatively low population density development in urban areas and a relatively high population density in rural areas. Many development challenges have arisen as a result of this unique structure of human habitat.

Kerala is a cultural diverse village . Kerala's rural-urban continuum (rurban) pattern of urbanization is supported to a greater extent by the state government's comprehensive public policy of "spatially continuous distribution of social infrastructure." There are both rural and urban parts in it. The Kerala Model, the state's human development strategy, resulted in the building of social infrastructure throughout the state, including public distribution networks, schools, hospitals, agriculture offices, and so on.

The unique physical layout of Kerala's towns and villages has aided the development of the rural-urban continuum. Kerala has a thinner divide between rural and urban areas than the rest of the country.

4.1 Rural-urban continuum

The rural-urban continuum can be defined as a dynamic equilibrium in which people from both rural and urban areas take part in the development process, and the benefits of development are dispersed to people with a spatially scattered habitation pattern.

One of the most visible characteristics that distinguishes Kerala from the rest of the country is the spatial pattern of the settlement system, which is marked by dispersed yet interconnected, linear but densely agglomerated stretch.

4.1.1 The settlement structure of kerala

With the primary, secondary, and tertiary sectors coexisting in both, there is no practical distinction between an urban and a rural area. As a result, Kerala's villages lack a distinct nodality and settlements lack a distinctive centre.

4.2 Reason for the formation of rural urban continuum settlement in kerala

4.2.1 Historical factors

Smaller kingdoms and trade decentralisation were the key reasons for this development trend in the past. More than 100 principalities ruled Kerala. Each of these kingdoms was self-contained, with their own state capitals and a trade and commerce system. Some of the kingdoms' kings constructed major ports in urban areas such as Kannur, Talashery, Calicut, and Cochin. Aside from these major ports, there were 33 minor ports for plantation products, spices, coir, and timber commerce. As a result, each of these port settlements began to grow into local urban centres, preventing the creation of a single port settlement development.



Figure 9 Formation of the state

SOURCE- STATE URBANISATION REPORT KERALA,2012

4.2.2 Physiogeographical factors

Kerala's distinctive linear shape, with widths ranging from 11 to 121 kilometres (east-west) and a length of 590 kilometres along the coast (north-south), caused the settlement to develop in a ribbon pattern.

Except for the forest parts in the east, Kerala has a more habitable climate due to sufficient water supply from heavy rainfall, a high water table, fertile terrain with moderate tropical temperatures (no extremes), and 42 rivers. As a result, villages could appear in any habitable territory, and people began to live in their own compound, preventing heavily populated areas from developing.

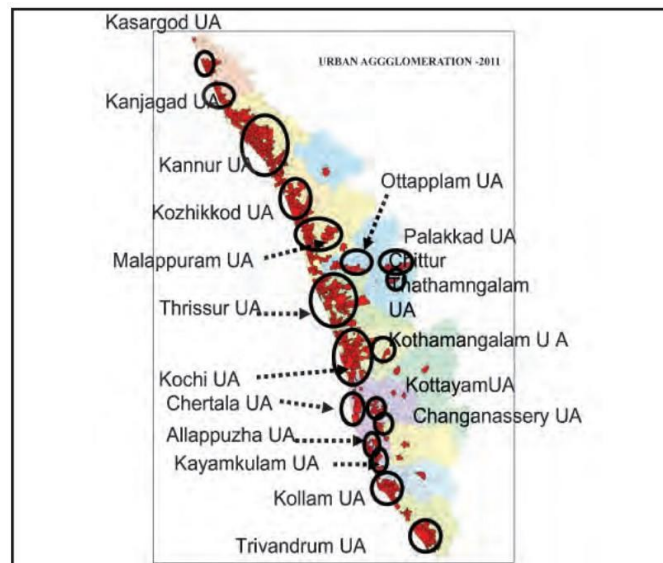


Figure 10 Urban Agglomeration 2011

Source- STATE URBANISATION REPORT KERALA,2012

4.2.3 Economic factors

4.2.3.1 Agro based industrial development

Kerala has a small number of industrial establishments. The majority of these industries arose after independence, and they were mostly small-scale agro-based firms dealing in coir and plantation crop commodities. Due to the abundance of raw materials and labour resources, they were founded in rural areas. This made it impossible for a single large-scale industrial town to grow together.

4.2.3.2 Effect of migrant labourers to middle east

Keralan households' income levels and budget increased with the large-scale migration of skilled and trained labourers to the oil-rich Middle East in the 1970s. As a result, the united family structure began to disintegrate. This, along with people's demand for controlled growth, resulted in low-rise uniform density patterns rather than dense high-density zones.

4.2.3.3 Migration from urban to rural areas

Plantation crops provided work, and the construction of a significant number of hydroelectric projects attracted migrant labourers from urban areas to the less developed rural portions of the highland and midland regions, especially after independence.

People were drawn to these areas for agricultural purposes since land was available at a low cost. As a result, there was a reverse migratory movement, which helped to form the RUC settlement pattern.

4.2.3.4 Political factors

Resources were distributed in a more or less equitable manner to both urban and rural communities. In Kerala, resource disparities are minor in different parts of the state. These policy efforts increased the quality of life in rural areas and improved the distribution of facilities, preventing people from migrating to cities.

4.2.4 Land ceiling act of 1963

The purpose of the Land Ceiling Act of 1963 was to redistribute land from landlords to the poor. Kerala is one of the few states in India where the Land Ceiling Act, which declares that no individual can own more than 12 standard acres of land, is rigidly enforced. Subdivision and property fragmentation are fairly common in Kerala. The average size of an operating holding was 0.49 hectares in 1976-77, but it had declined to 0.23 hectares by 2005-06. The fragmentation of terrain allowed the vast scattering of settlements.

Better road and waterway connectivity:

Better road and river connectivity: Transport systems were built to suit the physiographic features, with two national roads running north-south and six national highways running more or less east-west. Aside from that, a road network circuit is formed by multiple state highways, key district roads, and panchayath roads.

4.2.5 Development of Kerala

Kerala has consistently worked to reduce interregional disparities, enacted progressive legislation on land tenures and agrarian relations, reduced mortality and fertility rates, halted population growth, promoted educational growth with significant support to private sector initiatives, and modernized the healthcare sector since its beginnings in 1956. Kerala's performance in the materially productive sectors of agriculture and industry has been disappointing. Large-scale emigration, which began in the early 1970s, has kept Kerala's economy on pace and resulted in near-revolutionary changes in purchasing habits, housing conditions, academic performance, and health status.

Kerala is experiencing rapid urbanization without corresponding physical effects, which is another peculiarity. Kerala's urban content is 47.71 percent, with a decadal growth rate of 82.23 percent, according to the 2011 census. Kerala is a land full of peculiarities. It has a rich cultural legacy, strong social development indicators (life expectancy, infant mortality, literacy rate, and so on), and a per capita income that is comparable to that of a developed country. The planned development in practically every section of the state-supported the urban-rural continuum, a Kerala-specific habitation pattern. (CENSUS OF INDIA , 2011)

The history of Kerala's population growth rate reveals that the urban population has always grown faster than the total population, demonstrating the state's rapid urbanisation. Kerala saw the highest degree of urbanisation in its history from 2001 to 2011 (an increase of 83.82 percent over the previous decade). The main cause for the high level of urbanization observed here is areal reclassification (the declaration of a previously rural region as an urban due to a shift in occupational structure). Kerala's low population growth rate combined with increasing urbanization will reflect in the society's lifestyle.

Accordingly, there are two agglomerations with populations over 20 lakhs: Kochi Urban Agglomeration and Kozhikode Urban Agglomeration. The urban agglomeration of Trivandrum, Thrissur, Malappuram, and Kannur has a population of 15-20 lakhs.

The main reason for urban population growth in Kerala is not population concentration in existing urban areas, but rather an expansion in the number of urban areas and urbanization of the outskirts of existing major urban centres. Kerala is seeing a spread of urbanization rather than a concentration.

Urbanisation's high level and expansion may result in the diversion of potential agricultural land to non-agricultural uses, as well as the depletion of forest cover and water bodies. For a sustainable future, urban development must be optimized.

4.2.6 Issues pertaining to the rural urban continuum development in kerala

- Due to high pressure on land and the construction of more and more built spaces, settlements have resulted in a series of environmental issues such as loss of vegetation and natural habitat, lowering of water tables, natural resource exploitation and degradation, high pollution (air, water, and soil), and high surface runoff of stormwater.
- Settlements that are dispersed and spread out pose significant planning and management issues.
- Land prices have risen as a result of growing demand for land, particularly in rural areas, making it unaffordable for the poor.
- Because of the high population density and the fact that people live largely along the road sides, widening roadways is challenging in the Rural Urban Continuum settlement pattern.

4.3 Urbanization trend of Ernakulam city

4.3.1 Location

The city of Kochi is located on the western coast of India in Ernakulam district of Kerala. It is bound by Thrissur on the north, Idukki on the east and Kottayam and Alappuzha to the south.



Location map

Source : Google maps

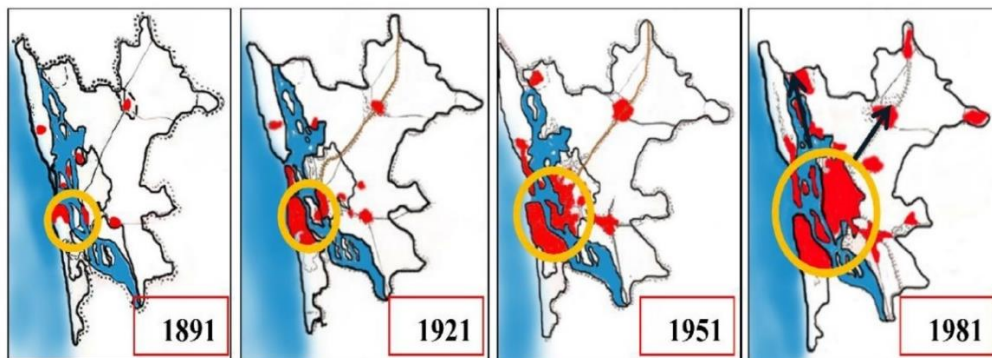
4.3.2 History

The discovery of the ancient port of Muziris¹ has confirmed the importance of ancient Kochi as a major link on the maritime circuit for trade and business. There are many evidences of trade links between Kochi and China and ancient Rome in the form of Chinese fishing nets and seals found at several locations. The rulers of this region had their capital at Tripunithura and the present-day Ernakulam was a flooded basin. The port of Cochin was formed due to siltation accompanied by heavy floods in the fourteenth century as a result of which the trading activity shifted from the Muziris port to the new port. The earliest settlement around the new port occurred around Mattancherry. This was on account of there being a protected harbour for fishing and inland navigation. The rest of the Kochi region was well-connected to the port through water-bodies and transportation was predominantly water-borne. Industrious communities with a knack at business, including Jews and Gujaratis had made Mattancherry their home and

contributed to the trade. By the sixteenth century, European traders had found their way to Kochi and established a Fort there. These included the Portuguese, Dutch and English colonial powers who established several schools, colleges and warehouses in Fort Kochi. There were numerous conflicts among the foreign powers on the subject of monopoly over the spices trade. Fort Kochi became a municipality in 1866 AD.

Ernakulam developed only in the nineteenth century on account of overcrowding in Fort Kochi and Mattancherry areas which were now municipalities. The arrival of the railways in 1905 AD enhanced the trade in the region. The present day Willingdon Island was formed as a result of the dredging of the sea channel in order to enable larger ships to enter the port from the industrial revolution driven European countries. This gave a further fillip to the status of Kochi as a major port city. Kochi Municipal Corporation was formed in 1967 by merging the municipalities of Fort Kochi, Mattancherry, Ernakulam and the Island.

Kochi City Region (KCR) is a contiguous region of land consisting of the areas under the Corporation of Kochi and sixteen other local bodies, including five municipalities in the form of Tripunithura, Kalamassery, Maradu, Eloor and Thrikkakkara.



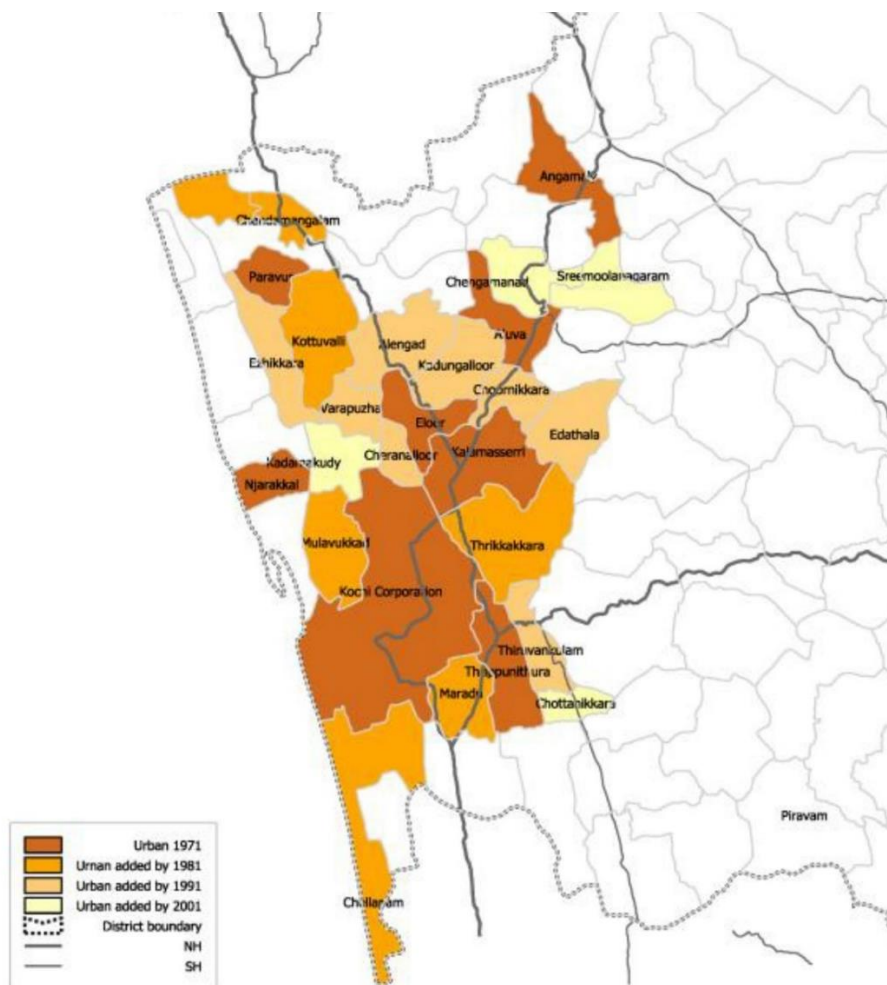
Evolution of Kochi over time from a trading outpost to a market centre

Source - A Study on Inland Water Transportation in Kochi City Region

The Kochi Corporation Region occupies an area of only 369.72 square kilometres and accommodates a population of above one million with a gross density of around 31 persons per hectare (ppha) in the year 2001.

4.3.3 Demography

- In 2011, Ernakulam had a population of 3,282,388 people, with male and female populations of 1,619,557 and 1,662,831 respectively.
- In comparison to the population in 2001, there was a 5.69 percent increase in the population. Ernakulam District's population increased by 9.35 percent between 1991 and 2001, according to India's last census.
- The Average literacy rate is 95.89 percent.



The various urban centres in Kochi city region

Source - A Study on Inland Water Transportation in Kochi City Region

4.3.4 Spatial parameters

4.3.4.1 Landuse

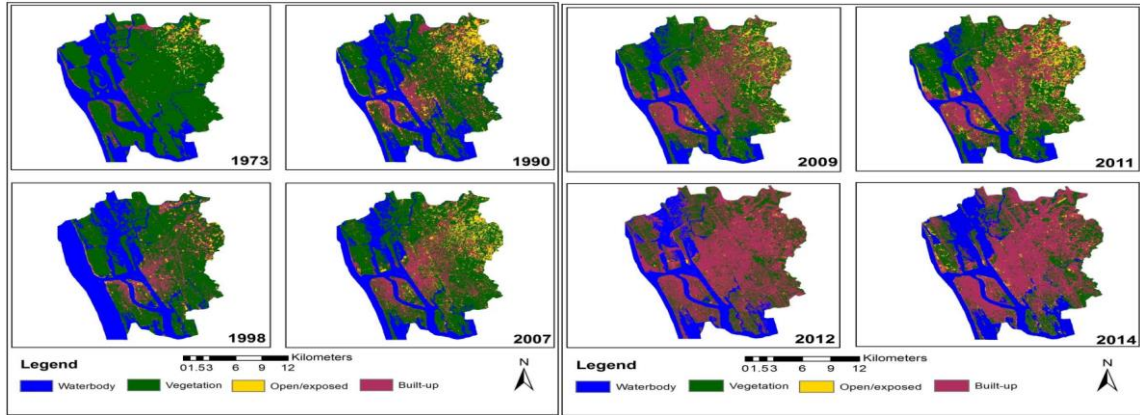


Figure 11 Land use map

Town and Country Planning Department, Government of Kerala. (2011). DISTRICT URBANISATION REPORT, ERNAKULAM

The expansion in urbanization is accompanied by a decline in water bodies and vegetation, as well as the extension of growth to rural fringe areas, as seen by the landcover map. This transformation can be seen as a result of land reclamation of the backwaters, as well as the conversion of previous plains into built-up areas.

With the commencement of major development initiatives such as the International Container Transshipment Terminal (ICTT), Metro Rail, Liquefied Natural Gas (LNG) Terminal, Kochi International Airport, Smart City, and Info Park, the city's land cover increased significantly.

4.3.5 Infrastructure facilities

4.3.5.1 Water supply

The Periyar river supplies water to 95 percent of Kochi households, which is delivered after treatment by the Kerala Water Authority. Kochi has a number of water-related issues, many of which have been worsened by growing urbanization. Water loss in the

distribution network, ground water depletion, ground water contamination due to unsafe sanitation and unscientific solid waste management, salinity intrusion into inland areas, decrease in the flow of the Periyar river, regional floods due to improper stormwater ,water management, and so on are some of these issues.

4.3.5.2 Sewerage & sanitation facility

- Septic tanks and other regional waste water management methods are the most common. Sewerage coverage in Kochi is extremely limited.
- Sewerage service is only available in areas of Kochi's core business center and along the coastal drive. Only about 5% of the city is connected to the sewer system.
- The lack of oversight of onsite sanitation and septage management, as well as poor regulation, is a severe public health risk over the entire urban agglomeration.

4.3.5.3 Drainage

Only 41% of the total land is covered by area drains. Flooding occurs when the canal system's carrying capacity is reduced as a result of encroachment, canal conversion to roads, rubbish dumping, and obstruction caused by utility wires and silting.

Storm drains are turned inefficient by the dumping of solid waste and waste water flows, making them vulnerable pollution hotspots.

4.3.6 Spatial Connectivity

As the world has become more urbanized, vast areas have been developed as urban expansion. To accommodate the rising traffic demand, many highways were built in phases. The city has taken on a fragmented urban shape that has spread along main transportation lines. Congestion on arterial highways is caused by unplanned development, small streets, congested intersections, unorganised parking, and other factors that obstruct traffic movement. Even with today's traffic demand, most bridges and important corridors are no longer able to keep up.

4.3.7 Economy

The growth pattern related to economy of Ernakulam is concentrated to InfoPark Kakkanad, CIAL Nedumbassery, International container transshipment terminal (ICTT), Metro Rail, Liquefied Natural Gas (LNG) Terminal, Smart City etc.

4.4 Growth pattern

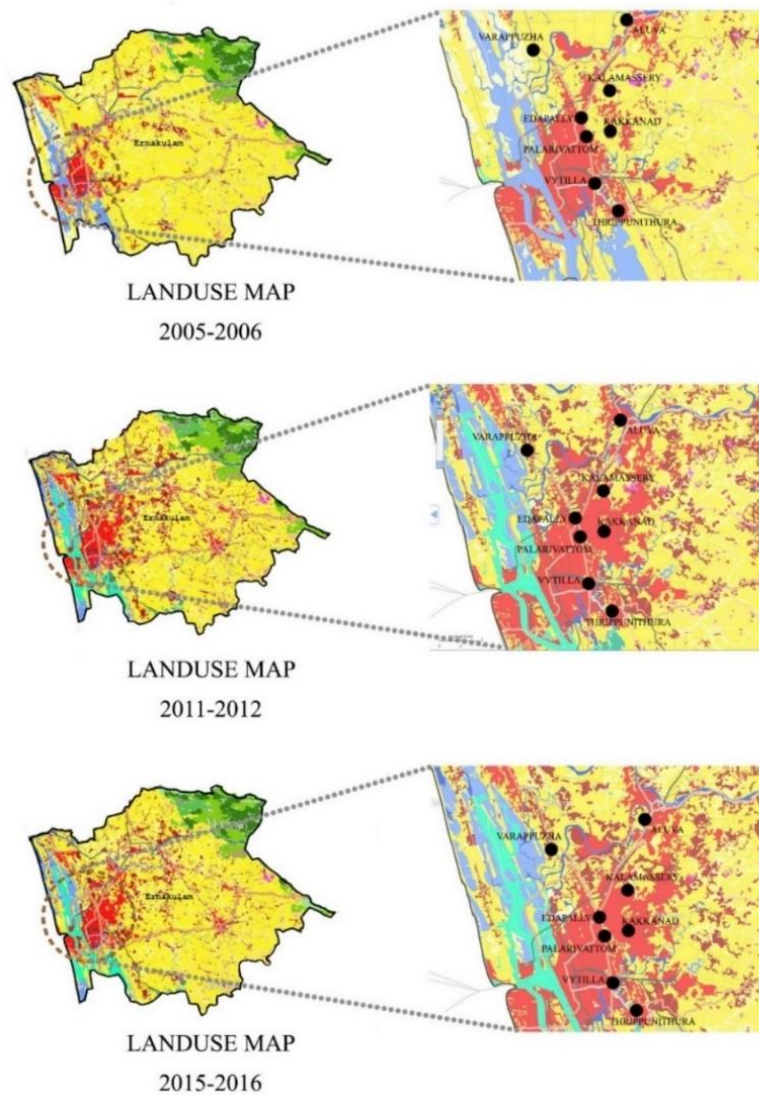


Figure 12 Land use change 2005 - 2016

Source: Author generated with reference to Bhuvan map

The rise in the number of census towns in 2011 has clearly resulted in a considerable increase in the number of towns.

The city's physical growth is concentrated in the northern and eastern sides, along important transportation routes (NH-66 and NH-544, state highways, and minor district roads).

As a result of the IT & ITES (Includes SEZs) expansion, Kochi's urban growth is shifting to the east. Similar increase is expected in the fourth coming years along Kochi City's northern outer quadrant, due to a host of large-scale integrated projects planned there. Parsvnath IT Park (Proposed-100 acres) and Emaar MGF (160.83 acres) are two examples.

In Ernakulam, the Landcover map shows that as urbanization increases, water bodies and vegetation decrease, and expansion spreads to rural fringe areas. In the last four decades, there has been an increase in built-up land and a loss in vegetation. With industrial and commercial establishments, Ernakulam city's growth spread to adjacent places such as Aluva, Muvatupuzha, Nedumbassery, and Angamaly.

Prior to developments, Ernakulam served as a sort of link to the Cochin Harbour Terminus, a station with excellent amenities that was at the time a bustling station. The development of FACT was aided by its growth and the construction of the Cochin Refineries near Ambalamugal. At that time, the marshalling yard was built.

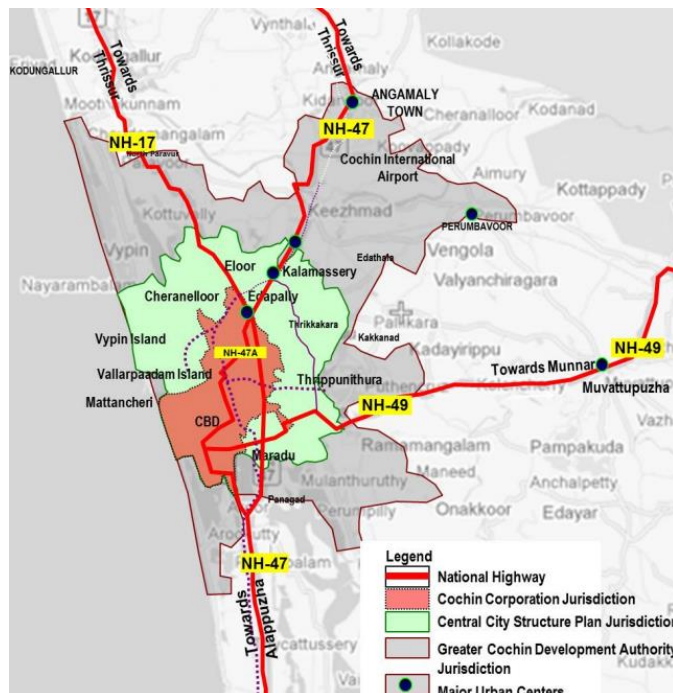
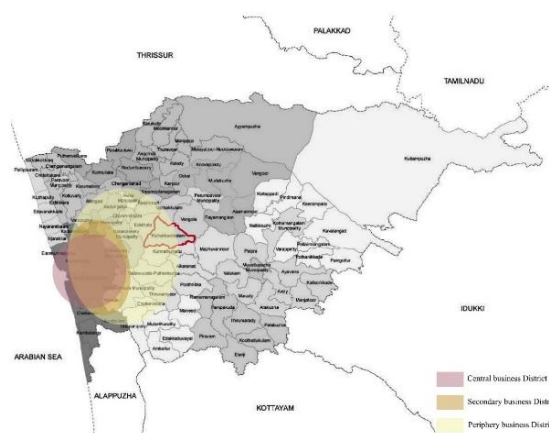


Figure 13 Growth of Ernakulam city

Source - Development plan for kochi city region 2031

4.5 Study area delineation

The biggest urban agglomeration in Kerala is Kochi City, which has experienced both large-scale and smaller-scale development projects over the past 15 years. International Container Trans-shipment Terminal, Info- 1 Park, LNG Terminal, and Metro-Rail Project are a few of the city of Kochi's ongoing development initiatives. Due to significant investment and the wide-ranging advantages that emerged, both inside and beyond the city, the quality of life for residents has increased thanks to employment growth and simpler access to a range of essential facilities. Kochi is recognized as one of the seventeen major industrial cities of India as per the World Bank report. Urbanization of Kochi city is showing its growth towards the eastern side of the city. Kakkanad is one of the focal point of economic development due to presence of IT park. Headquarters of Ernakulam district is also located at Kakkanad in Thrikkakara municipality. The urban boundary of Ernakulam city is extending toward the outskirts. Kizhakambalam panchayat is a rural area which is located 10 km from Kakkanad and 11 km from Aluva. The growth of Kakkanad and Aluva is spreading towards the eastern side in nowadays. this increases the growth of Kizhakambalam panchayat. A number of industries, new establishments are getting attracted to this panchayat due to the availability of resources. The rural-urban fringe area of Ernakulam city identified is Kizhakambalam panchayat.



Kochi city urbanization pattern

Source : Author generated with reference to Centre for Public Policy Research- “A Study on Inland Water Transportation” - Yogi Joseph

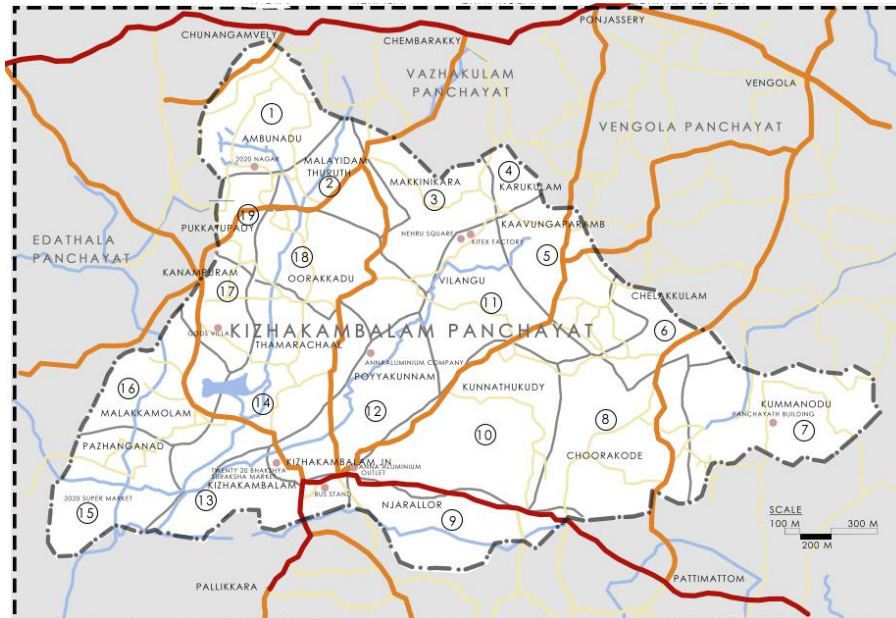
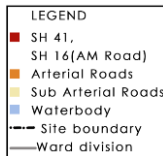
CHAPTER 5 INTRODUCTION TO STUDY AREA

5.1.1 Location



INDIA >> KERALA >> ERNAKULAM >> KIZHAKAMBALAM

Kizhakkambalam is an eastern suburb of the city of Kochi in Ernakulam district, Kerala, India. It is regarded as a model panchayat for its various development activities and is a part of the Kunnathunadu tehsil of the Ernakulam district



BASE MAP OF STUDY AREA

(Source-Author generated with reference to Google earth & primary information from panchayat)

5.1.2 Introduction

Kizhakkambalam is an eastern suburb of the city of Kochi in Ernakulam district, Kerala, India. It is regarded as a model panchayat for its various development activities and is a part of the Kunnathunad tehsil of the Ernakulam district.

Coordinates - 10° 2' 0" N, 76° 24' 0" E

Total area - 32 km² (12 sq mi)

Population - 23,186

Literacy rate - 85.53%

Number of households- 5,551

Administrative body - Kizhakkambalam panchayat



Study area Map

Source: google images

5.1.3 Kizhakkambalam urban local body

Kizhakkambalam Panchayath is ruled by an organization called Twenty-20, which is sponsored by the commercial organization Kitex. In the local governing body election held in November 2015, 17 out of 19 wards of the local panchayat were won by Twenty-20.



Twenty 20 logo, Panchayat Office
Source:Google images

5.1.4 Demography

Population - 23186

- Female - 11811
- Male - 11375



Workers - 9075

- Female - 2645
- Male - 6430



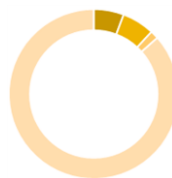
Literacy rate – 19830

- Female - 9912
- Male - 9918



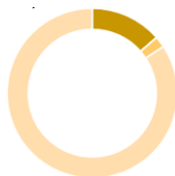
Main workers (total) - 7575

- Cultivators - 434
- Agricultural labourers -467
- Household industry workers- 119
- Other- 6555

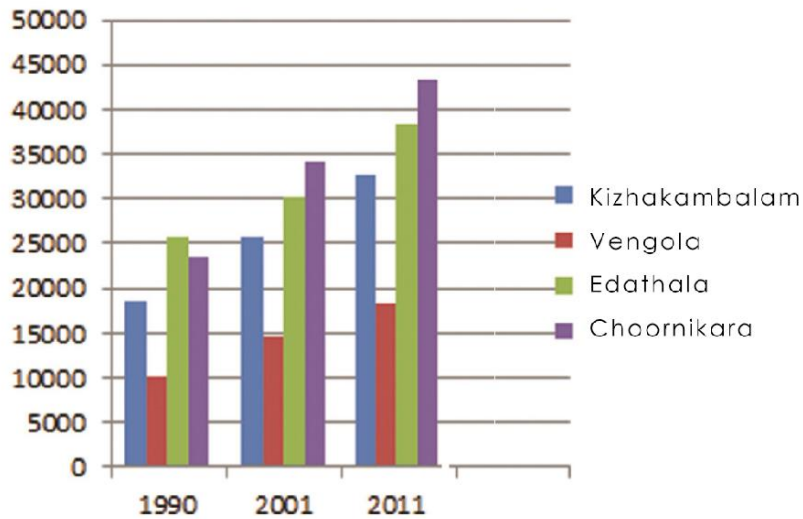


Marginal workers (total) – 1500

- Cultivators - 180
- Agricultural labourers -178
- Household industry workers- 28
- Other- 1114



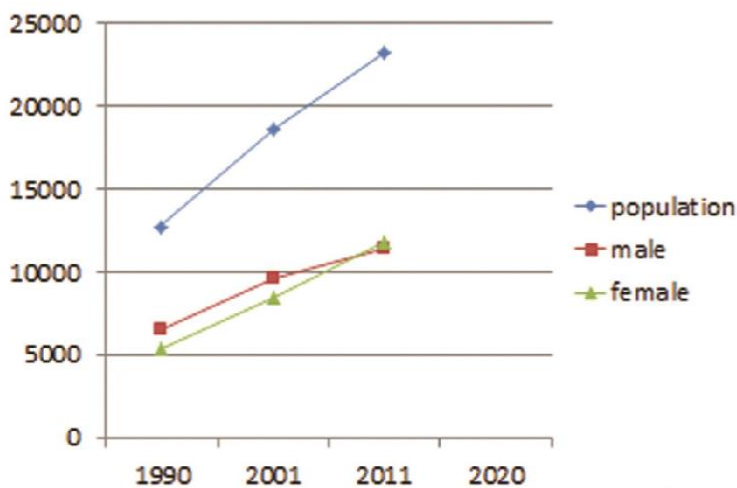
Population comparison with nearest panchayats



Population comparison with nearest panchayats

Source:with reference to census data 1991,2001,2011

Population comparison of kizhakambalam panchayat



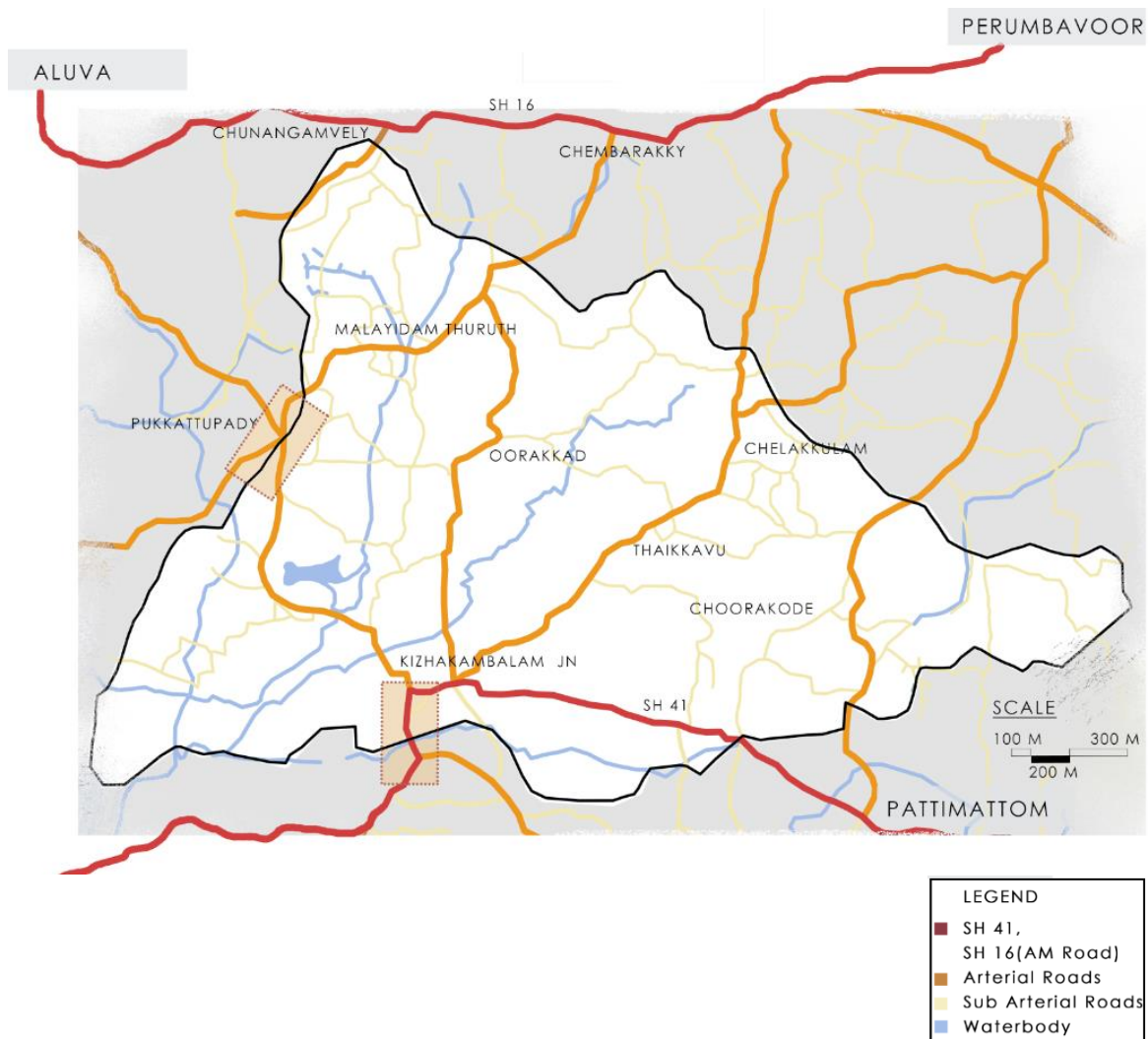
Population comparison of kizhakambalam panchayat

Source:with reference to census data 1991,2001,2011

5.1.5 Connectivity

5.1.5.1 Road

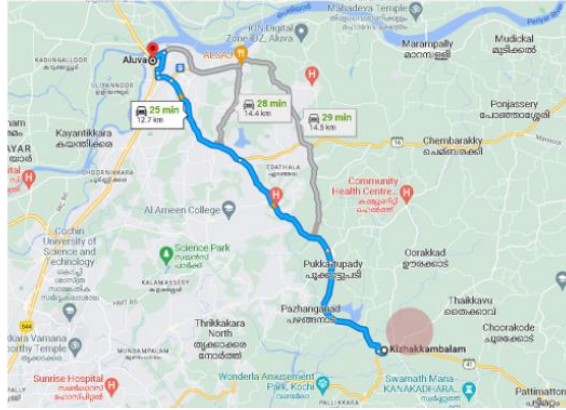
Kizhakambalam Panchayat is well connected to neighbouring towns and Ernakulam city through road networks. SH 16 & SH 41 are passing through the Border of Kizhakambalam Panchayat. Other Local roads also improve access in all directions. Kizhakambalam Panchayat is well connected to neighbouring towns and Ernakulam city through road networks. SH 16 & SH 41 are passing through the Border of Kizhakambalam Panchayat. Other Local roads also improve access in all directions.



Study area Map

Source: Author generated with reference to google maps

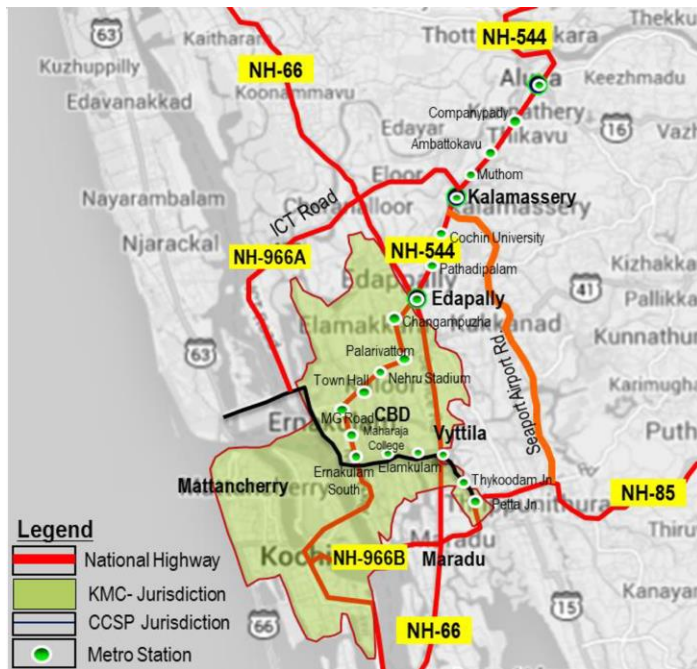
5.1.5.2 Metro



Nearest Metro station

Source:Google maps

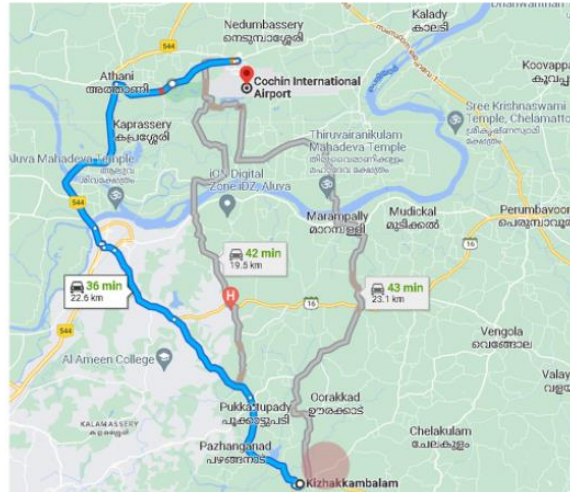
The nearest Metro station is Aluva.The station is currently the northern terminus of the line.It is situated 13Kms from Kizhakkambalam.



Metro location map

Source:Centre for Public Policy Research- “A Study on Inland Water Transportation” - Yogi Joseph

5.1.5.3 Airport

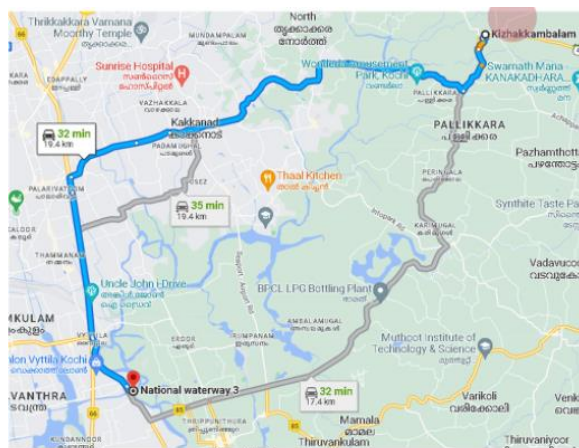


Nearest Airport

Source:Google maps

The nearest Airport is Cochin international Airport,Nedumbassery.It is situated 23Kms from Kizhakambalam.It is an International airport serving the city of Kochi.

5.1.5.4 Waterway



Nearest Waterway

Source:Google maps

The nearest waterway is National waterway no.3.National waterway No. 3 connecting Kollam and Kottappuram.It is situated 23Kms from Kizhakambalam.

5.1.5.5 Railway

The near by railway station of Kizhakambalam panchayat is Aluva(AWY).
It is situated 10Kms from Kizhakambalam.

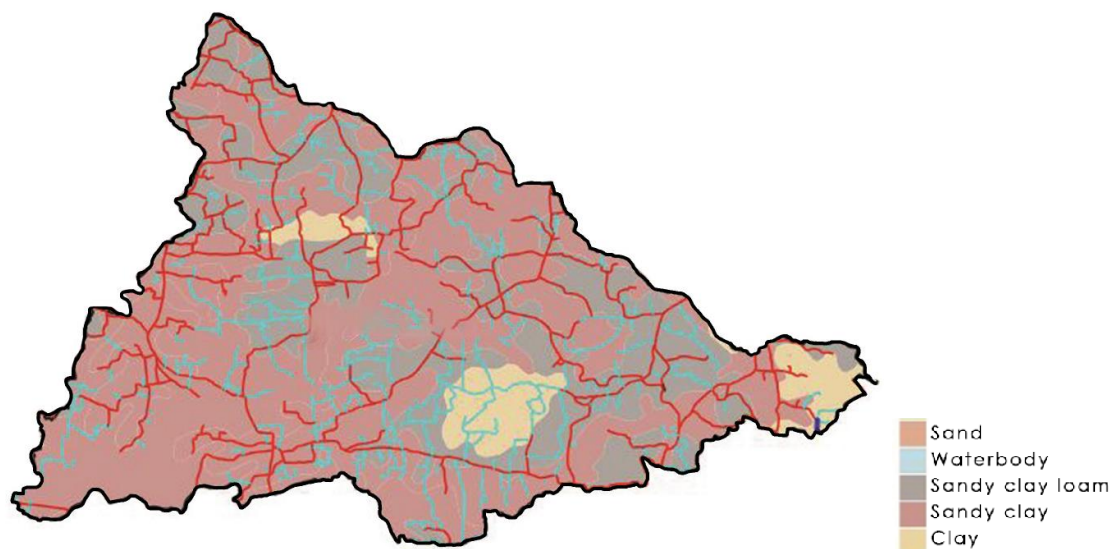
<u>Station</u>	<u>Train Frequency</u>	<u>Distance</u>
(AWY)ALUVA	421	9.92 Kms
(ERN)ERNAKULAM TOWN	269	12.84 Kms
(ERS)ERNAKULAM JN	319	13.77 Kms

Nearby railway stations

Source:Railway trainspy

5.1.6 Physical features

5.1.6.1.1 TOPOGRAPHY



Soil Texture map

Source-Land Resource Information system for Kerala

Being a coastal district majority of the Kochi region is within the low land regions of the state. The average altitude towards the eastern fringes is about 7.5 m above MSL, and

towards the west the altitude is less than one metre on an average. The whole of the land slopes gradually from east to west.

SOIL TYPE - Alluvial soil, Laterite soil, Clay

5.1.7 Climate

Tropical climate with intense solar radiation and abundant precipitation.

Avg. summer temperature-35 °C (95 °F)

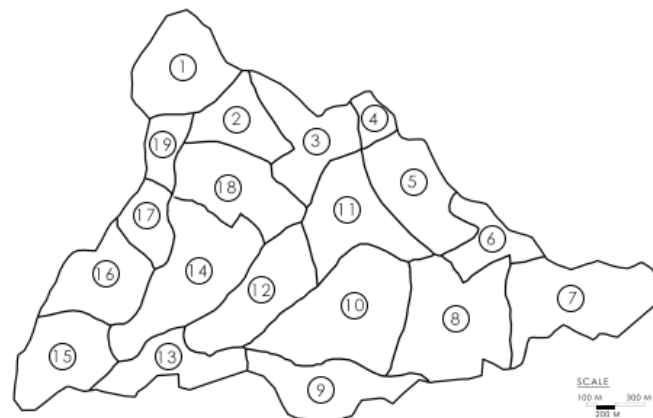
Avg. winter temperature- 20 °C (68 °F)

Maximum annual rainfall - around 3000 mm.

5.1.8 Administrative set up

Kizhakkambalam Panchayath having 19 wards. Among these 18 wards are ruled by Twenty 20 & 1 Ward by LDF.

1. Ambunaduu
2. Malayidamthuruth
3. Makkinikkara
4. Karukulam
5. Kavungaparambu
6. Chekkulam
7. Kummanode
8. Choorakkode
9. Njaralloor
10. Kunnathukudy
11. Vilangu
12. Poyyakunnam
13. Kizhakambalam
14. Thamarachaal
15. Pazhanganad
16. Malakkamolam
17. Kanampuram
18. Oorakkadu
19. Pukkatupady



Study area Map-Ward division

Source: Author generated with reference to Primary data from panchayat

5.1.9 Tourism

Major tourist attractions near Kizhakambalam are Hill palace museum Thrippunithura, Wonderla amusement park Kochi, Swarnath mana Punnorcode, Chick mount Pallikkara, Science park Kochi.



Hill palace museum(13 km)



Science park (9 km)



Nedungalachira(6 km)



Wonderla park (3 km)



Swarnath mana(4.5 km)



Kadambra View Point(4 km)

5.1.10 Major landmarks



Kitex factory



St Joseph school



Kitex limited



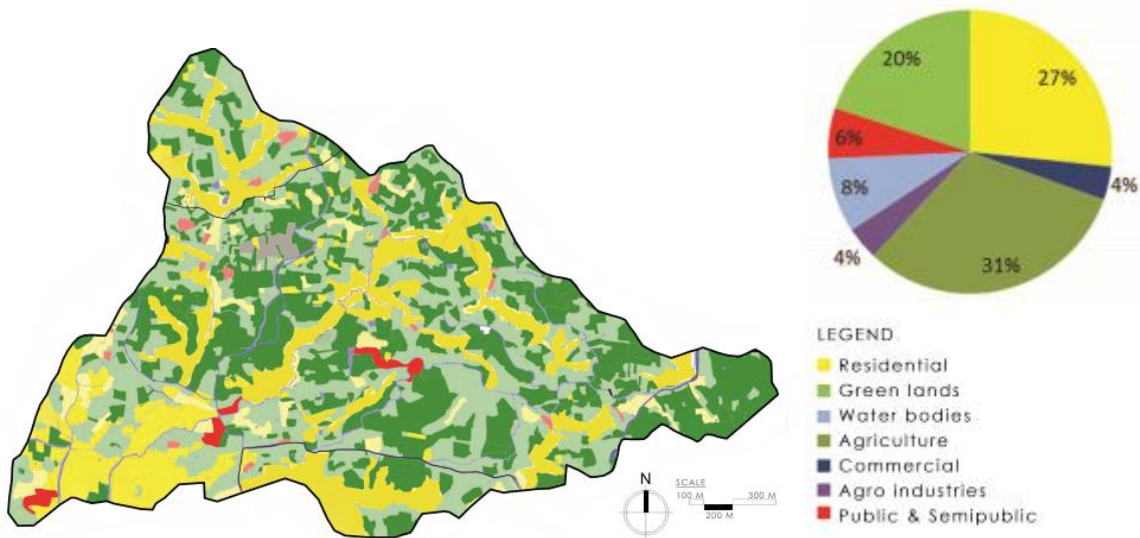
Panchayat building



Kizhakambalam Junction

5.1.11 Landuse

The major landuse is Agricultural landuse.it is the 31% of total land.Residential landuse is in the second position.it is 27% of total land. There is 20% of green lands with no specific cultivation.



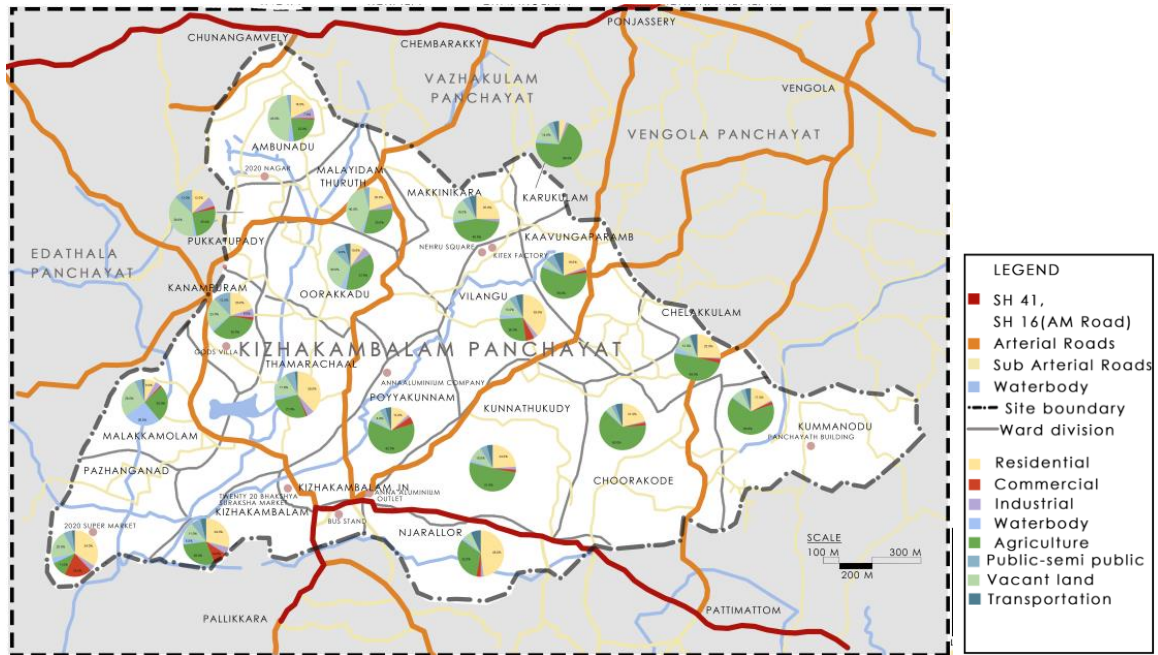
LANDUSE MAP OF STUDY AREA

(Source-Author generated with refernce to Land Resource Information system for Kerala)

	Residential	Commercial	Industrial	Waterbody	Agriculture	Public-semi public	Vacant land	Transportation
1. Ambunadu	18	1	7	4	22	3	45	-
2. Malayidamthuruth	20	-	-	2	30	4	40	4
3. Makkinikkara	25	-	2	2	16	5	45	5
4. Karukulam	5	4	2	2	69	4	14	4
5. Kavungaparambu	19	-	2	6	58	2	4	7
6. Chekkulam	25	3	1	1	49	4	12	5
7. Kummanode	17	2	1	1	65	3	7	4
8. Choorakkode	21	2	1	1	63	3	4	5
9. Njaralloor	48	3	2	2	32	-	6	7
10. Kunnathukudy	24	2	2	2	51	5	10	4
11. Vilangu	39	5	3	3	26	5	13	6
12. Poyyakunnam	13	5	2	2	62	4	8	4
13. Kizhakambalam	29	10	5	5	29	7	11	4
14. Thamarachaal	38	1	5	3	27	7	17	4
15. Pazhanganad	34	19	4	4	11	6	20	2
16. Malakkamolam	8	1	4	26	26	5	28	2
17. Kanampuram	20	2	6	2	35	12	23	-
18. Oorakkadu	10	-	6	9	37	4	30	4
19. Pukkatupady	13	2	7	2	25	13	38	-

LANDUSE DISTRIBUTION % IN EACH WARDS

(Source-Primary information from panchayat)

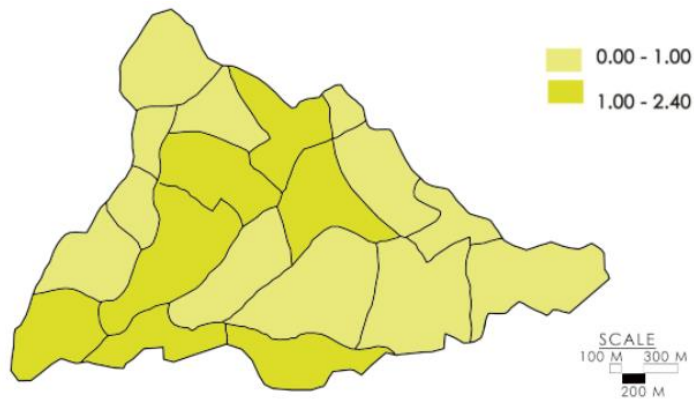


LANDUSE DISTRIBUTION IN EACH WARDS

(Source-Author generated with refernce to primary information from panchayat)

5.1.12 Sector wise study

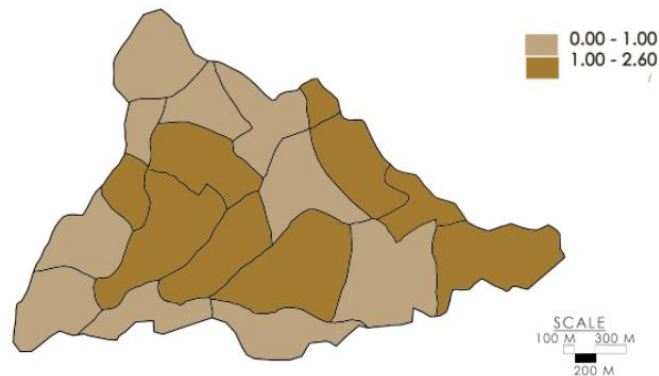
5.1.12.1 Residential concentration index



- The residential landuse currently occupies 27% of total land.
- The residential landuse was found to be more concentrated towards with industries such as kitex factory ,and Medium small scale industries.

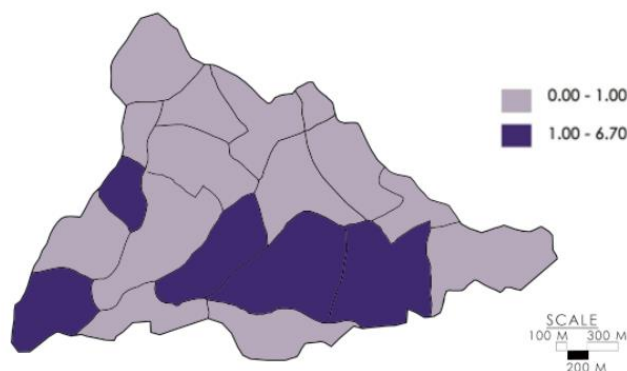
- The residential concentration is more focused on Makkinikara, Oorakkad, Thamarachaal, Pazhanganad, Kizhakambalam, Choorakode, Vilangu Wards of Kizhakambalam Panchayat.

5.1.12.2 Agriculture concentration index



- The agricultural sector other than paddy tends to be decline from past few years.
- Crops like rubber, pineapple etc are the other major agriculture practices in kizhakambalam but these crops have depreciated their crop value and hence cultivating these crops tend to be less profitable.
- The most agriculture concentration have been seen in Kunnathukudy, Poyyakunnam, Thamarachaal, Kanampuram, Oorakadu, Karukulam, Kavungaparambu, Chekkulam, Kummanodu Wards of Kizhakambalam panchayat.

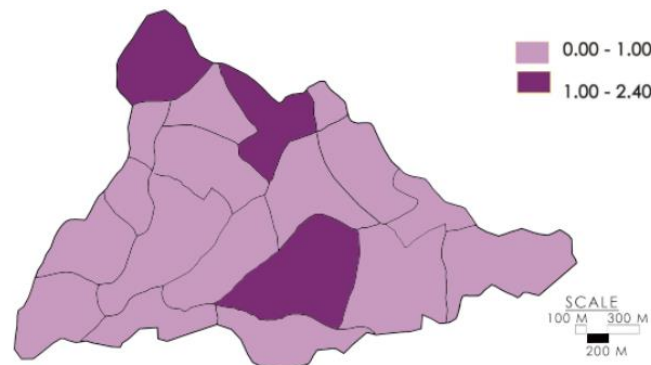
5.1.12.3 Commercial concentration index



- The commercial sector tends to be seen more along side the state highway.
- The road width in the main junction is 8m. It creates conjunction.

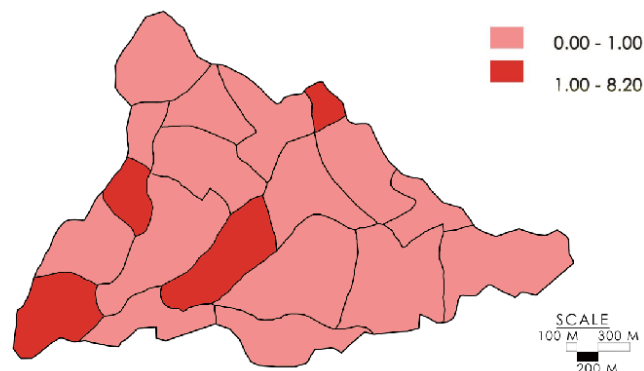
- Encroachment by street vendors is an other issue that has been seen in major nodes.

5.1.12.4 Industrial concentration index



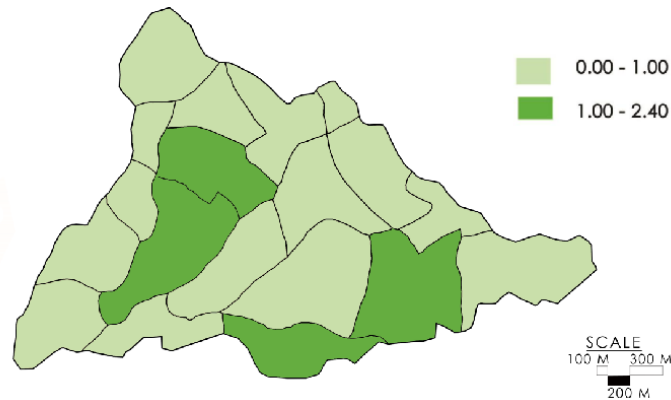
- Large industries like kitex garments and aluminium is one of the prominent economic subcenter in the panchayath
- About 402 small scale industries are there in the panchayath
- Industries are concentrated in the Kizhakambalam ward, Vilangu, Ambunad, Malayidamthuruth wards.

5.1.12.5 Public semipublic concentration



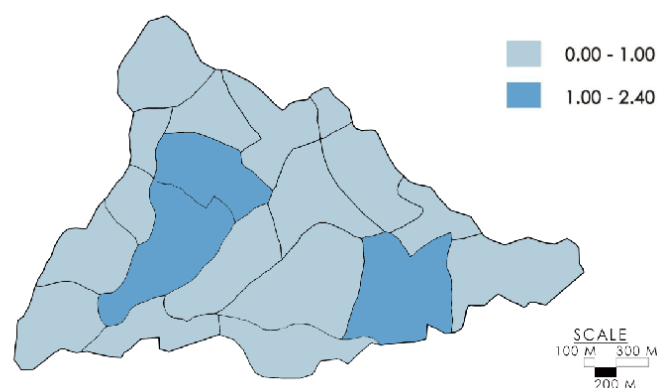
- More Public spaces are concentrated in Karukulam, Poyyakunnam, Kanampuram & Pazhanganad wards.
- There is no open spaces available for recreational purpose.

5.1.12.6 Paddy concentration index



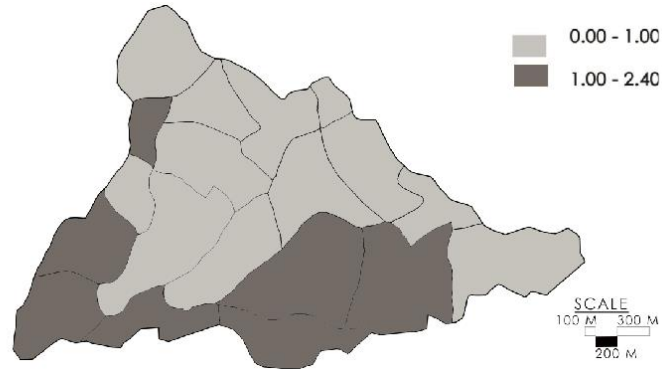
- Paddy fields tend to be uncultivated during these days because of decreasing Profit and income to agricultural labour and cultivators.
- Due to increased usage of Chemical fertilizers, the fertility of soil is decreasing.
- Spreading of diseases to crops, Loss due to uneven monsoon, Heavy rainfall also leads to reduce interest in farming.
- Panchayat took initiative to promote agriculture & increase productivity.

5.1.12.7 Waterbody concentration index



- The waste water from various industries are directly discharged to the small streams and water bodies & thus degrading the environment
- There is no major waterbodies passing through the study area. There are streams which provides enough water for agriculture.

5.1.12.8 Transportation concentration index



- Road width is less in Junctions (8m)which creates congestion.
- Roads under the panchayat are properly maintained.

Agriculture is the most important landuse, accounting for 31% of total landuse.

Residential landuse is ranked second. Population and residence demand in the study area are increasing due to gradual population growth and an increase in migrant labours. Because of the presence of industries and emerging job opportunities, migrant labours are being drawn to the study area. People working in Ernakulam city are also in high demand for residence in the study area due to its close proximity to the city.

Agriculture is in decline due to low productivity and low wages. Rubber, paddy, tapioca, vegetables are major crops in the study area. The Panchayat is taking the initiative to improve the agriculture sector.

Industrial landuse is emerging In the study area. the number of industries is increasing. The main reasons for this are the city's proximity, the availability of resources, the ease of supply, the ease of marketing, and so on. Increasing employment opportunities also draw migrant workers to this region.

Commercial landuse is mainly concentrated in kizhakambalam ward & pukkatupady ward.

The waterbody in the study area is the Kadambrayar river. It also serves as a source of water for farming. This waterbody receives storm water from the study area.

5.1.13 Environment

Major landuse of study area is agriculture. Major crops cultivating are Paddy, Tapioca, Rubber etc. According to lanuse distribution, 31% of total land is agriculture land. and 20% is vacant land.

People's interest in farming is rapidly declining as a result of low productivity and low wages. The Panchayat is taking steps to increase interest in farming and improve farming practises. Today's major issue is the growing number of quarries in the study area. Granite and laterite are abundant on the site. This increases the environmental threat.



Sugarcane plantation

Source: Malayala Manorama Newspaper

The waterbody in the study area is the Kadambrayar river. It is a part of Kadambrayar ecotourism village project. This adds to the scenic beauty of the panchayat. It also serves

as a source of water for farming. This waterbody receives storm water from the study area. The Kadambra river is an important part of the panchayat.

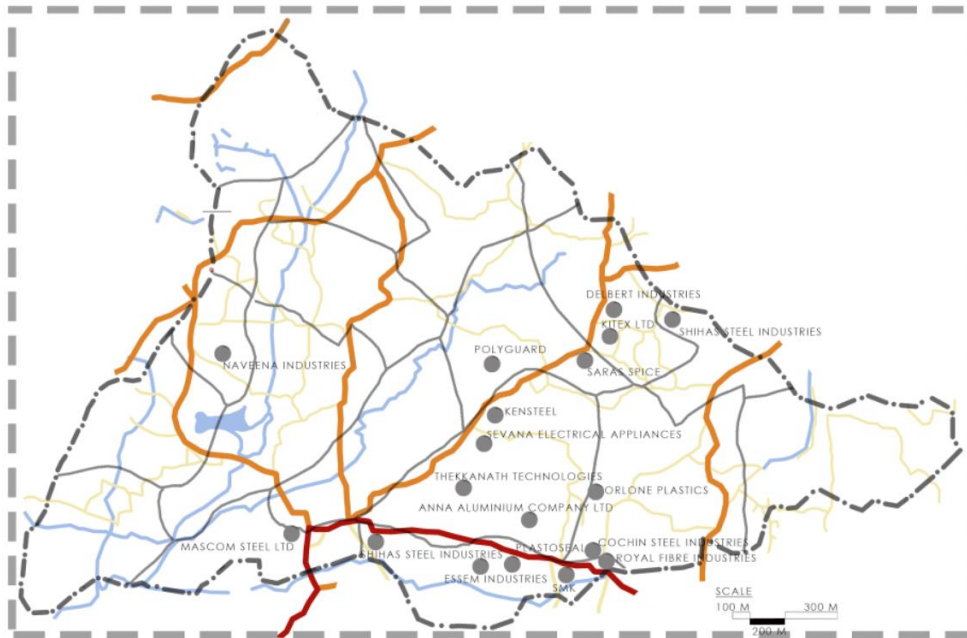
The Kadambayar Boating Centre, a charming picnic spot, has been transformed into an ecotourism village. There are numerous boating options available here, as well as a variety of activities that will captivate all visitors, and it is close to Wonderla amusement park.



Kadambra river

Source:Google images

5.1.14 Industries



Industries in Study area

Source: Author generated with reference to google maps

Major industries in the study area are in the field of.

- Electronics
- Spices
- Plastic Manufacturing
- Steel
- Aluminium

The major industry working in study area are Kitex limited(3000 workers), Kitex garments (15000 workers), Anna aluminium ltd (2500 workers).Most of the people in the studyarea are working in near by industries.

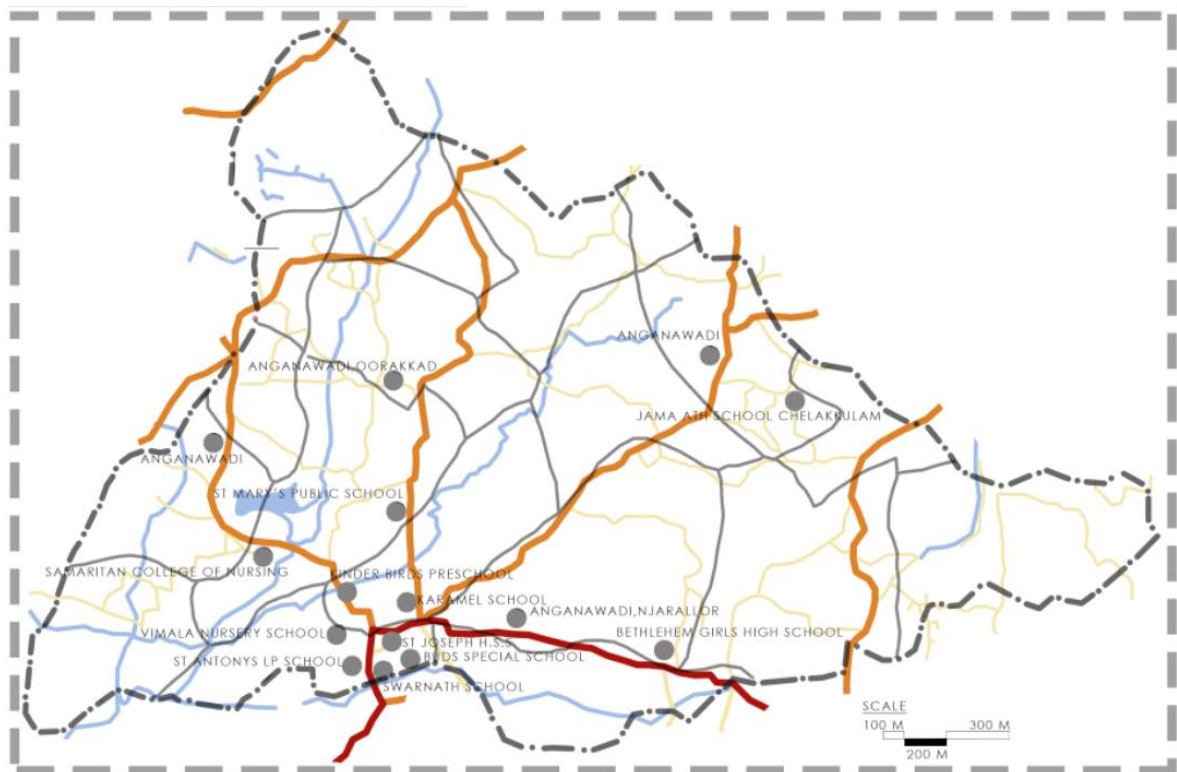
Other industries include Saras spices, Polyguard, and Sevana.

In the study area, the number of industries is increasing. The main reasons for this are the city's proximity, the availability of resources, the ease of supply, the ease of marketing, and so on. Increasing employment opportunities also draw migrant workers to this region.

There are currently 402 small-scale industries operating in the study area. The majority of the employees are migrant workers. This increases the demand for new housing.

5.1.15 Social infrastructure

5.1.15.1 Education

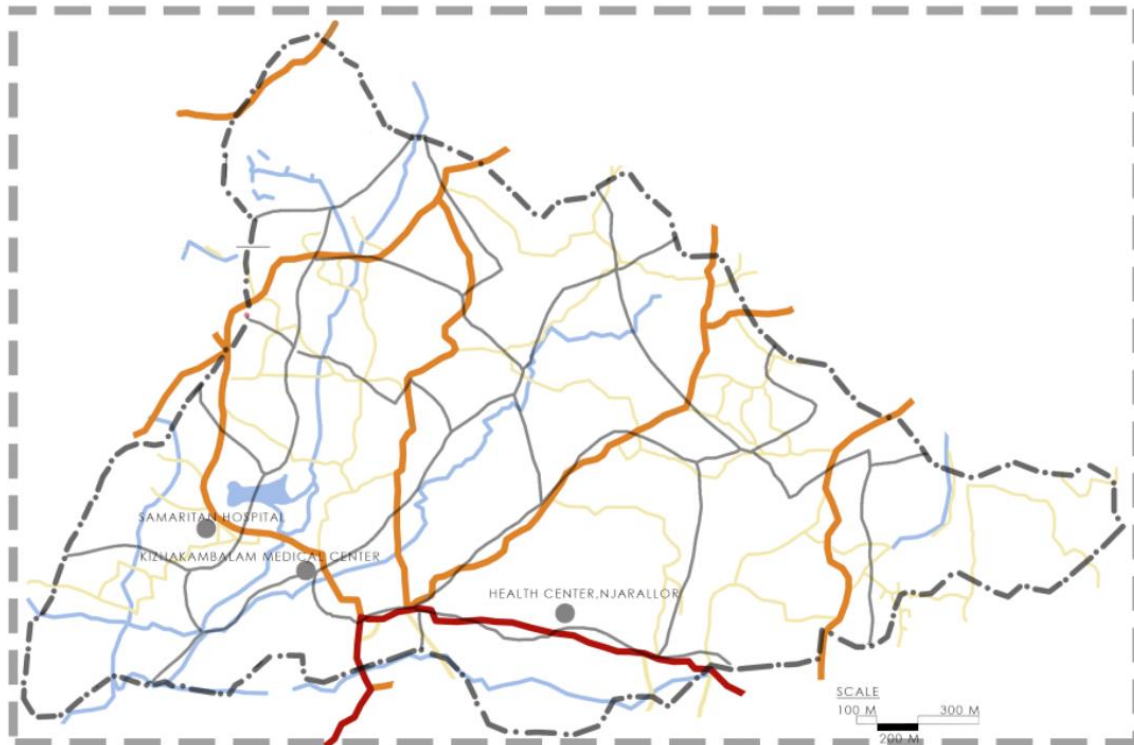


Educational institutions in study area

Source: Author generated with reference to google maps

According to the primary survey, the majority of students attend nearby schools for education.

5.1.15.2 Health



Health institutions in Study area

Source: Author generated with reference to google maps

In terms of health, the majority of people rely on Samaritan Hospital and hospitals in nearby panchayats.

5.1.16 Physical infrastructure

5.1.16.1 Water supply

There is no shortage of water in the study area. 90% of houses have open wells and 5% of houses have bore wells. According to the Ground Water Year Book of Kerala (2020-21), Kizhakambalam has a groundwater level of 5.52 - 5.62 DWL M BGL (Water level Depth in meters below ground level)

5.1.16.2 Electricity

Electrical power is available throughout the study area. Everyone is reliant on KSEB for energy. Solar energy is rarely used.

5.1.16.3 Sewerage treatment

Biodegradable wastes are disposed of on site, while non-biodegradable waste is collected by the panchayat. The waste is then transported to the Brahmapuram waste treatment plant.

5.1.16.4 Sanitation

Toilets are available in all houses. The study area has no sanitation issues.

5.1.16.5 Storm water drainage

Storm water drainage is directed toward the Kadambra River on the site's south west side. In the study area, there is no water logging. Kizhakambalam is located at an elevation of 4 meters/12 feet above mean sea level.

5.1.17 Housing

There is a total number of 5551 households in the study area.

Total population is 23,186.

According to the 20-20 group's socioeconomic survey(2010), kutcha houses account for 1.58 percent of total house numbers.

There are total of 6028 houses.

The total number of kutcha houses which require maintenance is 95.

Presently There is no shortage of housing in the panchayat.



Gods villa

Source:Google images

Twenty20 Kizhakkambalam has completed 300 houses for the poor and renovated 800 houses with modern amenities.

Migrant workers

According to the 20-20 group's socioeconomic survey (2010), the kizhakambalam panchayat has a total of 24087 migrant workers.

They are housed in the company's provided hostels.

5.1.18 Governance

5.1.18.1 CSR

Corporate social responsibility (CSR) is a self-regulating business model that helps a company be socially accountable to itself, its stakeholders, and the public.

Section 135 of the 2013 Act, seeks to provide that every company having a net worth of 500 crore INR, or more or a turnover of 1000 crore INR or more, or a net profit of five crore INR or more. during any financial year shall constitute the corporate social responsibility committee of the board and should spend 2% from their profit to social welfare activities

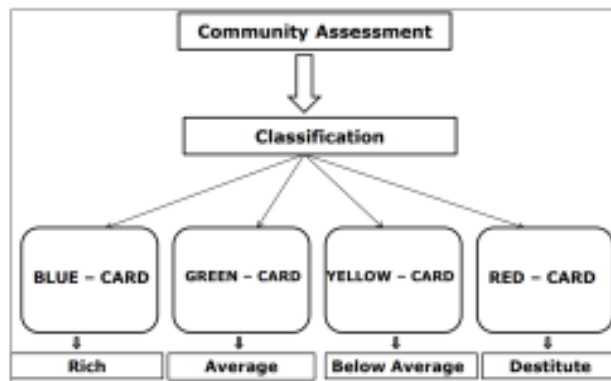
5.1.18.2 Anna kitex group

The Anna group has started its business organisation in 1968 with its Anna Aluminum company under the leadership of Sri M.C. Jacob. Kitex Garments Ltd, a part of the renowned Anna-Kitex group of companies was established in the year 1992. Among the various approaches, the Kitex follow ‘own NGO’ approach and they found it effective for the integral development of Kizhakkambalam. Hence Twenty20 has been registered as a Society in 2014 (Reg no. EKM/TC/944/2014). Now Twenty20 is a vision as well as an organisation to implement various CSR activities. This CSR venture aims at turning Kizhakkambalam into a model Panchayat in India by the year 2020.

5.1.18.3 The major csr initiatives

5.1.18.3.1 Stakeholder cards

Different stakeholder cards were issued to the people based on the assessment. The cards are named after colours (Blue, Green, Yellow and Red) and each card represents a category.



Structure of Assessment

Source: Twenty20 vision of CSR in Kizhakkambalam

5.1.18.3.2 Community water tanks

Community water tanks with individual pipe lines, digging of wells were implemented in 17 water projects under the CSR initiatives.

5.1.18.3.3 Promote agriculture

- Bringing people back to ‘agriculture’ were result oriented and they had immediate positive results.
- The agriculture was promoted by providing financial assistance, training, latest technologically powered equipment, manpower assistance, and organic farming techniques.

5.1.18.3.4 Employment generation

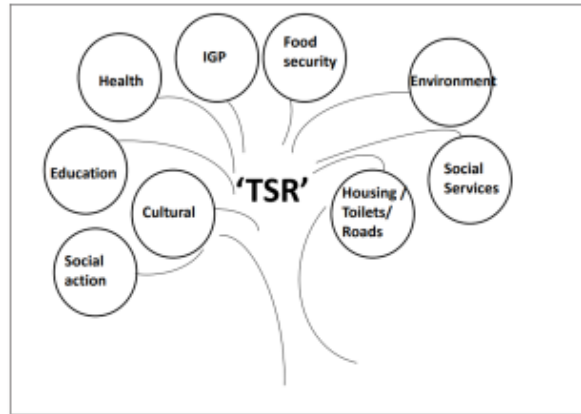
With the aim of agricultural self-sufficiency and raising the agriculture revenue in Kizhakkambalam.450 acres of land utilised for paddy cultivation, 190,000 banana plants, nearly half a million high yielding vegetable seeds and saplings were supplied to the community.

Along with agriculture promotion, dairy farming, umbrella-making, lottery ticket sale, and corner shops were encouraged among the most deserving stakeholders. Hens, ducks, goats, and cows were distributed to the farmers and imparted trainings to manage their Income Generation Programmes (IGP) in a sustainable manner.

5.1.18.3.5 Infrastructure facilities with participation of people

- The Twenty20 constructed and reconstructed 222 houses
- All houses with toilet facility’ was another project of Twenty20 and it was accomplished by constructing 110 new toilets and reconstruction of 280 toilets.
- All the 110 houses that did not have electricity facility were provided with the electricity connection with proper cabling and fittings.
- Twenty20 has started with supplying free food kits in 2013, when heavy rain destroyed the livelihood of the poor people and it was later expanded like a Public Distribution System (PDS).

- Opens avenues for the small scale farmers, handloom workers, micro-investment units to display and sell their products.



TSR (Total Social Responsibility)

Source: Twenty20 vision of CSR in Kizhakkambalam

5.1.18.4 Programmes & initiatives

5.1.18.4.1 Food security programme

Twenty 20 started supply of food products in 2013 related to Kerala flood. Later this developed as a Public Distribution system by providing all food products at a half rate of market price.



Kitex supermarket

Source: Google images

5.1.18.4.2 Ente veedu programme

Twenty 20 provided free houses (Gods villa) for economically weaker peoples.



Gods villa

Source:Google images

5.1.18.4.3 Educational assistance

Twenty 20 provides educational assistance, free educational kits, uniforms, and other technical support to ensure the better growth of the next generation.

5.1.18.5 Major activities

- Pension for the elderly people
- Medical assistance for all
- Educational assistance
- Agriculture promotion
- Food security programmes
- Healthcare programmes
- Developing infrastructure facilities
- Ground water conservation
- Anti-Alcohol movement
- Employment generation programmes
- Personal assistance for construction of house

5.1.18.5.1 anti alcohol movement

Twenty20 promised to make Kizhakkambalam an alcohol free village. This was the main offer of the organization during the election campaign in November, 2015. And they kept their word by closing down the only beverage outlet available in this area.

5.1.18.5.2 Side protection of leading channel

Kadambrayar canal in ward 14 of Kizhakkambalam grama panchayat used to be the main waterway which irrigated the whole area. Gradually the sides of the canal got damaged and the water flow was obstructed. As a result, the agricultural activities in the area were adversely affected. A plan to renovate the canal was taken up under Mahatma Gandhi NREGS and accordingly, the canal was deepened and both sides of the canal were strengthened using stone masonry.

As a result of renovating the canal, waterlogging in adjacent areas was reduced. It prevented flooding in the areas and ensured availability of water year-round to more than 50 households in the area. Agricultural land which could not be cultivated due to lack of irrigation was reclaimed.

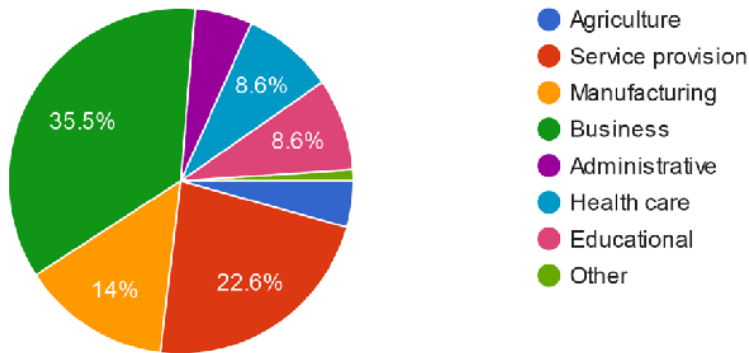


Kadambrayar river

Source:Google images

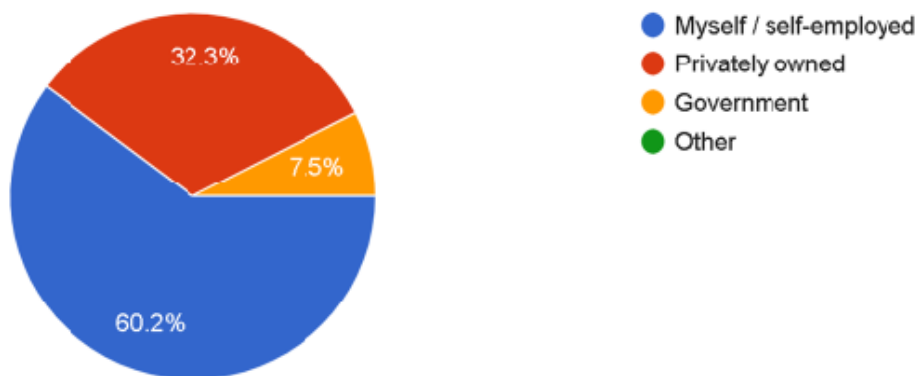
PRIMARY SURVEY- 190 HOUSEHOLDS(RANDOM SAMPLE)

1.Type of job which you are mainly working on



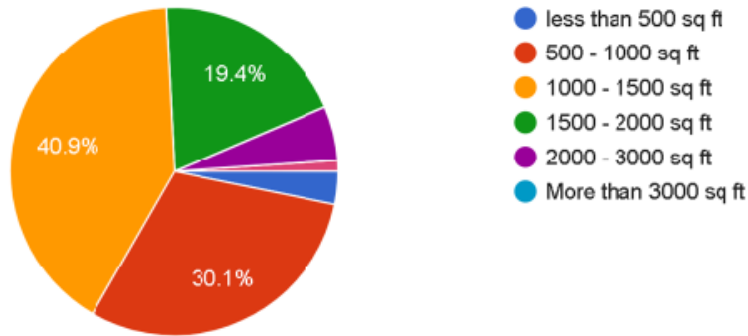
Most of the peoples are having business(35.5%).This showing the growth of Startups,Small & Medium scale industries in the study area.22.6% people are working in service provision and 14% in manufacturing units.

2. Who owns the establishment that you are working in



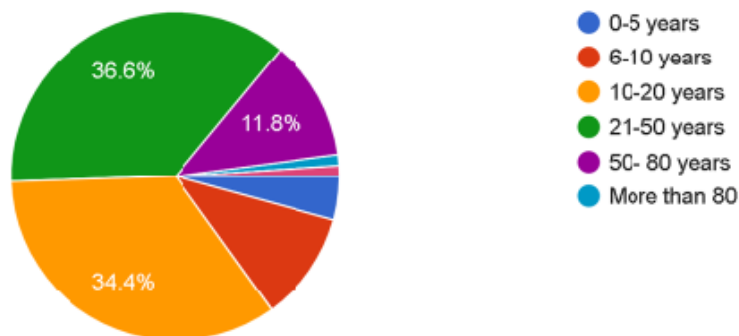
Most of the people run their own businesses(60%) and 32% of people work in the private sector. This shows people's increasing interest in running their enterprise.

3. Area of the House (in sq.ft)



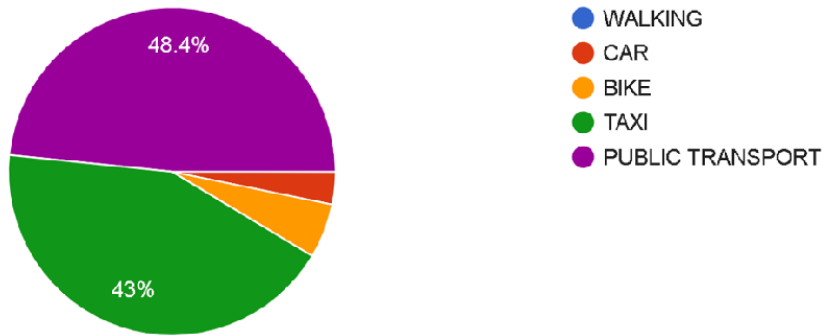
40% of people have a house with an area of 1000-1500 sq ft. this shows most of the people are coming under LIG & MIG group.

4. Residing since(year):



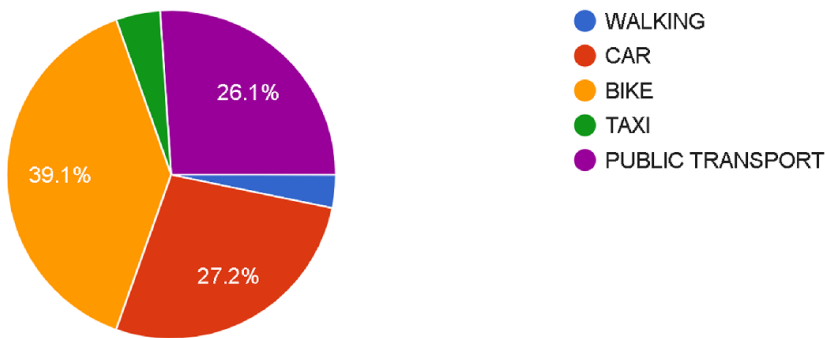
36% of people are residing in the study area for 21-50 years. this shows settlement continuity through generations. About 20% of people residing 0-10 years show migration to the study area and people are interested to settle in the study area.

5. Mode of transport - Education purpose



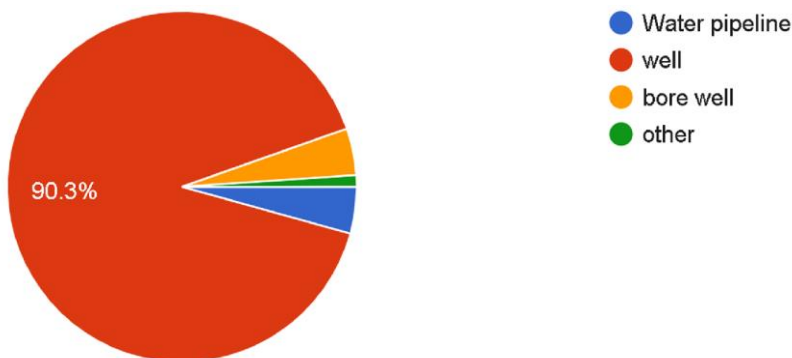
48% of people are using public transport for educational purposes.

6. Mode of transport - Employment purpose



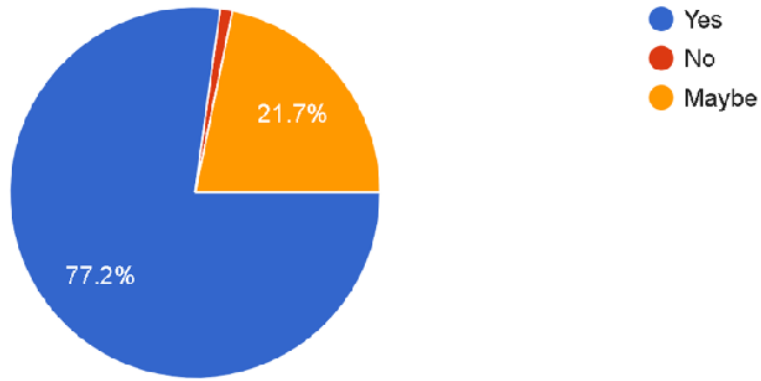
39% of people are using the private vehicle (bike) for employment purposes. 27% of people are using the car for travel.

7. Main source of drinking water

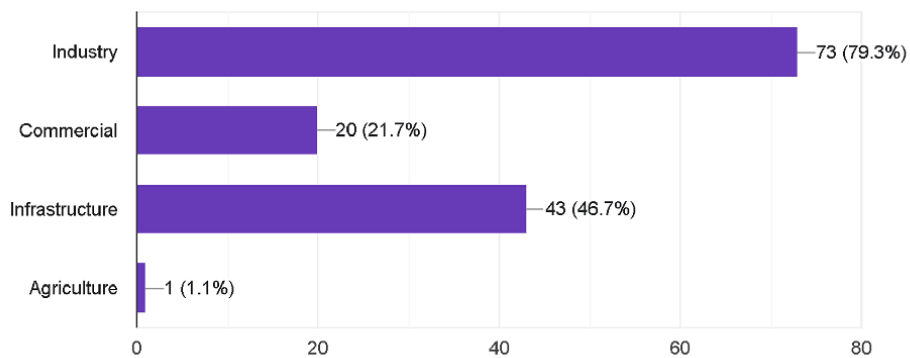


90% of people are depending on the well for drinking water. there is no shortage of water in the study area.

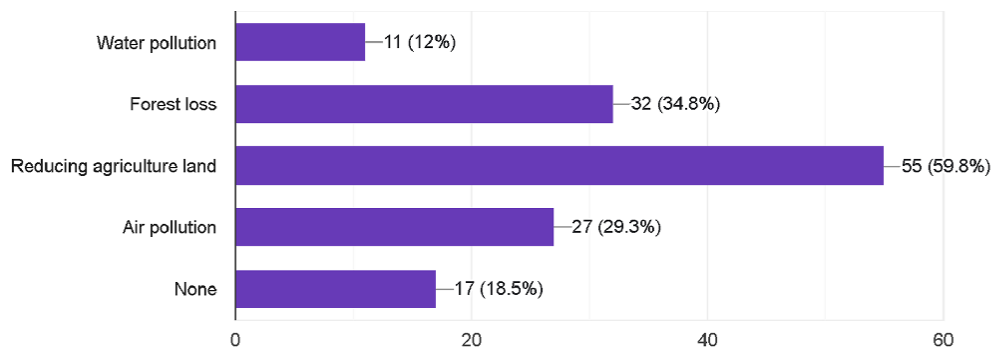
8. Do you think there has been any development that happened in the last decade?



9. Which kind of development did you notice?



10. Did you notice any environmental issues?



5.2 Swot analysis

STRENGTH

- Proximity to Kakkanad and Ernakulam city promotes growth and enhance development.
- Land is very fertile and suitable for cultivation.
- Presence of ‘Valiya thodu’ helps to drain off the water and gives protection from flood.
- Economy is mainly depend on industrial sector which also provides employment opportunities.
- Presence of Kitex Limited contributes social & economical support to people .

WEAKNESS

- Disputes between political parties act as a barrier for development.
- Peoples reluctance to do farming increases the vacant lands.
- Industries creates pollution.
- Absense of pedestrian friendly pathways
- Narrow road creates congestion.

OPPORTUNITY

- Land availability and less cost of living attracts people to Kizhakambalam.
- Improving infrastructure facilities may enhance development.
- Ongoing agriculture promoting programmes by kudumbasree & panchayat may improve interest in the field of farming.
- Growth & Extension of IT Hub in Kakkanad may increase employment opportunities.

- Presence of IT Hub creates more demand in residential sector.

THREAT

- Development of industrial and residential sector makes encroachment to Green cover.
- Industrial development also spreading to agriculture lands.

CHAPTER 6 STRATEGIES

INDUSTRIAL SECTOR

- Industrial sector is very active and contributes most to the economy. Improvement of Industrial sector can help to improve and enhance the growth.
- Programs which invite more entrepreneurs through startups, small & medium scale industries can facilitate the growth.
- IT Hub in Kakkanad is growing to outskirts. Better availability of resources and facilities can attract new firms to the panchayat.
- Introducing new schemes and programs for industrial development helps in facilitate industrial development

RESIDENTIAL SECTOR

- Industrial development and employment opportunities lead to the migration of people to the Kizhakkambalam panchayat which increases demand for affordable housing & rental housing.
- Less land price compared to the city and better connectivity to the city increases demand for housing.
- Introducing new housing schemes can help low income and medium income group.
- Introducing vertical housing (flats) can control encroachment of agriculture lands and reduce green cover.

AGRICULTURE SECTOR

- Adopting programmes and policies to protect existing farm lands.
- Special programmes to development interest to farming.
- Develop programmes to cultivate vacant agriculture lands
- Introduce new techniques and technology in field of farming to the cultivators.

ENVIRONMENT

- Adopting programmes and policies to protect existing Green cover.
- Special programmes to aware the importance of protection of environment.
- Programmes to Protect waterbodies(Valiyathodu).

INFRASTRUCTURE

- Efficient transportation facilities to improve connectivity of kizhakambalam to ernakulam city and neighbouring towns.
- Roads with sufficient width to cater vehicle population

- Improve connectivity to IT Hub,Kakkanad to attract new ventures.
- Pedestrian friendly pathways to promote walking

PUBLIC & SEMI PUBIC AREAS

- Kizhakambalam panchayat has no efficient public,semi public spaces to cater the recreational need of the people.Introducing public spaces can improve the social interaction of people.

CHAPTER 7 PROPOSAL

GOAL 1- Promote open spaces for improving socio economic relationship and enhance good quality of life

There is no public space available in the study area for recreation. It is necessary to provide a quality open space for people to spend their leisure time in the Kizhakambalam panchayat. It will help to revive the people and provide a boost of energy. It will also help to improve people's socioeconomic relationships.

‘KADAPRAYAR RIVER’ is the waterbody present in the site. Providing open space along the banks of this waterbody can provide scenic beauty while also protecting and caring for the waterbody.



Kadambrayar river

Source:Google images

- Protection of kadambra river from pollution.
- Provide quality space for leisure by providing seatings, paved pathways.
- Protection of agriculture and endangered plants, medicinal plants.
- Provide connectivity to existing kadambayyar eco tourism site.
- Provide playground for football, cricket and other sports.

- Establish cafeteria, meeting spaces in pavilions or temporary structures.
- Paved pathways for jogging.
- Open gym facility

GOAL 2 - Improve infrastructure facilities to promote growth.

- Provide street lights to create pleasant atmosphere, to prevent illegal activities, to reduce crimes and make it comfortable for workers on night shifts.
- Provide pedestrian pathways to encourage walking and reduce dependency on vehicles.
- Improve condition of roads which improve traffic flow condition to industries.
- Set time limit for goods vehicle to industries.
- Provide efficient waste management system for industries.

GOAL 3 - Improve connectivity to ernakulam city

- Provide more public transport service to ernakulam city.
- Provide extra bus service in morning and evening time.
- Establish special trip to infopark kakkanad in rush hours.

GOAL 4 - Improve housing sector to enhance the life of migrant workers

- Provide affordable housing facility for migrant labours in Kizhakambalam, makkinkara, kaavungaparamb wards which has more migrant labours concentration.
- Provide group housing facility for migrant labours

- Ensure educational and health facility for migrant labours family.
- Provide housing schemes for Ews,lig and Mig.
- Promote vertical housing for controll encroachment of agriculture lands.

AFFORDABLE HOUSING

Affordable housing for migrant labours and other EWS,LIG,MIG groups which helps to make a positive effect in overall growth.this helps to improve workers physical & mental wellbeing.

SHUTTLE SERVICE

Shuttle electric bus service from worker housing to town and company, providing efficient transportation for workers and their families.

WASTE MANAGEMENT

Efficient waste management system to segregate biodegradable and non biodegradable waste and composting in effective manner.

Biodegradable waste can be use for making biogas and can be use as cooking fuel.Non biodegradable waste can be move to brahmapuram waste treatment plant.

REDUCE POLLUTION

Reduce pollution by providing awareness programme in educational institutions and community groups.

ROOFTOP FARM

Promote rooftop farming tor increase the interest in farming which also helps to improve air quality.

EDUCATIONAL FACILITIES

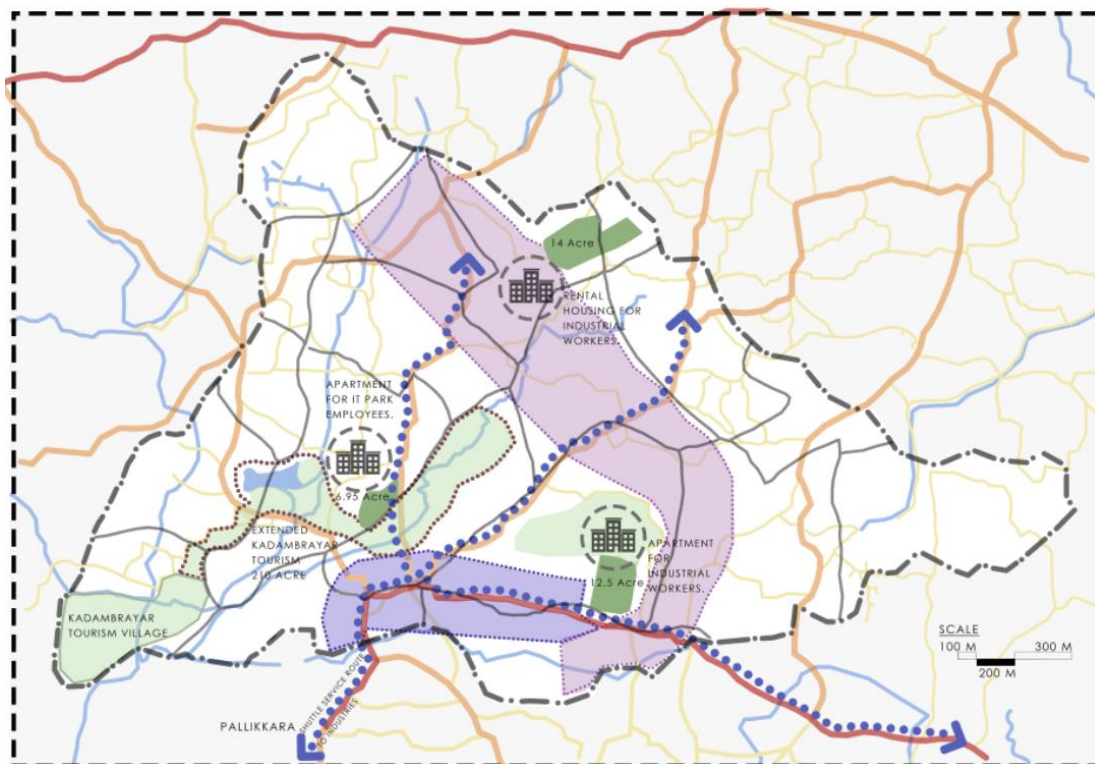
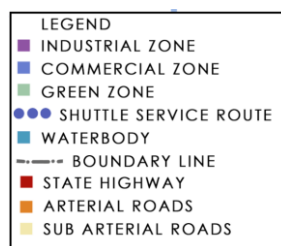
Promote basic educational facilities near by group housing.

HEALTH FACILITIES

Promote basic health facilities near by group housing.

COMMON SERVICE FACILITIES

Provide common service facilities like open space,stationary shop,clinics,playground etc.



PROPOSAL FOR STUDY AREA

(Source-Author generated)



Schematic reference image for road infrastructure development, recreational space.

Source: Google images

CHAPTER 8 CONCLUSION

Planned fringe development for Kizhakkambalam can help to provide an efficient planned space and have a positive impact on the occupants and promote overall growth. Improving infrastructure facilities can help the study area grow in a positive way. The research examined the need of planning strategies for fringe areas to promote healthy development. The study examined the concepts of Fringe development, Growth pattern of Ernakulam city, Growth potential of study area and prepared strategies to enhance efficiency and positiveness of the study area.

Kizhakambalam as a study area is chosen by analyzing the present growth pattern of Ernakulam city and the spread of growth towards infopark area. The strategies are formulated based on the primary and secondary studies. The main initiative was to control the study area's negative growth. Some of the initiatives includes Group housing for migrant workers to improve industrial efficiency, Green open space for recreation to enhance social relationship and Improving mobility of fringe area. Planned development of Kizhakambalam fringe can improve the Social, Economic status and can protect the environment.

APPENDIX

Household survey form

1. Your name :
2. Ward number :
3. How many people currently live in this household.
 1

 2

 3

 4

 5

 More than 5
4. Age group of households, Education/Employment status, Place of school/work
1.....
2.....
3.....
4.....
5.....
6.....
7.....
8.....
5. What is the type of business your are mainly working in?
 Farm – livestock
 Farm - crops
 Manufacturing
 Service provision
 Administrative
 Health care
 Education
 Other, specify:
6. Who owns the establishment that you are working in?

- Myself / self-employed
 - Privately owned
 - Government
 - Other, specify:
7. Ownership status of the house
 - Self owned
 - Rental
 - Govt funded
 8. Area of the plot (in cents)
.....
 9. Area of the House (in sq.ft)
.....
 10. Number of storeys
.....
 11. Residing since(year):
.....
 12. Condition of the house
 - Good condition
 - Maintenance required
 - Dilapidated
 13. Did you avail any help from govt/agency in constructing your home ,scheme type.
.....
 14. What is your main source of drinking water
 - Pipeline Water
 - Well
 - bore well
 - other:specify
 15. Which problems with drinking water do you have currently, if any? (multiple answers possible)
 - Lack of pipeline water
 - Water provision is bad
 - Water quality is bad
 - Do not have any problems
 16. Which effluent disposal line (sewage system) do you have?
 - Centralized effluent disposal
 - Sewage well in outside of the house – a. to the street; b. to the river; c. to the sewer hole
 - other :
 17. Biodegradable waste disposal

- Own premisis
 - Streetside bins
 - Home collection
18. Non biodegradable waste disposal
- Own premisis
 - Streetside bins
 - Home collection
19. Frequency of waste collection
- Daily
 - Alternate days
 - Once in a week
 - Once in two weeks
20. Collected by (organization name).....
21. Distance of public water bin.....
22. Electric power supply
- Yes
 - No
23. Own solar power supply
- Yes
 - No
24. Chief fuel for cooking
- LPG
 - Electricity
 - Kerosene
 - Firewood
 - Biogas
 - Others
25. Mode of transport using for Work
- Walking
 - Car
 - Bike
 - Taxi
 - Public transport
26. Mode of transport using for Education
- Walking
 - Car
 - Bike
 - Taxi

Public transport

27. Vehicle ownership

1 2 3

Two wheeler

3 Wheeler

4 Wheeler

other :

28. Domestic and regional trip destinations

.....

29. Ration card type

White

Blue

Pink

Yellow

30. Total household income

< 50 K

50K – 1L

1L – 3L

3L – 5L

More than 5L

31. 2018 floods - effect of flood

Not affected

Ground floor sill lvl

Ground floor lintel

Complete ground floor

Completely washed away

32. Camp location (institute and area)

.....

33. Recreational facilities - place of recreational use or public use area, mode of transport

.....

34. Place of grocery shopping ,mode of transport

.....

35. Health service near by : (name of institute and distance)

.....

36. Bus station / auto stand : (place and distance)

.....

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