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Chapter 1
INTRODUCTION

1.1. LOCATION AND LINKAGES

Karunagappally is a municipal area falling on the north western part of Kollam district at north latitude of 9° 01' and 9°04' and East longitude of 76° 30' and 76° 33'. Karunagappally Municipal area falls in the revenue villages of Ayanivenikulangara and Karunagappally. The Municipality has an extent of 18.65 Sq.km and has 35 wards. Karunagappally Municipality is situated 27 Kms north of Kollam town and 15 Km south of Kayamkulam. The location of Karunagapally in Kollam District is shown in figure 1.1.

Chinnakkada	27 Km
Kundara	18 Km
Kottarakkara	27 Km
Kayamkulam	15 Km

Table 1.1. Distance to the regional Commercial Centres around Karunagappally municipality



Fig 1.1 Location of Karunagappally Municipality in Kollam District

The Municipality is bounded on the north by Kulashekharapuram Panchayat, north-east and east by Thodiyur Panchayat, south-east and south by Panmana Panchayat and west by Alappad Panchayat (Figure 1.2). Karunagappally is bounded by two backwaters, Vattakayal and Kannetti Kayal in the south and south-east and T.S canal in the west.

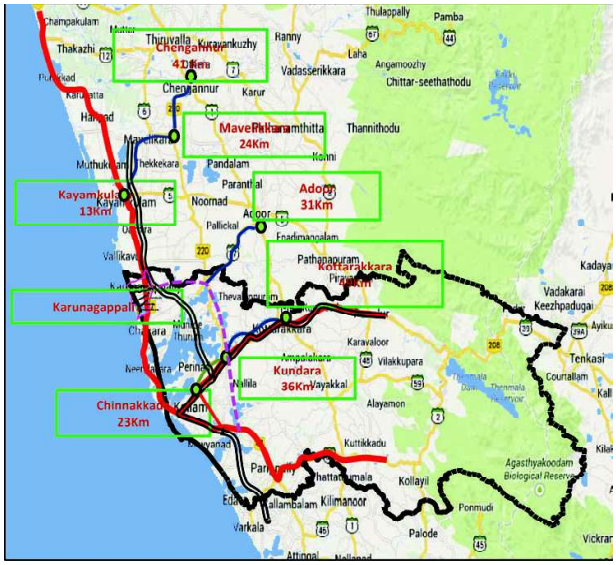


Fig 1.2- Neighbouring Panchayats near by Karunagappally Municipal Town

Karunagappally has the proximity of the three modes of transport - Rail, Road and Water. The T.S canal, which is a part of the National Water Way - 3 is there on the western side of the Municipal area, NH-66 passes through the Municipality, Karunagappally railway station, though not within the Municipal boundary, located hardly 1 K.M from Karunagappally town. The regional Commercial Centres around Karunagappally municipality are Kottarakkara, Kundara, Chinnakkada in Kollam District and

Kayamkulam in Alappuzha District (Figure 1.2). These are well connected with Karunagappally. The distance to the above centers are shown in table 1.1.

1.2. HISTORICAL AND CULTURAL BACKGROUND

The history of Karunagappally is closely linked with the history of Kollam. The area belonged to the ancient Ayi kingdom and it subsequently became part of the Kayamkulam kingdom and later it became part of Thiruvithamcore kingdom.

By around 3rd B.C during the reign of Emperor Ashoka, Buddhism took its roots in Kerala. In Karunagappally there are evidences for this "Palli", the educational institutions established by them has references to many current place names. Karungappally was a Buddhist settlement in early times and that the name has its origin from a famous Buddhist education centre in ancient times. It is also argued that nearby Karthigappally and Mynagappally too were Buddhist centres of learning. Remnants suggesting a Buddhist past of the place have been found in many locations here. An idol of Buddha, which was found from Maruthurkulangara of this region, testifies to the truth of such legends. It is now preserved in the Krishnapuram Palace, situated north of Oachira. The *Kavus*(sacred groves) existed were once the Buddhist shrines. These sacred groves were not mere worship places but also educational institutions and martial training centres known as *Kalari*. Now almost all these sacred groves have been converted into temples. Revival of Hinduism by Brahmin scholars in 800-1000 AD gradually wiped out Buddhism.

By around 1200 AD, with the establishment of Venad Kingdom by Ramavarma Kulasekhara Perumal Kollam remained as the capital of Venad kingdom till Raja Marthandavarma annexed the territory with Travancore. Karunagappally Desam with headquarters Maruthurkulangara includes the areas of the present Karunagappally, Karthikappally and Mavelikara Taluks. Later Karunagappally Desom became part of Kayamkulam – 'Odanadu'. Padanayarkulangara is an ancient temple in Karunagappally- the military station of the Kayamkulam Rajas. In 1746 His Highness Marthanda Varma merged Karunagappally to Travancore Kingdom. In 1795 Travancore with Kollam as one of the administrative division was formed. Thiruvithamcore was divided into four division and Karunagappally was a part of Kollam division. Karunagappally was ruled by Division Peshkar.

History of Karunagappally is closely connected with Deshinganad Raja Jayasimhan, Kayamkulam king, Marthandavarma, Ramayyan Dalawa, Veluthampi Dalawa. The municipality gave birth to many freedom fighters.

Cheuvannoor Veettil Raman Pillai Aasaan, a profound Sanskrit scholar, was the fortunate person who was destined to play the role of precept to Sree Narayan Gurudeva who lived at Karunagappally. Chattambi Swamikal and Sree Narayana Guru, two renowned spiritual leaders blessed this land with their visits to Srl Nanu Pillai's Kalari centre and played significant roles for uplifting the down-trodden and against the evil practices in the society. Leaders like Kochuvelu Pillai, Krishnadas, Ramachandradas are considered as the pioneers of freedom movement in Karunagappally. C.S. Subrahmanyam potty who played a prominent role as an educationalist and social reformist hails from Karunagappally.

1.3. DEVELOPMENT HISTORY

Karunagappally as part of Odanadu, had a prominent place in the field of agriculture. Economy once thrived on agricultutal sector. Three Thazhathodu passing through the 'Thazha Vayal' had well served the need of the irrigation purposes. Paddy was cultivated in the Thazhavayal in two seasons in a calender year. About 90% of the work force was engaged in agriculture. The innovation of Kollam thodu (canal) was initiated during this period The TS canal opened in 1880, posed a mile stone in the development of Kollam. This waterway connected Karunagappally to the outer parts of the area and led to the inception of many industries especially coir by the side of the canal which finally led to the development of settlements by the canal sides which continues to this date.There witnessed a shift in occupational pattern during early 1980's to traditional industries like coir and handloom. Alumkadavu,Thurayilkunnu & Kozhikode have a good history in coir industry. Ayanivelikulanagara North & Maru South had majority of Handloom sectors. There were more than 2000 small units and provided labour for almost 3000 labours. Karunagapally Panchayat was formed in 1953 October23. Opening up of National Highway is yet another important mile stone in the history of development of Karunagappally municipality. Due to

the functioning of Kollam - Shencotta railway and NH-66, the development along T.S canal slowly got shifted towards the eastern side and these links boosted up the trade and commercial activities at Karunagappally municipality.

Karunagappally Panchayat was having an area of 18.65 sq.km with a population of 30,000 and 11 wards. Karunagappally emerged as a municipality with 35 wards. Mini civil station and municipal office is located close to the central area of the town. Trade and commerce activities are flourishing in the central area of the town spanning over 4km of NH66.

The development history shows three are, three district phase in the development of Karunagappally. Agricultural sector during the end of 19th century and beginning of 20th century, shift towards traditional industrial sector during mid 20th century and change in to trade and commerce in the by end of 20th century.

1.4. REGIONAL ROLE

As per the Integrated District Development Plan of Kollam District, Karunagappally is a second order commercial node as well as second order settlement within the District, this bestow Municipality with the responsibility of acting as a higher order service provider of 16 nearby LSG's (Clappana, Oachira, Alappad, Kulasekharapuram, Thazhava, Sooranad North, Sooranad South, Panmana, Mynagappally, Thodiyoor, Sasthamcotta, Poruvazhy, Thevalakkara, Chavara, East Kallada, West Kallada) with a total population of 6,08,187 (Fig. 1.3).

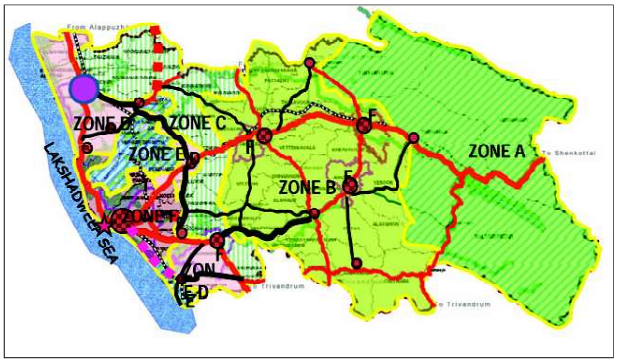


Fig. 1.3. Regional role of Karunagappally

The District Development Plan divides the entire district in to various zones of development based on analysis. Accordingly Karunagappally falls within the special development zone of the District, which assigns the municipality with the functions of an urban local body, whereas the local bodies (16 Nos) within the service area falls within agro allied development zone of the District, reiterating the function of the Municipality as the provider of higher order facilities in the agro allied development sector.

1.5. TOPOGRAPHY AND PHYSICAL FEATURES

The District is divided into three well-defined parts highland, midland and the lowland consisting of hills and forests, plains and the seaboard respectively. Karunagappally is situated in the lowland region of the District near the coast. Maximum elevation of the planning area is 15°. The terrain is almost plain with slope varying from 0 to 10 %. Slope more than 5% is on the eastern portion of Karunagapally (Fig. 1.4). Hence it may be assumed that the land within the planning area is suitable for construction activities, agriculture and other urban activities.

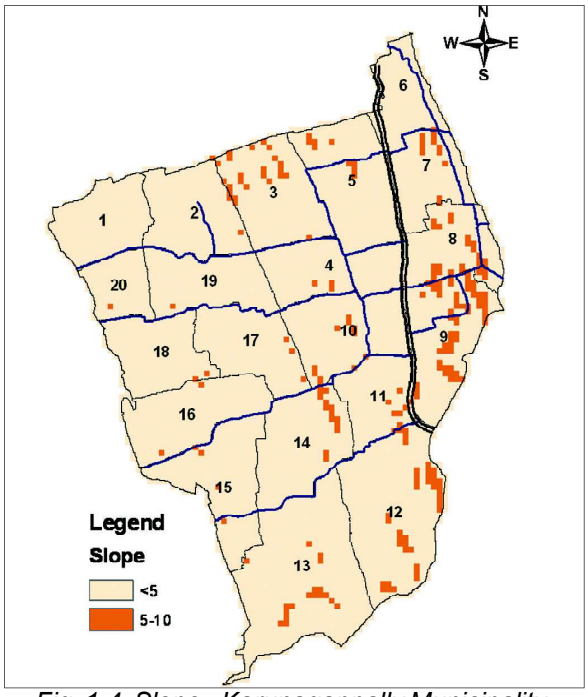


Fig. 1.4. Slope - Karunagappally Municipality

1.6. NATURAL RESOURCES

Planning area is gifted with natural resources such as lakes, plains, back waters and green fields. Karungappally used to be an agrarian economy until the late 19th century with coconut, banana, tapioca and paddy as the main crops grown. With rapid urbanization and the consequent pressure on land the reliance on agriculture has dwindled. Several cottage and small industries have now come up in the area in brick making, engineering and electronics. Hence the green fields got considerably reduced.

Chapter 2

DEMOGRAPHY

2.1. POPULATION AND ITS GROWTH PATTERN

As per 2011 Census the population of Karunagapally Municipality is 49604. This is 1.88% of the total population of Kollam District. The male population is 23883 & the female population is 25721. The total population of Karunagapally Municipality during 1971, 1981, 1991 and 2001 were 33959, 39123, 43691 and 46716 respectively. The growth of population is shown in figure 2.1. The comparison of population size of Karunagapally Municipality with other municipalities in the district is shown in figure 2.2.

The comparison of population size of Karunagapally Municipality with surrounding LSGs is shown in table 2.1 and figure 2.3.

Karunagapally stand in second position in population size when compared to surrounding LSGs. Panmana has the highest population.

The decadal growth rate of population in 2001-2011 periods is 6.18%. The population growth rate of Karunagapally Municipality is high when compared with Kollam District. The decadal growth rate of population of Kollam District in 2001-2011 periods is 1.95%. The decadal growth rate of Karunagapally Municipality in 1971-81, 1981-91, 1991-2001 and 2001-2011 periods are shown in figure 2.4.

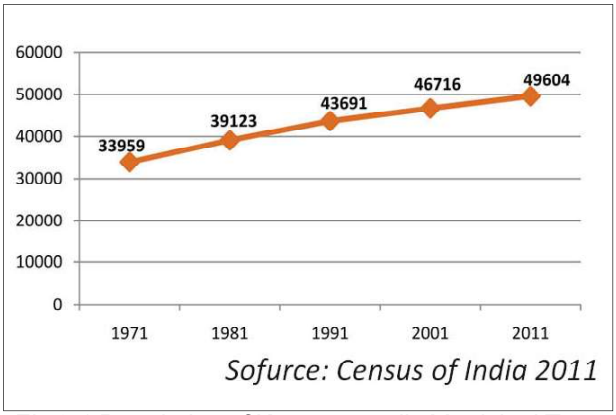


Fig 2.1 Population of Karunagapally Municipal Town from 1971 to 2011

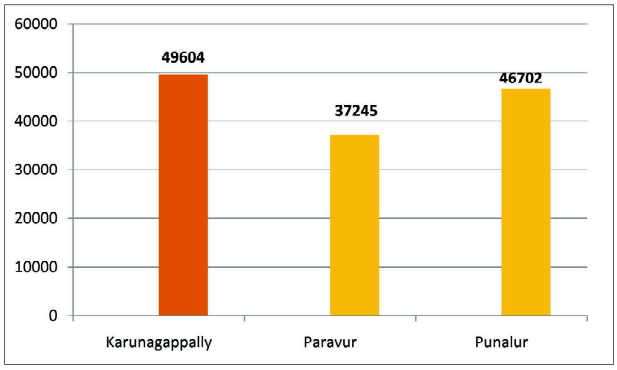


Fig. 2.2. Population comparison with other municipalities in the district (2011 census)

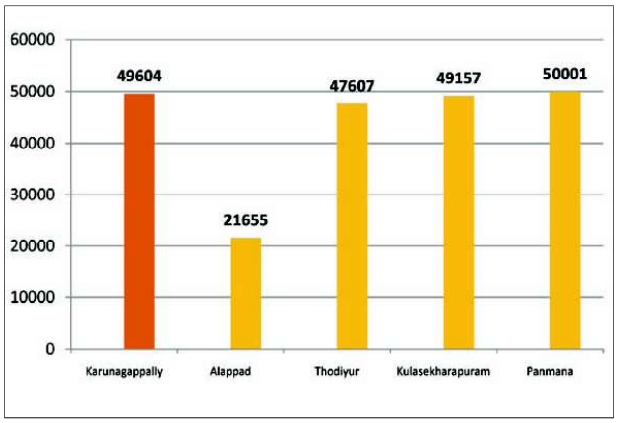


Fig. 2.3. Population comparison with surrounding LSGs (2011 census)

Growth rate of Karunagappally is declining over the years. But while comparing the growth rate of previous two decades (6.92% and 6.18%) there is not much variation in the growth rate.This is due to the migration effect of inhabitants of Alappad to Karunagappally. When analyzed in the overall scenario of decling population growth rate within the District, the growth rate in Karunagappally is presumed to be in a stabilizing stage around 5.6%; which will carrying

LSG	1971	1981	1991	2001	2011
Karunagapally	33959	39123	43691	46716	49604
Alappad	20369	22883	24576	24931	21655
Thodiyoor	28408	35535	40593	43937	47607
Kulasekharapuram	31496	37435	41464	44000	49157
Panmana	36132	41097	45722	48552	50001

Table 2.1 Comparison of population with surrounding LSGs *Source: Census of India 2011*

LSG	Total Population			Decadal Growth Rate (%)	
	1991	2001	2011	1991-2001	2001-2011
Karunagappally	43691	46716	49604	6.92	6.18
Alappad	24576	24931	21655	1.44	-13.14
Thodiyur	40593	43937	47607	8.24	8.35
Kulasekharapuram	41464	44000	49157	6.12	11.72
Panmana	45722	48552	50001	6.19	2.98

Table 2.2. Decadal Growth Rate of Population with Surrounding LSGs (1991-2011) Source: Census of India

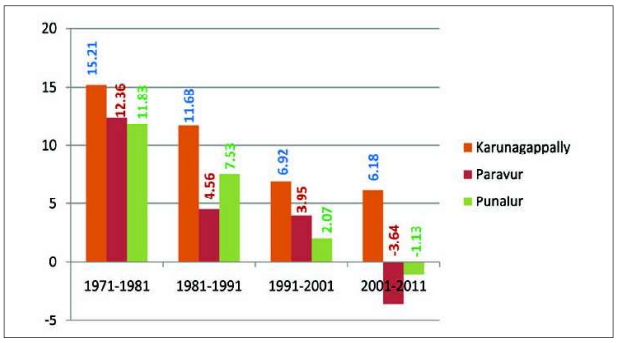


Fig 2.4. Comparison of growth rate of population from 1971 to 2011

forward in the next decades also. It can be seen that Punalur and Paravur municipalities are showing a negative growth rate(Fig. 2.4). The decadal growth rates of population of the surrounding LSGs are shown in table 2.2 and figure 2.5. This shows that Karunagappally is in a region of high growth rate within the District.

Karunagapally stands in third position in growth rate compared to surrounding LSGs. Kulasekharapuram have the highest growth rate. Thodiyoor, Panmana and Alappad have growth rate less than Karunagapally. Alappad shows negative growth rate. Majority of the inhabitants of Alappad Gramapanchayat migrated to Kulasekharapuram after the Tsunami that struck on 2002 and hence there is a steep increase in the growth rate of Kulasekharapuram and steep decrease in the growth rate of Alappad. The land value in Karunagappally municipality is very high comparing to that of Kulasekharapuram and Thodiyoor. This may be the reason for low growth rate in Karunagappally municipality.

The comparison of growth rate with Kollam District is shown in figure 2.6. From the figure, it is seen that the growth rate of Karunagapally is very high than that of the District.

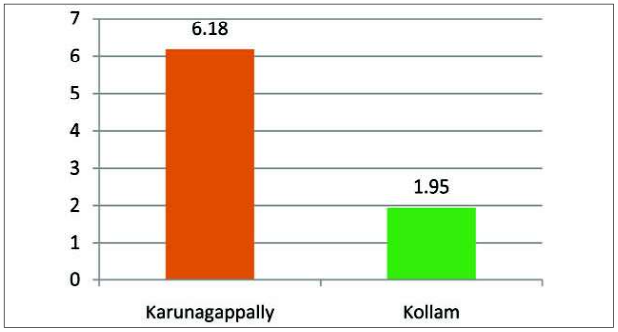


Fig. 2.6 Comparison of growth rate with Kollam District (Source: Census of India, 2011)

The comparison of gross population density with other municipalities in the district is shown in figure 2.7. As per 2011 census, the gross population density of Karunagapally is 2660 persons per sqkm which is very high when compared to district figure of 1058 ppsqkm (figure 2.8). While comparing gross population density with other municipalities in the district, Karunagappally has a moderate population density with Kollam Corporation has the highest and Punalur has the least population density.

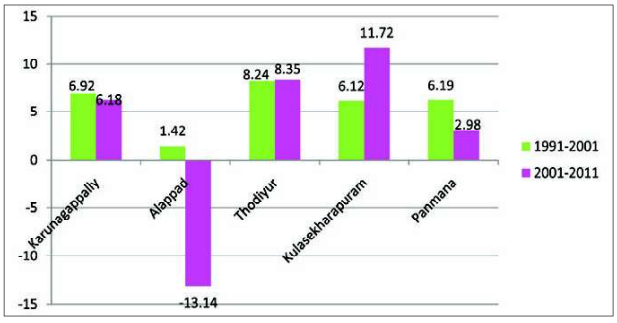


Fig. 2.5 Comparison of growth rate with surrounding LSGs

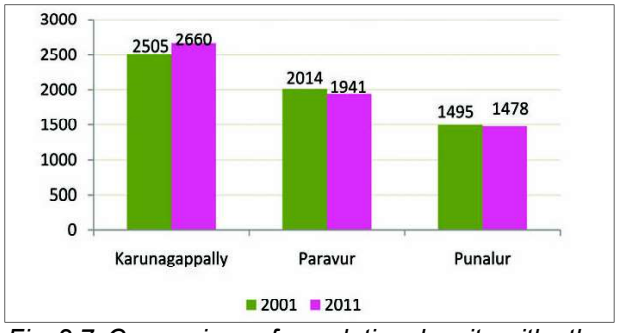


Fig. 2.7. Comparison of population density with other Municipalities (census 2001 & 2011)

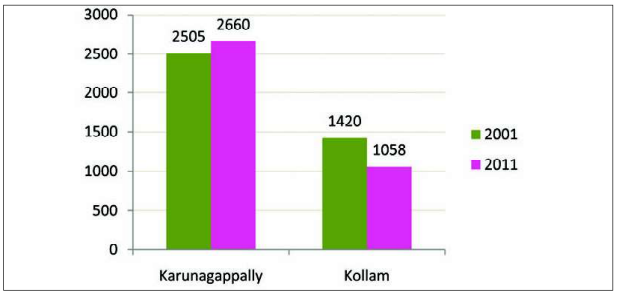


Fig. 2.8 Comparison of population density with the District (census 2001 & 2011)

The comparison of gross population density with surrounding LSGs is shown in figure 2.9. Figure indicates that Alappad, Panmana and Kulasekharapuram panchayats have higher gross population densities than Karunagappally.

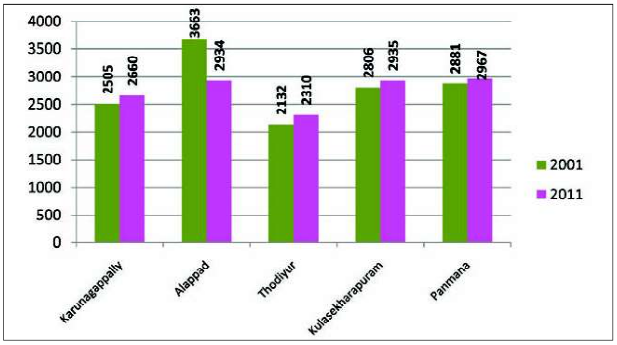


Fig. 2.9 Comparison of population density with surrounding LSGs (census 2001 & 2011)

The net population density of Karunagappally as per 2011 census is 2946 persons per sq.km. The comparison of net population density with nearby LSGs is shown in figure 2.10. Karunagappally has the second lowest position. Alappad being a perfect coastal area with large number of fishermen community if excluded, it may be assumed that Karunagappally municipality and the neighboring gramapanchayats have more or less same net population density. The comparison of net population density with other municipalities is shown in figure 2.11. Karunagappally has the highest net population density. Ward wise data for census 2011 is not available and hence ward wise data analysis is carried out using data from census 2001. The ward wise distribution of density is shown in figure 2.12. Net population densities of wards near TS canal and also on both sides of NH 66 are found comparatively higher than other wards.

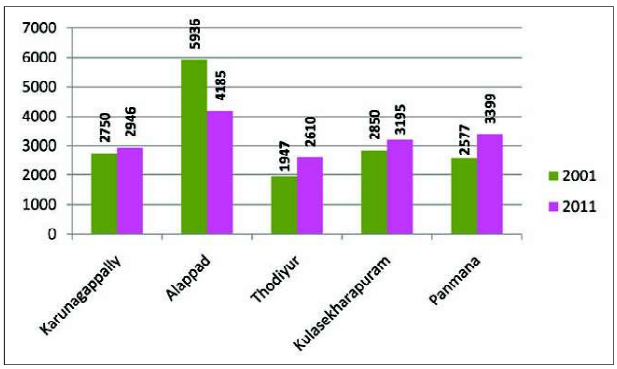


Fig 2.10. Comparison of net population density with nearby LSGs (census 2001 & 2011)

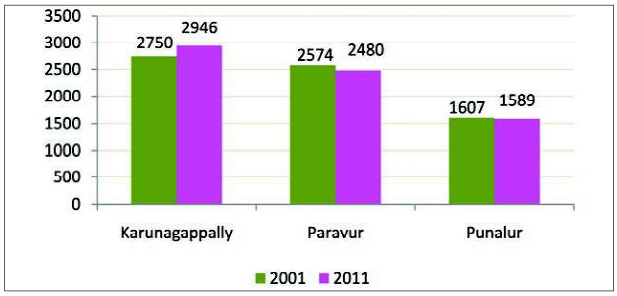


Fig 2.11. Comparison of net population density with other municipalities (census 2001 & 2011)

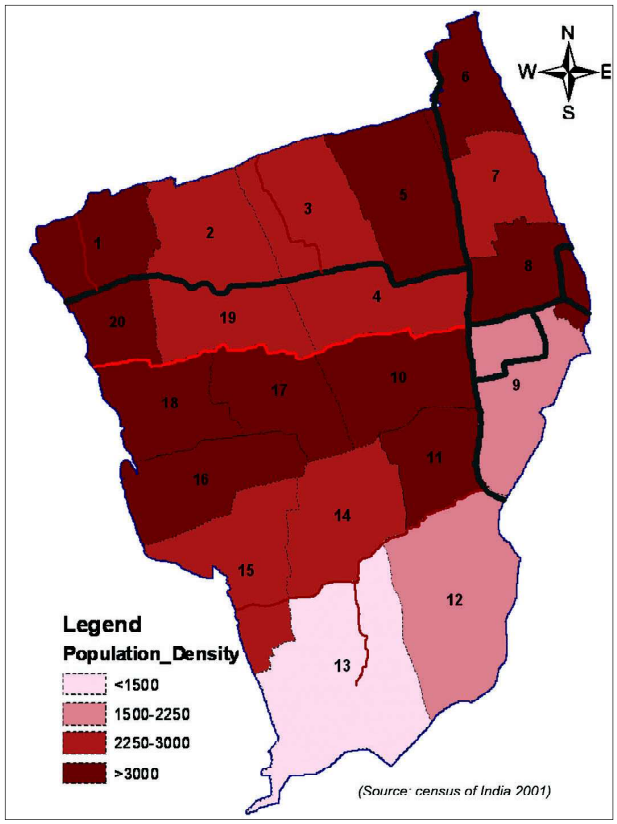


Fig. 2.12. Ward wise distribution of density (Source: census of India 2001)

2.2. SPATIAL DISTRIBUTION OF POPULATION

The distribution of ward wise population of Karunagapally Municipality is shown in figure 2.13. Wards 5, 10 and 17 have highest and wards 4, 7, 11 and 20 have lowest population size.

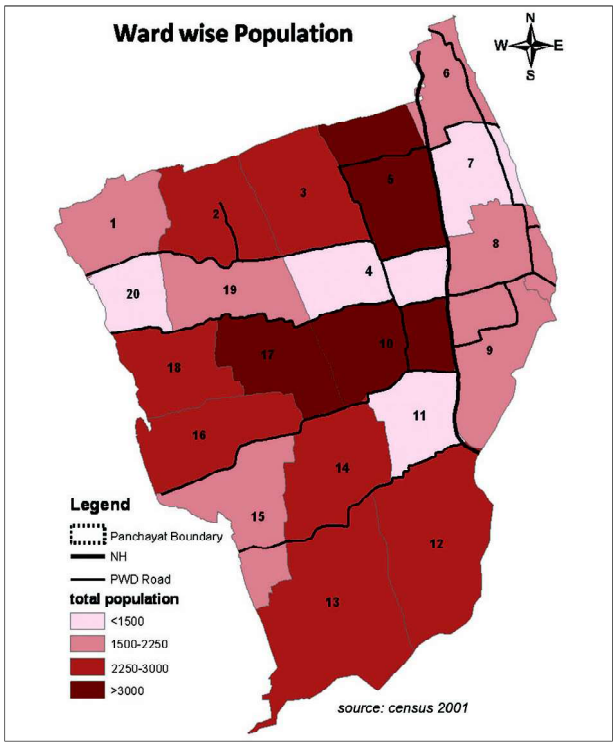


Fig 2.13. Ward wise distribution of population

2.3. AGE-SEX RATIO

The age sex ratio obtained from socio economic survey is shown in figure 2.14. The maximum percentage of male population is seen in age group 25-30 years and female in range 35-40. The maximum difference in percentage of male and female population is seen in age range of 0-5 years. In 0-5 age group the percentage of female population is more than that of male.

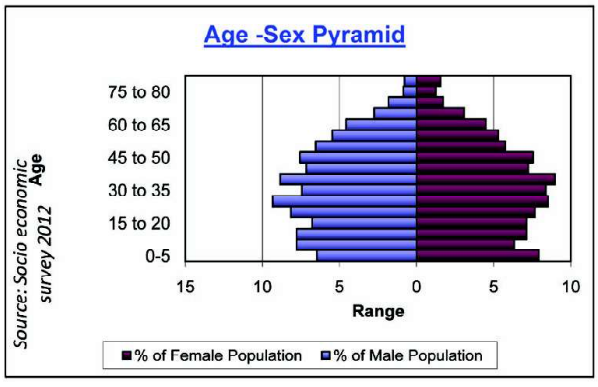


Fig 2.14. Age sex ratio

The sex ratio of Karunagappally is 1077. The comparison of sex ratio with Kollam District and Kerala is shown in figure 2.15. The comparison of sex ratio with other municipalities are shown in figure 2.16. The sex ratio of Karunagappally is low compared to other municipalities, Kollam District and Kerala.

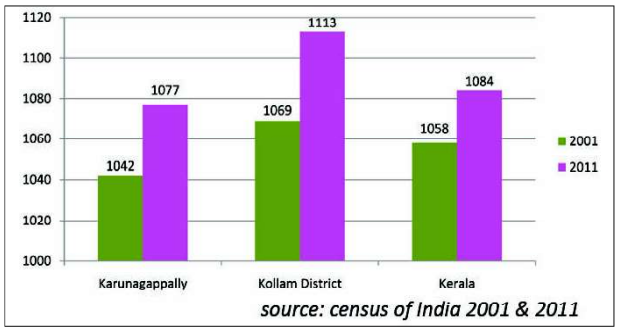


Fig 2.15. Sex Ratio Comparison with Kollam District and Kerala

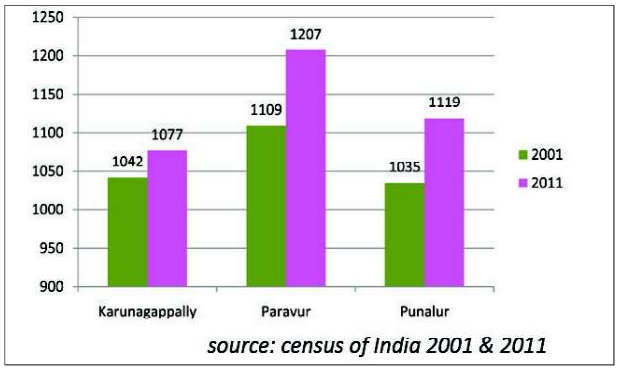


Fig 2.16. Sex Ratio Comparison with other municipalities

2.4. LITERACY

According to 2011 census, literacy rate of Karunagapally Municipality is 94.56 per cent which is higher than that of the district figure of 94.09 per cent. Out of the total population of 49604 persons, 42162 are literates. The female literacy rate of Karunagappally (92.67%) is higher than the corresponding district figure of 92.31%. Males have a higher literacy rate of 96.62%. The male literacy rate is also higher than the district average of 96.09%. Out of the total literates, 20599 are males and 21563 are females. In 2011 census, the literacy rate of male and female has improved. The literacy rate comparison with Kollam District and other municipalities are shown in figure 2.17.

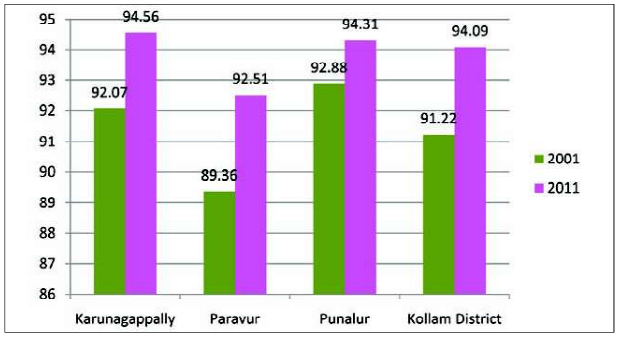


Fig 2.17. Comparison of literacy rate of Karunagappally with District and other municipalities

2.5. HOUSE HOLD SIZE

The average household size in 1981, 1991, 2001 and 2011 is 5.90, 5.20, 4.49 and 4.04 respectively. This is shown in figure 2.18. The household size is decreasing in the municipality.

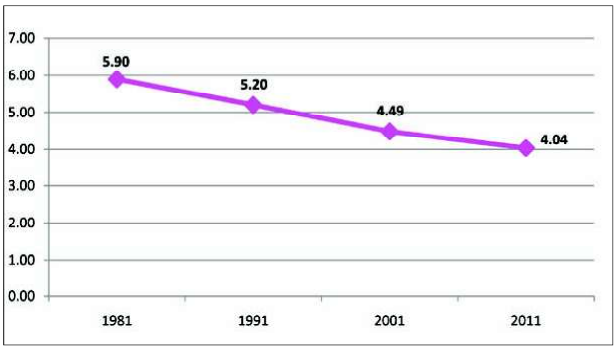


Fig 2.18. Variation of household size

2.6. INFERENCE

The population density and growth rate is very high when compared with the District and other municipalitiesin the district. The population growth rate of Karunagapally is declining. Karunagappally has the third highest growth rate when compared with neighbouring LSG's. Gross population density of Karunagappally (2660) is very high when compared with the District (1058) and other municipalities but lower than that of neighbouring LSG's (Except Thodiyur). Net population density of Karunagappally (2946) is higher when compared with the District and other municipalities in the district. However Karunagappally municipality and the surrounding LSG's have more or less same net population density. The sex ratio of Karunagappally is low compared to Kollam District and Kerala. Age – sex ratio obtained from Socio-economic survey reveals higher percentage of working population.

Growth rate of Karunagappally, Panmana and Alappad had decreased while Thodiyoor and Kulasekharapuram has increased. Availability of land at comparatively cheaper rate in Thodiyoor and kulasekharapuram may be the reason for high growth rate in Thodiyoor. The population is growing in the nearby local bodies. Growth of Panmana is restricted by the presence of water bodies to the South of the municipality. Hence it can be assumed that the net migration of population from Karunagappally is towards Thodiyoor and Kulasekharapuram. Population density of other municipalities is showing a decreasing trend as per 2011 census. Population density of Karunagappally, Kulasekharapuram, Thodiyoor and Panmana has increased. The steep increase in the value of land and higher living cost has forced ordinary people migrating to other local bodies.

Chapter 3
EMPLOYMENT

In the chapter the existing economic base of the municipality as per census 2001 and 2011 is studied.

3.1. WORKERS

According to 2011 census the number of workers in Karunagappally Municipality is 15609. The number of workers were 12180, 13805 and 15076 during 1981, 1991 and 2001 respectively. The number of workers is increasing in the municipality. The variation is shown in figure 3.1.

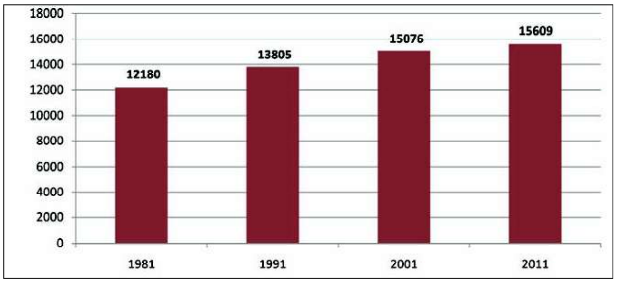


Fig 3.1. Variation in number of workers

3.2. WORK PARTICIPATION RATE

Out of the total population of 49604, 15609 are workers as per 2011 census. Hence Work Participation Rate (WPF) of the municipality is 31.47% which is comparatively low when compared with the WPF of the District (34.61%). The temporal variation of WPR is shown in figure 3.2.

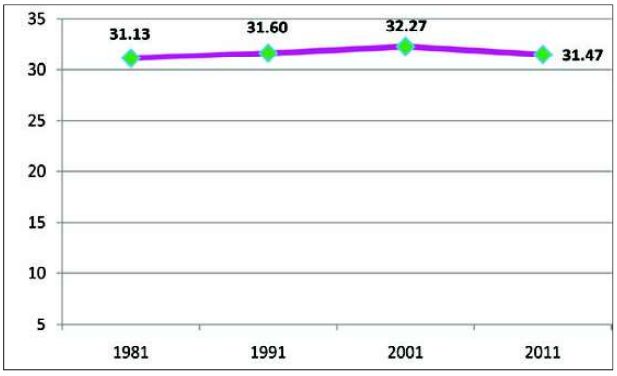


Fig. 3.2. The temporal variation of WPR (1981-2011)

The temporal variation of WPR of Karunagappally shows that it is in the range of 30-32% for the last 3 decades. Almost a consistent WPR value shows creation job opportunities at par with population growth. The comparison of WPR with other municipalities within the district and for the district is shown in figure 3.3. The WPR of Punalur has incresed from 28% to 32.17% while according to 2001 census Karunagappally had the highest WPR. But as per 2011 census Karunagappally has the second position among the urban LSGs.

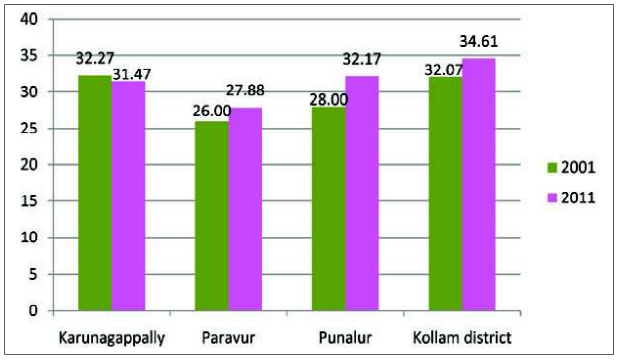


Fig. 3.3 Comparison of WPR with other municipalities and district

The comparison of WPR with nearby LSGs is shown in figure 3.4. Karunagappally stands in third position when compared to the surrounding LSGs. Alappad and Thodiyoor has the first and second position. There respective WPR has increased from 29% to 35.96% and 30.14% to 31.73 respectively.

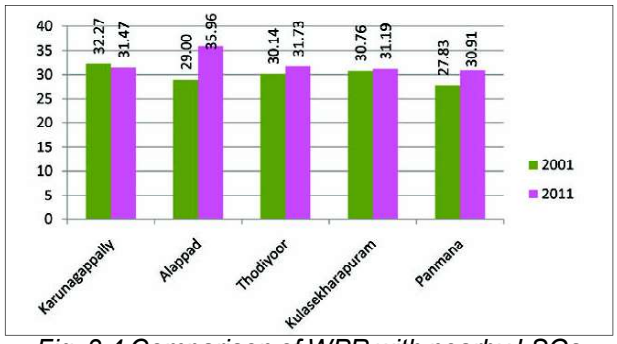


Fig. 3.4 Comparison of WPR with nearby LSGs

3.3. OCCUPATIONAL STRUCTURE

According to 2011 Census the workers are classified into two categories, main workers and marginal workers. The spatial distribution shows that majority of the agricultural land use is concentrated on the south western portion of the municipality the functional character shows that majority of the wards are semi – urban in nature, indicating that there is scope for promoting urban agriculture.The total workers constitute 31.47% of the total population of Karunagappally, of this 26.43% are main workers and 5.04% are marginal workers (Figure 3.5). The absolute

figures of main workers and marginal workers are 13108 and 2501 respectively. The main workers were 27.74% and marginal workers were 4.53% as per 2001 census. The main workers has decreased and marginal workers increased during 2001- 2011 period.

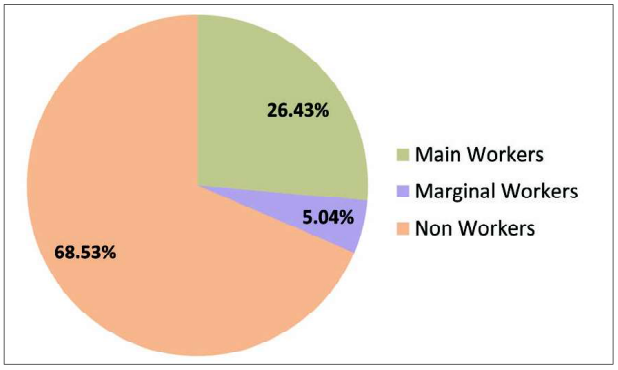


Fig. 3.5. Percentage of main workers, marginal workers and non workers (2011)

The variation of total workers and main workers is shown in figure 3.6. The total and main workers also had increased during the period 1981-2011.

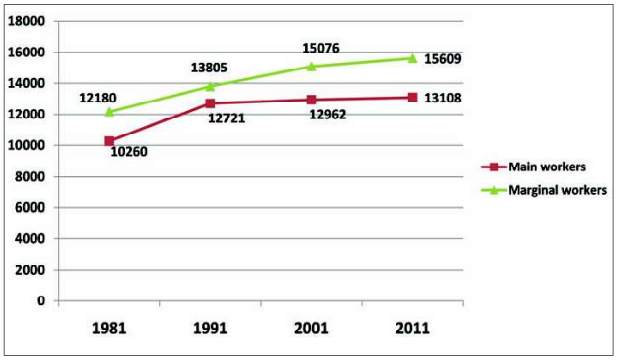


Fig. 3.6. Variation in number of workers (1981-2011)

The number of female workers is 3417 which constitute 21.89% of total workers. The total number of male workers is 12192 which constitute 78.11% of total workers. The percentage of women workers (21.89%) is less than the District average of 29.35%. Male workers has increased from 76.9% to 78.11% while female workers has decreased from 23.1% to 21.89% during 2001-2011. Population growth rate in declining, if the current trend continues an increase of only 2553 population is expected by 2031. The main workers are further classified into 4 categories namely cultivators, agricultural labourers, house hold industries and other workers. The details are shown in Table 3.1 and figure 3.7.

On examining the share of cultivators, agricultural labourers and household industrial workers in the

Type of labourers	Number	%
Cultivators	127	0.97
Agricultural Labourers	368	2.81
HH Industrial labourers	220	1.68
Other Workers	12393	94.54

Table 3.1. Number of workers

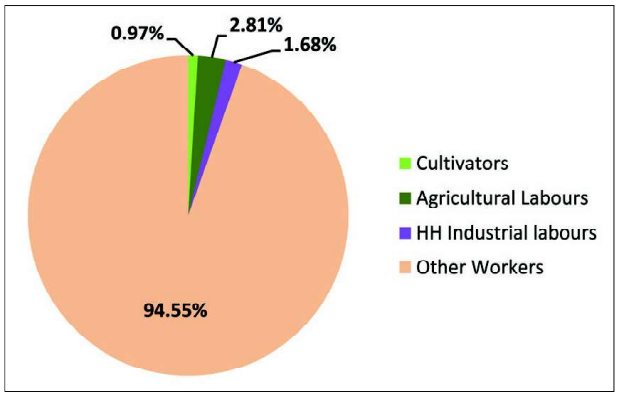


Fig. 3.7. Categorization of workers

workforce, further it can be understood that the cultivators constitute only 0.97% of the main workers and agricultural labourers constitute 2.81% of the main workers. Cultivators and agricultural labours have decreased from 2.97% to 0.97% and 5.61% to 2.81% respectively during 2001 to 2011. The district averages of the above two categories of workers are 5.96% and 8.15% respectively. Household industrial workers in Karunagappally constitute 1.68% of the workforce which is lower compared to the District figure of 1.99%. The occupational structure shows that more than 90% of the total workers engage in non-agricultural pursuits indicating a declining trend of primary sector. Indicating that the agriculture land is either unutilized or utilized for other purposes. From the environmental point of view agricultural land should be put to optimum use.

3.3.1. SPATIAL DISTRIBUTION OF WORKERS

Wardwise data for 2011 census is not available and hence the analysis is done with 2001 census data. The spatial distribution of cultivators in Karunagappally Municipality shows that they are concentrated in wards 1, 3, 10, 11, 12, 14, 15, 16, 19,(See fig 3.8) (census 2001 wards). The agricultural workers are concentrated in wards 3, 5, 9, 10, 11 and 17 (census 2001 wards) of the Municipality (fig 3.9). The concentration of both cultivators and agricultural labourers are seen in 3, 10, 11 (census 2001) wards of the Municipality. The household industrial workers are concentrated in wards 1, 8, 12, 13, 15 and 17

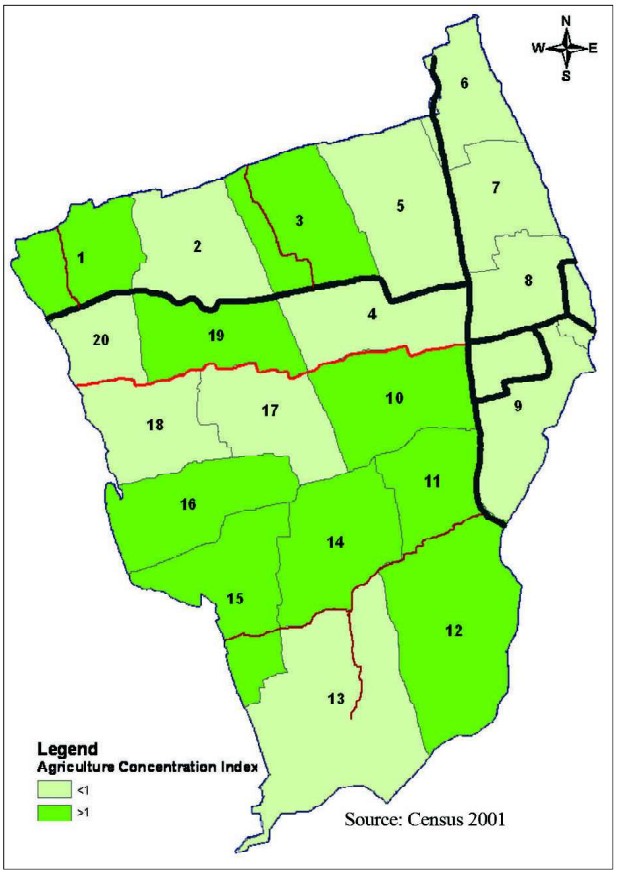


Fig. 3.8. Ward wise distributions of cultivators

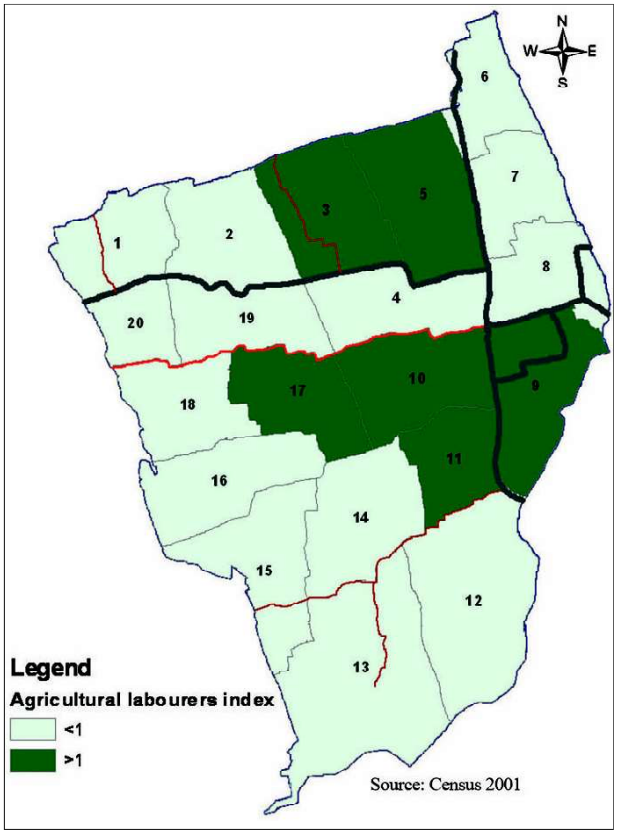


Fig. 3.9. Ward wise distributions of agricultural workers

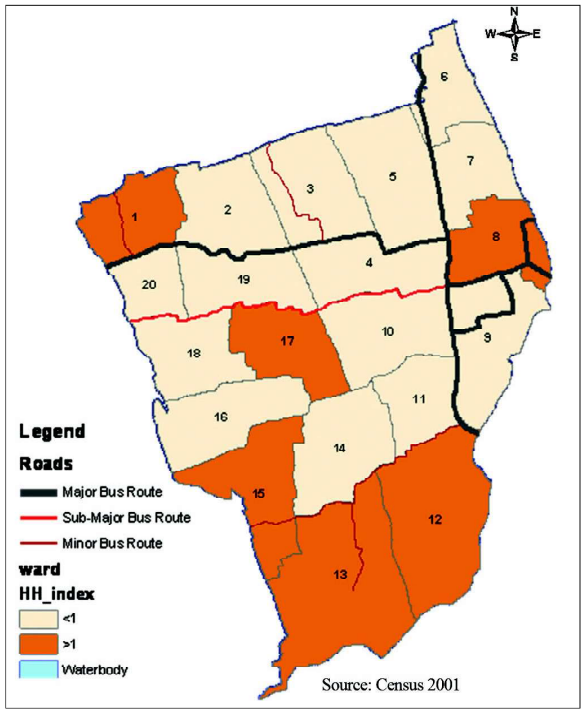


Fig. 3.10. Ward wise distributions of house hold industrial workers (source: census 2001)

(census 2001 wards) of the municipality (fig 3.10).

3.3.2. OCCUPATIONAL STRUCTURE – TEMPORAL VARIATION

The number of various categories of workers from 1981 to 2011 in the municipality is shown in the table 3.2. The number of cultivators increased from 1981 to 1991 and then drastically declined. The number of agricultural labourers and HH Industrial labourers decreased drastically from 1981 to 2011, whereas the number of other workers has increased constantly from 1981 to 2011. This is a clear indication of the weakening of the primary sector in the Municipality. Analysis of the composition of workers in 1981 % in 2011 shows that those involved in agriculture sector (agriculture labours and cultivators) has declined to 3.78% from 26.65%, whereas the other workers category has increased to 94.54% from 60.66%. (Fig. 3.11).

The socio-economic data shows that 19.42% of the total workers engaged in construction industry, 15.57% are employed in government service, 14.16% are working abroad, 7.18% are drivers. About 6% of

Workers	1981	1991	2001	2011
Cultivators	457	555	226	127
Agricultural Labourers	2278	1806	426	368
HH Industrial Labourers	1301	532	724	220
Other workers	6224	9828	11586	12393

Table 3.2 Temporal variation of workers

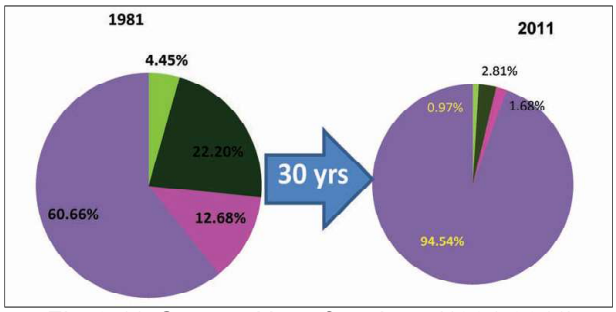


Fig. 3.11. Composition of workers (1981-2011)

the total workers are engaged in conventional fisheries sector as per the socio economic data. The workers data shows the shift in economic base of the Municipality from coir workers, handloom workers, agriculture labours is to service sector employment (Fig. 3.12).

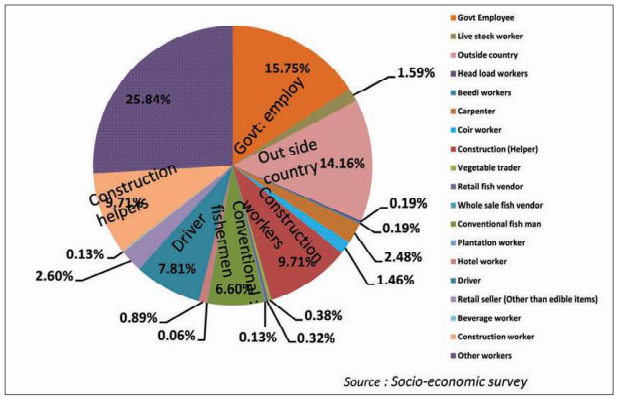


Fig. 3.12. Classification of workers

During 2001 to 2011, female working population, cultivators, agricultural labours and household industrial labours has decreased while other workers has increased from 81.38% to 94.55%. Population growth rate of the neighboring LSG's shows that Thodiyur and Kulasekharapuram has highest growth rate. It can be assumed that inhabitants are migrating to Thodiyur and Kulasekharapuram. The variation of categories of workers is shown in figure 3.13.

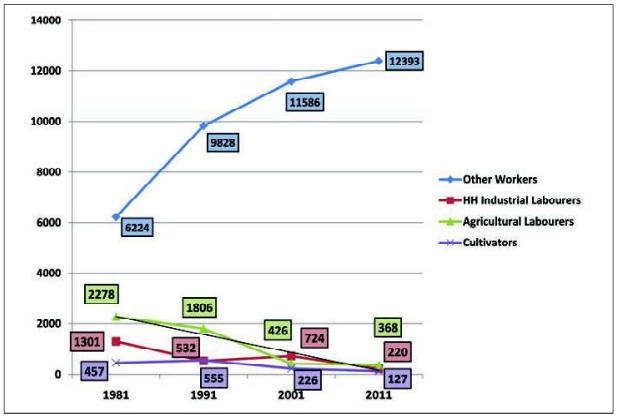


Fig 3.13. Temporal variation of workers

3.4. INFERENCE

- From the analysis it is observed that the WPR in karunagapally is 31.47%, the value is below 40%, which is preferred for a balanced economy.
- Analyzing the occupational structure, it is seen that share of main workers is high which will aid the overall development.
- The share of marginal workers is comparatively low. In general the rate of increase of main workers is less than that of marginal workers. the rate of increase of main workers and marginal workers has decreased from 2001 to 2011.
- The share of women workers is less when compared to the district average, the value of which is to be increased.
- Analysis also shows a drastic decline in the share of primary sector employees (cultivators and agricultural labourers), which together constitute only 3.78% of the total workers.
- The percentage of household industrial workers also declined from 12.68% in 1981 to 1.68% in 2011.
- When the shares of cultivators, agricultural labourers and house hold industrial workers are declining, the share of other workers are increasing at very high pace from 51.10% in 1981 to 79.40% in 2011.
- This major shift in employment pattern shows a lack of interest towards the primary sector, due to the reduced output from those sectors.
- Hence the main objective is to increase the WPR up to 40% mark gradually, especially by increasing the number of women workers and also by maintaining the main – marginal workers ratio. Another objective is strengthen and attract more workers towards traditional industries sector like Coir and Handloom.
- Fisheries is an economic sector of the Municipality, though in a moderate way, exemplified by the presense of 6.6% of total workers engaged in conventional fisheries sector.

Chapter 4

LAND USE

4.1. GENERAL ANALYSIS OF LAND USE

The land use can be divided into different categories namely residential, commercial, industrial, public & Semi-public, agricultural, park & open space, transportation, water bodies. The extent of different land use, its percentage and percentage of land use based on total habitable area of Karunagapally Municipality is given table 4.1.

Land use	Residential	Commercial	Industrial	Public & Semi-public	Agricultural	Park & Open space	Transportation	Water Bodies	Others	Total
Extend in Sq.km	13.97	0.27	0.02	0.39	1.49	0.09	0.47	1.15	0.23	18.09
Percentage of land use	77.2	1.51	0.14	2.18	8.25	0.51	2.58	6.36	1.27	100
Percentage of land use based on total habitable area (ie,Excluding water body area)	83.32	1.6	0.15	2.36	8.91	0.86	2.8			

Table 4.1. Land use in Karunagapally Municipality

The land use break up of Karunagapally Municipality is shown in figure 4.1. From the above figure it can be seen that the major land use of Karunagapally Municipality is Residential. About 77.20% of total area of the municipality comes under residential land use. Second comes agricultural land use with about 8.25% of total area of the municipality. The water body constitute 6.36% of the total area. The land use map of Karunagapally Municipality is shown in figure 4.2 (a), land use map over laid on satellite imagery (Google Earth Map) is shown in figure 4.2 (b) and the ward wise land use breakup is shown in figure 4.3.

The extent of different land use of each ward is table 4.2.

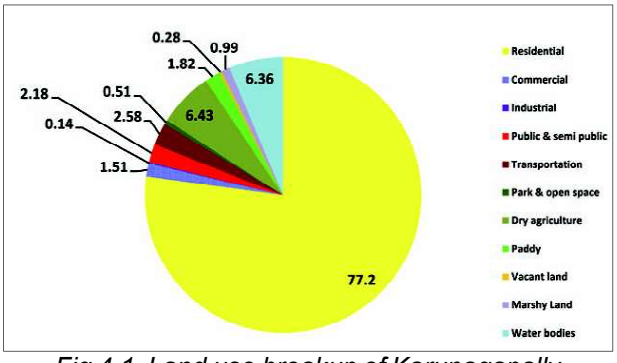


Fig 4.1. Land use breakup of Karunagapally Municipality

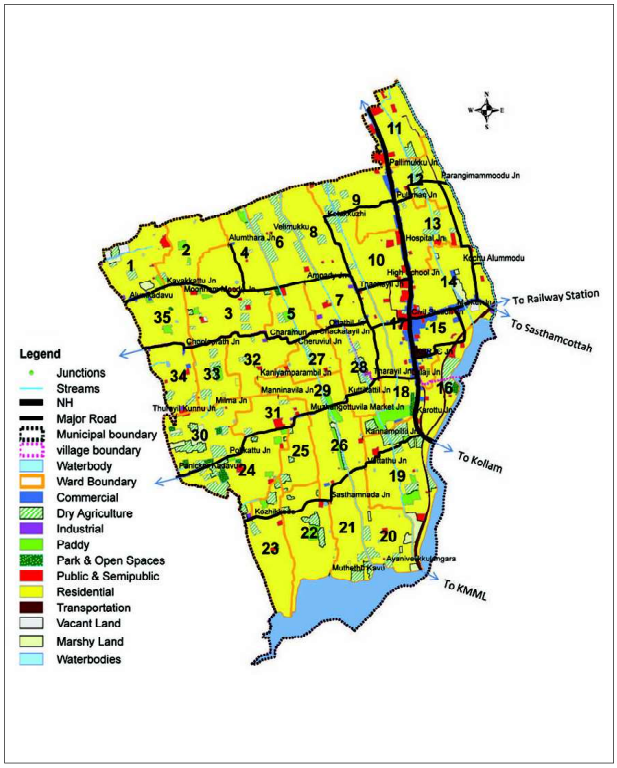


Fig 4.2 (a). Land Use Map of Karunagapally Municipal Town in 2012

4.1.1. RESIDENTIAL LAND USE

The concentration indices of residential land use of the wards of the Municipality are shown in figure 4.4.



Fig 4.2 (b). Land Use Map over laid on Google Earth

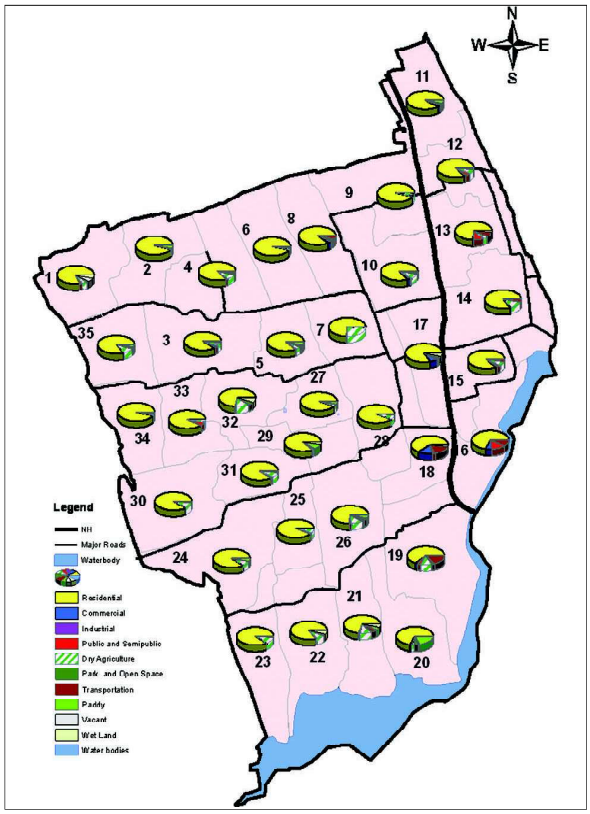


Fig 4.3. Ward wise land use breakup

From the figure the residential land use is concentrated in wards 1, 2, 3, 4, 5, 7, 8, 9, 10, 13, 20, 21, 22, 23, 25, 26, 27, 28, 29, 31, 32, 33, 34, and 35.

The comparison of the percentage of residential land use based on total area with other urban LSGs is shown in figure 4.5. Figure shows that Karunagappally has the highest percentage of residential land use at par that of Kollam Corporation, showing the urban character of Karunagappally Municipality.

Figure 4.6 shows the comparison of the percentage of residential land use based on total area with nearby LSGs. Karunagappally stands in the second position

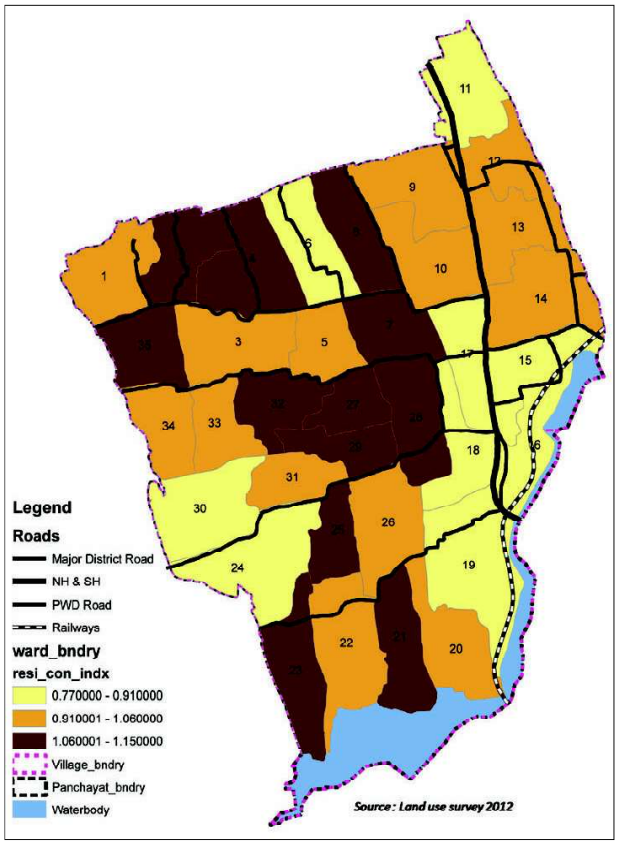


Fig 4.4. Concentration Index of Residential land use in Karunagappally Municipality

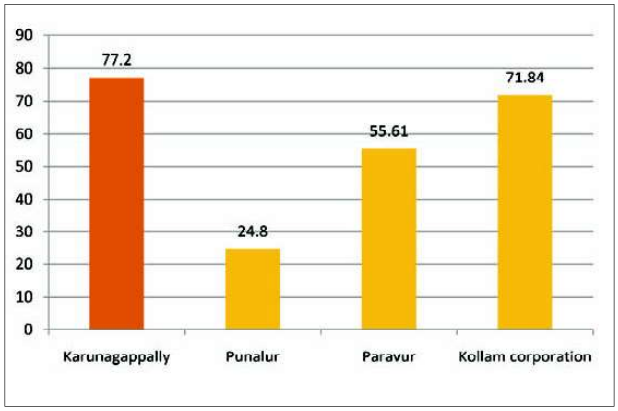


Fig 4.5. Percentage of Residential land use based on total area - Comparison with other urban LSGs

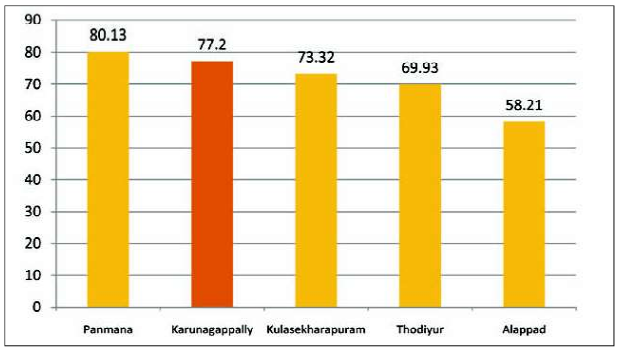


Fig 4.6. Percentage of Residential land use based on total area - Comparison with nearby LSGs

Ward no.	Residential	Commercial	Industrial	Public	Agricultural	Park & Open Space	Transportation	Water bodies	Vacant Land	Others
1	0.4018	0.0052	0.0032	0.0156	0.0373	0.0008	0.003	0.0011	0.0263	0.023
2	0.4263	0.0026	0	0.0011	0.0224	0	0.0018	0.0007	0	0
3	0.5038	0.0018	0.0002	0.0135	0.0601	0	0.014	0	0.002	0
4	0.5786	0.0013	0	0.0048	0.0195	0	0.0047	0.0013	0	0
5	0.2872	0.0005	0	0.006	0.0284	0.0059	0.0074	0	0	0
6	0.3674	0	0	0.0058	0.1313	0	0.0022	0	0	0
7	0.3844	0.0123	0.0064	0.0099	0.0035	0	0.0151	0	0	0
8	0.4404	0.0007	0	0.002	0.0225	0	0.0022	0	0	0
9	0.4868	0.024	0	0.0068	0.0509	0	0.0133	0	0	0
10	0.4685	0.0105	0	0.0272	0.0333	0	0.0126	0	0	0
11	0.3694	0.0049	0	0.0558	0.0197	0	0.0318	0	0.0107	0
12	0.2928	0.0054	0	0.0022	0.0456	0	0.0134	0	0	0
13	0.4526	0.0102	0	0.0188	0.0266	0.0019	0.0151	0	0.0021	0
14	0.5317	0.036	0	0.0235	0	0	0.03	0.0008	0	0.04
15	0.2866	0.0726	0.0029	0.0146	0	0.0022	0.0626	0	0.0104	0
16	0.2683	0.0085	0	0.0165	0.0578	0.0133	0.0592	0	0	0
17	0.2787	0.0336	0	0.0588	0.0019	0	0.0302	0.0001	0	0
18	0.2787	0.0077	0	0	0.0919	0.0175	0.0143	0	0	0
19	0.6043	0	0	0.0184	0.1568	0	0.0444	0.005	0	0.032
20	0.4408	0	0.0004	0.0056	0.046	0	0.0084	0.0009	0	0.0276
21	0.3935	0	0	0.0016	0.0474	0	0.0032	0	0	0
22	0.5513	0	0	0.005	0.0711	0	0.0051	0.0028	0	0
23	0.5047	0.0024	0	0.0077	0.0438	0.0029	0.0036	0	0	0
24	0.4802	0.0023	0.0038	0.0159	0.1085	0.0205	0.0079	0.0005	0	0
25	0.2825	0.0022	0	0	0.0223	0	0.0011	0	0	0
26	0.4597	0.0047	0	0.0057	0.0492	0	0.0074	0.001	0	0.0155
27	0.2704	0.0001	0.0002	0.0058	0.0256	0	0.0029	0.001	0	0
28	0.4611	0.0006	0	0.0011	0.0486	0	0.0089	0	0	0
29	0.2875	0.0011	0	0	0.0204	0	0.0028	0	0	0
30	0.4527	0.0018	0	0.0063	0.0952	0.0236	0.0061	0.0008	0	0.0406
31	0.2659	0.002	0.0012	0.0182	0.0131	0	0.0053	0	0	0
32	0.3954	0.0013	0.0019	0.0032	0.0075	0	0.0081	0	0	0
33	0.2874	0.001	0	0.0016	0.0471	0	0.0039	0.0009	0	0
34	0.3311	0.0064	0.0033	0.0135	0.0195	0	0.0043	0.0024	0	0
35	0.3944	0.0064	0.0014	0.0024	0.0181	0.0037	0.0097	0.0007	0	0

Table 4.2. Ward wise land use in sq.km

next to Panmana Gramapanchayat.

The table shows that agricultural land use is relatively higher in wards 3, 9, 16, 18, 22 and 30, and commercial land use is relatively higher in wards 9, 10, 13, 14, 15 and 17.

4.1.2. COMMERCIAL LAND USE

The area under trade and commercial land use is

27 Ha which is 1.5% of the total land area of the Municipality. This indicates the importance of commercial sector in the economy of Municipality. Figure 4.7 shows the concentration indices of commercial land use of different wards of the municipality. Ward number 15 and 17 shows the highest concentration of Commercial land use. Second highest concentration shows in ward no. 7, 9, 10, 12, 13, 14, 16, 18, 34 and 35. All these are adjacent wards excepts wards 34 and 35. NH has heavy concentration of commercial activities on either side.

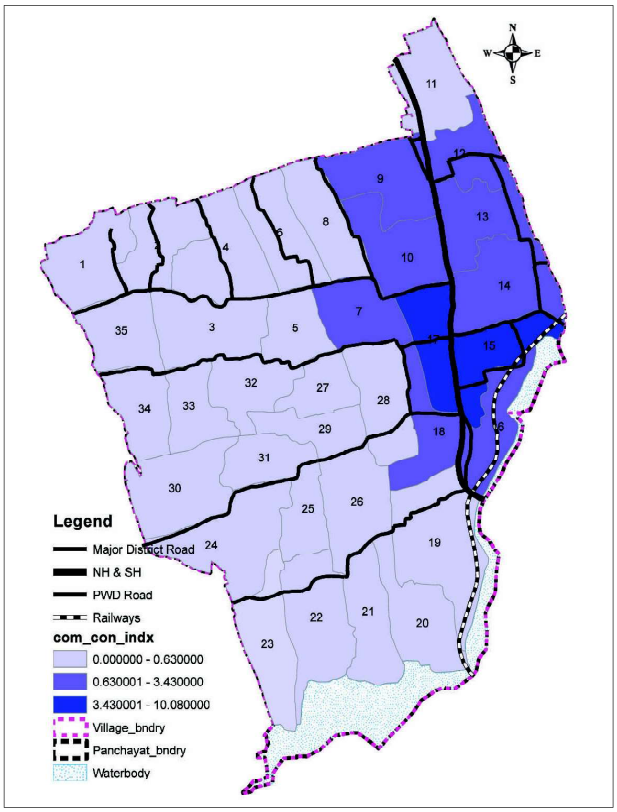


Fig. 4.7. Concentration index of Commercial land use

4.1.3. INDUSTRIAL

There are only very few industries in Karunagappally. The highest concentration is noted in Ward No.7.

4.1.4. PUBLIC & SEMI PUBLIC

The maximum concentration of public and semi public land use is seen along the sides of NH. The concentration index of public and semi public land use is shown in figure 4.8.

4.1.5. PARK AND OPEN SPACES

The concentration of Park and open space is highest in wards 16, 18, 30, and 24. There are few open spaces in the above wards. There are no parks in the municipality.

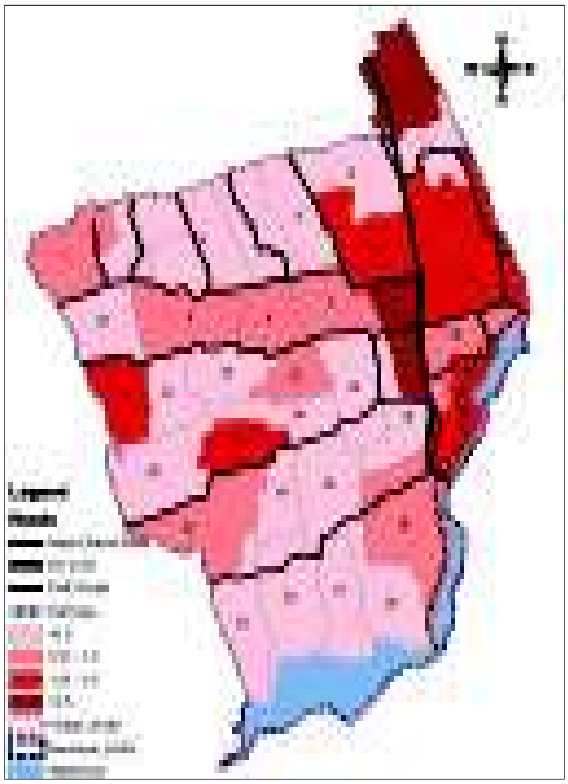


Fig. 4.8. Concentration index of Public & Semi Public land use

4.1.6. TRANSPORTATION

The concentration index of transportation land use is greater than 1 in wards 11, 15, 16 and 17. Municipality has a grid – iron pattern of road network with a few north – south links and large number of east – west links. Major north – south link in the NH 66 which passes through the centre of Karunagappally town. Civil station – Sasthamkotta road is one of the major east west road as it connects major towns in Kollam district such as Sasthamkotta, Bharanikavu and Adoor. Major traffic generators are KSRTC station, civil station, Padanayar Kulangara temple, Police station, municipal office, schools, public offices and municipal market.

4.1.7. AGRICULTURAL LAND USE

The area under agriculture is also 8.2%, which shows that agriculture is not a economic base of the Municipality. Figure 4.9 shows the concentration indices of agricultural land use of different wards of the municipality. The agricultural land use is more concentrated in the ward number 6. Also the wards 18, 19, 24 and 30 have concentration index between 1 and 2.

The comparison of the percentage of agricultural land use based on total area with other urban LSGs

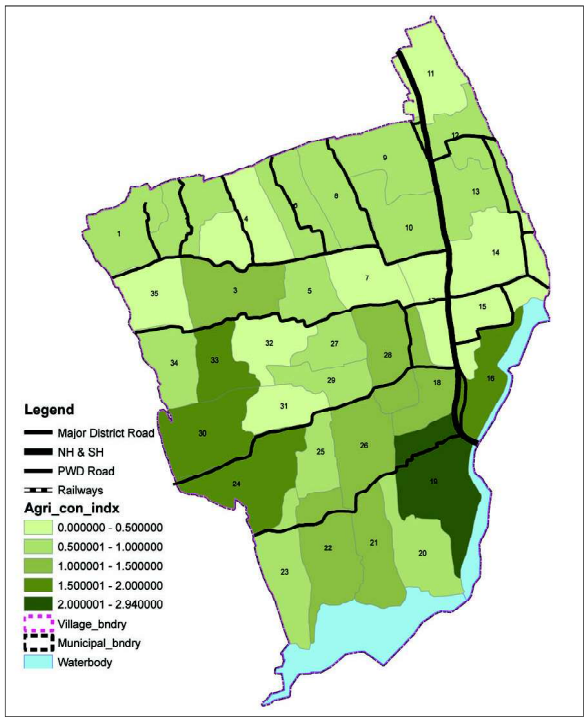


Fig. 4.9. Concentration index of Agricultural land use

and nearby LSGs is shown in figures 4.10 and 4.11 respectively. In both the cases Karunagappally has the lowest percentage when compared to Kollam Corporation and Alappad panchayat.

4.2. FUNCTIONAL CHARACTER OFWARDS

The settlement pattern in Kerala is scattered homesteads with rural-urban-continuum. Residential

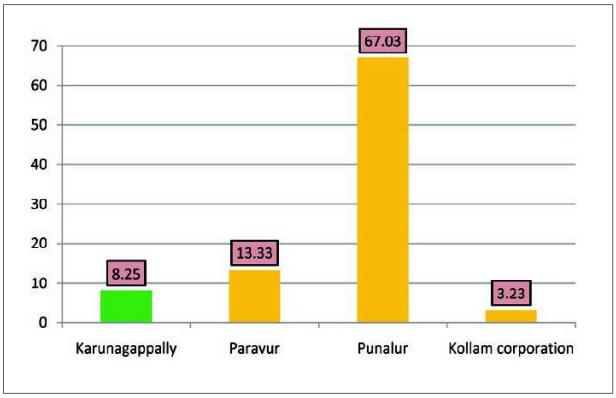


Fig 4.10. Percentage of Agricultural land use based on total area - Comparison with other urban LSGs

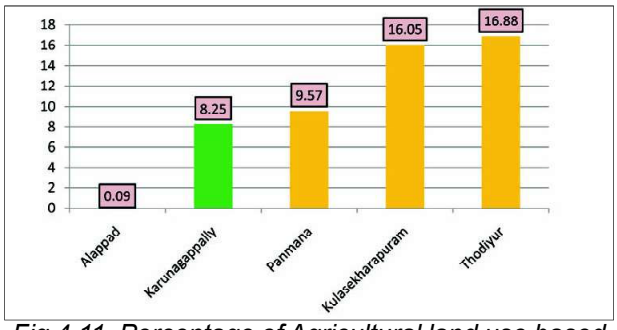


Fig 4.11. Percentage of Agricultural land use based on total area - Comparison with nearby LSGs

buildings are seen in almost all areas except paddy fields, plantations, forests, backwaters etc.

The functional character of an area is determined by the economic activity which can be brought into that area, based on the average size of land holdings in the area.

Based on the per capita availability of land holdings the functional character of any settlement of Kerala can be classified into four (Table 4.3).

The ward wise analysis of Karunagapally Municipality shows that the residential areas of most of the wards in the Municipality fall in the fully residential category.

Character of a ward of any local body may be rural, semi rural, semi urban or urban based on the existing land use and character of the mixed land use area available in that ward. This is detailed below. The character of an area can be termed as urban.

1. If the pucca urban land use (not taking in to account the classification of mixed land use) is more than or equal to 25% of the total area, then the area can be termed as an urban area. (The analysis of the land use of various urban LSGs and the share of various land uses of an urban area as specified in the UDPFI guide lines show that an urban area is having a residential land use of the same percentage as that of pucca urban land use (commercial, industrial, public and semi public etc). This is actually the residential land

Average size of land holdings in residential area	Categorization of residential area	Functional character
Below 25 cents	Fully residential area	Urban character
25-50 Cents	Agriculture cum residential area	Semi urban character
50-70 Cents	Agricultural activity is predominant with residential area	Semi rural character
Above 70 Cents	Fully agricultural land with residential area	Fully rural character

Table 4.3. Functional Character based on average size of land holdings

use attached to the urban land use. So if the pucca urban land use is 25% then by adding the residential share of 25% the total urban land use share becomes 50%)

2. The urban land use share, taking in to account the classification of mixed land use also, is greater than or equal to 50% of the total area of a region then the area can be termed as urban.

The character of an area can be termed as rural

1. If the pucca rural land use share is more than 50% it is rural area.
2. If the rural land use share, taking into account, both pucca rural lan d use and the classification of mixed land use, is greater than or equal to 50% of the total area, then it can be termed as a rural area.

The character of an area can be termed as semi urban.

1. If the mixed land use area is classified as semi urban and the sum of urban land use share and semi urban residential land use is greater than or equal to 50% of the total area.

The character of an area can be termed as semi rural.

1. If the mixed land use area is classified as semi rural area and the sum of rural land use share and semi rural - mixed land use, land use is greater than or equal to 50% of the total area.
2. If the pucca rural land use share is at least 1/3rd of the total area and the mixed land use is not urban or semi urban, then also the area can be termed as semi rural area (this condition is included after practical verification).

The functional character of entire wards in the municipality is determined using the above methodology as per 2001 census and 2005 land use is shown in figure 4.12 (A) and based on 2012 land use and socio economic survey 2012 is shown in figure 4.12 (B)

From the figure 4.12(A) it is evident that majority of wards in the municipality are categorized as semi urban which indicates that tertiary activities are suitable in this area. Ward 6 is classified as urban ward and indicates only urban activities are suitable in this area.

From the figure 4.12(B) it is clear that majority of wards in the planning area are categorized as urban which indicate that only urban activities are suitable in this area. Sixteen wards are classified as semi urban wards. Urban character is found along the sides of major roads and along NH. Non-agricultural activities can be promoted in urban areas and both urban and urban agricultural activities can be promoted in semi urban areas.

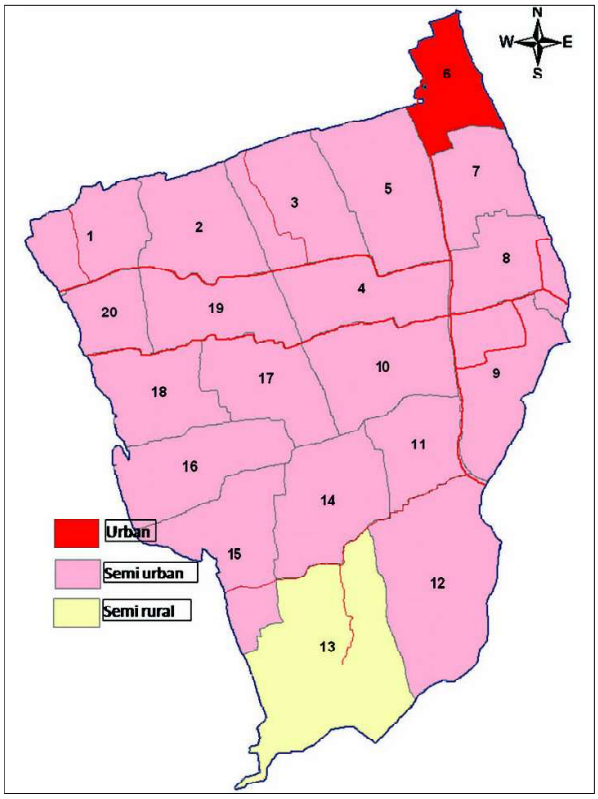


Fig 4.12 (A). Functional character of wards of Karunagapally Municipality (census 2001, Land use 2005)

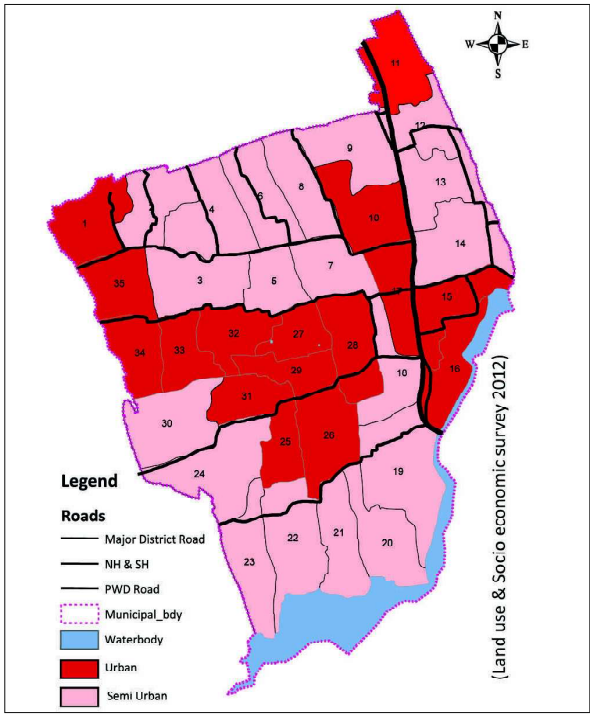


Fig 4.12 (B). Functional character of wards

(Land use & Socio economic survey 2012)

4.3. INFERENCE

- Majority (77.2 %) of the total area is used for residential purposes.
- More than 6% of the total area is covered by environmentally sensitive water bodies
- The area under trade and commerce is about 27Hectare which is 1.51% of the total land area. The CBD is civil station jn and market jn.
- Commercial activities are concentrated mainly along the sides of NH and along Karunagappally-Shasthamcotta road
- Industries occupy very small area of 2 hectare which is only 0.14% of total land area
- Comparing industrial(0.14%) & commercial land uses(1.51%), it is seen that land under commercial land use is higher, indicating domination of tertiary sector over secondary sector
- The area under agricultural land use is 149 hectare which is 8.25% of the total area Dry agriculture constitute 6.43% of total area. Paddy fields constitute 1.82% of total area
- More than 90% of the total workers engaging in non-agricultural pursuits indicates that agricultural land is either unutilized or utilized for other purposes.
- Residential land use is increasing at the cost of vacant land & paddy fields
- When compared with other municipalities in the district it is seen that Karunagappally has higher share of commercial activities and lowest share of industrial & agricultural activities
- When compared with other municipalities in the state -share of commercial activities are more or less the same and lowest share of industrial & agricultural activities.

Chapter 5
INDUSTRIES

5.1. EXISTING INDUSTRIAL BASE

Karunagappally has a very poor industrial base. Out of the total area of 18.65 km^2 only 0.14% is under industrial land use. The concentration index of industrial land use is shown in figure 5.1. The highest concentration is seen in ward numbers 7.

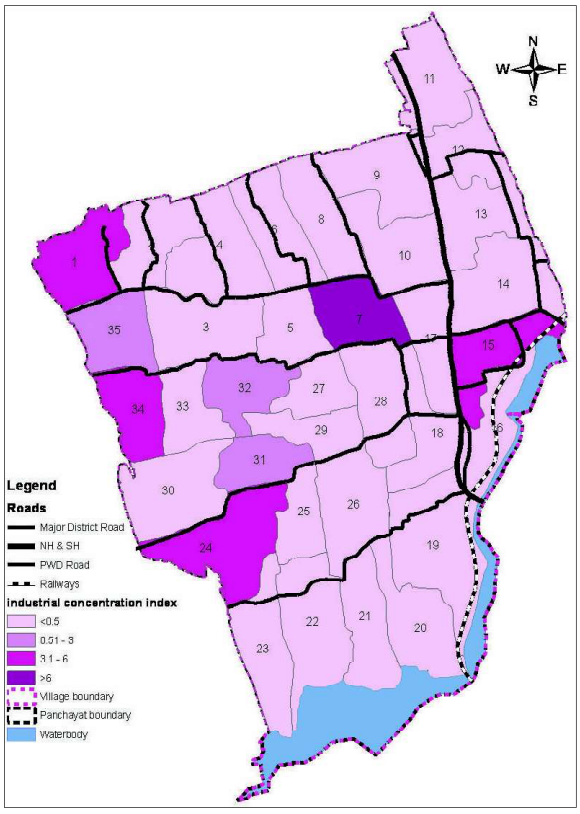


Fig 5.1. Concentration index of industrial land use

5.2 . INDUSTRIAL PRODUCTION

According to the secondary data, there are 2 small scale industries, 92 micro level industries, 9 traditional industries and 2 construction industry. List of small scale industries, micro level industries, traditional industries and construction industries in Karunagappally Municipality are shown in tables 5.1, 5.2, 5.3 and 5.4. Out of the nine traditional industries coir industry is the leading one. Comparison of production of coir industries and handloom industries in last 5 years is shown in figure 5.2 & 5.3. From figure it is seen that quantity of production is decreasing from the year 2010. The details of small scale industries, micro level industries, traditional industries and construction industries are given in following tables.

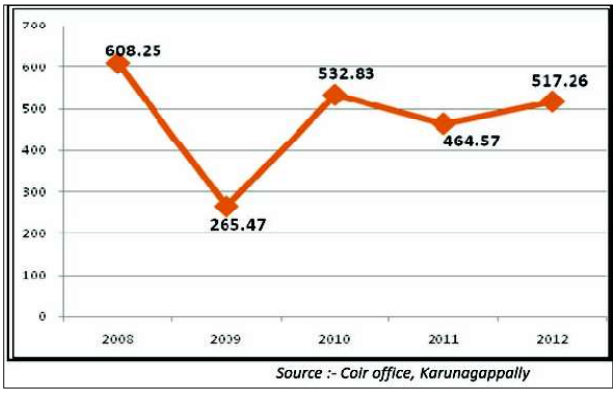


Fig 5.2 Comparison of production of coir industries in last 5 financial years (in tons)

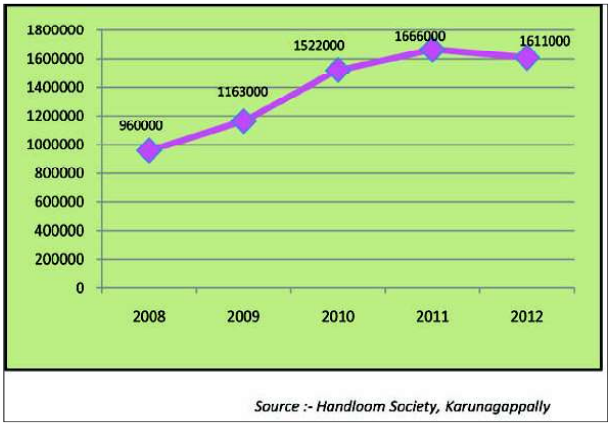


Fig 5.3.Comparison of production of handloom industries in last 5 financial years

Name of Industry	Engineering	Building Materials	No of employees
Palappallil Agencies		✓	8
Fakan Software Centre	✓		8

Table 5.1. Details of small scale industries



Lime shell industry at Dharmapuram

Name of Industry	Agro based	Rubber based	Cement based	Plastic based	Forest based	Animal Husbandry	Textiles	Chemical	Engineering	Electronics	Minerals	Building Materials	Others	No of employees
M/s Dhruwa Engineering & Constructions Karunagappally Kollam.									✓					5
Gate Way System&Electronics'										✓				5
Choice Engineering Works													✓	4
Kannan Industries									✓					8
Nizar Furniture Mart					✓									6
K.G.R Products													✓	7
K.M.K Saw Mills					✓									6
We One Offset Printers													✓	2
M/S Omni Wood Creations					✓									4
We One Photostate													✓	2
M/s Pournami Enterprises													✓	4
Suma Garments							✓							5
Rekha Engineering Works									✓					4
Bright Electronics										✓				4
Mohana Furniture Industries					✓									4
Palappillil Industries					✓									10
Socoal Printers													✓	11
A.R. Industries													✓	5
M/S. Saniya Fashion Stiching Centre Karunagappally P.O Kollam 690518							✓							13
Mini Industrial Estate													✓	8
Sangeeth Electronics										✓				3
Baburaj Wood Works					✓									6
Shameer Furniture Mart					✓									11
S.V. Market													✓	2
Sree Rag Vedie Lab										✓				3
Gulf Engineering Works									✓					4
Zoom Graphics										✓				3
Devapriya Industriees									✓					4
Ramod Industries									✓					4
Variety Engineering Works									✓					4
The Christ Bakery	✓													8
Soonus Energy Centre													✓	3
Kochayyathu Ice Plant Alappad													✓	5
Kannettil Ayurveda Pharma	✓													8
We Are Automobiles									✓					6
Aswitha Wood Works&Engineering Door No.Ii/239(Viii 1040) Karunagapally Pt					✓									6
Saran Furniture					✓									4
Pournami Industries									✓					4
Dershan Industries									✓					4
Vishnu Lekshmi Hollow Bricks			✓											6

Bokhadu Industries									✓					4
M/Ssreedevi Food Industries Door No. Ii/113 Of Karunagappally Pt	✓													4
Vighnesh Mineral Industries Door No. X/616 A (X/144 New)Karunagappally Pt											✓			7
Ravis Interior Door No. Viii/255 Of Karunagappally Pt													✓	5
Hi Tech Diesel Work													✓	3
Keerthi Cement Works			✓											6
Kayal Manjam													✓	6
Sneha Furniture Works Door No. Xiii/790 Of Karunagappally Pt				✓										4
Chamavilayil Furniture Industries					✓									4
Panayara Garments							✓							10
Sapthaswara Digital Recording studio										✓				3
Modish Furniture Works					✓									4
La Rubia Industries									✓					7
Hi-Tech Nozzils													✓	3
Kottumgal Chem Plast				✓										5
Swedesh Foods	✓													6
Sherli Industries													✓	4
Swal Flex										✓				4
Manu Bakers	✓													3
Ideal Manufacturing & Marketing Associates													✓	4
Jyothis Electronics										✓				2
Indigon Informatics													✓	17
Sabari Furniture Manufactures					✓									6
Cardoz Saw Mills					✓									4
Social Flex Printers										✓				3
Thirumenees Pickles	✓													7
Creative Graphics										✓				3
Sivas Book Manufacturing Unit													✓	1
Better Taste	✓													3
Keerthi Rice Mill	✓													3
Sree Vinayaka Industries													✓	3
Bharath Bakery	✓													5
Chakkalayil Plastic Printers										✓				7
Three Star Welding Works									✓					2
Sharon Garments							✓							3
Karunagappally Gramodharana Sanghom No-151/93													✓	2
Alpha Engieering Works									✓					4
Karthika Foods	✓													6
Sree Vinayaka Engineering Works									✓					3
R K Gold Dye Works													✓	4
Baburaj Wood Works					✓									4
Pathumuthu Enterprises													✓	9
Siva Ayurveda Pharmaceutical	✓													8
Star Structals Engineers									✓					3
Popular Engineering Works									✓					3

J D Power										✓				8
Wafer Systems										✓				3
Sun Electronics										✓				5
Lekshmi Industries													✓	3
Sangeeth Electronics										✓				2
Signage Digital Printers										✓				7
Nandana Dye Works													✓	2

Table 5.2. Details of micro level industries

Name of Ward/Place	Name of Industry	Type of Traditional Industry	Qty of Produce/Year (specify unit)	No. of workers	
				Members	Actual Workers
Ayanivelikulangara	CVCS ltd No.497	Primary Coir Cooperative Society	78.125 qtl	383	26
Maruthoor Kulangara North	North CVCS ltd No.474	Primary Coir Cooperative Society	184.64 qtl	606	29
Thurayil Kunnu	CVCS ltd No.327	Primary Coir Cooperative Society	184.415 qtl	873	44
Alappadmannel Kadavu	CVCS ltd No868	Primary Coir Cooperative Society	70.08 qtl	597	20
Kozhikkode	CVCS ltd No.74	Primary Coir Cooperative Society	Dormant	657	
Thatchayil	Handloom Co-operative Society	Handloom	40000 m cloth	15	
Maruthoorkulangara Thekku	Letha cashew Factory	Cashew	50 T	300	
Thatchayil	Jyothi Cashew Packing	Cashew		9	

Table 5.3 Details of traditional industries

Ward No.	Name of Ward/Place	No. of Construction workers	No. of Ongoing construction sites
Ward 17	Karunagapally Town	35	H&J Constructions
Ward 15	KSRTC	60	Valiyath Institute of medical science

Table 5.4 Details of construction industries



Acqua Bottling Factory near S.V.Market



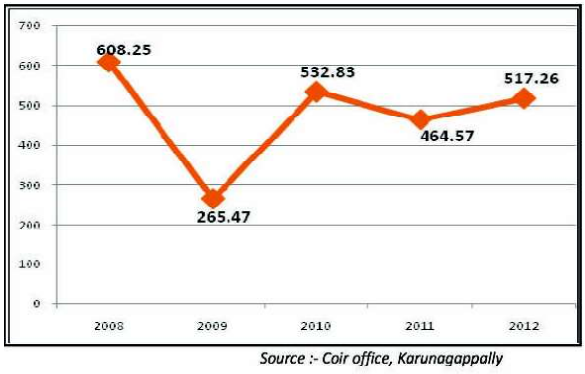
Coir industry at Thurayilkunnu



Handloom industries at Kuttikattil jn

5.3. COIR INDUSTRY

Coir sector was a prominent sector during the middle of the 20th century due to the availability of raw material and presence of water bodies for retting of the husk. However over a period of time the coir sector declined in tandem with that happened to the sector elsewhere in the state. Even today coir sector is not vanished fully from the industrial sector of Karunagappally is shown in figure 5.4, coir sector provides direct employment to more than 783 workers, majority are females, within the Municipality. The activities related to coir sector is concentrated mainly along TS canal. The coir sector of the Municipality thrive on fiber imported from Pollachi in Tamilnadu. The mechanization of the coir sector with Municipality is not yet started. But when viewed this sector from the industrial scenario of the state, it can be see that Government is committed for revival of this sector.



Source :- Coir office, Karunagappally

Fig. 5.4. Comparison of production of coir industries in last 5 financial years (quintal)

5.4. SPATIAL DISTRIBUTION

According to the secondary data there are no large or medium scale industries in Karunagappally. There are only 2 small scale industries. 92 micro level industries are scattered all over the municipality. There are 9 traditional and 2 construction industries. The spatial distribution is given in figure 5.5.

5.5. PROBLEMS AND POTENTIALS

Many of the industrial units are in a deteriorating stage in Karunagappally Municipality. Moreover there is no scope for large scale industries. This is because of the lack of availability of land. A number of industries like coir, cashew processing, handloom are depending on agriculture for their raw materials. Production and productivity have been declining consistently over the last several years. However there is a spent in growth of small scale industries are noted in the Municipality.

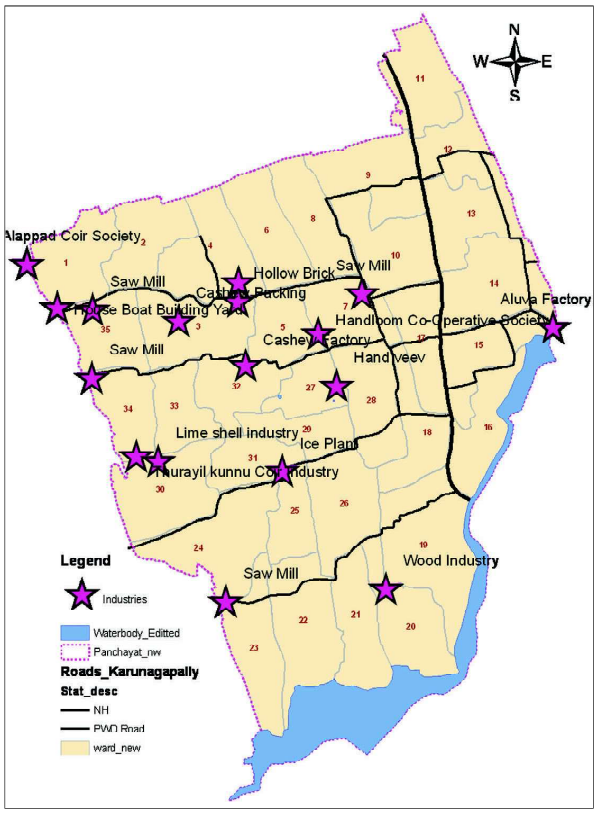


Fig 5.5. Spatial distribution of industries

PROBLEMS

- Many of the industrial units are in a deteriorating stage
- High population density, steep increase in value of land and presence of environmentally sensitive water bodies, paddy and streams makes Karunagappally difficult to have high level of industrialization
- Low raw material availability
- Huge cost of production due to high value of coir fiber imported
- Discontinuance of retting activity
- Issues related to marketing and shortage of funds
- Scarcity of expert workers
- Failure of mechanization
- Raw material imported from Tamilnadu & quality of procured fiber is low when compared with local fiber
- Most of the Handloom sector failed to implement modernisation and technology upgradation sufficiently.

POTENTIALS

- ❖ Two back waters increase the potentials for the improvement of coir industry

- Fibre produced in the municipality to be utilized for industrial purpose
- Establishment of defibering mills to produce adequate fiber locally
- Financial aid for private small scale producers
- Expansion of domestic market
- Linking of Coir and Handloom Clusters with Tourism
- Modernization with Workers Training
- Role of traditional industries for generating employment with minimum investment.

The scope for the future expansion of the Coir Industry is closely related to the availability of coconut husks. Traditional Industries such as Coir, Handloom and Cashew play a substantial role in generating employment with minimum investment. With a view to ensure sustainability and to revamp the traditional sectors, thrust should be given for enhancing technology upgradation, product diversification / value addition, market promotion and skill development.

Chapter 6

TRADE AND COMMERCE

The existing commercial status of Karunagappally Municipality are explained in this chapter.

6.1. PRESENT SCENARIO

The analysis of the land use map of Karunagappally shows that 1.51% of total area is under trade and commercial sector. This shows the predominance of trade and commerce sector in the Municipality. The area under trade and commerce is about 27 Ha. Ward 15 and 17 has the highest concentration of commercial activities. The ward wise concentration index of the Municipality is shown in figure 6.1. Commercial land use is concentrated along the sides of NH 66 and Karunagappally - Sasthamcotta road spanning over 4 km of NH 66.

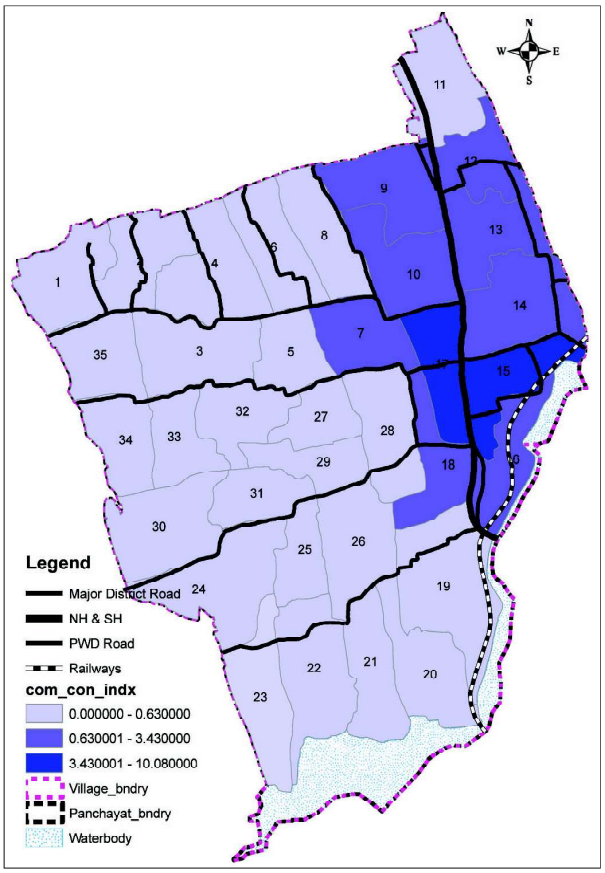


Fig 6.1. Concentration index of commercial land use

6.2. IMPORTANT CENTERS AND NODES

Commercial centres are the nodes, most probably junctions, where commercial facilities such as wholesale and retail shops, commercial offices etc are concentrated. The main commercial centers are concentrated along the sides of NH and Karunagappally – Sasthamcotta road. The main junctions in the Municipality are Karottu Junction, Lalaji Junction, KSRTC Junction, Civil Station Junction, High School Junction, Hospital Junction, Pulliman Junction and market junction. The commercial centers are concentrated in these Junctions. Civil station junction and Market junction together constitute the CBD of the Municipality.

6.3. MARKETS

There are three approved markets Sree Rama varmapuram market (municipal market), S.V. market, Alumkadavu market in the Municipality. Agricultural products from nearby villages are regularly traded in these markets. S.V market is located along T.S canal and decline in trading of coir products have led to the closure of the market. Other two markets are functioning daily. Only fish and vegetables are traded



Municipal market – Present situation



Alumkadavu Market – Present situation

in Alumkadavu market. In earlier days, trading was done using "vanchis" so the markets close to the water bodies (in AlumKadavu market, S.V market). But by the construction of Alumkadavu Bridge and Panikkarukadavu Bridge across TS canal the importance of the S.V market and Alumkadavu market declined. The Municipal market located adjacent to the CBD of the Municipality, once acted as a regional level market where agriculture products from Kunnathur Taluk and neighbouring LSGs were traded. Even now it is an important market within the Municipality.

6.4. PRESENT STATUS OF FACILITIES AT COMMERCIAL CENTRES

In order to assess the hierarchy of existing commercial centres detailed survey was conducted in all the major commercial nodes in Karunagappally municipality. Data were collected on retail shops, wholesale shops, other commercial establishments like beauty clinics, clinics, tailor shops, other commercial facilities like luxury hotels, cinema halls, auditorium and higher order facilities such as shopping malls, star hotels etc. The level of service provided is the main criteria for deciding the hierarchy of commercial nodes. The level of service may be local, sectoral or district. A local level commercial facility is that facility on which local people depend while sector level facility caters to 1 or 2 LSGs. In the case of district level facility, the entire LSGs in the district depend on such a facility. The data collected on commercial activities are depicted in table 6.1.

6.6. WHOLESALE SHOPS

Total number of wholesale shop is maximum at Market junction (16) followed by Alummoodu junction (4) and Civil station junction (4) local level wholesale activities are concentrated more at market junction and sector level are concentrated at Civil station junction.

6.7. COMMERCIAL OFFICES

Maximum number of commercial offices are concentrated at Pallimukku junction (6) and Lalaji junction (6) followed by KSRTC junction (3). There is n sector and district level commercial offices.

6.8. OTHER COMMERCIAL FACILITIES

Other commercial facilities are concentrated in KSRTC junction (3) and Hospital junction (3).

6.9. HIGHER ORDER FACILITIES

Maximum number of higher order commercial facilities are concentrated at KSRTC junction (10) followed by Civil station junction (9).

6.10. EXISTING HIERARCHY OF COMMERCIAL NODES

After collecting data on various commercial facilities available at nodes, due weightage to be assigned to each type of facilities according to level of service to calculate the Cumulative Commercial Facility Index (CCFI) further to this the combined commercial index (CCI) of a particular node is obtained by multiplying CCFI with the percentage of commercial land use of that node with that of municipality. From the analysis of facilities it is found that some facilities such as retail shops and commercial offices are available in all junction, hence a weightage of 1 is assigned to this facilities. In the case of wholesale shops out of 10 junction, only 8 junctions have that facility, hence weightage of 1.25 given for that facility. Similarly

Sl. No	Junctions	Retail Shop			Wholesale Shop			Commer.offices			Others			Higher order facilities		
		local	sector	Dist.	local	sector	Dist.	local	sector	Dist.	local	sector	Dist.	local	sector	Dist.
1	Karottu Junction	6	0	1	0	0	0	1	0	0	1	0	0	1	0	0
2	Lalaji Junction	13	0	3	0	1	0	6	0	0	0	0	0	2	0	0
3	KSRTC Junction	36	0	2	1	1	0	3	0	0	3	0	0	3	1	0
4	Civil Station Junction	19	0	2	0	4	0	6	0	0	1	0	0	2	3	0
5	High School Junction	11	0	6	0	0	0	2	0	0	0	0	0	1	3	0
6	Hospital Junction	20	0	0	0	0	0	2	0	0	3	0	0	2	0	0
7	Pallimukku Junction	8	0	0	0	0	0	6	0	0	1	0	0	2	1	0
8	Pulliman Junction	6	0	0	0	0	0	2	0	0	0	0	0	2	0	0
9	Market Junction	5	0	0	9	0	0	0	0	0	0	0	0	1	0	0
10	Alummoodu Junction	3	0	0	2	0	0	0	0	0	0	0	0	0	0	0

Table 6.1. Data collected on commercial activities

6.5. RETAIL SHOPS

The junction where maximum retail shops are existing is KSRTC junction (112) followed by Civil station junction (109) and Lalaji junction (74) but there is no district level facilities within the municipality. Both sector and local level retail activities are found maximum at KSRTC node.



Civil station junction

weightage 1.11 to higher order facilities and 2 to other facilities are assigned. For local level facilities, weightage of 1 and for sector level facilities weightage of 2 and for district level facility weightage of 74 (since the entire local bodies in the district is availing service from this facilities) are given.

By multiplying the number of facilities with the weightage of that facility weightage due to level of service CCFI will be obtained. The values of CCFI and CCI are worked out and shown in table 6.2. Out of 10 junctions civil station junction has the highest value of CCI of 44.62 and the junction is the 1st order commercial node in the municipality. KSRTC junction has CCI value between 20 to 35 are designated as 2nd order nodes. The 3rd order node is market junction nodes with CCI value between 10 to 20 are classified as 3rd order and the node with CCI value between 5 to 10 are classified as 4th order and the rest are classified as 5th order

Sl. No	Junctions	Retail	Wholesale		Higher Order			Others	CCFI	Commercial Land use	CCI	Order of Jn
		Local	Local	Sector	local	sector	district	Local				
1	Karottu Junction	23	0	0	1	0		1	26.11	0.055	1.44	V
2	Lalaji Junction	74	2	0	4	0			80.94	0.106	8.60	IV
3	KSRTC Junction	112	2	1	9	1		3	135.2	0.157	21.23	II
4	Civil Station Junction	109	0	4	6	3		1	129.3	0.345	44.62	I
5	High School Junction	37	2	0	2	3			48.38	0.067	3.22	V
6	Hospital Junction	61	0	0	2	0		3	69.22	0.073	5.07	IV
7	Pallimukku Junction	39	2	0	3	0		1	49.05	0.082	4.03	V
8	Pulliman Junction	41	1	0	3	0			45.58	0.110	5.01	IV
9	Market Junction	44	16	0	1	0			65.11	0.282	18.37	III
10	Alummoodu Junction	20	4	0	0	0			25	0.156	3.90	V

Table 6.2. Values of CCFI and CCI

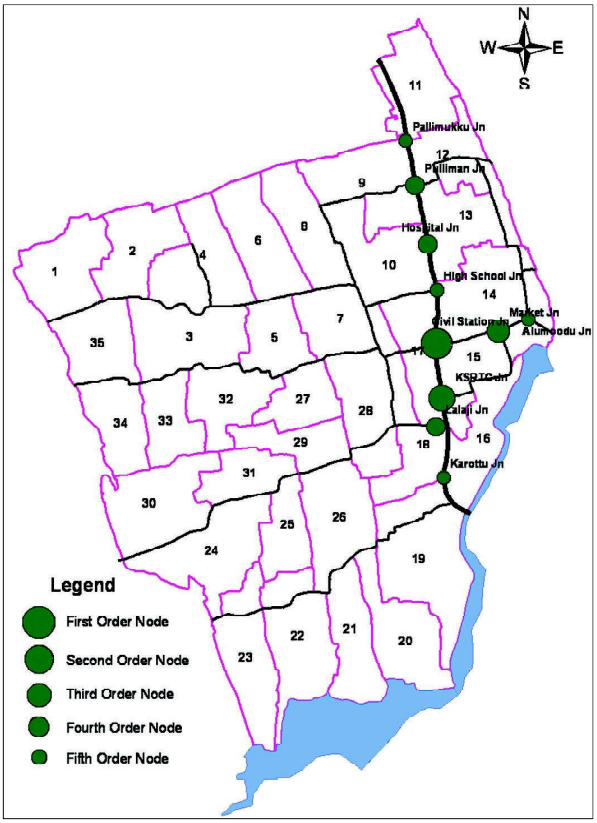


Fig 6.2. The existing hierarchy of commercial nodes

nodes Lalaji junction, Hospital junction and Pulliman junction are the 4th order nodes. The 5th order nodes are Karottu junction, high school junction, Pallimukku juntion and Alummmoodu junction. The existing hierarchy of commercial nodes in the municipality is shown in figure 6.2.

6.11. ISSUES IN COMMERCIAL NODES

Commercial areas generally require the following facilities.

1. Parking areas
2. Auto stand
3. Taxi stand
4. Lorry stand



Market junction Karunagappally

Sl No	Area of concentration of informal sector activities	Type of activity – fruits and vegetables, garments, tea and snacks, home appliances, books etc	Extent of informal sector activity in each area (no of shops/cart), no of street Vendors	No of units under Informal sector activity having the approval of Local body-Location wise	Labour force (man, women, children separately) in informal sector	Remarks
1	Kannetti	Fish	1	0	3	
2	Lalaji Jn.	Tea shop	3	0	9	2 nos working at night
3	Lalji Jn to Hospital Jn, West of NH	teashop	5	0	15	
		fruits	2	0	4	
		garments	2	0	2	
		snacks	3	0	3	
4	Lalji Jn to Hospital Jn,	teashop	4	0	8	2 nos working at night
5	East side of N.H	fruits	10	0	20	
		garments	6	0	6	
		vegetables	15	0	15	
6	Hospital Jn to Puthiyakavu	fruits	5	0	5	
		Tea shop	6	0	18	4 nos working at night
		vegetables	1	0	1	

Table 6.3. Details of street vendors

5. Public Comfort Station
6. Solid Waste Management Facilities
7. Drinking Water Facilities

6.12. STREET VENDORS/INFORMAL SECTOR

The details regarding street vendors are given in table 6.3. The maximum number of street vendors is seen along the sides of NH. No units have the approval from local body. 109 labour force are engaged in this sector. 27% are fruit shops, 25% are vegetable shops and 21% tea shops. Fish, garments and snacks are also seen.



Street vendors near Civil Station

6.13. REGIONAL IMPORTANCE

As per the Integrated District Development Plan of Kollam District, Karunagappally is a second order commercial node within the District, service nearly 16 LSGs is shown in figure 6.3.

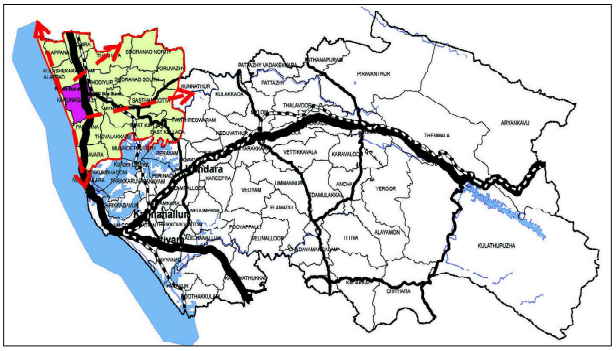


Fig. 6.3. Service area of Karunagappally

This indicates the importance of commercial sector in the Municipality in the future.

6.14. SPATIAL DISTRIBUTION

The spatial distribution of commercial centers is shown in figure 6.4. From the figure it can be seen that commercial centers along the sides of the roads.

6.15. PROBLEMS AND POTENTIALS

PROBLEMS

- Commercial centers are highly congested area having no sufficient parking space
- No Auto stand, Taxi stand, Lorry stand and Public Comfort Station

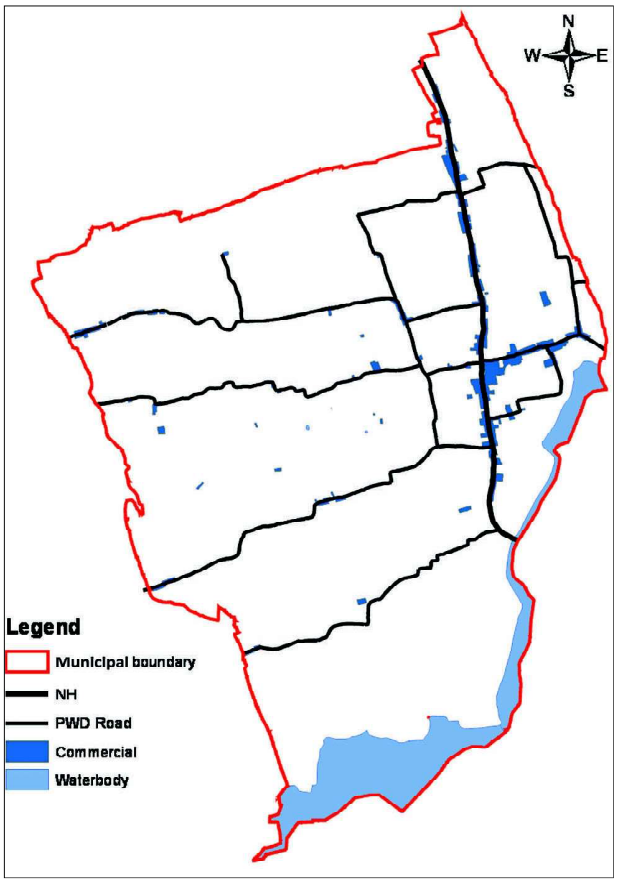


Fig 6.4. Spatial distribution of Commercial land use

- No proper solid waste disposal and drainage facility
- Drinking Water Facilities
- Ineffective utilization of municipal market
- Fish, meat & vegetable stalls are functioning without any solid waste disposal system

POTENTIALS

- Potential of Karunagappally to act as a commercial node based on regional setting
- Expansion of commercial centers towards north & south of CBD
- The service areas of Karunagappally
- Revival of closed market & effective utilization of municipal market
- Renovation and modernization of the market

6.16. INFERENCE

The first order and second order commercial centers are Civil Station Junction and KSRTC Junction. All the commercial centers are highly congested area having no sufficient parking space. There exists no proper solid waste disposal and drainage facility. To decongest the core area, the commercial area has scope of expansion towards North and South of CBD. Also when considering the service area, expending along the sides of NH is more convenient.

Chapter 7

TOURISM

The existing scenario of tourism sector and the potentials of tourism development in Karunagappally municipality here are detailed in this chapter.

The municipality is surrounded by water bodies such as kannetti kayal, Vattakayal and T.S.canal etc. Karunagappally was an important place of Buddhist settlement in early times. Karunagappally has a rich enlightening heritage and memorable tradition. A host of cultural and educational institutions, temples, mosques and churches dignify this traditional town and draw people from other parts of the state.

7.1. AVAILABILITY OF TOURISM INFRASTRUCTURE

Karunagappally is well served by road, railways and water ways. The major road in the town is the National Highway 66 from Panavel to Kanyakumari, which passes through the eastern part of the town and provides vital connectivity to Kollam and Thiruvananthapuram in the south and Alapuzha and Ernakulum in the central parts of Kerala. Karunagappally is famous for its proximity to Alumkadavu house boats building centre. Presence of scenically beautiful places, better connectivity and higher accessibility through road makes Karunagappally suitable for tourism development. Apart of NH 66, the other important roads in the town are Karunagappally – Sasthamcotta road, Karunagappally – Amrithapuri road, Karunagappally – Alappad road, Karunagappaly – Alumkadavu road etc. Details of hotel facilities in Karunagappally municipality is shown in table 7.1.

Stakeholder discussion reveals that there are 500 foreign tourists and 1350 domestic tourists visiting Karungappally per year.

7.2. PLACES OF TOURIST INTEREST

Ancient temples, sacred groves, Lakes and well known festivals are increasing the potential for tourism development in Karunagappally (Figure 7.1).

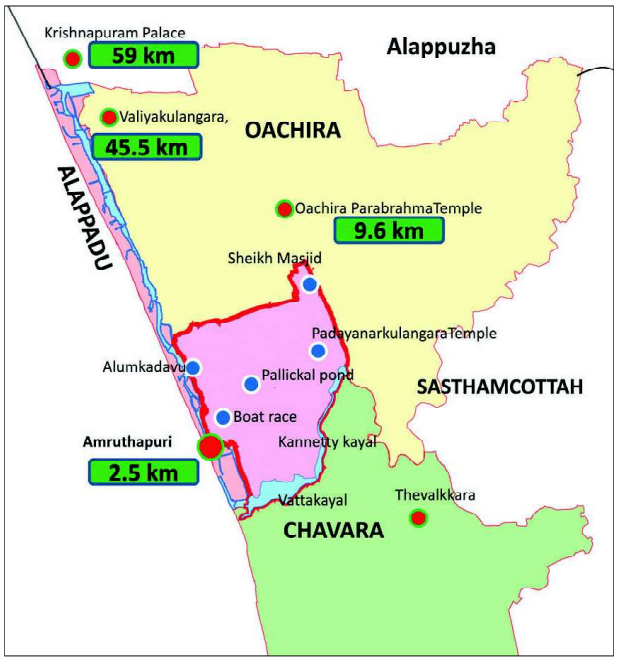


Fig. 7.1. Places of tourist interest

Padanayarkulangara temple – It is an ancient temple, located in the central part of the town. The temple has two devotees Lord Siva and Srikrishna, which is a rarely. The temple attracts thousands of pilgrims from all part of the town.

Alumkadavu – This is a famous place situated in the west of Karunagappally town and is an important tourist place and house boat building centre. The main tourist attraction is the house boat facility in Alumkadavu and Green Channel resort.

Sheikh Masjid – It is a famous mosque, which resembles one of the wonders of the world, Taj mahal is a pilgrim centre.

Kannetti kayal – Another attraction is the Sree Narayana trophy boat race, which takes place in Kannetti kayal, during the season of Onam.

Pallickal kavu – It is a sacred grove with some historical importance and is situated in the pallickal ward. It was an important Buddhist centre in early times.

Sl.No	Number of hotels			Tourist information centre	House boats
	Four star and above	3 star/2 star hotels	Economy hotels		
1	Nil	Nil	4	Nil	1

Table 7.1. Details of hotel facilities in Karunagappally municipality



Padanayar Kulangara Temple



Green Channel Resort



Sheikh Masjid



Pallickal Pond

7.3. WATER RELATED TOURISM

Karunagappally is surrounded by water bodies on three sides. Though the places of tourist interest are not significant in a regional scale, the Karunagappally has a potential for water related tourism as an extension to the tourism activities in Ashtamudi lake (Figure 7.2.).

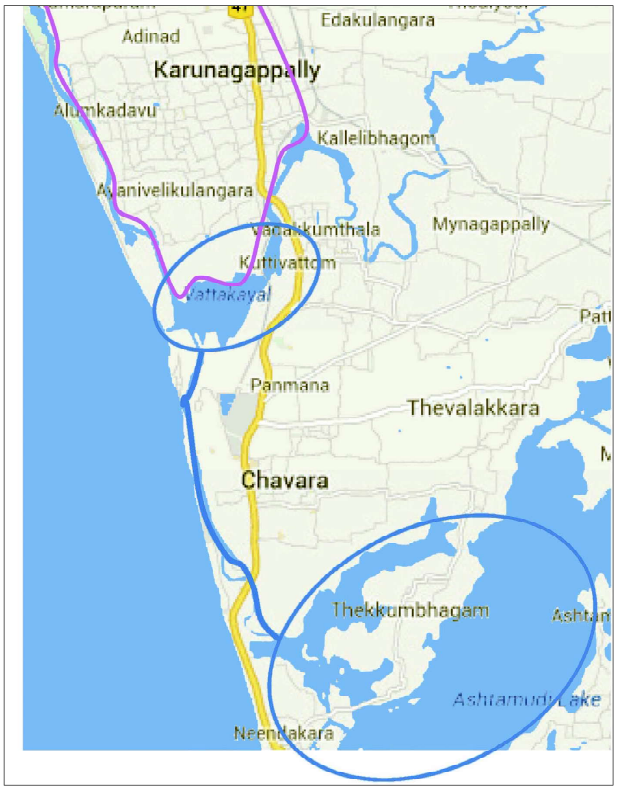


Fig. 7.2. Water related tourism



Sree Narayan Boat race at Kannetti Kayal

7.4 SURROUNDING AREAS

The Oachira Parabrahma Temple – One of the prominent centres of worship for Hindus across the state. It is about 9 km north from Karunagappally town. The annual festival of temple Vrichikolsavam is attended by tens thousands of devotees.

Valiyakulangara - near oachira is famous for a century's old Devi temple.

Amritapuri - which is the main Ashramam of Matha Amruthananthamayi is located 4 km from Karunagappally town.

Thevalakkara – A place, very famous in Kerala History connected with Portuguese attack in Thevalakkara temples and Orthodox Church.

Krishnapuram Palace – A famous palace with some historical relevance and is located in Kayamkulam, which is nearer to Karunagappally.

7.5. HOMESTAY

Homestay facilities are to be arranged for tourists. For this, people interested in providing homestay facilities may be identified and shall be given financial incentive for the above purpose.

7.6. TOURIST INFORMATION CENTRE

A tourist information centre is proposed to be started in Karunagappally. The above centre may be started by tourism promotion council or by municipal council. This is to give necessary information about tourist spots and the facilities available for tourists.

7.7. PROBLEMS AND POTENTIALS

PROBLEMS

- Backwaters, wetland, open space suffer due to dumping of solid waste

POTENTIALS

- Presence of scenically beautiful places, lakes, sacred grooves, back waters, temples etc increase the potential for tourism development in Karunagappally
- Back waters link with Astamudi backwaters
- Karunagappally is well served by roads, railway and waterway transportations
- House boat facilities and resorts also make Karunagappally suitable for tourism development
- Amritapuri located only 4 kms from Karunagappally town , increases pilgrim tourism potential of the area

AGRICULTURAL SECTOR

8.1 AREA UNDER CULTIVATION

Odanadu region was famous for agriculture, especially, paddy during the early 20th century and Karunagappally belongs to this region. Karunagappally has changed a lot over a period of time and paddy is there only in the name sake. Agricultural sector is not an important segment of Municipality's economy. Agriculture forms only 8.25 per cent of total area.

8.2 IMPORTANT CROPS AND PRODUCTION

PADDY CULTIVATION

As per land use, paddy is cultivated in 5.97% Ha of land ie, 1.82 % of total area of land is under paddy. The fact that 50.29% of the total land area of Municipality was under paddy cultivation in 1952 and presently which reduced to nearly 2% indicates the extent of severe reduction in paddy cultivation in the Municipality. Spatial distribution of paddy fields are shown in figure 8.1

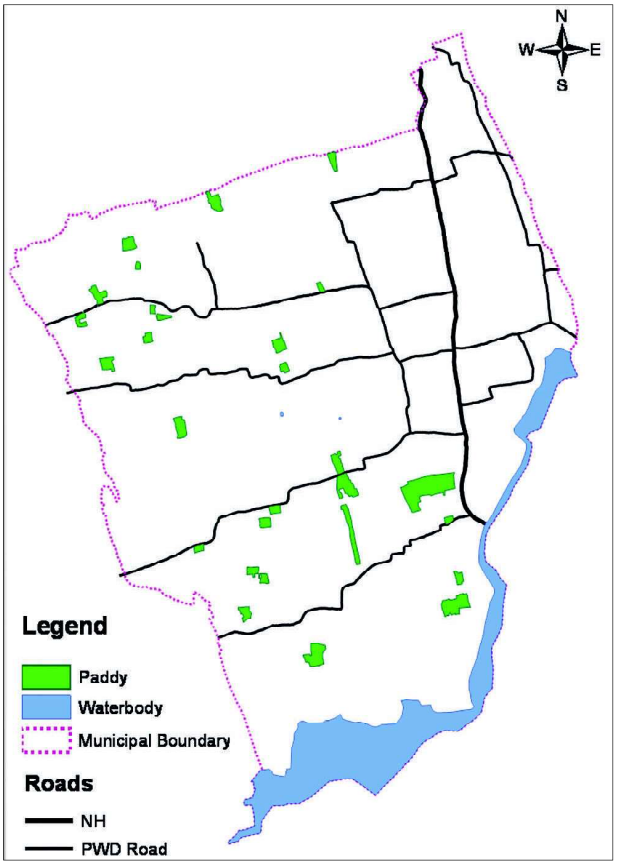


Figure.8.1. Spatial Distribution of paddy in Karunagappally Municipality

From the figure above, it can be observed that paddy lands are not continuous but isolated small holdings. The productivity of paddy in Karunagappally Municipality is 2500 kg/hect. When compared with the area cultivated, production of paddy is relatively low. The extent of paddy lands are getting reduced due to filling of paddy lands for dry cultivation and constructions.

COCONUT CULTIVATION

Coconut is a third major crop in Karunagappally Municipality. The production of coconut is 3500nuts/ Ha//year. Coconut cultivation is seen mainly as homestead cultivation. Spatial distribution of coconut cultivation is shown in figure 8.2.

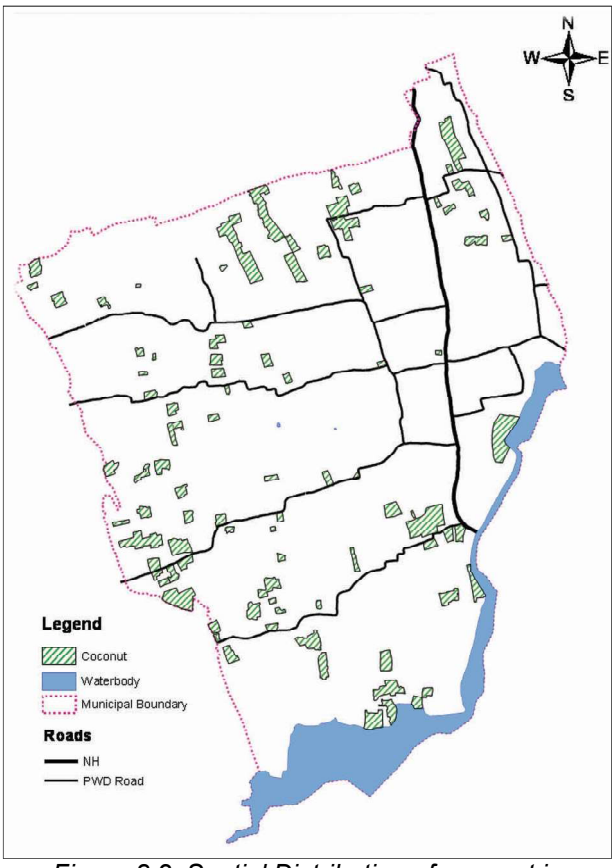


Figure 8.2. Spatial Distribution of coconut in Karunagappally Municipality

MIXED CROPS

Mixed crops include, pepper, Areca nut, banana, tuber crops, vegetables and pulses Productivity of tuber crops, vegetables, banana, and black pepper are being 8000kg/Ha, 8ton/Ha, 20ton/Ha, 2ton/Ha respectively.

Comparison of agricultural area of Karunagappally municipality with nearby LSGs are shown in table 8.1

Karunagappally & Its Near By LSGI'S	Agriculture (Area in sq.km^s)
Karunagappally	1.49
Alappad	0.006
Kulashekharapuram	2.52
Thodiyoor	3.48
Panmana	1.61

Table 8.1. Comparison of agricultural area with nearby LSGs

Comparison of agricultural scenario of Karunagappally municipality with its nearby LSGs are shown in figure 8.3. As per agriculture department, the soil in Karunagappally is suitable for crops such as coconut, tapioca, banana, pepper, arecanut and vegetables.

Compared to nearby LSGI's, Thodiyoor Panchayath tops with an agricutural land use of 16.88 percent. Whereas, percent of agricultural land use of Karunagappally Municipality is comparatively on a lower side.

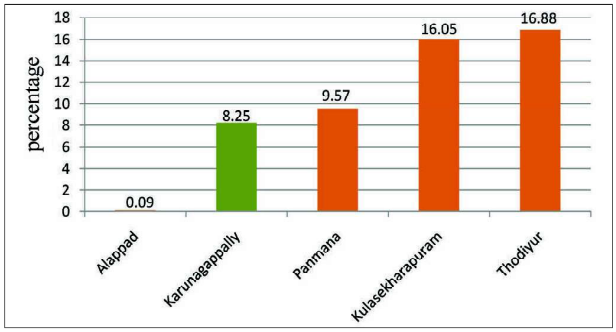


Figure 8.3. Agriculture scenario of Karunagappally municipality with its nearby LSG's

8.3. LABOUR FORCE IN AGRICULTURE

The graph shows that labour force in agriculture is decreasing continuously in the Municipality. This also is an indication of the weakening of the agriculture sector here (Figure 8.4.).

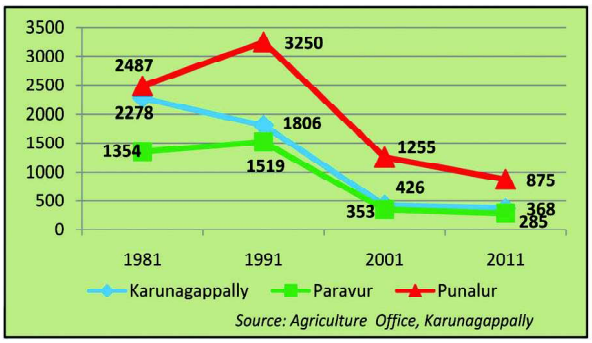


Fig 8.4.Number of agricultural labourers (1981-2011)

The socio-economic data shows (graph) that relatively high number of agricultural labourors are available in this wards 1, 2, 8, 11, 20, 21, 23, 24 and 26.

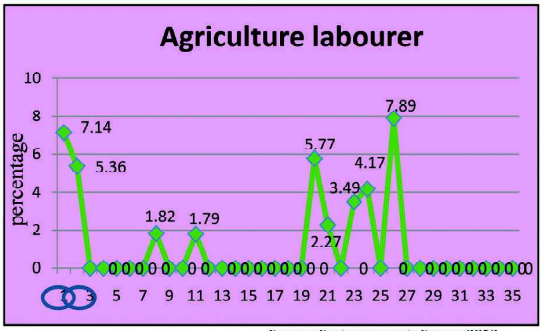


Fig. 8.5. Wardwise distribution of agricultural labourers

8.4. AGRICULTURE : PRESENT SCENARIO

Karunagappally's cropping pattern is characterised by predominance of perennial crops. The reason for increasing the area under fallow may be mainly due to un-remunerative nature of farming. The reasons for reduction in area under paddy is mainly due to replacement of paddy by remunerative crops and filling up of paddy fields for construction purposes.

8.5. PROBLEMS AND POTENTIALS

PROBLEMS

- No proper utilization of land for increased agricultural production
- Conversion of paddy fields
- Scarcity of workers& raised wage rates
- Lack of marketing facilities

POTENTIALS

- Land availability for floriculture
- Productivity & potential of coconut
- Crop Suitability as per IDDP is coconut & also proximity of KERAFED enhances the potential of coconut cultivation
- Active functioning of Kudumbasree units

8.6. INFERENCE

A comparison with other municipalities and nearby panchayaths shows that agricultural and allied activities are low in Karunagappally Municipality as the share of cultivators and agricultural laborers in the total workforce is very low. Agricultural labours are declining. As per 2001 census there are only 426 agricultural labours are there in Karunagappally. Paddy fields act as ground water recharge basins and so has to be protected. However the fact that availability of dry agricultural land, presence of water bodies and suitable soil makes Karunagappally as a place suitable for agriculture; especially hightech farming.

Chapter 9

ANIMAL HUSBANDRY AND FISHERIES

Animal husbandry sector is a major sector which usually plays a vital role in the economy of a local body. Animal husbandry sector has a bearing on agricultural sector. At the same time presence of waterbodies and fishermen give thrust for fisheries sector. The animal husbandry sector and fisheries sector in Karunagappally Municipality are studied here.

9.1. ANIMAL HUSBANDRY

The animal population in the Karunagappally Municipality is shown in the table 9.1. The number of cattle in the planning area is 2135. When the number of cattle per/1000 population is analyzed, it is seen that planning area have low cattle strength per person. When comparing the livestrock population of 2012 with that of 2008, it is seen that there is a marginal increase in the number of cattles, buffalows and ducks.

Sl. No	Name of Ward / Place	Live stock population			
		Cow/ Buffalo	Goat	Hen	Duck
1	Karunagappally Municipality	2135/ 104	1195	9941	5653

Source: Local Body, Veterinary Dept.

Table 9.1. Live stock population

The analysis of most important animal produces ie, milk, meat and egg are as follows. Total milk production is 65,000 litres. Milk production is high in Ayanivelikulangara ward. Since there are no authorized slaughter houses, data on meat production and monthly consumption are not available.

There are five dairy outlet centers, one veterinary hospital at Kannetti and two private veterinary clinics. The details of livestock population within the municipality in 2012 is given in the table 9.1. The comparison of livestock population in 2008 and 2012 are given in figure 9.1.The details of dairy outlet collection centres are given in table 9.2 and its location is shown in figure 9.2.



Diary Co-operative society at Alumkadavu

9.2. FISHERIES

Karunagappally Municipality is highly blessed with inland fisheries resources like Vattakayal and Kannetti Kayal. According to Fisheries Development Office Karunagappally, in 2012 nearly 1400 people (3%) in the municipality depends upon the fishing sector for their livelyhood, which was 5226 in the year 2005 (10.5%). This shows a decline in the fishing sector, which is to be given proper attention as the potential is immence. Large number of fishermen families, who depend on the coastal areas of Alappad Panchayat resides in the municipal area. Inland fishing activities based on local ponds were active in Karunagappally municipality. Potential of the ponds can be utilized for improving this sector. An integrated programme can be arranged for encouraging fish culture and for

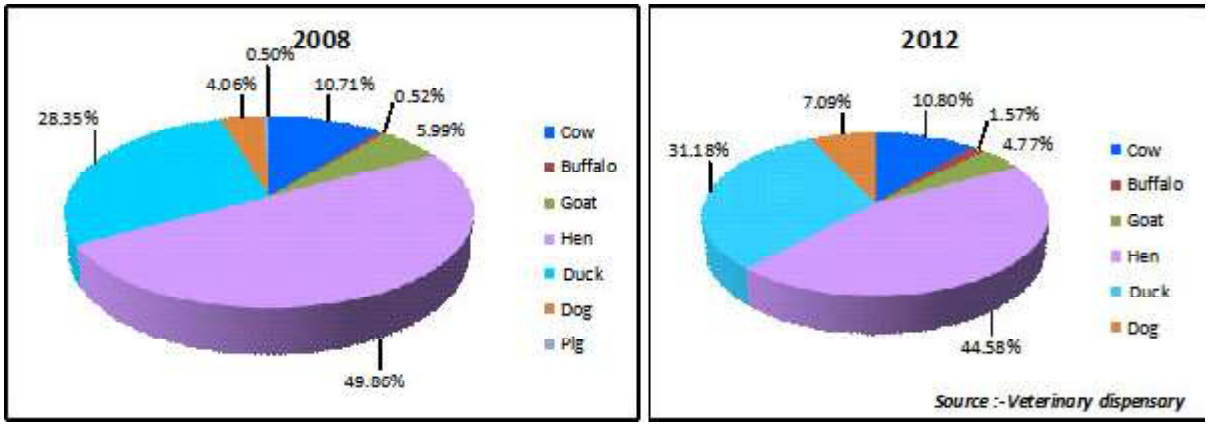


Figure 9.1.The comparison of livestock population in 2008 and 2012

Ward No.	Name of Ward/Place	Type of outlets and collection centers	No.	Average Qty collected per Month (Litres)
1	Alumkadavu	Alumkadavu APCOS	1	7500 lts
3	Numberuvikala	Numberuvikala APCOS	1	6500 lts
6	Pada North	Padanayarkulangara APCOS	1	13500 lts
10	Ayanivelikulangara	Ayanivelikulangara APCOS	1	19500 lts
14	Kozhikode	Kozhikode APCOS	1	18000 lts

Sourcc: Local body, vcterinary Dcpt., Diary Dcpt.

Table 9.2.Details of Dairy out lets and collection centers (or milk co-operative societies)

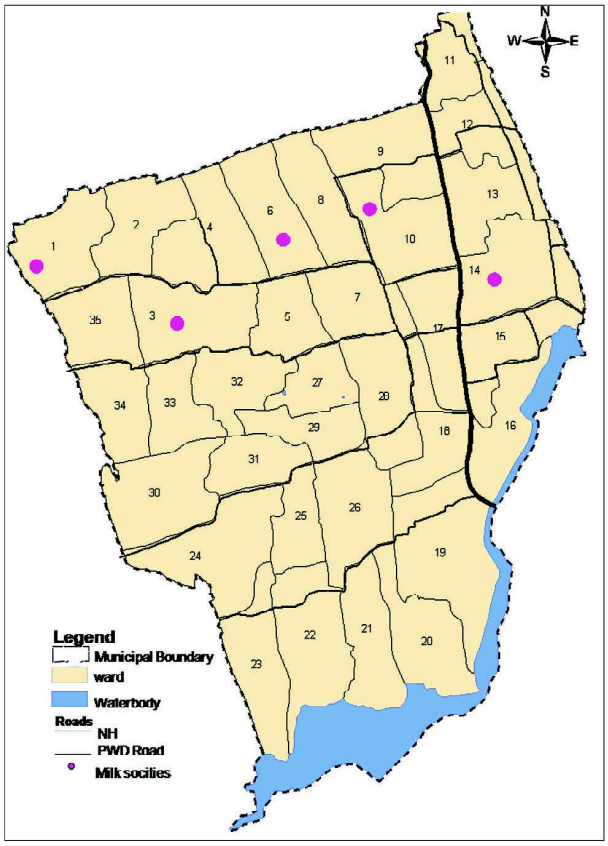


Figure 9.2. Location of milk societies

supplying equipments & other facilities for fishing. Public markets for fish trading is currently available in the town.

9.3. PROBLEMS AND POTENTIALS

PROBLEMS

Increasing feed cost results in cattle rearing a non profitable activity for small scale unorganized farmers. Conversion of agricultural land and reduced plot size reduced the availability of fodder. Moreover production expenses do not go with market prices in the sector of milk production. Lack of awareness regarding potential of inland fisheries and inadequate utilization of available resources are major issues faced in fisheries sector.



Fisheries Development Office,Alumkadavu

POTENTIALS

Presence of veterinary hospital / clinics increases the potential for animal husbandry. Availability of five milk societies also enhances the potentiality of this sector. Presence of two backwaters, 71 ponds and paddy fields increases the potential for inland fishing activities in Karunagappally municipality.

9.4. INFERENCE

Veterinary services can be strengthened through introduction of a veterinary doorstep service and improving facilities of veterinary hospital and laboratories. The primary focus in livestock development should be on enhancing seed production, where there is a marked shortage in availability. Projects to raise milk and egg production should be launched through a convergence approach with the schemes of the municipality. Strategies and action plans for augmenting inland fish production, expansion of fish culture in tanks and ponds and improvement of productivity should be given priority. Strengthening of post harvest infrastructure like better fish landing and handling facilities, cold chains, storage facilities as well as marketing facilities is a key requirement for the development of the sector.

Chapter 10

TRAFFIC AND TRANSPORTATION

10.1. INTRODUCTION

The need to take an integrated long term view of transport needs of a town, planning of development of roads and public transport services as a part of the urban planning process have been well recognized as essential for the efficient functioning of the urban system.

In this chapter the existing transportation infrastructure and facilities of Karunagappally Municipality are detailed out.

10.2. CHARACTERISTICS OF TRANSPORT NETWORK

The characteristics of road transport network are explained below.

10.2.1. ROADS

10.2.1.1. EXISTING ROAD NETWORK

Karunagappally town has a grid-iron pattern of road network with a few north-south links and a large number of east-west links. Major north-south link is the NH 66 which passes through the centre of Karunagappally town. A number of links exist in the north-south direction and need to be developed to form full-fledged north south links. There are a number of east-west links existing in the town and together with the north-south links complete the grid-iron pattern of network for the town. The major roads are maintained by PWD while the remaining roads are maintained by Karunagappally Municipality. Existing transport network of Karunagappally is shown in Figure 10.1.

Apart from NH 66, other important roads in the town are;

i. Karunagappally – Sasthamkotta road

ii. Karunagappally - Amrithapuri road

iii. Karunagappally - Alappad road

iv. Karunagappally - Alum Kadavu road

National Highway 66 is the major arterial road of the town and traverses along north-south direction through the central area of the town. It has nearly 4 km length of road within the town. Carriageway width of NH is 7.5 meters except for the stretch between Lalaji Jn (figure 10.2) and Civil Station Jn (figure 10.3) where the width was 15m. This NH section has heavy concentration of commercial activities on either side and thus constitutes the CBD area of the town. Major traffic generators along the stretch are the KSRTC station, Civil Station, Padanayar Kulangara temple, police station, municipal office, schools and public offices.

The road to Sasthamkotta leading from Civil station junction on NH 66 can be classified as a sub-arterial road as it connects major towns in Kollam district namely Sasthamkotta, Bharanikavu and Adoor. The road traversing along east west direction has a length of about 1 km within Karunagappally municipal town. The carriageway width of the road is about 7m in a right-of-way (ROW) of 10m. A market is located by the side of the road which generates a large volume of traffic into the town.

Other important east west links in the town are;

i. Civil Station Jn (figure 10.3) to Kallumoottil Kadavu road (4.0km). This road also provides connectivity to Amritapuri.

iv. High school Jn (figure 10.4) to Alum Kadavu road (3.8km). At Alum Kadavu, a tourist amenity centre is located which provides food and accommodation facilities for tourists who travel to Alappuzha to Kollam and return along National Waterway No. 3. A boat jetty is located at Alum Kadavu and is the transit point for commuters from Cheriazheekkal on the other side of NW-3.

iii. Karottu Jn (figure 10.5) to Kozhikkode road with a length of 2.85 km

iv. Lalaji Jn (figure 10.6) to Panikkar Kadavu road (3.55km). The road provides connectivity to Amrithapuri, the internationally famous Ashramam of Amritanantamayi Amma

v. High school Jn to Railway station road (1.1km). The road connects Karunagappally railway station located outside the municipal boundary of the town.

Important north-south links are;

i. KSRTC Jn to Market road (1.1km). KSRTC buses coming from Sasthamkotta side take a deviation at Market Jn and reach KSRTC station plying along this road.

ii. Puthiyakavu TB Jn to Alumoodu Jn road (2.5km)

There are many other roads in the town especially on the north-south direction, which provide inter connectivity to the above roads and growth centres in the town. These roads together have a length of around 28 km with the CW width ranging between 4 m and 5m.

10.2.1.2 TRANSPORT TERMINALS

BUS TERMINALS

Karunagappally town has a KSRTC bus terminal by the side of NH 66. The station handles both long distance and local services operated by KSRTC from various depots across the State.

In the case of private buses, about 113 buses are operated in Karunagappally town which make 405 trips per day. Details of private buses operated in Karunagappally town are given Table 10.1.

As there is no bus station available in the town area for private buses, private buses are idle parking on old NH between Lalaji Jn and Karottu Jn. Hence, it is proposed to locate a new private bus terminal on the northern side of Sasthamkotta road near the Sree Krishna cine theatre opposite market.

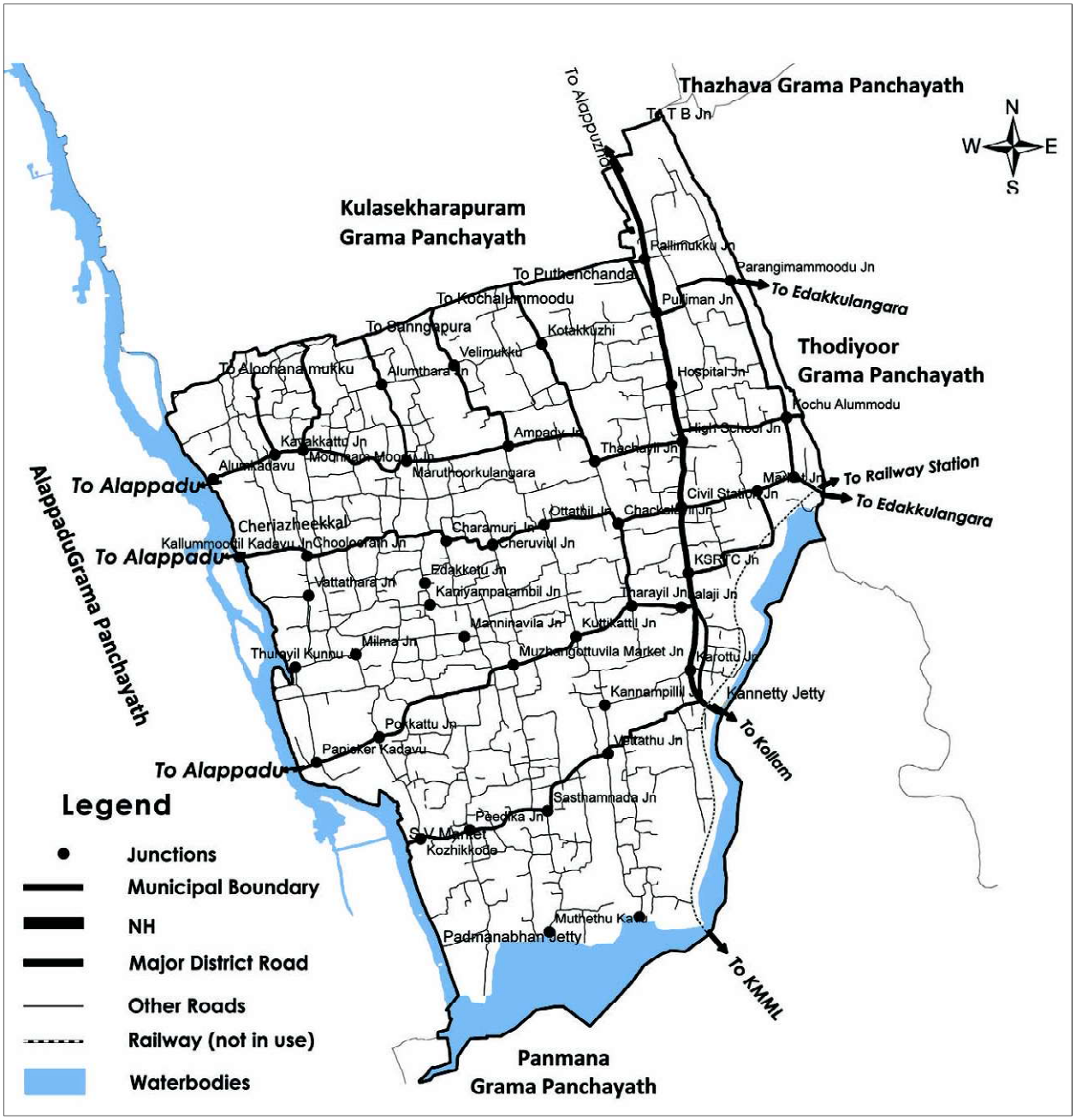


Fig 10.1. Transport network of Karunagappally town

Major Junctions within the Town

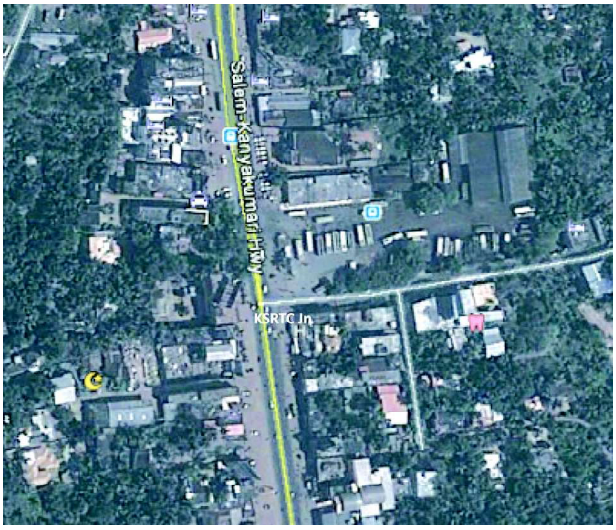


Fig 10.2.View of road section at Lalaji Jn

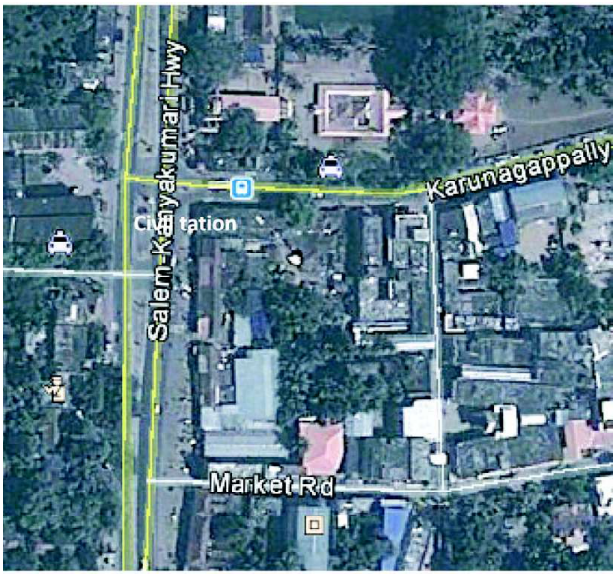


Fig 10.3. View of road section at Civil Station Jn



Fig 10.4.View of road section at High School Jn



Fig 10.5. View of road section at Karattu Jn



Fig 10.6. View of road section at KSRTC Jn

RAILWAYS

Karunagappally railway station is the only station serving the travel needs of Karunagappally town and located outside the municipal limit.

INLAND WATER TRANSPORT (IWT) TERMINALS

There are three boat jetties located on National Waterway-3 (NW-3) between Kollam and Kottappuram within the study region. They are;

i. Padmanabhan jetty
ii. SV Market jetty
iii. Alum Kadavu

10.2.1.3 EXISTING TRAFFIC CHARACTERISTICS

The Kollam-Alappuzha NH 66 passing through the centre of the town is forced to carry both intra-city and inter-city traffic. Consequently, this road carries traffic far exceeding its capacity at present and is likely to bear in the horizon year. The NH road stretch, where KSRTC station is located, faces acute traffic congestion because of movements of buses to and from the KSRTC station, parking of large number of vehicles on the road side and pedestrian criss-cross movements. Civil station junction and High school

Sl.No.	Name of route	No. of buses	No. of trips
1	Sasthamkotta	38	118
2	Edakkulangara	13	39
3	Puthiyakavu, Chakkuvally route	24	96
4	High school Jn, Ambadi Mukku, Ochira	2	8
5	High school Jn, Maruthoorkulangara	3	12
6	High school Jn, Alumkadavu	2	8
7	Lalaji Jn, Panikkar Kadavu	22	88
8	Civil Station, Alumkadavu	2	8
9	Chama Kadavu	2	8
10	Kozhikkode, Karottu, Kottarakkara	1	4
11	Kozhikkode, Karottu, Lalaji, Azheekkal	2	8
12	Thurayil Kunnu-Kochalumoodu-Sangepura	2	8
Total		113	405

Table 10.1. Details of private buses operated in Karunagappally town

junctions are the other problematic locations in the NH road corridor. The Sasthamcottah road also faces traffic congestion due to presence of market and the inadequate road width.

10.2.1.4. TRAFFIC VOLUME CAPACITY STUDIES

LINK VOLUME

Data pertaining to traffic volume and its composition was collected for all major road links in Karunagappally town through link volume survey. At other road sections, volume count survey was not conducted as there were only negligible traffic. Traffic volume data collected from the field were converted into a single unit called 'Passenger Car Units (PCU)' using conversion factors suggested by IRC. Composition of traffic on various homogeneous sections of the roads in Karunagappally town is given in table 10.1. Map of Karunagappally town showing the density of traffic on these sections are shown in Figure 10.7.

On National Highway 66, the daily traffic volume varied from 38,000 PCU observed at Kannetty Palam-Karottu section to a maximum of 52,000 PCU at Civil Station-High School section. At other sections of NH 66, the traffic volume ranged between 40,000 and 50,000 PCU.

On the road leading to Sasthamkotta, the highest traffic volume of 23,000 PCU per day was observed between Market Jn and Alumoodu Jn and it was only13, 000 PCU at exit point on the municipal border.

Traffic volume above 10,000 PCU was observed on the railway station road between Kochu Alumoodu and Railway station Jn, and on the road section between Alumoodu and Kochu Alumoodu Jn. Traffic volume in the range of 5,000-10,000 PCU was observed on the Lalaji Jn-Muzhangottuvila road section (8,262 PCU), Civil Station-Ottathil road section (7,255 PCU), High School-Alum Kadavu road section (6,885 PCU) and KSRTC Jn-Market road section (5,892 PCU). The traffic volume was below 5,000 PCU in all other road sections.

CAPACITY UTILISATION

Capacity utilization of the road stretches was measured by volume-to-capacity ratio (V/C Ratio). It is the ratio of volume of traffic plying on the road stretch to the capacity of the road stretch.

For working out the capacity of different road sections, the information compiled during the road inventory survey was considered along with the specifications of IRC-106-1990 (Guidelines for capacity of urban roads in plain areas). While working out the capacities due consideration was given to carriage-way width, junctions, parking, lateral clearance, shoulder, surface condition etc.

The traffic volume observed at different road stretches were compared with the capacity of road sections, to calculate the volume-capacity ratio (V/C ratio) of different road sections within the study area.

The volume capacity ratio of major roads within the Karunagappally municipal town is given in table 6.3. It could be seen that the entire NH stretch was over-utilized to the extent of more than 200% to their carrying capacity.

In the case of other roads, the following road sections were found to be overloaded more than their carrying capacity:

i. Market Jn to Alumoodu Jn (1.54)

ii. Civil Station Jn to Market Jn (1.39)

In the following stretches, the traffic volume is nearing the capacity.

i. Alumoodu Jn to Kochu Alumoodu Jn (0.96)

ii. Kochu Alumoodu to Mamoodu (0.89)

iii. Alumoodu to Railway crossing (0.87)

In the rest of the road stretches, the existing traffic volume was found to be below their carrying capacity.

10.2.1.5. SPEED AND DELAY STUDIES

As part of the study, speed and delay survey was carried out on nearly 17 Kms of road stretches within the Karunagappally town. The road sections included parts of National Highway, Sasthamkotta road and other major roads. The speed and delay characteristics of major roads are given in table 10.4.

CAUSES OF DELAY

An analysis of the delays and causes of delay has revealed that traffic congestion in front of KSRTC station, turning movements at Civil station and High school junction, were the major causes of delay for traffic flow on NH 66 while it was inadequate road width on Sasthamkotta road. On the other road stretches, high speed could not be attained due to inadequate road width, frequent curves and lack of sight distance at many places.

AVERAGE JOURNEY SPEED

On NH 66, the maximum average journey speed of 38 km/hr was observed between Kannetty Palam and Karottu Jn. The speed, however, was quite low between Civil Station and High school Jn and it hovered around 30km/ hr between Karottu and Civil station.On the Sasthamkotta road between Civil station and Alumoodu, the speed was quite low with 28 km/hr. in



Fig 10.7. Density of traffic in the Municipality

HS No.	Name of homogeneous section	KSRTC Bus	Private Bus	Other Buses	Mini- bus/ tempo	Car/ van/ jeep	Pass. auto	Two wheeler	MAT	Truck	Mini- truck/ tempo	Goods auto	Bicycle	Hand cart	Others	Total (No)	Total (PCU)
	I. National Highway No. 66 (Panavel - Kanyakumari)																
1	Kannetty bridge (Municipal Limit) – Karottu Jn	947	93	310	468	7,989	3,500	21,300	579	1,673	1,667	608	1,276	6	15	40,430	38,373
2	Karottu Jn - Lalaji Jn	990	382	176	455	7,574	5,489	21,694	350	1,579	2,172	841	1,639	30	-	43,372	40,588
3	Lalaji Jn – KSRTC Jn	1,029	740	197	643	8,265	6,902	20,712	370	1,902	2,519	1,154	1,479	52	-	45,962	45,631
4	KSRTC Jn – Civil Station Jn	1,424	913	237	847	8,801	4,681	28,363	229	1,191	2,924	1,191	1,228	8	-	52,037	47,481
5	Civil Station Jn – High school Jn	999	351	270	1,176	10,886	5,388	36,003	229	1,028	3,353	1,250	2,229	6	2	63,169	52,439
6	High school Jn – Pulliman Jn	1,028	344	392	866	10,677	4,526	30,592	453	1,428	2,887	953	1,559	-	3	55,708	49,493
7	Pulliman Jn – Puthiyakavu (Municipal limit)	1,123	381	447	449	9,560	3,739	26,006	642	1,941	2,053	792	890	-	-	48,023	45,857
	II. Karunagappally to Sasthamkotta road																
8	Civil Station Jn – Market Jn	78	313	56	294	3,277	4,929	15,824	-	284	639	758	769	11	-	27,232	20,898
9	Market Jn - Alumoodu	168	465	81	279	2,801	4,390	19,283	2	409	833	652	1,259	-	-	30,621	23,159
10	Alumoodu Jn to Railway crossing (Municipal limit)	145	314	92	275	1,918	1,508	10,192	2	295	401	429	927	-	-	16,498	12,977
	III. High school Jn to Railway station road																
11	High school Jn – Kochu Alumoodu Jn	-	8	14	46	624	722	4,002	-	62	163	150	591	12	3	6,397	4,426
12	Kochu Alumoodu Jn – Mamoodu (Municipal limit)	39	133	45	61	1,475	2,273	8,538	-	117	210	165	938	-	-	13,995	10,061

	IV. KSRTC station to Market Road																
13	KSRTC Jn – Market Jn	65	243	44	27	612	650	4,737	-	109	282	233	185	22	-	7,209	5,892
	V. Alumoodu Jn to Puthiyakavu road																
14	Alumoodu Jn to Kochu Alumoodu Jn	46	151	28	117	1,170	2,109	9,565	5	141	469	289	755	7	-	14,852	10,755
15	Kochu Alumoodu Jn to Puthiyakavu (Municipal limit)	-	-	-	40	232	449	2,753	-	36	61	66	271	-	-	3,909	2,520
	VI. Karottu Jn to Kozhikode																
16	Karottu Jn to Kozhikode	23	68	10	53	612	1,279	3,515	-	67	116	111	819	8	-	6,680	4,957
	VII. Lalaji Jn to Panikkar Kadavu road																
17	Lalaji Jn to Muzhangottuvila	70	173	21	136	924	1,879	5,883	-	250	184	257	458	4	-	10,236	8,262
18	Muzhangottuvila to Panikkar Kadavu (Municipal limit)	74	158	-	52	416	506	2,047	-	123	69	40	102	-	-	3,587	3,283
	VIII. Civil Station to Kallumoottil Kadavu road																
19	Civil Station Jn to Ottathil Jn	41	33	31	43	1,014	1,023	7,065	-	132	218	284	569	3	-	10,457	7,255
20	Ottathil Jn to Kallumoottil Kadavu (Municipal limit)	14	-	47	83	542	820	4,829	7	52	123	93	385	-	-	6,995	4,742
	IX. High school Jn to Alum Kadavu road																
21	High school Jn to Alum Kadavu	-	104	71	26	1,437	1,371	4,346	5	15	413	267	703	-	6	8,764	6,885

Source: Traffic & Transportation Study for Karunagappally Town in Kollam District by NATPAC, 2013

Table 10.2. Volume of daily traffic on major road sections in Karunagappally town

HS No.	Name of homogeneous section	Total volume (in PCU)	Capacity (in PCU)	Volume-capacity ratio
I. National Highway No. 66 (Panavel - Kanyakumari)				
1	Kannetty bridge (Municipal Limit) – Karottu Jn	38,373	28,125	1.36
2	Karottu Jn - Lalaji Jn	40588	28125	1.44
3	Lalaji Jn – KSRTC Jn	45,631	28,125	1.62
4	KSRTC Jn – Civil Station Jn	47481	37500	1.27
5	Civil Station Jn – High school Jn	52,439	28,125	1.86
6	High school Jn – Pulliman Jn	49493	28125	1.76
7	Pulliman Jn – Puthiyakavu (Municipal limit)	45,857	28,125	1.63
II. Karunagappally to Sasthamkotta road				
8	Civil Station Jn – Market Jn	20,898	15,000	1.39
9	Market Jn - Alumoodu	23159	15000	1.54
10	Alumoodu Jn to Railway crossing (Municipal limit)	12,977	15,000	0.87
III. High school Jn to Railway station road				
11	High school Jn – Kochu Alumoodu Jn	4,426	11,250	0.39
12	Kochu Alumoodu Jn – Mamoodu (Municipal limit)	10061	11250	0.89
IV. KSRTC station to Market Road				
13	KSRTC Jn – Market Jn	5892	11250	0.52
V. Alumoodu Jn to Puthiyakavu road				
14	Alumoodu Jn to Kochu Alumoodu Jn	10755	11250	0.96
15	Kochu Alumoodu Jn to Puthiyakavu (Municipal limit)	2,520	11,250	0.22
VI. Karottu Jn to Kozhikode				
16	Karottu Jn to Kozhikode	4,957	11,250	0.44
VII. Lalaji Jn to Panikkar Kadavu road				
17	Lalaji Jn to Muzhangottuvila	8,262	15,000	0.55
18	Muzhangottuvila to Panikkar Kadavu (Municipal limit)	3283	15000	0.22
VIII. Civil Station to Kallumoottil Kadavu road				
19	Civil Station Jn to Ottathil Jn	7255	15000	0.48
20	Ottathil Jn to Kallumoottil Kadavu (Municipal limit)	4,742	15,000	0.32
IX. High school Jn to Alum Kadavu road				
21	High school Jn to Alum Kadavu	6,885	15,000	0.46

Table 10.3. Capacity utilization of major road sections in Karunagappally town

the other road stretches also, the speed was between 25 and 30 km/ hr

10.2.1.6. TURNING MOVEMENT AT INTERSECTIONS

The capacity of urban roads to a great extent depends on capacity of intersections. Thus intersections have an important role to play in efficient and smooth traffic flow in the urban network. Turning movement surveys were conducted at eight major intersections in Karunagappally town to ascertain the peak hour demands. The summarized traffic flow in PCU at the eight intersections are given in table 6.5. Peak hour traffic flow at these intersections are shown as charts in Figures 10.8 to 10.15.

It could be seen that Civil Station Jn witnessed the maximum peak hour traffic flow of 4,014 PCU, followed by 3,931 PCU at High school Jn. KSRTC Jn, Lalaji Jn and Karottu Jn handled peak hour traffic low in the range of 2,900 to 3,100 PCU. Intersections located on Sathamkotta road had peak hour traffic flow below 1,600 PCU.

10.2.1.7. PEDESTRIAN SURVEY

Pedestrian volume survey was conducted out at important intersections and road sections where the pedestrian's cross-walk has been very high. The surveys were carried out for a period of four to eight hours during the peak periods.

(i) Lalaji Jn - Three arms

(ii) KSRTC Jn Three arms

(iii) Civil Station Jn - four arms

(iv) High school Jn - Four arms

(v) Taluk hospital Jn

Pedestrian surveys were found to be high throughout the entire NH road stretch in Karunagappally town.

Sl. No.	Name of road section	Distance (km)	Journey time (Sec)	Delay time (Sec)	Running time (Sec)	Journey speed (km/ Hr)	Running speed (km/ Hr)
I. NH.66							
1	Kannetty Bridge - Karottu Jn	0.8	75.39		75.39	38.2	38.2
2	Karottu Jn - Lalaji	0.5	50.77		50.77	35.45	35.45
3	Lalaji - KSRTC	0.3	35.37	7	28.37	30.53	38.07
4	KSRTC - Civil station Jn.	0.4	47.45	8	39.45	30.35	36.5
5	Civil station Jn. - HS Jn.	0.4	75.19	15.68	59.51	19.15	24.2
6	HS Jn. - Pulliman Jn.	0.9	89.15	4	85.15	36.34	38.05
7	Pulliman Jn. - Pallimukku	1.1	121.8		121.8	32.51	32.51
II. Karunagappally-Sasthamkotta road							
8	Civil station Jn. - Market Jn.	0.6	76.52	8	68.52	28.23	31.52
9	Market Jn. - Alumoodu	0.3	38.84	7	31.84	27.81	33.92
10	Alumoodu - Kerala feeds	0.6	60.45		60.45	35.73	35.73
III. High school to Railway station road							
11	HS Jn. - Kochu Alumoodu	0.8	106.47		106.47	27.05	27.05
12	Kochu Alumoodu - Rly Stn Road Jn.	0.4	37		37	38.92	38.92
IV. Lalaji Jn to Panikkar Kadavu road							
17	Lalaji Jn. - Muzhangottuvila	1.7	213.59		213.59	28.65	28.65
18	Muzhangottuvila - Panikkar Kadavu	1.8	228.26		228.26	28.39	28.39
V. Civil station to Kallumootttil Kadavu road							
19	Civil station Jn - Ottathil Jn	1.1	142.78		142.78	27.73	27.73
20	Ottathil Jn - Kallumoottil Kadavu	2.3	271.48		271.48	30.5	30.5
VI. High school Jn to Alum Kadavu road							
21	HS Jn. - Thachayil	2.8	579.74		579.74	17.39	17.39

Table 10.4. Speed and delay characteristics of major road sections in Karunagappally town

Accordingly, pedestrian crossing and lateral movement surveys were conducted at all the critical locations on NH 66. Analysis of the pedestrian cross movement at major activity/traffic generation areas revealed that a high volume of pedestrian cross movements totaling 1,837 occurred across various arms of High school Jn during peak hour in a normal working day. Of these most of them occurred across NH section. Civil station area consisting of two arms of NH 66 witnessed 1,798 cross movements during peak hour, followed by KSRTC area with 1,433 movements.

In the case of lateral movements, the high pedestrian movements of 3,764 occurred along Alappuzha arm of Civil Station junction, followed by 3,719 movements along Kollam arm of Civil station junction. 2,085 movements were observed along Kollam arm of High school junction. Peak hour pedestrian cross and lateral movements observed at major locations in Karunagappally town are given in table 10.6.

10.2.1.8. ORIGIN DESTINATION SURVEY

The objective of this survey is to determine the origin and destination of external-external, external-internal and internal-external passenger and goods movements through the outer cordon points. An analysis of these movements shows the proportion of bye-passable traffic along the major movement corridors of the town.

O-D survey at major entry/exit points of the study area was carried out continuously for a period ranging from eight hours to 24 hours on a working day depending on the importance of the road. Origin-destination survey was conducted at six major outer cordon points leading to the study area and Karunagappally railway station. The survey was carried out for a duration ranging from eight and 24 hours. Figure 10.16 shows the location of outer cordon survey points selected for the origin – destination survey. The outer-cordon survey locations are given below.

i. Between Kannetty bridge and Karottu Jn on NH 66

ii. At Panikkar Kadavu on Lalaji Jn – Amrithapuri road

iii. At Kallumoottil Kadavu on Civil Station Jn - Kallumoottil Kadavu road

iv. Between Puthiyakavu and Pallimukku Jn on NH 66

v. At railway level crossing on High school Jn – Railway station road

vi. At railway level crossing on Karunagappally - Sasthamkotta road

Sl. No.	Name of town	Peak hour volume (PCU)	Peak hour
1	Karottu Jn	2,970	18.00-19.00
2	Lalaji Jn	2,939	16.15-17.15
3	KSRTC Jn	3,013	09.15-10.15
4	Civil Station Jn	4,014	10.45-11.45
5	High school Jn	3,931	09.30-10.30
6	Market Jn	1,186	15.15-16.15
7	Alumoodu Jn	1,558	09.15-10.15
8	Kochu Alumoodu Jn	609	15.15-16.15

Table 10.5. Summarized traffic flow

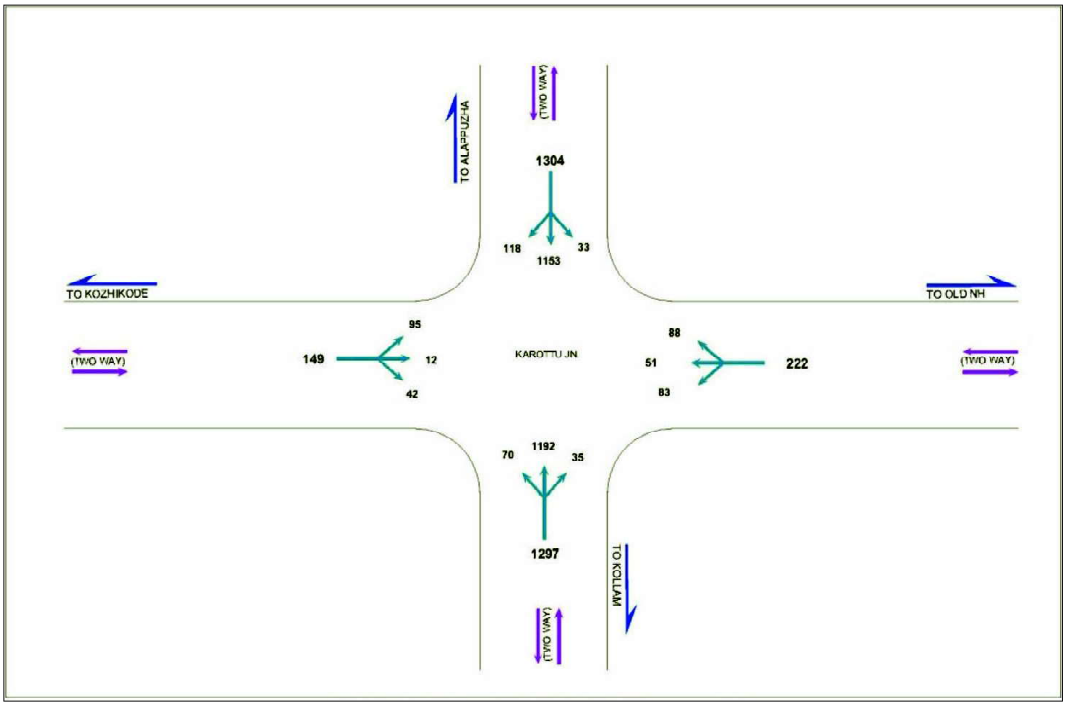


Fig. 10.8. Peak hour traffic flow at Karottu junction is Karunagappally town

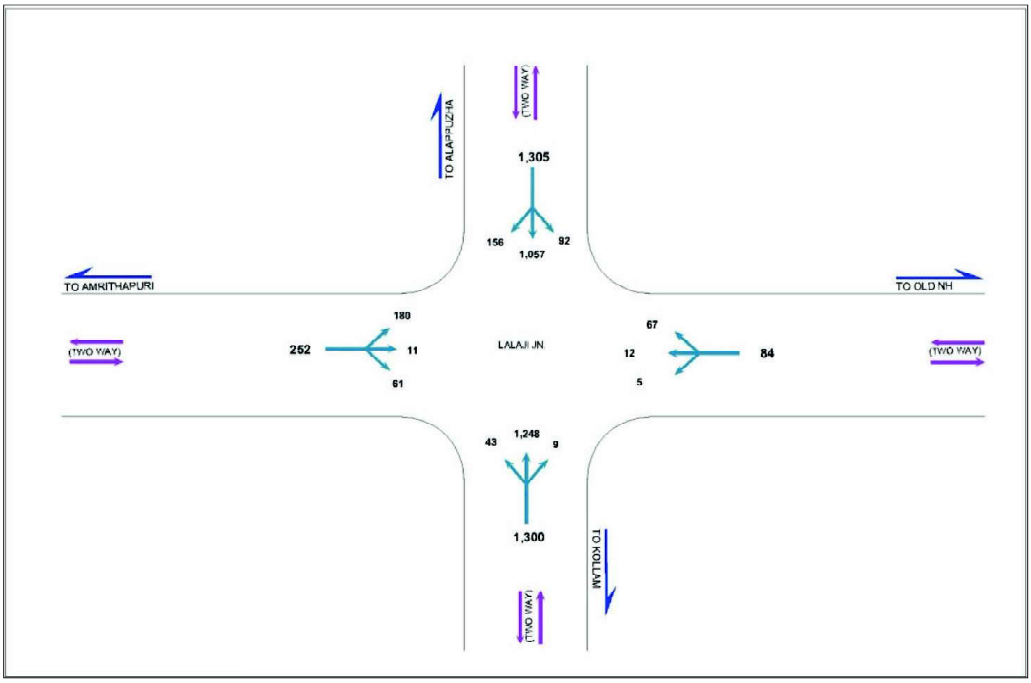


Fig. 10.9. Peak hour traffic flow at Lalaji junction is Karunagappally town

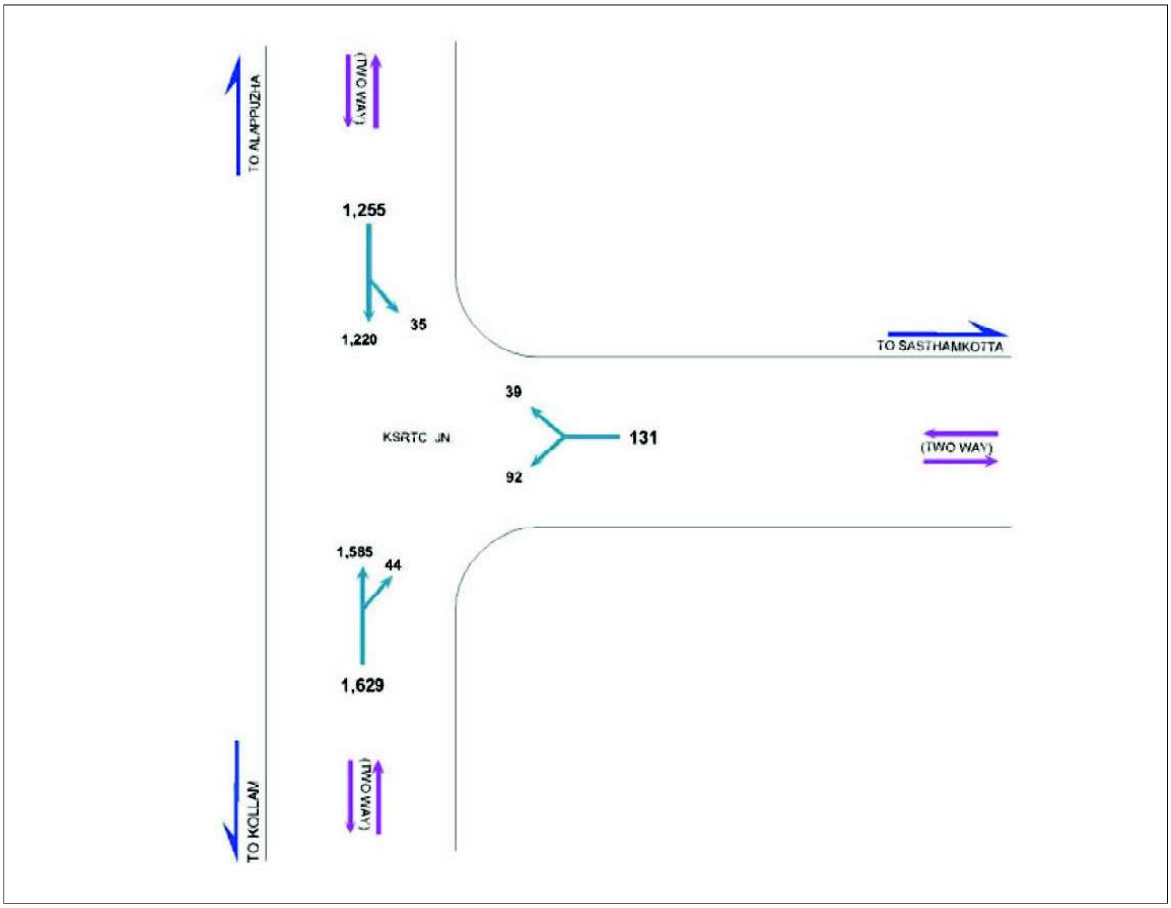


Fig. 10.10. Peak hour traffic flow at KSRTC junction is Karunagappally town

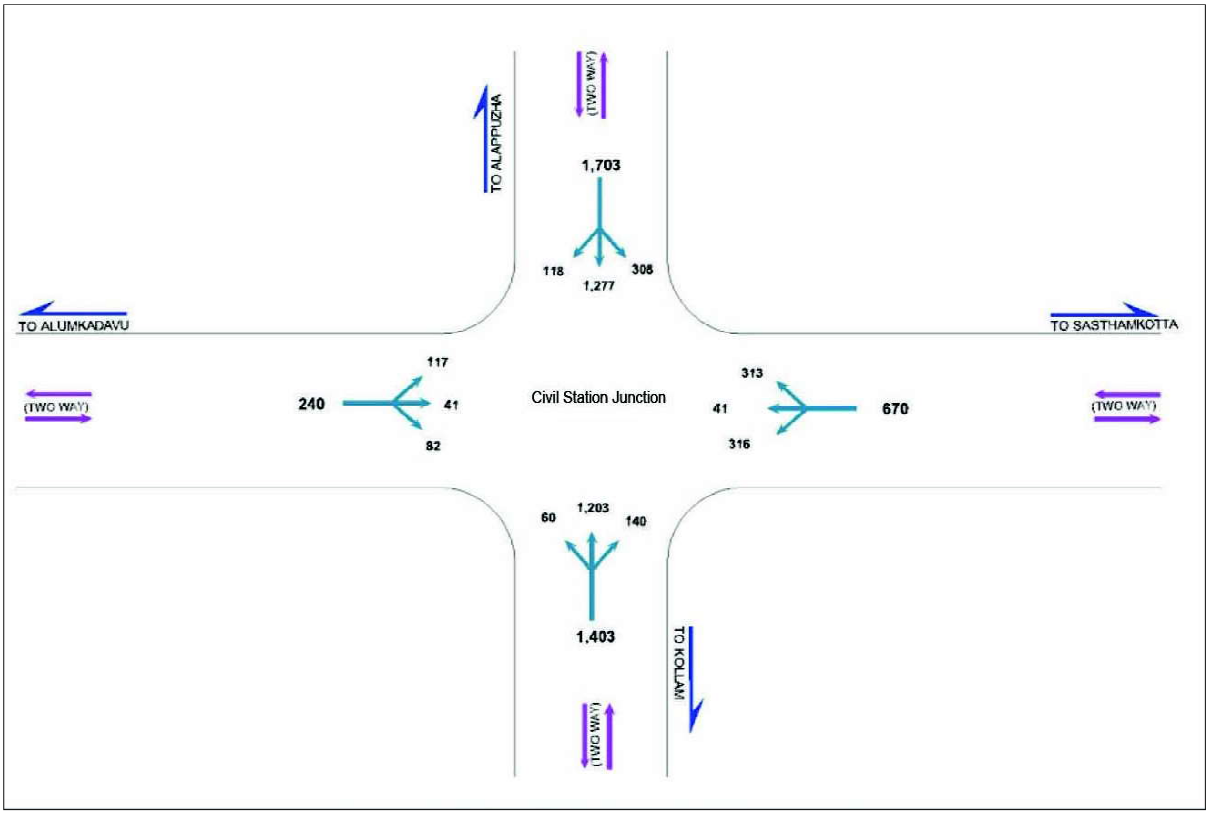


Fig. 10.11. Peak hour traffic flow at civil station junction is Karunagappally town

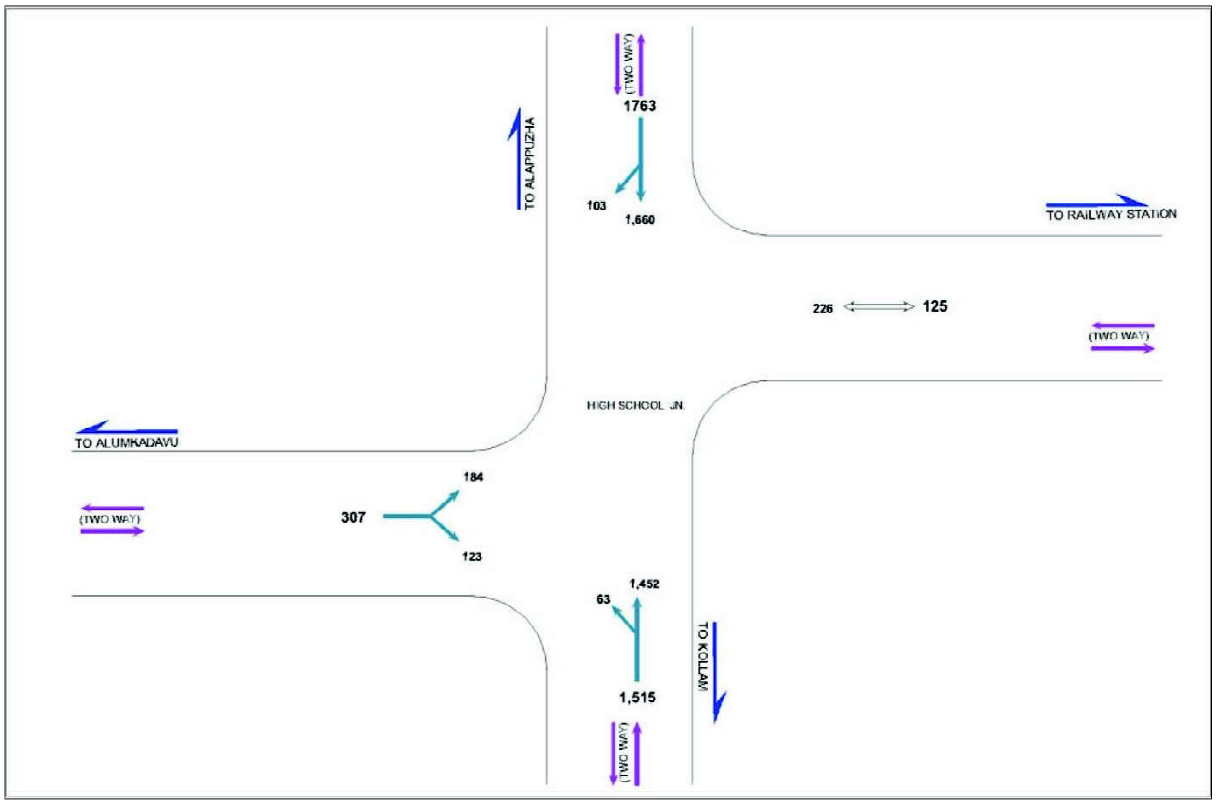


Fig. 10.12. Peak hour traffic flow at High school junction is Karunagappally town

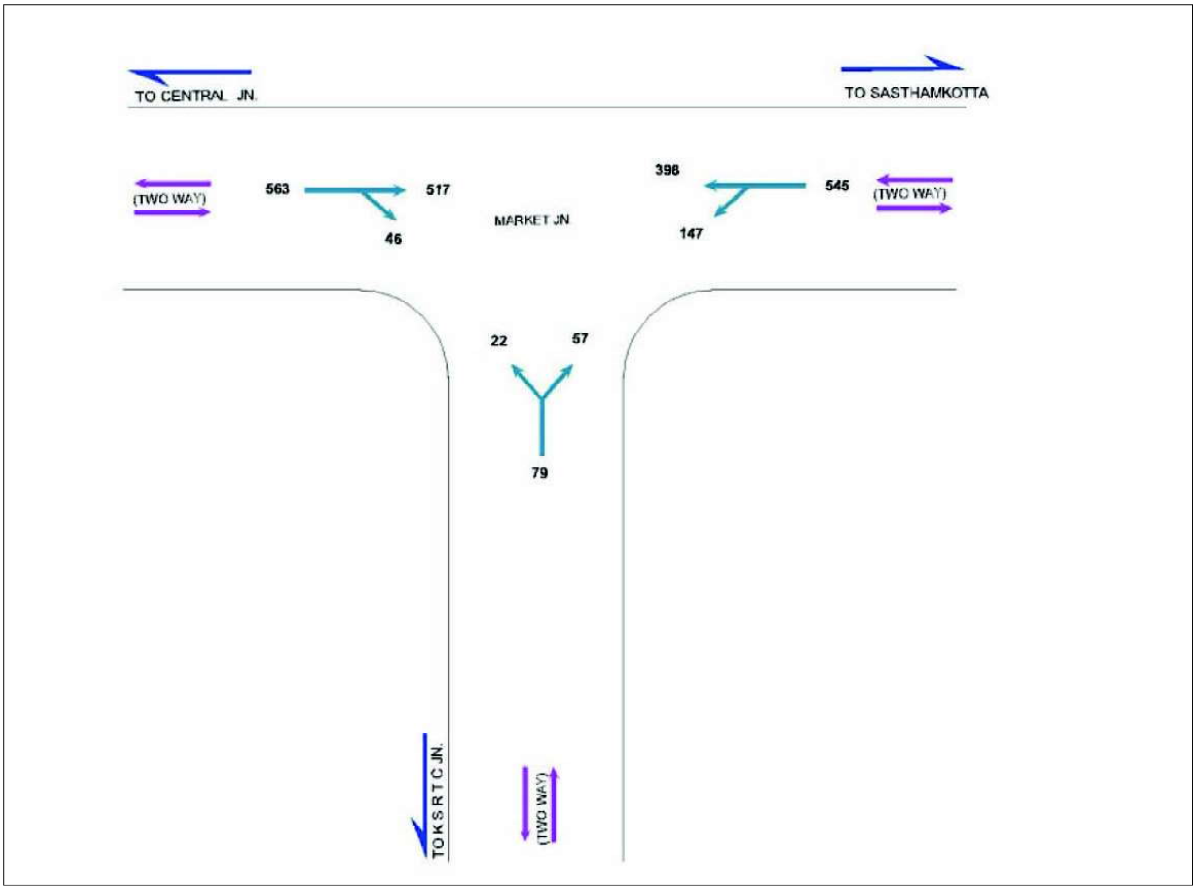


Fig. 10.13. Peak hour traffic flow at market junction is Karunagappally town

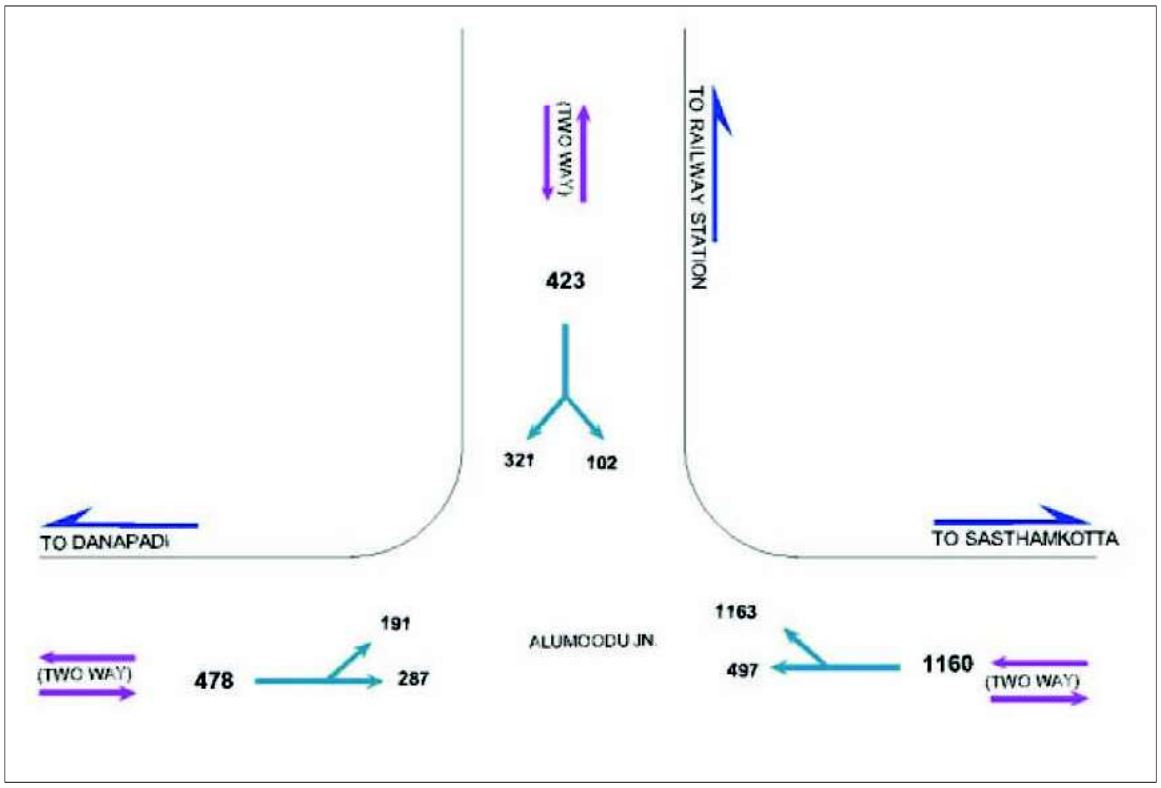


Fig. 10.14. Peak hour traffic flow at Alumoodu junction is Karunagappally town

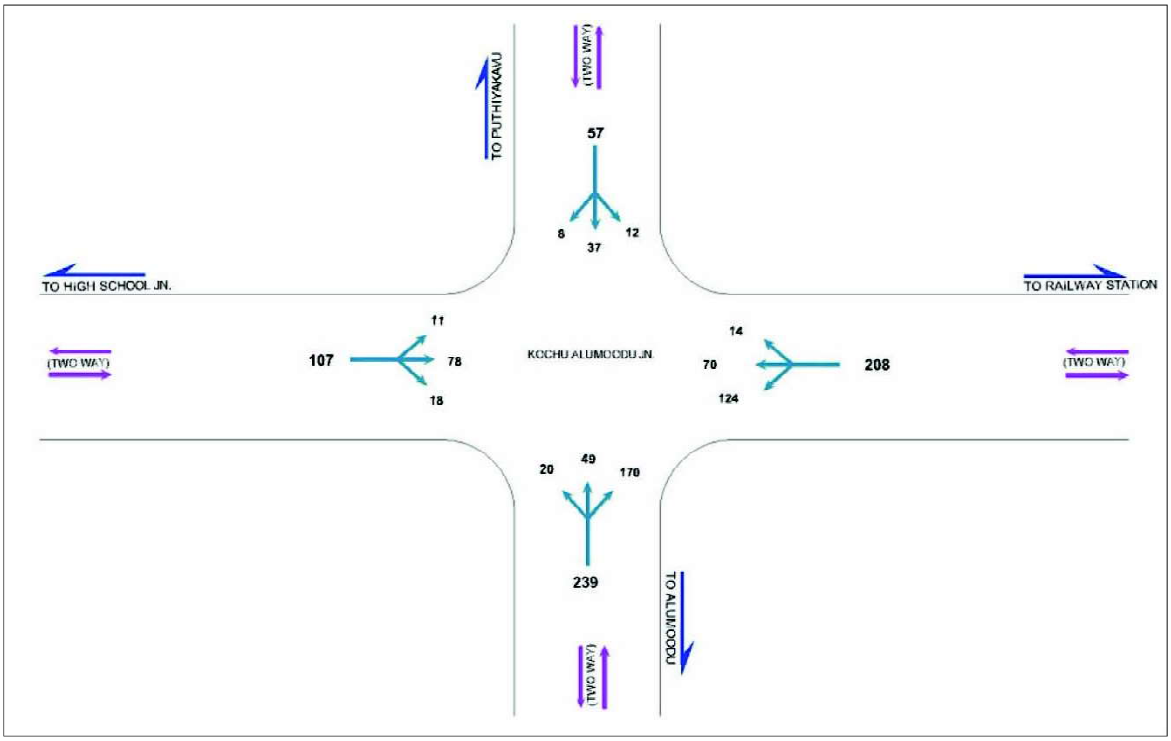


Fig. 10.15. Peak hour traffic flow at Kochu Alumoodu junction is Karunagappally town

As the origin-destination survey was conducted on a sample basis, in order to get the total number of vehicles passing through the outer cordon locations, traffic volume survey was also conducted simultaneously at these locations.

Traffic volume through outer cordon points

Volume survey of all the vehicles entering/exiting the study region was conducted at six outer cordon points of the town. Classified volume of vehicles was recorded according to their direction of travel.

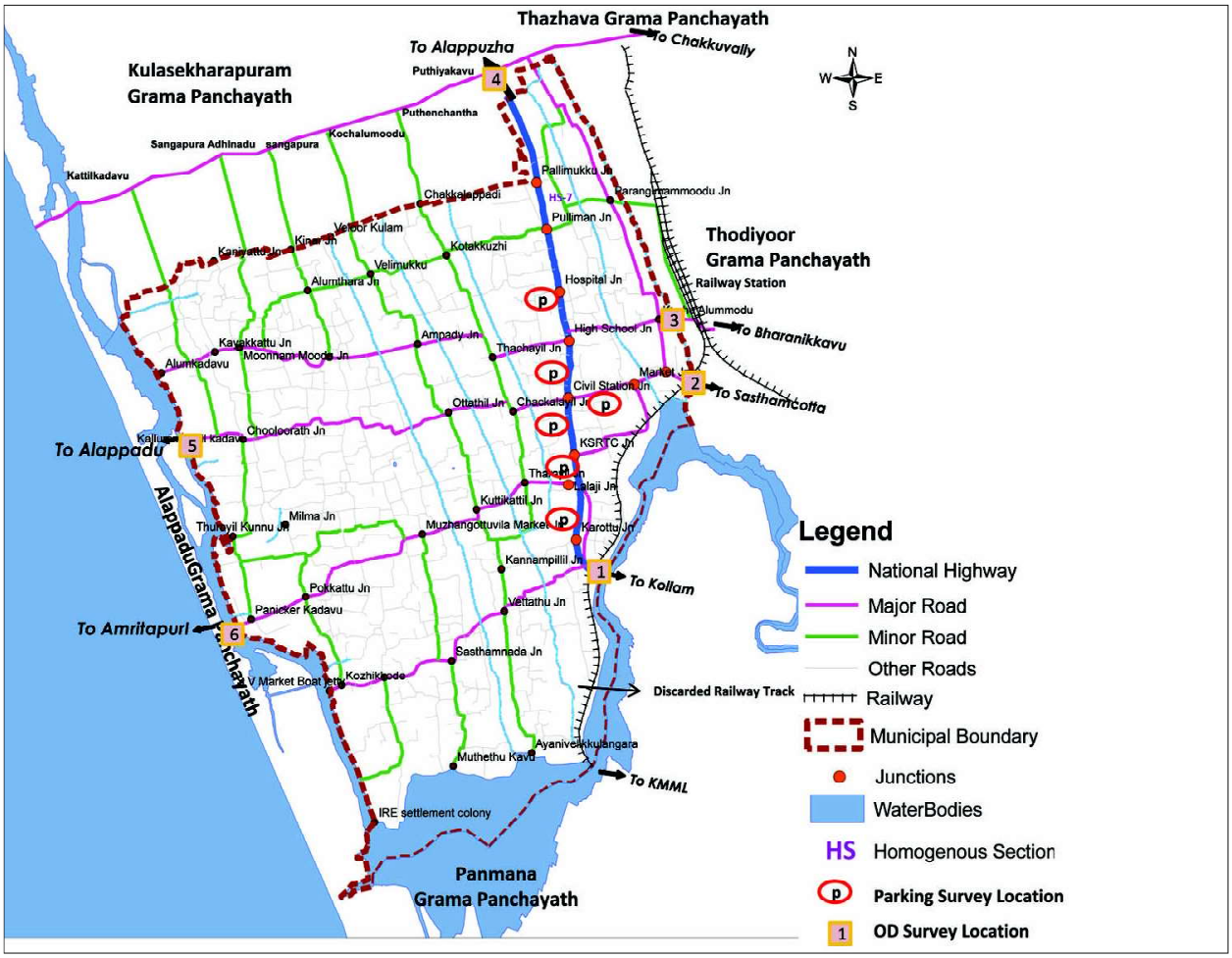


Figure 10.16. Location of outer cordon survey points selected for the origin – destination survey

The maximum daily traffic volume of 45,857 PCU was observed on the Pulliman survey location on northern side of NH-66, which included 23,603 PCU of outbound traffic and 22,254 PCU of inbound vehicles. Two wheelers constituted the maximum followed by cars and passenger autos. Daily traffic volume of 40,238 PCU was observed on the Kannetty Palam survey location on the southern side of NH-66, which included 19,168 PCU of inbound traffic and 21,070 PCU of out bound vehicles. Two wheelers constituted the maximum followed by cars and passenger autos. Through the eastern boundary of the town, as many as 10,000 PCU of vehicles were observed at Alumoodu survey location on Sasthamkotta road, and 8,900 PCU of vehicles through Edakkulangara survey location. NH 208. On the western boundary of the town, 4,700 PCU and 3,300 PCU of vehicles entered the town through Panikkar Kadavu and Kallumoottil Kadavu survey locations.

ZONING PATTERN ADOPTED FOR THE STUDY

For a meaningful analysis of O-D survey data, Karunagappally Municipality is divided into 10 traffic zones, and outside study region is divided into 13 traffic zones, outside region include the immediate surrounding areas, adjoining Districts and neighboring States. The traffic-zoning pattern adopted for the study is shown in figure 10.17 and table 10.7.

10.2.1.9.CHARACTERISTICS OF INTER-CITY PASSENGER TRAFFIC

MODAL-SPLIT

The inter-city passenger transport in Karunagappally is predominantly met by road based KSRTC buses, private buses, mini-buses, and a host of personalized vehicles like four-wheelers, two-wheelers etc. An analysis of the O-D survey data collected from outer cordon survey locations revealed that an estimated 291,718 inter-city passenger trips were performed in the study region on a reference day consisting of 159,777 bus passenger trips (54.8%), 45,358 car trips (15.6 %), 64,976 two-wheeler trips (22.3%), and 21,608 auto trips (7.41%). It could be inferred that public transport had a significant role in meeting the inter-city passenger demand. Figure

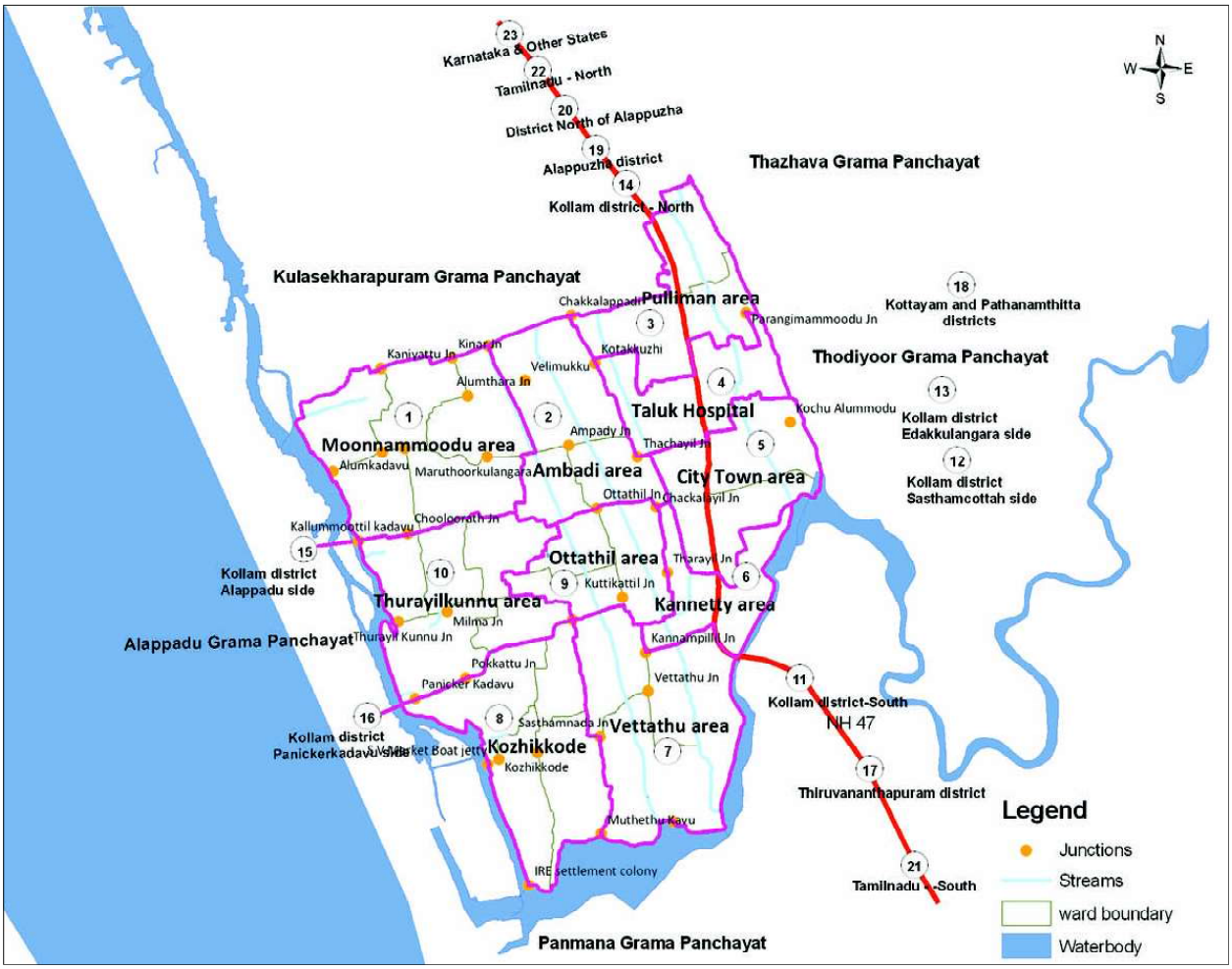


Fig. 10.17. Traffic-zoning pattern

Sl.No.	Survey location	Peak hour	Cross movements	Lateral movements
1	Lalaji Jn/Kollam Arm	16.15 -17.15	64	1,265
2	Lalaji Jn/Panikkar Kadavu arm	16.00 -17.00	27	290
3	Lalaji Jn/Alappuzha Arm	18.15 -19.15	58	455
4	KSRTC Jn/Sasthamkotta Arm	9.00 -10.00	651	207
5	KSRTC Jn/Alappuzha Arm	9.30 -10.30	500	1,106
6	KSRTC Jn/Kollam Arm	9.45 -10.45	282	1,166
7	Civil station Jn/Alumkadavu Arm	14.15 -15.15	164	628
8	Civil station Jn/Kollam Arm	16.45 -17.45	487	3,719
9	Civil station Jn/Sasthamkotta Arm	17.30 -18.30	561	887
10	Civil station Jn/Alappuzha Arm	16.45 -17.45	586	3,764
11	High School Jn/Kollam Arm	15.45 -16.45	1,364	2,085
12	High School Jn/Alum kadavu Arm	15.45 -16.45	274	1,138
13	High School Jn/Railway Station Arm	16.00 -17.00	104	299
14	High School Jn/Alappuzha Arm	18.00 -19.00	95	1,418
15	Taluk Hospital	16.00 -17.00	185	456

Table 10.6. Peak hour pedestrian movements at major locations in Karunagappally town

Zone code	Zone name	Wards included				
1	Moonnamoodu area	1	2	3	4	35
2	Ambadi area	5	6	7	8	
3	Pulliman area	9	11	12		
4	Taluk hospital area	10	13			
5	Town area	14	15	17		
6	Kannetty area	16	18			
7	Vettathu area	19	20	21	26	
8	Kozhikkode area	22	23	24	25	
9	Ottathil area	27	28	29		
10	Thurayil Kunnu area	30	31	32	33	34
11	Kollam district - south of NH 47					
12	Kollam district - Sasthamkotta side					
13	Kollam district - Edakkulangara side					
14	Kollam district - north of NH 47					
15	Kollam district - Alappadu side					
16	Kollam district - Panikkar Kadavu side					
17	Thiruvananthapuram district					
18	Kottayam and Pathanamthitta districts					
19	Alappuzha district					
20	Districts north of Alappuzha district					
21	Tamil Nadu - South					
22	Tamil Nadu - north					
23	Karnataka and other states					

Table 10.7. Traffic-zoning pattern - Karunagappally Municipality

10.18 gives the modal split of inter-city passenger traffic in Karunagappally town.

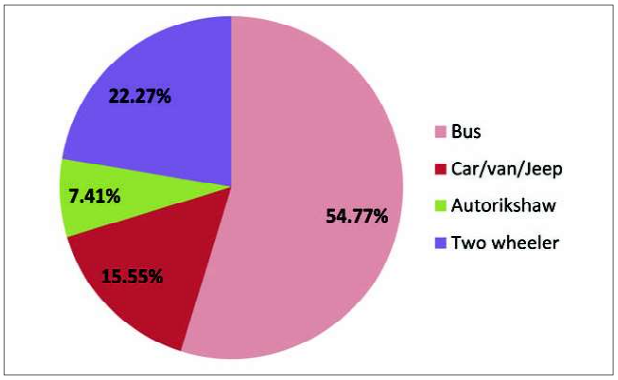


Fig 10.18. Modal-split of inter-city passenger traffic in Karunagappally town

ORIGIN-DESTINATION OF PASSENGER TRIPS

A total of 291,718 passenger trips were performed as inter-city trips in the study region on a reference day. The major traffic generating zone within the study region was the Town area with 87,084 trips while other zones had very little generation of trips. Kollam districts north of Karunagappally generated as many as 71,000 inter-city trips and south of Kollam district generated 47,000 trips. Sasthamkotta side generated about 39,000 trips. About 20,000 trips were originated from other districts in the State (Fig. 10.19).

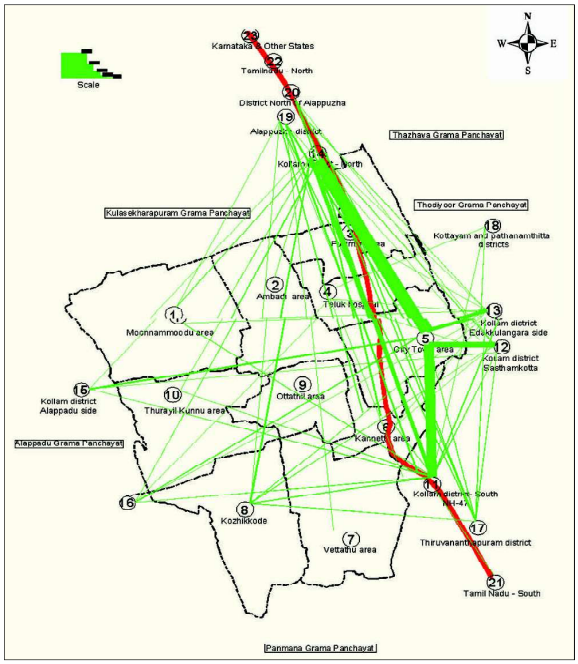


Fig. 10.19. Desire line of inter-city passenger traffic in Karunagappally town

PATTERN OF INTER-CITY PASSENGER TRIPS

The O-D pattern of inter-city passenger traffic revealed that there were 132,158 internal - external trips (Study region to outside study region), out of 291,718 inter-city passenger trips. They constituted 45 per cent of total trips. A total of 105,411 trips were

external – internal trips (outside study region to study region) constituting 36 per cent of the total trips. External – external trips to the tune of 54,149 were performed through the study region and they were about 19 per cent of the total trips. Pattern of inter-city passenger trips are given in Table 10.8.

Pattern of movement	No. of passengers	Percent of passengers
Internal to External	1,32,158	45.3
External to Internal	1,05,411	36.13
External to External	54,149	18.56
Total	2,91,718	100

Table 10.8. Pattern of passenger movements through Karunagappally town

INTER-CITY GOODS TRAFFIC

A maximum number of 5,428 goods vehicles passed through Pulliman point on NH 66 comprising 2,583 trucks, 2,053 mini-trucks and 792 goods autos. At Kannetty Palam on the southern end on NH-66, a total of 4,984 goods vehicles were observed on the reference day, of which 2,877 were trucks

MODAL SPLIT OF GOODS TRAFFIC

A total of 8,246 goods vehicles were found to be involved in carrying goods traffic to and from the study region, consisting of 3,898 trucks, 2,810 mini-trucks and 1,539 goods autos. The quantum of goods handled by these goods vehicles was to the tune of 21,000 tonnes. Trucks carried the maximum volume of goods traffic (85.9%), followed by mini-trucks (8.6%). The remaining 5.5 per cent of goods traffic was handled by goods autos (table 10.9).

Sl. No.	Mode of travel	No. of vehicles		Quantity carried	
		No.	Percent	Tons	Percent
1	Truck	3,898	47.27	17,996	85.89
2	Mini-bus/ tempo	2,810	34.08	1,800	8.59
3	Autorikshaw	1,539	18.66	1156	5.52
Total		8,246	100	20,952	100

Table 10.9. Modal split of inter-city daily goods traffic (in tonnes) in Karunagappally

ORIGIN-DESTINATION OF GOODS TRANSPORTATION

Inter-city movement of goods to the tune of 20,952 T was carried out over the study region. The major traffic generator of goods traffic within the study region was town area with 4,518 tonnes most of them bound for other districts within the State. Among the zones outside the study region but within Kollam district, traffic generation was high from south side of the town with 4,194 tonnes, and north of town with 2,389 tonnes. Other districts together had generated 5,000 tonnes of goods traffic while other States contributed 2,000 tonnes.

Similarly in the case of goods traffic attraction, Karunagappally town had the dominant share with 2,696 tonnes. Among the external zones, while Kollam district other than the study region attracted 3,000 tonnes, all other districts together attracted 3,000 tonnes. 1,250 tonnes of goods traffic was terminated in other States (Fig. 10.20).

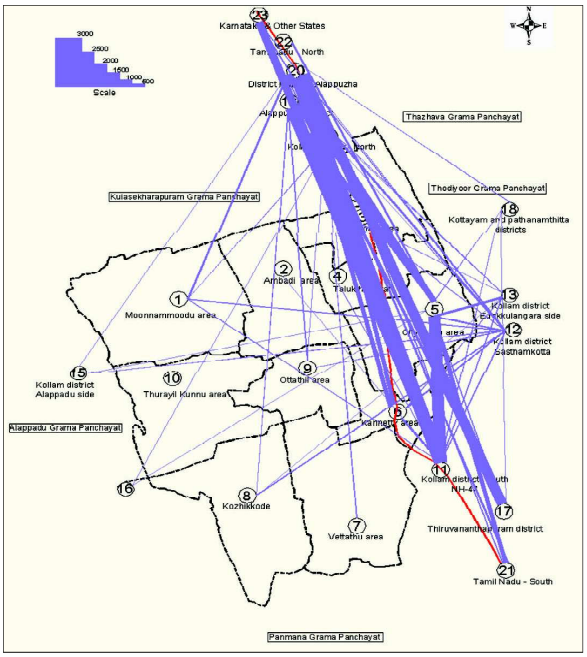


Fig. 10.20. Desire line of inter-city goods traffic in Karunagappally town

PATTERN OF GOODS TRAFFIC

A further study of the goods traffic pattern observed within the study region vis-a-vis the outside study region revealed that 6,067 tonnes of traffic originated from the study region and 4,669 tonnes of traffic terminated in the study region. Nearly 10,216 T of traffic (49%) are of divertible nature, which, are passing through the CBD area of the city due to non-availability of bypass (Table 6.10).

Pattern of movement	Quantity carried (M)	Percent
Internal to External	6,067	28.96
External to Internal	4,669	22.28
External to External	10,216	48.76
Total	20,952	100

Table 10.10. Pattern of goods movements through Karunagappally town

10.2.1.10. PARKING SURVEY

Parking accumulation and duration survey were carried out at all the major road stretches where the parking accumulations were found to be high. Figure 10.21 shows the locations selected for parking survey. Table 10.11 shows peak parking accumulation of vehicles at various road stretches in Karunagappally town. It was found that the NH 66 section between KSRTC Jn and Civil station Jn had the highest parking accumulation of 332 vehicles parked on a normal working day. 216 of these vehicles were found to be two wheelers, followed by 93 cars and 19 passenger autos. Majority of the vehicles parked at most of parking corridors on NH were found to be for short duration of less than 30 minutes. 56 to 72 per cent of the vehicles parked on selected parking corridors were found to be parked for duration of less than 30 minutes. Long duration vehicles constituted between nine to 22 per cent of the total vehicles.

Sl. No.	Name of road stretch	Length (m)	Type								Total
			Bus	Mini bus	car	auto	two wheeler	truck	mini truck	goods auto	
1	Karottu Jn to Lalaji Jn	500	-	2	32	31	135	-	-	19	219
2	Lalaji Jn to KSRTC Jn	300	-	1	17	66	98	2	8		192
3	KSRTC Jn to Civil station Jn	400	-	3	93	19	216	-	-	1	332
4	Civil station Jn to High school Jn	500	3		85	18	173	1	4	7	291
5	High school Jn to TH Jn	800	6	8	48	10	51	-	-	6	129
6	TH Jn to Pulliman Jn		-		32	22	108	-	1		163
7	Civil station Jn to Market Jn	400	-		-	1	39	-	-	1	41

Table 10.11. Peak parking accumulation of vehicles

10.3. PROBLEMS AND POTENTIALS

PROBLEMS

- The share of land use for transportation is only 2.58%, which is very low when compared with the planning standards(5-6%)
- Heavy movement of vehicular traffic along the NH 66 and inadequate carriageway width

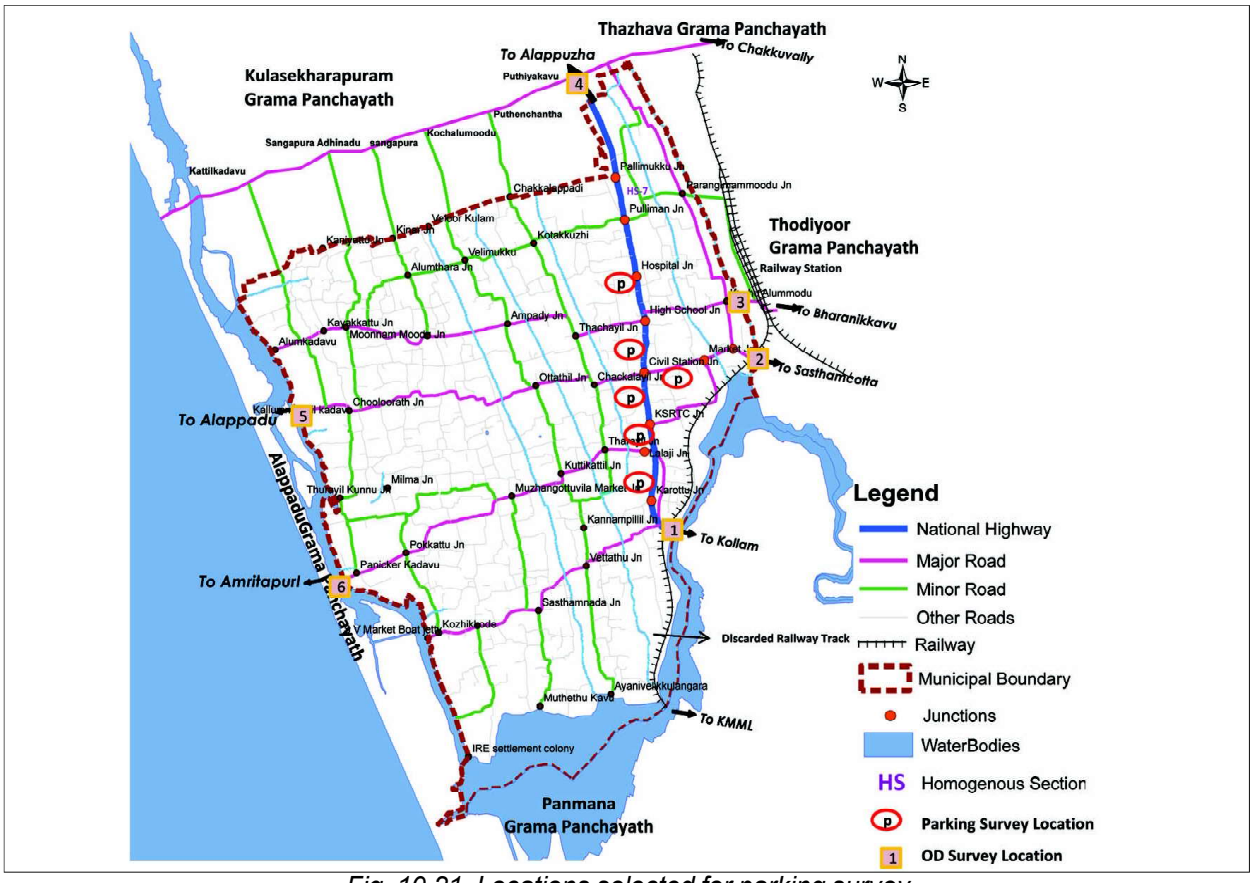


Fig. 10.21. Locations selected for parking survey

- Inter-mixing of intra-city and inter-city traffic on the NH road corridor in the absence of alternate road links
- NH-66 traffic far exceeding its capacity at present
- Unorganized on-street parking in the absence of proper parking lots
- Movement of inter-city bus traffic due to the location of inter city-bus station within the central area of the town
- Encroachment of right-of-way by hawkers, parking of vehicles
- High safety risk to pedestrian crossing the NH 66 in front of KSRTC station
- Absence of adequate design for major junctions along NH 66 like Karottu Jn, Lalaji Jn, KSRTC Jn, High school Jn, Pulliman Jn and Pallimukku Jn
- KSRTC Jn, Civil station Jn, High School Jn and Market Jn are problematic locations in the NH road corridor. The Sasthamkotta road faces traffic congestion due to presence of market and the inadequate road width.

POTENTIALS

- Grid - iron network pattern
- Discarded railway track leading to KMML
- Existing boat jetties along NW-3(Padmanabhan, S.V. Market, Alumkadavu)

The widening of NH 66 from two lane road to four lane road is on the cards and its implementation has not yet taken off due to variety of reasons. As the required land for road widening has already been acquired, it is now being utilized for idle parking of vehicles. This results in generation of lot of pedestrian movements across the right of way of NH 66 putting the pedestrians into great risk.

Chapter 11

WATER SUPPLY

In this chapter, availability of safe drinking water, the source, existing distribution system, treatment facilities, scarcity details, water quality etc are detailed out.

11.1. EXISTING WATER SUPPLY SYSTEM

COVERAGE

Water supply is a key concern when it comes to the problem of physical infrastructure. It is essential to ensure adequate supply of water in terms of reliability, quality and quantity. A broad augmentation plan to meet the projected requirement is essential.

Major implementing agencies of drinking water supply schemes in the town are Kerala Water Authority (KWA) and Rajiv Gandhi Water Supply scheme (RWS) and municipality. Water was taken from public wells belonging to the Municipality, public ponds, private wells and ponds etc. Large conversion of wetland and ponds lead to scarcity of water.

As per Secondary Data Report, there are 4617 house hold connections and 607 street taps in the municipal area through KWA. All wards are covered. The coverage of drinking water is disseminated in all 35 wards. The delivery of water is about 20 to 24 hours of supply / day. Total quantity of supply of drinking water is 15 MLD. Details are shown in table (11.1) specified below. There is a conventional water treatment plant at Oachira for purifying water. Main source of water for treatment is from Achankovil River (table 11.2). The distribution pipes are 500 mm to 50 mm. As per stake-holder discussion there are 392 household connections through Rajiv Gandhi Water Supply Scheme.

IMPORTANT SOURCES

As per socio-economic survey 61.73% depends on wells and 37.38% depends on KWA.Remaining 0.89% depends on community pond & others.

According to census 2011 uncovered wells (38.06%) and covered wells (16.22%) are the major source of drinking water (54.28%) and 37.97% depends on water from treated sources (KWA) (figure 11.1).

For water distribution in Karunagappally, Kerala Water Authority is using 5 tube wells. The details of sources are given below.

1. Tube well existing near Alumkadavu
2. Tube well in the Karunagappally market (Not working)
3. Tube well near Muthettukadavu
4. Tube well in the Thachayil mukku
5. Tube well in the Pannisseril (Not working)

Sl. No	Net work	Sources	Area of coverage (wards)	Number of houses covered/no of connections	No and Capacity (ML)of OH tank	Total Quantity supplied /day	Quality of water (properly treated/only chlorination/no treatment)
1	500 mm to 50 mm lines	Achankovil River	All Wards	4617 houses & street taps 607	5 nos 1.65 (1650000 liters)	15 MLD	Properly treated

Source: Secondary Data Report – 2012

Table.11.1. Coverage of drinking water supply in Karunagappally Municipality

Source of water	Present use	Quality of water source wise	Organic content of the water resources measured in terms of BOD	Physical characteristics – colour, odour, turbidity etc	PH level	Major sources of pollution (industrial waste, domestic waste, hospital waste, market waste, garages)	Yield from the sources (MLD)
Achankovil River	Drinking Water	Potable water that can be used after Chlorination		Normal	--	Domestic waste	

Source: Secondary Data Report - 2012

Table.11.2. Major sources of drinking water in Karunagappally Municipality

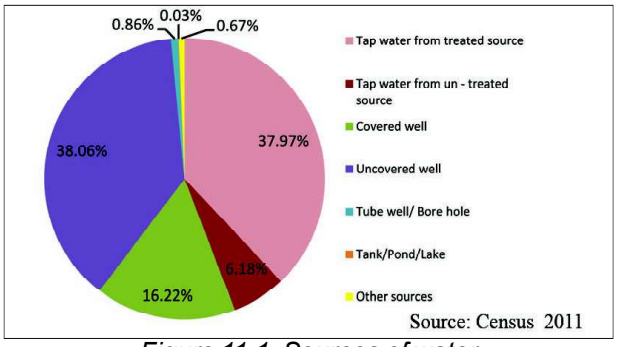


Figure 11.1. Sources of water

Rajiv Gandhi Water Supply Scheme has 6 tube wells in the municipality (Alumtharamukku (Ambedkar Jn), Maruthoorkulangara, Ottathilmmukku, Mravana Jn, Pallikkal and Kayakad Jn (West). At present tube wells at Alumtharamukku, Ottathilmukku and Pallikkal are not functioning.

DISTRIBUTION OF DRINKING WATER

Total quantity of water supplied in the town is 15 MLD. As per Water Authority/Local Body/ Discussion with Stake Holders, there are 20 to 24 hours of drinking water supply in all 35 wards. The percentage of houses where source of water is less than 0.5 kilometer is 100 percent (i.e, distance to water sources). Dependence by households for domestic water supply on traditional ground water systems is 55 percent, where 30 to 40 percent uses piped water supply systems. The remaining 5 percent use community well and other systems. Even then continuous distribution of drinking water is not available in many wards.

11.2. SCARCITY DETAILS

The socio economic survey reveals that 99.18 percent have no water scarcity. Table 11.3 reveals that only 0.52 percent has drinking water scarcity of 1 to 2 months, 0.15 percent has scarcity of 2 to 3 and 0.15 percent has scarcity of more than 6 months.



OHST at Alumkadavu

11.3. GROUND WATER LEVEL & QUALITY

No studies have been conducted regarding groundwater quality of Karunagappally. The quality of ground water is generally good for drinking and irrigation. Managing and protecting surface and groundwater is essential. A continuous water quality monitoring program and proper water safety plan are essential to preserve and improve the water quality. Average Ground Water table depth is 2.87 meter. Higher concentration of iron content which results in a reddish brown stain is observed around western parts of the municipality.

11.4. PROBLEMS AND POTENTIALS

PROBLEMS

- ❖ Large dependency(61%) on tube wells & private wells
- ❖ The average size of plot is between 6 to 10 cents (83.32%)

Category of scarcity	No scarcity	1-2 Months	2-3 Months	3-6 Months	more than 6 months
Average % for the LSGI	99.18	0.52	0.15	0	0.15

Table 11.3. Drinking water scarcity in Karunagappally Municipality

- ❖ The power failure at WTP, Oachira for a long time affects water supply to the municipality
- ❖ The western boundary of Karunagapally Municipality faces scarcity of drinking water even after commissioning of the water supply scheme

❖ No schemes for recycling waste water in the town

POTENTIALS

❖ Presence of ponds, streams and public wells

11.5. INFERENCE

Karunagappally Municipality is blessed with natural water resource. These may be utilized & preserved optimally as drinking water sources for the Municipality. There are no schemes for recycling waste water in the town. There is no ongoing or committed project with any agencies.

It is imperative to not only initiate new projects and upgrade present infrastructure, but also to promote water conservation through an integrated and a community driven model, comprising of short term and long term measures. Ground water recharging through rain water harvesting, conserving water bodies and controlling groundwater extraction is imperative. Water bodies and aquifers should be conserved. The concepts of 'zero run-off drainage', with retention ponds, sediments traps and balancing ponds should be adopted, with a segregated wastewater disposal system.

Chapter 12

SANITATION

Solid waste management has been recognized as a major component of sustainable development. Waste minimization still being the most important and initial priority of the waste management processes, awareness and capacity building of the society becomes a critical part of any strategy for attaining a societal behaviour in conformity with the changing paradigms of centralized scientific management of waste. At the same time, paucity of land also poses problem for locating sites for centralized treatment and disposal.

According to the socio economic survey conducted, sanitation is the major priority of development at ward level as well as HH/ level. About 23% are of the opinion that sanitation is to be given first priority of development at municipality level.

12.1. DRAINAGE

12.1.1. EXISTING DRAINAGE NETWORK

The town slopes from north-east to south-west. Sloping terrain facilitated easy drainage in earlier days. Huge conversion of paddy and wet lands for residential & commercial purposes caused water logging in south west areas of the municipality. Water-logging was not reported as a serious issue during stake holder discussions but it was reported as major problem from many of the sub-standard housing areas located on the south-western areas of the municipality. Figure 12.1 shows the water logged areas. There is no proper drainage facility in the town. Drainage possess a major problem and necessary steps has to be taken to drain water to the natural streams and backwaters.

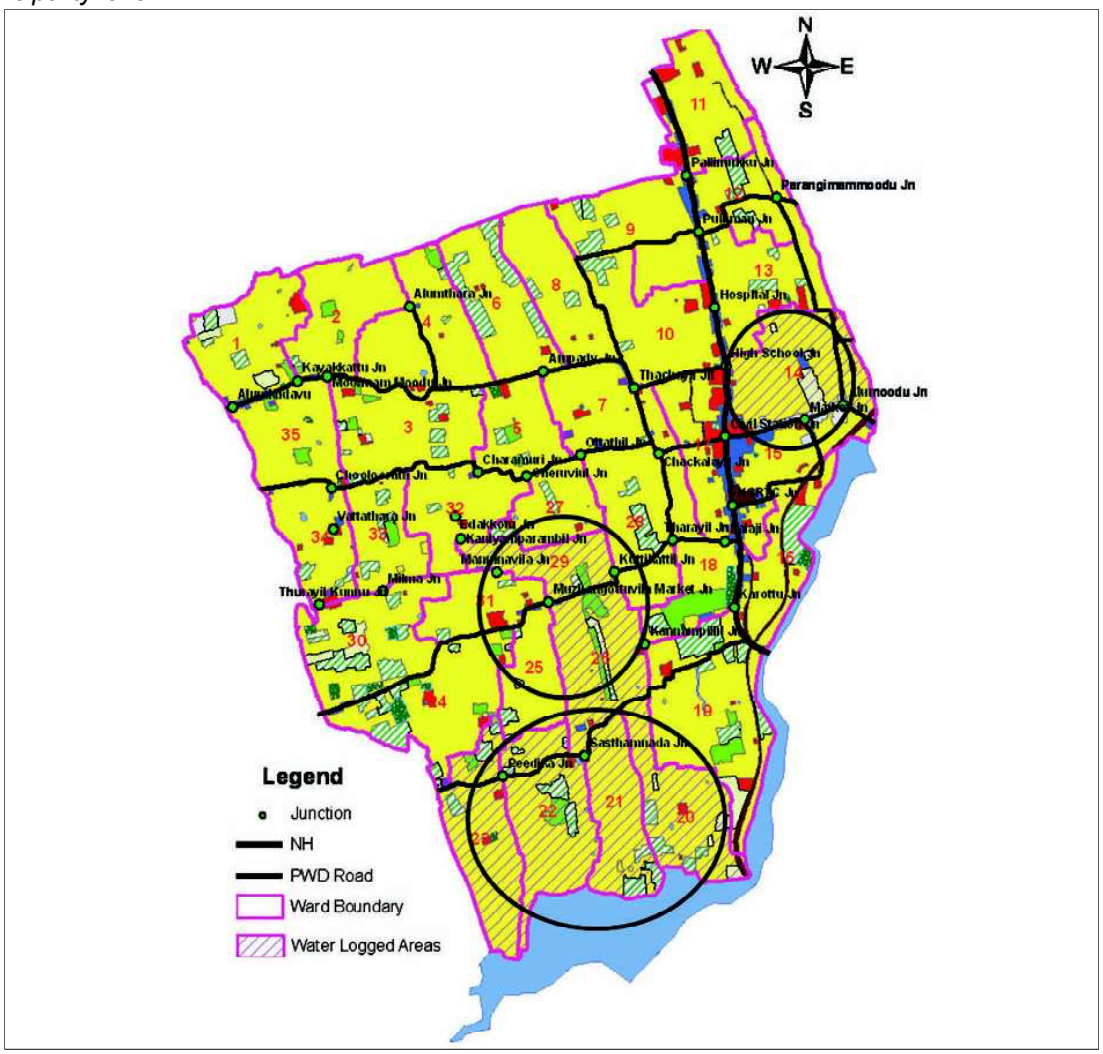


Fig 12.1 Map showing water logged areas

12.1.2 INFERENCE

Filling of low lying areas, streams, ponds and paddy leads to water logging and reduces the water recharge facilities of the area. Enforcement of laws prohibiting filling and strategies for replenishing ground water table can be adopted. Proper drainage system has to be developed in the municipality.

12.2. SEWERAGE SYSTEM

An organised sewerage system is an important aspect to create healthy living conditions. Currently there is no sewerage system in the Town. There is no piped sewerage system existing in the Town, other alternate and traditional methods of sanitation are in practice by people like water closets/septic tanks, pit latrines or defecating in the open. People largely depend on individual septic tank for disposing sewage. Socio-economic survey reveals that 80.34% depends on septic tank, 4.02% depends on pit latrine and 15.64% depends on others for sanitary waste disposal. 2.23 % of household's do not have any sanitation facility. It can be seen that majority in wards 20, 21, 22,23,24,25 & 26 depends on other methods. However a sewarage system is a must atleast for the central area of the town like Karunagappally in the future.

Figure 12.2 shows the spatial distribution of ward wise sanitation facilities in the municipality. The average size of plots in each of the wards as per the socio-economic survey (2012) is shown in figure 12.3. 32 % of the average size of plot is between 6 to 10 cents and 33 % of the average size of plot is between 11 to 25 cents. There are no ongoing and committed project under sewage disposal with any agency.

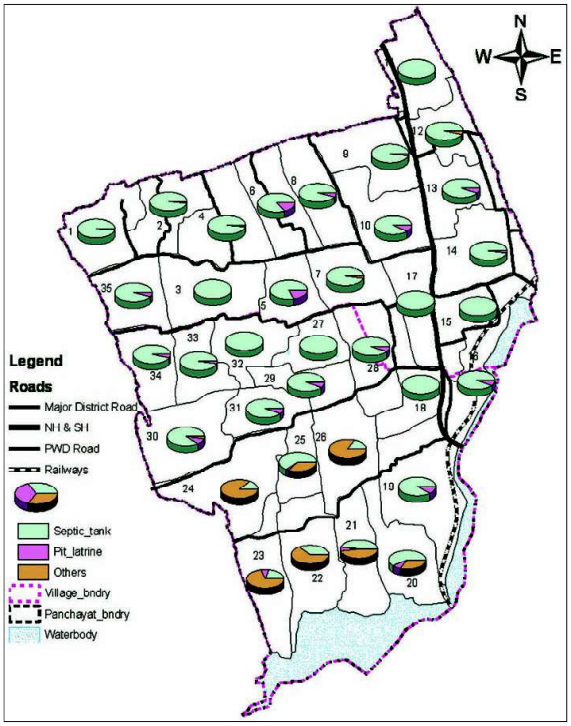


Fig 12.2 Spatial Distribution of ward wise Sanitation facilities

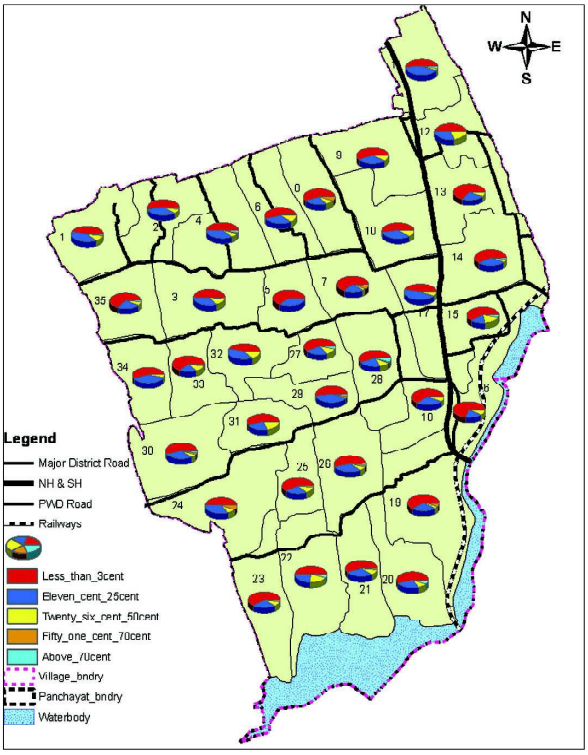


Fig 12.3 Spatial Distribution of Ward Wise Average Plot Size

12.2.1. INFERENCE

Though a sewage system for the entire municipal area is not needed, it becomes a necessity attempt for the CBD area of the Municipality.

12.3. SOLID WASTE DISPOSAL

12.3.1. GENERATION AND COLLECTION

Solid wastes from Karunagappally and nearby local bodies were dumped in Karunagappally town before the upliftment of Karunagappally Panchayath to Municipality. As a solution, the Panchayath has fixed and started operating biogas plant and vermi compost plant of 500kg for solid waste management in 80 cents of land at Kesavapuram (Ward 19), which is 2.5 kms away from town area. When the Panchayath was uplifted to municipality adjacent 103 cents of lands were bought and added for expansion of plant operations with in a plot of area. Now the plant is functioning within a plot of area 1.83 acres.

It is identified that Solid Waste Management as a thrust area, as it is found to be the root cause for many other problem areas like water logging and mosquito

menace (stake holders consultation). Majority throws waste into open spaces / drains / water bodies. It is found that major portion of solid wastes are generated from the central area of town. Solid waste includes domestic and commercial wastes, hospital wastes, e-waste and construction debris etc. According to socio-economic survey, 98.59% of solid wastes are deposited on compounds of houses. 0.52% is deposited on streets. 0.07% of wastes are deposited on garbage bins. 0.45% of wastes are dumped on open grounds and 0.37% of wastes are deposited on other areas. The markets do not have any method for the disposal of waste.

The studies conducted by National Environmental Engineering Research Institute (NEERI) in Indian cities have revealed that the quantum of municipal solid waste generation varies from 210gm/capita/day to 350gm/capita/day and it goes up to 500gm/capita/day in large cities. As per the assessment done by Water Sanitation Programme (WSP) in 2006 the per capita waste generation per day in a municipal town in Kerala in 2006 is 321 g. Hence the waste generation is assumed as 300gm/day. The total quantity of waste generated based on 2011 population is 14.88MT per day. At present only 7 T of solid waste is collected.

Wastes are collected from 9, 10,11,12,13,14,15,16 and 17 wards on daily basis by Municipality. All these wards are along the sides of NH. Rest of the inhabitants deposit on their own compound. 3 vehicles are used for the collection process. The waste from collection points are collected by manual loading into fleet of vehicles and finally disposed in an environmentally fragile site at Kesavapuram. No secondary storage space is available for solid waste collection. The collection system is managed by a Health Inspector Grade 1 who is assisted by one Junior Health Inspector (Grade 1). There are 3 Jr. Health Inspector (grade II) and 3 drivers who work on daily wages. Also there are 35 temporary workers engaged for solid waste collection and disposal. The capacity of solid waste treatment plant is reported as 2 MT. Also a bio-gas plant of capacity of 250 Kg is functioning along with the treatment plant where bio degradable waste collecting from hotels is treated. The composition of waste in Karunagappally is indicated in table 12.1

Source wise waste generation excluding markets and biomedical waste is given in table 12.2. The total waste accounts to 31.705 T. (Quantity of waste generated from commercial waste, institutional waste and hotels and restaurants accounts to 20% of total waste, domestic waste consists 42.5 % of total waste). There are no authorized slaughter house in the municipality. Unauthorized slaughter house and

Sl. No	Category	% of net wt
1	Vegetable waste	50%
2	Paper	10%
3	Fish and meet waste	10%
4	Plastic	20%
5	Glass	2%
6	Metals	1%
7	Textile	2%
8	Leather	1%
9	Rubber	1%
10	Wood	3%
	Total	

Table 12.1. Composition of solid waste in Karunagappally Municipality

Source		No. of units	Quantity (Tones/day)
Demestic Waste		49604	14.88
Commercial Waste (shops, workshps etc excluding market waste)		1500	7
Institutional waste (offices, schools etc)		75	5.3
Hotels and restaurants		60	2
Slaughter houses	Authorized	nil	nil
	Unauthorized	7	0.7
Chicken stalls		15	0.375
Hospitals and health care establishments (non infectious waste only)		20	0.05
Drain cleanings			0.2
Road sweepings			0.2
Construction material / debris			1
Total			31.7 T

Table 12.2. Details of source wise waste generation

chicken stalls together contribute 3% of the total waste.

There are 3 markets in the municipality. The municipal market is located near market junction. Other two markets are S.V. market and Alumkadavu market, which are not functioning properly. The details of the market waste generation are given in table 12.3. Bio medical wastes are managed by the concerned hospitals and its details are given in table 12.4.

Vegetables		Fruits		Fish	
No. of Units	Quantity (Tones/day)	No. of Units	Quantity (Tones/day)	No. of Units	Quantity (Tones/day)
1	1	30	1	20	1

Table 12.3. Details of market waste generation

No. of units	Treated Quantity (in kg)
Hospitals (5 Nos)	250
Other health care system (15 Nos)	30

Table 12.4. Biomedical waste generation

The total waste generated including market waste per day is 35 T and 7 T of waste are collected per day. Thus the collection efficiency is only 17.14% and hence there is an urgent need to invest on an economically and effective waste management system in the Municipality.

12.3.2. SOLID WASTE DISPOSAL PROJECT

Municipality has started taking actions for proper solid waste disposal. A biogas plant with a capacity of 500 kg is already functioning at Kesavapuram. For the development of plant, 183 cents of land is acquired by the Municipality and capacity is upgraded to 10T. Solid wastes collected from the above mentioned 9 wards on NH side are treated in this plant. Details regarding solid waste disposal is shown in table 12.5.

There are 2 proposed projects under solid waste disposal management with agency,

1. Project for windrow composting – 1
2. Project for plastic shredding unit – 1

Estimated cost of windrow compost plant is 1,58,84,000/-

12.4. PROBLEMS AND POTENTIALS

PROBLEMS

- Poor level of waste collection
- No segregation at source
- Street cleaning utterly inadequate
- Dumping of wastes in to streams and there by the streams are polluted and waterlogged
- Dumping of wastes in the public streets in front of trading centers and different areas of municipality
- No drainage system
- Wastes coming to the existing plants not efficiently separated and processed.
- The accumulation of plastic wastes
- Unable to collect and process wastes from hospitals, auditoriums, hotels etc.
- Mosquito menace due to stagnation of water in drains, streams and wetlands
- Lack of people's participation
- Separate estimates not available with regard to commercial waste (Compostable, recyclable), Industrial waste (hazardous and non-hazardous), e-waste(recyclable and non-recyclable), Construction debris(reusable as building material)l
- No waste management system for institutions
- No planned reuse/recycle. Unwillingness on part of citizens to spend on separate bin for recyclables;
- Lack of litter bins in the municipality;
- Lack of public awareness, motivation and education

Sl. No	Type of system	Source of solid waste (area/ ward)	Total quantity of solid waste generated	Total quantity of solid waste collected	Covering area / ward	Collection and details			
						Waste collecting points	Workers employed	Frequencies of collection	Vehicle uses
1	Centralized	9 to 17	10	7	Wards on NH side	Wards on NH side	25	Daily	3
Scheme insufficient – new scheme proposal submitted									

Table 12.5. Details regarding solid waste disposal



Solid wasted dumped near market junction



Solid wastes dumped in wetland near market junction

- Collection efficiency is only 17.14%

POTENTIALS

- Active residents associations and NGOs
- More than 60% of the waste are bio-degradable thus making it possible to introduce schemes for energy production
- Presence of active kudumbasree workers
- Initiation of municipality

12.5. INFERENCE

Awareness creation about the need for source segregation and differential disposal of solid waste is essential. The dwellers of the municipality shall be encouraged to treat a major portion of the solid waste within the compound of their houses. Decentralized treatment and processing of municipal solid waste with emphasis on energy production can be promoted. This helps to reduce the pressure on transportation of wastes from localities where they have been generated. Another area of attention is system for separate collection of e-wastes. Health care institutions in the planning area shall set up requisite biomedical waste treatment facilities like incinerators, autoclaves and microwave systems etc. Establishing a number of decentralized sanitary landfill facilities to be shared with local bodies in the area is another alternative. Kudumbasree workers may be deployed for collecting plastic waste which can be used for recycling purposes. Safe recycling facilities for e-waste and construction debris shall be provided and plastic free environment shall be promoted.

The objective of solid waste management system for the Municipality may be to reduce the quantity of solid waste disposed off on land through the principle of Reduce, Reuse and Recycle.

Chapter 13
ENERGY

13.1. ELECTRICITY

Electricity generation, transmission and distribution in Karunagappally is handled by the Kerala State Electricity Board which is the frame agency in this sector in Kerala. The following articles describe the present scenario in power sector in Karunagappally.

13.2. SOURCES OF ENERGY

The major source of electricity in Karunagappally is the conventional energy sources (Hydel and Thermal) provided by the KSEB. Kallada Hydro electric Power Project at Thenmala in Kollam District and Kayamkulam Thermal Power Plant in Alappuzha District are the nearby major hydel energy and thermal energy generating stations. Non conventional energy sources (private or public) are not available in the Municipality.

13.3. DISTRIBUTION NETWORK

Karunagappally Municipality mainly falls under the Karunagappally south electrical sub division. 66 KV substation at Puthiyakavu is the major feeder which distributes power to the municipality. 3 transformers (100 KVA capacity) are installed at Kottakuzhi, Pada. North and CMA no. 1. The details regarding length of electricity line is given in table 13.1.

Type	Length
11 kV line	90.2km
LT Line	417km

Table 13.1 Length of electricity lines

According to socio economic survey only 0.38% of the houses are unelectrified and there are no houses where the electricity is not available in the locality. There is a 66 kV substation at Karunagappally. Electricity is distributed via 125 transformers. Figure 13.1 shows the 11 KV distribution network of Karunagappally south electrical section.

Electricity consumption for the municipality in 2012 was 3.81 MKWH. Since there are no large or medium scale industries in Karunagapally Municipality, the consumption of electricity is generally less. The percentage of connections is given in table 13.2.

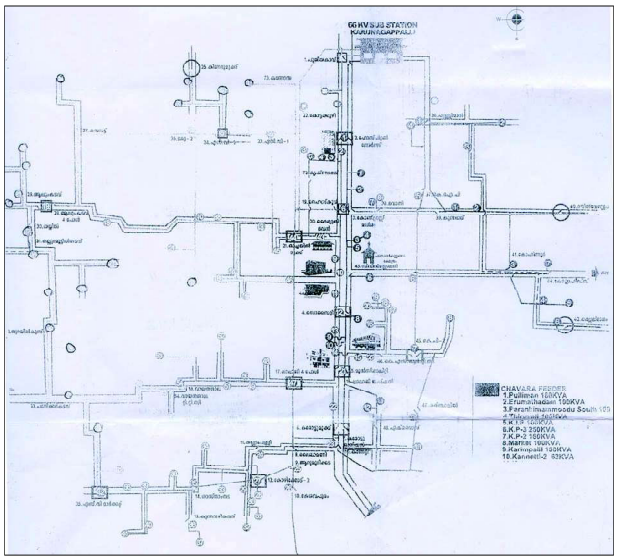


Fig 13.1. 11 KV distribution network of Karunagappally south electrical section

13.4. CONSUMPTION PATTERN

The details of consumers as on 2012 are shown in table 13.2. The total number of connections in Karunagappally Municipality as on 2012 is 18012 in which domestic consumers are the highest (14236) followed by commercial consumers (3322). The category wise percentage of connections are shown in table 13.3.

Type	Percentage of connections
Domestic	79.04
Commercial	18.44
Industrial	1.64
Agriculture & Others	0.88

Table 13.3. Percentage of connections

The category wise power consumption pattern (in MKWH) is shown in the table 13.4. From the table it is found that the total power consumption during 2011-12 was 3.82 MKWH of which the major share is utilized by the domestic sector (2.64 MKWH).

Sl.No	Total number of connections	Category wise break up - No: of connections				
		domestic	Industrial	Commercial	Agricultural	Others
1	18012	14236	295	3322	154	5

Source: KSEB, Karunagappally south electrical sub division

Table 13.2. Category wise break up- no. of connections as on 2012

Sl.No	Total consumption (MKWH)	Category wise break up of - Power consumption (MKWH)				
		domestic	Industrial	Commercial	Agricultural	Others
1	3.815	2.64	0.219	0.83	0.0024	0.124

Table 13.4. Category wise power consumption pattern

13.5. PROBLEMS AND POTENTIALS

PROBLEMS

- Frequent disruption of power due to the tripping of 11 KV OH lines
- Non-utilization of non conventional energy sources

POTENTIALS

- Up gradation of 66KV substation to 110KV substation
- Extraction of power from non-conventional energy sources

13.6. INFERENCE

The main problems faced in electricity sector are due to drawbacks in the distribution field. Most of the power failure occurs due to the tripping of 11 KV OH lines due to falling of coconut leaves, tree branches etc. over the lines. Considering existing demand, 66KV substation need to be upgrade to 110 KV substation. Overhead weatherproof lines should be changed to underground cables for domestic connections. Also extraction of power from non-conventional energy sources can be promoted in the area.

Chapter 14

EDUCATION

In this chapter, the educational status and the infrastructural facilities available in educational sector in Karunagappally are detailed out. The problems faced by educational sector are also analyzed in this chapter.

14.1. GENERAL

According to 2011 census, literacy rate of Karunagappally Municipality is 94.56% which is higher than the district figure of 94.09%. The comparison of literacy rate with district and state as per 2011 census as shown in figure 14.1.

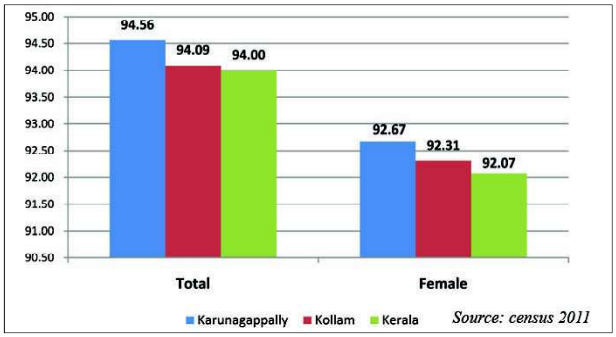


Fig 14.1. Comparison of literacy rate of Karunagappally with District and State

The literacy rate of Karunagappally Municipality was 92.07 % which is higher than the district figure of 91.24 % as per 2001 census. Out of the total population of 46716 persons, 38364 are literates. The female literacy rate of Karunagappally (80.19 %) was lower than the corresponding district figure of 88.34%. Males had a higher literacy rate of 87.24%. The male literacy rate were also lower than the district average of 94.39%. Out of the total literates, 19408 are males and 18956 are females. It is to be noted that the numbers of male literates weremore than that of female. The literacy rate comparison with district and state is shown in figure 14.2.

Educational status of the people of Karunagappally as per the socio-economic survey is shown in figure 14.3. From the figure majority of the people (37.04%) have an educational qualification of high school level. About 26.68% have a qualification of only primary level and about 12.16% are graduates. Only 3% of people are post graduates. While comparing the level of education with that of district, it is found that the level of education of the municipality is generally low.

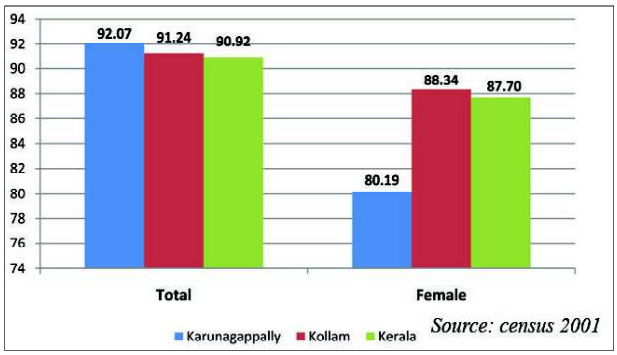


Fig 14.2. Comparison of literacy rate of Karunagappally with District and State

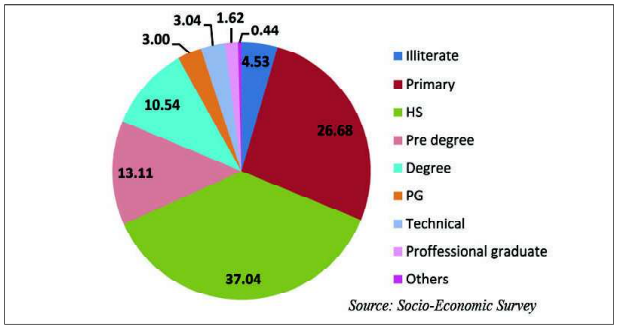


Fig 14.3 Educational Status of Karunagappally

14.2. THE CATEGORY OF EDUCATIONAL INSTITUTIONS AND THEIR NUMBERS

The number of educational institutions available within the Municipality is given table 14.1 and details of schools is given in table 14.2. As per the table there are 37 institutions for facilitating school education from primary to higher secondary level. In Karunagappally Municipality there is well served network of 19 primary schools.Oldest one is CMS LPS Kannetti which was started in 1877. Founder of GHS and BHSS is Sri. C.S. Subrahmanyam Potty, the famous writer. This institution was started in 1915, exclusively for girls as a primary school. The bifurcation of the institution as GHS and BHS was during the late 1960's. Students

Sl. No.	Category	Number
1	Primary school (up to 7th)	19
2	High School	7
3	Higher Secondary School	5
4	Vocational Higher Secondary School	1
5	Special school for mentally disabled	1

Table 14.1. Number of institutions

Sl. No.	Category	Govt			Aided			Unaided		
		School	Student	Teachers	School	Student	Teachers	School	Student	Teachers
1	Primary school (up to 7th)	10	2990	121	5	716	35	4	2784	83
2	High School	2	1419	40	3	2207	57	2	471	61
3	Higher Secondary School	1	735	22	1	454	40	3	132	74
4	Vocational Higher Secondary with School	1	196	21	0	85	11	0	0	0

Table 14.2.Details of schools in Karunagappally Municipality

from fishermen community from various places of the State are studying in Dr. V. Velukutty Arayan Memorial Fisheries Technical VHSS.

Block resource centre under control of SSA is functioning in the compound of Town LPS by adopting modern teaching methodologies the centre have greate potential to develop as a modern training centre for imparting training to teachers upto high school level.

Majority of the population get the necessary education from Government schools and hence the Government schools play a vital role in education sector. But these schools lack in infrastructure facilities like well-stocked library, interactive science centre, multimedia class rooms, well equiped science labs, multipurpose halls etc. Upgrading of facilities, where students strength has been gradually declining, would attract more students.

14.2.1. PRIMARY SCHOOLS

Spatial distribution of primary schools in the municipality is shown in figure 14.4. From the figure it is observed that the distribution of the primary schools are spatially balanced. Hence an analysis is carried out out to assess the adequancy of primary schools with respect to the service areas. A maximum distance of 1 k.m from the school is assumed as a convinient distance for a child in the primary class to travel daily without any physical stress.

The service area of each primary school is plotted and shown in figure 14.5. The spatial distribution of density is also shown in the same figure.

About (56%) of primary schools (10 Nos) are in Government sector and 22% (4 Nos) in both aided and unaided sectors. The details of primary schools are shown in table 14.2. From the figure it is seen that there are 5 partially uncovered wards in the municipality. Primary schools need to be functioning in these areas as primary education is the basic right of every child.

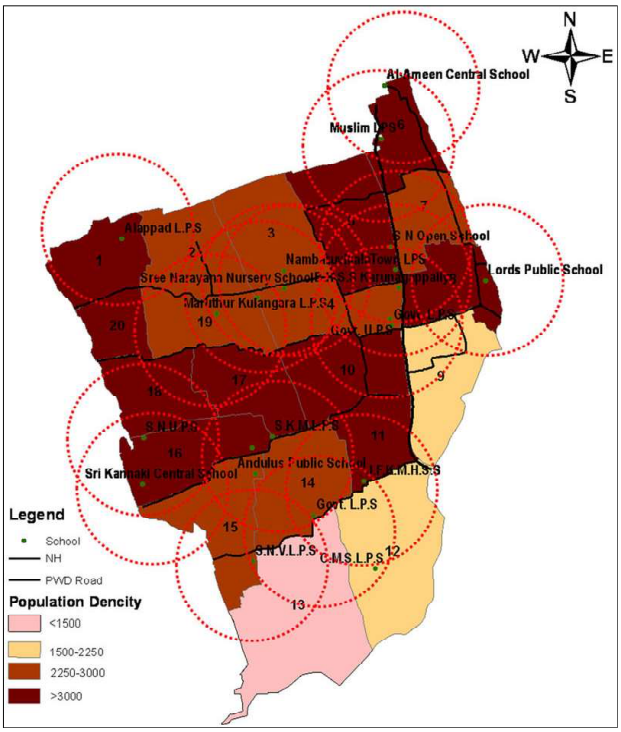


Fig. 14.4. Spatial distribution of primary schools in the municipality

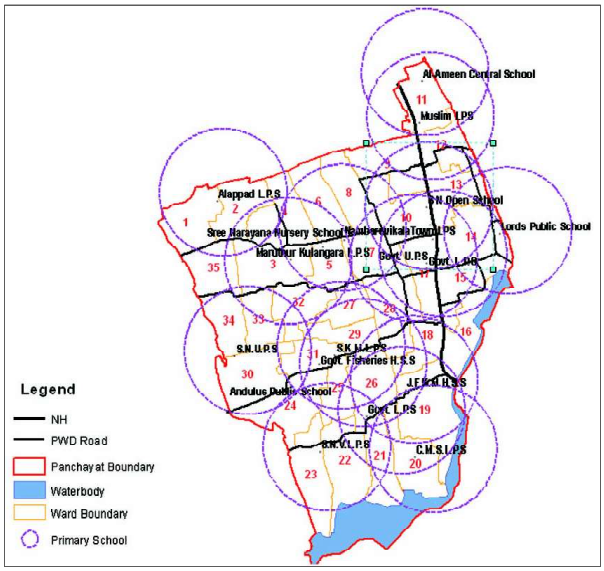


Fig. 14.5. Service area of each school in the municipality

It is found that the average number of student in Government primary school is 2990 which is high comparing to that of aided school (716) and unaided school (2784). Also the teachers – students ratio are 1:25, 1:21 and 1:34 respectively for Government, aided and unaided schools. The recommended teacher's – student's ratio in the draft rules for the implementation of the Right to children to free and compulsory education Act in the state is 1:30 for standard 1 to 5. Hence from the analysis of teacher's – student's ratio it can be seen that, teachers – students ratio in Government and aided school is high when compared to the standard where as the ratio is low in the case of unaided schools.

14.2.2. HIGH SCHOOLS

The total number of high schools in the municipality is 7. As per planning standard developed by the department of Town and Country Planning, one high school of 700 seats is required for a population of 13000. Hence for a population of 46716 around 4 schools are necessary. Hence in case of high schools, it can be assumed that the number of high schools is sufficient for the existing population of municipality and it supports a population of about 44284 outside the municipality.

Out of 7 high schools in the municipality majority of schools (3 nos) are in the aided sector. Number of high schools in both Government and unaided sector is 2. The spatial distribution of high school is shown in figure 14.6. All the high schools are situated along the

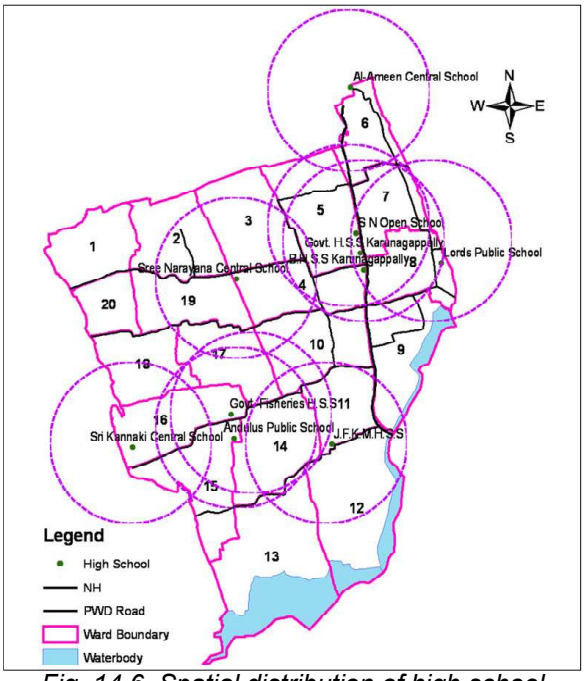


Fig. 14.6. Spatial distribution of high school



Government HSS, Karunagappally

sides of major roads it is observed from the table 14.2. that the number of students in Government high school is 1419 where as in aided school the students strength is 2207 which is more than that of Government schools. In the case of unaided schools the students strength is about 471. While assessing the teacher's students ratio, it is found that in Government schools this ratio is 1:35.5. The teacher's students ratio of aided school is 1:38 and those of unaided school is very high (1:8) comparing to Government and aided sector. As per the draft rules, the teacher's – student's ratio for standards VI to VIII is recommended as 1:35, if the same ratio is maintained for high schools also.

14.2.3. HIGHER SECONDARY SCHOOLS

The total number of higher secondary schools available in the municipality is 5 with students strength of 1321 (table 14.2). As per the planning standard a population of 46716 around 4 schools are required. Hence in case of higher secondary schools, it can be assumed that the number of higher secondary schools is sufficient for the existing population of municipality. Out of the total number of 5 higher secondary schools, the share of Government sector is more (56%) followed by aided sector (34%).

The total number of students in Government higher secondary school is 735 which is high comparing to that of aided schools. The teachers students ratio in Government schools is nearly 1:22. The main reason for increased number of teachers in higher secondary schools is that unlike high schools more than one teacher is required for teaching each subject with sub groups. If the acceptable teacher's student's ratio is considered as 1:40 it can be assumed that in the existing higher secondary schools enough number of teachers are available and if the number of divisions can be increased, with the present teacher's strength more number of students can be accommodated.

14.2.4. ARTS AND SCIENCE COLLEGES

There is only one arts and Science College within the municipality situated in ward 16 shown in figure 14.7. As per the planning standard one college is required for a population of 80,000. Hence for a population of 46716 one number is sufficient.

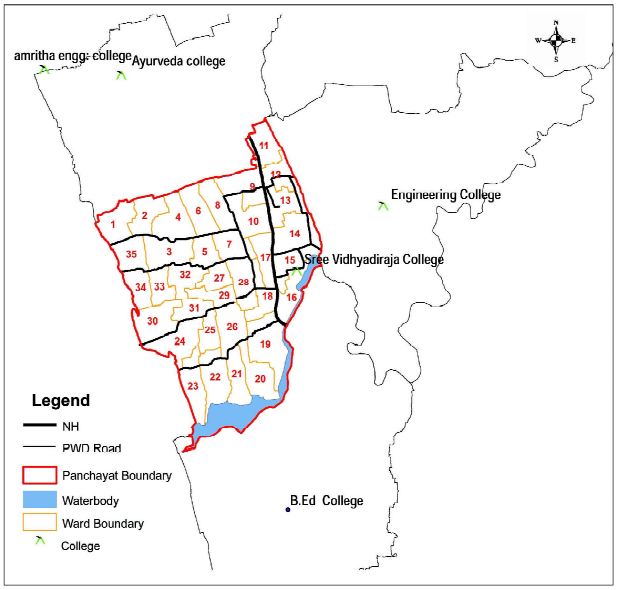


Fig. 14.7.Higher educational facilities available in and around the municipality

14.3. EDUCATIONAL FACILITIES COMPARATIVE STUDY WITH PLANNING STANDARDS

The educational facilities required as per planning standards is given in Table 14.3.

Sl No	Category	Planning Standards	Remark
1	High School	1 H.S for 13000 Ppn	Satisfied
2	Higher Secondary School	1 H.S.S with 8 divisions for 13000 Ppn	Satisfied
3	Arts & Science College	1 Arts & Science college for 80000 Ppn	Satisfied
4	Technical Education College	1 Professional college for 2,50,000 Ppn	Not Satisfied
5	Polytechnic College	1 Polytechnic for 36000 Ppn	Not Satisfied
6	ITI	1 ITI/ITC for 35000 Ppn	Satisfied

Table 14.3. Comparison with Planning standards in educational sector



Government FHSS, Kozhikode

14.4. PROBLEMS AND POTENTIALS

Shortage of modern academic facilities, infrastructure facilities and dearth of open recreational facilities for the mental and physical motivation of the students are the major problem facing in all educational institutions. A separate institution for mentally and physically challenged students is not yet started in this Municipality. The main problem identified under primary school is the lack of modern study tools such as smart class rooms, computer lab with internet facilities etc. Lack of building, drainage facilities, hygiene toilets, modern academic facilities such IT lab are other main problem. Majority of the blocks of Govt. HSS are in dilapidated condition. There is potential for upgrading the academic range of Govt. FHSS by using the facilities available in the nearby Neendakara and Azheekkal fishing ports and inland fishing areas of Karunagappally Taluk. Also there is potential for upgrading Vidhyadiraja Arts and Science College to PG level. The GHS is capable for upgradation to higher secondary school

14.5. INFERENCE

When the basic educational facilities available in the Karunagappally Municipal Town are compared with the planning standards, it is seen that the facilities are deficient in the level of professional education. Also it is seen that the existing infrastructural facility needs improvements further so as to attract more students and to increase the overall quality of education. Another area of priority will be education of differently abled children through appropriate support to the institutions working with government assistance and through positive Government initiatives.

Chapter 15
HEALTH

In this chapter existing health facilities, disease pattern and development issues existing in the municipality are detailed out.

15.1. GENERAL

The standard of living is mainly depending upon the general health of the population. Total number of medical institutions is above 100 in Kollam district including primary and community health centers. In Karunagappally special attention is being given to increase health care facilities. With the advancement of science & technology and access to modern medicine, health facilities have increased a lot. Usually health status is measured in terms of mortality indicators like death rate, Infant Mortality rate and expectation of life at birth. A strong infrastructure provides the capacity to prepare for and respond to both acute and chronic threats to the health problems of the people. A sound infrastructure serves as a foundation for planning, delivering and evaluating public health. The public health infrastructure comprises the workforce, information systems and public health organizations.

15.2. HEALTH CARE INSTITUTIONS

The details of health care institutions in the municipality is given in table 15.1. The total number of health care institutions in the municipality is 18

Sl. No	Name of Hospital	Location /Ward	Category*	Number of beds	Number of Doctors	Type
Allopathic Hospitals						
1	Taluk head quarters hospital,	Taluk Hospital ward	7	190	23	Govt.
2	A.M hospital	Karunagappally Town	4	90	12	Pvt.
3	SBM Hospital	NH 47 Pada. South	4	40	4	Pvt.
4	Unity Orthopedic centre Accident & Trauma care unit	Karunagappally Town	2	8	1	Pvt.
5	Ideal Hospital & Clinic	Karunagappally Town	3	20	5	Pvt.
6	Pearl hospital	Karunagappally Town	3	60	6	Pvt
Ayurvedic Hospitals						
1	Govt. Ayurveda Dispensary, Karunagappally	Thachayil	1	Nil	1	Govt.
2	Sanjeevani Ayurveda hospital	Karunagappally Town	2	5	1	Pvt.
3	Vaag Bhada Ayurveda Hospital	Karunagappally	2	6	1	Pvt.
4	Sushrutha Ayurveda	Pada North	2	4	1	Pvt.
5	RPM Ayurveda Hospital	Kannetty	2	7	1	Pvt.
6	Vydhya Ratnam Arya Vydhya pharmacy	Karunagappally Town	1	Nil	1	Pvt.
7	Kottakkal Arya vydhya sala	Karunagappally Town	1	Nil	1	Pvt.
Homeopathic Hospitals						
1	Government Homeo Dispensary, Karunagappally	Nediyavila	1	Nil	1	Govt.
2	Government Taluk Homeo Hospital (One ayurh doctor from NRHM fund)	Maruthoorkulanagara LPS	7	25	3	Govt.
3	Dr.Rajaram's Clinic	Karunagappally Town	1	Nil	1	Pvt

Table 15.1.Details of health care institutions in the municipality

Category 1 – Clinics only OP
Category 2– Hospitals with 24 hrs service
Category 3 – Hospitals with single Operation theatre [Specify no. of operation theaters and category i.e. major/minor]
Category 4 – Hospitals with more than one OT
Category 5 – Hospitals with advanced diagnostic facilities like CT scan, EEG
Category 6 – Super specialty hospitals
Category 7 – Referral Hospital (Govt. Sector)



Taluk Hospital - Karunagappally

including 2 primary health centres. The share of private sector is more (83%) comparing to government health care institutions (17%). Figure 15.1 shows the spatial distribution of allopathic hospitals in the planning area. Most of the hospitals are located along the sides of the national highway.

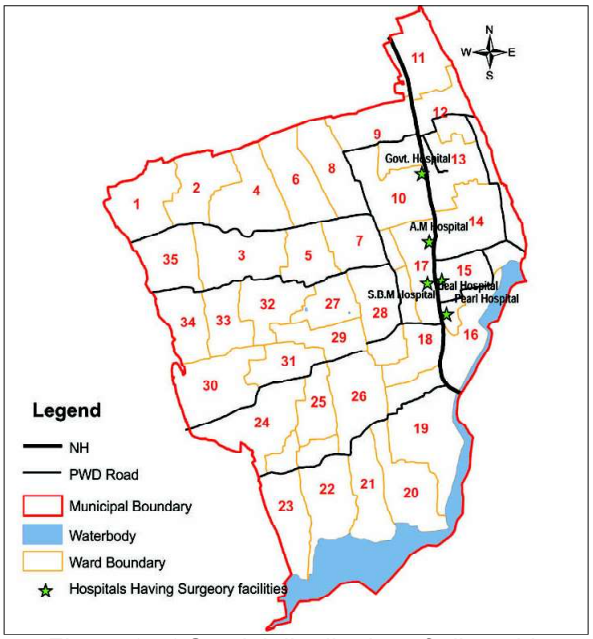


Figure 15.1 Spatial distribution of allopathic hospitals in the planning area

The Government homeo dispensary located at Nediyavila with one doctor. The spatial distribution of homeopathic dispensaries is shown in figure 15.2. It is seen that homeo dispensaries are evenly distributed in municipality.

In the case of Indian system of medicine, there is one Government Ayurvedic Dispensary with one doctor at Thachayil junction. The spatial distribution of Ayurvedic dispensaries is shown in figure 15.3. From the map it is seen that Ayurvedic dispensaries are distributed in the eastern side of the municipality.

Primary health care centers may be considered as the basic infrastructure in health sector. There are 2 primary health centers in the municipality. The spatial

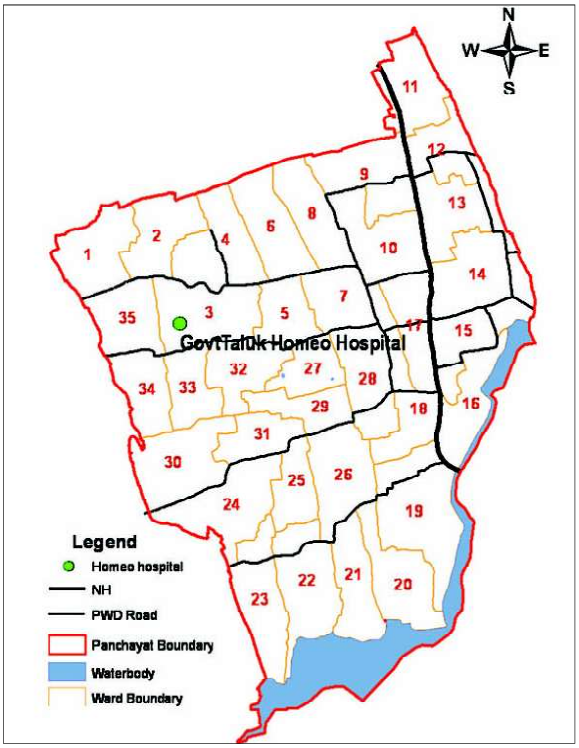


Fig.15.2. Spatial distribution of homeopathic dispensaries

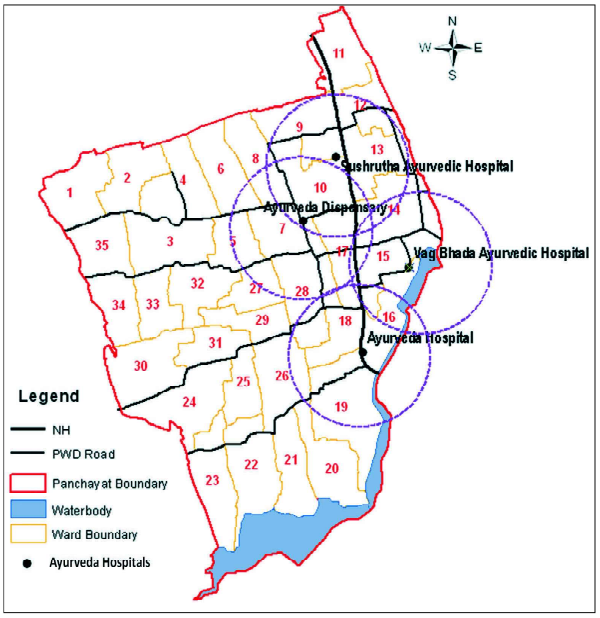


Fig.15.3. Spatial distribution of Ayurvedic dispensaries

distribution of primary health care centers in the municipality is shown in figure 15.4. From the figure it is clear that one is situated in Ayanivelikulangara Village and other in Karunagappally village.

15.3. DISEASE PATTERN

From the secondary data, the major disease affecting people are viral fever. Which are 100% cured.

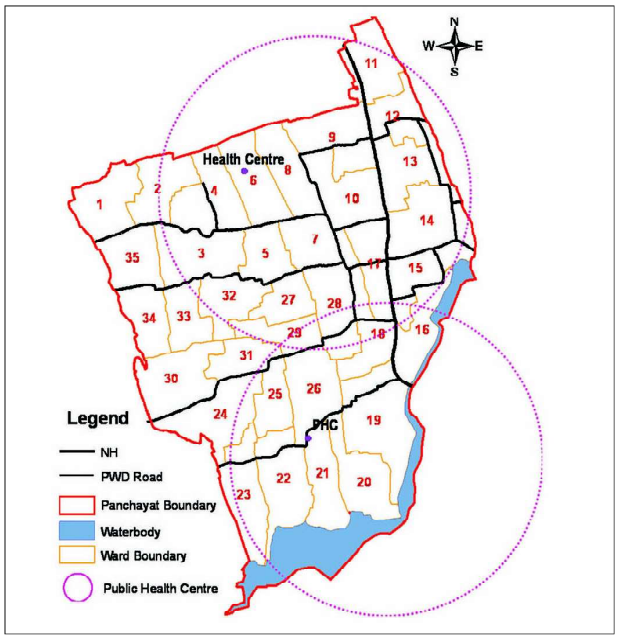


Fig 15.4. The spatial distributions of primary health care centers

Socio economic survey reveals that about 28.44% of the people are affected by Chicken Guinea.

While analyzing the waste management facilities of major hospitals in the municipality it is found that all the hospitals have their own project for disposal of waste.

15.4. PROBLEMS AND POTENTIALS

PROBLEMS

- Absence of blood bank
- Absence of dialysis facility
- Absence of required quantity of drinking water and lack of toilet facility
- Absence of effective functioning labs
- Absence of super specialty hospital

POTENTIALS

- Presence of Taluk Hospital and Taluk Homeo Hospital

Chapter 16

RECREATIONAL FACILITIES

Recreational facilities includes parks and open spaces, play grounds, theatres, multi pupose open space, botanical garden, zoological parks and other facilities like water bodies and other natural features.

16.1. PARKS AND OPEN SPACES, PLAYGROUNDS / STADIUM

There are no parks, play grounds and stadium in the municipality. From the analysis of the existing land use, it is found that there are open maidans which constitute only 0.02% of the total land use. There is no organized open spaces or parks for the public to use in the Municipality, but the existing ones are either attached to the schools or vacant land at the time of survey which are temporarily used as maidans. The share of recreation is quite low when compared to the planning standards. Water body constitute above 6.27% of the area. Hence recreational potential may be considered as 6.29% of the total area. As per recommended standard for small town 15 - 18 % land may be reserved for recreational activities. So apart from waterbodies there is a need for construction of parks and open spaces and stadium in the municipality.



Khan Theatre

16.2. THEATRES

There are 4 cinema theatres in Karunagappally such as Janatha theatre, TNP theatre, Krishna theatre and Khan Theatre. TNP theatre is situated near municipal office. It has a capacity of 544 seats. Krishna theatre is situated near Maha deva temple and it has 760 seats. Khan theatre is located at Nambaruvikala and it has 734 seats.

16.3. OTHERS

Vattakayal and Kannetti kayal constitute 6.25% of the total area. Vattakayal suffer due to dumping of solid waste. The potential as recreational facilitiy is not fully utilized. At present Sree Narayana Boat Race is conducted each year during the month of September. The boat race attract many tourists. Accessibility by roads is limited.

16.4. PROBLEMS AND POTENTIALS

The recreation facilities are a few in Karunagappally Municipality. With the fragmentation of residential property, people have lesser open spaces attached to their houses. Dumping of solid waste in Vattakayal and Kannetti kayal needs immediate attention. So construction of a stadium for encouraging sports and Parks & open spaces should be made available for increasing physical and mental ability of people.

Chapter 17

OTHER CIVIC AMENITIES

Community halls, Cremetoria, public library, maintanance of markets, Anganwadi, availability of petrol pumps, LPG godown, fire station, police station etc have been seen a function of the municipal bodies.

17.1. TOWN HALL

There is no Municipal Town Hall in the Municipality but there are four community halls/Auditorium presently functioning within the municipal area. They are used for various public gatherings. The details of halls, their locations and capacity are given in table 17.1.

Sl. No.	Name	Ward	Capacity (seats)
1	Aiswarya auditorium	9	800
2	Vandana	16	1100
3	Puthumannel	17	850
4	Chalayam	25	850

Table 17.1 Community halls in Karunagappally Municipality

17.2. READING ROOMS AND LIBRARY

There are nine libraries in the municipality. Kalavilasini grandhashala located in ward 30 is the municipal library. The libraries are as follows.

1. Pulliman Library & Reading room
2. Lalaji library
3. Kalavilasini
4. Pannisseri memorial
5. Bodhodayam library
6. Kumaranasan memorial
7. P.S Samskarika library
8. Sreenivasan memorial
9. Tagore library etc.

17.3. CREMATORIA AND BURIAL GROUND

There is a municipal crematorium at Kesavapuram over an area of 50 cent of land. But now a days it is very rarely used. People burying the deadbody in their own compound or in places attached to religious institutions as a part of ritual. Only those who have no land of their own in the Municipality bury the dead bodies in the Municipal crematorium. But in the future it will become a must as the size of landholding per house is drastically reducing.

17.4. OTHERS

There are four petrol pumps, an LPG godown, a fire station and a police station in the municipal area. The details are given in table 17.2.





Libraries in Karunagappally

Sl. No	Facilities	Name / numbers	Location	Extent / capacity of serving
1	Petrol pumps	IOC	Pulliman junction	10500 lit/day
		V.K. Janardhana pillai	Karunagappally junction, Near Mahadeva temple	10500 lit/day
		Veena fuel	Near Taluk hospital	2950 lit/day
		IOC	Pulliman junction	11000 lit/day
2	LPG godown	Shilpi gas agency	Taluk hospital junction	900 cylinder /day
3	Fire station	Near civil station	Karunagappally junction	1 acre
4	Police station	Town police station	Karunagappally junction	Karunagappally municipality

Table 17.2 Details of other facilities

17.5. PROBLEMS AND POTENTIALS

Construction of Municipal Town Hall and local community centres are required in the planning area. Modern facilities and sufficient funds for efficient functioning of libraries is also a requirement.

Chapter 18

HOUSING

18.1. INTRODUCTION

Shelter is a basic need. When the need for shelter is not satisfied, it becomes almost impossible for an individual to think of satisfying his/her family aspirations and intellectual needs. Primary responsibility of any town is to provide its members with a decent and habitable shelter. A standard housing does not mean merely land and building, but includes basic services like water supply, sanitation and access roads.

18.2. CATEGORY OF HOUSES

The socio economic survey conducted within Karunagappally Municipality in the year 2012 shows that the total number of houses is 13857 in all 35 wards. The houses are divided in to Pucca, Moderate and Kutha categories. Approximately 9399 houses are Pucca in nature. About 3340 houses falls under the category of moderate, where 1117 houses are Kutcha houses. The ward wise distribution of houses are shown in figure 18.1. The number of houses is maximum in ward.35 (580). Minimum number of houses is in ward.13 (151). 68 % of the houses are Pucca, 24 % moderate and 8% of the houses are Kuthca. According to socio-economic survey 49.29% of the households occupy 2 to 4 rooms and 50.34% have five or greater than 5 rooms. 3.87% of the households stay in rented houses. Plinth area wise categorization of houses from socio economic survey is shown in table 18.1.

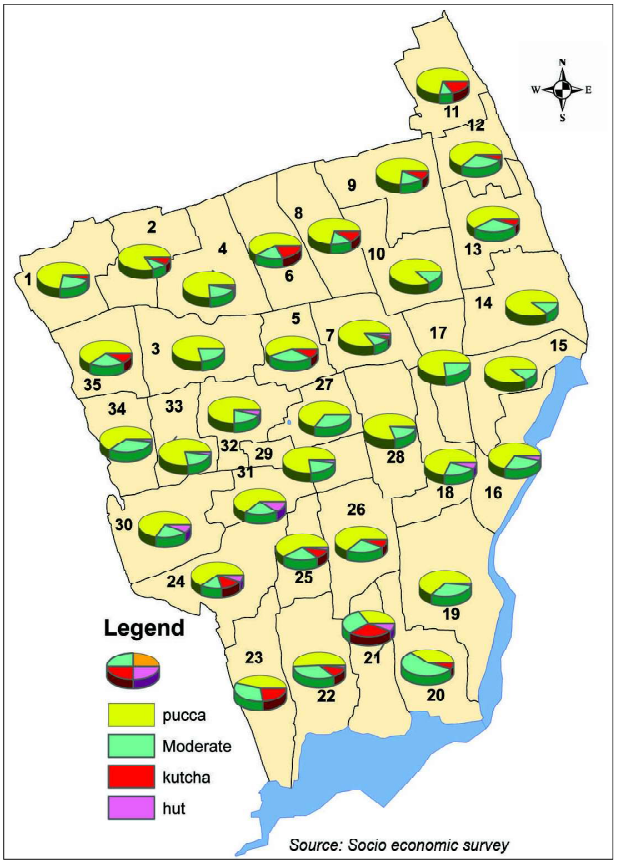


Figure 18.1. Ward wise distribution of houses

Ward No	% of building in each category of plinth area (in m^2)					
	< 20	20-50	50-75	75-150	150-250	>250
1	2.13	0	42.55	42.55	12.77	2.13
2	5.41	2.7	35.14	51.35	10.81	0
3	6.52	4.35	50	41.3	4.35	0
4	8.16	6.12	26.53	51.02	16.33	0
5	23.81	23.81	42.86	28.57	4.76	0
6	18.75	15.63	28.13	53.13	3.13	0
7	19.44	13.89	38.89	33.33	11.11	2.78
8	21.62	8.11	21.62	64.86	5.41	0
9	25	13.89	47.22	25	11.11	0
10	47.62	4.76	57.14	38.1	0	0
11	30.56	11.11	13.89	72.22	2.78	0
12	54.55	9.09	9.09	63.64	18.18	0
13	86.67	13.33	53.33	26.67	0	6.67
14	34.15	0	14.63	65.85	19.51	0
15	62.5	0	12.5	33.33	54.17	0
16	59.26	0	18.52	40.74	37.04	3.7
17	56.67	0	16.67	50	33.33	0
18	54.55	0	18.18	66.67	15.15	0
19	33.33	3.51	29.82	49.12	17.54	0
20	57.14	28.57	37.14	25.71	8.57	0
21	50	35.71	33.33	23.81	7.14	0
22	45.83	33.33	18.75	18.75	27.08	2.08
23	43.4	39.62	22.64	35.85	1.89	0
24	50	31.25	16.67	50	2.08	0
25	64.1	20.51	25.64	25.64	28.21	0
26	50	23.08	42.31	32.69	1.92	0
27	100	0	25.93	62.96	11.11	0
28	47.46	0	6.78	69.49	23.73	0
29	78.38	0	24.32	62.16	13.51	0
30	81.08	5.41	32.43	48.65	13.51	0
31	114.8	3.7	40.74	33.33	22.22	0
32	72.73	0	18.18	63.64	18.18	0
33	91.67	0	30.56	61.11	8.33	0
34	77.27	0	25	68.18	6.82	0
35	60.34	25.86	53.45	18.97	1.72	0

Table 18.1. Plinth area wise categorization of houses

According to secondary data 65.72% of the houses are pucca, 24.98% semi pucca and 9.3% kutcha in nature. Wardwise distribution of classification of houses is shown in figure 18.2. Pucca houses are seen along the sides of major roads and majority of semi pucca and kutcha houses are seen along the south western side of the municipality.

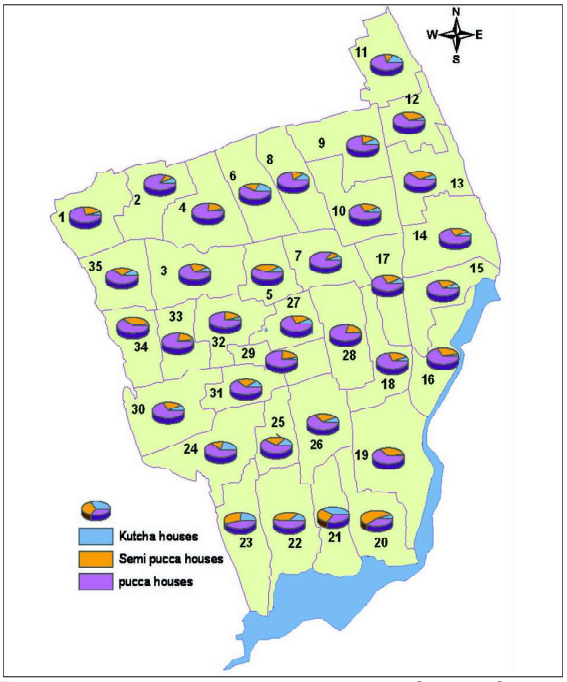


Figure 18.2. Wardwise distribution of classification of houses

According to 2011 census houses classified according to predominant material of wall 60.94% of houses are constructed with burnt brick, 26.59% of houses are constructed with stones packed with mortar (figure 18.3).

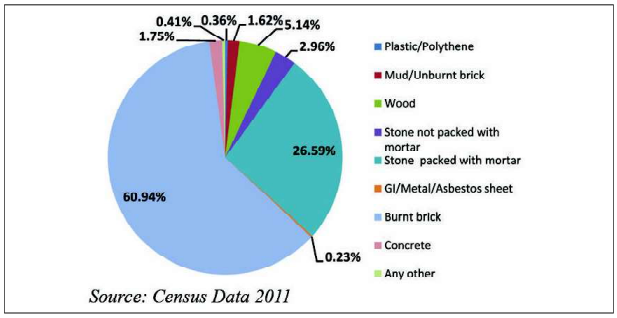


Fig. 18.3.Classification according to predominant material of wall

According to 2011 census houses classified according to predominant material of roof 65.49% of houses are constructed with concrete (figure 18.4).

18.2.1. HOUSEHOLD SIZE

Household size of Karunagappally has decreased from 6 (1981) to 4 (2011). When compared with other

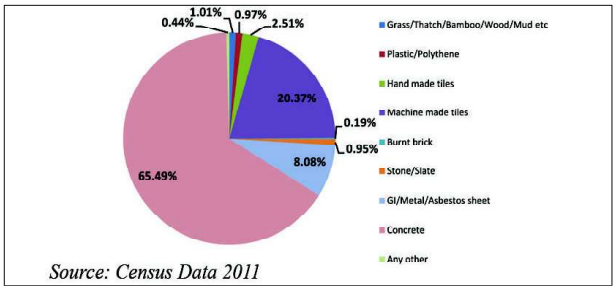


Fig. 18.4. Classification according to predominant material of roof

urban local bodies the household size is high in Paravur (4.1) & low in Punalur (3.7) (figure 18.5).

Total number of households in Karunagappally Municipality is 12292 in 2011 and the same was 10409 in 2001. The household size is showing a decreasing trend. The number of households during 1971, 1981, 1991 and 2001 were 5550, 6636, 8397 and 10409 respectively. However the Municipal record shows that the construction of residential buildings is at a low pace. The average construction rate for the last 4 years from 2009 is about 112 houses per year. Majority of the building activities are going under private sector.

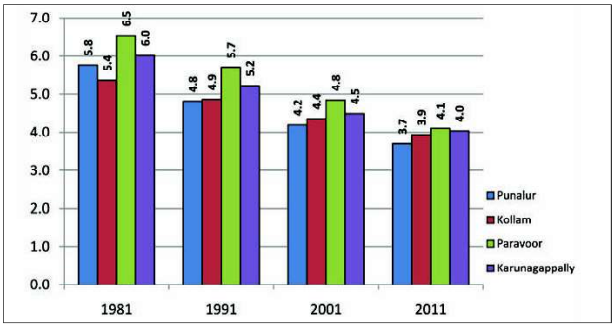


Fig. 18.5. Household size of Karunagappally

Many projects are undertaken under the initiation of municipality for housing. Construction of flat for housing 36 houseless landless families are undertaken by the Housing Board. Financial aid was given for 27 families for construction of houses during 2012-13. Initiatives were taken for housing 70 families under Thanal Bhavana Nirmana Padhathi for SC/ST and for housing 35 families under Kerala State Development Corporation for SC/ST. Initiatives for procuring land for 77 families are also undertaken under Kerala State Development Corporation for SC/ST.

18.3. HOUSING SHORTAGE

Housing shortage is estimated in terms of excess households over houses including houseless households, congestion (number of married couples requiring separate room/house), replacement/

upgradation of kutcha/unserviceable kutcha houses and obsolescence/replacement of old houses. At present as per census 2011 there is a housing shortage of 101 dwelling units.

18.4. SUB-STANDARD HOUSING/ SLUMS

Sub-standard housing colonies are housing agglomerations with no or in insufficient basic facilities. The details of substandard housings are given in table 18.2. Their locations are given in figure 18.6. The total area under substandard housing is 13.01hectares and the number of houses in the substandard housing areas is 642. The majority of people in substandard housing areas are backward classes and below poverty line.

GRADING OF SUBS-TANDARD HOUSING/ SLUMS

Data on the availability of infrastructure in each of the above colonies are collected during the survey. (The survey format was prepared based on the report on Urban Slums in Kerala,1985, Town Planning

Sl. No.	Name of the Slum	Ward	Total area (Ha)	No of Houses	Housing category		
					Pucca	Moderate	Kutcha
1	Mambozhil Leksham Veedu Colony	2	0.32	18	18		
2	Makkattu colony	4	0.32	15	10	5	
3	Thayyil kizhakkethara colony	4	0.12	11	6		5
4	Machinatu colony	4	0.28	10	5	4	1
5	Lakshamveedu colony	11	0.38	16	10	2	4
6	Thiruvally colony(Myhri Nagar)	13	0.32	27	15	5	7
7	Kalari colony	16	0.32	18	11	6	1
8	Mathruka Nagar Harijan colony	19	0.92	38	29	7	2
9	Salvation army Tsunami settlement colony	19	0.58	34	34		
10	Amrutha Nagar Tsunami SettlementColony	20	0.92	54	54		
11	Maharashtra Govt.Tsunami colony	21	1.11	63	63		
12	Jayaraj Nagar colony(Govt.Tsunami settlement colony)	21	0.49	28	28		
13	Moothethu colony	21	0.61	10	10		
14	World Vision Nagar	22	1.05	21	21		
15	QSS colony(Thiruhridaya Nagar)	22	0.26	15	15		
16	Amrutha Settlement Tsunami colony	22	0.28	16	16		
17	IRE Settlement colony	23	0.74	35	23	9	3
18	Amrutha Settlement colony(kottara colony)	23	1.15	63	63		
19	Mahatma SC colony	24	0.16	10	1	9	
20	Amrutha settlement colony	24	0.32	17	17		
21	Manannavila Lakshamveedu colony	29	0.4	22	19	3	
22	Kavanal Laksham Veedu colony(Kalavilasini Nagar Residence association)	31	0.53	18	9	5	4
23	Amrutha colony	33	0.2	12	12		
24	World Vision Tsunami colony	33	0.4	23	23		
25	Tsunami colony(vadoor puraidam)	33	0.2	12	12		
26	QSS colony	33	0.25	15	15		
27	Muraseril Laksham veedu colony (Thurayilkunnu)	34	0.38	21	17	4	

Table 18.2. Details of slums / sub-standard housing colonies

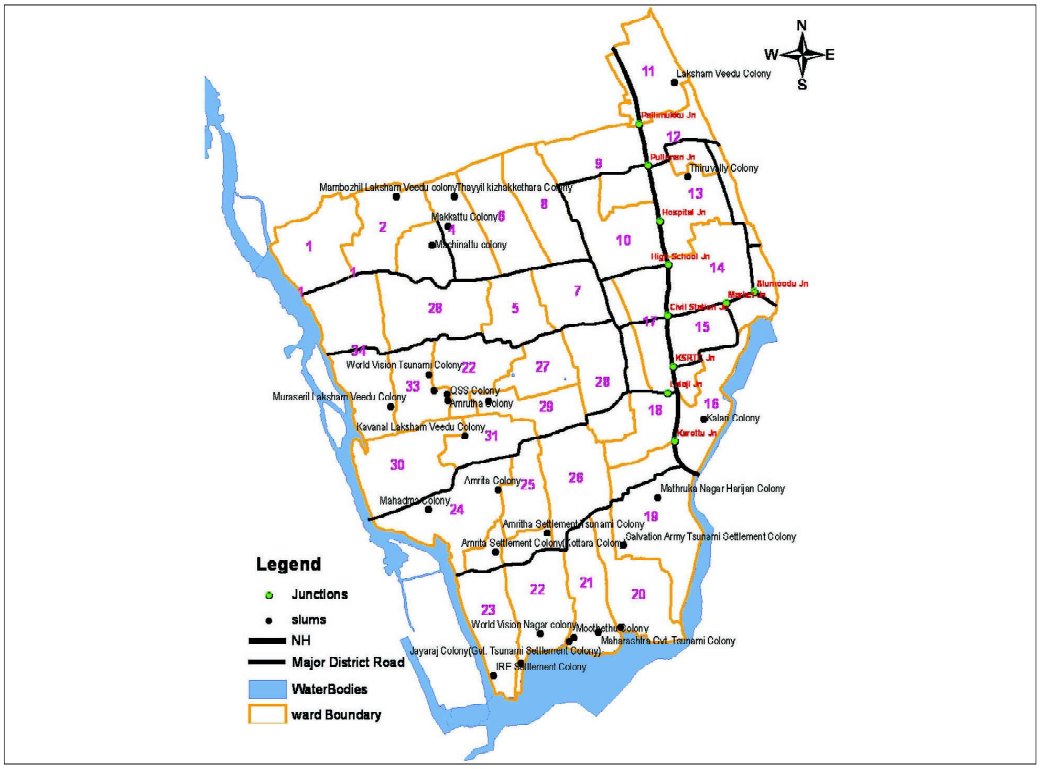


Fig 18.6. Location of slums / sub-standard housing colonies

Department). The methodology adopted for identifying urban slums includes assigning weightage on basic amenities, density of population, number of scheduled caste/scheduled tribe population and the structural condition of dwelling units in the area. The indication of backwardness, their minimum standard and weightage assigned are listed in table 18.3. The area with weightage of 40 or above would be treated as slums.

All the 27 substandard housing areas identified are assigned weightages based on criteria mentioned in table 18.3. Table 18.4 gives the combined weightage of all the 27 colonies.

GRADE-D

Colonies with combined weightage of 40 or above are categorized as Grade D which can be considered as Pucca slums. The colonies identified in grade D

Sl.No	Indicators of Backwardness	Minimum Standard/Bench Mark	Maximum Weightage when amenities are completely absent
A	Adequacy of basic amenities		
1	Inadequacy of latrine facilities	One seated latrine for every 20 persons	10
2	Inadequacy of drainage system and exit for sullage and rain water		10
3	Inadequacy of access road		8
4	Inadequacy of water supply	One tap point for every 100 persons	5
5	Inadequacy of street light	One street light for every 30 meters	5
B	Density of Population	100 persons/acre (250 persons/Hectare) gets 5 point and one point each for every additional 20 persons	20 Maximum weightage when density reaches 300 persons per acre
C	Scheduled Caste/Scheduled Tribe Population	30% above	10 Maximum Weightage
D	Structural conditions of dwelling units	50% or more huts or dilapidated structures	5 Maximum Weightage
Total			73 points

Table 18.3. Indicators of Backwardness, their minimum standard/benchmark and the weightage assigned

Sl No	Name of Colony/Slum	Weightage								Combined Weightage
		Sanitation facilities	Drainage	Access Road	Water Supply	Street Light	Density	SC Population	Housing Condition	
1	Mambozhil Leksham Veedu Colony	0	10	3	2	5	5	3	0	28
2	Makkattu colony	0	10	6	0	0	2	7	0	25
3	Thayyil kizhakkethara colony	0	10	5	5	1	6	9	4	40
4	Machinatu colony	0	10	2	3	0	1	6	1	23
5	Lakshamveedu colony	0	10	2	2	2	2	1	2	21
6	Thiruvally colony (Myhri Nagar)	0	8	4	5	0	7	2	2	28
7	Kalari colony	0	10	3	1	2	4	3	0	23
8	Mathruka Nagar Harijan colony	0	10	4	0	4	0	6	0	24
9	Salvation army Tsunami settlement colony	0	.	4	0	0	7	1	0	12
10	Amrutha Nagar Tsunami Settlement Colony	0	10	4	0	0	5	0	0	19
11	Maharashtra Govt.Tsunami colony	0	10	2	2	0	4	4	0	22
12	Jayaraj Nagar colony (Govt.Tsunami settlement colony)	3	10	4	3	0	5	8	0	33
13	Moothethu colony	0	10	2	0	3	0	8	0	23
14	World Vision Nagar	0	10	4	0	1	0	0	0	15
15	QSS colony(Thiruhridaya Nagar)	0	10	4	1	2	6	1	0	24
16	Amrutha Settlement Tsunami colony	0	10	4	2	0	6	1	0	23
17	IRE Settlement colony	0	10	2	3	0	3	1	0	19
18	Amrutha Settlement colony(kottara colony)	0	10	4	0	0	4	1	1	20
19	Mahatma SC colony	0	10	5	1	1	6	10	0	33
20	Amrutha settlement colony	0	10	3	0	1	4	1	0	19
21	Manannavila Lakshamveedu colony	5	10	4	0	1	4	3	0	27
22	Kavanal Laksham Veedu colony(Kalavilasini Nagar Residence association)	0	10	3	1	1	2	1	2	20
23	Amrutha colony	0	10	3	3	1	5	1	0	23
24	World Vision Tsunami colony	0	10	4	0	0	6	0	0	20
25	Tsunami colony(vadoor puraidam)	0	10	3	1	0	5	0	0	19
26	QSS colony	0	10	4	0	1	5	0	0	20
27	Muraseril Laksham veedu colony (Thurayilkunnu)	0	10	2	1	1	4	2	0	20

Table18.4. Combined weightage of all the colonies

are Thayyil kizhakkethara colony.

GRADE-C

Colonies with combined weightage ranging from 30 and 39 are categorized as grade C colonies. These colonies are in slightly improved state compared to grade D colonies. However severe problems on basic infrastructure, relatively high density and social backwardness exist in these colonies. Jayaraj Nagar colony (Govt.Tsunami settlement colony) is identified as Grade C colony.

GRADE-B

Colonies with combined weightage varying from 20 – 29 are categorized as Grade B colonies. The major problem is overcrowding of people. The colonies identified to be in grade B category are as follows.

1. Mambozhil Leksham Veedu Colony
2. Makkattu colony
3. Machinatu colony
4. Thiruvally colony(Myhri Nagar)



World Vision Nagar



Maharashtra Tsunami Settlement Colony (Grade A)

5. Kalari colony
6. Mathruka Nagar Harijan colony
7. IRE Settlement colony
8. Moothethu colony
9. QSS colony(Thiruhridaya Nagar)
10. Amrutha Settlement Tsunami colony(Ward 22)
11. Amrutha Settlement colony(Kottara colony)
12. Manannavila Lakshamveedu colony
13. Kavanal Laksham Veedu colony(Kalavilasini Nagar Residence association)
14. Amrutha colony(Ward 33)
15. World Vision Tsunami colony
16. QSS colony
17. Muraseril Laksham veedu colony (Thurayilkunnu)

GRADE-A

Grade A colonies are in a comparatively well developed state. Most of the basic infrastructure are available in such areas. With less financial support this colonies could be developed as normal housing area.

1. Salvation army Tsunami settlement colony
2. Amrutha Nagar Tsunami Settlement Colony (Ward 20)
3. World Vision Nagar(Ward 22)
4. Maharashtra Govt.Tsunami colony
5. Amrutha settlement colony(Ward 24)
6. Tsunami colony(vadoor puraidam)



Jayaraj Nagar



Thayyil Kizhekkethara Colony

18.5. SPATIAL DISTRIBUTION

The ward wise distribution of houses is given in figure 18.7 & 18.8. Wards 5, 10 and 17 have the highest number and ward 7 has the lowest number of houses according to 2001 census. Wards 5, 12 and 13 have the lowest number of houses and wards 19 & 35 has the highest number of houses.

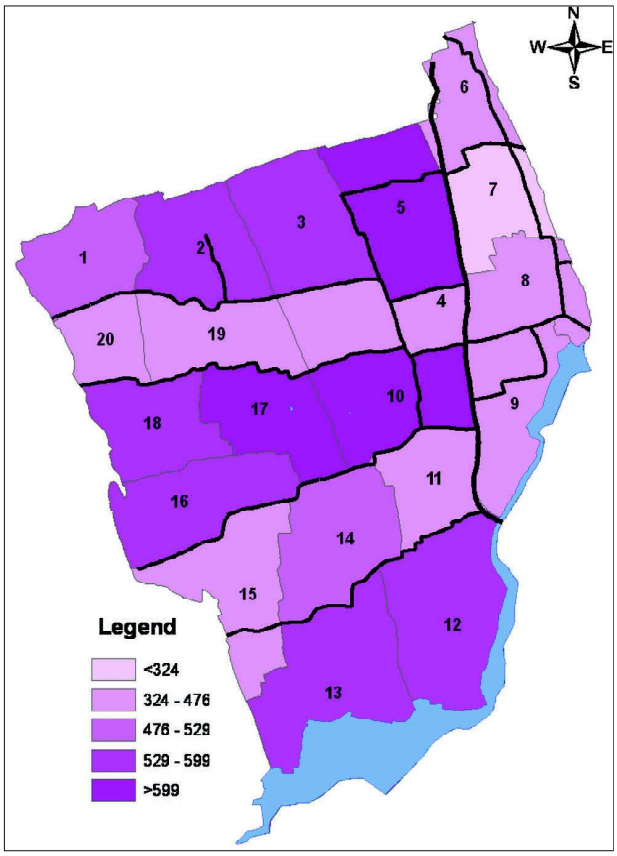


Fig 18.7. Ward wise distribution of houses (census 2001)

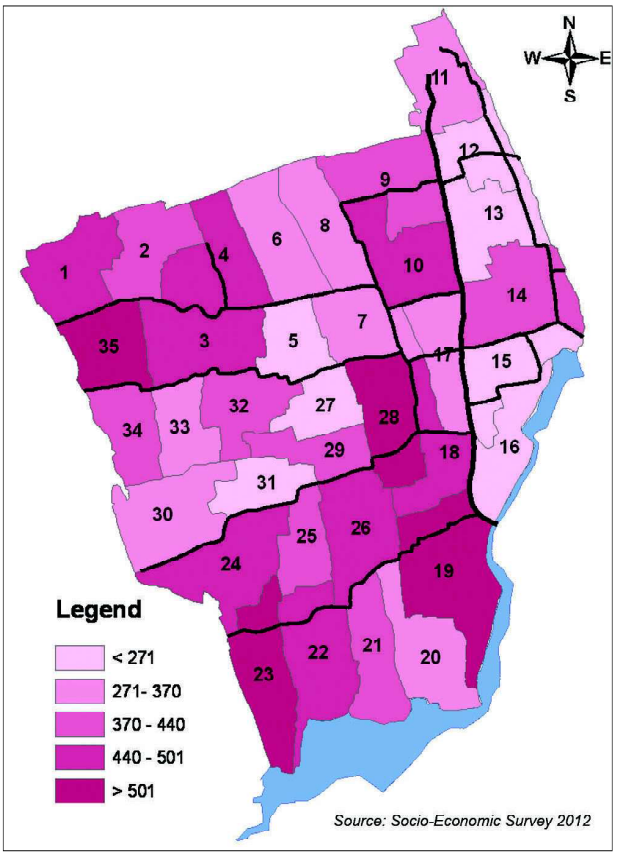


Fig. 18.8. Ward wise distribution of houses (census 2011)

18.6. INFERENCE

Rather than housing shortage, the presence of sub-standard housing colonies is main problem in the Municipality. Immediate attention is needed improve the status of basic facilities in these housing agglomerations. Thayyil kizhakkethara colony face severe problem such as absence of sanitation facility, drinking water,drainage and access road. Hence the colony should be considered as priority area while implementing improvement programmes. Grade C colonies are to be considered as the second priority areas. The status of infrastructure in Grade A and B colonies are comparatively good. Hence the colony specific issues are to solved and raised to the normal standard housing.

Chapter 19

ENVIRONMENT

The Back waters, Paddy fields, Thodu, Pond and Sacred groves attached to the temples are environmentally important areas in Karunagappally. Centuries old temples are existing in Karunagappally. The above temples are of heritage significance. In this chapter analysis is carried out for assessing the present scenario of environmentally important places and various developmental issues.

19.1. PRESENT SCENARIO

Many environmentally and historically important areas which shows the natural and cultural heritage of Kerala are present in the municipality. All these areas which includes places of scenic beauty like water bodies, mangroves, wetlands etc, which is home to a wide range of flora and fauna and old temples, sacred groves needs immediate attention as most of these places are in a degraded condition.

19.2. SENSITIVE / FRAGILE AREAS

Environmentally sensitive areas includes backwaters, sacred grooves, paddy fields, wetland and marshy areas.

19.2.1. BACK WATERS

Kannetti Back water and Vattakayal are two important backwaters in Karunagappally Municipal area. These two waterbodies have a profound influence in the environmental and economical frame work of the municipality. Home to a wide range of acquatic organisms including many consumable fishing varieties, it is very essential to ensure the environmental sustainability of these two waterbodies. Another important issue is the dumping of solid waste in Kayal. The waterbodies also have there own role in maintaining the environmental balance by replenishing the ground water reserves. The waterbodies can also be used for inland water based tourism activities.

Kannetti Kayal: - Kannetti Kayal is a water body located to the south eastern boundary of Municipal area. Originating from Thodiyoor Grama Panchayat, the Kayal enters the municipality to the east of Karunagappally market and ends up in Kothamukku bridge draining off to the Vattakayal after traveling 3.3 Km. The kayal is more like a stream flowing with a mean width of 0.15 Km.

Vatta Kayal: - Vatta Kayal is a water body located to the southern boundary of Municipal area which extends about 2.5 km with a mean width of 3.78 Km, originating from Kothamukku bridge, flowing west and draining off to the Arabian Sea. Due to sand mining, this water body is facing problems.



Vattakayal



Kannetti kayal

19.2.2. WATERSHED

The municipality consists of four watersheds (figure 19.1).

1. Pattolithodu watershed
2. Randamthazhathodu watershed
3. Moonnamthazhathodu watershed
4. Pallikkalthodu watershed

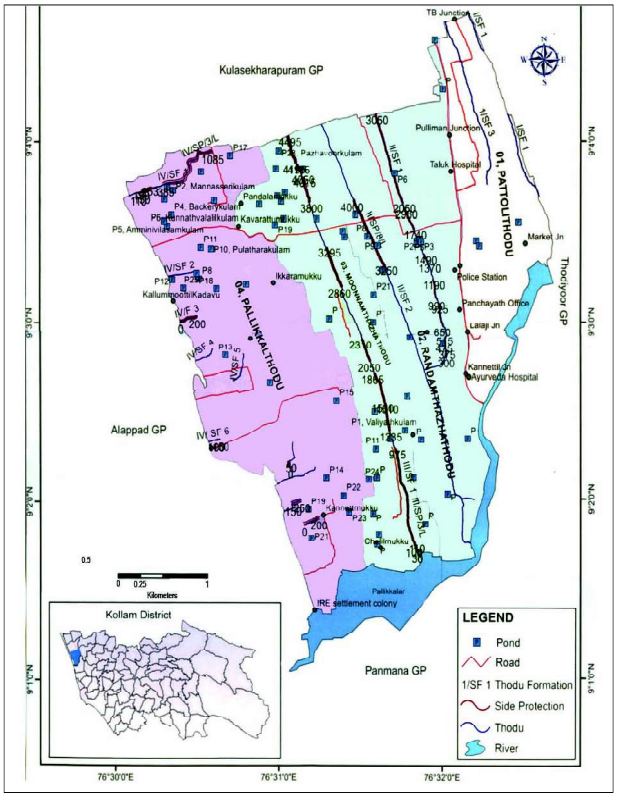


Fig 19. 1 Watershed Map- Karunagapally Municipality

PATTOLI THODE WATERSHED

Pattolithodu watershed is located in the karunagappally municipality of karunagappally thaluk, covering an area of about 272.39 hectares, including places such as South Alummoodu, North Alummoodu, Parankimammoodu, Kannetti and Puthiyakavu.

Sl No.	Name of stream	Length (m)	Width (m)	Availability of water (months)
1	Pattolithodu	900	6	12
2	Pattolithodu	475	6	12
3	Mundakappadamthodu	1900	2	12

Table 19.1. Details about water sources (Thodu)

Pattoli stream is the main water source in this watershed. In addition to this, two other streams and three ponds, with water through out the year are also available. Details regarding the water resources are given below (table 19.1 & 19.2).

RANDAMTHAZHATHODU WATERSHED

Randamthazhathodu watershed is located in the karunagappally municipality of karunagappally thaluk, covering an area of about 480.15 hectares, including places such as Kozhikode, south ayani, north ayani, pada. south, pada. north, maru. south and maru. north.

The watershed has an even and plain topography. Paddy fields are adjacent to the stream.

First Thazhathode and Second Thazhathode are the major sources of water in the watershed. These sources are fed by many small water streams. Five ponds are also there in the watershed. Details regarding the water resources are given below (Table 19.3 & 19.4).

MOONNAMTHAZHATHODU WATERSHED

It is located in the karunagappally municipality of karunagappally thaluk, covering an area of about 359.30 hectares, such as Alumthara Junction, maru. North, Nambaruvikkala, Kuttikkadu Jn., Kannampally Temple Junction, Ayanivelikulangara and the areas to the south of Vettathu Jn. extending upto the Vattakkayal near the Maharashtra colony.

The watershed has an even and plain topography. Paddy fields are there at places to the western side of

Sl No.	Name of stream	Length (m)	Width (m)	Availability of water (months)
1	Thazhathodu 1	3050	6	12
2	Thazhathodu 2	4850	8	12

Table 19.3. Details about water sources (Thodu)

Sl no.	Name of pond	Length(m)	Width(m)	Depth(m)	Availability of water (months)	ownership
1	Kodiyattumadam pond	12	12	3	12	Private
2	Kottakkakathu pond	12	15	2.5	12	Private
3	Kochumadam pond	14	15	2	12	Private

Table 19. 2. Details about water sources (Ponds)

Sl No.	Name of pond	Length(m)	Width(m)	Depth(m)	Availability of water (months)	ownership
1	Madathilkavu pond	10	5	3	12	Public
2	Vadakkeparambil pond(A)	4	3	2	12	Private
3	Vadakkeparambil pond(B)	15	10	5	12	Private
4	Kochayyathu pond	85	18	2	12	Private

Table 19. 4. Details about water sources (Ponds)

Perumbathekkathil and extending south upto the S N Central School, to the western side of palalil, to the north of kurumbi bridge on either sides and to the north of village jn. on either sides.

Vattakkayal is the major water source in the watershed. In addition 6 small water streams and 30 ponds are there. Of the 29 ponds, 20 nos. have water throughout the year. Details regarding the water resources are given below (Table 19.5 & 19.6).

PALLIKKALTHODU WATERSHED

Pallikkalthodu watershed covers an area of about 631.49 hectares, including places such as Kozhikode Thurayilkunnu, Alumkadavu and Maruthoorkulangara.

Majority of land in the watershed has a plain and marshy character and almost 25% are paddy fields.

Plasseri thodu is the major water source in the watershed. In addition 8 small water streams and 29

Sl No.	Name of stream	Length(m)	Width(m)	Availability of water (months)
1	Thazhathodu	4495	5	12
2	Pond near Kurumbi House	150	2	6
3	Ilanjiveli Padi. Pond	300	3	During rainy season
4	Pond to the east of Ayanivelikulangara Road	150	2	During rainy season
5	Pond of Kochandisseri Temple Pond	150	2	During rainy season
6	Pond to the east of Cheruvilla Veedu	150	2	During rainy season

Table 19.5. Details about water sources (Thodu)

Sl No.	Name of pond	Length(m)	Width(m)	Depth(m)	Availability of water (months)	ownership
1	Maru. Temple pond	350	300	25	12	Temple
2	Madathil pond	200	175	35	12	Panchayat
3	Valyath pond	125	100	30	12	Private
4	Vettathu jn. pond	125	100	35	12	Panchayat
5	Anchutharayil pond	100	75	20	12	Public
6	Kuruppalliyil pond	100	75	20	12	Private
7	Vayalil pond	100	75	20	12	Private
8	Padmas pond	120	90	15	6	Private
9	Kottakkakathu pond	110	75	10	6	Public
10	Kombukalikkal pond	100	70	20	6	Private
11	Layil pond	120	80	18	12	Private
12	Layil purampokku pond	140	100	20	12	Purampokku
13	Manasseril pond	80	60	8	6	Public
14	Ushas pond	35	20	4	12	Private
15	Appooppankavu temple pond	25	15	5	12	Temple
16	Puthanpura pond	35	25	15	6	Private
17	Maalekkal pond	15	10	2	12	Temple
18	Padeettadathu pond	15	10	2	12	Temple
19	Aayikkamathu pond	200	150	6	12	Private
20	Pazhavoor pond	20	15	5	6	Private
21	Mathilummoottil pond	75	50	10	6	Private
22	Pond near Health Centre	125	100	20	6	Private
23	Kannampally Temple pond	150	150	30	12	Private
24	Kochandisseri pond	75	75	20	12	Private
25	Cheruvilla pond	200	175	25	12	Private
26	Nediyathu pond	100	75	20	12	Public
27	Sasthamnada temple pond	200	175	40	12	Private
28	Kottamkulangara pond	100	100	25	12	Public
29	Kunnizhikathu pond	150	150	25	12	Public

Table 19.6. Details about water sources (Ponds)

Sl No.	Name of stream	Length(m)	Width(m)	Availability of water (months)
1	Plasseri thodu	1056	2.5	12
2	Kottayil thodu	200	2.5	12
3	Thonduthura thodu	175	2	12
4	Panayil thodu	250	2	12
5	Kannothu thodu	525	2.5	12
6	S V market thodu	150	2	12
7	Ammanchery thodu	175	2	12
8	Vayalvarathu thodu	325	2	12
9	Jettiyil thodu	130	2	12

Table 19.7 Details about water sources (Thodu)

Sl No.	Name of pond	Length (m)	Width (m)	Depth (m)	Availability of water (months)	ownership
1	Sakthiparampu pond	15	15	1.5	12	Public
2	Mannasseri pond	15	15	1	12	Private
3	Konnethara vadakku pond	20	20	1.5	12	Private
4	Bakery pond	35	35	2	12	Private
5	Amminivilasam pond	46	35	1.5	12	Private
6	Kunnathuvalayil pond	55	15	1	12	Private
7	Peedikayil vadakke pond	30	25	1.5	12	Private
8	T S pond	50	50	1.5	12	Private
9	Pathisseri pond	25	25	1	12	Private
10	Pulathara pond	50	25	1	12	Private
11	Sreesadanam pond	65	25	1.5	12	Private
12	vadayilyil pond	40	15	1.5	12	Private
13	Pallikkal pond	26	25	1	12	Private
14	Maruthoorkulangara pond	100	50	1.5	12	Public
15	Pallikkal pond	25	25	1	12	Public
16	Onampallil pond	30	25	1	12	Private
17	Eblakavu temple pond	35	20	1	12	Public
18	S V market pond	50	25	1.5	12	Private
19	Thayyil pond	25	25	1	12	Private
20	Sasthamnada temple pond	100	50	1.5	12	Public
21	Kunnilazhikathu pond	30	25	1	12	Public
22	Pullamplavil pond	35	20	1	12	Public
23	Plathara pond	50	25	1.5	12	Public
24	Mangattethu pond	25	25	1	12	Private
25	Vattathara pond	100	50	1.5	12	Private
26	Pathiyil pond	25	20	1	12	Private
27	Puthenparambil pond	30	25	1	12	Private
28	Valalil temple pond	15	15	1.5	12	Private
29	Kochuthura pond	35	15	1	12	Private

Table 19. 8 Details about water sources (Ponds)

ponds are there. Details regarding the water resources are given in table 19.7 and 19.8.

19.2.3. SACRED GROVES

In Karunagappally several sacred grove attached to the temple. In these evergreen sacred groves birds and various types medicinal herbs and trees are seen. The extent of the sacred grove has reduced. Considering the environmental aspects this sacred groove may be protected as it is. Sacred groves are listed below in table 19.9.

Pallickal Kavu:- This sacred grove was center for Buddhist and Jainist religious believes and practices

Sl No	Name and Type
1	Pallickal Kavu
2	Pannisseri Kavu
3	Madan Kavu
4	Kovilakathu Kavu
5	Thevar Kavu
6	Appooppan Kavu
7	Madathil Kavu
8	Elasseri Madam Kavu
9	Thondalil Kavu
10	Thiruvoor Kavu
11	Thereth Kavu
12	Ittekkal Kavu
13	Ayanivelikulangara Temple Kavu
14	Kulathil Kavu
15	Vembilakavu
16	Chitteth Kavu
17	Cheruthikau

Source: Local Body, Dept of forest, Primary Survey

Table 19.9 List of sacred grooves

in earlier times.It was from here the Buddha statue which is now seeing at Krishnapuram palace obtained. The surrounding places of this sacred grove are known with names related to Buddhist believes. Places like Vattathara, Manjipuzha, Meenatheril, Pallickal, Pallickal madam, Kalpakasseril etc. are the best examples. The total area of this sacred grove is seen decreasing presently and area now belongs to Akavur mana.

19.2.4. PADDY FIELDS

Paddy fields are lying in a lower level than the surrounding areas. So these areas trap flood water and act as re-charging basins and hence get importance from the point of view of Environmental sustainability. In Karunagappally major paddy field is Pallickal Paddy field (.013 sq.km). Most of the marshy lands and paddy fields are seen unutilised now. Existing paddy fields, wetland and kavu are shown in figure 19.2. The wetlands mentioned are once used for paddy cultivation and at present it is water logged. Comparing the land use of 2012 with that of 2005, it is seen that 1.7% of paddy land has been converted for residential and other purposes.

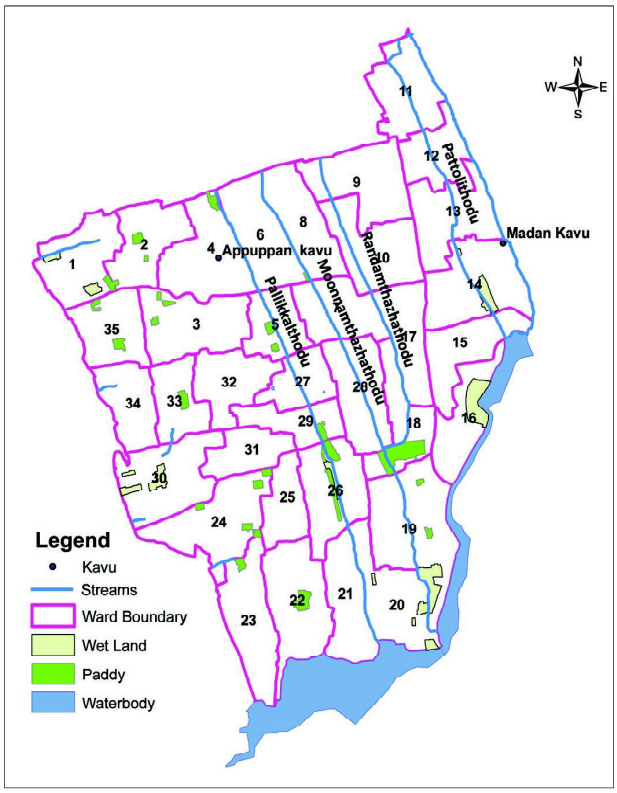


Fig 19.2. Paddy fields in Karunagappally Municipality

19.2.5. HERITAGE AREAS

Several historically important ancient temples are there in Karunagappally such as Padanayarkulangara temple and Pallikkal pond.



Padanayarkulangara temple

19.3. INFERENCE

Accumulation of solid waste in wetlands, ponds, streams and back waters is an important issue. Reclamation of paddy area is another important issue. sacred grooves, historically important temples and ponds, streams, paddy and back waters may be protected from any harmful development.

Chapter 20

FINDINGS AND CONCLUSIONS

20.1. ROLE OF KARUNAGAPPALLY TOWN AS PER IDDP KOLLAM

1. As per IDDP, Kollam, Karunagappally is a second order settlement. Its service areas include the neighbouring local bodies
2. Karunagappally falls in Special Development Zone. Value addition units & industries based on marine resources, coir, plastic & chemicals are suitable
3. The functional character of Karunagappally is identified as Semi-Urban

20.2. DEMOGRAPHY

1. The population of Karunagappally Municipality is 49604 as per 2011 census, which is 1.88% of the population of the District.
2. The population growth rate of Karunagapally Municipality is high(6.18%) when compared with Kollam District (1.95%) Karunagappally has the third highest growth rate when compared with neighbouring LSG's
3. Gross population density of Karunagappally (2660) is very high when compared with that of the District (1058) and other municipalities in the district but lower than that of neighbouring LSG's (Except Thodiyur).
4. The sex ratio of Karunagappally (1077) is low compared to the sex ratio of Kollam District and Kerala.
5. Age – sex ratio obtained from Socio-economic survey reveals higher percentage of working population & Youth population
6. The work force participation rate of Karunagappally is higher when compared to other urban LSG's (31.47%) and less than that of District (34.61%). But less than that required for a balanced economy
7. The number of cultivators & agricultural laboures has declined drastically over the years (5.03 %). However number of other workers has increased constantly which is a clear indication of the weakening of the primary sector of the municipality.
8. Marginal workers shows an increasing trend. The rate of increase of main workers is less than that of marginal workers.

20.3. LAND USE

1. The major portion of land use comes under residential (about 77.19%) and only 8.25% of the land comes under agricultural activities. Karunagappally has the highest percentage of land under residential area when compared with other urban LSGs of the District.
2. The commercial and public and semi-public land uses are concentrated mainly along NH.
3. Comparatively less development is seen on the western areas of the municipality
4. More than 6% of the total area is covered by environmentally sensitive water bodies situated mainly on the southern and south eastern boundaries.
5. The major portion of the Municipality has a slope of 0° to 15° which is suitable slope for human settlements and other development activities.

20.4. SECTORAL ANALYSIS

1. There are no large scales or medium scale industries. There are only 2 small scale industries and 87 micro level industries. Share of landuse for industrial activities is only 0.14% of total area which is very small when compared with the suggested industrial land use share (3-4%) for small town as per UDPFI guidelines.
2. The economy once thrived on the traditional industries is degrading. There are only 5 coir societies, 2 handloom units & one cashew processing unit and one cashew packing unit.Two back waters increase the potentials for the improvement of coir industry. As per Socio-economic survey 782 labourers are working in the coir sector. Traditional Industries such as Coir, Handloom and Cashew play a substantial role in generating employment with minimum investment especially women.
3. Traditional industrial sectors should be revived with

emphasis on technology up gradation, market promotion and skill development

4. Commercial centers are concentrated in the central area of the town spanning over 4 km of NH 66. The first order, second order and thrird order commercial centers are Civil Station Junction, KSRTC Junction and Market Jn. Fourth order commercial centres are Lalaji, Hospital, and Pulliman junction. Fifth order commercial centres are Karottu,Pallimukku, Highschool and Alummoodu Junction.

5. The commercial centres have developed in a haphazard manner which needs redevelopment. Even though municipal market has sufficient facilities, it is not optimally utilized. All the commercial centers are highly congested area having no sufficient parking space. There exists no proper solid waste disposal and drainage facility.

6. The major road in the town is NH 66. It passes through the central part of the town and provides vital connectivity to Kollam & Thiruvananthapuram in the south and Alappuzha & Ernakulam in the central parts of the state. Karunagappally Railway Station is located outside Karunagappally Municipal boundary. It provides inter-city connectivity for residents of Karunagappally town. The share of land use for transportation is only 2.58%, which is very low when comapared with the planning standards(5-6%)

7. NH 66 passing through the centre of the town is carrying both intra-city and inter-city traffic. Consequently, this road carries traffic far exceeding its capacity at present and is likely to bear in the horizon year. The NH road stretch, where KSRTC station is located, faces acute traffic congestion because of movements of buses to and from the KSRTC station, parking of large number of vehicles on the road side and pedestrian criss-cross movements. Civil station junction and High school junctions are the other problematic locations in the NH road corridor. The Sasthamkotta road also faces traffic congestion due to presence of market and the inadequate road width.

8. Inter-mixing of intra-city and inter-city traffic on the NH, absence of alternate link roads, unorganized on-street parking, absence of proper parking lots, absence of adequate design for major junctions and encroachment of right-of-way by hawkers are the major problems faced by transportation sector.

9. KWA & Rajiv Gandhi Water supply scheme provides water supply to municipality. It covers all wards. As per socio-economic survey 61.73% depends on wells and 37.38% depends on KWA. The source of water is Achankovil river and treatment plant is at Oachira with a capacity of 15 MLD.

10. The socio economic survey reveal that 99.18 percent have no water scarcity. Karunagappally Municipality is blessed with natural water resource. These may be utilized & preserved optimally as drinking water sources for the Municipality. There are no schemes for recycling waste water in the town. There is no ongoing or committed project with any agencies. It is imperative to promote water conservation through rain water harvesting, conserving water bodies and controlling groundwater extraction

11. According to the socio economic survey conducted, sanitation is the major priority of development at ward level as well as HH/ level. About 23% are of the opinion that sanitation is to be given first priority of development at municipality level. At present there is no sewerage system in the municipality.

12. Average size of plots in majority of the wards is less than 10 cents and hence absence of common sewage treatment facilities in the long run will cause ground water as well as surface water contamination.

13. Solid wastes collected from wards 9, 10,11,12,13,14,15,16 and 17 are treated in the plant functioning at Kesavapuram. The capacity of the bio-gas plant is 5T. For the development of plant, 125 cents of land is acquired by the Municipality and capacity is upgraded to 10T. The total waste generated in the municipality is around 30T and hence the present system is not adequate.

14. Wastes coming to the existing plants are not efficiently separated and processed. Plastic wastes are seen accumulated. Wastes are dumped in to streams, public streets in front of

trading centres and different areas of municipality. Streams are getting polluted and waterlogged due to solid waste dumping.

15. Decentralized treatment and processing of municipal solid waste with emphasis on energy production may be promoted. This helps to reduce the pressure on transportation of wastes from localities where they have been generated. Kudumbasree workers can be deployed for collecting the plastic waste which can be used for recycling purposes. Safe recycling facilities for e-waste and construction debris and plastic free environment may be promoted.

16. Karunagappally Municipality mainly falls under the Karunagappally south electrical sub division. 66 KV substation at Puthiyakavu is the major feeder which distributes power to the municipality. The total power consumption during 2011-12 was 3.82 MKWH of which the major share is utilized by the domestic sector (2.64 MKWH). Domestic consumers constitute 79%, industrial consumers1.6%, commercial consumers 18.4% and agricultural consumers constitute 0.85%.

The main problems faced in the power sector are crisis drawbacks in the distribution field. Most of the power failure occurs due to the tripping of 11 KV OH lines. Considering existing demand, 66KV substation need to be upgraded to 110KV substation.

17. The literacy rate is 92.07% which is higher than the district figure of 91.24 %. Data obtained from socio-economic survey reveals 37.04% have an educational qualification of high school level, 26.68% have a qualification of only primary level and about 12.16% are graduates. Only 3% of people are post graduates. About 56% of primary schools are in government sector. There are no Professional College and school for disabled in the town.

18. When the basic educational facilities available in the Karunagappally Municipal Town are compared with the planning standards, it is seen that the facilities are deficient in the level of professional education. Also it is seen that the infrastructural facility available needs improvements further. Another area of priority will be schooling and development of differently abled children through appropriate support to the institutions working with government assistance and through positive Government initiatives.

19. There are 6 allopathic, 4 Ayurvedic and 2 homeopathic hospitals. The share of private sector is more(83%). Most of the hospitals are located along the sides of the NH. There are two Primary Health centres, one located in Ayanivelikulangara village and other in Karunagappally village. Socio-economic survey reveals high incidence of Chicken Guinea, which necessitates the need for proper solid waste disposal and conservation of water bodies. There is no super specialty hospital or hospitals with advanced facilities like CT scan, ECG etc. There is absence of blood bank, dialysis facilty, drinking water and lack of hygiene toilet facilities.

20. Housing shortage is not a serious issue. Housing condition and infrastructure facilities in colonies planning area are found to be poor. So improving the housing conditions of colonies need special attention. Thayyil kizhakkethara colony face severe problem such as absence of sanitation facility, drinking water, drainage and access road. Hence the colony should be considered as priority area while implementing slum improvement programmes. Jayaraj Nagar colony may be considered as the second priority area for implementing slum improvement programmes. The status of infrastructure in other colonies is comparatively good. Hence the colony specific issues are to be solved and raised to normal standard housing.

21. The major agricultural product cultivated is coconut on an area of 19.55 hectares with a production of 3500 nuts/Ha/year. Paddy is cultivated on 5.97 hectares of land and others (vegetables, banana, and black pepper) on 1.48 hectares of land. While comparing the land use of 2012 with that of 2005 it is seen that 47% of paddy fields are filled. Paddy fields constitute 1.82% of the total land area which act as ground water recharge basins and so has to be protected. It is also seen that agricultural labours are declining. As per 2001 census there are only 426 agricultural labours in Karunagappally. Scarcity of workers and increased wage rates are major issues in the agriculture sector.

22. Increasing feed cost as lead cattle rearing non

profitable for small scale unorganized farmers. High urban activities and reduces plot size reduced the availability of fodder. Presence of veterinary hospitals also increases the potential for animal husbandry.

23. Lack of awareness regarding potential of inland fisheries and inadequate utilization of available resources are major issues faced in fisheries sector. Presence of two backwaters, 71 ponds and paddy fields increases the potential for inland fishing activities in Karunagappally municipality.

24. Presence of scenically beautiful places, lakes, sacred grooves, back waters, temples etc increase the potential for tourism development in Karunagappally. The recreation facilities are a few in Karunagappally Municipality. With the fragmentation of residential property, people have lesser open lands attached to their houses. Dumping of solid waste in Vattakayal and Kannetti kayal needs immediate attention. The potential of backwaters as recreational facilitiy is not fully utilized.Construction of a stadium for encouraging sports and Parks & open spaces should be made available for increasing physical and mental ability of people.

25. Accumulation of solid waste in wetlands, ponds, streams and back waters is an important issue. Reclamation of paddy area is another important issue. sacred grooves, historically important temples and ponds, streams, paddy and back waters may be protected from any harmful development.

Chapter 21

DEVELOPMENT CONCEPT

21.1. FUTURE FUNCTIONS AND FORM

The major factors which defines the function of the Karunagappally Municipality are the conveyance of the three modes of transport in Karunagappally, the regional importance of the Municipality as a second order settlement and the inheritant potential in sectors like agriculture and coir. Karunagappally Municipality is a second order settlement within Kollam District (Ref: IDDP of Kollam) which indicates that the Municipality should act as a higher order facility provider for the service area. The service area consists of 16 LSGs (fig.21.1) having a total population of 5.74 lakh. As per the analysis of the present scenario

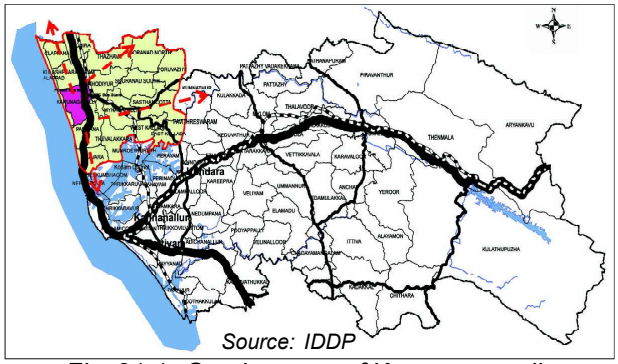


Fig. 21.1. Service zone of Karunagappally Municipality

Karunagappally Municipality is a higher order facility provider in Traffic and transportation sector (KSRTC bus stand, private bus stand), Trade and commercial sector, health sector (Taluk hospital, Super specialty private hospital) but is not a higher order facility provider of the service area in any other sector.

Karunagappally Municipality is a second order commercial node within the District as per IDDP of Kollam, which reiterate the role of the Municipality as provider of higher order facilities in trade and commerce for the surrounding region.

Karunagappally local body falls within the delineated special development zone (fig. 21.2) within the District, which reiterates the role of Karunagappally as an urban area. However majority of the local bodies within the service area of Karunagappally belongs to the delineated agro-allied development zone within the District. This defines the role of the Municipality as the provider of higher order facility supporting agriculture and allied activities like markets, cold storages,

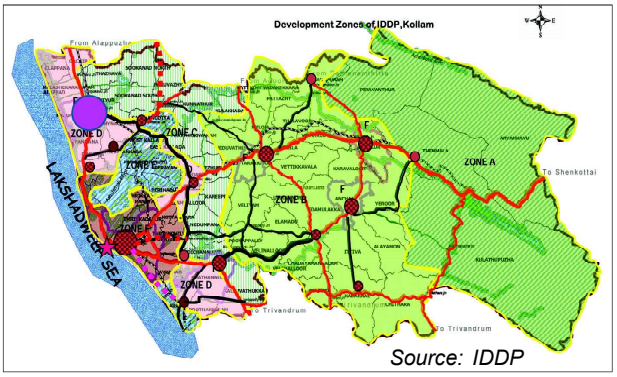


Fig. 21.2. Development zone as per IDDP

agriculture institutions, agriculture promotion centre, agriculture bank etc and simultaneously it should render the functions of an urban area.

The fact that Karunagappally is having the presence of three modes of transport (National Water Way, NH 66, Railway Station) reiterates its role as a second order node within the District (fig. 21.3). This indicates the importance to be given in housing sector, commercial sector and other service infrastructure within the Municipality.



Fig. 21. 3. Mode of transport - Karunagappally Municipality

Over a period of time, the occupational structure of the Municipality has changed from traditional sector labourors (in coir, handloom and agriculture) into the mainly primary sector like government servants, gulf employees, minor service industrial employees,

construction workers, traders etc indicating the shift in economic base of the Municipality (fig.21.4). This change in economic base indicate that Municipality has to give more thrust to sectors like commerce, housing, service sector.

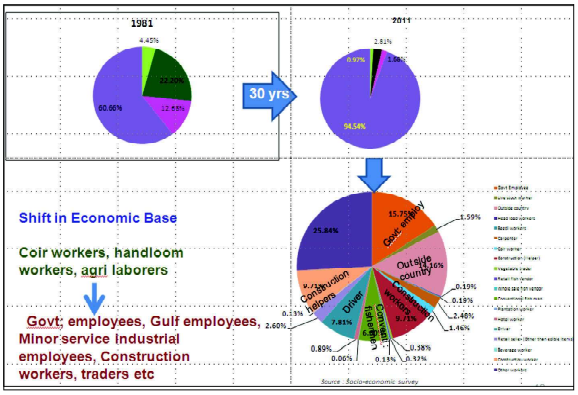


Fig. 21.4. Shift in economic base of Karunagappally Municipality

Ashtamudi kayal in Kollam is famous for water related tourism. The same water body shares boundary with Karunagappally Municipality, which increases the potential for water related tourism in the Municipality as an extension of the tourism related activities in Ashtamudi lake (fig 21.5). This will give thrust to tourism activities, like tea stalls, shops, home stays, adjacent to the Vattakayal area in the Municipality.

Availability of agricultural land, the presence of water bodies (canals), availability of agricultural labours on the western side of the Municipality makes the possibility of dry agriculture (professionally managed high-tech agriculture) as a potential sector for the Municipality.

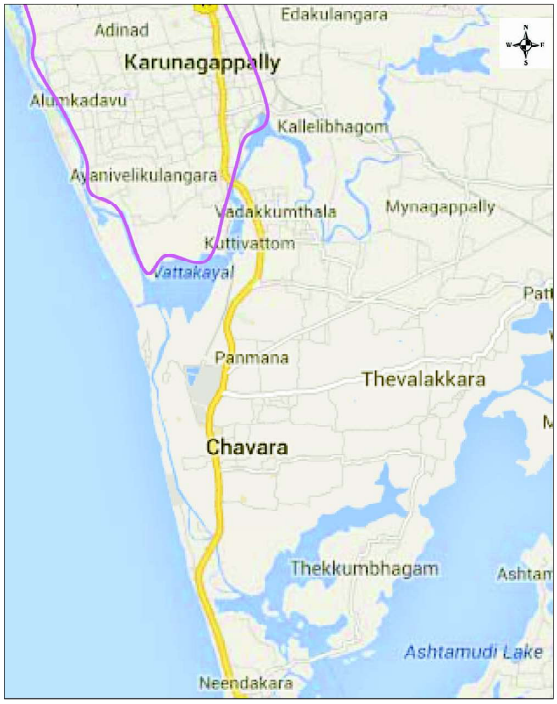


Fig. 21.5. Water related tourism network

Karunagappally is a gateway to Amruthapuri, where number of pilgrims, both domestic and foreign, visits daily. This gives importance to sectors like transportation, trade etc in the Municipality.

The spatial distribution of higher order facilities in health sector in the Karunagappally region comprising of Karunagappally Municipality and adjacent local

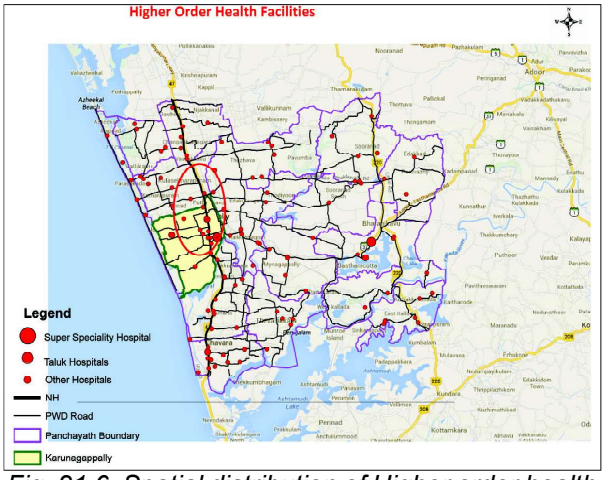


Fig. 21.6. Spatial distribution of Higher order health facilities

bodies (fig 21.6) shows that the higher order facilities under health sector falls within the Karunagappally region. The spatial distribution of higher order facilities in the Karunagappally Municipality shows that it falls in the local bodies adjacent (Kulasekharapuram and Thodiyoor) to the Karunagappally Municipality. The higher order industrial establishments like Kerala feeds, Kerafed, Warehouse also falls outside the Municipality, but adjacent to it (fig 21.7). Higher order facilities under transportation sector, KSRTC bus stand, private bus stand, taxi stands and railway station falls in the Karunagappally Municipality (fig. 21.8). The study on

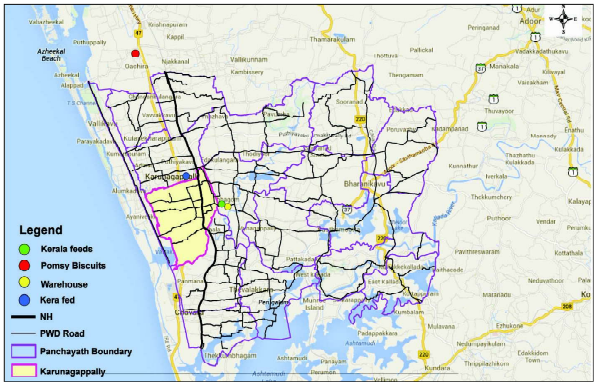


Fig 21.7. Spatial distribution of industries

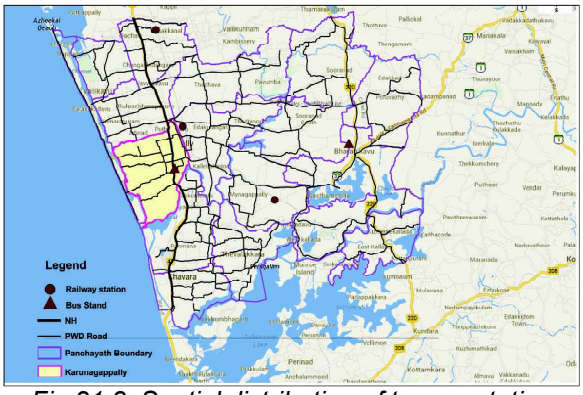


Fig 21.8. Spatial distribution of transportation facilities

commercial nodes shows that the Karunagappally act as a higher order commercial node of the region (fig 21.9). The spatial distribution of the higher order facilities in health, education, traffic and transportation, trade and industries within the Karunagappally region (fig 21.10) shows that it is not the Karunagappally Municipality which act as a second order node within the region but a total geographical area comprising of Karunagappally Municipality, Thodiyur grama panchayat and Kulasekharapuram gramapanchayat together act as the second order settlement. The analysis of the population growth rate and population density also shows that the three local bodies show higher population growth rate and higher population density in the region. This indicates that Karunagappally, Thodiyur and Kulasekharapuram will act as an urban agglomeration of the region in the future, where the major role of the Karunagappally Municipality will be provider of higher order facilities in transportation and commercial sectors. Study on the development history of Karunagappally shows spatial shifting of activities from west to the east (from TS canal side to NH 66 side) of the Municipality. Character shifting also occurred (from traditional activities like coir, handloom, agriculture to service sector) during the same period of time. This spatial shifting created an inbalance in the development of the Karunagappally Municipality. This imbalance is to be rectified for the comprehensive development of the region. The analysis shows that there is scope for revival of coir sector, agricultural activities in a more modern way, in the western side of the Municipality.

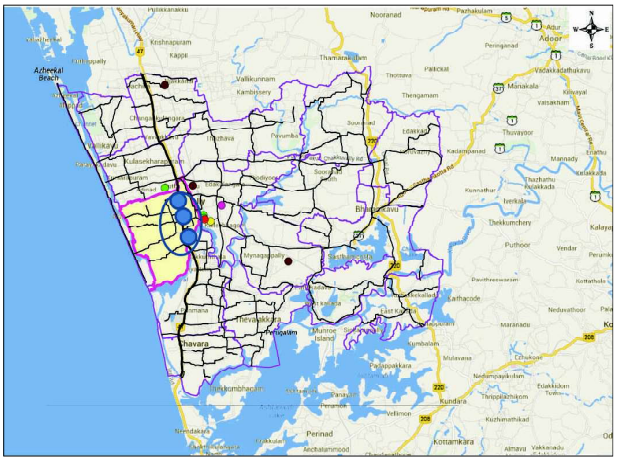


Fig. 21.9. Spatial distribution of commercial node

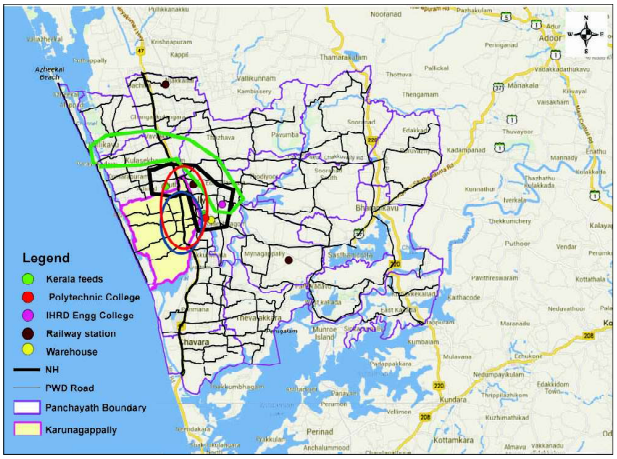


Fig 21.10. Spatial distribution of higher order facilities

It can be summarised that Karunagappally is to function as a major commercial centre of the region and provider of higher order facilities in health, transportation and recreation with thrust on modern practices in agriculture sector.

Presently commercial activities of Karunagappally are developed along the national highway and along Karunagappally – Sasthamcotta road with a centre as the meeting point of these roads. Being connectivity plays a major role in the development of commercial sector, it is expected to grow the commercial area more along the NH side and along the Karunagappally – Sasthamcotta road (Fig 21.11). This commercial area will act as a regional commercial hub. Expecting an inflow and outflow of goods in the Karunagappally from two boat jetties along the T.S canal, commercial activities are expected in and around these boat jetties. And also two commercial sub centres are proposed at Alumkadavu and Kozhikkode to serve the local people in these area.

The future heirarchy of road network within the Municipality is that National Highway and Karunagappally – Sasthamcotta roads will act as the primary road, whereas Karunagappally – Amruthapuri road will be the secondary road. All the roads connecting TS canal with the CBD of the Municipality will act as the tertiary roads. A fly over is proposed along the NH to cross over the CBD of the Municipality.

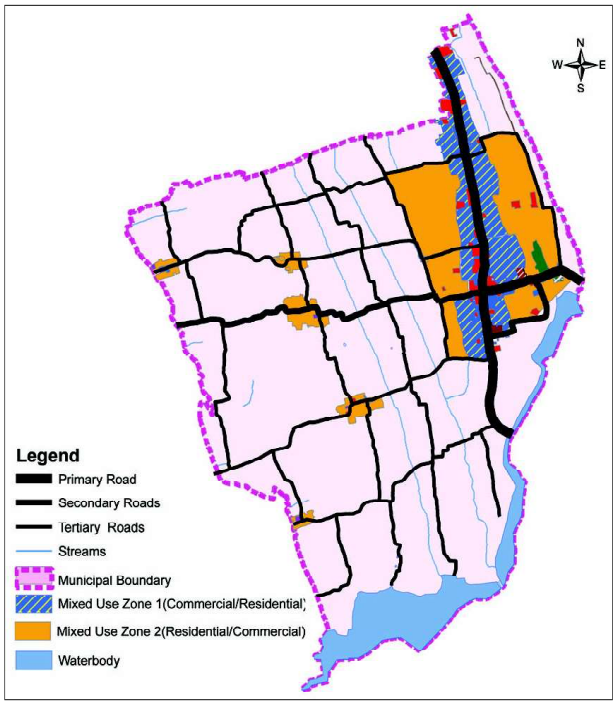


Fig. 21.11. Distribution of commercial area

A ring road surrounding the CBD of the Municipality is also proposed to ease the traffic flow (fig. 21.12).

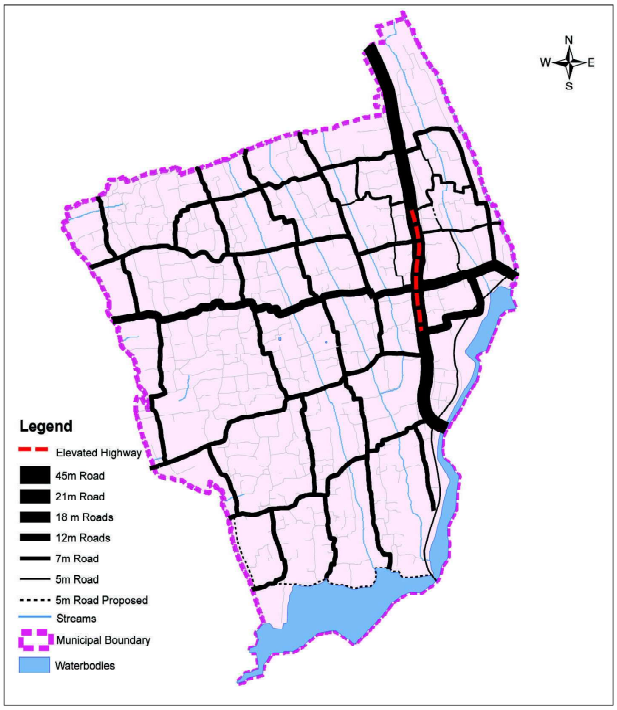


Fig. 21.12. Road network

Residential activities of three intensities are proposed in the Municipality. A residential – commercial mix area is proposed immediately around the commercial centre. Intensive residential area is proposed beyond the residential – commercial mix area. In between TS canal and intensive residential area normal residential area with tracts of existing dry agriculture area are proposed. The existing dry agricultural area in the residential – commercial mix area and intensive residential are proposed for residential development (Fig 21.13).

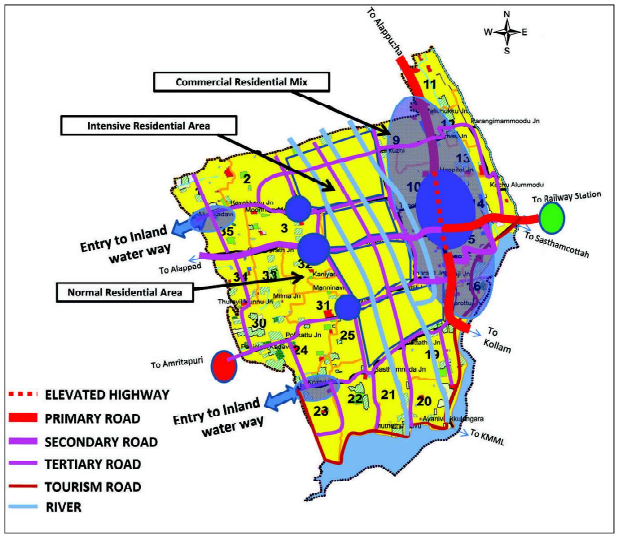


Fig 21.13. Distribution of residential area

The various activities and its spatial distribution derived above are conveyed in the Municipality map to get the development concept of the Municipality, which is shown in figure 21.14.

21.2. LAND USE PLAN – 2031

The land use of the Municipality is derived according to the development concept. Land use map is shown in the figure 21.15. Land use break up as per the proposed land use map is shown in table 21.1.

Zone	Area in sq.km
Residential Use Zone	11.800
Commercial Use Zone	0.270
Mixed Use Zone (Com & Res)	0.940
Residential Mix Use Zone	1.800
Public and semi public Use Zone	0.400
Insustrial Use Zone	0.088
Transportation Use Zone	0.480
Park / Stadium	0.045
Dry Agriculture Use Zone	0.650
Paddy / Lay laying land	0.460
Crematorium / Waste dumping yard	0.007
Water body	1.150
Total	**18.090**

Table 21.1. Land use break up as per proposed land use map

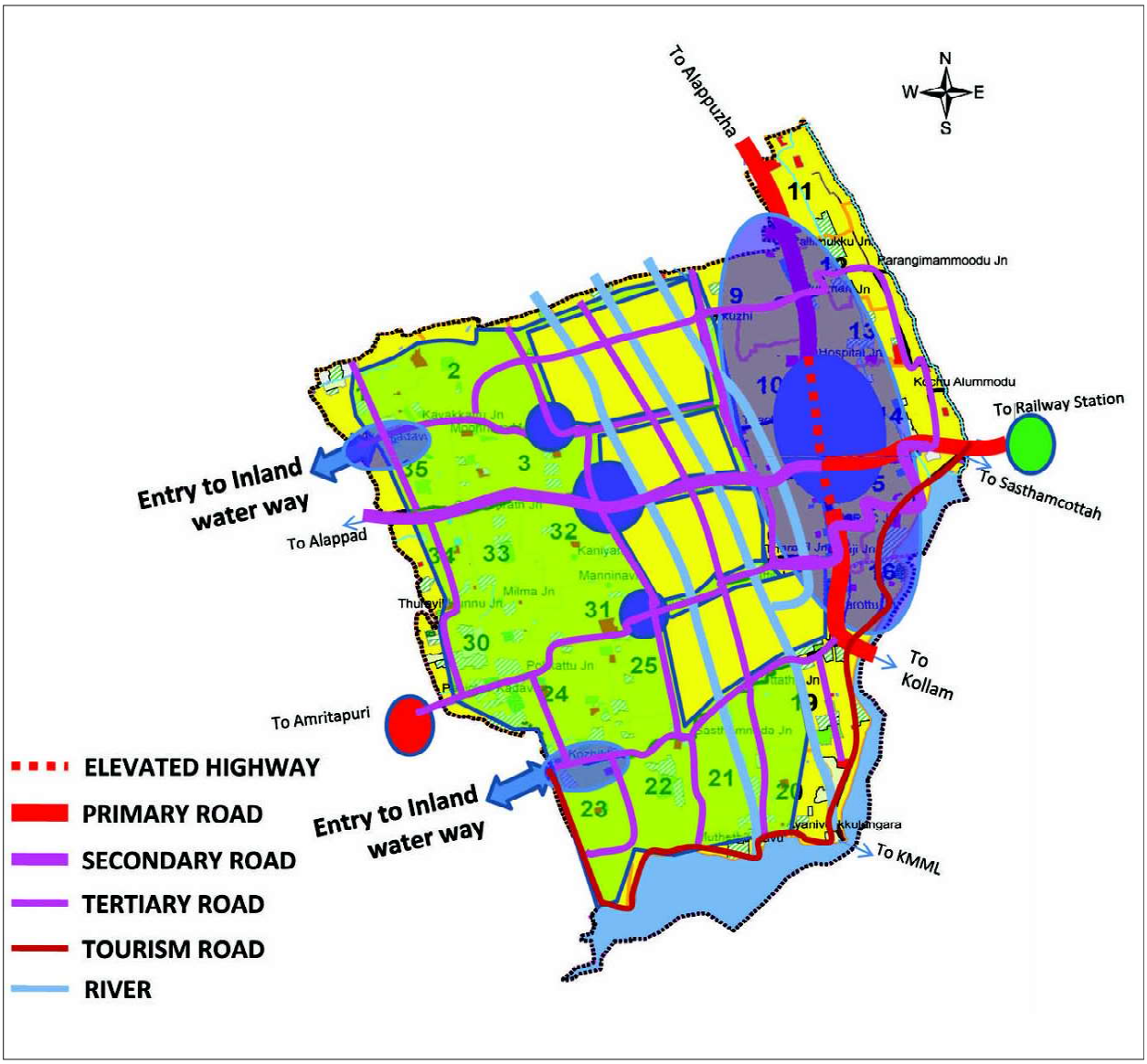


Fig 21.14. Development concept

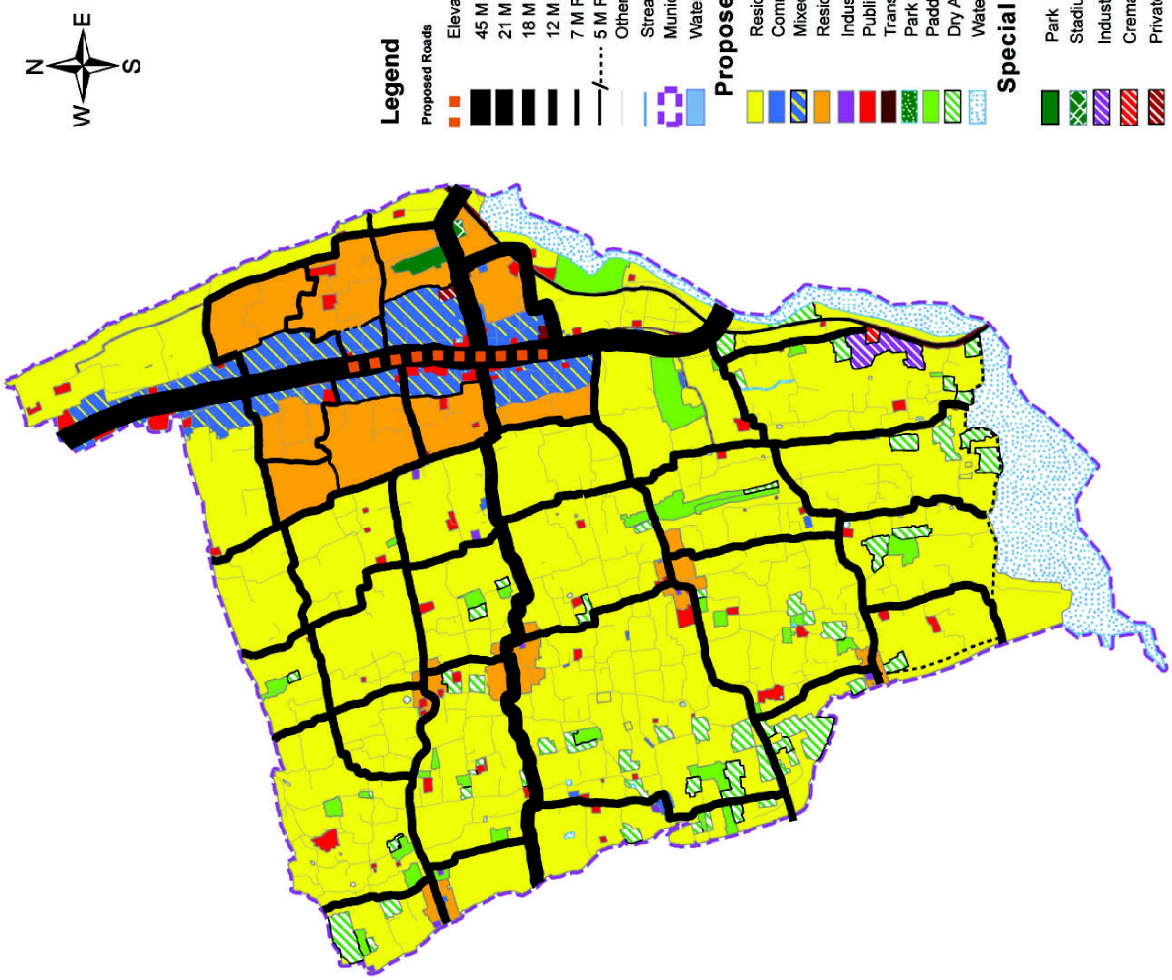


Fig 21.15. Proposed Land use map of Karunagappally

Chapter 22

SECTORAL PROPOSALS

This chapter explains the development proposals of various sectors.

22.1. INDUSTRIES

Exhibition cum trading centre for traditional industries

The main problem associated with this sector is lack of facilities for marketing the products. To solve this issue it is suggested to establish a permanent exhibition cum trading centre in the proposed municipal commercial tower is shown in figure 22.1.

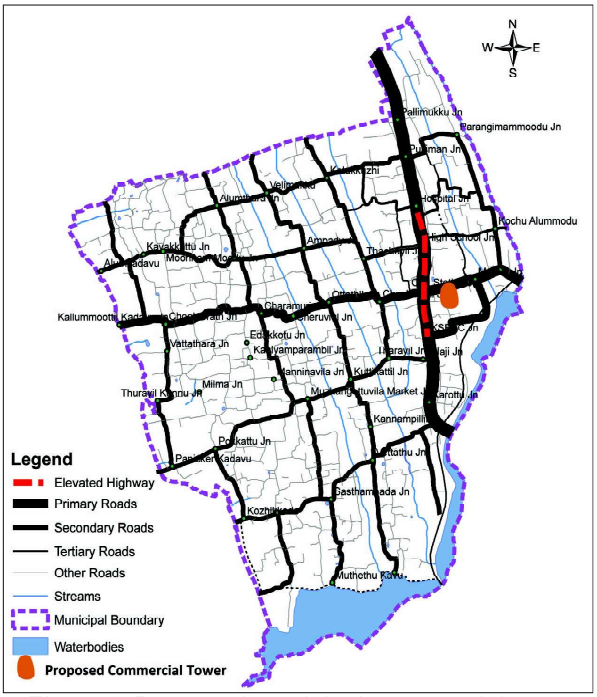


Fig 22.1. Proposed municipal commercial tower

Strengthening of handloom units

Handloom industry plays a vital role in the socio-economic development of the sector as well as in the field of employment. Marketing assistance will be provided by Hantex and Handveev. Hence it is proposed to strengthen handloom units in Karunagappally Municipality.

Collection of coconut husk with the help of Kudumba Sree

Coir yarn manufacturing unit

Considering the scope and demand for value added coir products it is proposed to setup coir yarn manufacturing units in Karunagappally Municipality. Coir yarns are the main input for the production of coir mats and mattings.

Exporting coir products

Presence of backwaters and other water bodies made coir industries possible within Municipal area. Along with safe disposal of coir pith and modernization environment impact can be reduced. The natural coir in the domestic market is being replaced by artificial fibres. However there is demand for naturally made coir and other products in the global market. Hence the proposal is to increase the production of coir / coir based products and facilities export through NW-3. The production process can be decentralized through trained people at household level and the trading can be done through Coir cooperatives.

Promoting wood based industries

Export demand for the decorative wooden furnitures is found high due to the universally accepted skilled workmanship of the state. Hence wooden furniture export units are proposed to be established at the industrial zone at Karunagappally Municipality.

Industrial estate

An industrial estate is proposed in the south east side of municipality near to the waste dumping yard. The location is given in figure 22.2.

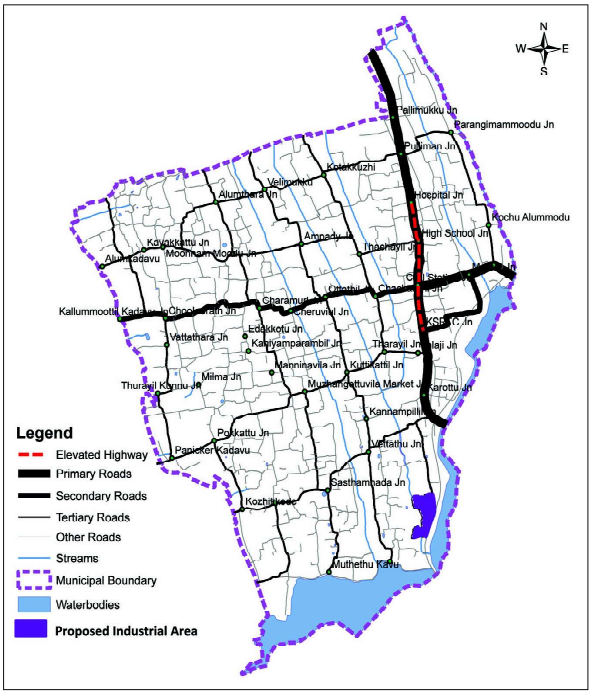


Fig 22.2. Proposed industrial estate

Development of existing cluster

Fish processing unit

The main occupation of the people in municipal area is fishing and related activities. At present fishermen catch and sell fish in raw form without any value addition. Hence it is proposed to start fish processing units in the industrial area proposed at Karunagappally Municipality.

22.2. TRADE AND COMMERCE

The proposals of the trade and commerce are as follows.

- Development of an internal road network within the commercial area for optimum utilixation of the land in the area is shown in figures 22.3.

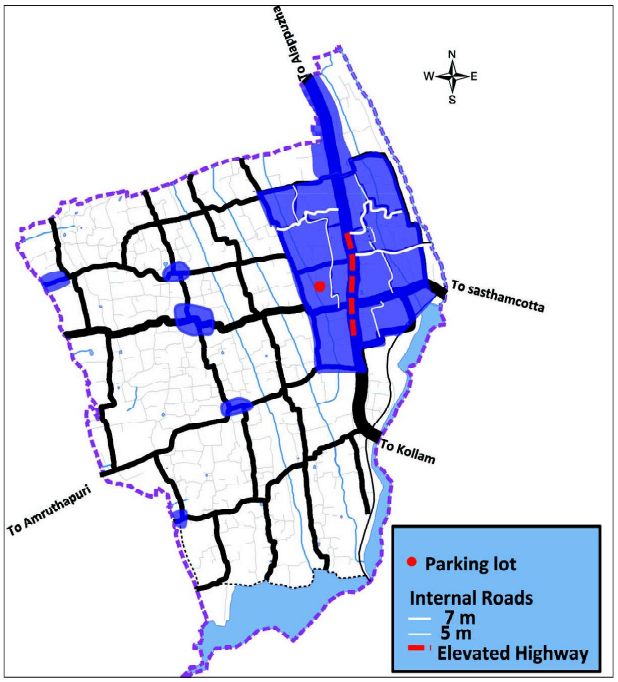


Fig. 22.3. Internal road network / parking within the commercial area

- Proposals for parking lots is shown in figure 22.3
- Redevelopment of municipal market with facilities for waste disposal, comfort station, cold storage, fish stalls, meat stalls, vegetable stalls, loading and unloading spaces.
- Municipal commercial tower is proposed near Padanayarkulangara temple along the sides of Karunagappally – Sasthamcotta road is shown in figure 22.1.

22.3. TOURISM

For the efficient utilization of the available tourism potential within the municipal area several development proposals are suggested.

- Water related tourism as an extension to the tourism activities in Ashtamudi lake as shown in figure 22.4.

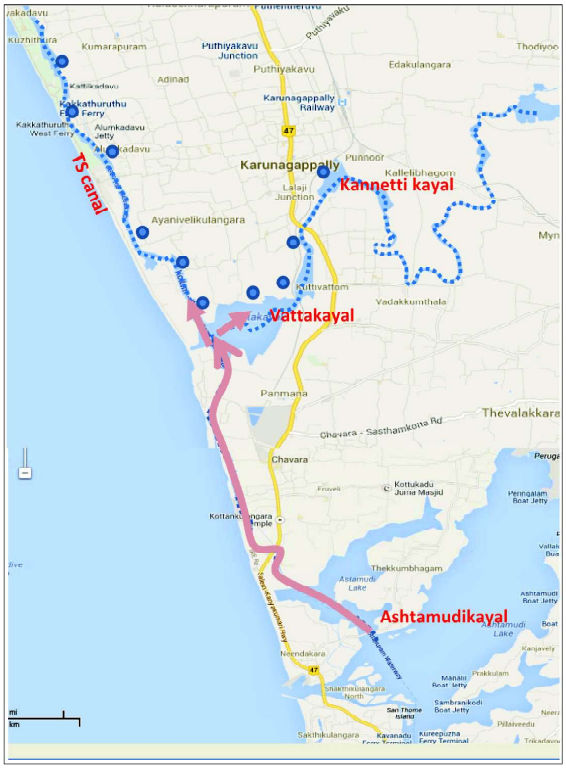


Fig. 22.4. Tourism activities in Ashtamudi lake

- Proposal for starting home stay, club, restaurants etc. along the sides of vattakayal.
- Beautification of the sides of Vattakayal and fixing solar lights. It can be done with the help of KTDC / DTPC.

22.4. AGRICULTURE

- Promote high-tech farming techniques like precision farming, plyhouse etc.
- Promotion of grow bag vegetable cultivation in all houses. The proposal includes supplying high yield varieties of seeds and onsite technical guidance through trained personnels. Agriculture department can help for this.
- Utilize on building terraces and other lands to promote vegetable cultivation and floriculture.
- Agro clinical centres are proposed in ward wise for providing various services for farmers including maintenance / hiring of agricultural machineries and implements.
- To protect the sides of Thazhathode for

uninterrupted flow of water to Vattakayal.

- To improve the financial status of coconut cultivators through measures like promotting the production of neera.
- To provide a trading centre for storing and marketing the agricultural products.

22.5. SOLID WASTE MANAGEMENT

The solid waste management proposals are as follows

- Development of existing solid waste treatment plant at Kesavapuram is shown in figure 22.5.
- Multilevel waste management with decentralized treatment facilities shown in figure 22.6.
- Solid waste treatment plant in all existing and proposed market to treat market waste.

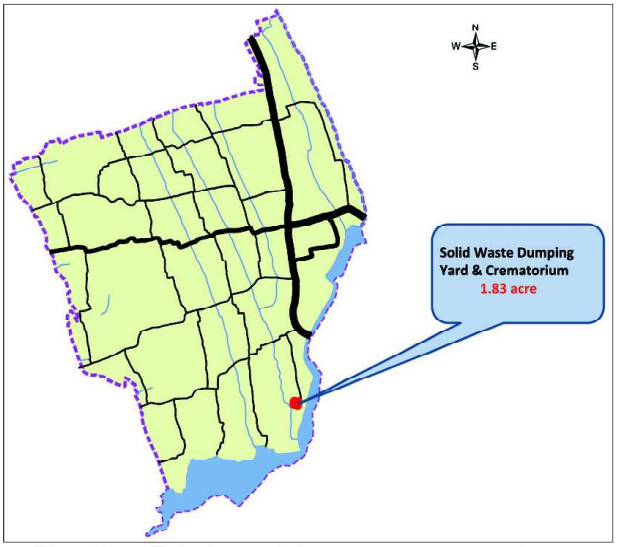


Fig. 22.5. Existing solid waste treatment plant at Kesavapuram

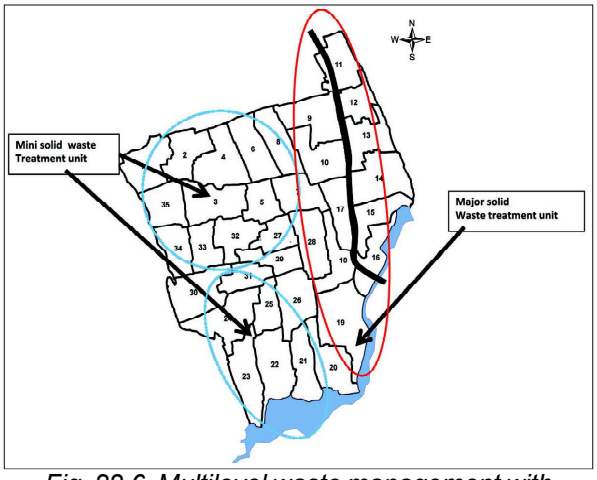


Fig. 22.6. Multilevel waste management with decentralized treatment facilities

- In situ Solid waste treatment plants in hotels, restaurants and other major commercial establishments.
- Individual solid waste treatment facility in each household (Bio-gas plant, pipe compost etc according to space availability).
- Segregation of waste at source with the help of Kudumbasree units.

22.6. DRAINAGE

- It is proposed to prepare a drainage plan for the entire municipal area. Surface drains along the sides of all important roads are to be provided and connected to Thazhathodes in the municipal area. This may be included as the part of drainage plan.

22.7. DRINKING WATER

- Renovation of overhead tanks and tube wells of Rajiv Gandhi drinking water scheme for solving water scarcity.
- Provide necessary helps for protecting private water bodies.
- Construct tube well on the land near Maruthurkulangara mosque for solving scarcity.
- Constructing new treatment plant near Pallickal river and distribute the treated water to the eastern side of NH. (See figure 22.7).

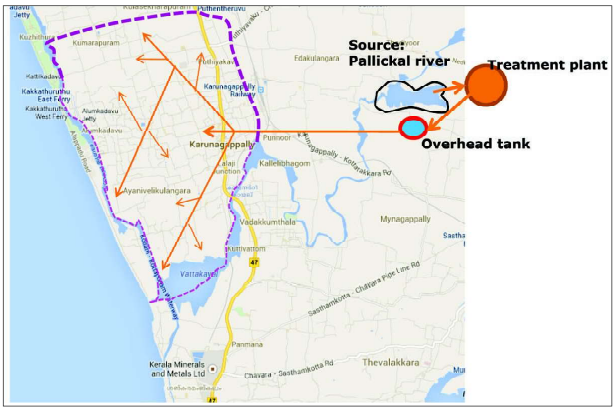


Fig. 22.7. Proposed treatment plant near Pallickal river

22.8. RECREATION FACILITIES

Recreational facilities includes tourism centres, park and stadium. Hence all proposals included for the development of tourism sector are for providing recreational facilities also. Inaddition to the above the following proposals are also included.

Park:- A sub-regional level park is proposed in ward 14 at an area of 8.62 acre shown in figure 22.8.

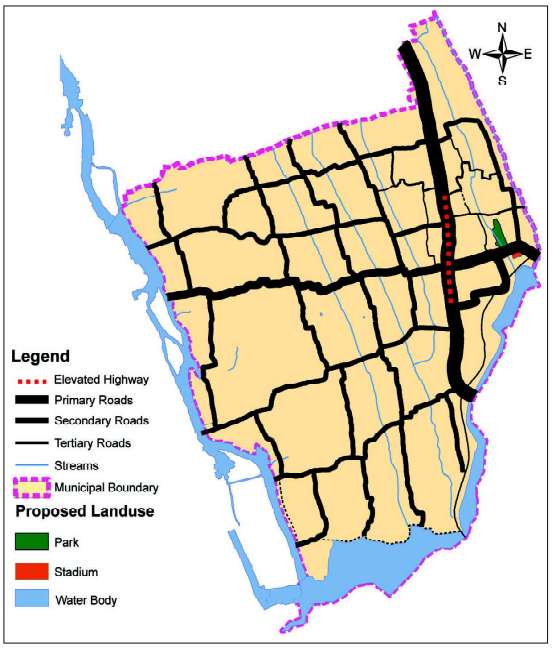


Fig 22.8. Proposed park and stadium

Stadium:- The proposal intends to establish a mini stadium at ward 15 at an area of 2.57 acre shown in figure 22.8.

22.9. TRAFFIC AND TRANSPORTATION

A transportation network ensuring inter connectivity and intra connectivity of a town which is essential for the development of the town. This chapter details out the development proposals to be implemented in transportation sector within a plan period in Karunagapally municipality. Karunagappally has the proximity of three modes of transport – rail, road and water. But Karunagappally railway station was not within the Municipal boundary, located hardly 1 Km from Karunagappally town. The inter connectivity between the three modes of transport are shown in figure 22.9. The proposed transportation network of Karunagapally municipality consists of Road network and water way network. There is no proposal for the air connectivity because of the proximity of Trivandrum International Airport, which is situated only 89 km away from the municipality.

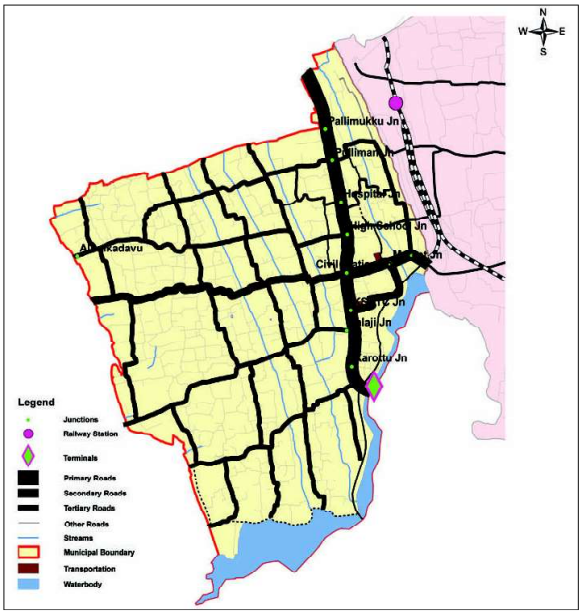


Fig 22.9. Inter connectivity between the three modes of transport

Proposed Road Network

The road development plan is formulated on the basis of the projected volume of traffic and alternative network. The proposed road network conforms to a grid iron pattern which consists of primary road, secondary road, tertiary road and Tourism road, which is shown in the figure 22.10.

Primary Road

There are two primary roads within the Municipality. One is existing national highway 66 which provides connectivity to state and district head quarters. Proposed right of way width of this road is 45 m. Another primary road is Karunagappally (Civil Station jn)– Sasthamcotta road. Proposed right of way width of this road is 21 m.

Secondary Roads

These provide connectivity to the neighbouring town within the district. Karunagapally(Civil Station jn) - Aalappad road and KSRTC – market road are considered as secondary road. The proposed right of way width is 18m.

Tertiary Roads

Tertiary roads provide connectivity to the town centre with rest of activity centres. The proposed right of way width of tertiary road is 12m. Following roads are considered as tertiary roads.

1. Road from High school jn to Alumkadavu
2. Road from Ayanivelikulangara jn to Municipal limit North via Ottathil jn
3. Road from Karottu Jn to Kozhikkode
4. Road from Karottu Jn to solid waste dumping yard
5. Road from Muthethukavu (South Municipal boundary) to Municipal limit North
6. Road from Pulliman Jn via Parangimammoodu Jn to Alummoodu Jn
7. Road from Pulliman Jn via Kottakkuzhi Jn to Tharayil Jn
8. Road from Lalaji jn to Amruthapuri

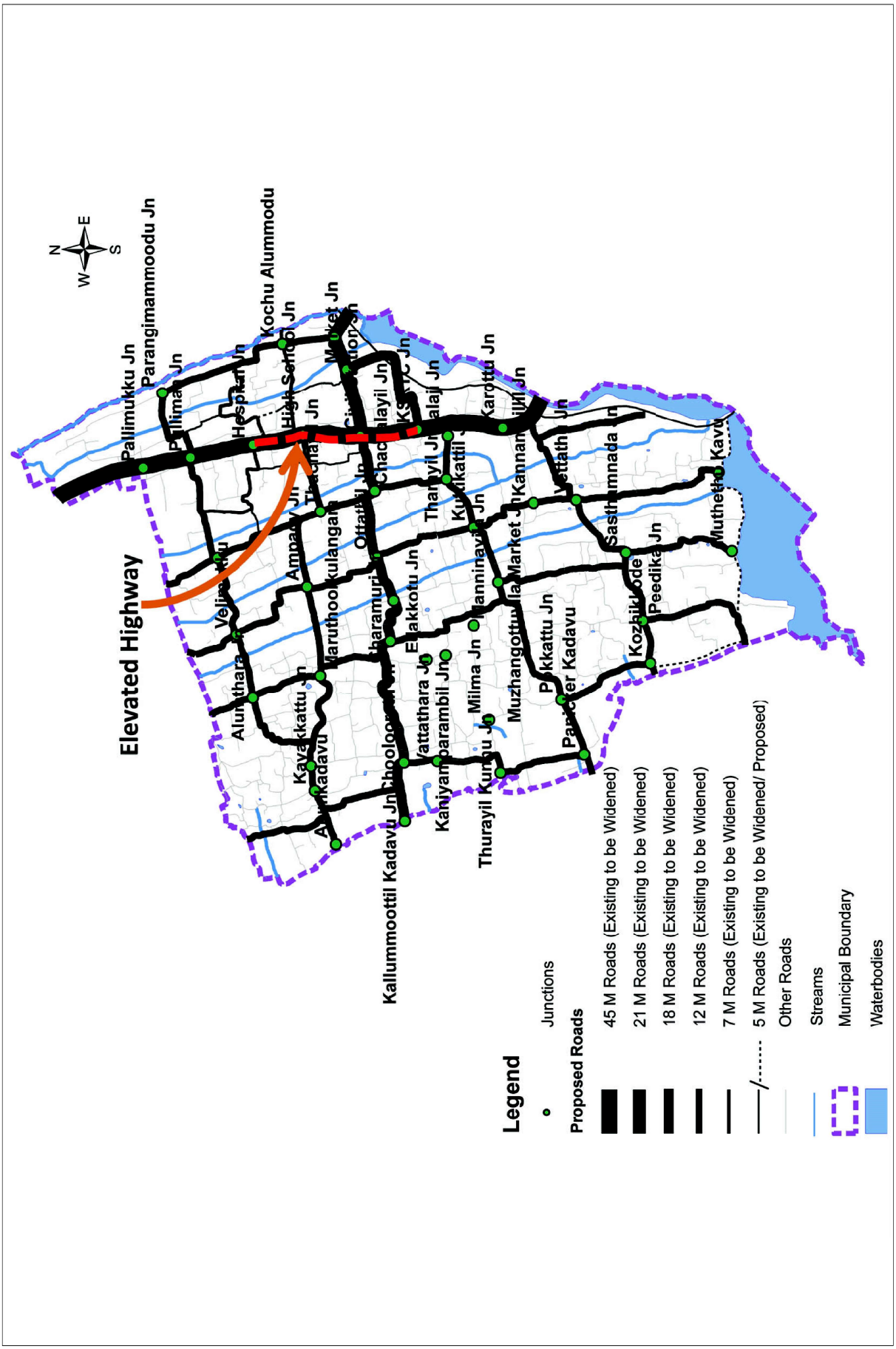


Fig 22.10. Proposed road network

9. Road from Padmanabhan jetty to Municipal limit North via Pookkattu jn to Choolarath jn
10. Road from Pulliman jn to Kayakkattu jn via Alumthara jn

Tourism Road

Tourism road connects to the back waters surrounding the municipality, hence this connectivity promote back water tourism. The discarded railway track leading to KMML can be utilized as tourism road. The proposed width of this road is 5 m.

Elevated Highway

A flyover is proposed as elevated highway at Karunagappally junction (covering Civil Station junction and High school junction) along the National Highway. This will ensure unhindered traffic along the National Highway and ease traffic conjunction at Karunagappally junction.

Proposals for Intersection Improvements

Intersections are the road crossing with number of of vehicle conflict points that cause prone to accident risk. Therefore there is a need to properly design the intersections for streamlining traffic flow and minimizing conflict points. The following intersecting points in Karunagapally municipality need to be improved. But before implementing this detailed engineering survey is required.

On Primary Road

On NH 66 - Karottu Junction, Lalaji junction, KSRTC Junction, Civil station junction, High school Junction and Pulliman Junction.

On Karunagappally – Sasthamcotta road – Market Jn and Alummoodu Jn

On Secondary Road

Kuttikkattu Jn and Pookkattu Jn

On Tertiary Roads

Kochu Alumoodu Junction, Parangimamoodu Junction, Thachayil Junction, Maruthurkulangara Mosque Junction and Moonnamoodu Junction

Proposal for Private Bus stand

About 113 private buses are operated in Karunagapally town which make 405 trips per day. But there is no bus station available in the town area for private buses. Hence it is proposed on the northern side of Karunagapally - Sasthamkotta road near the Krishna cine theatre opposite market; which is shown in the figure 22.11.

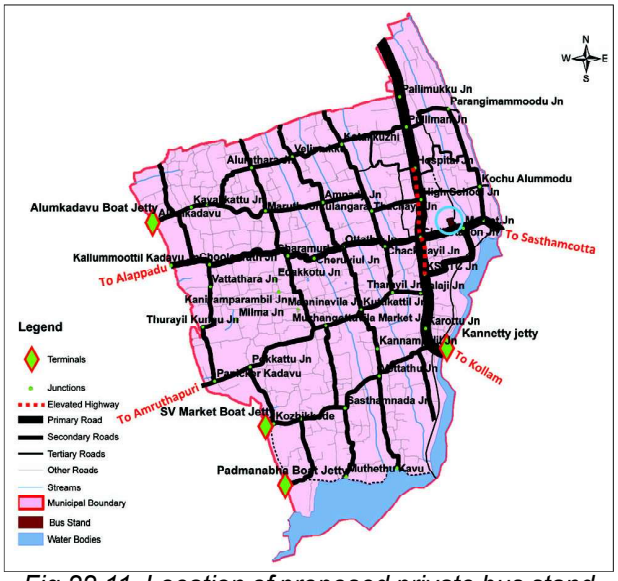


Fig.22.11. Location of proposed private bus stand

Parking Facilities

Considering the parking demand observed in Karunagapally town the following locations are proposed for providing parking facilities.

1) KSRTC station area
2) Civil station area
3) High school area

Pedestrian Facilities

The proposed pedestrian facilities are sideways or walk ways, Marked cross walks and pedestrian overpasses/underpasses

Sideways or walk ways

Sidewalks and walkways are pedestrian lanes that provide people with space to travel within the public right of way, i.e. separated from road way vehicles. Side walks are associated with significant reduction in pedestrian collision with motor vehicles. Considering the pedestrian demand side walk ways on both sides with a width of 1.5 m is proposed for primary road and secondary roads width of walk ways / shoulders in 3 road.

Marked Cross walks

Marked cross walks are essential for high pedestrian volume locations. To guide pedestrians along a preferred walking path and to prevent criss

cross movement of pedastrian on major locations, barriers on median except the location of zebra crossing is desirable. Cross walk markings are proposed at all arms of the major intersections. Apart from these intersections, it is proposed at major high pedestrian volume locations like educational institutions, hospitals and commercial centres.

Pedestrian Overpasses / Underpasses

Pedestrian overpasses and underpasses allow for the uninterrupted flow of pedestrian movement separated from the vehicle traffic. It is proposed at selected locations which have high concentration of commercial establishments and pedestrian volume such as KSRTC junction, Civil station junction and High school junction. But before implementing this, detailed engineering survey is required.

Proposed Waterway Network

Waterway network mainly consists of National Waterway No. 3 from Kollam to Kottappuram, which passes by the western boundary of Karunagappally Municipality. When the NW-3 is fully developed it is expected that substantial quantum of goods traffic passing through NH 66 will be diverted to water network. There is also scope for diverting passenger traffic to IWT by providing adequate and modern vessels operating at high speed with seating comfort and other passenger amenities. The NW-3 passes through the Ashtamudi Lake. This also enhances the potentiality of tourism.

Other links in the waterway network are Kannetti Kayal – Vattakayal – NW3, Kannetti Kayal – Waerbody originated from Thazhava. The proposed water way network is shown in figure 22.12.

Water Front Development

Water front development is propsed along the proposed waterway network. Tourist information center, home stays, curious shops, small tea shops etc are proposed along the water way.

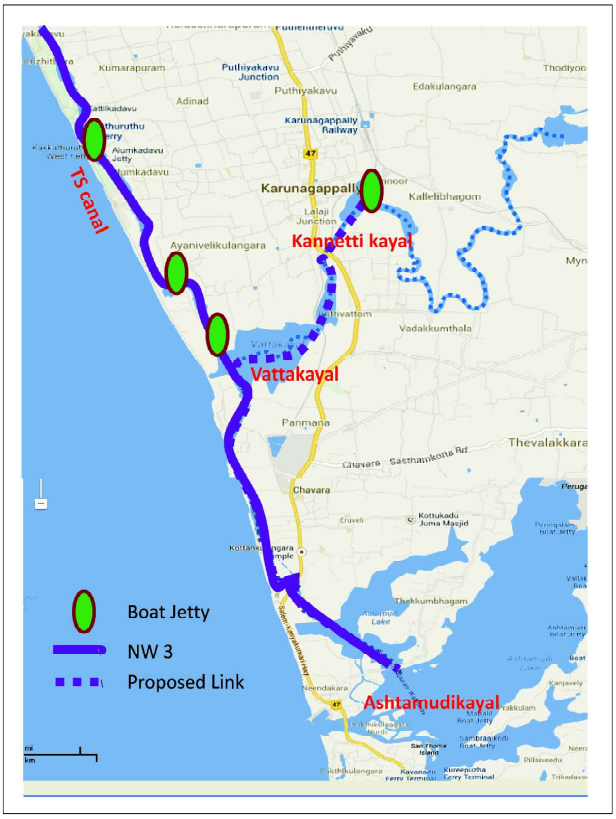


Fig.22.12. Proposed water way network

Development of Terminals Located Along NW3

Alumkadavu boat jetty, SV market boat jetty and Padmanabhavan jetty are located along the NW3. At present these are used for transporting passengers from areas adjoining NW 3 in the town to places across NW3 in Alappad panchayat area by privately operated boats. As a part of developed NW3 the above three terminals are proposed to handle a portion of goods traffic generated by Karunagappally Municipality. Also warehouses with ample storage spaces are proposed adjacent to the terminals. These three terminals enhances the development of traditional industries mainly coir industries.

Development of Kannetty Boat Jetty

Another proposal is to develop the Kannetti boat jetty as the part of proposed link (Kannetti Kayal – Vattakayal – NW3). This can also increase the tourism potential of Municipality.