

Vol-1

MASTER PLAN FOR PALAKKAD MUNICIPALITY-2041

Atal Mission for Rejuvenation and Urban Transformation

LSGD

Masterplan

for

PALAKKAD MUNICIPALITY

2041

Volume 1

Prepared by

PALAKKAD MUNICIPALITY

LOCAL SELF GOVERNMENT DEPARTMENT PLANNING, GOVERNMENT OF KERALA

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PALAKKAD MUNICIPALITY
LOCAL SELF GOVERNMENT DEPARTMENT PLANNING
GOVERNMENT OF KERALA

Masterplan for Palakkad municipality

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FOREWORD

Palghat Municipality is one of the oldest municipalities in the state of Kerala. Palakkad municipality as it is now known is the District Headquarters, and known as the granary of Kerala. It borders Tamilnadu in the East and North and Thrissur district in the South-West and Malappuram district in the North-West.

The Palakkad Municipality has a vision for 2041 and hopes to maximise the facilities for its citizen and increase the scope for future growth by promoting trade and commerce. It is in this backdrop that a Master plan has been formulated under the AMRUT scheme of the Govt. of India.

The Master plan of Palakkad Municipality provides the overall policy framework for future development in the town. The Master plan is developed in consistency with the plans, policies, population and other projects envisaged by the LSGD department of Govt. of Kerala.

The Master plan of Palakkad Municipality has come out with a slew of innovative ways to solve the present problems especially in addressing the decongestion of the central area of the town and spatial allocation and equitable distribution of the infrastructure facilities. It has been formulated after extensive discussions with various stake holders including the special committee that was formed by the municipal council.

Every effort has been taken to tap the maximum potential that Palakkad Municipality has to offer for the future development of the Town. We hope that this Master plan will cater to all sections of the people of Palakkad Municipality and we are sure that all the beneficiaries will pitch in to make this a reality. Let us make a new Palakkad in new India.

Palakkad

Date: 03/02/2024

Pramila Sasidharan
Chairperson
Palakkad Municipality

E Krishnadas
Dy. Chairman
Palakkad Municipality

MUNICIPAL OFFICE PALAKKAD

PREFACE

The urban settlements of the country have experienced relatively rapid population growth. Most of the urban settlements, especially smaller urban settlements, are characterised by haphazard and unplanned growth, non-conforming land uses, mushrooming unauthorized colonies, and land conversion from agriculture to urban, resulting in environmental degradation and poor quality of life. The proper management of urban areas calls for accurate and vital information to be available on a regular basis. But in Kerala, the main reason for urban population growth is the increase in the number of urban areas and also urbanization of statutory rural areas, owing to the shift in occupational pattern. Hence, comprehensive master plans having long term perspective is need of the hour for our urban settlements, which will retard the undesirable effects of such urban sprawl.

Atal Mission for Rejuvenation and Urban Transformation (AMRUT) scheme, launched by Government of India, focuses on infrastructure creation that has a direct link to provision of better services to the urban citizens. The AMRUT mission mandates a set of 11 reforms which are to be implemented by the States during the Mission period. 'Urban Planning and City level Plans' is one among the 11 reforms. For achieving one of the milestone under this reform viz.'preparation of Geographical Information System (GIS) based Master Plans', Government of India have launched the 'scheme of formulation of GIS based Master Plans for AMRUT cities'. The Local Self Government Department Planning was designated as State level Nodal Agency of this Scheme. The Scheme has three components viz. Geo-database creation, Preparation of Master Plans and Capacity building. In the State, Palakkad is one of the 9 AMRUT cities/towns included under this sub-scheme.

74th Constitution Amendment Act envisages empowerment of the Urban Local Bodies (ULBs) with planning functions, which is enshrined in the Twelfth Schedule to Article 243-W of 74th Amendment. The first three functions of urban planning including town planning, regulation of land-use and construction of buildings, planning for economic and social development related to spatial planning. As per G.O.(Rt) No. 310/2018/ LSGD dated 02.02.2018. Administrative Sanction and Financial Sanction was accorded for the implementation of preparation of GIS based master plan for Palakkad municipality. The Municipal Council has taken resolution to prepare Master plan for the town as per resolution number 1857 dated 02.02.2019.

The studies were carried out in connection with the preparation of Master Plan for Palakkad town comprehensively covering the areas crucial to planning and sustainable development of the region. The master plan was prepared through a systematic process, comprising of extensive data collection and analysis, identification of development issues, setting up of goals and objectives, formulation of development concept and carving out policies & strategies followed by detailed sectoral proposals. Joint effort of the Palakkad Municipality and the District office of the Local Self Govern-

ment Department - Planning has culminated in the successful preparation of this Master Plan.

I would like to appreciate the leadership provided by the Palakkad Municipality for this endeavour under the chairpersonship of Smt. Pramila Sasidharan and formerly under Smt. Priya Ajayan. The Special Committee constituted for the preparation of the Master Plan have made significant contributions. I take this opportunity to appreciate all the officials of Palakkad district office of the department under the able leadership of Smt Deepa V P, Town Planner in the preparation of this document. I also appreciate the Sri Ajaykumar S, Senior Town Planner and the team of officials in the office of the Chief Town Planner for their efforts in coordinating and finalizing the GIS based Master plan for Palakkad town.

Certainly, the Master Plan will provide guidance for all stakeholders with an interest in the future development of the city.

OFFICE OF THE ... THIRUVANANTHAPURAM

H Prasanth

Chief Town Planner (Planning)

Thiruvananthapuram

Date: 06/03/2024

ACKNOWLEDGEMENT

The master plan delivers a coordinated strategy to guide future development, transport and public space investments over the next 20 years to ensure our town to be safe, attractive and a continued source of pride. The preparation of the AMRUT Master Plan for Palakkad town was started in February 2018, and the process of preparation included extensive data collection, local level and spatial analysis of collected data, identification of problems and potentials, envisaging the future integrating the results of scientific analysis and the aspirations of people and finally transferring that vision into a Plan. Considering the intricacy of the details involved and multi-disciplinary 'technical knowhow' required, the plan preparation process would not have been realized without the dedicated leadership of the local government and the participation of various stake holders. In this regard, I am sincerely acknowledging the valuable guidance and involvement of Municipal chairperson **Smt. Pramila Sasidharan,** Deputy chairman **Adv. E. Krishnadas.** The contributions and support put forth by the former Municipal Chairperson **Smt. Priya Ajayan** and Vice Chairman Sri. C. Krishnakumar in their tenure during the preparation of Palakkad Master Plan is also to be acknowledged together.

I gratefully acknowledge the contributions of the master plan committee members, who huddled together to discuss the objections and suggestions raised by the public after publishing of the master plan, to hear them in detail, and remould this plan with a democratic approach. The contributions of all the councilors of the municipality and the former councilors and political leaders who offered their support for fulfilling this project are also to be equally acknowledged.

Further, I am extremely grateful to the encouraging leadership, support and motivation extended by our Chief Town Planner, **Sri. Pramod Kumar C P** and **Sri Prasanth H**, Chief Town Planner (Planning) beyond which the plan would not have been realized in time. I would like to thank all those who have participated in the discussions and moulding the plan to the level we see today. In this connection, I am extremely thankful to **Sri. Giji George**, **Smt.K.S.Girija** (Former Chief Town Planners), **Sri. S Ajayakumar, Senior Town Planner**, **Smt. Isha P A, Town Planner and Sri Denzil Fernandez, Deputy Town Planner** for the immense support, creative guidance, valuable assistance and efforts taken for carving and vetting the plan. I also express my deepest gratitude for the creative and valuable advice extended by **Smt. Asha Ajoy Ghosh**, Town Planner and **Smt. Raji S. S.**, Deputy Town planner, Chief Town Planning Office.

Special thanks also go to officials of various line departments who shared data and gave their valuable support in this plan preparation exercise without which the compilation of this vital document would have been difficult to realize. The plan has been prepared in a participatory way having several consultations with stake holders at all stages. I offer special thanks to members of Special Committee, members of various Working Groups and other

stake holders for offering their views, comments and recommendations to strengthen the plan. I would like to extend special thanks to the residents of Palakkad town who provided substantial input that helped to shape the Master plan.

The dedicated effort put by **Sri. V.A. Gopi** during his tenure in the capacity of District Town Planner for the successful timely completion of the plan need special acknowledgement. Preparation of Master Plan for Palakkad Town is the culmination of several months of dedicated work by the members of the planning team constituted for the purpose in this office. I sincerely appreciate the dedicated efforts of **Sri Renjith K S,** Former Deputy Town Planner who led the planning team on his tenure to shape this plan in the way what we see today. I extend my sincere gratitude to all members of planning team with special mention to **Sri. Sarath Sankar M, Sri. A. N. Subhash, Smt. Jagadambika Devi** and **Smt. Jeshna C. C.**, Assistant Town planners who worked together to contribute to this plan along with and **Smt. Radhika R and Smt. Prabhitha B** I[st] grade surveyors who lead and created the GIS part of the plan. Contributions of Planner Associate **Smt. Nighitha. V. S,** Planning Assistants **Kum. Ally Paul,** Planning Assistant (GIS) **Sri T.K Thaliz, Kum. Sachna A. S, Sri. Mohammed Hashim R. M**, Computer Assistant (GIS) **Smt. Syamini. C,** IInd Grade statistical Assistant **Smt. Aswani A,** and Typist **Sri. Babu V**, who were involved in the plan preparation are also acknowledged here. Special thanks also to all other staff of district office who worked during the period of this plan preparation, for their tireless efforts without which this plan would not have been completed.

I once again express my gratitude to all those who were associated for the successful completion of this plan and I believe that the plan will contribute to the orderly, planned and sustainable development of Palakkad Town.

Palakkad

11/01/2024

DEEPA V P

Town Planner

Local Self Government Planning,

Palakkad

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ABBREVIATIONS

AAY	-	Antyodaya Anna Yojana
ABC Programme	-	Animal Birth Control Programme
ACMA	-	Automotive Component Manufactures Association
AD	-	Anno Domini
ADS	-	Area Development Society
AHP	-	Affordable housing in partnership
AM	-	Ante Meridiem
AMRUT		Atal Mission for Rejuvenation and Urban Transformation
ANERT	-	Agency for Non-conventional Energy and Rural Technology
APCOS	-	Anand Pattern Co-op Societies
APL	-	Above Poverty Line
ATM	-	Automated Teller Machine
BC	-	Before Christ
B.Ed	-	Bachelor of Education
BLC	-	Beneficiary led consturction
BMC	-	Bulk Milk Cooler
BOD	-	Biological Oxygen Demand
BOT	-	Build, Operate and Transfer
BPL	-	Below Poverty Line
BRGF	-	Backward Regions Grant Fund
BSNL	-	Bharat Sanchar Nigam Limited
BSY	-	Balika Samridhi Yojana
CA	-	Chartered Accountant
CAA	-	Constitution Amendment Act
CAGR	-	Compounded Annual Growth Rate
CBD	-	Central Business District
CBSE		Central Board of Secondary Education
CBO	-	Community Based Organization
CCU	-	Coronary care unit
CC	-	Cement Concrete
CDP	-	City Development Plan
CDS	-	Community Development Supervisor
CEC	-	Cation Exchange Capacity
CESS	-	Centre for Earth Science Studies
CFL	-	Compact Fluorescent Lamp
CHC	-	Community Health Centre
CI	-	Concentration Index
CLS	-	Credit linked subsidy scheme

CNC	-	Computer Numerical Control
COPP	-	Committee on Plan Projects for Industrial Townships
CPHEEO	-	Central Public Health Environmental Engineering Organization
CREDAI	-	Confederation of Real Estate Developers' Associations of India
CT	-	Computerized Tomography
CWRDM	-	Centre for Water Resources Development and Management
DCA	-	Diploma in Computer Application
DCS	-	Dairy Co-operative Societies
DDMP	-	District Disaster Management Plan
DEM	-	Digital Elevation Model
DIC	-	District Integration Committee Organization
DMD	-	Disaster Management Department
D&O Trade	-	Dangerous and Offensive Trade
DPCs	-	District Planning Committees
DPR	-	Detailed Project Report
DRM	-	Digital Rights Management
DRW	-	Drought Relief Work
DTP	-	Detailed Town Planning
Dt.	-	District
DTPC	-	District Tourism Promotion Council
DWCUA	-	Development of Women and Children in Urban Areas
DWT	-	Depth of Water Table
DYSP	-	Deputy Superintendent of Police
ECG	-	Electro Cardio Gram
EEG	-	Electro Encephalon Gram
EIUS	-	Environmental Improvement in Urban Slums
EOC	-	Emergency Operation Centre
ENT	-	Otolaryngologist
ESA	-	Environmental Sensitive Areas
ESI	-	Employees State Insurance
ESS	-	Entrepreneur Support Scheme
ETP	-	Effluent Treatment Plant
EWS	-	Economically Weaker Section
FAR	-	Floor Area Ratio
FCI	-	Fixed Capital Investment

FHC	-	Family Health Centre
FHSC	-	Family Health Service Centre
FFDA	-	Fish Farmers Development Agency
FOP	-	Financial Operating Plan
FSI	-	Floor Space Index
FY	-	Financial Year
GLSR	-	Ground Level Storage Reservoir
gm	-	Grams
GO	-	Government Order
GOI	-	Govt. of India
Govt.	-	Government
GOI-UNDP	-	Govt. of India- United Nations Development Programme
GOK	-	Government of Kerala
gpcd	-	Grams per Capita per Day
GIS	-	Geographic Information System
GP	-	Grama Panchayath
GST	-	Goods and Services Tax
GPF	-	General Provident Fund
GPS	-	Global Positioning System
GWD	-	Ground Water Department
GWMW	-	Ground Water Monitoring Well
H_2S	-	Hydrogen Sulphide
Ha	-	Hectares
HH	-	Households
HHI	-	Households Industries
HIV		Human Immunodeficiency Virus
HP	-	Horse Power
HS	-	High School
HS	-	Health Supervisor
HSC	-	House Service Connection
HSS	-	Higher Secondary school
HUDCO	-	Housing and Urban Development Corporation
HWCs	-	Health and wellness centres
ICDP		Integrated Cattle Development Programme
ICDS	-	Integrated Child Development Scheme
IELTS	-	International English Language Testing system

ICSE	-	Indian Certificate of Secondary Education
ICT	-	Information and Communication Technology
ICTC		Integrated Counseling and Testing Centre
ICU	-	Intensive Care Unit
IDDP	-	Integrated District Development Plan
IDSMT	-	Integrated Development for Small and Medium town
IPT	-	Intermediate Public Transport
IGMSY	-	Indira Gandhi Mathruthva Sahayog Yogana
IHSDP	-	Integrated Housing and Slum Development Project
ILFS	-	Infrastructure Leasing & Financing Society
IMAGE	-	Indian Medical association Goes Eco friendly
IP	-	In Patient
IPM	-	Integrated Pest Management
IPSASB	-	International Public Sector Accounting Standards Board
IPT	-	Intermediate Public Transport
IRC	-	Indian Roads Congress
IIMS	-	Institute of Integrated Medical Science
IRCTC	-	Indian Railway Catering and Tourism Corporation
IRTC	-	Integrated Rural Technology Centre
ISM	-	Indian System of Medicine
ISP	-	Integrated Sanitation Program
IT	-	Information technology
ITC	-	Industrial Training Centre
Jn.	-	Junction
JNNURM	-	Jawaharlal Nehru National Urban Renewal Mission
JSSK	-	Janani-Shishu Suraksha Karyakram
JSY	-	Janani Suraksha Yojana
KELSA	-	Kerala State Legal Services Authority
KAS	-	Karnataka Administrative Service
kg	-	Kilograms
KILA	-	Kerala Institute of Local Administration
KIIFB	-	Kerala Infrastructure Investment Fund Board
km	-	Kilometer
KMBR	-	Kerala Municipal Building Rules
KSBC	-	Kerala State Bamboo Corporation
KSEB	-	Kerala State Electricity Board

KSE Ltd.	-	Kerala Solvent Extraction Limited
KSFE	-	Kerala State Financial Enterprises
KSPCB	-	Kerala State Pollution Control Board
KSRTC	-	Kerala State Road Transport Corporation
KSTP	-	Kerala State Transport Project
KSSDA	-	Kerala State Seed Development Authority
KSWDC	-	Kerala State Women's Development Corporation
KSY	-	Kishori Sakthi Yojana
KUDFC	-	Kerala Urban Development Finance Corporation
KUHS	-	Kerala University of Health Sciences
KVA	-	Kilo Volt Ampere
KWA	-	Kerala Water Authority
KWH	-	Kilo Watt Hour
LCS	-	Low Cost Sanitation
LDP	-	Local Development Plan
LED	-	Light-Emitting Diode
LHS	-	Left Hand Side
LIC	-	Life Insurance Corporation
LIFE	-	Livelihood Inclusion and Financial Empowerment
LIG	-	Low Income Group
Lit	-	Liters
LL	-	Lakh Liters
LP	-	Lower Primary
lpcd	-	Liters Per Capita Per Day
LPG	-	Liquefied Petroleum Gas
LSG	-	Local Self Government
LSGD	-	Local Self Government Department
LSGI	-	Local Self Government Institution
(M)	-	Municipality
m	-	Meters
mbgl	-	Meters Below ground level
MBA	-	Master of Business Administration
MCM	-	Million cubic Meters
MCW	-	Maternity and Child Welfare
MDR	-	Major District Road
METIND	-	Metal Industries Limited

MGNREGS	-	Mahatma Gandhi National Rural Employment Guarantee Scheme
mg/L	-	Milligrams per Litre
ML	-	Million Liters
MLA	-	Member of Legislative Assembly
MLD	-	Million Liters per Day
MILMA	-	Malabar Region Co-operative Milk Producers Union
mm	-	Milli Meters
MML	-	Margin Money Loan Scheme
MoUD	-	Ministry of Urban Development
MP	-	Member of Parliament
MSL	-	Mean Sea Level
MSME	-	Micro, Small & Medium Enterprises
MSMED	-	Small and Medium Eterprises Development
MSW	-	Municipal Solid Waste
MT	-	Metric Tonne
NABARD	-	National Bank for Agricultural and Rural Development
NATPAC	-	National Transportation Planning and Research Centre
NCD	-	Non Communicable Disease
NGO	-	Non-Governmental Organizations
NHAI	-	National Highway Authority of India
NHED	-	Nutrition and Health Education
NUIA	-	National Institute of Urban Affairs
NHG	-	Neighborhood Group
NMAM	-	Model National Municipal Accounting Manual
NNM	-	National Nutrition Mission
Nos.	-	Numbers
NPA	-	Nutrition Programme for Adolescent Girls
NRC	-	National Remote Censing
NREGA	-	National Rural Employment Guarantee Act
NMT	-	Non Motorized Transport
NRHM	-	National Rural Health Mission
NRSC		National Remote Sensing Centre
NRW	-	Non-Revenue water
NSDP	-	National Slum Development Program
NSS	-	National Service Scheme
NTU	-	Nephelometric Turbidity unit

NIOS	-	National Institute of open schooling
NUHM	-	National Urban Health Mission
OBC	-	Other Backward Class
ODR	-	Other District Roads
O&M	-	Operation & Maintenance
O-D	-	Origin & Destination
OG	-	Out Growth
OH	-	Over Head
OHSR	-	Overhead Service Reservoir
OHT	-	Overhead Tank
OP	-	Out Patient
PCU	-	Passenger Car Unit
PCO	-	Polycystic Ovary Syndrome
PGDCA	-	Post Graduate Diploma in Computer Applications
pH	-	Potential of Hydrogen
PHC	-	Primary Health Centre
PI	-	Pollution Index
PM	-	Post Meridiem
PMAY	-	Pradhan Mantri Awas Yojana
PMEGP	-	Prime Minister's Employment Generation Programme
PMRY	-	Prime Minister's Rozgar Yojana
PO	-	Post office
PPH	-	Persons Per Hectare
PPP	-	Private Public Participation
ppsqkm	-	Person Per Square kilometer
RGGVY	-	Rajiv Gandhi Grameen Vidyutikaran Yojana
RHS	-	Right Hand Side
RNCTP		Revised National Tuberculosis Control Program
ROB	-	Road Over Bridge
R.O Plant	-	Revenue Osmosis plat
SC	-	Scheduled Caste
SECC	-	Socio Economic and Caste Census
SFC	-	State Finance Commission
SH	-	State Highway
SHG	-	Self Help Group
SIC	-	Spatial Integration Committee

SIDCO	-	Small Industries Development Corporation
SIFL	-	Steel Industrial Forgings Ltd
SILK	-	Steel Industrials Limited Kerala
SIMCO	-	South India Metal Company
SIPC	-	Small Industries Promotion Centre
SISI	-	Small Industries Service Institute
SIS	-	Standard investment Subsidy Scheme
SJSRY	-	Swarna Jayanti Shahari Rozgar Yojana
SLC	-	Special Local Committee
SLBP	-	Special Livestock Breeding Program
SNP	-	Supplementary Nutrition Programme
SPAC	-	State Plan of Action for the Child
SPM	-	Suspended Particulate Matter
SPEM	-	State Poverty Eradication Mission
sq. ft	-	Square Feet
sq. km	-	Square Kilometers
SSA	-	Sarva Siksha Abhiyan
SSI	-	Supplemental Security Income
SSO	-	Soil Survey Organisation
ST	-	Scheduled Tribe
STP	-	Sewage Treatment Plant
SVL	-	Sodium Vapour Lamp
SWM	-	Solid Waste Management
TB	-	Tuberculosis
T&CS	-	Thrift & Credit Societies
TDS		Total Dissolved Solids
THRS	-	Take Home Ration Scheme
TPD	-	Tonnes per day
TOD	-	Transit Oriented Development
TTC	-	Teachers Training Centre
TTI	-	Teachers Training Institute
TV	-	Television
TWSS	-	Town Water Supply Scheme
UA	-	Urban Agglomeration
UPSC	-	Union Public Service Commission

URDPFI	-	Urban and Regional Development Plan Formulation and Implementation
USGS	-	United States Geological Survey
UGD	-	Underground Drainage
UK	-	United Kingdom
ULB	-	Urban Local Body
UNESCO	-	United Nations Educational, Scientific and Cultural
UP	-	Upper Primary
UPHCs	-	Urban Primary Health Centres
USEP	-	Urban Self Employment Program
USS		Ultra Sound Scan
UST	-	Urban Skill Training
UWEP	-	Urban Wage Employment Program
V/C	-	Volume to Capacity
VAMBAY	-	Valmiki Ambedkar Awas Yojana
VFPCK	-	Vegetable and Fruit Promotion Council Kerala
VHSS		Vocational Higher Secondary School
W	-	Watts
WBM	-	Water Bound Macadam
WFPR	-	Work Force Participation Rate
WHO		World Health Organization
Wi fi	-	Wireless networking technology
WPR	-	Work Participation Rate
w.r.to		With Respect To
WSS	-	Water Supply Scheme
W/S	-	Watershed
WTP	-	Water Treatment Plant



CHAPTER 1- INTRODUCTION

1. INTRODUCTION

1.1 GENERAL INTRODUCTION

Urban Planning is an interdisciplinary field that includes social science, architecture, human geography, politics and engineering & design sciences. The process of urban Planning is concerned with research and analysis, strategic thinking, architecture, urban design, public consultation, policy recommendations, implementation and management. From a local government perspective, urban planning touches numerous elements such as land, buildings, roads, communal spaces, transportation, economic development, infrastructure and the environment, among others.

A Master Plan is a dynamic long-term planning document that provides a conceptual layout to guide future growth and development of an urban area. Master plan is about making the connection between buildings, social settings and their surrounding environments. A Master Plan includes analysis, recommendations, and proposals for the town population, economy, housing, transportation, community facilities and land use. It is based on public input, surveys, planning initiatives, existing development, physical characteristics and social and economic conditions. 'Master Plan' is a statutory document for controlling, directing and promoting sound and rational development and redevelopment of an urban area with a view to achieve maximum economic, social and aesthetic benefits. In fact, the Master Plan is a vision document giving a perspective of 20 to 25 years , keeping in view the future growth of population, economic development potential and ecological improvements likely to come up during the plan period.

1.2 EARLIER PLANNING EFFORTS AND STUDIES

The earlier planning efforts in this area can be addressed in two levels viz., District level and town level.

1.2.1 District Level

The decentralized planning system was implemented in India through the 73rd and 74th constitutional Act of India on December 1992. Accordingly, Kerala State legislative assembly enacted The Kerala Panchayath Raj Act 1994 and The Kerala Municipality Act 1994 repealing the previous acts. The 74th Amendment Act of the constitution of India mandated District Planning Committee to prepare a Development Plan for the District. As per the Article 243 ZD of the constitution; the District Planning Committee shall consolidate Panchayath/ Municipality Plans in the District and pre-

pare a Development Plan for the District as a whole.

By realizing the above fact, Government has accorded sanction to prepare an Integrated District Development Plan (IDDP) and Local Development Plan (LDP) for Palakkad District vide Order No.354/07/LSGD dated 01.02.2007. The District Planning Committee of Palakkad decided vide decision dated 26.05.2007 to prepare an Integrated District Development Plan (IDDP), Palakkad along with local development Plan (LDP) for each and every local governments in the district in an integrated manner. The District Planning Committee in its meeting held on 31.12.12 approved IDDP Palakkad. Kerala Town and Country Planning Act 2016 gives a statutory backing to the preparation of Perspective Plan for District as per section 14.

1.2.2 Town Level

For Palakkad Municipality first Master Plan was sanctioned as per GO(Ms) No 236/86 / LAD dt 20.11 1986. Zoning regulations of Master Plan were later varied as per GO(Ms) No 210/09/LSGD dated 11.11.2009 under clause (B) of subsection (2) of section 15 of The Madras Town Planning Act 1920. Five Detailed Town Planning Schemes covering the central areas of the town were also prepared and sanctioned by the Government. After that the Master Plan is updated as per GO (Rt) No. 3982/2008/ LSGD dated 13.11.2008, Government of Kerala had decided to prepare Master Plans for 32 towns and Palakkad Municipality was one among them. As per the order G.O (Rt). No. 3982/2008/LSGD dated 13.11.2008 a Draft Master Plan was published in Kerala Gazette No. 50/2016/DTP Part IV dated20/12/2016.

1.2.3 DTP Schemes

1.2.3.1 Kalvakkulam area

The DTP scheme for Kalvakkulam area for 58.75 hectares was sanctioned under G.O.M.S.No.33/88/LAD dated 9/3/88 . The scheme envisaged in developing a link road which connects Coimbatore road and proposed Calicut– Coimbatore bypass to relieve congestion in Sulthanpet junction. Calicut Coimbatore bypass has been completed by reducing the width to 20m from 30m. Also a new bus stand was proposed in the area for which 2/3rd of the land was acquired. Since the link road was partially completed, the commercial development was not developed according to the plan. Planned neighborhoods and an organized park were also included in the scheme which were not completed.

1.2.3.2 Stadium complex

The scheme was sanctioned under G.O.M.S.No.161/87/LAD dated 13/7/1987 for an area of 60 hectares which mainly focused on the development of stadium on the southern side of the Coimbatore road. A 20 m wide link road connecting Coimbatore road and Kunnathurmedu road near IMA hall was also proposed with planned resi-

dential area on either side. All these proposals were either completed or are in the threshold of completion

1.2.3.3 Central area

The scheme for central area which extends up to 71 hectares was sanctioned by the Government under G.O(M.S)No.141/93/LAD dated 16/7/1993. The scheme included a parallel road to telephone exchange road which reduce congestion, development of Melamuri bypass road, a railway over bridge and planned residential neighborhood in the area. The construction of over bridge was completed and rest of them were not yet started. The commercial development in the area was beyond the expected commercial development in the proposal.

1.2.3.4 Big Bazar area

An area of 39.84 hectares were included in the scheme which was sanctioned by the government under G O (Ms) No 17/83/LAD dated 30/1/1983. . A 15 m wide road from telephone exchange junction to Melamuri, parallel to the existing big bazar road with development on either sides of the road was the major proposal. It also aimed at providing infrastructure facilities for commercial activities of the area. None of the proposals were completed successfully.

1.2.3.5 Ayyapuram– Ramanathapuram

The area is a narrow strip of paddy which lies between Kalpathy and Puthur and it extends northwest from Malampuzha road near Koppam. The scheme area is about 69.70 hectares. A 36m wide bypass road to Calicut– Coimbatore road and 30 m wide road from Victoria college to Malampuzha are the major proposals to relieve the congestion in Sultanpet junction. The scheme was sanctioned by government under GO No (Ms) No 108/88/LAD dated 22/8/1988. The road to Calicut– Coimbatore road was completed by reducing its width to 20m and the road which connects Victoria college to Malampuzha was also successfully completed.

1.2.3.6 Fort area and Environs

The scheme was published by the government for Fort area and environs which comes around 70 hectares, mainly focused in protection of the scenic beauty of fort and maidan to accentuate its historical and archeological significance. It also aimed at controlling the developmental activities in the surrounding area by prescribing special building line and FAR for plots abutting ring road which was proposed to be widened to 22m with special building line of 10m. Another objectives were a bus bay near civil station, development of eastern paddy field , create a green belt with children's park to beautify the approach road to civil station and restriction on commercial developments

as well as building height abutting the road. All these proposal area comes under heritage zone now except some land. Since fort is a protected monument according to Ancient monuments and Archeological sites and remains act,1958 all constructions with in 100m periphery where prohibited and within 200 m periphery were restricted. The scheme is not sanctioned by the government

1.2.3.7 Sub centre area (Near Mercy College)

The scheme area is 85 hectares of land which is located at Melamuri by the side of Shornur Coimbatore road. This published scheme aimed at developing a sub centre at Mercy college junction to cater commercial and other public needs which has not been taken up till now. 20m wide road linking the town with Shornur bypassing Melamuri junction and 16 metre wide road that connects the subcentre with other areas of scheme were the other proposals of which the former is completed. The scheme also envisaged conversion of a portion of paddy fields for the proposals.

1.2.3.8 Sub centre area (Puthur)

The scheme for Puthur area which comes around 64.45 hectares by the side of 30m Malampuzha– Palakkad tourist road was published by the government on 18/1/1999. Major objective was to develop the area as a subcentre with ample facilities. This proposal was not taken up. A 16m wide road was proposed linking subcentre area with Malampuzha– Palakkad road bypassing narrow junction at Puthur. It also envisaged at utilizing undeveloped vacant dry land in the area.

1.2.3.9 Civil Station– Manappullikkavu- NH Road

The scheme was published on 14/1/1999 for an area of 10.60 hectares of land. The main objective was the development of an 18m wide road connecting Civil Station—Manappullikkavu road to reduce congestion in IMA junction. The proposal was not implemented. The scheme also included widening of Fort Maidan Chittur road to 12m and Thrissur road from Manappullikkavu junction to 18m. None of the proposals were implemented.

1.2.3.10 Vettilakkulam area

The scheme was published on 7/3/1986 and extent of the scheme was 56 hectares. The main objective of the scheme was to achieve the objectives of Masterplan by organizing developments, by providing new link roads and by widening existing important roads. The scheme also included the proposal of shifting Municipal bus stand and development of the area as commercial centre. This has not been achieved so far. Construction of Railway over bridge connecting BOC– Vettilakulam–Sulthanpetta was successfully implemented.

1.2.3.11 Kalmandapam area

Scheme area is 100 hectares and was published on 5/12/1985 aiming for an orderly growth in the area. The proposals included were a 30m wide Calicut– Coimbatore bypass, protection of paddy area in the northern side, improvement of existing roads and formation of missing links of roads. Another objective was to disburse activities from central area and to develop light industries. None of the proposals were implemented except the Calicut Coimbatore bypass which was constructed by reducing its width to 20m.

1.2.3.12 Olavakkode area

The scheme area is 86 hectares and was published on 10/1/1986. The scheme envisaged the overall development of the area near Palakkad Railway junction and the land on either side of the Calicut Coimbatore road extending from Municipal boundary at Olavakkode road overbridge to the Ayyapuram road junction. Calicut Coimbatore bypass was included part by part in 3 DTP schemes. The major proposals included in the scheme were Calicut Coimbatore road widening to 30m, a new road of 12 m width in the north side starting from Calicut Coimbatore towards north which was not implemented as of now. Other road widening proposals were 12m widening of Malampuzha road and Railway station road via Jainimedu to 15m. Both sides of the river land was reserved for parks and open spaces. Only a small percentage of these proposals has been implemented.

1.3 NEED FOR MASTER PLAN

Palakkad is the land of Palmyras and Paddy fields. It is the granary of Kerala often called the Gateway of Kerala. Palakkad lies at the foot of the gigantic Western Ghats on the border of Kerala. Palakkad District is situated in the central part of Kerala State. The District is bounded in the North by Malappuram district, in the East by Coimbatore District of Tamilnadu, in the south by Thrissur district and in the west by Thrissur and Malappuram districts.

There are seven taluks, 163 villages, 88 panchayats and 7 municipalities namely Palakkad, Shoranur, Ottappalam, Chittur – Thathamangalam, Pattambi, Cherpulasseri and Mannarkkad. A twenty-miles-across gap in the Western Ghats is the most striking feature of Palakkad district. The geographical area of the district is 4480km^2 which is 11.5% of the state's area. The District's economy is primarily agricultural. The proximity and easy accessibility to Tamilnadu have caused the blend of Malayalam and Tamil cultures in this area.

As per Integrated District Development Plan (IDDP), Palakkad municipality is the only first order settlement in the district. Since Palakkad municipality is the district capital the development of the city is essential considering the entire district growth. It

is essential to develop the town with more infrastructure facilities and better traffic and transportation. There is prior need to plan the transport corridors to the municipality as the town area is the main commercial hub of the entire district. There is a need for growth and investment to cater the needs of the residents of the municipality as well as the residents of adjacent Local Self Governments.

The Government of India has launched the Atal Mission for Rejuvenation and Urban Transformation (AMRUT) on 25.06.2015 with the aim of providing basic civic amenities like water supply, sewerage, urban transport, parks as to improve the quality of life for all, especially the poor and the disadvantaged. As per the Central Government scheme AMRUT (Atal Mission for Rejuvenation and Urban Transformation), Palakkad municipality is selected as an AMRUT city.

The thrust areas which the Mission will focus are Water supply, Sewerage facilities and septage management, Storm water drains to reduce flooding, Pedestrian, non-motorized and public transport facilities, parking spaces and Enhancing amenity value of cities by creating and upgrading green spaces, parks and recreation centers, especially for children. A sub scheme for Preparation of GIS based master plan by providing predominant consideration for thrust areas is also fa major component for AMRUT cities

1.4 LEGAL FRAME WORK FOR MASTERPLAN

As per The Kerala Town and Country Planning Act 2016 in force in the state, not withstanding anything contained in The Kerala Municipality Act, 1994 or the Kerala Panchayath Raj Act 1994, the Municipal Corporation, Municipal Council, Town Panchayath or Village Panchayath shall have the additional function of "Preparation of Master Plan for the Local Planning area". As per G.O.(Rt) No. 310/2018/LSGD dated: 02/02/2018 administrative sanction and financial sanction was accorded for the implementation of preparation of GIS based master plan for Palakkad town. The Municipal Council has taken resolution to prepare Master plan for the town as per resolution number 1857 dated 02/02/2019.

1.5 METHODOLOGY

1.5.1 Methodology for GIS based Master Plan as per AMRUT Guidelines

The master plan under AMRUT scheme is formulated by creating common digital geo-referenced base maps and land use maps using Geographical Information System (GIS). These GIS-based Master Plans will help in different types of urban planning exercises, such as preparation of Master Plan, Development Plan, Zonal Plan, Utility Plan, Infrastructure Plan, etc. can be simplified by using IT tools. The National Remote Sensing Centre (NRSC) provides assistance to all AMRUT cities. The main steps in preparation of GIS based Master Plan are shown in figure 1.1

City /town base map and thematic maps including existing land use map are created in functional scale having defined layers as per Design & Standards stipulated by AMRUT. Similarly for Urban Database Creation, Sector-wise data collection and data analysis report of 25 aspects has been completed. Formulation of Master Plan of city I is as per State Town & Country Planning Act, which includes demand assessment, identification of issues, projected requirements, development strategy and draft proposals on the GIS base map and sector wise data analysis. Build capacity among Town Planning, line departments and other concerned personnel at state and local levels including ULBs and development authorities to create a cadre of professionals proficient in the use of GIS technology for using and updating databases in urban Planning and management is the key feature of AMRUT. The training programs includes hands-on training on the use of GIS software including open source GIS/RS technologies, data-base generation for formulation and updating of Master Plan etc. Operators, technicians, draftsmen, planning assistants, town planners and administrators will be trained during the program at different stages relevant to their roles in implementing the scheme.

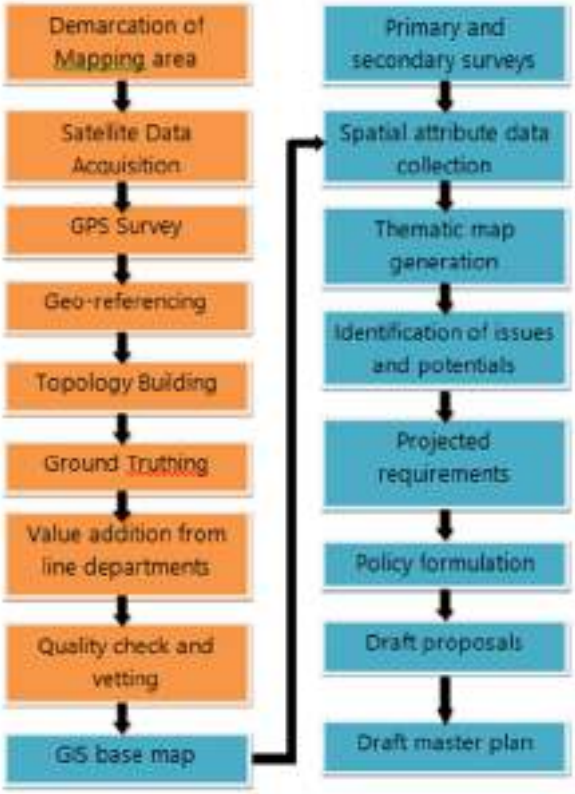


Fig.1.1 Formulation of GIS based Master Plan as per AMRUT

1.5.2 Preparation of GIS based Master Plan as per Town & Country Planning Act

The Master Plan preparation process can be divided into many steps listed as follows:

1.5.2.1 Preliminary Efforts

Existing Town Planning schemes are to be evaluated first to justify the need for a new Master Plan, followed by:

1. Constitution of Special Committee
2. Delineation of planning area.
3. Collection of cadastral maps.
4. Global Position System (GPS) Survey.

5. Preparation of Digitized maps.

1.5.2.2 *Data Collection and Compilation*

Two types of data collection are involved.

- Primary data**:** Primary data collection involves land use survey, socio economic survey and traffic survey.
- Secondary data**:** Secondary data collection involves sectoral data collection by Special Committee through working groups.
- Data Compilation: Collected data is compiled in specified format so as to make the analysis easy.

The process of data collection and compilation is done along with conducting series of workshops with various working groups, stake holders and departments to acquire maximum data from each sector.

1.5.2.3 Analysis

Two types of analysis are done:

- Local Analysis: The objective of local analysis is to analyse the development trend of each sector, its potential and development problems associated with each sector. It also includes a study on people's development aspirations from the earlier development reports. SIC has the responsibility of local level analysis. The process of local analysis may be enriched and monitored by conducting series of workshops.
- Spatial Analysis: The spatial analysis focuses upon regional setting of the settlement as well as the distribution pattern of activities & population, land use and infra-structure network within the local body. The findings of both the analysis and findings from the urbanization study of the district are then integrated to facilitate the envisioning process.

1.5.2.4 *Envisioning Process*

The outcome of the envisioning process comprises of setting up of goals and objectives, formulation of development concepts and formulation of policies and strategies within the integrated development vision of the planning area.

- Setting up of Goals and Objectives

  The major development problems and potentials of planning area will be clear from the consolidated findings of the analysis. Accordingly, the development goals and objectives will be formulated.

- Formulation of Development Concept.

A Master Plan has to look in to the development perspective of the area for a future period. This is accomplished through the formulation of development concept of the area.

- Formulation of Policies and Strategies

General development policy based on the development concept is formulated. Then sectoral policies and strategies are framed in conformity with the general policy. The development concept and sectoral policies are presented in the council which is then finalized by taking the feasible suggestions of the council into account.

1.5.2.5 *Detailing*

- Projected Requirements

The future requirements in each sector are assessed in this step. Inter sectoral integration is also ensured while assessing the future requirements in each development sector.

- Sectoral Detailing and Land Use Planning

Sectoral development suggestions are formulated to achieve the projected requirements. Detailing is a joint activity of both Town and Country Planning Department and Special Committee. A proposed land use plan is also prepared with zoning regulations.

- Draft Plan and its Legal Processing

The following statutory steps have been enjoined in The Kerala Town and Country Planning Act 2016 with regards to the preparation, publication and regulation aspect of the Master Plan.

Section 36 (1) of The Kerala Town and Country Planning Act 2016 envisages that the municipal council may, get prepared or adopt with or without modifications, a master plan for the Local Planning Area or part thereof and shall notify the intention of the same in the Official Gazette and shall be duly published in the notice board and the website of the Local Self Government Institution, and in at least one newspaper having wide circulation in the area in the prescribed manner in a time bound manner.

As per section 36(2), the municipal council should prepare or get prepared or adopt with or without modifications a Draft Master Plan in consultation with the Local Self Government Department (Planning) for the Local Planning Area, within two years from the date of notification in the Official Gazette regarding the intention to prepare the Plan, which has to be forwarded along with council resolution to government

through the Chief Town Planner. Chief Town Planner shall forward such plans to Government, as far as possible, within forty five days along with the remarks that whether such plans are in accordance with other plans under this Act

As per section 36 (3) Government on receipt of Master Plan, accord approval for publication within a period of 60 days from the date of receipt of Draft Master Plan.

As per section 36(4), Municipal Council within a period of 60 days from the date of receipt of approval for publication, publish the same in the website of the Local Self Government Institution and a notice of publication in the official Gazette and in at least two newspapers having wide circulation within Municipality (one must be Malayalam newspaper) inviting objections and suggestions to be submitted within 60 days from the date of publication of notice specifying the place or places where a copy shall be available for inspection by the public.

Immediately after publication of the Master Plan, a copy of Master Plan should be forwarded to District Planning Committee for their remarks as per section 36(5). As per section 36(6), municipal council shall appoint a special committee formed under section 32. Special committee shall process the objections and suggestions and hear all such persons who have made request in writing or being so heard and submit report in prescribed format to municipal council.

As per section 36(7), municipal council within a period of 60 days from the date of receipt of report of special committee approve the Master Plan with or without modifications as may be considered necessary and shall forward Master Plan together with objections and suggestions, report of special committee and the recommendations through the Chief Town Planner to Government for sanction. Chief Town Planner shall forward such plans to Government, as far as possible, within forty five days along with the remarks that whether such plans are in accordance with other plans under this Act

As per section 36(8) within a period of 60 days from the date of receipt of Master Plan, government may accord sanction to the Plan after considering the objections and suggestions, if any, the recommendations of the Municipal Council concerned there on and Chief Town Planner , the remarks if any, received from the District Planning Committee on the draft plan and after ensuring compliance with the provisions of the Perspective Plans prepared under this Act, accord sanction to the Plan with or without modifications and publish a notice in the official Gazette intimating the fact of sanction of Master Plan. . If the Master Plan is returned for incorporating modifications suggested by Government, the same shall be resubmitted within 90 days to Government for sanction as if the Plan is submitted afresh.

As per section 38, In case the Municipal Council concerned, fails to process and

get the Plan sanctioned as required by the Government, the Government may, by order, require the District Planning Committee to take action for obtaining sanction for the published Master Plan.

As per section 39,If the Municipal Council fails to publish such Master Plan as in the proviso under subsection (4) of section 36 within the time limit prescribed, the Government may, *suo motu*, publish it, process objections and suggestions, modify the plan to the extent required and sanction it in accordance with this Act.

As soon as Master Plan has been sanctioned by the Government, Municipal Council shall forward a copy to the District Planning Committee and shall publish a notice regarding sanction of the Master Plan by the Government and in at least one newspaper specifying the place or places where a copy shall be available for reference or sale. Sanctioned Master Plan or its extract shall be published in the website of Municipality, as an intermediate link between the people and the government. It should be mandatory to present the salient features of the Master Plan in a public meeting, organized by the local authority just after the public notice inviting their comments and suggestion before its approval. All land pooling schemes should be formulated with direct active participation of the people.

1.6 COMMUNITY INVOLVEMENT

There can be no meaningful development in any society, if the people themselves are kept out of the planning process. People's participation, therefore, is essential and must be introduced at relevant stages in the planning process.

To "listen to the people" both to understand their needs and to assess how their lives are actually being affected by the development projects and policies , are important. The suggested indirect participation of the people is ensured through elected representatives in the Municipal Council / Corporation and Ward Committees (74th Constitutional Amendment Act). This kind of participation has been provided in the Plan formulation process. The direct participation can be through individuals, citizen groups, neighborhood groups, business groups, consumer groups, and such other groups. NGOs and CBOs can also play a vital role as an intermediate link between the people and the government. It should be mandatory to present the salient features of the Master Plan in a public meeting, organized by the local authority just after the public notice inviting their comments and suggestion before its approval.

The method adopted for the preparation of Master Plan ensured community involvement , at various stages of preparation of the Plan. In the council meeting conducted on 26.11.2019, a Special Committee was formed with Municipal Chairperson Smt. Prameela Sasidharan as the Chairperson of the committee. Sri. C. Krishnakumar

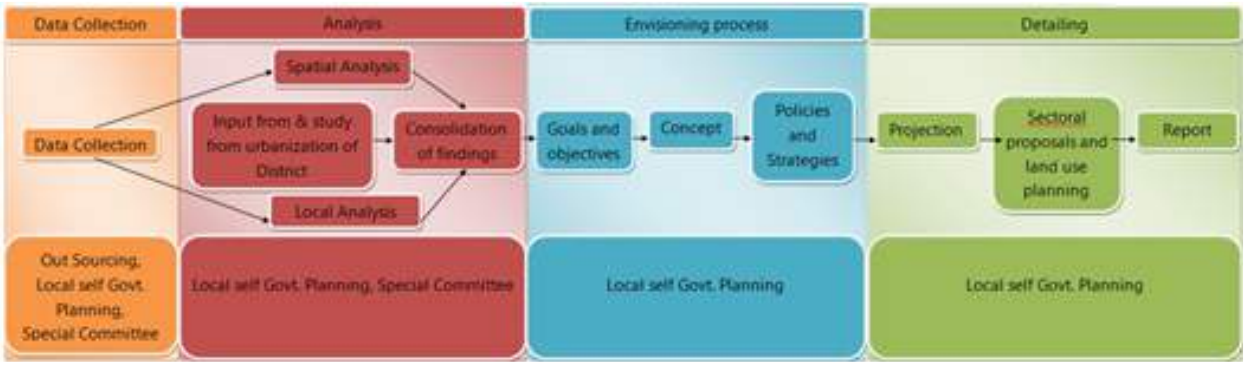


Fig.1.2 Stages and responsibilities of Master Plan preparation

was elected as the Vice Chairman of the Committee and Municipal Secretary was appointed as convener of the said committee. Other members of the Committee were working group Chairman and District Town Planner.

Separate Planning team was created in the Office of the District Town Planner under the leadership of District Town Planner. As per the discussions conducted with the Special Committee, various surveys and data collection were carried out. Land use and socio- economic surveys were completed and traffic and transportation survey and study work were undertaken with the technical support of NATPAC, Thiruvananthapuram.

Special Municipal Council meeting was conducted for evaluating the process and development of AMRUT Master Plan on 6.11.2019 and the aspirations of council members collected through the separate form in writing.



Fig.1.3 The special council meeting for evaluation of development of Master Plan

Due to the outspread of COVID pandemic after march 2020, participatory process with public through direct means had a huge setback, even though efforts were made to overcome this crisis and to ensure public participation. Wide publicity was given about the preparation of Master Plan through newspapers and social media and individual letter has been sent to the stakeholder groups for collecting their aspirations for the next 20 years .The suggestions and opinions received from the public/stakeholders through mail and suggestion box has been closely evaluated and incorporated in the master plan. A brief note on such suggestions were also incorporated in this plan as an Annexure.

Various suggestions from the members of the Municipal Council were also collected and incorporated in the Master Plan. Great efforts are thus made for ensuring community participation to reflect the needs, aspirations and problems of the community .

1.7 TIMELINE OF MASTERPLAN PREPARATION

As per the decision taken regarding the preparation of Masterplan for Palakkad Municipality, the socio– economic survey was conducted in the year 2019. The survey was completed on 16/3/2019. The landuse survey and ground truthing were completed on January 2020 and the collection of secondary data was completed on march 2020. In the special council meeting conducted on 6/11/2019, the projects and the schemes were primarily discussed and on 26/11/2019, a special committee was formed. The

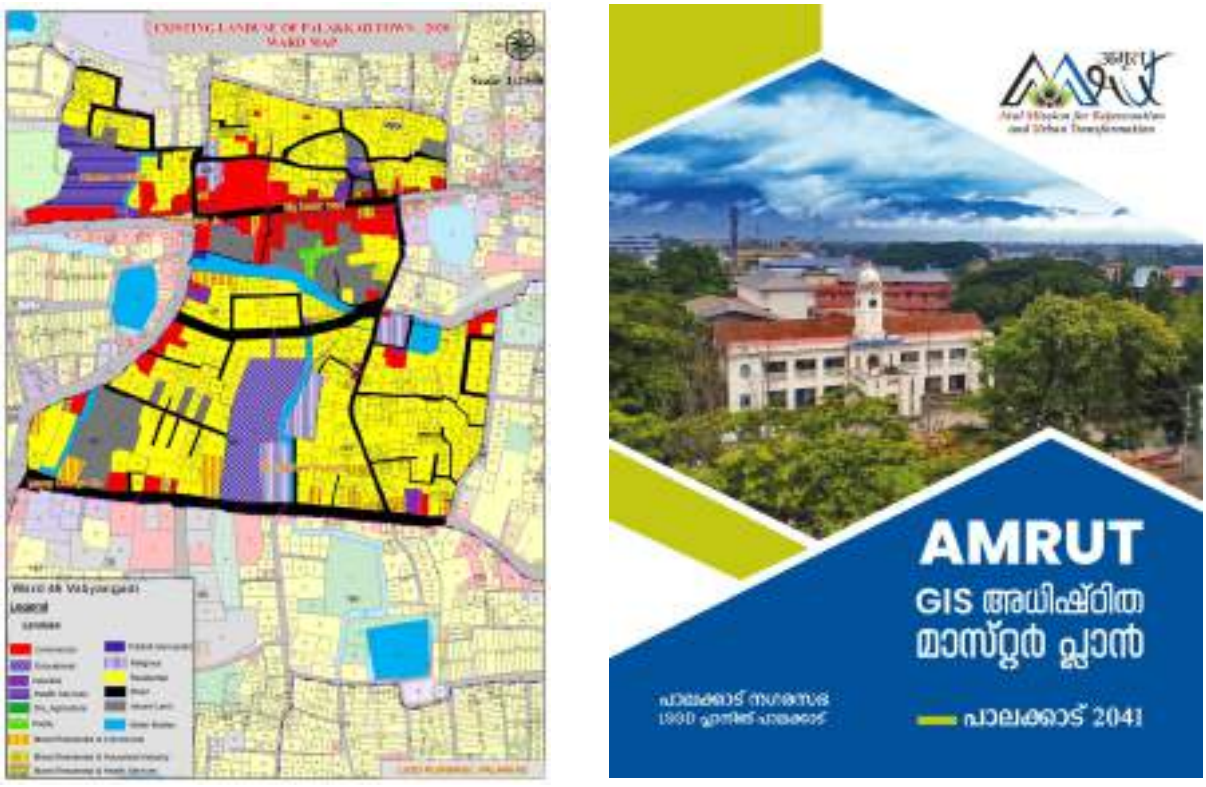


Fig.1.4 Model of Ward maps and brochure given to councilors

suggestions for the developmental proposals were collected from the 52 council members of Palakkad municipality on January 2020 and suggestions from public were received on august 2020. Taking all these into consideration, the draft masterplan report was prepared and submitted to the Chief Town Planner on February 2021. Incorporating the corrections and suggestions from CTP, the masterplan was modified and presented before the council on 27/12/2021. Detailed ward wise maps and a brief brochure on Malayalam was given to every councilor for suggesting their ideas and comments. As per the amendment of Town Planning Act 2021, the chapters , Priority action plan, Review and Revocation of DTP Scheme, Disaster Management on the aspect of making the master plan risk informed and Zoning regulations were also prepared after discussion with CTP. In the mean time copies of the master plan report and maps were also given to MP and MLA. A new Master Plan committee was formed as per decision No 2 in the council meeting held on 12/07/2022 and its first meeting was held on 20/09/2022 .In that meeting newly added chapters and proposals were discussed. The discussion with MLA was held on 25/07/2022 and a Stakeholder Consultation with various departments, people's representatives, representatives of various political and non governmental organizations was conducted on 3/10/2022 in order to discuss the plan and obtain suggestions. The suggestions thus received were suitably incorporated in the final draft report, and submitted to the Master plan committee in order to recommend to the Municipal council to approve the draft Master Plan .



CHAPTER 2- PROFILE OF TOWN

2. PROFILE OF TOWN

Palakkad municipality is the head quarters of the district and is located at 76°37.196'E - 76°40.748' E and 10°44.848'N – 10°48.364'N. The town is bounded by Kalpathy river, Puthuppariyaram Panchayat on north ,Kannadi river on south, Marutharod Panchayat on east and Pirayiri panchayat on west. The city of Palakkad is situated about 350kms north of state capital Thiruvananthapuram. Palakkad lies near the Palakkad Gap, a pass or natural depression through the Western Ghat ranges which connects the plains of the state of Tamil Nadu to the east. This 32 to 42 km wide natural gap in the 960 km long Western Ghats, is perhaps the most influential factor for the unique characteristics of the district such as climate, commercial as well as cultural exchanges between the state and the rest of the country. The people of Palakkad speak Malayalam, though Tamil is spoken and understood by a significant proportion of the population due to the presence of Tamil speaking communities and proximity to Tamilnadu especially along the borders.



Fig.2.1 Connectivity of Palakkad Municipality with other towns in the District

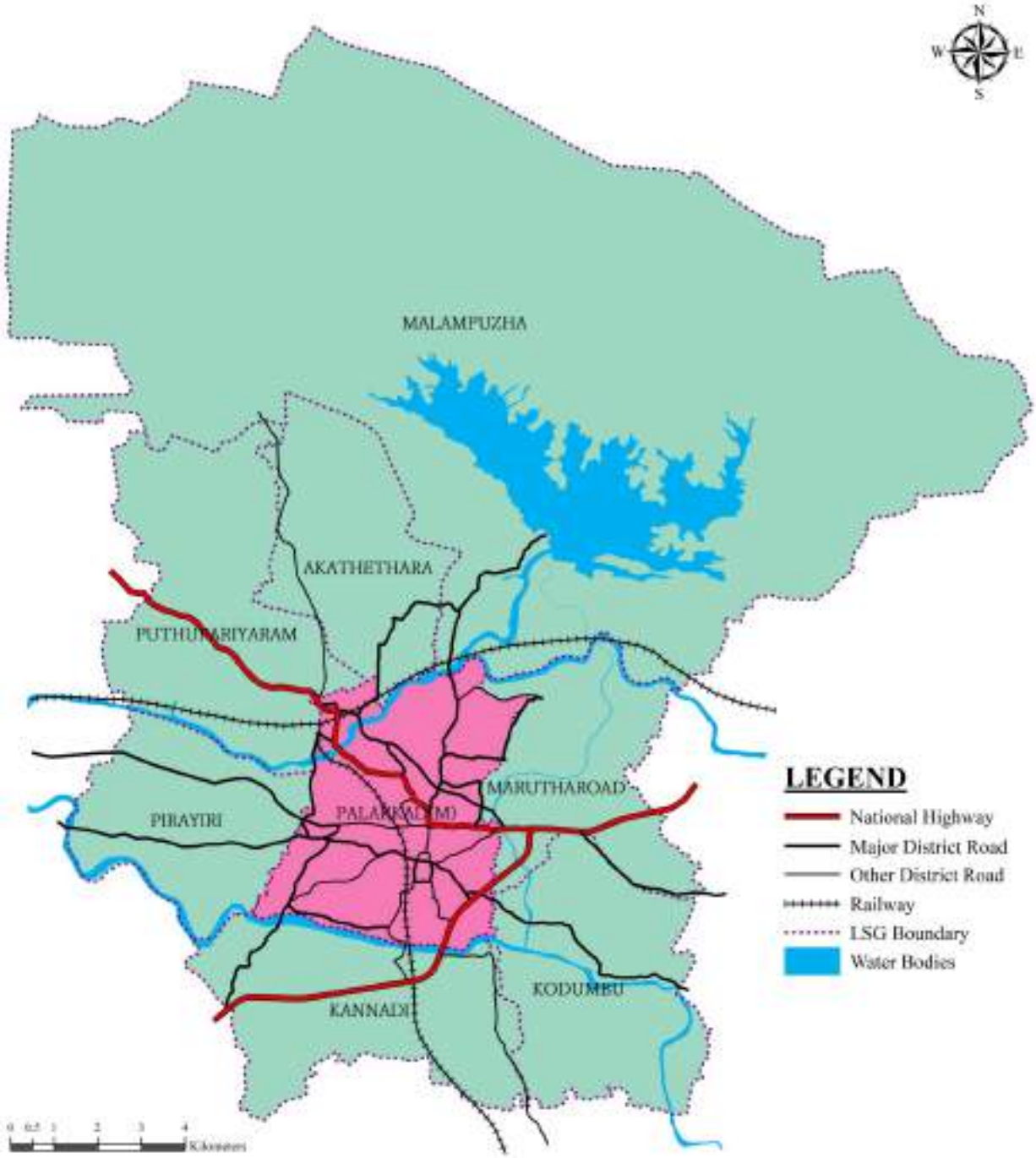


Fig.2.2 Adjoining local bodies of Palakkad municipality

2.1 AREA, ADMINISTRATIVE DIVISIONS

Palakkad town extends over an area of 26.60 km^2 which is approximately 0.59% of the total area of the district. Palakkad municipality consists of 4 revenue villages: Yakkara, Palakkad I, Palakkad II, and Palakkad III (Figure 2.3). There are 52 wards in the municipality and figure 2.4 shows the ward divisions of Palakkad municipality. The gross population density is 4923 persons per km^2 .



Fig.2.3 Revenue Divisions of Palakkad municipality

As per Census 2011, the total population in Palakkad municipality is 130955 which is 4.66% of the total population of the Palakkad District. 48.74% of the total population in the municipality are males and remaining 51.26% are females.

As per National Health Mission (NHM) 2019 survey the total population in Palakkad municipality is 137459. The ward names and the population in each ward is given in table 2.1.

Table 2.1 Number and name of wards in Palakkad Municipality

Ward No	Name of ward	Population	Ward No	Name of ward	Population
1	Olavakkode Central	2730	27	Manappullykavu	2986
2	Kalpathy	3848	28	Civil Station	2797
3	Kunnumpuram	3017	29	Murikkavu	3130
4	Ayyappuram West	2800	30	West Yakkara	3689
5	Kalpathy East	1955	31	Puduppallitheruvu	3893
6	Thonipalayam	1355	32	Vennakara South	3741
7	Kumarapuram	1600	33	Vennakara Central	2300
8	Valiyapadam	2560	34	Othungode	3100
9	Mattumantha	3200	35	Thirunellayi East	2894
10	Kallepully North	2032	36	Thirunellayi West	3600
11	Kallepully South	2280	37	Kallikkad	2775
12	Puthur South	2988	38	Kaikuthuparambu	2260
13	Puthur North	3522	39	Nurani	2470
14	Sekharipuram	2221	40	Vithunni	2812
15	Ayyapuram East	2250	41	Municipal Office	2085
16	Parakkunnam	2928	42	Pattikkara	2710
17	Narikuthy	2435	43	Vadakkanthara East	2770
18	Koppam	2436	44	Sreeramapalayam	2248
19	Sulthanpetta	2635	45	Melamuri	2379
20	Mankavu	2248	46	Valiyangadi	2960
21	Vadakkumuri	1865	47	Pallipuram	2600
22	Selvapalayam	1615	48	Meparamba	2400
23	Kunnathurmedu North	1790	49	Kannaki Nagar West	2860
24	Kunnathurmedu South	2510	50	Vadakkanthara	3060
25	Chirakkad	2800	51	Jainmedu	2440
26	Kenathparambu	2100	52	Olavakkode South	2780
				Total	137459

Source: National Health Mission (NHM)

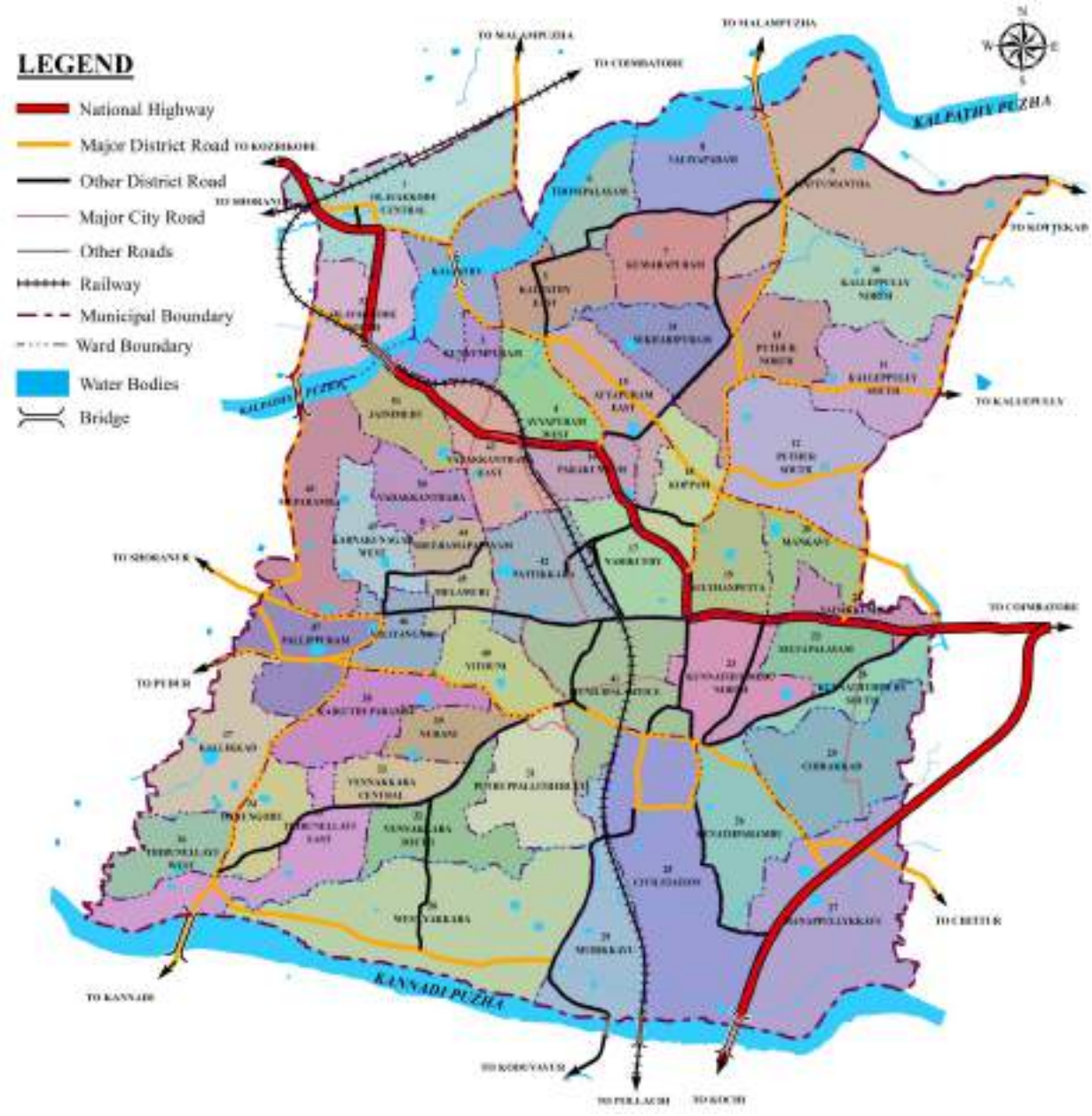


Fig.2.4 Ward wise map of Palakkad municipality

2.2 CLIMATE

Palakkad town is one of the hottest places in Kerala. The annual average temperature is 27.33°C. In summer, the maximum temperature goes up to 43°C. Town receives rainfall from south west monsoon (June-September) and north east monsoon (October- November). The average annual rainfall is 286mm. About 75% of the annual rain is received during the south west monsoon period. January to May is generally dry weather with oppressive hot period from March to end of May. During dry weather, hot winds blow from the plains Coimbatore through Palakkad gap. Winds blow mainly from the west or north west during south west monsoon. The air is highly humid throughout the year, relative humidity being generally over 70%.

Table 2.2 Average rainfall of Palakkad Municipality

Month		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Rainfall (mm)	2016	0	0	0	1.8	187.6	398.3	435.4	171.7	83.6	107.6	131.4	33.2
	2017	0	0	170.2	0	160.1	412.2	357.1	332.8	340.4	148.3	17	70
	2018	0	72	87	90.4	406.8	729.5	989	1054	0	0	0	0

Source: IRTC , Mundur

2.3 PHYSIOGRAPHY AND RELIEF

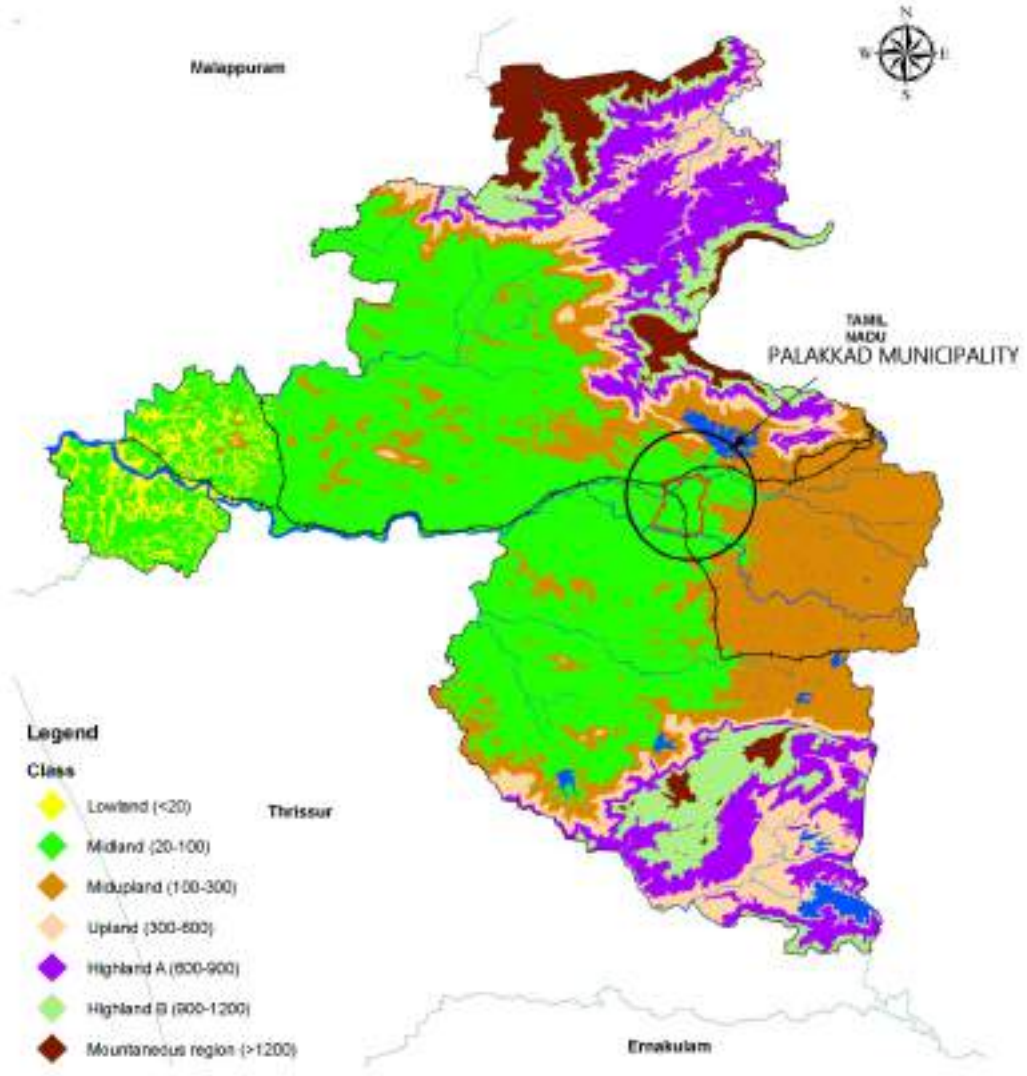


Fig.2.5 Physiography of Palakkad District showing Palakkad Municipality

Source: Soil Survey office, Palakkad

Palakkad district is divided into two natural divisions on the basis of its physical features as midland and highland. Most part of the district fall in the midland region (elevation 75-250 m), except the Nelliampathy-Parambikulam area in the Chittur taluk in the south and Attappadi Malampuzha area in the north, which are hilly and fall in the highland region (elevation >250 m). The midland region consists of valleys and plains. Palakkad town lies in the midland region. Figure 2.5 shows the physiography of the district with Palakkad municipality. Palakkad municipality lies in midland region (20m - 100m).

Relief influences soil formation primarily through its effects up on drainage, runoff and erosion and secondarily through variations in exposure to the sun, wind and drainage. Palakkad municipality has a relief within 50 m and 100 m. Palakkad municipality has a percentage slope of 3 to 5 and comes under gently sloping area. North east portion of the municipality is comparatively above Mean Sea Level than the southern portion. Figure 2.6 shows the relief map of Palakkad municipality.

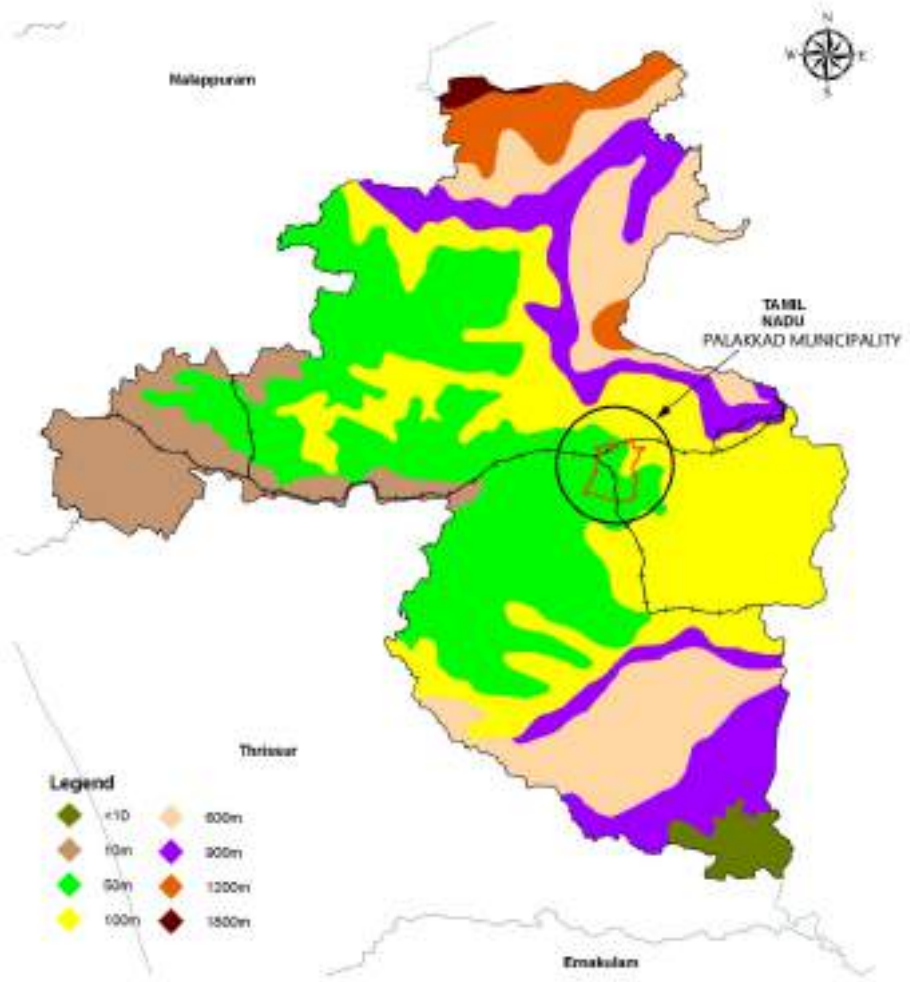
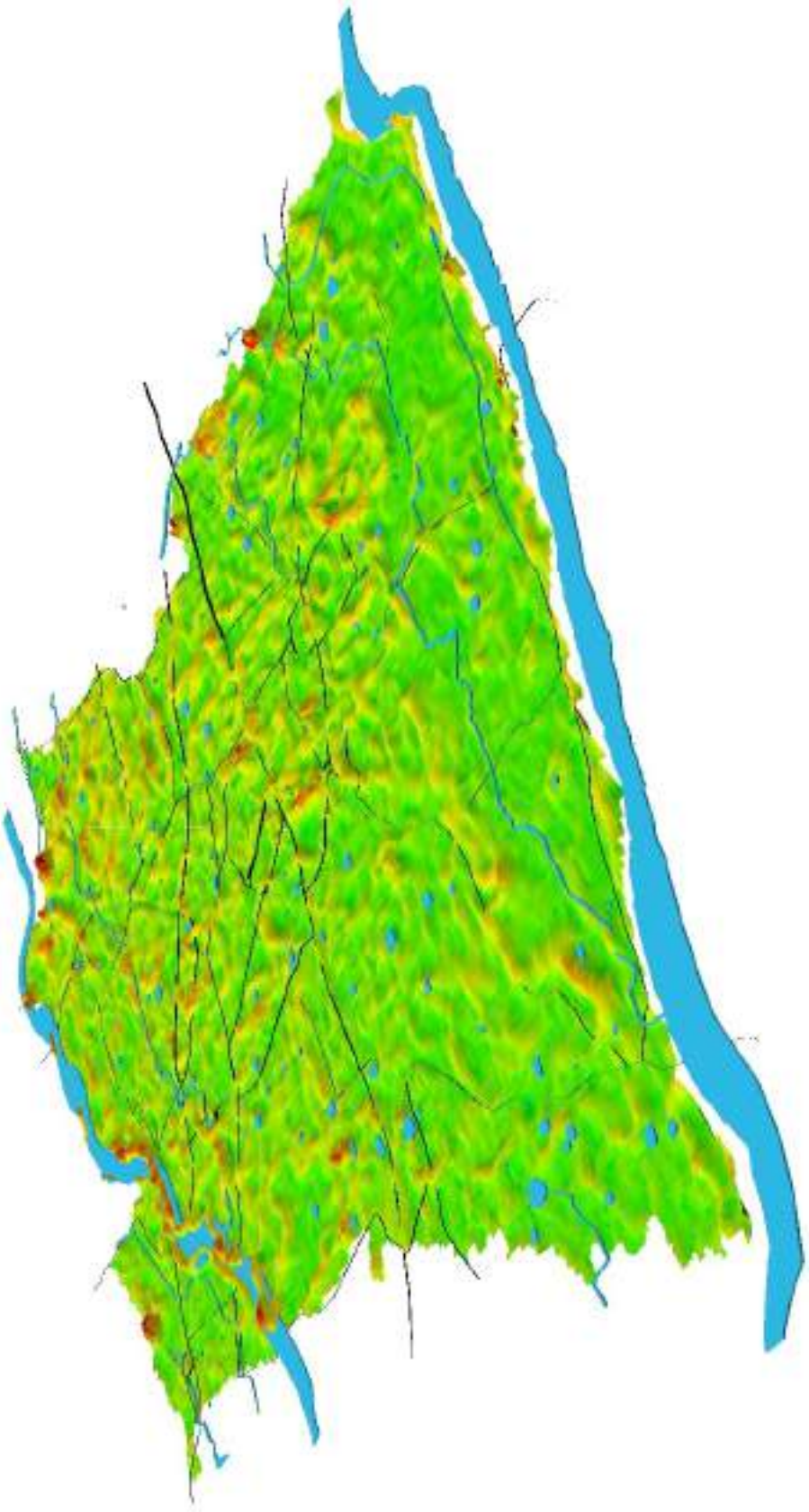


Fig.2.6 Relief of Palakkkad District showing Palakkad municipality



Source: USGS

Fig.2.7 DEM of Palakkad municipality

Digital Elevation Mode (DEM) and Contour map of Palakkad municipality are shown in figure 2.7 and figure 2.8 respectively. Palakkad municipality having percentage slope of 3 to 5 and comes under gently sloping area (figure 2.9).

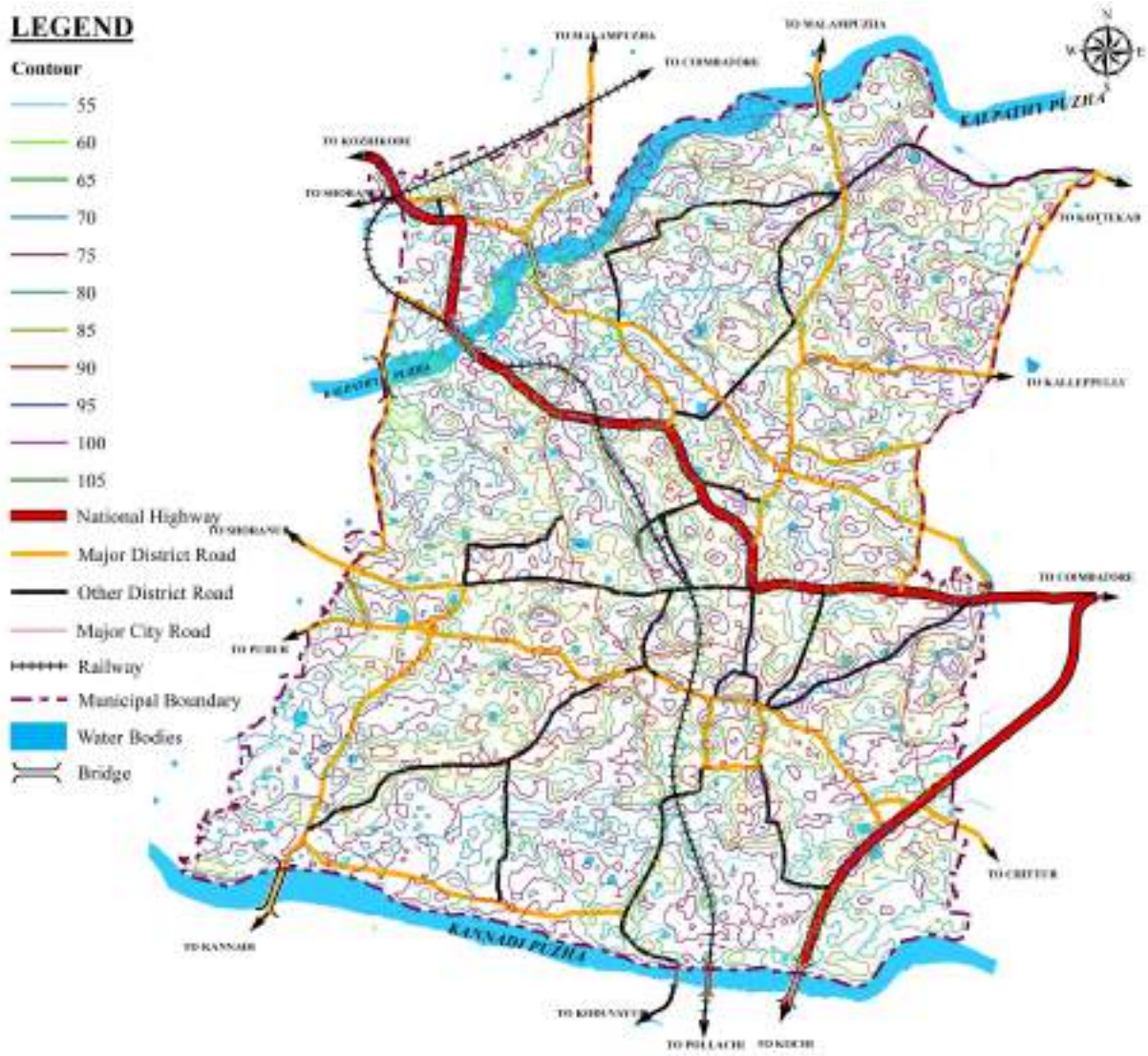


Figure 2.8 Contour map of Palakkad Municipality

Source: USGS

Table 2.3 Slope of Palakkad Municipality

Slope	Area in Sq. Km
0-5	8.11
5-10	11.08
10-15	5.44
15-20	1.6
20-25	0.36
25-30	0.06
>30	0.01

Source: USGS

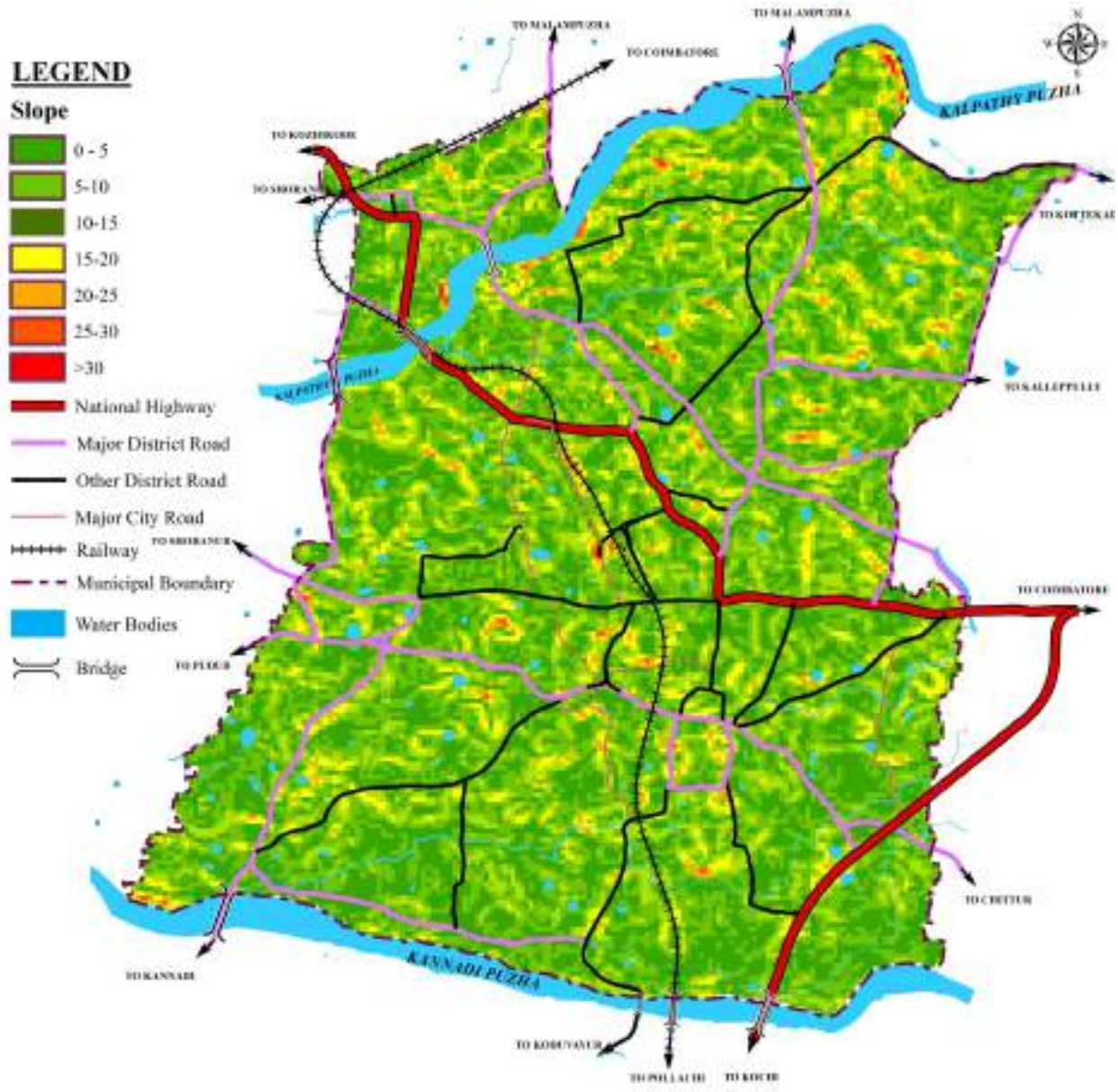


Fig.2.9 Slope of Palakkad Municipality

Source: USGS

2.4 SOILS

According to Soil Survey Department, the soil of Palakkad district is classified into mainly four types namely peaty (Kari), laterite, forest, black and red. Peaty soil is found only in Thrithala area of Ottappalam taluk. Laterite is seen in the major portions of all taluks. Major soil types of Palakkad district is shown in figure 2.10. Major part of Palakkad municipality contains laterite soil.

There are 8 major soil series in Palakkad District and Palakkad municipality comes under Kanjikulam series which is spread over 35% of the total geographical area of Palakkad District. These are distributed on the central and western parts of Palakkad District. The Kanjikulam series consists of moderately deep to deep sandy clay loam to

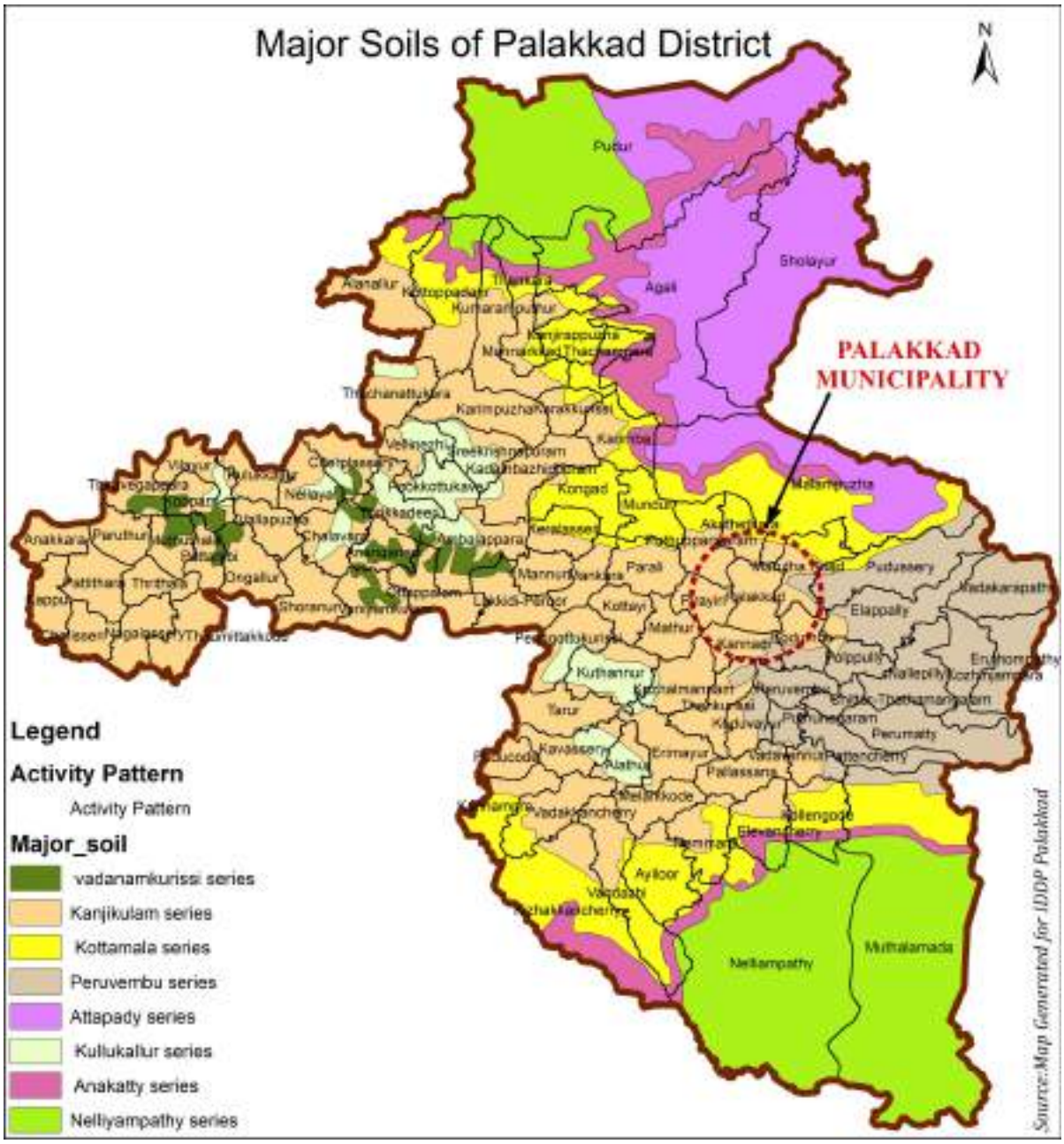


Fig. 2.10 Soil types of Palakkad District

Source: Kerala State Land Use Board

clay loam soils developed from laterite over gneissic parent material. The soils have gravels distributed throughout the profile. These occur on gently sloping to moderately steep sloping lands. They are well drained and having moderate permeability. The soils are excessively gravelly and have yellowish brown to dark reddish brown colour, sandy clay loam to clay loam surface soils and reddish yellow to dark reddish brown, clay loam to clay subsoil layers.

All Kanjikulam soil series comprising Palakkad municipality belongs to the erosion class e2 to e3 having moderate to severe erosion status. The levels of potassium, nitrogen and phosphorus are low to moderate in this soil.

2.5 BIODIVERSITY

The flora of Palakkad municipality is tropical in nature depending upon the seasonal rainfall and moderate temperature. Palakkad municipal area comes under the midland region. Some of the dominant trees in the region are Eppothi (Macaranga indica), Mavu (Mangifera indica), Paragimavu (Ancardium occidentale), Pilavu (Artocarpus integriofolia), Elavu (Cieba pentandra), Ezhilampala (Astomia scholoris). No animal is mentioned peculiar to this area.

2.6 HISTORY/EVOLUTION AND GROWTH

The name Palakkad is considered to have been derived from the Malayalam words pala & kadu which means forest of pala trees; others believe that Palakkad means a barren jungle. There is another belief that the region was initially called Palikaddu in honour of the Jains who built the famous Jain temple in Palakkad.

The ancient history of Palakkad is shrouded. It has witnessed various incursions of historical importance. The history can be dated back to Paleolithic period and several megalithic relics have been found in the region. One of the earliest records about Palakkad has a chronicle of a war victory in A.D. 988 when the king of Palakkad, Nedumpurayur Nadudayavar stopped an invasion by the forces of the King of Kongunadu at Chittur.

Even today a festival is celebrated in memory of the victory at Chittur. The Nedumpurayar Royal family was later known as Tarur Swaroopam. For many centuries it was ruled by the Perumals. Later their Governors, called Utayavars took possession of this area and divided it among themselves. One of the hubs of the Pallavas of Kanchi was Palakkad.

According to William Logan, the author of Malabar Manual, the Pallava Dynasty of Kanchi might have invaded Malabar in the second or third century. Malabar had been invaded by many south Indian rulers. When the Zamorin of Kozhikode invaded Palakkad in 1757, the Raja of Palakkad sought the help of Hyder Ali of Mysore. Hyder Ali's help forced Zamorin to retreat. Later Hyder Ali subjugated all territories in Palakkad which were under the possession of Zamorin. The whole area possessed by the Raja of Palakkad passed into the hands of the Mysore rulers, Hyder Ali and his son Tippu Sultan.

The war between Tippu and the East India Company ended with the treaty of 1872 and all the possessions of Tippu in Malabar were ceded to the British. Gradually these formed part of the Malabar district of the Madras Presidency. The Muslim influence that we find in Palakkad has come through the invasions of Mysore Sultans and the consequent inflow of people from Mysore and Hyderabad.

2.6.1 History of Governance

Palakkad was declared as a town in 1866 by the Madras Governor and the Town Reforms Acts were also enforced. The population was 36,339 in 1866. Initially Assistant Collectors held the Post of Municipal Chairman. In 1892, for the first time one non official member became Chairman of Municipality. From 1912, the chairman of the Municipal Council was elected; In 1933, Madras Act vested with the Government the power to select the Municipal Commissioner and first Municipal commissioner of Palakkad municipality took charge on 5/7/1934.

Municipality was upgraded as II grade Municipality in 1947 and later to first grade in 1955. The area of the municipality was 10.27 Square Miles and it still continues to be of the same area (26.6 Sq. Kms). In 1960, Kerala Municipality Act came into effect. Water supply, road construction, Public health, street light and cleaning activities were under the responsibility of the Municipality. From 1866 to 1938, there were 22 Municipal wards, in 1941 it was increased to 24 wards, in 1951 it was increased to 28 no's, in 1973 it was increased to 32 no's, in 1978 it was increased to 36 no's, and in 1998 it was increased to 50 no's. From 2010 onwards there are 52 wards.

Palakkad Development Authority was formed in the year 1982 and many schemes and projects were directly undertaken by the development authority. The Master plan and the DTP schemes were being implemented by the Development Authority. Subsequent to the enactment of the 73rd and 74th Constitutional Amendment Act (CAA), in year 1992, based on Government decision, the Development Authority was dissolved and the assets and liabilities were taken over by the municipality. The Municipality is now the main agency responsible for the planning and development of the town.

2.6.2 History of development

Since 1866 when Municipality was constituted, the town has grown in size and stature, largely due to its central location with roads converging to it from all directions. Main business areas of town are Big Bazaar or Chathurangapattana, Sulthanpetta area and Municipal Dance Market, which was opened in 1897.The public hospital in Palakkad which came into existence in 1850 AD was handed to Palakkad municipality in 1865. In 1928, Government took over the hospital. The Victoria college which was started as a school in 1871 was raised to the rank of a college in 1888. Railway facilities were extended to the town in 1860.

The industrialization of the town was commenced with the opening of Basal mission (Common wealth) tile factory at Olavakkode in 1865. Since the reorganization of Kerala state in 1956 and evolution of Palakkad district in 1957, Palakkad Municipalty became the administrative head quarters of district and the Civil station was

constructed in 1959. The industrial estate was started in 1960 and the protected water supply system for the town was inaugurated in 1962. Government Medical college, Palakkad main block was opened on 9th July 2019 and the remaining blocks are under construction.

2.6.3 Socio Cultural History

When the local Brahmins of Palakkad refused to offer ritualistic services to the rulers for some reason, Palakkad King brought Tamil Brahmins from Tanjore to offer these services and they were gifted land for settlements. There are nearly 19 agraharams in Palakkad town. The migration of vedic scholars well-versed in Shastras and Agamas from the districts of Tanjore, Trichy, Tirunelveli, Coimbatore etc. gave the necessary impetus for the growth of vedic culture. Agraharams, with hardly hundred small houses were once a citadel of Sanathana Dharma and Brahminic culture which nurtured studies in Vedas and Vedantas.

As a centre of Karnatic Music, palakkad has produced luminaries like Chembai Vaidya Natha Bhagavathar and Palakkad Mani Iyer. Another section of people, special to palakkad and experts in trade and commerce belongs to Moothan, Mannadiyar community. Palakkad king invited people from other parts of country who were specialized in one or other occupations and gave them land to settle down and later these places were named after their occupation For eg:- Arikkaratheruvu, Pappadakara-theruvu, Thunnakkaratheruvu etc. We can find a confluence of Tamil and Malayali cultures. People of all religion are living together very harmoniously here.

Earlier, more than 50% of the land were under paddy cultivation, hence rural character was more prevalent. History of Palakkad is quite different from other towns of Kerala. The town has a diverse and mixed culture due to the invasion and ruling of many foreign powers. Palakkad gap has a very historical role in determining cultural history of the town. It has an influence of Tamil culture and agricultural culture. The festivals of this area is linked to both of these cultures.

Within town there are nearly 50 mosques. Old Manjakkulam Dargah is a pilgrim centre of Muslims (near K.S.R.T.C Bus stand). Shaikh Husain Madani, an eighteenth century sufi lived here and was cremated here. The Dargah still exists and is visited by devotees. Other important mosques are at Puthuppallitheruvu, old fort, Pallitheruvu, Kallikkad, Valiyangadi, Civil station, Harikkaratheruvu, Vennakkara, Jainimedu, Olavakkode. Jannathul Uloom Arabic College also called Jannathul Uloom is a religious educational institute of sunni muslims located at Valiyangadi near Palakkad town and was established in 1967.

Mathakovil church at Sulthanpet is very old and famous one. Even people from Tamil nadu comes to attend the festival of this church. C.S.I Church of Hope is the only

remaining presbyterian church in palakkad town which was built by the basel mission missionaries on 1910, situated on the western side of the town and the congregation started in 1866. C.S.I Holy Trinity Church is the anglican church situated in the fort maidan area of palakkad town and it is the only church in palakkad where the english worship is held. The congregation here was started in the 18th century. C.S.I Robinson church is the Basel Mission church which was renovated recently and is named after Mr. Robinson, who was the collector of Palakkad during the british days and the congregation dates backs to 18th century.

The famous temples of town are Vadakkanthara temple, Manappullikavu temple - Hindu religious place situated near the N.H.544 on the eastern side of the town and Jain Temple of Jainimedu – Situated on the western border of Palakkad town and not far from the railway station and this is a historic Jain Temple. The area around the temple is known as Jainimedu. This is one of the few places in Kerala where vestiges of Jainism in Kerala have survived without substantial damage. The granite walls are devoid of decoration. The temple, 32 feet (9.8 m) long and 20 feet (6.1 m) wide, consists of four divisions with images of Jain Thirthankaras and Yakshinis in three of them. Kumaranasan wrote his monumental poem Veena Poovu (the fallen flower) in a Jain house here during his brief stay with his master Sri. Narayana Guru.

The famous festivals in town are:

- **Vadakkanthara Vela**

It is held at Vadakkanthara Thirupurakkalbhagavathi temple once in 3 years which is also known as Valiya Vilakku Vela. Last festival was held on March 2018 and the next will be on February - March 2021. This is the most famous local festival of Palakkad town which is celebrated by people of all castes and denominations.



Vadakkanthara Vela

During Vela festival 'Kariveshams' (people painted themselves in greasy black) will be visiting the houses in the region for making the ritualistic announcement of the arrival of the 'Vela'. Traditional ritualistic festivals like *Kathirvela, Variezuthu, Paalamaram murikkal, Kummati,* and *Kanniyar* will be performed in the temple. On the final day of the festival, will be the *Kazchashiveli* or the procession. For this, as many as 15 caparisoned elephants will be there.

- **Manappullikavu Vela**

The festival is celebrated between last week of February and first week of March based on the malayalam calendar year. The celebration starts with 'Kodiyettam' (flag hoisting on a bamboo pole) which declares that the 'Vela' has started. After the

Kodiyettam, a week full of pooja ceremonies and evenings with colourful cultural programmes are organized by the 'Vela Committee' (Festival Committee) which all ends with the grand day 'Manapullikavu Vela'. Lots of devotees from various parts of Kerala and other southern states of India come for worshipping Bhagavathy on this auspicious day.



Manappullikavu Vela

- **Kalpathy Ratholsavam**

It is held during the second week of November every year at Sri Visalakshi Sametha Sri Viswanatha Swamy temple. This is basically a festival of Tamil brahmins of Kalpathy and cannot be termed as a popular festival of all walks of people. The annual ten-day chariot festival conducted here during the month of November is one of the most remarkable festivals of Kerala. Vedic recitals and cultural programmes are held in the temple during the first four days of the festival. This is believed to be over 700 years old. On the last three days, thousands of devotees gather together to draw decorated temple chariots through the streets.



Kalpathy Radholsavam

2.7 REGIONAL SETTING

Study of regional setting of a town is necessary to view the developments taking place in town in regional context and to evaluate the locational advantages and disadvantages of the city. In the Master Plan, this aspect would help in proposing the activities that can be explored based upon the regional potential and linkages.

Palakkad municipality is located near the north side of Palakkad gap in the Western Ghats. National highway connecting important towns within Kerala state and towns in Tamilnadu and other states and railway broad gauge double line connecting Kerala to other states passes through Palakkad town. Palakkad municipality is placed approximately 55 Km southwest of Coimbatore town which is the commercial hub of Tamilnadu state, south to Thrissur town which is the cultural capital of Kerala, 150 km north to Kochi which is a industrial hub of Kerala and 120 kms south to Kozhikode, the commercial capital of Malabar region. The regional setting of Palakkad town is shown in figure 2.11.

Palakkad municipality is having a good connectivity to neighboring districts;

Thrissur and Malappuram through road and rail. NH 544 (Salem– Kochi Highway) and NH 966 (Kozhikkode- Palakkad Highway) connects Palakkad with major towns like Thrissur, Coimbatore, Kochi and Kozhikkode. Figure 2.12 shows the sub regional setting of Palakkad municipality.

Palakkad Junction (Olavakkode railway station) is the third largest railway station in Kerala which is 5.6 km from Palakkad Town Railway station which is situated within

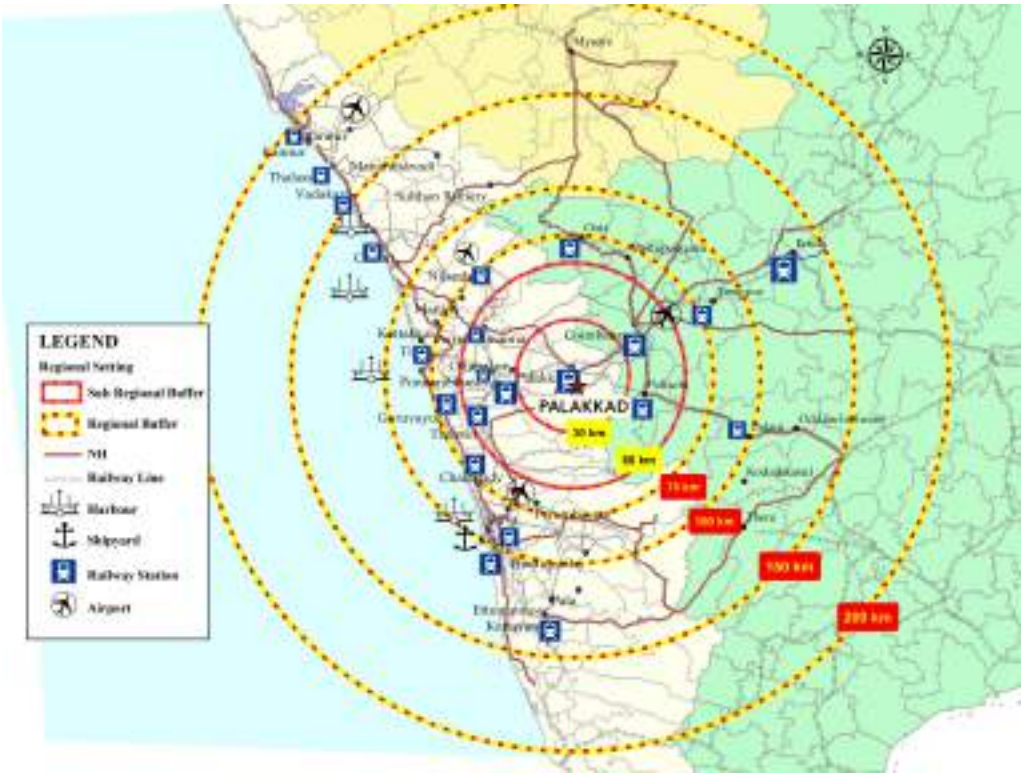


Fig.2.11 Regional setting of Palakkad Municipality

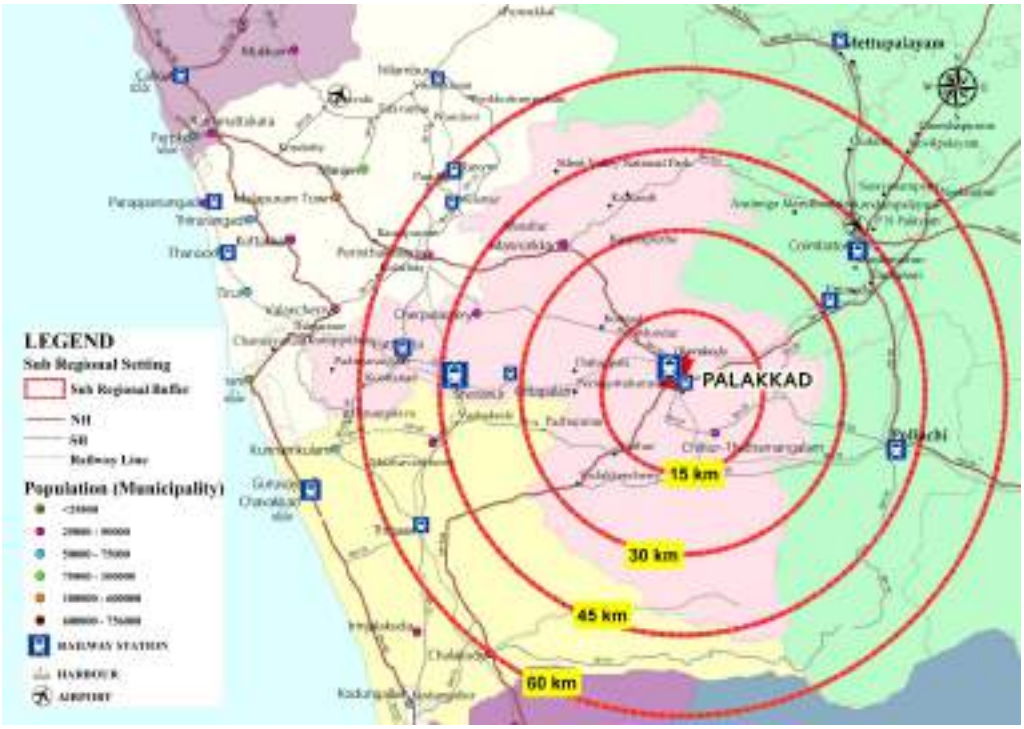


Fig.2.12 Sub regional setting of Palakkad Municipality

the Municipality. Palakkad Junction railway station acts as a major railway hub for Palakkad town and Palakkad town railway station acts as a secondary hub.

Since Palakkad is the district headquarters and Palakkad gap is the main trade route to Kerala, Palakkad Town acts as the main trade distribution centre or trade hub for middle Kerala. For trade the district depends on Palakkad town.

2.7.1 Hierarchy of Settlements based on District Plan 2017

Hierarchy of settlements is based on the number and order of facilities. As per the settlement analysis of District Plan 2017, the settlements of the district are grouped into four hierarchies. The Palakkad municipality is the first order settlement which has urban character. Palakkad municipality acts as the only one first order settlement in the entire district. Fig. 2.13 shows hierarchy of settlements of Palakkad district.

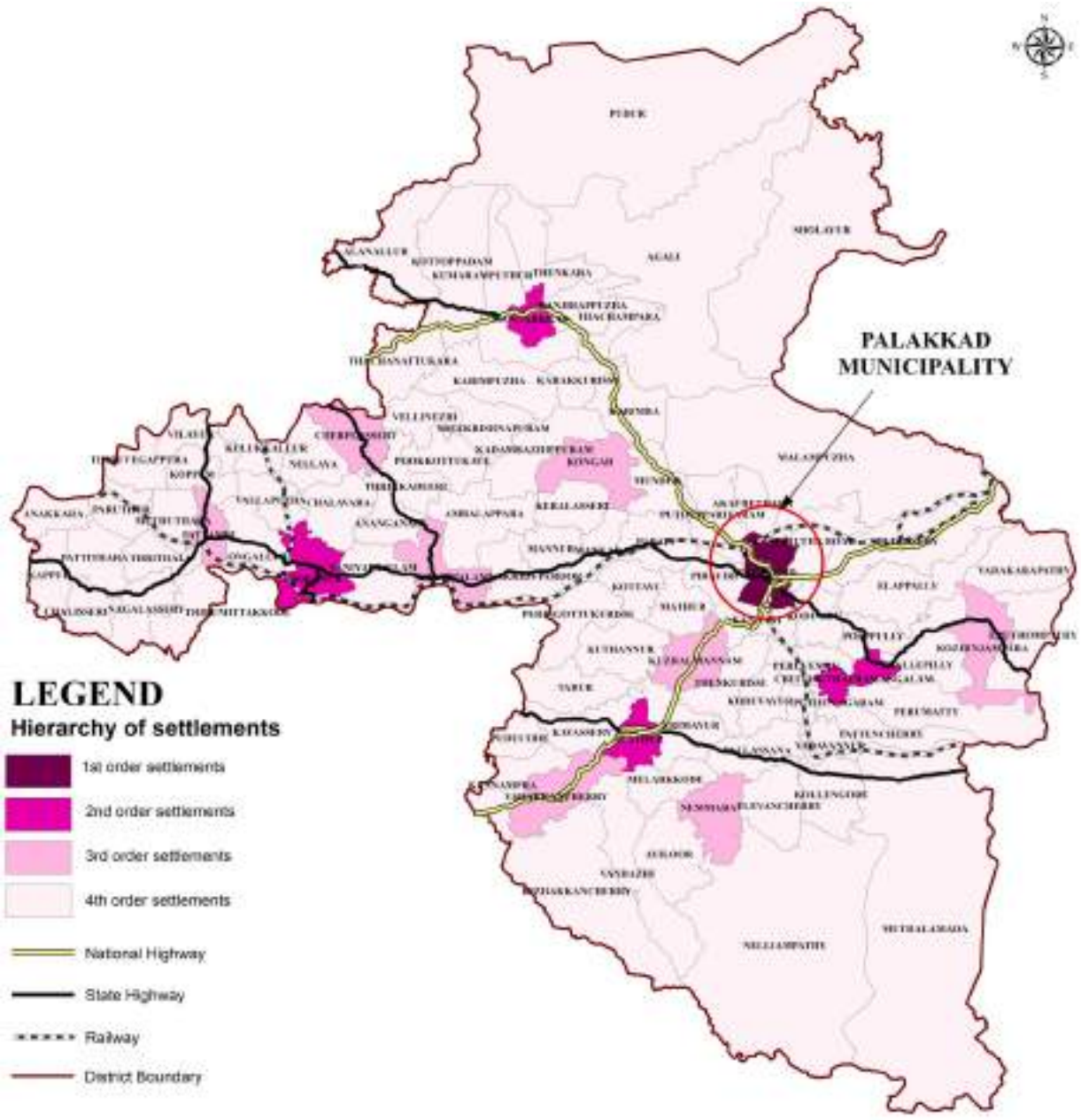


Fig.2.13 Hierarchy of settlements

2.7.2 Hierarchy of Nodes based on District Plan 2017

A node is formed by the agglomeration of commercial activity around one or more adjacent road junctions. The hierarchy of node is identified by the extent of activity taking place in the node. As per District plan 2017 Palakkad is the first order of the district acting as a commercial center serving the entire district. Figure 2.14 shows the Hierarchy of nodes of Palakkad district.

2.7.3 Functional Character

The functional character of the settlement is derived from the major activity of the settlement. Functional character is determined by taking the major function of land use and the average plot size within the settlement. The spatial distribution of the

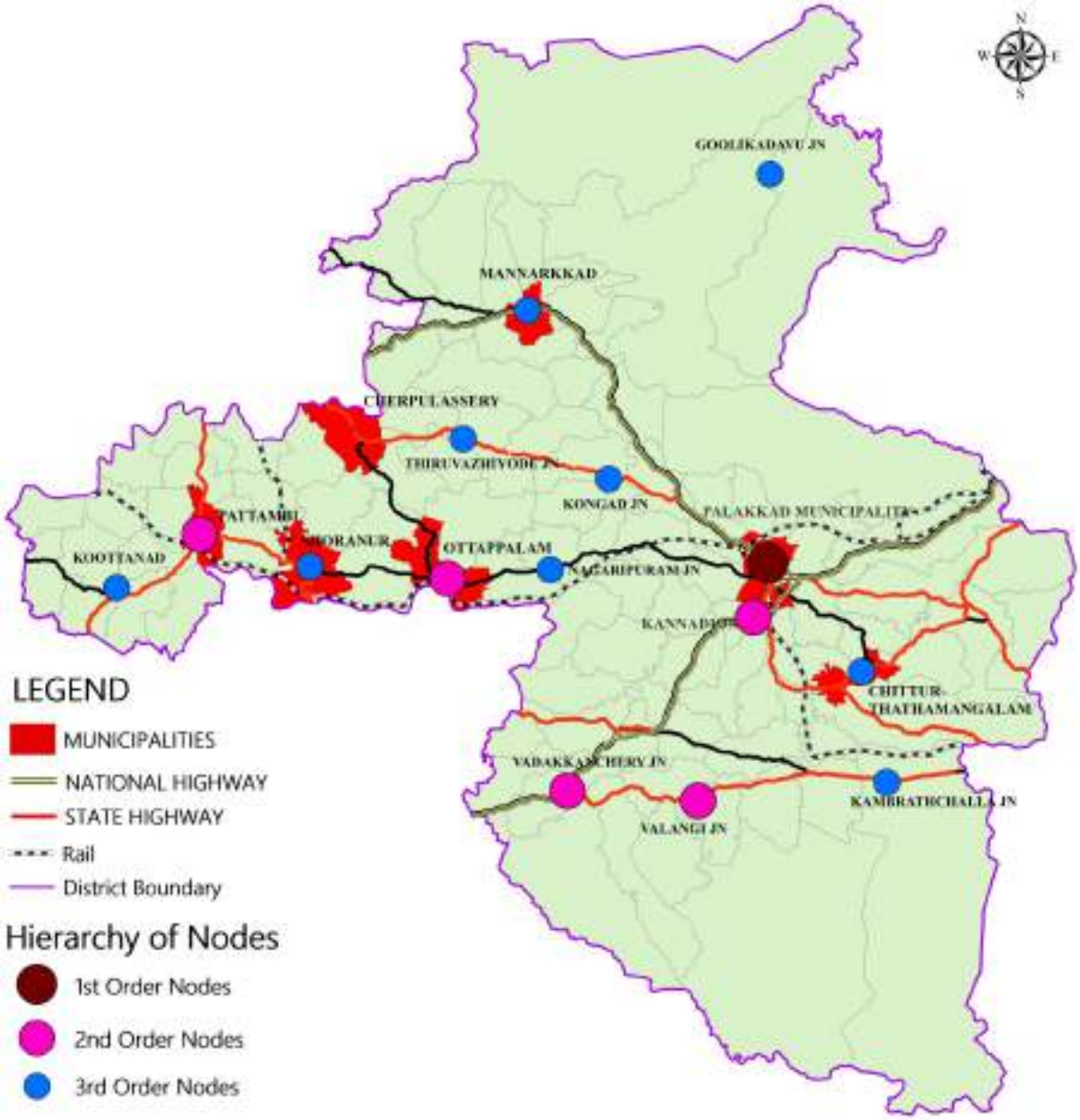


Fig.2.14 Hierarchy of Nodes

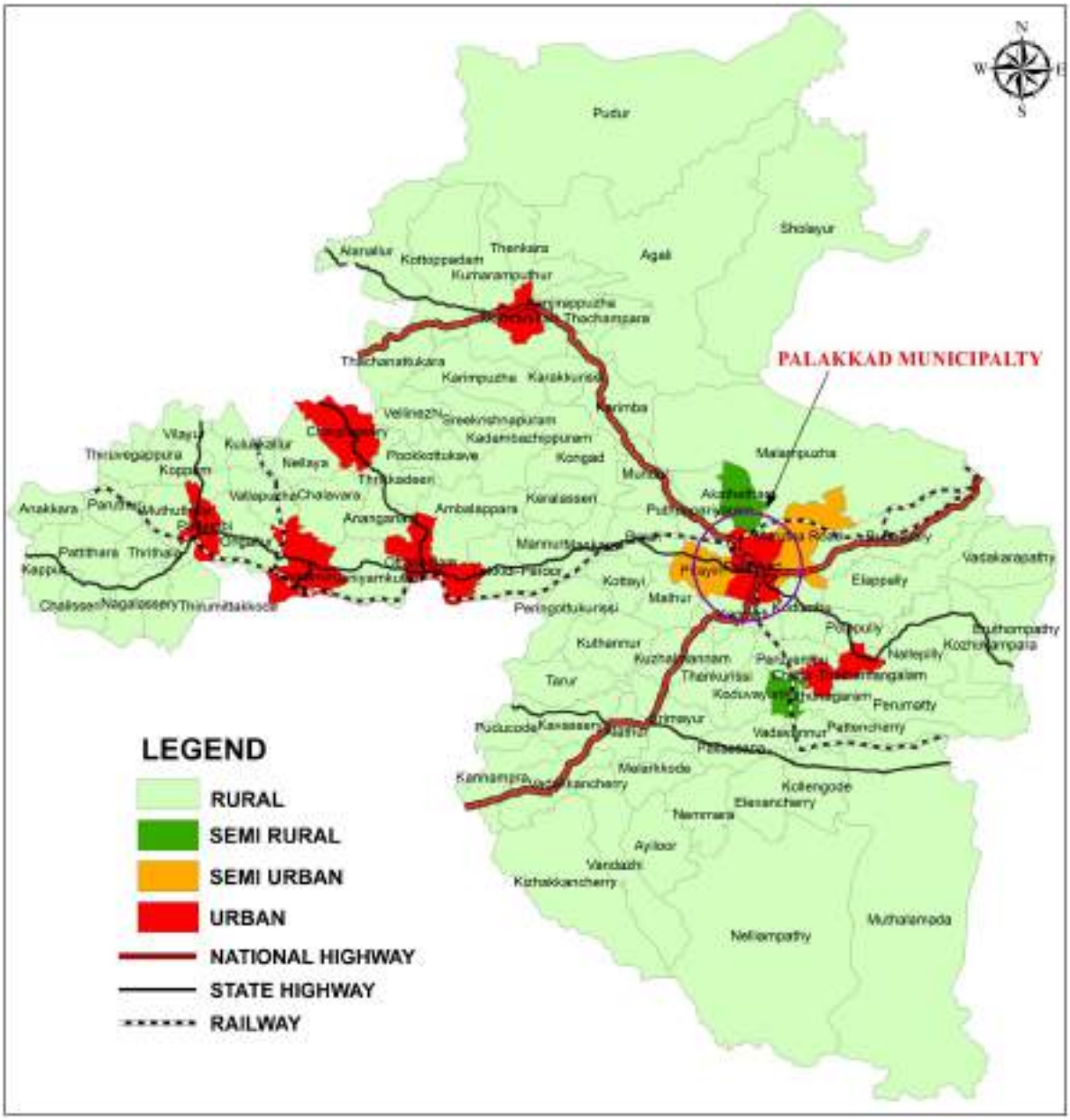


Fig.2.15 Functional character

settlements based on its character shows a clear demarcation in the pattern of the settlements into Urban, Semi Urban, Semi Rural and Rural. Palakkad municipality clearly shows urban character. The functional character of the district showing Palakkad Municipality is shown in figure 2.15.

2.7.4 Activity Pattern of the District

The Activity Pattern of the district is derived based on the land use concentration pattern, functional character of the settlement and future urban profile. The existing activity pattern within the district is derived based on the study of spatial distribution of the aspects covered in the settlement studies. Accordingly the major activities of the settlements of the district are identified to be urban activity, primary activity, secondary activity, agriculture & allied activity and activity non detrimental to

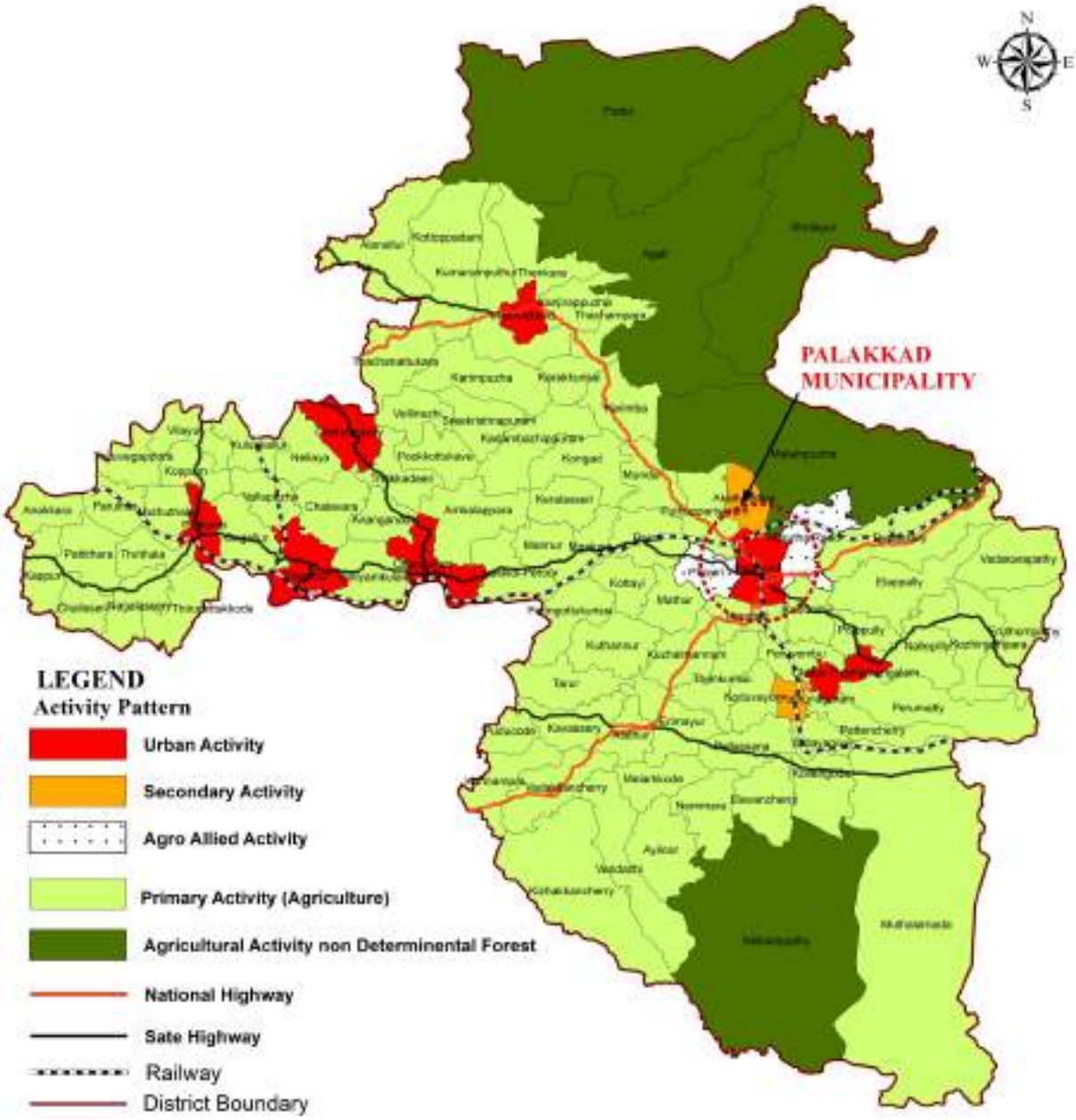


Fig.2.16 Activity Pattern of the District

forest. The final activity pattern of the district emerging out by superimposing the activities is shown in figure 2.16. As per the activity pattern of the District, Palakkad municipality shows urban activity.

2.7.5 Development Concept of the District

The spatial structure of the district is evolved by integrating the activity pattern, regional connectivity and hierarchy of settlements. The development goals and objectives of the district were derived based on findings of various studies. The development concept of the district is formulated by synthesis of findings of studies in the orbit of goals and objectives over the district platform. The development concept will provide the required frame work for integrated development of the district. As per development concept of District Plan (Figure 2.17), Palakkad comes under Multi-functional zone (First order).

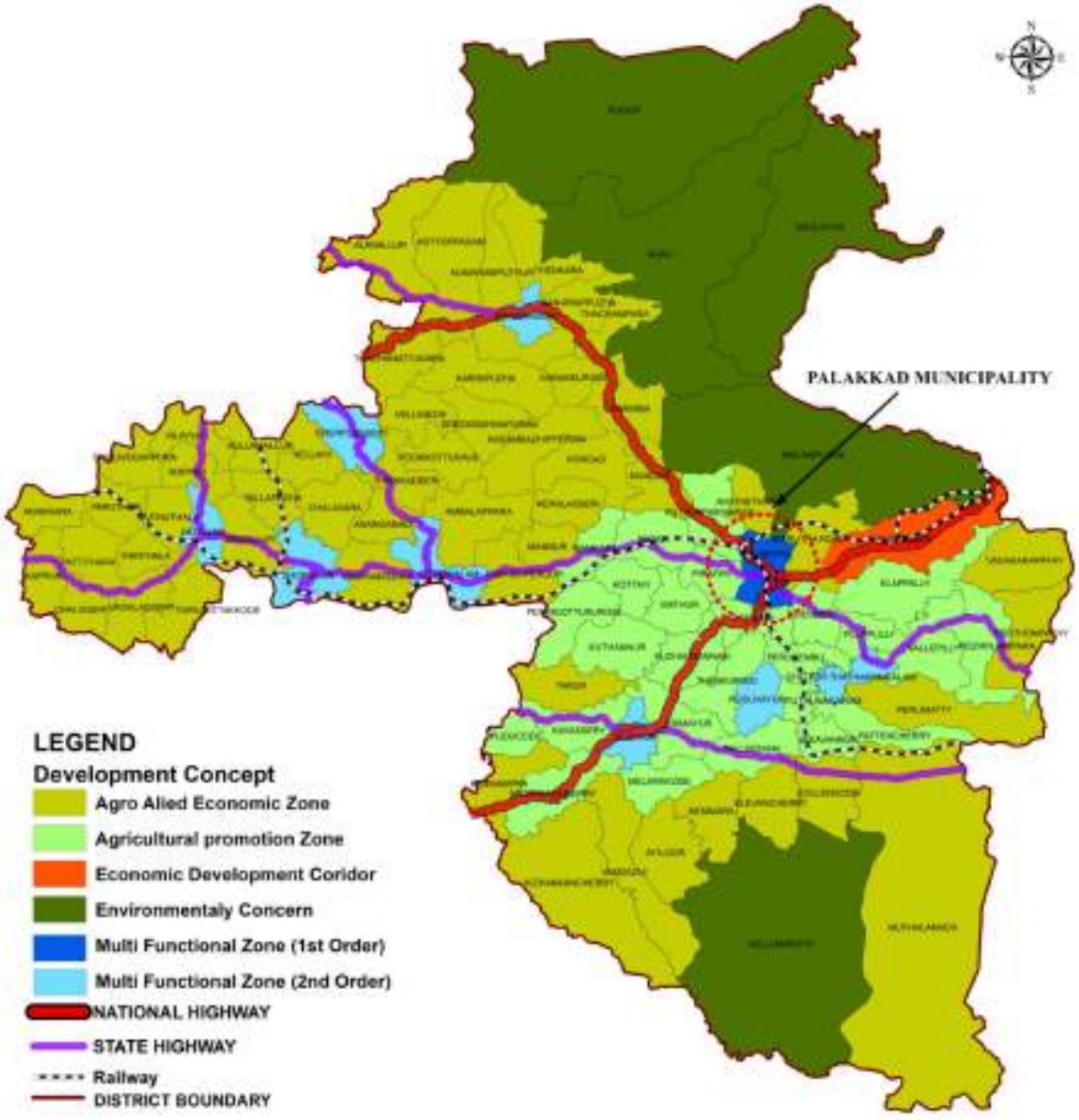


Fig.2.17 Development Concept of District as per District Plan

2.8 INFERENCE

Based on the hierarchy of settlement, Palakkad municipality is the only one first order settlement in Palakkad District. Since Palakkad municipality is the district capital, the service area of the Municipality accounts the whole district. As per the AMRUT GIS based Master Plan preparation, Palakkad municipal area is selected as the planning area.

The analysis of regional linkage of the town with surrounding Districts/State and Regional setting of the town within the district based on the "Integrated District Development plan" clearly points out the fact that the Palakkad municipality is well connected with surrounding Districts/State, Airport, Port, tourist spots, growth centers within the district by road and rail network.

The analysis also reveals the fact that the Palakkad municipality has to function as a first order settlement, the town has to perform the function of an urban center with due consideration to serve the entire district. Hence development of Palakkad municipal area with more improved infrastructural facilities and job opportunities are required to satisfy the needs of the increasing population.



CHAPTER 3- DEMOGRAPHY

3. DEMOGRAPHY

Demography is the scientific study of human populations primarily with respect to their size, structure and development; it takes into account the quantitative aspects of their general characteristics. It is concerned with the 'numbering of the people' and understanding population dynamics – how population change in response to the inter-play between fertility, mortality and migration. This understanding is a pre-requisite for making the forecasts about future population size and structure, which are required for the government and policy makers for the preparation of target oriented projects. Demography is largely concerned with answering questions about how population change and with the measurement of population and the components of population change. The present chapter is designed to understand the trend of population growth in the municipality in relation to district, state and various local bodies: prevailing variation in this respect in both spatial and social contexts; and factors associated with such patterns.

3.1. POPULATION SIZE

Kerala's population as per 2011 Census is 3,34,06,061 which includes 1,60,27,412 males and 1,73,78,649 females. Although Kerala accounts for only about 1.1% of the total area of India, it contains about 2.76% of the country's total population. In 2001 it was 3.10% of the population of India. As per 2011 Census, Kerala stands at 12th position in terms of population. Out of the total population in Kerala, 52 per cent are women and 48 per cent are men. Figure 3.1 shows the decadal variation of population

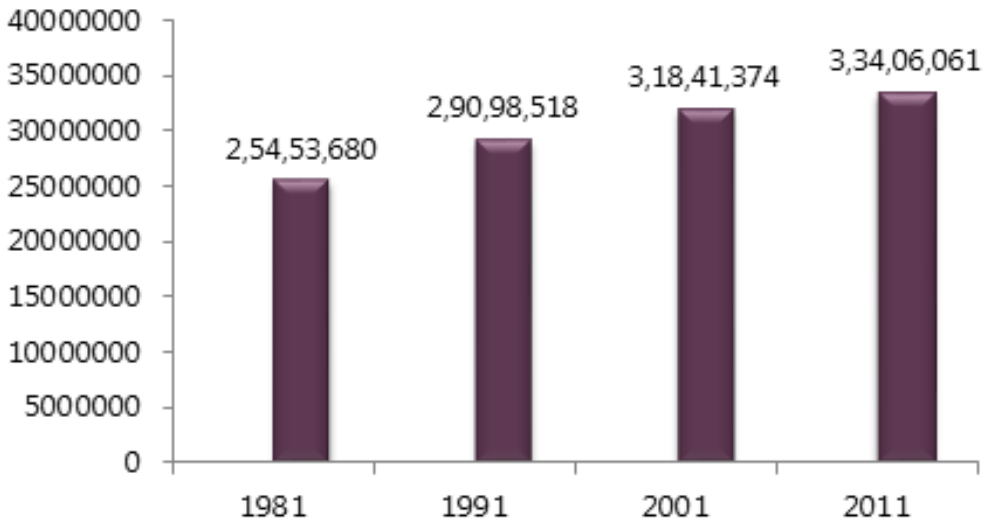


Fig. 3.1 Decadal variation of population of Kerala state

Source:Census 1981,1991,2001,2011

of Kerala.

Palakkad is the largest district in Kerala with an area of 4,480 Sq.km which is 11.53% of the area of Kerala. The population of Palakkad district as per Census 2011 is 28,09,934 persons which constitutes 13,59,478 males and 14,50,456 females, which accounts for 8.41% of the total population of Kerala. Palakkad District shows a positive

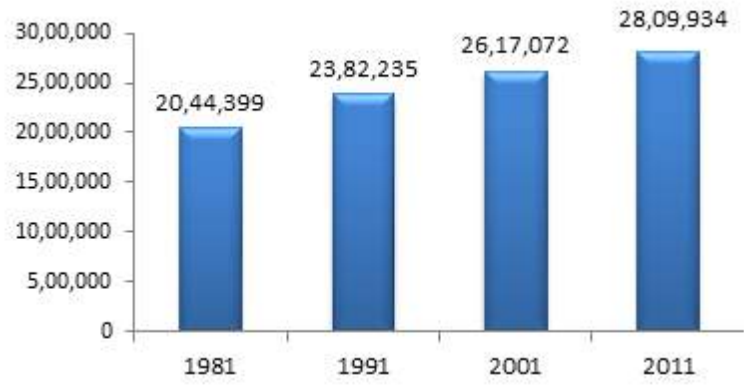


Fig.3.2 Decadal variation of population of Palakkad district

Source: Census 1981,1991,2001,2011

growth rate which is the third highest in Kerala state during the last decade. The decadal variation of population of Palakkad District is shown in figure 3.2.

The population of Palakkad municipality as per Census 2011 is 1,30,955 which constitutes 63,833 males and 67,122 females. Population of Palakkad municipality constitutes 0.39% of Kerala State and 4.66% of Palakkad District. Municipality has a total geographical area of 26.60 sq. km that shares 0.59% of total District area. Decadal variation of total and gender wise population during the last four decades in Palakkad

Table 3.1 Decadal total and gender wise population of Palakkad municipality

Year	Total	Male	Female
1971	95,778	47,776	48,012
1981	1,11,245	55,222	56,023
1991	1,23,289	61,047	62,242
2001	1,30,767	64,379	66,388
2011	1,30,955	63,833	67,122

Source: Census 1971, 1981,1991,2001,2011

municipality has shown in table 3.1. Trend shows that female population is slightly higher than the male population during 2001-11. In 1971 women outnumber men by 236 people and it became 3,289 in 2011. Male population has declined during 2001-11.

The population of the municipality at the turn of twentieth century was only around 44,177. This has increased by nearly three times in period of one hundred and ten years to reach 1,30,955 in 2011. Interestingly, the population of the municipality grew by one and half times in the first half of the century, while in the later half it recorded a two-fold increase. Fig 3.3 shows the decadal growth of population for the municipality during 1901-2011. Present decade (2001-2011) is the first decade (with

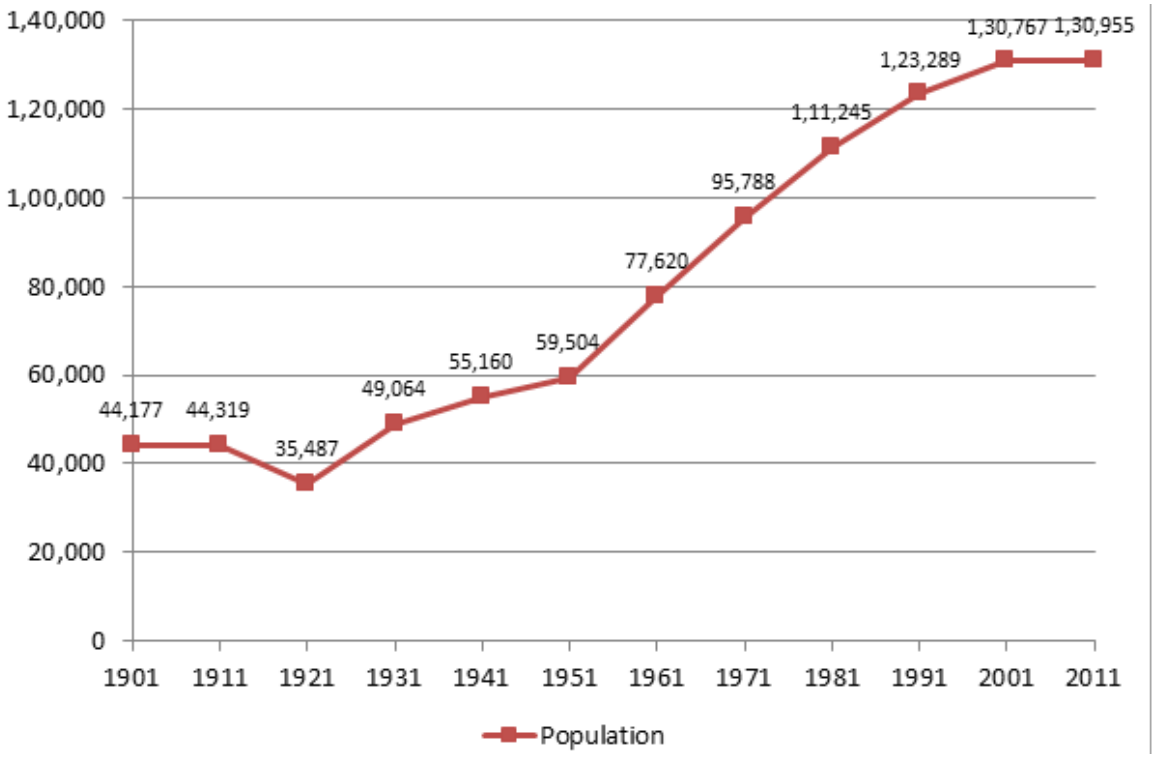
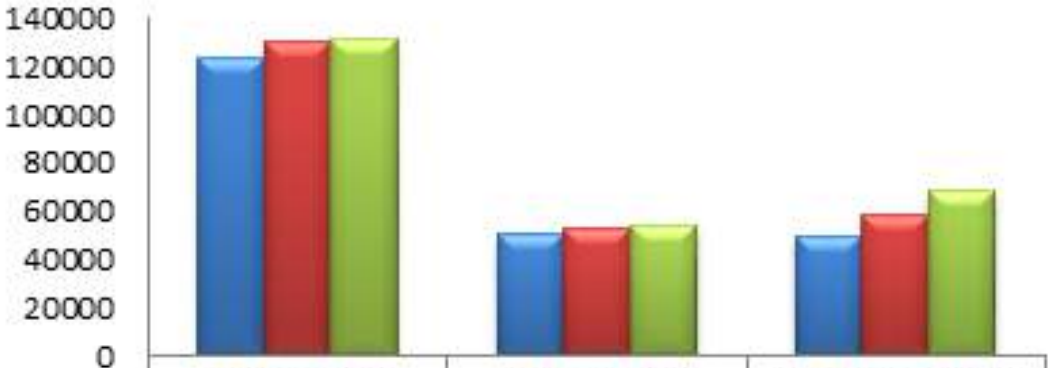


Fig.3.3 Temporal variation of total population of Palakkad municipality

Source: Census 1911,1921,1931,1941,1951,1961,1971,1981,1991,2001,2011



	Palakkad M	Kasargod M	Malappuram M
1991	123289	50126	49692
2001	130767	52634	58491
2011	130955	54172	68127

Fig. 3.4 Decadal variation and gender wise population of similar municipalities

Source: Census 1991,2001,2011

the exception of 1901-1911 & 1911-21) which has added lesser population compared to the previous decades. Although the municipality continues to grow in size, its pace of net addition is on the decrease. The change in net addition has shown a steady declining trend over the decades starting from 1971.

Population of Palakkad municipality is compared with Kasaragod municipality and Malappuram municipality in dew consideration of their similar geographical area, extent of physical development and their administrative importance as district head-quarters. From figure 3.4, it can be seen that, the highest population is in Palakkad municipality, which is two and half times greater than Kasaragod municipality and is almost double the population of Malappuram municipality. During the last decade, the increase in population in Kasaragod municipality (1,538) and Malappuram municipality (9,636) is significant compared to that of Palakkad municipality (188). The decadal population variation in these three municipalities has shown in figure 3.4.

Figure 3.5 shows comparison of population with surrounding local bodies. Population size of Palakkad municipality is three or four times higher than that of the adjoining local bodies. Temporal analysis explains that all local bodies registered continuous increase in the last four decades. Apart from the municipality, Pirayiri panchayath has recorded the highest increase by 17,266 people followed by Marutharoad (14,925), Puthupariyaram (12,023) and Akathethara (10,775). During 2001-11,

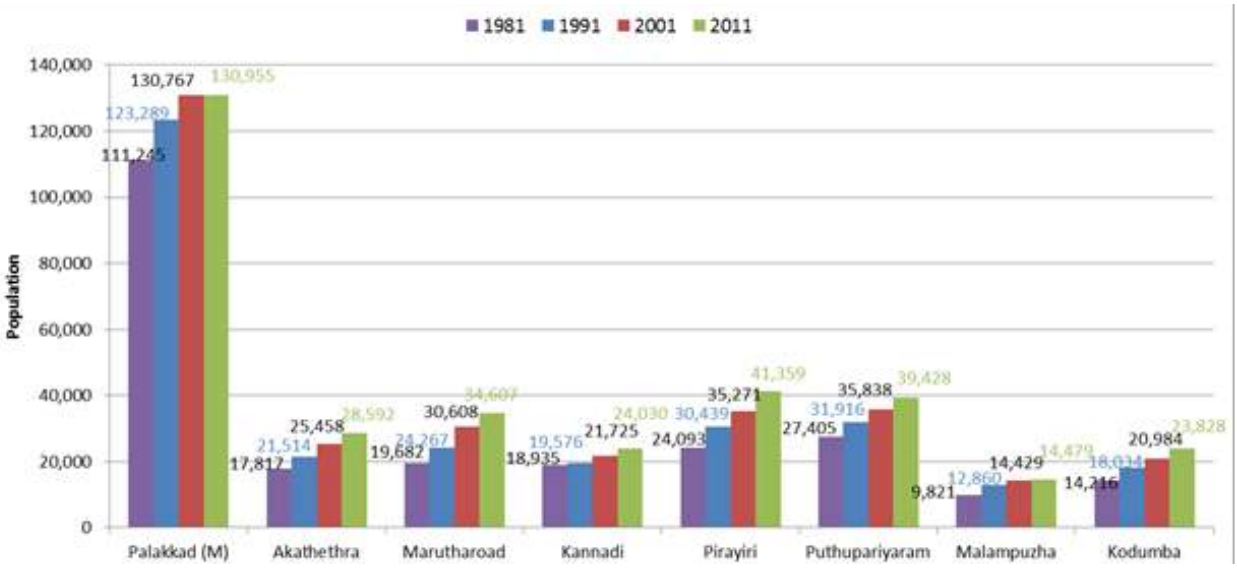


Fig 3.5 Comparison of decadal variation of population of adjacent local bodies with Palakkad municipality

Source: Census 1991, 2001, 2011

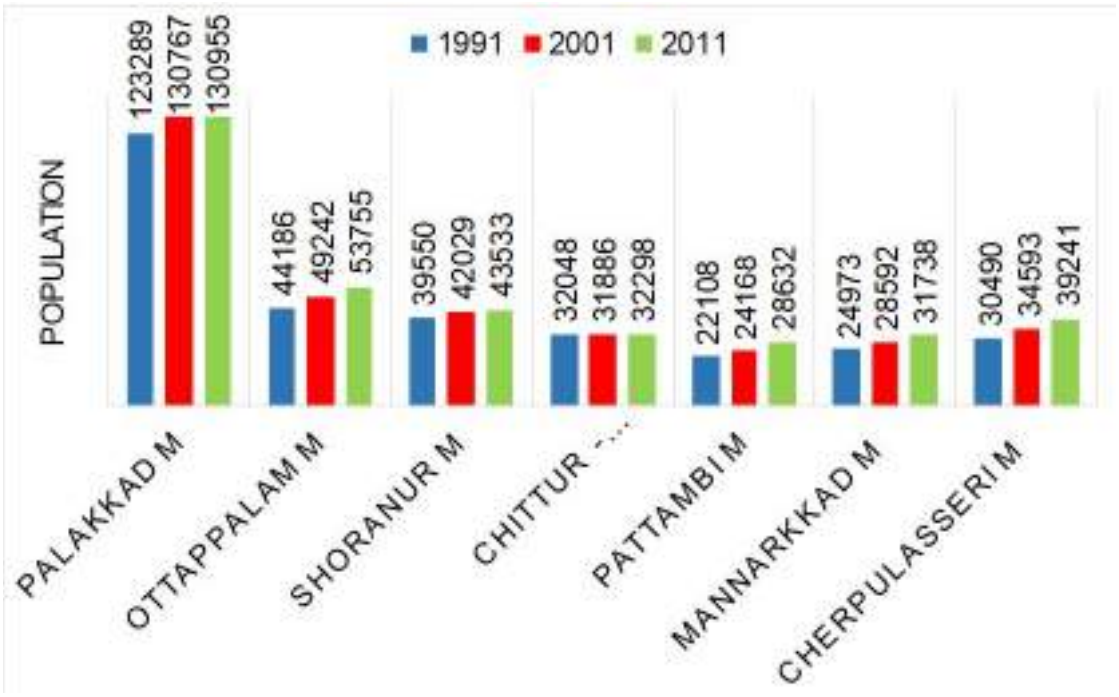


Fig 3.5(a) Comparison of decadal variation of population of other urban local bodies in the district with Palakkad municipality

Source: Census 1991, 2001, 2011

population in Palakkad municipality was consistent but the surrounding LSGIs showed a considerable growth. There is a chance for urban agglomeration including parts of Maruthurod, Puthupariyaram, Pirayiri and Akathethara. As of Census standards these Panchayaths comes under urban category.

Figure 3.5(a) shows comparison of decadal variation of population of other urban local bodies in the district with Palakkad municipality. Ottapalam has the second most population after Palakkad, followed by Shoranur. Pattambi has the least population among the seven municipalities of the district. Even though the population of Palakkad is higher while comparing with other urban local bodies, the growth rate of population is the least among all other municipalities of the district. Whereas the adjacent local bodies of the municipality shows higher growth rate as per figure 3.5. This clearly indicates an urban sprawl towards adjacent local bodies. People who wish to utilise the benefits of this first order service provider mainly choose to live in the outskirts of the town. This may be due to various reasons such as land availability, land cost, wish for a rural character with urban facilities etc.

Table 3.2 gives details of ward wise population of Palakkad municipality. Ward wise population size ranges from 1,355 to 3,893. All the wards have population size more than 1,000. Fig 3.6 shows the ward wise population distribution of the municipality. The highest value is observed from ward 31- named Puthupallitheruvu (3,893)

Table 3.2 Ward wise population of Palakkad municipality-2019 in descending order of population

Ward Number	Ward Name	Population	Ward Number	Ward Name	Population
31	Puthuppallitheruvu	3,893	19	Sulthanpetta	2,635
2	Kalpathy	3,848	47	Pallippuram	2,600
32	Vennakkara South	3,741	8	Valiyapadam	2,560
30	West Yakkara	3,689	24	Kunnathurmedu south	2,510
36	Thirunellayi West	3,600	39	Nurani	2,470
13	Puthur North	3,522	51	Kunnumpuram	2,440
9	Mattumantha	3,200	18	Koppam	2,436
29	Murikkavu	3,130	17	Narikuthy	2,435
34	Othungodu	3,100	48	Meparamba	2,400
50	Vadakkanthara	3,060	45	Melamuri	2,379
3	Kunnumpuram	3,017	33	Vennakkara Central	2,300
12	Puthur South	2,988	11	Kalleppully South	2,280
27	Manappullykkavu	2,986	38	Kaikuthuparambu	2,260
46	Valiyangadi	2,960	15	Ayyappuram East	2,250
16	Parakunnam	2,928	20	Mankavu	2,248
35	Thirunellayi East	2,894	44	Sreeramapalayam	2,248
49	Karnaki Nagar West	2,860	14	Sekharipuram	2,221
40	Vithuni	2,812	26	Kenathparambu	2,100
4	Ayyapuram West	2,800	41	Municipal Office	2,085
25	Chirakkad	2,800	10	Kalleppully North	2,032
28	Civilstation	2,797	5	Kalpathy East	1,955
52	Olavakkode South	2,780	21	Vadakkumuri	1,865
37	Kallikkad	2,775	23	Kunnathurmedu North	1,790
43	Vadakkanthara East	2,770	22	Selvapalayam	1,615
1	Oalvakkode Central	2,730	7	Kumarapuram	1,600
42	Pattikkara	2,710	6	Thonipaalayam	1,355

Source: Compiled from Primary Survey & NHM Baseline Data 2019

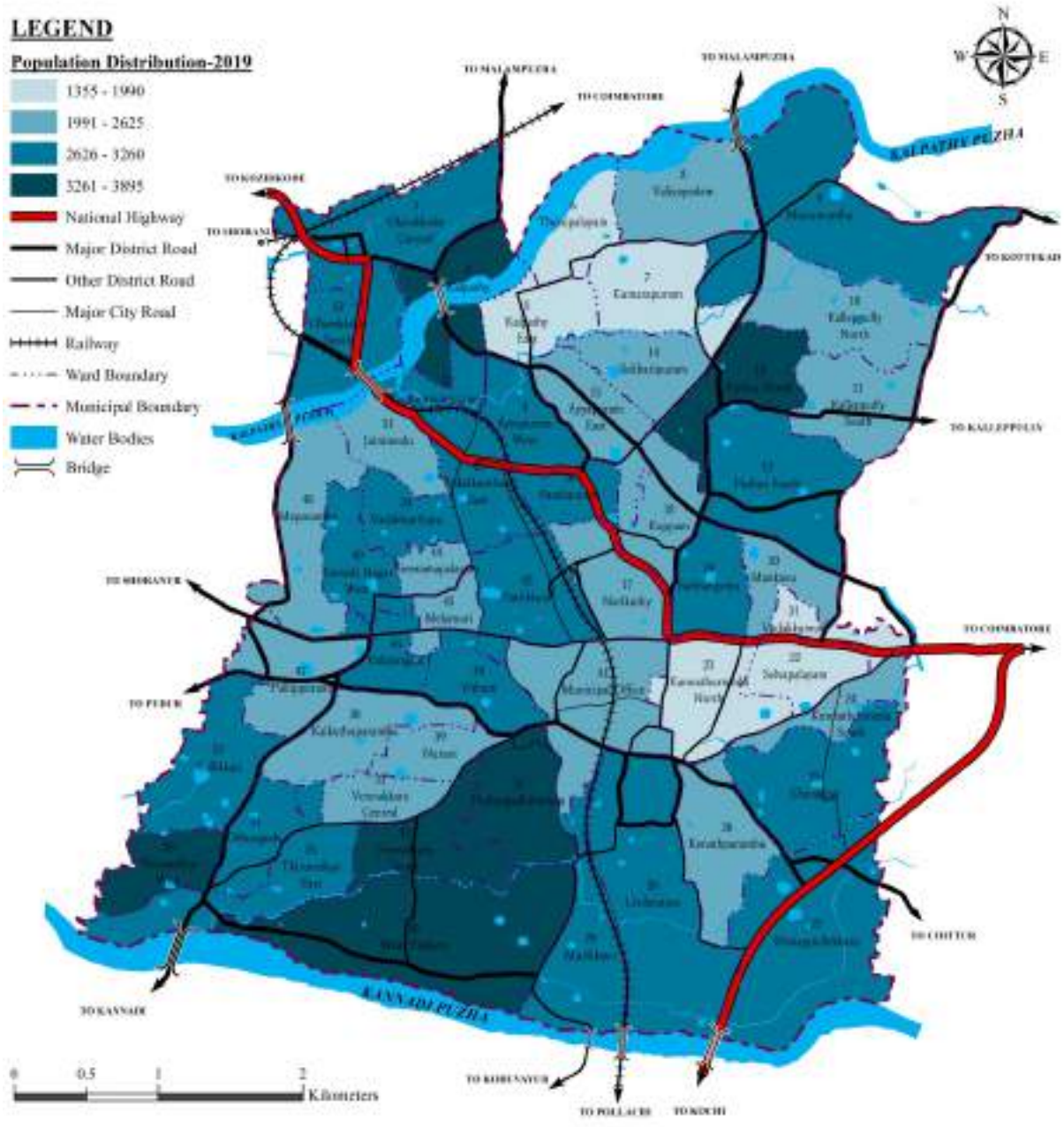


Fig 3.6 Ward wise distribution of population in Palakkad municipality

followed by ward 2-Kalpathy (3,848) and ward 32- Vennakkara South (3,741). Ward 30-West Yakkara (3,689), 36- Thirunellayi West (3,600), 13- Puthur North (3,522) are the other wards having higher population size (3,261-3,895). Least population is observed in ward 6- Thonipaalayam (1,355).

3.2 POPULATION CONCENTRATION PATTERN

Of the several methods of describing the spatial distribution of population the simplest way is the percentage distribution of population over the geographical areas. Figure 3.7 below shows the population concentration pattern of Palakkad municipality. One-third of the population is scattered in 14 wards located in peripheral area. Nearly

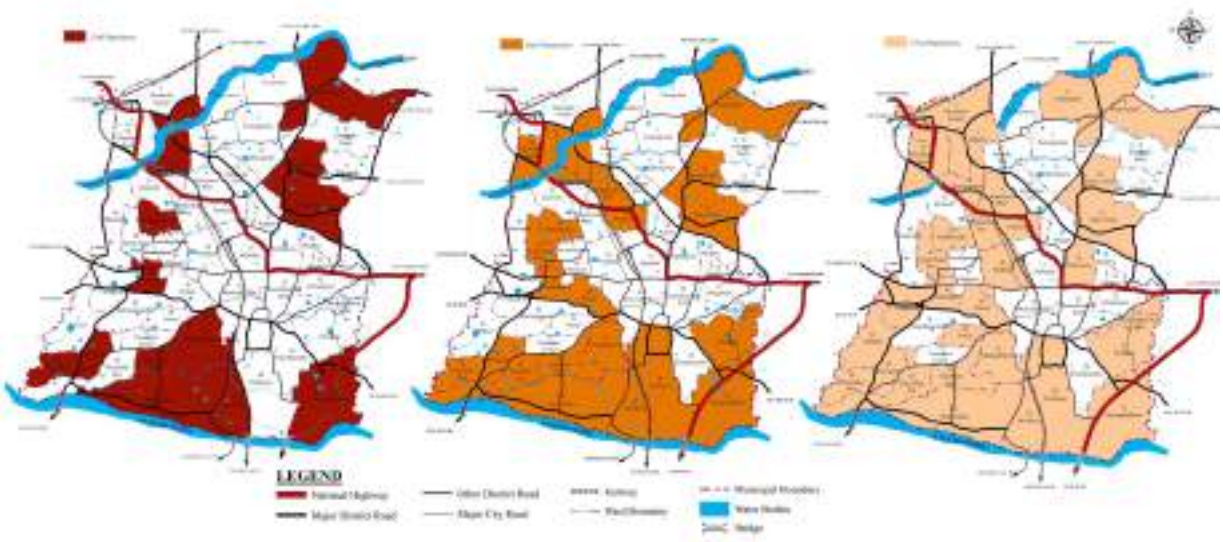


Fig 3.7 Population concentration pattern of Palakkad municipality

half of the population is concentrated in 22 wards consisting mainly in the southern parts. Two-third of the population is concentrated in thirty-one wards as depicted below.

3.3 POPULATION GROWTH RATE

Size and growth rate of population depicts the speed at which the population of an area changes. The decadal growth rate provides an overview of the percentage of total population growth in a particular decade. In 2001, total population in Kerala was 31,841,374 persons and in 2011 it became 3,34,06,061 persons. The total population growth in this decade was 4.91 % while in previous decade it was 9.42 %. The population growth rate of Palakkad District is higher than that of state and holds 3rd position

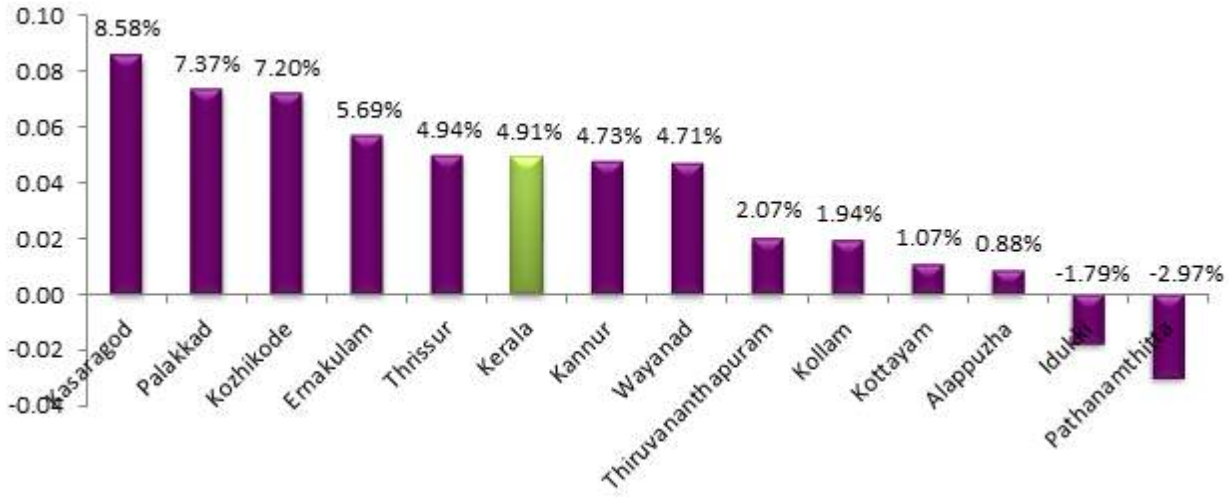


Fig.3.8 Population growth rate of all Districts and Kerala state during 2001-2011

Source: Compiled from Census 2001,2011

in population growth rate among other Districts of Kerala. Population growth rate in 2001-2011 decade of state and all districts have shown in Fig. 3.8.

Figure 3.9 shows temporal variation of population growth rate in Palakkad municipality along with district and state. The graph shows that there has been a steady decline in the rate of growth of population in case of municipality, districts and state. During 1971-2011, the growth rate for the district showed higher values than

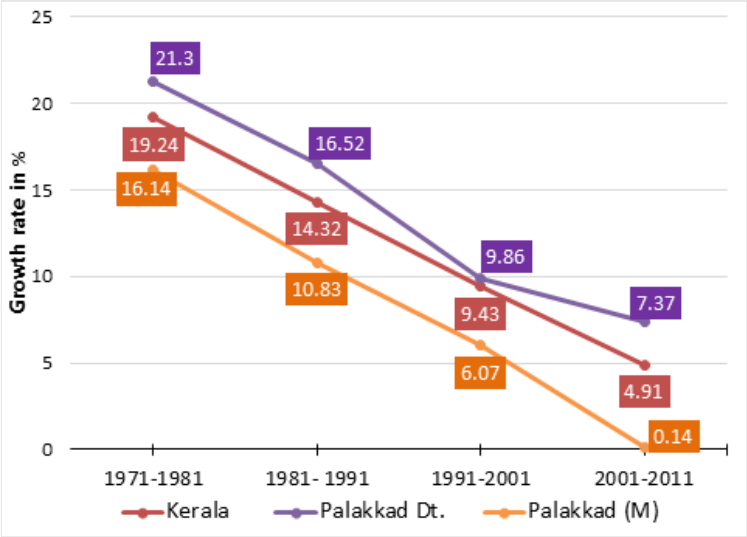


Fig 3.9 Comparison of decadal population growth rate in Palakkad municipality with state and district

Source: Census 1971, 1981, 1991, 2001, 2011

that of state and municipal averages. The decadal growth rate of municipality has decreased from 16.14 % to 0.14%. The net addition to the total population during the last decade was only by 188 persons.

As stated earlier, the change in net addition has shown a steady declining trend only after 1971. Even so, the municipality has witnessed a continuous decline in the



Fig 3.10 Decennial population growth rate of Palakkad municipality

Source: Census 1911,1921,1931,1941,1951,1961,1971,1981,1991,2001,2011

growth rate from 1961 onwards. The growth rate for the decade 1951-61 was 30.45 %, and has come down to 0.14% in 2001-11. The highest growth rate was in the period 1921-31 (38.26%) and a negative growth rate in 1911-21. Fig 3.10 depicts the percentage decadal growth rate of the municipality for 1901-2011.

A review of gender wise growth of population of four decades from 1971-81 to

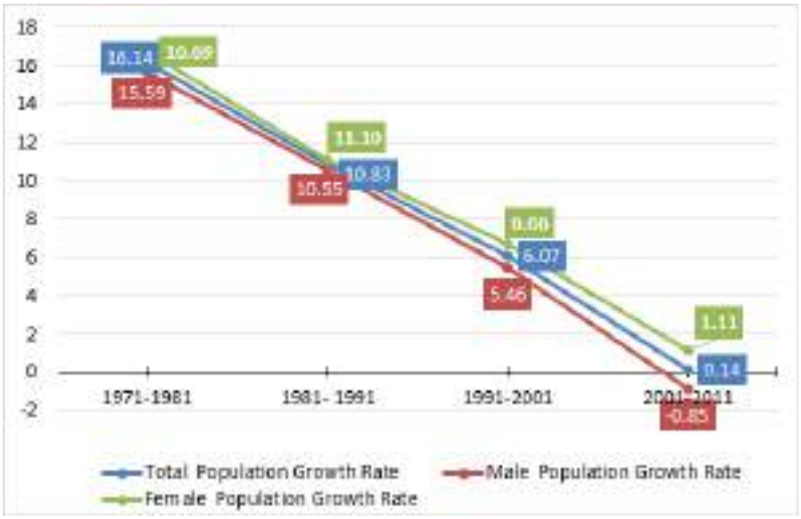


Fig 3.11 Temporal variation in Growth Rate of Total, Male and Female Population in Palakkad municipality

Source: Census 1971, 1981, 1991,2001,2011

2001-2011 has shown in fig 3.11. The growth rate of female population showed slightly higher values than that of male population during 1971-2011. During the last decade (2001-11), the growth rate of female population was 1.11% and male population drops to a negative growth rate of -0.85%. The trend shows an increasing gender gap in the municipality.

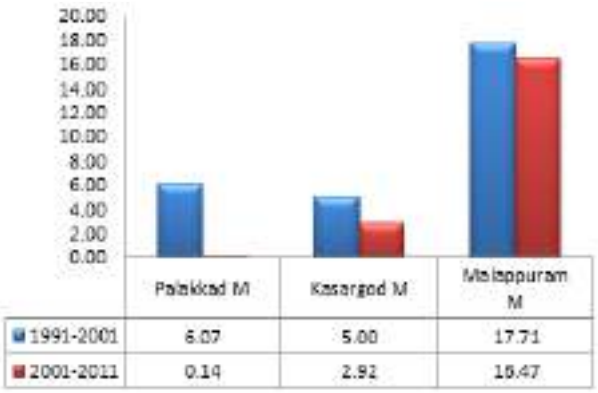


Fig. 3.12 Comparison of population growth rate with similar Municipalities

Source: Census 1991,2001, 2011

Figure 3.12 shows comparison of population growth rate with similar Municipalities. During 2001-11, Malappuram municipality has highest growth rate value as 16.47% and recorded a reduction by 1.24 points between the last two decades. Even though growth rate of all towns shows declining trend Palakkad municipality attains a value near zero population growth rate during the decade 2001-2011. Palakkad municipality has the least value as 0.14% due to urban sprawl towards adjacent local bodies.

When comparing with surrounding local bodies, Pirayiri panchayath has the

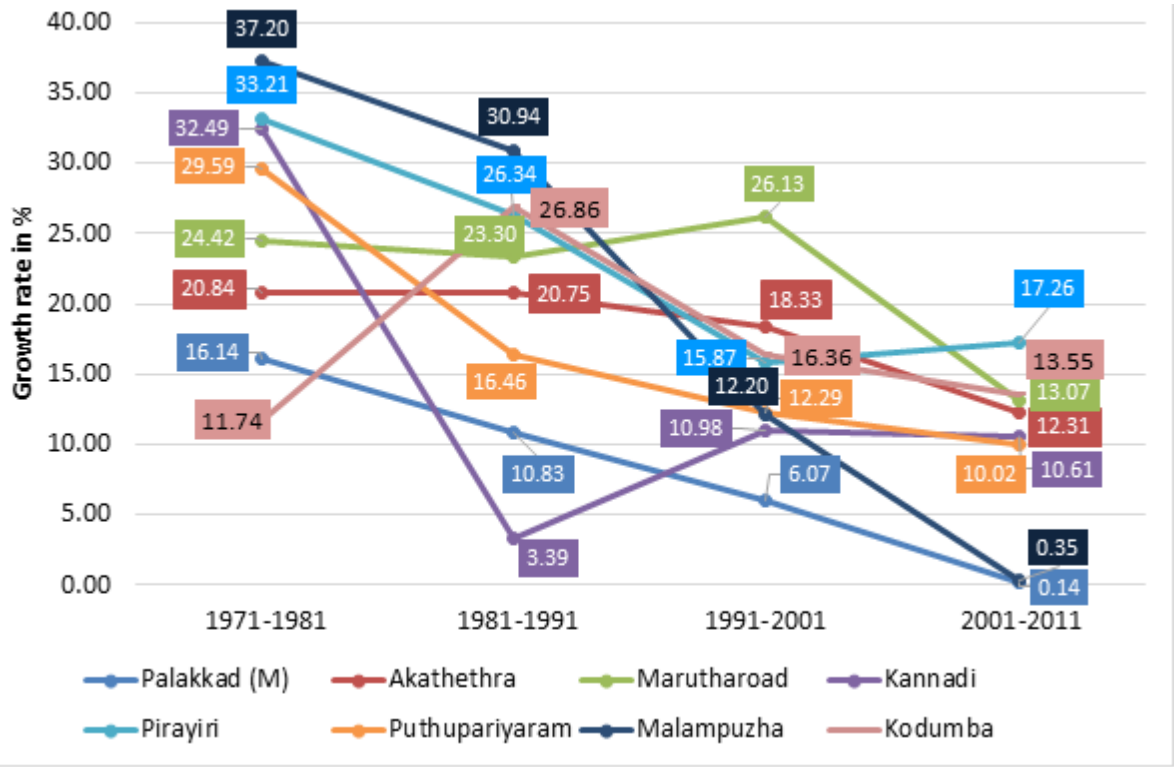


Fig. 3.13 Comparison of population growth rate with surrounding local bodies

Source: Census 1971,1981,1991,2001, 2011

highest growth rate value as 17.26% and Palakkad municipality has least population growth rate as 0.14% during the last decade (2001-11). An increasing trend were observed in Kannadi & Marutharoad panchayaths during 1991-2001 and in Pirayiri panchayath during the last decade. However, the overall trend for all local bodies shows a decline. Among the adjoining local bodies Malampuzha panchayath shows the highest reduction by 36.86 points followed by Kannadi panchayath (by 21.88 points). Figure 3.13 shows comparison of population growth rate with surrounding local bodies.

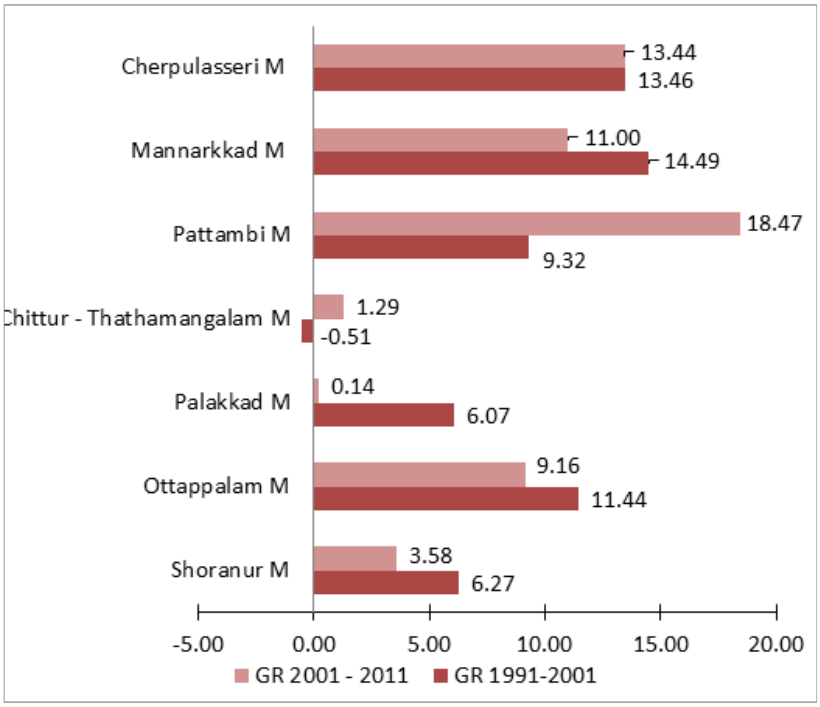


Fig. 3.14 Comparison of population growth rate with other municipalities in the district

Source: Census 1991,2001, 2011

The following fig 3.14 illustrates a comparison of decadal

variation of population growth rate with other municipalities within the District. A glance at the figure provided reveals that the growth rate for Pattambi and Chittur-Thathamangalam Municipalities have registered some increase during 2001-11 over the previous decade, whereas Palakkad, Ottappalm, Shoranur and Mannarkkad Municipalities shows continuous reduction in the growth rate. The growth rate for Cherpulassery remained almost same as that in the previous decade. As per 2001-11, Pattambi municipality shows the highest growth rate value 18.47% and Palakkad municipality has the least value as 0.14.

Table 3.3. Comparison of population density with District and State

Sl No.	Description	Kerala State	Palakkad District	Palakkad (Urban)	Palakkad municipality
1	Total Population	3,34,06,061	28,09,934	6,76,810	1,30,955
2	Total Area (Sq.km)	38,863	4,480	399.69	26.60
3	Gross Population Density	860	627	1,693	4,923

Source: Census 2011

3.4 POPULATION DENSITY

It is an important index of population which shows concentration of population in a particular area. In general, it can be defined as the number of persons residing in one sq. Km area. As per the population totals of census 2011, the gross population

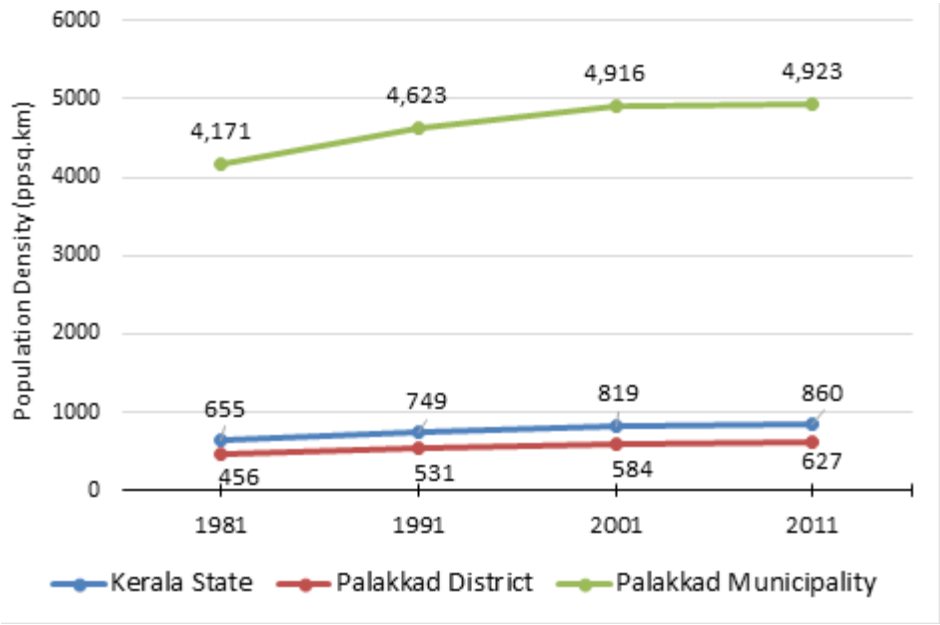
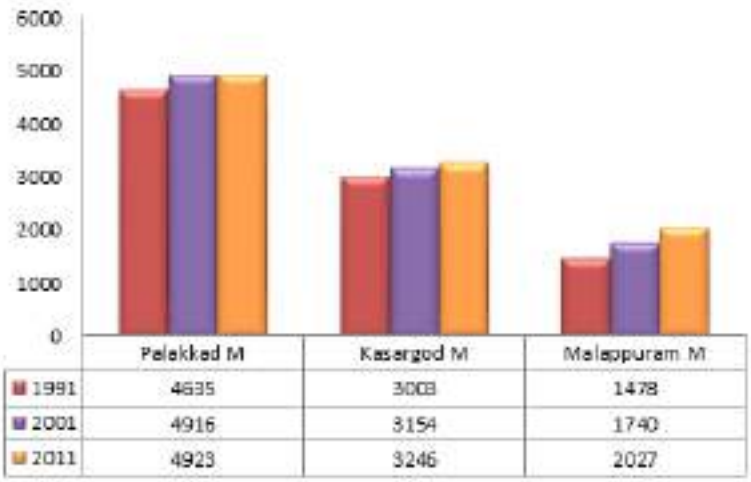


Fig.3.15 Decadal variation of population density of Palakkad municipality

Source: Census 1981,1991,2001,2011

density of the state is 860 persons/sq.km which is 2.25 times the national average. The gross density of urban population of the district is 1,693 p.p.sq.km. The gross population density of the municipality is 4,923 persons/sq.km, which is much higher than the district's gross & urban figures and state average as shown in table 3.3.



	Palakkad M	Kasargod M	Malappuram M
1991	4635	3008	1478
2001	4916	3154	1740
2011	4923	3246	2027

Fig. 3.16 Comparison of gross population density with similar municipalities

Source: Census 1991,2001,2011

Figure 3.15 shows the comparison of decadal variation of population density of municipality with that of district and state. During the last four decades Palakkad municipality shows higher density values than that of District and State. Population density of Palakkad municipality have plateaued in the decade 2001-2011 and it is approximately 8 times that of Palakkad district.

The gross population density of the municipality and its comparison with similar towns are given in fig 3.16. The highest population density is in Palakkad municipality, which is one & a half times greater than Kasaragod municipality and is almost two & a

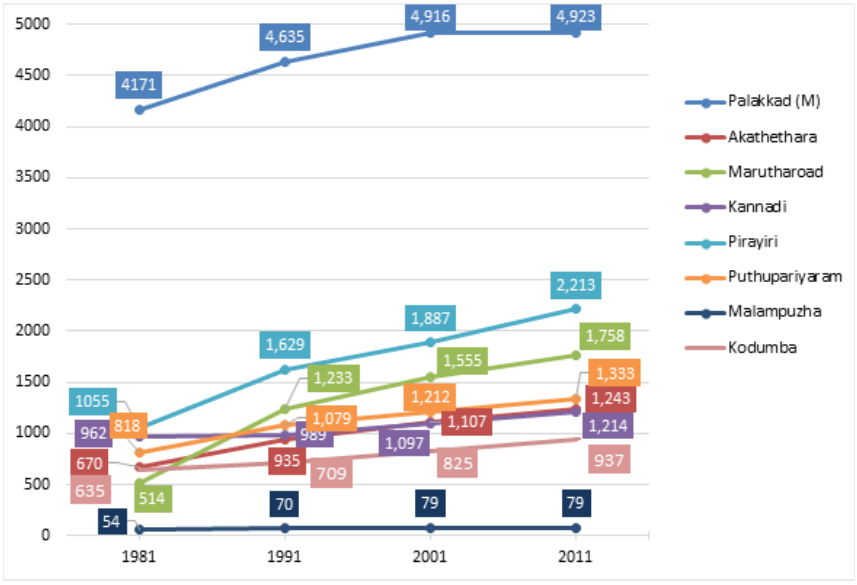


Fig. 3.17 Gross population density comparison with nearby LSGIs

Source: Census 1981,1991,2001,2011

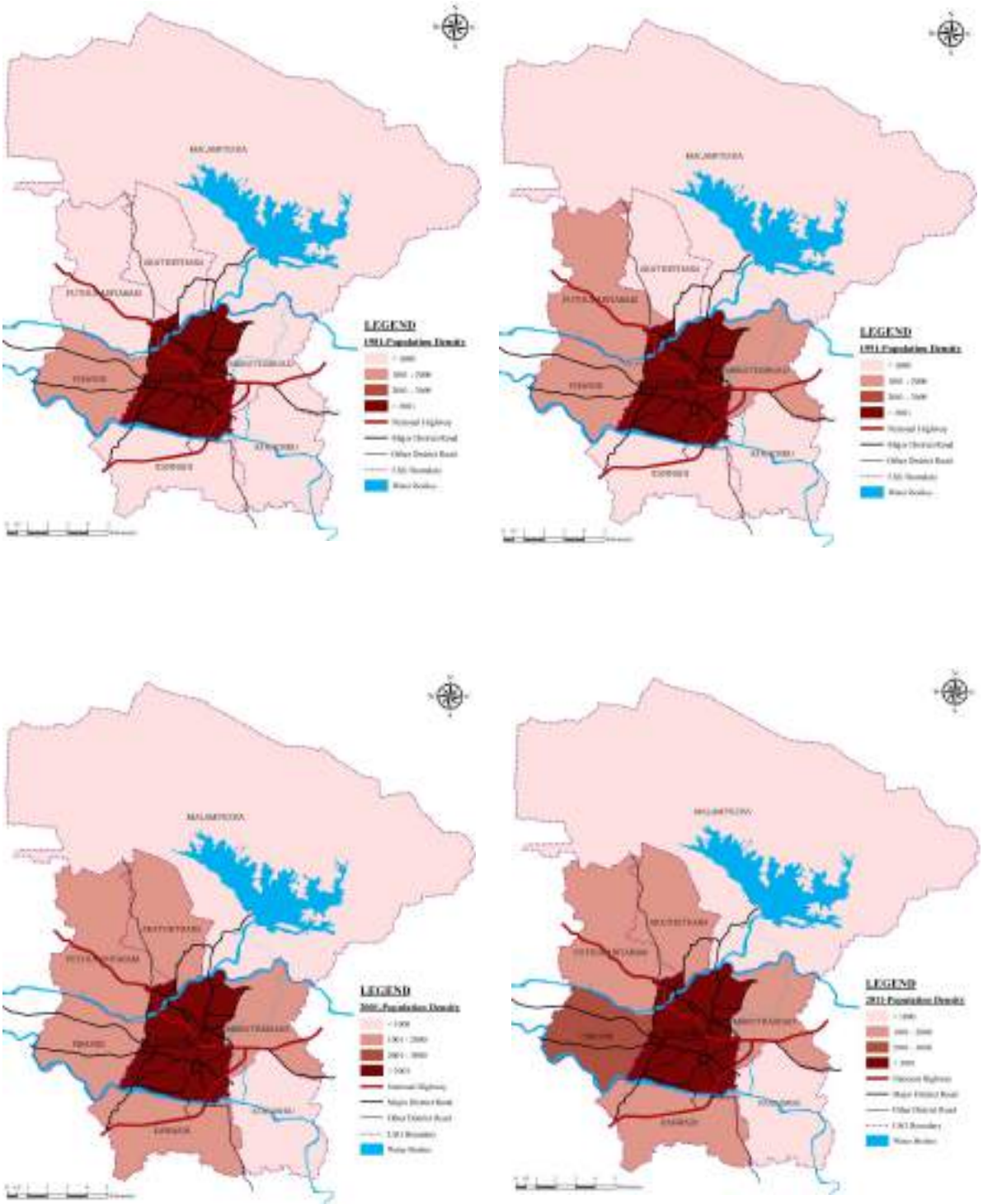


Fig. 3.18 Spatial depiction of decadal variation in gross population density of nearby LSGIs

and half times the population density of Malappuram municipality.

In comparison with the adjacent local bodies, the gross population density of Palakkad municipality is very high. From 1981 to 2011, all shows a great difference in their gross population density values. Since the net addition to the total population

Table 3.4. Ward wise Gross and Net Population Density -2019

Ward Number	Gross Population Density	Net Population Density	Ward Number	Gross Population Density	Net Population Density
36	10,548	18,884	25	3,803	7,364
3	15,355	18,160	48	3,852	7,193
44	15,155	16,087	43	5,817	7,032
45	13,938	14,420	8	3,906	6,678
49	8,403	13,754	12	3,639	6,459
46	11,661	12,976	14	5,795	6,431
32	8,215	12,844	5	5,357	6,364
34	10,175	11,879	15	4,914	6,334
50	10,465	11,658	47	5,153	6,333
16	11,191	11,515	29	5,286	6,269
2	6,019	11,431	42	5,091	6,129
24	9,942	10,855	17	4,650	6,051
39	9,649	10,116	38	4,703	5,888
21	9,905	10,023	6	3,164	5,765
13	7,300	9,976	26	3,928	5,704
35	4,665	9,754	22	5,207	5,696
4	8,229	9,343	30	2,988	5,638
31	7,358	9,080	11	4,306	5,362
18	6,716	8,849	10	3,141	4,978
33	8,463	8,814	1	3,778	4,130
51	7,066	8,787	28	2,294	3,749
37	4,726	8,522	9	2,300	3,744
40	8,130	8,501	7	2,870	3,346
20	7,448	8,373	23	3,257	3,331
52	4,973	7,683	27	2,321	2,758
19	6,918	7,556	41	2,568	2,748

Source: Compiled from primary survey & NHM baseline data, 2019

during the last decade was only by 188 persons, there is no significant difference in the gross population density in Palakkad municipality in the decade 2001-11. Gross density of Malampuzha panchayath is very less, since its gross area is about 183.42 sq.km consisting forest and Malampuzha reservoir. Figure 3.17 shows the comparison of Gross population density of Palakkad municipality with the surrounding local bodies during

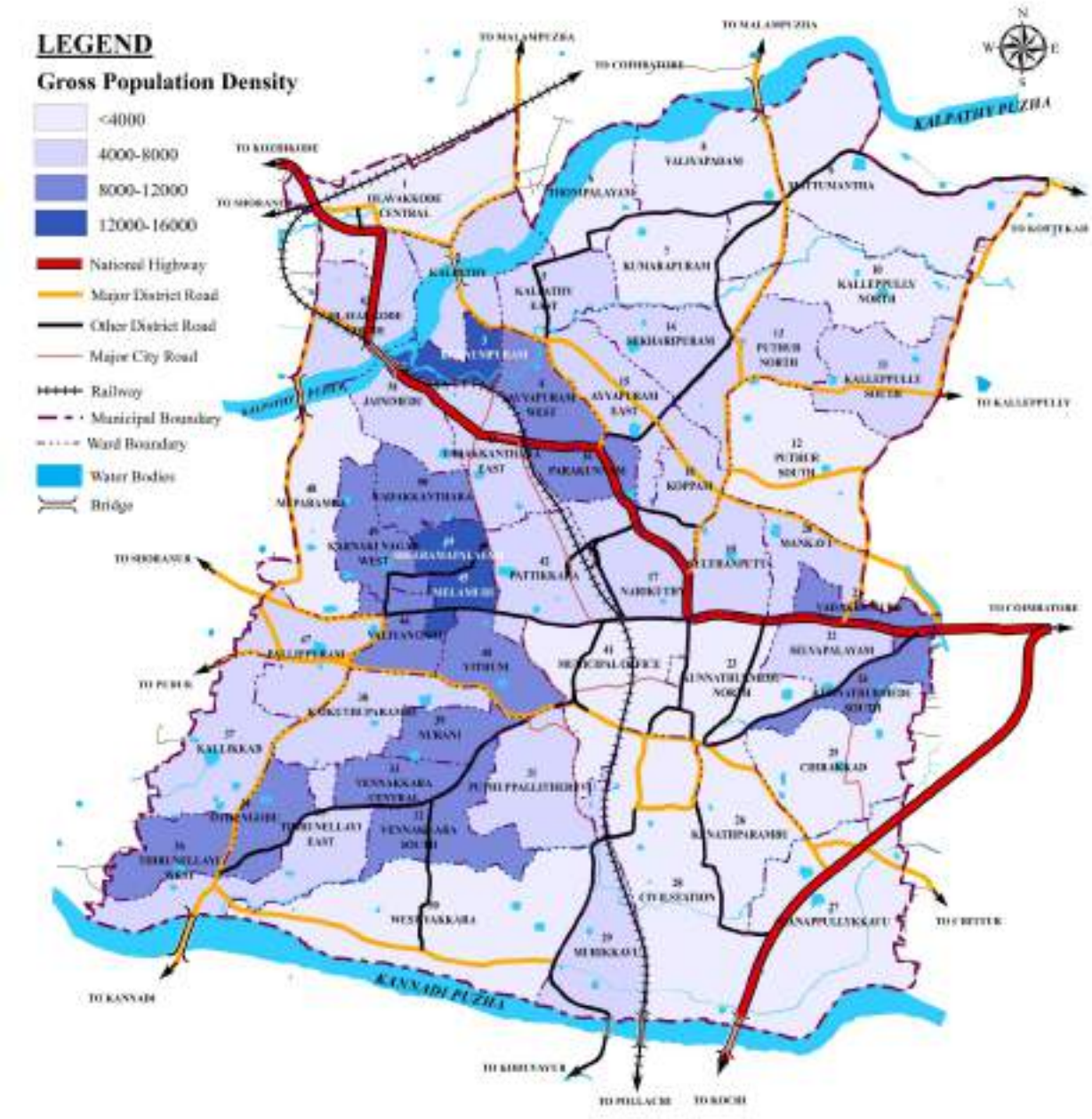


Fig. 3.19. Ward wise gross population density of Palakkad municipality

1981-2011.

As per 2019 population, the average value for gross population density of the town is 6,475 persons/sq.km and the net population density is 8,295 persons/sq.km. Ward wise gross and net population density details of municipality is given in table 3.4.

Fig.3.19 shows the spatial depiction of ward wise gross population density of Palakkad municipality in 2019. The gross population density in the municipality ranges from 2,294-15,355 persons/sq.km. The highest gross population densities were

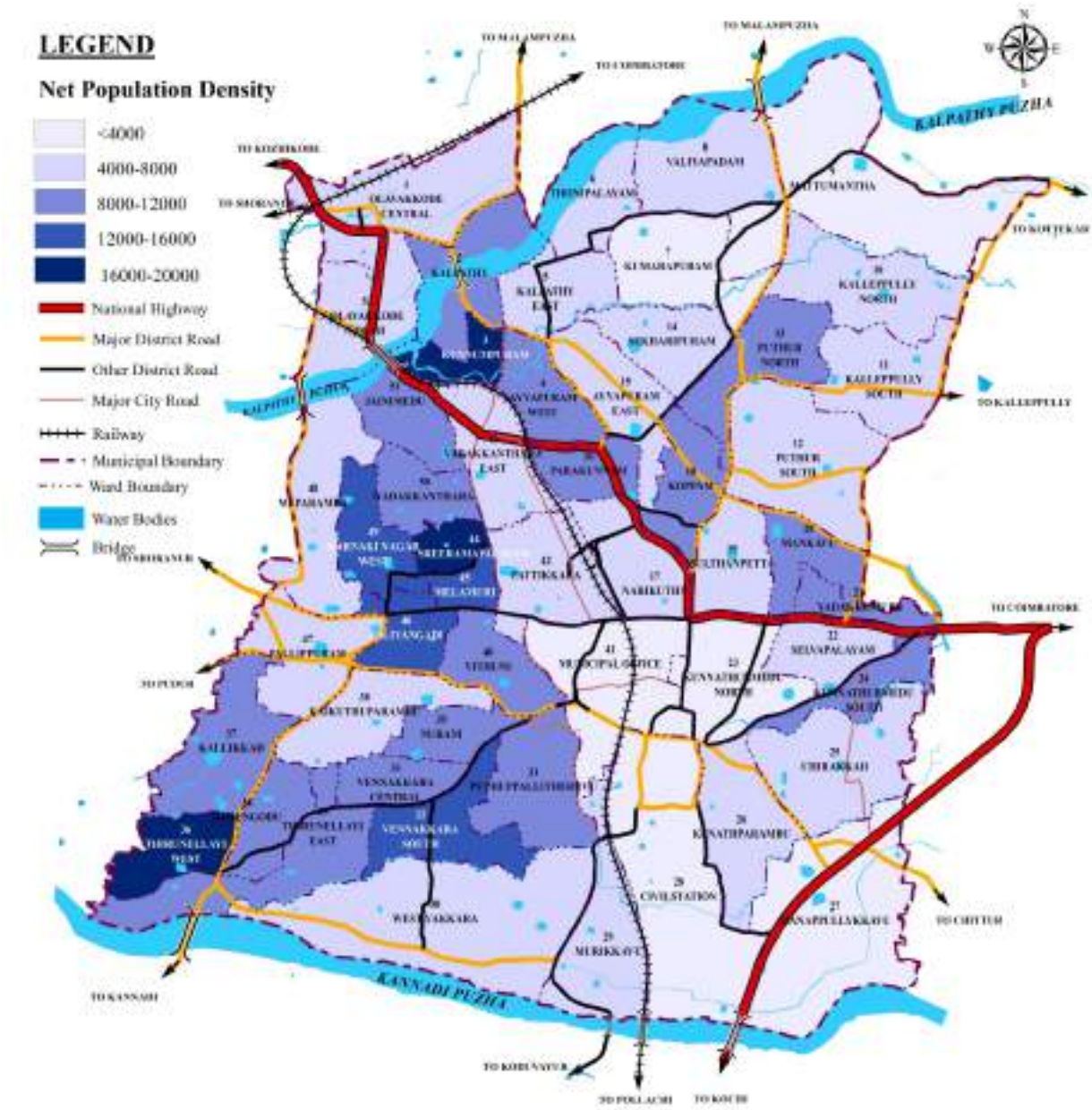


Fig. 3.20. Ward wise net population density of Palakkad municipality

3.5 SEX RATIO

Sex composition of the human population is one of the basic demographic characteristics, which is extremely vital for any meaningful demographic analysis. It is defined as the number of females per 1,000 males. Changes in sex composition largely reflect the underlying socio–economic and cultural patterns of the society. It is a measure of prevailing equity between males and females at a given point of time.

In the case of sex ratio, Kerala is unique, being the only state in India where females have predominance over males with a sex ratio of 1,084. As per 2011 Census, Palakkad District is having a sex ratio of 1,067, one point above the previous decade's value of 1066. The sex ratio in the municipality is lower than that of the district and

state average values.

According to the 2011 Census, Palakkad municipality is having a sex ratio of 1052, 21 points greater than 2001 Census value of 1,031. Trend shows there is a gradual increase in female population in Palakkad Municipality. The sex ratio of Palakkad municipality is lesser than that of state average (1,084) and district average (1,067). Sex ratio of Palakkad municipality, the District and the state figures shows a rising trend over the last four decades as can be seen from the Figure 3.21.

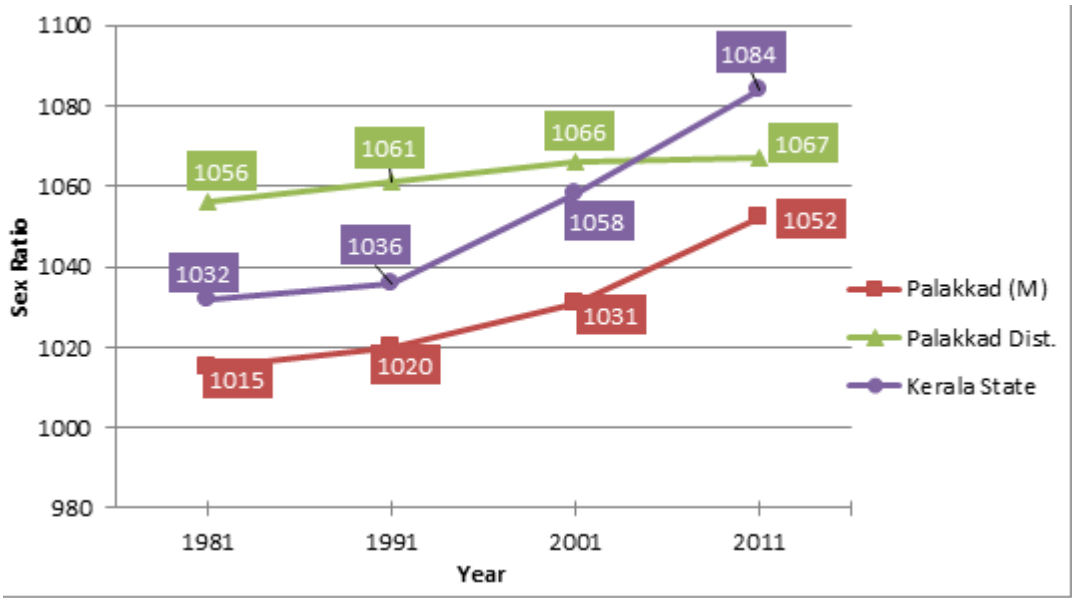


Fig. 3.21 Temporal variation of sex ratio of Palakkad municipality, Palakkad District and Kerala State

Source: Census 1971, 1981,1991,2001,2011

Figure 3.22 shows the temporal variation of sex ratio of similar municipalities with Palakkad municipality. Comparing the sex ratios of similar municipalities, the sex ratio shows an increasing trend over the last two decades. In 1991 the sex ratio of Palakkad municipality is higher than that of Malappuram and Kasaragod municipalities. But in 2001 and 2011 the scenario changes and the sex ratio becomes lower than the other two municipalities.



	Palakkad M	Kasargod M	Malappuram M
1991	1020	1014	1019
2001	1031	1051	1041
2011	1052	1058	1066

Fig. 3.22 Temporal variation of sex ratio of Palakkad municipality, comparison with similar municipalities

Source: Census 1991, 2001, 2011

Figure 3.23 shows the comparison of sex ratio with surrounding local bodies. Comparing sex ratio of Palakkad municipality with the surrounding local bodies, the sex ratio shows an increasing trend over last four decades except Marutharoad panchayath, which shows a continuous declining trend in sex ratio. As per the latest census, Akathethara shows the highest value as 1063 followed by Puthupariyaram (1,059) and Palakkad municipality (1,052). Marutharoad has the least value as 1028.

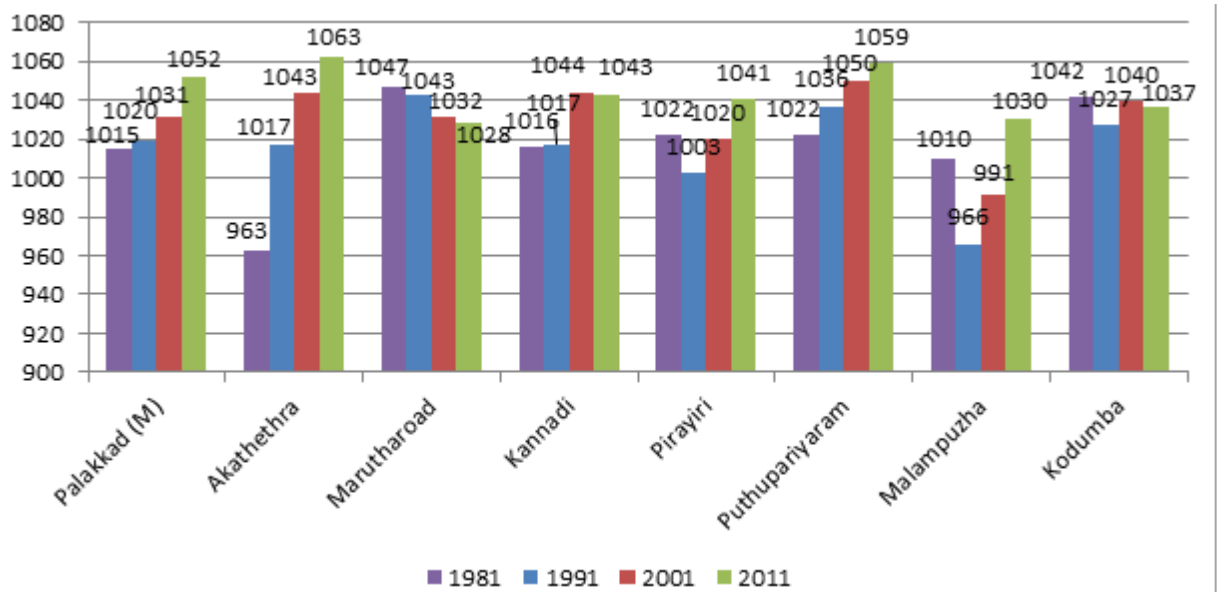


Fig. 3.23 Temporal variation of sex ratio of Palakkad municipality, comparison with adjacent local bodies

Source: Census 1991,2001,2011

In India, the Child Sex Ratio is defined as the number of females per thousand males in the age group 0–6 years in a human population. Changes in child sex ratio index reflect underlying socio-economic and cultural patterns of the society, especially its attitude towards the girl child. In Palakkad municipality child sex ratio shows an increasing trend. As per 2011 Census, the child sex ratio of municipality is 958 which is less than the State average (964) and District average (967) average. Compared to Palakkad municipality the child sex ratio of Malappuram and Kasaragod municipalities shows a decreasing trend. Figure 3.24 shows the comparison of child sex ratio with similar municipalities.



	Palakkad M	Kasargod M	Malappuram M
1991	937	959	963
2001	950	968	962
2011	958	947	957

Fig. 3.24 Temporal variation of Child sex ratio of Palakkad municipality, comparison with similar municipalities

Source: Census 1991, 2001, 2011

Fig. 3.25 shows comparison of child sex ratio of the municipality with adjacent local bodies. While comparing, Palakkad municipality, Kannadi panchayath, Malampuzha Panchayath & Pirayiri panchayath show an improvement in child sex ratio while others show a declining trend.

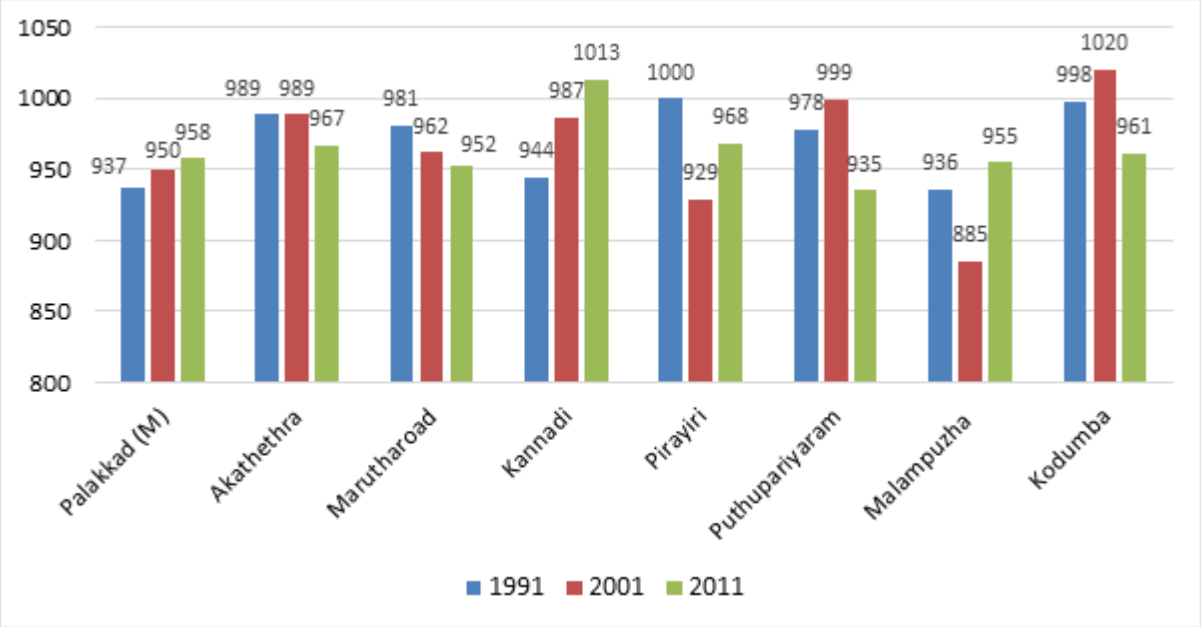


Fig. 3.25 Temporal variation of Child sex ratio of Palakkad municipality, comparison with adjoining local bodies

Source: Census 1991, 2001, 2011

3.6 SIZE OF HOUSEHOLDS

The total number of households in Palakkad municipality is 31,176 as per Census 2011. The average household size is 4.2, and is lower than the District average (4.41) and state average (4.3). Household size of Palakkad municipality, Kerala and Palakkad District shows deceasing trend. General trend in State shows shifting to nuclear families from joint families, increasing income level and decreasing dependency ratio may be the possible reasons. Figure 3.26 shows the comparison of temporal variation of household size in Palakkad municipality with district and state

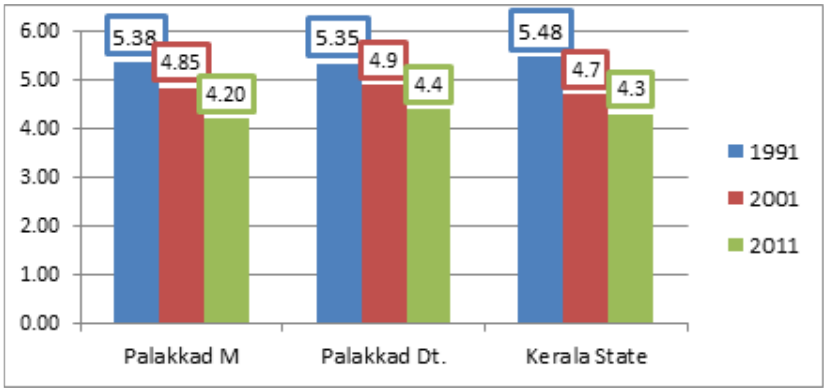


Fig. 3.26 comparison of temporal variation of household size in Palakkad municipality with district and state

Source: Census 1991, 2001, 2011

When compared with the neighbouring local bodies Pirayiri panchayath (4.62) is having the highest household size. Figure 3.27 shows the comparison of household size of Palakkad municipality with surrounding local bodies. Household size of Palakkad municipality and surrounding local bodies shows decreasing trend. Except Pirayiri all other panchayaths are having approximately same household size.

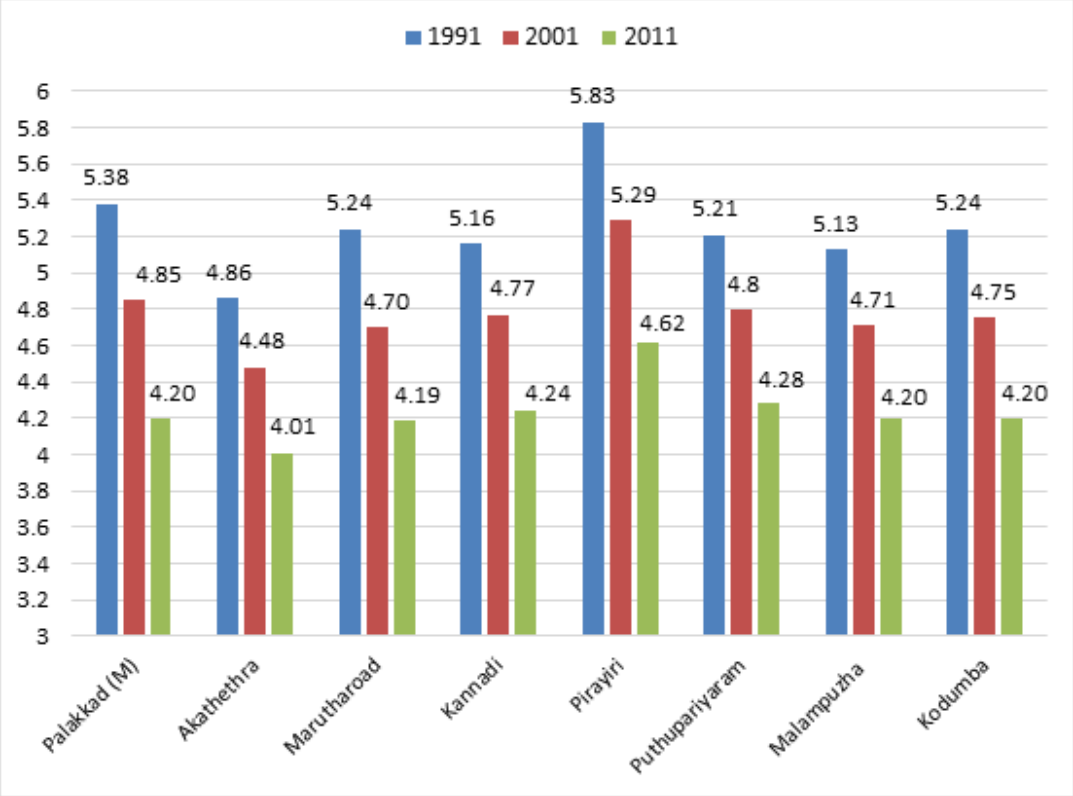


Figure 3.27 Temporal variation of Household size in Palakkad Municipality, comparison with surrounding local bodies

Source: Census 1991, 2001, 2011

The household size of similar municipalities also shows decreasing trend shown in figure 3.28. While comparing, Kasaragod municipality has the highest household size of 5.31 and Malappuram has a household size of 5.11.



	Palakkad M	Kasargod M	Malappuram M
1991	5.38	6.23	6.14
2001	4.85	5.67	5.65
2011	4.20	5.31	5.11

Figure 3.28 Temporal variation of Household size in Palakkad municipality, comparison with similar Municipalities

Source: Census 1991, 2001, 2011

3.7 POPULATION PYRAMID

The data on population by age and sex is vital for planning and evaluation of various developmental and health programs. Fig 3.29 given below presents the age pyramid obtained from socio-economic survey 2019. The age structure 2019 shows that the percentage of working population within the age group 20-60 is about 56.62%. Dependent population in the younger age group (0-20) constitutes 31.35% and older age group (60 above) constitutes 12.03 %.

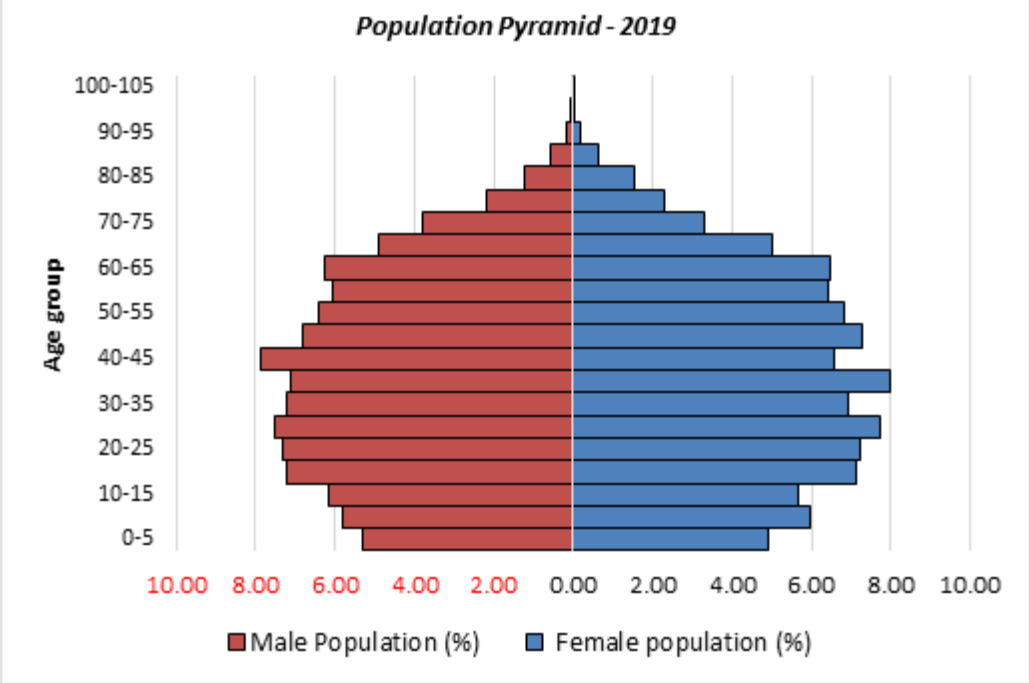


Figure 3.29 Age- sex pyramid of Palakkad municipality – 2019

Source: Socio-economic survey 2019

3.8 SOCIAL COMPOSITION

The distribution of the population according to caste, religion, sex, language, occupation, etc. is called population composition. The religion wise population shows that nearly 66% are Hindus, 31% are Muslims and 3% are Christians. (Fig 3.30).

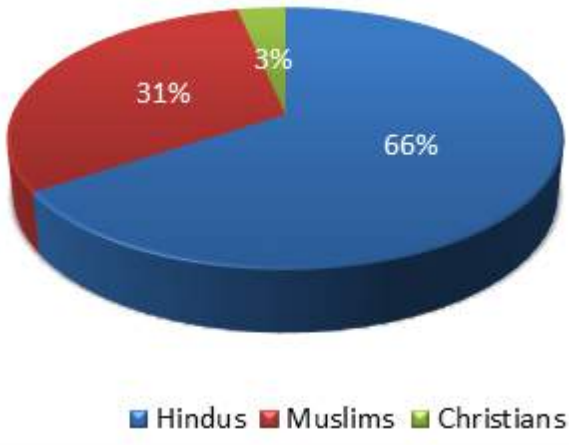


Figure 3.30 Religion wise population break up of Palakkad municipality

Source: primary survey

A comparison of Scheduled Castes (SC) and Scheduled Tribe (ST) population of the municipality, State, District and its percentage with respect to the respective total population has given in table 3.5. As per the Census

2011, the share of the Scheduled Tribe population in the municipal area is meagre, 0.16% and total population of the Scheduled Castes in the municipality accounts for 7.69%. Both values are less when comparing with the district and state averages.

Table 3.5. SC & ST Population– Comparison with District and State

Administrative Division	SC Population	% of Total Population	ST Population	% of Total Population	Others	% of Total Population
Kerala	30,39,573	9.10	4,84,839	1.45	2,98,81,649	89.45
Palakkad District	4,03,833	14.37	48,972	1.74	23,57,129	83.89
Palakkad municipality	10,068	7.69	213	0.16	1,20,674	92.15

Source : Census 2011

3.9 INFERENCE

Population growth is associated with a variety of demographic, socio-cultural and economic factors and it reflects the prevailing dynamism of demographic character in the area. Population growth of the town shows a declining trend from 1951 onwards and if the trend continues, even a negative growth rate can be expected in the future. High growth rate of surrounding local bodies and decline in the growth rate value of Palakkad municipality indicates a possible out migration which may be due to an increase in land value within the municipality or availability of job opportunities in the surrounding LSGs.

In other words, transportation facilities provide easy commutation, hence more people start settling in the outskirts of the town where land availability is more and land value is less, hence floating population found more. This causes conversion of agriculture land for residential uses in the urban peripheral areas.

The gross population density (as per census 2011) of the Municipality is 4,923 persons/sq.km, which is much higher than the district's gross & urban figures and state average.

As elsewhere in state, the trend in household size shows continuous decrease, indicating the shifting of preference from joint families to nuclear households. Although, Palakkad municipality have a healthy sex ratio value. The trend shows an increasing gender gap in the municipality (Women continue to outnumber men during 1971-2011).



CHAPTER 4- OCCUPATIONAL STRUCTURE

4. OCCUPATIONAL STRUCTURE

The study of occupational structure of population occupies an important position in field of population studies. Since, it determines the economic strength of a population, such studies are very important for planners who formulate plans and policies for social and economical development of a region. According to census 1971, occupation is the name of function which a person performs by engaging himself in some gainful activity. To understand the economic profile of Palakkad municipality a detailed analysis of various economic indicators like workers classification, workforce participation rate and occupational structure have been discussed in this chapter.

4.1 WORK FORCE

Work is defined as participation in an economically productive activity with or without compensation, wages or profit. Such participation may be physical or mental in nature. Work involves not only actual work, but also effective supervision and direction of work. It also includes part time help or unpaid work on farm, family enterprise or in any other economic activity. All persons engaged in 'work' as mentioned above are workers. Reliable information on the structure of the work force is available from the population censuses. The total number of workers in Palakkad municipality as per census 2011 is 45,696 which is 34.89% of the total population of the municipality. Fig 4.1 shows the details of total workers and non- workers.

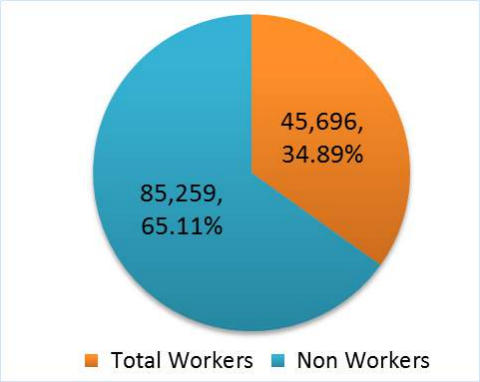


Fig. 4.1 Total workers and non-workers in Palakkad municipality

Source: Census 2011

Table 4.1 shows decadal variation in total population size total workers and workforce for the years of 1981 to 2011 in Palakkad municipality. The number of total workers in 1981 was 32,610 and it increased to 37,710 by 1991 with an increase of 5,100 workers. In the succeeding decade (1991-2001) also, the net addition has increased continuously by 5,222. The latest census reported a decrease in growth size as it is 2,764. The number of total workers shows an increasing trend during 1981 to 2011.

This shows that job opportunities are increasing and the economic base is gaining momentum.

Table 4.1 Decadal variation in total population size and total workers in Palakkad municipality

Year	Total Population	Total Workers	Increase in Workforce
1981	1,11,245	32,610	
1991	1,23,289	37,710	5,100
2001	1,30,767	42,932	5,222
2011	1,30,955	45,696	2,764

Source: Census 1981,1991,2001,2011

The growth rate of population and growth rate of total workers shows decreasing trend. However, the rate of growth in workforce has always been higher than that of population growth during the last three decades. It means that there must be an increase in work participation rate (WPR). In depth analysis shows that the population growth rate in the decade 1991-2001 is decreased 43.95% from 1981-1991 decade but in the meantime the decrease in growth rate of workforce is only 11.45%. And this shows a positive trend. The population growth rate in the decade 2001-2011 is decreased 97.69 % from 1991-2001 decade but in the meantime the decrease in workforce growth rate is only 53.50%.And this indicates a positive trend in workforce participation. Figure 4.2 shows decadal variation in growth rate of population and total workers in Palakkad Municipality.

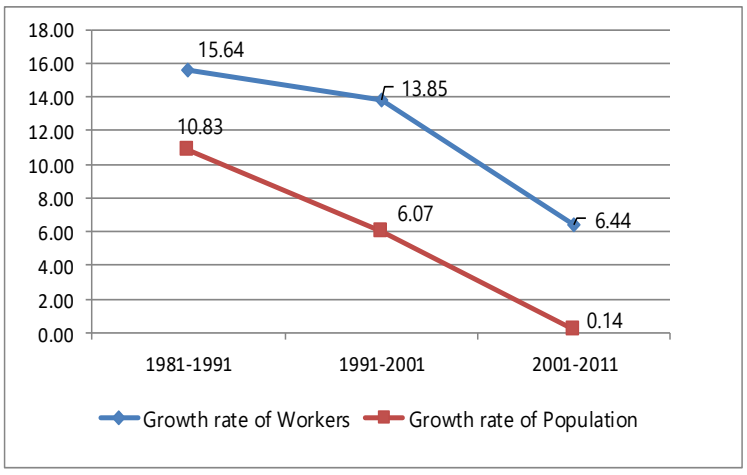


Fig.4.2 Decadal variation in growth rate of population and total workers in Palakkad municipality

Source: Census 1981,1991,2001,2011

4.2 WORK PARTICIPATION RATE

Work Participation Rate (WPR), a measure of economic activity is taken as the ratio of total workers to the total population, and it is expressed as a percentage. As

per 2011 census, work participation rate of Palakkad district is 37.10%, Palakkad municipality is 34.89%, where as that of the state is 34.78%. The work participation rate of Palakkad municipality is 34.89% which is lower than the district average and approximately equals to state and Palakkad district (urban) averages. The decadal variation of WPR of state, district and Palakkad municipality are depicted in figure 4.3.

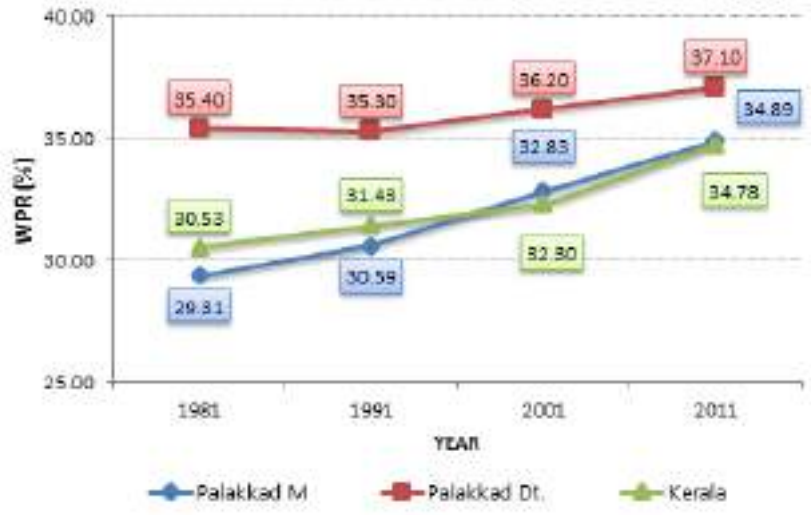


Fig.4.3 Decadal Variation of WPR in Palakkad Municipality, State and District

Source: Census 1981,1991,2001,2011

During 1981 WPR of Palakkad municipality (29.31%)was lower than that of the state (30.53%) and district (35.4%) averages. Considering the overall trend in WPR (1981-2011) Palakkad municipality shows the sharpest increase of 5.58 points, followed by state 4.25points and district 1.7 points. WPR of Palakkad dist. has always been higher than that of state and Palakkad municipality during the last four decades.

Growth rate of WPR of Palakkad municipality shows a decline from 7.32% in 1991-2001 to 6.27% in 1991-2011. But in 2001-2011 decade Kerala shows a sharp increase in growth rate of WPR from 1991-2001 as depicted in fig.4.4.

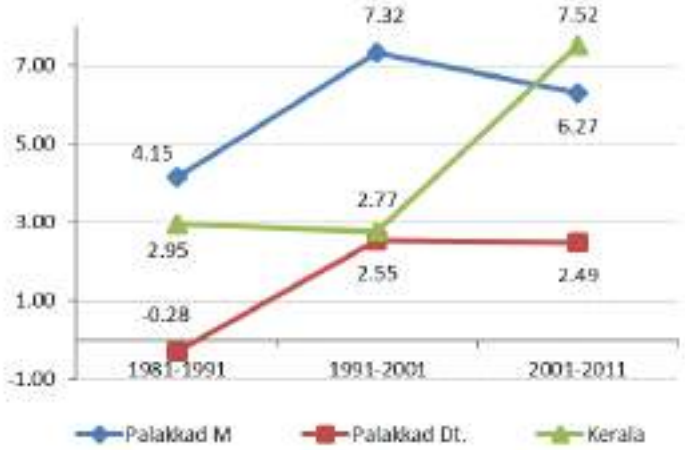


Fig. 4.4 Decadal growth rate of WPR in Palakkad municipality, state and district

Source: Census 1981,1991,2001,2011

Fig 4.5 depicts decadal variation in work force participation rate of Palakkad municipality with surrounding panchayaths. As per 2011 census, Kannadi panchayath has highest WPR (43.98%) followed by Kodumba (43.84%) Marutharoad (42.04%) and Akathethara (38.27%) panchayaths . In comparison Palakkad municipality has the least work force participation rate (34.89%) among the surrounding local bodies.

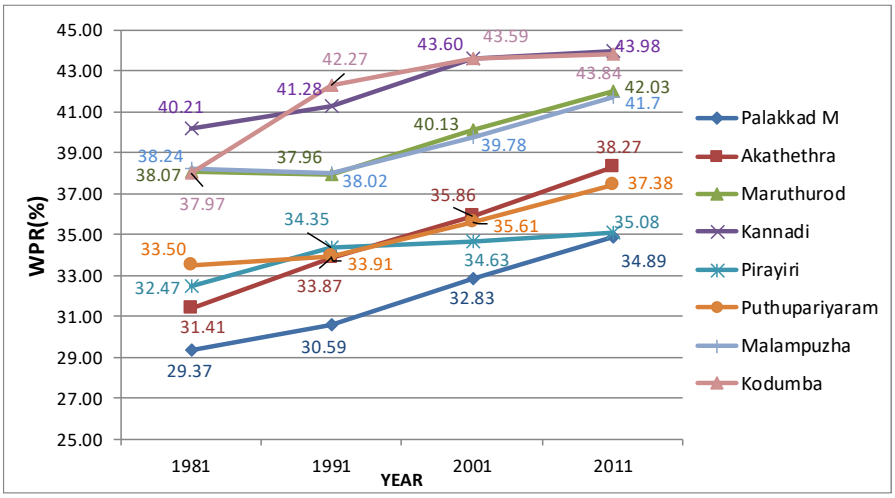


Figure 4.5 Comparison of decadal variation of WPR with adjoining local bodies

Source: Census 1981, 1991, 2001, 2011

The temporal analysis explains that, in all local bodies the WPR has registered continuous increase in the last four decades. From 1981-2011 highest increase in WPR is reported in Akathethara (6.85%) followed by Palakkad Municipality (5.58%) and Marutharoad (3.96%).From 1981 onwards, Kannadi Panchayath occupies the top position while Palakkad municipality occupies the bottom position in WPR as shown in fig 4.5.Even though Palakkad municipality is the headquarters of Palakkad district, it is seen that the city doesn't absorb the job creations.

Comparison of Work Participation Rate of Palakkad municipality with other municipalities in the district is given in figure 4.6. WPR of Chittur- Thathamangalam municipality remains highest and Pattambi municipality remains the lowest throughout the decades. Analysis shows that in 1991 Palakkad Municipality was in the fourth position and in 2011 holds second position among the urban local bodies in the district.

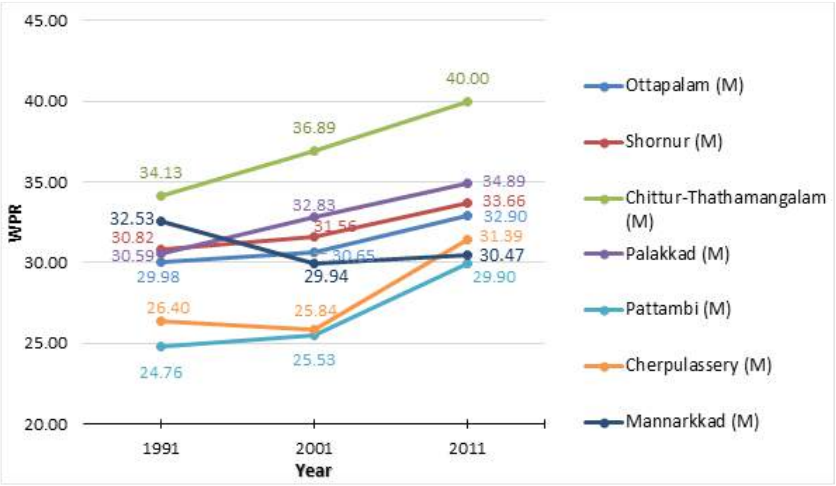


Figure 4.6 Comparison of WPR with other municipalities in the district

Source: Census 2011

Comparing with similar municipalities the work participation rate of Palakkad municipality is higher than that of Kasaragod and Malappuram municipalities. Work Participation rate of Palakkad municipality, Kasaragod municipality and Malappuram mnicipality shows increasing trend as shown in figure 4.7.

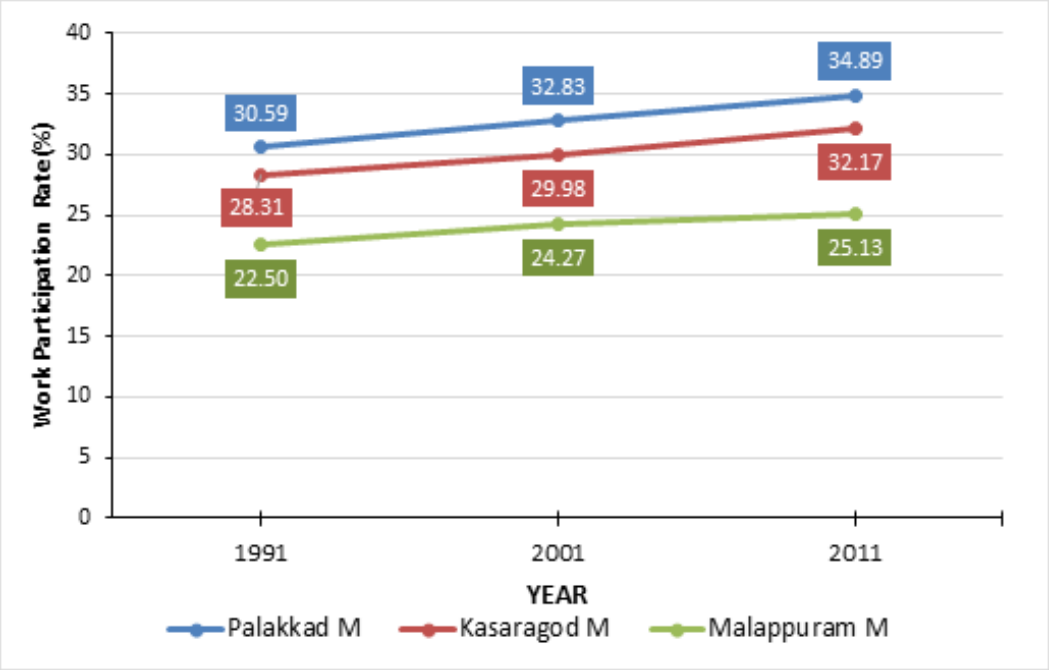


Figure 4.7 Decadal Variation of WFPR of Palakkad Municipality with similar Municipalities

Source: Census 1991,2001,2011

4.2.1 Gender-wise Analysis of Work Force Participation Rate

It is important to learn the work participation of males & females in the economy, so that corrective decision may be taken for overall economic growth of the nation. In this context, female labour work force participation is a driver of growth and therefore, participation rates indicate the potential for a country to grow more rapidly. However, the relationship between women's engagement in the labour market and broader development outcomes is complex. Besides labour market gender gaps are more pronounced in developing countries, and disparity is highest in South Asian countries.

The total workforce in Kerala, according to the 2011 census is around 11,619,063 out of which 8,451,569 are males and only 3,167,494 are females. Even though there are slight variations , Palakkad municipality, Palakkad district and Kerala show similar composition of male and female workers with respect to total workers in 2011 as depicted in fig. 4.8. However female WPR of Palakkad municipality is slightly lower than that of district and state where as male WFPR is slightly higher than that of state and district. The total WPR of Palakkad municipality and state is approximately same.

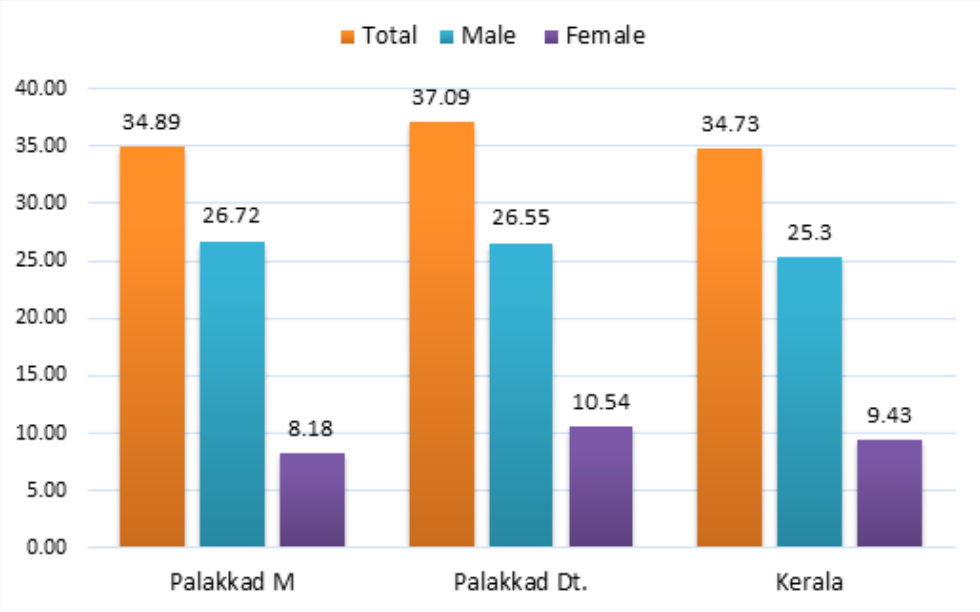


Fig. 4.8 Comparison of gender wise WFPR of Palakkad Municipality, Palakkad and Kerala (w.r.t. total population)

Source: Census 2011

Trend analysis shows that (fig.4.9), the male-female combined WPR had increased all throughout during the last three decades .During 1981-91 & 1991-2001, the male workers contribute to the increase in total WPR. i.e. in 1981-91, an increase of 1.46% is seen in male workers and a decrease of 0.19% is seen in female workers. In the succeeding decade (1991-2001), male and female workers has registered an increase by 1.73% and 0.52% respectively. But during 2001-2011, female workers became the main contributors to the increase in work force (% increase in female workers is 1.44% and male workers is 0.62%).The work participation rate by gender shows that the WPR of male population has registered an increasing trend since 1981.WPR of female population also shows an increasing trend since 1991 after a down fall between 1981 and 1991. The possible reasons may be due to the successful implementation of various women empowerment programs like 'Kudumbasree'.

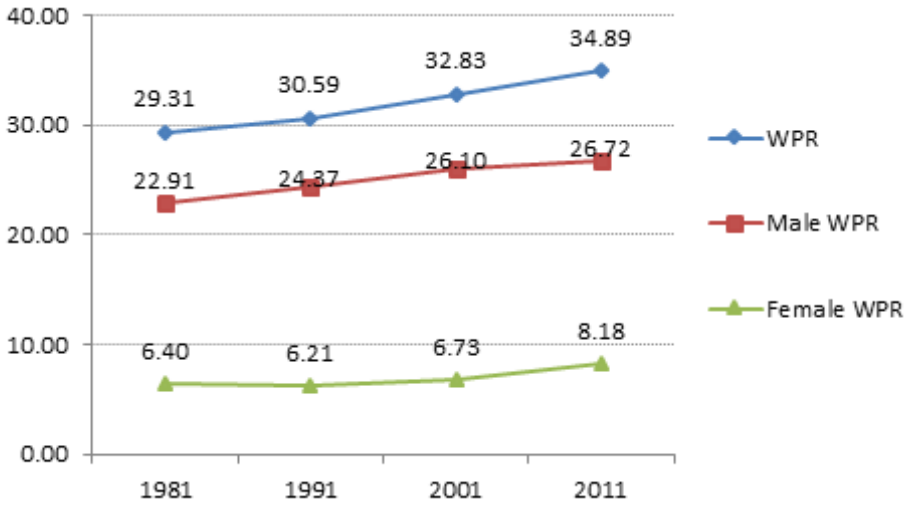


Fig. 4.9 Temporal Variation of gender wise WPR of Palakkad Municipality

Source: Census 1981, 1991, 2001, 2011

Comparison of percentage of male workers with respect to male population and female workers with respect to female population in Palakkad municipality, Palakkad district and Kerala are graphically represented in Figure 4.10. The percentage of female workers (15.95%) is less in Palakkad Municipality compared to Palakkad district (20.42%) and Kerala (18.23%). The percentage of male workers is almost same in Palakkad district and Palakkad municipality. The percentage of male workers is higher

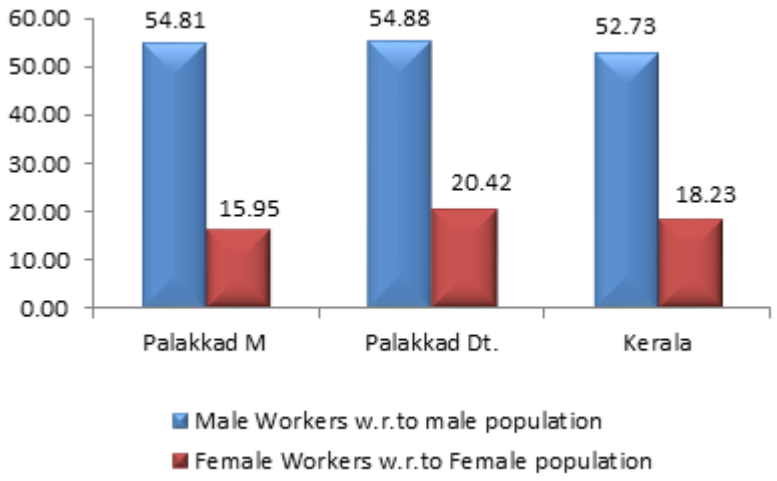


Fig. 4.10Percentage of male workers and female workers w.r.t. male and female population in Palakkad Municipality, State and District

Source: Census 2011

than that of Kerala. General trend shows that the female participation in labor force is lacking compared to male population.

When analyzing the decadal variation (fig. 4.11), the percentage of male population shows an increasing trend. i.e. percentage of male workers has increased from 46.16% to 54.81% during 1981- 2011. But the percentage of female population decreased from 12.71% to 12.31% during 1981 to 1991 and later shows an increasing trend from 1991(12.31%) to 2011(15.95%). Another

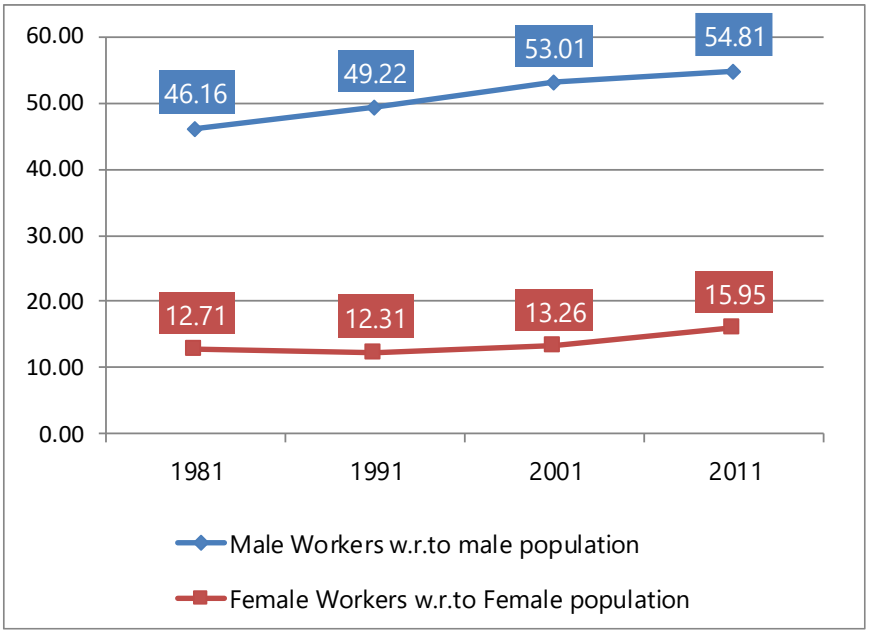


Fig. 4.11Decadal Variation of male workers and female workers w.r.t. male and female workers in Palakkad Municipality

Source: Census 1981, 1991, 2001, 2011

important thing is that 84.05% of total female population is economically dependent either fully or partially. 45.19% of total males are dependents, which is a much better condition than females.

Figure 4.12 shows the percentage of male and female workers w.r.t. total workers in the state, district and municipality. All shows a similar composition as approximately three fourth of the workers are male workers. In municipality female workers constitute 23.43% of the total workers which is less than the district (28.42%) and state (27.26%) average.

The decadal variation of percentage of male and female workers w.r.t. total

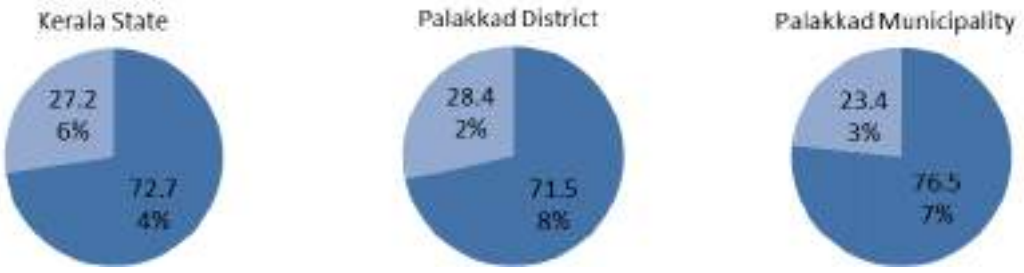


Fig. 4.12Percentage of Male and Female Workers w.r.t. Total workers.

Source: Census 2011

workers is depicted in figure 4.13.During 1981 male-female work force ratio was about 78:22 and in 2011 it became almost 77:23. Last decade reported an increase of 2.92% in female workers. Even though there exist a gender gap between male workers and female workers, the women participation in work force shows an increasing trend.

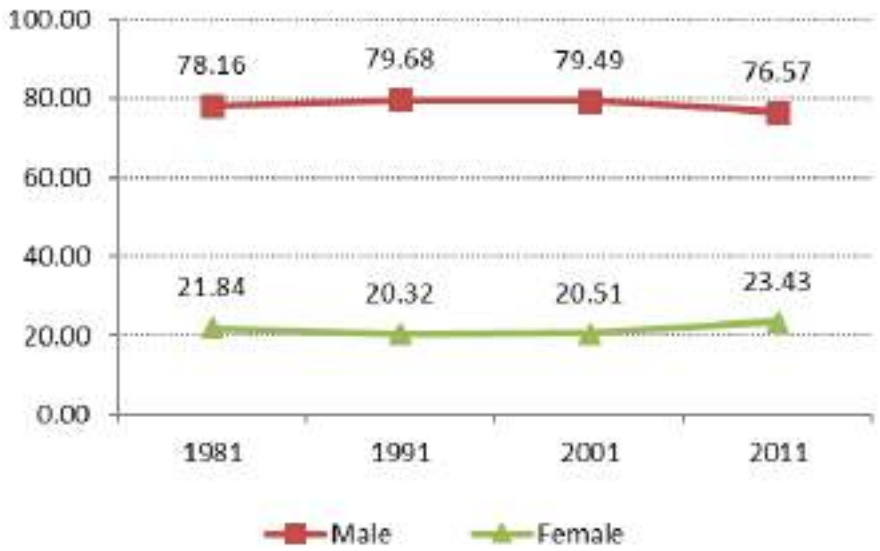


Fig.4.13. Decadal variation of % of male, female workers w.r.t total workers in Palakkad Municipality

Source: Census 1981,1991,2001,2011

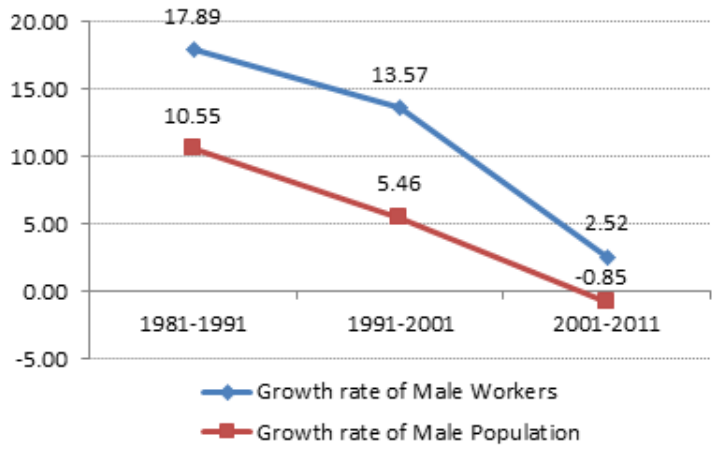


Fig. 4.14 Decadal Growth Rate of Male Workers and Male Population

Source: Census 2011

Fig. 4.14 and Fig. 4.15 depict comparison of decadal variation in gender wise population growth rate and workers growth rate. It is evident that the male population has decreased at a rate of 0.85 percent over the last decade, and the female population has grown at a rate of 1.11 percent. Male workers have grown at a rate higher than the male population growth rate during the last three decades and it shows a decreasing trend.

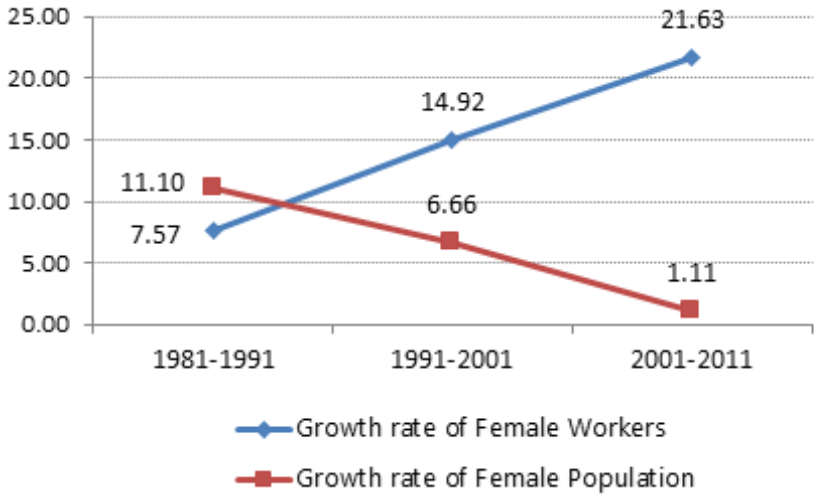


Fig 4.15 Decadal Growth Rate of Female Workers and Female Population

Source: Census 2011

The growth rate of female workers is steadily increasing while the female population growth rate is decreasing. In the decade 1981-1991, the growth rate of female workers is less than the growth rate of female population and then in the last two decades this condition just flipped .The rate of growth in female workforce during 1990's was 1.75 times higher than that of its population during 2000's, it was 20 times

greater. Such a relatively high growth of female workforce over their population was possible with increasing WPR between 1991 and 2011.

4.3 CLASSIFICATION OF WORKERS

The total workers are classified into *main workers* and *marginal workers (as per Census of India)*. A person who has worked for 6 months or more in any economically productive activity is termed as a main worker and those who have worked for less than six months in the last one year preceding to the date of enumeration is termed as marginal worker. Non- workers are those persons who have not worked at all in any economically productive activity in the year preceding the enumeration period. Persons who belong to the categories; students, household duties, dependents, retired or reenter persons, inmates of institutions, beggars, vagrants and other non- workers constitute Non-workers.

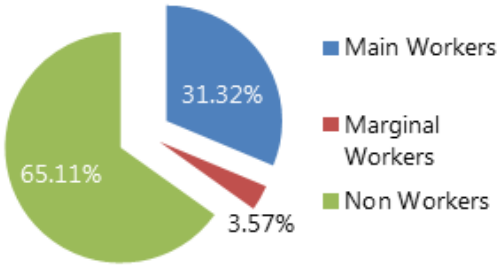


Fig. 4.16 Category of workers in Palakkad municipality

Source: Census 2011

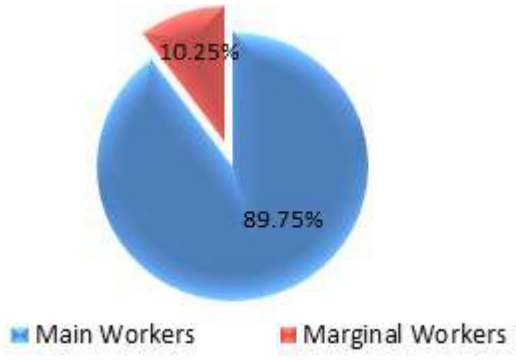


Fig. 4.17 Main and marginal workers in Palakkad municipality out of total workers

Source: Census 2011

As per 2011 Census, in Palakkad municipality 41,011 (31.32%) are main workers and 4,685 (3.57%) are marginal workers. Further more out of total workers 89.75% are main workers and 10.25% is marginal workers. Figure 4.16& 4.17shows the details of main and marginal workers in the municipality.

Table 4.2 Classification of workers, comparison with state and district

	Kerala State	% of Total population	Palakkad District	% of Total population	Palakkad Municipality	% of Total population
Main Workers	93,29,747	27.93	8,75,540	31.16	41,011	31.32
Marginal Workers	22,89,316	6.85	1,66,800	5.94	4,685	3.57
Total Workers	1,16,19,063	34.78	10,42,340	37.1	45,696	34.89
Non Workers	2,17,86,998	65.22	17,67,594	62.9	85,259	65.11

Source: Census 2011

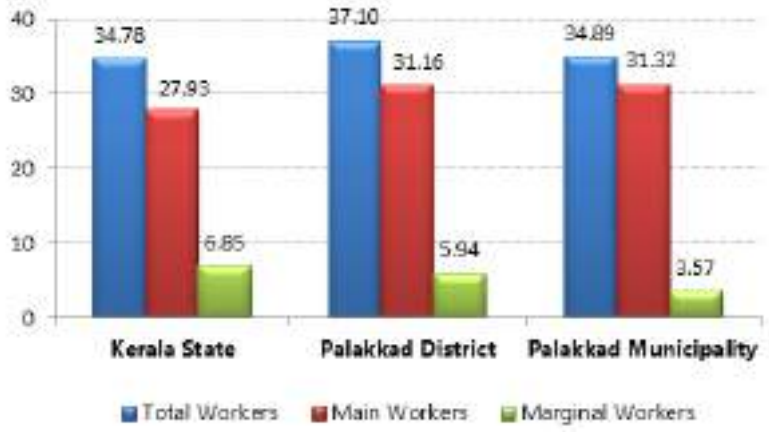


Fig. 4.18 Comparison of total workers, main workers and marginal workers with district and state

Source: Census 2011

The number of total workers and main workers in Palakkad municipality shows a steady increase during 1981 to 2011 as depicted in fig. 4.19. In the case of marginal workers from 1981 to 2011, the number almost tripled even though there was a downfall during 1981 -1991.

The rate of growth in main workers had decelerated during 1990s (7.60) when compared with previous decade 1980s (17.03), where-as among marginal workers it accelerated from -14.07% to 195.93% during the same period. However, it appears that the decreasing trend of growth in main workers is continued to 2000s. On the other hand there is a deceleration in the rate of growth in marginal workers between 2001 and 2011 from 195.93% to 26.45%, but the rate is still

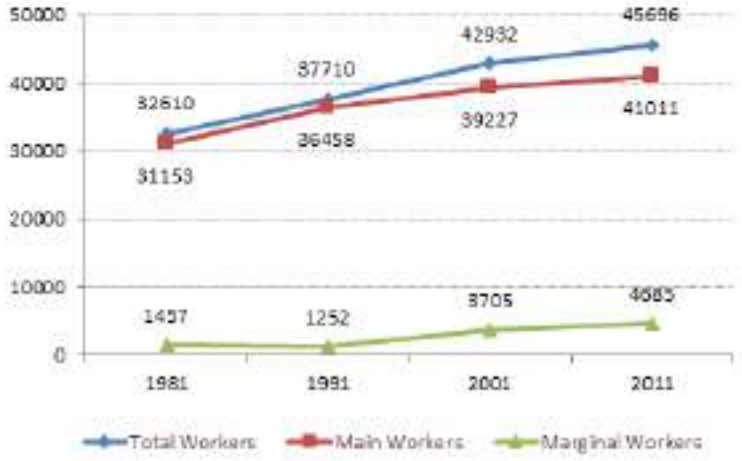
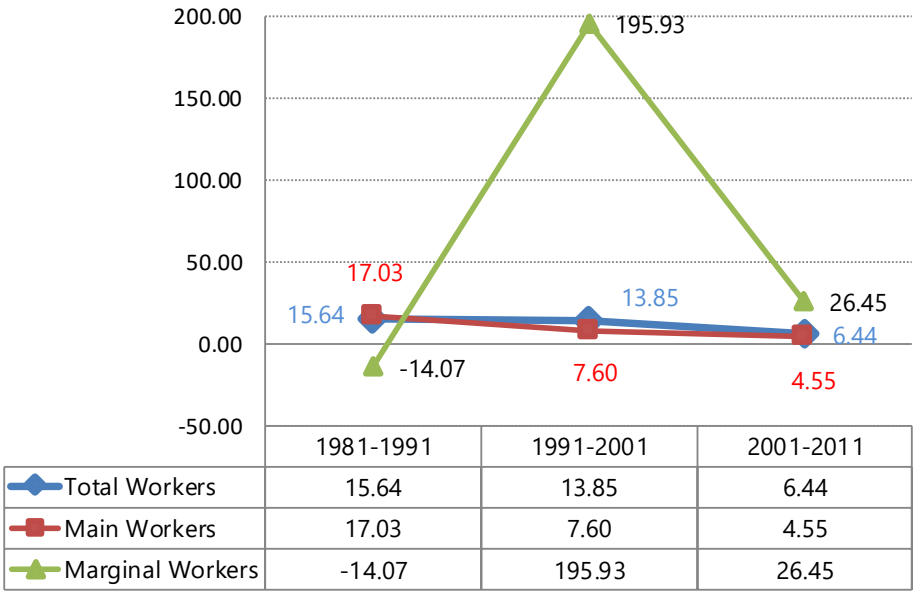


Fig. 4.19 Temporal Variation in Main workers, Marginal Workers and Total Workers in Palakkad Municipality

Source: Census 1981, 1991, 2001, 2011

higher than that of 1980s and higher than that of main workers (4.55%). The analysis shows that marginal workers growing faster than main workers. The temporal variation in growth rate of main workers, marginal workers and total workers in Palakkad municipality are shown in Fig. 4.20.



	1981-1991	1991-2001	2001-2011
Total Workers	15.64	13.85	6.44
Main Workers	17.03	7.60	4.55
Marginal Workers	-14.07	195.93	26.45

Fig. 4.20 Temporal variation in growth rate of main workers, marginal workers and total workers in Palakkad municipality

Source: Census 1981, 1991, 2001, 2011

Table 4.3 gives the decadal changes in the percentage of workers and non-workers. The percentage of total workers increased from 29.37% (1981) to 34.89% (2011). Correspondingly the percentage of non- workers decreased from 70.96% to 65.11% during the same. As per 2011 Census the percentage of marginal workers is only 3.57% compared to main workers 31.32%. i.e., 31.32% of the population is working more than 180 days and shows a positive economic growth. The decadal variation of total workers, marginal workers, main workers and non- workers are also given in Fig. 4.21.

Table 4.3 Decadal variation in percentage share of workers

Year	% Main Workers	% Marginal workers	% Total Workers	% Non-Workers
1981	28	1.31	29	70.69
1991	30	1.02	31	69.41
2001	30	2.83	33	67.17
2011	31	3.57	35	65.11

Source: Census 1981, 1991, 2001, 2011

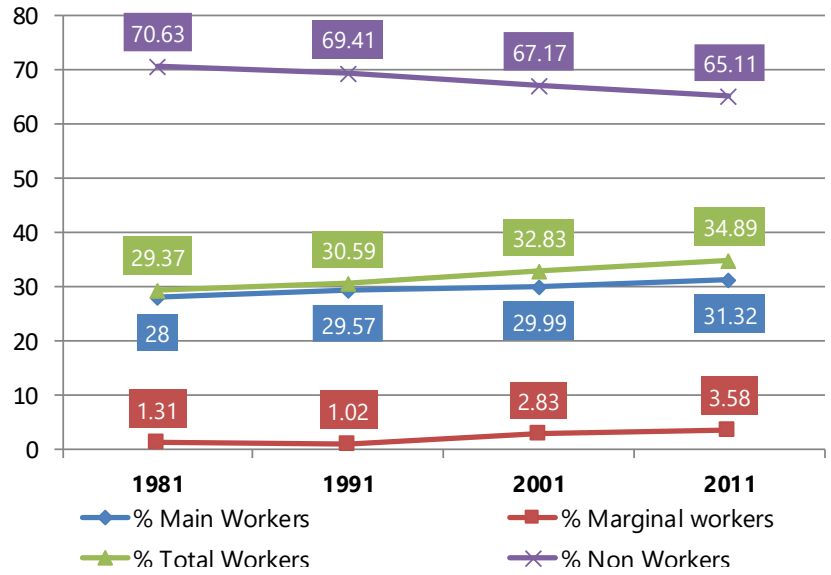


Fig. 4.21 Decadal variation of total workers, marginal workers, main workers and non-workers

Source: Census 1981, 1991, 2001, 2011

The WPR of main workers and marginal workers shows an increasing trend during 1981 - 2011. While marginal worker's WPR shows a decline during 1981-1991 and thereafter follows a steady increase .Fig. 4.22 illustrate the temporal variation in percentage share of main workers and marginal workers w.r.t total workers in the municipality. The percentage share of marginal workers is increased from 3.32%(1991) to 10.25% (2011) of workforce. The main share of total workers is main workers which indicate relatively strong economic condition. The percentage increase in marginal workers indicate that the employment opportunities has to be improved for marginal workers in the municipality. Thus, the rise in overall WPR is, due to the combined result of increase in marginal workers' WPR and main workers' WPR.

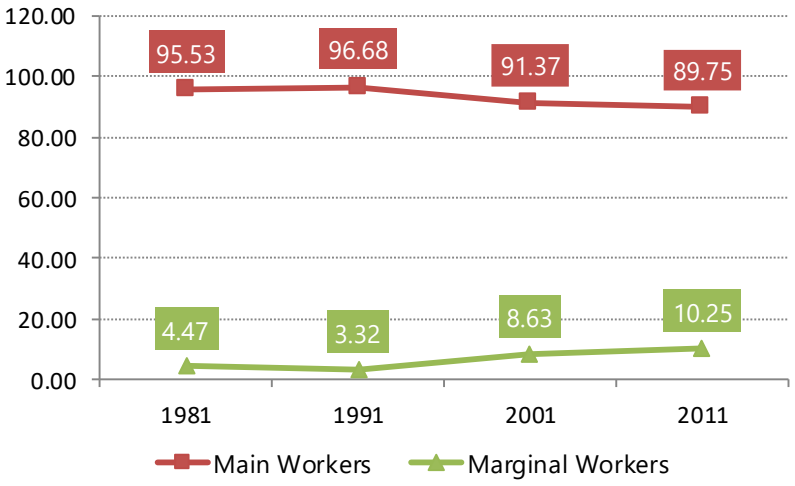


Fig. 4.22. Temporal Variation in % Share of Main Workers and Marginal Workers w.r.t. Total Workers in Palakkad Municipality

Source: Census 1981, 1991, 2001, 2011

The gender-wise analysis of main and marginal workers is shown in fig.4.23 & fig.4.24. The analysis of census data shows that, the percentage share of female workers(main & marginal) remains considerably lower than that of male workers during the last three decades (1981-2011). In the case of male-female work force ratio, main workers follows a similar pattern of the total workforce i.e. during 1981-2011 male-female work force ratio remains the same at about 79:21.

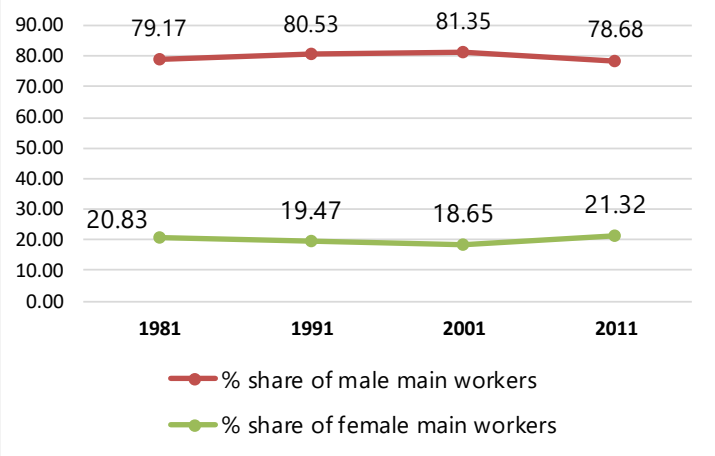


Fig.4.23. Decadal Variation in % of Male, Female Main Workers w.r.t. Total Main Workers in Palakkad Municipality

Source: Census 1981, 1991, 2001, 2011

In case of marginal workers the pattern is little different from that of total workers and main workers. The male-female participation shows a much better ratio as 58:42.Thus, a significant part of the increase in marginal workforce during the 1990s could be because of faster acceleration in the male workforce.

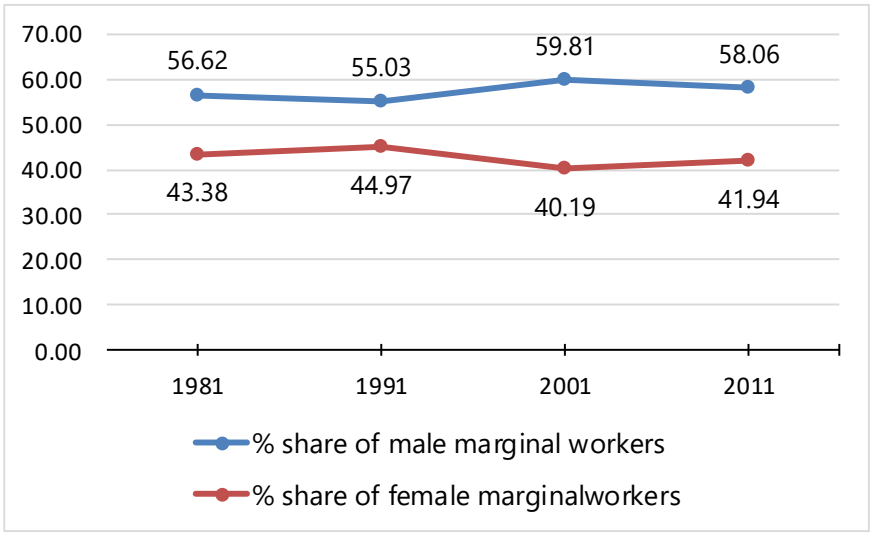


Fig.4.24. Decadal Variation in % of Male, Female Marginal Workers w.r.t. Total Marginal Workers in Palakkad Municipality

Source: Census 1981, 1991, 2001, 2011

Table 4.4 Decadal Variation in Sex Ratio in Population and Workforce

Year	Population	Total Workers	Main Workers	Marginal Workers
1981	1,015	279	263	766
1991	1,020	255	242	817
2001	1,031	258	229	672
2011	1,052	306	271	722

Source: Census 1981, 1991, 2001, 2011

Sex ratio of population and total workers is increasing since 1981. In the main workforce, the sex ratio has declined between 1981and 2001, and thereafter improved in recent decade. The sex ratio among marginal workers follows a wave pattern; it increased during 1981-1991 and thereafter it declined between 1991 and 2001. Although there is acceleration in sex ratio of marginal workers during 2001-11, the value of sex ratio is still less than that of 1980s.

Fig. 4.25 and fig. 4.26 gives gender wise analysis of main and marginal workers over the last three decades. The percentage share of marginal workers in the total workforce has increased for both males and females since 1991. In case of male workers the share of marginal workers has been lesser than that of females during the last three decades.

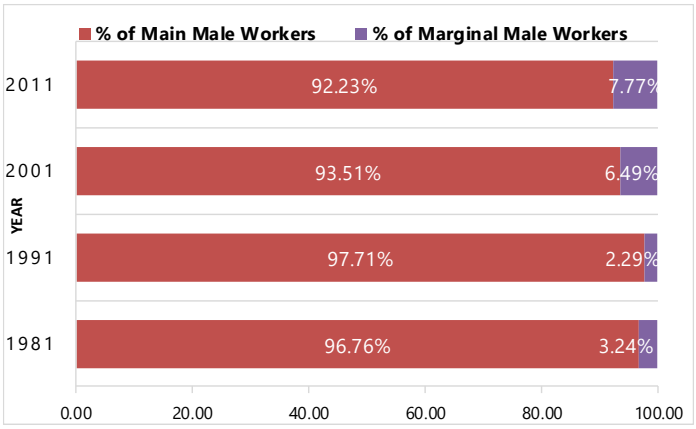


Fig.4.25 Decadal variation in % of main & marginal male workers w.r.t. total male workers in Palakkad municipality

Source: Census 1981, 1991, 2001, 2011

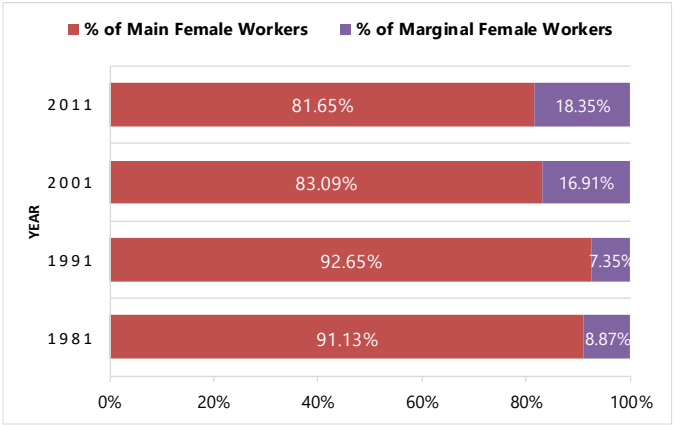
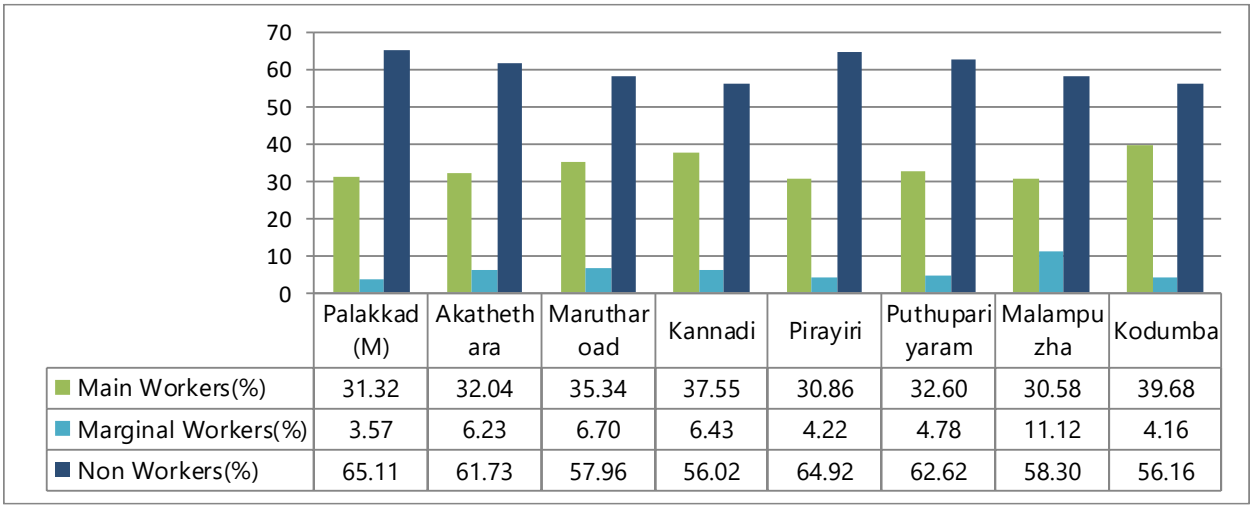


Fig.4.26 Decadal variation in % of main & marginal female workers w.r.t. total female workers in Palakkad municipality

Source: Census 1981, 1991, 2001, 2011

By comparing with other adjoining panchayats (Fig. 4.27),Kodumba grama panchayat have the highest percentage of main workers class (39.68%), marginal workers are more in Malampuzha panchayat (11.12%) and least in Palakkad municipality (3.58%). Compared to adjacent local bodies only 3.57% of population of Palakkad Municipality have to get better employment opportunities where as the highest percentage of non-workers are in Palakkad Municipality .This indicate a high value of dependency ratio and 65.11% of total population are dependent on 34.89% working population.



	Palakkad (M)	Akatheth ara	Maruthar oad	Kannadi	Pirayiri	Puthupari yaram	Malampu zha	Kodumba
Main Workers(%)	31.32	32.04	35.34	37.55	30.86	32.60	30.58	39.68
Marginal Workers(%)	3.57	6.23	6.70	6.43	4.22	4.78	11.12	4.16
Non Workers(%)	65.11	61.73	57.96	56.02	64.92	62.62	58.30	56.16

Fig. 4.27 Workers Classification - A Comparison with Adjoining Panchayaths

Source: Census 2011

All the Municipalities have almost similar proportion. The percentage of main workers in Palakkad Municipality (31.32%) is higher than that of Malappuram (22.13%) and Kasargod (28.24%). The percentage share of marginal workers is almost same (3% - 4%). Malappuram Municipality has the highest percentage of non-working population i.e. three fourth of the population belongs to dependents category as depicted in fig. 4.28.



Fig. 4.28 Workers Classification - A Comparison with Similar Municipalities

Source: Census 2011

4.4 OCCUPATIONAL STRUCTURE

Occupational structure of a society refers to the division of its work force engaged in different economic activities. It is the aggregate distribution of occupations in society, classified according to skill level, economic function, or social status. It also describes the distribution of people among those occupations, which gives some sense of which types of work predominate in a society.

The workers are again categorized into cultivators, agricultural labourers, workers in household industries and other workers. For purposes of the Census, a person is classified as cultivator if he or she is engaged in cultivation of land owned or from government or from private persons or institutions for payment in money, kind or share. Cultivation also includes effective supervision or direction in cultivation. Cultivation does not include the plantation crops like– tea, coffee, rubber, coconut and betel nuts (areca). The workers engaged in Plantation crops are recorded under 'other workers'.

A person who works on another person's land for wages in cash or kind or share is regarded as an agricultural labourer. She/he has no risk in the cultivation, but merely works on another person's land for wages. An agricultural labourer has no right of lease or contract on land on which she/he works. Household industry is defined as an industry conducted by one or more members of the household at home or within the village in rural areas and only within the precincts of the house where the household lives in urban areas. The industry should not be run on the scale of a registered factory which would qualify or has to be registered under the Indian Factories Act and should be engaged in manufacturing, processing, servicing and repairs of goods.

The type of workers that comes under 'other workers' category includes all Government servants, Municipal employees, Teachers, Factory workers, Plantation workers, those engaged in trade, commerce, business, transport, banking, mining, construction, political or social work, priests, entertainment artist etc. According to Census 2011, the occupational structure of Kerala, Palakkad Dt. and Palakkad municipality are given in figure

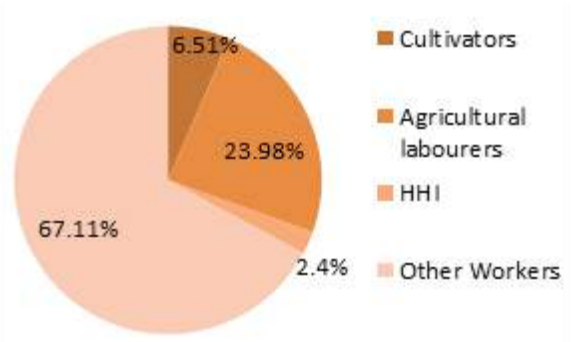


Fig 4.29 Fourfold Classification of Workers in Kerala

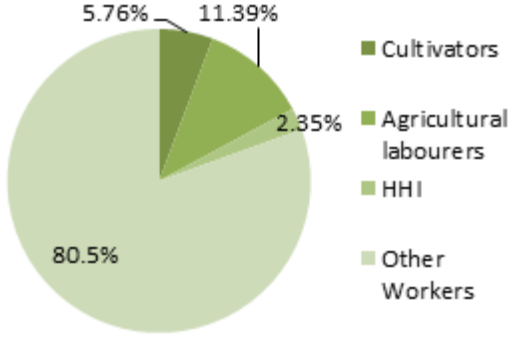


Fig 4.30 Fourfold Classification of Workers in Palakkad District

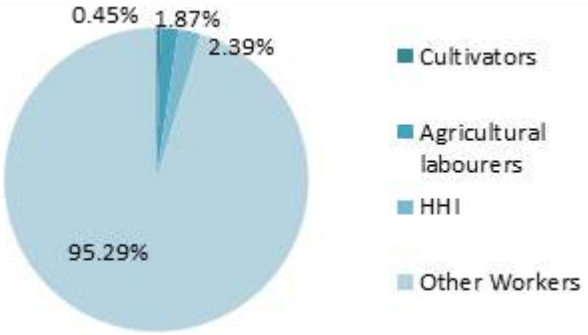


Fig 4.31 Fourfold Classification of Workers in Palakkad Municipality

Source: Census 2011

In case of Kerala, Palakkad district and Palakkad municipality the 'Other workers' category constitutes the major share of total workers i.e. 67.11%, 80.5%, 95.29% respectively. The percentage of agricultural labourers and cultivators together constitute 30.49%, 17.15% and 2.32% corresponds to state, district and Palakkad municipality.

The general trend in Kerala, Palakkad District. and Palakkad municipality is that the percentage of cultivators is decreasing .The percentage of agricultural laborers is also decreasing and this may be due to the conversion of agricultural land to other purposes. Tertiary sector workers are also increasing and there is a shift from primary and secondary sectors to tertiary sector. Figure 4.32 and figure 4.33 shows the four fold classification of main workers and marginal workers respectively.

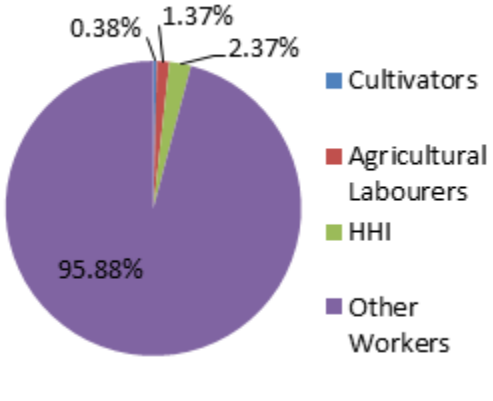


Fig. 4.32 Main Workers Split-up

Source: Census 2011

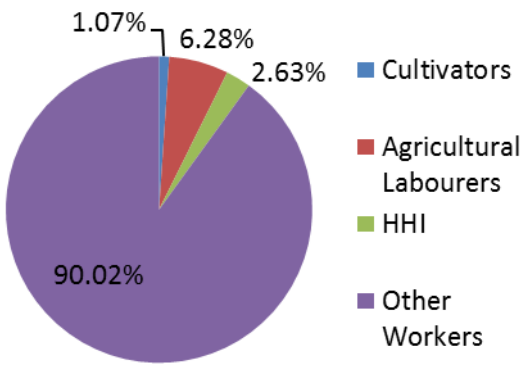


Fig 4.33 Marginal Workers Split-up

Source: Census 2011

In Palakkad municipality only 34.89% of the population constitutes total workers. Out of that only 10.25% is marginal workers and this means 89.75% of the workers have better jobs and that helps to a better economic growth. Out of total workers only 2.32% of primary workers and 2.39% of secondary workers are there. Majority of workers are in tertiary sector i.e., 95.29% (Fig.4.31).

Out of main workers, 95.88% of workers are under other workers category or in tertiary sector. The percentage of cultivators (0.38%) and agricultural labourers (1.37%) is very meagre, which means agriculture activities are very much limited in municipality and it shows the urban nature of the municipality. Household industrial workers are 2.37% of main workers and which means more attention should be given to household industries.

The percentage of cultivators (1.07%) and agricultural labourers (6.28%) is negligible, which shows urban character of the municipality. Even though the percentage share of marginal workers is negligible, the primary workers in marginal workers category (7.35%) are greater than main workers in primary sector (1.75%). This means in primary sector the main share workers are from marginal workers. Out of marginal workers 90.02% of workers are under other workers category. Household industrial workers 2.63% of marginal workers is almost same as that of main workers (2.37%), and the household industrial sector have to improve.

The study reveals that the major share of agricultural labours and cultivators are from marginal workers. The major share of other workers is from main workers. The major workers related to agricultural activity i.e. agricultural labours and cultivators are belonging to marginal workers which comes only 10.25% of the total workers. It indicates that the agricultural sector in the municipality has limited role in the economic growth of the municipality and this may be due to the urbanization.

4.4.1 Decadal Variations in Main Workers

The marginal workers are only 10.25% of the total workers in Palakkad municipality and the data available for decadal analysis is limited. So the four fold classification of the main workers is used for study to analyze the decadal variation of major class of workers instead of taking fourfold classification of total workers as given in the following fig.4.34.

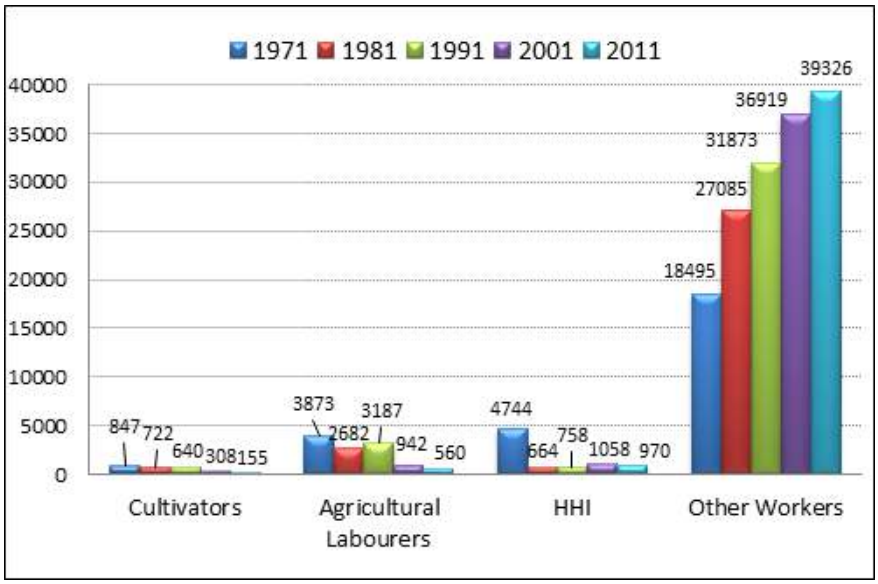


Fig 4.34 Fourfold Classification of Main Workers of Palakkad Municipality - Decadal Variation

Source: Census 1971, 1981, 1991, 2001, 2011

The study shows there is a continuous decrease in the number of cultivators from 1971 to 2011. The total cultivators were 847 in 1971, which was reduced to 155 in 2011; the number reduced to one fifth. But "other workers "registered a continuous increase from 18,495 to 39,326; i.e. the number almost doubled during the same period. Agricultural labourers and HHI workers shows an overall decreasing trend during 1971-2011.

Figure 4.35 remarks how the growth rate in various decades changes. The cultivators in Palakkad municipality shows negative growth rate and it attains 50% decrease in the last decade. Growth rate of cultivators and agricultural labourers (negative growth rate of workers) shows decreasing agricultural activities within the municipal area.

From 1971-81(-86%) household industrial workers shows an increasing growth rate to 1981-91 (14%). In 1991-2001 the growth rate is again increased to 40% and suddenly falls to a negative growth rate in 2001-11(-8%).This indicate household industrial workers in the municipality have to be improved.

In the case of "other workers" category, the growth rate is positive but the growth value is decreased from 46% (1971-1981 decade) to 7% (2001-2011 decade).i.e., 84.8% decrease in growth rate during 4 decades. So the service sector or tertiary sector in Palakkad municipality should be improved for better economic growth. Figure 4.28 shows the growth rate of fourfold classification of main workers of Palakkad municipality.

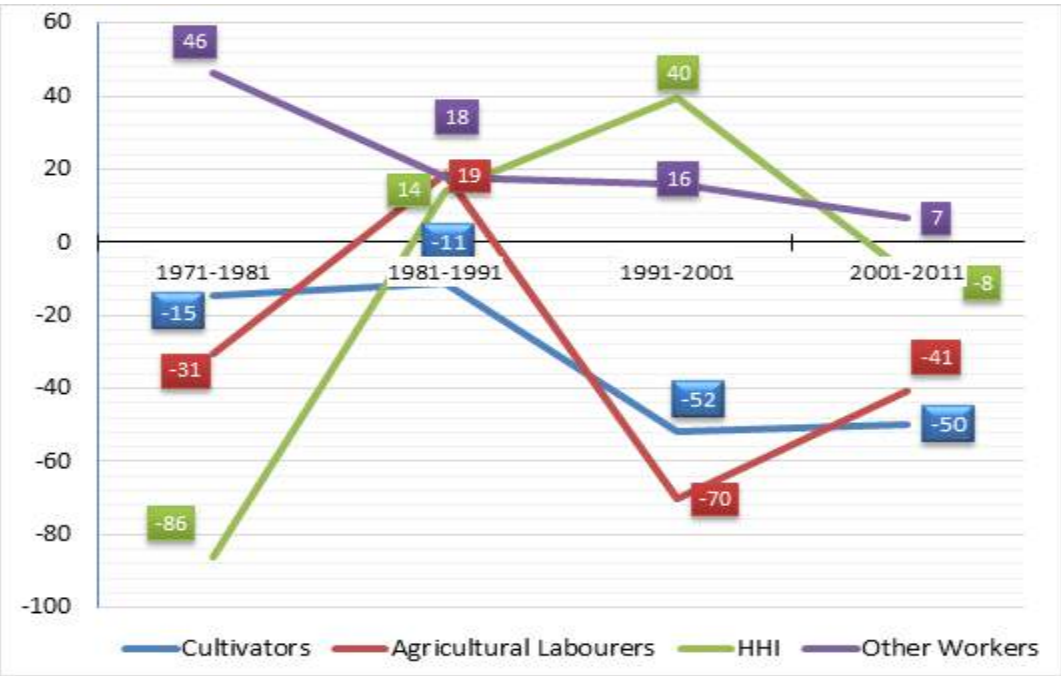


Fig 4.35 Growth rate of Fourfold Classification of Main Workers of Palakkad Municipality

Source: Census 1971, 1981, 1991, 2001, 2011

The decadal variation of fourfold classification of workers in Palakkad municipality is shown in Fig. 4.36. It is very clear that the tertiary sector has been the leading sector of growth in the Municipality in recent decades. The cultivators, agricultural labourers and house hold industrial workers altogether constitute 13.06% of the main work force during 1981. As the decades passed, it further decreased to 4.12% in 2011.This is mainly due to the decreasing rate of absorption of labour force in cultivation and agricultural labourers. Even though there are slight decadal variations, the percentage share of HHI remains almost same as 2%.

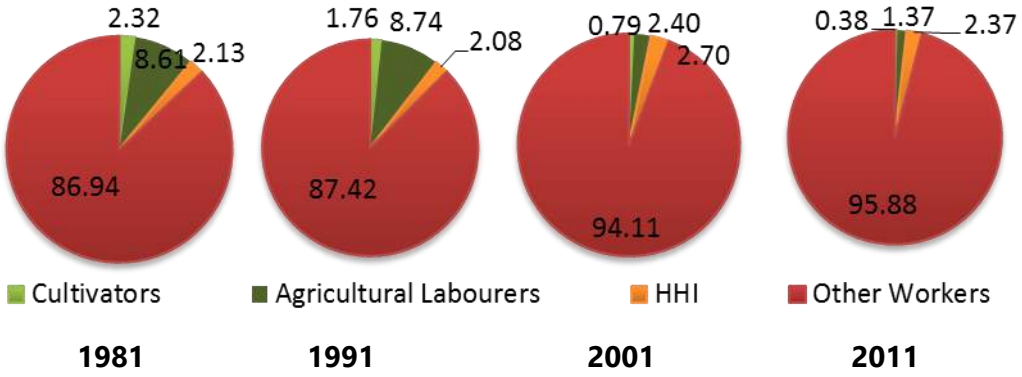


Fig 4.36 Decadal Variation of Fourfold Classification of Main Workers in Palakkad Municipality

Source: Census 1971, 1981, 1991, 2001, 2011

Fig. 4.37 gives the employment status of adult population (age>18), obtained from the socio-economic survey analysis of the town. It shows that, home makers constitutes 28.63%. Participation of women in economic activities in formal sectors of industries, services and agricultural sector is measurable, but aforesaid are still not measurable. Also 23.3% adult population postpone their entry into labour force in order to attend educational institution and pursue higher studies, this might be due to the increasing demand for better job opportunities. Such an increase in demand for education increases the human capital base of the region and hence it is considered as a welcome feature. 3.56% of the adult are trying for jobs .It is those people in the workforce or pool of people who are available for work that does not have an appropriate job.7.75%belongs to retired hands who withdrew from their position or occupation or from one's active working life.

When we analyse the employment pattern (excluding home makers, students, unemployed and pensioners from the above) major provider of employment is private sector followed by public sector.

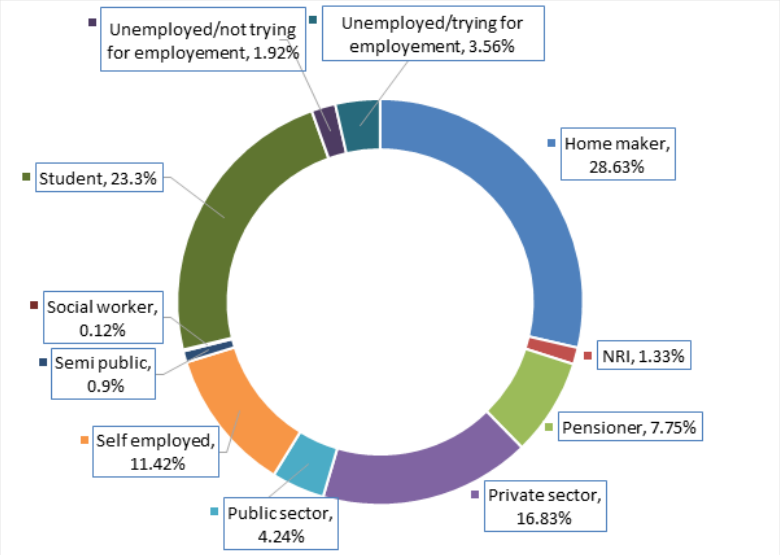


Fig 4.37 Employment status of adult population in Palakkad municipality

Source: Socio-economic Survey 2019

4.5 SPATIAL DISTRIBUTION OF MAJOR CLASS OF WORKERS

The ward wise concentration map of cultivators is given in fig.4.38. The concentration index value of cultivators ranges from 0 to 3.4 and the highest

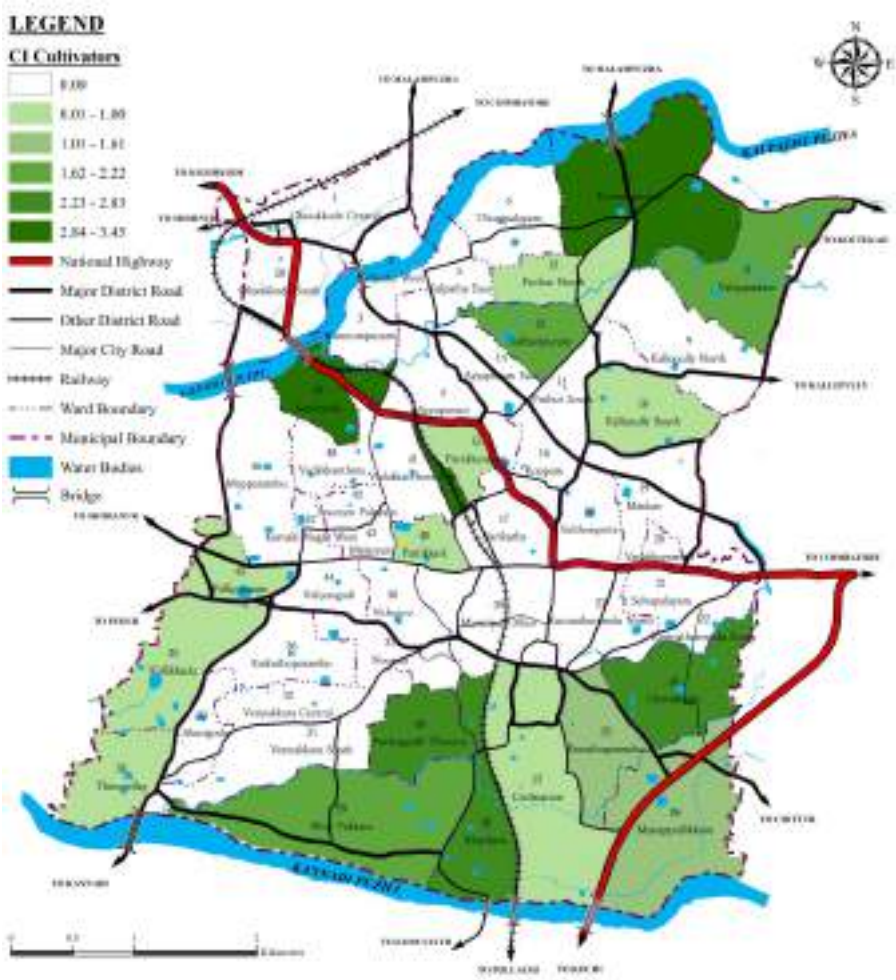


Fig. 4.38. Ward wise Concentration of Cultivators in Palakkad Municipality

concentration is observed in ward Jainmedu(3.45) followed by Kumarapuram(3.18) and Murikavu (2.63). 32 wards have CI value zero which are located in the core area of the Municipality.

The concentration index value for agricultural labourers ranges from 0 to 4.95 as shown in fig.4.39. Agricultural labourers concentration is relatively high in two wards namely Kallepully North (4.95) and Civil Station (4.75). Out of 50 wards,26 wards have zero CI value.

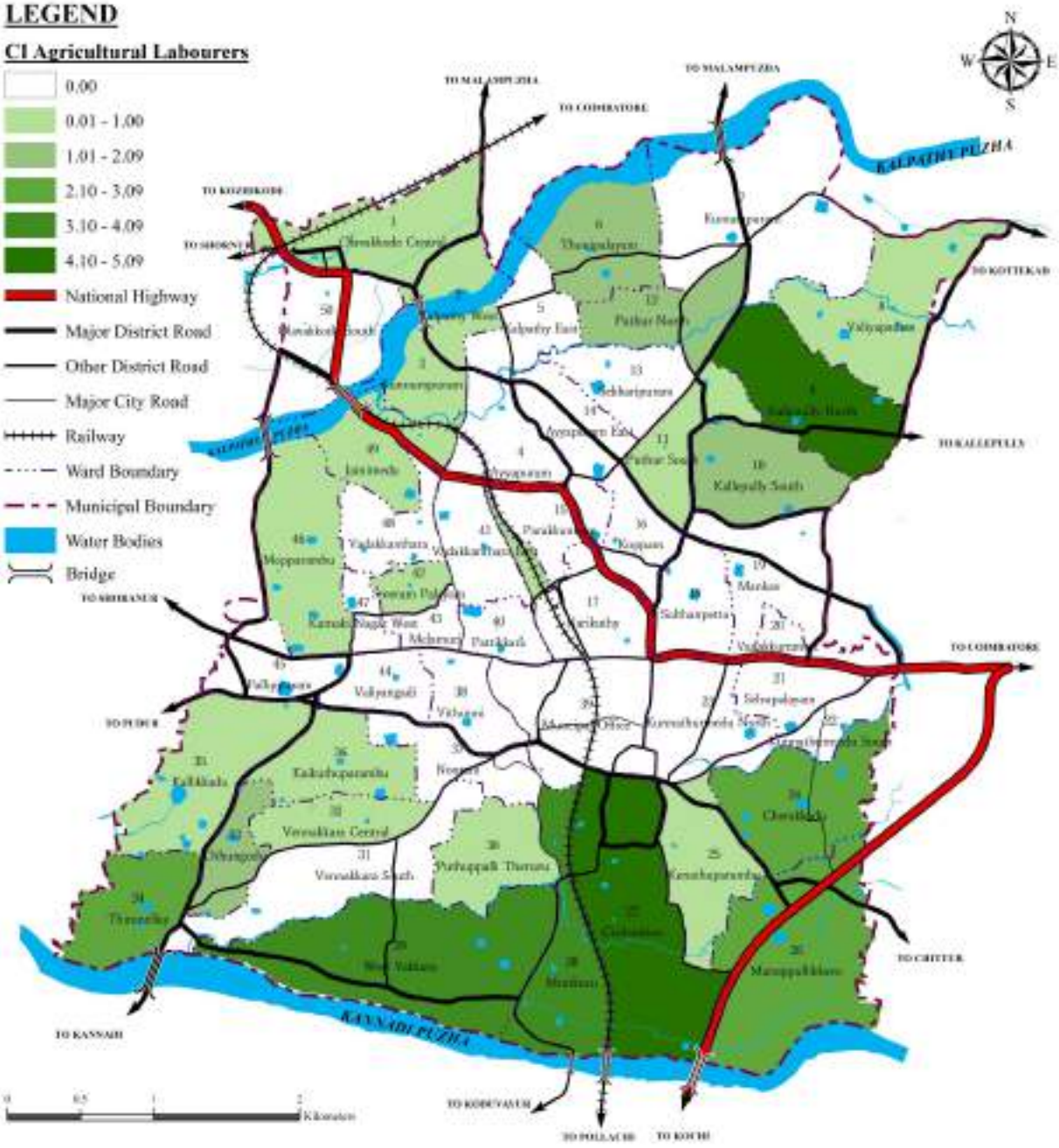


Fig. 4.39. Wardwise concentration of agricultural labourers in Palakkad municipality

Figure 4.40 shows that the concentration index of house hold industrial workers which ranges from 0 to 4.39. Concentration is relatively high in ward namely Kunnathurmedu North (4.17). 17 wards have zero concentration index value.

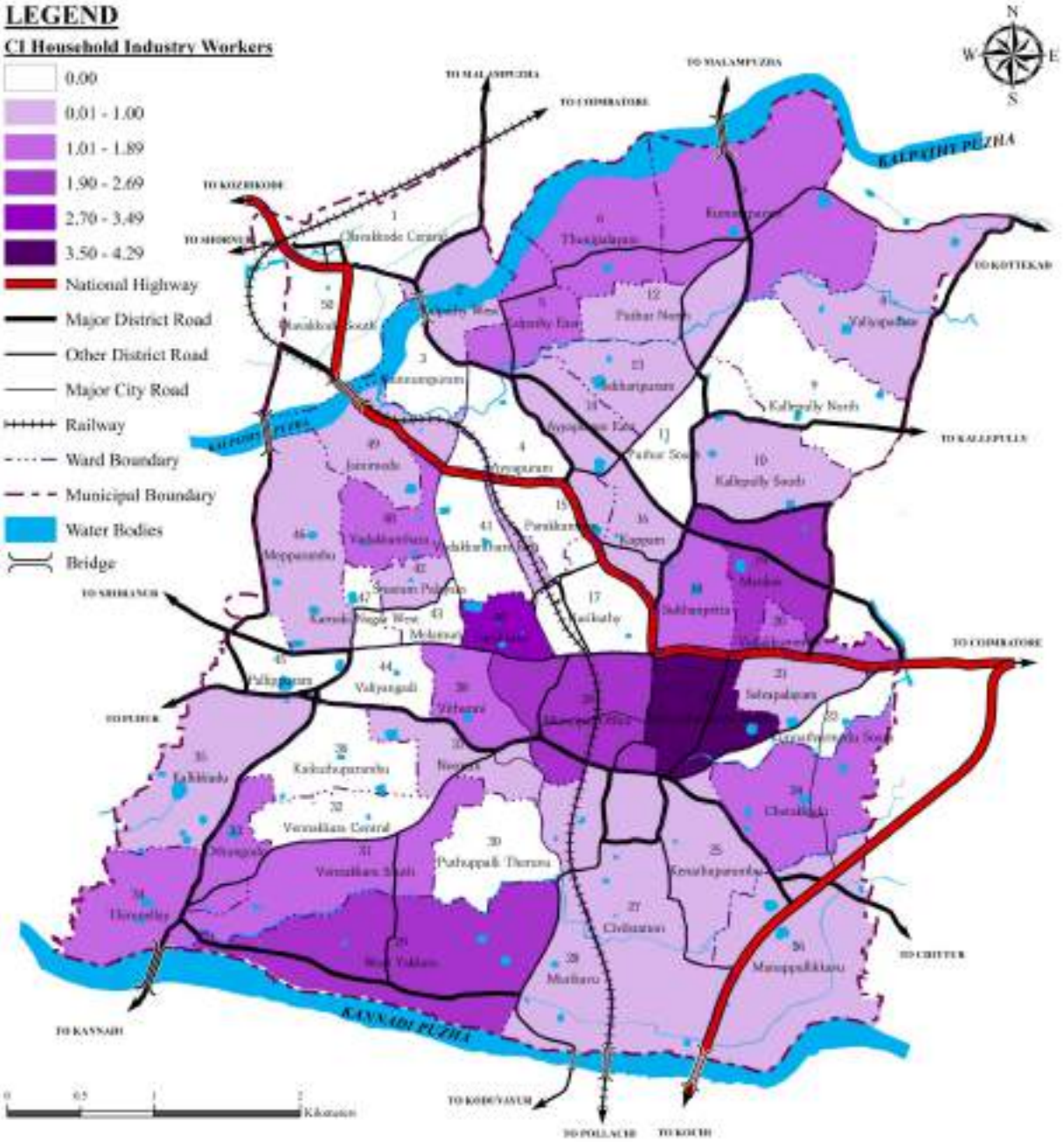


Fig. 4.40. Ward wise Concentration of House Hold Industrial Workers in Palakkad Municipality

The other workers concentration index value ranges from 0.91 to 1.05. Unlike from the aforesaid categories extent of variation in CI values is only 0.14 points. Figure 4.41 shows ward wise distribution of concentration of other workers in the municipality.

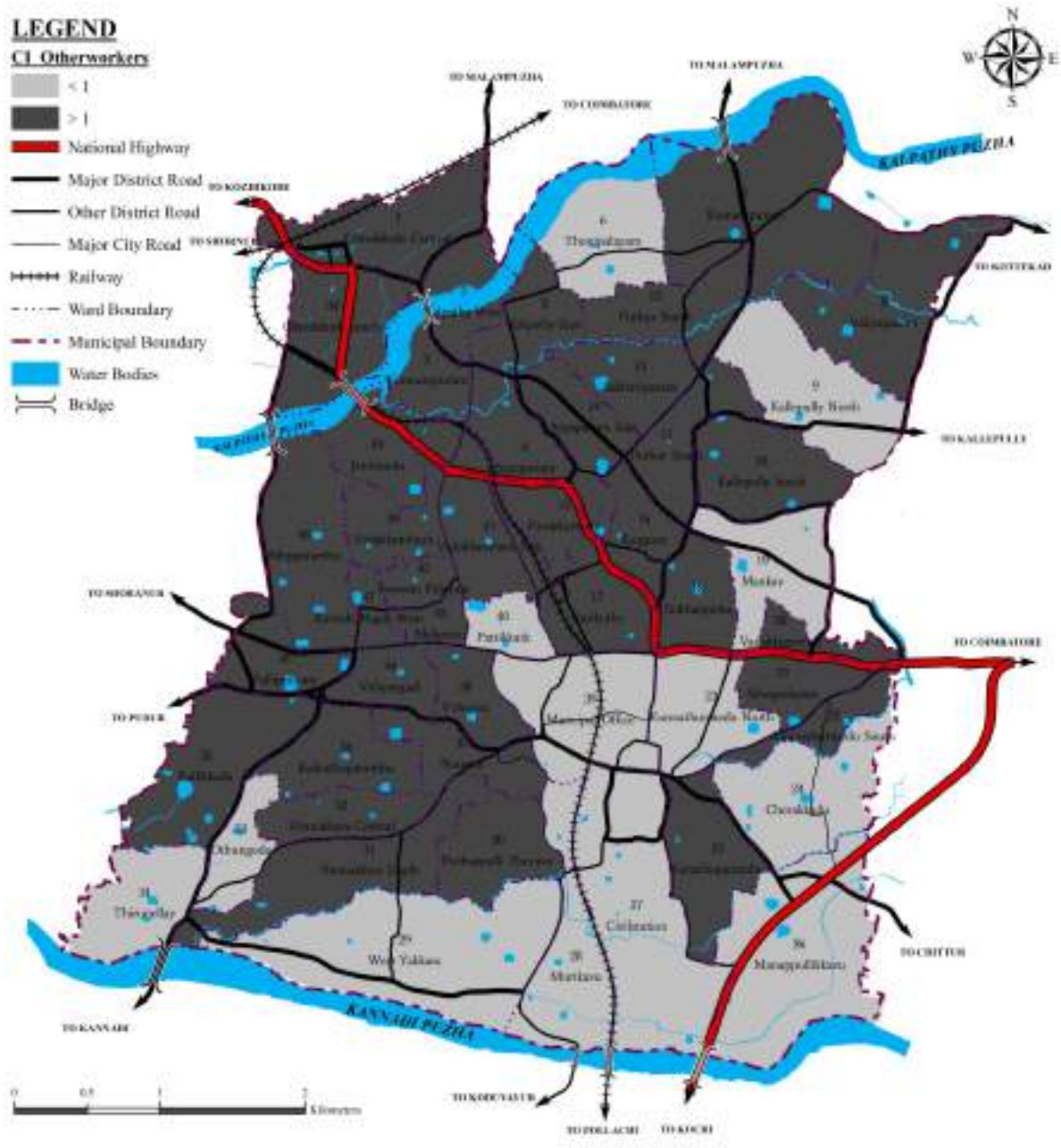


Fig. 4.41. Ward wise Concentration of Other Workers in Palakkad Municipality

4.6. DEPENDENCY RATIO

Dependency ratio is the ratio of the non-workers to the workers in an area. A high ratio means, the working people and the overall economy face a great burden in supporting non-working population. The dependency ratio of Kerala (1.88) and Palakkad municipality (1.87) is almost same as per Census 2011. But dependency ratio for Palakkad district is 1.69 and is slightly less than that of the average values of Palakkad municipality and state. Figure 4.42 shows the comparison of decadal variation in dependency ratio of state and district with Palakkad municipality. Temporal analysis shows that the dependency ratio is decreasing continuously. Which indicate, the burden of non-workers to workers is getting decreased.

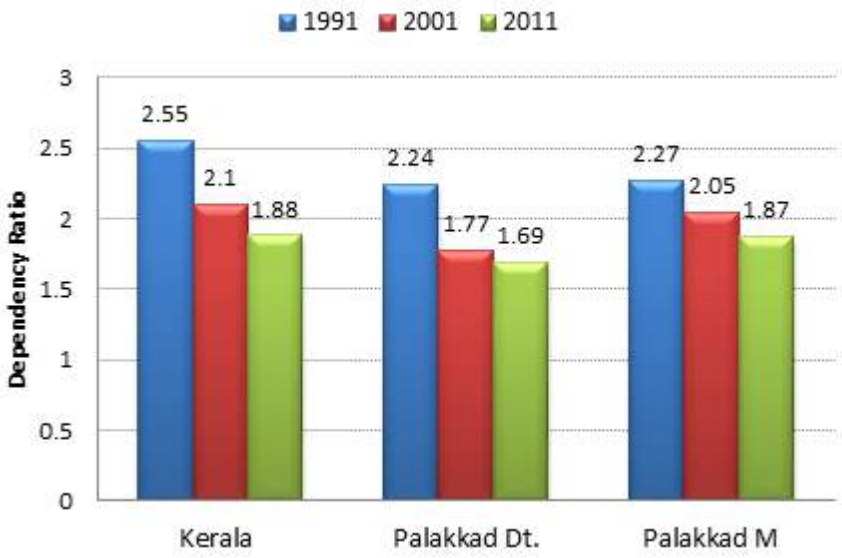
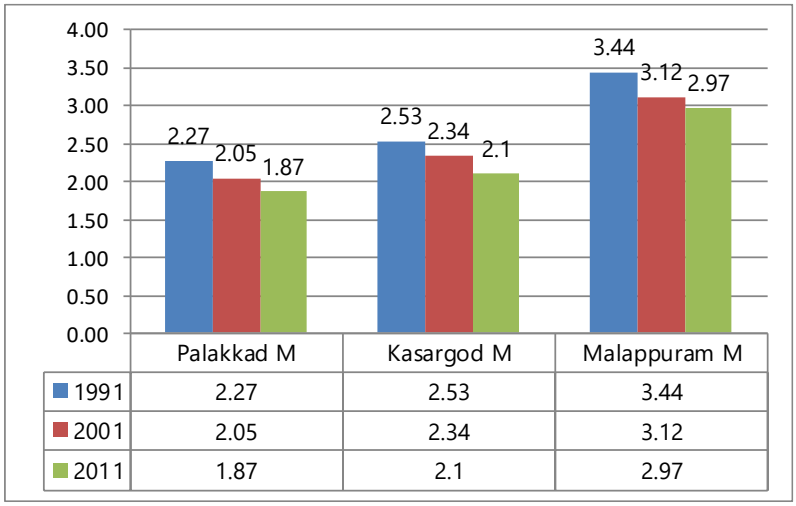


Fig.4.42 Dependency ratio – Comparison with State and District

Source: Census 1991, 2001, 2011

Compared to similar municipalities the dependency ratio of Palakkad municipality (1.87) is lesser than that of Kasaragod municipality (2.1) and Malappuram municipality (2.97) shown in figure 4.43.



	Palakkad M	Kasargod M	Malappuram M
1991	2.27	2.53	3.44
2001	2.05	2.34	3.12
2011	1.87	2.1	2.97

Fig.4.43 Dependency ratio – Comparison with similar municipalities

Source: Census 1991, 2001, 2011

Compared to adjacent local bodies the dependency ratio of Palakkad municipality is higher followed by Pirayiri panchayath (1.85). Akathethara, Pirayiri and Puthupariyaram panchayaths shows dependency ratio higher than 1.5 in 2011 (fig. 4.44). From the decadal variation of dependency ratio the dependency ratio of Palakkad municipality and surrounding local bodies shows decreasing trend from 1981 to 2011. Palakkad municipality has the highest dependency ratio which indicates the dependent persons is high in Palakkad municipality. This indicates more services have to be provided for these dependent persons.

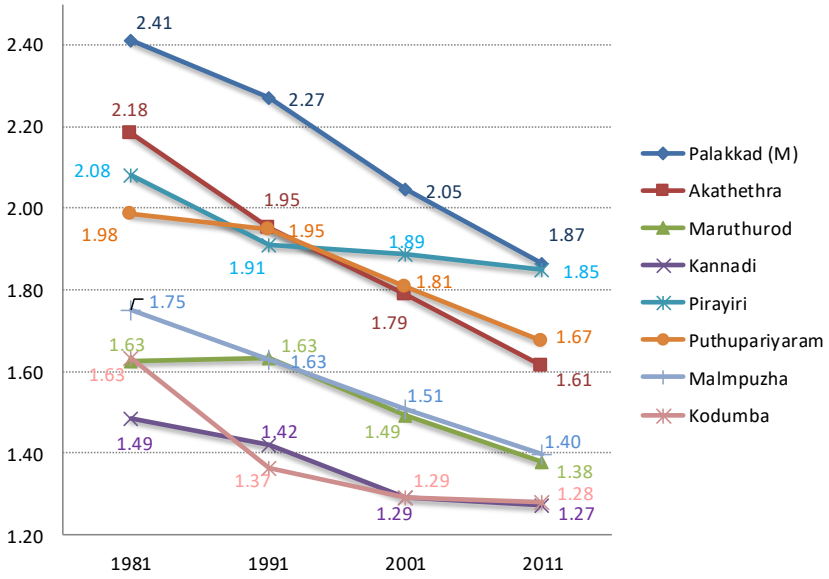


Fig. 4.44. Decadal Variation of Dependency ratio- Comparison with adjacent local bodies

Source: Census 1981, 1991, 2001, 2011

4.7. INFERENCE

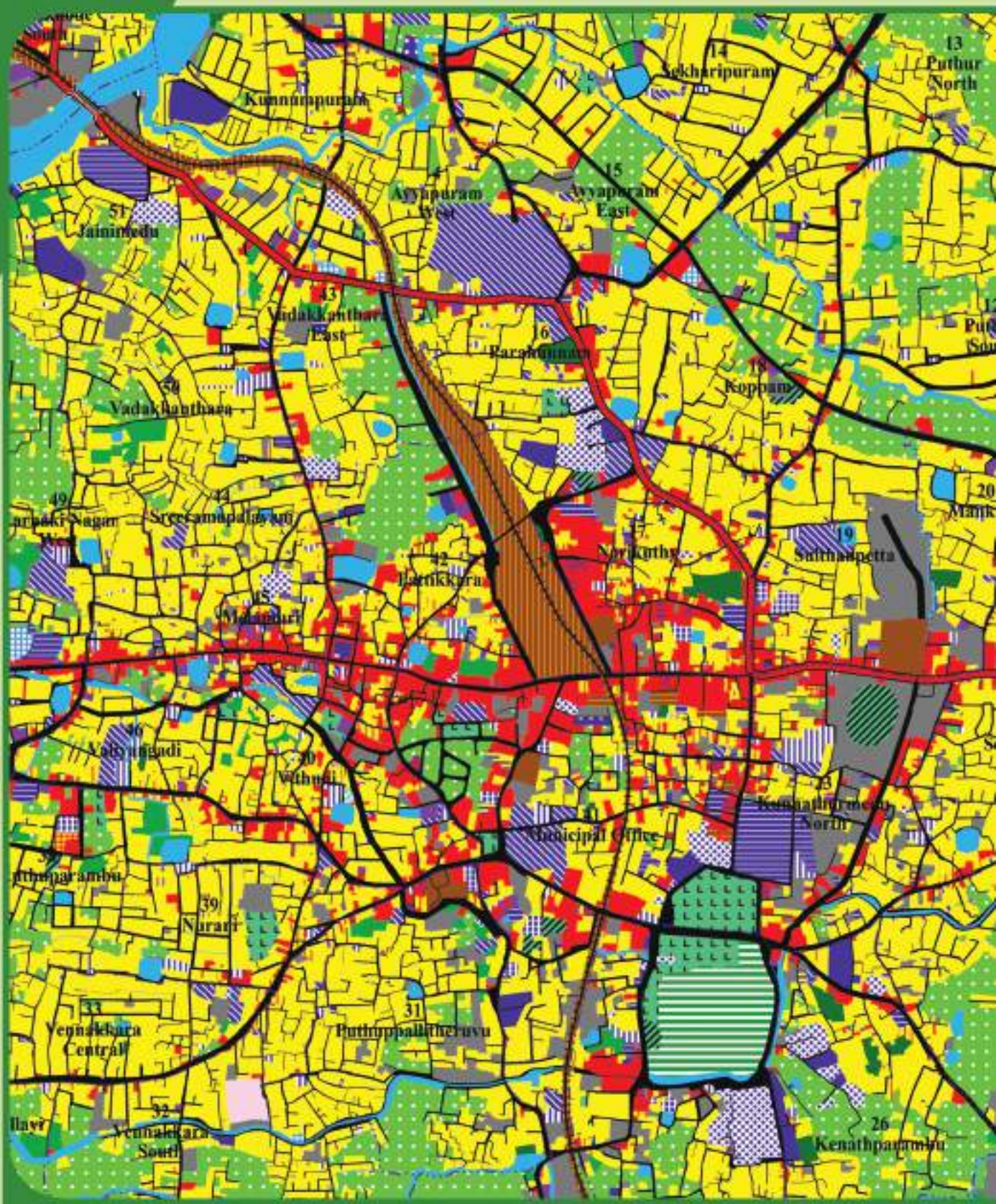
The work participation rate of Palakkad municipality is 34.89% which is lower than the district average and approximately equal to state average. Municipality occupies the bottom position in WPR when comparing with other urban local bodies in the district. However, the last four decades gives a trend of improvement. Dependency ratio in the municipality shows continuous decrease from 2.41 (in 1981) to 1.87 (in 2011) which is due to the cumulative effect of increased work participation and also reduction in household size.

Economic growth is associated with a relative shift in the structure of the work-force away from agriculture, towards industry and services. It is evident from the recent trend that the tertiary sector has been the leading sector of growth in the municipality and is improving over time. The primary and secondary sectors have a limited contribution to the work force (only 4.12%).The structure of the workforce did not change much between 1981 and 2011.

To sum up, the rate of growth in total work force is decreasing during the last decade when compared with previous two decades. Among male and female workers, the fast reduction is observed among the male workers. On the other hand the rate of growth in female workers increased during 1990s. It could not compensate the reduction in male workers during the same period and hence there is reduction in growth rate of total workforce. Between main and marginal workers, the

rate of growth is high in the case of marginal than the main workers during the last two decades. The analysis also bring out the increasing share of female marginal workers in the total workforce engaged in non-agriculture, appears to be a welcome feature.

Even though Palakkad municipality is the headquarter of Palakkad district, it can be seen that the city has not absorbed the job creations.



CHAPTER 5- LAND USE

5. LAND USE

Land is one of the most essential natural resources for the survival and prosperity of humankind, and it is the platform on which human activities take place. Land is a limited resource with increasing substantial demands placed on it. As a result of increasing heavy pressure on land resources, agricultural production declines, the quantity and quality of land deteriorates, resulting increased competition for access to land.

One of the prime pre-requisites for better use of land is information on existing land use patterns and changes in land use through time. Knowledge of the present distribution and area of such agricultural, recreational, and urban lands, as well as information on their changing proportions, is needed by legislators, planners, and state and local governmental officials to determine better land use policy, to project transportation and utility demand, to identify future development pressure points and areas, and to implement effective plans for regional development. This chapter deals with the study of the micro level survey on existing land use & its categorization, spatial distribution, spatial concentration pattern, comparison with planning standards etc.

5.1 EXISTING LAND USE OF THE TOWN

The geographical area of the town is 26.60 sq.km and land use break-up of the area is given in table 5.1. This existing land use map has been developed from National Remote Censing (NRC) imageries compiled by ground survey. In developing the classification system, every effort has been made to provide as much compatibility as possible with 'AMRUT– land use classification systems' currently being used by various federal agencies involved in land use inventory and mapping. Existing land use map of the town is given in fig 5.1.

5.2 SPATIAL DISTRIBUTION AND CONCENTRATION OF VARIOUS LAND USES

The spatial distribution and ward wise concentration of various land use types in the planning area is analyzed separately. The concentration pattern of a land use gives an idea about where that particular land use is concentrated within the municipality. The concentration pattern of a land use can be ascertained by the concentration index of the land use which is calculated as follows.

Concentration index (C.I) of a particular land use in the municipality = {[(Area of that land use in a ward) / (Total area of the ward)]/[(Area of that land use of the municipality) / (Total area of the municipality)]}

Table 5.1. Land use break-up of the town

Sl. No	Area Name	Area	Percentage Share
1	Residential	1040.404	39.112
2	Commercial	107.287	4.033
3	Industrial	19.269	0.724
4	Public & Semipublic	17.625	0.663
5	Public Utilities	3.350	0.126
6	Central Govt. Property	3.254	0.122
7	State Govt. Property	22.124	0.832
8	Educational Institutions	49.603	1.865
9	Health Services	49.341	1.855
10	Communication	0.655	0.025
11	Religious	28.913	1.087
12	Mixed Commercial & Educational	1.288	0.048
13	Mixed commercial & Health services	1.384	0.052
14	Mixed Commercial & Industrial	0.240	0.009
15	Mixed Residential & Commercial	17.268	0.649
16	Mixed Residential, Commercial & Health Services	0.122	0.005
17	Mixed Residential, Commercial & Institutional	0.675	0.025
18	Mixed Residential & Educational	0.534	0.020
19	Mixed Residential & Health Services	1.215	0.045
20	Mixed Residential & Household Industries	0.316	0.012
21	Heritage Precinct	5.690	0.214
22	Heritage Structure	4.834	0.182
23	Recreational built-up	5.919	0.223
24	Recreational Open Space	13.055	0.491
25	Paddy	154.998	5.827
26	Paddy Non-Active	421.751	15.855
27	Forest	0.313	0.012
28	Dry Agriculture	49.884	1.875
29	Road	291.746	10.968
30	Railway	51.975	1.954
31	Transportation	4.716	0.177
32	Traffic related	1.389	0.052
33	Solid waste management	0.084	0.003
34	Slaughter House	1.564	0.059
35	Sacred Groves	0.216	0.008
36	Water body	139.449	5.242
37	Vacant Land	147.55	5.547
Total		2660.000	100.000

Source: Land use survey, 2020

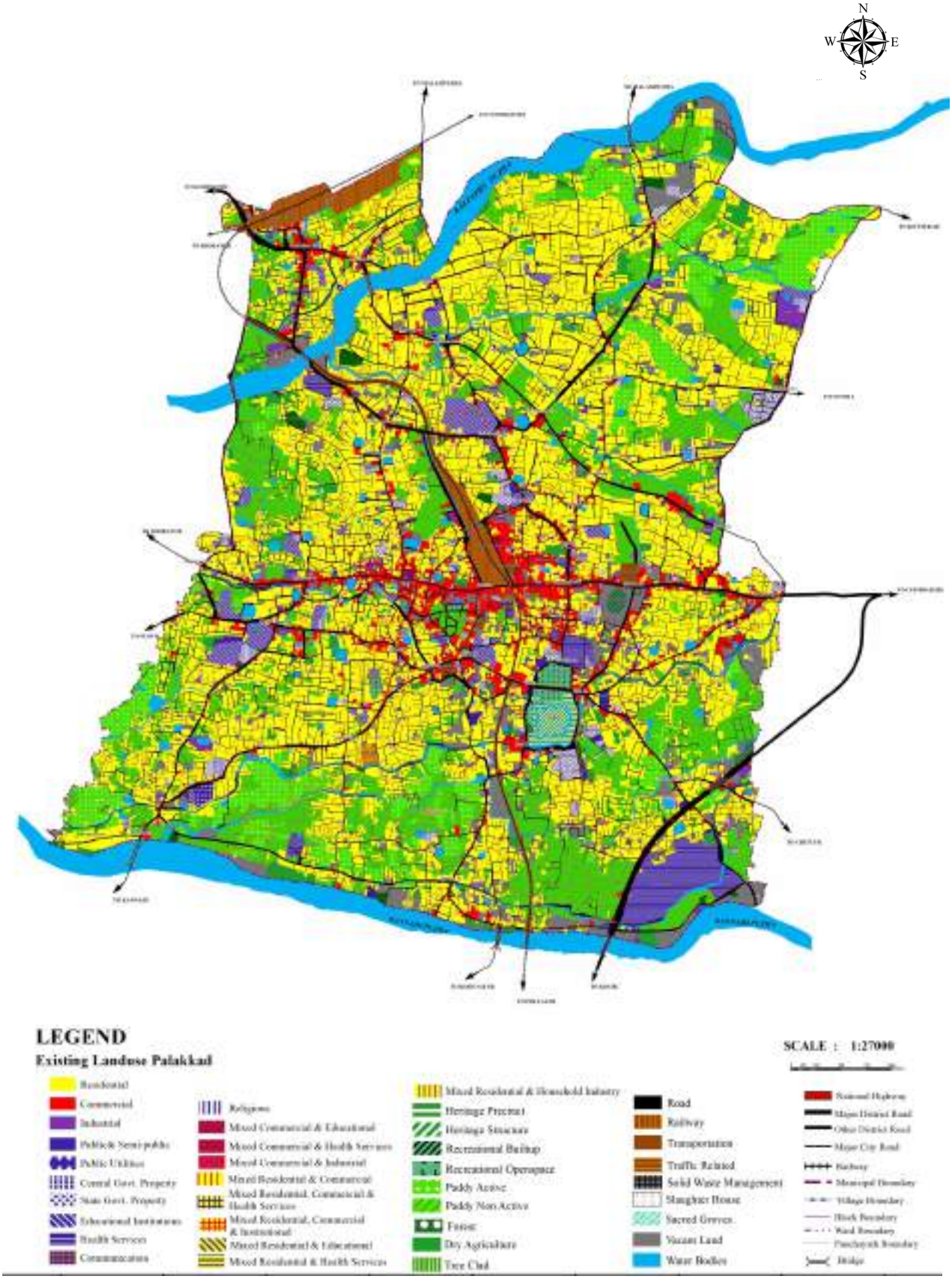


Fig. 5.1 Existing land use of the town, 2020

The Concentration Index may be greater than one, equal to one or less than one. Wards with any particular land use concentration index greater than one indicates that the land use under consideration is highly concentrated in that area.

5.2.1 Residential Land Use

Residential land use contributes the major share of land. The area under residential use constitutes 1040.404 ha i.e. 39.112% of the total area of the municipality. The residential developments are in the form of residential colonies and individual houses. Recently many apartments have emerged in Palakkad municipality. The peculiar feature that distinguishes Palakkad town from other towns is its pattern of human habitation, which is mostly in closed and compact row settlements or gramams.

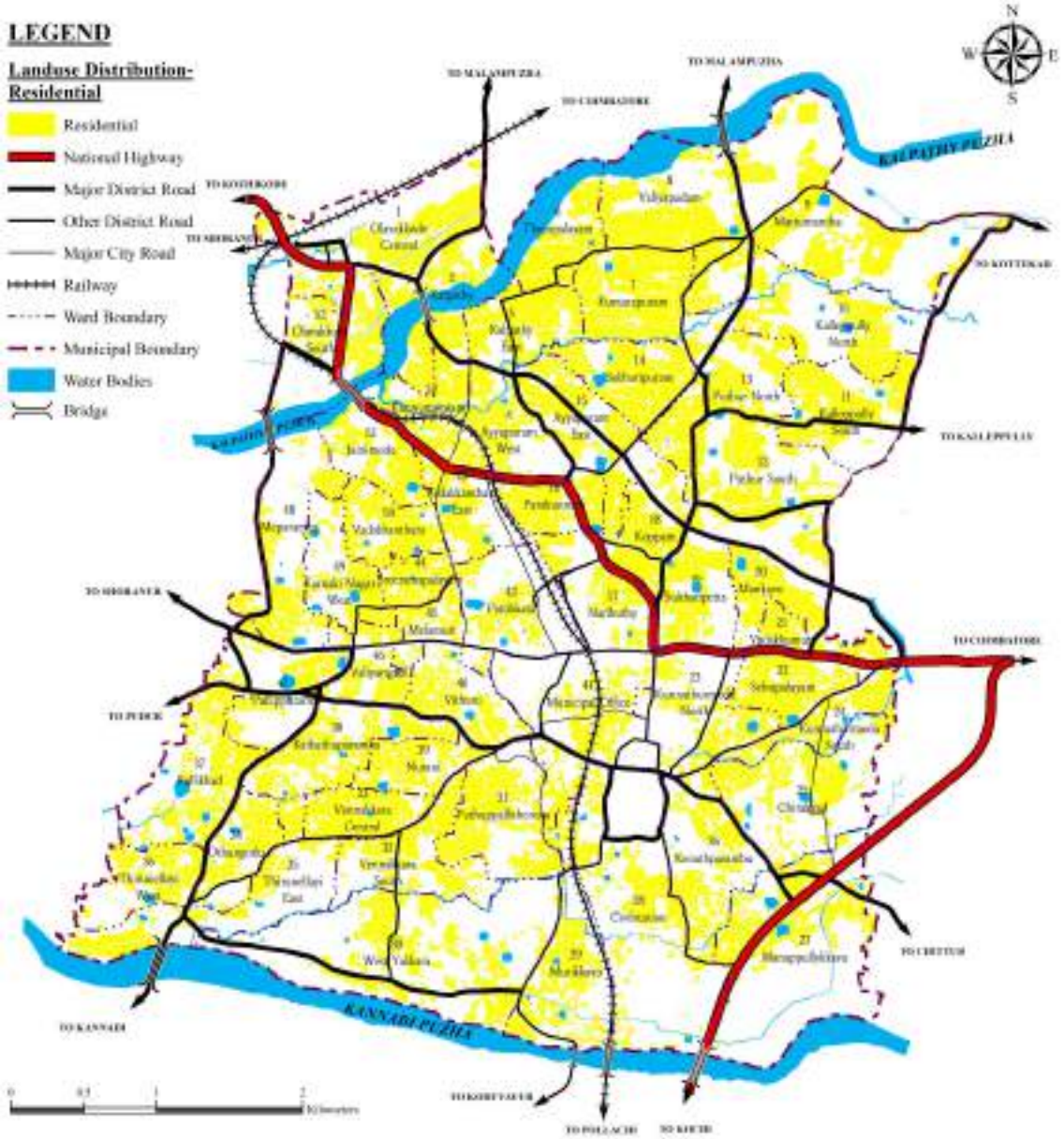


Fig. 5.2 Spatial distribution of residential land use

These gramams are heritage sites in the form of residential colonies mostly occupied by Tamil Brahmins. Spatial distribution of residential land use is shown in the following fig. 5.2.

Following fig 5.3 shows the ward wise residential concentration index of Palakkad Town. Concentration index values ranges from 0.49 to 1.86. Out of 52, 35

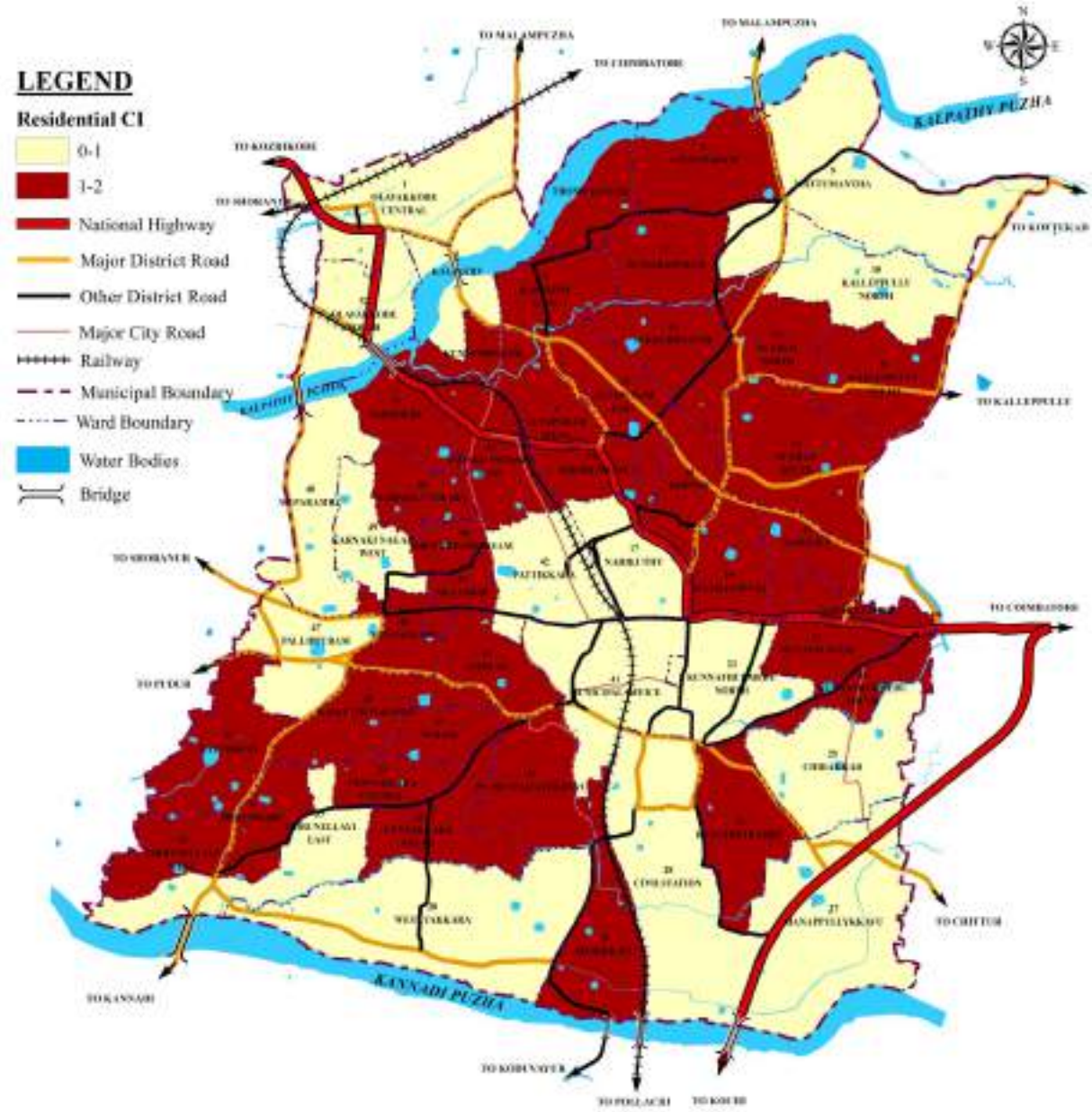


Fig. 5.3 Ward wise concentration of residential land use

wards have CI values equal to or greater than one. Highest concentration is in ward 44- Sreeramapalayam (1.86) followed by ward divisions 33- Vennakkara Central (1.73) & 14 -Sekharipuram (1.73). It is evident that, residential land use is mainly concentrated in between the central business area and the peripheral area.

5.2.2 Commercial Land Use

The area under commercial use constitutes 4.033% of the total area which is 107.287 ha. The city has significant area under commercial use reflecting its importance and contribution in the economy of the city (fig.5.4). It is not only serving the wholesale and retail commercial needs of the residents but also of the neighboring urban and rural settlements within district. The major commercial activities in the town are concentrated towards the core area. It includes commercial centers like Sulthanpet and Big bazaar. The Big bazaar area is having mainly wholesale markets in Palakkad town

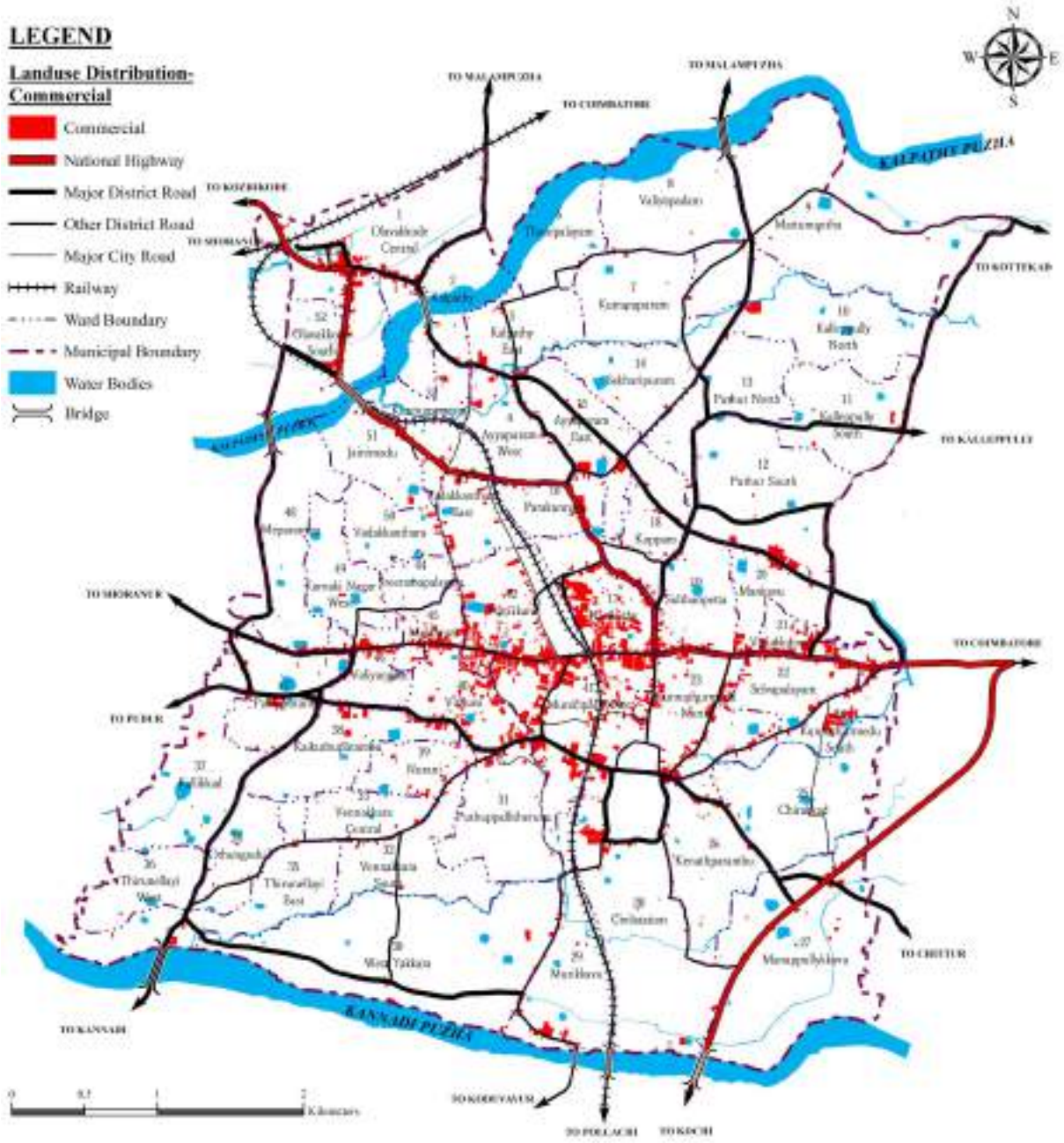


Fig. 5.4. Spatial distribution of commercial land use

which acts as a collection and distribution centre of commodities to other parts of the district. Apart from the CBD, commercial activities occurring in Olavakkode area which

is serving the commercial needs of the people residing in the northern part of the town.

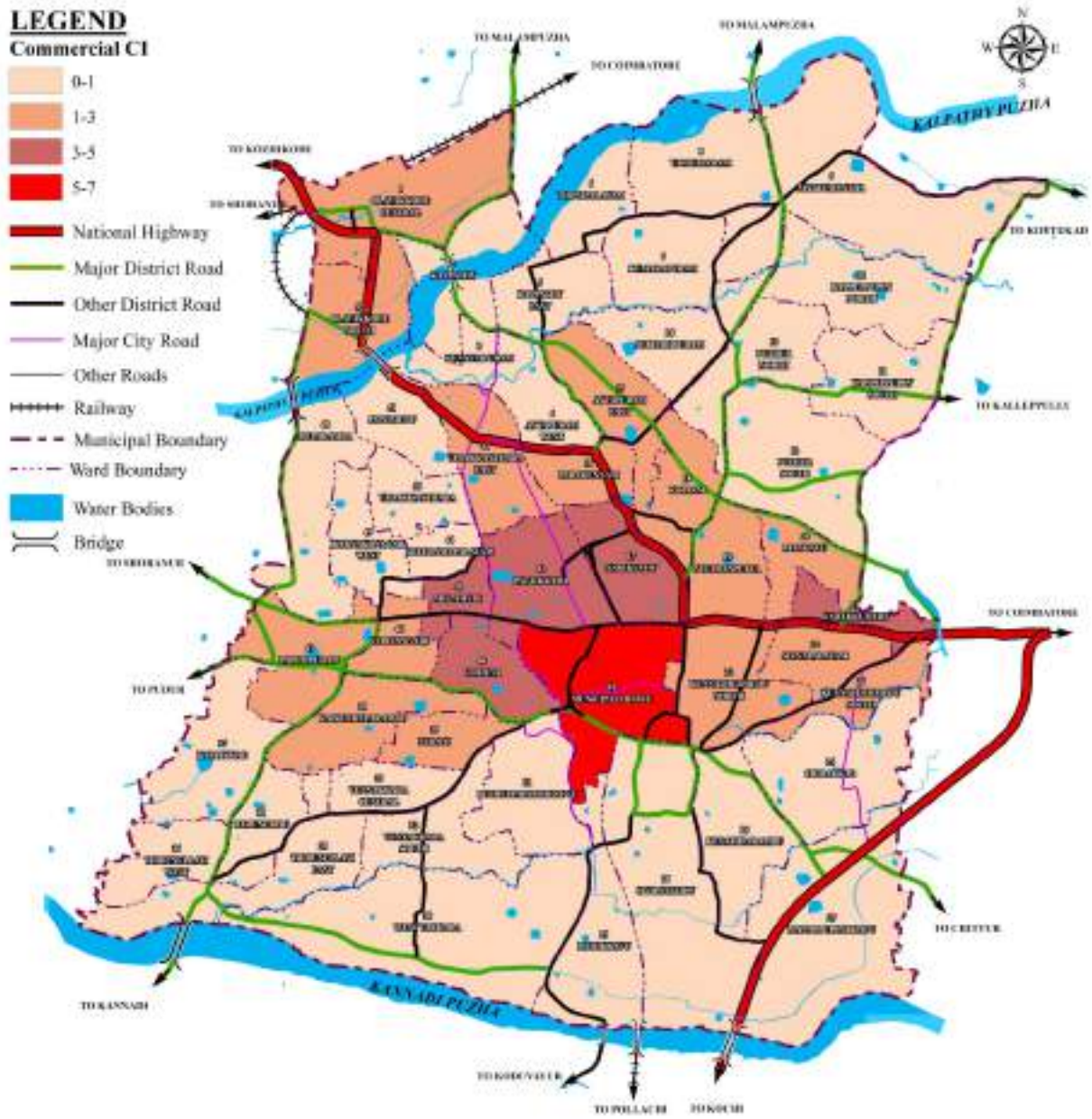


Fig.5.5 Ward wise concentration of commercial land use

The commercial land use concentration index value ranges from 0.05 to 5.02. 21 wards have concentration index value greater than one. Commercial activities are high in wards 41-municipal office (5.02), 17-Narikuthy (4.69), 21-Vadakkumuri (4.56), 40-Vithuni (3.92), 45-Melamuri (3.75) and 42-Pattikkara (3.68); this includes Big bazaar and Sulthanpet areas. Fig 5.5 gives the spatial depiction of the above.

5.2.3 Industrial Land Use

At present, the total area under industrial use is around 19.269 Ha, which is about 0.724% of the total area of the town. There are only two large scale industries and one medium scale industry in Palakkad town. Remaining majority belongs to small

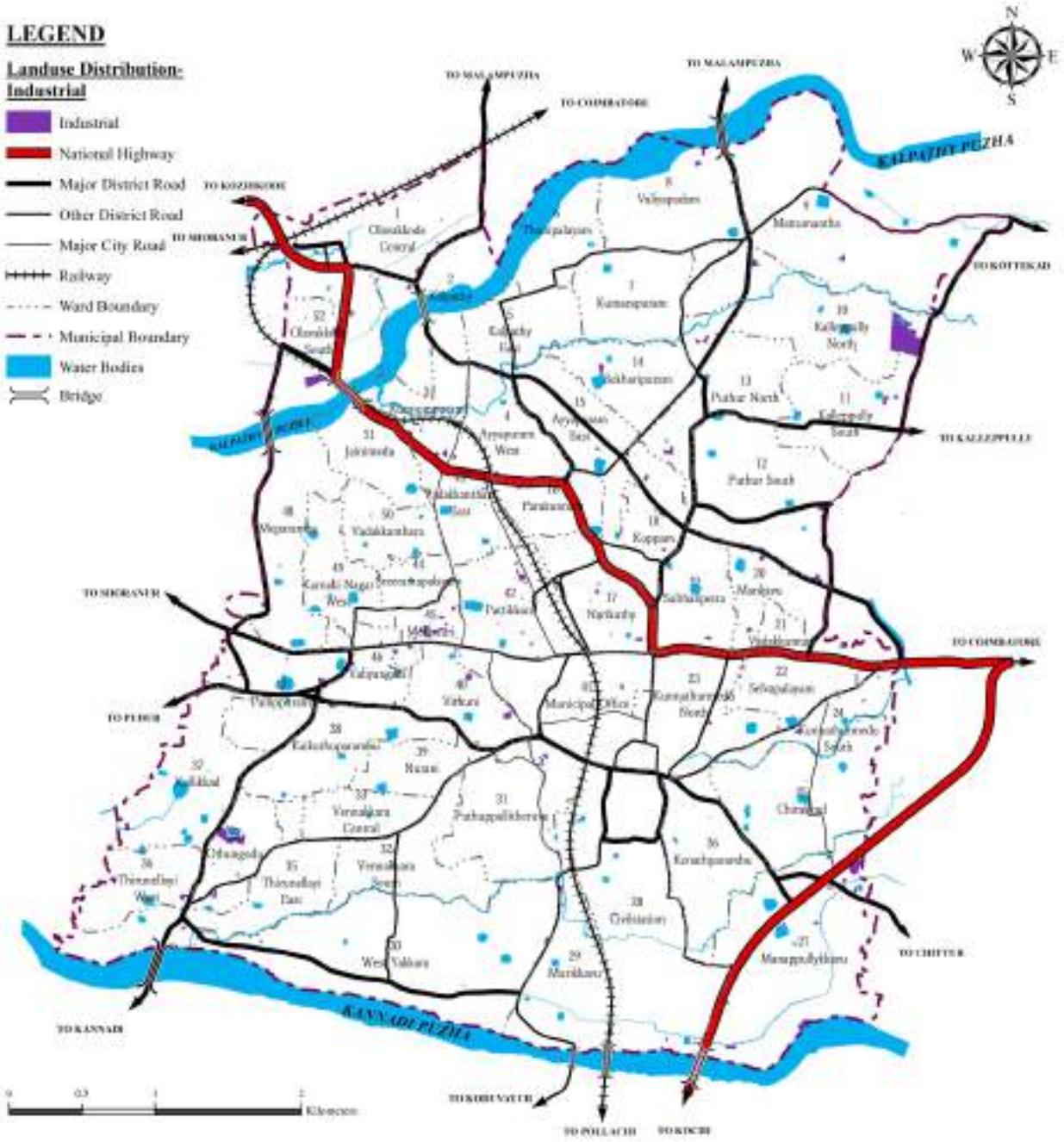


Fig. 5.6. Spatial Distribution of industrial land use

scale service industries. Spatial distribution (fig. 5.6.) implies that industries are located in a scattered manner.

Ward wise concentration of industrial land use is depicted in fig 5.7. The concentration index value ranges from 0 to 9.57. In wards 6,5,33 & 44 CI values is zero. High CI values are observed in 4 wards in which the large and medium scale industries are located; namely ward 10 – Kallepully North (9.57) and 45-Melamuri (8.03), 34-Othungodu (6.38) and 52- Olavakkod South (3.63).

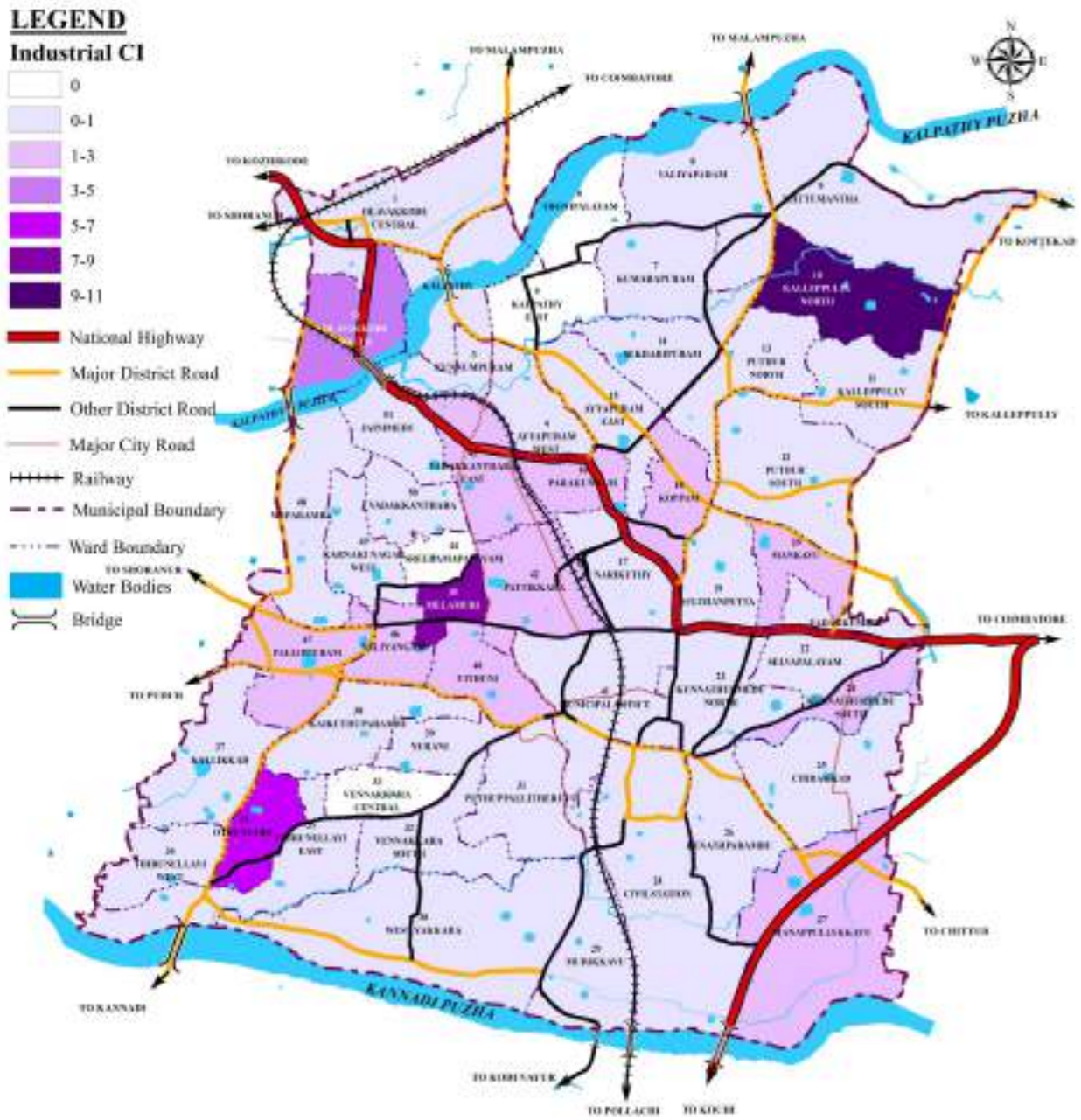


Fig. 5.7 Ward wise concentration of industrial land use

5.2.4 Public & Semi-public Land Use

Govt./semi govt. offices, educational and research institutions, medical and health institutions, social, cultural and religious institutions, cremation and burial grounds, Govt. lands etc. are grouped under this category.

Fig 5.8 shows the spatial location of the educational, health, public utilities, central & state government properties, communication facilities, cultural and religious institutions existing in the city. Since Palakkad municipality being the administrative headquarters of the district, there are a large number of government offices

concentrated in the central area. In detail public & semi-public category constitutes 17.625ha (0.663%), central govt. properties account for 3.254 ha (0.122%) and state govt. properties comprise 22.124ha (0.832%).

Many of the oldest and prominent educational institutions like Govt. Victoria College, Chembai memorial Music college, Mercy college etc. are located within the municipal area. Schools, colleges and all educational institutions constitute 49.603ha (1.865%) of land. The health institutions in the city include District Hospital, ESI Hospital etc. Apart from that, there are many private hospitals functioning in the municipal area.

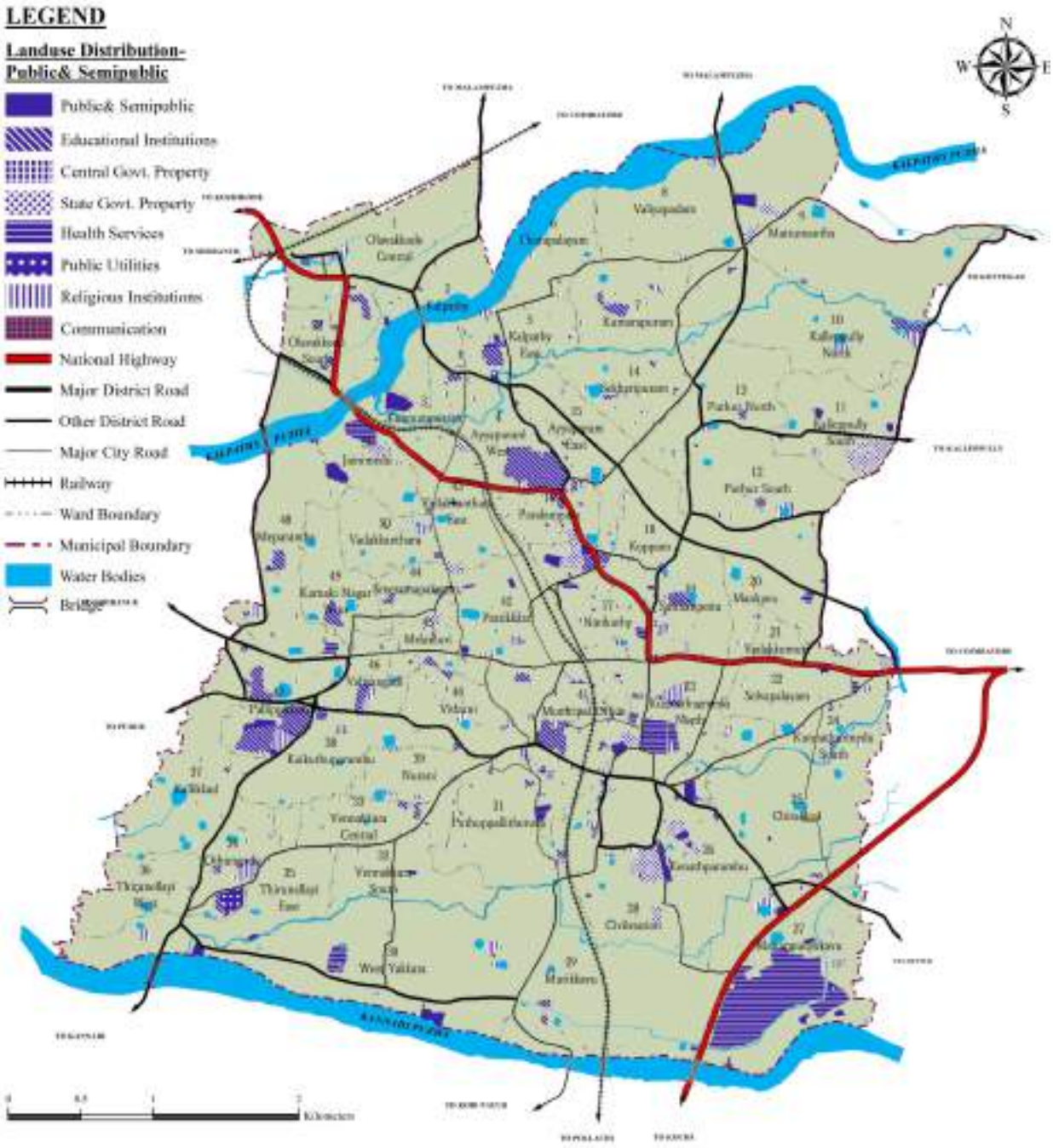


Fig.5.8 Spatial Distribution of Public & semi-public land use

These health facilities altogether comprise 49.341ha (1.855%) of land. Public utilities account for 3.350 ha (0.126%) and religious institutions add up to 28.913 ha (1.087%) of land area. Altogether the city has 174.865 hectares which is 6.575% of the total municipal area under public and semi-public use.

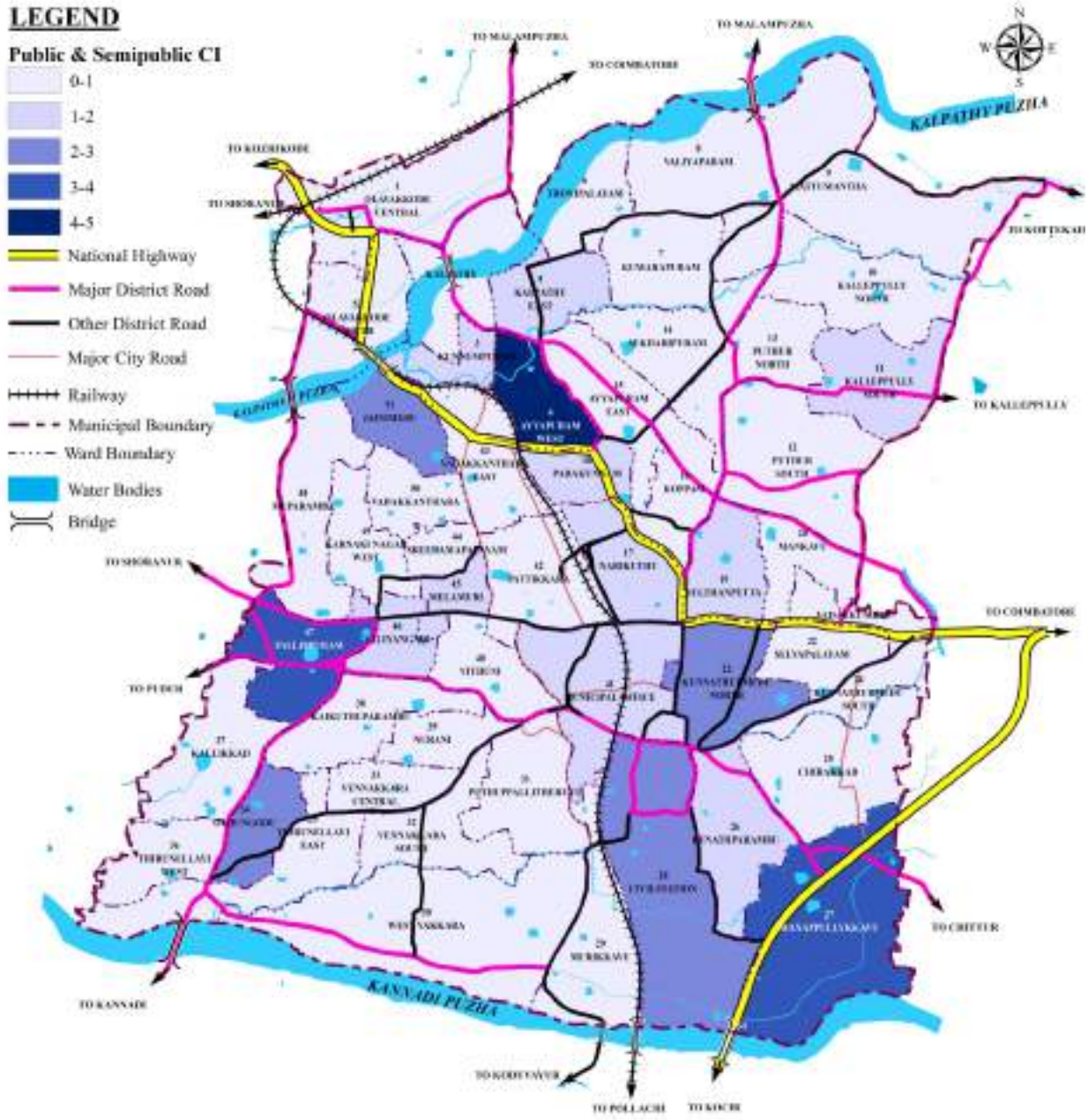


Fig. 5.9 Ward wise concentration of public & semi-public land use

Ward wise concentration of public and semipublic land use is shown in fig 5.9. The concentration index value ranges from 0.08 to 4.21 and is highly concentrated in wards 4- Ayyapuram West(4.21), 27- Manappullykkavu (3.94), 47- Pallippuram (3.71) where Govt. medical college and important educational institutions are situated.

5.2.5 Mixed Land Uses

Many uses are arranged in same land vertically, which are incorporated by using mixed land uses. Fig 5.10 depicts the spatial distribution of various mixed land uses and are mainly located in the central part of the municipal area. Nine different mixed uses are identified during the land use survey. They are- Mixed Commercial & Educational (1.288ha, 0.048%), Mixed commercial & Health services (1.384ha, 0.052%), Mixed Commercial & Industrial (0.240ha,0.009%), Mixed Residential & Commercial (17.268ha,

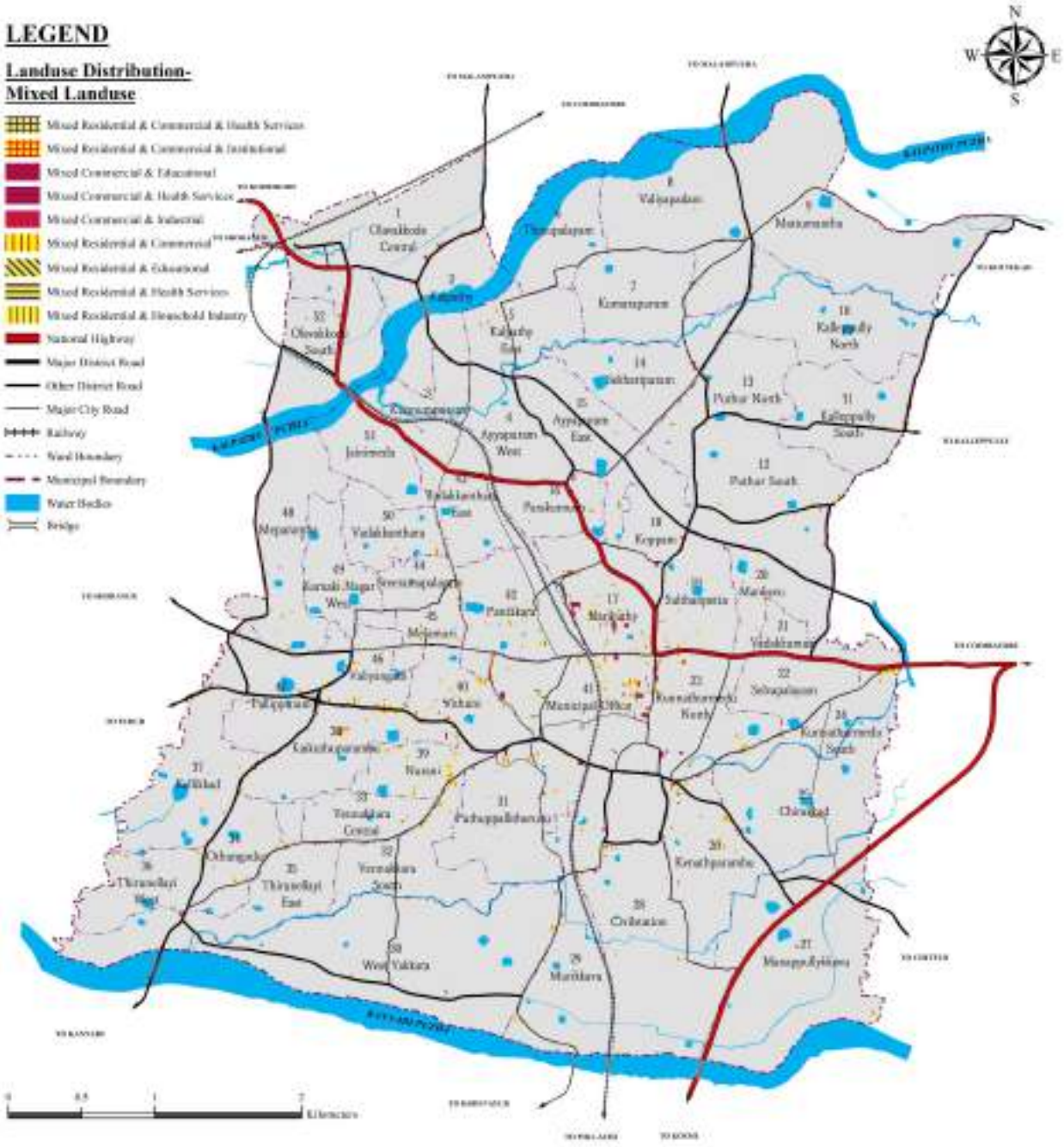


Fig. 5.10 Spatial distribution of mixed land uses

0.649%), Mixed Residential & Educational (0.534ha, 0.020%), Mixed Residential & Health Services (1.215ha,0.045%), Mixed Residential & Household Industries (0.316ha, 0.012%), Mixed Residential-Commercial & Health Services (0.122ha, 0.005%) and finally Mixed Residential-Commercial & Institutional (0.675ha,0.025%). These mixed land uses altogether constitutes 23.042 ha i.e. only 0.866% of the total municipal area.

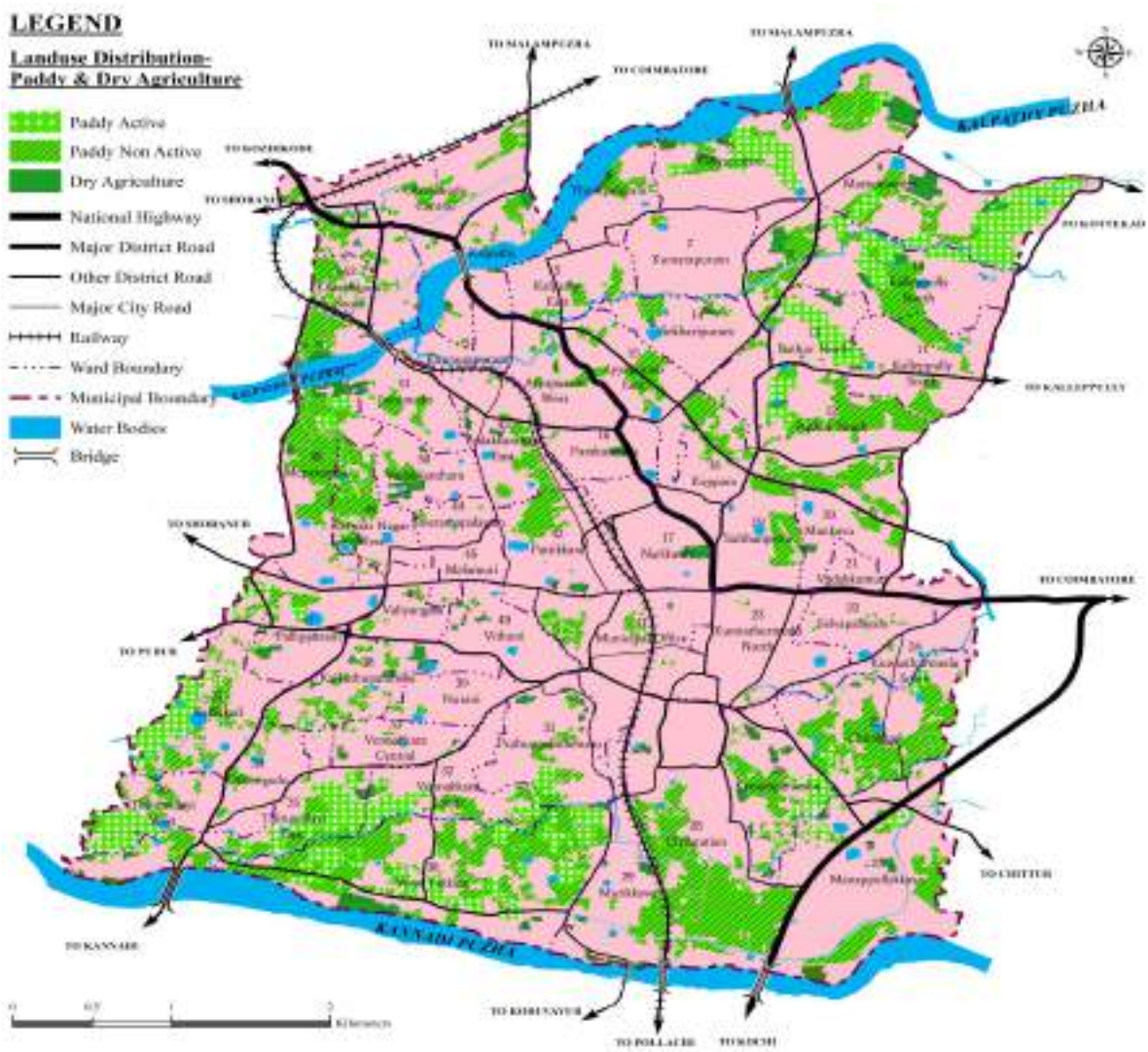


Fig. 5.11 Spatial distribution of agricultural land uses

5.2.6 Agricultural Land Use

Agriculture area is mostly concentrated along the periphery of the municipal area. Paddy fields constitutes 576.749 ha (21.682%) of land and dry agricultural area constitutes 49.884 ha (1.875%). The spatial distribution of agricultural land use is shown in Fig. 5.11

The figure 5.12 shows the concentration pattern of agriculture land use. The concentration index values ranges from 0.28 to 2.32. 21 wards have CI values greater than one. In which ward 33-Vennakkara Central (2.32) , 23– Kunnathurmedu North (2.10) and 25– Chirakkad (2.03) shows highest values.

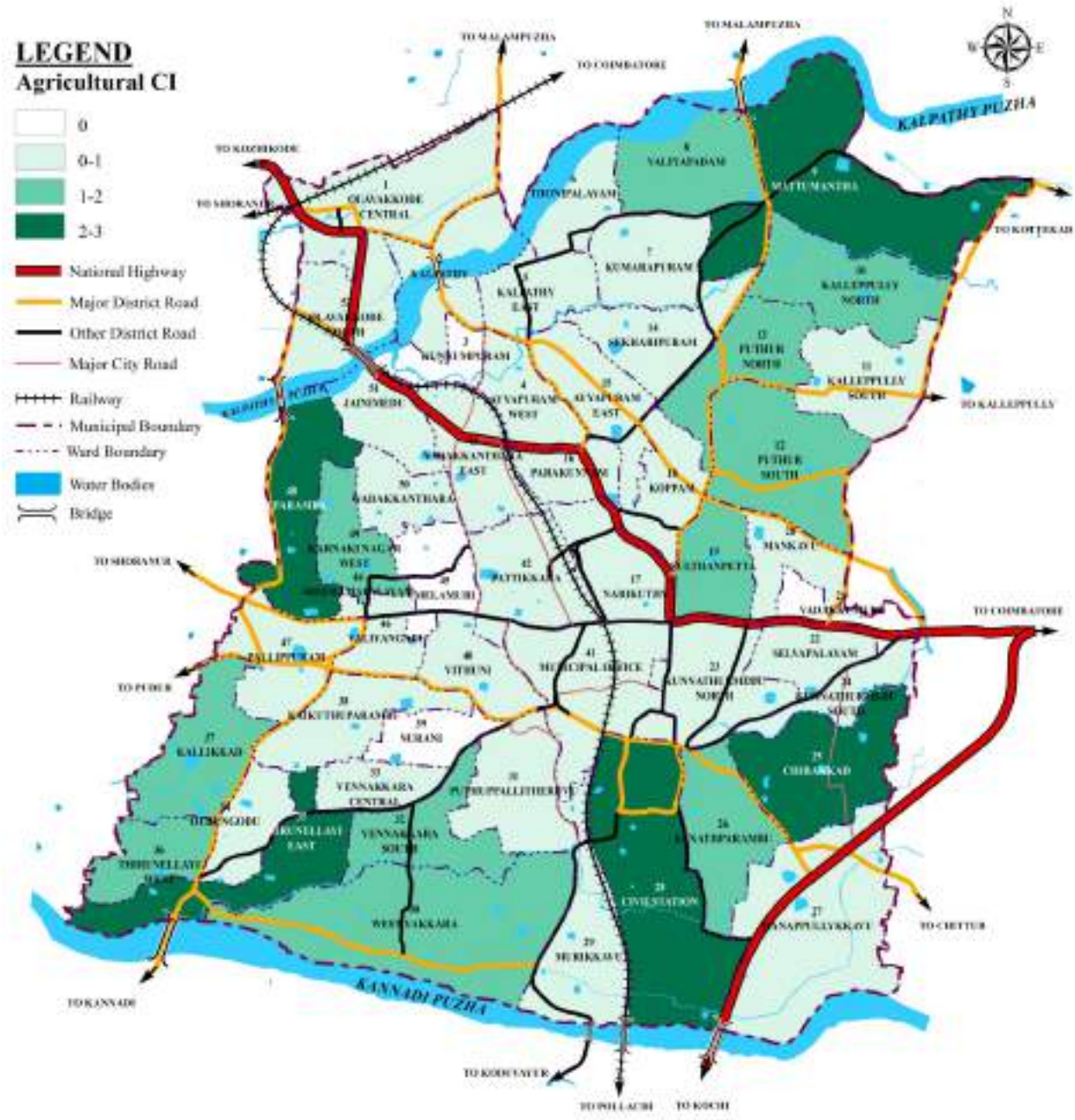


Fig. 5.12 Ward wise concentration of agricultural land uses

About 92.03% of total agricultural land use is covered by paddy fields. The distribution of paddy land use is shown in fig 5.13. Out of the total paddy 67.3% were found non– active. As we know, paddy fields are a vital part of our environment and ecological system. They provide natural drainage path for flood waters, conserve ground water, and are crucial for the preservation of a rich variety of flora and fauna. The conversion of paddy fields into residential and commercial plots has been going on a rapid pace.

The concentration index values for paddy land varies from 0 to 2.53. Ward 25 - Chirakkad has the highest value as 2.53 followed by ward 35– Thirunellayi East (2.38), 28– Civil station (2.24) and 48-Meparamba (2.2) as depicted in fig 5.14.

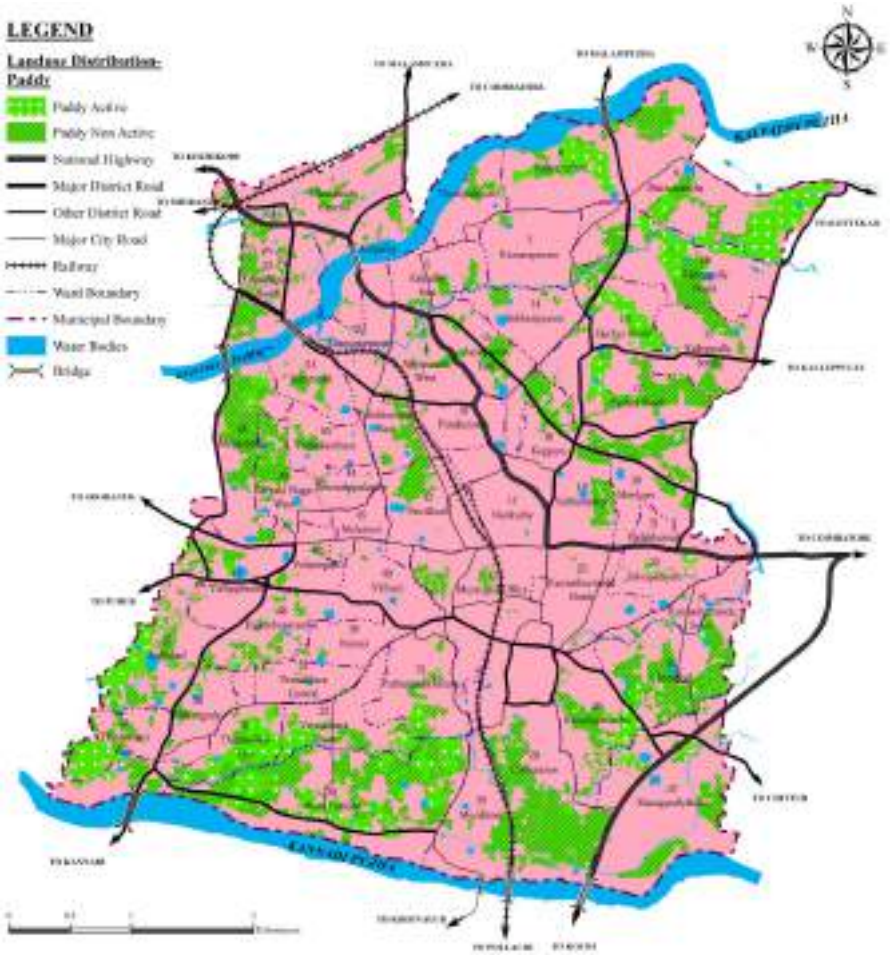


Fig. 5.13 Spatial distribution of paddy land use



Fig. 5.14 Ward wise concentration of paddy land uses

5.2.7 Traffic & Transportation Land Use

Good road network and transportation is life line for any city. It has special role in development of economic activities. Palakkad has a good network of roads and rails. NH-544 (Kochi-Salem) and NH-966 (Palakkad-Kozhikode) also passes through the municipal area. Nearly 349.826 hectares of the area which is 13.151% of the total municipal area is under transportation network which comprises of roads, railway line, terminals such as bus stand, railway station and parking lots/areas existing in the town. Fig. 5.15 shows the spatial distribution of transportation land use. Land under railway use account for 51.975 ha (1.954%) and land use under roads add up to 291.746 ha (10.968%) of total municipal land area.

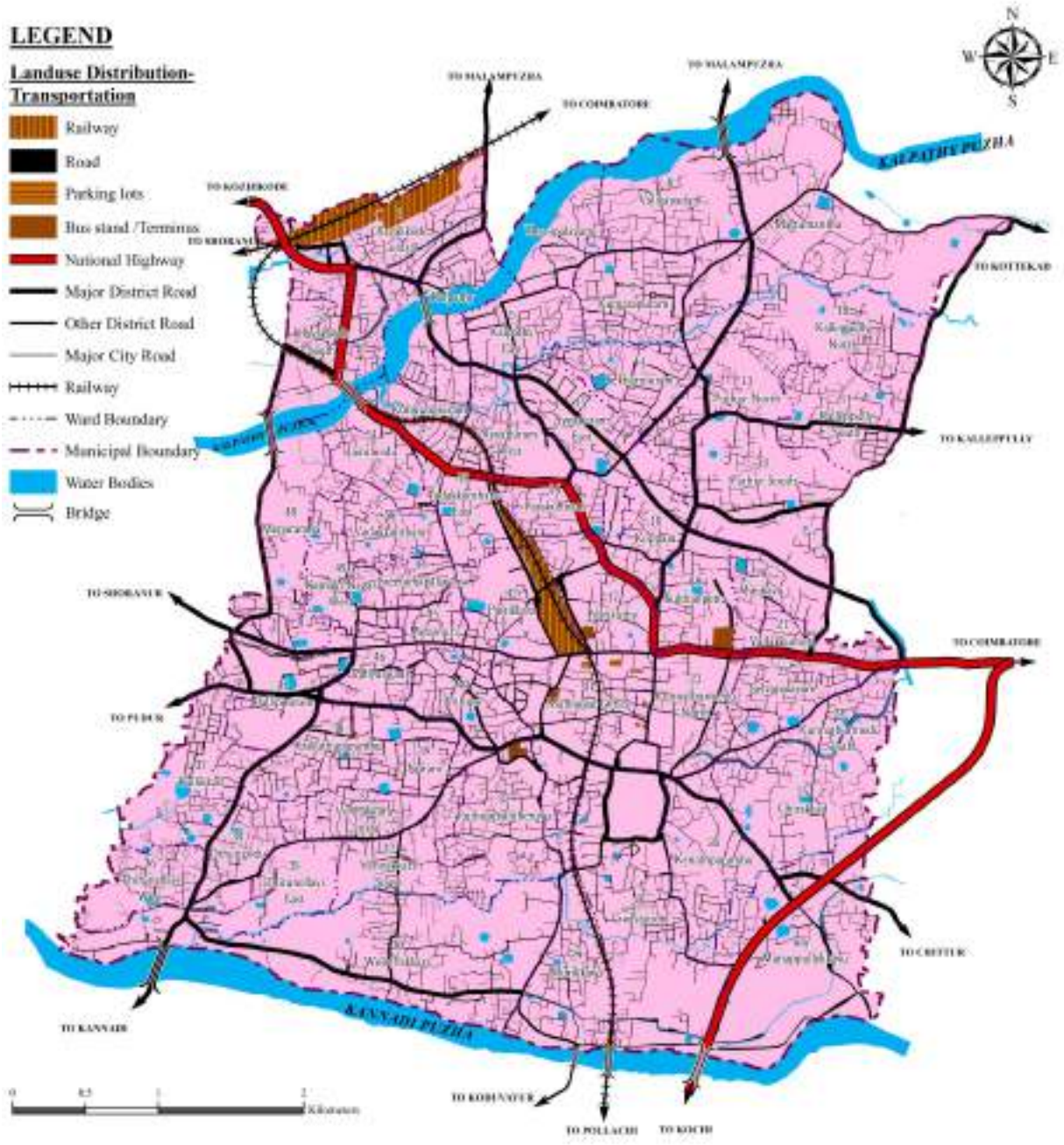


Fig. 5.15 Spatial distribution of transportation land use

Ward wise concentration of transportation land use is shown in fig 5.16. the concentration index values range from 0.47 to 3.52. Highest concentration value seen in ward 1 – Olavakkode Central (3.52) followed by 42-Pattikkara (2.69) where Palakkad junction and town railway stations are located.

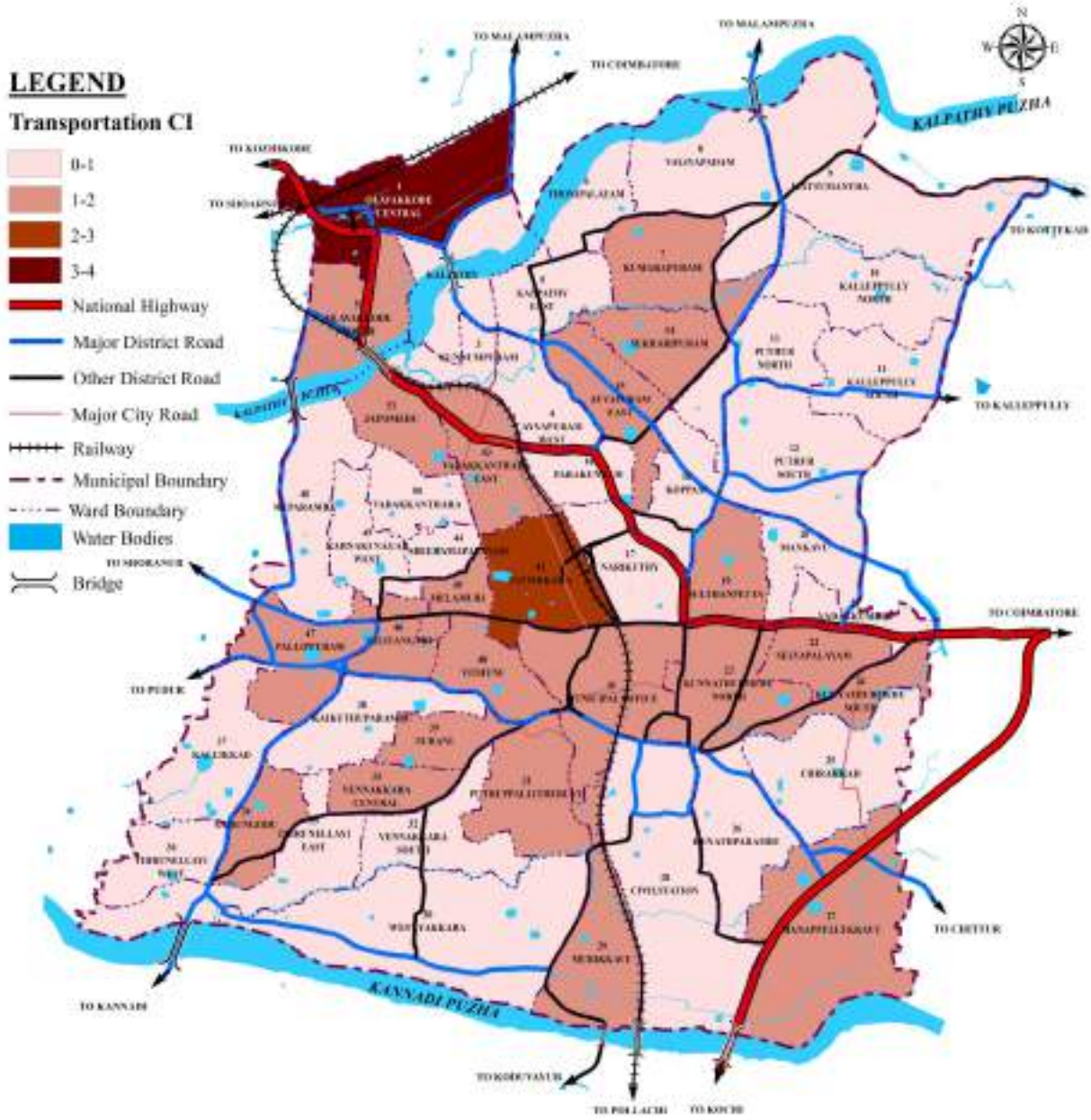


Fig. 5.16 Ward wise concentration of transportation land use

5.2.8 Heritage and Recreational Land Uses

'Tippu Sulthan's Fort' existing in the heart of the town is declared as a Protected Monument by Archaeological Survey of India (ASI) and is included in heritage land use. Kalpathy area, declared as heritage village by Art & Heritage commission of Kerala is also included in this use. The total area covered under this use is about 10.524 ha which is 0.395% of the total municipal area.

The park and open spaces are mainly for recreational facilities like parks, play-ground, stadium, club etc. and which have important role for qualitative healthy social and culture life in any city. Major recreational facilities present in Palakkad municipality are A R Menon park, Rappadi Open air auditorium, 'Indira Gandhi open stadium', synthetic track and Fort Maidan. Other than these, there are several small parks and playgrounds of educational institutions.

The total area under recreational category within the town is only 18.974ha and it constitutes 0.714% of the total municipal area. In which recreational built up (club, gymnasium, open air theatre, sports centers etc.) comprises 5.919ha (0.223%) and recreational open spaces (park, play ground, maidan, garden/tot lots etc.) add up to 13.055ha (0.491%) of land. The area under this use is much less than the prescribed norm of 10-12 sq.m per person (presently available 1.38sq.m/person), reflecting that the city badly lacks in the provision of recreational spaces, which requires attention

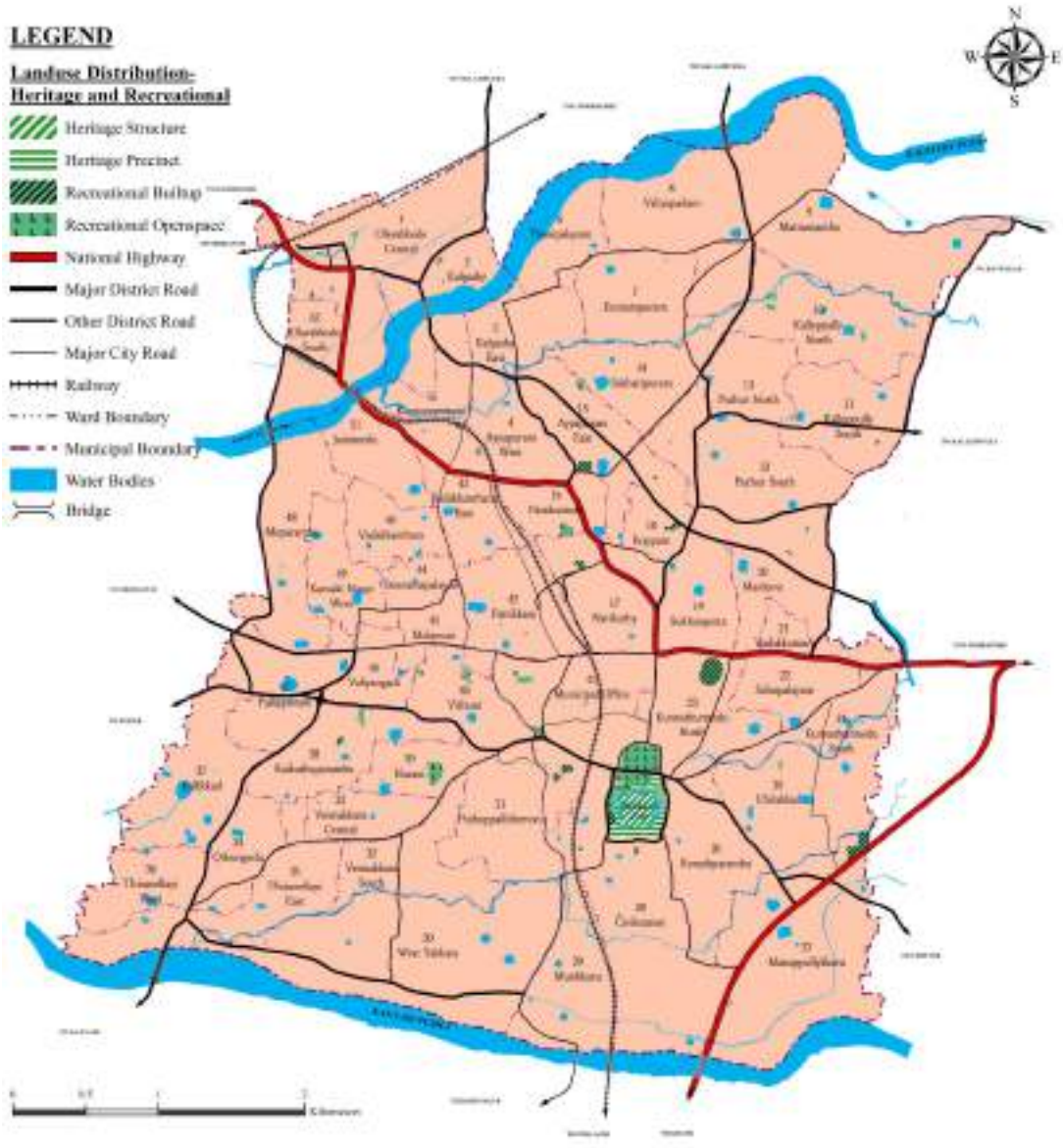


Fig. 5.17 Spatial distribution of heritage and recreational land uses

5.2.9 Forest, Water body & Sacred Groves

A small portion of protected) forest is situated in ward 1- Olavakkode central. Total extent of forest area comes to only 0.313 hectares which constitutes 0.012% of the total area.

The land under the use of water course accounts for 5.242% of total area which is 139.449 ha. The main water bodies Kalpathypuzha flows through the northern part and Kannadipuzha flows through the southern part of the municipality, remaining water bodies belongs to ponds and 'thodus'.

There are about 5 sacred groves either big or small, comprising an area of 0.216ha (0.008%) and most of them are attached to family temples.

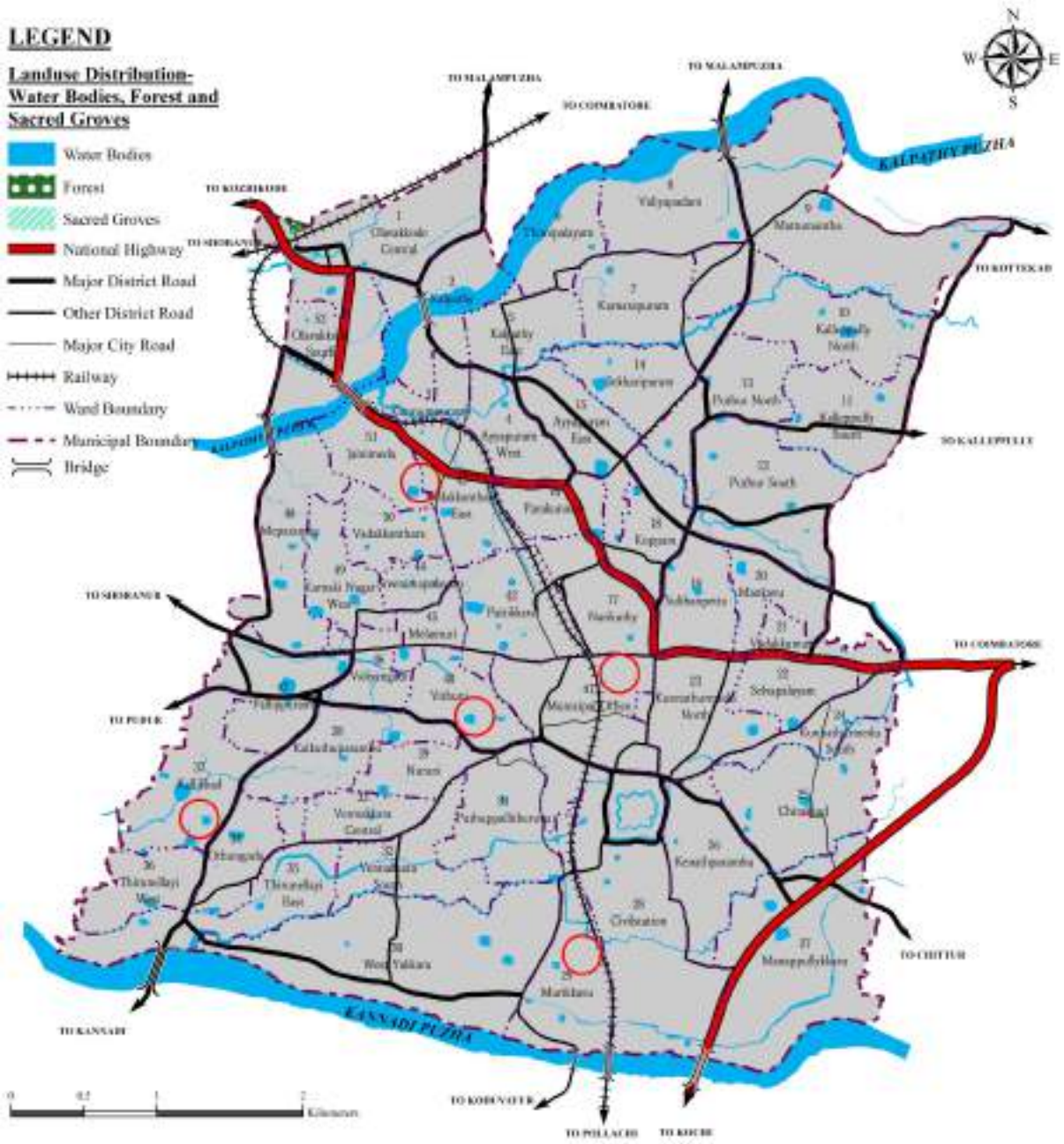


Fig. 5.18 Spatial distribution of forest, water body and sacred groves

5.2.10 Slaughter House & Solid Waste Management

Slaughter house located in ward 32 constitutes 1.564ha (0.059%) of land and land used for solid waste management system in ward 35, ward 24 and ward 7 add up to only 0.084ha (0.003%) as shown in fig 5.19.

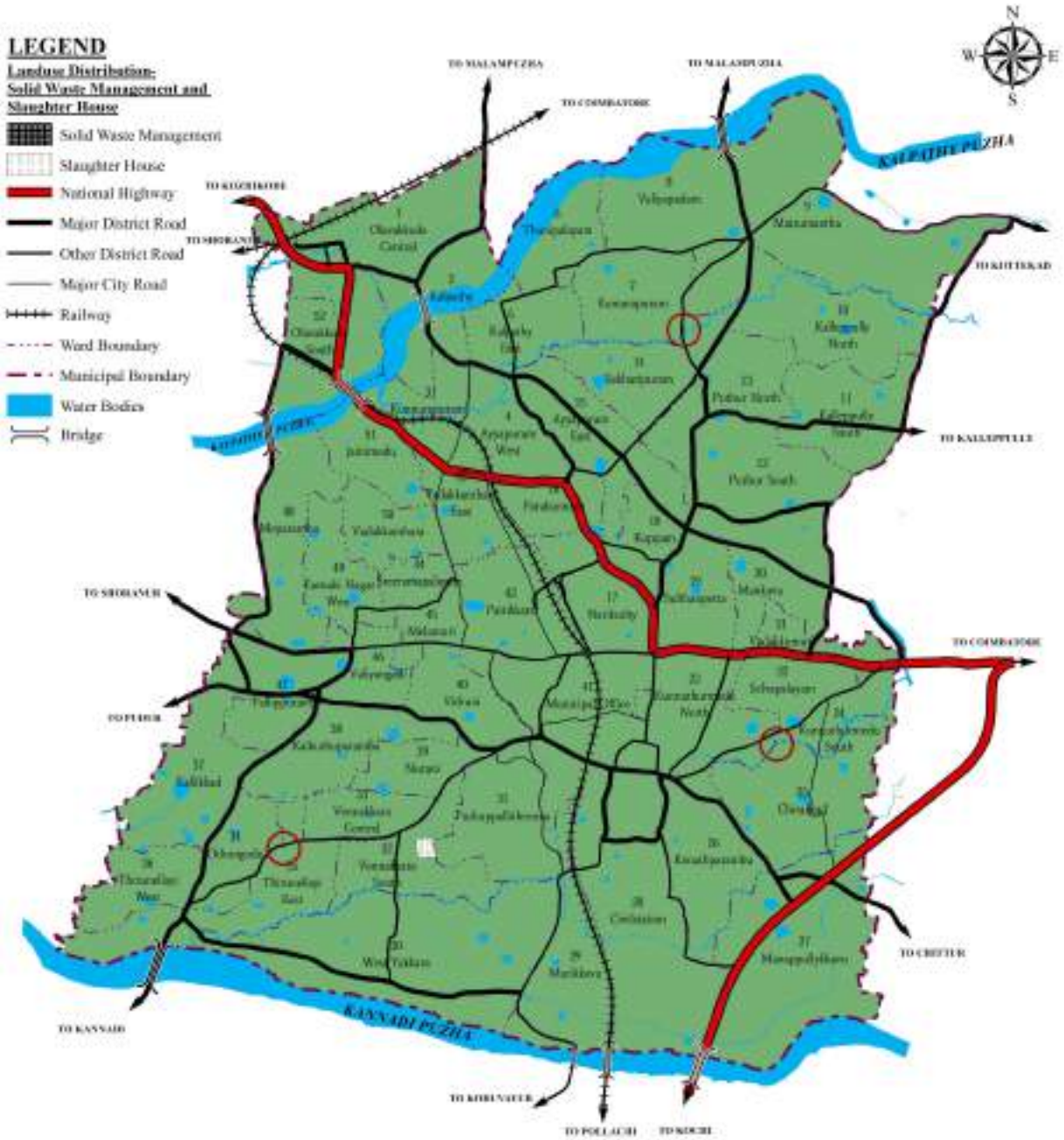


Fig. 5.19 Spatial distribution of slaughter house and solid waste management

5.2.11 Vacant Land

The Vacant land means the area which is presently not being developed and is under no use. In this municipality 147.55 hectares of land (5.547%) were seen vacant during the land use survey. And their tenure status belongs to government, municipal asset and private ownership. Spatial distribution of vacant lands are shown in fig. 5.20.

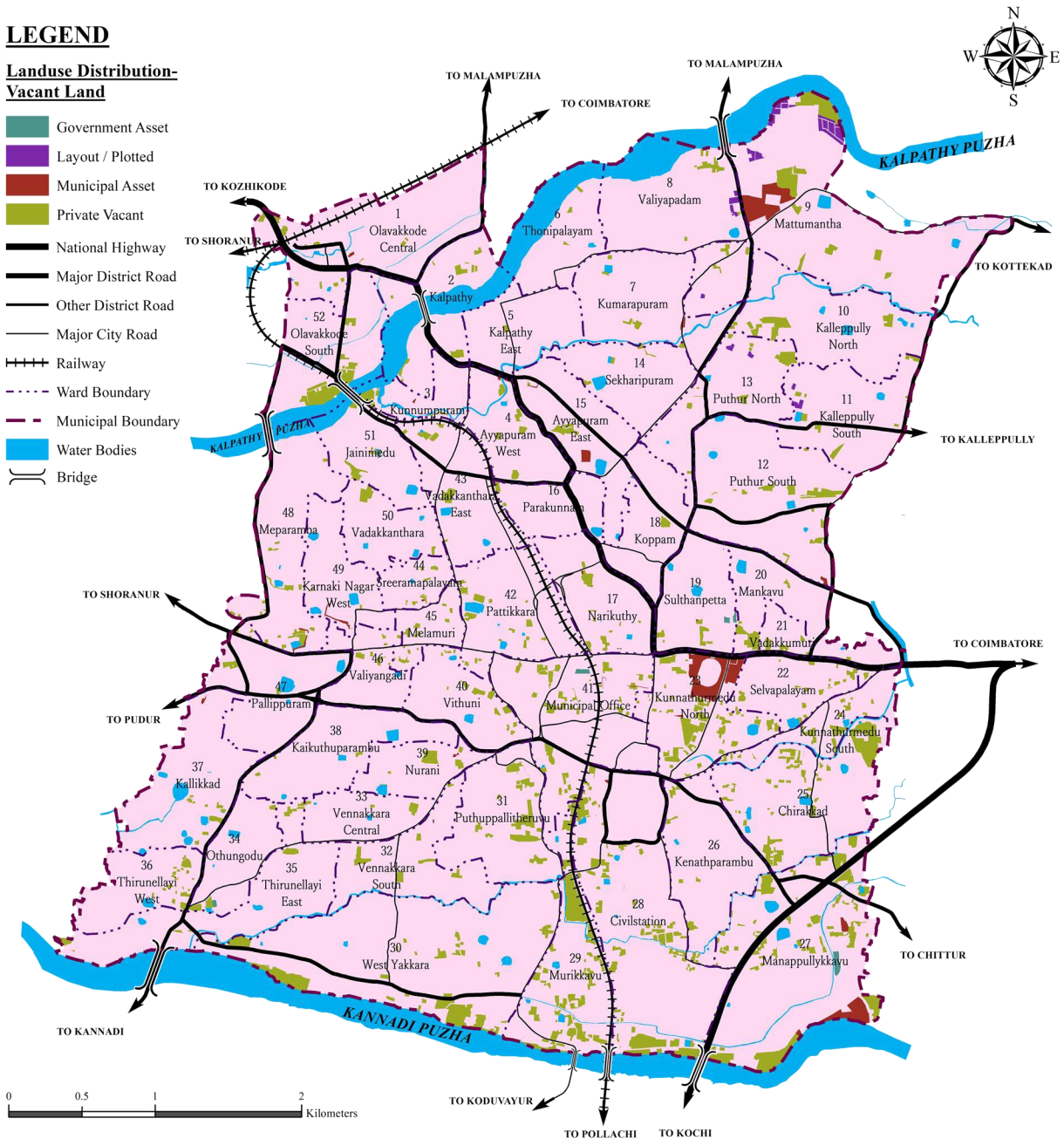


Fig. 5.20 Spatial distribution of vacant lands

5.3 WARD WISE BUILT- UP LAND USE CONCENTRATION

Urban or built-up land is comprised of areas having intensive urban use with much of the land covered by structures. Included in this category are commercial, industrial, public & semi-public ,transportation, power, and communications facilities etc. since it clearly demarcates the extent of urban content of the area. Ward wise land use concentration is as shown in fig.5.21, and it is clear that ward 41-Municipal office, 42– Pattikkara and 1– Olavakkode Central are the wards containing highest urban content in Palakkad Municipality. In the remaining wards residential/agriculture constitutes the major share.

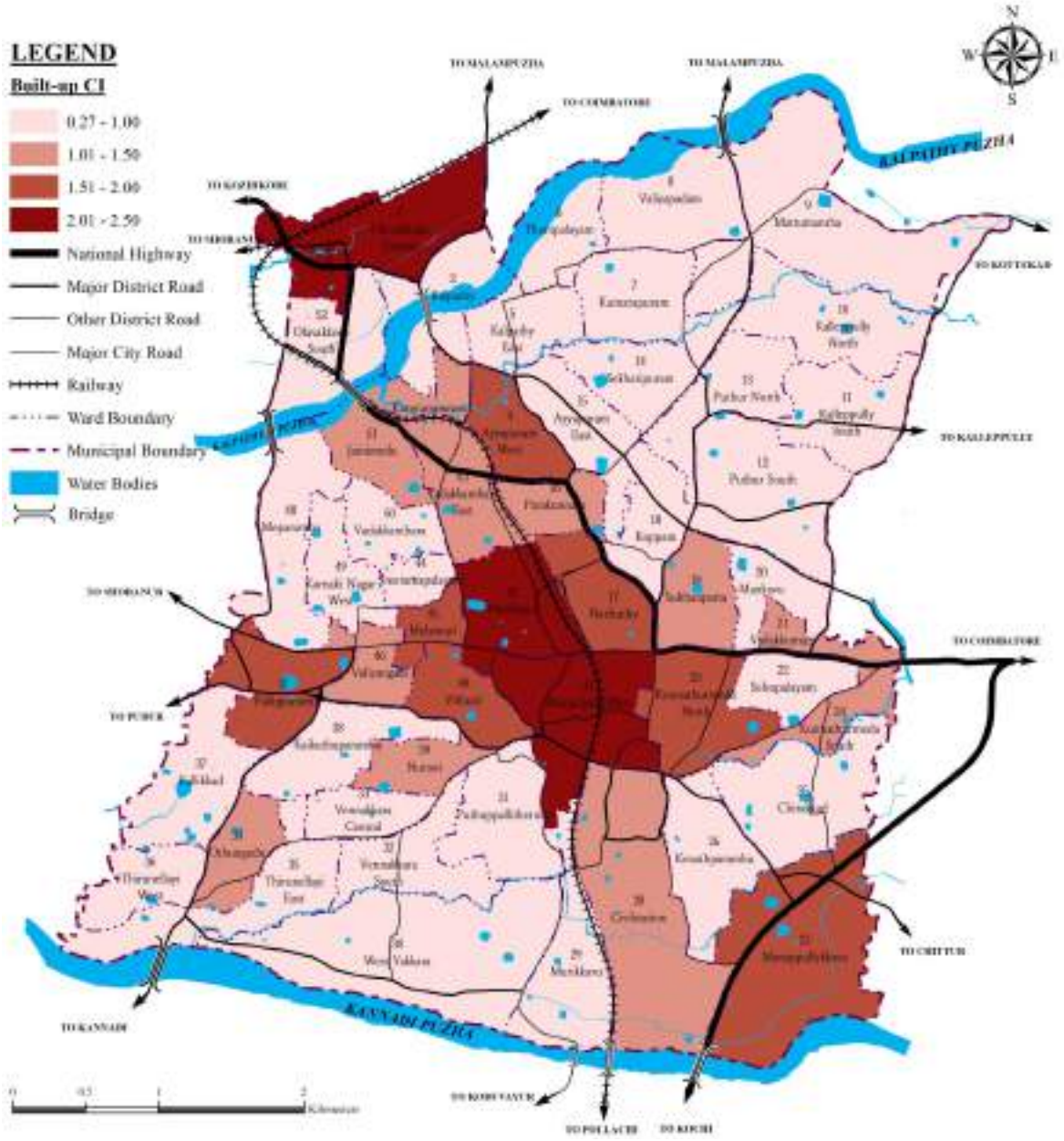


Fig. 5.21 ward wise concentration of built up land use

5.4 COMPARISON WITH LAND USE 1971 & 2010

The land use in the year 1971 and 2010 is shown in fig 5.22& 5.23 respectively. Acceleration of development in the town has created a major land use change. From the comparison of both, it is evident that there is conversion of productive agricultural land to the use of quite complex spaces, due to the increase in population. Urban expansion will inevitably lead to the loss of high-quality cultivated land, which will lead to a contradiction between urban expansion and agriculture land protection. From the changes in land use for the periods 1971 & 2020 as given in table 5.2, the city shows a large scale residential development by utilizing an increased area of 3.5 sq.km followed by trade and services (commercial & public and semi-public) which has increased itself by an area of 1.71 sq.km.

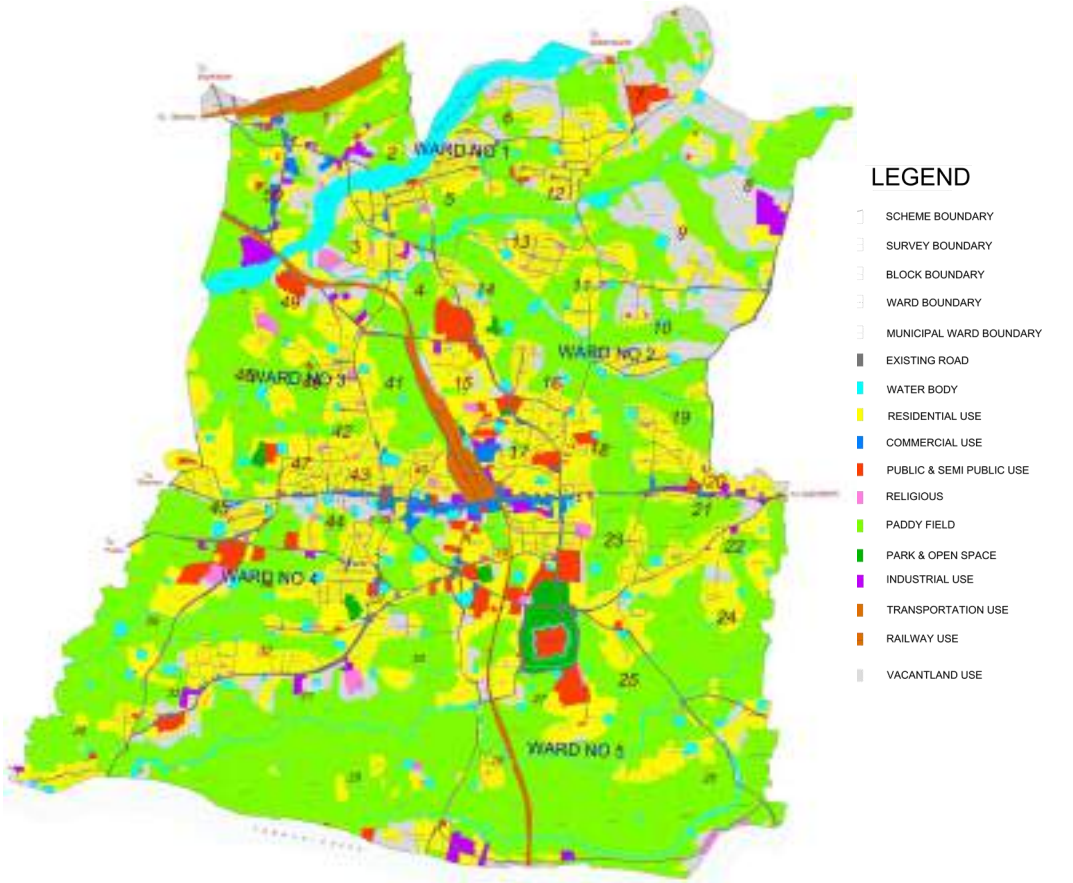


Fig. 5.22 Land use map of Palakkad town 1971

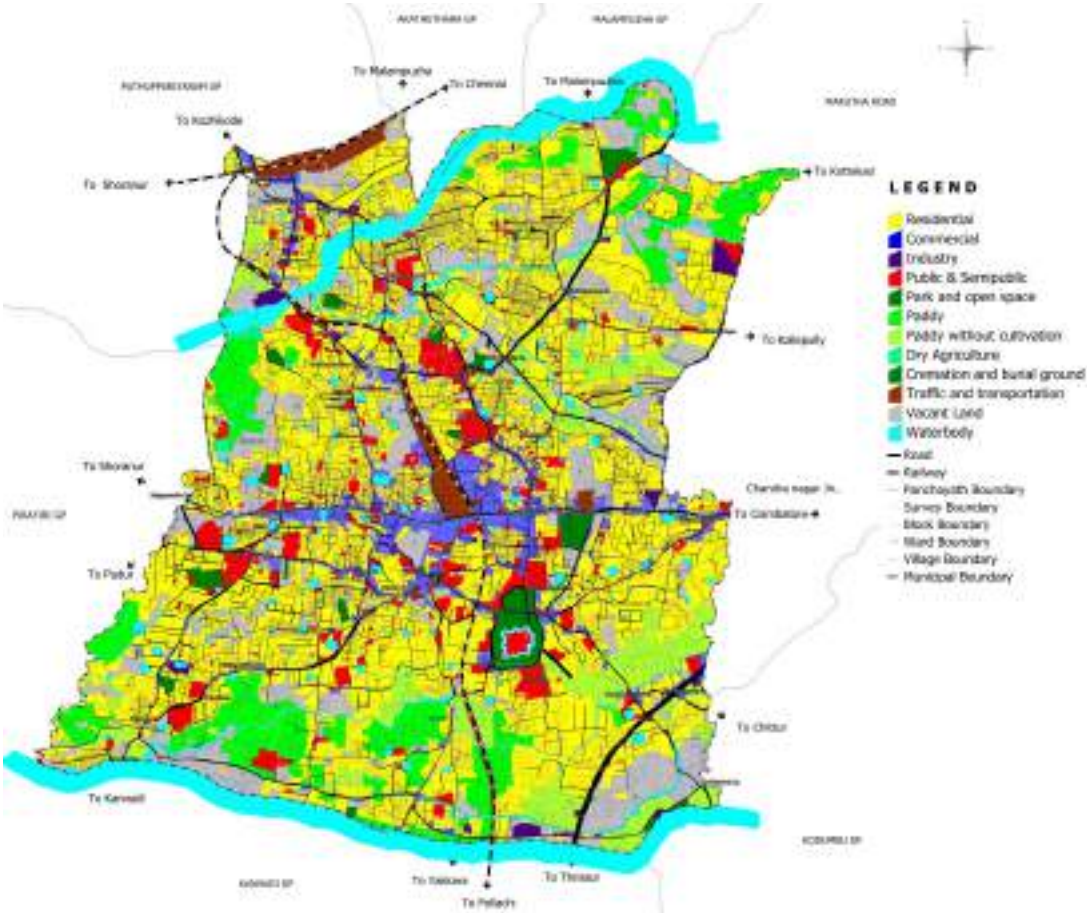


Fig. 5.23 Land use map of Palakkad town 2010

Table 5.2 Comparison of land use in 1971,2010 and 2020

Sl. No	Category	1971		2010		2020	
		Area in sq.km	% share	Area in sq.km	% share	Area in sq.km	% share
1	Residential	6.92	26.02	12.05	45.29	10.42	39.13
2	Commercial	0.24	0.9	1.08	4.08	1.08	4.06
3	Industries	0.29	1.09	0.22	0.82	0.18	0.68
4	Public & semipublic	0.96	3.60	1.40	5.26	1.83	6.88
5	Agriculture	12.36	46.47	3.80	14.29	6.30	23.69
6	Park & Open Space	0.26	0.98	0.47	1.77	0.19	0.71
7	Transportation	2.41	9.06	2.68	10.08	3.50	13.16
8	Water body	1.73	6.50	1.28	4.81	1.39	5.23
9	Vacant	1.43	5.38	3.62	13.6	1.46	5.53
10	Mixed land uses					0.23	0.86
	Total	26.60	100	26.60	100	26.60	100

Source: Master plan for Palakkad town 1986, 2016, Land use survey 2020

Land use pattern shows that the growth of the town is spreading towards the outer area. It's direction is radiating from the core towards the periphery. The central area is crowded by the commercial and public units due to which the residential units are mostly distributed along the outer core area.

5.5 INFERENCE

As per the existing land use, majority of land area is residential (39.13%). The second highest land use is agriculture (23.69%) , which is spread along the municipal boundary. The commercial area is concentrated in the central core area along the major roads (running east-west direction). While analyzing the existing land use pattern of the town, it has been observed that the town requires rationalization of different land uses in order to bring it to the level of prescribed norms as per UDPFI guidelines and so as to decentralize the area so as to reduce congestion in the CBD area . The city requires creation of enough recreational/ open spaces and increased number of socio-cultural institutions that at present are absent in order to improve the quality of living in the city. It also requires conservation of existing water bodies and paddy fields which are environmentally sensitive and thus should not be put to any intensive use.



CHAPTER 6- TRADE AND COMMERCE

6. TRADE AND COMMERCE

Economic growth is an important factor driving the overall development of an area. An urban economy is clearly demarcated from the rural economy due to the predominance of industrial and service sectors in it, as against the predominance of agricultural sector in rural economy. Trade and commerce are important activities in it. Religious, political, economic, technological and complex administrative structures found in a city complement the trade and commerce network. Thus it is the flux of market economy and commerce, which brings together people of different socio-cultural backgrounds in an urban area. The economy of the Palakkad municipality is based mainly on trade and commerce and service sector activities. This chapter discusses about the trade and commerce activities in Palakkad municipality.

6.1 ANALYSIS OF EXISTING SCENARIO

According to I.D.D.P, 2013 for Palakkad district, Palakkad municipality is ranked as first order settlement. Since it is the headquarters of the district, the service area of the settlement is spread all over the district. Palakkad town also act as the most important commercial centre of the district. Fig 6.1 shows the hierarchy of nodes in the district.

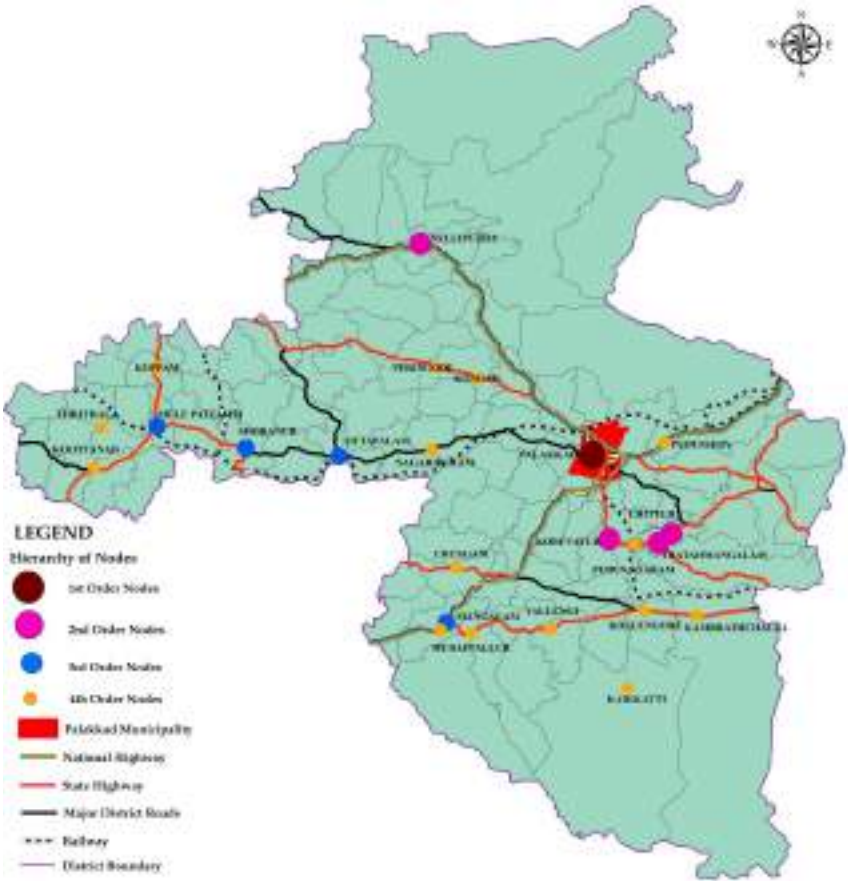


Fig. 6.1. Hierarchy of Nodes in Palakkad District

The economic and commercial evolution of any land depends upon its physical environment. This stands true for Palakkad. 'Chola Inscriptions' make references that the Palakkad pass was the most important link that connected the coastal trade route with Tamilnadu. This road started from Kodungallur and via Thrissur, Alathur and Palakkad, pass reached the Coromandal coast. Also the Ponnani River in the extreme south of Malabar was well connected to the Palakkad and a land route from there to Coimbatore and Madurai; during rainy season the river seems to be navigable up to Palakkad.

Palakkad has some of the most charming streets which has its own distinct name, history, culture etc. Some of them are: Porikkara Street, Market Road. (Pori is a stuff made from rice. The name derived from the settlement of merchants who make a living on selling this item). Arikkara Street, Court Road. (Rice Merchant Street). Erumakkara Theruvu, G.B. Road (Buffalo Merchant Street). Edayar Theruvu, Kalmandapam (Shepherd Street). Kozhikkara Theruvu, Shornoor Road- Near Nurani : Means 'Chicken Vendor's Street'. This street was once a leading area for poultry trade.Tailor Street, Sultanpet: Once this street was fully dominated by tailors and weavers from cities of Coimbatore, Tirupur, Kanchipuram etc. Now there are only a few of them. They mainly came here during the British Raj period to make uniform clothes for the officers and soldiers. And also they made clothes for leading textile shops in Malabar. Another section of people, special to Palakkad are experts in trade and commerce belongs to Moothan, Mannadiyar community. Moothans are the traditional Arya-Vaisya community who led their life by doing business. They came to this city in 15th Century A.D. Palakkad King invited people from other parts of country who are specialized in one or other occupations and gave them land to settle down and later these places were named after their occupation.

In the following session, commercial land use in the municipal area was evaluated over three time periods 1971, 2010 and 2020. The historical land use of the 1971(fig 6.2), extent of commercial area is 24.92 hectares (0.94% of the town). The major commercial area of the town was concentrated along the Gandhi Bazaar Road and the Court Road. The business areas of the town namely, Big Bazar or Chaturangapetta and Sulthanpetta lie on the aforesaid road stretches. Nodal points like Kallepully, Olavakkode have developed into local shopping centres.

As per land use 2010 (fig 6.3), the commercial use constitutes 4.08% of the total area. Current land use of the municipality (2020), 107.287ha (4.033%) of the land belongs to commercial use. This transformation also involved restitution and rearrangement of ownership; initiating owner changes and subsequent alterations in property functional use. This was reflected mostly in the city centre where many residential buildings were converted to service facilities, resulting in higher city building density.



Fig. 6.2. Commercial land use in 1971



Fig. 6.3 Commercial land use in 2010

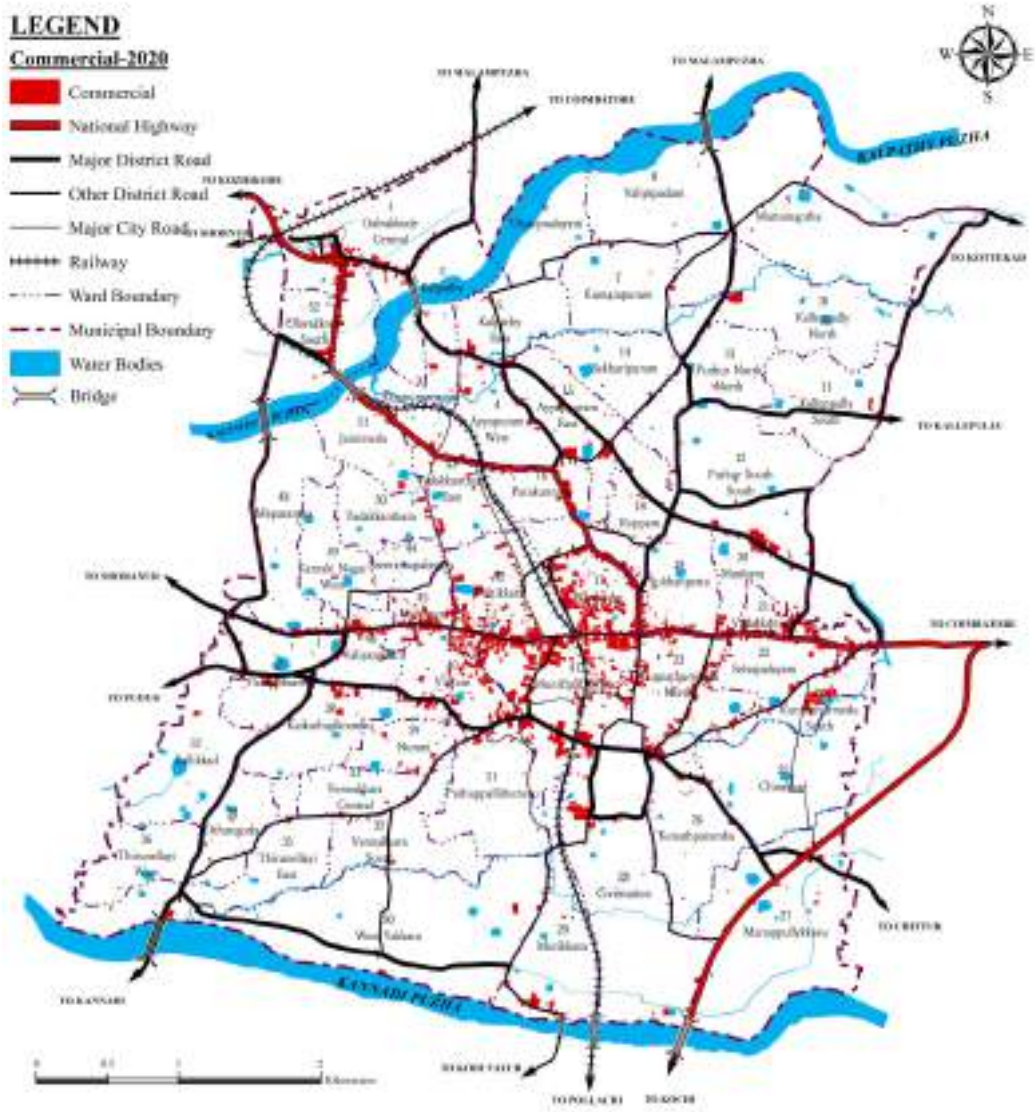


Fig. 6.4 Commercial land use in 2020

It can be seen that retailing has spread out and become decentralized in urban areas. It happened when public transportation became more efficient and covered larger regions, growing car ownership rendered a further decentralization possible together with mass selling techniques and standardization. Finally, the core area only stood for selling high end products, while common place products were sold in shopping centres outside the core area.

While analysing spatial morphology, significant features are the sizes of building, their shape and their spatial configuration. As per AMRUT guidelines the buildings have been classified into 18 sub classes keeping in mind the character of Palakkad town. The spatial development of commercial spaces has largely been on the shoulder of roads. Number of commercial shops and business establishments is shown in table 6.1.

Table 6.1 Details of commercial establishments in the municipality

Subclass	Numbers
Auditorium	54
Banks	65
Convention Centre	10
Credit Society	22
Function Hall / Marriage Garden	24
General Business	2131
Hotel / Restaurant	187
Informal Shop	74
LPG/CNG Gas Booking Office	7
Market (Daily & Weekly) / Mandi	1
Multiplex / Cinema theatre	14
Petrol Pump / LPG filling station	27
Private Office	250
Retail shops	864
Shopping Centre / Mall	194
Storage Godown	255
Warehouse	23
Wholesale shops	69

Source: Primary survey

The major commercial area in the municipality is along the Gandhi bazar road and Ponnani road (Sankunthala jn to Melamuri) which runs almost through the heart of the city. Even today the town is experiencing a shifting of its CBD towards Coimbatore road (Sulthanpet to Kalmandapam) and KSRTC-Mercy college also KSRTC- Thirunellayi roads, Gandhi bazar and Ponnani road still remains a dominant hub of all commercial

activities. In spite of the gradual degeneration of the core, old commercial area still retains its character with traditional shopping areas and wholesale markets making this place dense, haphazard but highly integrated.

Palakkad has a majority of low density commercial units i.e almost 50% establishments belongs to single storeyed buildings. Two storeyed (G+1) buildings constitutes 30% and G+2 category account for 16% and G+3 comprises 3%. Although there are high density commercial establishments and malls sprucing up but relatively their percentages are still less i.e. remaining (upto G+8) altogether constitutes only 1%. Again if we look at the fig 6.5, the high density establishments (new additions) are located mainly around Sulthanpetta junction, Municipal and Stadium bus stands.

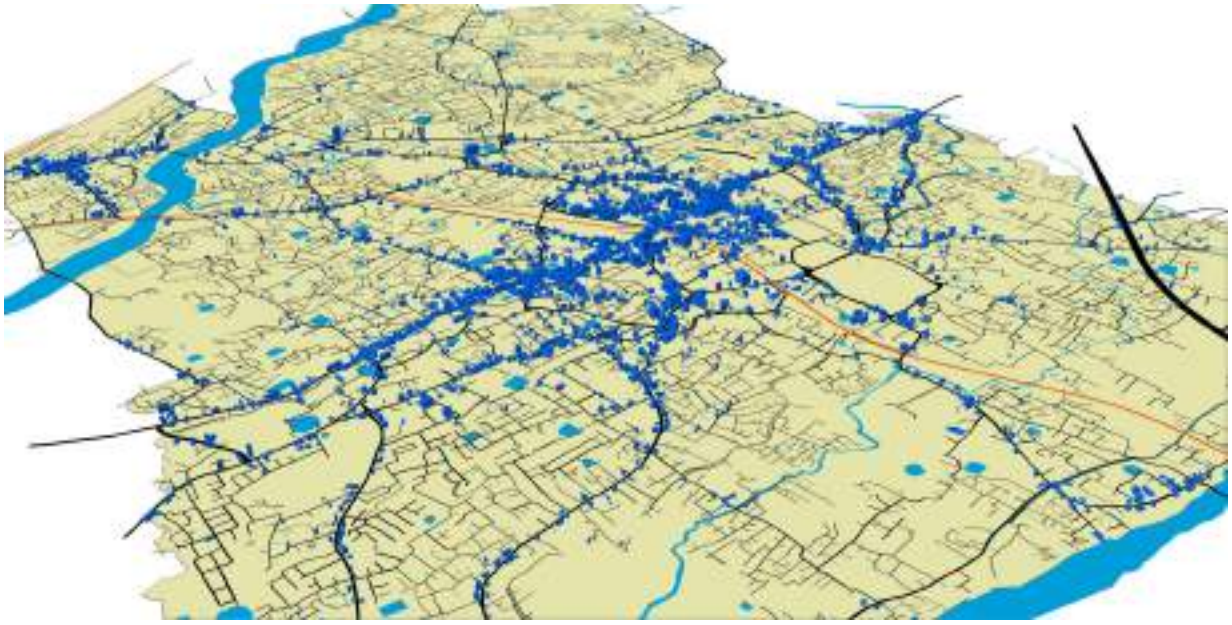


Fig. 6.5 Distribution of Commercial builtup

The wholesale trade in the municipality is mainly concentrated in Valiyangadi and also it is scattered along with the retail shops in the Municipality. Wholesale markets include the trading of rice and other grocery items. The trading of agricultural products in the surrounding LSGIs and entire district to an extend depend on the main wholesale traders in the Big bazaar area.

A total of 36,757 people are employed in commercial establishments. In which 22617(69.71%) are employed in retail sector, 9660(17.37%) employees are working in wholesale shops. 2,650 people are working in restaurants/hotels(8.07%) and 1800(4.85%) are working in various business establishments in the municipality.

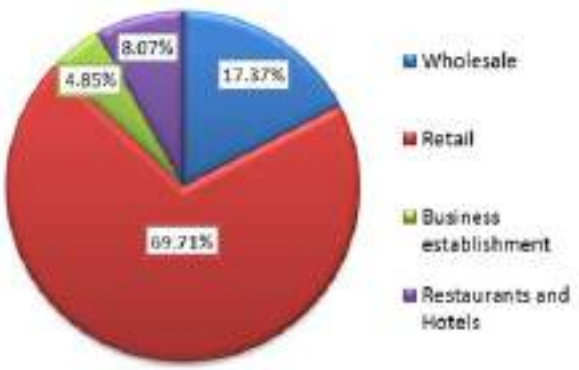


Fig. 6.6 Details of workers employed in commercial establishments

Source: Primary Survey

6.2 MARKETS

i. Big Bazaar, Market Road

One of the major market 'Big bazaar" also known as "Valiyangadi" in market road with an area of about 12 Ha (1.5 km Stretch) is functioning from 4 AM to 9 PM. Valiyangadi act as the major commercial centre for the entire district. It contains majority of the wholesale markets in the Palakkad town which acts as a collection and distribution centre of commodities to other parts of the district. Commercial use is mainly concentrated along the Melamuri-Stadium road.

As stated earlier Moothaan community were the inhabitants of the Tamil merchant communities, who handled all sorts of goods and collected agri produces directly from the cultivators and incorporated trading activities from here to their hometown. They had built their own settlement 'Moothanthara' in connection with the valiyangadi. Big bazar area has been the central place for commercial activities in the municipality for hundreds of years. It was densely built with lively streets used by both pedestrians and horse carriages. The indigenous products like rice, ghee, chillies, leather, salt, oil, and various weapons were merchandized in the market. Infrastructural arrangement for trade as well as regulation of prices remained within the jurisdiction of the rulers. It is possible that a sense of solidarity among members of this community have helped in maintaining its prosperity.



Old face of Valiyangadi

Source: http://www.keralaculture.org/historic-heritage-gallery/old-face-of-palakkad-valiyangadi/289

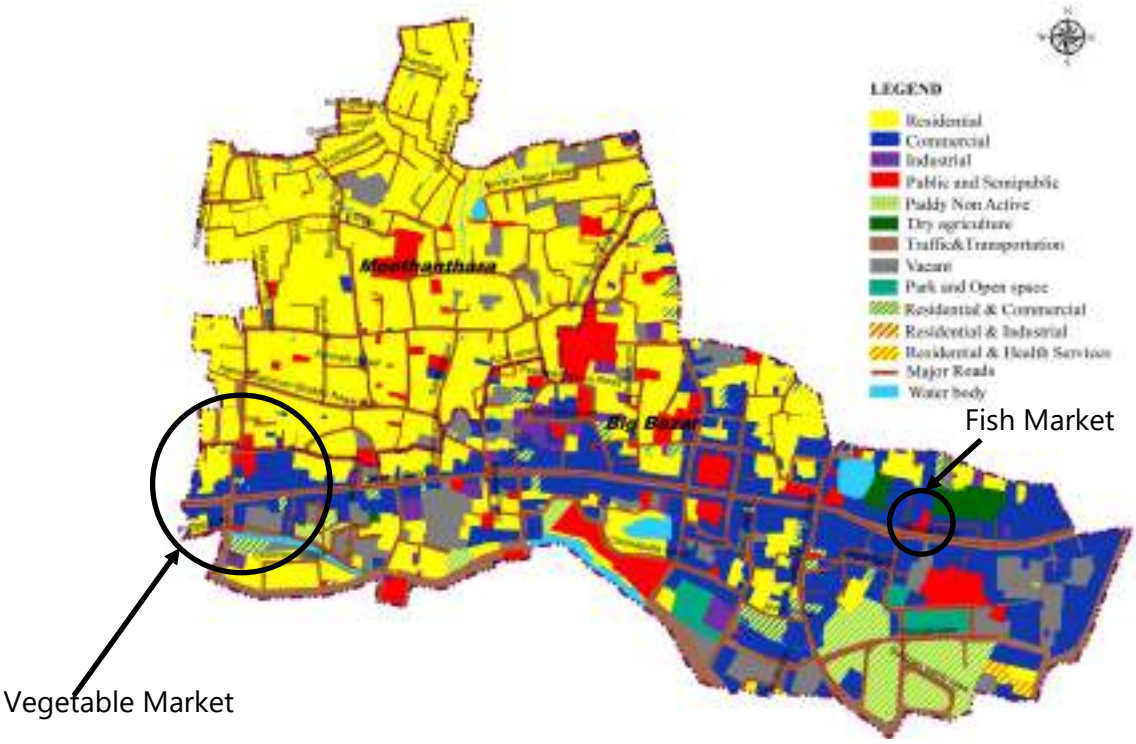


Fig.6.7 Moothanthara and Big Bazaar area

A vegetable market and a fish market are also functioning in this area(fig.6.7).

- **Vegetable Market at Melamuri**

Vegetable (auction) market having an area of 0.439ha at Melamuri provides a platform for hundreds of local farmers and a diverse group of wholesale traders from different districts (also form Tamilnadu), to trade vegetables freshly picked from farms. Every day, nearly 3 to 5 tonnes of an amazing variety of vegetables are sold here. The market functions from 4 AM to 10 PM.







Vegetable Market, Melamuri

- **Fish market**

Market infrastructure includes wholesale market and several fish retail outlets. It has chilled storage and display facilities with an area of 0.234ha.




Fish market, Valiyangadi

Majority of commercial buildings on both sides of market road are dilapidated in nature. In most of the two storied commercial buildings only ground floor is used for commercial activities and remaining upper floors are kept as storage space. This place experiences lack of space for storing commodities there by keeping it on the road itself during day time making the roads congested and unhygienic.

The major problem is the lack of loading and unloading facilities; thereby resulting in parking the vehicles somewhere and transporting material to the site by manual carts which create traffic congestion. Gracing and wandering of cattle on the road sides also create traffic congestion and inconvenience to the pedestrians.




Image of big bazar, Palakkad

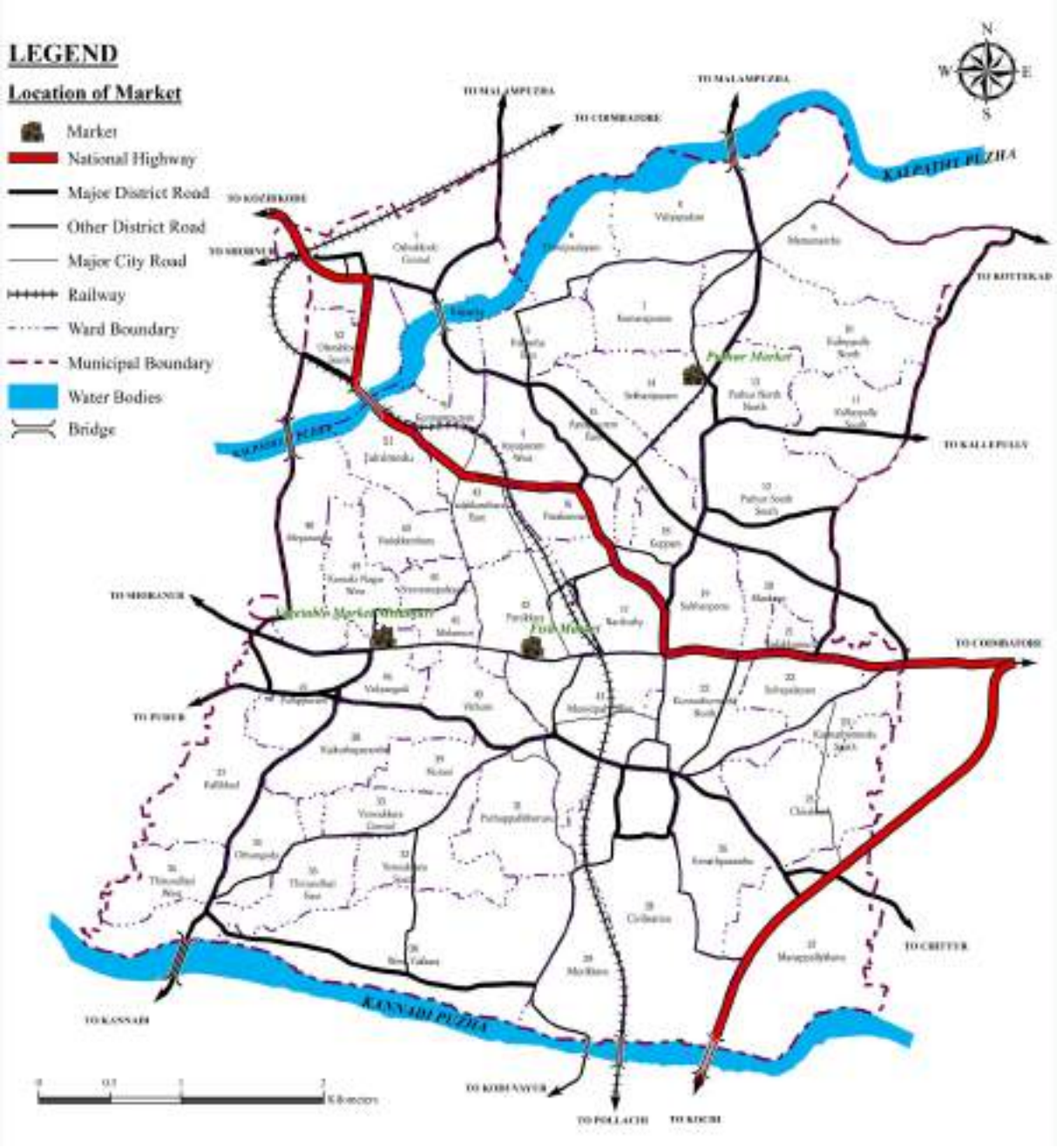


Fig. 6.8 Locations of markets in Palakkad municipality

Weekly Market at Puthur

There is a weekly market in Puthur known as Puthur weekly market functioning in every Monday . It does not have permanent shops. Traders set up shops for the day and closes them in the evening. The market functions from 8 AM to 7 PM. The major commodities are vegetable and meat. The geographic extent of the market is only 100 sq.m area and the land tenure belongs to PWD Kerala.

6.3 STREET VENDORS

Informal sector in urban economy comprises of domestic workers, home-based workers, street vendors and waste pickers. Street vendors are an integral part of urban economy around the world, offering easy access to a wide range of goods and services in public spaces. They sell everything from fresh vegetables to prepared foods, from building materials to garments and crafts, from consumer electronics to auto repairs , haircuts etc.

A street vendor is a person who offers goods or services for sale to the public without having a permanently built structure but with a temporary static structure or mobile stall (or head-load). Street vendors are either stationary occupying space on the pavements or other public/private areas, or mobile moving from place to place carrying their wares on push carts or in cycles or baskets on their heads, or selling their wares in moving buses. Street vendors are a common sight in the municipality and there are totally 677 registered street vendors in Palakkad municipality. The major locations where street vendors are concentrated in the municipality are shown in table 6.2 and figure 6.9 shows the spatial distribution of street vendors in the municipality. Major areas where street vending is going on in the municipality are road stretches near

Table 6.2 Major Street vending zones in the municipality

Location	Number Of Street Vendors	Current Status Of Vending Zone
Civilstation	18	Restricted
Coimbatore Road	42	Free Zone
Court Road	18	Free Zone
Fort Maidan	53	Free Zone
KSRTC Stand	16	Free Zone
Manjakkulam Road	17	Free Zone
Market Road	20	Restricted
Mettupalayam Street	15	Free Zone
Municipal Stand	44	Free Zone
Town Stand	11	Free Zone
Palayampetti Road	11	Free Zone
R S Road	13	Free Zone
Railway Station Road	30	Restricted
Sakuthala Junction	35	Free Zone
Stadium Bus Stand Road	11	Free Zone
Stadium Bypass Road	22	Free Zone
Stadium Road	10	Free Zone
T B Road	20	Free Zone

Source: National Urban Livelihood Mission (NULM), 2017 Report

Sakunthala junction, Municipal bus stand, Stadium bus stand, near Fort maidan, Civil station and Olavakkode railway station.

The gender wise distribution of the street vendors show that 96.16% of the street vendors are male and only 3.84% are female. Age distribution show that male street vendors are in the age group 18 to 80 and females are between 40 to 80. Figure 6.10 shows the percentage of male and female street vendors.

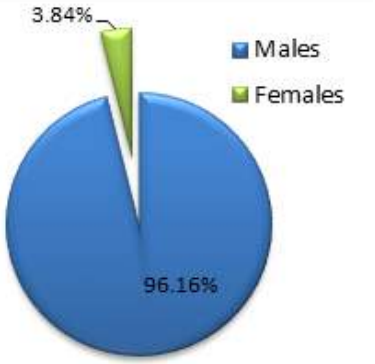


Figure 6.10 Percentage of male and female street vendors

Source: NULM, Palakkad 2017 Report

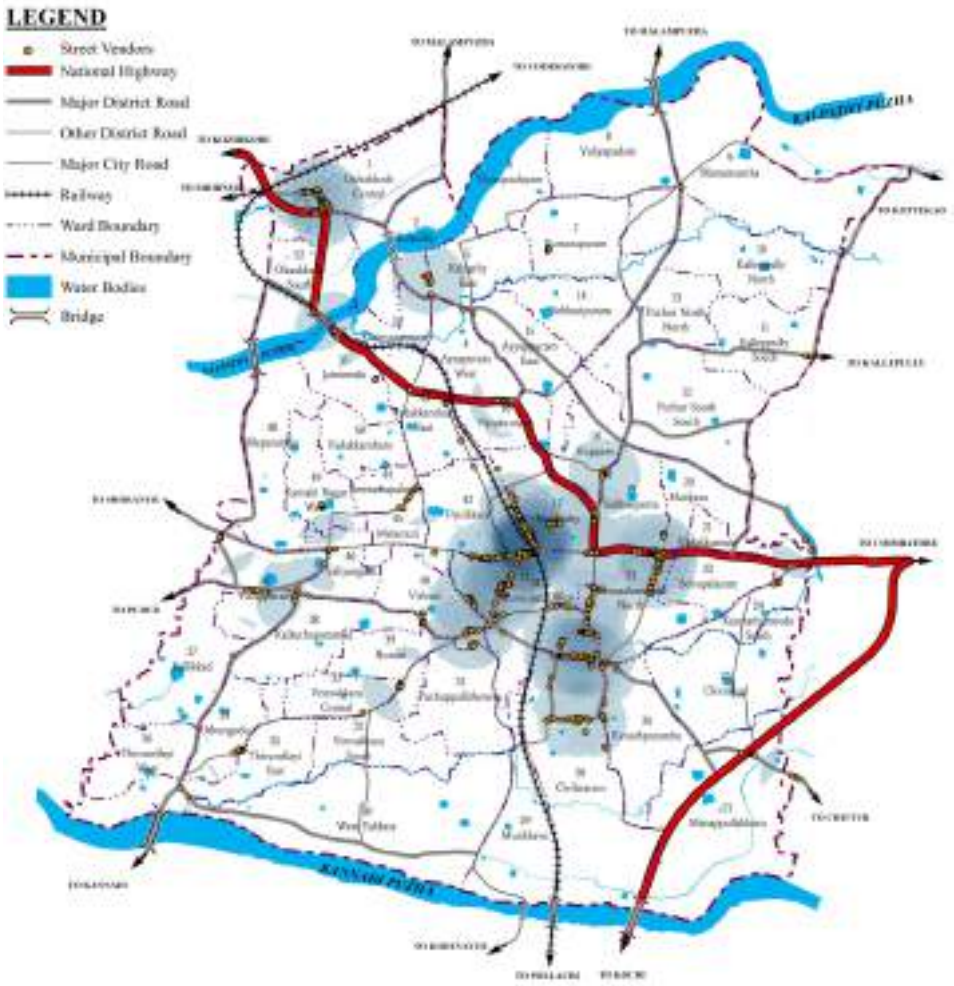


Fig. 6.9 Spatial distribution & point density analysis of street vendors in the Municipality.

Figure 6.11 shows the nature of street vending items sold in the municipality. Among the total street vendors, 66.47% use to sell perishable goods such as vegetables, fruits, food stuffs etc...though they have to face the problem of storage. And remaining 33.53% deals with the sale of nonperishable goods such as clothes, ornaments, leather bags, chapels etc.

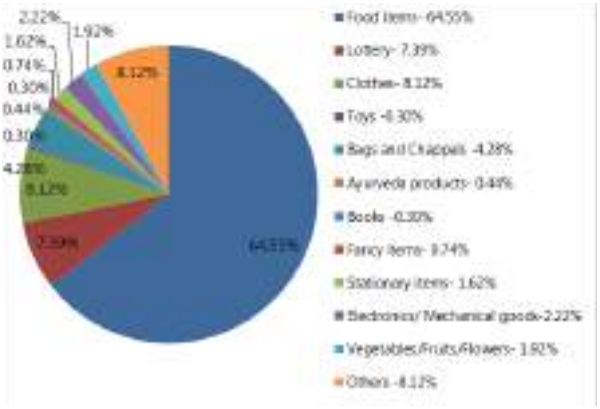


Figure 6.11 Details of street vending items in Palakkad municipality

Source: National Urban Livelihood mission, 2017 Report

Mainly street vending activities are occurring in day time in the Municipality. 67.35% street vendors sell their products in day time. 7.83% of street vendors are active in night time. Mostly night street vending is active near railway station and bus stands. 2.07% vendors are active for 24 hrs. and is seen near hospitals. 2.66% of street vendors prefer mornings till 12 PM and 20.09% uses evenings after 5 PM. Evening and morning activities are seen concentrated with business establishments, offices and parks etc.

Percentage of timings of vending activities is shown in figure 6.12. i.e. among the street vendors 77.25% work for more than 10 hours. The street vendors working for less than 8 hours are only of 22.75% per cent and all of them are women. The percentages of street vendors working for 8 to 10 hours are 38 per cent. This shows that the working hours of most of the street vendors are more than 8 hours.

People engaged in street vending do not have a fixed daily income. Their income keeps changing. Some days, they have a very little income, whereas, next day, they may get more income. Fig 6.13 depicts income status of the street vendors in the

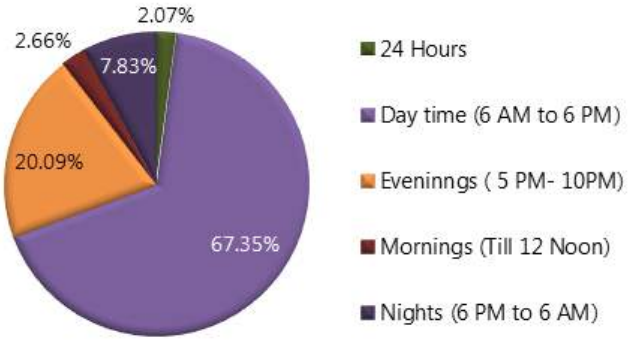


Figure 6.12 Time of Vending Activities

Source: National Urban Livelihood mission, 2017 Report

municipal area. Most of the street vendors (55.67%) had daily income of 251-500 rupees. 12.54% had income between Rs.501-1000. And a very few (2.24) had income more than Rs. 1,000.

By giving them proper education and training they can improve their entrepreneurial skills, so that they could increase their income level and have a better livelihood. Street vending should be regulated so that it does not result in unauthorized occupation of roads and walkways. Effective measures should be taken to streamline their activities by the municipality and should be secured with institutional financial support and legally enforceable protection.

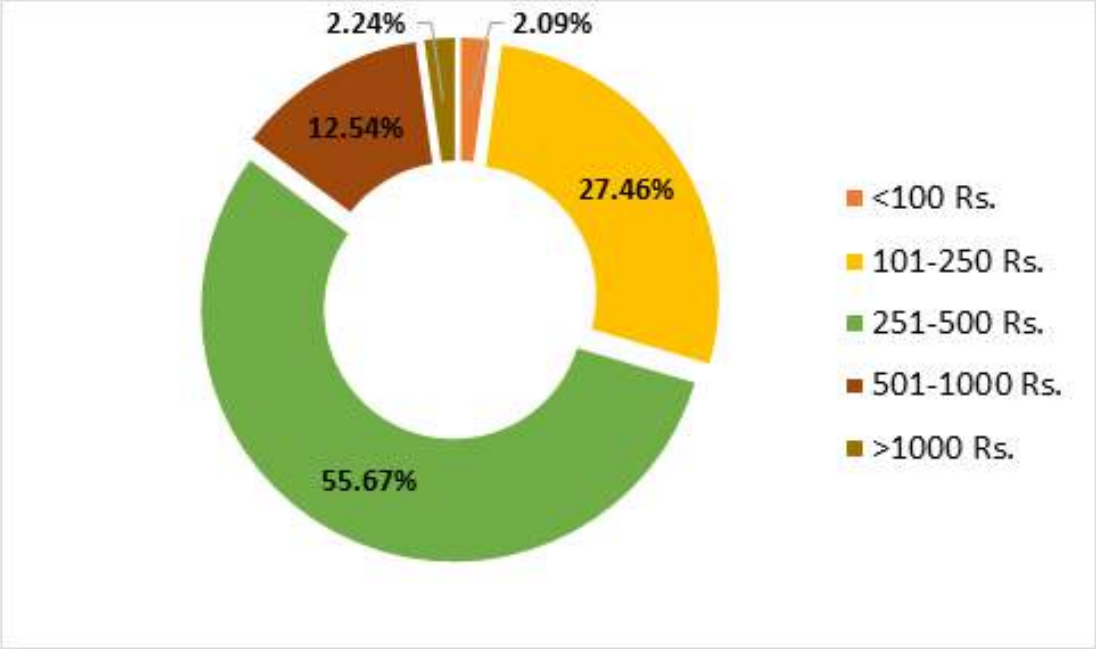


Figure 6.13 Daily income status of street vendors

Source: National Urban Livelihood mission, 2017 Report

6.4 HIERARCHY OF NODES

The agglomeration of activity area around one or more road junction which act as a commercial centre is known as a node. The important nodes in Palakkad municipality is shown in Table 6.3.

The major commercial nodes include Sulthanpeta, Big bazaar, Shakunthala, Noorani and Mission High School/KSRTC junction. Location of KSRTC, Stadium and Municipal bus terminals has influenced the development of certain commercial nodes in the area. Most of the commercial nodes are characterized by inadequate space for efficient circulation of pedestrian and vehicular traffic.

Table 6.3 Existing hierarchy of nodes in the municipality

Hierarchy of Nodes			
I st order	Sulthanpeta	III rd order	Mercy College Jn.
II nd order	Melamuri Jn.		Nurani Jn.
	BEM Jn.		Puthur Jn.
	IMA Jn.		Shekharipuram Jn.
	Olavakkode Jn.		Victoria college Jn.
	Shakunthala Jn.		Chunnambuthara Jn.
	Stadium Jn.		Palat Jn.
	KSRTC Jn.		
	Kalmandapam Jn.		
	HPO Jn.		
	Big Bazar		
	Municipal Busstand		

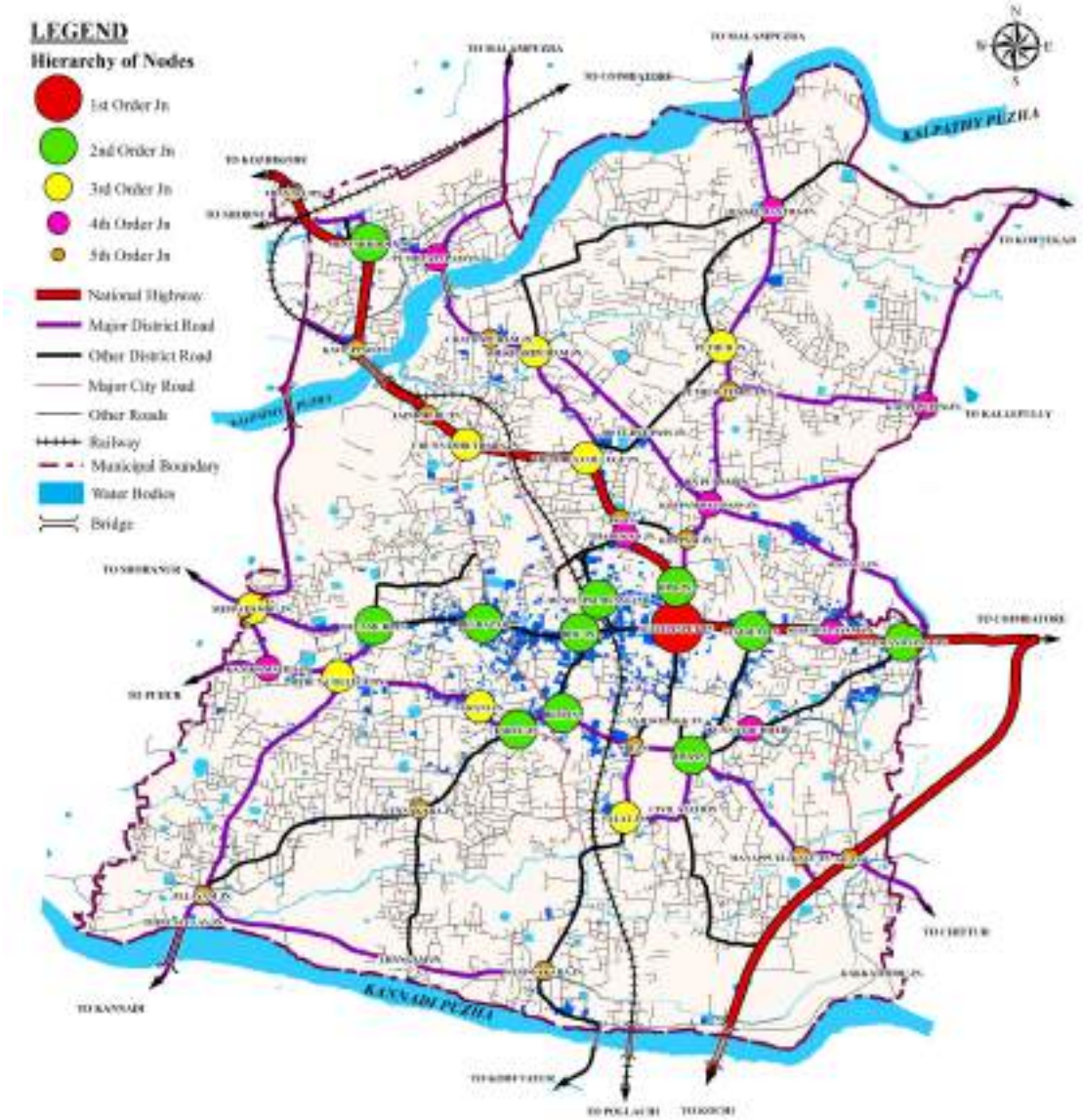


Fig. 6.14 Existing hierarchy of nodes in the Palakkad municipality

6.5 PROBLEMS AND POTENTIALS

Problems

- Lack of enough road width and parking lots prevents smooth maneuvering of vehicles causing frequent traffic block. Gracing of cattle on the road sides also create traffic congestion and inconvenience to the pedestrians.

- Poor maintenance of drains and waste management system creates unhygienic conditions.

Potentials

- Palakkad municipality is the only first order settlement in the district, which itself indicate its commercial importance.

- The town is well connected by road and rail and thus it helps for the easy movement of goods.

6.6 INFERENCE

Insufficient space for parking, loading and unloading goods are the main problems in the existing commercial areas. There is lack of an organized market within the municipality. There is no scientific slaughter houses within the municipality but some unauthorized slaughter houses and meat shops are functioning in the municipality. Street vendors are mainly concentrated along the main corridors and it could create problems in smooth flow of the traffic.



CHAPTER 7- INDUSTRIES

7. INDUSTRIES

Palakkad is an industrial based district and it is the second most industrialized district in the state. Palakkad District is suitable for sustainable industrial development due to the resource availability or raw materials availability and environmental factors. But there are no major and medium scale industrial activities within Palakkad municipality. Non basic and service industries and household industries are the industrial base in Palakkad Municipality.

7.1 EXISTING INDUSTRIAL BASE

In Palakkad Municipality the land under industrial use is 19.269 Ha and it constitutes 0.724% of the total area of the Municipality. There are 2 large and 1 medium scale industries in Palakkad Municipality. Major public sector companies such as the ITI, and the Instrumentation Ltd. are located just 12km from the Palakkad Town. Other companies include The BPL Company, Malabar cements, Fluid Control Research Institute etc. A number of medium industrial units are established in the Kanjikode industrial area.

Industries under MSMED Act 2006 are classified into two types, such as enterprises engaged in the manufacture or production of goods and enterprises engaged in providing or facilitating services. Both types are again classified on the basis of investments into three, such as micro, small, medium and large industries.

Table 7.1 Type of industries in Palakkad municipality

Sl. No.	Type of Industries	No. of units
1	Large	2
2	Medium	1
3	Small	46
4	Household	953
5	Hazardous	0

Source: Industries department office, Palakkad

In the Municipality, majority of the industries are small and household industries. Different types of industries are given in table 7.1. There are only two Large scale industries in Palakkad Municipality; that is Malayala Manorama Co-operative limited and KSE Ltd at Othongode. There is one medium scale industry which is Malabar Region Co-operative Milk Producers Union (Milma), Palakkad Dairy at Kallepully. There are no hazardous industries in the Municipality. There are 46 small scale industries

registered till 2019. There are 953 household industries in the Municipality registered till 2019.

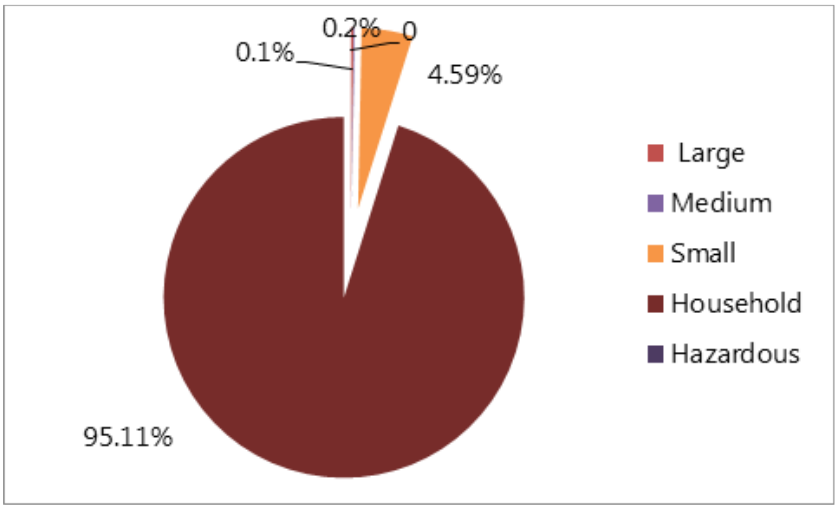


Fig.7.1 Percentage of categories of industries in Palakkad municipality

According to 2018-2019 statistics, in Palakkad Municipality 95.11% of total industries are micro household industries and household industries are the industrial base of Palakkad Municipality. Small scale industries constitute only 4.59%. In Palakkad Municipality, there are 0.2% of large industries and 0.1% of medium industries. Percentage of various categories of industries are shown in figure 7.1.

Service industries such as rice and flour mills, oil mills, saw mills, timber industries, printing and binding, tyre retreading, cotton textiles, garment manufacturing service, repair of vehicles etc. are located in various parts of the town. There are industrial units established in Kanjikode industrial area which is 12 kms away

Table 7.2 Temporal variation of SSI registered in Palakkad municipality

Type of Industry	2000	2005	2010	2019
Agro based	184	250	35	47
Rubber based	7	29	6	0
Plastic	22	29	58	9
Forest	53	53	26	26
Animal Husbandry	34	34	46	3
Textile	186	271	213	92
Chemical	94	102	21	17
Engineering	262	298	72	215
Electronic	28	72	13	122
Mineral	0	7	4	8
Building material	14	24	75	46
Others	742	832	440	417
Total	1626	2001	1009	1002

Source: Panchayath Level Statistics, DIC - Palakkad

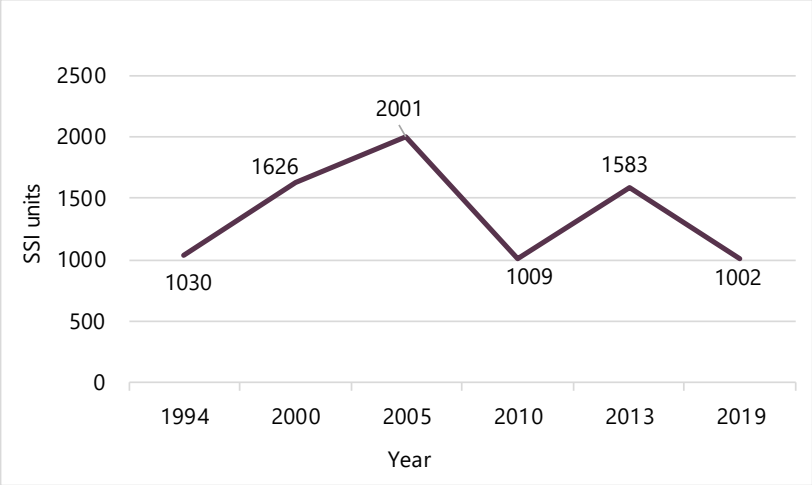


Fig.7.2 Temporal variation of SSI registered in Palakkad municipality

Source: Panchayath Level Statistics, DIC - Palakkad

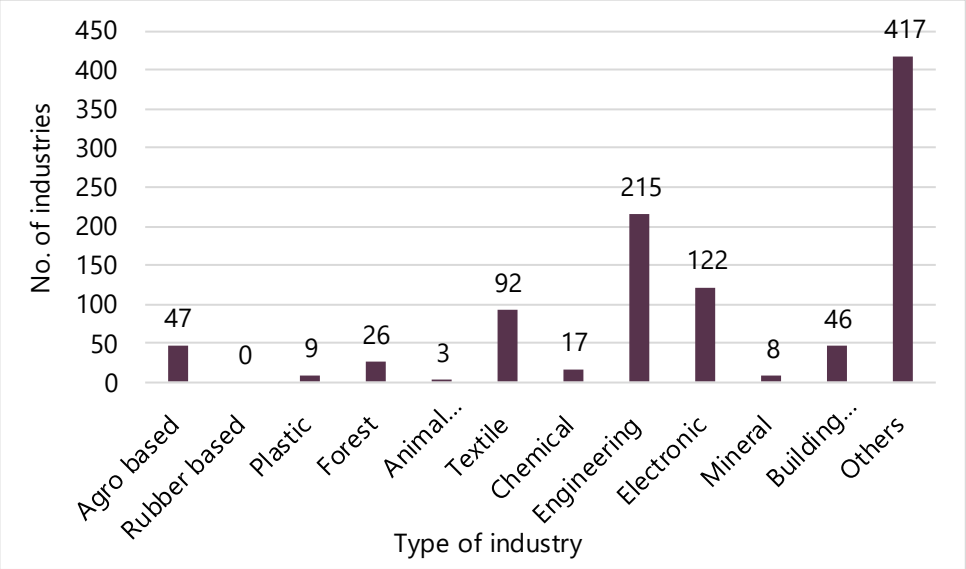


Fig.7.3 SSI registered up to 2019 in Palakkad municipality

Source: District Industries Centre, Palakkad

from Municipality.

Earlier, enterprises were broadly classified into agro based, rubber based, forest based, animal husbandry based, textile materials, chemical, engineering, electronics, minerals, plastic based, building materials and others. Industries registered up to the years 2000, 2005, 2010 and 2019 are shown in table 7.2. Figure 7.2 shows the temporal variation of industries in Palakkad Municipality and figure 7.3 shows the SSI units registered up to 2019.

Number of SSI units show a decreasing trend from 2005 to 2019. As per 2019 statistics, 21.46% are engineering based industries which include mostly workshops and manufacture of fabricated structural works. 41.62% of other category mainly includes bakeries, food industry, printing and DTP works, beauty parlors etc. which

mainly act as service industries. There is an increase of 23.1% in 2005 and from 2000 to 2005. The number of industries is reduced to half the number in 2010. From 2010 to 2019 there is no major increase in number of industries is seen.

Food processing and general engineering are the major industrial sectors in the municipality. Major portion of industries are engineering industries which include mechanical workshops, fabrication works. It includes industries which manufactures fabricated structural products of iron or steel: bridges and bridge parts, towers, masts, columns, girders, trusses, arches, sluice gates, piers and jetties. Erection of structures from self-manufactured parts are included in these industries. Agro based industries include mainly rice mill (flour mills) and coconut oil mill which act as service level industries only. There are 17 flour mills, 3 rice mills and 2 oil mills in the municipality.



Fig.7.4 Location of important industries in Palakkad municipality

1002 units in the municipality belong to the micro and small industrial units. Out of which, there are 189 female entrepreneurs. Two Kudumbasree units are registered under industries department. In Municipality, there are 2 women Co-operative societies registered under industries department. One is a printing unit by Palakkad Sree Narayana Vanitha ICS Limited and the other is Priyadharsini Vanitha Industrial Co-operative society Limited which is a vanitha canteen registered under MSME Act 2006 - Entrepreneurship Memorandum part II. Also there are 92 physically handicapped entrepreneurs in the Municipality.

Earlier there were MSME Act 2006 Part 1 and 2 registrations for industrial units. Then after that the industrial units were registered under permanent SSI registration. Presently, there is a unique identification number under Udhyog Aadhaar. Out of 1001 SSI units, 445 industries are updated to Udhyog Aadhaar (44.46% of total SSI units).

7.1.1 Schemes and Programmes

Earlier there were two schemes: Standard investment subsidy scheme and Margin money loan scheme.

- The Standard investment Subsidy Scheme (SIS)

SIS is a scheme of the Government of Kerala to promote productivity, job opportunities and entrepreneurship of IT sector in Kerala. The Government provides subsidy based on Fixed Capital Investment (FCI) of the IT Unit. Industries in the Municipality registered under this SIS scheme.

- · Margin Money Loan Scheme (MML)

MML scheme was initiated by the Government of Kerala with an objective to assist potential entrepreneurs in establishing small-scale industrial units by offering soft loan to raise the required equity that is insisted on by the financing institutions.

Presently there are two schemes for development of SSI units like Entrepreneur support scheme, Prime minister's employment generation programmes.

- · Entrepreneur Support Scheme

The ESS is a scheme initiated by Government of Kerala with an aim to merge and replace all the previous schemes like SIS and MML schemes. ESS provide extensive support to micro, small and medium enterprises and and give one time support to entrepreneurs, with due regard to special categories by optimal utilization of funds and giving more flexibility of operation while implementing the scheme.

- · Prime Minister's Employment Generation Programme (PMEGP)

In this PMEGP scheme, 15 days training is given to the entrepreneurs and subsidies for new startups are given through designated banks for eventual disbursal to the

beneficiaries / entrepreneurs directly into their bank accounts.

7.1.2 Declining SSI Units in the Municipality

In Palakkad Municipality 17 SSI units out of 1001 are identified as declining and out of that 6 units are not working. Table 7.3 shows the list of units which shows declining trend. The main problems are introduction of GST, high competition, marketing problems etc.

Table 7.3 Details of Declining SSI units in the Municipality

Sl. No.	Name Of Enterprise	Category	Description	Reason For Declining
1	Cee Kay Candles	Micro	Wax Candles	No Market Potential
2	Sree Thirupuraikkal Kudumbasree Unit	Micro	Detergent Powder	Promoters Personal Problems
3	MBS Tyres	Small	Tyre Retreading	High Competition
4	Bismi Two Wheeler Service	Micro	Maintenance Of Motor Vehicle	Location Problem
5	Mayugham Beauty Parlour	Micro	Beauty Parlour	High Competition
6	Sree Krishna Springs	Micro	Spring Works	Due To GST Problem
7	Srishti	Micro	Fashion Design Related To Textiles, Wearing Apparel, Shoes, Jewelry, Furniture And Other Interior Decoration And Other Fashion Goods.	High Competition
8	Safe Travels	Micro	Tours & Travels	Marketing Problem
9	New Kitchen Service	Micro	Stove Repairing	Not Fully Involved
10	Cheenus Catering and Events	Micro	Catering Service	GST - New Service Tax Enhancement
11	Sree Ranga Flour Mill	Micro	Flour Milling	Management Problem
12	Tasty Food Products	Small	Flour Milling	Marketing Problem Due To Note Issue And New Policies Of Central Govt
13	Raindrops Visual Media	Micro	Digital Studio	Accessibility Of The Area
14	Star Polish	Micro	Metal Polish	Raw Material Problem
15	Tech Experts	Micro	Software Development	Management Problem
16	Vijaya Metal Company	Micro	Manufacture Of Tableware, Kitchenware And Other Household Articles	Management Problem
17	Shruthi Communications	Micro	Photostat, Blue-Printing, Xeroxing, Copying Of Documents, Ammonia Printing And Cyclostyling Services	New Technology

Source: Panchayath Level Statistics, 2011

7.2 HOUSEHOLD INDUSTRIES

Main household industries in the Municipality include food items, stitching, clothes, repairing works etc. Food items include pickles, Pappadam, Dosa batter, snacks, etc. Other household industries include tea shops, flour mills, beauty parlors etc associated with houses. The potential areas for service industry in Palakkad Municipality are textile & tailoring, general engineering, flour milling and beauty parlor. From the analysis, the potential areas for new MSMEs in the Municipality are food and beverages, wood base industry, plastic based and paper based industries. Figure 7.5 shows the percentage of household industry sectors.

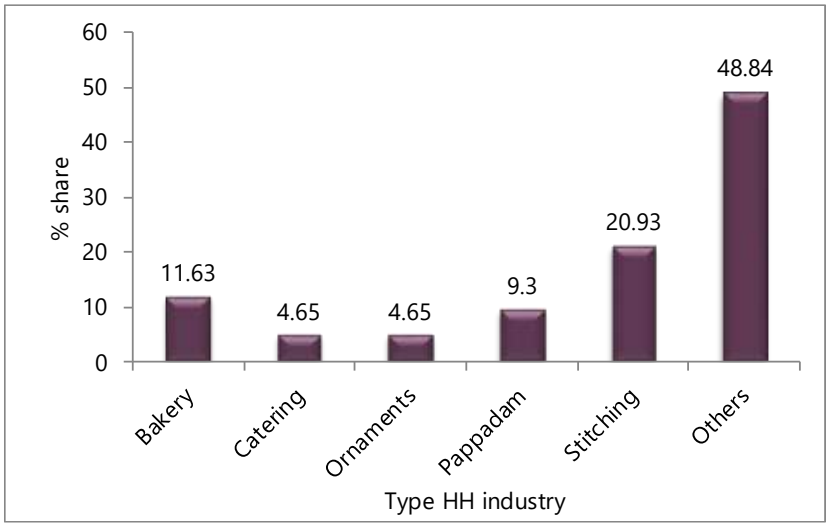


Fig.7.5 Percentage of household industries in Palakkad

Source: Socio economic survey,2019

7.3 TRADITIONAL INDUSTRIES

Central and state Government have come up with a number of schemes for the development of sectors such as cluster approach for development, Advanced tools and Craft development centers, Skill development training, Design and product development, Creation of marketing infrastructure, Craft tourism initiatives. There are only 5 handicrafts and coir units in the Municipality with 17 employees and the details of these traditional industries are shown in Table 7.4. This shows a least possible potential for traditional industry in Palakkad Municipality.

Table 7.4 Traditional industries in Palakkad Municipality

Sl. No.	Traditional Industries	No. of units	No. of employees	Commodities
1	Handicrafts	3	9	Fibre Brushes, Metal Plates, Metal Articles
2	Coir	2	8	Manufacture of brooms and brushes

Source: District Industries Centre, Palakkad

7.4 INDUSTRIAL WORKERS

Table 7.5 shows the details of industrial workers in Palakkad Municipality and Figure 7.6 and 7.7 shows the percentage of workers and native of workers respectively.

Table 7.5 Details of Industrial Workers

Sl. No.	Type of Industries	No. of units	No. of workers						Total Workers
			Keralite			Non-Keralite			
			M	F	T	M	F	T	
1	Large	2	105	16	121	9	0	9	130
2	Medium	1	123	35	158	0	0	0	158
3	Small	47	597	246	843	46	0	46	889
4	Household	953	2143	907	3050	47	0	47	3097
5	Hazardous	0	0	0	0	0	0	0	0

Source: District Industries Centre, Palakkad

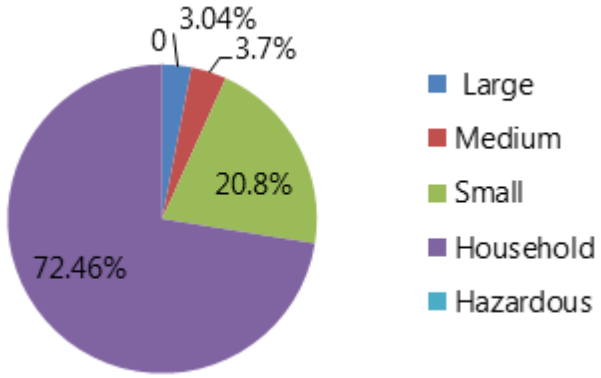


Fig.7.6 Percentage of industrial Workers

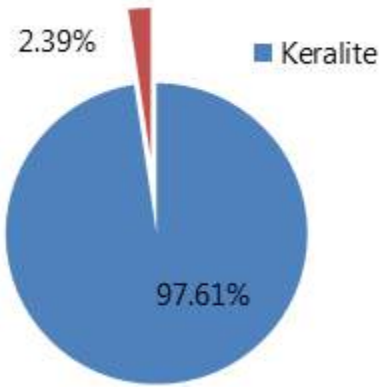


Fig.7.7 Percentage of native of industrial workers

In Palakkad municipality 75.92% of industrial workers are household industrial workers and 21.79% of workers are small scale industrial workers. This indicates the potential of household industry in the Municipality. According to 2019 statistics, the major contribution of workers in industrial sector is native workers. Only 2% of non Keralite workers are there in Palakkad municipality.

7.5 PROBLEMS AND POTENTIALS

- **Problems**

Palakkad is an industrial based district. But in the case of Palakkad municipality most industries are mainly concentrated outside the Palakkad municipal boundary especially at Kanjikkode in Pudussery Panchayat. Lack of vacant land and increase in the residential land use prevents the establishment of large scale industries. Environmental issues related to the industries are the major problem in this sector.

The land area under industrial use comes 18.11 Ha, which constitutes only 0.68%

of the total municipal area.

- **Potentials**

Food processing and general engineering are the major industrial sectors in the municipality. Household industries are the main industrial base of Palakkad municipality. Also the connectivity of town to the neighboring districts and state makes it a major processing, collection and distribution centre. There are 2 large scale industries in Palakkad Municipality. One is KSE Ltd and other is Malayala Manorama Co-Operative limited. One medium scale industry is Malabar Region Co-operative Milk Producers Union (MILMA), Palakkad Diary, Kallepully. One large scale industry and medium scale industry in Palakkad Municipality are agro allied related industries.

7.6 INFERENCE

Palakkad is well connected to the neighboring district and state. The major portion of the industries in Palakkad Municipality is household industries. The municipality's industrial base is food processing units and general engineering works. The municipality lacks basic industries and not in a position to export industrial goods. Lack of vacant land and environmental problems due to high residential area are the main problems that hinder the establishment of industries within the municipality.



CHAPTER 8- AGRICULTURE

8. AGRICULTURE

Palakkad known as the "Granary of Kerala". Agriculture accounts about 60% of the economy of the district and about 65% of the total labour class of the district. Palakkad district holds 11.5% of the total cropped area of the state and also accounts 41% of the area and production of paddy crop. The district holds first position in vegetable cultivation and third position in the case of spices and condiments.

Agriculture sector is passing through a very difficult period as a result of a steep fall in the prices of most of the farm commodities. Agriculture sector needs special attention in the case of Palakkad district.

8.1 AREA UNDER CULTIVATION

In Palakkad municipality, agriculture constitutes nearly 626.633 Ha area which is 23.557% of the area of municipality. The major cultivation in the municipality is paddy 576.749 Ha, which is 21.682% of the total land area, but the paddy active is 154.99 Ha as per land use survey 2019, which is 26.87 % of the total paddy. Other important crops are Coconut, Vegetables, Areca nut, Pepper, Ginger, Tapioca, Banana and Turmeric. But the area of cultivation and production of these crops are very less compared to Paddy.

8.2 IMPORTANT CROPS AND PRODUCTION

Area, production and productivity of important crops in the municipality over the last five years is shown in Table 8.1. Among the important crops, paddy is the major crop in the municipality.

The area of cultivation of paddy including 1st and 2nd crops was decreasing from 310 Ha (2014-15) to 260Ha (2018-19). During the period 2014-16, paddy cultivation area was reduced by 40 hectares and in 2015-17 an additional 20 Ha area under cultivation was reduced. After this, during 2017-19 an additional 10Ha area was used for Paddy cultivation in the municipality. Totally 50Ha (16.13% decrease) area paddy under cultivation was reduced during 2014 to 2019. Whereas there was sizable increase of 27.78% in area, under coconut cultivation during the same period. i.e. the area of coconut cultivation was increasing gradually from 90Ha in 2014-15 to 115Ha in 2018-19. The temporal variation of area, production and productivity of paddy and coconut is shown in figure 8.1 and 8.2 respectively.

Production of paddy during 2017 to 2019 shows 20% increase whereas the area of cultivation remains the same. Productivity of paddy is increased from 9 tone/Ha. during the last 5 years. The production of coconut is gradually increasing from 2014 to 2019. There is no further change in the productivity of coconut in the last 5 years.

The area of vegetable cultivation has gradually decreased from 50 Ha to 25 Ha during the period 2014-18 and then increased to 30 Ha in 2018-19. The area of other crops shows no major difference from 2014 to 2017. Productivity is high for banana and Plantain. However, the area of these are very small compared to Paddy and Coconut.

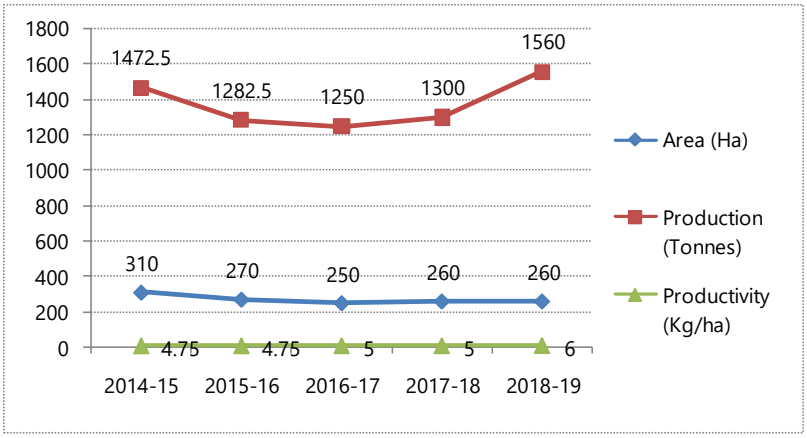


Fig.8.1 Temporal variation of productivity, production and area of paddy

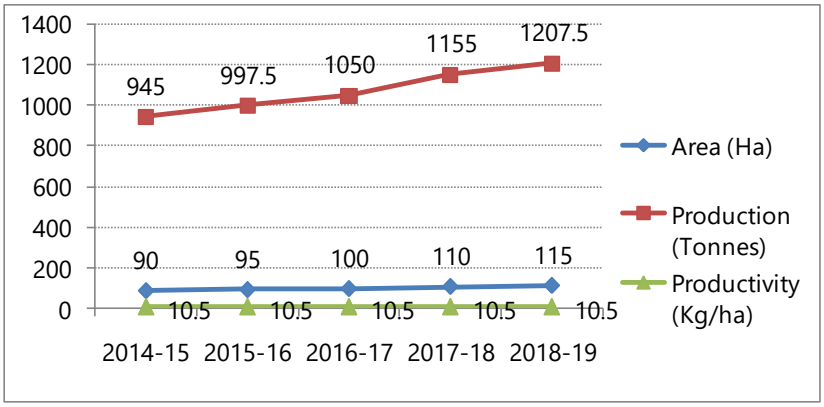


Fig. 8.2 Temporal variation of productivity, production and area of coconut

Source: Krishi Bhavan, Palakkad

Productivity of Areca nut remains constant from 2014 to 2019. Productivity of Pepper was constant during 2014 to 2018 and then shows slight increase. In the case of tapioca it served both as a food crop and a source for value addition. This might have prompted the farmers for its regular cultivation and maintaining a gradual increase in production. Productivity is high for banana and plantain. However, the area of these are very small compared to paddy and coconut. Remaining crops show a constant productivity during the last three years.

Even though the area under paddy cultivation is decreasing the production of paddy shows increasing trend due to the mechanization. The depleting trend of area of paddy cultivation shows the urbanization character of the municipality and indicates

Table 8.1 Temporal variation of production & productivity

Type of crop	Area (Ha)					Production (Kg)					Productivity (Kg/ha)				
	2014-15	2015-16	2016-17	2017-18	2018-19	2014-15	2015-16	2016-17	2017-18	2018-19	2014-15	2015-16	2016-17	2017-18	2018-19
Paddy	310	270	250	260	260	1472500	1282500	1250000	1300000	1560000	4750	4750	5000	5000	6000
Coconut (nos)	90	95	100	110	115	945000	997500	1050000	1155000	1207500	10500	10500	10500	10500	10500
Areca nut (nos)	5	4	3	3	3	45000	36000	27000	27000	27000	9000	9000	9000	9000	9000
Pepper(kg)	3	3	3	3	3	9000	9000	9000	9000	10000	3000	3000	3000	3000	3333
Banana(kg)	5	5	5	5	4	100000	100000	100000	100000	100000	20000	20000	20000	20000	25000
Plantain(kg)	4	4	4	4	4	80000	80000	80000	90000	90000	20000	20000	20000	22500	22500
Tapioca(kg)	3	2	2	2	2	30500	20700	20900	21000	21000	10166	10350	10450	10500	10500
Ginger(kg)	1	1	1	1	1	6000	6000	7000	7000	7000	6000	6000	7000	7000	7000
Turmeric(kg)	1	1	1	1	1	7500	7500	7800	7800	7800	7500	7500	7800	7800	7800
Vegetables	50	40	35	25	30	12500	8000	6125	3125	4500	250	200	175	125	150

Source: Krishi Bhavan, Palakkad

that the paddy fields may be turned into residential uses or otherwise used for dry cultivation purposes.

8.3 SPATIAL DISTRIBUTION OF AGRICULTURAL LAND

From the spatial distribution of paddy, it is clear that the paddy is concentrated around the water bodies. In the south of the municipality, paddy fields are concentrated around the Kannadi puzha. Active & non active paddy are there in the municipality. Active paddy in which paddy cultivation is going on and it is concentrated in wards Valiyapadam (8), Mattumantha (9), Kallepully North (10), Puthur South (12), Puthur North (13), Chirakkad (25), Kenathuparambu (26), Manappullikkavu (27), Civil Station (28), West Yakkara (30), Puthuppallitheruvu (31), Vennakkara South (32), Thirunellayi East (35), Thirunellayi West (36), Kallikkad (37), Pallippuram (47), Meparamba (48). Non active paddy is in which currently there is no paddy cultivation going on. Figure 8.3 shows the spatial distribution of Paddy.

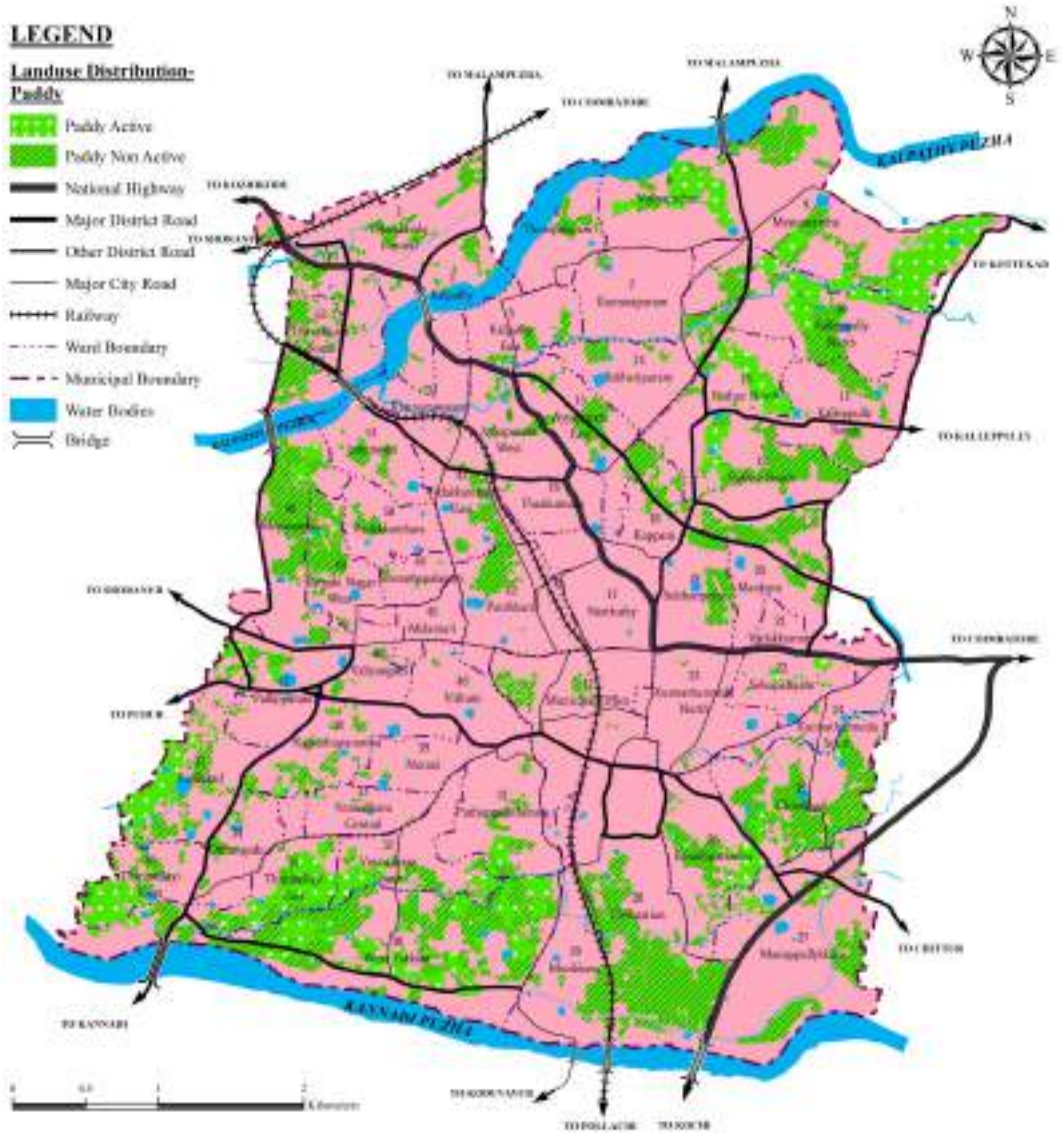


Fig. 8.3 Spatial distribution of paddy

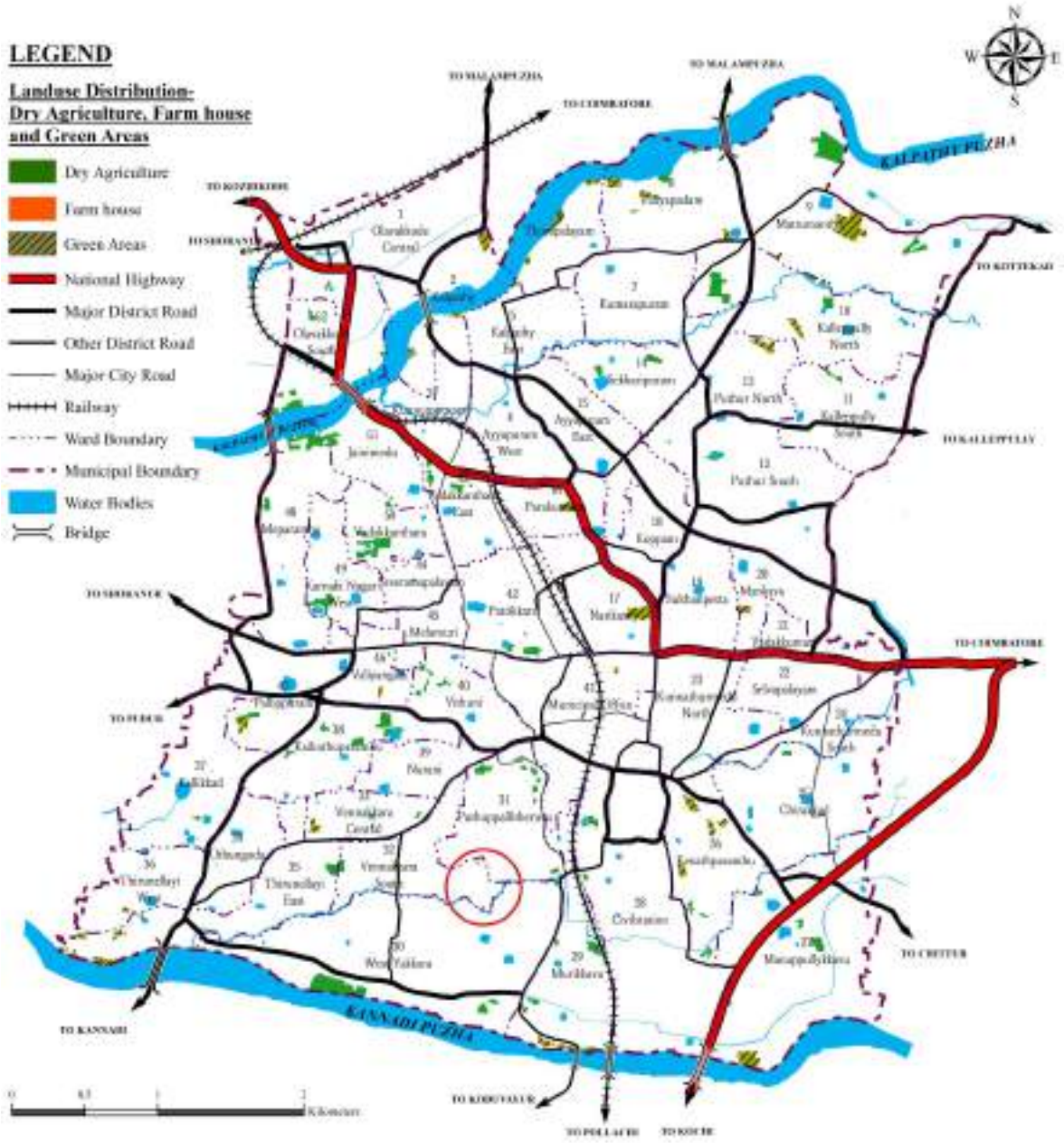


Fig. 8.4 Spatial distribution of dry agriculture

Figure 8.4 shows the spatial distribution of dry agriculture in Palakkad municipality. From the spatial analysis, it is seen that the dry agriculture area in the municipality is very less and it is scattered in different portion of the municipality. The main dry agriculture crops in municipality are coconut, areca nut, banana, plantain etc.

8. 4 AGRICULTURAL INPUTS AND MARKETING FACILITIES

Agricultural and marketing inputs include distribution of seeds, fertilizers and crop protection from chemicals, irrigation facilities, mechanization, storage facilities, distribution of agricultural produces and processing units etc.

- Quality seeds

Seeds are distributed under people's plan scheme in the municipality. Krishibhavan collects seeds from Vegetable and Fruit Promotion Council Kerala (VFPCK) – Alathur & Kerala State Seed Development Authority (KSSDA) and distribute it to the farmers. Also farmers use their own seeds for cultivation.

- Marketing centers for fertilizers

Marketing centers for chemical fertilizers and insecticides is only 10 in the Municipality. In which, 9 of them are private. Chemical fertilizers are more predominant than organic fertilizers. Farmers make use of chemical fertilizers for the cultivation. Agriculture department also provides fertilizers and pesticides for farmers through Krishibhavan also. Table 8.2 shows the details of marketing centers for fertilizers in the municipality.

Table 8.2 Details of marketing centers for fertilizers

Sl No.	Product	Marketing Centres		
		Private	Co-operative	Farmers participation
1	Pesticides and Insecticides	6	-	
2	Chemical fertilizers	3	1	

Source: Krishibhavan, Palakkad

- Machineries used

Farming activities are done using machines and are also done manually . The main machineries used are transplanter, reaper tractor, power tiller etc. For watering pumpsets, knapsack sprayer, power sprayer, rocker sprayer etc. are used. There are 2 shops in the municipality supplying machineries: Krishi Kendra near town bus stand and Agromart in Manjakulam road. The table 8.3 shows the details of machineries used in the municipality.

Table 8.3 Machineries used

Type of Machinery	Quantity (Nos)	
	Public	Private
Tractor	-	2
Power Tiller	-	2
Transplanter	1	-
Reaper	1	-
Power Weeder	-	-
Power Sprayer	-	4
Rocker sprayer	-	2
Thresher	-	-
Pump set	-	60
Knapsack Sprayer	-	20

Source: Krishibhavan, Palakkad

- Storage and marketing facilities

There is no storage centre or marketing centre for agricultural products in the municipality. Kerala State seed farm Kunnanur is located just outside the municipal boundary near Kalmandapam Junction.

8.5 PADASEKHARA SAMITHIES

Organisation of farmers of a locality, registered under any law for the time being in force, with the objective of promoting paddy cultivation called Padasekharasamithies which form the driving force for group farming activities. There are 8 active Padasekhara samithies in the Palakkad municipality and the details of them are shown in Figure 8.5. and in Table 8.4.



Fig.8.5 Spatial distribution of padasekhara samithies in Palakkad municipality

Table 8.4 Details of padasekhara samithies in Palakkad municipality

Sl. no.	Name of Padasekhara samithies	Number of Farmers	Season	Total Area in hectare	Availability of seeds etc (satisfactory or	Machineries used	Existing irrigation facilities
1	Thottingal	35	I	40	Satisfactory	Tractor, Tiller, Transplantor, Harvester	Canal, Rain, Pumpsets
			II	40			
2	Murugani	60	I	40	Satisfactory		
			II	40			
3	Thirunellayi	22	I	10	Satisfactory		
			II	10			
4	Vennakkara	26	I	10	Satisfactory		
			II	10			
5	Karukodi	8	I	7	Satisfactory		
			II	7			
6	Kallekkad	12	I	7	Satisfactory		
			II	7			
7	Vazhanchery	24	I	15	Satisfactory		
			II	15			
8	West Vennakkara	42	I	15	Satisfactory		
			II	15			

Source: Krishi Bhavan, Palakkad

8.6 IRRIGATION FACILITIES

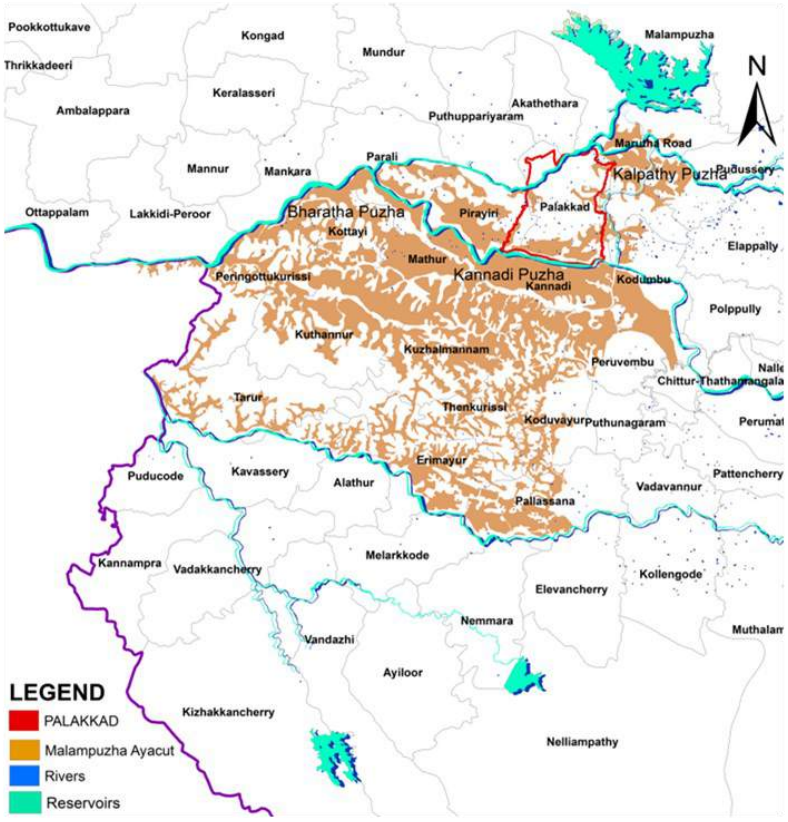


Fig.8.6 Malampuzha irrigation project ayacut area

Source: Irrigation Department, Palakkad

i. Malampuzha Irrigation Project

Agricultural sector in the municipality mainly depends on Malampuzha dam for irrigation, which is 6 Kms away from the municipality. Malampuzha ayacut area extends about 21,165 Ha. It covers Palakkad, Ottappalam municipalities and 24 neighboring panchayats. The crops irrigated in this project are mainly Paddy in both seasons. Irrigation is provided mainly November – February months.

The main crop in the municipality is paddy. In Palakkad municipality, there is autumn (1st Crop) and winter paddy (2nd Crop) and there is no summer paddy or third crop. First crop completely depends on Monsoon rain and no irrigation is required. For winter paddy or second crop, irrigation is provided. The irrigation facilities is provided through irrigation canals and private wells in the municipality. There is no lift irrigation and irrigation by tube wells. The total ayacut area of Palakkad municipality is 965.76 Ha. Figure 8.6 & 8.7 shows ayacut area of Malampuzha and Palakkad municipality respectively.



Fig.8.7 Ayacut area of Palakkad municipality

Table 8.5 Details of rivulets (thodu)

Sl No	Name of Thodu	Length in Km
1	Sankuvara thodu	7.3
2	Ramanathapuram Canal	3.5
3	Manappullikkavu-Yakkara-Thiru Nellayi thodu	5.5
4	Thiru Nellayi-Ayodhya Nagar thodu	1.5
5	Chadanankurissi-Thankam Hospital Canal	1.5
6	Manakkal thodu	2.5
7	Vadakkumthara thodu	2.7
8	B.O.C Road Canal	1.25
9	Olavakkodu thodu	-
10	Edathara canal-Vithunny-Thiru Nellayi	-

Source: Watershed Development Report, Haritha Kerala Mission

The table 8.5 shows the important thodus in Palakkad municipality. There are 10 main thodus in the municipality in which Sankuvara thodu is the main thodu with 7.3 km length. Apart from these, there are 16 small thodus with 4.7 Km length drains with 122 Km length. There are two main canals, which are left bank canal and 9 Right bank canal total 15 km length of irrigation canal including its distribute area.

ii. Public and Private wells

1310 private wells are used for irrigation purpose in 130 Ha area of land in the municipality. But bore wells are not used for irrigation purpose. Table 8.6 shows the details of wells in Palakkad municipality.

Table 8.6 Details of wells in Palakkad town

Type of well	Public		Private		Total
	Used	Damaged	Used	Damaged	
Wells	146	13	5287	687	6133
Bore Wells	19	5	205	5	234

Source: Watershed Development Report, Haritha Kerala Mission

iii. Ponds/ Tanks

According to the data from watershed development report - Haritha Keralam, there are 126 ponds in municipality. Out of that, 3 ponds have an area of 2 Acres, 33 ponds have 12 Acres , 39 have 1050 Acres, and 51 ponds have less than 0.5 Acres. There are totally 38.18 Ha area of ponds with capacity of 763000 cubic meter. Almost all the ponds are used for irrigation purposes.

8.7 WATERSHEDS IN PALAKKAD MUNICIPALITY

Watershed is defined as any surface area from which runoff resulting from rainfall is collected and drained through a common point. It is synonymous with a drainage basin or catchment area. A watershed may be only a few hectares as in small ponds or hundreds of square kilometers as in rivers. All watersheds can be divided into smaller sub-watersheds. These water bodies supply drinking water, water for agriculture and manufacturing, offer opportunities for recreation and provide habitat to numerous plants and animals.

Unfortunately various forms of pollution, including runoff and erosion, can interfere with the health of the watershed and hence its protection is important. A watershed embraces physical-biological features as well as socio-economic and political features which have to be integrated into the planning and management process. The spatial location is given in figure 8.8.

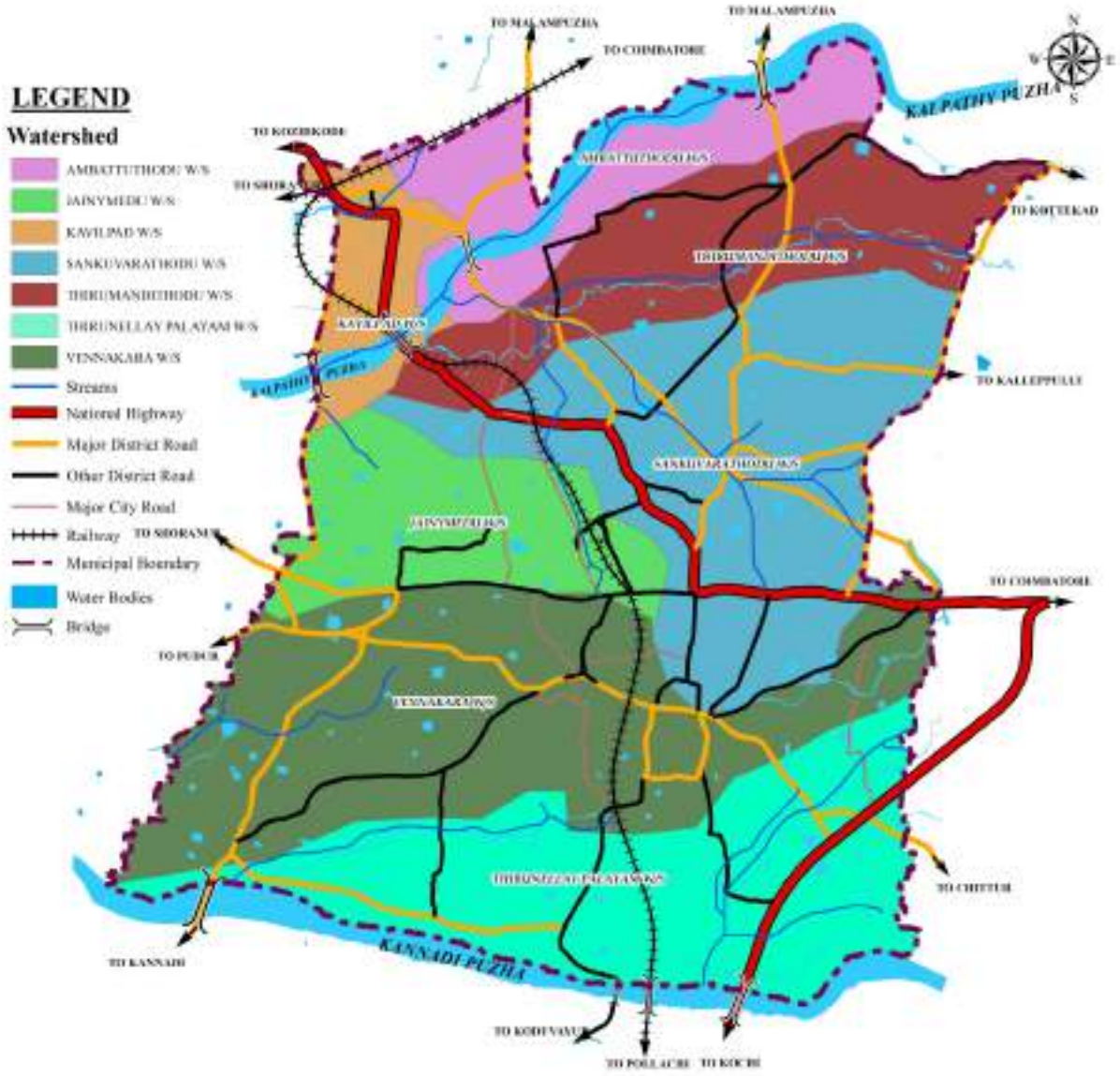


Fig.8.8 Water shed map of Palakkad municipality

Kalpathy puzha and Yakkara puzha are the sub water sheds of Bharathapuzha. The water sheds Ambattuthodu, Jainumedu, Kavilpad, Sankuvarathodu and Thirumandithodu are the micro water sheds of Kalpathy puzha. Thirunellayi Palayam and Vennakkara are the micro watersheds of Yakkara puzha. Under the Haritha Kerala mission, the main processes associated with water shed management is the protection of rivers, ponds and thodus etc. the details of water sheds are given in table 8.7.

Table 8.7 Details of water sheds in Palakkad town

Sl.No.	Name of W/S	Local bodies	Area in Ha	Prority
1	Ambattuthodu	Palakkad, Akathethra, Malampuzha	858.2	Low
2	Jainumedu	Palakkad, Pirayiri	535.9	Low
3	Kavilpad	Palakkad, Puthupariyaram	674.6	Low
4	Sankuvarathodu	Palakkad, Pudussery	1013.8	Low
5	Thirumandithodu	Palakkad, Maruthurod	805.4	Low
6	Thirunellayi Palayam	Palakkad, Kodumbu	836.6	Low
7	Vennakkara	Palakkad, Kodumbu, Maruthurod	801.4	Low

Source: Watershed Development Report, Haritha Kerala Mission

8.8 SCHEMES AND PROGRAMMES

- Sustainable Development of Rice Based Farming System

The Scheme will be concentrated in three major rice-growing tracts of the state for augmenting rice productivity. Through this scheme financial assistance is given to the farmers. Under the scheme, Rs.5500 is given to farmers for inputs and also Rs.360 per ha is given for operations in Padasekhara Samithies. For fallow lands, farmers get an amount of Rs.30000 per ha under this scheme.

- Registered Seed Growers Programme

In order to encourage the farmers and to offset the special efforts taken by them, incentive is provided for all the seeds produced by the farmers. The farmers registered under the scheme who are willing to produce quality seeds from their lands for their own use and for distribution to other farmers through KrishiBhavan.

- Vegetable development

This scheme is used to achieve self-sufficiency in vegetable production at municipality level. Grow bags, seeds and seedlings are distributed to schools, clubs and farmers for cultivation. Under this scheme school garden and project based cultivation for government organizations are done in the municipality. In palakkad municipality maximum Rs. 4000 given for project based cultivation. In 2019 financial year Victoria College and Vigilance Office is registered for this scheme.

- Coconut development / Keragramam

This scheme aiming integrated development of holdings aimed at maximizing income from unit area. Increasing productivity through the activities such as replanting, integrated pests and disease management, integrated nutrient management, promotion of inter cultivation, improving irrigation facilities, promotion of value addition, ensuring availability of quality planting materials and employment generation. Hybrid coconut varieties are distributed to the farmers aiming for production of high yield varieties of tender coconuts.

- State Horticulture mission

This scheme envisages an end to end development of the horticulture sector covering production, post harvest management, processing and marketing.

- People's plan planning

The scheme is operated and maintained by the municipality. Under this scheme, for farm mechanization, ploughing charges are given by the Municipality to the farmers. Also seeds, lime and fertilizers were distributed to farmers.

- Agricultural Pension Schemes

The agricultural pension scheme is provided for farmers above 60 years. As per the funds sanctioned timely, pensions are being send to the beneficiaries. The details of pension given to the farmers are given in table 8.8

Table 8.8 Expenditure of agricultural pensions in Palakkad municipality

Agricultural pension		
Year	No. of beneficiaries	Amount
2014-15	370	351600
2015-16	260	2526210
2016-17	323	777000
2017-18	310	3925300
2018-19	343	3906000

Source: Palakkad Municipality

8.9 INFERENCE

Palakkad district is well known for paddy cultivation. The soil and climatic conditions are suited for agriculture produces. But in the case of Palakkad municipality the paddy area is fast declining. The area of paddy has decreased from 310 Hectares to

260 Hectares during 2014 to 2019. As the total workers in tertiary sector have increased, as more and more people are inclined towards service oriented jobs. The residential dominance is high in municipal area. High population density in Palakkad municipality indicates the increasing demand for human settlement; as a result most of the paddy area has been converted to residential area.

The area under agriculture in Palakkad municipality is 23.557% and out of which, 1.875% are dry agriculture and 21.68% are paddy. (Out of total area, 5.827 % are active paddy and 15.855 % are non active paddy.) Active paddy is concentrated along the northern and southern end of the municipality where Kalpathypuzha and Kannadipuzha is flowing. From the spatial analysis, it is seen that the dry agriculture area in the municipality is very less and it is scattered in different portions of the municipality. The main dry agriculture crops in municipality are coconut, areca nut, banana, plantain etc.

Production of paddy has decreased from 2014 to 2017 and then the production of paddy during 2017 to 2019 shows 20% increase, where the area of cultivation remains the same. Productivity of paddy has increased from 4.75 to 6 tone/Ha during the last 5 years. The production of coconut has been gradually increasing from 2014 to 2019. There is no change in the productivity of coconut in the last 5 years.

There are 8 active Padasekhara samithies in the Palakkad municipality. The main irrigation facilities in Palakkad municipality is the Malampuzha irrigation project. Also there are 1310 private wells, which are used for irrigation and bore wells are not used for irrigation. Moreover 126 ponds in the municipality are also used for irrigation.



CHAPTER 9- ANIMAL HUSBANDRY

9. ANIMAL HUSBANDRY

Animal husbandry is the controlled cultivation, management, and production of domestic animals, including improvement of the qualities considered desirable by humans by means of breeding. It is a branch of agriculture concerned with animals that are raised for meat, fiber, milk, eggs, or other products. It includes day-to-day care, selective breeding and the raising of livestock. Animal husbandry plays an important role in the economic sector and management of food security of people.

9.1 ANIMAL WEALTH

As per 20th livestock census (2017) the livestock species mainly includes cattle, buffaloes, goats, fowls and duck and their products are meat, milk and egg. The main species of livestock found in Palakkad Municipality are fowls and cattles. i.e. out of the total livestock, fowls constitute 67.01%, cattles constitute 10.41%. The poultry population includes ducks, fowls, turkeys and other poultry birds. Figure 9.1 shows the percentage shares of live stock in Palakkad Municipality. Table 9.1 shows live stock population in Palakkad Municipality in 2017.

Fowl population is always higher in Palakkad municipality than cattle population. Table 9.2 shows the temporal variationof livestock population in Palakkad Municipality.

Table 9.1. Live stock population in Palakkad municipality

	Numbers	Percentage
Cattles	1356	10.41
Buffalo	130	1
Sheep	3	0.02
Goat	1191	9.15
Horse	1	0.01
Pig	39	0.3
Dog	1251	9.61
Rabbit	7	0.05
Elephant	1	0.01
Fowl	8727	67.01
Duck	154	1.18
Turkey	5	0.04
Other Poultry Birds	158	1.21
Total	13023	100

Source: Livestock Census 2017

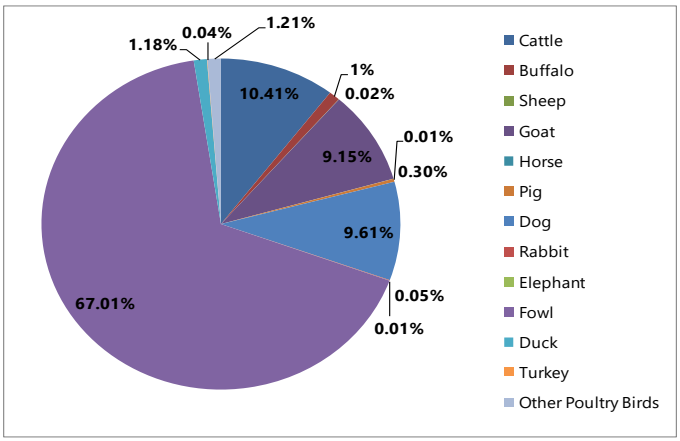


Fig.9.1 Percentage share of livestock in Palakkad municipality

Table 9.2 Temporal variation of live stock population in Palakkad Municipality

	1996	2003	2007	2012	2017
Cattle	3430	2696	1473	1977	1356
Buffalo	1148	204	67	121	130
Sheep	-	-	-	16	3
Goat	2385	1871	347	988	1191
Horse	-	-	-	0	1
Pig	94	-	-	12	39
Dog	2838	-	401	2015	1251
Rabbit	-	-	-	-	7
Elephant	-	-	-	-	1
Fowl	17424	11511	9627	9160	8727
Duck	1209	264	272	352	154
Turkey	-	-	-	36	5
Other Poultry Birds	-	-	-	-	158
Total	28528	16546	12187	14677	13023

Source: Livestock Census 1996, 2001, 2007, 2012,2017

9.1.1 Cattle Population

Cattles are large grazing animals with two-toed or cloven hooves and a four-chambered stomach. This stomach is an adaptation to help digest tough grass. Cattles are farmed for beef, veal, dairy, and leather, and they are less commonly used for conservation grazing. Details of cattle population is given in figure 9.2 shows the temporal variation of cattle population.

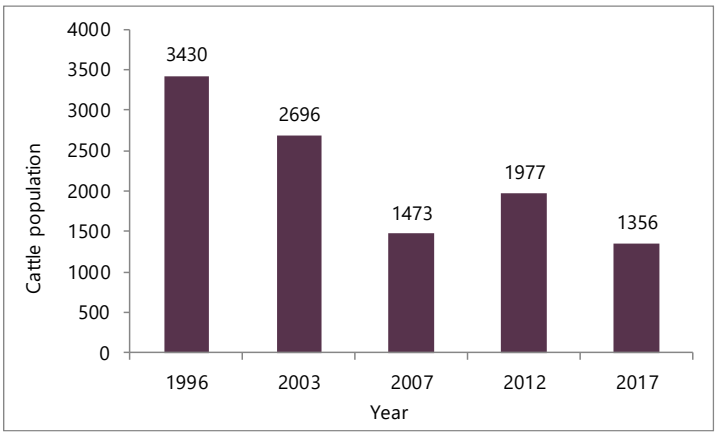


Fig.9.2 Temporal variation of cattle population in Palakkad municipality

Source: Livestock Census 1996, 2001, 2007, 2012,2017

As per Livestock Census 2017 only 10.41% of the live stock population are cattle population. Out of which, 89.01% are males and remaining 10.99% are females. The cattle population was decreasing from 1996 to 2007 and then the cattle population

started increasing. From the data, the temporal variation of cattle population was increasing at a rate of 34.22% during the period 2007-2012. Then again there was a decreasing trend in the cattle population from 2012 to 2017 by 31.41%.

9.1.2 Buffalo Population

The buffalo species originated in India. Buffaloes are mainly used for meat and not commonly used for milking purposes. The temporal variation of buffalo population is given in figure 9.3. From 20th live stock census, the total buffalo population is only 1% of the total livestock population out of which 13.08% are males and 86.92% are females. The buffalo population decreased by 94.16% from 1996 to 2007. Then there is an increase of 94.03% in the buffalo population from 2007 to 2017.

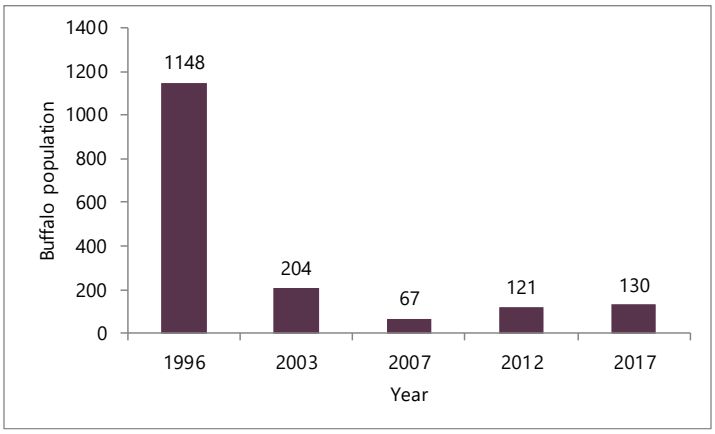


Fig.9.3 Temporal variation of buffalo population

Source: Livestock Census 1996, 2001, 2012,2017

9.1.3 Goat Population

Goats are small livestock animals that used for meat and milk. As per Live Stock Census 2012, 9.15% are goat population. The temporal variation of goat population in Palakkad Municipality is given in figure 9.4. The goat population is decreasing from 1996 to 2007 at rate of 85.45%. From 2007 to 2017 goat population shows an increasing trend by 243.23%.

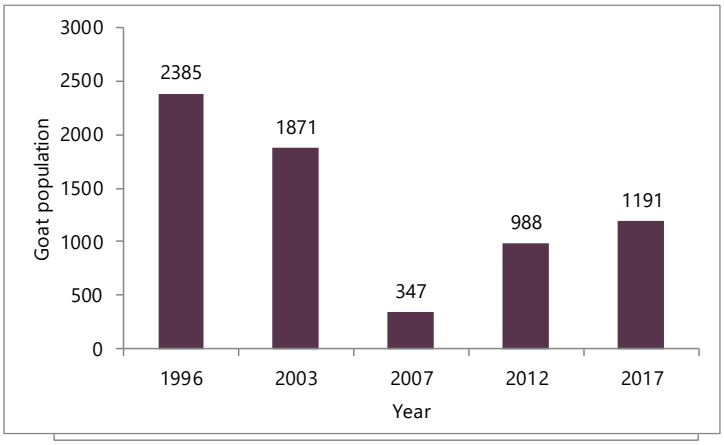


Fig.9.4 Temporal variation of goat population

Source: Livestock Census 1996, 2001, 2012,2017

9.1.4 Poultry Stock

Domestic birds (both layer and broiler) kept by human in a shed for eggs they produce, their meat, their feathers. Poultry convert feedstuff to food efficiently. Poultry industry require short period for growth and marketing the products. It can adjust rapidly to changing economic factors such as feed, availability, cost, number of birds on feed etc. Other livestock industries require longer length of time from birth to market (e.g. cattle). Poultry products are relatively inexpensive and Poultry meats are one of the best meat buys in the market. Backyard poultry production can cater to the nutritional requirements of the population as well as cater to a niche market, thus providing a source of subsistence income.

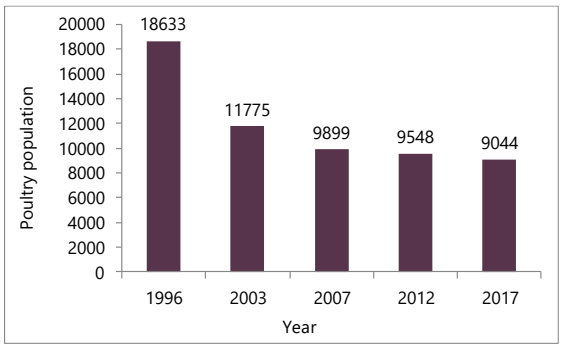


Fig.9.5 Temporal variation poultry stock in Palakkad municipality

Source: Livestock Census 2017

Total poultry stock in the municipality 9044 as per Livestock Census 2017. From the figure 9.5 the poultry population in the municipality shows a decreasing trend from 1996 to 2017. The poultry population mainly includes Fowls, ducks and turkeys.

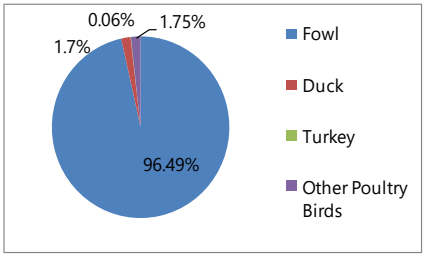


Figure 9.6 Percentage share of poultry population

Source: Livestock population 2017

As per the live stock census 2017, 96.49% of the poultry population are fowls. Only 1.7% are ducks and 0.06% are turkeys. Remaining 1.75% are other poultry birds like quails etc.

9.2 LIVESTOCK PRODUCES

Milk and meat are the main live stock produces in Palakkad Municipality.

9.2.1 Milk

Milk is a nutrient rich liquid food which is an important source of income to the small scale farmers. There is one milk co-operative society in Palakkad Municipality under APCOS at East Yakkara collecting 304 Lakhs Litres per year in Palakkad municipality. The details of Milk Co-operative society is shown in table 9.3. The annual average sale in the local area is about 95 Lakh litres. There are 6 employees in this milk society. There are 91 APCOS registered farmers providing milk to the milk co-operative society.



Kalathil diary farm

There are no registered diary farms in the Palakkad Municipality. But there are 9

Table 9.3 Details of Milk Co-operative society in Palakkad municipality

Name of Unit	Location	Name of owner	No. of employees	No .of Registered Farmers	Milk Colln. (in lac. Litres)	Milk Sale in Local (in lac. Litres)
Milk Co-operative Society	East Yakkara, PKD	APCOS	6	91	304	95

Source: Primary Survey

nonregistered diary farms in the Palakkad Municipality producing approximately 1720 liters of milk per month. The details of the diary farms are shown in table 9.4.

Table 9.4 Details of non registered diary farms in Palakkad municipality

Sl.No.	Location	Number of milking animals	Daily production of milk (Ltrs per month)	No. of employees
1	Kunnathurmedu	30	300	3
2	Moothanthara	20	200	2
3	Elanthiyamkode	10	80	2
4	Elanthiyamkode	10	80	2
5	Pattikkara	50	450	4
6	Shadi Mahal Road	15	150	2
7	Ambalakkad	10	80	2
8	Sankuvarthode	12	100	2
9	Moothanthara	30	280	3

Source: Primary Survey

9.2.2 Meat

Meat produced in the municipality is mainly from cattle, Buffalo, goat and chicken. There is only one slaughter house in the Palakkad Municipality at Puthuppalli Theruvu. Slaughter house is a facility where animals are slaughtered, most often to provide food for humans. There is no facility for proper waste management. The veterinary doctor from Government veterinary hospital is serving the medical needs in the house. The details of animals slaughtered are given in table 9.5.

Table 9.5 Number of animals slaughtered

Animal	No. of Animals Slaughtered
Bull & Bullock	3324
Cow	3588
Buffalo	972
Sheep	9840
Goat	2688

Source: Animal husbandry department, Palakkad municipaliity

There are no registered poultry farms in the Palakkad Municipality. But the details of poultry stock indicates that there are unauthorized or unregistered poultry farms in the Municipality. Table 9.6 shows the details of broiler chicken selling units in Palakkad Municipality. There are 44 broiler chicken/meat selling units in Palakkad Municipality in which totally 41850Kg meat is sold

per month. As per 2012 livestock Census, 61.11% of the livestock population are fowls. Out of total poultry population 95.93% are fowls, 3.69% are ducks and 0.38% are turkeys. Major portion of the meat is coming from Tamilnadu.

Table 9.6 Details of Broiler farms and selling outlets

Sl. No.	Name of Unit	Location	No. of birds sold(Kg per month)	No. of employees
1	Pulari Chicken Centre	Mettupalayam Street	1500	2
2	FMC Chicken Centre	V.H. Road	1000	1
3	MSR Chicken Centre	Kallikadu	900	1
4	Mambay Chicken Centre	Market Road	1000	1
5	Trivandrum Chicken Centre	Court Road	900	1
6	Shamzeena Chicken Centre	Palakkad	900	1
7	Bismi Chicken Centre	Puduppalli Street	900	1
8	K.K.H. Suguna Chicken Centre	Near KSRTC	1200	1
9	Hassan Chicken Centre	Melamuri	600	1
10	Sahid Chicken Centre	Melamuri	900	1
11	Hashim Chicken Centre	Palayam, Othungode	1000	1
12	Fidha Chicken Centre	Mepparamba	900	1
13	Suguna Chicken Centre	Koppam	1200	2
14	Fresh Chicken Centre	Olavakode	900	1
15	New Chicken Stall	Olavakode	1000	1
16	S.R. Chicken Centre	West Yakkara	900	1
17	Madeena Egg & Chicken Centre	MTP Street	750	1
18	Alpha Chicken Centre	Nurani, Palakkad	900	1
19	Kalpaka Chicken Centre	MTP Street	1000	1
20	Musthafa Chicken Centre	College Road	1000	1
21	Fathima Chicken Centre	Jainmedu	900	1
22	Best Chicken & Matton Stall	Pattikkara	800	1
23	Alpha Chicken Centre	Big Bazar	1200	1
24	Fidha Chicken Centre	Pezhunkara	750	1
25	New One Chicken Centre	Vennakkara	750	1
26	New One Chicken Centre	Puduppalli Street	900	1
27	M.M. I. Chicken Centre	Near Poolakkad	1000	1
28	Rafeeq Chicken Stall	Kannara Street	1200	1
29	Palakkad Chicken & Matton Stall	Kalmandapam	750	1
30	Best Chicken & Matton Stall	Koppam	750	1
31	Halal Chicken Centre	Palayam, Othungode	600	1
32	Dikra Chicken Centre	Vennakkara	750	1
33	Chicken & Mutton Stall	Puduppalli Street	600	1
34	A.S. Chicken Centre	Olavakode	750	1
35	K.H. Chicken Centre	Olavakode	900	1
36	Moiduppa Chicken Centre	Olavakode	1000	1
37	Chicken Centre	Jainmedu	1000	1
38	Halal Chicken Centre	Olavakode	1200	1
39	Bombay Chicken Centre	Dance Market	1200	1

Continue...

Sl.	Name of Unit	Location	No. of birds sold	No. of em-
40	Bombay Chicken Centre	Chadnamkurissi	1500	1
41	Farooq Chicken Centre	Kallepully	1000	1
42	S.H. Chicken Centre	Kallepully	900	1
43	Chicken Centre	Near Milma, Kallepully	900	1
44	Bismi Chicken Centre	100 ft Road, Puthur	1200	1

Source: Primary survey

Consumption of milk and meat as per household consumption of various goods and services in Kerala NSS 66th round, June 2010 is 2.57 liters and 0.19 Kg per capita per month respectively. The gap between demand and production of milk and meat is shown in table 9.7 and figure 9.7.

Table 9.7 Consumption and supply of milk and meat in the municipality

Category	Consumption per capita per month	At Present total demand	Production	Existing gap
Milk	2.57 ltrs	4221873	2535054	1686819
Meat	0.19 kg	312123	41850	270273

Source: HH consumption of various goods and services in Kerala NSS 66th round, June 2010

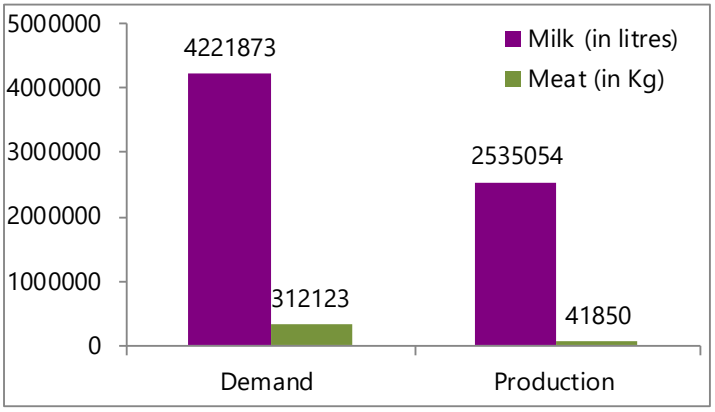


Figure 9.7 Consumption and supply of milk and meat in the municipality

In Palakkad Municipality milk production is 60.05% of the milk demand and only 13.41% of the meat demand is produced. Wide gap is seen in the production and demand of milk and meat in the municipality. The nutritional needs of the municipality should be satisfied.

9.3 INSTITUTIONAL FACILITIES AVAILABLE IN THE MUNICIPALITY

Monitoring animal health and preventing animal disease outbreaks is vital to the economy and safety of food supply. Production of healthy livestock helps to ensure a safe food supply and keep consumer prices stable. The control of animal diseases and the promotion



District Veterinary Hospital

and protection of animal health are essential components of any effective animal breeding and production programme. There is only one veterinary hospital in Palakkad municipality and the details of the hospital is given in Table 9.8. As per URDPFI standards, one veterinary hospital is enough for 5 Lakh livestock population. Facilities like medical treatment, Immunization, scanning, E.C.G., Laboratory services, artificial

Table 9.8 Details of veterinary dispensaries in Palakkad municipality

Name of Veterinary Hospital/ Dispensary	Location (Ward)	Staff	Nos	Services & Facilities
District Veterinary Centre, Palakkad	17	Chief Veterinary Officer	1	Medical Treatment, Immunisation, scanning, E.C.G., Laboratory services, artificial insemination, Endoscopy, Surgery
		Senior Veterinary Surgeon	1	
		Veterinary Surgeon	2	
		Livestock inspector	1	
		LDC	1	
		Attendant	2	
		PTS	1	

Source: District Veterinary Centre, Palakkad



Figure 9.8 Locations of institutions related animal husbandry

insemination, Endoscopy, Surgery etc are done in the hospital.

9.4 ANIMAL DISEASES AND OUT BREAKS

Table 9.9 gives the details of various diseases reported in the Palakkad Municipality during 2018-19. The domestic cattle, buffaloes and goats suffer mainly by some diseases of digestive system, deficiency diseases and other endo-parasites.

Digestive diseases, metabolic diseases and respiratory diseases are more in goats. Compared to cattle and goats, less number of buffaloes are disease affected. Deficiency diseases and other endoparasite diseases are more in cattle. There is no outbreaks, attacks and deaths due to animal diseases. There is no vaccinations taken

Table 9.9 Major animal diseases reported during 2018-19

	Cattle	Buffaloes	Goat	Others
Digestive Disorders	2005	252	2448	5670
Respiratory Diseases	650	25	2300	3500
Metabolic Diseases	345	15	1725	512
Deficiency Diseases	1235	86	655	988
Coccidiosis	765	Nil	350	125
Other Endoparasites	1670	312	1175	4880

Source: District Veterinary Centre, Palakkad

Table 9.10 Number of animal outbreaks, attacks, deaths and vaccinations during 2018-2019

	Out break	Attack	Death	Vaccinated
Foot and mouth	Nil	Nil	Nil	2212
Anthrax	Nil	Nil	Nil	Nil
Black Quarter	Nil	Nil	Nil	Nil
Hemirage Septisamia (H.S)	Nil	Nil	Nil	100
Canine Distember	Nil	Nil	Nil	808
ParvoVirus	Nil	Nil	Nil	808

Source: District Veterinary Centre, Palakkad

for Anthrax or Black quarter. Table 9.10 shows the number of animal disease outbreaks, attacks, deaths and vaccinations during 2018-2019.

9.5 ANIMAL HUSBANDRY RELATED INDUSTRIES

- *KSE Limited*

A unit of KSE Limited is operating at Othongode, Thirunellayi with an area of 4.4 Acres of land. This unit was renovated and new machineries were installed to produce cattle feed. The products from this unit are marketed in the districts of Palakkad, Malappuram and



KSE Ltd ,at Othongode

part of Calicut.

Malabar Region Co-operative Milk Producers Union (MILMA), Palakkad Diary

Milma Co-operative society is functioning at Kallepully near Palakkad Municipality with an area of 10.73 Acres. The main produces of Milk Co-operative society is milk, curd, ghee and sambaaram.



Palakkad Diary

9.6 SCHEMES AND PROGRAMMES

The Livestock Department of Animal husbandry and Dairying is responsible for matters relating to livestock production, preservation, protection from diseases and improvement of stocks and dairy development. The Department advises State Governments/Union Territories in the formulation of policies and programs in the field of Animal Husbandry and Dairy Development. The main thrust areas are:

- Development of requisite infrastructure in States/union territories for improving productivity.
- Preservation and protection of livestock through provision of health care and, strengthening of central livestock farms (Cattle, Sheep and Poultry) for development of superior germ plasm for distribution to states.

The development of Livestock and marketing of livestock produces are carried out by a number of institutions. The main agencies involved in the live stock sector are Department of Animal husbandry and Dairying, which is in charge of the health care and breeding services, The Department of Dairy Development which is in charge of the livestock extension services and administration of milk cooperatives, and third one is Local body. The major activities of the animal husbandry department are veterinary services and animal health care, disease eradication programmes, cattle, goat, pig, and poultry development programmes, control of zoonotic diseases, extension and training programmes for farmers and veterinarians.

The major schemes under Department of Animal husbandry and Dairying are Animal Birth Control Programme (ABC Programme) to control the menace of street dogs , distribution of female goats, calf feed subsidy scheme, poultry development project via schools in which encourage schools to develop poultry club activity, etc. Animal welfare seminars are also conducted to give ideas about

Table 9.11 Details of major programmes during 2017-18

Sl. No.	Schemes and Programmes
1	Animal Birth Control Programme
2	Distribution of Female Goats
3	Animal Welfare Seminar
4	Calf feed subsidy scheme
5	Poultry Development Project via Schools
6	Duck insurance

Source: District Veterinary Centre, Palakkad

dairying and poultry farming to farmers. Details of major programmes during the last year are given in table 9.11.

9.7 COMMITTED PROJECTS

Palakkad municipality proposed a modern slaughter house at its own land with an area of 1 acre 41.1 cents in Puthupally street, Kundukad (Resurvey No. 1 Block No.61) availing fund from KIIFB. The proposed land is well connected with motorable road. Capacity of slaughter house would be 100 small animals and 50 large animals per day. There is an existing slaughter house but closed down due to pollution issue. Statutory approvals from pollution control board, fire and rescue department and local self government department planning will be obtained. Total cost of the project is 11.50 crores.

Modern slaughter facilities like halal boxes, slaughter rails working pneumatic systems, carcass splitter, dehiding machines etc. will be used in slaughter house. The design of slaughter house is made in compliance with Bureau of Indian standards, slaughter house rules of government of India, PCA act, and FSSAI rules etc.

The total built-up area of the slaughter house is 1583.4 m^2. Also the plant has effluent treatment plant (ETP) for waste water treatment, rendering plant for slaughter waste and an R.O. plant for water recycling. There is also a proposed compost unit in the plant. The plant will put an end to the waste generation and disposal problem in that area. The project is sanctioned by KIIFB. For water supply, an open well, one bore well and a KWA water connection is there. Electricity connection is also provided.

At present animals are brought from neighboring states on daily basis. On an average of 200 small animals and 100 large animals are brought daily for the illegal slaughtering.

9.8 PROBLEMS AND POTENTIALS

Problems

- There is a decreasing trend in the number of cattles and poultry population from 2012 to 2017. This may be due to decline in the availability of grazing land which made it uneconomical for the farmers to rear cattle.
- Since there are no dairy farms or hatcheries in the Municipality, the livestock are mostly reared within the household.
- Due to the changing lifestyle, less number of people is attracted to agriculture and animal husbandry. Marketing is also a major problem for farmers. Only one Milma Co-operative society is there in the Municipality.
- There is an alarming gap between production and demand of live stock

produces. Eg:- 1.67 % of the demand of milk is attained and 13.41% of the demand of meat is attained.

- Availability of low cost milk from other states in the market cop up the daily needs of people in the Municipality.
- Disposal of wastes from the slaughter house is the main problem in Puthupally street area. There is a proposal for meat processing unit in Puthupally street for meat waste treatment in Palakkad.

Potentials

- The buffalo population and goat population shows increasing trend from 2007 to 2017.
- There is one veterinary hospital, one slaughter house and one Milk Co-operative Society in the Municipality.

9.9 INFERENCE

Animal husbandry is weak in the Municipality. This may be due to non availability of grazing land and people are not interested in farming and dairying. From the occupation structure the agricultural laborers and cultivators in the municipality shows a declining trend in the past 4 decades. Even though the farming activities are weak in the municipality, basic infrastructure and market for trading of animal husbandry products are available within the municipality. There is one veterinary hospital in the Municipality and there is no registered diary farms or hatcheries in the Municipality. KSE cattle feed production unit and Palakkad Milma diary are there in the Municipality. A modern slaughter house is proposed in Puthupally street by the Municipality.



CHAPTER 10- HERITAGE AND TOURISM

10. HERITAGE AND TOURISM

Tourism industry possess a vast intrinsic potential to act as a catalyst for generating employment and promoting equitable and inclusive economic growth. Cultural and heritage tourism is a tool of economic development that achieves economic growth through attracting visitors from outside a host community, who are motivated wholly or in part by interest in the historical, artistic, scientific or lifestyle/ heritage offerings of the host community, region, group or institution.

10.1 ANALYSIS OF EXISTING SCENARIO

According to 2018 statistics, 3.06% of the total tourists in Kerala (including domestic and foreign tourists) is visiting Palakkad district. Compared to foreign tourists, the number of domestic tourists is high in Palakkad district. Figure 10.1 shows the number of tourists in all the districts in Kerala and figure 10.2 shows the temporal variation of domestic and foreign tourists in Palakkad district.

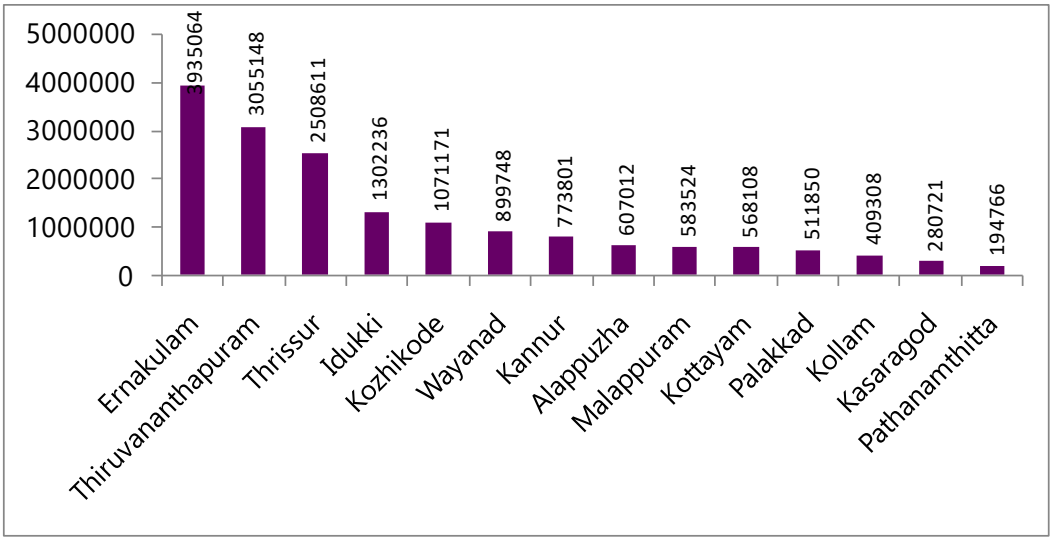


Fig. 10.1 Number of tourists in districts of Kerala (2018)

Source: Tourism Statistics

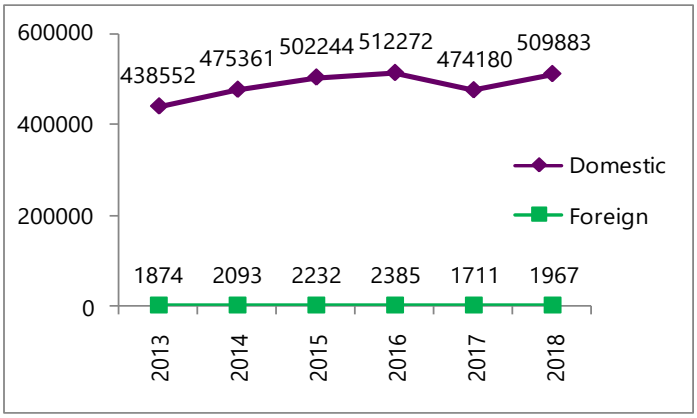


Fig. 10.2 Temporal variation of domestic and foreign tourists in Palakkad district (2018)

Source: Tourism Statistics

From 2013 to 2016, the number of tourists shows an increasing trend and then from 2016 to 2017, the number of tourists suddenly decreased. But after 2017, the number of tourists got increased in 2018.

Tourism potential for Palakkad Municipality mainly concentrates on Palakkad fort and Kalpathy Agraharam. Manappullikkavu Vela and Kalpathy Radholsavam are the main festivals celebrated in Palakkad Municipality.

10.1.1 Important Heritage Sites

The main tourist destinations in Palakkad municipality are Palakkad Fort, Kalpathy Agraharam, and Jain Temple (fig.10.3). Most of the tourism destinations are heritage sites.

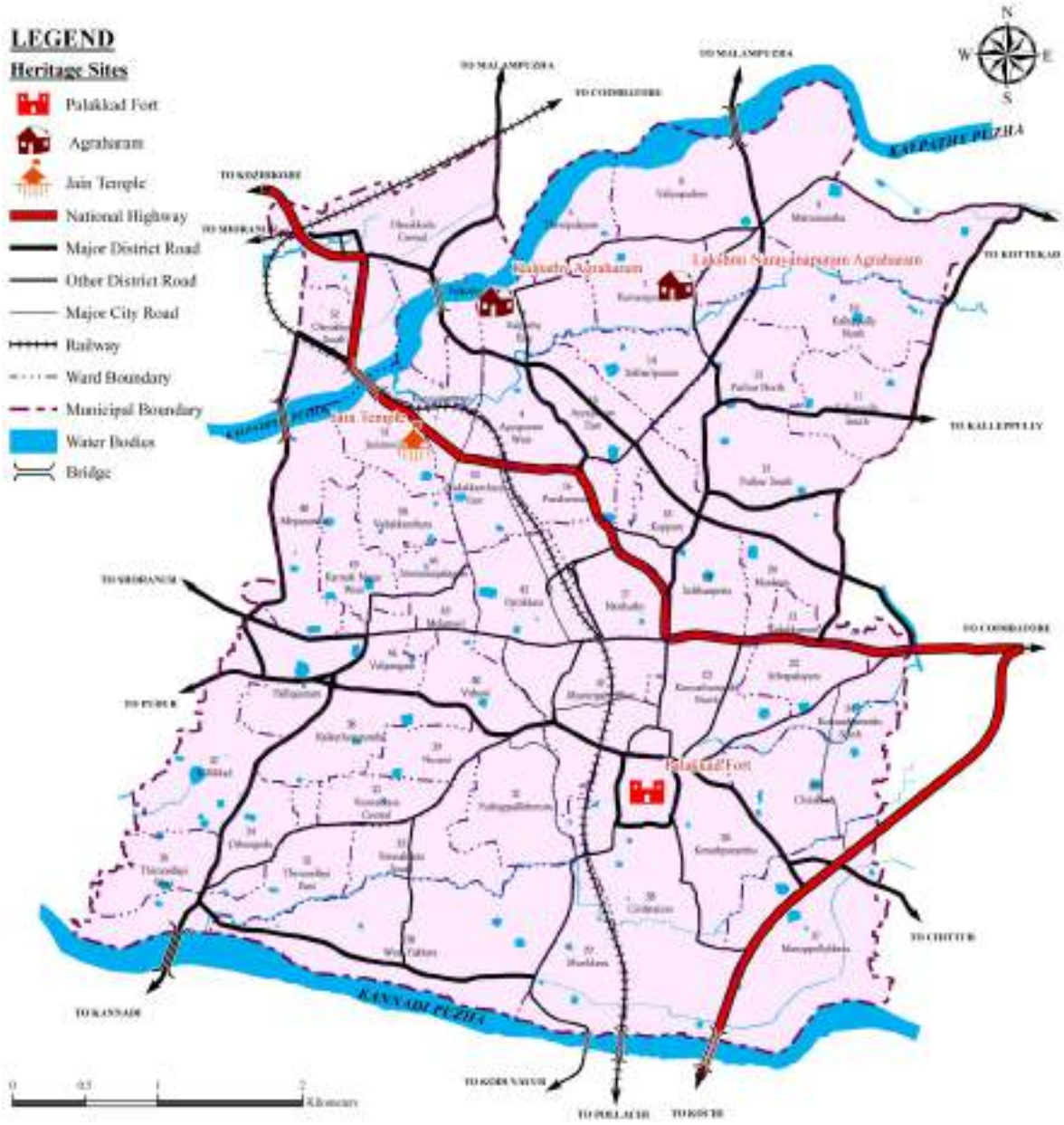


Fig.10.3 Heritage sites in Palakkad municipality

i. Palakkad Fort



Palakkad Fort

Palakkad fort is one of the main tourist destinations in the Palakkad town, which was an important military base in the past. It is situated in the middle of the Palakkad municipality. The fort is under the ownership of The Archaeological Survey of India since 1921. Earlier the sub jail and taluk supply office was functioning in the fort, now the jail shifted and TS office still functioning in the fort. The structure of the fort is well maintained. It is characterized by a 14m wide moat around the castle. The moat is surrounded by a beautiful lawn area which is used for recreational purposes. The open ground opposite to the fort is called the Fort Maidan. It is an open ground which is used for conducting sports and other public ceremonies. There is an entry fee of Rs.25 per person for entering into the fort area. It is a preferred picnic spot for everyone visiting Palakkad. Also people come to the Hanuman temple in the fort area.

The fort built on granite, rhomboidal on plan with walls of enormous thickness. Fort was entered through a single draw bridge. Inside the fort, there was a few tiled buildings, granaries and stepped well. The fort is an inland fortress suited to withstand artillery bombardment.

The monument has been declared to be of national importance under the Ancient Monument & Archeological Sites and Remains Act 1958 (24 of 1958) and Ancient Monument and Archeological Sites and Remains (Amendment and Validation) Act 2010. Under Section 20A, Prohibited area is extending to a distance of 100 m in all directions from the protected area and no construction is permitted in this area. Under section 20B an area of 200 m in all directions from the limit of prohibited area (in all 300 m from the limit of protected area) is regulated area and any construction or reconstruction or repair or renovation of such building or structure within this area shall be with the prior permission of the National Monument Authority, New Delhi

ii. Agraharams

One of the peculiarity of Palakkad town from other Kerala towns is its pattern of human habitations, which is huddled mostly in closed and compact settlements of Gramams. Agraharams are characterized by row houses edging the street on either side and centered around a temple thus forming nucleated communities called "Grammams". Tamil Brahmin communities are the inhabitants of these Grammams. Most of the houses are ill-ventilated, with low roofs and small window openings.

There are totally 20 Agraharams (fig.10.4) in the Palakkad Municipality like Tharekkad, Thirunellai, Ramanathapuram etc. These agraharams shows the cultural heritage of Palakkad and the heritage tourism can be promoted by infusing this Brahmin culture with traditional architecture.

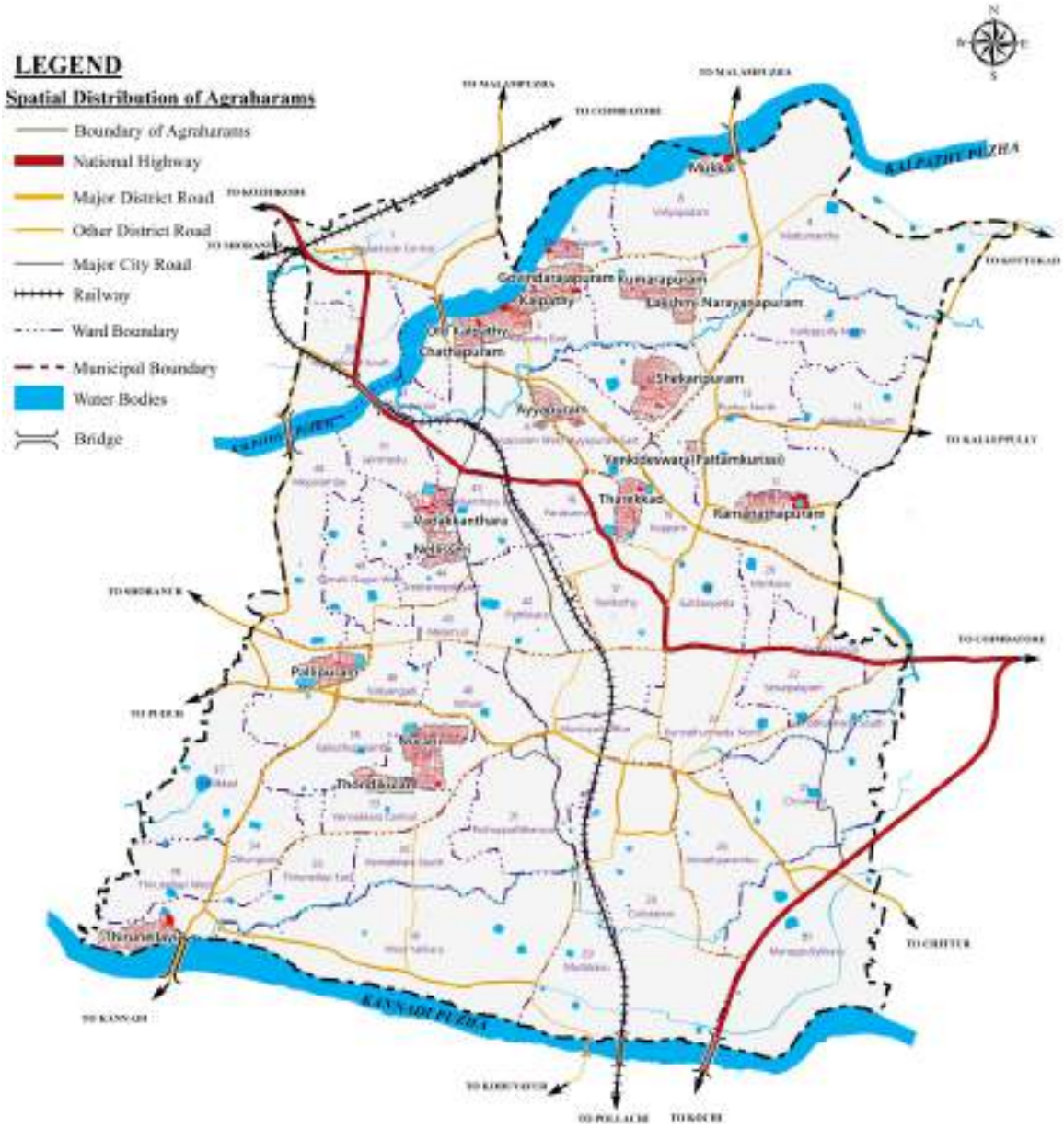


Fig.10.4 Spatial distribution of agraharams in Palakkad municipality

- Kalpathy Agraharam

It is located along the Palakkad–Kozhikode route. Kalpathy is declared as a Heritage Village by Government of Kerala. The buildings, their lifestyle and the total set up of the settlement evoke historic, architectural, aesthetic and sociological interest. At present many of the houses have been modified to R.C structures due to its weak structural strength. Kalpathy has 4 main streets - New Kalpathy, Old Kalpathy, Chathapuram and Kalchatti.

Kalpathi Ratholsavam(Kalpathi Car festival) is an annual hindu temple festival celebrated in kalpathy at Sri Viswanatha Swamy Temple (fig.10.5).

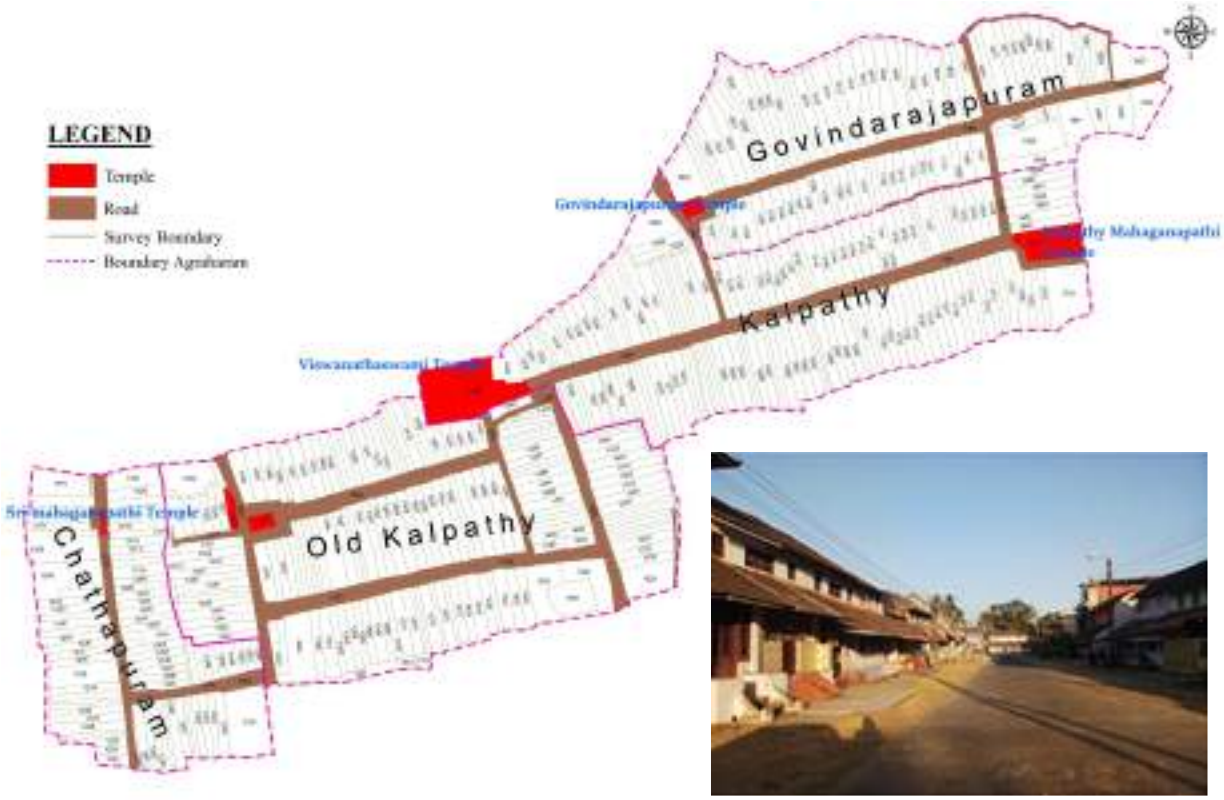


Fig.10.5 Kalpathy Agraharam

- Lakshminarayanapuram Agraharam

Lakshmi Narayanapuram village is one of the well-known ancient villages and one of the 19 villages in Palakkad. It is situated east of Kalpathy by the side of Palakkad Puthur Malampuzha main road. This beautiful village with its two famous temples of *Lord Gopalakrishna* at the western extremity and *Lord Subramanya* at the southern extremity(fig.10.6) has held a unique fascination for those who have been living here for several decades and even for those who visit the village on some occasion or the other. It is difficult even for a casual visitor not to be impressed by the natural cleanliness of the village and the inexplicable tranquility of the environment.

Lakshmi Narayanapuram is the only village in Palakkad where there are two car

festivals every year. The *Chithira car festival* (also known as the "Periyather" or big car festival) is celebrated during the month of April/May, and the *Vaikunta Ekadasi car festival* (also known as "Chinnather" or small car festival) is celebrated during the month of Dec/Jan.

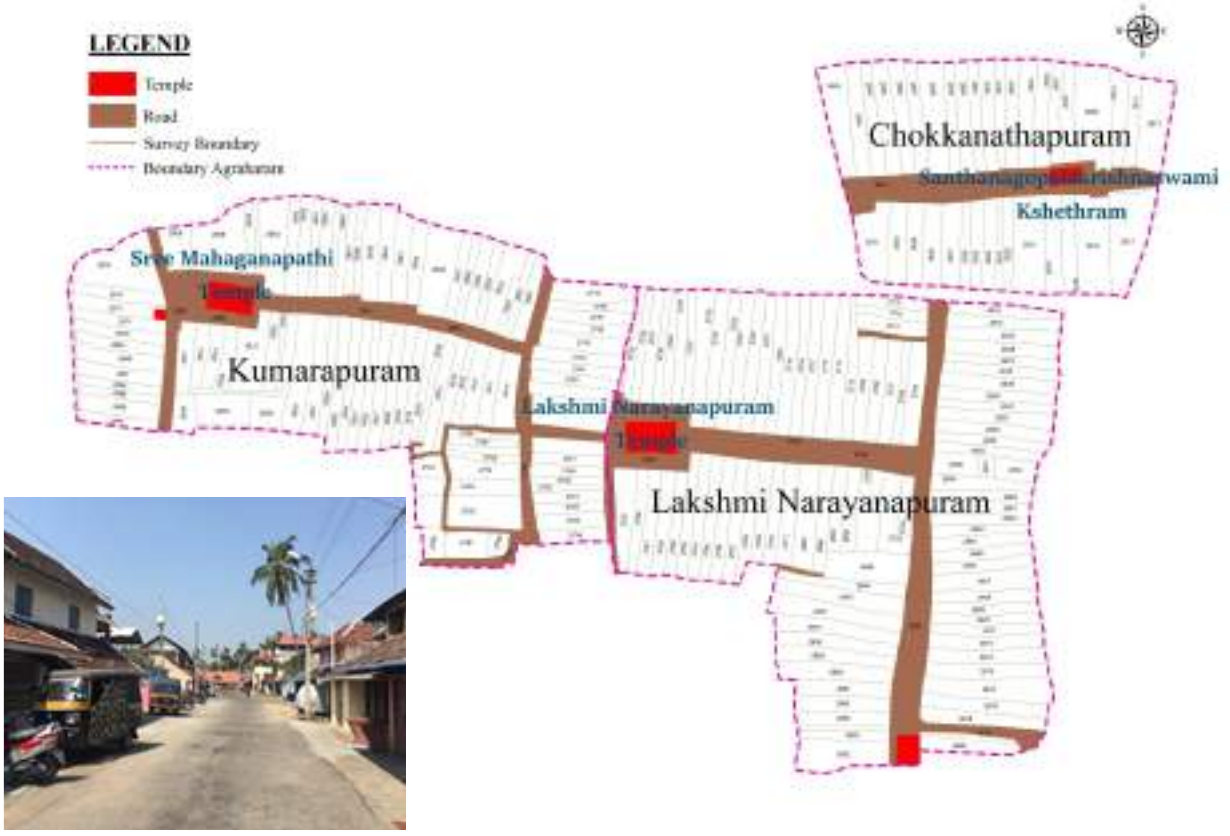


Fig.10.6 Lakshminarayanapuram Agraharam

iii. Jain Temple



Jain Temple

It is located at Jainimedu at a distance of about 3.5km from Palakkad town on Palakkad – Olavakkode road. The Jain temple is a heritage structure, more than 1500 years old. This historic 32 feet long, 20 feet wide granite temple displays images of the Jain Thirthankaras and Yakshinis. The structure is mainly made of granite slabs, but R.C.C protection has been given over the roof. The temple is maintained by a trust and is well maintained. The region around the

temple, known as Jainimedu, is one of the few places in Kerala where the vestiges of Jainism have survived. It is said that, poet Kumaranaasan wrote his monumental poem Veenapoovu at a Jain house here .

10.1.2 Important Festivals

i. Kalpathy Radholsavam

Kalpathy Radholsavam, an annual ten-day chariot festival conducted here during the month of November is one of the most remarkable festivals of Kerala. Vedicrecitals and cultural programmes are held in the temple during the first four days of the festival. This is believed to be over 700 years old. Approximately 75000 devotees come every year for the Radholsavam.



Kalpathy Radholsavam

During the time of Radholsavam, 6 chariots from 4 temples of Kalpathy (table 10.1) come together and circumvent streets of the villages in a grand procession. The main chariot carries Lord Shiva and additional 2 small chariots are for his sons, Ganapathy and Murugan. Chariots from the other 3 villages namely New Kalpathy with Lord Ganapathy, Old Kalpathy with Lord Krishna and Chathapuram with Lord Ganapathy also joins. This is known as 'devarathasamgamam'. Thousands of devotees converge at Kalpathy and pull the chariot every year. On the last three days, thousands of devotees gather together to draw decorated temple chariots through the streets.

ii. Manapullikkavu Vela

Table 10.1 Temples associated with Kalpathy Radholsavam

Sl.No.	Tample Name	Location
1	Lakshmi NarayanaPerumal Temple	Old Kalpathi
2	VishalakshiSamethaViswanathaSwamy Temple	Kalpathy
3	ManthakaraMahaganapathi Temple	New Kalpathy
4	PrasannaGanapathy Temple	Chathapuram

Source: Tourism Statistics

Manapullikavu Vela is a festival honouring the deity at Manapullikavu called 'Manapulli Bhagavathy'. The festival is celebrated between last week of February and first week of March based on the Malayalam Calendar year. The celebration starts with 'Kodiyettam' which declares the 'Vela'(Festival) has started. After the Kodiyettam, a

week full of pooja ceremonies and evenings with colourful cultural programmes are there and all ends with the grand day 'Manapullikavu Vela'. Lots of devotees from various parts of Kerala and other southern states of India come for worshipping Bhagavathy on this auspicious day.



Manapullikkavu Temple

ii. Puthur Vela

Puthur Vela is associated with Sree Thirupuraikkal Bhagavathy Temple, located at Puthur. Puthur Vela begins with a Kodiyettam on the first Friday in the Malayalam month of Meenam (Mid-March to Mid -April) and it ends on the last Friday in the same month with the ritual of Thalapoli. The most interesting and artistic element in Puthur Vela is the Tholpavakoothu (shadow puppetry) performance. Also there is 10-day dance and music festival, known as Puthur Sree Thirupuraikal Music and Dance Festival. Every year renowned dancers and musicians across the country performs here.



Sree Thirupuraikkal Bhagavathy Temple

iii. Valiya Vilakku Vela

Valiya Vilakku Vela, popularly known as Vadakkanthara Vela, is a festival celebrated once in three years at Sree Kachanam Kulam Thirupuraikkal Bhagavathy Temple at Vadakkanthara. Last festival was held on March 2018 and the next will be on February - March 2021.

During Vela festival Karivesham (people painted themselves in greasy black) will be visiting the houses in the region for making the ritualistic announcement of the arrival of the 'Vela'. Traditional ritualistic festivals like Kathirvela, Variezuthu, Paala-maram Murikkal, Kummati, and Kanniyar will be performed in the temple. On the final day of the festival is the Kazchashiveli or the procession. For this as many as 15 caparisoned elephants will be there.



Sree Kachanam KulamThirupuraikkal Bhagavathy Temple

10.2 PROXIMITY TO OTHER TOURIST SPOTS

Table 10.2 shows important tourism spots near Palakkad town within 30 Km buffer. Malampuzha being the main tourism destination near the town and Palakkad act as a service providing town for Malampuzha. The heritage museum under department of Archeology is recently reopened after renovation, which posses display of various classical instruments and art forms that showcases the heritage and cultural practices being followed throughout the state. Display of centuries old musical instruments is an asset to watch for the art lovers.

Table 10.2 Tourism destinations near Palakkad town

Sl. No.	Tourism Place	Distance from Palakkad	Name of Local body
1	Malampuzha Dam	12	Malampuzha
2	Fantasy Park	6	Malampuzha
3	Kottayi ChembaiGramam	16	Kottai
4	Dhoni Water Falls	15	Puthupariyaram
5	Walayar Dam	25	Pudusseri
6	Choolannur Peacock Sanctuary	27	Peringottukurissi
7	Rock Garden	8	Malampuzha

10.3 TOURISM INFRASTRUCTURE

Table 10.3 Main hotels in Palakkad municipality

Sl. No.	Name	Location	No. of rooms	Distance from (Km.)	
				Railway Station	Bus-Stand
1	Hotel Indraprastha,	Fort Road, PKD	54	5 km	0.5 km
2	Sayoojyam Residency	Robinson Road	35	5 km	1 km
3	ITL Residency	Near Press Club, Robinson Road	30	5 km	1 km
4	Hotel Gazala Inn	HPO Road, PKD	31	4 km	1 km
5	City Halt Lodge	R.S. Road, Olavakode	30	0.3 km	4 km
6	Hotel Green Park	Near KSRTC Stand, PKD	30	4.5 km	0.3 km
7	Boon Inn	Kandath Complex, PKD	40	4.5km	0.7 km
8	Soorya Retreat	Robinson Road	30	5 km	0.7 km
9	Hotel Gate Way Residency	Near Stadium Bus Stand, PKD	30	5 km	0.3 km
10	Breeze Lodge	Near Rly Station, Olavakode	31	0.1km	4 km
11	New Fashion Lodge	G.B. Road, Palakkad	50	4 km	0.3 km
12	Orma Tourist Home	Opp. Railway Station, Olavakode	60	0.1km	4 km
13	Malang Tourist Home	Kannara Street, Palakkad	30	3.8 km	0.3 km
14	Aparna Lodge	Chittur Road, Palakkad	60	6 km	2 km
15	S.V. Palace Residency	Olavakode, Palakkad	36	1 km	3 km

Source: Palakkad municipality

Basic tourism infrastructure includes transportation facilities and services, water supply, electricity etc. Other essential infrastructure needs are hotels and stays. There are 90 lodging and tourist home facilities within the Municipality. Majority of the hotels are near bus stands and railway stations. There is a PWD Guest house in Tharekkad which is 3 Kms away from railway station and near Municipal bus stand. Out of the 90 lodging facilities, there are 15 main tourist home facilities in the Municipality with more than 30 rooms (Table 10.3). There are 4 hotels in the Municipality which has a capacity of more than 50 rooms and can accommodate more than 60 persons.

10.4 PROBLEMS AND POTENTIALS

- Even though Palakkad District is rich in its beauty and cultural heritage, the only major attraction in the Municipality is Palakkad Fort and Kalpathy Agraharam.
- Agraharams with Brahmin culture and traditional architecture provides a scope for heritage tourism
- Since the municipal area provides connectivity to the whole of the district, infrastructure development needs special attention. Especially in the case of Malampuzha, Palakkad town act as a service provider.
- Traditional festivals are the attraction of the town and nearby area, tourism can be promoted in that seasons despite of weather. Then April is a good time to visit the place.
- Since the tourism destinations are heritage sites, there is a scope for heritage tourism.
- There are several parks and gardens along with a dam in Malampuzha, 8 km away from Palakkad.

10.5 INFERENCE

Tourism sector in Palakkad Municipality is very weak and the main reason is the lack of tourism destinations in the municipality. The number of tourism destinations are very less in the municipal limit, but the major heritage locations like Palakkad fort, Kalpathy Heritage village, Jain temple etc gives a heritage value to the town. These heritage sites are in a walkable distance and it can be connected and developed as a heritage corridor. Apart from the tourist destination, Palakkad town is a major service provider for the tourists who visits the Palakkad district. Presently the quality and quantity of the tourism infrastructure like hotels, resorts, lodges etc. are not satisfactory. The municipality can act as major infrastructure provider for the tourism industry and need to establish world class facilities in this sector.



CHAPTER 11- PHYSICAL INFRASTRUCTURE

11. PHYSICAL INFRASTRUCTURE

Investment in infrastructures is an accelerating factor in economic growth, but accelerated growth requires broad integration of additional development policy components across economic, social and environmental realms and national planning policy. Palakkad municipality having high population density, essentially the development of infrastructures has, therefore, a direct impact on quality of life and on maintaining environmental values. The most influential factors in infrastructure development are long term planning and also the institutional structure responsible for planning, budgeting and implementation of the same.

11.1 WATER SUPPLY

In Palakkad municipality, surface sources and ground water sources together meet the water requirement for different purposes i.e., domestic needs, industrial and commercial needs, institutional needs, fire fighting, livestock needs, public purpose, agricultural needs etc.

According to the socio-economic survey, majority of the households (66.42%) depends KWA water for drinking and other domestic purposes. 28.28 % uses their own well and 2.85% depends on public bore wells. Only 0.72% depends on common wells or public bore wells.

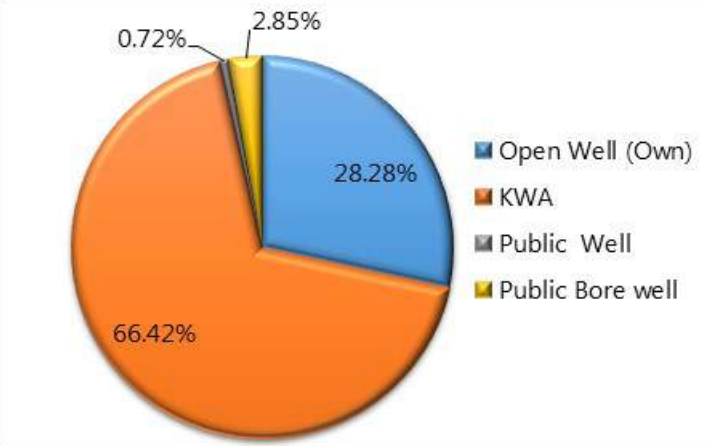


Fig. 11.1 Sources of drinking water

Source: Socio-economic survey, 2019

11.1.1 Existing Water Supply Scheme by KWA

Kerala Water Authority, a parastatal agency is responsible for the supply of potable water including planning, design, construction, implementation, maintenance, operation & management of water supply system within the entire Kerala state. The

Board is stipulated to run on commercial lines by generating surplus through tariffs in a manner to meet operational costs and capital expenditure. At present the water supply schemes in the municipality are run by KWA.

- Source and Water Treatment Plant

Existing source of water is Malampuzha dam located in the upstream reaches of Kalpathi River, a major tributary of Bharathapuzha. 96 MLD of water has been earmarked to meet drinking water needs and Malampuzha dam is the source of water supply for the Palakkad Municipality and five neighboring panchayaths which are fed from the water treatment plants of capacity, 12.5 MLD+ 12.5 MLD+9 MLD are located in the Malampuzha panchayath. In addition to this, the dam is also the source for Pudussery industrial area and KINFRA. At present only 23.5 MLD is supplied to Palakkad municipal area and after transmission losses only 20 MLD reaches the service reservoirs for actual supply.

- Zoning and Storage

The town is divided into three zones for the supply of water. All the three zones have Over Head Service Reservoirs (OHSR) at present.

I. Mattumantha Zone: OHSR - 15 Lakhs

II. Moothanthara Zone: OHSR - 23 Lakhs+13.5 Lakhs

III. Fort Zone or Kalmandapam Zone: OHSR -15 Lakhs

- Distribution Network

Total road length of the town is about 360 km. The present distribution consists of pipelines varying from 500mm (Cast iron) to 32 mm (PVC) for a length of about 300km in which almost 50 km pipes are laid at both sides. The current distribution is intermittent ranging from less than an hour to 8 hours a day. The network consists of pipes laid during 1961-1981 period and consists of AC, Cast Iron, GI and PVC pipes.

Water from the Malampuzha dam reaches three filter plants of capacities 9MLD,12.5 MLD,12.5 MLD located in Malam-puzha panchayath. The water so collected is being pumped through the 700 mm clear water premo pumping main to the reservoirs located at the three zones. The 700mm premo pipe laid from the first stage filter plant to Mattumantha branches into 500mm premo and 450mm CI pipes to carry the water to Mattumantha OH service reservoir and



OHS Reservoir at Kalmandapam

ground level reservoir. 600mm CI pipe is laid to carry water to Puthur junction and from there 450mm CI pipe is laid to carry water to Moothanthara reservoir. The 350 mm CI old pumping main of the old 9MLD plant was cut at Puthur and connected to the 350mm CI main from Puthur to Fort zone reservoir at Kalmandapam.

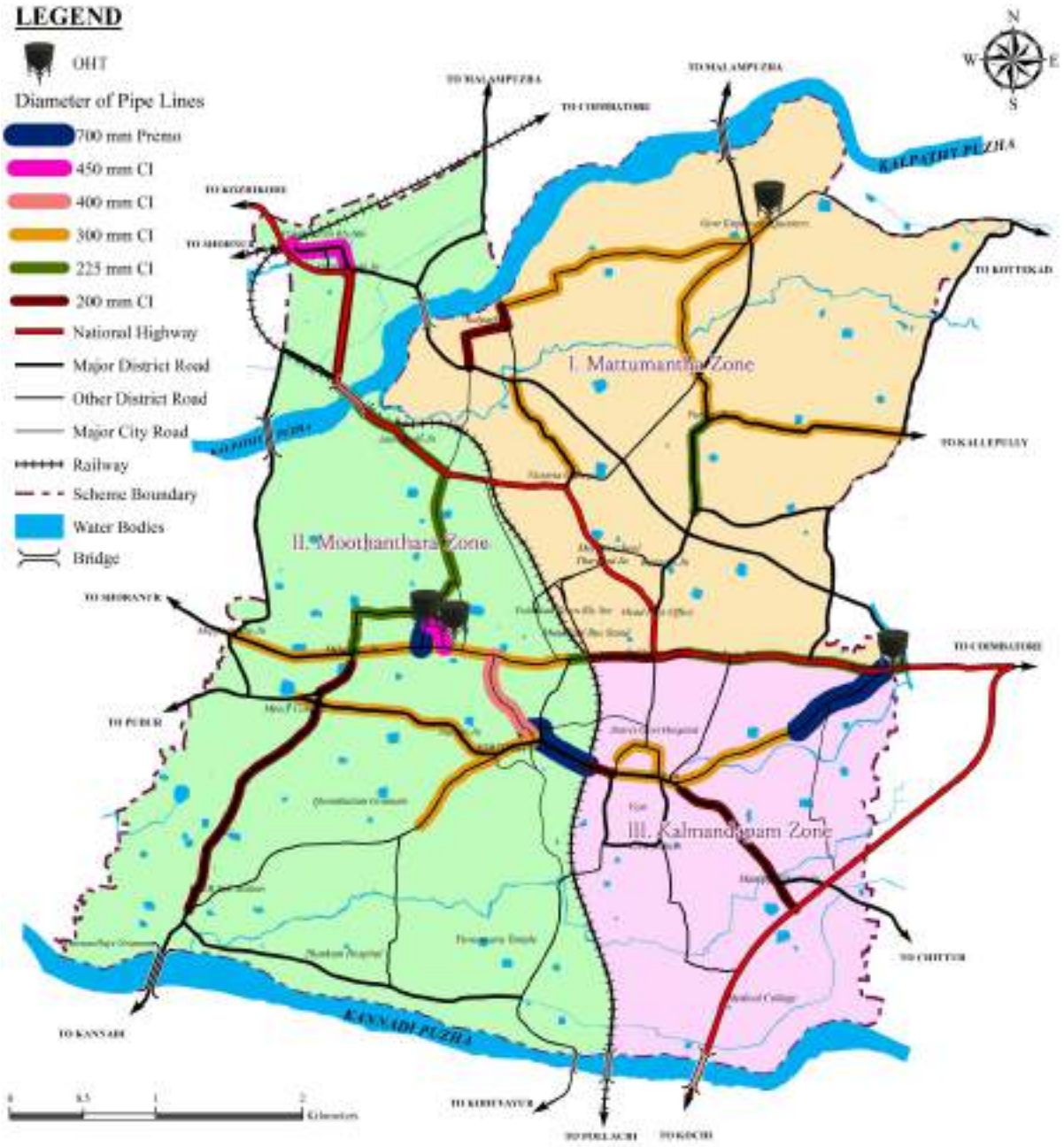


Fig. 11.2 Water supply distribution system in Palakkad municipality

Source: Source: KWA, Palakkad

- Service Coverage and Water Connections

The water supply scheme by Kerala water authority covers all 52 wards separated as 3 water supply zones shown in figure 11.2. The city has a total of 72,441

water supply connections. In which 88.73% of connections belongs to residential category. The remaining 11.27% constitutes commercial, industrial, others categories and street taps. Presently the municipality has 1,331 public stand posts (PSP) for water supply to the weaker sections of society, who cannot have individual house connections. The details of water supply connections during the last six years are given in Table 11.1. During 2014, total no. of connections were 55,128 and it became 72,441

Table 11.1 Water connection details in Palakkad town

Sl.no.	Category	No. of Connections					
		2014	2015	2016	2017	2018	2019
1	Residential	48,857	51,337	54,463	58,134	61,352	64,279
2	Commercial	4,265	4,458	4,800	4,994	5,281	5,515
3	Industrial	141	140	141	143	146	150
4	Others	413	528	641	763	952	1,166
5	Street taps	1,452	1,452	1,452	1,452	1,452	1,331
Total		55,128	57,915	61,497	65,486	69,183	72,441

Source: Source: KWA, Palakkad

in 2019.

A comparison of present water supply level indicators with MoUD benchmark is given in the following table 11.2. 95% of connections are metered. Extent of non-

Table 11.2 Existing water supply level indicators

Sl. no.	Indicators	Present status	MoUD Bench-mark
1	Coverage of water supply connections	62%	100%
2	Daily per capita supply of water	88 litres	135 litres
3	Extent of metering of water connections pro-vided	95%	100%
4	Extent of Non-Revenue Water	30%	20%
5	Quality of water supplied	100%	100%
6	Cost recovery in water supply services	62%	100%
7	Efficiency in collection of water supply related charges	76%	90%

Source: Source: KWA, Palakkad

revenue water is 30% which is higher than allowable MoUD benchmark (20%). Per capita water made available is 88lpcd and is far below the MoUD bench mark 135lpcd.

11.1.2 Distance to Water Sources

Socio-economic survey, 2019 reveals that overall 90.69% households had access to drinking water within their compound. 4.54% households had to travel up to 50m outside the premises, 2.35% households are estimated to travel a distance up to 100m

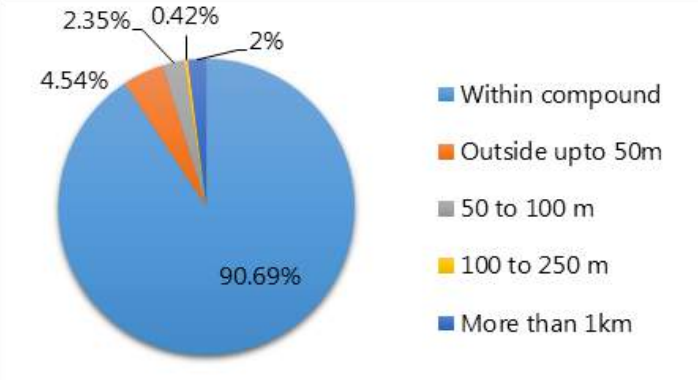


Fig.11.3 Distance to water sources

Source: Socio-economic Survey, 2019

and 0.42% households had to travel up to 250m to access the source of drinking water. The proportion of households who had to travel long distance (>1km) for drinking water is about 2% as given in fig 11.3.

11.1.3 Duration of Water Supply

In addition to the information on source of drinking water, information regarding availability of sufficient drinking water was also collected in this survey. Accordingly, most of the households (99.67%) had access to daily regular water source/ supply while 0.33% did not have access to regular water supply (once in two days or more than that). However, the duration of water availability varies from 'below 1hr' to 24hrs.

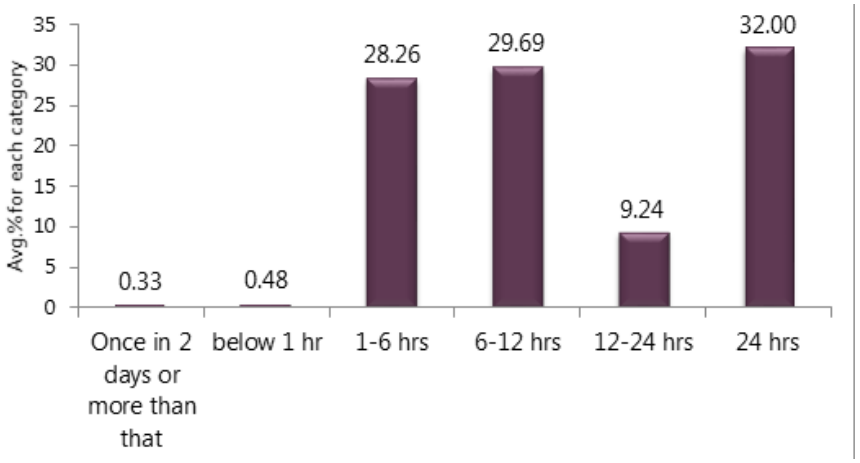


Fig.11.4 Duration of water supply

Source: Socio-economic Survey, 2019

About 32% households had 24 hrs water supply and those may be households having open well as their primary source of water. Figure 11.4 shows duration of water supply in Palakkad Municipality.

11.1.4 Ground Water Scenario

Groundwater is an essential and vital component of our life support system. The groundwater resources are being utilized for drinking, irrigation and industrial purposes. In the town, 31.85% households depend on ground water for drinking and other domestic purposes. There is growing concern on depletion of Ground Water Table (GWT) and deterioration of groundwater quality due to geogenic and anthropogenic activities.

- Ground Water Table

Hydrographs of Ground Water Monitoring Well located in the town bus stand (open well) and in DTPC ground (bore well) are shown in figure 11.5 and 11.6 respectively. From the hydrograph observations, it can be seen that the depth of water table varies from 3-9 mbgl for bore well (Well no: 127) and 5-18 mbgl (Well no:160 PKD -8) for open well.

The hydrograph observations show that the ground water level decreased during summer season it leads to acute shortage of water. From the observations in the bore well, average water level is decreased from 9.1 mbgl (01-06-2005) to 11.5

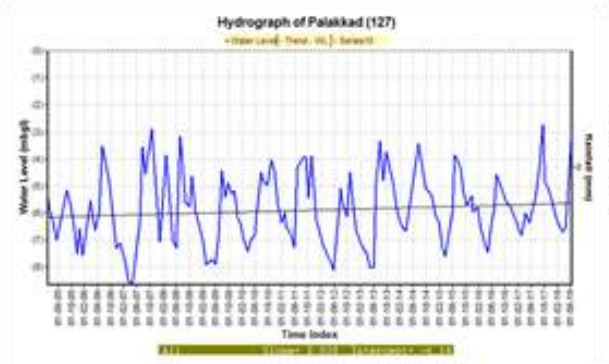


Fig.11.5 Hydrograph observation from open well at Town bus stand

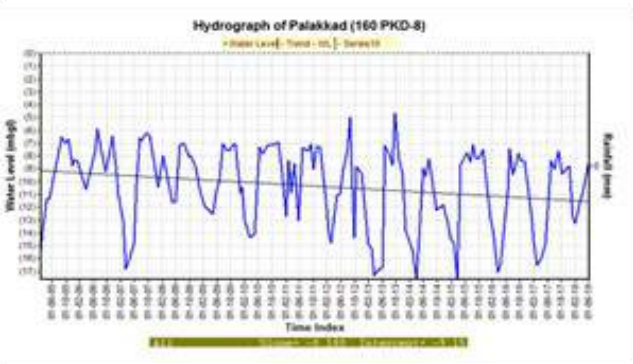


Fig.11.6 Hydrograph observation from bore well at DTPC ground

Source: Ground Water Department, Palakkad

mbgl (01-06-18). From the observations in the open well, average water level is increased from 6.1 mbgl (01-06-2005) to 5.6 mbgl (01-06-18). Long term ground water level trend indicate a fall in water level during pre-monsoon period.

- Ground Water Quality

Groundwater, being a fragile and important source of drinking water, must therefore be carefully managed to maintain its purity within standard limits. The

ground water samples collected from open well (at town bus stand) and bore well (at DTPC ground) tapping phreatic aquifers are analyzed for all the major inorganic parameters as given in table 11.3 and 11.4. Based on the results, it is found that the pH value and iron content are not within the acceptable limit for drinking purpose. pH value of well indicate alkaline nature to water and drinking water with a pH level above 8.5 indicates that a high level of alkalinity mineral is present. High alkalinity does not

Table 11.3 Ground water quality of open well at town bus stand

Sl No.	Parameter	Obtained value					Permissible Limit for Drinking Purpose
		2014	2015	2016	2017	2018	
1	pH	8.4	8.3	8.4	8.4	9.1	6.5-8.5
2	Total Dissolved Solids (TDS) (mg/L)	114	162	324	186	702	500-2000
3	Total hardness as CaCo3(mg/L)	66	95	165	120	120	300-600
4	Alkalinity (mg/L)	38	68	116	104	104	200 -600
5	Sulphates(SO_4) (mg/L)	-	10.2	36.6	8.6	-	200-400
6	Nitrates (NO_3) (mg/L)	-	1	0.8	-	-	45-100
7	Chlorides(Cl) (mg/L)	32	26	105	28	22	250-1000
8	Iron(Fe)	-	3.6	0.06	4.6	-	0.3-1
9	Calcium Ca (mg/L)	20.4	32	20	48	28	75-200
10	Magnesium Mg (mg/L)	3.7	3.7	28	9.8	12.2	30-100

Source: Ground Water Department, Palakkad

Table 11.4 Ground water quality of bore well at DTPC ground

Sl No.	Parameter	Obtained value					Permissible Limit for Drinking Purpose
		2014	2015	2016	2017	2018	
1	pH	8.9	8.3	8.5	8.4	7.2	6.5-8.5
2	Total Dissolved Solids (TDS) (mg/L)	330	300	312	264	270	500-2000
3	Total hardness as CaCo3(mg/L)	94	175	135	180	165	300-600
4	Alkalinity (mg/L)	182	174	174	74	176	200 -600
5	Sulphates(SO_4) (mg/L)	-	13.9	16.5	8.6	-	200-400
6	Nitrates (NO_3) (mg/L)	-	-	-	-	-	45-100
7	Chlorides(Cl) (mg/L)	71.5	61	70.4	64	60	250-1000
8	Iron(Fe)	1.5	8	7.2	-	-	0.3-1
9	Calcium Ca (mg/L)	49	34	22	38	36	75-200
10	Magnesium Mg (mg/L)	17.4	22	19.5	21	18.3	30-100

Source: Ground Water Department, Palakkad

pose a health risk, but can cause aesthetic problems, such as an alkali taste to the water that makes coffee taste bitter; scale build-up in plumbing; and lowered efficiency of electric water heaters.

11.1.5 Scarcity of Water

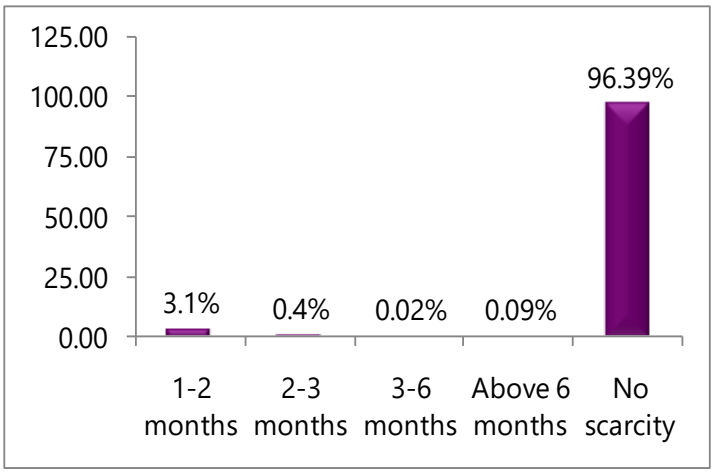


Fig. 11.7 Nature of water scarcity

Source: Socio-economic Survey, 2019

Examining the availability of sufficient drinking water throughout the year, socio-economic survey data shows that about 96.39% of households reported no water scarcity. 3.10% has scarcity for a period of 1-2 months and only 0.09% of HHs are facing scarcity for more than 6

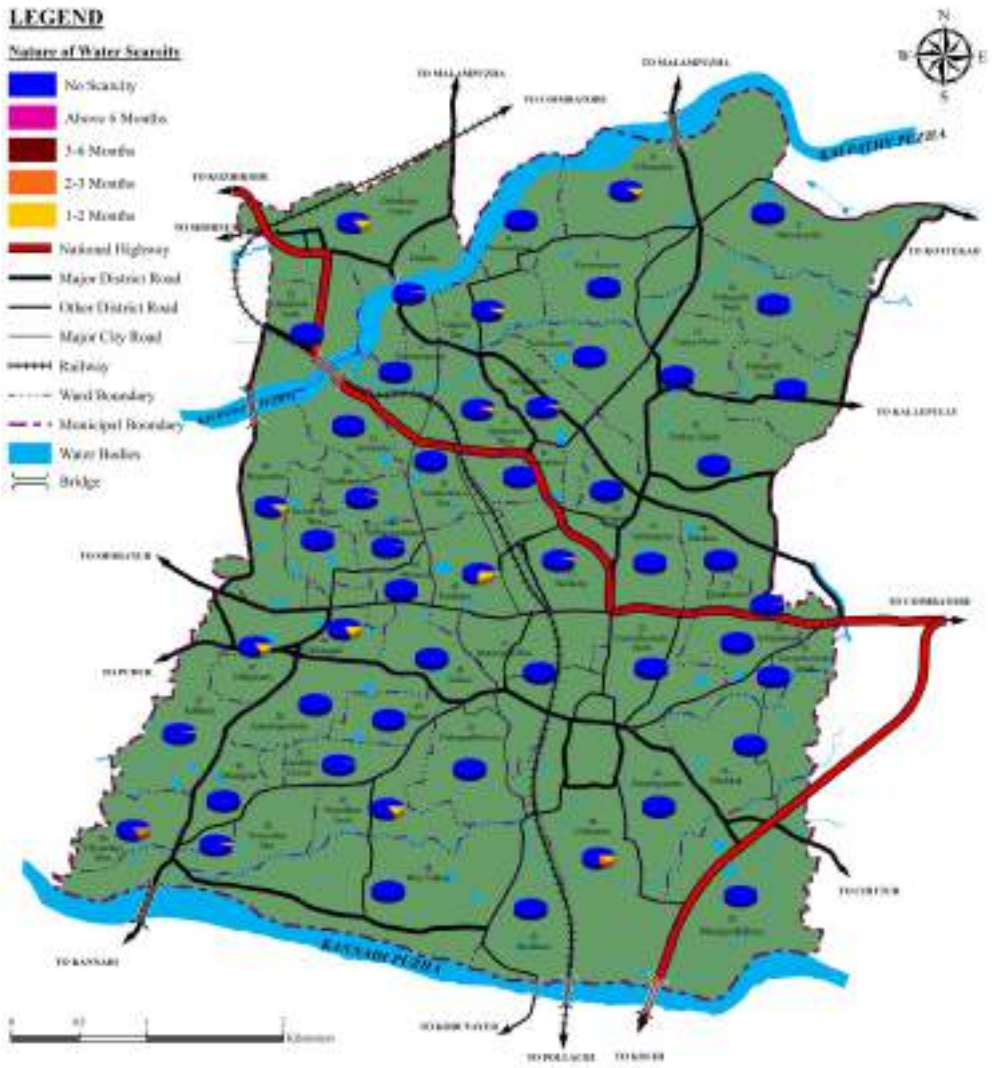


Fig.11.8 Spatial depiction of water scarcity areas

Source: Socio-economic Survey, 2019

months. Nature of water scarcity of the Municipality is shown in figure 11.7. Households face shortage of water mainly in summer season. Ward wise scarcity analysis shows (fig 11.8) that portions of Puthur South (Ward 12), Civil station (Ward 28) were reported scarcity more than 6 months.

11.1.6 Water Demand

The present water demand in Palakkad municipality for the total population is estimated as 26.04 MLD (based on 2019 population). As per socio-economic

Table 11.5 Present water demand from the town

Year	2019
Population	1,37,459
Domestic water demand @ 135 l/h/d (MLD)	18.56
Non-domestic water demand @ 20.8% of (1)	3.86
Fire demand 1% of (1)+(2)	0.22
UFW @ 15% of (1) + (2) + (3)	3.40
Total water demand @ (1)+(2)+(3)+(4)	26.04
Storage capacity required @ 33% of supply	8.59
Total storage capacity required @ (6) + (5)	34.64

survey only 66.42% of population is covered under major water supply scheme by water authority, i.e., Malampuzha water and Potable water available for them from KWA water supply system is 17.269 MLD. The present water supply scheme is insufficient to meet the water requirement of the total population. Ground water level gets decreased during summer season and it leads to acute water shortage problems.

11.1.7 Ongoing and Committed Projects

Major Water supply schemes in municipality are under Kerala Water Authority. In addition to this, there is water supply and system (WSS) project under National Rural Drinking Water Programme (NRDWP) at Kannadi. 4 projects are funded by National Bank for Agriculture and Rural Development (NABARD). There are other

Table 11.6 Ongoing and committed projects under AMRUT

Sl. No.	Project name	Status
1	Construction of 16 LL OHSR at Kalmandapam KWA & Demolishing existing 15LL OHSR Palakkad municipality - 2016-17	Completed
2	New pumping main-From Malampuzha WTP to Mattumantha DI- K9 pipe 600 mm - 2850 m	Completed
3	Providing flow meter at clear water pumping main to quantify and reduce Non Revenue Water(NRW)	Ongoing

Table 11.6 .continue ...

Sl. No.	Project name	Status
4	Construction of 45 MLD at Malampuzha KWA compound and booster station and demolition of old booster & sump in Palakkad municipality	Ongoing
5	Providing new DI pipeline of 600mm Puthur to Moothanthara	Completed
6	Providing new DI pipeline of 600mm Moothanthara to Kalmandapam	Completed
7	Replacement of raw water and clear water pump set, transformers and electrification	Ongoing
8	Construction of OHSR 2 Nos , total 60.5 LL capacity	Ongoing
9	Providing Rider main pipe lines, replacing AC pipe lines and service connection for proper zoning (Part-I) : Mattumantha Zone- 46.933km (600mm DI K9 -200mm DI K9 &160mm PVC)	Ongoing
10	Providing Rider main pipe lines, replacing AC pipe lines and service connection for proper zoning (Part-II) : Moothanthara Zone-47.613km (600mm DI K9 -200mm DI K9 &160mm PVC)	Ongoing
11	Providing Rider main pipe lines, replacing AC pipe lines and service connection for proper zoning (Part-III) : Kalmandapam Zone-43.996km (450mm DI K9 -200mm DI K9 &160mm PVC)	Ongoing

Source: AMRUT project wing, Palakkad municipality

water supply schemes under green book, state plan, KIIFB and AMRUT. At present the ongoing AMRUT project aims at 100% house hold coverage. For this a new 45 MLD plant at Malampuzha and three OHSRs with a combined capacity of 76.5LL exclusively to meet the demand of municipality area is under construction by KWA. House hold connections and replacement and upgradation of old pipelines are also part of its components.

11.1.8 Inference

As per socio economic survey, 66.42% population of municipality depend on KWA water. The total demand is 26.04 MLD and the total amount of water available is 20 MLD. There is a gap between demand and supply. But the installed capacity of tank is about 34 MLD. The quality of water supplied is poor even though rapid sand filter plant with capacity of 20 MLD is there in the municipality.

The proposed project on implementation is capable to meet the demands of water supply in a limited extent. Existing water sources should be protected and water conservation techniques should be implemented to meet the water demands of people in the municipality. Appropriate strategies and mechanism needs to be explored

including recycling of waste water. Mechanism of rain water harvesting should also be encouraged so as to minimize the fast depletion of ground water table.

11.2 DRAINAGE

Storm water drainage is concerned with the accumulation of run off resulting from rainfall, which needs to be conveyed to an appropriate outfall as quickly as possible, without causing inconvenience to pedestrian and vehicular traffic, and damage to property. With the creation of large area of paved surface by bringing agricultural land into urbanization, large volume of storm water is generated in urban areas. During the rainy season, drainage assumes important because of the numerous problems created due to inefficient disposal of storm water. Due to inefficient or non-existence of storm water drainage network, most of the town now faces a problem of water logging and flooding causing health hazards.

11.2.1 Existing Drainage Network

Palakkad town receives on an average of 2,135mm of rainfall annually. A planned system of drainage is a necessary for an urban area. The existing drainage system in the town comprises of a hierarchy of natural and manmade drains and water bodies that ultimately discharge surface run-off into rivers Kalpathy and Kannadi and its tributaries. Numerous ponds and thodus constituting the major storm water drainage system for the area helps to drain storm water from the town. The thodu and canals are the major carriers of storm water, finally disposing into the river and water bodies in the catchment. Currently, storm water drains in the town are constructed and maintained by the municipality and Kerala Public Works Department. Normally storm water drains receive the least priority and are constructed on an ad-hoc basis only, in response to localised problems.

- Major Water Bodies & Drains

The terrain of the municipal area is gently undulating with low lying areas and paddy fields. The south western portion of the municipality is low lying and flood prone. The paddy fields were under cultivation earlier but are now being converted to housing areas. There are mainly two rivers Kalpathy river 5.5 kms stretch flowing on the northern boundary and Kannadi river ;6 kms flowing on the southern side of the town.

The drainage water is discharged through 8 canals traversing the municipal area which in turn discharge into Kalpathy river and Kannadi river. The natural canals serving as the primary canals have a total length of 25.75km. The secondary drains are mostly masonry drains joining the primary canals discharging the storm and the sullage from the tertiary drains in the town area. Besides this, two branches of the Edathara irrigation canal are also partially used for drainage purpose. The main Malam-puzha canal (Edathara canal) is about 6.5Km long and the branch canal is 3.5 Km.

Table 11.7 Length of storm water drains in Palakkad municipality

Type	Length (km)
Primary drains (Natural drains)	25.75
Irrigation canals	10
Secondary canals	47
Tertiary canals	122
Total	204.75

Source: Palakkad municipality

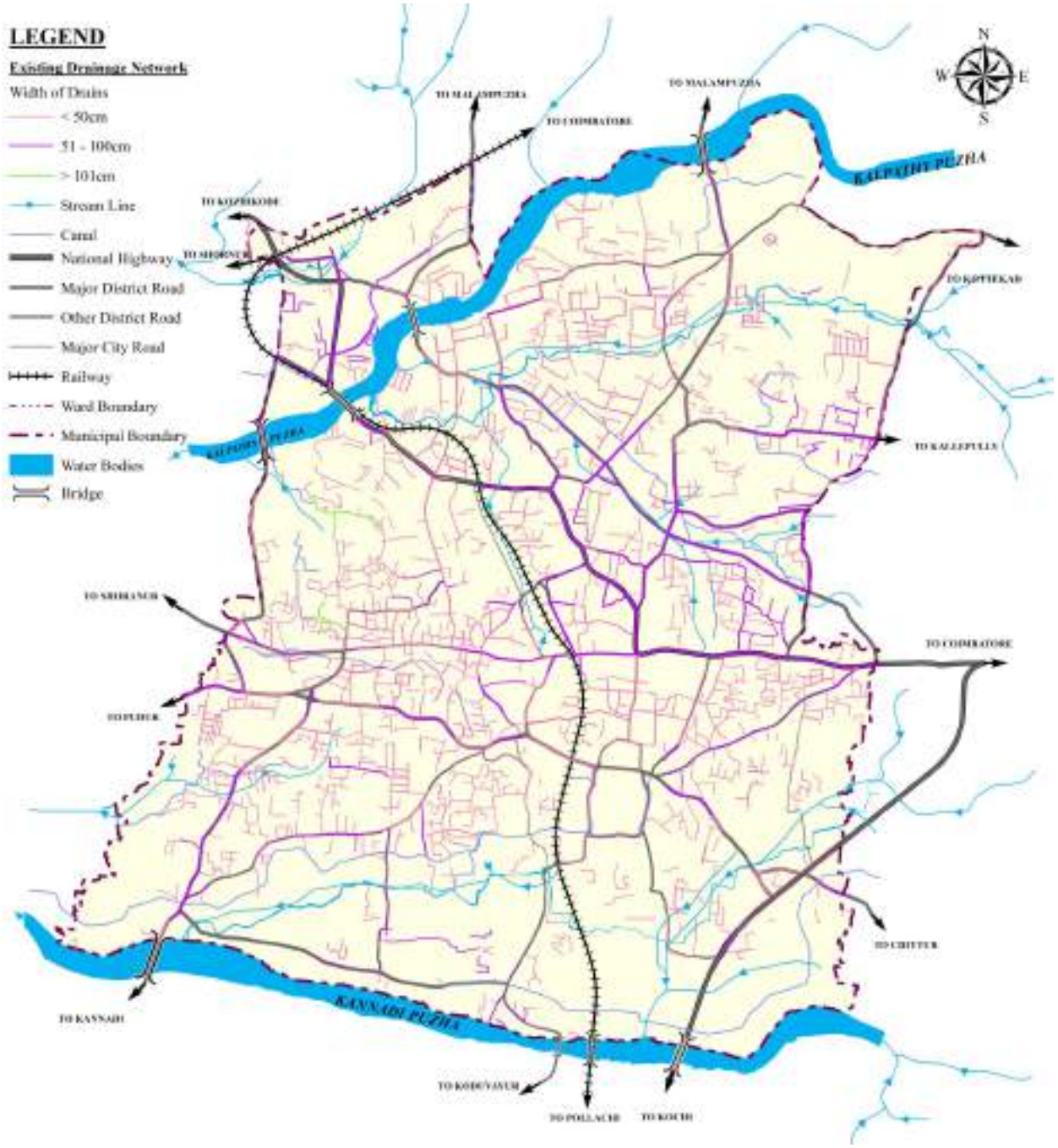


Fig. 11.9 Existing drainage network in Palakkad municipality

Table 11.7 shows the length of storm water drains in Palakkad municipality and figure 11.9 shows the drainage network in Palakkad municipality.

Natural drains and manmade drains exist inside the city. Natural drains are of length 25.75 km. Manmade drains are classified into secondary and tertiary drains. Secondary drains are of length 47 km and tertiary drains are of length 122km. Palakkad municipality maintains a road length of 336 km in which 103.5 km of roads are having width below 3 meter. Only 25 to 30% of roads have storm water drains. At present there are numerous drainage problems occur especially in the low lying areas due to inadequate tertiary drains.

11.2.2 Major Drainage Problems in the Town

The following problems were recognized through deep investigation in the drainage network

- Mixing of Sewage Water with Drainage Water

The city has a separate storm water drainage network but doesn't have a sewerage network. Storm water drains are constructed for the purpose of discharging rain water run off during monsoon into lakes and tanks. These drains, for several decades were getting mixed with sewage and have been responsible for contamination and pollution of water bodies in many parts of the city. Especially in commercial areas, the waste water is directly flown into drains or into nearby water bodies. They had no other option other than letting sewage water into SW drains to keep localities free

Table 11.8 Locations where storm water gets mixed with sewer

Sl.no.	Location	Merging with
1	Tailor Street	Merging with commercial establishment and household sewer outlets
2	Kannara Theruvu	Merging with commercial establishment and household sewer outlets
3	Pattikkara	Merging with commercial establishment and household sewer outlets
4	Victoria College road	Merging with commercial establishment and household sewer outlets
5.	Chadana Kurissi	Merging with commercial establishment and household sewer outlets
6.	Chakkanthara	Merging with commercial establishment and household sewer outlets

Source: Engineering wing, Palakkad Municipality



Fig. 11.10 Locations were storm water gets mixed with sewer outlets

from stagnation of sewage. Details of major locations where sewage gets mixed with storm water drains are given in Table 11.8 and fig 11.9.

- Chocking of Drains

The drains are more prone to disposal of solid wastes and growth of vegetation resulting in reduction/stagnation of normal flow. Inadequate collection and disposal of solid waste and sewage is the key issue, which leads to filling of the drains with filth. Absence of de-silting and non-removal of vegetation from the drains results in the stagnation of storm water. Pre monsoon cleaning is being done every year and during flooding. Collection of solid waste by Kudumbasree and source recovery of

Table 11.9 Major locations prone to chocking of drains due to solid waste

Sl.No.	Location	Stretch Length Affected	Reason
1	GB ROAD	0.2 KM	Silted to very high degree and clogged due to solid waste especially plastic.
2	Moyans to Priyadarshini Theatre junction	0.1 Km	
3	Olavakkodu Railway Station	0.5 Km	
4	Thanavu Rajeev Nagar	0.2 km	
5	Mettupalayam Street	0.2 Km	
6	Victoria CollegeJunction	0.3 Km	
7	Behind Palat Hospital	0.5 Km	
8	Thottil Lane near Kalmandapam	0.2 Km	
9	Moothanthara Martket locality	5 Km	
10	Melamuri Junction	0.3 km	
11	Puthuppalikkavu	2 Km	
12	Kalmandapam to sevalpalayam Junction	0.8 Km	

Source: Engineering wing, Palakkad Municipality

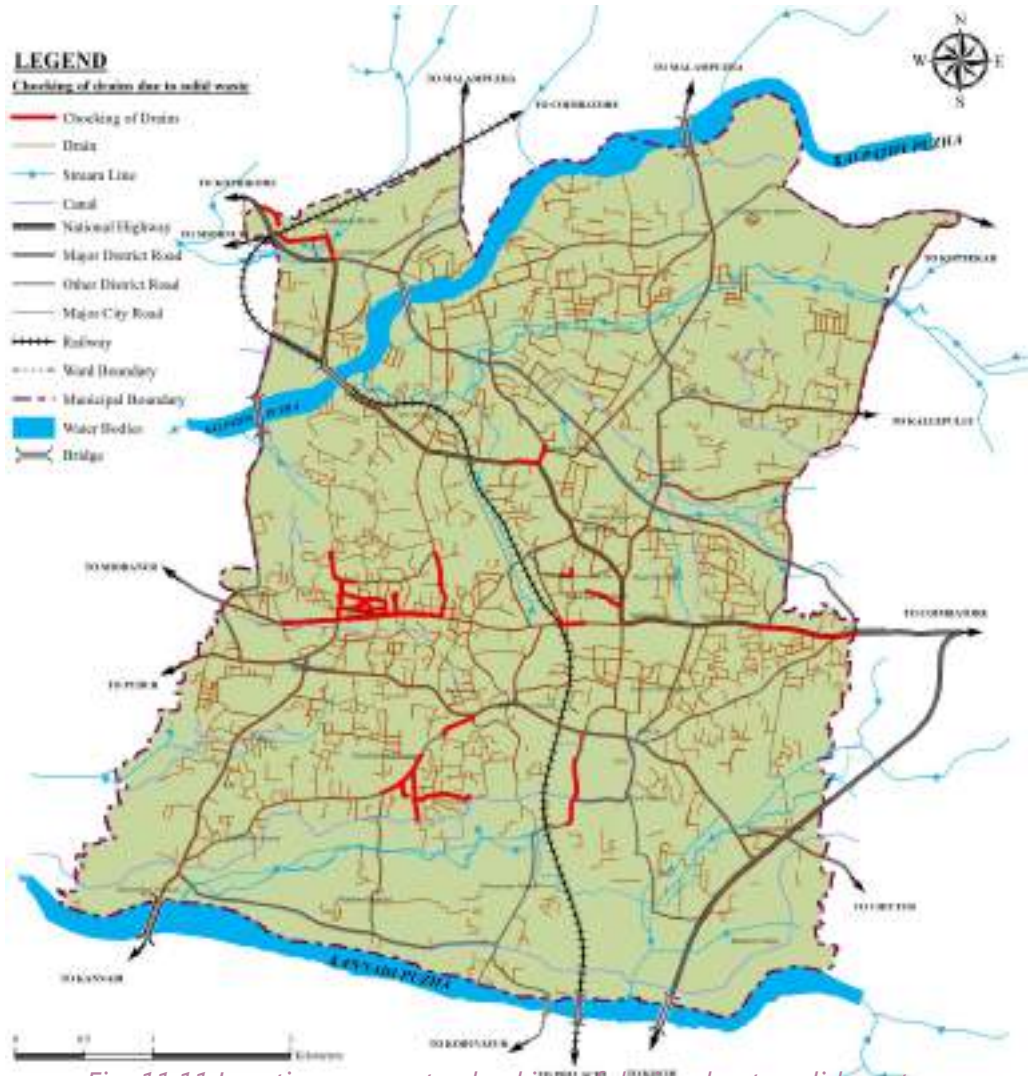


Fig. 11.11 Locations prone to chocking of drains due to solid wastes

waste at residential and commercial units limited the high levels of chocking of drains to certain extend. Table 11.9 & fig.11.11 gives major locations prone to chocking of drains due to solid wastes.

Apart from this, several natural drains in the municipal area are observed to be chocked, defunct and even encroached upon. In some cases, it is difficult to trace the path of original drains mainly due to encroachment. As the influence areas of these drains could not find way to drain off water either creating a water stagnant condition or flooding. For such redundant drains some suitable alternative drains are to be constructed or the original path is to be located and restored.

- Water Logging/Flooding

Lack of universal coverage of drainage is the key issue for water logging. Improper maintenance of the existing drains coupled with excessive runoff is the root cause of flooding of low lying areas. Absence of sewerage network and inadequate collection and disposal of solid waste also leads to problems in this sector.

Water logging incidences were reported in certain road stretches, inter-sections and residential colonies during two rainy seasons. Present practice is that, an excavator machine and heavy truck is hired by the municipality and water logging is cleared by making channels from water logged areas to natural drains present in the

Table 11.10 Flood prone locations in the city

Sl. No.	Area	Number of points	No of times *water log-ging reported in a year
1	Key road intersec-tion	Shakuntala Junction, Palakkad Town Rail-way station junction, Victoria College to 100 Ft road and Manappullikkavu Junction	20
2	Along roads (50 m length or more)	Kalvakkulam road to Koppam -300m street stretch, Kalmandapam to stadium bus stand junction road -800m street stretch, Koppam to Puthoor road -300m street stretch, Palayppetta road- 300m street stretch and Court road -50m street stretch	20
3	Locality (affecting 50 HH or more)	25 Slums	25

* stagnant water for more than four hours of a depth more than 6"

Source: Engineering wing, Palakkad municipality

area. And also a temporary set up is provided by the municipality for rehabilitation of people living in the water logged area till the clearance of logged water. These

remedies are only temporary and do not provide a satisfactory outcome. Table 11.10 and fig 11.12 show the flood prone areas in Municipality.

Water logging and subsequent flooding is experienced in parts of Chakkumthara, thirunellai, Melamuri and Meparambu. The 'Thottungal' drain is one of the main discharge canal of the southern part of the municipal area which traverses through Manapullikkavu, Civil lanes, Yakkara, Padathu and Thirunellai. The entire area is

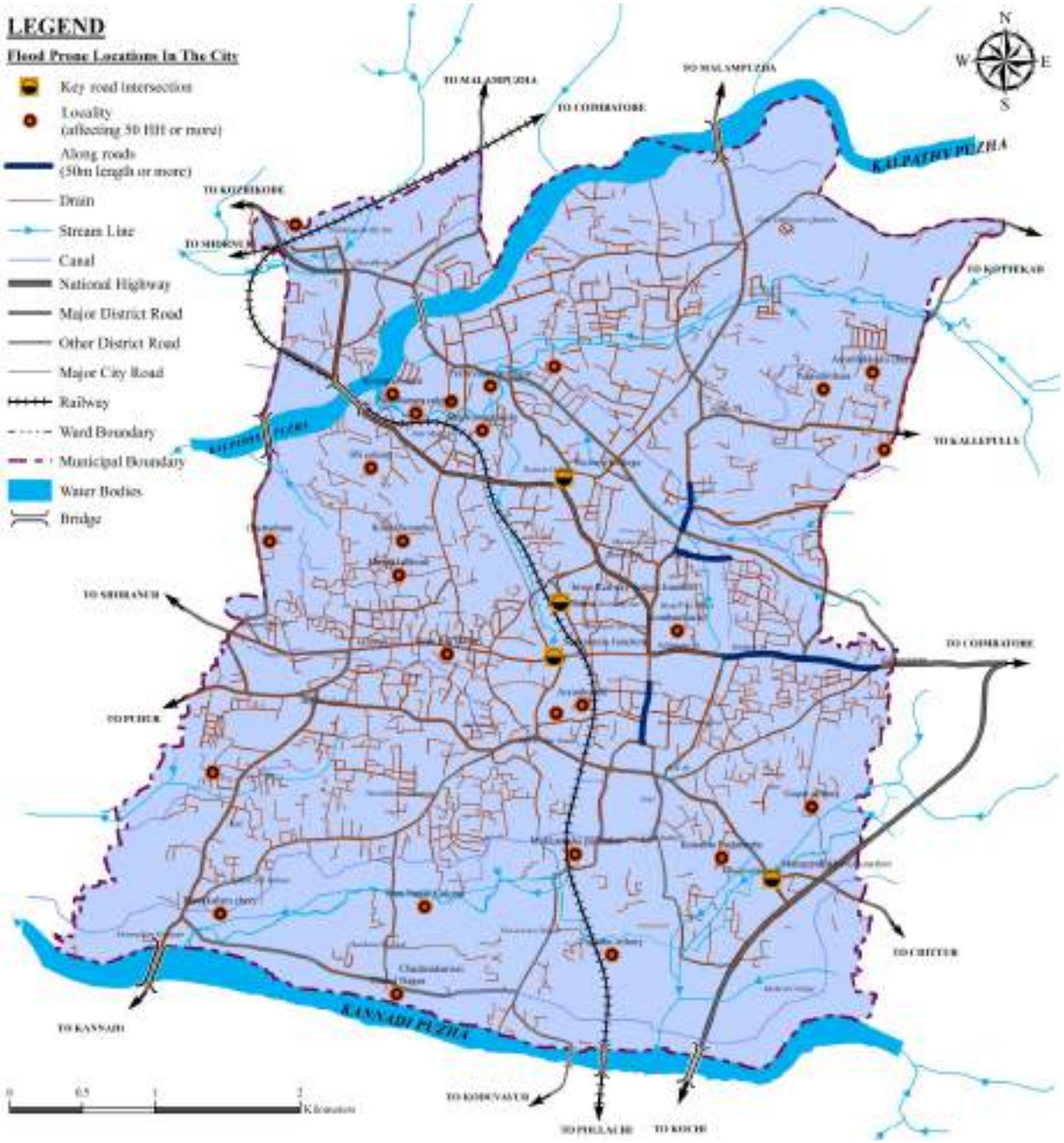


Fig. 11.12 Locations prone to flash flooding within the municipality

prone to flooding during monsoon. Many road side drains and waste water outlets make discharge into this thodu, which make the entire system polluted. Further it is observed that sewage and sullage from the houses on the banks of thodu are directly

diverted into this channel making the situation worse. Ultimately, dirty water stagnation has become the part of urban life in Palakkad municipal area and is always exposing the urban life towards the chances of spreading epidemics in the municipal area.

11.2.3 Service Coverage

As per the study of municipal engineering wing, 80% of the drains are inadequate to carry the peak flow. Lack of funds, lack of width for constructing drains in the municipal pocket roads, encroachments on sides of the main roads and on

Table 11.10 Flood prone locations in the city

Sl. No.	Indicators	Sustainable standards	Black (Caution for improvement)	Red (Immediate action for improvement)	Present Status
1	Coverage of Storm water drainage network	100%	<75%	<50%	61%
2	Sewerage mixing in the drains	0%	<25%	<50%	60%
3	Waterlogging	0%	<25%	>50%	-

Source: Engineering wing, Palakkad Municipality

Table 11.11 Demand gap assessment for storm water drainage

Component	2015			2021	
	Present	Ongoing projects	Total	Demand	Gap
Major Drains	28 Km	Nil	28 km	33 km	5 km
Network requirement to provide proper drainage to all identified water stagnant point/ flooding points up to the end discharge point (in Km)	197 km	Nil	197 km	360 km	163 km
Network length where households discharging wastewater directly into the drains	118 km	Nil	118 km	0	118 km
Rejuvenation of existing primary 'nallahs' and primary drains including covering and installation of filter	8 km	0.5 km	8.5 km	28 km	19.5 km

Source: Engineering wing, Palakkad Municipality

natural drains, decreased carrying capacity of the existing canals /drains due to heavy silt deposition, discharge of solid waste in the canals/ drains and growth of vegetation in the canals/drains and encroachments, missing links in the existing drainage network, lack of cross linkage drains are the main reasons for improper functioning of drains in municipality. Comparative information of service levels with respect to the service level benchmarks prescribed by MoUD and sustainable standards for service levels under the 'National Mission on Sustainable Habitat' (NMSH) are given in the following table 11.10. existing demand gap assessment is given in table 11.11.

11.2.4 Ongoing Projects

Municipality has initiated a drainage master plan for Palakkad Municipality to achieve maximum coverage of storm water drains. It also includes rejuvenation of primary, secondary & tertiary drains, rehabilitation of major drains, construction of area drains & tertiary drains and construction of storm water treatment plants. Construction of tertiary drains inside the city is one of the major projects. It is proposed to build 5 km tertiary drain inside the city for a length of 5 km along one side of the road. The components in the projects include construction of side protection wall using DR packing, Concrete Canvas (CC) drain and providing cover slabs to the tertiary drains in the Manakkalthodi, Shankuvarathodu, Thottungal drain, drain behind new civil station and Ayodhya Nagar drain. Rejuvenation of Kalvakkkulam thodu is another project under AMRUT. The completion of the project will lead to a 2% increase in network coverage of the city. De-silting and de-chocking of drains included in the project hence it will help to eliminate the chocking of drains and water stagnation to an extent.

11.2.5 Inference

Due to steady increase in population, the needs for housing complexes and colonies have also increased. The overall development activities intruded with the drainage system and necessitated new storm water drains have become the imperative need of the day. The unauthorized mixing of drainage water into storm water drains and vice versa is leading to unhygienic conditions and there is every need to arrest the mixing of water from one another. Improper maintenance of the existing drains coupled with excessive runoff is the root cause of flooding of low lying areas. In-depth study of the present status of the drains, their carrying capacity, anticipated flood discharge and the probable routing/re-routing may be devised and implemented for restoring/ enhancing the status of drainage network in the city to solve the issue to a significant extent. And such design criteria should be founded on sound scientific background and engineering principles.

11.3 SANITATION AND SEWERAGE SYSTEM

Sanitation refers to the provision of facilities and services for the safe management of human excreta from the toilet to containment and storage and treatment on-

site or conveyance, treatment and eventual safe end use or disposal. More broadly sanitation also included the safe management of solid waste and animal waste. Inadequate sanitation is a major cause of infectious diseases such as cholera, typhoid and dysentery world-wide.

11.3.1 Existing Sanitation System

Palakkad Municipality has no under-ground sewerage system so far. The present system of sewage disposal and treatment is mainly through septic tank. As per socio-economic survey, 99.65% households in the municipality have sanitation facilities

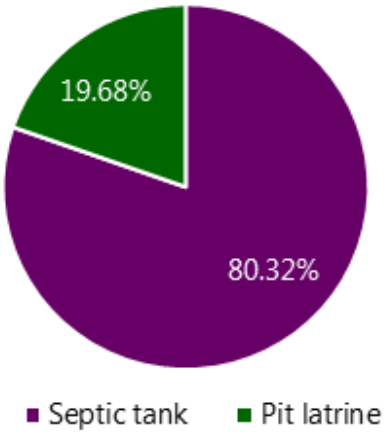


Fig.11.13 Existing sanitary waste disposal system

Source: Socio-economic Survey, 2019

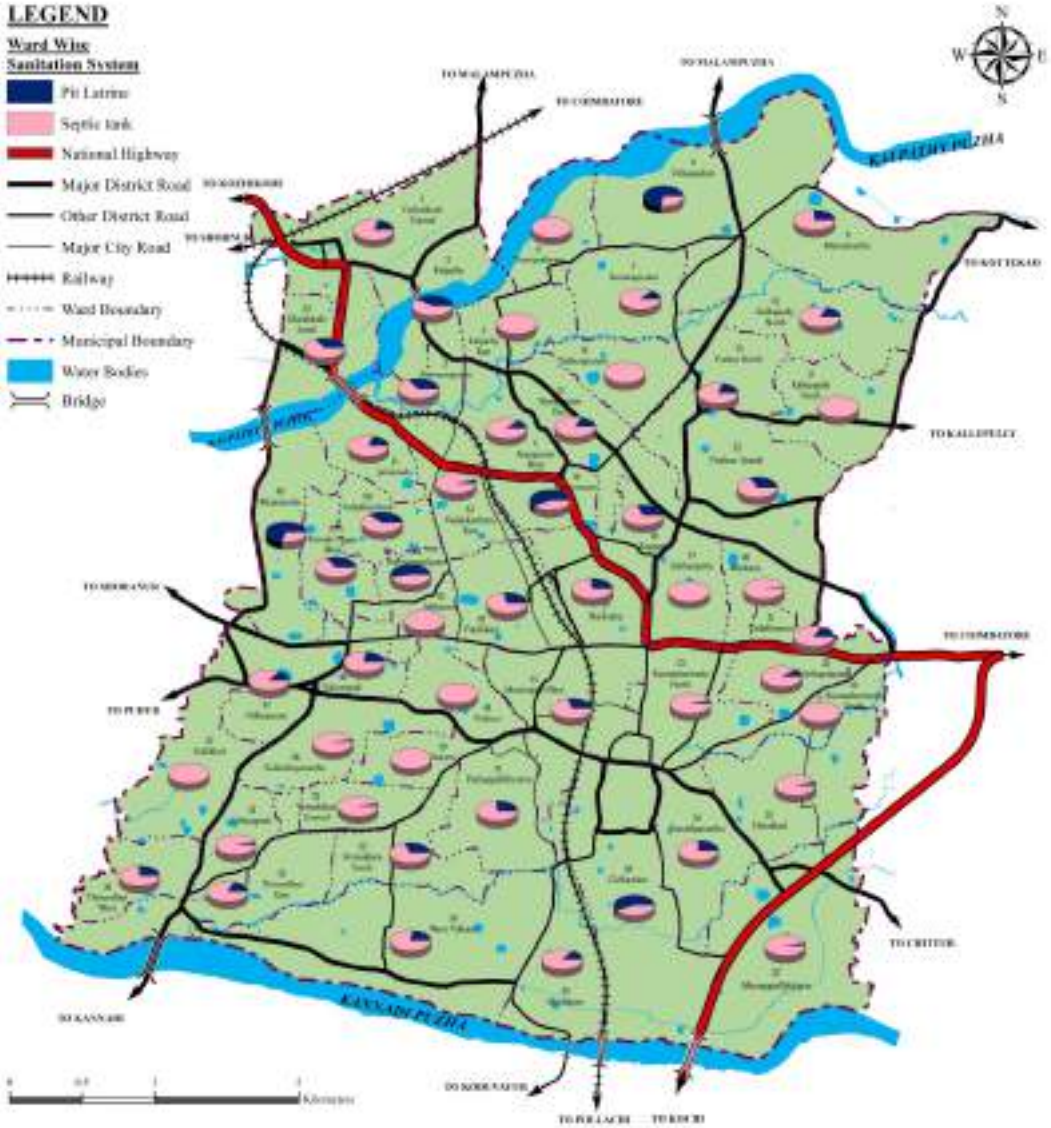


Fig. 11.14 Ward wise sanitary waste disposal systems

Source: Socio-economic Survey, 2019

within their compound. In that 80.32% households use septic tank and 19.68% have pit latrine, which is the traditional low cost sanitation system. With rapidly cities they were becoming inadequate to the new scale and density of population since the possibility of infiltration of contaminated water into the surrounding soil is very high. Figure 11.13 shows the sanitary waste disposal system in the municipality and figure 11.14 shows the ward wise sanitation system.

11.3.2 Public Comfort Stations

Public toilets play a role in community health and individual well-being. The promotion of adequate number of public comfort stations are essential for a community. These public toilets play an important role in safety, dignity and well-being of

Table 11.12 Public comfort stations within Palakkad municipality

Sl. No.	Type and size of Public Convenience	Location	Run by Local body or Private	Free/ Charged
1	Latrine & Toilet	KSRTC Bus Station	Private	Charged
2	Latrine & Toilet	Stadium Bus Stand	Private	Charged
3	Latrine & Toilet	Municipal Bus Stand	Private	Charged
4	Latrine & Toilet	Town Bus Stand	Private	Charged
5	Toilet	Vegetable Market	Private	Charged
6	Latrine & Toilet	Kotta Maidhanam	Private	Charged

Source: Primary Survey

community and floating population. There are 6 Public toilets in the Palakkad municipality and these are run by private parties. In these comfort stations people were charged for using the toilets. Lack of sufficient numbers is the first problem as far as public toilets are concerned; tracing the existing ones can be even more tiresome. Details of these public toilets are given in the table 11.12. Also there are several e-toilets were installed in several spots inside the city premises as part of the Swatch Bharath Mission, but most of them are not properly working.

The number of toilets provided in commercial establishments and offices are far below requirements. There is no systematic method to collect and treat waste from the septic tank. At many places overflow of septic tank occurs and these tanks are connected with the nearby storm water drains.

No sewage treatment facilities are available in the municipal area. City needs a new sewerage system to fulfill the gap including Sewerage Treatment Plants (STP), pumping stations and universal coverage of sewerage networks.

11.3.3 Inference

There are both technical and institutional dimensions to the problem of septic tanks in the state of Kerala. The septic tank design does not comply with the national guidelines with reference to planning, design and construction. Local masons are unaware of the existing design and construction guidelines to construct and design the septic tanks. Also promotion of adequate number of public and community toilets is required to be focused to cater to the needs of floating population of tourists and migrants.

11.4 SOLID WASTE MANAGEMENT

Solid Waste Management is defined as the discipline associated with control of generation, storage, collection, transport or transfer, processing and disposal of solid waste materials in a way that best addresses the range of public health, conservation, economics, aesthetic, engineering and other environmental considerations. The sources of solid waste include residential, commercial, institutional, and industrial activities.

In its scope, solid waste management includes planning, administrative, financial, engineering and legal functions. Solutions might include complex inter-disciplinary relations among fields such as public health, city and regional planning, political science, geography, sociology, economics, communication and conservation, demography, engineering and material sciences.

11.4.1 Waste Disposal Followed by Households in the Municipality

As per socio economic survey, 65.06% of the households dispose their wastes within the compound, 13.35% used to dump wastes in public/barren lands and 13.35% dispose wastes in garbage bins provided by municipality . Only 0.62% make use of bio-gas plants as given in fig 11.15 .

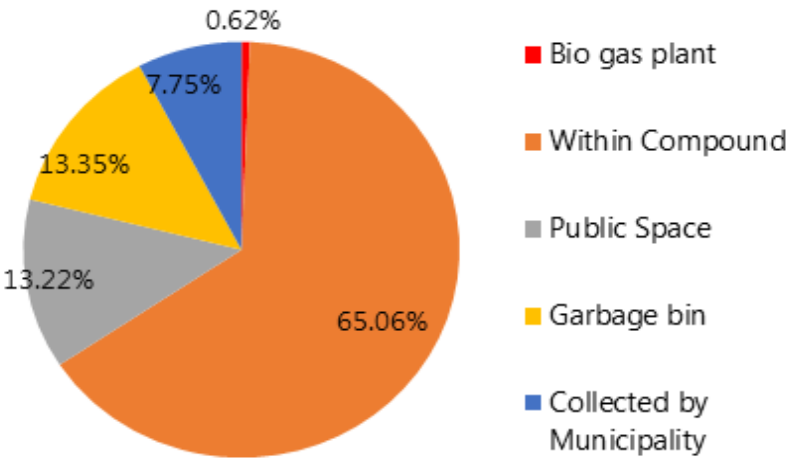


Fig. 11.15 Waste disposal methods adopted by households

Source: Socio-economic Survey, 2019

11.4.2 Existing Municipal Solid Waste Management System

Palakkad municipality has its own solid waste management system. Municipality provides door to door waste collection facility for all the households and institutions within the municipal area. The waste generated is collected and dumped at the disposal site located at Kodumbu panchayath (8.5 acres). The site is about 8km from the town. The health department is mainly responsible for the collection, transportation, and disposal of solid waste. The engineering department handles the removal of construction and demolition waste, while they also provide technical and infrastructural support to the health department.

- Quantum of Waste Generated in the Town

Wastes that arise from a typical urban society comprises of garbage, rubbish (package materials), construction and demolition wastes, leaf litter, hazardous wastes, etc. Table 11.13 shows the details of waste generated in Palakkad town. As per municipal health department, the total quantity of solid waste generated in the town is 42.75 tonnes per day as given below.

Table 11.13 Total waste generated in Palakkad town

Sl. No	Source	Total waste in Tonnes /Day	% of total
1	Domestic Waste	15	35.09
2	Commercial Establishments	12	28.07
3	Slaughter House Waste	2	4.68
4	Hospital Waste (non-bio medical)	0.5	1.17
5	Street Sweepings	0.5	1.17
6	Markets	11	25.73
7	Schools and Institutions	0.25	0.58
8	Others	1.5	3.51
	Total	42.75	100.00

Source: Public health wing, Palakkad municipality

The data pertaining to the quantity of waste generated reveals that 35.09% (15 tonnes) of the waste is generated from domestic households. From commercial establishments, waste generated per day is 12 tonnes (28.07%) and is 11 tonnes from market places (25.73%). Remaining 11.13% include waste generated from slaughter houses (4.68%), hospitals (1.17%), street sweepings (1.17%), schools and institutions (0.58%) and others (3.51%).

- Waste Collection and Transportation Facilities

For a more efficient and effective approach, the municipal area has been divided into four zones: North, South, East and West zones as depicted in fig 11.16. As part of

the 'Swatch Bharath Mission' 8 units of material collection facilities are installed in Palakkad municipality (table 11.14). Material Collection Facility (MCF) is a center where

Table 11.14 Details of aerobic composting units within Palakkad municipality

Sl. no.	Location	Facility
1	Vennakkara	6 Bins
2	Stadium Bus Stand	8 Bins + M.C.F
3	Sekharipuram	4 Bins
4	Sundaram Colony	4 Bins + M.C.F
5	L.N. Puram	5 Bins + M.C.F
6	Kalmandapam	8 Bins + M.C.F
7	Aravusala	4 Bins
8	Municipality Office Compound	4 Bins + M.C.F

Source: Report on site visit, Solid waste disposal, Palakkad municipality

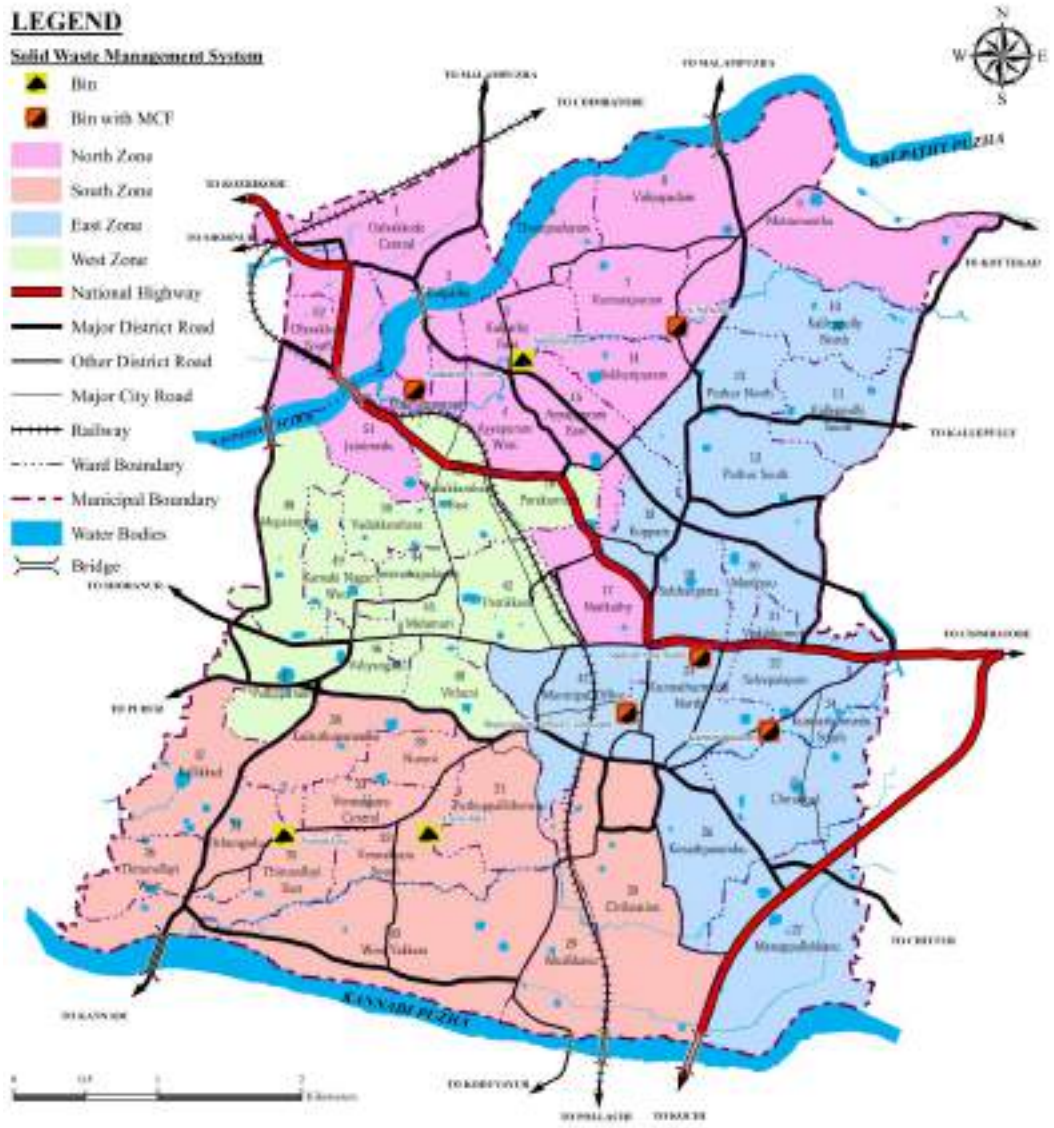


Fig. 11.16 Zones for solid waste management system in Palakkad town

non-compostable solid waste can be temporarily stored by the municipality to facilitate segregation, sorting and recovery of various components of waste. These acts as aerobic composting units and 5 of them are used for temporary disposal of non-bio degradable wastes. These community facilities are installed in selected places based on population, space availability and accessibility. In these composting units daily 1.25 tonnes of waste can be treated. But the operation of these units is not done properly and collection of waste for resource recovery also not done in regular intervals.

Currently in the town, awareness about source segregation is still a concern, and it is picking up slowly. Solid waste collection is carried out in two phases. The first phase is a primary collection, in which the solid waste is collected on tipper and hand-carts. Waste is collected through door to door collection and street sweeping. segregated waste is collected by the 'Haritha karma sena' from households and commercial establishments. Three employees are allotted for each ward in order to collect wastes from households. A collection charge of Rs.100/- per month is charged from households and Rs.300/- is charged from commercial establishments. In door to door collection system, sanitary napkins are collected in every 5 days, non-biodegradable

Table 11.15 Quantity of solid waste collected in Palakkad town

Zone	Total number of Houses	Total number of Commercial Establishment	No. of units making use of door to door waste collection facility
North	8,840	1,387	4,686 (46%)
East	9,097	2,735	4,822(41%)
West	5,777	1,697	3,078 (41%)
South	7,856	655	4,164 (49%)
Total	31,570	6,474	16,750

Source: Public health wing, Palakkad municipality

wastes are collected every 15 days from each zones. In every three months e–wastes are collected from each zones. For cleaning of public places there are 18 city cleaning units comprising about 90 members.

Table 11.15 shows the ward wise door to door collection details of Palakkad municipality. From 16,750 households and commercial establishments waste is collected by door to door collection method by Palakkad municipality. i.e., 44.03% of households and commercial establishments make use of this service.

Waste from the markets: - Waste generated from market area are collected separately by the 'Kudumbasree city cleaning units'.

Bio Medical Waste: - Bio medical waste is collected and processed by IMAGE (Indian Medical Association Goes Eco Friendly). It is operated and managed by Indian Medical Association. Collection and processing of medical waste is being charged per bed rate depending on the number of beds in the hospital. Waste generated from hospitals and clinics is treated in the bio-medical plant located at Kanjikode. The unit caters to processing of medical waste from other parts of the state also.

Transportation of wastes from collection centers to the landfill site is another crucial step in waste management. At present, waste transportation is using pushcarts, auto etc which bring wastes to primary collection centers. From there, trucks collect the municipal solid waste and transport it to the waste disposal sites. The municipality has 28 hand carts and own 8 tractor trolley with capacity 1 ton, one mini dumper placer with capacity 2 tons, and one mini tipper with capacity 1 ton for waste transportation. The vehicles have no separate partition for wet and dry wastes.

- Waste Disposal Site

The safe and reliable long-term disposal of solid wastes is an important component of integrated waste management. Although source reduction, reuse, recycling, and composting can divert significant portions of MSW, a large amount of wastes still needs to be placed in landfills. As stated earlier total quantity of waste generated is about 42.75 tonnes per day. In which 30tonnes of waste is collected per day by the municipality. Municipality maintains a collection efficiency of 70.18%. From the collected 30 tonnes of waste 25 tonnes is treated per day and remaining 5 tones is directed to the solid waste treatment plant situated in 2nd ward of Kodumbu grama panchayath. (Around 8km from the city centre). Solid Waste Management (SWM) facility having an area of 8.5 acres include windrow composting plant, plastic shredding unit and plastic bailing unit. Table 11.16 gives details of solid waste treated in the treatment plant.

Table 11.16 Quantum of solid waste handled in the plant

Category	Quantity (Tonnes/day)
Bio Waste	
Domestic	3
Commercial	8
Vegetable Market	6
Slaughter house	3
Total	20
Non-Bio Waste	
Plastic segregated for shredding	3
Scraps, e waste, Bottles etc.	2
Total	5

Source: Public health wing, Palakkad municipality

Anaerobic windrow composting plant with a capacity of 12 tons per day is commissioned at this site. This system also faces several problems; it is noticed that the compost yard is getting wet during rainy seasons so that processing of compost is not taking place properly. Side protection is seen necessary to overcome this. The waste transported to the yard is deposited without any treatment and is polluting the surrounding area.

The operation of this windrow composting plant is not properly done. The facility for removing leachate waste water from the treatment plant is silted and can't be used. Earlier practice of 'crude open dumping' of municipal solid waste lead to mountains of legacy waste. According to records submitted by the corporation, 23,407, tonnes of legacy waste remains as untreated. In the absence of exposure to air, the high-rises of rotting mixed waste on these sites generate methane and other landfill







Fig. 11.17 Solid waste treatment plant owned by Municipality in 2nd ward of Kodumbu panchayath

Source: Report on site visit, Solid Waste Disposal, Palakkad Municipality

gases. They also produce leachate which pollutes groundwater. Frequent outbreaks of fire at the dumpsites lead to air pollution. People also protested to close the existing sites because of nuisance.

- Decentralized Waste Processing Facilities

For making effective solid waste management services, it is essential to select appropriate technology, which can suit and work in the given area successfully. In this direction, the municipality has adopted 'Thumboormuzhi model' aerobic composting system for its bins. It is considered as one of the most efficient and cost-effective waste management models. It uses a sandwich or layering technique. The six-inch layer of fresh cow dung as the first layer with a 6-inch layer of dried leaves provided the carbon source for the bacteria to flourish. It utilizes cow dung bacteria consortium which worked well in all changing climatic conditions. And they are becoming an important part of the progressive waste management system. The aim of these aerobic



Fig. 11.18 Aerobic composting units in Aravusala & Municipality Office Compound

Table 11.17 Total quantity of solid waste processed in the centralized and decentralized facilities

Sl. No	Facility	No of units	Capacity
1	Centralised windrow composting plant	1	12 tonnes/day
2	'Thumburmuzhi model' decentralised aero-bic composting unit	8	8 tonnes/day

Source: Report on site visit, Solid Waste Disposal, Palakkad Municipality

composting units and Material Collection Facility (MCF) is to keep as much waste out of the landfills/waste dumps as possible and to help make waste useful and profitable. The centralized and decentralized facilities altogether can process 20 tonnes of organic waste in a day as given in table 11.17.

11.4.3 Identified Hotspots

Most people understand and are very much aware of the repercussions of illegal dumping. Regardless, a fraction of our society also does not care about the illegal dumping problem and its consequences. They used to dump waste on the streets, open spaces, drains, and water bodies in the vicinity, creating insanitary conditions.



1. Near Vegetable market



2. Kalmandapam bypass



3,4 . Ganesh nagar & Kailas nagar ,Kalpathy



5. Neelikkad



8.Near mercy college junction

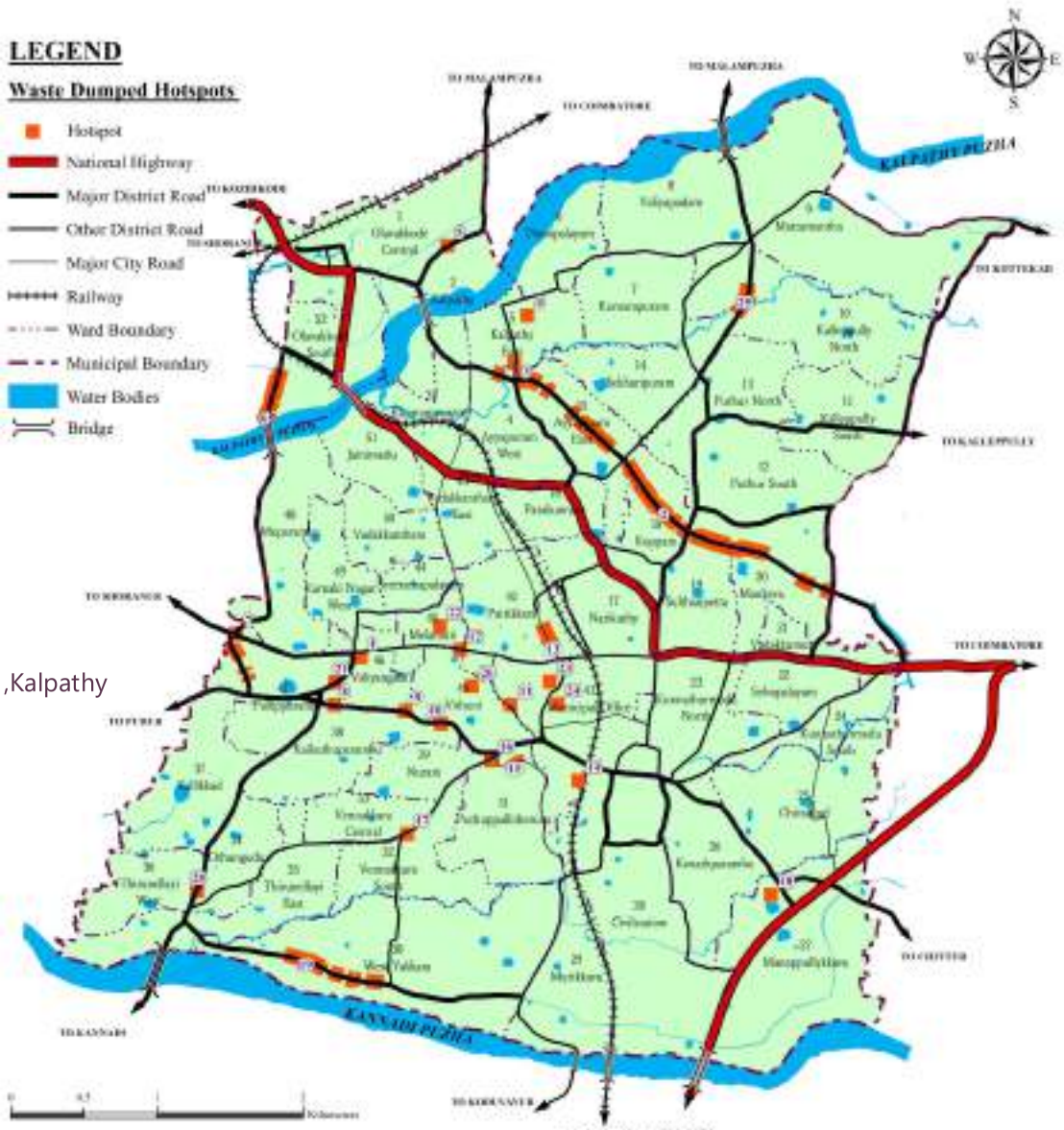


Fig. 11.19 Solid waste dumped hotspots within the municipal area



10. Noorani



11. Manjakulam Church road



15. Near KSRTC bus terminal



19. Near Thankam Hospital



19. Near Town bus stand

According to environmental protection agencies and departments, this malpractice is termed as illegal dumping. It is considered unlawful on account of the harm it causes to the environment. Based on the Suchitwa mission report, 2019' the spatial pattern of illegal waste disposal locations (major 26 locations) in the municipal area were done as depicted below (fig 11.19).

11.4.4 Inference

Despite large manpower deployed for management of solid waste, heaps of stinking waste can be seen at number of places in the town. Removal of garbage was done arbitrarily by the staff without following any well laid down system. Cleaning of roads also has not been found to be satisfactory and the dumping of waste by the public has been found to be highly unsatisfactory. In the process, solid waste management has emerged as the major issue in the management of the city.

11.5 LIQUID WASTE MANAGEMENT

The mismanagement of wastewater in urban areas possesses a major challenge. The major part of water that can be consumed is getting polluted by anthropogenic activities. Together, the waste water discharge and waste disposal had brought about degenerative effects on human well-being and environment which made uneasiness on urban day to day life. Thus there is an immense need of an effective liquid waste management for a sustainable healthy environment.

11.5.1 Existing Scenario

The waste water generated after human use contains both black and grey water which is either directly discharged to the environment or to the septic tanks and soak pits. In the case of Palakkad Municipal area, due to absence of sewerage network, the waste water is directly discharged into roadside drains which are meant for storm water drainage. Thus polluting the water bodies and environment. Improper liquid waste management within the study area had both environmental and health impacts.

Table 11.18 Water quality details of major surface sources

	Allowable limits	Shankuvara thodu	Kalvakulam thodu	Thirunellai thodu
Physical properties	Within limits			
Chemical properties	Within limits			
Biological properties A) total bacteria count B) E-Coli C) Coliform bacteria	20cfu/ml Absent/ml Absent/ml	26cfu/ml Present/ml Present/ml	20cfu/ml Present/ml Present/ml	12cfu/ml Present/ml Present/ml

Source: Pollution control board office ,Palakkad

Discharge of sewage water directly into the drains gets mixed with surface water bodies which results in its contamination. Which making it unfits for useful purposes like bathing, washing and irrigation. Surface water quality is tested at the points where drain outlets meets the water bodies. The results are shown below table 11.18. The





Waste water from Commercial Establishments into Kalpathy River

water samples are collected from the primary and secondary drains. Natural drains which eventually joins the main rivers.

The water quality test proves that the surface water bodies are contaminated due to the presence of harmful bacteria, which marks it unfit for human uses. If this problem lasts longer without taking any proper measures, the entire water body system will get polluted and contaminated in the near future. Thus it indicate surface water pollution persists within the study area.

As per "Human Excreta Management in Urban Kerala: Towards Sustainable Options State-Wide by World Bank" the estimated quantity of sewage generated in the town is around 6.735 MLD.

11.5.2 Inference

Lack of an efficient liquid waste management system within Palakkad town possess enormous health and environmental risks owing to degraded quality of living. Development of appropriate sewerage system with efficient sewage treatment is vital to facilitate balanced and harmonized development of the town. A comprehensive sewerage master plan should be prepared to achieve the goals in a compendious and systematic manner.

11.6 ENERGY

Power is a basic infrastructure influencing the growth of industrial, agricultural and service sectors and ultimately the economic development. One of the determinants for quality of life is the level of availability and acceptability of affordable and quality power.

11.6.1 Energy Consumption

The major energy consumption is the electrical energy generated from hydro electric project. No other non-conventional energy is fed into the main grid. Petroleum products like diesel and petrol, biomass etc. are also sources of energy. Since the energy consumption is mostly electrical energy, the consumption of electricity by various categories is considered. The details of number of power consumers in Palakkad municipality are shown in Table 11.19

Table 11.19 Power consumption details by each category for the Town

Type	No of electric connections	Electric consumption kwh for one year
Residential	56,445	64,17,486
Commercial	27,266	31,64,987
Industrial	851	3,88,936
Agricultural	577	2,92,004
Others	1,644	3,67,242
Total	86,783	1,06,30,655

Source: 2019 Statistics, KSEB

11.6.2 Network and Infrastructure

The power requirement of the town is being covered by Kerala State Electricity Board. Power to the town is supplied from Pallivasal and Peringalkuth Hydro Electric Projects. There is one 110 KV substation at Vennakkara. Under which there 5

Table 11.20 Details of power network in the Town

Sl. No.	Name of Section	Number of Transformer	Length of High Tension (HT) Line (km)	Length of Low Tension (LT) Line (km)
1	Sulthanpet	205	59	137.28
2	Big Bazar	91	29.2	73.88
3	Melamuri	98	41.2	227.31
4	Kalpathy	107	68.2	212.38
5	Marutharoad	27	14.28	63.82

Source: KSEB Office, Palakkad

sub-section namely Sulthanpet, Big Bazar, Melamuri, Kalpathy and Marutharoad. There are 528 transformers in the municipality (table 11.20). For the supply of electricity there are 211.88 km length high tension lines and 714.67km low tension lines in the municipality under these 5 sections.

Table 11.21 Details of street lighting in the Town

Sl.no.	Type of Luminary	Number
1	Ordinary bulb	NIL
2	Tube lights	10,400
3	SVL 250W	3,120
4	SVL 150W	NIL
5	CFL	NIL
6	LED 35 W	4,120
7	LED 50 W	100
	Total	17,740

Source: Municipal Office, Palakkad

11.6.3 Street Lighting

In the municipality totally 17,740 luminaries are used in the street light system. The luminaries used are tube lights, sodium vapour lamp (250 W) and LED (35W /50W). 58.63% of the luminaries are tube lights, 17.59% are SVL 250W, 23.78% are LED lights as given in table 11.21.

11.6.4 Inference

Presently the town does not have major power problems. Use of non conventional energy is very much limited. There is tremendous potential for the development of non-conventional energy especially solar energy.



CHAPTER 12- EDUCATION

12. EDUCATION

An educated and skilled workforce is a driving force in an economy. Education and skills improve productivity that in turn leads to higher income and improvements in livelihoods. The benefits of good education are not confined to individual economic prosperity, it is vital for a country's economic performance.

Education contributes to improvements in health, a more egalitarian society, awareness of environmental sustainability and democratization of society. Education is one of the important indicators of development of a society and it plays an important role in the planning and development process.

12.1 LITERACY RATE

A 'Literate' is any person who is able to read and write on his own and 'Literacy' is the ability to read and write or is the quality of being literate. Literacy rate is a key to socio economic process. The educational status of a society is dependent on literacy rate. The literacy rate of a community indirectly speaks about the educational status of that community. As per Census 2011 the overall literacy rate of Kerala state is 94% and female literacy rate is 92.07%. As per the norms of National Literacy Mission, a literacy rate above 90 % shall be treated as complete literacy. Figure 12.1 shows comparison of literacy rate with state and district.

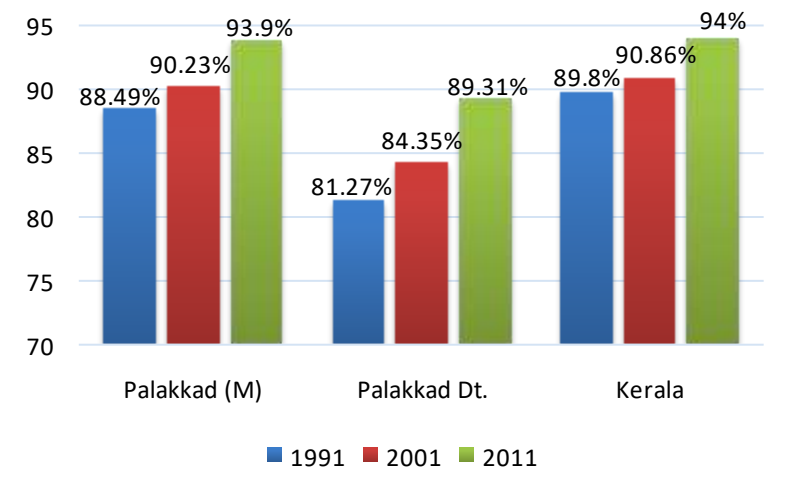


Figure 12.1. Literacy rate - comparison with district and state

Source: Census 1991,2001,2011

As per Census 2011 the literacy rate of Palakkad Municipality is 93.9% which is greater than the district average 89.31% and almost same as the state average 94%. Palakkad Municipality is the headquarter and the availability of better educational facilities is the reason for the increased literacy rate. As per Census 2011, the difference in male-female literacy is by 4.04% for state, 7.31% for district and 5.2% for Palakkad municipality.

From the gender analysis of literacy rate male literacy rate is higher than female literacy rate. Figure 12.2 shows the temporal variation of literacy rate in Palakkad municipality. The overall literacy rate is increased from 88.49% in 1991 to 93.9% in 2011.

After two decades the literacy rate is increased by 6.11%. The corresponding increase in female literacy rate is 9.47% whereas in the case of male, literacy rate is 3.46%. This indicate more female participation. It is understood that the female literacy is less than male literacy. As per Census 1991 the gender gap in literacy rate of Palakkad municipality is 9.81% and in Census 2011 the gender gap is decreased to 5.12%.

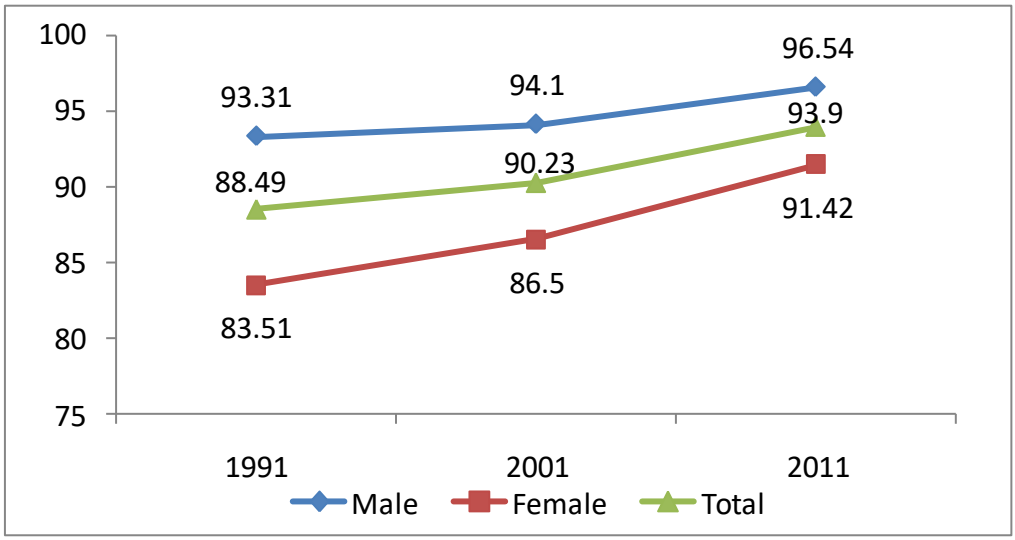


Figure 12.2 Temporal variation of literacy rate in Palakkad municipality

Source: Census 1991,2001,2011

12.2 EDUCATIONAL STATUS

As per the socio economic survey conducted by Town and Country Planning Department in 2019, 5.89% of the population is illiterate in the municipality and 18.58% of the population is having primary educational status. 35.01% of the population is having high school education. The percentage of degree holders are very less indicating the backwardness in the higher educational status of the municipality. Figure 12.3 shows the education status of the municipality.

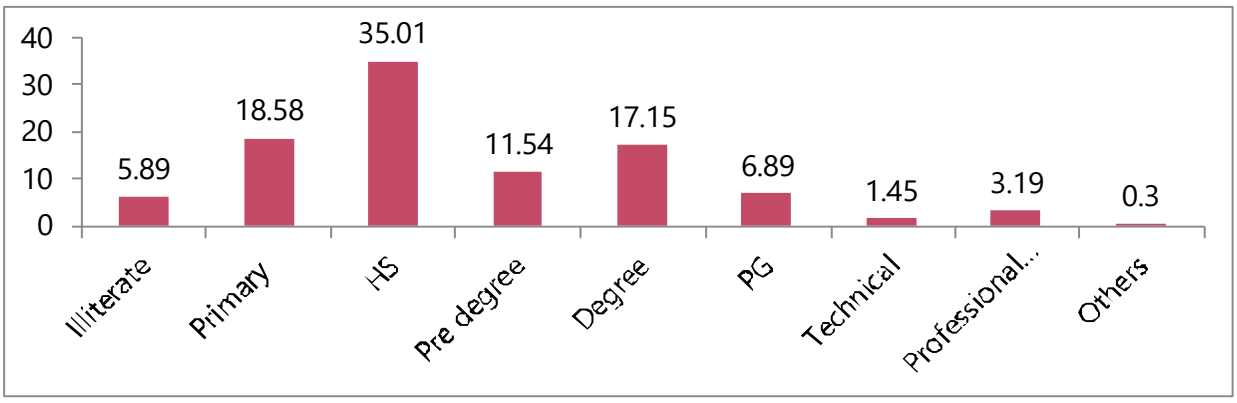


Figure 12.3 Educational status of Palakkad municipality

Source: Socio economic survey

12.3 EXISTING SCENARIO

The municipality of Palakkad, which serves as the administrative centre for the Palakkad district, has the potential to grow into a hub for education. The municipality of Palakkad is home to numerous historic schools. Government Victoria College and the Music College are two examples of the municipality's rich history of education and culture, which has produced many eminent personalities. The Mercy College is another well-known aided college. There are reputable organisations at the school level as well, such as the BEM School, Moyans' School, etc.

There are 58 schools in the Palakkad Municipality, of which 22 are government schools, 17 are aided schools, and 20 are unaided or private schools. Figure 12.4 lists the specific public, private, and aided schools in the Palakkad Municipality.

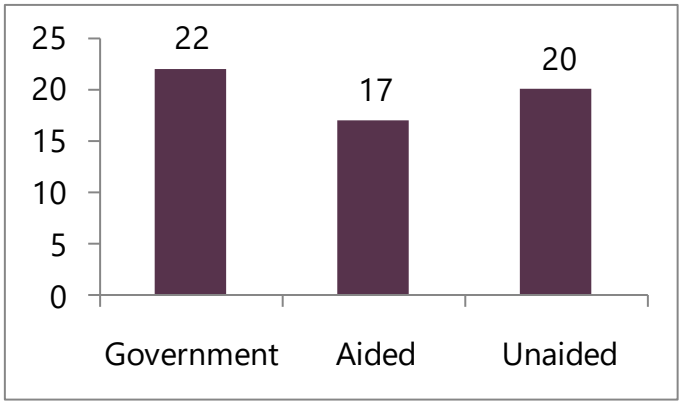


Figure 12.4 Details of number of schools

Source: Palakkad municipality, DEO

Table 12.1 shows the details of schools in Palakkad Municipality. In Palakkad Municipality there are 10 higher secondary schools, 5 high schools, 17 upper primary schools and 27 lower primary schools. Out of the total 59 schools 15 schools have pre-primary sections. There is no vocational higher secondary school in Palakkad Municipality. There is one special school named "Sravana Samsara High School" at Yakkara functioning in the municipality.

The percentage of students in each school sector is shown in Figure 12.5. There are 19798 children enrolled in schools in the municipality of Palakkad. 36.04% of the kids are enrolled in public schools, 22.01% are in aided schools, and 41.95% are enrolled in private schools.

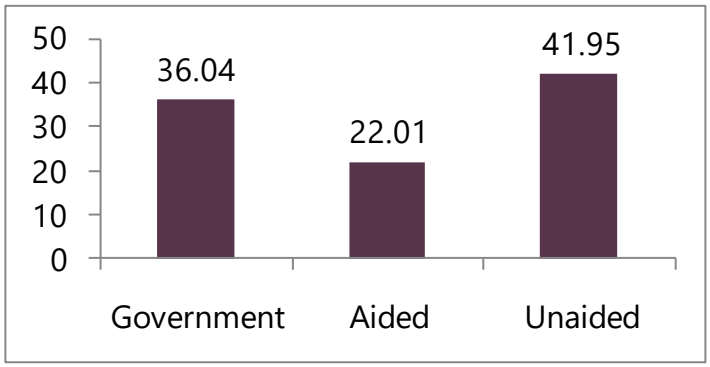


Figure 12.5 Percentage of students

Source: Palakkad Municipality, DEO

Table 12.1 Details of Schools in Palakkad Municipality

Sl.No.	Name of Schools	No. of Students					No. of teachers
		Pre - Primary	Lower Primary	Upper Primary	High School	HSS	
Government							
1	GHSS Big Bazaar	0	56	135	162	720	48
2	GMMGHSS Palakkad	0	0	1192	2533	820	147
3	PMGHSS Palakkad	0	0	182	662	720	64
4	GHS Vennakkara	0	130	150	205	0	30
5	GUPS Mepparamba	0	201	222	0	0	19
6	GUPS Puthur	0	254	270	0	0	24
7	GUPS RB Kudam	0	34	47	0	0	8
8	Dr. Nair GUPS Vadakkanthara	0	78	61	0	0	9
9	GUPS West Yakkara	0	47	49	0	0	10
10	GLPS East Yakkara	0	39	0	0	0	4
11	GLPS Kallikkad	0	59	0	0	0	5
12	GLPS Kalpathy	0	35	0	0	0	4
13	GLPS Koppam	0	54	0	0	0	6
14	GLPS Kunnathurmedu	0	26	0	0	0	4
15	GLPS Neithucar Street	0	30	0	0	0	5
16	GLPS Noorani	0	76	0	0	0	5
17	GLPS Olavakkode North	0	14	0	0	0	4
18	GLPS Olavakkode South	0	70	0	0	0	5
19	Govt. Moyans LPS Palakkad	0	367	0	0	0	20
20	GLPS Parakkunnam	0	25	0	0	0	5
21	GLPS Sulthanpet, Palakkad	0	50	0	0	0	4
22	G. H. S Kumarapuram	0	0	0	326	360	29
Aided							
23	KHSS Moothamthara	0	0	0	857	250	41
24	BEMHSS Palakkad	0	0	773	1307	480	77
25	AUPS Kalmandapam	0	11	19	0	0	9
26	AUPS Kalpathy	0	0	42	0	0	5
27	KSBS Moothanthara	0	201	364	0	0	24
28	NTUPS Palakkad	0	21	29	0	0	11

Table 12.1 Continued.....

29	Kaderiya UPS Pallistreet	0	25	46	0	0	4
30	St. Sebastian's SBS Palakkad	0	567	521	0	0	39
31	UUPS Pallipuram	0	18	37	0	0	9
32	AJBS Kalpathy	0	28	0	0	0	4
33	BEMLPS Melparamba	0	175	0	0	0	10
34	CMMAJBS Murukani	0	26	0	0	0	3
35	BEMJBS Palakkad	0	507	0	0	0	14
36	AJBS LN Puram	0	21	0	0	0	4
37	AJBS VN Puram	0	14	0	0	0	3
38	AJBS Sekharipuram	0	6	0	0	0	2
39	Sravana Samsara H. S. Yakkara	0	0	0	45	0	20
	Unaided						
40	Nurani BES EMHS	108	159	126	80	0	23
41	Olavakkode MES EMHSS	182	573	399	376	134	53
42	St.Sebastain's EMUPS, Palakkad	125	359	196	0	0	23
43	St.Mary's EMUPS, Thottunkal	142	266	96	0	0	20
44	Kalpathy Rosy Modern EMUPS	0	63	30	0	0	6
45	Palghat Lions School	326	652	487	615	278	17
46	Kanikamatha EM HSS	455	956	660	626	269	69
47	St. Raphel's Cathedral School	435	823	507	326	129	85
48	Model High School	0	743	369	353	0	53
49	Elagant Public School	80	200	87	44	0	31
50	C.S.I. English Medium School	36	183	0	0	0	9
51	Devi Vidya Nikethan School	36	55	63	0	0	14
52	Sree Vivekananda Vidyalaya	56	135	0	0	0	10
53	K.H. Memorial EM School	189	332	55	0	0	25
54	True Line E.M. School	135	118	0	0	0	19
55	Sree Visweswara E.M. School	48	56	0	0	0	7
56	Bhavan's Bala Vidya Mandir	0	98	0	0	0	9
57	PNT School (NRI School)	12	20	0	0	0	7
58	Co-operative English Medium School	20	45	0	0	0	3
59	MI Memorial international school	20	35	0	0	0	4

Source: Palakkad municipality, DEO

In Palakkad Municipality there are Malayalam, English and Tamil medium schools. Only two Tamil medium schools in the municipality are in Government sector namely Upper Primary School RB Kudam and St. Sebastian's SBS Palakkad. Out of this, RB Kudam school has only Tamil medium and St. Sebastian's School has Malayalam, English and Tamil mediums. All the aided and private schools are English medium schools. 48 schools follow state syllabus, 9 schools follow CBSE Syllabus. Devi Vidya Nikethan School follows NIOS (National Institute of Open Schooling) syllabus and True line English Medium School follows ICSE syllabus.

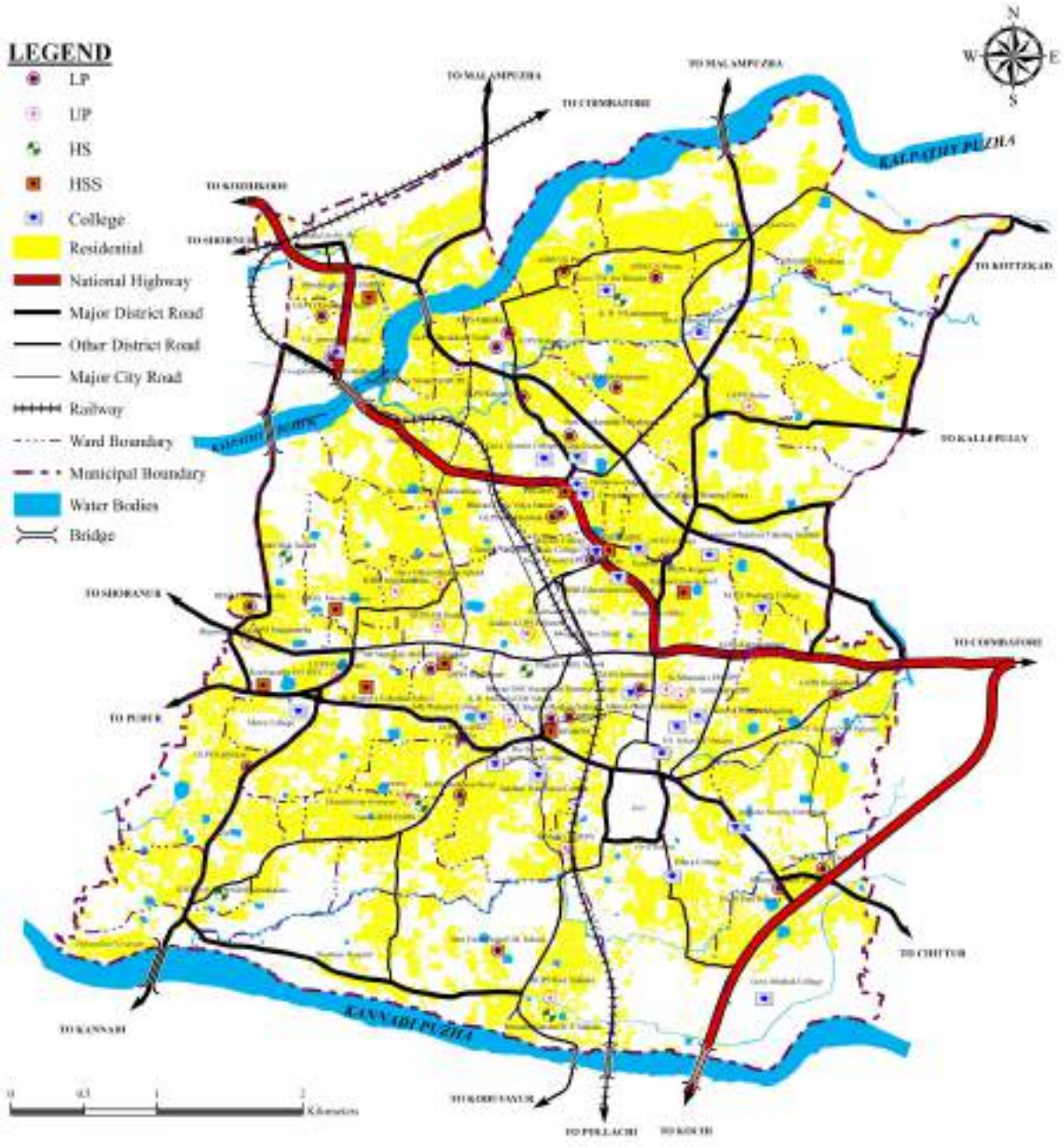


Figure 12.6 Spatial distribution of educational institutions

The existing service area of lower primary schools, upper primary schools and high schools are shown in figure 12.7, figure12.8, and figure12.9 respectively. Service area of high schools and higher secondary schools cover the entire municipality. Spatial analysis of schools show that almost all the areas in the municipality especially all the residential area in the municipality are covered by educational institutions.



BEM School

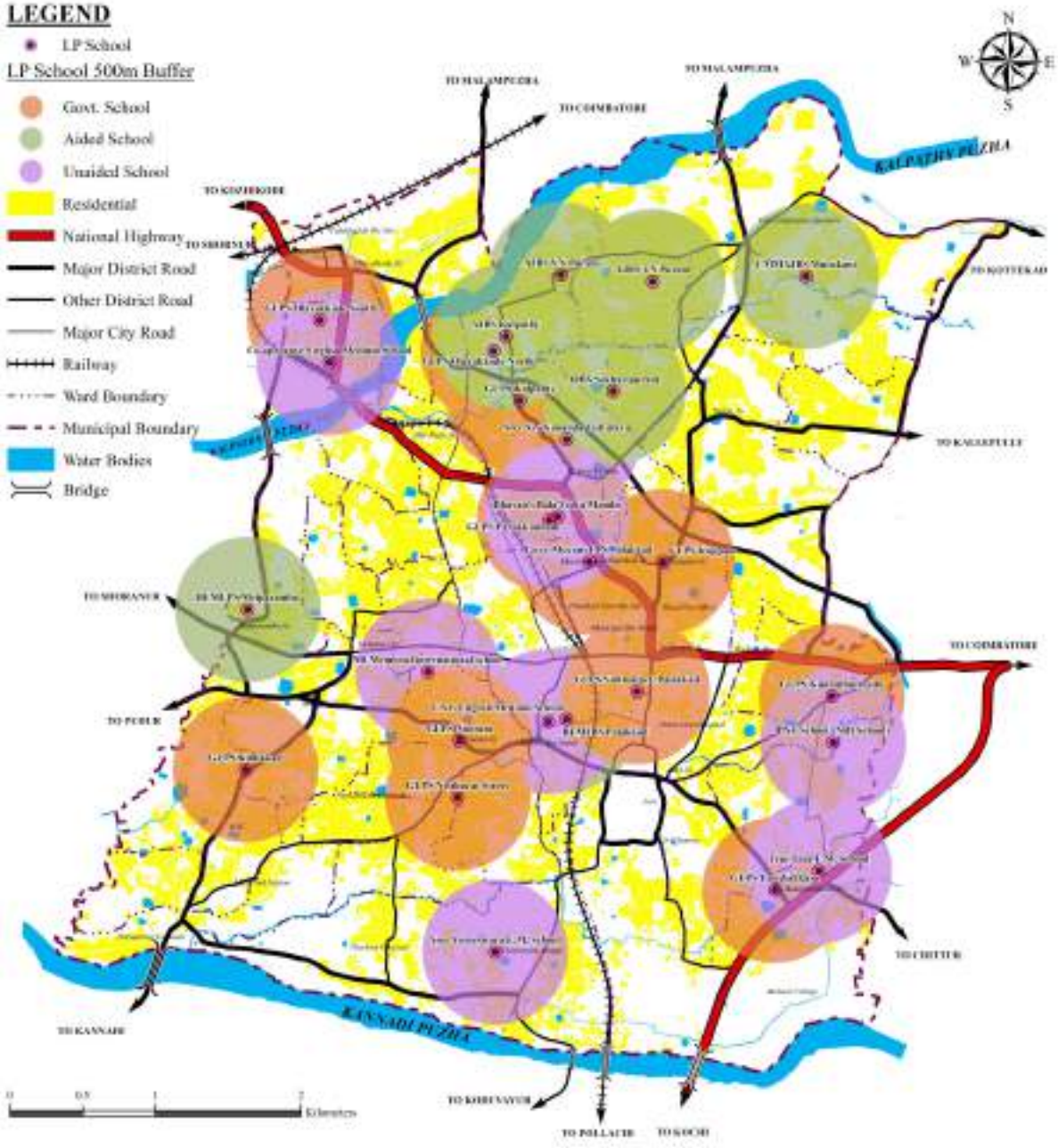


Figure 12.7 Service area of primary schools



GMMGHSS Palakkad



GHSS Big Bazaar

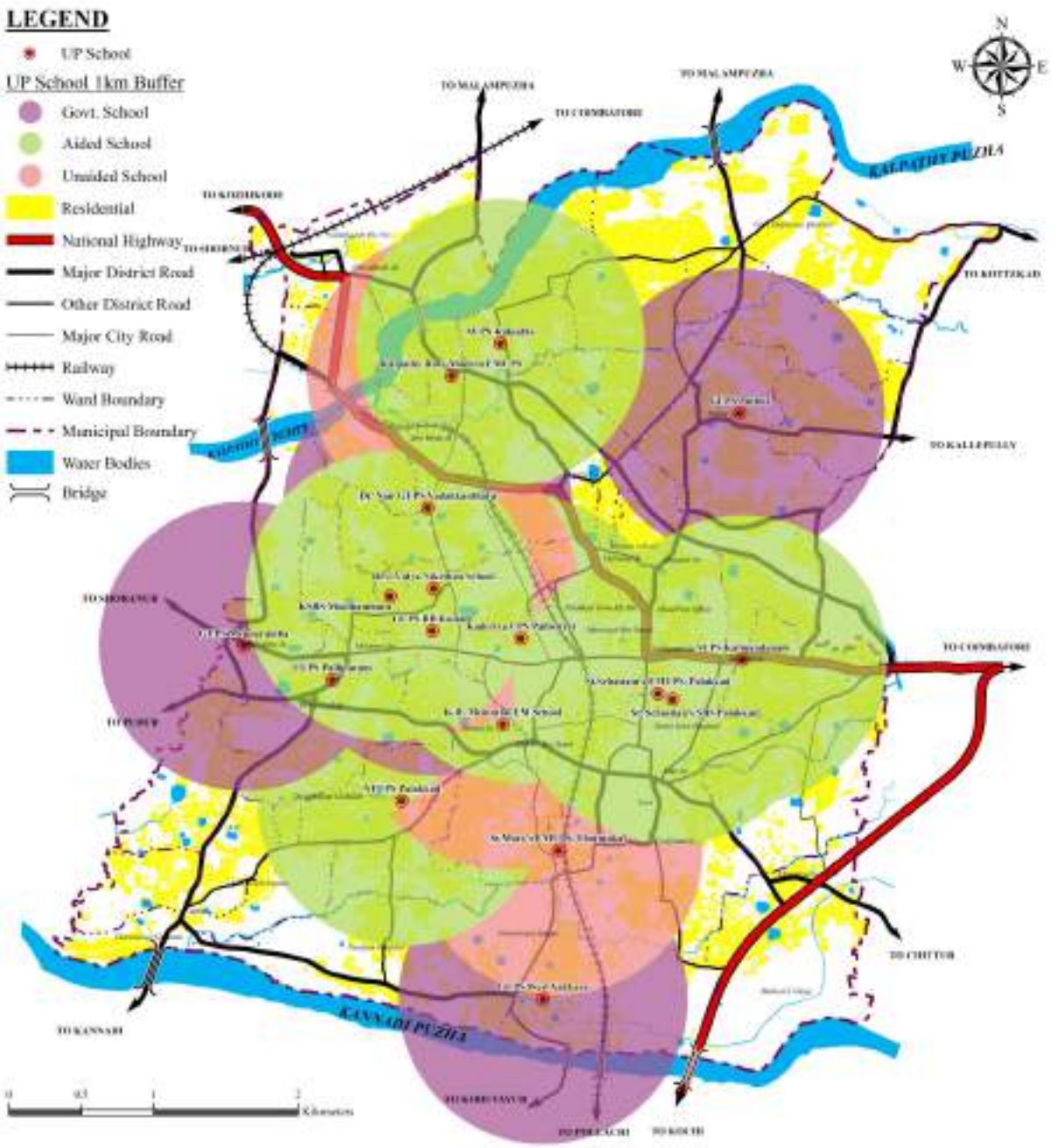


Figure 12.8 Service area of UP schools



PMGHSS Palakkad



Palakkad Lions School

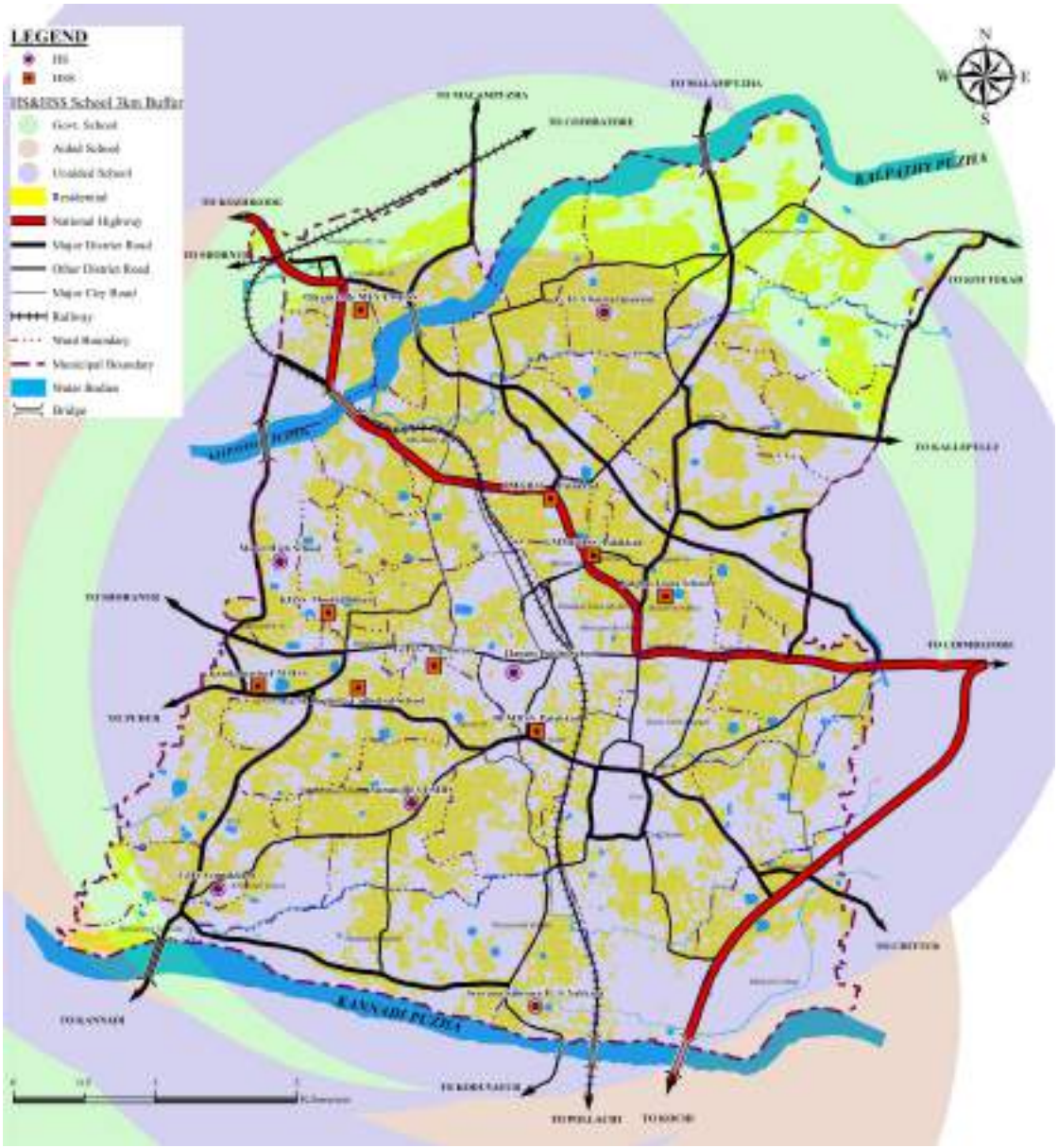


Figure 12.9 Service area of high schools

12.4 INFRASTRUCTURE FACILITIES OF SCHOOLS

Considering the physical infrastructure of schools in the municipality, all schools in the municipality are accessible by motorable roads and have toilet facilities. Out of 59 schools all the schools have facility for drinking water. Out of 59 schools, 30 schools depend on wells for drinking water, 20 schools depend on KWA water connection and 9 schools depend upon both KWA water connection and well. Remaining True line English Medium School uses bore well for drinking water.

All the schools have electric connection. Out of 59 schools, 72.4% of schools have play grounds and 77.6% schools have their own library. Computer Lab, Science labs and internet facilities are available in all High Schools and higher secondary schools (only a few LPS have this facilities and all the unaided schools have these facilities). 25 Schools in the municipality claims they use e-toilet facilities.

12.5 HIGHER EDUCATION FACILITIES AVAILABLE IN THE MUNICIPAL AREA

There are 5 Arts and Science colleges in the Municipality and these colleges offer regular bachelor degree courses & PG courses like B.A, B.com. Bsc, B.C.A, M.A. M.com. M.sc etc., Chembai Memorial Musical colleges offers B.A. Degree in Vocal, Veena, Mridhangam, Violin etc. Table 12.2 shows the details of arts and science colleges in Palakkad Municipality.



Mercy College

The Government Victoria College was started nearly a century ago and it is one of the prestigious colleges in the state. Also Chembai music College is famous for both vocals and instrumental music. Which reflects rich culture heritage of Palakkad.



Government Victoria College



Chembai Music College

Table 12.2 Details of arts and science colleges in Palakkad Municipality

Sl. No.	Name of College	Public/ Private	Location	Courses offered (Degree, Post Graduate).	No. of students
1	Govt. Victoria College, Palakkad	Public	College Road, PKD	B.A, B.com. Bsc, M.A. M.com. M.sc, P.hd, etc	2402
2	Chembai Memorial Govt. Music College	Public	Tharekkad, Palakkad	B.A. (Vocal, Veena, Mri-dhangam, Violin)	100
3	Mercy College	Aided	Pallipuram, PKD	B.A, B.com. Bsc, B.C.A,M.A. M.com. M.sc, MSW, etc	1915
4	Palakkad Co-operative Arts & Science College	Co-operative	Olavakode, PKD	B.A, B.com. Bsc, B.C.A,M.A. M.com. M.sc etc	1100
5	Chinmaya Mission Col-lege	Private	100 Feet Road, PKD	B.A, B.Sc, B.Com, BBA	1100

Source: Primary survey

There are 6 professional colleges in the Palakkad municipality. Government Medical College offers MBBS course with 100 seats. Other Professional colleges inside the municipality mainly offers courses like teachers training and nursing. Table 12.3 shows the details of the professional colleges in Palakkad municipality.

Table 12.3 Details of professional colleges in Palakkad municipality

Sl. No.	Name of College	Location	Public/ Private	*Courses offered (Degree, Post Graduate).	No. of students
1	Govt. Medical College, Palakkad	East Yakkara	Govt	MBBS	100
2	Co-operative Training College & Training Centre	Near Victoria Col-lege, Palakkad	Co-opera-tive	JDC, HDC & Business Management	181
3	Bharat Sevak Samaj (Montessori Teachers Training Institute)	Kalvakulam Road, Koppam, PKD	Private	Diploma In Montessori & Child Education Course,Pre-TTC	40
4	S.S. School of Nursing	Near Stadium Bus Stand, Palakkad	Private	Nursing Assistant, Lab Technician, Nursing Asst. (Panchakarma)	42
5	Govt. College of Nursing	District Hospital, Palakkad	Govt	General Nursing & Midvi-sory Diploma	98
6	Govt. TTC for Women	Kumarapuram	Govt	Teachers training Course	32

Source: Primary survey

12.6 OTHER EDUCATIONAL INSTITUTIONS IN PALAKKAD MUNICIPALITY

There are 22 other institutions in the Palakkad municipality in which one govt owned commercial institute in Nurani gramam offers diploma in secretarial practice. Government LBS centre for science and technology, and one Keltron Knowledge centre in Manjakulam road is there also in Government sector. There are

other technical institutions which offer various technical courses like Engineering diploma, DCA, PGDCA,Ms office etc. Table 12.4 shows details of other institutions in the Palakkad Municipality.

Table 12.4 Details of other institutions in Palakkad municipality

Sl. No.	Name and address	Govt/ Private.	Courses Offered	No. of students
1	Regional Technical Institute, Nurani	Private	Automobile Engg., Mechanical Engineering, Civil Engineering, Fire & Safety Engg, Electronics & Communication Engg., Refrigeration & Air Conditioning Engg.	225
2	Govt. Commercial Insti-	Govt.	Diploma In Secretarial Practice	120
3	ICS India IT Education, Sulthanpet	Private	PGDCA, Diploma in Professional Accounting, Tally & Fashion Designing,Diploma in Hardware & Networking & Other Software Courses	105
4	Kerala Technical Institute	Private	Electrical Engineering, Electronics & Commuication Engineering, Refrigeration & Airconditioning & Electrical (Wireman)	47
5	Sudharsana Computer Centre	Private	DCA, PGDCA, Tally, MS Office Etc	31
6	IECT Computer Education	Private	Software & Multimedia Courses, PGDCA, DCA, CCTC, Tally etc	57
7	Silicon Academy	Private	Hardware & Software Courses	25
8	NIIT, Fort Maidan	Private	DCA, PGDCA, Tally, MS Office Etc	120
9	G-Tech Computer Education, Near Ghani Honda	Private	DCA, PGDCA, Tally, MS Office and Diploma Courses Etc	60
10	ACE Computer College	Private	DCA, PGDCA, Tally, MS Office and Diploma Courses Etc	107
11	G-Tech Computer Education, Olavakode	Private	DCA, PGDCA, Tally, MS Office and Diploma Courses Etc	48
12	CAD Centre, Mangalam Towers	Private	All Software Courses & Coures for Civil, Mechanical & Electrical Engg. Students	1237
13	LBS Centre for Science & Technology, Nurani	Govt.	PGDCA, DCA,Hardware Courses	220
14	Keltron Knowledge Centre, Manjakulam Road	Govt.	All Software Courses , Fire & Safety Course	65
15	TCIL IT Education Training Centre, Tailor Street	Private	Auto CAD, Tally, PGDCA, DCA, DTP, C, C++,VB, MS Office Etc	33
16	ICON College of Engg. & Computer Education, Near Alukkas Jewelley	Private	All Software Courses - Diploma in software Accounting, DCA, PGDCA, etc	42

Table 12.4 Continued.....

17	Malabar Technical Institute, Opp. Priyadarsini Theatre	Private	Automobile Engg., Mechanical Engineering, Civil Engineering, Fire & Safety Engg, Electronics & Communication Engg., Refrigeration & Air Conditioning Engg.	43
18	Learntech IT Academy, Stadium Bypass Road	Private	Tally Academy, ABACUS, Interior Designing Courses	24
19	Qualitrain Solutions, Tailor Street	Private	Graphic Designing, PGDCA, DCA, DTP, C, C++,VB, MS Office Etc	38
20	Greeninfo Space, Near KSRTC	Private	Auto CAD, Tally, PGDCA, DCA, DTP, C, C++,VB, MS Office Etc	53
21	School of IT, Coimbatore Road	Private	All Software Courses - DCA, PGDCA, MS Office etc	30
22	IMAC Computer Centre	Private	Multimedia Animation & Cinematics Courses	21

Source: Primary Survey

Apart from arts and science, technical, professional colleges, there are 104 other educational institutions in Palakkad municipality. Out of these, 22 private institutions offers courses like MBA, CA, Tally, Hotel management etc., 28 institutions are tuition centers, 43 are coaching centers offering PSC,RRB,UPSC,KAS,IELTS, Bank coaching courses etc. 8 are distance education centers and 3 numbers are music and drawing class academies.

12.7 COMPARISON WITH KERALA PLANNING STANDARDS

As per URDPFI standards, 53 primary schools are needed for the Palakkad municipality and at present there are 17 upper primary schools and 25 lower primary schools in the Municipality. The number of high schools needed in the municipality is 11 and there are 5 high schools in the municipality and additionally 10 higher secondary schools have high school classes. The strength of high school students specified is 1000 and many of the high schools having strength more than 1000. Government Moyans Model GHSS have strength of 2533 and BEM HS have strength of 1307.

From the standards, student strength of higher secondary schools is 1000. There are 10 higher secondary schools in the municipality. No higher secondary schools are having strength more than 1000. As per standards 4 higher secondary schools are needed in Palakkad Municipality. As per requirements 2 arts and science colleges are needed. But in Palakkad municipality there are 5 arts and science colleges. As per URDPFI standards 3 schools for handicapped students are needed in Palakkad municipality. But there is only one special school "Sravana Samsara School" at West Yakkara in the

Table 12.5 Comparison with planning standards

Sl. No	Type	Strength	Existing (2019)	Required
1	Population	143,205		
2	Nursery: 1 for every 2500	-	16	57
3	Primary: 1 for every 5000	500	53	29
4	HS: 1 for every 13000	1,000	16	11
5	HSS: 1 for every 13000	1,000	10	11
6	Arts & science college: 1 for every 80000	1,000	5	2
7	Polytechnic college: 1 for every 36000	500	3	4
8	Professional college: 1 for every 250000	-	6	1
9	ITI/ITC: I for every 35000	400	20	4
10	TTC: 1 for every 120000	-	2	2
11	School for handicapped: 1 for every 45000	400	1	3

Municipality. Table 12.5 shows the comparison of number of schools and colleges with planning standards .

12.8 PROBLEMS AND POTENTIALS

As per census 2011, the literacy rate of Palakkad municipality is 93.9% which is greater than the district average 89.31% and almost same as the state average 94%. From the gender analysis of literacy rate male literacy rate (96.45%) is higher than female literacy rate (91.42%). As per socio economic survey only 17.15% of the total population are degree holders which shows the backwardness in the higher educational status in the municipality.

In Palakkad municipality there are 59 schools out of which 22 schools are government schools, 17 are aided schools and 20 schools are unaided schools. 53 schools have primary classes and 16 schools have high schools facilities. There is no engineering colleges inside the municipality. But there are NSS college of Engineering and Prime College of Engineering within 11Km buffer. There is a Government Medical college inside the municipality. Also there are 3 teachers training institute and 2 nursing institute within Municipality. From the spatial analysis of schools , it is clear that almost all the area of the municipality is covered.



CHAPTER 13- HEALTH

13. HEALTH

Health can be defined as physical, mental, and social wellbeing, and as a resource for living a full life. Urban population tend to have greater access to social and health services and their life expectancy is longer. But cities can also concentrate threats to health such as inadequate sanitation and refuse collection, pollution, road traffic accidents, outbreaks of infectious diseases.

Human development and improvement in quality of life are the basic aims of any planning process. Health facilities with prescribed standards improve the quality of life in any settlement. Also the availability of government medical facilities are important in planning since health facilities should be affordable for all income groups. Innovative health care and programs are needed for better standard of living.

13.1 EXISTING FACILITIES

In Palakkad Municipality, there is a District Hospital and most of the people in Palakkad depends on District Hospital for health services. There are no super specialty hospitals within the Palakkad Municipality. Other Government health facilities include District Women and Children's hospital near District hospital, primary health centres at Melamuri, Vennakkara, Diarra street and Alamkode, one ESI hospital at Vennakkara. There is a Co-operative hospital and a research centre opposite to District Hospital. District hospital has an advanced diagnostic facilities like CT scan and ECG.

Government Medical college, Palakkad, also known as Institute of Integrated Medical Science (IIMS) is under construction at East yakkara. It was established in 2014 by the Government of Kerala, under the management of Kerala State Scheduled Caste Development Department. The Institute is affiliated to Kerala University of Health Sciences (KUHS). 16 private allopathic hospitals are functioning in Palakkad Municipality.

A large number of hospitals, dispensaries and clinics managed by public and private sectors are functioning in the Palakkad municipality. There are totally 92 health institutions in the municipality. Most of them are dental clinics and homoeo clinics. There are 4 private allopathic hospitals situated within the municipality – Thankam Hospital, Balaji Hospital, Lakshmi Hospital, Malabar hospital. Also people depend on Paalana institute of medical sciences which is at a distance of 12 kms outside municipality. Hospitals in Coimbatore as well as Thrissur have great influence on Palakkad.

Municipality is divided into 6 divisions by the health department. Each division has one Health inspector. The Health supervisor of Palakkad Municipality control these

health inspectors. The hospitals are grouped in these divisions in which 65 institutions are allopathic, 12 are ayurvedic institutions and 15 are homeopathic institutions.

13.1.1 Allopathic Sector

District Hospital near Fort Maidan is the only district hospital in the Palakkad District Considering the 2011 population of Palakkad District (i.e. 28,09,934), at least two district hospitals are needed for the district as per planning standards. The District hospital has a bed strength of 544 and an average daily 1,184 patients visits the hospital. The hospital provides advanced facilities like CT scan, ECG etc. There is an electric vehicle for transporting patients to different departments. Also there is District Women and Children's Hospital near District Hospital and an ESI hospital at Vennakkara.

There are 4 primary health centre at Vennakkara, Diarra Street, Melamuri, and Alamkode. There is a primary health centre at Koppam which is not functioning due to shortage of staff. Health centre Alamkode is functioning at Olavakkode and Kalpathy. The details of government hospitals under allopathic sector are shown in table 13.1 and details of primary health centres are given in table 13.2. The urban primary health centre at Diarra Street is getting converted to health and wellness centre for better health care services.

Table 13.1 Details of government hospitals under allopathic sector in Palakkad Town

Sl. No.	Name &Address	Location	No. of Beds	Average daily No. of out patients	No. of Doctors	No. of Nurses
1	Govt. Medical College, Palakkad	East Yakkara	350	-	151	90
2	District Hospital	Near Fort Maidan	544	1184	42	-
3	District Women & Children's Hospital	Near Taluk Hospital	29	145	12	24
4	ESI Hospital	Vadakkanthara	Nil	150	2	2

Source: Palakkad Municipality

Table 13.2 Details of primary health center in Palakkad Town

Sl. No.	Name & Address	Location	No. of Beds	Average daily No. of out patients	No. of Doctors	No. of Nurses
1	Primary Health Centre	Melamuri	Nil	4	1	0
2	Primary Health Centre (Urban)	Vennakkara	Nil	3	1	-
3	Primary Health Centre (Urban)	Diarra street	Nil	3	1	-
4	Primary Health Centre (Urban)	Alamkode	Nil	15	2	2

Source: Palakkad Municipality



District Hospital



Govt. Medical College



Primary Health Centre, Melamuri



Primary Health Centre (Urban), Diarra Street

Table 13.3 Details of co-operative hospitals under allopathic sector in Palakkad Town

Sl. No.	Name & Address	Location	No. of Beds
1	Palakkad District Co operative Hospital	Near Taluk Hospital	47
2	Co operative Research Centre	Near Taluk Hospital	Nil

Source: Palakkad Municipality

Table 13.3 shows the details of the District Co-operative hospital and the research centre in the Palakkad Municipality. The Co-operative hospital is situated opposite to the District hospital and has a bed strength of 47. The hospital has 18 specialized doctors team and facilities like Eco Color Doppler Scan, 5 I.C.U., Neo Natal I.C.U, X Ray, Pharmacy, Laboratory, Labour Room, Ventilator, Laproscopy, Key Hole Surgery, Video Endoscopy, Kryo Surgery, C Arm, Birth & Death Kiosk, E C G, Speech Therapy, Ambulance, Canteen etc.



Palakkad District Co-Operative Hospital



Welcare Hospital



Thankam Hospital

Table 13.4 Details of Private Hospitals under Allopathic sector in Palakkad Municipality

Sl. No.	Name & Address	No. of Beds	Average daily No. of out patients	No. of Doctors
1	Thankam Hospital of PMRC	300	-	41
2	Avitis (Balaji) Hospital	90	170	12
3	Welcare Hospital	100	4	
4	Lakshmi Hospital	80	4	26
5	Lakshmi Hospital	-	5	1
6	Malabar Hospital	-	6	2
7	Malabar Hospital	-	25	3
8	Prasanthi Hospital	-	5	1
9	Trinity Eye Care Hospital	-	5	2
10	Dr.Menon's Hospital	-	20	1
11	Sai Hospital	-	5	1
12	Karuna Hospital	-	30	2
13	Sarada Nursing Home	-	4	1
14	Devi Nursing Home	24	10	2
15	Ascent ENT Hospital	20	50	5
16	Hindustan Maternity home	28	-	-

Source: Palakkad Municipality

Table 13.4 shows the details of the private hospitals in the Palakkad municipality under allopathic sector. There is Thankam Hospital at West Yakkara, situated away from the city crowd, but easily accessible with a bed strength of 300. Another hospital is the Lakshmi hospital which is a super speciality hospital and a major referral cardiac center in the Palakkad municipality. Lakshmi Hospital is the first tertiary cardiac care center in Palakkad. The first center was started on Chittur Road, and subsequently, a second center was started on Coimbatore Road in 2012. The hospital provides facilities in 13 departments including Anesthesiology, dermatology, diabetology, ENT, gastroenterology, infertility, neurology, oncology, ophthalmology, pediatrics and radiology departments.

Table 13.5 Details clinics under allopathic sector

Sl. No.	Name & Address	No. of Beds	Average daily No. of out patients	No. of Doctors	No. of Nurses
1	Oral Healthcare Dental Clinic	Nil	70	2	5
2	Quality Clinic	Nil	2	1	0
3	Dentnova Dental Care	5	80	3	9
4	Smile One Dental Clinic	Nil	5	1	0
5	Clear Eye Clinic	20	30	2	10
6	Menon's Multi speciality Dental Clinic	Nil	100	2	2
7	Devi Clinic	Nil	-	-	-
8	Rugmini Poly Clinic	Nil	20	1	0
9	Soorya Clinic	Nil	5	1	0
10	Dr. Sarath's Dental & Ortho Dental Clinic	Nil	12	2	0
11	Happy Dental Clinic	Nil	15	3	2
12	Sai Dental Clinic	Nil	5	1	0
13	Tru Dent Clinic	Nil	4	1	0
14	Adithya Kiran Eye Care Centre	250	500	21	88
15	Alpha Dental Clinic	40	40	4	8
16	ARMC IVF Fertility Centre	30	30	5	11
17	Jhanvi Dental & Braces Centre	Nil	-	1	3
18	Modern Dental Clinic	Nil	4	2	2
19	Sudharma Clinic	Nil	3	1	0
20	Fort Dental Clinic	Nil	-	-	-
21	Dental Clinic	Nil	-	-	-
22	Narayana Speciality Dental Care Centre	Nil	150	1	0
23	Sai Dental Clinic	Nil	2	1	0
24	Smile One Dental Clinic	Nil	5	1	0
25	Smile Solution Dental Clinic	Nil	4	1	0
26	Sradha Dental Clinic	Nil	5	1	0
27	Bava Fathima Dental Clinic	Nil	Nil	-	-
28	Sreeram Clinic	Nil	5	1	0
29	Hatheem Clinic	Nil	Nil	-	-
30	Dental Clinic	20	20	3	5
31	Palakkad Poly Clinic	27	5	1	0
32	C.K.J. Clinic	50	100	6	17
33	Aiswarya IVF Fertility Centre	150	500	13	43
34	Citident Dental Clinic	30	45	7	50
35	Dental Diagnostic Centre	15	100	5	6
36	City Lab	Nil	42	1	4

37	Mangalam Diagnostic Centre	Nil	20	1	5
38	Dane Diagnostics	Nil	39	1	4
39	Anoop laboratory	Nil	58	1	6

Source: Palakkad Municipality

Welcare hospital is a super speciality hospital with bed strength of 100 and the hospital has facilities like cardiac services, 24x7 ICU,CCU and dialysis unit. Malabar hospital near Government Medical College Palakkad at West Yakkara offers speciality treatments like Orthopaedic/ Orthopaedic Surgery/Knee replacement, Uro/Kidney center, Neorologist, Plastic-cosmetic Surgeon, Oncology etc apart from general medicine and surgery. Avitis (Balaji) Hospital in Brindavan street near Town Hall offers general medicine facilities. There are a lot of clinics in Palakkad Municipality and most of them are dental and eye clinics. Most of these clinics have bed facilities. The details of these clinics are shown in table 13.5.

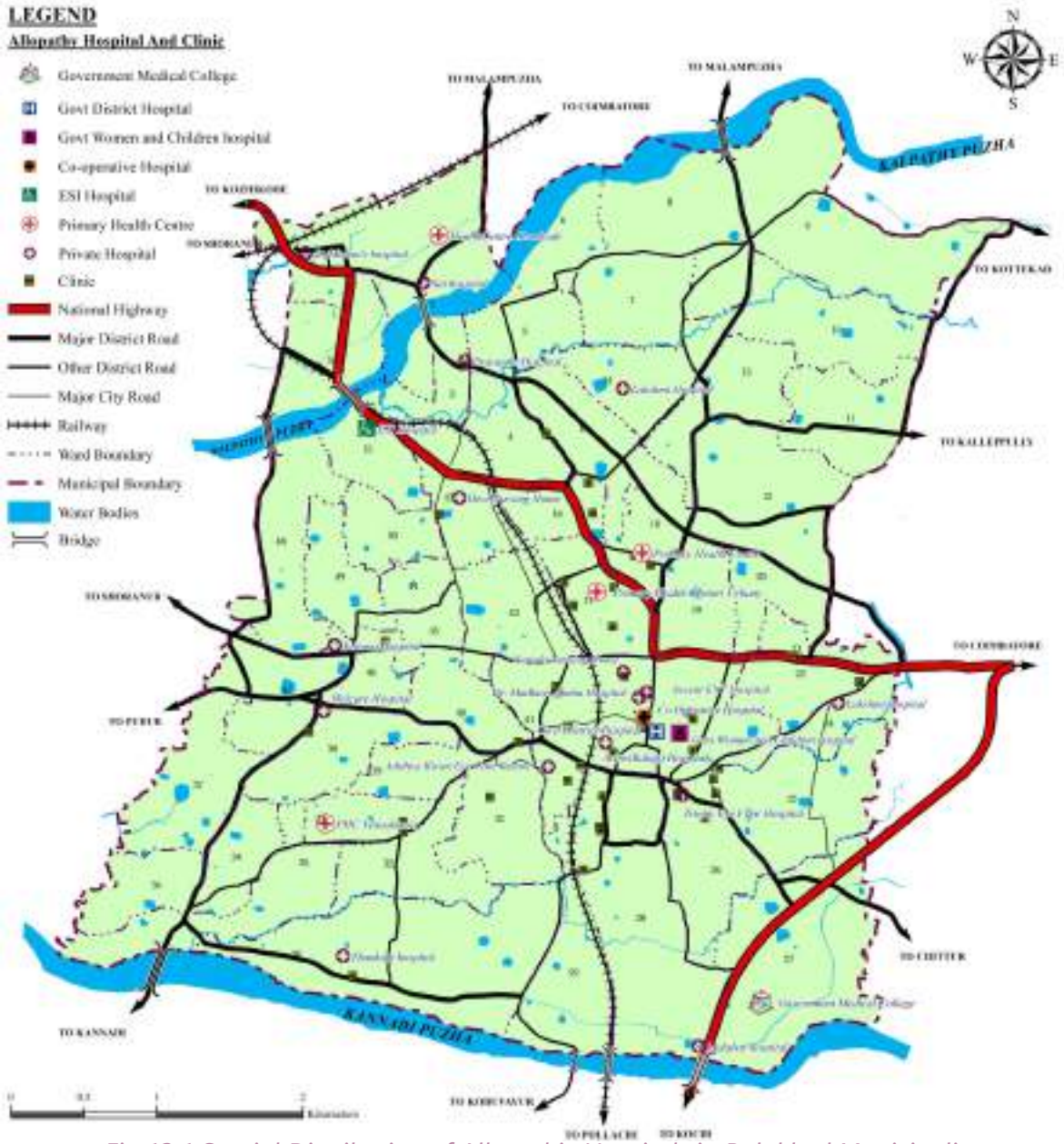


Fig.13.1 Spatial Distribution of Allopathic Hospitals in Palakkad Municipality

13.1.2 Ayurvedic Sector

There is one Ayurveda hospital under the Government sector and 11 clinics and hospitals under private sector in the Palakkad Municipality. Table 13.6 shows the details of Ayurveda hospitals in the Palakkad Municipality. Government Ayurveda hospital also called Arogyodaya Ayurveda hospital or District Ayurveda hospital has 50 bed strength. An average of 450 number daily patients visit District Ayurveda hospital.



District Ayurveda Hospital



Fig. 13.3 Spatial Distribution of Ayurveda Hospitals in Palakkad Municipality

In private, Ayurveda hospitals like Arogyodayam Ayurveda Hospital - Kalpathy, Ayurvedamantra Clinic - Ambhikapuram, AVP Ayurveda Centre - C.N. Puram, are the hospitals with inpatient facilities. The treatments and therapies offered by these hospitals are Abhyangam, Pizhichil, Sirovasti, Sirodhara/ Shirodhara, Navarakizhi. In these ayurveda hospitals an average of 20 patients visits daily.

Table 13.6 Details of Ayurveda Hospitals in Palakkad Municipality

Sl. No.	Name & Address	No. of Beds	Average daily No. of out patients	No. of Doctors
1	District Ayurveda Hospital	50	450	6
2	Arogyodayam Ayurveda Hospital	10	10	2
3	Ayurvedamantra Clinic	20	5	4
4	AVP Ayurveda Centre	8	12	3
5	Navajeeva Paramparya Vaidyalayam	Nil	1	0
6	Kerala Ayurveda Samajam Hospital	Nil	10	1
7	Ayushka Ayurveda Hospital	Nil	17	5
8	Anandamadam Ayurveda Hospital	Nil	-	-
9	Ayush care Ayurveda Hospital	Nil	15	6
10	Devikripa Ayurveda Hospital	Nil	10	1
11	Rishi Ayurveda Clinic	Nil	15	2
12	Kottakal Arya Vaidya Sala	Nil	Nil	-

Source: Palakkad Municipality

13.1.3 Homoeopathic Sector

There is one Government District homeo hospital in the palakkad municipality at Kalpathy. In this homeo hospital, 25 beds are available and an average of 270 patients visit daily. Three consulting doctors work in this hospital. Also 15 homeo clinics are functioning in the municipality and none of them provide inpatient facilities.



Government District Homoeo Hospital

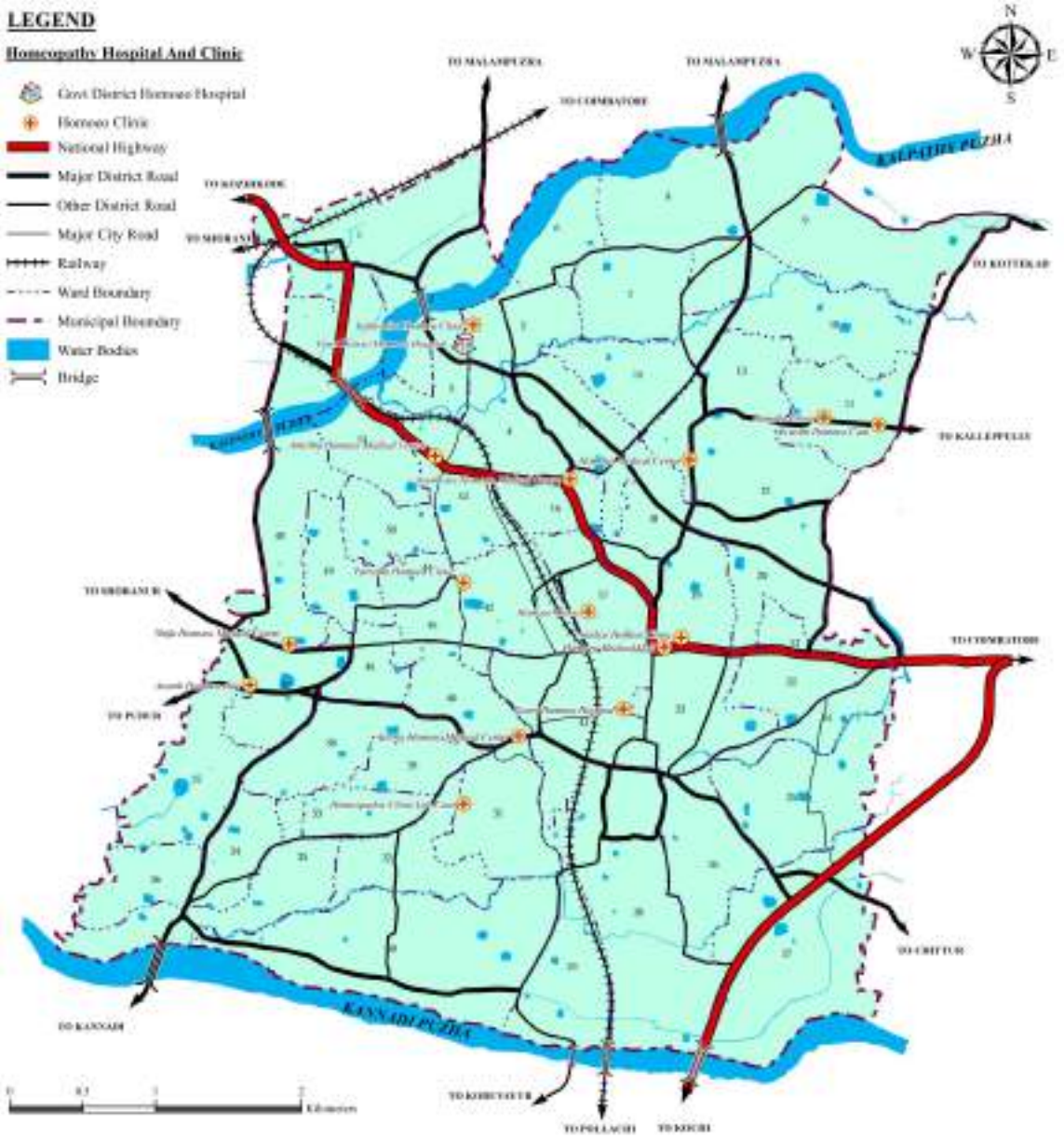


Fig. 13.2 Spatial Distribution of Ayurveda Hospitals in Palakkad Municipality

Table 13.7 Details of Homoeopathic Hospitals in Palakkad Municipality

Sl. No.	Name & Address	No. of Beds	Average daily No. of out patients	No. of Doctors
1	Government District Homeo Hospital	25	270	3
2	Sathya Sai Homeo Clinic	-	5	1
3	Amritha Homeo Medical Centre	-	20	2
4	Parvathi Homeo Clinic	-	5	2
5	Shifa Homeo Medical Centre	-	5	1
6	Swasthi Homeo Care	-	5	1
7	Avanth Homoeo care	-	-	-
8	Gloria Homoeo Medical Center	-	-	-

Source: Palakkad Municipality

Table 13.6 Continued....

9	Ayush care Homeo Medical Centre & Dental	-	10	1
10	Homoeo Medical Centre	-	-	-
11	Homoeo Medical Hall	-	-	-
12	Homeopathic clinic life care	-	-	-
13	Homoeo Clinic	-	-	-
14	Homoeo Clinic	-	-	-
15	Gouri Homoeo Hospital	-	-	-
16	Anithas Homeos Clinic	-	-	-

Source: Palakkad Municipality

13.2 COMPARISON WITH PLANNING STANDARDS

As per URDPFI guidelines, one district hospital is needed for a population of 11 Lakh. Palakkad district has a population of 2809934 (as per Census 2011). Therefore at least 2 district hospitals are needed for the Palakkad District. This indicates that an upgradation of any one of the Taluk level hospital is required.

In Palakkad municipality, the number of beds available in DH is 544, but as per standard, 660 beds (220 beds for 10 Lakhs population) are required. The number of doctors serving these beds are 42, i.e. at present there is only 1 doctor to serve 12 beds which is very less compared to the standards. It shows the necessity of another District hospital for the Palakkad District.

According to the planning standards, one Primary Health Centre is needed for a population of 20,000 and 1 bed capacity requirement is needed for every 2,500 population. As per the population in 2011, the number of PHC's required in Palakkad municipality is 7 and there are only 5 primary health centres in the municipality.

Table 13.8 Comparison of health facilities with planning standards

	Existing (2019)	Required
Population	137459	
1. **Nursing home:** 1 for every 45,000 -1,00,000 of 25-30 beds	2	3
2. **PHC Sub centre:** 1 for every 20,000	5	7
3. **District hospital:** 1 for every 11 Lakhs	1	1
4. **District hospital (number of beds):** (220 beds for 10,000,00 population)	544	660
5. **Super speciality hospital :** 1 for every 1,00,000	4	2
6. **Multi speciality hospital :** 1 for every 1,50,000	-	1

In addition to 16 private hospitals, there are 39 clinics also in the municipality. Thankam hospital has a bed strength of 300, Balaji Hospital has a bed strength of 90, and District co-operative hospital has a bed strength of 47. Welcare hospital, which is a super speciality hospital in the municipality has a bed strength of 100. Lakshmi hospital is another super speciality hospital with a bed strength of 80. Table 13.7 shows the comparison of health facilities with planning standards.

13.3 MAJOR DISEASES

The population of Palakkad municipality in 2019 is 1,43,205 and only 0.042% of people are affected by chronic diseases. The major disease affected in the municipality is tuberculosis. Tuberculosis disease is the major disease that shows increasing trend from 2014 to 2019. Table 13.8 and figure 13.4 shows the variation of diseases from 2014 to 2019.

Table 13.9 Details of disease affected persons

Name Of Predominant Diseases	No. of persons Affected					
	2014	2015	2016	2017	2018	2019
Leprosy	0	8	3	6	4	6
Phylaria	4	16	22	22	17	15
Tuberculosis	0	12	15	30	32	33
Cholera	0	0	0	0	0	0
Dengue	0	3	6	26	9	3
Chikunguniya	0	0	0	5	0	1
Malaria	0	0	0	0	0	1
Others (Specify)	0	1	0	0	0	1
Total	4	40	22	89	62	60

Source: Primary Health Centre, Palakkad Municipality

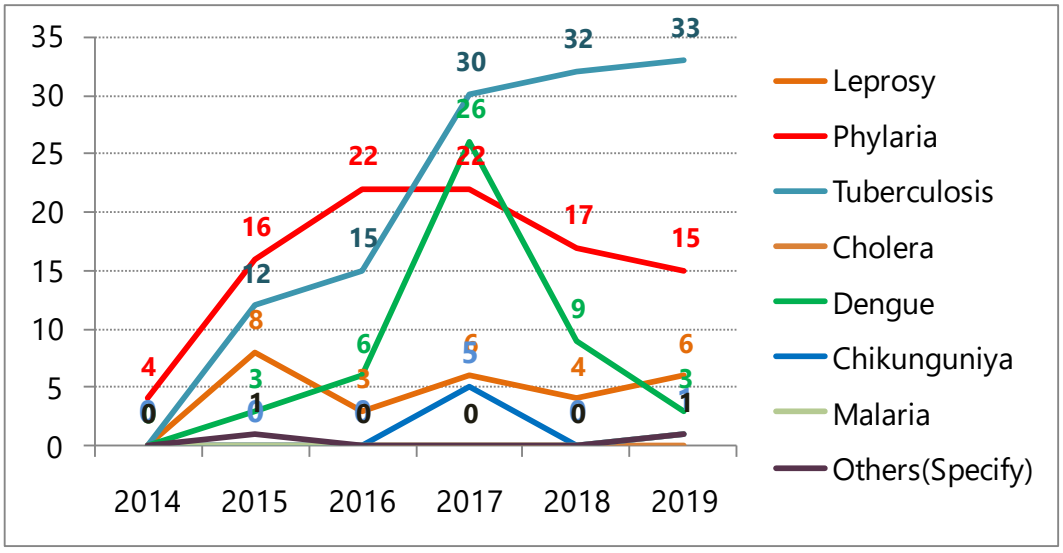


Fig. 13.4 Variation of predominant diseases in Palakkad Municipality

13.4 SCHEMES AND PROGRAMMES

Under the Ministry of Health and family welfare department, the primary health centre at Diarra street is proposed to be a health and wellness centre. Under the scheme Ayushman Bharat, Health and wellness centers (HWCs) are envisaged to deliver expanded range of services that go beyond Maternal and child health care services to include care for non -communicable diseases, palliative and rehabilitative care, Oral, Eye and ENT care, mental health and first level care for emergencies and trauma , including free essential drugs and diagnostic services. There are 5 primary health centres in the Palakkad Municipality. In addition to PHC at Diarra street, UPHCs at Vennakkara and Alangodu are also proposed to be HWCs in future.

13.5 PROBLEMS AND POTENTIALS

The major problem of the health sector in the municipality is the insufficient health care facilities in the government sector. There is only one District hospital in the municipality to serve the need of the entire district. There is a need for at least one more District hospital in the district. A lot of private hospitals are functioning in the municipality, but the cost of treatment in these hospitals can be difficult to afford for low income groups. Completion of the Government Medical College is an asset to the Palakkad Municipality as well as for the whole district and people can depend on the hospital for better medical facilities instead of going to Thrissur and Coimbatore. There are 4 super specialty hospitals in the Palakkad municipality and all of them are private hospitals. PHCs in Palakkad municipality are proposed to be converted into health and wellness centers in the future for better healthcare within the town limit.



CHAPTER 14- HOUSING

14. HOUSING

Housing is an important determinant for the quality of life of people. It is the most basic need of human being after food and clothing that needs to be addressed on priority. The population growth rate in Palakkad Municipality shows a declining trend in the last 4 decades. The area under residential landuse in the municipality is 39.112% of total area of municipality which shows the importance of housing needs. This chapter explains the existing housing conditions in Palakkad Municipality.

14.1 EXISTING HOUSING STOCK

The population of Palakkad Municipality is 130955 and the number of households is 31176 as per census 2011 which are distributed in 52 wards. The average household size of Palakkad Municipality is 4.2 which is lower than the district average (4.41) and state average (4.3). Table 14.1 shows the decadal variation of population, number of households and household size of Palakkad Municipality. The trend in household size has been steadily decreasing from 5.69 in 1981 to 4.2 in 2011 indicating the shifting of preference from joint families to nuclear households.

Table 14.1 Decadal variation of population and HH size in Palakkad municipality

Year	1981	1991	2001	2011
Population	111245	123289	130767	130955
No. of Households	19546	22923	26956	31176
Average Household size	5.69	5.38	4.85	4.20

Source: Census 1981,1991,2001,2011

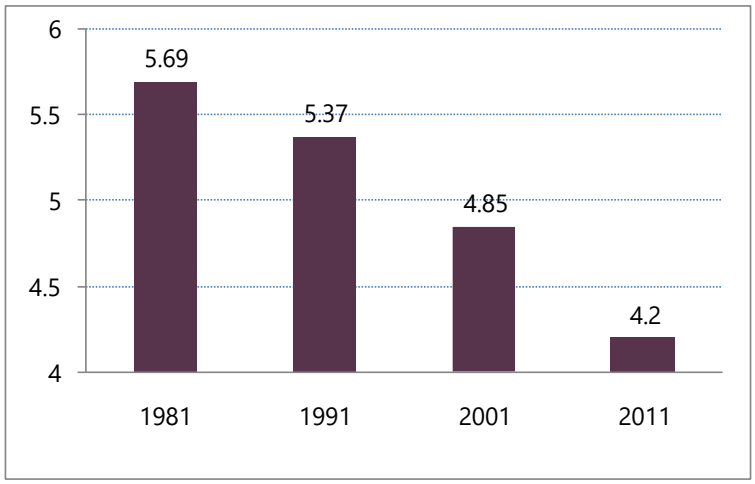


Fig. 14.1 Decadal variation of household size of Palakkad municipality

Source: Census 1981,1991,2001,2011

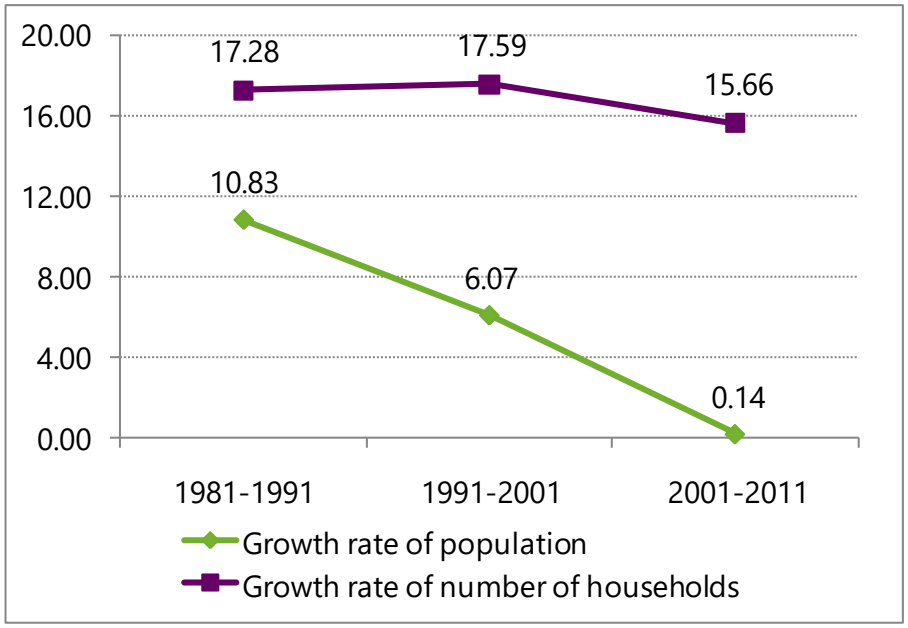


Fig. 14.2 Growth rate of decadal variation of population and number of households

Source: Census 1981,1991,2001,2011

Figure 14.1 shows the decadal variation of household size within the municipality. Figure 14.2 shows the growth rate of decadal variation of population and number of households. From the Census data, growth rate of number of households is higher than growth rate of population. This indicates that the number of houses is increasing at a rate higher than that of population increase. This trend shows there may be shifting of joint families to nuclear families within the municipality and this may be due to the improved economic status. And there may be a chance that more than one house is owned by middle income groups , high income groups or the NRI Population.

14.2 HOUSING SHORTAGE

As per census 2011, the number of households in Palakkad Municipality is 31176 and the average household size is 4.2. The total number of houses in the Palakkad municipality including kutcha and hut category is 38692 and the household size is 3.48 as per NUHM 2019 data. The total number of households is 39319. The data shows that the number of houses in the municipality is less than the households, hence the absolute shortage of housing is 627 as per NUHM 2019 data which strengthens the demand for housing.

As per PMAY demand survey, the families surveyed for housing assistance is 7424 in which 2785 families opted beneficiary led construction who have their own land to build. The rented or landless families derived from PMAY demand survey is around 3077. So the data obtained from PMAY demand survey is very much closer to the actual situation of Palakkad Municipality and it is an indicator of increasing demand for housing.

14.3 HOUSING PATTERN

The ownership status of the households is given in figure 14.3. In the municipality 86.34% of the households are own buildings as per socio economic survey. 11.34% of the households are rented house. 0.52% of the houses are under lease agreement. Major portion of the buildings are owned households which indicate a better performance for implementation of housing schemes.

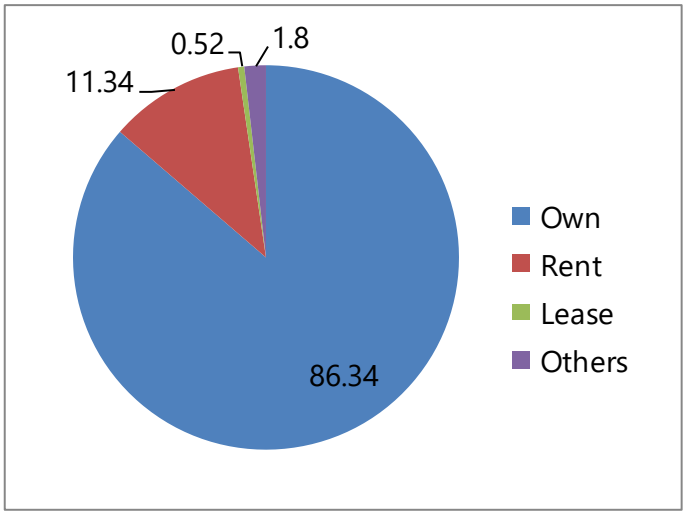


Fig.14.3 Ownership of building

Source: Socio economic survey, 2019

The houses are broadly classified into 3 different categories namely pucca, moderate or semi pucca, and kutcha according to the construction materials used and considering the durability of the structure. As per socio economic survey the kutcha and hut houses comes to 0.99% of the total houses. 72.25% of the households are pucca houses and remaining 26.76% are under the category of semi pucca or moderate houses. This indicates a better living condition in Palakkad municipality. Kutcha houses need to be reconstructed or repaired for achieving a 100% healthier habitation in the municipality. Figure 14.4 shows the percentage variation of each category of building type.

The distribution of houses by different plinth area is given in figure 14.6. It is clear that majority of the houses have plinth area in the range of 750 – 1500 Sq. ft which constitutes 43.36% of total houses, the plinth area less than 200 Sq. ft is 1.86%

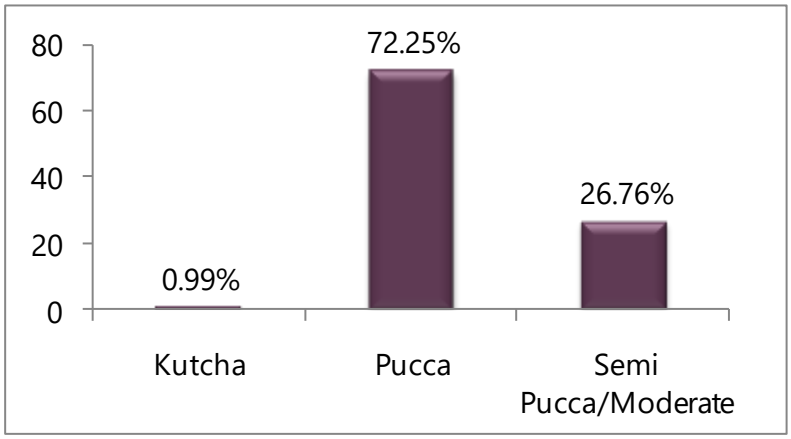


Fig. 14.4 % Variation for each category of building type

Source: Socio economic survey, 2019

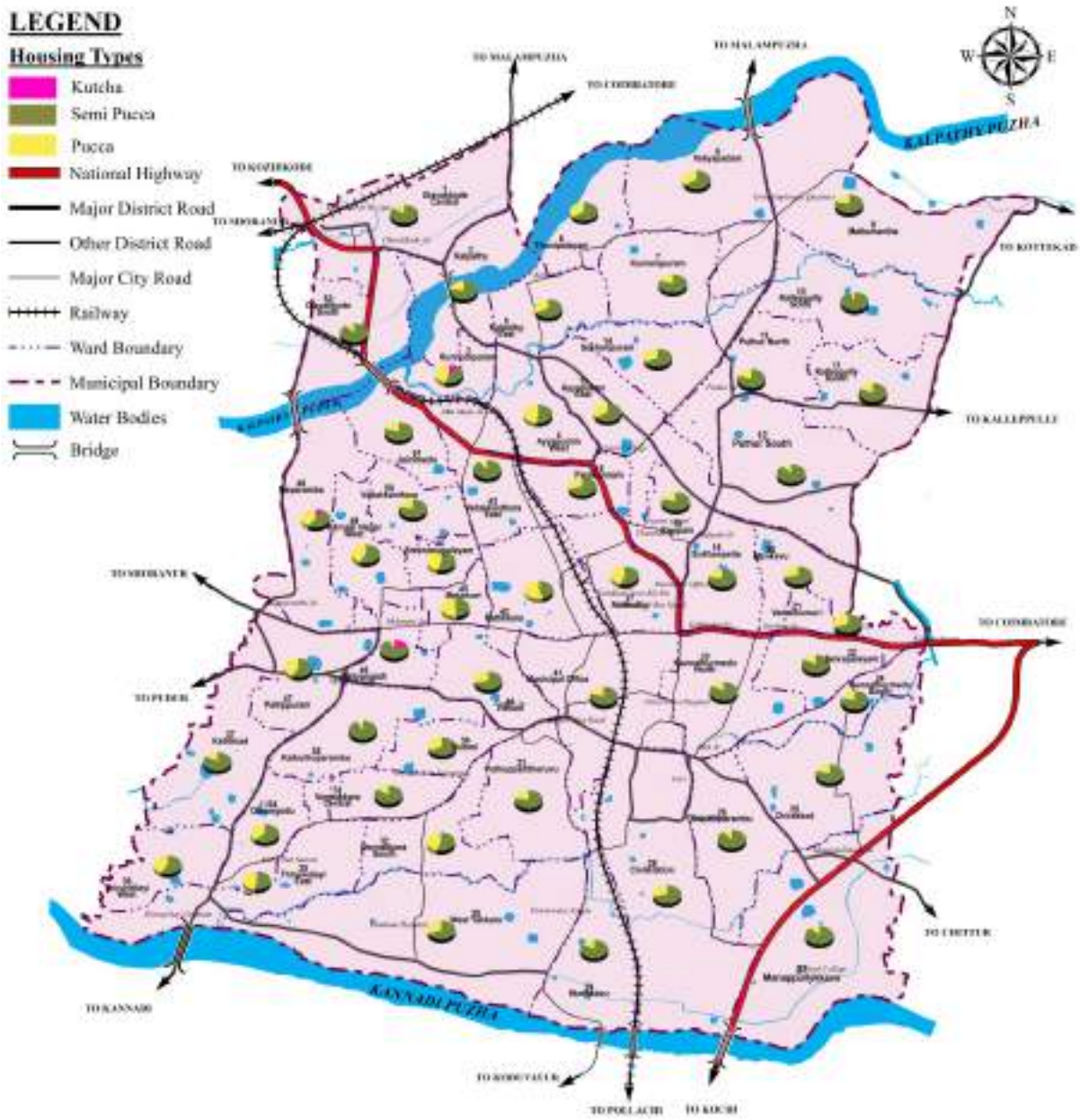


Fig. 14.5 Ward wise housing types in Palakkad municipality

Source: Socio economic survey,2019

and in the range of 200-500 sq. ft, it is 14.38% . 7.69% of households have plinth are in the range of 1500 - 2500 Sq. ft and 0.99% have plinth area greater than 2500. In general about 47.96% of houses have plinth area less than 750 Sq. ft and remaining 52.04% of houses have plinth area greater than 750 Sq. ft. Since the municipality is an urban area, the size of houses can not be the determinant of economic level of the municipality. Even though more than half of the houses have plinth area greater than 750 Sq. ft.

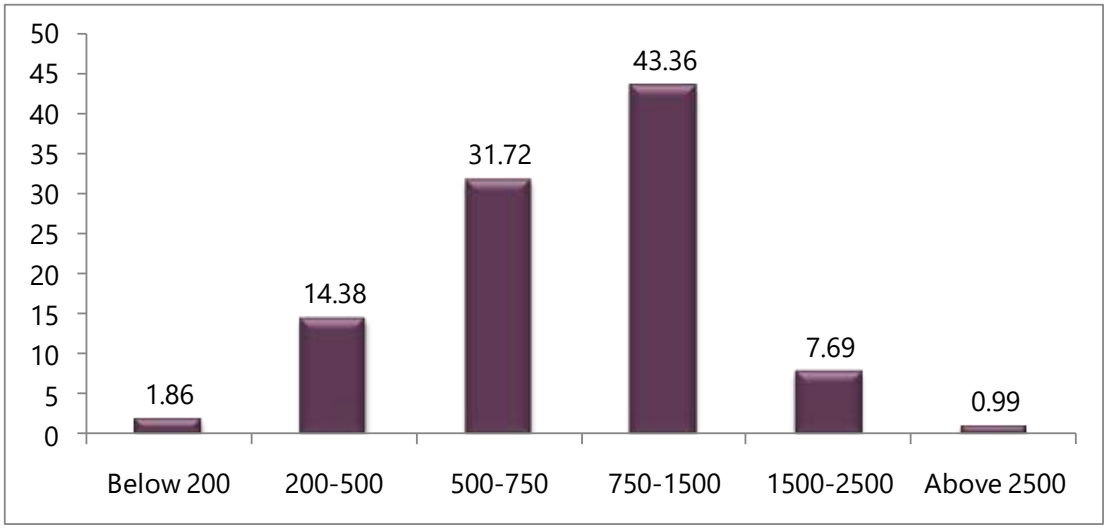


Fig. 14.6 Percentage variation of plinth area of houses in Palakkad municipality

Source: Socio economic survey, 2019

The materials used in roofs, walls and floors are important quality characteristics of a dwelling unit. Figure 14.7 shows the percentage of houses with different types of roofing material. In Palakkad Municipality 73.6% of the houses are concrete buildings. 24.18% of houses are tile roofed, 1.91% uses asbestos, 0.19% uses tin and 0.1% uses coconut leafs which indicate kutcha housing condition. The data clearly shows the economic level. The Kutcha buildings are structurally poor and needs reconstruction according to the modern standards of convenience. The moderate houses will last some more years if suitably and timely maintained. The Socio Economic survey indicates that people, at all levels, give top priority for qualitiy of housing. Hence the structural condition of houses requires further study.

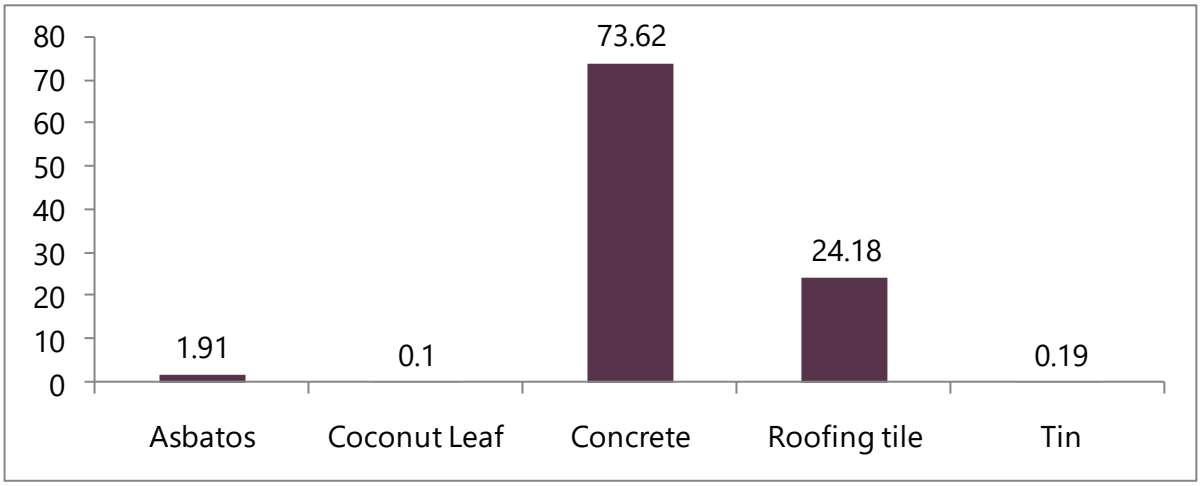


Fig. 14.7 Percentage variation of roof material of houses in Palakkad municipality

Source: Socio economic survey ,2019

Figure 14.8 shows the percentage variation of houses for different types of floors. 64.95% of the houses have marbles/tiles/granite. 5.66% uses mosaic floors, 25.85% uses cement floors. Figure 14.9 shows the percentage variation of different types of walls. 54.89% of the houses are constructed with bricks and 29.45% houses use plastered soil for walls. 10.34% houses uses plastered stones for walls.

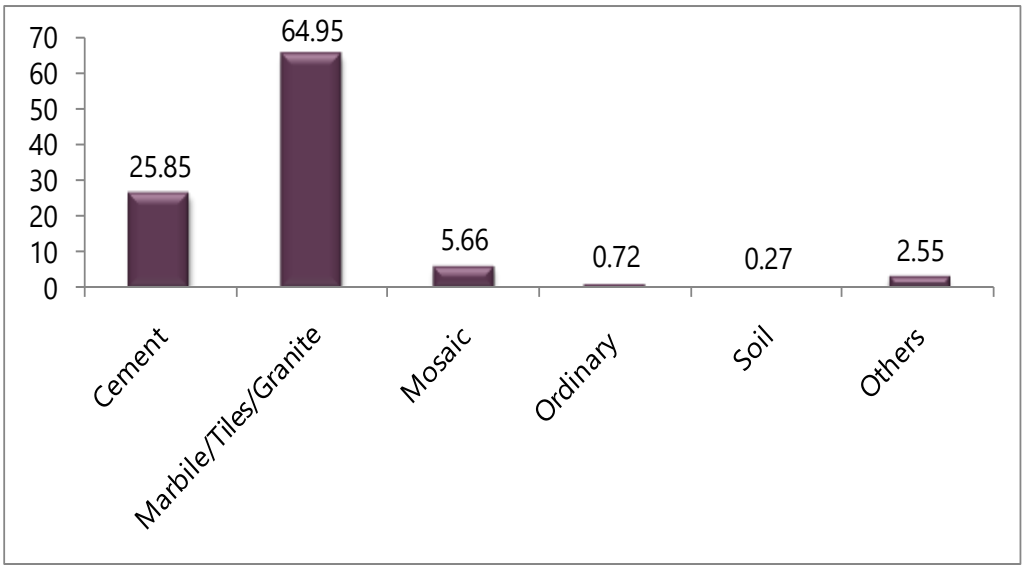


Fig. 14.8 Percentage variation of floor material of houses in Palakkad municipality

Source: Socio economic survey, 2019

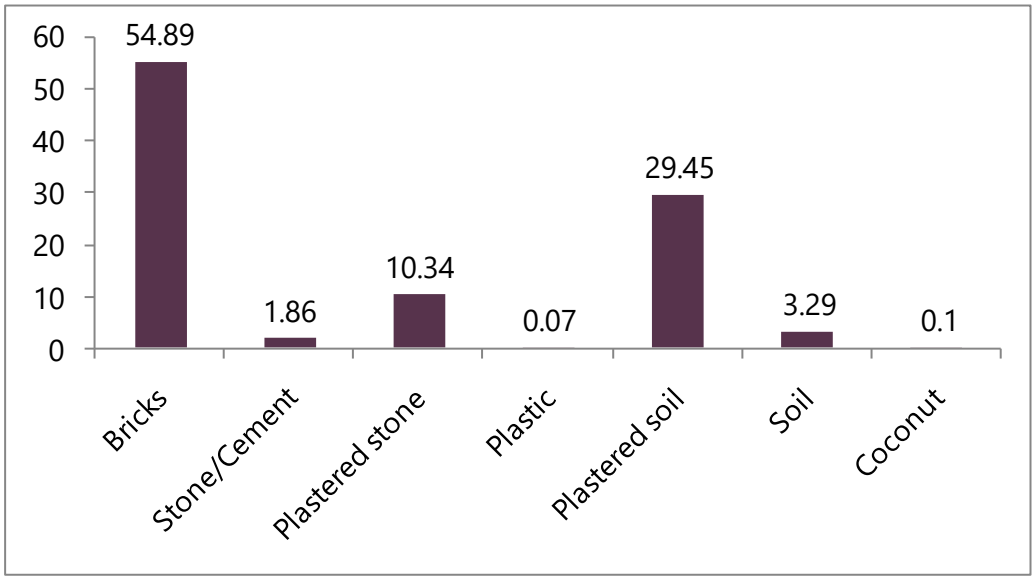


Fig. 14.9 Percentage variation of wall material of houses in Palakkad municipality

Source: Socio economic survey,2019

Figure 14.10 shows the percentage variation of plot size. According to the holding size of the plot, 34.6% of the households have plot size 5 to 10 cents and 30.44% is having 3 to 5 cents. 23.18% have plot area up to 3 cents and 10.09 % households have 10 to 25 cents. 1.69% of the households in the municipality have plot size more than 25 cents. This trend indicates the urban nature of the municipality (4923 persons per sq. km as per census 2011).

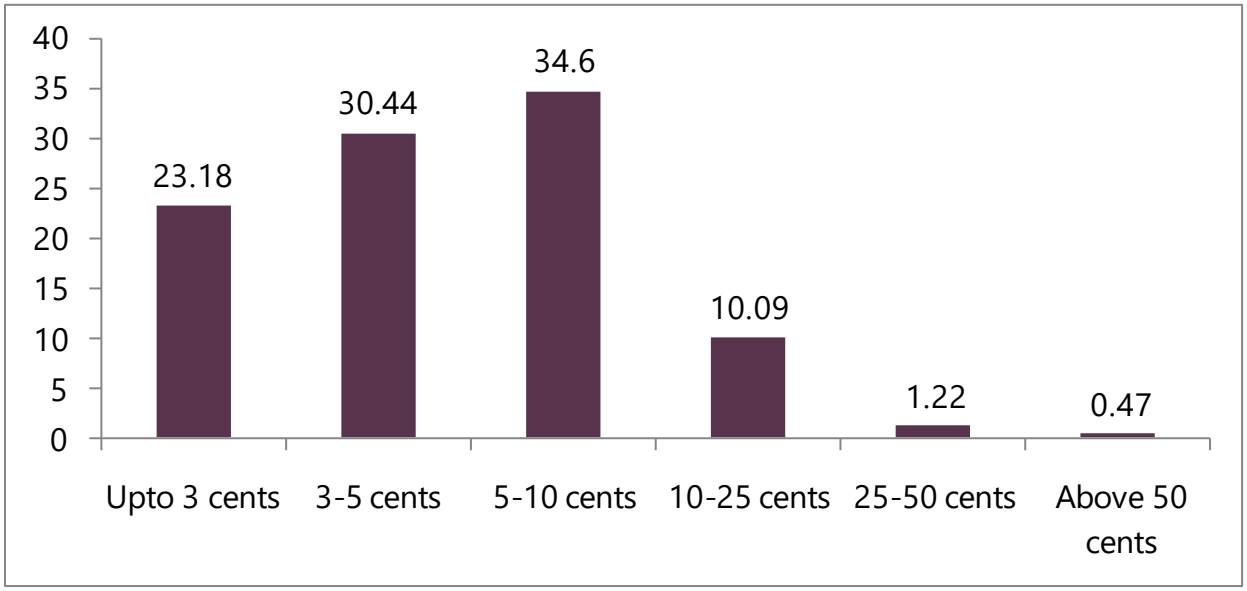


Fig. 14.10 Percentage of households holding various plot size

Source: Socio economic survey, 2019

14.4 OWNERSHIP STATUS

Ownership status refers to the legal status under which household have the right to occupy their accommodation. Land tenure is the legal regime in which land is owned by an individual, who is said to hold the land. The tenure type considered are owned lease and others. 86.37% of the households have their own land in the municipality. 2.33% of the households have their ownership on lease agreement. Figure 14.11 shows the ownership details of land.

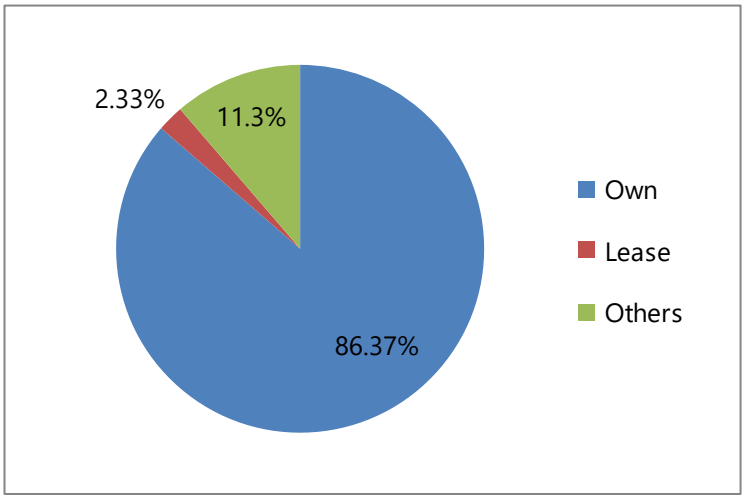


Fig. 14.11 Land ownership details

Source: Socio economic survey, 2019

The Percentage of households occupying one room is 1.22%, two rooms is 5.32%, three

rooms is 16.7% and four rooms is 31.19%, and five rooms is 25.26% and above five rooms is 2.31%. The number of households occupying two rooms and three rooms are more or less equal in this category. The highest percentage of households consists of dwellings with four and five rooms.

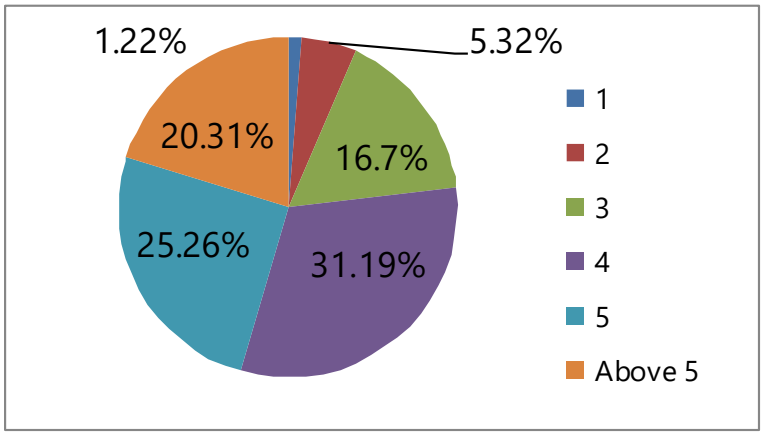


Fig. 14.12 Percentage of number of rooms in households

Source: Socio economic survey, 2019

14.5 SCHEDULED CASTE COLONIES

There are 41 scheduled caste colonies in the Palakkad municipality. Higher number of colonies are in Ward 28 Civil Station. Wards 8, 22, and 43 have 3 colonies and wards 4, 8, 15, 26, 31, 34 have 2 SC colonies. Table 14.2 shows the ward wise distribution of SC colonies. There are 1166 families residing in these SC colonies. And as per the study conducted by the municipality, there is a need for 395 new houses. Largest colony is in Ambalakkad Colony in Ward 11 with 81 families. Smallest colony is in Avinjipadam (Ward 4) and Pechiyamman Nagar (Ward 11) with 10 number of families each. In these SC colonies, 95.11% of the families have toilet facilities.

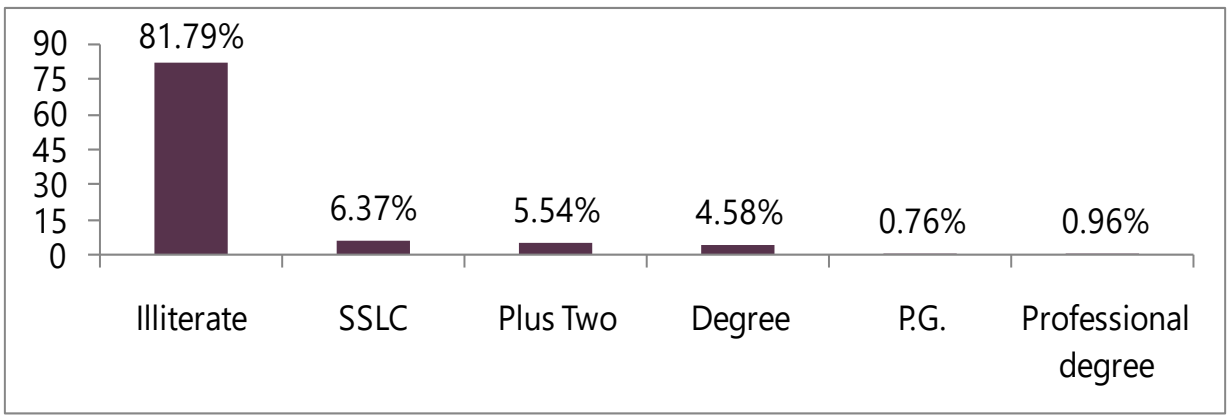


Fig. 14.13 Details of educational status of SC colonies in Palakkad municipality

Source: Palakkad Municipality

Table 14.2 Ward wise distribution of SC Colonies

Sl. No.	Name of colony	Ward	No. of families	Population
1	Pulluvathara	1	15	45
2	Sankhuvarathode	3	64	240
3	Sankhuvaramedu	4	42	145
4	Avinjipadam	5	10	35
5	Pechiyamman Nagar	4	10	30
6	Karekkad Parambhu	8	15	55
7	Valiyapadam	8	12	40
8	Chulliyode	7	18	72
9	Poojanagar	11	16	60
10	Thekkinkadu	10	11	32
11	Ambhalakkad	11	81	300
12	Archana Colony	11	18	66
13	Aanachira	15	54	260
14	Thorappalayam	15	24	70
15	Parakkunnam	16	11	40
16	Araliyode Kulam	41	13	52
17	Padathu Colony	28	30	120
18	Ambhalappuram	28	18	50
19	Angaraparambu	28	15	69
20	Mukkanathuparambu	28	27	103
21	Kallekkad	28	14	45
22	Kenathu Parambu	26	58	170
23	Kenathu Parambu(Near Fire)	26	11	58
24	Thottighal	31	35	125
25	Pazhayakalam	31	65	256
26	Chettytheruvu	19	20	73
27	Murikkavu	29	15	61
28	Chadanamkurissi	30	12	44
29	Aalanghattuthara	27	42	85
30	Valipparambu	22	13	40
31	A T R Street	22	71	93
32	Selvapalayam	22	14	28
33	Parkalam	34	25	79
34	Mannathara	34	20	47
35	Othughad	36	35	122
36	KALAMPUZHA	43	38	135
37	Pranamkulam	43	32	113
38	Selvinagar	43	43	142
39	Nochullam	42	34	135
40	Kaikuthuparambu	38	36	126
41	Pallipuram	47	29	92

Source: Palakkad Municipality

The total population in the SC colonies are 3953 in which 1.97% are working population. From the figure, it is clear that 81.79% of the population are illiterate and this shows that social backwardness in these colonies is a major problem. Figure 14.12 shows the educational status of these SC colonies.



Fig. 14.14 Spatial distribution of SC colonies

Source: Palakkad Municipality

14.6 SLUMS AND OTHER SUB-STANDARD HOUSING

There are 22 slums in the Palakkad municipality as per PMAY scheme. There is a combination of different types of land ownerships. Some people have their own land, some people stay in puramboke land. So it is very difficult to construct houses with private participation using land as a resource. Table 14.3 shows the details of slums in the Palakkad municipality.

1733 house holds are residing in these slums. Regarding infrastructure in these slums, the physical infrastructure has been developed sufficiently. About 57.89% houses are facilitated by water supply, 85.21% by latrine facility, 92.38% with electricity. Only 32.18% of the houses in these slums are pucca houses. There is no proper sewage treatment in these slums. Drainage channels are present in most of the slums. But these drains are clogged due to plastic wastes dumped into the drains.

After the flood in 2018 most of the inhabitants in Sundaran colony are shifted to apartments constructed by municipality inside the colony. Some of the inhabitants live in the old houses in the slum. The spatial distribution of these slums is shown in figure



Sundaram colony

14.15 and most of the slums are situated along the sides of water bodies and fringes of agricultural lands.

Slum survey was conducted to know the actual situation of these slums in the municipality. 75.19% of the households in these slums have their own land. The working population in the slums is 35.99%, out of which 74.04% are males and 25.96% are females. 8.02% of the population in these slums are illiterates, out of which 67.21% are females. 1.12% of the population are disabled and there are 403 SC families residing in these slums.

In municipality various slum improvement programmes are implemented i.e., Valmiki Ambedkar Awas Yojana, National Slum development Programme and Integrated housing & Slum Development Programme.

Table 14.3 Details of slums in Palakkad Municipality

Sl.No.	Name of Colony	Ward Number	Population	Total Households	Number of pucca houses	Number of households latrines	No. of HH with electricity connections	No. of HH having water connections
1	Kumaraswami colony	3	315	66	26	64	66	47
2	Sundaram Colony	3	505	114	3	114	114	65
3	Sankuvarathodu	4	271	52	15	50	51	28
4	Pechiyamman nagar	4	366	90	11	90	89	68
5	Shankuvaramedu	4	661	157	68	145	139	95
6	Amablakkadu chery	10,11	465	103	72	102	103	65
7	Parambithara	12	329	64	31	61	64	35
8	Kalyaninagar	12	145	29	10	23	29	8
9	Kombankuzhy	19	323	77	21	73	76	52
10	Gopal colony	25	561	121	21	80	118	78
11	Kenathu Parammbu	26	261	63	15	57	54	34
12	Padathu colony	28	157	39	21	34	38	18
13	Aryankulam	49	204	51	30	50	51	46
14	Chettathara	48	291	63	16	57	63	43
15	Kozhiparambu	50	254	67	21	67	67	56
16	Manakkalthodi	50	511	120	67	118	119	103
17	Mukkanathu parambu	28,29	357	83	39	78	78	48
18	Near Big Bazar	40	234	61	0	14	57	5
19	Parakkulam chery	34	263	61	8	47	49	20
20	SN colony	51	267	63	28	62	60	54
21	Sree Nagar Colony	30	381	86	28	73	84	52
22	Thanal Nagar	30	477	103	31	101	103	65
Total			7598	1733	582	1560	1672	1085

Source: Slum Survey, 2019 Local Self Government Planning

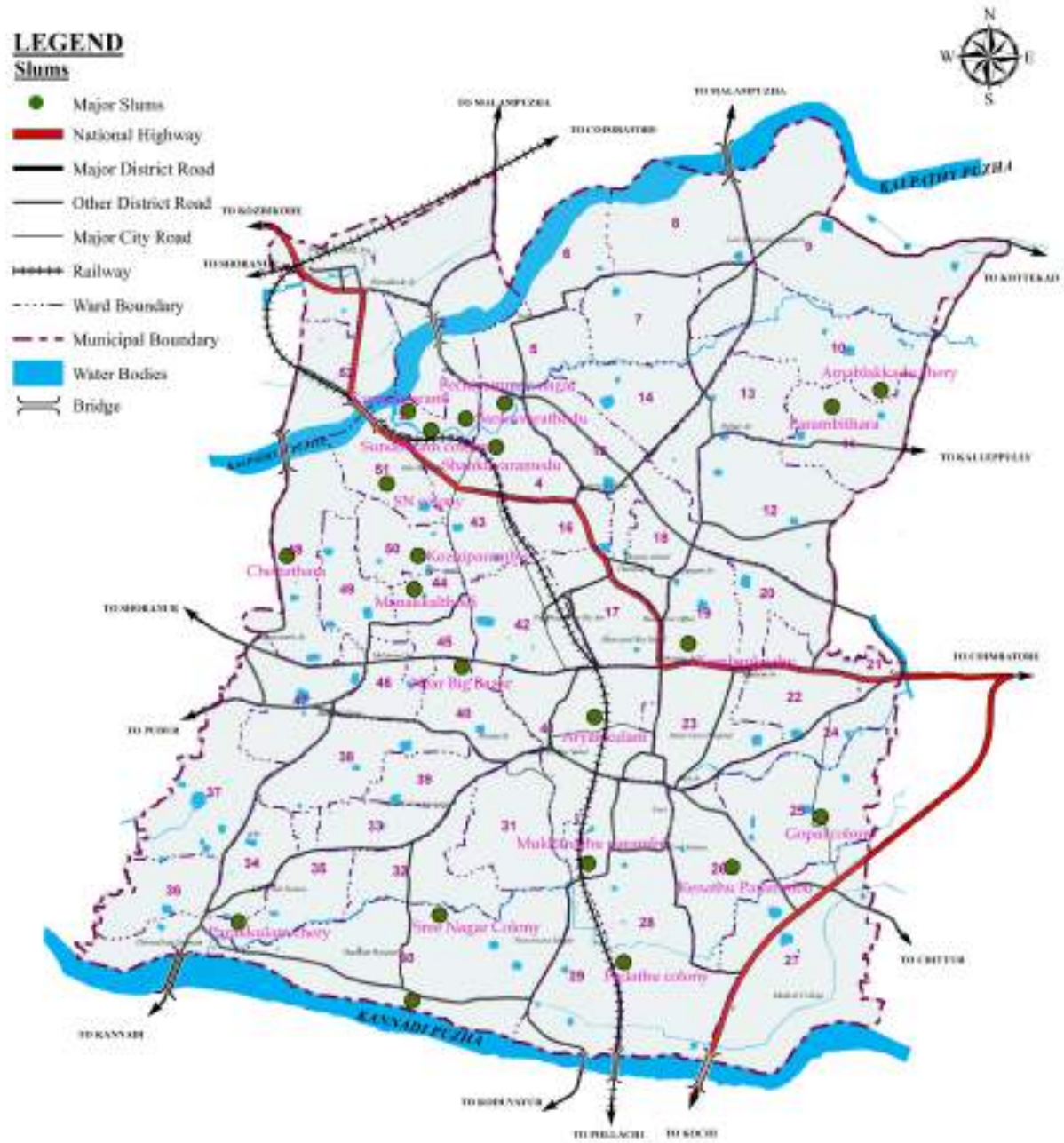


Fig. 14.15 Spatial distribution of slums in Palakkad municipality

14.6.1 Slum Improvement Programmes Implemented in Palakkad municipality

i. Valmiki Ambedkar Awas Yojana (VAMBAY)

In VAMBAY programme during the financial year 2003-06, 907 houses were given to the beneficiaries who had been identified through ward sabhas of the municipality. All the houses constructed are pucca structures having a plinth area of more than 35sqm.

ii. National Slum development Programme (NSDP)

This project was launched in 1998-99 year in the municipality. The sanctioned amount was mainly used to provide infrastructure facilities like road, electricity line, water supply line and community centres like anganwadies.

iii. Integrated housing & Slum Development Programme (IHSDP)

IHSDP has an integrated approach in ameliorating the conditions of the urban slum dwellers that do not possess adequate shelter and reside in dilapidated conditions. The components under the scheme includes slum improvement/ up gradation/ relocation projects including upgradation/ new construction of houses and infrastructural facilities, like, water supply and sewerage. This project got sanction from central Govt in 2007 with a total cost of Rs. 2112.26 lakhs covering 1626 families.

14.7 AGRAHARAMS IN PALAKKAD TOWN

An agraharam is the name given to the Brahmin quarter of a heterogeneous village or to any village inhabited by Brahmins. Agraharams were also known as Chaturvedi mangalams. The name originates from the fact that the agraharams have lines of houses on either side of the road and the temple to the village god at the centre, thus resembling a garland around the temple. Agraharams: The name literally means "a garland of houses". Water bodies were always seen in the vicinity of these settlements as the Vedic life recommended both spiritual and physical purity.

One of the particular feature of Palakkad town from other Kerala towns is its pattern of human habitations, which is agraharams. Agraharams are characterized by row houses edging the street on either side and centered around a temple thus forming nucleated communities called “Grammams”. Tamil Brahmin communities are the inhabitants of these Grammams. Most of the houses are ill-ventilated, with low roofs and small window openings.

Table 14.4 Agraharams in Palakkad town

Sl. No.	Name of Gramam	Extent in Ha
1	Kalpathy	6.94
2	Old Kalpathy	7.8
3	Chathapuram	3.48
4	Govindarajapuram	5.16
5	Vaidyanathapuram	2.59
6	Kumarapuram	3.75
7	Chokkanadapuram	1.98
8	Lakshminarayanapuram	4.66
9	Mukkai	3.47
10	Ayyapuram	5.24
11	Tharekkad	7.54
12	Sekaripuram	12.86
13	Ramanathapuram	7.86
14	Vadakkanthara	7.73
15	Nellisseri	5.16
16	Pallipuram	7.59
17	Thondikulam	5.07
18	Nurani	12.71
19	Thirunellayi	8.38
20	Pattamkurissi	1.26

Source: Primary Survey



Fig.14.16 Spatial distribution of agraharams in Palakkad municipality

There are 20 Agraharams in the Palakkad municipality and the details of these agraharams are shown in table 14.4 and the spatial distribution of these agrahrams are shown in figure 14.16. The planning of the agraharams followed a grid iron or concentric ring patterns, with the temple forming the main focus. The row houses is either single or double storied, with the traditional pitched roof form striking a significant profile against the sky. Linear planning is followed in most of the agraharams with row houses.

The row houses sharing a common wall and a long veranda running along the front portion, supported by stone and wooden pillars. The house has a veranda at the entrance for social activities and a platform, slightly raised from the street, which runs the entire length of the row houses. It also acts as a transition from the street to the dwelling.



Kalpathy Agraharam

A passage which starts at the street face, runs through the house ending at the backyard. Many of the agraharams had small inner courtyards, which provided adequate daylight to the rooms. The occupants own the eastern wall of the house whereas the western wall under the ownership of neighbour.



Nurani Gramam

The linearity of the houses is based on the beliefs upon Brahmins to follow principle of Vasthu. The purity and sanctity are the major criteria which determine the linearity. The streets in front of the houses transform themselves into an active community space serving as a commercial space for vendors, a play area for children, a meeting place for elders a venue for religious processions and meeting.

14.8 RESIDENTIAL APARTMENTS IN MUNICIPALITY

From the primary survey, the total number of residential buildings in the municipality with four floors is 85. There are 49 flats having 5 floors and above. The details of these flats are shown in table 14.5 and the spatial distribution of residential apartments is shown in figure 14.17. The maximum number of floors in the residential apartments constructed within the municipality is 14 floors. There are 14 flats in the municipality with 10 and above floors. From the spatial distribution, more number of flats are in the northern portion of the municipality and away from the central area.

Table 14.5 Details of residential apartments in Palakkad town

Sl.No.	Name	Locality	No of floors
1	Riviera Apartments	West Yakkara	14
2	Riviera Apartments	West Yakkara	5
3	Surya pride flat	Yakkara	14
4	Builtech greens	Kadamkode	8
5	Bhadram Thulasi	Kadamkode NH junction	11
6	Federal fort	Manappullikkav	7
7	Apartment	West Yakkara	9
8	Fort Avenue Appartment	Maidanam jn	6
9	Builtech Residency	Kunnathurmedu	14
10	Bhadradeepam Apartment	West Yakkara	9
11	Flat	DPO Road	6
12	Capital village	Nurani	6
13	Flat-classic Sree Lakshmi	Nurani	5
14	Classic srinika	Nurani	6
15	Flat	Kalikkad	6
16	PVC Symphony	Pallippuram	6
17	Sammohanam	Koppam	12
18	Orchid	Mattumandha	11
19	Jai kailas	Puthur	9
20	S.A. Homes Jewel	Kalleppully South	7
21	Amaravathi Corel appartment	Puthur	5
22	Daffoldils	Puthur	6
23	Jayaraj	Puthur	5
24	Lord Krishna prestiage	Puthur	14
25	Jayalakshmi	Puthur	8
26	Access darshan	Palakkad	6
27	Soorya height's	Kalmandapam	12
28	Soorya manzil (flat)	Olavakode	9
29	MountainMist	Thanavu	10
30	SA Homes Appartment,Keerthanam	Valiyapadam	8
31	SA Homes,Pranavam	manalmantha	10
32	Field view	Tharekad	5
33	Aishwarya nest	Koppam	5
34	Pride park	Koppam	5
35	Starbay golden however appartment	Shegaripuram	6
36	Sa icon appartment	Shegaripuram	7
37	Starbay Banyan Shades Apartment	Ayyapuram	6
38	Builtech sanctum	Chunnabuthara	9
39	Lords appartment	Victoria	5
40	Grandeur Aster	Chathapuram	11

Table 14.5 Continued....

41	Soorya Heritage Flat	Chathapuram	9
42	Jaideep appartment	Puthur	5
43	Surya flat	Nurani	12
44	Surya City	Sulthanpet	7
45	Apartment	Sulthanpet	6
46	Jayaraj Apartments	Ayyapuram	11
47	Apartment	Shekharipuram	5
48	Apartment	Chathapuram	13
49	Ranjini Apartments	Chathapuram	7

Source: Primary Survey



Fig.14.17 Spatial distribution of residential apartments in Palakkad municipality

Source: Primary Survey

14.9 HOUSING SCHEMES AND PROGRAMMES

The decentralised planning process was introduced in the state through the launching of "Janakeeyasoothranam" in a campaign model on 17th August 1996 by structuring the Ninth Plan as People's Plan. In order to cater the housing needs of people, municipality supported 41, 75, 62 general category families in the financial year 2013-14, 2014-15 and 2015-2016 respectively and 100, 55, 92 SC families in the year 2012-13, 2013-14, 2014-15 respectively. Scheduled caste department also provided housing assistance to many families and the details is shown in table 14.6. In addition to that housing demands were addressed through various housing schemes which are explained below.

Table 14.6 Assistance provided from SC department

Year	New House-holds	House Repair
2011-12	27	...
2012-13	32	...
2013-14	17	20
2014-15	32	21
2015-16	27	19

Source: Palakkad Municipality

14.9.1 EMS Housing Schemes

EMS Housing scheme was launched by the Government of Kerala with an objective of housing homeless people who fall below poverty line and providing land & housing for the people without land and home. The scheme provided 2 lakhs for SC category beneficiaries and 2.5 lakhs for ST category beneficiaries. Under this scheme, 117 families were benefitted in Palakkad municipality till this year.

14.9.2 Asraya Project

Kudumbashree designed a project called Asraya - Destitute Identification Rehabilitation and Monitoring Project for the rehabilitation of destitute families. Destitute families are identified using a transparent risk index framed by the Mission. Individual needs of the family are identified through a participatory need assessment. The project envisaged to address lack of food, health problems including chronic illness, pension, educational facilities to children, land for home, shelter, drinking water, safe sanitation facilities, skill development, employment opportunities, etc. Under this project, Palakkad municipality has given home for 5 destitute families.

14.9.3 Pradhan Mantri Awas Yojana (PMAY)

There are 4 verticals under PMAY scheme. Those are in situ slum redevelopment, credit linked subsidy scheme, affordable housing in partnership, and beneficiary led construction. The total no of beneficiaries identified for PMAY project of Palakkad municipality is 7424 in which 2785 families opted Beneficiary led construction who have their own land. The rented or landless families derived from PMAY demand

survey is around 3077. The details of number of beneficiaries of PMAY in Palakkad municipality is shown in table 14.7.

Credit linked subsidy scheme will be provided on home loans taken by eligible urban poor (EWS/LIG) for purchasing, construction of house. Affordable housing in partnership provide financial assistance to EWS houses being built with different partnerships by States/UTs/Cities. The EWS households who do not possess any ownership on land are considered under Affordable housing. Assistance to individual eligible families belonging to EWS categories to either construct new houses or addition to existing houses on their own to cover the beneficiaries who are not able to take advantage of other components of the mission. Out of the approved beneficiaries 80.72% of the beneficiaries are selected as eligible beneficiaries. Table 14.8 shows details of phases of PMAY.

Table 14.7 The details of beneficiaries of PMAY in Palakkad municipality

Implementation strategy	Scheme method	No. of beneficiaries identified
"In-situ" Slum Redevelopment	Not feasible	-
Credit linked subsidy scheme (CLS)	Housing loans for new construction and new addition	1562
Affordable housing in partnership (AHP)	Financial assistance to EWS houses built with partnership by state/UT/Cities	3077
Beneficiary led construction (BLC)	Financial assistance to new construction and enhance existing kutcha, semi pucca houses.	2785 (New houses = 1282 For enhancement=1503)
Total	7424	

Source: Palakkad Municipality

Table 14.8 Details of phases of PMAY

PMAY	Approved beneficiaries	Eligible beneficiaries	Number of beneficiaries to whom installment released			
			First	Second	Third	Fourth
Phase 1 (2016)	605	452	344	298	250	129
Phase 2 (2017)	343	289	185	160	124	43
Phase 3 (2017)	381	319	166	133	99	30
Phase 4 (2017)	259	197	108	87	55	13
Phase 5 (2018)	161	143	78	64	35	9
Phase 6 (2018)	123	111	54	41	13	0
Total	1872	1511	935	783	576	224

Source: Palakkad Municipality

14.9.4 LIFE Mission

LIFE Mission (LIFE – Livelihood Inclusion Financial Empowerment) is the mission to provide the benefit of all social welfare schemes including financial services, and to provide safe and affordable housing for the beneficiaries.

The main aim of the scheme is construction of houses to the landless and houseless in Kerala. Under the scheme LIFE, in Palakkad municipality 5125 beneficiaries are identified. Out of these, 4053 beneficiaries are landless and houseless, 567 beneficiaries are houseless and 505 beneficiaries are not considered for the scheme. 280 houses are constructed in the last 5 years under LIFE mission scheme. The details of beneficiaries benefitted under the scheme is given in table 14.9.

Table 14.9 Details of beneficiaries of LIFE mission

Name of Scheme	Dwellings constructed during last five years	Size of the dwelling unit in sq.m	Price of house	Mode of payment	No. of households benefited
Life mission	280	60sqm (min 30 sq.m)	Average Rs 800000(Rs 400000 for 30sq.m)	Bank account (online)	1005

Source: Palakkad Municipality

14.10 INFERENCE

39.18% of the total land in Palakkad municipality is of residential use. Total number of households is 31176 as per census 2011. Household size in Palakkad municipality is 4.2 which is lower than the district average of 4.41. The trend in household size has been steadily decreasing from 5.69 in 1981 to 4.2 in 2011 indicating the shifting of preference from joint families to nuclear households.

From the NUHM data the number of houses in the municipality is less than the households, hence the absolute shortage of housing is 627 as per NUHM 2019 data which strengthens the demand for housing.

As per socio economic survey 86.37% of the households is have their own land and 86.34% of the households having own house. 72.25% of the houses in the municipality are pucca houses and 26.76% of the houses are semi pucca houses. As per socio economic survey, 0.99% of houses are having plinth area less than 200 sq.ft., 14.38% having plinth area 200-500 sq.ft., 31.72% having plinth area 500-750 sq.ft., 43.36% are having plinth area 750-1500sq.ft, 7.69% are having plinth area 1500-2500 sq.ft and remaining 0.99% have plinth area greater than 2500 sq.ft. Overall housing condition in the municipality are satisfactory except slums and other substandard housing types. About the plot size of the households, 88.22% households have plot size less than 10 cents indicating the nature of an urban area.

There are 22 slums in the municipality and most of the slums are along the water bodies and fringes of agricultural land. Only 32.18% of the houses in these slums are pucca houses. There is no proper sewage treatment in these slums. Drainage channels are present in most of the slums. There are 41 Scheduled caste colonies in Palakkad Municipality. Various slum improvement schemes are implemented in municipality are VAMBAY, NSDP, IHSDP, and housing schemes implemented in the municipality are EMS housing scheme, Janakeeyasuthranam scheme, Asraya project, PMAY and LIFE Mission.



CHAPTER 15-
RECREATIONAL AND CULTURAL FACILITIES

15. RECREATIONAL AND CULTURAL FACILITIES



Recreational spaces are a human product that uses geographical and recreational infrastructure for leisure purposes. Thus, every area where a phenomenon of recreation (physical, social or cultural/entertainment) takes place is a recreational space.

Recreational spaces mean any part of a city used for recreational purposes during leisure time and appropriately developed for recreational purposes. Urban recreational spaces include parks and urban forests, sports fields, beaches and bathing areas, playground as well as facilities or areas where cultural, entertainment and social activities take place (including restaurants, clubs, cinemas, theatres, art galleries and museums). Such a broad approach to recreational spaces suggests that the concept of recreation is very capacious, and its significance is very broad – while primarily identified with physical recreation, it is currently gaining more and more forms and meanings.

Recreational facilities constitute an important element of physical and social development of an individual as well as community and for that there should be provisions for balanced distribution at the local, sub city and city level. It would be important that the city is divided into compact and sustainable communities and recreational facilities of appropriate order are made available to these communities to improve their quality of life. Recreational areas in town include parks, open space, recreational club, and cinema halls etc.

15.1 EXISTING FACILITIES

15.1.1 Parks and Open Spaces

As identified from land use survey, there are 23 parks which are listed in table 15.1 that include municipality owned parks, private parks as well as the parks within residential colonies. Lot of lands are identified as earmarked for park and open spaces at several residential layouts. Many of such parks like Ganesh Nagar, Rose garden etc are identified for development under AMRUT scheme. Further maintenance of these parks have to be ensured for its sustainability. The maintenance of municipality owned parks are under progress. Need of an iconic park near the fort combining all such recreational activities around it is a great demand for the town and have to developed under the ownership of municipality.

Table 15.1 List of parks in Palakkad municipality

Sl.No.	Name	Area in Ha	Ward
1	Rama Devi Nagar Park	0.169	Oalvakkode Central
2	Indrani Nagar	0.116	Vadakkanthara East
3	Nilanagar layout	0.16	Kalpathy
4	Dasaradha Layout	0.036	Kalpathy
5	Dr. Krishnan Park	0.314	Municipal Office
6	Gandhi nagar	0.213	Vithuni
7	Subix Park	0.415	Kaikuthuparambu
8	Park (Layout)	0.418	Municipal Office
9	Park (Layout)	0.113	Municipal Office
10	Park (Layout)	0.179	Kalleppully North
11	Eshwar Garden Park	0.308	Ayyappuram East
12	AR Colony Park	0.049	Municipal Office
13	Aishwarya Nagar Park	0.13	Chirakkad
14	Vadika	1.527	Civilstation
15	Nehru Children's Park	0.359	Civilstation
16	A.R Menon Park	1.183	Civilstation
17	Manalmantha Park	0.066	Thonipaalayam
18	Rose Garden	0.15	Kalleppully North
19	Venkiteshwara Colony	0.015	Kumarapuram
20	Municipal Office Road Park	0.141	Municipal Office
21	Salamat Nagar	0.189	Civilstation
22	Puthur Oceanus	0.202	Kalleppully North
23	Aiswarya Colony	0.102	Oalvakkode Central

Source: Primary survey



Municipal children's park



Subix park



A.R Menon park



Children's Park, Manalmantha

15.1.2 Play grounds/Stadium

The major playgrounds of Palakkad municipality are Fort Maidan, Small fort Maidan and Indira Gandhi Stadium. The Small Fort Maidan facilitated with a basket ball court and a small open gym has enough space which is used for conducting various political party conferences, exhibitions etc. Fort Maidan is being used as a cricket ground and had hosted even Renji Trophy matches. This is being used by the Cricket association to provide coaching for children and also for hosting matches of various levels. People also use it for morning and evening walks and also for other recreational activities. The Indira Gandhi stadium is also used for sport related activities, mainly football and for conducting exhibitions. The stadium being located in the heart of the municipality has a great potential in developing it for recreational purposes which was not able to implement as envisaged. The other playgrounds located in the municipality are listed in table 15.2.

Table 15.2 List of play grounds and stadiums in Palakkad municipality

Sl.No.	Name	Area in Ha	Ward
1	Municipal Stadium	4.212	Municipal Office
2	BEM HSS	0.567	Municipal Office
3	Mercy College	2.378	Pallippuram
4	Kanikamatha School	0.722	Pallippuram
5	Karnnakiyamman HSS	0.582	Karnaki Nagar West
6	Victoria College	3.234	Ayyapuram West
7	Kumarapuram GHS	0.602	Kumarapuram
8	Synthetic Track	3.374	Manappullykkavu
9	MES	0.535	Olavakkode South
10	Lions School	0.332	Sulthanpetta
11	Football ground Noorani	1.304	Nurani
12	Football Maidan Medar	0.43	Vithuni
13	Victoria College Principle Hostel	0.576	Parakunnam
14	Indira Gandhi Stadium	2.405	Kunnathurmedu North

Source: Primary survey



Kottamaidan



Indira Gandhi Stadium

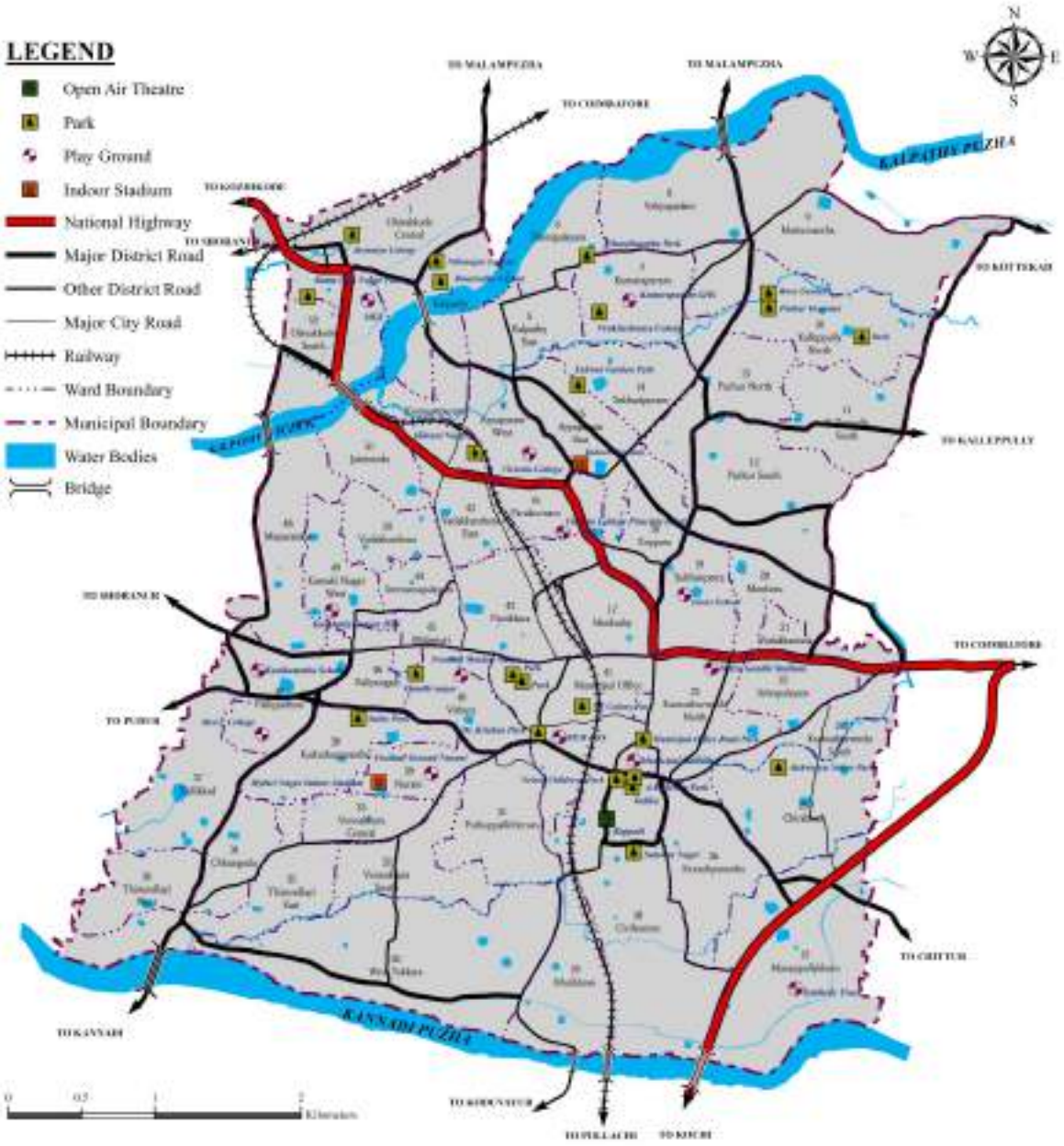


Fig. 15.1 Spatial distribution of parks, open spaces in Palakkad municipality



Indoor Stadium

An indoor stadium is under construction in an area of 3.234 Ha near Govt Victoria College. It is aimed to provide modern infrastructure facilities for all sort of indoor games and activities which will help in promoting and popularizing sports in Palakkad. The project is estimated at Rs.12.5 crore with a built-up area of 1 lakh sq ft, and is proposed to have a swimming pool, a spa, a conference hall, a commercial complex and a media gallery . Cost of this project is jointly owned by sports council, district panchayath and MP LAD.

15.1.3 Town Halls, Auditorium, and Other Public Halls

There is one Municipal Town Hall near Fort Maidan with a capacity of 950 seats. It is mainly used for conducting seminars, meetings etc. This town hall is undergoing extensive renovation and face lift . The district panchayath hall near district panchayath with 250 seating capacity is used mainly for government purpose.

Table 15.3 List of Town halls, auditoriums and public halls in Palakkad municipality

Sl. No.	Name	Location	Seating Capacity
1	Municipal Town Hall	Near Fort Maidan	950
2	S.A. Hall & Annexe	West Yakkara	1250
3	Sumangaly Kalyanamandapam	West Yakkara	700
4	Prasannalakshmi Kalyana Mandapam	Chakkanthara	1000
5	Shadhi Mahal Auditorium	R.C. Road	600
6	Simon Centre Kalyanamandapam	Chakkanthara	350
7	Mothi Mahal	Nurani	350
8	Saradha Sankar Kalyanamandapam	Nurani	750
9	Bhagavathi Kalyanamandapam	Manapullikavu	500
10	K.R.K. Kalyanamandapam	Vadakkanthara	1500
11	Nellissery Brahmana Samooha Madom	Nellissery	300
12	Sudharsana Hall	Moothanthara	150
13	Guru Mandapam	Moothanthara	260
14	Uma Maheswara Kalyanamandapam	Moothanthara	400
15	Raja Rajeswari Kalyanamandapam	Moothanthara	600
16	Aswathy Kalyanamandapam	Vadakkanthara	750
17	Radhika Auditorium	Vadakkanthara	700

Table 15.3 Continued.....

18	Krishnakripa Auditorium	Vadakkanthara	450
19	Bhagavathy Auditorium	Vadakkanthara	700
20	Gouri Sankara Kalyanamandapam	Vadakkanthara	300
21	NN's Covention Centre	Jain Medu	1000
22	Gayathri Auditorium	Olavakode	850
23	Anugraha Kalyanamadapam	Puthiyapalam	500
24	Vasavi Hall	Sulthanpet	300
25	Aristo Hall	Olavakode	500
26	M.C.M Hall	Pattikkara Bye Pass	500
27	Mahaganapathy Auditorium	Kalpathy	500
28	Sree Guruvayurappan Kalyanamandapam	Puthur	1000
29	Devi Chaithanya Kalyanamandapam	Puthur	500
30	Fine Centre Auditorium	T.B. Road	500
31	Surya Reshmi Convention Centre	Robinson Road	800
32	Seethal Hall (Top in Town)	Near KSRTC	500
33	Garden View Hall (Top In Town)	Near KSRTC	200
34	Seethal Mini Hall (Top In Town)	Near KSRTC	100
35	Moon Light Hall (Top In Town)	Near KSRTC	50
36	Parvathy Hall	N.K. Palayam	350
37	Sruthy Hall	Valiyapadam	200
38	Sree Gopalakrishna Swamy Bhajana Madom	V.N.Puram	100
39	Prasanna Vigneswara Hall	Chathapuram	350
40	Sradha Auditorium	College Road	150
41	Fine Arts Society Hall	Tharekkad	350
42	Baylees Hall	Court Road	150
43	N.M.R. Hall	T.B. Road	180
44	IMA Hall	Fort Maidan	150
45	Kadalivanam Hall	Fort Maidan	100
46	District Panchayath Hall	District Panchayath	250
47	Nakshthra Auditorium	Kallepully	200
48	Mukkai Kalyanamandapam	Mukkai	300

Source: Primary survey

There are 5 Kalyana Mandapams in the Palakkad Municipality with seating capacity more than 1000. There are 25 Kalyanamandapams with seating capacity above 400. There are 23 halls with seating capacity 350 and below. Table 15.3 shows the details of halls, auditoriums, and public halls in the municipality. Figure 15.2 shows the spatial distribution of public halls and auditoriums in municipality.



Municipal Town Hall



S.A. Hall & Annexe



Prasannalakshmi Kalyana Mandapam



K.R.K. Kalyana mandapam

15.1.4 Cinema Theatres

There are 7 cinema theatres in the Palakkad municipality and its details are shown in table 15.4. The spatial distribution of cinema theatres are also shown in fig15.2. From the spatial distribution, it is seen that the cinema theatres are concentrated in the CBD area and there is no uniform distribution of cinema theatres in the Municipality.

Table 15.4 List of Cinema Halls in Palakkad Municipality

Sl.No.	Name	Location
1	Priya	Priyadarshini Road
2	Priyadarshini	Parakkunnam
3	Priyathama	Parakkunnam
4	Aroma	Near town railway station
5	New Aroma	Priyadarshini Road
6	Satya	Near Municipal Bus Stand
7	Sreedevi Durga	Gandhi Bazaar Road

Source: Primary survey

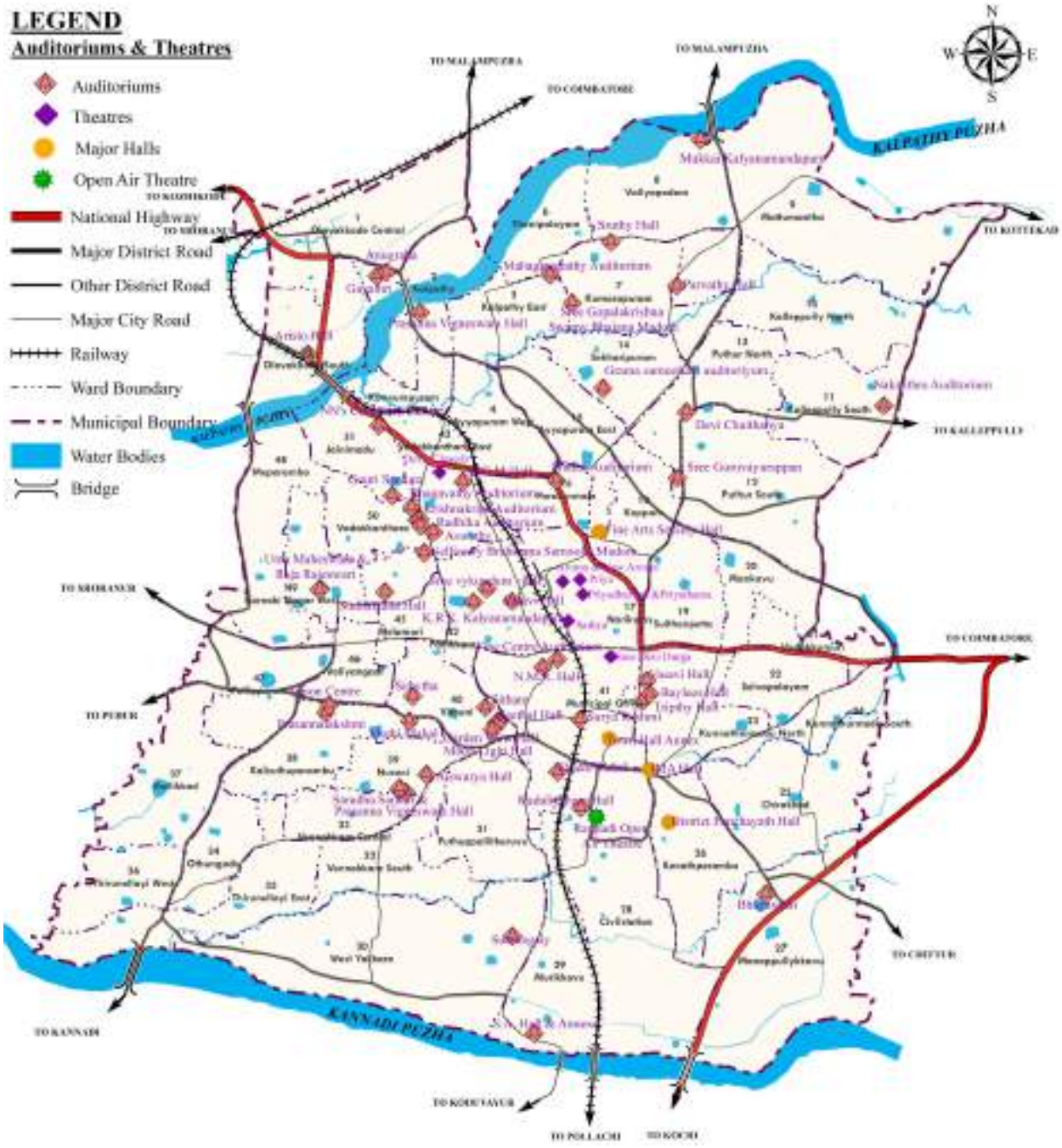


Fig. 15.2 Spatial distribution of public halls and auditoriums in Palakkad municipality



Priya Theatre



Aroma and new Aroma Theatre



Sathya Theatre



Priyathama Theatre

15.1.5 Rappadi Open Air Auditorium

Rappadi is an open air auditorium and it is well maintained and used for cultural and community events. Rappadi is situated behind the fort in ward 28 (Civil Station) and it is easily accessible from road and insufficient parking space is a major problem in Rappadi. Rapadi open air theatre has an area of 0.387 Ha. The location of Rappadi open air auditorium is given in figure 15.2.



Rappadi Open air Auditorium

15.1.6 Libraries

There are 14 Libraries in Palakkad Municipality. Palakkad District Public Library and Palakkad Public Library are the main libraries in the municipal area. Palakkad library is temporarily not functioning now.

Palakkad District Public Library owns a building having a built up area of 960 Square Meters (10, 000 sq. ft.) situated in 30 cents of land at the heart of Palakkad town near District Panchayath Office and Government Guest House in front of Civil Station. The library contains a complex having three floors for accommodating the

following facilities – two reading halls in the name of Olappamanna and O V Vijayan, a seminar hall, an exhibition hall, digital library, an internet cafe, an art gallery, an auditorium for performing arts and cultural programmes like 'Thullal' 'Koothu' 'Koodiyatam' and various other forms of dance.

Municipal library is situated near fort maidan and it is easily accessible and this library is temporarily closed now. Sarada Memorial library near Sulthanpet is located on the side of a cut road, which makes it hard to be noticed. Table 15.5 shows the list of libraries in Palakkad Municipality. Figure 15.3 shows the spatial location of libraries in Palakkad Municipality.

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Palakkad District Public Library

Table 15.5 Details of libraries in Palakkad Municipality

Sl. No.	Name and Description	No.of books available	No.of members
1	Palakkad District Public Library	105000	6600
2	Palakkad Public Library	48535	2012
3	Saradha Krishnayyar Library	6784	1521
4	Municipal Library	3648	Nil
5	Koppam Poura Sangham Library	5108	142
6	Sekharipuram Granthasala	20119	514
7	Janakeeya Vayanasala& Gramina Granthasala	2955	227
8	Gramina Granthasala & Vayanasala	8971	320
9	E. Padmanabhan Smaraka Vayanasala	2826	220
10	E.M.S. Study Centre & Library	3375	206
11	Narayana Memorial Library	1742	120
12	G.Y.S. Library & Reading Room	13460	340
13	A.K.G Vayanasala	-	-
14	Nehru Vayanasala	-	-

Source: Palakkad municipality



Palakkad Public Library



Municipal Library



Fig. 15.3 Spatial distribution of libraries in Palakkad Municipality

15.1.7 Religious Institutions

Churches, temples, mosques, and other places of worship are examples of religious institutions. These institutions support and oversee the practise of a particular set of religious beliefs. In the Palakkad Municipality, there are roughly 375 religious institutions, of which 301 are temples, 57 are mosques, and 17 are churches. Figure 15.4 depicts the spatial distributions of religious establishments. It is evident from the spatial distribution of religious institutions within the municipality that they are dispersed throughout the area.

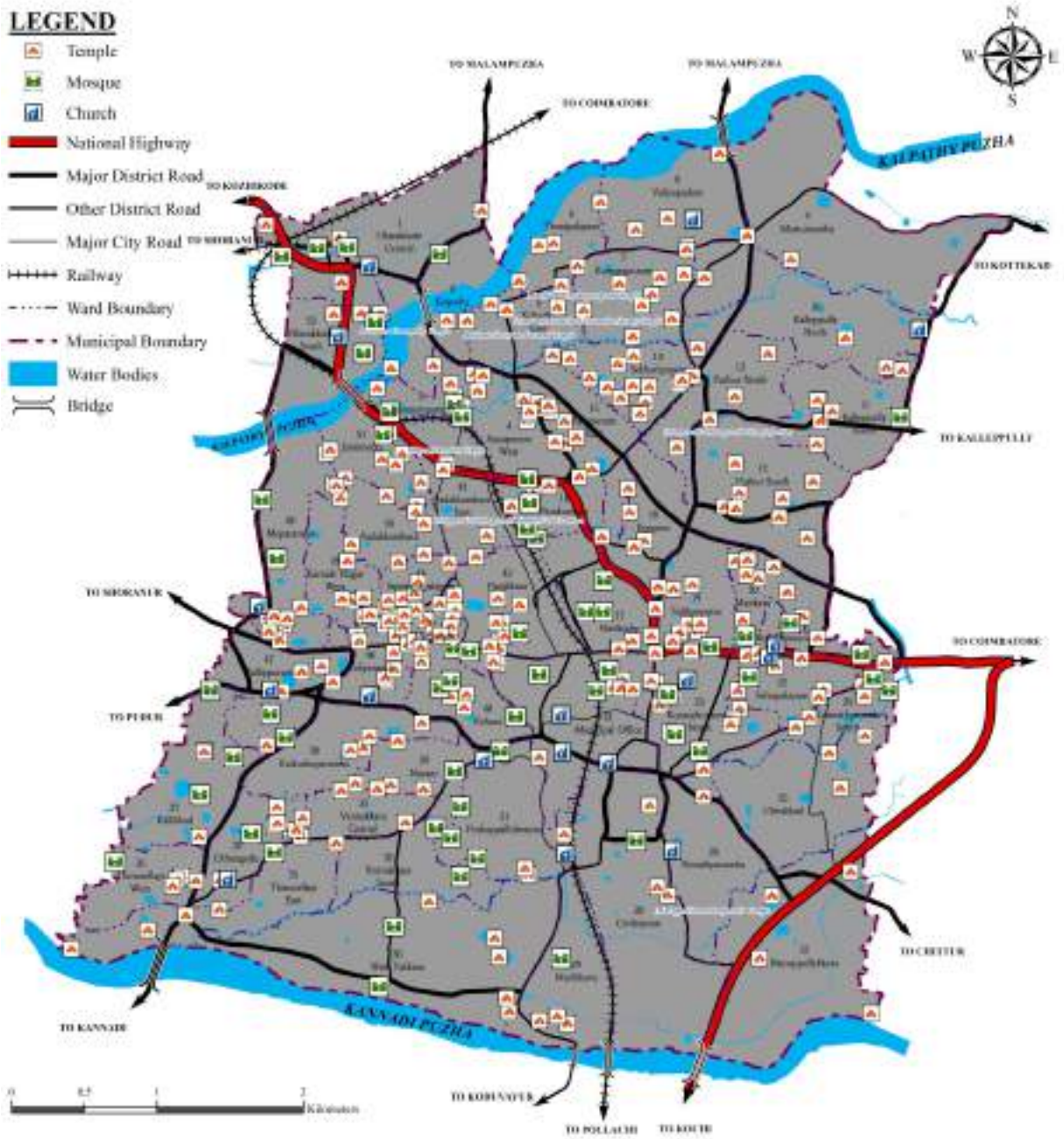


Fig. 15.4 Spatial Distribution of Religious Institutions

80.3% of the religious institutions in the municipality are temples and the main temples in the municipality are Manappullikavu bhagavathi temple at East Yakkara, Lakshmi Narayana Perumal Temple,Vishalakshi Sametha Viswanatha Swamy Temple (Kundambalam), Manthakara Mahaganapathi Temple, and Prasanna Ganapathy Temple at Kalpathy associated with Kalpathy Radholsavam, and Thirupurakkal Bhagavathi Temples at Puthur and Vadakkanthara. The main Christian churches are St. Raphael's Cathedral Church, Nithya Sahaya Matha Town church, Robinson Memorial CSI church, St. Sebastian Roman Catholic Cathedral and important mosques are Manjakkulam Darga Shareef, Stadium Jama'at Islami Jumu'ah Masjid, Arikkara Street Hanafi Juma Masjid, Civil Station Juma Masjid (Mujahid) etc.

The major festivals of the town are listed below in table 15.6

Table 15.6 Major festivals in Palakkad Municipality

Sl.No.	Festival Name	Average No. of persons attended
1	Manappullikavu Vela	30000
2	Kalpathy Radholsavam	75000
3	Kalpathy Radholsavam	75000
4	Kalpathy Radholsavam	75000
5	Kalpathy Radholsavam	70000
6	Puthur Vela	20000
8	Valiya Vilakku Vela	25000

Source: Primary survey

15.2 INFERENCE

There are 7 main Parks in the municipality namely Vadika, A.R. Menon park, subix park, Dr. Krishna park, Nehru children's park, Municipal office road park and Manalmantha park. Sports activities are mainly conducted in Fort Maidans near to Municipal office and Indira Gandhi stadium. There is a town hall with 950 seats and district panchayath hall with 250 seats in the municipality. In addition to that there are 46 halls and auditoriums within the municipality. There are 7 cinema theatres and one open theatre Rappadi near Fort in the municipality. There are totally 14 libraries in the municipality including Palakkad District public library. There are 375 religious institutions in the municipality and 80.3% of these are temples.



CHAPTER 16- OTHER CIVIC AMENITIES

16. OTHER CIVIC AMENITIES

The facilities provided by the governments and municipal corporations for common people are called civic amenities. Equal distribution of civic amenities are important for better functioning of the society. The civic amenities include police station, fire station, communication facilities, fuel stations and burial grounds/ crematoria. Availability of such civic amenities in Palakkad Municipality is discussed in this chapter.

16.1 EXISTING FACILITIES

16.1.1 Police Station

In Palakkad Municipality there are mainly two police stations (North police station at Big bazaar and South police station at Kunnathurmedu) and there is district Police office. Service area of police station is not only Palakkad Municipality but neighboring panchayat areas. As per the URDPFI guidelines, one police station is needed for 90,000 persons. Table 16.1 shows the list of police stations in Palakkad municipality. Spatial distribution of police station and fire station is shown in figure



North Police Station



South Police Station

Table 16.1 List of Police offices in Palakkad town

Sl. No.	Police station	Ward	Location
1	District Police office	41	Puthupally street
2	North police station	42	Vadakkanthara
3	South police station	26	Kunnathurmedu
4	Crime branch CID office	41	Puthupally street
5	Traffic police station	26	Kunnathurmedu
6	DYSP office	26	Kunnathurmedu

Source: Palakkad municipality

16.1.2 Fire Station

There is one fire station within municipality located near Civil station. As per UDPFI guidelines, one fire station is sufficient for 2 lakh population . But the present service area of fire station is in Palakkad municipality and in adjacent grama panchayats. Other fire stations near municipality are at Kanjikkode, Alathur and Chittur. The water storage capacity of fire station is 13,000 litres .



Fire Station



Fig. 16.1 Spatial distribution of Police station and fire station in Palakkad Municipality

16.1.3 Communication facilities

Communication facilities mainly include Post and Telegraph Offices and telephone service. BSNL is the major telephone service provider in the town. BSNL telephone exchanges are present at seven locations, that is near town bus stand (Ward 41), CTO (Ward 19), Civil line (Ward 28), Melamuri (Ward 47), Manapullykkavu (Ward 27), Kalpathy (Ward 3), Olavakkode (Ward 1). There are approximately 6,24,019 land line connections and PCO's and mobile connections. Other than BSNL, IDEA, Airtel, jio and Vodafone are also proving services in the town.

There are 25 mobile towers and 13 Wi Fi hotspots for BSNL in the municipality. Table 16.2 shows the details of BSNL connections in Palakkad municipality. According to URDPFI guidelines, one telephone exchange of 40,000 lines is required for a population of 4 lakh. But the introduction of mobile phones transformed the land line connections to wireless and mobile connections. Out of the total BSNL connections 97.54% are mobile connections.

Table 16.2 Details of BSNL Connections in Palakkad Municipality

No. of Telephones	
Private Offices & Institutions	2084
Attached to Public offices	574
Individual connections	11358
Others	1338
Total	15354
No. of Mobile Connection	
Pre paid	598994
Post paid	9671
Total	608665
No. of Broad band Connections	7141
No. of Mobile Towers	25
No. of Wi Fi Hot Spots	13

Source: BSNL, Palakkad



BSNL exchange, TB Road



Sanchar Bhavan, Palakkad

Even though advanced communication facilities are available people still uses postal facilities. There are 18 post offices at different locations serving the entire municipality and the list of post offices in the municipality is given in table 16.3. According to URDPFI guidelines one post office is required for a population of 10,000-15,000. As per planning standards, the number of post offices is more than enough in Palakkad municipality. There are two head post offices in Palakkad municipality one at Olavakkode and the other at Sulthanpet. Spatial distribution of telephone exchanges and post offices are shown in figure 16.2.

Table 16.3 List of Post offices in Palakkad Municipality

Sl.No.	Post Office Name
1	Thirunellai Post Office
2	Kunnathurmedu Post Office
3	Olavakkodu Head Post Office
4	Ambikapuram Post Office
5	Sekharipuram Post Office
6	Kalpathy Post Office
7	Palakkad Head Post Office
8	Palakkad College Post Office
9	Palakkad Fort Post Office
10	Collectorate Post Office
11	Puthupally Post Office
12	Puthur Post Office
13	Nurani Post Office
14	Vadakkanthara Post Office
15	Chokkanathapuram Post Office
16	Moothanthara Post Office
17	Pallippuram Post Office
18	Palakkad City Post Office

Source: Primary Survey



Palakkad Head Post office



Olavakkode Head Post office

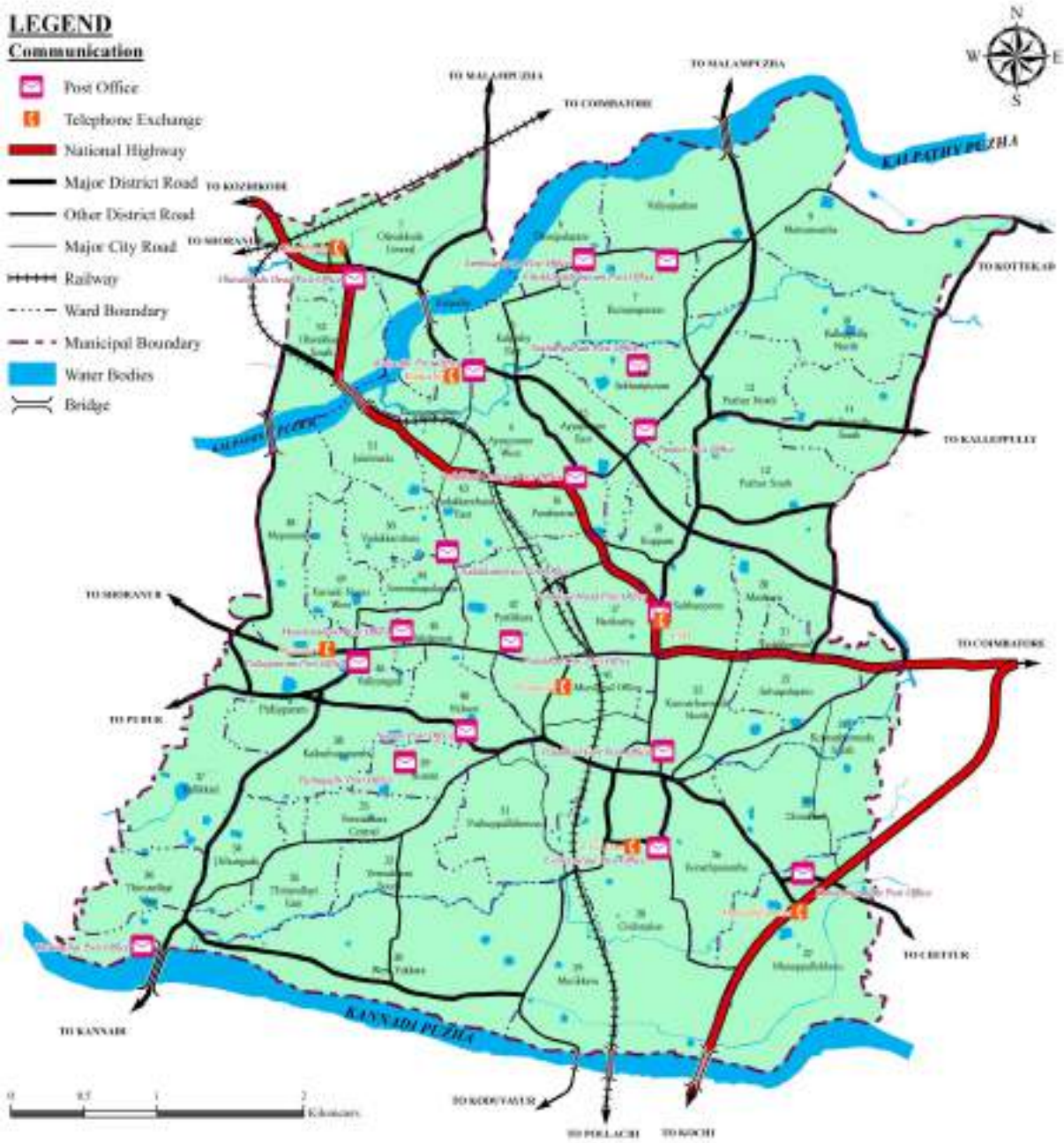


Fig 16.2 Spatial distribution of Communication facilities

16.1.4 Fuel Stations

There are 19 petrol/ diesel pumps and five LPG gas godowns functioning within town limits. Storage capacity of petrol is 432000 litres and that of diesel is 566000 litres. There are five LPG gas godowns with total capacity of 52000 Kg in the municipality. 72.1 % of the houses depends on LPG connections for cooking purposes. Spatial distribution of fuel stations are shown in figure 16.3. The details of petrol/diesel pumps are shown in table 16.4 and details of LPG gas godowns are shown in figure 16.5.

Table 16.4 List of Petrol/Diesel stations in Palakkad Municipality

Sl. No.	Petrol/ Diesel	Location	Capacity in litres	
			Petrol	Diesel
1	Mannnarkkad Filling Station	Rly Station Road,Olavakkod	9000	15000
2	Sahil Auto fuels	Sekharipuram Jn., Klapathy	30000	40000
3	CVM Motor fuels	Jainimedu	40000	38000
4	Anitha	Nurani	16000	22000
5	Venkadeswaram	Kanikkamatha Bypass	35000	30000
6	Radhakrishnan	Melamuri	35000	20000
7	MA Ahammad ravuthar& Co.	Sakunthala Jun	10000	30000
8	Park View	Near KSRTC	15000	20000
9	Sree Amman	West Yakkara	25000	4000
10	Mayil Vahanam fuels	Kalpathy-Kalmandapam By pass	20000	40000
11	Indian Oil Co.	Kalpathy-Kalmandapam By pass	15000	40000
12	10C	College road	40000	40000
13	Hameed fuels	Kalmandapam Jn.	15000	40000
14	PJR fuels(10C)	V H Road	15000	40000
15	Sree Bhagavathy Services	Sulthanpetta CBE Road	9000	16000
16	NR Srinivasan, Bharath petro-leum	Sulthanpetta CBE Road	25000	40000
17	Thiruvanan fuels, Indian Oil dealer	Kunnathurmedu	30000	40000
18	Saravana fuels, Hindustan petrolium	Chittur road, Manappul-lykkavu	18000	31000
19	SRK fuels	Chittur road,Kunnathurmedu	30000	20000

Source: Primary Survey

Table 16.5 List of LPG gas Godowns in Palakkad Municipality

Sl.No.	Name	Location	Capacity (Kg)
1	Kondappuram Kalathil Gas agencies	Melamuri	12000
2	Kandath agency	Puthur Devaprabha Colony	12000
3	Krishna swamy, M K Agen-cies(10C)	Ramanathapuram	4000
4	Builtech gas agencies	Near medical college	12000
5	Kandath agency	Sekharipuram	12000

Source: Primary Survey

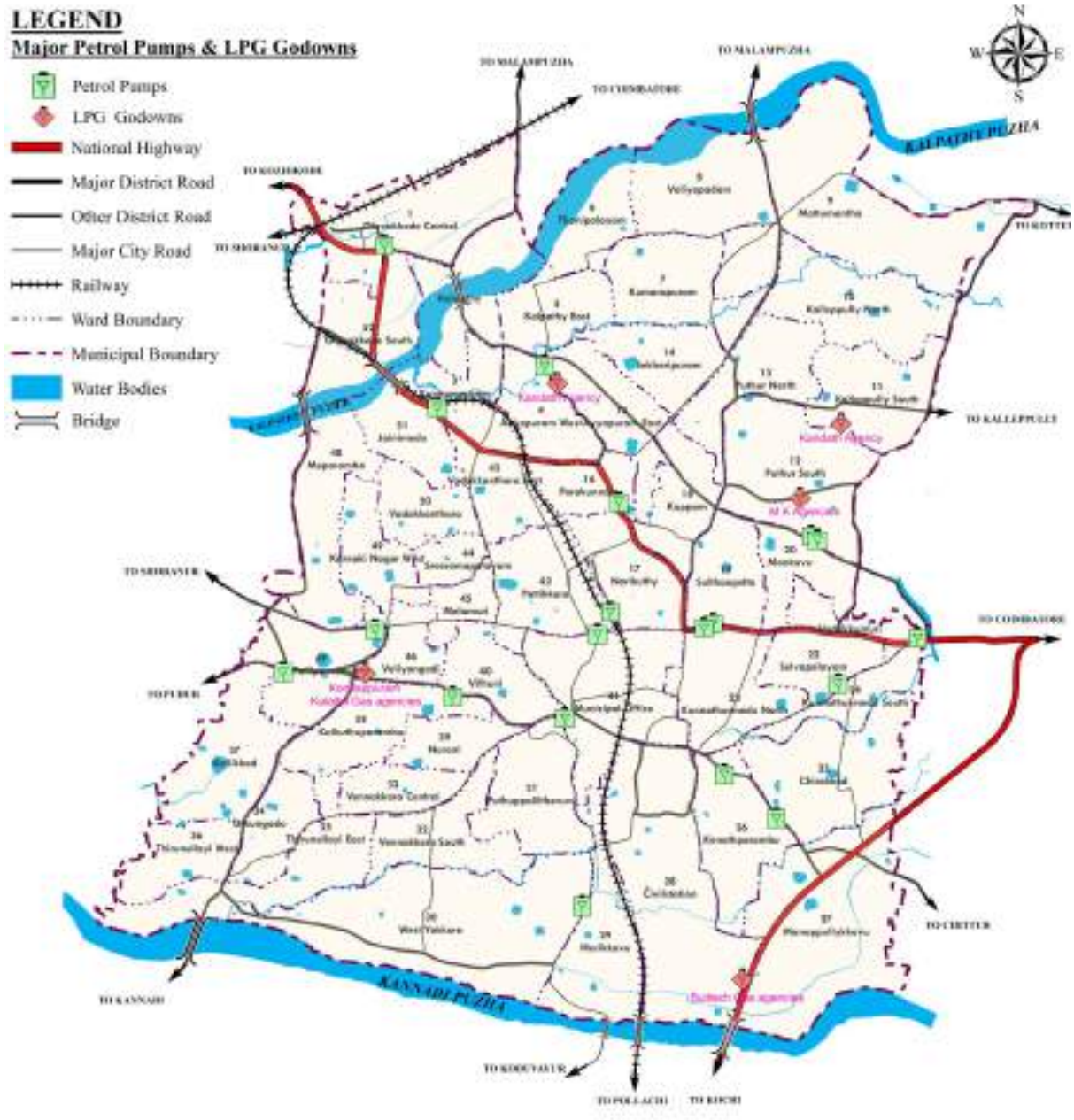


Fig. 16.3 Spatial distribution of fuel stations

16.1.5 Crematoriums and Burial grounds

There are 21 crematoriums/burial grounds in the Palakkad municipality. Burial ground at Mattumantha near NGO Quarters owned by municipality situated in Valiyapadam (Ward 8). It covers an area of 1.246 Ha. Remaining are associated with religious institutions. The spatial location of burial grounds is shown in figure 16.4. There is one electric cremation ground at Kalmandapam (Selvapalayam– Ward 22), near to the eastern boundary of Palakkad municipality. Table 16.6 gives the area of each crematorium and burial ground.



Kalmandapam Christian Crematorium

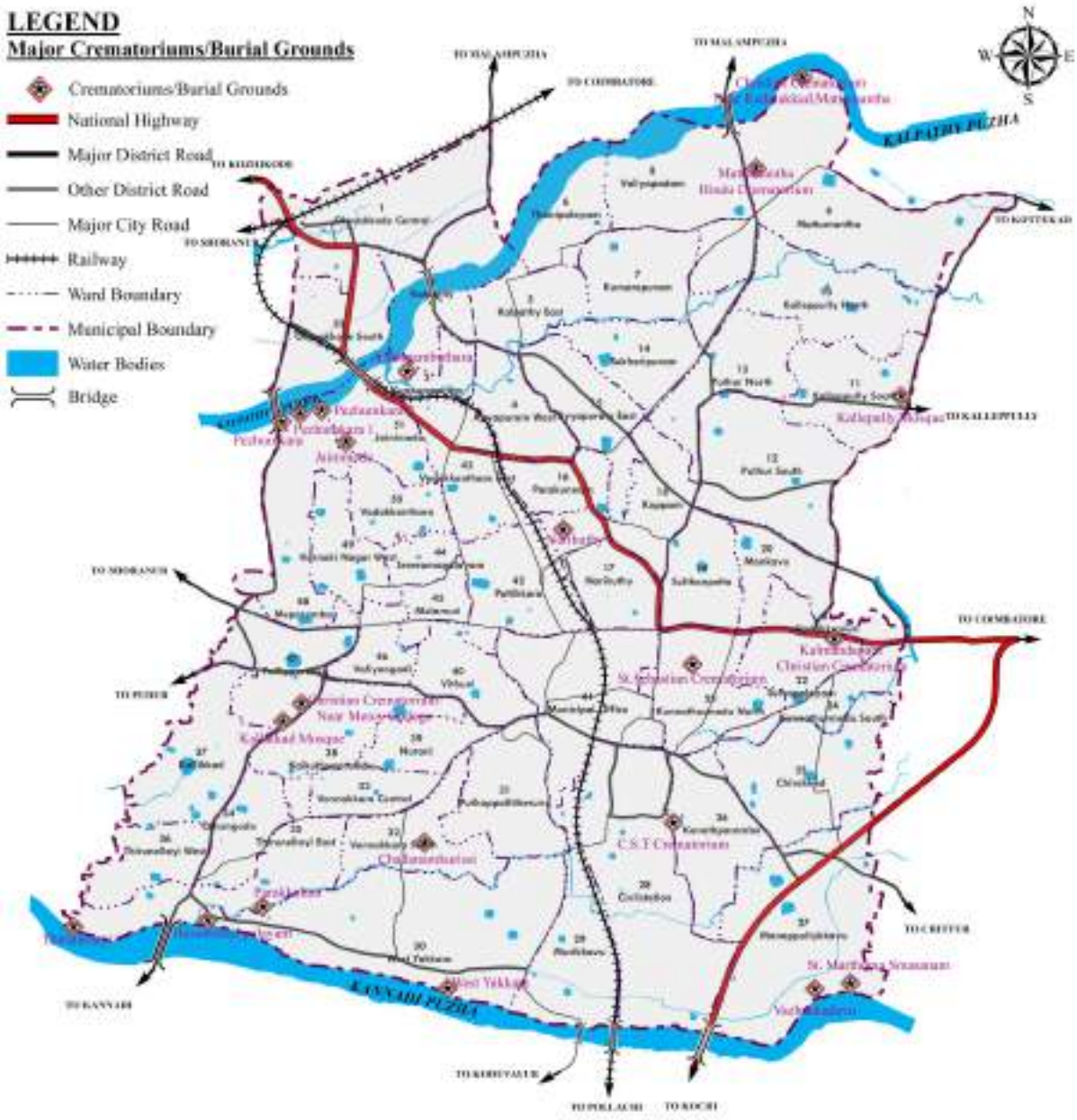


Fig. 16.4 Spatial distribution of crematoriums and burial grounds

Table 16.6 List of Crematoriums and Burial Grounds in Palakkad Municipality

Sl.No.	Crematoriums and Burial Grounds	Area in Ha
1	Christian Crematorium Near Mercy College	0.09
2	Pezhumkara 1	0.033
3	Pezhumkara	0.106
4	Jainimedu	1.453
5	Pezhumkara 2	0.061
6	Thirunellayi	0.103

Table 16.6 Continued.....

7	Narikuthy	0.757
8	Thirunellayi palayam	0.496
9	Parakkulam	0.197
10	Kallepully,Mosque	0.221
11	C.S.T Crematorium	0.441
12	Kalmandapam Christian Crematorium	0.258
13	Chadanamkurissi	0.152
14	West Yakkara	0.718
15	St. Marthoma Smasanam	0.212
16	Vazhakkadavu	0.311
17	Chunnambuthara	1.778
18	Christian Crematorium Near Kadalakkad,Mattumantha	0.173
19	Mattumantha,Hindu Crematorium	1.246
20	St.Sebastian Crematorium	0.14
21	Kallikkad Mosque	0.167

Source: Primary Survey

16.1.6 Comfort Stations

There are 6 comfort stations in the Palakkad Municipality and four of them are in the bus stand areas, one near the vegetable market, and another near Kotta maidan. All the comfort stations are run by private bodies and they are charging for using the facility. Table 16.7 shows the details of comfort stations and figure 16.5 shows the locations of comfort stations within the municipality. From the spatial distribution, it is seen that the locations of comfort stations are in the CBD area of the city where public transport systems are concentrated.

Table 16.7 Details of comfort stations in Palakkad Municipality

Sl. No.	Comfort Stations	Location	Free/ Charged
1	Latrine & Toilet	KSRTC Bus Station	Charged
2	Latrine & Toilet	Stadium Bus Stand	Charged
3	Latrine & Toilet	Municipal Bus Stand	Charged
4	Latrine & Toilet	Town Bus Stand	Charged
5	Toilet	Vegetable Market	Charged
6	Latrine & Toilet	Kotta Maidhanam	Charged
7	Latrine, Toilet, Cloakroom and Dormitory	Pattikkara Bypass	Charged

Source: Primary Survey

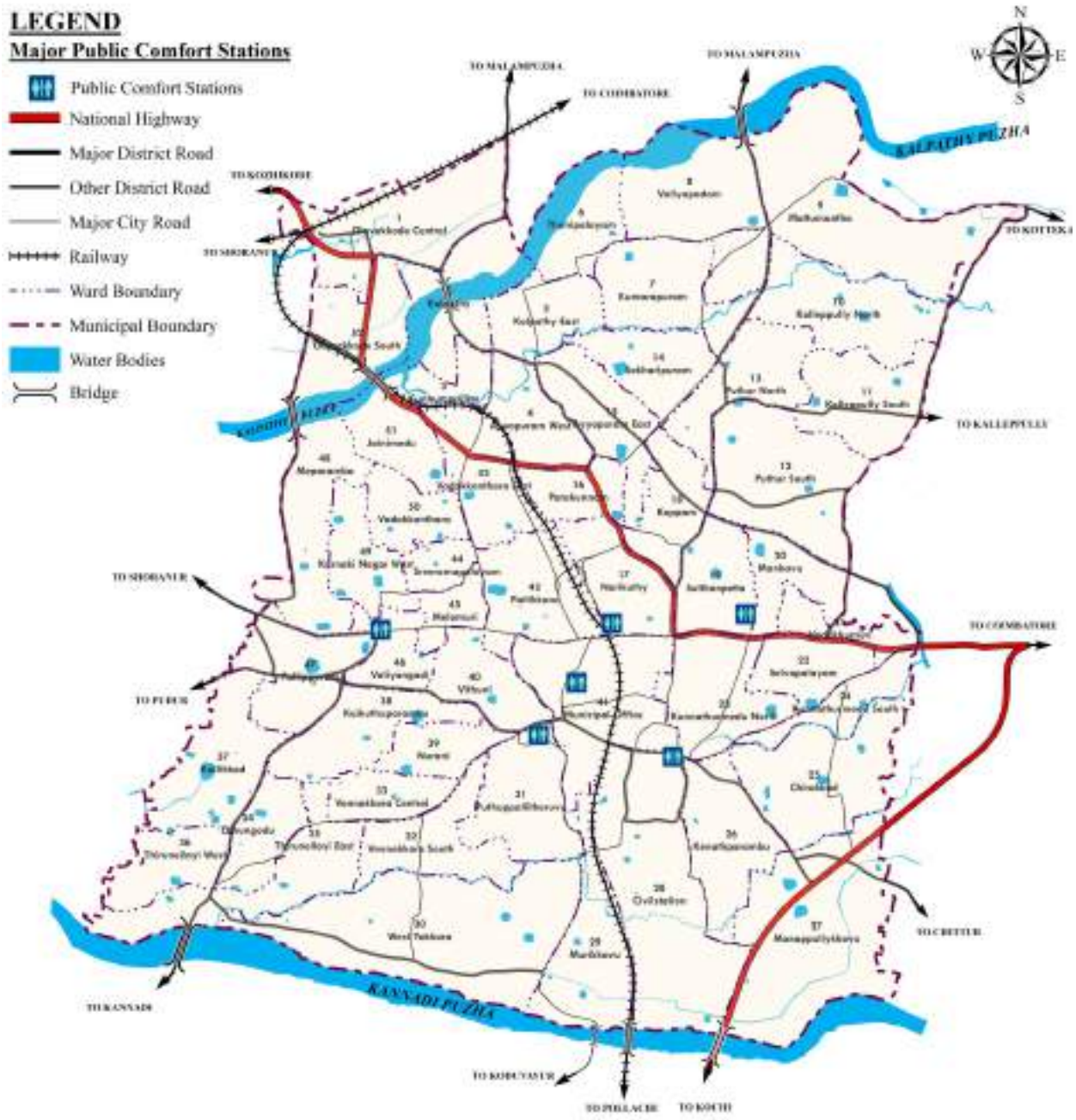


Fig. 16.5 Spatial distribution of comfort stations

16.1.7 Banking and Financial Institutions

There are 15 state banks, 32 other nationalised banks and 17 scheduled and commercial banks in the municipality. The details of banks and other financial institutions are given in table 16.8. The spatial distribution of financial institutions are shown in figure 16.6.

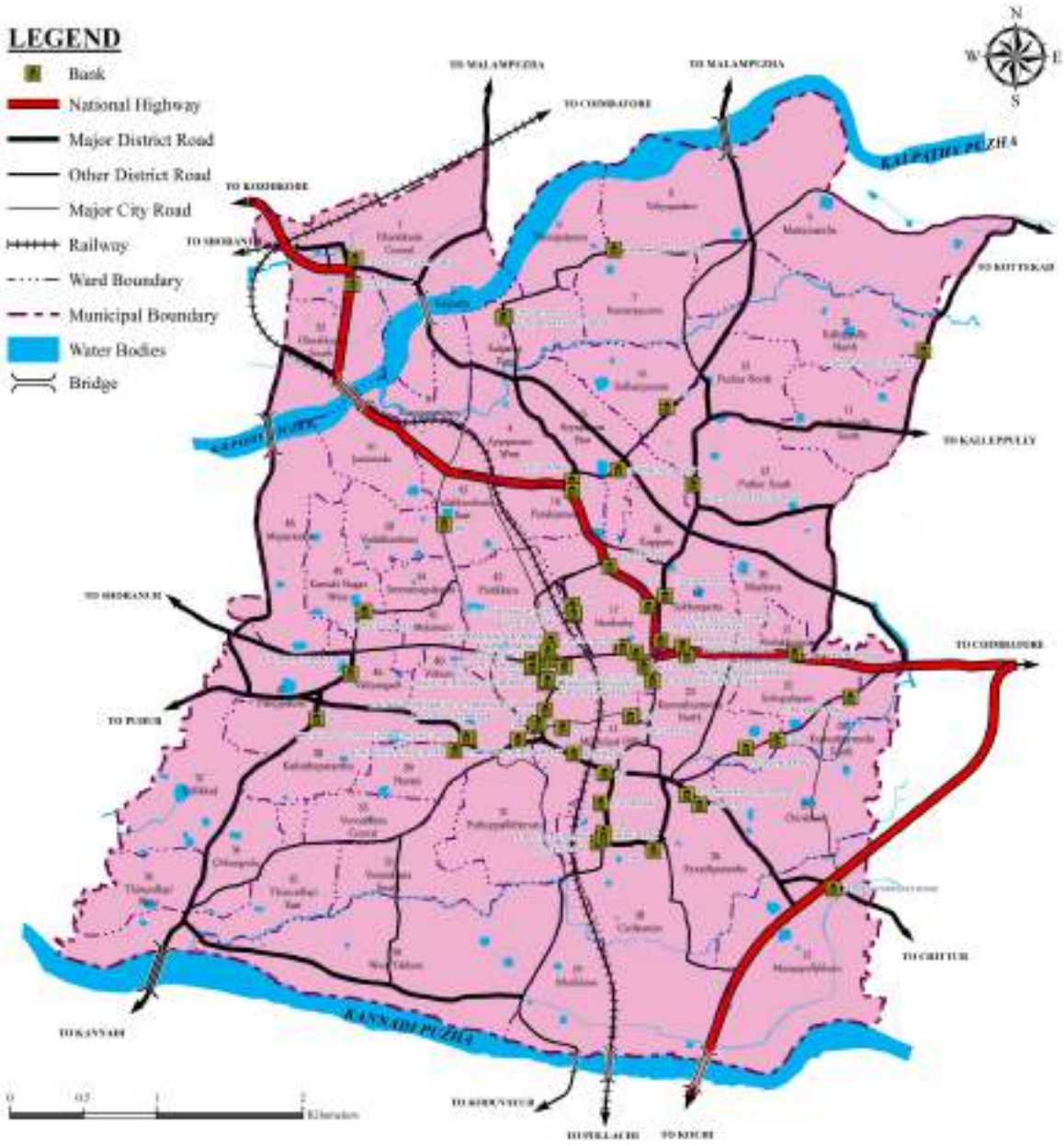


Fig. 16.6 Spatial distribution of financial institutions in Palakkad municipality

Table 16.8 Details of Financial Institutions in Palakkad Municipality

Sl.No.	Financial Institutions and Co-Operative Societies	Numbers
1	State bank of India and Associates	15
2	Nationalized Commercial Banks	32
3	Scheduled and Commercial Banks	17
4	Urban Co-Operative Banks	3
5	Urban Credit Society	1
6	Employees credit Co.op.Societies	48
7	Wholesale Consumer Stores	6

Table 16.8 Continued....

8	College Co-operative Society	1
9	School Co-operative Societies	17
10	Primary Co-operative Marketing Societies	2
11	Special Marketing Society	1
12	Labour Contract Co-Operative Society	1
13	Vanitha Co-Operative Societies	2
14	Autoriksha Co-op. society	1
15	Hospital Societies	2
16	Printing Co-operative Societies	1
17	Canteen societies	9
18	Educational Societies	1
19	Non Agricultural Co-Operative Societies	23

Source: Palakkad Municipality

16.2 INFERENCE

Since Palakkad Municipality is the headquarters of the district, most of the facilities are within the municipality to serve the people residing in the municipality and the floating population. There are 2 main police stations in the municipality, Palakkad South and Palakkad North police station. In addition to that crime branch, traffic control offices are also situated within the municipality. And there is one fire station in the municipality. For communication BSNL is the main service provider and 7 BSNL telephone exchanges are there and 18 post offices are there in the municipality. 19 petrol/diesel stations and 5 LPG gas godowns are there within the municipality.

There are totally 21 crematoriums and burial grounds in the municipality. There is one burial ground at Mattumantha owned by municipality. There is a private electric crematorium at Kalmandapam. And remaining crematoriums and burial grounds are associated with religious institutions. There are 6 public comfort stations in the municipality and is adequate in number.



CHAPTER 17- TRAFFIC AND TRANSPORTATION

17. TRAFFIC AND TRANSPORTATION

Transportation infrastructure development plays a vital part in the overall development of city by connecting the movement of people and goods within and around the city. In order to propose an efficient traffic and transportation plan that cater the needs of future population, the existing traffic network needs to be studied. National Transportation Planning and Research Centre (NATPAC) was entrusted to carry out Traffic and Transportation Studies for Palakkad town. The major findings of the study are briefed under here.

17.1 EXISITING SCENARIO

Palakkad is served by two dominant modes of transport viz. road and rail. Out of these, road network has a wide presence throughout the study area due to its penetration into every nook and corner of the town and suitability to all terrain conditions. In the case of rail network, it has a limited but dominating influence.

Palakkad is well connected to neighbouring cities and states by National Highway 966 and National Highway 544. There are 13 stretches of State Highways in the district with a total length of 251 km. The district has 171 major district roads having a length of 1,157 km connecting various interior parts within the district. In addition to the above, there are many primary roads connecting the interior parts of the district.

Palakkad district has good connectivity through rail network connecting important places in other States and within the State. There are two railway stations in Palakkad are Palakkad Town and Palakkad junction that connect it to neighboring cities/ towns.

17.2 VEHICLE POPULATION

An efficient traffic and transportation system plan have to satisfy the demands of growing vehicle population over the years. The vehicle registration details in Palakkad district from 2014 to 2018 is shown in Table 17.1. It can be observed that the number of vehicles being registered in an year in comparison to the previous year keeps on changing/ fluctuating, giving an annual average growth rate of below 2%.

Table 17.1 Vehicle registration in Palakkad district from 2014-18

Year	Number of vehicle registered
2014	17,256
2015	16,530
2016	17,666
2017	18,756
2018	18,304

Source : NATPAC Survey 2020

17.3 ROADS

17.3.1 Existing Road network

The road network within the study area can be vaguely classified into ring & radial with limited inter linkages. Four major roads of Palakkad town lead to major towns/ cities surrounding the town from four arm Sulthanpet junction located in the central part of the town. First is the Sulthanpet – Olavakkode – Kozhikode road in the northern direction passing through Victoria College, Kalpathy Junction, and Olavakkode Junction. The road has a length of 6.2 km within the town, with width ranging between 6.5m and 15.5 m.

Second is the road leading to Coimbatore on the eastern side which passes through Stadium, Kalmandapam and Koottupatha. The road has a length of 1.7 km within the town, with road width ranging between 8.0 m and 13.2 m. Third is Court road and Yakkara road which goes towards Thrissur on the south of the town via Palakkad fort. Total length of the road is 3.4km within the town and road width lies between 8.0 m and 8.2 m.

Fourth is the road to Ponnani in the western direction which is not directly connected from Sulthanpet junction as the road is intercepted by railway line from Palakkad junction towards Pollachi. However, connectivity to Ponnani is provided through Gandhi Bazar road, an ROB across the railway line to Sakunthala Junction; and Market road. Total length of the road through ROB and market area comes to 4 km and the road width ranges between 6.2 m and 8.1m.

NH 544 (Ernakulam – Salem National Highway) and NH 966 (Palakkad – Kozhikode National Highway pass through the outer area of the town providing direct connectivity to through vehicles. Chittoor road leads from IMA Junction, passes through Karinkarapully bypassing NH 544 and leads to Chittoor. The road has a length of 1.95 km with a road width of 7.75 km. Melamuri – Kottayi road leads from Melamuri on Ponnani road, passes through Pudur and Kottayi and joins Ponnani road at Mankara. This road runs parallel to Ponnani road with a length of hardly 1km within municipal limits.

Other major roads of the town are the Mepparamba - Kalmandapam road via KSRTC Junction which serves an inner ring for Palakkad town bypassing Sulthanpet Junction. The road with a length of 5km and width of 5.5m -8.4m passes through Mercy college Junction, KSRTC Junction, BEM Junction, SBI Junction, Palakkad Fort and IMA Junction.

The road to Malampuzha, major tourist Centre in the district, originates from Victoria college Junction and has a length of 2.85 km within the town limits. The carriageway width of the road ranges from 7.5m to 13.2m.

17.4 CHARACTERISTIC STUDIES OF TRANSPORTATION NETWORK

The study of existing traffic characteristics of a city is very important to understand the efficiency at which the system works and the general quality of service offered to road users. The transportation network characteristics are studied in detail by conducting traffic surveys. This include road inventory surveys, speed and delay survey, traffic volume study at outer cordons and important intersections, parking survey, pedestrian survey. For the purpose of presenting the traffic characteristics, major roads in the study area were divided into 20 homogeneous sections based on road and traffic characteristics as shown in Figure 17.1.

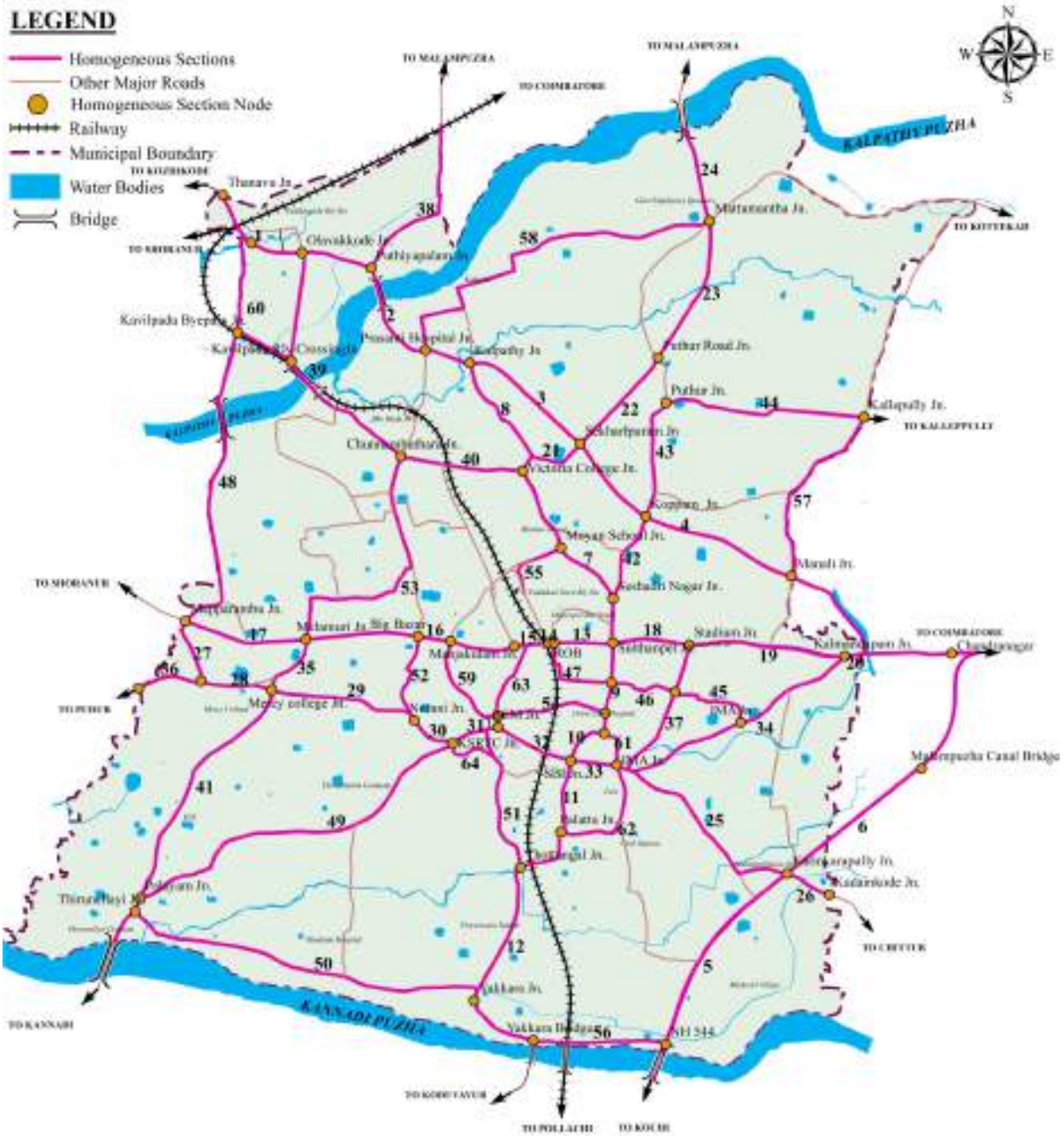


Fig.17.1 Homogeneous sections in Palakkad Town

Source : NATPAC Survey 2020

17.4.1 Road Inventory Details

Summarized road inventory profile of various homogeneous sections in Palakkad Municipality are given in Table 17.2 .They include information on length of road, width of carriageway, road furniture and land use aspects.

Table 17.2 Inventory of major roads in Palakkad Town

Sl. No.	Homogeneous section		Length (km)	Carriage way (m)			Shoulder LHS		Shoulder RHS		Footpath		Land use*	
				LHS	Median	RHS	Type	Width	Type	Width	LHS	RHS	LHS	RHS
	1. NH 966: Palakkad to Kozhikode Road													
1	Thanavu Junc-tion	Olavakkode Jn	0.8	7	-	7	UP	0.5	UP	0.5	1.5	0.5	c+pp	c+pp
2	Olavakkode	Kalpathy Jn	1.5	7	-	7	UP	0.45	UP	0.45	1.5	0.5	c+p	p
3	Kalpathy Jn	Sekharipuram Jn	1	6.9	0.25	7	UP	0.4	UP	0.4	1.5	0.5	c	PP
4	Sekharipuram Jn	Kalmandapam Jn	2.6	6.9	0.25	7	P	0.4	P	0.4	1.5	0.5	c+pp	c+r
	2. NH 544													
5	Bharathapu-zha bridge	Karinkarapully	1.6	7.5	3.5	7.5	P	1.5	P	1.5	1	1	c+r+p	c+r+e
6	Karinkarapully	Malampuzha kanal bridge	1.1	8	3.5	7.5	P	1.5	P	2	1	1	c+p+e	c+p
	3. College Road													
7	Sulthanpet	Victoria college Jn	1.6	7.5		-	P	4.3	P	2.5	1.5	0.5	c+p+e	c+p
8	Victoria col-lege Jn	Kalpathy Jn	0.9	8.1		-	P	2	P	1.5	-	-	c+r+p /g	c+r+p
	4. Court road and Yakkara road													
9	Sulthanpet	Anjuvilakku	0.6	8		-	P	1.5	P	2	1	1	c+p+e	c+p
10	Anjuvilakku	SBI Jn	0.3	8		-	P	2	P	2.5	1	1.5	c+p+p /g	c+p
11	SBI Jn	Palattu Jn	0.5	7.5		8	P	1.5	p	1	1	1	c+p+p /g	c
12	Palattu Jn	Yakkara Bridge	2	7.5			UP	1	UP	1	1	1	c+r+p	c+r+e
	5. Gandhi Bazar road													
13	Sulthan pet	Muncipal bus stand Jn	0.4	7.5							1	1	c+p+p p	c+p+p p
	6. Market road/Railway station road													
14	Municipal Bus stand Jn	ROB	0.6	6.2			P	1					c+p	c+e+p /g+pp
15	ROB	Sakunthala Jn	0.6	8.1			p	2	p	1.5			c+p+p /g	c+p
	7. Palakkad Ponnani road													
16	Sakunthala Jn	Melamuri Jn	1.5	7.50			up	1	up	1	1	1	c+p+p /g	c+p
17	Melamuri Jn	Mepparamba Jn	0.9	7.5			p	1.2	up	1			c+r+r el	c+r
	8. Coimbatore road													
18	Sulthanpet	Stadium Jn	0.6	4		4	p	1.5	p	1.5			c+p+e	c+p+e
19	Stadium Jn	Kalmandapam Jn	1	6	1	6.2	p	1					c+p	c+e+p /g+pp
20	Kalmandapam Jn	Chandra Nagar	0.15	6	1	6.2	p	1					c+p	c+e+p /g+pp
	9. Malampuzha 100 feet road													
21	Victoria Col-lege Jn	Sekharipuram Jn	0.35	8.2			p	1.4	p	1.5	1	1	c+p+p p	c+p+p p

Table 17.2 continued

Sl. No.	Homogeneous section		Length (km)	Carriage way (m)			Shoulder LHS		Shoulder RHS		Foot-path		Landuse*	
				LHS	Median	RHS	Type	Width	Type	Width	LHS	RHS	LHS	RHS
22	Sekharipuram Jn	Puthur road Jn	0.75	7.5			up	1	up	1	1	1	c	pp
23	Puthur road Jn	Mattumantha	1	6	1	6.2	p	1					c+p+e	c+p+e
24	Mattumantha	Mukkai Bridge	0.75	9.28			p	0.5	p	0.5			c+r+rel	c+r+rel
	10. Chittur road													
25	IMA Jn	Karinkarapully	1.3	8			p	1	p	1			c+r	c+r+p+rel+pp
26	Karinkarapully	Kadamkode	0.65	7.5			up	1	up	1	1	1	c+p+e	c+p+e
	11. Shoranur Road													
27	Mepparamba Jn	Mercy college (Kottayi Rd Jn)	0.5	7.5			UP	1	UP	1	1	1	c+r+rel	c+r
28	Mercy college (Kottayi Rd Jn)	Mercy College	0.5	6.5			p	0.5	p	0.5			c+r	c+r+p+rel
29	Mercy college	Noorani Jn	0.95	7		7	UP	0.5	up	0.5	1.5	0.5		
30	Noorani Jn	KSRTC Jn	0.35	8.40			P	1	P	1.5	1		c+p+e	c+e
31	KSRTC Jn	BEM Jn	0.3	7.5			P	0.5	P	0.5	1.2	1	r+rel	r+e+rel
	12. English church road													
32	BEM Jn	SBI Jn	0.5	6									c+r+rel	c+r+p+e+rel
33	SBI Jn	IMA Jn	0.35	5.5			UP	0.5	UP	0.5			c+rel	c
	13. IMA Jn to Kalmandapam													
34	IMA Jn	Kalmandapam Jn	1.6	8.2			P	0.5	P	0.5			c+r+p	c+r+p+rel
	14. Melamuri - Kottayi road													
35	Melamuri Jn	Mercy college	0.5	8.2			P	1.4	P	1.5	1	1	c+r+p+rel	c+r
36	Mercy college	Pirayiri	0.25	7.5	1	7.5	P	1	P	0.5	1.2	1.2	c	c
	15. Stadium Bypass													
37	Stadium	IMA Jn	0.9	7.5	1	7.5	P	0.5	P	0.5	1.2	1.2	c	c
	16. Malampuzha Road													
38	Soorya Jn	Railway gate	1.2	7.5			P	0.5	P	0.5			c+r+e+ rel	c+r+p/g+ rel
	17. Olavakode to Chunnamputhara													
39	Olavakode Jn	Chunnamputhara Jn	1.7	8.4			P	0.5	P	0.5			c+r+rel	c+r+p+rel
40	Chunnamputha-ra Jn	Victoria College Jn	0.8	8.4			P	0.5	P	0.5			c+r+rel	c+r+p+rel
	18. Mercy College to Thirunellayi Bride													
41	Mercy college	Thirunellayi bridge	2.3	7.5			UP	0.5	UP	0.75			c+r+rel	r+e+rel
	19. Puthur Road													
42	Sheshadri Nagar Jn	Koppam Jn	0.55	9			P	1	P	1			c+p+e+pp	c+p+e
43	Koppam Jn	Puthur Jn	0.8	6.5			UP	1	UP	0.5	1	1	r+e+rel	c+r+p/g
44	Puthur Jn	Kallepully Jn	1.3	7			P	2	P	2			r+p+e	c+r+pp
	20. Kalmandapam Road to Stadium Road to Gandhi Bazar Road													
45	Stadium bypass Road	Coimbatore Road	0.55	4.5			UP	1	UP	1			c+r	r+p

Table 17.2 continued

Sl. No.	Homogeneous section		Length (km)	Carriage way (m)			Shoulder LHS		Shoulder RHS		Footpath		Landuse*	
				LHS	Median	RHS	Type	Width	Type	Width	LHS	RHS	LHS	RHS
46	Stadium Road	Court Road	0.45	6									c+r+rel	c+r+p+ e+rel
47	Court Road	Bombay Dying near Municipal Bus stand	0.6	5.5			UP	0.5	UP	0.5			c+rel	c
	21. Other roads													
48	Mepparamba	Kavilpadu (Bypass Road)	2.9	7.5			P	0.5	P	0.5	1	1	c+r	r
49	KSRTC Jn	Thirunellayi Bridge (Puthupally Theruvu)	2.6	7.2			p	0.4	p	0.5			c+r+p + pp	c+r+p+e + rel
50	West Yakkara	Thankam Hospital	2.5	7			p	0.3	p	0.25			r+rel	c+r
51	BEM Jn	Thottunkal Jn (DPO Road)	1	8			p	0.5	p	0.5	1	1	c+r+p	c+r+p+e
52	Noorani	Vadakkanthara Street	0.5	4.8									c+r+rel	c+r
53	Vadakkanthara road		2.3	5			UP	1	UP	1			c+r	c+r
54	Mission School	District Hospital	0.8	8.12			UP	0.8	UP	0.5			c+p+e	c+p+e
55	Moyan school	Town Railway sta-tion	0.5	7.5			P	0.5	P	0.5			c+r+e	c+r+e
56	Yakkara Bridge	NH 544	0.85	3.5			UP	0.2	UP	0.2			r	r
57	Manali Jn	Kalleppally Jn	2.2	5.5			UP	1	UP	1			c+p/ g+ pp	c+e
58	Kalpathy Prasanti Hospital	Mattumanda Jn	2.6	5.5			UP	1	UP	1			c+r+rel +pp	r+p+p/g
59	Mission School	Manjakulam Jn	0.8	7.5			UP	1	UP	1.5			c+e+re l	c+r
60	Kavilpadu bypass railway crossing	Thanavu Jn(via underpass)	2	4			UP	0.5	UP	0.5			r	r
61	Anjuvilakku Jn	IMA Jn	0.22											
62	IMA	Palattu Jn	0.75	10			P	1.5	P	1.5	1.5	1.5	c+p	p+p/g
63	BEM	Sakunthala Jn	0.6	9.5			P	1	P	1	1	1.5	c+p+e + pp	c+p+e
64	KSRTC Link road		0.3											
	Total		**65.12**											
	c - Commercial r - Residential p - Public e - Educational p/g - Park/Ground rel - Religious Places pp - Petrol Pump													

Source: NATPAC survey 2020

17.4.2 Speed and Delay Characteristics

Speed of vehicles on the city roads reflect the level of congestion. Speed and delay characteristics on major roads in Palakkad study area is given in Table 17.3.

The average speed of vehicles on the roads in Palakkad town was 26 kmph which reflects poor service level of roads. Travel speed was found to be extremely low at 16 kmph on the road connecting Mepparamba and Kalmandapam through Market Road, GB road and Coimbatore road.

Table 17.3 Speed and delay characteristics of major roads in Palakkad Town

Sl. No	Name of the Road	From Node	To Node	Delay (hh:mm:ss)	Avg. journey time (hh:mm:ss)	Delay (hh:mm:ss)	Journey speed (kmph)	Running speed (kmph)	Cause of delay
1	NH 966	Kalmandapam Jn	Thanavu Jn	5.8	0:10:36	0:00:44	32.83	35.27	Pothole, Traffic signal, Conflicting movements
2	College road	Sulthanpet	Kalpathy	2.3	0:05:54	0:01:05	23.39	28.65	Parking, Conflicting movements
3	Yakkara road	Sulthanpet Jn	Yakkara bridge	3.8	0:07:28	0:00:15	30.54	31.59	Parking, Conflicting movements
4	Coimbatore road/GB road/ market road	Kalmandapam Jn	Mepparamba Jn	5.88	0:21:28	0:05:25	16.43	21.98	Parking, Market activities, and Conflicting movements
5	Malampuzha 100'' road	Victoria College Jn	Mukkai Bridge	3.00	0:06:09	0:00:24	29.27	31.30	Pothole, Conflicting movements, Pedestrian movements
6	Chitoor Road	IMA Jn	Municipal Boundary	2.00	0:03:24	0;00:09	35.29	36.92	Conflicting movements
7	Shoranur Road	SBI Jn	Mercy college Jn	2.20	0:05:40	0:00:26	23.29	25.22	Conflicting movements
8	IMA Jn - Kalmandapam road	IMA Jn	Kalmandapam Jn	1.60	0:02:38	0:00:00	36.46	36.46	
9	Stadium Bypass road	IMA Jn	Stadium Jn	0.95	0:01:45	0:00:00	32.57	32.57	
10	Chunnamputharaaroad	Olavakode Jn	Victoria College Jn	2.60	0:07:55	0:01:42	19.71	25.09	Traffic signal, Conflicting movements
11	Mercy college Jn to Thirunellayi bridge	Mercy college Jn	Thirunellayi bridge	2.10	0:03:25	0:00:02	36.88	37.24	Parking
12	Puthupalli theruvu Jn to Thirunellayi Jn	Puthupalli Theruvu Jn	Thirunellayi Jn	2.50	0:03:52	0:00:00	38.79	38.79	
			Total	**34.73**	**1:20:13**	**0:10:11**	**25.98**	**29.75**	

Source: NATPAC survey 2020

Chunnambuthara road from Victoria college to Olavakkode has travel speed of 19 kmph caused by traffic signals at intersections. Other roads which recorded relatively low travel speed (23kmph) were College road connecting Sulthanpet Junction with Kalpathy via Victoria College and Shoranur road from Mercy College Junction to SBI Junction. All other roads in the town have travel speed above average value of 26kmph. About 13% of the total journey time was found to be lost in delays. Prominent causes of delays were conflicting movements of traffic at intersections, parking activities, traffic signals etc.

17.4.3 Traffic Volume

17.4.3.1 Link Volume

Data pertaining to traffic volume and its composition was collected for all major roads through link volume survey. Maximum peak hour volume in the range of 1,700-4,600 PCU was observed on NH 966 between Kalmandapam and Olavakkode junction within Palakkad Town. Other major road of Palakkad town namely Coimbatore road

had traffic volume between 2,900-5,200 PCU, followed by College road between Sulthanpet and Kalpathy Junction in the range of 1,800 to 2,700 PCU and Palakkad – Thrissur road via Palakkad fort and Yakkara with traffic volume of 1,800-2,600 PCU.

Ponnani road, Shoranur road and Chittoor road were the other major road witnessing traffic in excess of 1,200 PCU. Considerable traffic volume was observed on road stretches connecting IMA Junction with stadium bus stand, IMA Junction with Kalmandapam, Victoria college with Olavakkode and Malampuzha road.

17.4.3.2 Capacity Utilization

Capacity utilization of the road stretches was measured by volume-to-capacity ratio. It is the ratio of volume of traffic plying on the road stretch to the capacity of the road stretch. The volume capacity ratio of major road stretches within study area is given in Table 17.4. It can be seen that most of the road stretches are over-utilized to the extent of more than 200% of their carrying capacity. Over-utilized roads of Palakkad town are marked in Figure 17.2.



Figure 17.2 Over utilized roads of Palakkad Town

Table 17.4 Capacity utilization of major over utilized road stretches in Palakkad Town

Sl No.	Road Stretch	Design Service Volume (PCU/ hour)	Volume (PCU/hour)	VC ratio
	NH 966(Palakkad-Kozhikode)			
1	Thanavu Junction to Olavakkode Jn	1,500	4,514	2.11
2	Olavakkode Jn to Kalpathy Jn	1,500	3,378	1.58
3	Kalpathy Jn to Sekharipuram Jn	3,600	1796	0.35
4	Sekharipuram Jn to Kalmandapam Jn	3600	2190	0.43
	College Rd (Sulthanpet Jn to Kalpathy Jn)			
5	Sulthanpet Jn to Victoria College Jn	1,500	2,668	1.24
6	Victoria college Jn to Kalpathy Jn	1,500	1823	0.85
	Court Rd & Yakkara Rd (Sulthanpet to Yakkara)			
7	Sulthanpet to Anjuvilakku	1,500	1850	0.86
8	Anjuvilakku to SBI Jn	1,500	3,662	1.71
9	SBI Jn to Palattu Jn	1,500	2,903	1.35
10	Palattu Jn to Yakkara Bridge	1,500	2,161	1.01
	Gandhi Bazar Rd			
11	Sultanpet Jn to Municipal Bus stand Jn	900	729	0.57
	Market Road			
12	Municipal Bus stand Jn to ROB	900	1,826	1.42
13	ROB to Sakunthala Jn	900	2,589	2.01
	Ponnani Rd			
14	Sakunthala Jn to Melamuri Jn	900	649	0.5
15	Melamuri Jn – Mepparamba Jn	1,500	2,344	1.09
	Coimbatore Rd			
16	Sulthanpet Jn to Stadium Jn	1,500	2,973	1.39
17	Stadium Jn to Kalmandapam Jn	3,600	2,909	0.57
18	Kalmandapam Jn to Chandra Nagar	3,600	5,193	1.01
	Malampuzha 100 feet Road			
19	Victoria college Jn to Sekharipuram Jn	1,200	876	0.51
20	Sekharipuram Jn to Puthur Rd Jn	1,200	1,258	0.73
21	Puthur Rd Jn to Mattumantha	1,200	1,258	0.73
22	Mattumantha - Mukkai Bridge (Municipal Border)	1,200	1,258	0.73
	Chittoor Rd			
23	IMA Jn to Karinkarapully	1,500	2,973	1.39
24	Karinkarapully to Kadamkode (Municipal border)	1,500	1,588	0.74
	Shoranur Road			
25	Mepparamba Jn - Mercy college (Kottayi Rd Jn)	1,200	1,151	0.67
26	Mercy College (Kottayi Rd Jn) to Mercy College	2,400	1,535	0.45
27	Mercy College to Noorani Jn	1,200	2,453	1.43
28	Noorani Jn to KSRTC Jn	1,200	2,138	1.25

Sl. No.	Road Stretch	Design Service Volume (PCU/ hour)	Volume (PCU/ hour)	VC ratio
29	KSRTC to BEM Jn	1,200	2440	1.42
	English church road			
30	BEM Jn to SBI Jn	1,200	3,804	2.22
31	SBI Jn to IMA Jn	1,200	3,243	1.89
	IMA to Kalmandapam			
32	IMA Jn to Kalmandapam Jn	1,200	2,190	1.28
	Kottayi Rd			
33	Melamuri Jn to Mercy College	1,200	2,523	1.47
34	Mercy College to Pirayiri	1,200	1,749	1.02
	Stadium Bypass			
35	Stadium to IMA Jn	2,900	1,781	0.43
	Puthiyapalam-Malampuzha Road			
36	Puthiyapalam Surya Jn to Railway gate (Municipal bor-der)	1,200	652	0.38
	Olavakkode To Chunnamputhara			
37	Olavakkode Jn to Chunnamputhara Jn	900	4,428	3.44
38	Chunnamputhara Jn to Victoria College Jn	900	959	0.75
	Mercy college to Thirunellayi Bridge			
39	Mercy College to Thirunellayi bridge	1,200	1,794	1.05
	Puthur Road			
40	Sheshadri Nagar to koppam Jn	900	787	0.61
41	Koppam Jn to Puthur Jn	900	1,080	0.84
42	Puthur Jn to Kallepully Jn (Municipal Border)	900	989	0.77
	Stadium Road to Gandhi bazar Road			
43	Stadium Bypass Rd to Coimbatore Rd (Vivekananda Col-	900	162	0.13
44	Stadium Road to court Road	900	736	0.57
	Other Roads			
45	KSRTC JN to Thirunellayi Bridge	900	2,226	1.73
46	BEM Jn to Thottumukal Jn (DPO Rd)	900	2,307	1.79
47	Noorani to Vadakumthara street (Erumakkara street)	900	404	0.31
48	Vadakkanthara road	900	1,735	1.35
49	Mission school –District hospital	900	2,383	1.85
50	Moyan school to Town railway station via over bridge	900	1,835	1.43
51	Mission school to Manjakulam	900	1,475	1.15
52	Anjuvilakku Jn to IMA	1,900	1,505	0.55
53	IMA Jn to Palattu Jn (S Fort Road)	900	156	0.12
54	KSRTC link road	900	2,147	0.52

Source: NATPAC survey 2020

17.4.3.3 Traffic Volume at Major Intersections

Turning movement of vehicles was observed at 17 major locations in the Palakkad Town as shown in Figure 17.3. Among these 17 Junctions, Olavakkode junction handled the highest peak hour traffic volume with more than 7,000 PCU of vehicles followed by English Church Jn with 6,800 PCU, and Kalmandapam and Sulthanpet junction with 4,000 PCU each.

Moyan school Junction, Melamuri Junction, BEM Junction, KSRTC Junction and Koppam Junction handled traffic volume in the range of 3,000 - 4,000 PCU. Shekharipuram Junction, Stadium Junction, Kalpathy Junction, Sheshadri Nagar Junction and Victoria college Junction handled traffic volume in the range of 2,000 - 3,000 PCU. Thirunellayi Junction handled the lowest peak hour traffic volume of 1100 PCU.

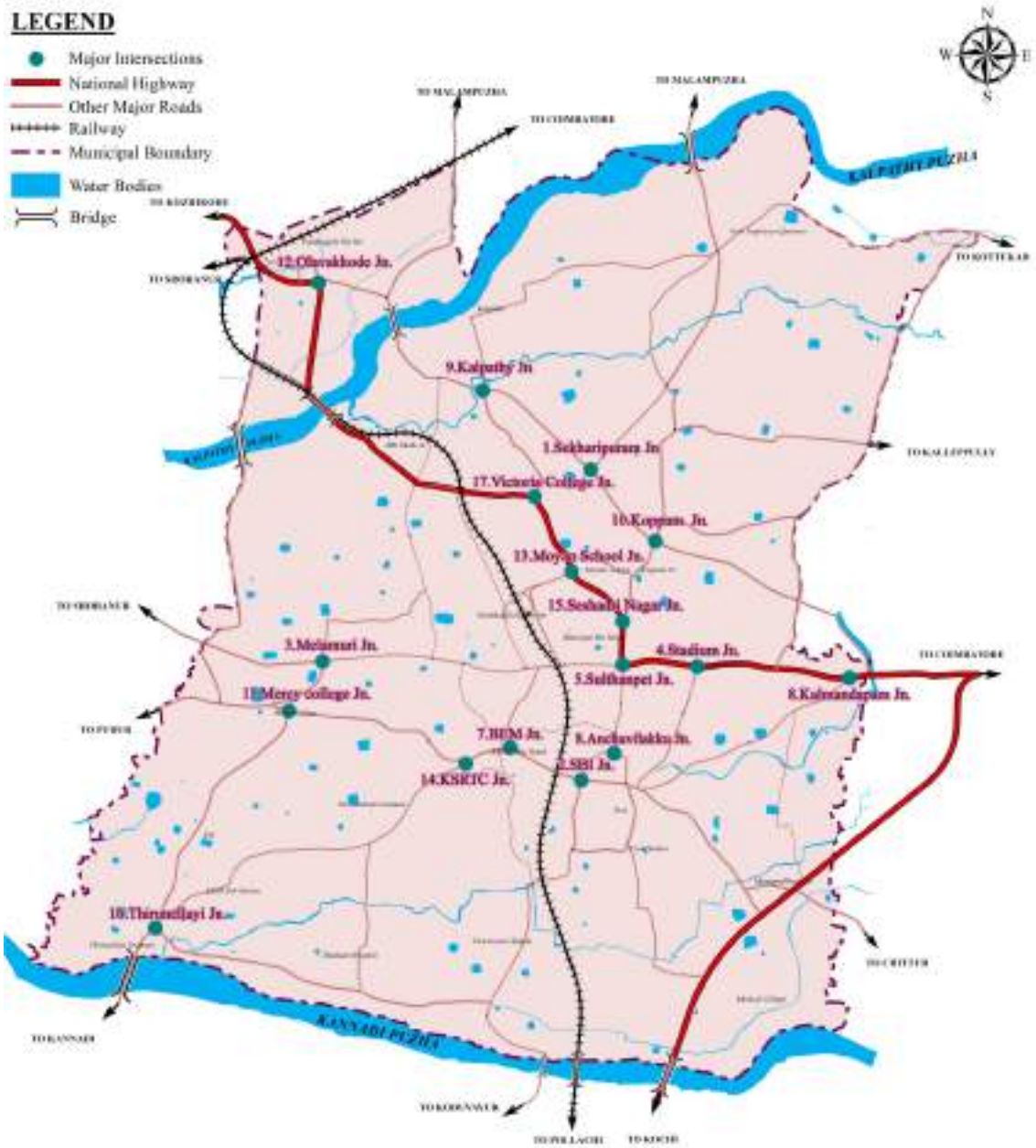


Fig 17.3 Intersections selected for the study in Palakkad Town

17.4.3.4 Traffic Volume at Outer Cordon Points on Roads

Traffic volume survey of all the vehicles entering/exiting the study region was conducted at seven outer cordon points of the study region. Classified volume of vehicles was recorded according to their direction of travel. Distribution of vehicles passing through the outer cordon points in Palakkad town are conceptually shown in Figure 17.4.

The maximum daily traffic volume of 52,000 PCU was observed at Chandra Nagar on Palakkad – Coimbatore road. Two wheelers constituted the maximum, followed by cars. There were approximately 27,000 PCU observed at Poochira survey location on Palakkad – Kozhikode NH 966, closely followed by almost same number of PCUs at Yakkara on Palakkad – Thrissur road. A total of about 25,000 PCU of vehicles passed through Kallekkad on Palakkad – Ponnani road, 21,000 PCU through Pirayiri on Palakkad – Kottayi road and 16,000 PCU on Kadamkode on Palakkad – Chittoor road. The least traffic volume among the outer cordon points was observed at Thirunellayi with 12,000 PCUs.

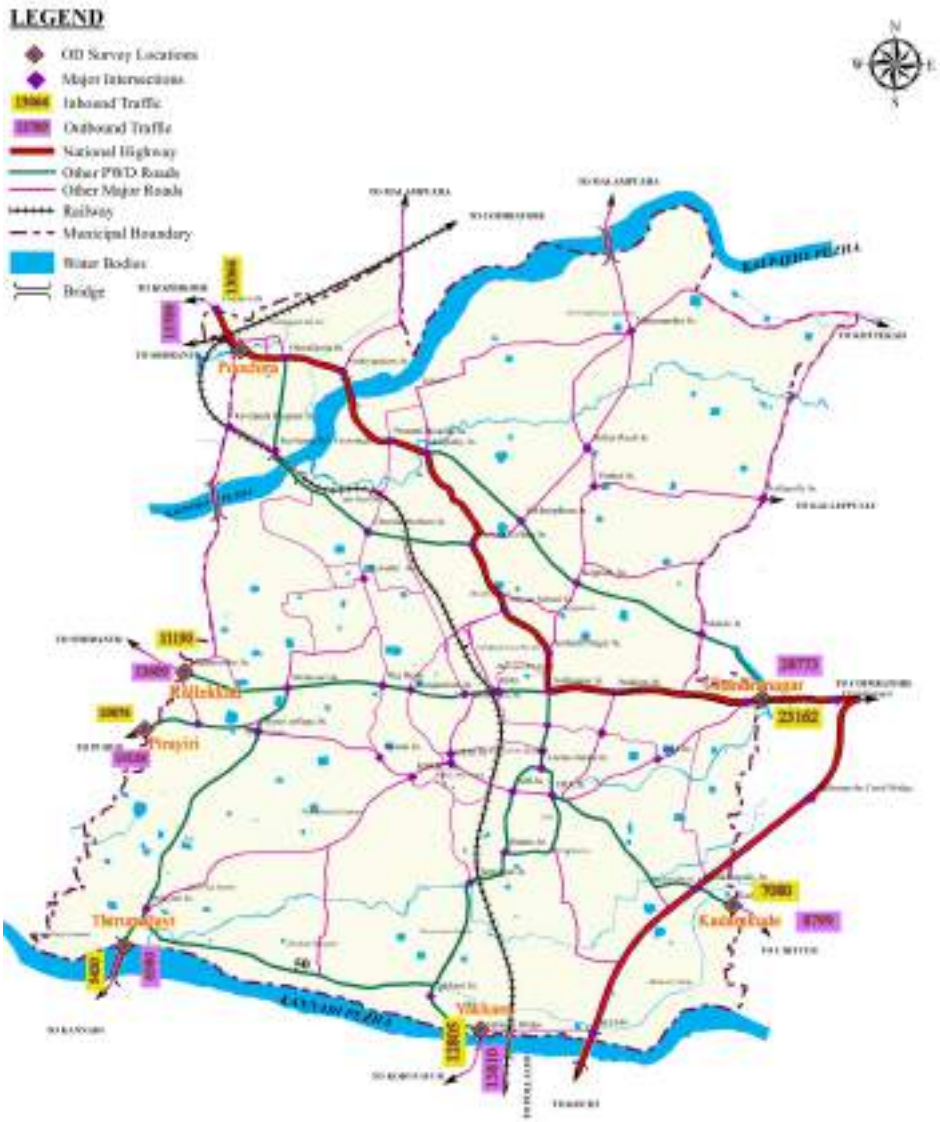


Figure 17.4 Inbound and outbound vehicular traffic through outer cordon locations

17.4.4 Parking Characteristics

Parking surveys were carried out on 3.5km of major road sections of Palakkad study area to obtain the peak parking demand and parking duration of various categories of vehicles on these road sections .

17.4.4.1 Parking accumulation

Table 17.5 and figure 17.5 shows parking accumulation of vehicles in major roads in Palakkad town. About 1,500 vehicles were found parked on these roads at a point of time during peak hours, most of them (1,160) were two wheelers. Highest incidence of parking was noticed on Gandhi Bazaar (167 vehicles), followed by Coimbatore road around the Stadium with 164 vehicles, Market road with 142 vehicles, Shoranur road near KSRTC (135) and Olavakkode railway station back entry (128).

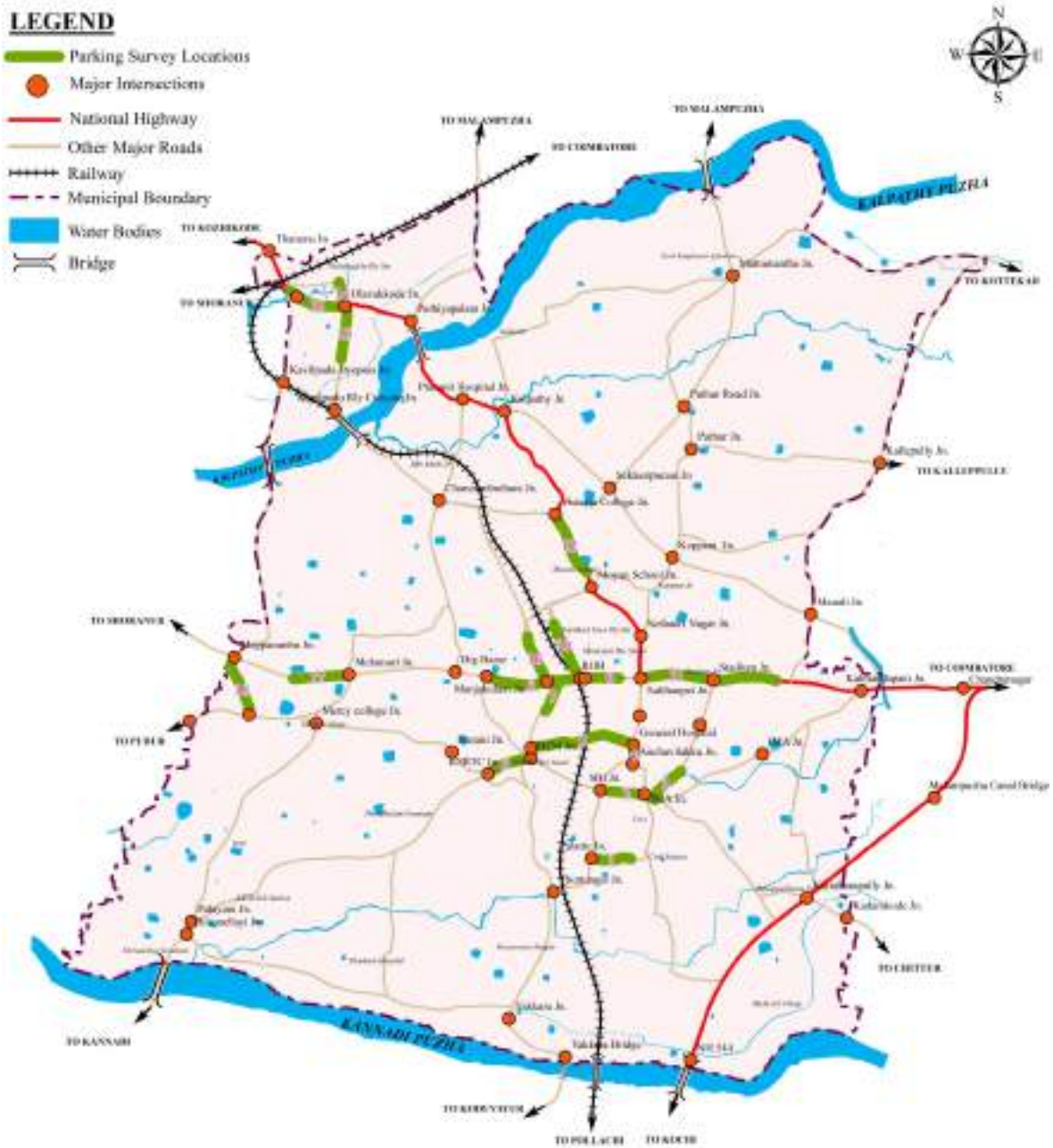


Fig 17.5 Parking locations selected for the study in Palakkad Town

17.5. Parking accumulation of vehicles in major roads in Palakkad town

Sl. No	Name of road/ stretch	Length (m)	Bus	Mini Bus	Car	Pass. Auto	Two wheeler	Truck	LCV	Goods auto	Total (No.)	Total ECS (No.)	Parking density (ECS/km)
1	S Fort Road from Palat Hospital to Civil station - Adhara Ezhuthu Office	350	-	-	23	3	21	1	2	4	54	39.65	113
2	SBI Jn - IMA Jn Road from Palakkad Fort Front Gate to IMA Jn - Ghani Honda	100	-	-	28	4	27	-	-	-	59	37.40	374
3	East Fort - Kalmandapam Road from East Fort Jn (South Indian Bank) to Palakkad Town South Police Station	100	-	-	16	6	75	-	-	-	97	37.00	370
4	Court Road from Robinson Rd Jn to Anchuvilakku Jn	100	-	-	14	15	42	-	-	-	71	37.40	374
5	Robinson Road from District Hospital to Surya Residency	100	-	-	20	4	71	-	1	1	97	40.80	408
6	Shornur Road Near KSRTC from KSRTC front gate to Mission school	400	-	-	4	5	126	-	-	-	135	34.20	86
7	Town Bus Stand Road from Yashoram Fashion Jewellers to Josco jewellery	150	-	-	2	-	30	-	-	-	32	8.00	53
8	Market Road Near Kannaki Amman temple from Town Bus stand side to melamuri side	200	-	-	3	26	84	-	-	29	142	74.80	374
9	Gandhi Bazar Road from Sulthanpet side - Palace Lodge to Railway line	300	-	-	1	4	160	-	-	2	167	39.00	130
10	Town Railway Station road from Rly foot overbridge to Kalyan Silks	250	-	-	7	16	34	-	-	-	57	29.80	119
11	Coimbatore road near Stadium Bus stand from Sulthanpet side - Al Ameen Bakery to Kalmandapam side - Malabar restaurant	300	12	1	21	12	115	-	1	2	164	88.20	294
12	College road near Victoria College from Sulthanpet Side - Indian Bank to Indoor Stadium	200	-	-	14	9	72	-	-	-	95	37.40	187
13	Olavakkode - Chunnambuthara road from Olavakkode Jn to Chunnambuthara MES School	150	-	-	5	2	23	-	-	3	33	14.60	97
14	Olavakkode railway station front entry from Olavakkode Jn to Palakkad Railway station Main Entry	200	-	1	1	12	68	-	-	1	83	29.20	146
15	Kozhikode - Palakkaad Highway from North of Olavakkode Jn - KR Bakers to South of Olavakkode - Church	150	-	2	1	6	36	-	-	6	51	23.40	156
16	Olavakkode railway station back entry from Palakkad Railway Station Back to Railway colony	100	-	-	2	10	116	-	-	-	128	35.20	352
17	Palakkad – Ponnani road (near Mepparamba) from Ponnani side - SML Finance to Melamuri Side - Classic Pipe fitting	250	-	-	5	5	49	-	1	2	62	23.40	94
18	Mercy College to Mepparamba from Famous bakery to Mishal arcade	100	-	-	9	1	13	-	-	2	25	14.60	146
	Total	**3,500**	**12**	**4**	**176**	**40**	**1,162**		**5**	**52**	**1,552**	**644**	**184**

Source: NATPAC survey 2020

17.4.4.2 Duration of Parking

Majority of the vehicles (75%) parked on most of the corridors were found to be for short duration of less than 30 minutes. 12 per cent of these vehicles were parked for a period ranging between 30 minutes and one hour and 5% for a duration of 60-90 minutes. Vehicles parked for long duration of more than 90 minutes constituted only eight per cent of the total vehicles. Table 17.6 shows the parking duration details at these locations.

Table 17.6 Parking duration of vehicles at parking locations in Palakkad Town

No.	Type of vehicle	<30	30-60	60-90	90-120	120-150	150-180	>180	Total
1	Bus	18	2	1	-	-	-	-	**21**
2	Mini Bus	20	1	1	-	-	1	-	**23**
3	Car	518	63	33	15	5	4	4	**642**
4	Pass auto	491	45	15	2	3	1	-	**557**
5	Two wheeler	2,183	426	170	118	77	58	70	**3,102**
6	Truck	8	-	-	-	-	-	-	**8**
7	LCV	18	1	1	-	-	-	-	**20**
8	Goods auto	92	9	-	-	-	-	-	**101**
	Total	**3,348**	**547**	**221**	**135**	**85**	**64**	**74**	**4,474**
	Percent	**74.83**	**12.23**	**4.94**	**3.02**	**1.90**	**1.43**	**1.65**	**100.00**

Source : NATPAC Survey 2020

17.4.5 Pedestrian Characteristics

Pedestrian surveys were conducted at major locations where the pedestrians cross and lateral movements were found to be high. Figure 17.6 shows the locations selected for pedestrian survey.

Table 17.7 Peak hour pedestrian Cross movements in Palakkad Town

Sl. No.	Name of Locations	No. of pedestri-ans
1	Olavakkode Signal Jn across NH	352
2	Victoria College Jn across College Rd	496
3	Sultanpet Jn across College Rd	349
4	Stadium Jn across Coimbatore Rd	527
5	Court road across Gen Hosp Front	377
6	KSRTC Bus station across Shoranur Rd	373
7	Melamuri Jn across Palakkad – Ponnani Rd	329
8	Town bus stand Rd across Town Bus station	396

Source : NATPAC Survey 2020

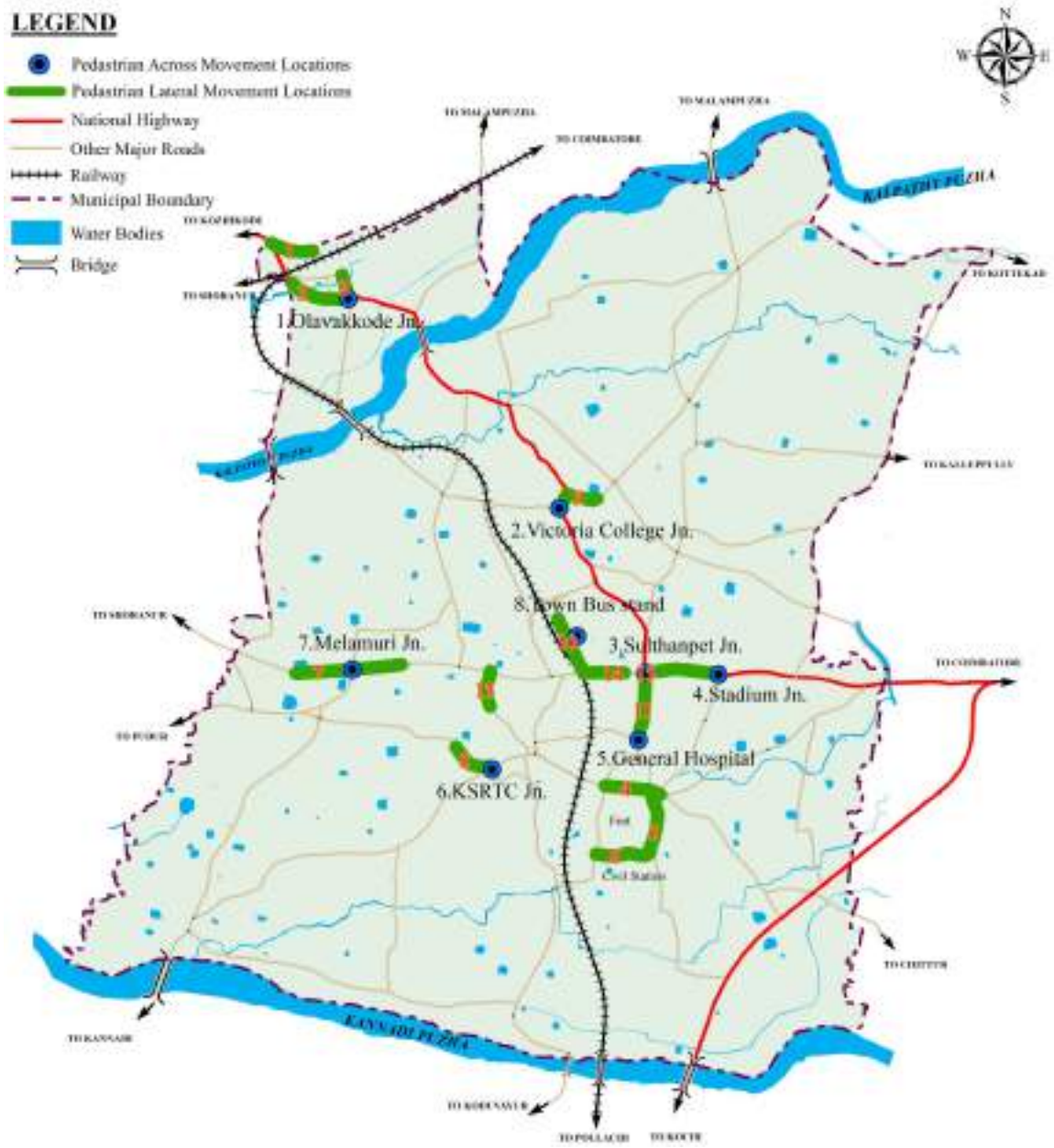


Fig 17.6 Pedestrian locations selected for the study in Palakkad town

17.4.5.1 Cross Movements

It was found that Coimbatore road across stadium junction with 527 movements had the highest pedestrian activity in Palakkad town, followed by 496 across college road at Victoria college junction, 396 across Town bus stand road, 377 across Court road in front of General hospital, 373 across KSRTC bus station across Shoranur road, 352 across Olavakkode signal junction, 349 across college road at Sulthanpet junction and 329 at Melamuri junction across Palakkad-Ponnani road. Table 17.7 shows the Peak hour pedestrian cross movements in Palakkad town .

17.4.5.2 Lateral movements

Table 17.8 shows the Peak hour pedestrian lateral movements in Palakkad town . Palakkad Fort area along IMA to English church road showed the highest number of lateral pedestrian movement.

Table 17.8 Peak hour pedestrian lateral movements in Palakkad Town

Sl. No.	Type of vehicle	Total
1	Olavakode Railway station along Backside entry	581
2	Olavakode Railway station along Front entry	975
3	Olavakode signal Jn along Kozhikkode-Palakkad NH	376
4	Palakkad Fort area along IMA to English Church road	1,271
5	S Fort road along civil station to Maidanam	326
6	S Fort Road along Civil station Front	709
7	Melamuri Jn along Civil station Front	112
8	Front side of KSRTC bus stand along Shoranur road	320
9	College road along Chinmaya to stadium	570
10	Municipal Bus station along Town Railway station Road	574
11	Court road along GH-Sulthanpet	431
12	Market road	84
13	Market road – Pattikkara	118
14	Gandhi Bazar Road along Municipal stand to sulthanpet	787
15	Stadium Jn along Coimbatore road	741
16	Town stand road	493

Source : NATPAC Survey 2020

17.5 PUBLIC TRANSPORT OPERATIONS-BUS

17.5.1 Bus Terminals

The study area is served by public transport system consisting of KSRTC buses and private buses. The inter-city services are provided by KSRTC buses operating from the KSRTC bus station located near BEM Jn. Private buses are operated from three bus stands namely Municipal bus stand located near the Town Railway Station, Town stand near Shakuntala Junction and Stadium stand on Coimbatore road near Indira Gandhi Municipal stadium.

17.5.2 Routes and Number of Trips Operated

About 1,200 buses are operated to different destinations within and outside the State, of which 750 are private buses, 320 are KSRTC buses and 75 Tamil Nadu buses. Bus transport routes and terminals in Palakkad town are marked in Figure 17.7.

Out of 404 trips operated from KSRTC terminal, 134 trips are operated to Coimbatore, 52 to Thrissur, 46 to Kozhikode, 31 to Pollachi, 22 to Guruvayoor, 15 to Thiruvananthapuram and 11 to Mannarkkad. From Municipal Bus station, out of 251 trips, 73 trips are operated to Cherpulasserry, 47 to Tholanur, 20 to Pathiripala, 17 each to Kinavalloor and Kuthanur, 14 to Kambavallikode and 12 to Kongad.

From Town bus station, out of 594 trips, 95 trips are operated to Malampuzha, 76 to Railway colony, 75 to Guruvayoor, 38 to Kottekad, 36 to Pattambi, 24 to Dhonni and 23 to Kinavalloor. From Stadium bus station, out of 1,505 trips, 133 trips are operated to Kozhinjampara, 107 to Thrissur, 99 to Nemmara, 92 to Walayar, 80 to Railway colony, 63 to Malampuzha, 61 to Peringottukkurissi, 56 to Chittoor, 50 to Meenakshipuram, 46 to Tholanur and 44 to Kollengode.

17.5.3 Access and Egress of Buses at Bus Terminals

A count of buses entering/ exiting the four bus stations in Palakkad were made during normal working days between 0700hrs and 2000hrs and it was observed that about 3,300 entries and exits were made out of Stadium Bus station, followed by 1,350 at Town Bus Station, 874 at KSRTC Bus Station and 550 at Municipal Bus station.

17.5.4 Extent of Bus Passengers on Major Roads

The major bus transport corridors in Palakkad Town with bus passengers more than 3,000 are; Thanavu Junction to Kalpathy (Palakkad – Kozhikode road), College road from Sulthanpet Junction to Kalpathy Junction, Anjuvilakku Junction to Yakkara Junction (Palakkad – Thrissur road), Coimbatore road from Sulthanpet Junction to Chandra Nagar, Shoranur road between Mercy College Junction and BEM Junction, and BEM Junction to IMA Junction. All other public transport routes had patronage lying below 3,000 passengers during peak hour.

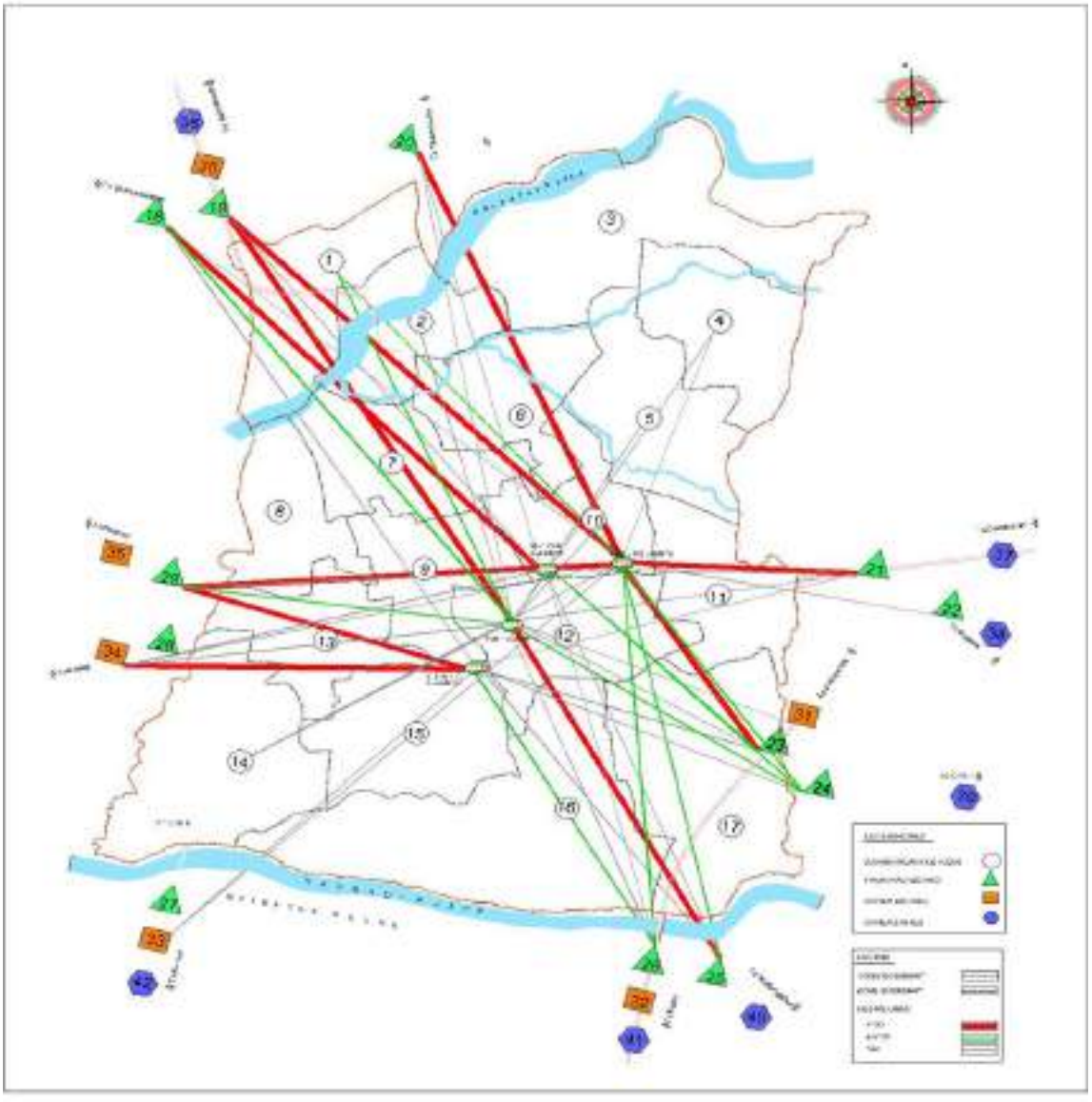


Fig 17.7 Bus transport routes and terminals in Palakkad Town

Source : NATPAC Survey 2020

17.6 PUBLIC TRANSPORT OPERATIONS (TRAIN)

Palakkad Junction railway station situated at the outskirts of the town is the second largest railway station in Kerala as per the number of tracks. It also boasts one of the longest railway platforms in Kerala. The station is located at 4 km from Palakkad KSRTC bus stand. Palakkad Junction is located on Jolarpettai - Shoranur railway line and is the terminating point for the Palakkad-Madurai rail line. The other station serving the city is Palakkad Town railway station. Palakkad Town railway station on the Palakkad - Madurai line is located in the heart of Palakkad town but is served by a limited number of trains.

Rail transport system caters mainly to the needs of inter-city passenger and goods traffic. Palakkad junction is connected to major urban centers through major railway lines. There are 143 trains passing through Palakkad railway station and two trains originate/terminate at the railway station. A total of 11 trains pass through Palakkad railway station. Palakkad railway station is handling about 22,148 passengers per day while town railway station is handling an average of 3,636 passengers per day.

17.7 INTERMEDIATE PUBLIC TRANSPORT OPERATIONS (IPT)

IPT available in the town is mostly made up of taxis and auto rickshaws. There are 38 stands for autorickshaws and eights stands for taxis located in various parts of the town. Average share of auto passengers among all the passengers on the major corridors of the town was 21% and ranged between a low of 2% to as high as 80% at certain minor streets (Table 5.12). Other than the minor streets, the corridors which showed high auto share of more than 35% were Sulthanpet to Anjuvilakku (40%), Gandhi bazaar road (37%), Market road (46 to 49%). It could be noted that all the road corridors which are not served by public transport facilities are having higher share of auto trips.

17.8 CRASH PRONE LOCATIONS

The road crashes in Palakkad district have been on the rise as shown in Table17.9. The priority crash black spots in Palakkad district have been identified taking into consideration the crash record for the years 2016-2018 and is shown in Figure 17.8. Among four priority crash black spots in the district, only one falls within the municipality limit which is Sekharipuram junction on NH 966 and has been classified with moderate-risk.

Table 17.9 The road crashes in Palakkad district

Sl. No.	Year	Number of accidents
1	2016	2305
2	2017	2339
3	2018	2411

Source : NATPAC Survey 2020

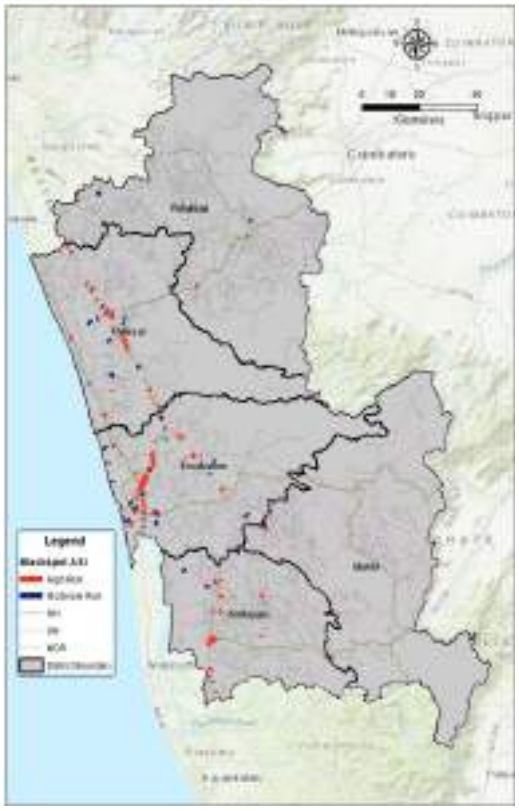


Fig 17.8 Priority Crash black spots in Palakkad district (2016-18)

17.9 ZONING PATTERN ADOPTED FOR THE STUDY

For a meaningful analysis of O-D survey data, the study region was divided into 17 traffic zones, the boundaries of the zone forming the combined boundary of one or more wards. In a similar way, outside study region was divided into 25 traffic zones, which included the immediate surrounding areas in the district, adjoining districts and neighboring states. The traffic-zoning pattern adopted for the study is tabulated in Table 17.10 and depicted in Figure 17.9.

Table 17.10 Zoning pattern adopted for the study in Palakkad Town

Zone No	Zone Name	Wards			
1	Olavakkode	1	52		
2	Kalpathy	2	3	5	
3	Mattumantha	6	7	8	9
4	Kallepully	10	11		
5	Puthur	12	13		
6	sekharipuram	4	15	14	
7	Vadakkanthara	43	50	51	16
8	Mepparamba	48	49		
9	Melamuri	40	42	44	45
10	Central Area	17	18	19	
11	Vadakkumuri	20	22	22	24
12	Municipal office	23	41		
13	Valiangadi	38	46	47	
14	Thirunellayi	34	35	36	37
15	Puthupally theruvu	31	32	33	39
16	Civil station	28	29	30	
17	Manappully	25	26	27	

Zone No	Zone Name	Wards
18	Palakkad District-Cherpulassery side	
19	Palakkad District-Mannarkkad side	
20	Malampuzha area	
21	Palakkad District-Coimbatore Side	
22	Palakkad District-Pollachi side	
23	Palakkad District-Thrissur via bypass	
24	Palakkad District-Chittoor side	
25	Palakkad District-Koduvayoor side	
26	Palakkad District-Thrissur side	
27	Palakkad District-Kannur size	
28	Palakkad District-Pirayiri side	
29	Palakkad District-Ponnani side	
30	Other District-Mannarkkad side	
31	Other District- Coimbatore Side	
32	Other District- Thrissur via bypass	
33	Other District- Chittoor side	
34	Other District- Thrissur side	
35	Other District- Kannanur side	
36	Other District- Pirayiri side	
37	Other District- Other states	
38	Other states-Mannarkad side	
39	Other states-Walayar side	
40	Other states-Chittoor side	
41	Other states-Thirissur side	
42	Other states-Kannanur side	

Source : NATPAC Survey 2020

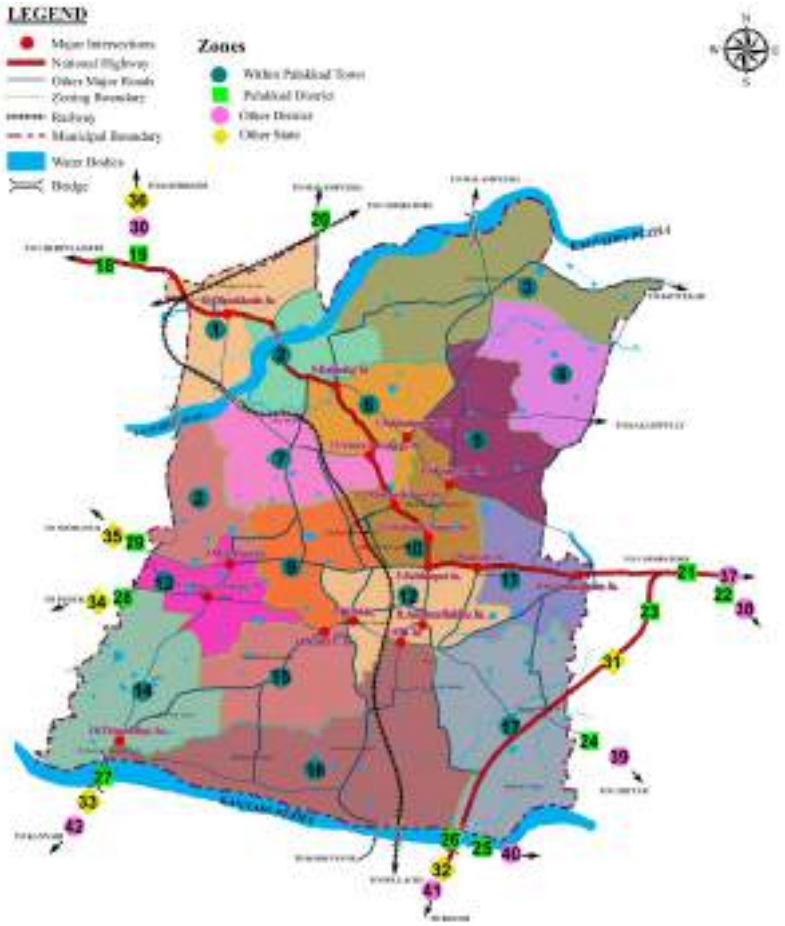


Figure 17.9 Zoning pattern adopted for the study in Palakkad Town

17.10 CHARACTERISTICS OF INTER-CITY PASSENGER TRAFFIC

17.10.1 Modal Split

The inter-city passenger transport in Palakkad is predominantly met by road based KSRTC buses, private buses, mini-buses, and a host of personalized vehicles like 4-wheelers, two-wheelers etc., while train plays a significant role in transport of inter-city passengers. An analysis of the O-D survey data collected from outer cordon survey locations and railway stations revealed that an estimated 55.51 lakh inter-city passenger trips were performed in the study region on a reference day consisting of 38% bus passenger trips, 28% two wheeler trips, 14% car trips, 10% auto trips and 9% train trips.

It could be inferred that in comparison to the passenger travel pattern public transport share has significantly come down from 51% in 2011 to 38% at present. The share of personalized vehicles has increased substantially on the other hand. Figure 17.10 give the modal split of inter-city passenger traffic in Palakkad study area.

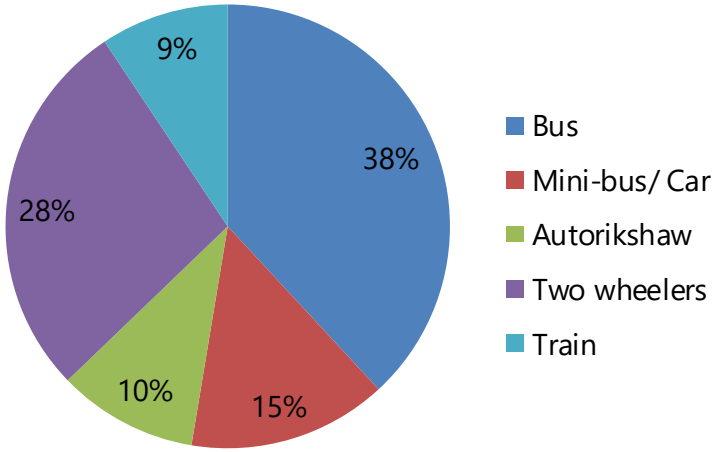


Figure 17.10 Modal split of inter-city daily passenger trips in Palakkad municipality

17.10.2 Purpose of Trip

In Palakkad study area, more than half of the 5.52 lakh inter-city passenger trips were performed for work or related purpose, followed by 13% for social and recreational purpose and five percent each for education, medical and shopping purposes. About 14% of trips were performed for miscellaneous purposes. Figure 17.11 present distribution of inter-city passenger trips for different purposes according to mode of travel.

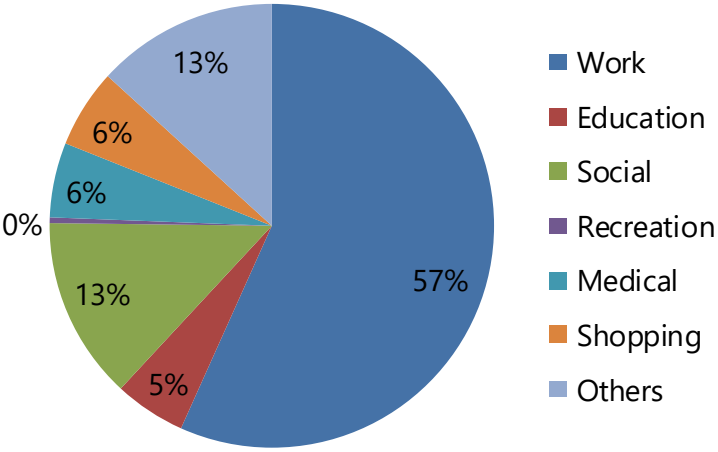


Figure17.11 Distribution of inter-city passengers according to purpose of trips in Palakkad Town

Source: NATPAC study, 2020

17.10.3 Origin-Destination of Passenger Trips

Table 17.11 shows the passenger OD matrix of intercity trips in Palakkad town. A total of 5.50 lakh passenger trips were performed as inter-city trips in the study region

Table 17.11 Passenger OD matrix of intercity trips in Palakkad town

	O/D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	Total
1	Olavakkode	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	745	11,343	-	5,644	392	194	1,897	4,023	251	355	714	1,051	557	-	-	365	-	-	-	-	-	-	-	-	-	27,531
2	Kalpathy	-	-	-	-	-	-	-	-	228	-	-	-	-	-	-	-	-	-	157	-	1,551	194	-	-	-	-	-	68	569	-	395	-	-	-	-	-	-	-	-	-	-	-	3,162
3	Mattumantha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	194	-	896	-	389	-	194	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,673
4	Kalleppully	-	-	-	-	-	-	-	-	228	-	228	-	-	-	-	-	-	-	597	-	978	395	-	531	-	-	-	-	-	-	-	371	-	-	-	-	-	-	-	-	-	-	3,328
5	Puthoor	-	-	-	-	-	-	-	-	-	-	124	-	-	-	-	-	395	-	283	-	2,928	-	-	-	-	395	160	312	-	94	-	1,546	-	-	-	-	791	-	-	-	-	-	7,028
6	Sekharipuram	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	519	-	-	194	-	-	251	-	160	68	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,192
7	Vadakkanthara	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,402	-	-	194	-	531	-	-	-	68	434	63	-	-	-	-	489	-	102	-	-	-	-	-	3,283
8	Mepparamba	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	126	-	194	-	-	531	492	-	519	2,482	5,103	126	-	102	-	-	345	-	395	-	-	-	-	-	10,415
9	Melamury	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	189	2,940	-	3,696	-	194	643	1,056	125	8,583	2,740	3,766	227	-	102	484	-	367	-	102	-	-	-	-	-	25,214
10	Central Area	-	-	-	791	-	-	-	-	-	-	-	-	-	-	-	-	-	189	3,764	-	13,703	12,226	2,365	10,221	8,995	9,154	4,823	858	19,895	1,016	395	2,356	122	-	-	-	10,918	-	-	-	-	-	1,01,791
11	Vadakkumury	-	-	-	194	194	-	-	-	-	-	-	-	-	-	-	-	-	126	1,090	194	6,607	3,697	1,940	1,720	1,601	1,181	1,117	738	801	289	194	-	162	-	-	-	1,481	-	-	-	-	-	23,326
12	Municipal office	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	94	745	-	2,723	389	-	3,601	1,750	314	838	507	1,168	385	-	-	200	-	-	-	389	198	-	-	-	-	13,301
13	Valiangady	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	361	-	198	-	-	265	-	-	2,149	3,342	1,260	-	-	-	-	-	-	-	102	-	-	-	-	-	7,677
14	Thirunellayi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	102	-	-	-	194	-	-	-	-	-	160	135	596	-	-	-	-	-	-	-	102	-	-	-	-	-	1,289
15	Puthuppally Theruvu	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	41
16	Civil Station	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	550	-	2,044	-	-	70	3,422	5,126	1,811	456	-	-	-	102	-	-	-	-	-	-	-	-	-	-	13,581
17	Manappully	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	63	-	392	-	-	4,855	-	2,459	-	35	228	-	-	-	-	70	-	102	-	-	-	-	-	-	8,204
18	Palakkad District - Cherpulasserry side	432	212	-	-	116	-	318	-	-	521	39	-	-	-	-	-	-	-	-	-	53	-	-	-	479	77	-	-	190	-	-	305	-	-	-	-	434	-	-	-	-	-	3,176
19	Palakkad Disrict - Mannarkkad side	10,529	569	-	77	352	926	193	1,690	289	8,968	550	1,310	328	-	-	1,592	39	-	-	154	1,153	53	-	332	757	755	80	386	391	69	-	1,518	-	-	-	-	1,794	53	-	-	-	-	34,907
20	Malampuzha area	-	-	-	-	-	-	-	-	-	-	-	228	-	-	-	-	-	-	126	-	194	97	97	-	340	492	-	66	163	133	198	102	-	-	-	-	305	-	-	-	-	-	2,541
21	Palakkad District - Koyamputhur side	2,131	457	124	247	1,180	352	-	228	1,665	12,709	12,326	352	-	457	-	4,220	809	608	1,341	114	-	228	-	238	494	238	208	599	2,494	424	-	102	-	-	114	-	852	-	-	-	-	-	45,311
22	Palakkad District - Pollachi side	228	-	-	-	457	-	-	-	741	1,513	124	-	-	-	-	-	-	-	254	-	-	-	-	-	-	114	134	-	956	-	-	-	-	-	-	-	-	-	-	-	-	-	4,521
23	Palakkad District - Thrissur side via bypass	352	-	-	-	124	-	-	-	723	3,063	1,285	228	-	-	-	228	-	-	124	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6,127
24	Palakkad district - Chittoor side	157	-	-	-	157	192	-	636	6,004	2,232	1,560	1,853	-	-	-	831	1,575	16	-	-	273	78	194	-	127	927	264	534	645	298	-	508	-	-	235	-	481	-	-	-	-	-	19,777
25	Palakkad district - Koduvayoor side	1,340	-	-	-	968	-	-	-	3,956	7,363	1,138	2,243	1,067	-	894	6,353	222	267	532	-	685	223	-	203	-	-	20	460	2,674	133	-	813	-	-	-	-	887	-	-	-	-	-	32,441
26	Palakkad district - Thrissur side	1,116	-	-	-	-	-	447	-	6,068	4,931	888	2,007	39	-	148	3,717	-	31	357	483	738	97	196	336	-	-	41	274	715	426	-	203	-	-	-	-	111	-	-	-	-	-	23,369
27	Palakkad distrtict - Kannanur side	2,233	-	-	-	39	-	624	605	6,727	7,313	313	1,156	2,835	1,724	-	1,498	78	-	801	39	49	-	-	-	-	261	-	709	225	59	-	102	-	-	-	-	20	-	-	-	-	-	27,410
28	Palakkad disrict - Pirayiri side	860	-	-	-	302	-	-	471	2,885	2,057	1,104	538	1,765	131	-	622	-	-	538	188	919	-	-	290	282	110	1,198	-	465	165	-	24	183	-	102	-	476	-	-	-	-	-	15,675
29	Palakkad district - Ponnani side	2,913	283	-	117	58	205	1,162	4,357	6,119	7,220	788	1,210	673	58	175	721	175	-	225	566	598	195	-	661	1,554	903	120	526	-	-	-	155	-	-	-	-	2,561	99	-	-	-	101	34,498
30	Other Disrict - Mannarkkad side	39	-	-	-	152	-	-	-	152	1,814	152	39	-	-	-	-	152	152	361	96	364	152	-	588	303	303	-	-	210	102	-	355	-	-	-	-	1,342	39	19	-	-	-	6,886
31	Other district - Thrissur side via bypass	247	-	-	371	-	-	-	-	-	371	371	-	-	-	247	-	-	-	247	114	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,968
32	Other district - Thrissur side	152	-	-	-	152	-	-	152	296	3,490	455	374	-	-	-	1,227	148	63	990	152	303	1,129	-	222	303	246	80	273	913	102	-	203	-	-	-	-	305	-	-	-	-	-	11,730
33	Other distrtict - Kannanur side	543	-	-	-	59	-	215	117	841	861	39	-	20	39	-	20	-	-	205	-	-	-	-	-	-	68	-	29	39	20	-	-	-	-	-	-	-	-	-	-	-	-	3,115
34	Other disrict - Pirayiri side	-	-	-	-	124	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	78	-	-	-	-	-	-	-	-	-	-	-	-	61	263
35	Other district - Ponnani side	273	-	-	-	-	-	-	-	1,228	117	546	152	-	-	-	409	-	-	16	-	-	-	-	-	-	-	-	152	-	-	-	-	-	-	-	-	29	-	-	-	-	-	2,922
36	Other States - Mannarkkad side	-	-	-	-	-	-	-	-	-	730	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	39	-	-	-	-	-	-	-	769
37	Other States - Koyamputhur side	152	-	-	-	-	-	-	-	303	7,920	609	152	-	-	-	-	152	597	470	303	303	152	-	105	607	1,062	120	561	1,273	2,776	-	526	-	185	245	-	355	-	-	-	152	-	19,080
38	Other States - Pollachi side	-	-	-	-	-	-	-	-	247	-	-	-	-	-	-	-	-	-	79	-	-	-	-	-	-	-	-	-	-	-	-	102	-	-	-	-	-	-	-	-	-	-	428
39	Other States - Chittoor side	-	-	-	-	-	-	-	-	116	-	313	-	-	-	-	-	-	-	31	-	-	-	-	157	-	-	-	-	-	117	-	-	-	-	122	-	-	-	-	-	-	-	856
40	Other States - Koduvayoor	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	370	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	370
41	Other States - Thrissur Side	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
42	Other States - Kannannoor	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
	Total	23,697	1,521	124	1,797	4,434	1,675	2,959	8,256	38,816	73,193	22,952	11,842	6,727	2,409	1,464	21,438	4,041	3,077	31,533	2,773	46,873	20,085	5,374	27,997	26,836	24,561	22,981	17,170	46,224	7,581	1,182	9,597	1,516	294	2,019	102	24,334	389	19	0	152	162	**5,50,176**

Source: NATPAC survey 2020

on a day. About 45% of trips were generated from Palakkad town, out of which highest traffic generating zones within the town was the Palakkad town with about 19% of total trips, followed by 5% each by Olavakkode area, Market area and Chandra Nagar area and 2.5% each by zone Mepparamba (8) and Municipal office area (12) Rest of the town had traffic generation below 7,000 trips per day.

Another 45% trips were generated from Palakkad district, the highest number of trips generated from Coimbatore side (8%), followed by Mannarkkad side, Koduvayoor side and Ponnani side (6% each). Five percent of trips were generated from other districts and 4% from other states especially Coimbatore side of Tamil Nadu. An analysis of inter-city trip attractions revealed that the same pattern as that of traffic generation occurred in this case also. The desire lines of inter-city passenger trips are shown in Figure 17.12.

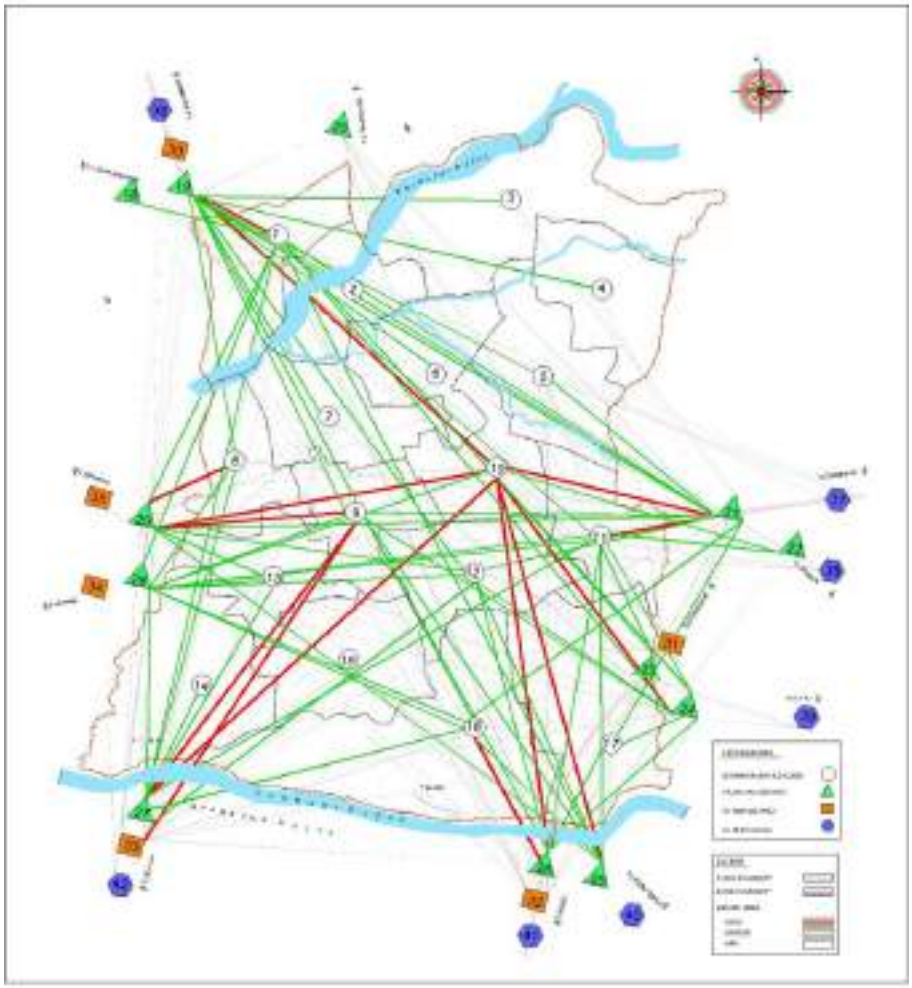


Figure 17.12 Desire lines of inter-city passenger trips in Palakkad Town

Source: NATPAC survey 2020

17.10.4 Pattern of Inter-city Passenger Trips

The O-D pattern of inter-city passenger traffic revealed, out of 5.52 lakh inter-city passenger trips, 46% originated from Palakkad town and 40% terminated in the town. 14% of the trips bypassed the town. Pattern of inter-city passenger trips is given in Table 17.12.

Table 17.12 Pattern of movement of inter-city passengers in Palakkad Town

Sl. No.	Pattern of movements	Road passengers	Rail passengers	Percent of passengers
1	Internal to Internal	2,578	102	0.49
2	Internal to External	236,854	15,347	45.72
3	External to Internal	209,317	12,798	40.26
4	External to External	51,346	23,322	13.54
	Total	**1,96,530**	**51,568**	**100.00**

Source: NATPAC study, 2020

17.10.5 First mile/ Last mile Connectivity of Rail Passengers

Details regarding first mile/ last mile connectivity of rail passengers were compiled from passenger's interview surveys and are provided in Table17.13. It could be seen that bus was the predominant mode of travel for about 62 to 69 % of rail passengers for reaching/ departing from railway station. Auto was the next preferred mode with a share of 15 to 17% and two wheelers with 7 to 8%.

Table 17.13 Mode used by rail passengers for reaching/ departing from railway stations

Sl. No.	Type of vehicle	Boarding passengers		Alighting Passengers	
		No.	Share(%)	No.	Share(%)
1	Bus	17,863	69.28	16,229	62.94
2	Mini Bus/Tempo	203	0.79	-	-
3	Car	2,091	8.11	2,318	8.99
4	Passenger auto	3,779	14.66	4,290	16.64
5	Two wheeler	1,747	6.77	2,036	7.9
6	Walk	102	0.39	910	3.53
	Total	**25,784**	**100**	**25,784**	**100**

Source: NATPAC study, 2020

17.11 CHARACTERISTICS OF INTER-CITY GOODS TRAFFIC

17.11.1 Volume of Goods Vehicles at Outer Cordon Points

The maximum number of 4,640 goods vehicles passed through Chandra Nagar survey location on Coimbatore road, followed by 2,663 goods vehicles at Poochira on NH 966 leading to Kozhikode, 2,315 at Kallekkad on Palakkad – Ponnani road and 1,370 at Yakkara on Thrissur road. Other survey stations recorded less than 1,300 goods vehicles per day.

17.11.2 Modal Split of Goods Traffic

A total of 11,908 goods vehicles were observed to carry goods to and from the study region, consisting of 4,382 trucks, 2,580 mini-trucks and 4,945 goods autos. The quantum of goods handled by these goods vehicles was estimated to be 40,584 MT. Trucks carried the maximum volume of goods traffic (78%), followed by mini-trucks (12%) and goods auto (10%) as shown in Table 17.14.

Table 17.14 Desire lines of inter-city passenger trips in Palakkad Town

Sl. No.	Type of vehicle	No. of vehicles	Quantum of goods (Tons)	Share (%)
1	MAT/ Truck	4.382	31.618	77.91
2	Mini-truck	2.580	5.012	12.35
3	Goods auto	4.945	3.954	9.74
	Total	**11.908**	**40.584**	**100**

Source: NATPAC survey 2020

17.11.3 O-D of Goods Transportation

Inter-city goods movement to the tune of 40,619 MT was observed over the study region. About 31% of goods generated from Palakkad town, of which the major traffic generator of goods traffic was central area with 17.5%, distantly followed by Vadakkumury, Olavakkode, Melamuri and Thirunellayi with 2 - 3.5%. Other areas contributed about 830 tonnes (2%).

About 27% of goods traffic was generated from Palakkad district other than the study area, with major share of 7% coming from Coimbatore side. Other districts contributed about 14.5% while other States accounted for 28%, majority of which came from Coimbatore side.

Similarly, in the case of goods traffic attraction, Palakkad town attracted 19% of total goods traffic with central area of the town having the dominant share with 11%. Among the external zones, while Palakkad district other than the study region attracted 43%, all other districts together attracted 23%. Goods traffic to the extent of about 15% terminated in other States. Table 17.15 shows passenger OD matrix of intercity trips in Palakkad town and the desire lines of inter-city goods traffic in Palakkad town is shown in figure 17.13.

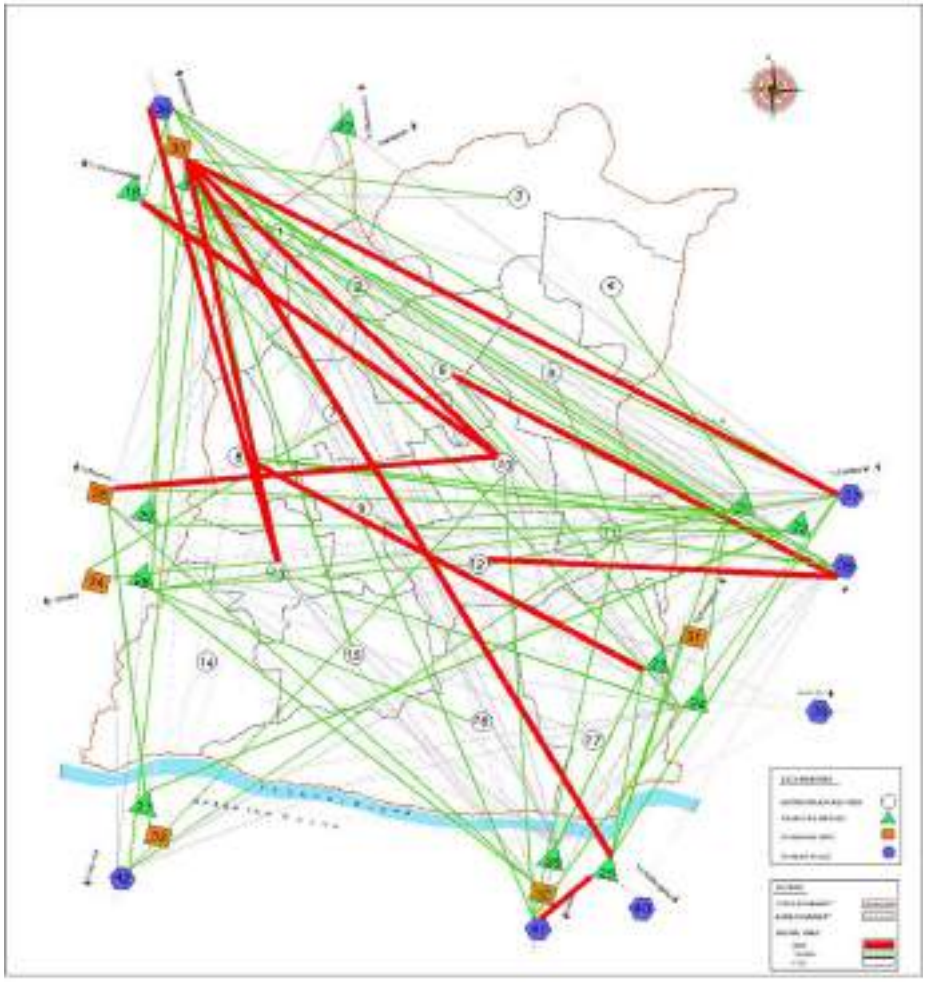


Figure 17.13 Desire lines of inter-city passenger trips in Palakkad Town

Table 17.15 Passenger OD Matrix of intercity trips in Palakkad town

	O/D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	Total
1	Olavakkode	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	393	135	-	-	98	-	10	14	-	343	301	8	-	-	-	-	-	-	-	-	-	-	-	-	-	1,302
2	Kalpathy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
3	Mattumantha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
4	Kalleppully	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
5	Puthoor	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16
6	Sekharipuram	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	104	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	104
7	Vadakkanthara	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
8	Mepparamba	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	41	-	-	-	-	-	-	2	3	40	27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	113
9	Melamury	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	123	221	-	-	-	-	-	14	-	101	15	169	-	-	-	59	-	137	-	164	-	-	-	-	-	-	1,003
10	Central Area	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1,274	361	-	889	42	382	134	60	-	23	230	497	1,152	260	8	38	301	12	-	1,383	68	-	-	-	-	-	7,115
11	Vadakkumury	-	-	-	-	-	-	-	-	-	-	-	11	-	-	-	-	-	-	14	-	-	39	1,252	-	5	5	-	-	0	-	-	-	-	-	-	-	-	52	-	-	-	-	-	1,378
12	Municipal office	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	136	-	-	48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	184
13	Valiangady	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	36	13	-	-	-	-	-	-	-	-	-	-	-	-	-	50
14	Thirunellayi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	831	-	-	-	-	-	-	-	-	-	-	-	-	831
15	Puthuppally Theruvu	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
16	Civil Station	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	30	-	87	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	135
17	Manappully	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	229	-	-	-	0	-	-	-	-	-	-	-	-	-	1	-	-	-	-	230
18	Palakkad District - Cherpulasserry side	-	-	-	-	-	-	266	-	-	42	-	-	-	-	-	-	-	-	-	-	54	4	-	-	-	-	-	2	-	-	-	-	-	-	-	-	36	221	-	-	-	-	625
19	Palakkad Disrict - Mannarkkad side	115	-	-	-	-	-	-	28	109	123	-	-	-	-	-	-	-	-	0	3	173	7	90	364	122	48	-	54	36	-	-	0	7	-	-	-	4	20	11	-	-	-	1,314
20	Malampuzha area	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15	-	25	-	-	-	-	11	-	-	-	-	-	479	-	-	-	-	-	-	-	-	-	-	530
21	Palakkad District - Koyamputhur side	334	15	-	-	77	-	-	-	94	463	239	14	-	7	-	94	-	128	321	-	8	-	11	2	-	-	-	129	126	606	-	-	-	-	177	-	-	-	-	-	-	-	2,845
22	Palakkad District - Pollachi side	-	-	-	-	-	-	-	-	-	292	-	-	-	-	-	-	-	11	-	-	-	-	-	-	-	-	-	77	43	54	-	-	-	-	15	-	-	-	-	-	-	-	492
23	Palakkad District - Thrissur side via bypass	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	23	-	-	-	-	-	-	-	-	-	-	-	23
24	Palakkad district - Chittoor side	56	-	-	-	-	-	-	-	0	6	21	52	56	-	-	2	19	3	15	-	14	-	57	5	-	9	-	19	5	-	-	5	-	-	42	-	5	-	-	-	-	-	391
25	Palakkad district - Koduvayoor side	-	7	-	-	-	-	-	-	182	62	5	-	-	-	-	14	-	-	384	-	-	-	-	-	-	-	-	2	57	820	-	-	-	-	-	-	-	-	-	-	-	-	1,533
26	Palakkad district - Thrissur side	-	-	-	-	-	-	-	-	-	73	162	-	-	-	-	99	-	-	12	-	26	-	-	41	-	-	-	55	90	-	-	-	-	-	15	-	-	-	-	-	-	-	573
27	Palakkad distrtict - Kannanur side	37	-	-	-	-	-	-	11	116	88	-	-	62	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	27	-	-	-	-	-	-	-	-	-	-	-	-	-	346
28	Palakkad disrict - Pirayiri side	2	-	-	-	-	-	-	-	10	152	-	-	59	-	-	-	-	-	45	-	312	-	-	0	4	9	0	29	-	18	-	-	-	-	-	-	-	-	-	-	-	-	640
29	Palakkad district - Ponnani side	21	-	-	-	26	-	-	141	11	151	51	-	7	-	-	25	-	-	25	-	12	4	-	11	847	-	9	26	3	-	-	3	-	-	-	-	186	2	-	-	-	-	1,561
30	Other Disrict - Mannarkkad side	21	-	-	-	-	-	-	-	-	63	-	-	-	-	-	-	-	-	-	-	318	-	260	8	18	-	-	-	-	-	-	-	-	-	-	-	462	1,158	-	-	-	-	2,308
31	Other district - Thrissur side via bypass	-	-	-	-	-	-	-	-	128	61	-	-	-	-	-	-	-	-	3	47	-	-	-	-	-	-	-	-	48	-	-	-	-	-	-	-	-	-	-	-	-	-	287
32	Other district - Thrissur side	-	-	-	-	-	-	-	-	-	9	-	-	-	-	-	46	-	-	18	-	352	-	908	14	-	-	0	5	25	-	-	-	-	-	1	-	-	-	-	-	-	-	1,378
33	Other distrtict - Kannanur side	18	-	-	-	-	-	-	-	-	100	44	-	-	-	-	-	-	-	-	-	-	-	-	-	23	-	-	-	-	6	-	-	-	-	-	-	-	2	-	-	-	-	193
34	Other disrict - Pirayiri side	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
35	Other district - Ponnani side	1	1	-	-	-	-	-	-	-	1,658	-	-	-	-	-	-	-	-	-	-	2	-	-	1	-	-	3	-	26	-	-	-	-	-	-	-	21	-	-	-	-	-	1,713
36	Other States - Mannarkkad side	-	-	-	-	-	-	-	-	-	109	-	-	-	-	-	-	-	-	-	-	183	-	-	-	-	-	-	452	-	-	-	-	-	-	-	-	-	1,298	-	-	-	-	2,042
37	Other States - Koyamputhur side	-	-	-	-	-	-	-	335	38	907	70	-	-	-	-	-	-	-	814	-	-	-	-	240	-	-	-	79	1,216	3,577	-	32	11	160	410	895	-	-	-	-	-	213	8,997
38	Other States - Pollachi side	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	46	-	3	-	-	-	-	-	-	-	16	12	-	-	-	-	-	-	-	-	-	-	-	-	88
39	Other States - Chittoor side	-	-	-	-	-	-	-	-	-	83	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	156	35	-	-	-	-	-	-	-	-	-	-	-	-	279
40	Other States - Koduvayoor side	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
41	Other States - Thrissur Side	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
42	Other States - Kannannoor side	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
	Total	605	23	0	0	103	0	266	515	688	4,442	592	77	184	8	0	280	19	1,943	2,470	50	2,611	194	2,976	1,112	1,117	114	483	1,638	2,601	7,134	260	527	115	461	809	895	2,261	2,822	11	0	0	213	**40,619**

Source: NATPAC survey 2020

17.12 INTER-CITY VEHICULAR TRAFFIC

Pattern of inter-city vehicular movements through Palakkad town is obtained by analyzing the origin-destination movements of vehicular traffic at the outer cordon survey locations. It was found that out of the total 1.5 lakh PCUs, 20,000 PCU of bypassable vehicles moved through Palakkad town.

About 6,000 PCU of movements were taking place between Coimbatore side and Kozhikode side which passes through NH 966 in Palakkad town. Other major movements between Ponnani side and Coimbatore side (2,500 PCU) however pass through the town area in the absence of bypass or link roads. Movement pattern of inter-city vehicles through various exit points of Palakkad Town are presented in Figure 17.14.

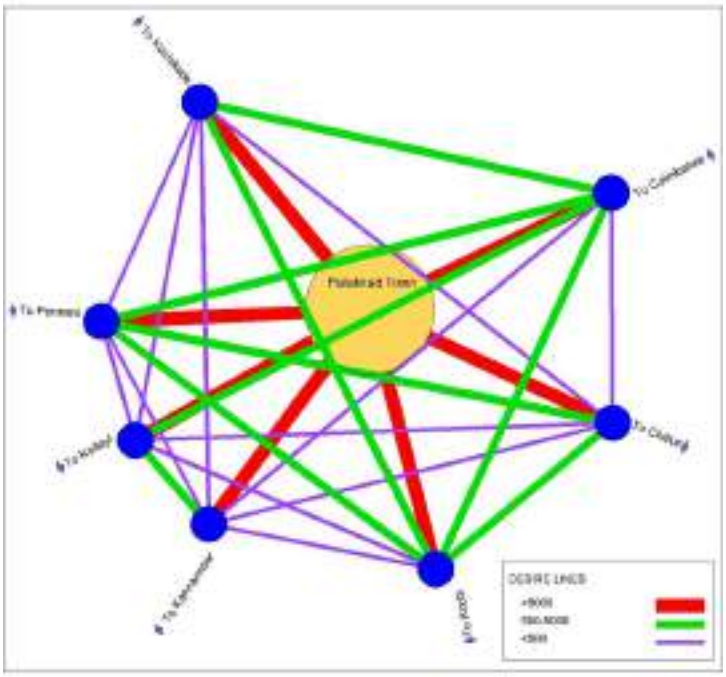


Figure 17.14 Inter-city vehicular movements in Palakkad Town

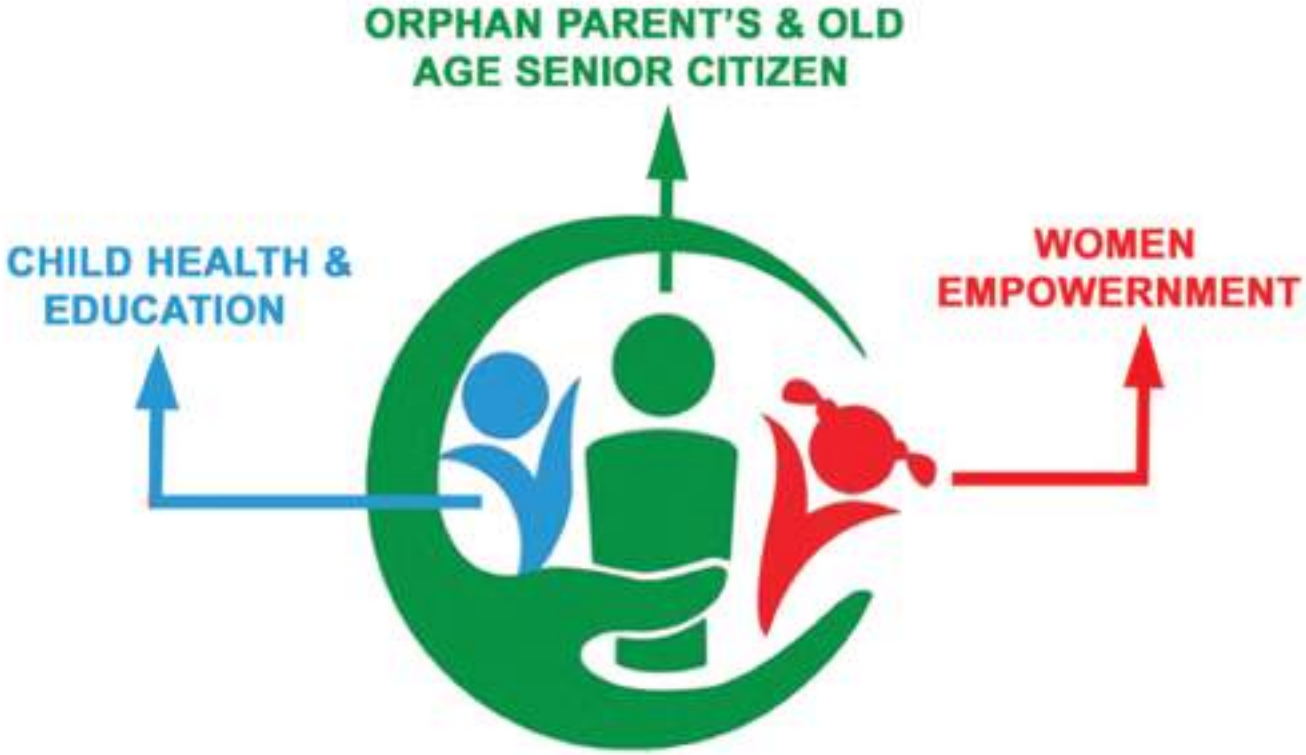
Source: NATPAC study, 2020

17.13 INFERENCE

Palakkad town has a widespread road network connecting every nook and corner of the town but like any other town in Kerala, Palakkad also faces many traffic problems. Those are,

- Four bus stands within the CBD causes traffic congestion due to plying of large vehicles. Interconnectivity between bus stands is an issue to be addressed as the commuters have to depend on auto rickshaws/go by walk to commute between bus stands.
- The state of affairs within the bus stands are not up to the mark and calls for improvement in terms of riding surface, platforms, segregation of passengers, passenger amenities etc.

- Absence of proper parking facilities causes extensive unorganized parking all over the town.
- Pedestrian facilities such as footpath, refuges, crossing facilities, pedestrian markings are absent or inadequate, and thus needs improvement.
- Non Motorized Transport (NMT) facilities have not been given due consideration in the town's transportation system.
- Many intersections in the town are left uncontrolled or manually controlled and has no channelizing traffic islands. Some lack adequate turning radius causing visibility issues to drivers.
- Traffic signage and road markings are inadequate and the ones that are provided are scarcely maintained.
- Most of the road stretches within the study area are over-utilized and requires widening .
- Inter-mixing of local traffic with through traffic in the absence of alternate road links/ regional bypasses.
- Improvement of loading and unloading facilities, provision of truck terminal, cycle tracks, provision of taxi stand also needs to be considered.



CHAPTER 18- SPECIAL CONCERN AREAS

18. SPECIAL CONCERN AREAS

Urbanization leads to better economy, education, and social development. At the same time it can result in poor living and working conditions. The benefits and difficulties in urbanization are not equally distributed in the society. The affect of urbanization is different for rich and the poor. This leads the low income groups to bear the most negative impacts of urbanization.

For the successful development of a community, inclusive planning is important. When we plan for an urban area, all type of communities should be included in the planning process. In the long term planning process, the living standards of the poor should be upgraded and for this there have to be an understanding of the vulnerable population of the society.

18.1 SOCIAL BACKWARDNESS AND URBAN POVERTY

Urban poverty will become a major challenge for policymakers in our country as the urban population in the country is growing, so is urban poverty. Therefore, a need has arisen to develop new poverty reduction tools and approaches to attack the multi-dimensional issues of urban poverty. For this, policymakers at the national and local levels should have a good understanding of the nature of urban poverty as well as accurate data on various issues relating to it, in order to develop programme/policies to manage urban poverty in a systematic manner.

Social backwardness is the indication of changes in the economic structure and poverty is one of the major component of social backwardness. Social backwardness is determined by class of the citizen, caste and poverty. But neither caste nor poverty alone determine the backwardness. Hence the social backwardness is studied by studying the below poverty line, scheduled caste and scheduled tribe populations.

18.1.1 BPL Index

Below Poverty Line (BPL) is an economic benchmark and poverty threshold used by Government of India to indicate the economic backwardness and to identify individuals and households in need of government assistance. Kerala is one of the states that had formulated its own criteria. In Kerala there are 9 parameters, family which lack access to 4 or more parameters are classified as BPL. They are:

1. No land or less than 5 cents of land
2. No house or dilapidated house
3. No sanitary latrine

4. Family without colour television
5. No regular employed person in the family
6. No access to safe drinking water
7. Women headed household or presence of widows and divorcee
8. Schedule Caste (SC) and Schedule Tribe (ST)
9. Mentally retarded or disabled member in the family

Table 18.1 Ward wise number of BPL Households

Sl. No.	Ward No.	Ward name	No. of BPL families	Sl. No.	Ward No.	Ward name	No. of BPL families
1	**29**	West yakkara	581	26	**32**	Vennakkara central	168
2	**34**	Thirunellayi	532	27	**37**	Noorani	168
3	**3**	Kunnumpuram	514	28	**44**	Valiyangadi	165
4	**47**	Karnaki Nagar West	410	29	**38**	Vithunni	164
5	**6**	Thonipalayam	407	30	**12**	Puthur north	160
6	**31**	Vennakkara south	379	31	**25**	Kenathuparambu	153
7	**33**	Othungodu	329	32	**2**	Kalpathy west	150
8	**9**	Kallepully north	273	33	**45**	Pallippuram	150
9	**30**	Puthuppalli theruvu	267	34	**43**	Melamuri	146
10	**5**	Kalpathy east	261	35	**10**	Kallepully south	142
11	**4**	Ayyapuram	259	36	**35**	Kallikkadu	141
12	**8**	Valiyapadam	256	37	**28**	Murikavu	134
13	**17**	Narikuthy	255	38	**14**	Ayyapuram east	133
14	**49**	Jainimedu	252	39	**13**	Sekharipuram	130
15	**48**	Vadakkanthara	248	40	**36**	Kaikuthuparambu	127
16	**24**	Cherakkadu	247	41	**50**	Olavakkode south	121
17	**40**	Pattikkara	245	42	**19**	Mankav	112
18	**46**	Mepparambu	225	43	**22**	Kunnathurmedu south	100
19	**42**	Sreeram palayam	216	44	**1**	Olavakkode Central	86
20	**27**	Civilstation	207	45	**7**	Kumarapuram	86
21	**41**	Vadakkanthara east	191	46	**20**	Vadakkummuri	80
22	**21**	Selvapalayam	184	47	**16**	Koppam	77
23	**26**	Manappullikkavu	179	48	**23**	Kunnathurmedu north	63
24	**18**	Sulthanpetta	175	49	**39**	Muncipal office	59
25	**11**	Puthur south	171	50	**15**	Parakkunnam	52
Total BPL Families = 10,330							

Source: BPL survey, 2009

As per BPL survey, 10,330 families in Palakkad town have been classified as BPL. Ward wise BPL households are shown in Table 18.1 and BPL population concentration is shown in Fig. 19.1. West Yakkara (Ward 29), Thirunellayi (Ward 34) and Kunnumpuram (Ward 3) has number BPL families more than 500. Karnaki nagar west (Ward 47), Thonipalayam (Ward 6), Vennakkara south (Ward 31) and Othungodu (Ward 33) has BPL families ranging from 350 to 450.

The existing economic standard of people as obtained from the socio economic survey shows an average monthly income of Rs. 16,457 while the average monthly expenditure per house is Rs. 15,566. This gives an insight into the economic status of the people of Palakkad municipality. The earning capacity is very less. The BPL population is quite substantial and constitutes 33.13% of the total households in the municipality.

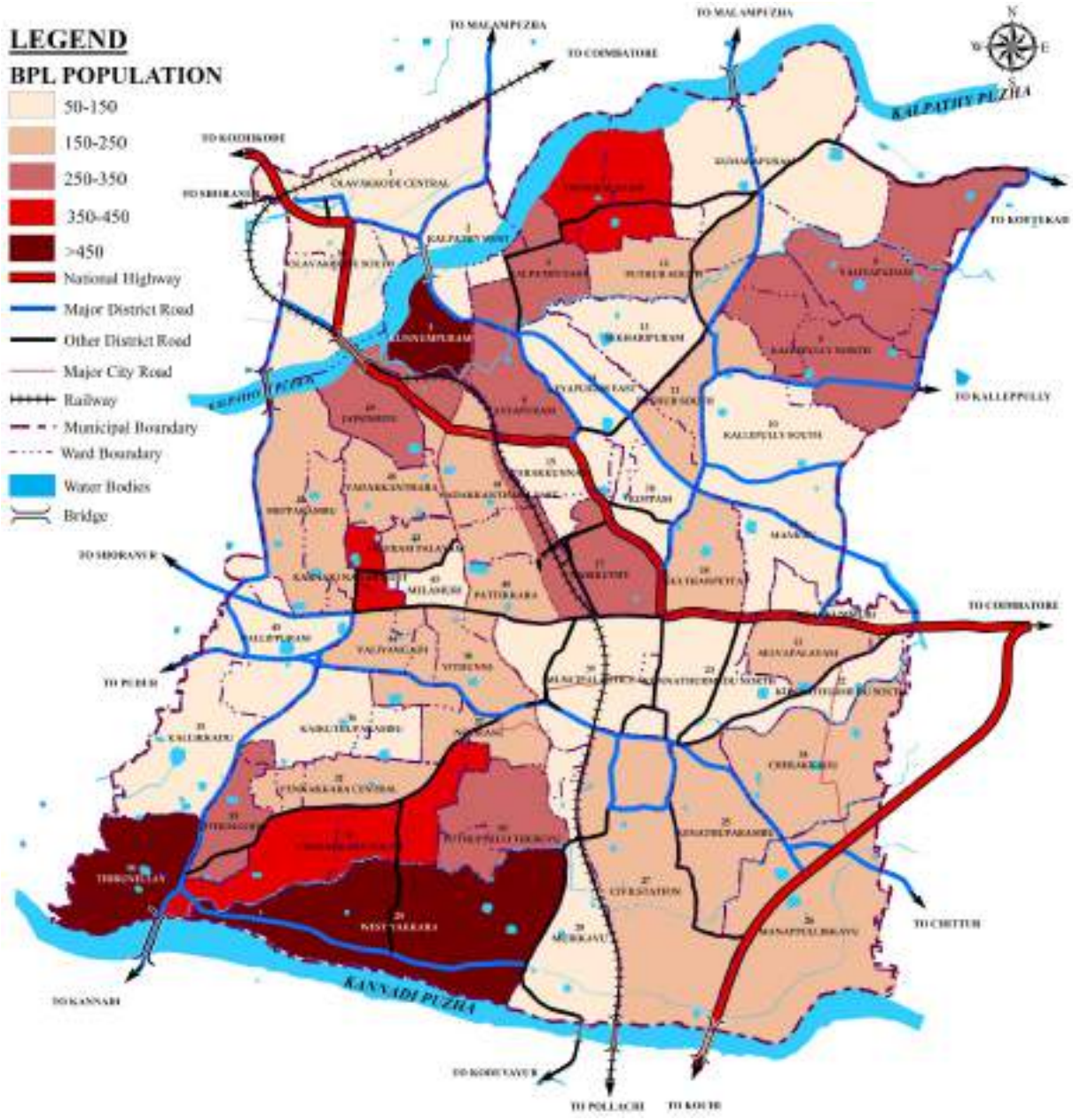


Fig. 18.1 Ward wise distribution of BPL families

18.1.2 SC and ST Population Index

Palakkad district is a socially backward district. SC/ST index indicates the social backwardness of a region and BPL index shows its economic backwardness. SC population constitutes nearly 7.69% of the total population in the municipality where as ST population is very low (0.16%) in Palakkad municipality. Percentage of SC population of the district is 14.37%. Table 18.2 and 18.3 gives the decadal variation of SC and ST population in Palakkad town respectively.

The decadal variation of SC and ST population from 1981 to 2011 is shown in figure 18.2. The SC population is gradually increasing from 1981 to 2001 and then from 2001 to 2011 there is a decrease in SC population in the municipality. While ST population shows gradual increase from 1981 to 2011.Compared to SC population, ST population is very less in the municipality.

Table 18.2 Decadal variation of Scheduled Caste population in Palakkad town

Year	Total	Male	Female	Total Population	Percentage of total Population
1981	9,095	4,490	4,605	1,17,986	7.71
1991	9,757	4,721	5,036	1,23,289	7.91
2001	10,673	5,137	5,536	1,30,767	8.16
2011	10,068	4,889	5,179	1,30,955	7.69

Table 18.3 Decadal variation of Scheduled Tribe population in Palakkad town

Year	Total	Male	Female	Total Population	Percentage of total Population
1981	16	7	9	1,17,986	0.01
1991	97	69	28	1,23,289	0.08
2001	175	90	85	1,30,767	0.13
2011	213	131	82	1,30,955	0.16

Source: Census 1981, 1991,2001,2011

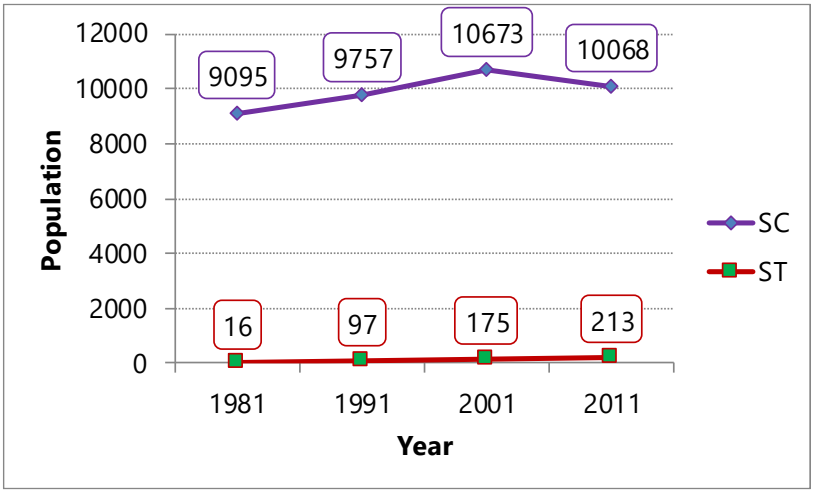


Fig. 18.2 Decadal variation of SC and ST population

Source: Census 1981, 1991,2001,2011

The growth rate of SC population is shown in figure 18.3. There is only 2.11% increase of SC population occurred between 1981 to 2001 in the municipality. And there is a considerable decrease (-5.67%) in the growth rate of SC from 2001 to 2011. The SC population concentration and ST population concentration in the municipality are given in Fig 18.4 and 18.5 respectively.

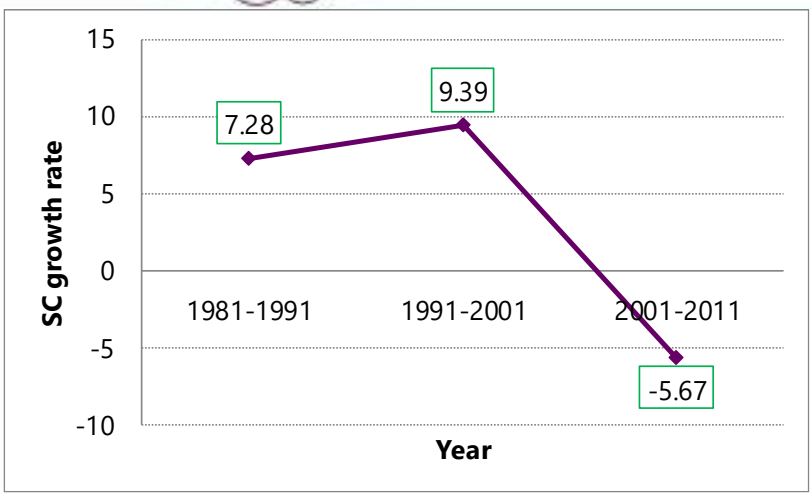


Fig. 18.3 Population growth rate of SC population

Source: Census 1981, 1991,2001,2011

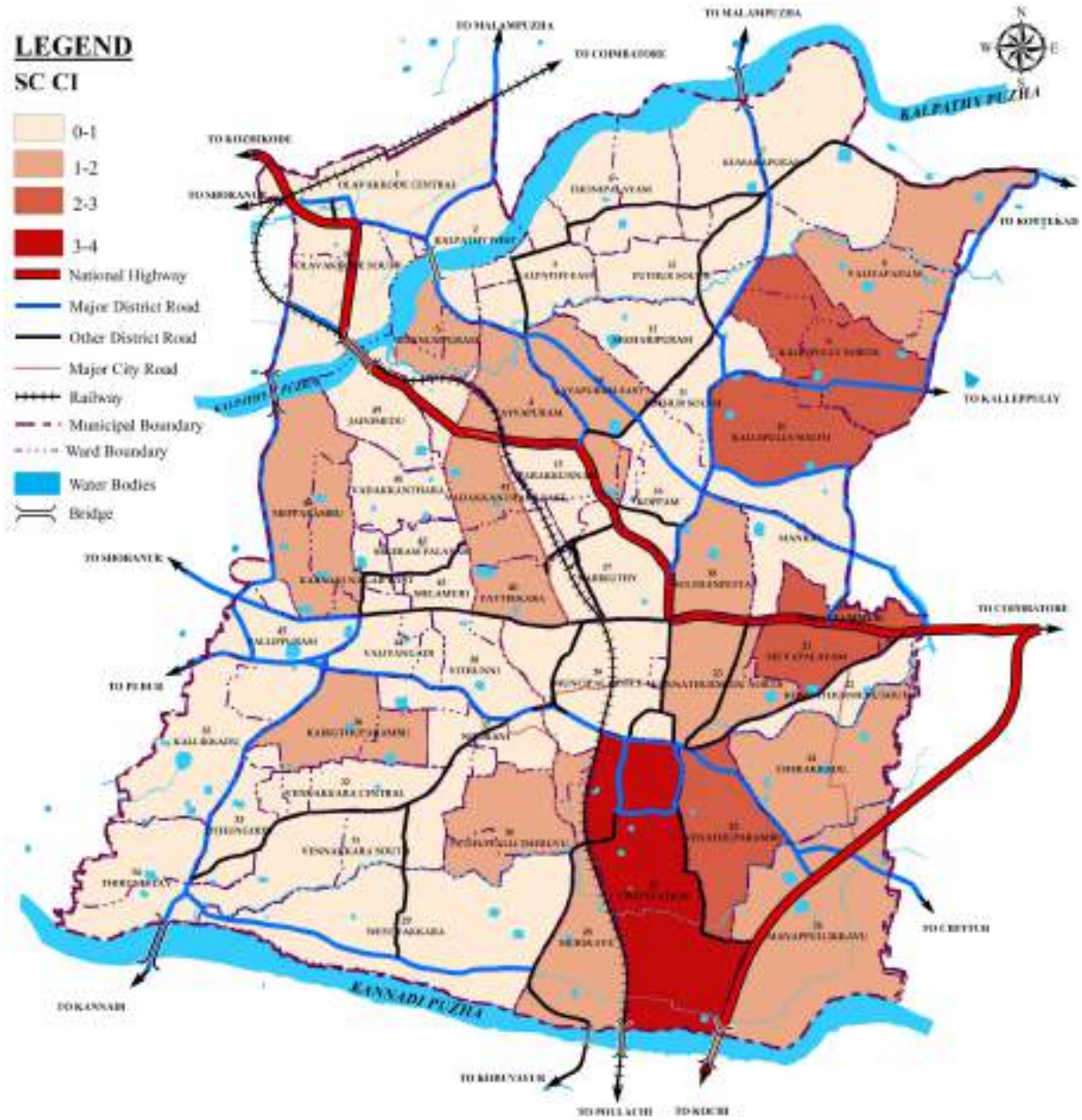


Fig. 18.4 Concentration Index of Scheduled Caste population

Ward - 27, Civil station has the highest concentration index. The SC population is mainly concentrated in Kallepully South (10), Selvapalayam (Ward 21), Kenathuparambu (Ward 25) and Kallepully north (Ward 9) whose concentration indices ranges from 2 to 4. Although the ST population is very less when compared with that of the SC, their population is mainly concentrated in Ward 27 (Civil station), Ward 26 (Manapullikavu), and Ward 2 (Kalpathy West).

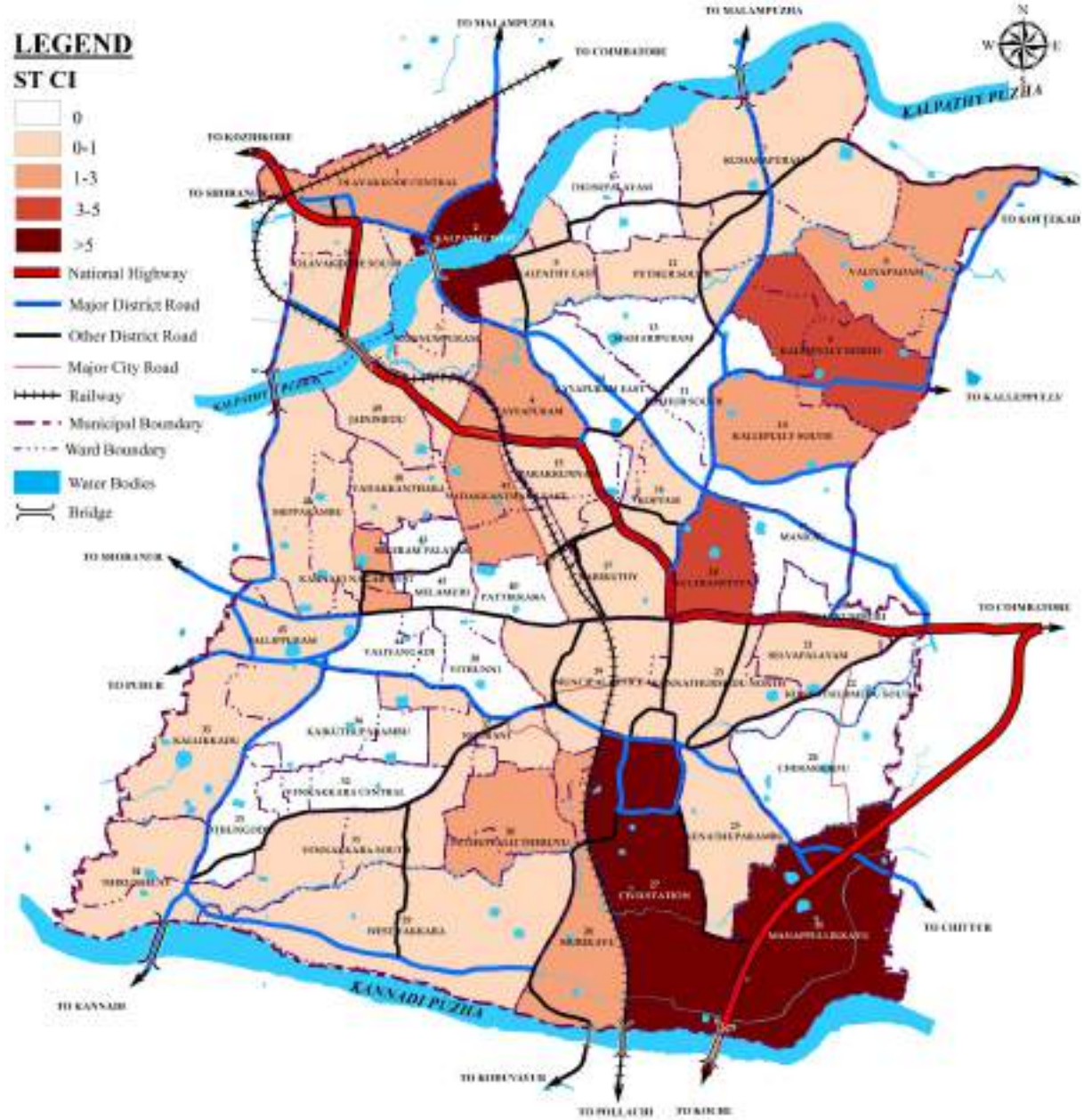


Fig. 18.5 Concentration Index of Scheduled Tribe population

18.1.3 Scheduled Caste Colonies

There are 41 SC Colonies in the Palakkad municipality with 1,166 families (Table 18.4). There are 3,953 persons residing in theses colonies. According to data obtained from Palakkad municipality, 96.48% have toilet facilities of which 71.29% of houses have sanitary facilities. 74.27% houses in these colonies are electrified. 86.71% of the SC families have their own house and remaining 13.29% of families live in rented houses.

Fig. 18.4 Details of Scheduled Caste colonies

Sl. No.	Name of colony	Ward	No. of families	Female	Male	Population
1	Pulluvathara	1	15	24	21	45
2	Sankhuvarathode	3	64	130	110	240
3	Sankhuvaramedu	4	42	78	67	145
4	Avinjipadam	5	10	20	15	35
5	Pechiyamman Nagar	4	10	18	12	30
6	Karekkad Parambhu	8	15	32	23	55
7	Valiyapadam	8	12	23	17	40
8	Chulliyode	7	18	40	32	72
9	Poojanagar	11	16	30	30	60
10	Thekkinkadu	10	11	17	15	32
11	Ambhalakkad	11	81	170	130	300
12	Archana Colony	11	18	40	26	66
13	Aanachira	15	54	160	100	260
14	Thorappalayam	15	24	40	30	70
15	Parakkunnam	16	11	22	18	40
16	Araliyode Kulam	41	13	30	22	52
17	Padathu Colony	28	30	64	56	120
18	Ambhalappuram	28	18	22	28	50
19	Angaraparambu	28	15	33	36	69
20	Mukkanathuparambu	28	27	41	62	103
21	Kallekkad	28	14	20	25	45
22	Kenathu Parambu	26	58	88	82	170
23	Kenathu Parambu (Near Fire)	26	11	30	28	58
24	Thottighal	31	35	55	70	125
25	Pazhayakalam	31	65	130	126	256
26	Chettytheruvu	19	20	35	38	73
27	Murikkavu	29	15	31	30	61
28	Chadanamkurissi	30	12	23	21	44
29	Aalanghattuthara	27	42	42	43	85
30	Valipparambu	22	13	22	18	40
31	A T R Street	22	71	55	38	93
32	Selvapalayam	22	14	16	12	28
33	Parkalam	34	25	43	36	79
34	Mannathara	34	20	25	22	47
35	Othughad	36	35	64	58	122
36	Kalampuzha	43	38	72	63	135
37	Pranamkulam	43	32	59	54	113
38	Selvinagar	43	43	73	69	142
39	Nochullam	42	34	72	63	135
40	Kaikuthuparambu	38	36	64	62	126
41	Pallipuram	47	29	49	43	92
	Total		**1166**	**2102**	**1851**	**3953**

Source: Palakkad Municipality

53.17% of the SC population is female and 46.83% is male. Percentage of male and female population in the SC colonies. Majority of the population in SC colonies are illiterate (81.79%). 6.37% has SSLC education and 5.54% has higher secondary education. 6.30% of population has education level of degree or above. Figure 18.6 shows the education status of SC colonies in Palakkad municipality.

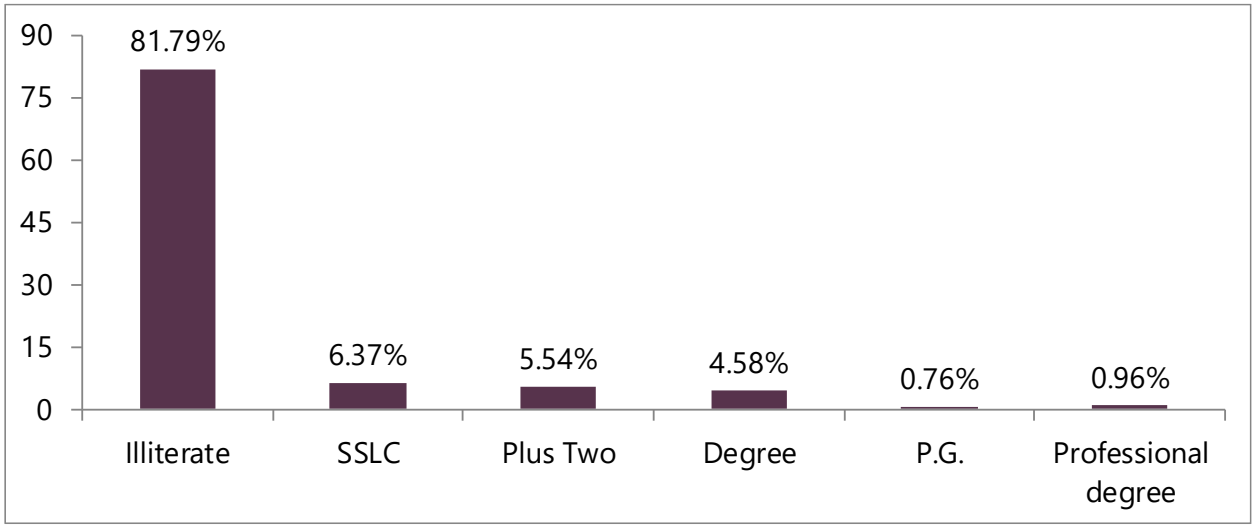


Fig. 18.6 Education status of SC colonies in Palakkad municipality

Source: Palakkad Municipality

18.1.4 SC Sex Ratio

As per census 2011, sex ratio of SC population is 1059. Sex ratio shows and increasing trend from 1981 to 2001, then shows a slight decrease in 2011 (1059). Decadal variation of SC sex ratio is shown in figure 18.7.

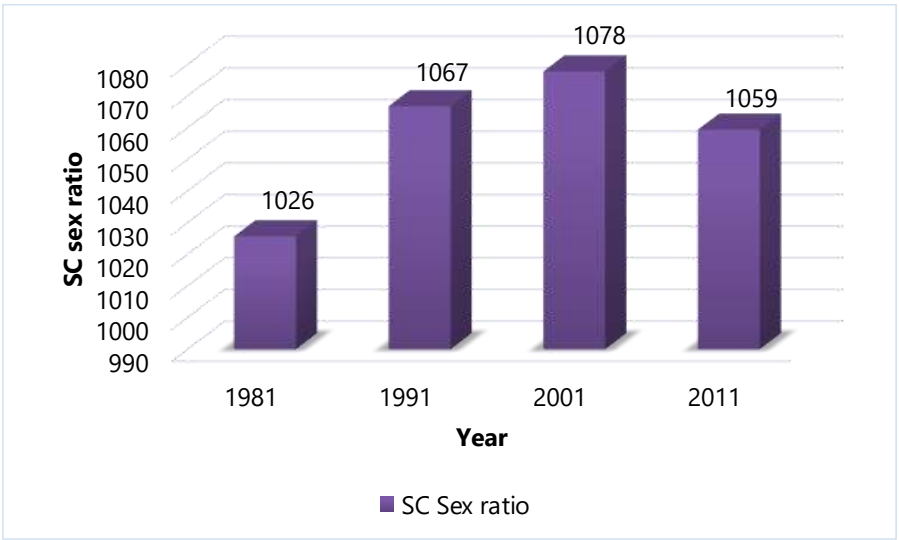


Fig. 18.7 Decadal variation of SC sex ratio in Palakkad municipality

Source: Census 1981,1991, 2001, 2011

18.2 SOCIAL SECURITY & WELFARE, WOMEN AND CHILD DEVELOPMENT

The term social welfare is used in its broadest sense which can embrace all efforts aimed at improving health, education, employment housing, recreational and cultural services for the community at large extend. The purpose of social welfare

facilities is to care and nurture anyone requiring various types of services to be able to lead a social life, including the elderly, children, persons with mental and physical disabilities, and the indigent, and to provide them with various treatment and training on rehabilitation and thus improving their welfare. India's social welfare system is composed of a number of schemes and programs spread throughout a variety of laws and regulations.

Women, children, disabled, aged, transgender and persons with chronic illness are the most vulnerable sections of our society for historic and social reasons. Social welfare measures covering the needy sections of the population namely unsheltered, diseased, uncared, neglected, deviant people who usually do not have a place in the

Table 18.5 Details of disabled persons in Palakkad municipality

Sl. No	Disability	Female	Male	Total
1	Locomotor	89	104	193
2	Muscular Dystrophy	50	39	89
3	Chronic Neurological Disorder	4	8	12
4	Multiple sclerosis	0	1	1
5	Dwarf	7	2	9
6	Blindness	14	22	36
7	Low vision	102	114	216
8	Learning Disability	2	5	7
10	Mental Illness	43	41	84
11	Autism	10	21	31
12	Hearing Impaired	78	83	161
14	Haemophilia	0	1	1
17	cerebral palsy	14	30	44
18	Multiple Disability including deaf, blind etc.	6	6	12
19	Parkinson disease	3	1	4

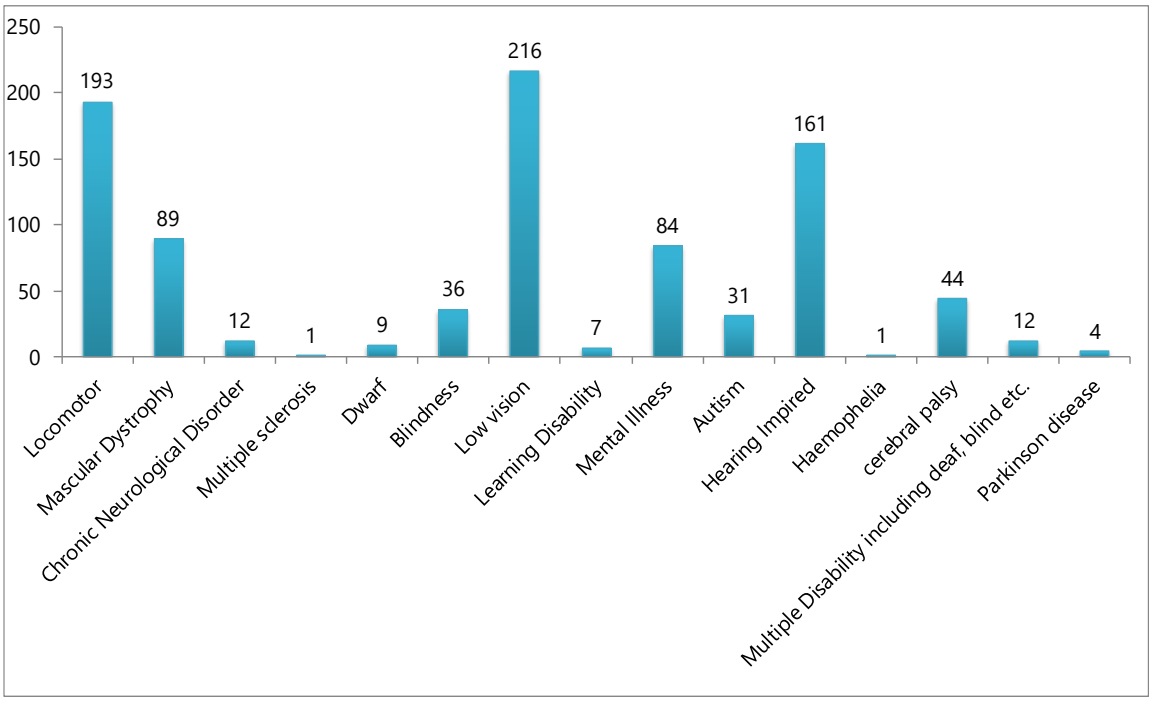


Fig. 18.8 Education status of SC colonies in Palakkad municipality

modern society. Table 18.5 and figure 18.8 shows the details of disabled persons in Palakkad municipality. It can be seen that majority of the disabled people are with low vision, 193 persons has locomotor disability and 161 persons are hearing impaired. Rehabilitation of victims is also a considerable factor for the planning area. Table 18.6 shows the accident & crime data from the year 2014 to 2018 in Palakkad municipality.

Table 18.6 Accident and crime data in Palakkad municipality

Sl. No.	Crime Heads	Year				
		2014	2015	2016	2017	2018
1	Theft	300	361	207	206	232
2	Burglary	196	173	176	149	203
3	Kidnapping	20	20	14	26	21
4	Robbery	42	99	89	94	107
5	Riots	472	593	404	424	508
6	Murder (all including gain)	22	27	15	27	19
7	Crimes against women	803	695	612	648	553
8	Crimes against Children	132	137	153	222	238
9	Fatal Accidents	314	400	347	367	329
10	Non-fatal Accidents	1746	2104	2053	1995	1993
11	Cyber Crimes (IT Act Only Cases)	9	2	1	2	6

Source: DCRB, Palakkad

As per census 2011, the total number of women is 67,122 constituting 51.26% of total population. From the Fig. 18.9, it is seen that the female population shows an increasing trend from 1981 to 2011.

As per 2011 census, literacy rate of Palakkad municipality is 93.90% with male literacy rate 96.54% and female literacy rate 91.42%. Female illiterate population is 11,204. The women work force rate of Palakkad is 9.43%. Out of the total female

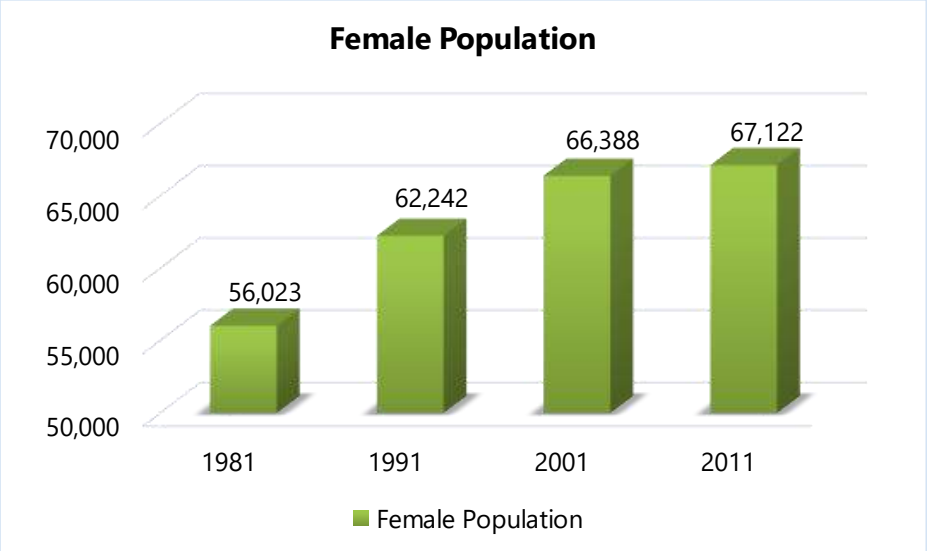


Fig. 18.9 Decadal variation of female population

Source: Census 1981, 1991,2001,2011

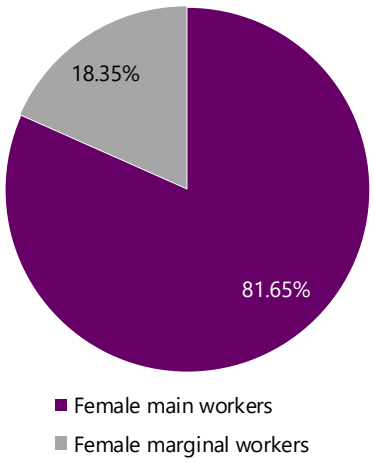


Fig. 18.10 Workers classification of Female population

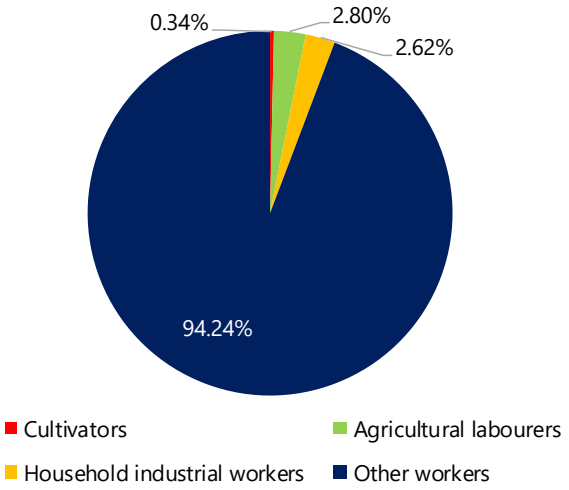


Fig. 18.11 Four-Fold Classification of Female Main Workers

Source: Census 2011

workers (10,708), 81.65% belongs to main workers (8,743) and 18.35% belongs to marginal workers category (1,965) as per figure 18.10

Figure 18.11 shows the classification of female workers. In four - fold analysis female main workers, other workers constitute 94.24%. The remaining 5.76% constitutes cultivators, agricultural labourers and household industrial workers. Fig. 18.10 shows the four fold classification of female main workers. From chapter 4 - Occupational structure; WFPR of female population shows a decrease during 1981 - 1991 and after that it shows an increasing trend from 1991 to 2011.

Every human being below the age of 18 years is nationally defined as a child. Children are the greatest asset of any nation, and investing in them is investing for a better future of the nation. As per 2011 census, total population in the age group of 0-6 in Palakkad municipality is 12,177 i.e. 9.30% of the total population.

18.2.1 Social Security Schemes

Social security schemes extend service and support to destitute, poor, aged, children, women, chronically ill patients and other weaker sections of the society. Kerala was the first state to have introduced agriculture workers' pension and 3.6 million people are benefited through different pension schemes. For securing the lives of the poorest of the poor families, the Government of Kerala has introduced the Social Security Pension Schemes.

These schemes give ample support for aged, handicapped or orphan people, by way of pension provisions, insurance coverage and other benefits. Currently, five types of social security pensions are being distributed through local bodies. The types of Pensions are agricultural labour pension, old age pension, widow pension, disability pension, pension for unmarried women above 50 years, etc. Table 18.7 & 18.8 gives the details of pension schemes and number of beneficiaries in Palakkad municipality.

Table 18.7 Details of social security pension beneficiaries

Sl. No.	Name of Pension	No. of beneficiaries in Palakkad Municipality				
		2014 -15	2015 -16	2016 -17	2017 -18	2018-19
1	Agricultural labour pension	370	260	323	310	343
2	Old age pension	5,773	7,480	8,873	9,062	7,655
3	Widow pension	3,897	3,542	4,300	4,700	4,941
4	Special disabled pension	887	702	982	1,046	1,148
5	Unmarried Women above 50 years	121	128	154	180	185

Table 18.8 Details of expenditure on social security pension

Sl. No.	Name of Pension	Amount of pensions in Palakkad Municipality				
		2014-15	2015-16	2016-17	2017-18	2018-19
1	Agricultural labour pension	3,51,600	25,26,210	7,77,000	39,25,300	39,06,000
2	Old age pension	2,89,77,831	3,76,82,610	1,35,64,625	9,16,81,800	9,09,49,300
3	Widow pension	3,15,75,654	3,81,53,720	1,04,91,100	5,55,42,100	5,80,39,600
4	Special disabled pension	78,78,856	88,50,245	21,13,800	1,21,16,000	95,77,200
5	Unmarried Women above 50 years	13,57,519	9,81,320	3,81,000	14,38,000	20,26,300

Source: Malampuzha Panchayath

From the yearly variation it is clear that the number of beneficiaries and the fund allocated is increasing and this shows the municipality is doing a great help to these beneficiaries. To ensure health of children, youngsters, pregnant women, lactating mothers etc. supply of food items through anganwadis are helping a lot.

18.2.2 Integrated Child Development Service (ICDS)

Integrated Child Development Services (ICDS) is a government programme which provides food, preschool education, primary healthcare, immunization, health check-up and referral services to children up to the age of 6 years, pregnant and lactating mothers and women 16 - 44 years of age.

The grass root level service delivery points are anganwadi centers. ICDS projects provide supplementary nutrition, NHED (Nutrition and Health Education), immunization and awareness on different subjects to women. Various welfare schemes of ICDS programmes are under SNP, the Supplementary nutrition programme for Children and SABALA scheme for Adolescent girls (11-18), for their empowerment, especially in the tribal areas.

Anganwadi is a type of rural mother and child care centre. They were started by the Indian government in 1975 as a part of the Integrated Child Development Services program to combat child hunger and malnutrition. A typical Anganwadi centre provides basic health care in Indian villages. It is a part of the Indian public health care system. Basic health care activities include contraceptive counseling and supply, nutrition education and supplementation, as well as pre-school activities.

- Status of Anganwadies

Anganwadi Center is the focal point for delivery of services which is managed by an Anganwadi Worker, assisted by a helper. Both are honorary workers selected from local community. As per the criteria, there should be one anganwadi for 1000 population. As per ICDS, the current population of Palakkad municipality is 1,37,459 persons. As per norm, 137 anganwadies are required to meet the needs.

At present, there are only 76 anganwadies functioning in Palakkad municipality. Figure 18.12 shows the spatial distribution of anganwadies in Palakkad municipality. There is a total of 2,096 child beneficiaries and 566 women beneficiaries. Ward 10, 21, 22 and 33 does not have anganwadies. Table 18.9 gives the details of anganwadies functioning in Palakkad municipality.



Fig. 18.12 Spatial Distribution of Anganwadis in Palakkad municipality

Table 18.9 Details of anganwadies in Palakkad municipality

Sl. No.	AWC NAME	Ward No	Ward Name/ Location	No of Child Beneficiaries	No of Women Beneficiaries
1	Alamkkad	1	Olavakkode central	25	4
2	Neelikkad	2	Kalpathy	20	6
3	Kunnampuram	3	Kunnampuram	29	10
4	Suderam colony	3	Kunnampuram	25	5
5	Sankuvaramedu Ist	4	Ayyapuram west	28	18
6	Sankuvaramedu IInd	4	Ayyapuram west	28	9
7	Chathapuram	5	Kalpathy East	24	27
8	Thonipalaym	6	Thonipalayam	22	8
9	Chulliyode	7	Kumarapuram	25	8
10	Karakkatuparambe	8	Valiyapadam	21	5
11	Manalmantha	8	Valiyapadam	21	11
12	Cholode	9	Mattumantha	29	10
13	Naduvakattupalayam	9	Mattumantha	16	5
14	Kundukad	9	Mattumantha	24	8
15	Ambalakkad	11	Kalleppully South	26	10
16	Kallepully	11	Kalleppully South	27	9
17	Parambithara	12	Puthur South	23	7
18	Manali	12	Puthur South	21	3
19	Kalyanninagar	12	Puthur South	20	5
20	Puthur	13	Puthur North	24	7
21	Kappukad	13	Puthur North	25	6
22	Sekharipuram	14	Sekharipuram	39	5
23	Ayyapuram	15	Ayyapuram East	21	5
24	Parakkunnam Ist	16	Parakkunnam	24	7
25	Parakkunnam IInd	16	Parakkunnam	29	15
26	Diara street	17	Narikuthy	24	5
27	Narikuthy	17	Narikuthy	29	6
28	Koppam	18	Koppam	29	4
29	Chetty street	19	Chettitheruve	25	6
30	Mankkave	20	Mankave	53	8
31	Kunnathurmedu	23	Kunnathurmedu	30	6
32	Chirakkad Ist	24	Kalmandapam	42	6
33	Chirakkad IInd	25	Chirakkad	33	6
34	Kenathuparambe	26	Kenathuparambu	27	5
35	Kadamcode	27	Manappullikave	38	8
36	Pandarakkave	27	Manappullikave	18	4
37	Kallekkade	28	Kallekkad	35	10
38	Murikkave	28	Yakkara	34	10

Table 18.6 continued.

Sl. No.	AWC NAME	Ward No	Ward Name/ Location	No of Child Beneficiaries	No of Women Beneficiaries
39	Ambalappuram	29	Yakkara	38	8
40	Chadanamkurussi	30	Murikkave	31	15
41	Moonamkkave	30	Murikkave	47	10
42	Thottuppalam	31	Poolakkad	25	10
43	Poolakkadu	31	Poolakkad	29	10
44	Thottingal	32	Puthupallitheruve	35	6
45	Puthupally theruvu	32	Puthupallitheruve	27	4
46	Bharatnagar	32	Puthupallitheruve	27	9
47	Vennakkara	34	Vennakkara	32	4
48	Vennakkara Power house	34	Othugode	30	6
49	Milakudheen Nagar	34	Othugode	29	2
50	Vennakkara Bishop house	35	Vennakkara	26	10
51	Othunagode	36	Thirunellai	42	12
52	Thirunellai	36	Thirunellai	45	8
53	Kallikkad	37	Kallikkad	20	9
54	Pirayiri Chungam	37	Kallikkad	25	8
55	Mercy College	38	Kaikuthuparambu	27	6
56	Kaikuth paramb	39	Nurani	21	11
57	Kurikkalpadam	40	Villunni	26	8
58	Pattanitheruv	40	Villunni	30	5
59	Harrikkara theeram	41	Municipal office	25	5
60	Pattikkara	42	Pattikkara	23	4
61	Ambethkar colony	42	Pattikkara	28	4
62	Palli street	42	Pattikkara	22	4
63	Police Quarters	43	Vadakkanthara East	27	6
64	Sreeramapalayam	44	Sreeramapalayam	22	9
65	Moothanthara	45	Melamuri	26	7
66	L P Madam	46	Valiyagadi	32	8
67	V K Nagar	47	Pallippuram	21	6
68	Kalampuzha	48	Mepparambu	23	6
69	Pezhumkara	48	Mepparambu	21	8
70	Karakkudi	48	Mepparambu	38	5
71	Moothankara 1	49	Karnakinagar west	20	5
72	Moothankara 2	49	Karnakinagar west	25	5
73	Manakkalthodi	50	Vadakkanthara	20	4
74	Kozhiparambu	50	Vadakkanthara	22	4
75	Jainimedu	51	Jainimedu	30	10
76	Pookkarathottam	52	Olavakkode South	26	8

Source: ICDS Palakkad

Table 18.10 Physical Status of Anganwadies in Palakkad municipality

Physical status	Percentage
Own building	60.53
Rented building	35.53
Rent less building	3.95
Toilet	97.37
No Baby friendly toilet	100.00
Electrified	98.68
Boundary wall	75.00
Drinking water	100.00
Gas connection	100.00
Kitchen	100.00

Source: ICDS Palakkad

Inadequate infrastructural facilities seem to be the major constraint to effective functioning of anganwadis. Out of 76 units, 46 units have their own building and 30 units don't have their own building. 98.68% of anganwadi units have electricity connection. The sanitary conditions in the anganwadis are generally satisfactory. All units have sanitation facility, however they are not baby friendly. All the units have kitchen and gas connection. Drinking water facilities are found to be satisfactory. 75% of the anganwadi units (57 no.s) have boundary wall. Table 18.10 gives the physical status of anganwadi units in Palakkad town.

18.3 POVERTY ALLEVIATION PROGRAMMES

Urban Poverty alleviation involves: (i) upgrading the physical environment in poor settlements by providing basic services such as water, sanitation, waste collection, storm drainage, access roads and street lighting; (ii) regularizing security of land tenure and housing; and (iii) instituting a social support program focused on promoting sustainable livelihoods through the accumulation of natural, physical, human, social, financial as well as institutional and knowledge/information assets.

18.3.1 Public Distribution System

Targeted Public Distribution System (TPDS) was introduced in the country following the failure of the Universal Public Distribution System to serve below the poverty line and poorest of the poor households. It is being implemented in the country through a three-tier structure which consists of Antyodaya (AAY), PHH (Priority Household) and APL (Above Poverty Line) households. Under the targeted PDS, food grains are being distributed to BPL households at heavily subsidised prices and to APL households at marginally subsidised prices.

Kerala has achieved significant milestones in the reform of the public distribution system through the implementation of the e-PDS project and the model pilot scheme of computerised ration shops. The table 18.11 Shows the details of ration shops and ration card holders. There are 42 ration shops under Public distribution system in Palakkad municipality. Total number of card holders are 38,767.

Table 18.11 Details of Ration Shops & Ration Card Holders

Sl. No.	Ration shop (ARD) No.	Location	No. of Ration card holders				No. of NE cardholders
			APL		BPL	AAY	
			APL	APLSS			
1	ARD1	Kalpathy	555	418	44	8	2
2	ARD 2	Ambikapuram	426	445	34	12	2
3	ARD3	Valiyapadam	479	379	33	27	1
4	ARD4	Puthur	883	540	76	47	8
5	ARD5	Kalmandapam	476	377	62	26	-
6	ARD6	Ayyapuram	309	250	152	41	6
7	ARD7	Tharekkad	603	255	23	4	-
8	ARD8	Parakkunnam	460	331	132	59	1
9	ARD9	Koppam	764	499	39	13	3
10	ARD10	Mankavu	153	135	30	27	-
11	ARD11	Harikara street	129	159	4	5	-
12	ARD12	Kunnathurmedu	447	529	36	27	3
13	ARD13	Near civil station	300	275	60	41	2
14	ARD14	West yakkara	693	699	190	75	5
15	ARD15	Puthupalli theruvu	533	472	35	10	2
16	ARD16	Thirunellayi	117	189	4	3	4
17	ARD17	Nurani	253	372	4	14	2
18	ARD18	Nurani	300	295	7	41	1
19	ARD19	Pattani Theruvu	281	360	87	48	2
20	ARD20	Pension Street	367	289	21	8	1
21	ARD21	Pattikkara	104	208	34	28	-
22	ARD22	Karnaginagar	319	502	95	39	-
23	ARD23	Chavalakkara Theruvu	214	292	57	32	-
24	ARD24	Pallipuram	436	309	54	14	1
25	ARD25	Vadakkanthara	607	506	69	23	3
26	ARD26	Mepparambu	362	340	24	19	1
27	ARD27	Jainimedu	289	388	63	14	-
28	ARD28	Olavakkode	932	627	36	34	3
29	ARD104	Kallepully	658	560	64	19	12
30	ARD105	Manali	241	128	2	2	-
31	ARD106	Mankavu	679	617	42	29	1
32	ARD107	Manapullikavu	744	628	142	47	5
33	ARD108	Vennakara East	749	740	81	44	1
34	ARD109	Pallitheruvu	189	255	47	17	3
35	ARD110	Meparambu	365	573	34	27	1
36	ARD111	Karakodi	243	437	46	24	4
37	ARD119	N K Palayam	322	323	67	28	-
38	ARD123	Kunnampuram	207	381	116	17	-
39	ARD131	Vennakara	386	721	62	9	5
40	ARD155	Karnaginagar	347	504	82	24	-
41	ARD158	Kallikkad	542	748	125	63	6
42	ARD159	Nehru colony	245	389	90	21	3

Source: Taluk supply office, Palakkad

18.3.2 Ayyankali Urban Employment Guarantee Scheme (AUEGS)

Ayyankali Urban Employment Guarantee Scheme (AUEGS) aims at enhancing the livelihood security of people in urban areas by guaranteeing hundred days of wage-employment in a financial year to a urban household whose adult members volunteer to do unskilled manual work. It aims to provide a strong, rights-based social safety net for the people in the urban areas of Kerala by giving a fallback employment source, when other employment alternatives are scarce or inadequate.

The scheme is implemented by Directorate of Urban Affairs, Government of Kerala. The Ayyankali Urban Employment Guarantee Scheme mainly focuses on the people in urban areas. During the year 2019 - 2020, 267 households and 273 persons from Palakkad municipality were registered under AUEGS and the amount of wages disbursed during this period was about 8.42 lakhs.

18.3.3 Pradhan Mantri Awas Yojana (PMAY)

PMAY scheme is implemented through 4 verticals giving options to beneficiaries, ULBs, and State governments. They are:

1. "In - situ" slum redevelopment
2. Affordable housing through credit linked subsidy scheme
3. Affordable housing in partnership, and
4. Subsidy for beneficiary - led individual housing construction.

The total number of beneficiaries identified under PMAY project of Palakkad municipality are 7,424, in which 2,785 families who has their own land to build opted for beneficiary - led construction. The rented or landless families derived from PMAY demand survey is around 3,077.

18.3.4 LIFE mission

LIFE Mission is the mission of the Government of Kerala to provide employment for all homeless people in the state from 2016 to 2020, and to provide employment for the livelihood and to take decent role in social activities. The purpose of the mission is to provide the benefit of all social welfare schemes including financial services, and to provide safe and affordable housing for the beneficiaries.

The main aim of the scheme is to construct houses for the landless and houseless in Kerala and the scheme is purely under the Government of Kerala. Under the LIFE mission scheme, there are 5,125 beneficiaries identified in Palakkad municipality. Out of these, 4,053 beneficiaries are landless and houseless, 567 beneficiaries are houseless and 505 beneficiaries are not considered for the scheme. 280 houses are constructed in the last 5 years under LIFE mission.

18.3.5 Kudumbashree

The **State Poverty Eradication Mission (SPEM)**, popularly known as the **Kudumbashree Mission** is the State government's instrument for poverty eradication under the Local Self-Government Department started in 1998. Kudumbashree has a three-tier structure for its women community network, with Neighbourhood Groups (NHGs) at the lowest level, Area Development Societies (ADS) at the middle level, and Community Development Societies (CDS) at the local government level. Several programs are undertaken by the Kudumbasree sub units for poverty alleviation through women's empowerment.

A Community Development Society (CDS) and, under that, 52 Area Development Societies (ADS) and 882 neighbourhood groups/SHGs. There are 266 enterprises in Palakkad municipality. 121 enterprises belong to Palakkad north and 145 belongs to Palakkad south. Number and distribution of neighbour help groups in Palakkad municipality is shown in table 18.12.

Table 18.12 Number and distribution of women self help groups in Palakkad municipality

Ward No.	ADS name	Total NHG	No. of enterprises	Ward No.	ADS name	Total NHG	No. of enterprises
1	Priyadarsini	16		27	Aishwarya	18	5
2	Gayathri	22		28	Anugraha	14	17
3	Deepika	24		29	Thejas	13	21
4	Kairali	34	1	30	Star	31	13
5	Udhaya	14	5	31	Soumya	21	
6	Gokulam	20	73	32	Souhrutha	14	1
7	Safalyam	17	1	33	Akshara	13	6
8	Santhwanam	22		34	Titanic	26	13
9	Pratheeksha	29		35	Manasa	21	8
10	Surabhi	17	21	36	Amrutha	24	2
11	Vismaya	11	5	37	Kallikkad	11	2
12	Vinayaka	16	1	38	Pulari	12	3
13	Sreeragam	16		39	Navodhaya	10	2
14	Sangamam	17	6	40	Ushas	10	1
15	Anamika	13		41	Nayana	5	2
16	Bismi	18		42	Thriveni	17	13
17	Sreyas	32		43	Janani	11	8
18	Suryodhayam	14		44	Dharshana	12	4
19	Swasraya	15		45	Durga	23	1
20	Gangothri	17		46	Bavana	7	2
21	Sujaya	9	1	47	Chaidhanya	12	1
22	Kripa	16	3	48	Thanal	11	8
23	Keerthy	13	1	49	Karnaki	13	1
24	Indira	19		50	Durgashree	18	7
25	Varsha	22	1	51	Devi	23	2
26	Sowparnika	10	2	52	Alameen	19	2
Total NHG = 882				**Total enterprises = 266**			

As per the Section 284 of the Kerala Municipality Act 1994, 2% of the income of each ULB is to be spent for Urban Poverty Alleviation Programme. The ULBs are transferring such amount to the CDS annually, as its share for UPA budget. The other sources of income to the CDS for UPA activities, include the transfer from GOK under Kudumbasree centrally sponsored UPA programmes and institutional finance for Self Help Groups.

18.3.6 Slum Improvement Programmes

There are 22 slums in Palakkad municipality which are already listed in table 14.3 of Chapter 'Housing'. Various slum improvement programmes are implemented in the municipality like *Valmiki Ambedkar Awas Yojana* (VAMBAY), National Slum development Programme (NSDP) and Integrated housing & Slum Development Programme (IHSDP) of which details and explanations are given in Chapter 14 (Housing).

18.4 INFERENCE

33.13% of the total households in Palakkad municipality are Below Poverty Line. SC population constitutes nearly 7.69% of the total population in the municipality, where as ST population is very low (0.16%) in Palakkad municipality. The SC populations are mainly concentrated in wards having greater concentration of agricultural labourers and cultivators.

There are 21 SC colonies in Palakkad town however there aren't any ST colonies. Development programmes should give priority to the BPL population especially the SC/ST and other socially weaker sections of the society. Also, infrastructure facilities including safe drinking water, electricity, solid waste disposal system etc. should be provided in the BPL concentrated areas.

There are five different pension schemes for the poor and from the analysis number of beneficiaries are increased from the year 2014 to 2019. ADS under Kudumbasree is working in the municipality and self help groups are also functioning in the municipality as part of Kudumbasree. Food for pregnant women, new born babies and lactating women is supplied through Anganwadi. The analysis clearly reveals that the planned development of the town has to be achieved by giving due consideration to economically and socially backward sections of the community.



CHAPTER 19- ENVIRONMENT AND ECOLOGY

19. ENVIRONMENT AND ECOLOGY

Urban areas are facing a range of environmental health challenges including contamination of air, water and soil. Sprawling urban areas contribute to traffic congestion, with associated air pollution, noise and long commuting times affecting public health and productivity across the world. The Kerala State Pollution Control Board (KPCB) is responsible for monitoring water and air quality. It includes under its purview, testing of both surface water and ground water and testing the ambient air quality. In this chapter the present scenario of environment of the town, pollution levels and spatial location of environmentally sensitive areas are described.

19.1 PRESENT SCENARIO

Impact of pollution has been witnessed in the town in the form of quality of air, quality of water (both surface and underground), noise pollution, degradation of the natural resources, low vegetation cover etc. The urban areas in Palakkad municipality are witnessing the impacts of pollution in the form of degrading quality of air, water, natural resources and sound pollution.

19.1.1 Water Pollution

Water pollution occurs when pollutants are discharged directly or indirectly into water bodies without adequate treatment to remove harmful compounds. Water pollution affects plants and organisms living in these bodies of water. In almost all cases the effect is damaging not only to individual species and populations, but also to the natural biological communities.

19.1.1.1 Water Quality of Surface Water Sources

Kalpathy puzha is one of the main tributaries of Bharathapuzha and a part of the river is flowing through the northern portion of Palakkad town. Kannadi puzha, another tributary of Bharathapuzha, is also flowing along the southern boundary of Municipality. The nearest water quality monitoring station in Bharathapuzha is at Parali. The water quality test result of Bharathapuzha river at Parali station in is shown in table



Kalpathy puzha



Kannadi puzha

Table 19.1 Water quality of surface water source tested at station Parali

Sl No.	Parameter	Obtained value					Permissible Limit for Drinking Purpose
		2014	2015	2016	2017	2018	
1	pH	7.5	7.5	6.8	7.4	7.2	6.5-8.5
2	Total Dissolved Solids (TDS) (mg/L)	82	300	90	208	115	500
3	Total hardness as CaCo3 (mg/L)	56	140	50	45	56	200
4	Calcium Hardness (Ca) (mg/L)	36	80	40	27	42	75
5	Magnesium hardness (Mg) (mg/L)	20	60	10	18	14	0.1
6	Sulphates(SO_4) (mg/L)	0.37	34	7	0.12	2	200
7	Nitrates (NO_3) (mg/L)	0.0378	0.4	1.27	0.275	0.58	45
8	Chlorides (Cl) (mg/L)	16	86	17	94	30	250
9	Fluorides (F) (mg/L)	0.059	0.09	0.212	0.223	0.081	1
10	Alkalinity (mg/L)	48	120	42	47	44	200
11	Temperature (^{0}C)	34	32.5	27	28	26	40
12	Total Coliform	700	330	260	240	520	0 per 100 ml

Source: Kerala Pollution Control Board

The values obtained from Bharathapuzha river tested at station Parali shows that all chemical parameters of water except the total coliform are within the permissible limits. The presence of high levels of coliform indicates contamination from surface or shallow sub-surface sources such as soil, septic or cesspool leakage, animal feed lot runoff and treatment failures.

19.1.1.2 Ground Water Quality

Open well water is often used for drinking, irrigation and other domestic uses. Bore well water is used for both Industrial and domestic purposes. The observations of water quality at open well at town bus stand well and bore well at DTPC ground well is shown in table 19.2 and 19.3 respectively. For both open well and bore well samples, parameters such as pH, hardness, Alkalinity etc. have crossed the acceptable limits.

From the available data the pH value and iron content is not within the acceptable limit for drinking purpose. Water may get turbid when directly pumped from well. This may be the reason for turbid water from Malampuzha. pH value of well indicate alkaline nature to water and drinking water with a pH level above 8.5 indicates that a high level of alkalinity minerals is present. High alkalinity does not cause a health risk, but can cause aesthetic problems, such as an alkali taste to the water that makes coffee taste bitter; scale build-up in plumbing; and lowered efficiency of electric water heaters.

Table 19.2 Quality details of Ground Water from open well at DTPC ground

Open well at DTPC GROUND							
Sl No.	Parameter	Obtained value					Permissible Limit for Drinking Purpose
		2014	2015	2016	2017	2018	
1	pH	8.9	8.3	8.5	8.4	7.2	6.5-8.5
2	Total Dissolved Solids (TDS) (mg/L)	330	300	312	264	270	500-2000
3	Total hardness as CaCo3(mg/L)	94	175	135	180	165	300-600
4	Alkalinity (mg/L)	182	174	174	74	176	200 -600
5	Sulphates(SO_4) (mg/L)	-	13.9	16.5	8.6	-	200-400
6	Nitrates (NO_3) (mg/L)	-	-	-	-	-	45-100
7	Chlorides (Cl) (mg/L)	71.5	61	70.4	64	60	250-1000
8	Iron (Fe)	1.5	8	7.2	-	-	0.3-1
9	Calcium Ca (mg/L)	49	34	22	38	36	75-200
10	Magnesium Mg (mg/L)	17.4	22	19.5	21	18.3	30-100

Table 19.3 Quality details of Ground Water from bore well inside Town bus stand

Bore well inside Town bus stand							
Sl No.	Parameter	Obtained value					Permissible Limit for Drinking Purpose
		2014	2015	2016	2017	2018	
1	pH	8.4	8.3	8.4	8.4	9.1	6.5-8.5
2	Total Dissolved Solids (TDS) (mg/L)	114	162	324	186	702	500-2000
3	Total hardness as CaCo3(mg/L)	66	95	165	120	120	300-600
4	Alkalinity (mg/L)	38	68	116	104	104	200 -600
5	Sulphates(SO_4) (mg/L)	-	10.2	36.6	8.6	-	200-400
6	Nitrates (NO_3) (mg/L)	-	1	0.8	-	-	45-100
7	Chlorides (Cl) (mg/L)	32	26	105	28	22	250-1000
8	Iron (Fe)	-	3.6	0.06	4.6	-	0.3-1
9	Calcium Ca (mg/L)	20.4	32	20	48	28	75-200
10	Magnesium Mg (mg/L)	3.7	3.7	28	9.8	12.2	30-100

Source: Kerala Pollution Control Board

19.1.1.3 Ground Water Table

It is necessary to assess the quality of the ground water in order to protect the health of the human habitants and the conservation of the water system. Figure 19.1 and 19.2 shows the hydrograph observation from open well at Town bus stand and bore well at DTPC respectively. From the hydrograph observations, the depth of water level generally varies from 3 mbgl and 9 mbgl for bore well (Well no: 127) and 5 mbgl and 18 mbgl (Well no: 160 PKD -8) for open well. The hydrograph observations show that the ground water level decreased during summer season which leads to acute

shortage of water. From the given hydrograph trend, the sub surface water level is observed to be increased and this may be due to the increase in rainfall and water logging.

From the observations in the bore well, average water level is decreased from 9.1 mbgl (01-06-2005) to 11.5 mbgl (01-06-18). From the observations in the open well, average water level is increased from 6.1 mbgl (01-06-2005) to 5.6 mbgl (01-06-18). Long term ground water level trend indicate a fall in water level during pre-monsoon period. The decreased trend of ground water level indicate over exploitation of ground water rather than recharging.

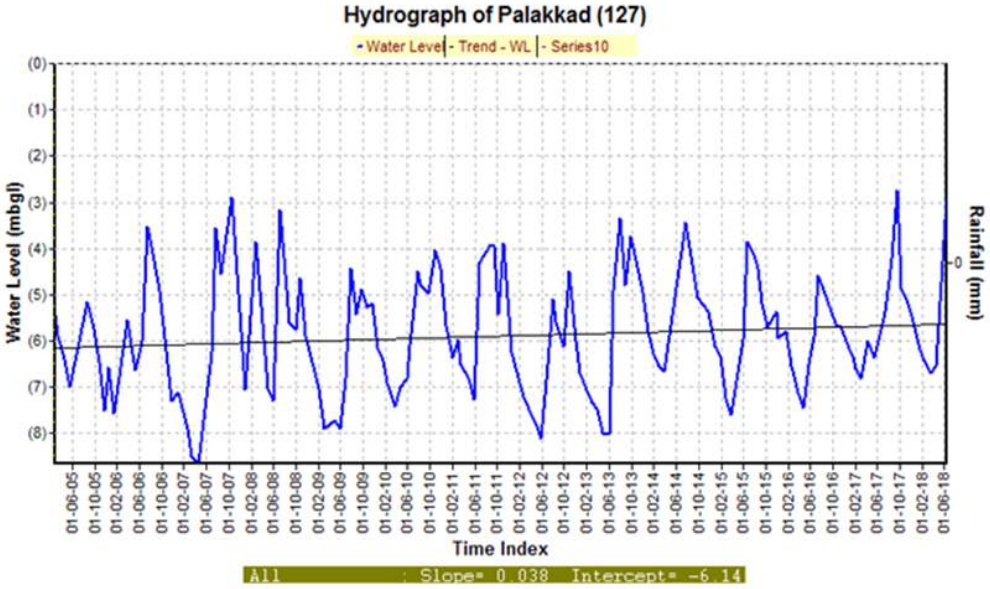


Fig. 19.1 Hydrograph observation from open well at Town bus stand

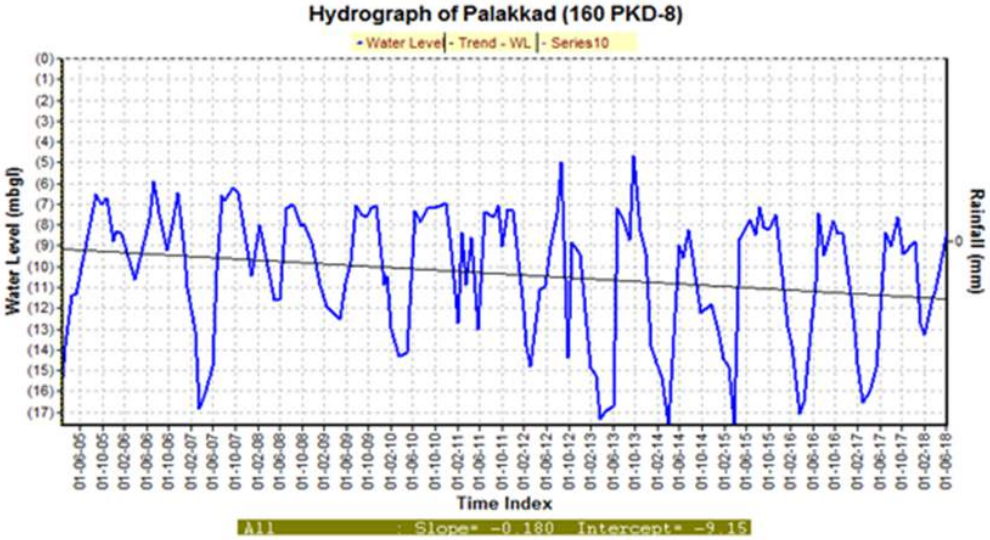


Fig. 19.2 Hydrograph observation from bore well at DTPC ground

Source: Ground water department

19.1.2 Land Pollution

Land pollution is the deposition of solid or liquid waste materials on land or underground in a manner that can contaminate the soil and groundwater, threaten public health, and cause unsightly conditions and nuisances. Solid wastes are

usually thrown out on empty plots and on road side. The waste mounds cause health hazard for the residents, apart from being a visual sore eye. Table 19.4 shows the locations of solid waste disposals in Palakkad municipality.

Palakkad Municipality has its own solid waste management system. However waste are disposed in certain locations within the municipality as shown in figure 19.3, 19.4, 19.5, 19.6. Efforts to improve the solid waste management in the town were made by the Health Department wing of Municipality. Treatment of solid waste from the source itself is being promoted, Thumburmuzhi model waste treatment plants are provided at various locations and non bio degradable wastes are being collected with the help of Haritha Karma Sena. The collected waste is transported to the solid waste treatment plant in Kodumbu Grama Panchayat which is about 8km from the town, where it is baled or shredded and subsequently handed over to Clean Kerala Company.

Table 19.4 Locations of solid waste disposal in Palakkad municipality

Sl no	Location	Quantity	Type of solid waste
1	Melamuri vegetable market	10 tonnes	Garbage from market
2	Kalmandapam Canal road	2 tonnes	Bio degradable and Non biodegradable
3	Kalmandapam bypass	1.5 tonnes	Bio degradable and Non biodegradable
4	Ganesh nagar & Kailas nagar, Kalpathy	1 tonne	Non bio degradable
5	Neelikad		Bio degradable and Non biodegradable
6	Olavakkode railway cross, Pezhumkara - Mepparambu road		Bio degradable and Non biodegradable
7	Mepparambu junction	2.5 tonnes	Bio degradable and Non biodegradable
8	Near Mercy college junction, opposite Welcare hospital		Bio degradable and Non biodegradable
9	Chakkanthara	1.75 tonnes	Bio degradable and Non biodegradable
10	Noorani	1 tonne	Bio degradable and Non biodegradable
11	Manjakulam pally road	2.5 tonnes	Bio degradable and Non biodegradable
12	Valiyangaadi market road	75 kg	Biodegradable
13	BOC road	7 tonnes	Bio degradable and Non biodegradable
14	DPO road		Bio degradable and Non biodegradable
15	Rear side KSRTC	1.5 tonnes	Bio degradable and Non biodegradable
16	Puthupally street	1 tonnes	Bio degradable and Non biodegradable
17	Near Rugmani nursing home, Noorani	1500 kg	Non bio degradable
18	Vennakkara	2 tonnes	Bio degradable and Non biodegradable
19	Thirunellayi - Yakkara road (Near Thangam hospital)	3 tonnes	Bio degradable and Non biodegradable
20	Thirunellayi palayam - Mercy college junction	1 tonne	Bio degradable and Non biodegradable
21	Near Pallipuram UP school	75 kg	Bio degradable and Non biodegradable
22	GUPS RB kudam	1 tonne	Non bio degradable
23	Vithunni road	200 kg	Bio degradable and Non biodegradable
24	Manjakulam - Mangalam tower road	2 tonne	Bio degradable and Non biodegradable
25	Rear side of Town bus stand	2 tonnes	Bio degradable and Non biodegradable
26	Near Mathrubhumi office, Mattumantha		Bio degradable and Non biodegradable

Source: Service Level Improvement Plan



Fig. 19.3 Melamuri vegetable market



Fig. 19.4 Kalmandapam canal road



Fig. 19.5 Rear side of town bus stand



Fig. 19.6 Manjakulam pally road

30 tons of wastes i.e, 70.18% of waste is collected and transported for disposal in the municipality.

19.1.3 Air Pollution

One of the major areas of environmental concern in the town is that of rising air pollution levels which is the result of increasing personalized modes of transport and intermediate modes of transport such as auto rickshaws in the absence of efficient public transport system in the city.

The personalized vehicles make congestion on roads creates pollution. Apart from this, narrow roads carrying high volume of traffic, frequent traffic jams, etc. have been observed creating air pollution along the major roads such GB road, TB road, Big Bazar road, Kalmandapam road etc.

The main contaminants relevant for assessment of air quality are Sulphur Dioxide (SO2), Oxides of Nitrogen (NO2), Respirable Suspended Particulate Matter (RSPM) and Suspended Particulate Matter (SPM). There is no air quality monitoring station within town limits. The nearby location is at Kanjikode, yearly variation of the quality of air at the station is shown in Table 19.5 and figure 19.7.

Table 19.5 Temporal Variation of quality of air near Municipality

Year	Sulphur Dioxide	Nitrogen Dioxide	Respirable Suspended Particulate Matter
2010	3.22	6.17	32.39
2011	2.99	8.86	22.95
2012	3.13	6.98	39.33
2013	2.7	4.74	39.26
2014	2	6.41	40.19
2015	2.08	7.6	47.5
2016	2	8.56	41
2017	2	8.96	44
Limit	50	40	60

Source: Kerala State Pollution Control Board

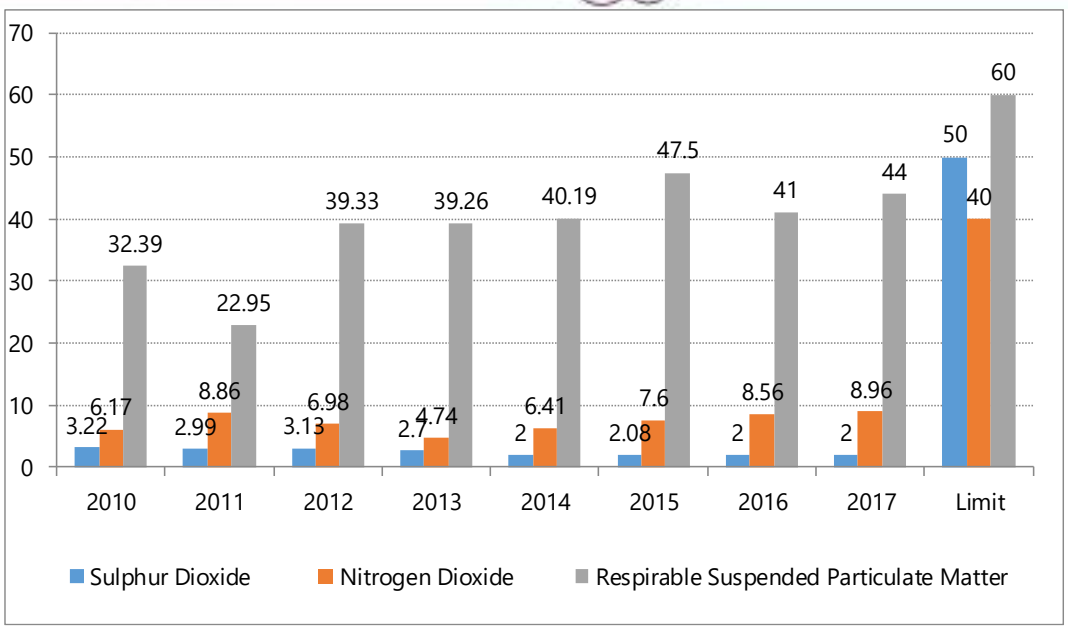


Fig. 19.7 Temporal Variation of quality of air near Municipality

19.1.4 Noise Pollution

Noise pollution due to vehicular traffic is a general problem in the traffic corridors and commercial centres. Control measures are to be taken to regulate the noise pollution due to vehicular traffic near public institutions like schools, colleges and hospitals. Noise level data of Palakkad town is not available with Kerala State Pollution Control Board.

19.2 ECOLOGICALLY SENSITIVE ZONES OR FRAGILE AREAS

Ecologically Sensitive Areas (ESAs) are to be viewed as areas where human activities will continue, but be prudently regulated under the Environment (Protection) Act, 1986. ESAs are not at all meant to stop development in ways that would hurt local people, but to ensure that development is environment friendly and people oriented, as well as serve to preserve the ecological heritage on a long term basis. Ecologically sensitive areas of the Palakkad Town include surface water sources (river, rivulets, ponds), and paddy fields.

19.2.1 Surface Water Sources

Surface water sources constitute about 1.39 sq. km. of total area of Palakkad town which is 5.542% of the total municipal area. 1.14% out of the 5.54% of the surface water sources belongs to ponds. This constitutes an area of 0.304 sq. km of the municipal area. 0.058 sq. km of the ponds are either filled or dried out.

The northern and southern boundary of Palakkad municipality is bounded by Kalpathy river and Kannadi river respectively. Both of them are the tributaries of Bharathapuzha. The main natural drains in Palakkad town includes Sankuvara thodu, Ramanathapuram thodu, Manapullikavu - Thirunellayi thodu, Vadakumthara thodu etc. The details of natural drains in the Palakkad town is given in table 19.6.

Figure 19.8 shows the spatial distribution of waterbodies in the Palakkad town. Like every other river sand mining is a problem in Kalpathy puzha. Illegal sand mining and, unauthorized constructions and water hyacinths are killing the Kalpathy river.

Table 19.6 Details of natural drains in Palakkad municipality

Sl. No	Name of drain	Length in Km
1	Sankuvara thodu	7.3
2	Ramanathapuram Canal	3.5
3	Manappullikkavu-Yakkara-Thirunellayi thodu	5.5
4	Thirunellayi-Ayodhya Nagar thodu	1.5
5	Chadanankurissi-Thankam Hospital Canal	1.5
6	Manakkal thodu	2.5
7	Vadakkumthara thodu	2.7
8	B.O.C Road Canal	1.25
9	Olavakkodde thodu	-
10	Edathara canal-Vithunni-Thirunellayi	-

Source: Watershed development report, Haritha Kerala mission

There is an ever increasing need for the protection and preservation of surface water sources as they are part of an interrelated system that is paramount when the demand for water exceeds the available supply. They also help in sustaining the water table since major ground water recharge areas like paddy fields are diminishing drastically. Natural drainage like *Thodu* have to be side protected and made free from encroachment.

19.2.2 Paddy Fields

Paddy fields in Palakkad town constitutes an area of 1.54 sq. km. which is 5.83% of the total area. About 4.21 sq. km of paddy land is kept vacant as non cultivated area, which constitute 15.855 % of total land area of the municipality. Fig 19. 8 shows the spatial distribution of paddy fields within the municipality.

The main environmental problem facing are due to paddy reclamation. Paddy fields are being converted for non-agricultural activities. Increased cost of cultivation, labour shortage and less profit leads to crop shift from paddy to other crops. The paddy lands perform a number of ecological functions as feeders of water aquifers and retain the ground water level of the area. Destruction and permanent conversion of this ecosystem will threaten the water security. Another function of paddy field is for offering food security and biodiversity conservation.

Paddy field are usually filled with a water depth of 100 to 150 mm and this standing water is maintained until prior to harvesting. Some water percolates through the heavy soils and moves into the ground as ground water recharge. Most of the percolated water flows back into the rivers and drains and are an important source of water for irrigation reuse or recycling.

An estimated 7 percent goes towards recharging the underground aquifers and this will be an important source of groundwater recharge in the future, when dependence on groundwater supply is expected to increase as competition for surface water increases. In order to conserve paddy land and restrict the conversion/ reclamation of it, Government has enacted "The Kerala Conservation of Paddy and wetland act, 2018".

19.2.3 Sacred Groves

A sacred grove or sacred woods are any grove of trees that are of special religious importance to a particular culture. They are traditional socio cultural mechanisms aiming at nature conservation involving many taboos, rituals, and other religious practices. Sacred groves known as "Kavu", a garden or consortium of trees. These are like mini forest. Food chain and food web inside these kept population of

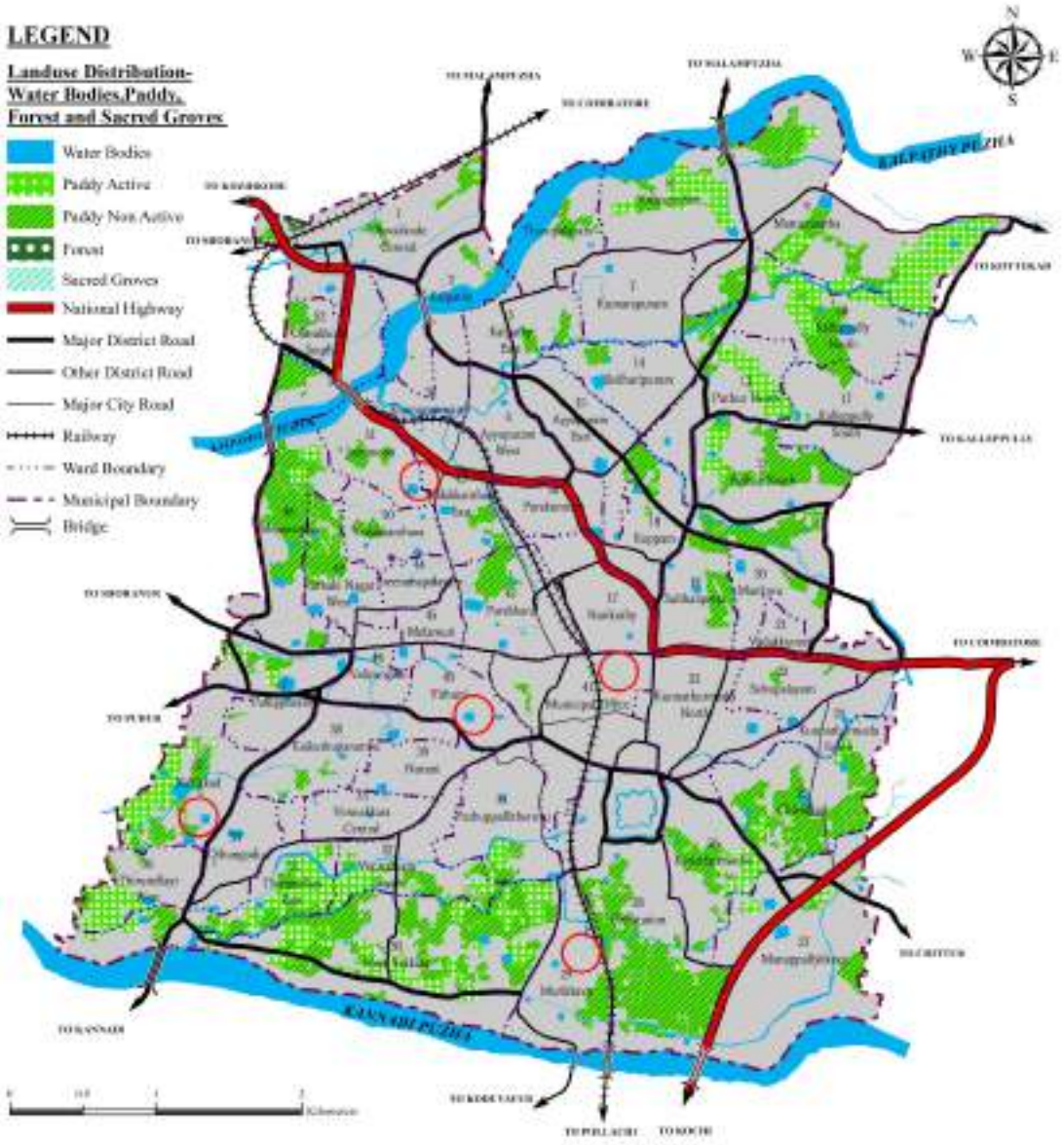


Fig. 19.8 Spatial distribution of Ecologically Sensitive Areas

wild life under control.

There are sacred groves in Palakkad municipality at 5 locations. They area Murikkavu (Ward 29), Kallikad (Ward 37), Vithunni (Ward 40), Municipal office (Ward 41) and Vadakkanthara east (Ward 43). They constitute an area of 0.216 hectares which is about 0.008% of the total municipal area. Figure 19.8 shows the location of sacred groves in Palakkad municipality.

19.3 INFERENCE

Existing paddy fields and water bodies need to be conserved. Existing water bodies has to be protected by preventing discharge of sewage and dumping of solid waste into it. Solid wastes are usually thrown out on empty plots and on road side causes land pollution. The waste mounds cause health hazard for the residents, apart from being a visual sore eye.

From Water quality data obtained from Bharathapuzha river tested at station Parali shows that all chemical parameters of water except the total coliform are within the permissible limits. The presence of high levels of coliform indicates contamination from surface or shallow sub-surface sources. The observations of water quality at open well at town bus stand well and bore well at DTPC ground well shows that the parameters such as pH, hardness, alkalinity etc. have crossed the acceptable limits.



CHAPTER 20- DISASTER MANAGEMENT

20. DISASTER MANAGEMENT

20.1 INTRODUCTION

Nature is the source of life but when challenged, it also has the ability to destroy the whole life structures. A natural event assumes the shape of a disaster when it causes large-scale destruction of physical infrastructure, creates isolated islands of people snapping them from the supply of food & water leading to loss of lives and livelihood. It unearths and challenges the power structure of an affected society, disrupting livelihood strategies and deconstructing social arrangements. Floods, Earthquakes, Landslides, Tsunami, Cyclones etc. are the most common hazards all over the world. India, due to its unique geographical character, faces natural disasters every year, which cause massive harm to lives and property whether it be the floods of Uttarakhand in 2013 or the landslides in Western Ghats of Kerala. The cost of our blind exploitation of natural resources without showing reverence for the delicate balance of nature has severely harmed us and is ongoing relentlessly.

Triggered from the abnormally heavy rainfall, Kerala beheld a catastrophic flood in 2018 which is the worst deluge experienced in Kerala since 1924. The deluge has created unprecedented damage to eight districts in Kerala and resulted in the loss of 488 human lives. The magnitude of damage to houses was too large forcing 14.51 lakh people from 3.91 lakh families to move away from their houses to relief camps provided by the state government. Thousands of houses, shops, commercial buildings, public buildings were either completely destroyed or partially destroyed due to the devastating flood.

Natural disasters are not always natural. Now we accept that human activity itself has created conditions for disaster events. Each disaster presents an opportunity to learn from it. In light of the devastating experience we had gone through in 2018, the present report focuses on disaster management plans for the Palakkad Town, emphasizing flood and drought mitigation measures.

20.2 NATURAL HAZARD PROFILE OF PALAKKAD DISTRICT

The district has been vulnerable, in varying degrees, to a large number of natural disasters on account of its unique geo-climatic conditions (Tropical Savanna Climate (Köppen Climate Classification Aw)). The region falls under multiple hazard zone and is highly vulnerable to floods, droughts, earthquakes, landslides, lightning and forest fires. The following table 20.1 shows the hazard seasonality of various disasters based on past occurrences.

Table 20.1 Hazard Seasonality of Palakkad district (Source: DDMA, 2015)

Disaster	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Flood												
Drought												
Forest Fire												
Lightning												
Earthquake												

Table 20.2 shows a matrix of past disasters that occurred in the Palakkad district. The data befits to a period of 2010 - 2014 as sourced from District disaster management plan 2015.

Table 20.2 Matrix of past disasters in Palakkad district (Source: DDMA, 2015)

Sl no		Flood	Earthquake	Landslide	Drought	Lightning
1	No. of affected villages	135	3	2	6 taluks	1
2	Population affected	6980	0	0	0	0
3	Cultivated area affected (Ha)	8073.29	0	0	11313	0
4	Estimated area of crop loss	766,822,220	0	0	976,337,500	0
5	No. of houses damaged	6734	0	0	0	0
6	Estimate cost of houses	221lakh	0	0	0	0
7	No. of casualties	19	0	0	0	0

20.2.1 Flood

A study by the National Centre for Earth science studies (NCESS) in 2010 revealed that 12.66% of the area under the Palakkad district is prone to the risk of flooding which would be around 567 sq.km. In 2018, the district received 2378 mm of rainfall, far exceeding the annual average which is around 2110 mm, which raised the benchmark of runoff water resulting in floods along with localized landslides aggravating the condition. As per the study report of Central Water Commission (CWC) on Kerala Floods 2018, 08th and 09th of August 2018 witnessed a sharp rise in inflow of water to the Malampuzha Reservoir. Despite absorbing nearly 50% of the inflow, the impounding structure had to shell out 48 million cubic meters of water resulting in the inundation of low-lying areas and aggravating the situation in floodplains of Palakkad. Another instance of similar nature with lesser inflow occurred during 15th to 17th of August 2018 sustaining the flood conditions. Taluk-wise details of past flood events of

Palakkad are mentioned in table 20.3 and a map (Fig 20.1) representing the Flood-affected area of Palakkad generated from Kerala state Disaster management Authority

Table 20.3 Taluk wise details of past flood events in Palakkad district (Source: DDMA, 2015)

Taluk	Details	Flood				
	Year	2010	2011	2012	2013	2014
Chittur	No of affected villages	20	22	0	21	23
	Population Affected	648	740	1820	1128	20
	No. Of Houses Damaged	162	185	455	282	5
	Estimated cost of house damages in Rs.	525190	778445	1084180	769750	0
	No. Of casualty	0	0	0	1	0
Pattambi	No of affected villages	0	0	0	0	16
	Population Affected	0	0	0	0	0
	No. Of Houses Damaged	0	0	0	0	84
	Estimated cost of house damages in Rs.	0	0	0	0	612272
	No. Of casualty	0	0	0	0	0
Mannarkad	No of affected villages	25	25	25	25	19
	Population Affected	598	611	536	557	322
	No. Of Houses Damaged	275	295`	202	289	88
	Estimated cost of house damages in Rs.	589300	463700	430000	678200	115400
	No. Of casualty	4	1	0	0	0
Palakkad	No of affected villages	30	0	0	0	0
	Population Affected	0	0	0	0	0
	No. Of Houses Damaged	390	310	168	335	20
	Estimated cost of house damages in Rs.	2533600	970180	380400	1937480	122100
	No. Of casualty	0	0	0	0	0

Ottapalam	No of affected villages	41	41	41	41	23
	Population Affected	0	0	0	0	0
	No. Of Houses Damaged	181	561	163	379	67
	Estimated cost of house damages in Rs	375000	1585000	799290	3365350	329930
	No. Of casualty	1	3	0	0	0
Alathur	No of affected villages	0	0	0	0	0
	Population Affected	0	0	0	0	0
	No. Of Houses Damaged	656	224	274	202	482
	Estimated cost of house damages in Rs.	10 Lakh	7 Lakh	15 Lakh	8 Lakh	25 Lakh
	No. Of casualty	3	0	1	0	5

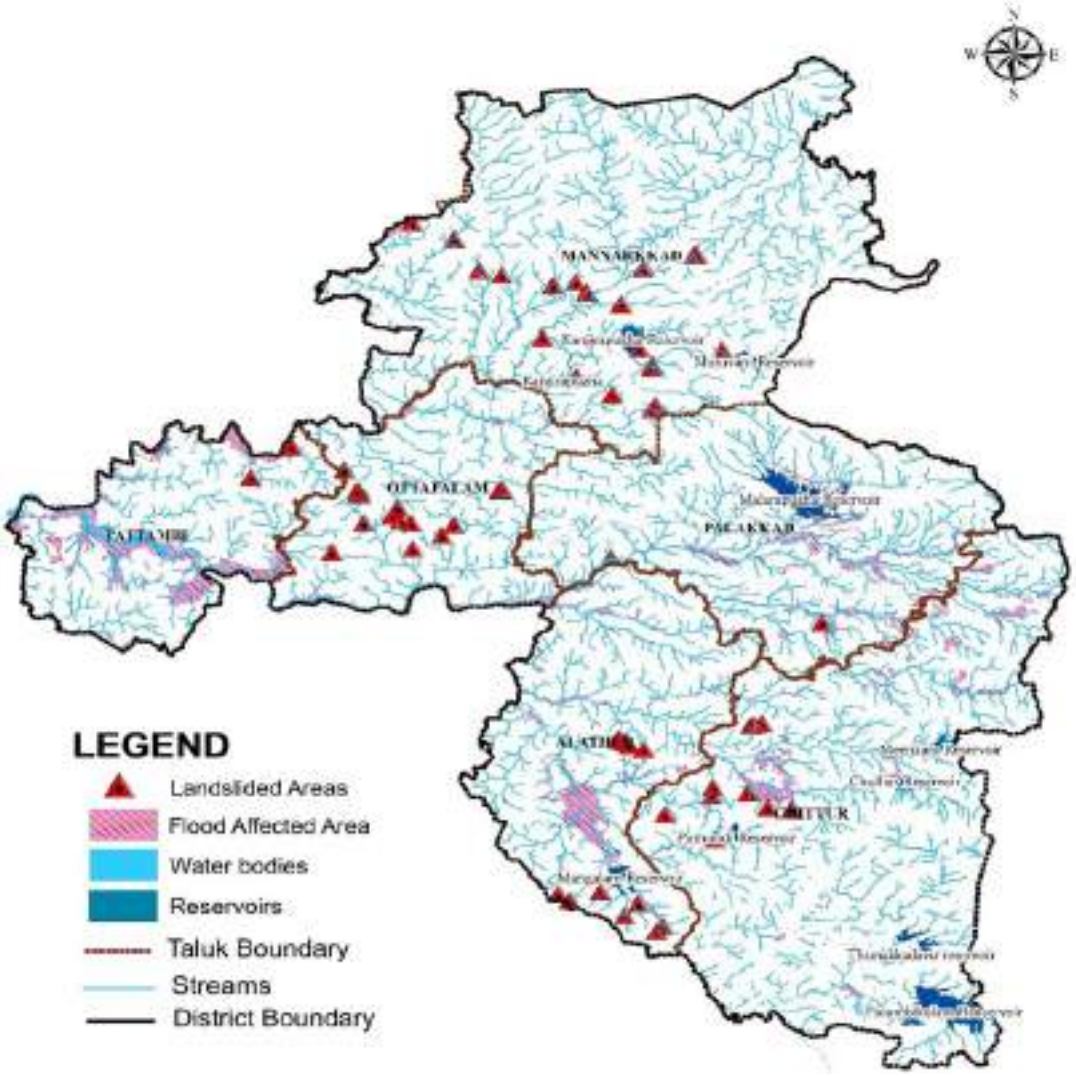


Fig 20.1 Flood affected areas of Palakkad

Spatial representations of other disasters and their likelihood locations are shown below. Further analysis is limited as the scope of this report is mainly regarding floods.

20.2.2 Drought

Drought is a recurrent phenomenon in Palakkad. Even though Palakkad has the maximum number of rivers, rivulets, dams and canals in the State, the district experiences severe drought every summer. As per JSA report, Despite getting more than 2,300 mm rain annually, the district has little progress in reusing and recharging infrastructure, developing watersheds or catching rainwater and intensive afforestation. Thus district is ranked 219th rank in terms of water conservation. According to SEOC, a large portion of Chittur taluk and portions of Palakkad and Alathur taluks are severely drought-prone and the worst-hit sector is agriculture with an estimated economic loss of 97 crores. Apart from depleting potable water sources, many regions, particularly the eastern part of the district, are exposed to serious groundwater contamination, which intensifies the drinking water scarcity. According to the groundwater information booklet, the groundwater samples from Chullimedu, Athikod, Kollengod, Koppanur, Kozhinjampara, Nadupuni, Puthunagaram, Chunnambukalthode, Vandithavalam and Nellinmedu regions have recorded Electrical Conductivity (EC) values above normal indicating inland salinity. The groundwater in the regions of Kopanur, Chinnamoolathara and eruthanpathy are contaminated due to fluoride in the range of 1-5.75 ppm. The drought susceptibility map of Palakkad district is shown in fig 20.2.

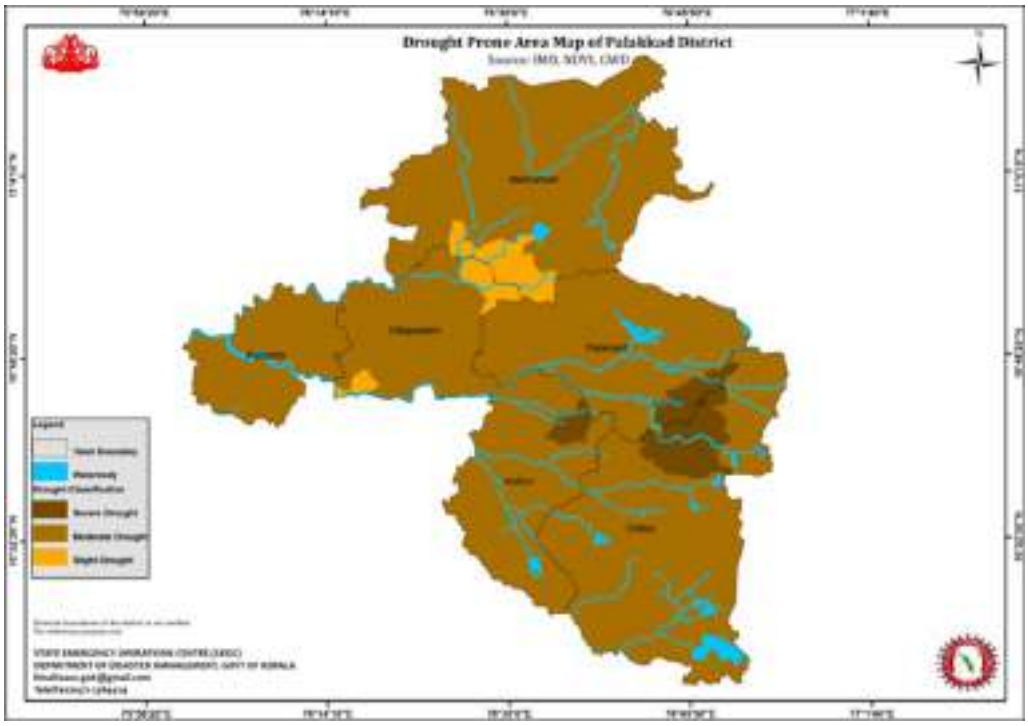


Fig 20.2. Drought prone areas of Palakkad

20.2.3 Landslide

Landslides are frequent in the localized regions of the Western Ghats where the slope is steep and soil is oversaturated as a result of prolonged rainfall. The impact of these events varies from small parcels to large tracts with the large ones involving loss of life and property getting highlighted and investigated in detail. Studies by NCESS show that most of the events are of debris flow type triggered by excess rainfall and are influenced by terrain factors like slope, overburden thickness, land use, relative relief, disposition of streams etc. The recent events of Landslide in Palakkad (Table 20.4) indicate consistency with the past trends in spatial location. The spatial representation showing landslide susceptible zones is given in fig 20.3

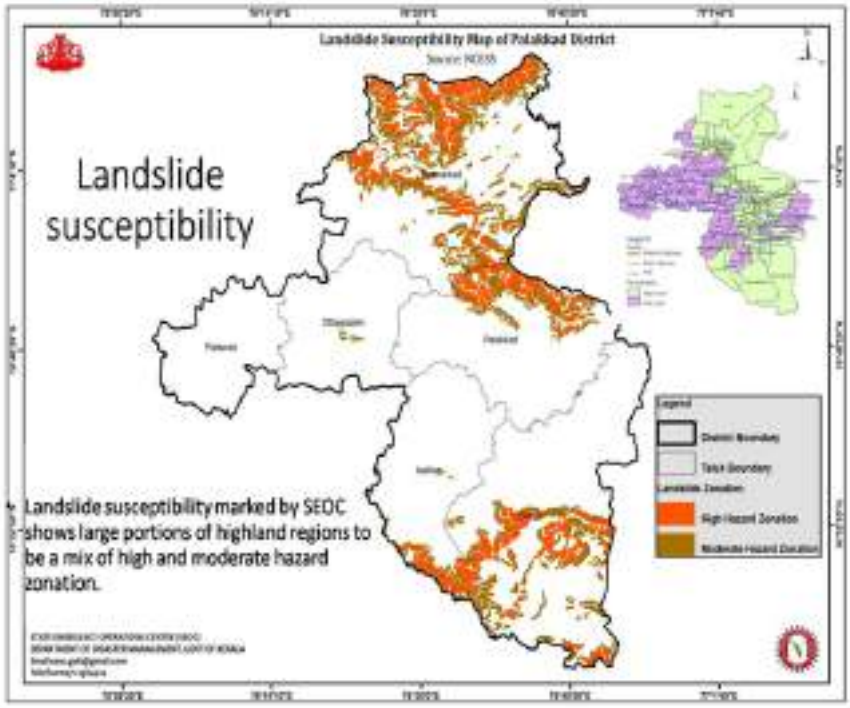


Fig. 20.3. Landslide Susceptibility map of Palakkad

Table 20.4 Review of recent landslides in Palakkad on the 12th of June 2018(Mannarkkad)

Parameters	Event 1	Event 2
Name of the Land	Paypullu	Kundampotti-Vattapara
Village	Palakayam village	Palakayam village
Land use	High Height plantation	High Height plantation in runout area, Rubber planta-tion, Forest at source
Hydrological condi-tion	Dry at source region and flowing at toe area	Flowing
Triggering factor	Rainfall	Rainfall
People affected	One single storied house fully damaged, one partially damaged	Nil

Geo-scientific causes	Natural slope had been benched for cash crops thereby blocking natural drainage. Heavy antecedent rainfall for 3days preceding the event resulted in building up excess pore water pressure and reduction of strength on saturation. Landslide was initiated as planar failure along rock-overburden	Initiated as rockslide dislodging huge boulders that size up to 3m×3m×2m. It further graded into a debris flow collecting more debris and soil, following a natural stream path

(Source: NLSM, GSI)

20.2.4 Earthquake

Palakkad district falls in seismic zone III and has experienced minor tremors in the past. The seismic data of palakkad district for a period of 20 years (1989-2008) is presented in Table 20.5. A spatial representation showing earthquake susceptible areas based on past occurrences is given in fig 20.4.

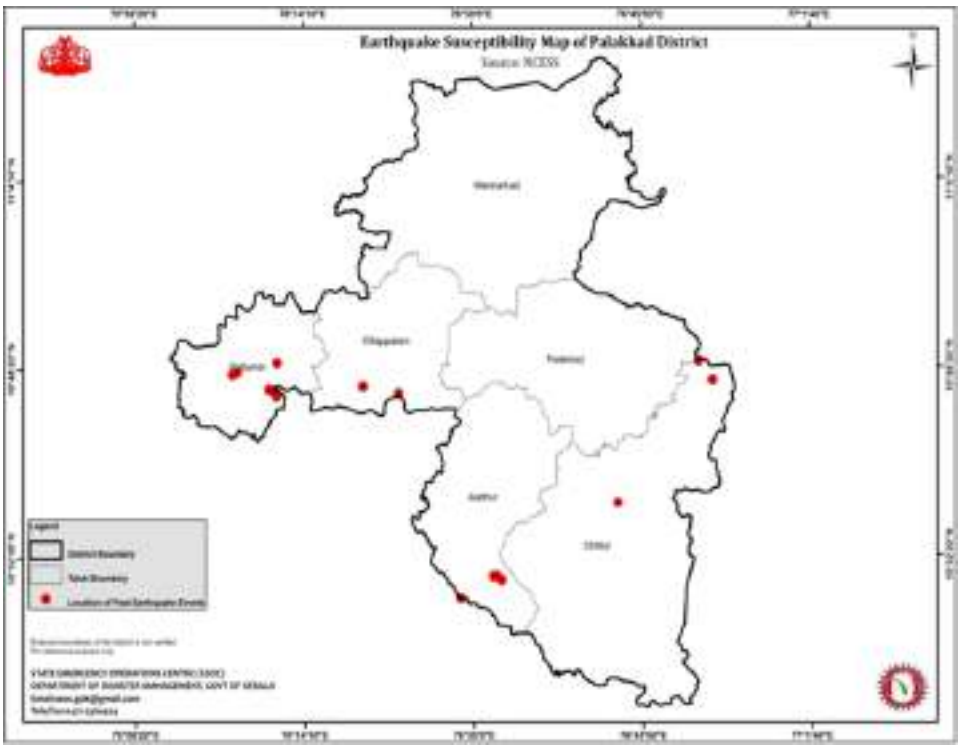


Fig 20.4. Earthquake-prone areas of Palakkad

Table 20.5. Historical Earthquakes reported from Palakkad

Sl.no	Date (dd/mm/yy)	Location		Magnitude
		N°	E°	
1	02/12/1994	10.75	76.25	4.3
2	25/08/2001	10.76	76.25	2.8
3.	17/04/2004	10.81	76.13	1.6
4.	18/04/2004	10.69	76.66	1.5

5.	27/02/2006	10.80	76.57	1.0
6	01/03/2006	10.86	76.32	2.0
7.	25/03/2006	10.76	76.34	1.6
8.	03/06/2006	10.79	76.38	1.6
9.	07/09/2006	10.46	76.57	1.2
10.	30/04/2007	10.83	76.47	0.9
11.	04/05/2007	10.83	76.47	<1
12.	01/12/2008	10.69	76.52	2.3

Source: NCESS & GSI

20.2.5 Lightning

Lightning being a random event, it is impossible to map its spatial probability of occurrence to an aerial extent. Accidents induced by ground conduction from trees and lack of awareness aggravate the condition, intensifying the number of fatalities and property losses. The months of October, November and December have the highest lightning rates, according to data. The most likely time for lightning to strike during the day is between 15:00 and 19:00. The lightning susceptible regions based on past experiences is shown in fig 20.5.

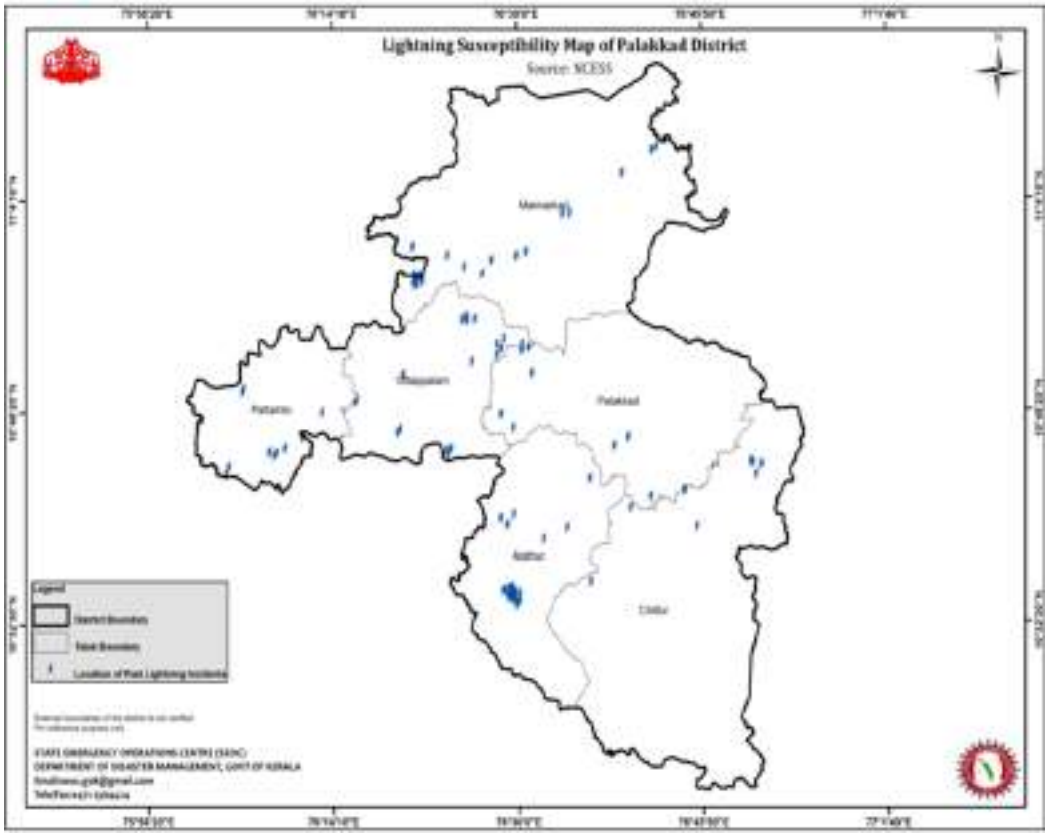


Fig 20.5. Lightning-prone areas of Palakkad

20.3 HAZARD PROFILE OF PALAKKAD TOWN

The Palakkad Town experiences dry climate similar to several regions in Tamilnadu due to the presence of the Palakkad gap and the absence of a coastline. The city is prone to naturally triggered hazards like floods, drought and lightning. Understanding the past history of hazards and their severity is important in planning appropriate risk management activities which is essential for the wellbeing of the community. The increasing frequency of urban flooding and severe droughts in the recent past has proved disastrous to life, property and livelihood in the town area. The hazards footprints in Palakkad Town is discussed in detail below;

20.3.1 Flood

We have a very recent experience on how disastrously a flood can affect our land. from the previous Amrut disaster management chapter published by LSGD, Planning, Palakkad: "Palakkad municipality took a major hit during the mega flood in 2018. The northern and southern region of the municipality was affected by flood since they are bounded by the Kalpathy River and Kannadi River respectively. 27 wards out of 52 were severely affected by the flood covering an area of 1.974 sq. km in which, Ward 1- Olavakkode Central, Ward 2- Kalpathy, Ward 4- Ayyapuram west and Ward 5- Kalpathy east were severely damaged due to the flood. Flood-affected colonies include Sundharam colony, Pechiyamman Nagar, Shanguvarathodu, Anachira colony, Thanavu, Sreenivasa garden, Abubacker Road, Jainimed, Chulliyad, LN Puram, Shekaripuram, RK Nagar, Vennakara, Yakara, Padath Colony, Pookarathottam, etc. Table 20.6 shows flood-affected wards in Palakkad municipality and a spatial representation of flood-affected areas is given in fig 20.6. Flooded area overlaid on ward wise population density is given in fig 20.7.

Table 20.6 Flood affected wards in Palakkad Town (2018).

Sl No.	Ward No.	Ward Name	Area Affected (Ha)
1	1	Olavakkode Central	22.09
2	2	Kalpathy	9.46
3	3	Kunnumpuram	7.08
4	4	Ayyapuram West	7.14
5	5	Kalpathy East	6.81
6	6	Thorapalayam	5.17
7	7	Kumarapuram	15.47
8	8	Valiyapadam	5.24
9	10	Kalleppully North	4.16
10	14	Sekharipuram	7.95
11	15	Ayyapuram East	15.3
12	18	Koppam	11.3
13	19	Sultanpettu	4.8

12	18	Koppam	11.3
13	19	Sultanpettu	4.8
14	20	Mankavu	6.14
15	25	Chirakkad	9.35
16	26	Kenathuparambu	5.13
17	27	Manappullikavu	5.99
18	28	Civil Station	7.34
19	30	West Yakkara	6.8
20	31	Puduppally East	1.5
21	32	Vennakkara South	5.49
22	33	Vennakkara Central	1.66
23	35	Thirunnellayi East	1.73
24	37	Kallikad	9.33
25	39	Nurani	0.13
26	49	Karnaki Nagar West	4.1

Source: Palakkad Municipality



Fig 20.6. Flood affected areas of Palakkad Town

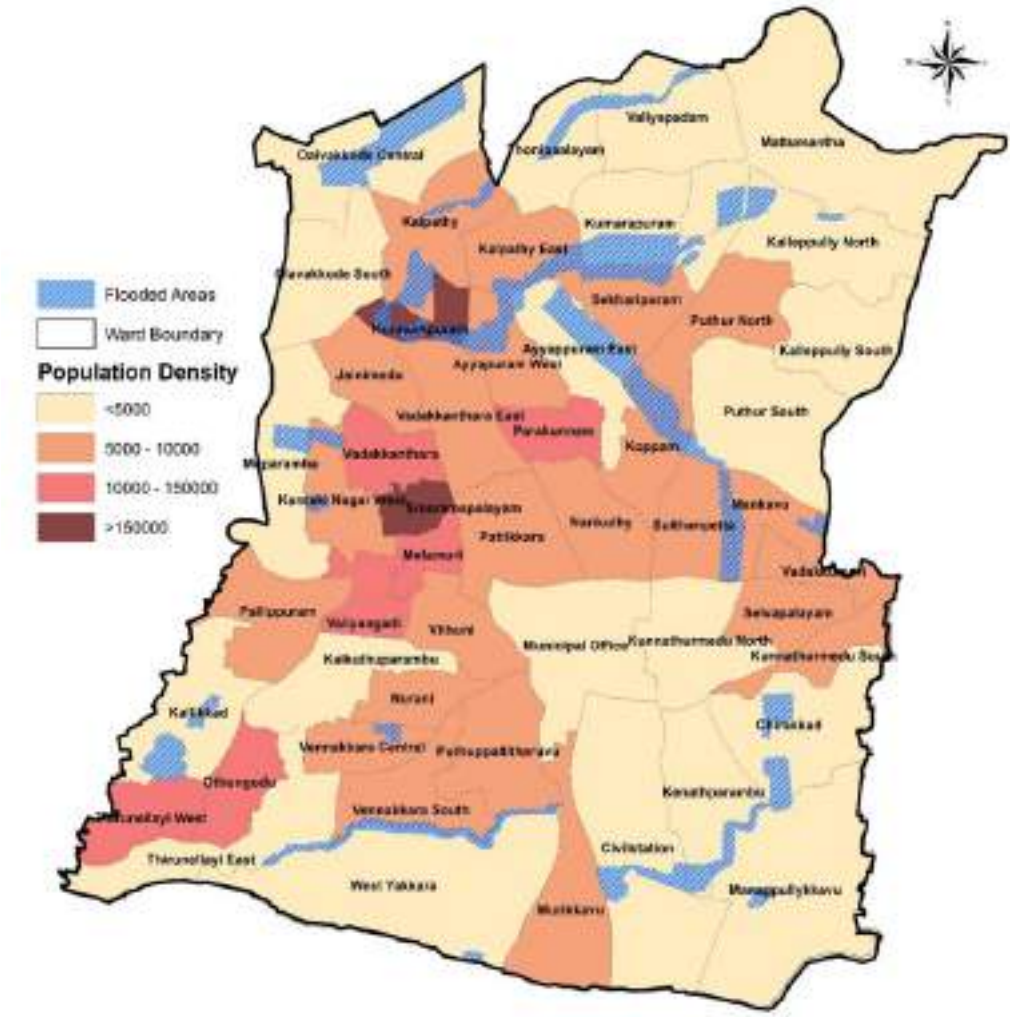


Fig 20.7. Flooded areas Vs population density map

20.3.1.1 Impact Analysis of Flood in Public Sector

i. Housing

415 houses in the municipality were damaged during the megaflood in 2018. 177 houses were fully damaged and 238 houses were partially damaged. Table 20.7 gives the details of houses damaged during flood in 2018 in the Palakkad municipality.

Table 20.7 Details of damaged houses in Palakkad municipality

Sl no	Details of Houses		Damage estimate in no.	Total No. of Damage estimate
1	Damaged Houses	Fully damaged houses	177	415
		Partially damaged houses	238	
2	Slightly damaged houses		592	592

Source: Palakkad Municipality

ii. Connectivity

Transport infrastructure viz, roads and bridges were submerged in various parts of the municipality due to surging waters. 120 km of roads in Palakkad town were damaged during the flood. The estimated cost of rework costs about 1200 lakhs.



Flooded Houses



Connectivity Loss

iii. Electricity

Damages in the transmission subsector were caused by the collapse of electric towers, transformers and poles due to the erosion of their foundations. Damages in the distribution subsector were mainly caused by faults, collapsed poles in distribution lines and power cut-offs in the flooded area.

iv. Agriculture

12 hectares of agricultural land were damaged during the megaflood in 2018. There was an estimated crop loss of 4.8 lakhs. 46 farmers were affected by the flood. Paddy and banana are the crops most affected. It is also important to note that while crop loss is an immediate effect of flooding, larger issues related to loss of topsoil, degradation of fertile land, silt formation in paddy etc. make the restoration of the agricultural sector a difficult task.

Table 20.8. Details of damages in agricultural sector.

Farmers Affected	Area damaged in Ha	Estimated crop loss in Lakhs	Breach of Bund	Loss of pumpset
46	12	4,80,000	25	1

Source: Krishi Bhavan (Cross Checked)



Agriculture crop loss

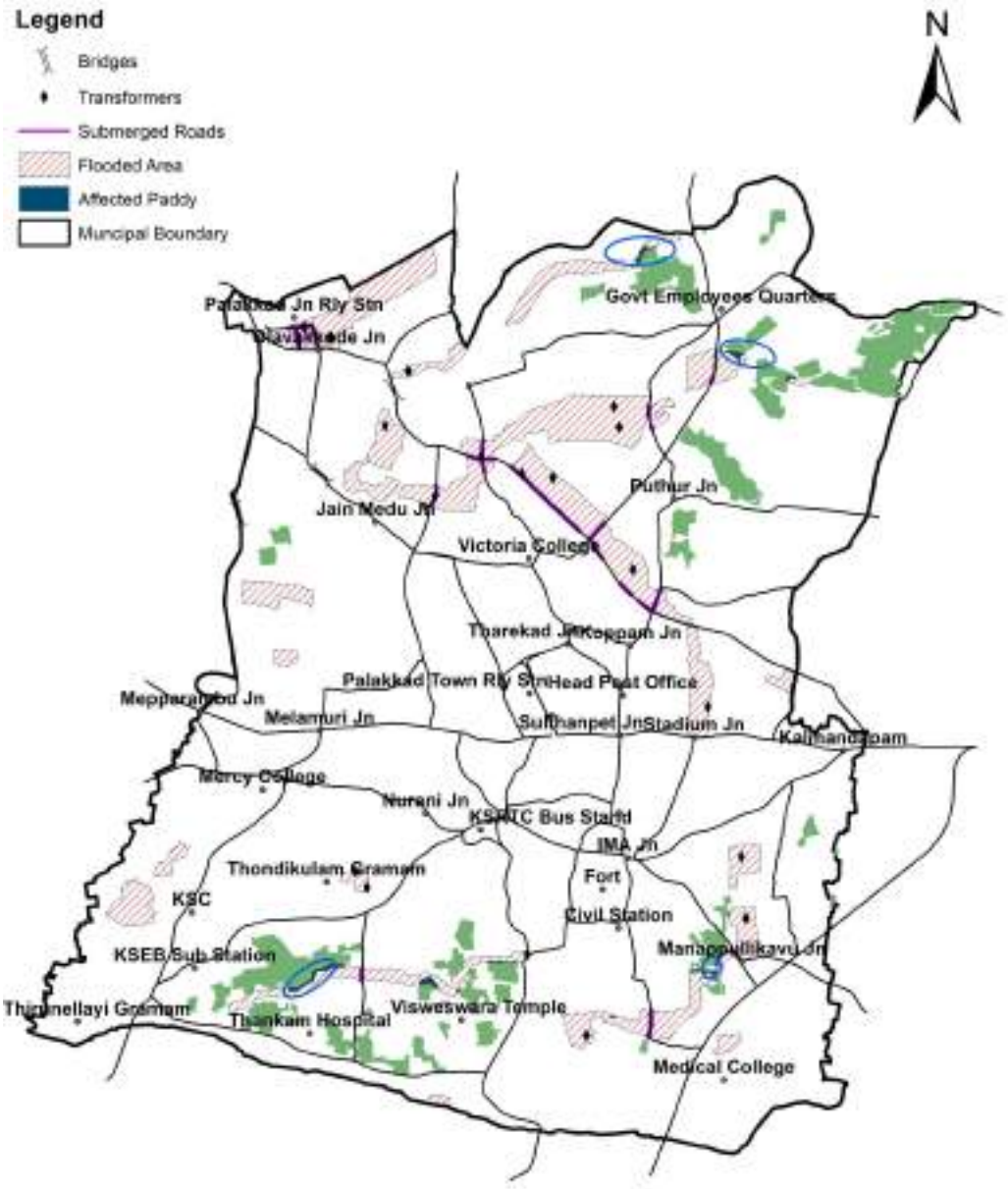


Fig.20.8. Spatial locations of Loss of Agriculture loss, Electric Infrastructure, Submerged Roads of Palakkad Town. Source: SOEC

20.3.2 Drought

Despite being bestowed with Kannadipuzha and Kalpathy puzha bordering the north and south as well as nearer proximity to the Malampuzha dam, the Palakkad municipal region experiences severe drought and acute drinking water shortage almost every summer. Warm temperatures for most parts of the year, resulting in high evapotranspiration rates, coupled with seasonally concentrated rainfall make the water economy crucial in the region. According to the State Emergency Operations Center (SOEC), the entire region of Palakkad Town is categorized as drought-prone, falling under moderate risk category. Rapid decrease in the number and size of water bodies as well as the conversion of wetlands are the probable reasons for such frequent droughts.

20.3.3 Lightning

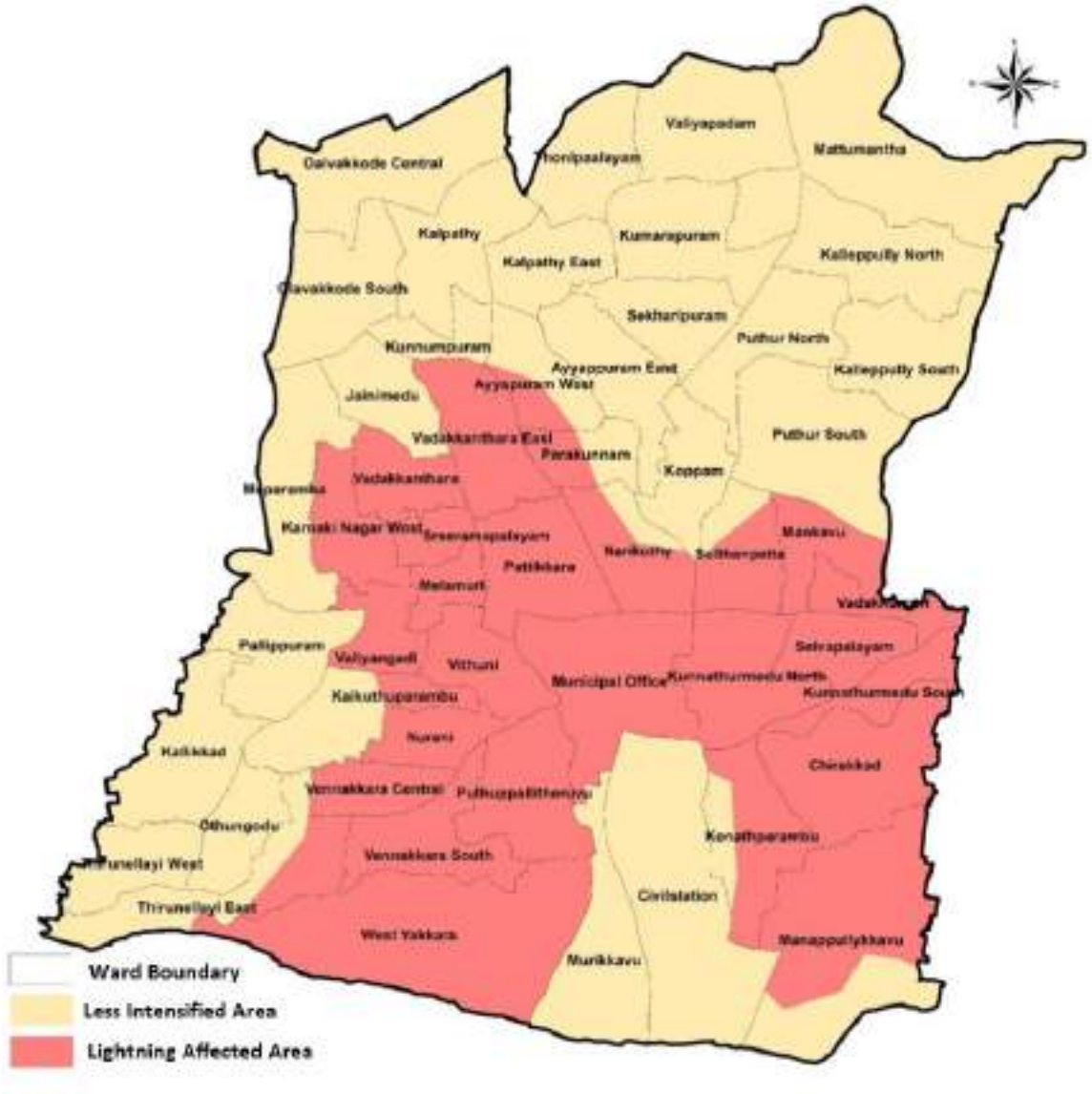


Fig.20.9. Lightning frequency map of Palakkad Town. Source: SOEC

According to disaster management reports, the Palakkad municipal region is prone to frequent lightning incidences. The higher population density and vegetation density make the region more vulnerable to lightning. Lighting fatalities and damages in the municipal region may be attributed to the city's undulating landscape and high electrification density. Fig 20.10 shows the frequency of lighting per ward based on long-term data of fatal and major damage causing lighting events reported. The red color represents the area that shows most lightning affected area. Yellow color represents less intensified area.

The above records prove that the region is not in the safer hands of nature and these disasters will repeat in the future. Considering the gravity of these disasters, a proper disaster management plan should be envisaged without much delay. Hence, the scope of this chapter is to propose a disaster management plan answering flood and frequent droughts, giving more focus to disaster mitigation measures.

20.4 DISASTER MANAGEMENT

Disaster management comprises of management of knowledge and resources prior to a catastrophic calamity and it is determined by how well and efficiently these resources are managed. Indiscriminate, improper, injudicious use of the environment will result in nature deviating from its original path and cause hazards to all living beings that we cannot defend. In order to keep it in control, proper action plans must be encouraged. Disaster management is a process of effectively preparing for and responding to such disasters. It involves strategically organizing resources to lessen the harm that disasters cause. The four key stages of activities that are taken up within disaster management are depicted in fig 20.10. The four disaster management phases illustrated here do not always occur in isolation or in this precise order. Often phases of the cycle overlap and the length of each phase greatly depends on the severity of the disaster. The cyclical nature of disaster management involving Mitigation, Preparedness, Response and Recovery processes focuses on the ongoing and continual actions to prevent and manage disasters.



Fig 20.10. Disaster Management Cycle

20.4.1 Disaster Mitigation

Disasters wipe away what was written on the slate earlier. They give us the opportunity to write back on a clean slate in such a way that it facilitates the building of more resilient communities. This is what mitigation is meant for. Mitigation efforts attempt to prevent hazards from developing into disasters altogether, or to reduce the effects of disasters when they occur. Mitigation specifically refers to actions taken that can lessen the severity of a disaster's impact. The mitigation phase differs from the other phases because it focuses on long-term measures for reducing or eliminating risk. This includes proper planning and implementing what we need in a more eco-friendly way. Our cities are becoming increasingly impervious to water, not just because of increasing built-up but also because of the nature of materials used (hard, non-porous construction material that makes the soil impervious). This common link causes both floods and droughts. To improve the city's capacity to absorb water, new porous materials and technologies must be encouraged or mandated across scales. This can be envisaged by making the cities permeable by promoting the concept of sponge city. In view of the hazard profile of Palakkad Town, mitigation measures addressing frequent floods and droughts are discussed below in detail.

20.4.1.1 Flood

The present report focuses to map the susceptible areas of the flood as a mitigation measure incorporating various flood conditioning factors and previous flood experience in a GIS environment.

"When we talk of flood control, we usually think of dams and deeper river channels, to impound the waters or hurry their run-off. Yet neither is the ultimate solution, simply because floods are caused by the flow of water downhill. If the hills are wooded, that flow is checked. If there is a swamp at the foot of the hills, the swamp sponges up most of the excess water, restores some of it to the underground water supply and feeds the remainder slowly into the streams. Strip the hills, drain the boglands, and you create flood conditions inevitably. Yet that is what we have been doing for years".

-Harl Borland

20.4.1.1.1 Flood Susceptibility Mapping

Floods, which are a natural hazard, will not become a disaster, if we are prepared and are aware of how to deal with them. The first step to this goal is to find the probable areas of the flood. Flood susceptibility is defined as the relative likelihood of a dangerous flood event based on the propensity of a locale or site without considering the temporal probability of the occurrence event. The main purpose of the flood susceptibility mapping technique is to identify areas that are susceptible to flooding using geographic information system (GIS) and available topographical data. As natural hazards are multi-dimensional and multi-disciplinary phenomena that have a strong spatial component, GIS can be effectively applied in the context of flood damage analysis and risk assessment. The use of flood susceptibility mapping is a prerequisite for sustainable risk management, as it can predict the probability of flood occurrence and provide useful information on suitable measures for mitigating future floods.

To assess flood susceptibility, the flood conditioning factors were determined and their mutual interaction ratios were calculated. For the present study, a total of 6 conditional factors were created for susceptibility mapping including Rainfall, Slope, Flow Accumulation, Drainage Density, Land use and Geomorphology using ArcMap.

Base datasets used:
1. Alos DEM data with 12.5m resolution
2. Geomorphology map from NRSC
3. 2018 Existing Land use
4. Rainfall data of 8 stations (Olavakkode, Malampuzha, Peringottukurissi, Chittur, Alathur, Kizhakkanchery, Elappully and Muthalamada)

20.4.1.1.2 Flood Conditioning Factors

i. Rainfall

The rainfall input is one of the main factors influencing the magnitude of the runoff response during a flood event. Flooding is influenced by a combination of rainfall characteristics including amount, intensity, duration and spatial distribution. Therefore floods may be produced by high intensity, short-duration storms, or longer duration, low-intensity rainfall. Entire Kerala witnessed un precedent spells of rain in 2018 which was the worst to hit the state in a century. A graphical representation showing rainfall details of the 2018 southwest monsoon for Palakkad is given in fig 20.11. This peak rainfall data was used for susceptibility mapping to predict the regions that may get the worst hit by flood. Annual average rainfall data for the year 2018 were collected from 6 stations surrounding the Palakkad town area and were mapped by Inverse Distance Weightage (IDW) method (fig 20.12). Annual rainfall for Palakkad Town ranges from 268-303 mm. The weightage details for rainfall classes are given the table 20.9.

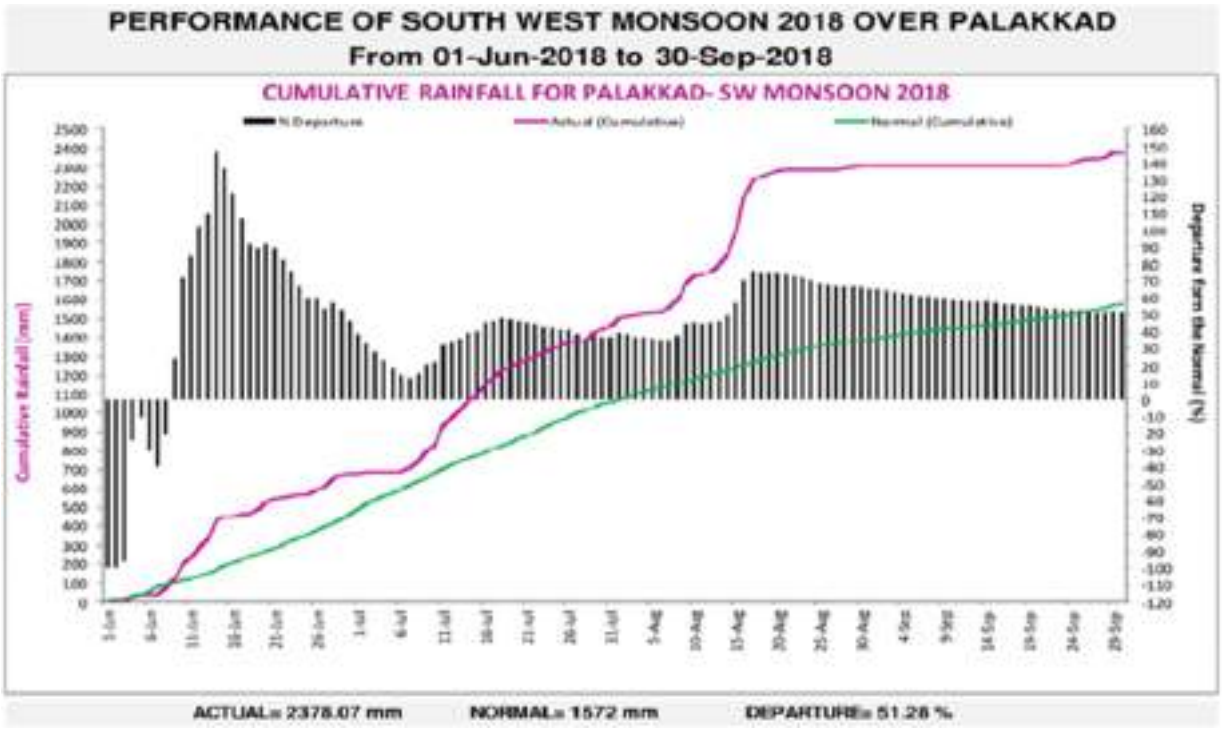


Fig. 20.11. Performance of southwest monsoon-2018 over Palakkad

ii. Slope

Slope controls the velocity of water on the ground surface, which affects infiltration and runoff. Generally, the areas with steep slopes generate more velocity hence conveying the water to nearby basins more rapidly without giving scope to further accumulation. Whereas gentler slope areas dispose the excess water gradually resulting in floods and water-logging. The slope map (fig 20.13) for Palakkad Town was generated from ALOS Dem of the same area utilizing the surface tool of ArcMap software. From the map, it is evident that the majority of the area falls under 7º (flat-Gentler) slope category hence more susceptible to flooding. The weightage details for slope classes is specified in table 20.9.

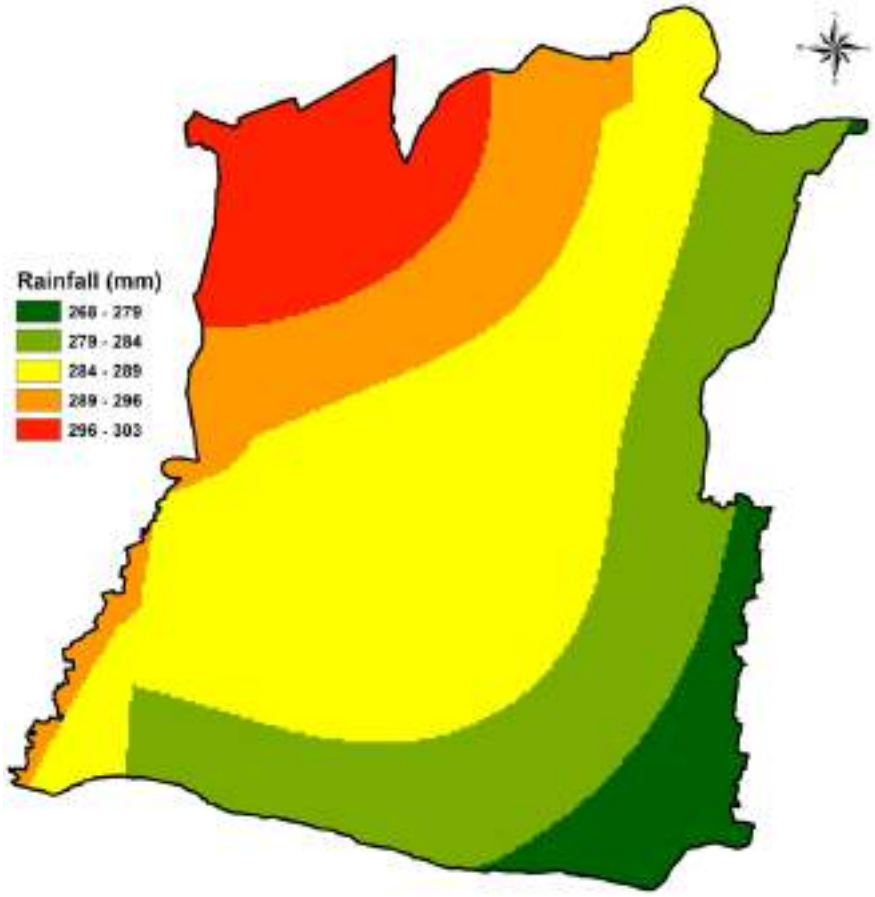


Fig 20.12. Rainfall map of Palakkad Town

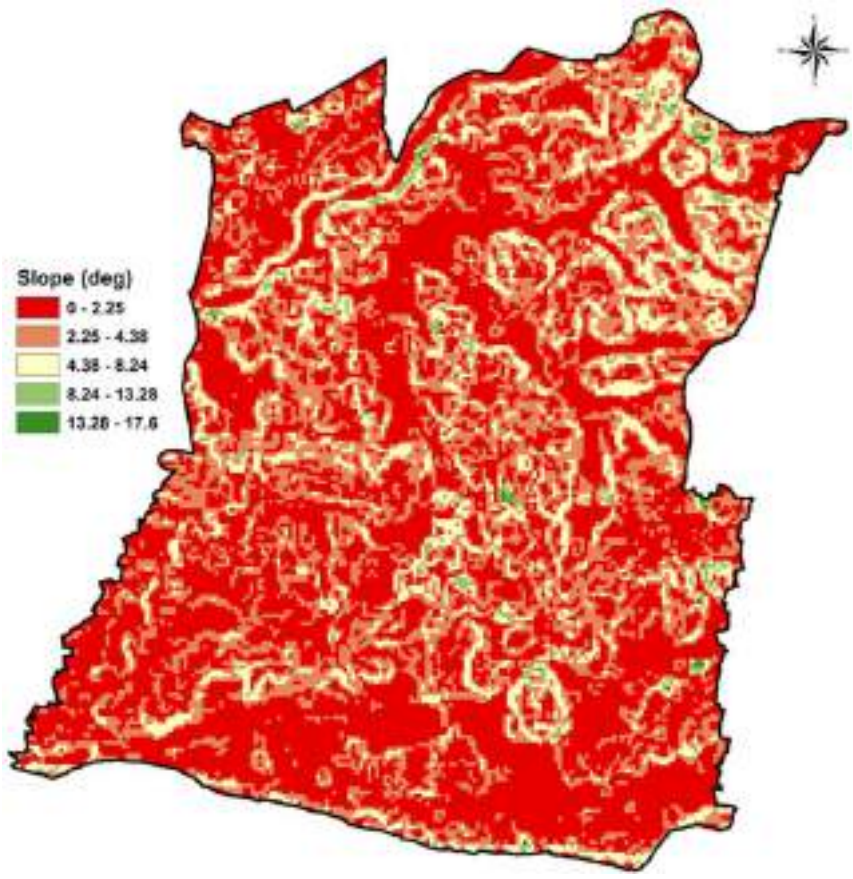


Fig. 20.13 Slope map of Palakkad Town

iii. Elevation

Elevation has a reverse correlation with flooding. It is commonly observed that low elevated areas are more susceptible to flooding. The elevation map (Fig 20.14) was prepared using ALOS DEM data. The altitude values were sub-divided into five classes ranging from 68-121 m using the natural breaks method which was later reclassified by assigning weights (Table 20.9) in accordance with their ability to contribute to flooding.

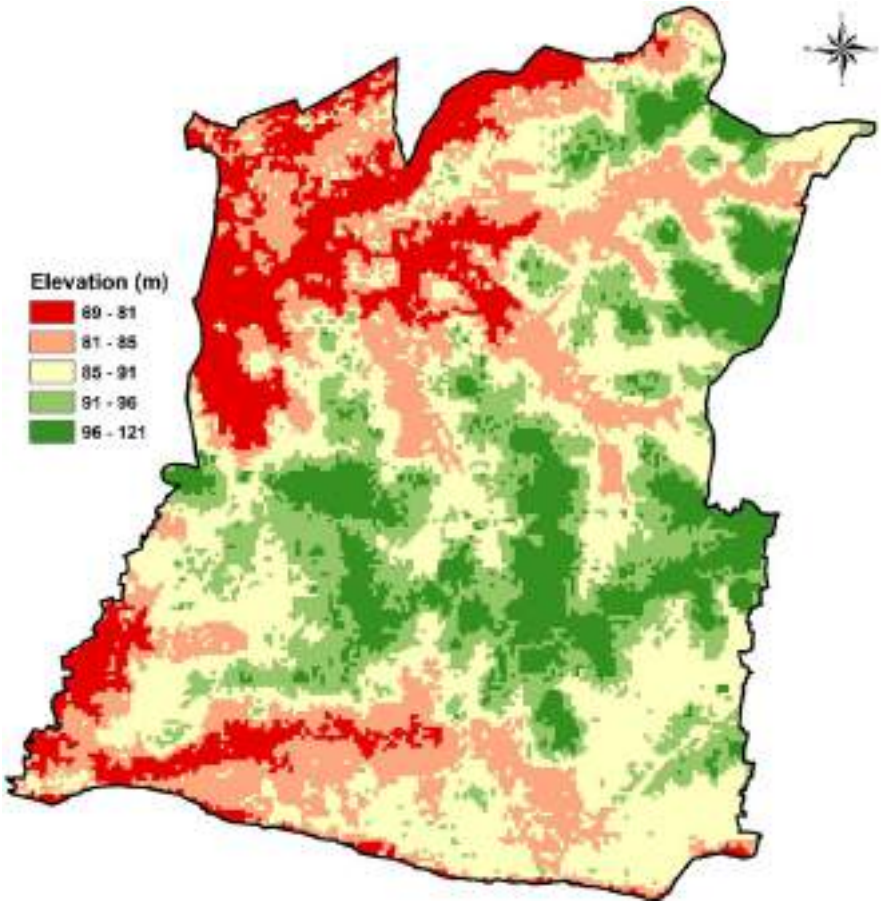


Fig. 20.14 Elevation Map of Palakkad Town

iv. Flow accumulation

Flow accumulation is an indirect way of measuring drainage areas. It is a pixelised representation of actual flow accumulation that occurs in the ground. The accumulated flow depends on the number of cells flowing into each cell in the output raster. An increase in flow accumulation should reflect an increase in flood susceptibility. Flow Accumulation map (Fig 20.15) was derived from ALOS DEM data on a watershed basis using the Hydrology tool in ArcMap environment which was later clipped to the areal extent of the town. The blue lines act as source regions for water, which adds up to form the next higher channel (green lines), and finally to a stream network inundating the pathways. The weightage details for flow accumulation classes are given in table 20.9.

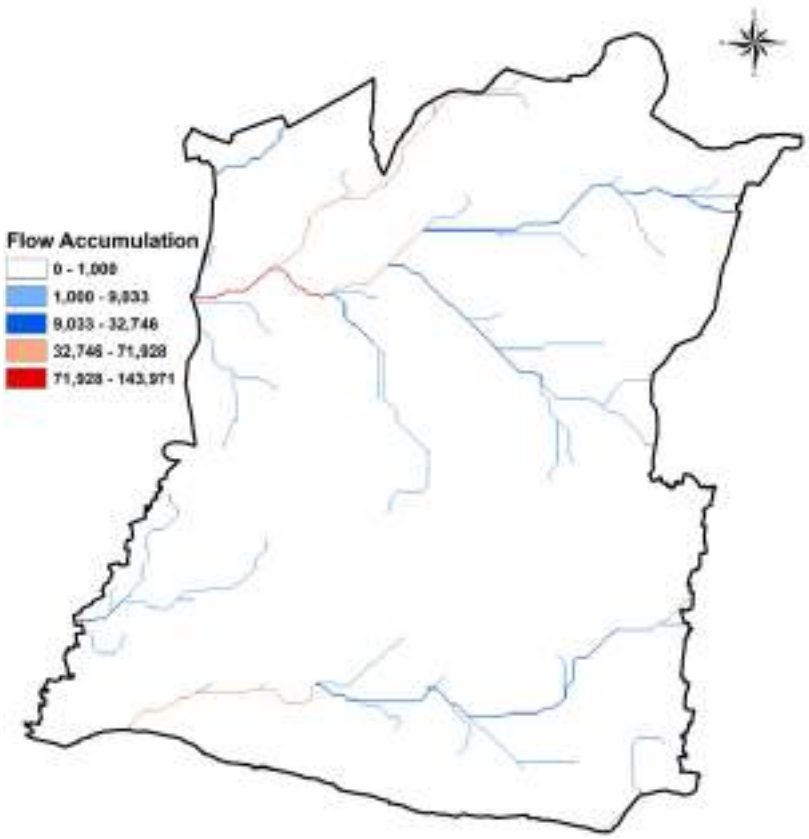


Fig.20.15 Flow Accumulation map of Palakkad Town

v. Geomorphology

As identified from the NRSC geomorphology map, the Palakkad municipal area is mainly categorized into 3 geomorphic classes; waterbody, Flood plain and Pediment-Pediplain complex (fig 20.16). Flood plain can be observed adjoining the river area and represents the land created by the lateral shifting of river channels and by the deposition of overbank flood deposits during 'present-day' environmental and climatic conditions. Pediment-pediplain complex covers a major part of the town and represents a gently sloping landform made of weathered sediments. All three features represent areas with low slope and elevation hence are likely to be inundated during flood. Weightage details for geomorphic classes are specified in table 20.9

vi. Land use

Land use is the only manmade parameter among flood conditioning factors. Anthropogenic interventions, such as urban area growth, disrupt the natural slope of the land and increase the impervious surface area of the city continuously, while the storage facilities such as large paddy fields and fishponds decrease, causing an increased runoff coefficient leading to localized flow accumulations and flooding. The Land use map of 2018 (Fig 20.17) was rasterized and weightage (Table 20.9) for each land-use class was given according to their potential in contributing flood.

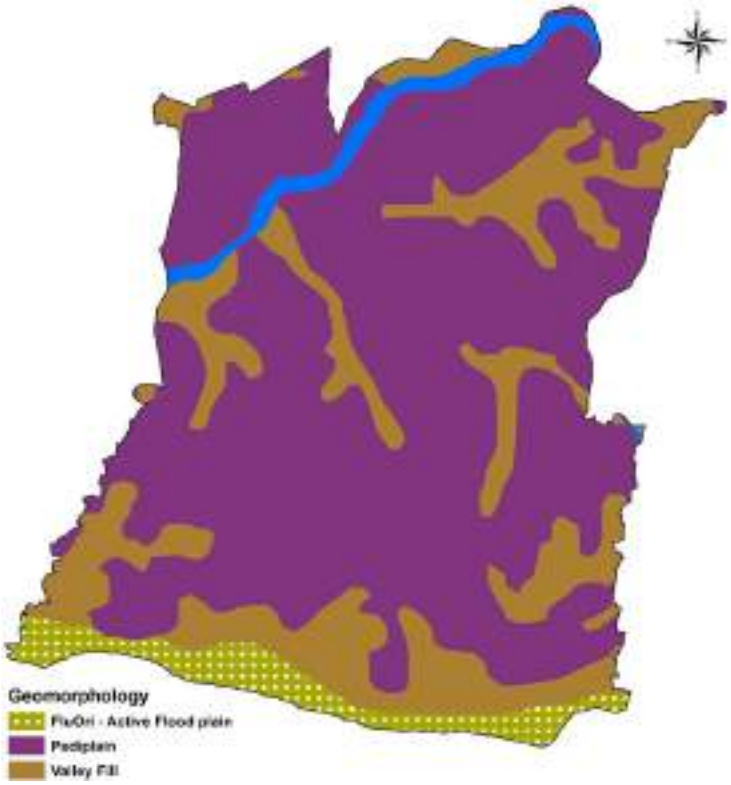


Fig.20.16 Geomorphology Map of Palakkad Town

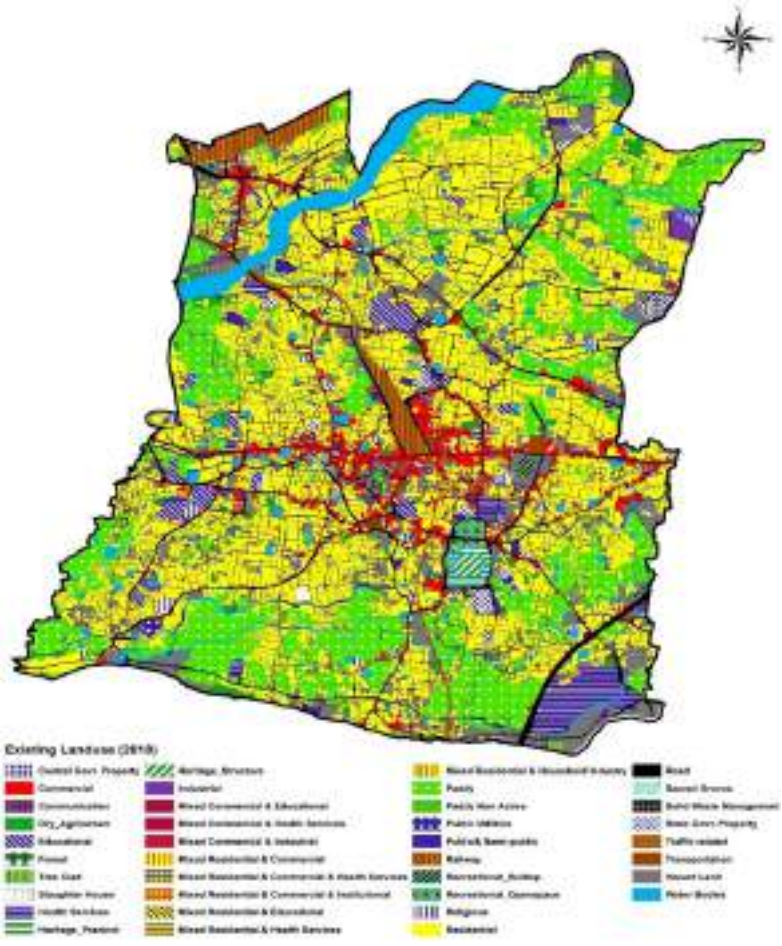


Fig 20.17. 2018 Existing Land use map of Palakkad Town

The hazardous areas cannot be estimated by considering the effect of each factor separately. The integration of all factors is necessary in order to obtain the overall map of flood-hazard areas. Since not all factors have the same degree of influence on the hazardous areas, a weighting approach, in which a different weight is assigned to each factor, was applied. The factor weights were assigned considering the effect of each factor on all other factors. The interactions between the factors are depicted in Fig. 20.18. A solid line between two factors indicates that one factor has a main effect on the other pointed to by the arrow; that is, a change of the first factor has a direct effect on the other. A dashed line between two factors indicates that one factor has a secondary effect on the factor pointed to by the arrow; that is, a change of the first factor has an indirect effect on the other. For example, flow accumulation has the main effect on land use and a secondary effect on the slope. In order to quantify the two different types of effects, one (1) point is assigned to the main effect and half a point (1/2) to the secondary effect. Then, the rate for a factor was computed as the summation of the points corresponding to the effects emanating from the factor.

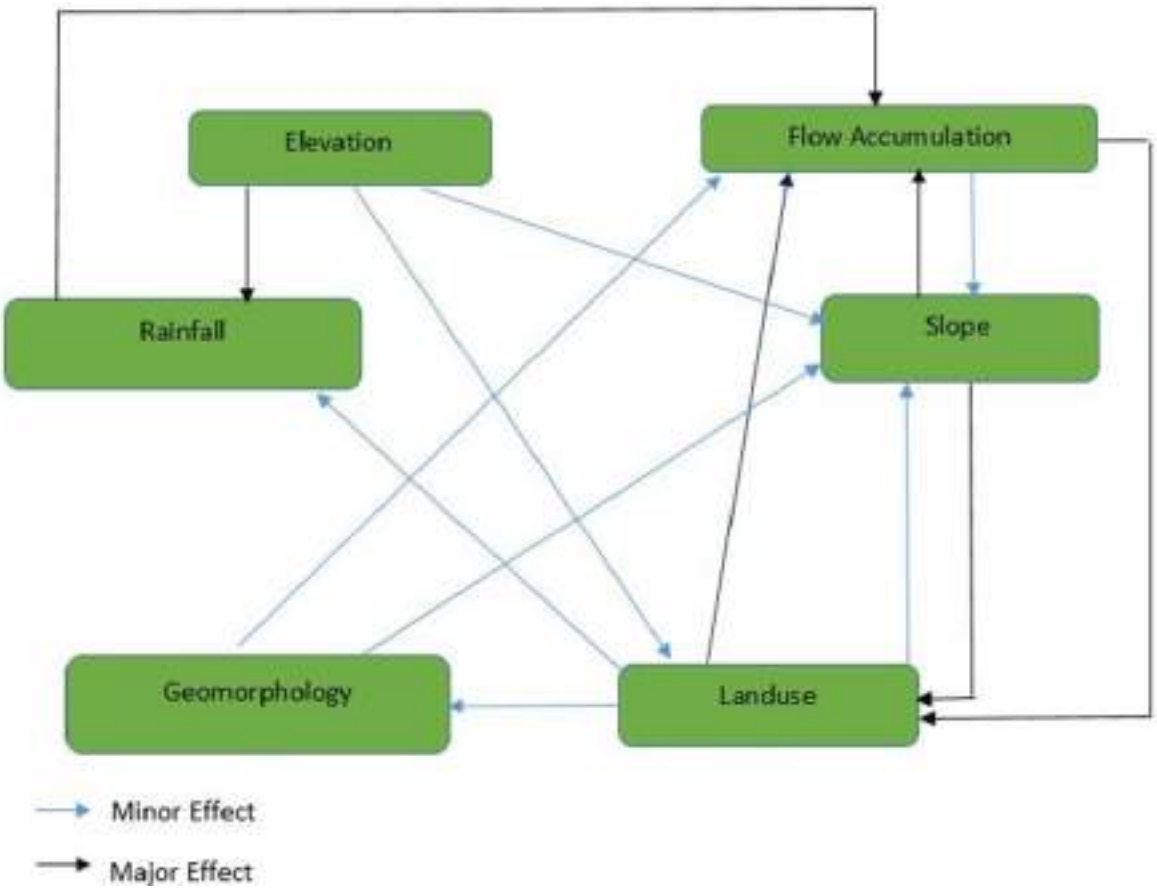


Fig.20.18. A schematic depiction of the interaction between factors that influence the flood hazard.

The rates for the factors depicted in Fig.20.19 are as follows:

Table 20.9 Mutual Interaction effects of factors

	Interaction between factors	Rates	Rate weights
Flow Accumulation	1 Major + 1 Minor	(1*1)+(1*0.5)	1.5
Rainfall	1 Major	(1*1)	1
Slope	2 Major	(2*1)	2
Elevation	1 Major + 2 Minor	(1*1)+(2*0.5)	2
Geomorphology	2 Minor	(2*0.5)	1
Land use	1 Major + 3 Minor	(1*1)+(3*0.5)	2.5

From table (20.9) it is evident that the rate weights of land use are slightly higher than all other factors. For a comprehensive evaluation of each factor related to hazardous areas, the rates and weights must be combined. This is achieved by multiplying the proposed weight by the rate of effect, which yields the total weight of each factor. The summation of all the factor weights yields the grand total weight (Table 20.9). The contribution of each factor to the hazardous areas, expressed as a percentage, is shown in the last column of Table 20.9. The percentage of each factor was computed as the ratio of the total factor weight to the grand total.

Table 20.10 Classification and weighting of factors

Factor	Classes	Hazard	Proposed weight of class (a)	Rate (b) (x_i)	Weighted rating (a*b)	Total Weight	Weight in % (w_i)
Flow Accumulation (pixels)	0-1000	Very Low	1	1.5	1.5	51	18.8%
	1000-9033	Very Low	1		1.5		
	9033-20325	Low	2		3		
	20325-32746	Low	2		3		
	32746-44602	Medium	5		7.5		
	44602-64928	Medium	5		7.5		
	64928-74526	High	8		12		
	74526-143971	Very High	10		15		

Rainfall (mm)	268.7-279.6	Very Low	1	1	1	25	9.2 %
	279.6-284.7	Low	3		3		
	284.7-289.4	Medium	4		4		
	289.4-296.3	High	7		7		
	296.3-303.5	Very High	10		10		
	0-2.25	Very High	10	2	20	58	21.4 %
	2.25-4.38	High	8		16		
	4.38-8.24	Medium	6		12		
	8.24-13.28	Low	4		8		
	13.28-17.6	Very Low	1		2		
Elevation (m)	68-80	Very High	10	2	20	50	18.5 %
	80-86	High	7		14		
	86-91	Medium	5		10		
	91-97	Low	2		4		
	97-121	Very	1		2		
Geomor-phology	Water Body	Very High	10	1	10	21	7.7 %
	Flood Plain	High	7		7		
	Pediment Complex	Medium	4		4		
Land use (2019)	Water Bodies	Very High	10	2.5	25	65	24 %
	Built-up/ Transporta-tion	High	8		20		
	Open spaces	Medium	5		12.5		
	Vacant Land	Low	2		5		
	Active, Non-active paddy/ Dry Cultiva-tion	Very Low	1		2.5		

The maps corresponding to each conditional factor were overlayed following the weighted linear combination approach. According to this technique, each factor is multiplied by its percentage weight (numeric overlay) and the summation of all factors yields the final map of hazardous areas:

$$S = \sum w_i x_i$$

where S is the final map of hazardous areas, w_i is the weight of factor (percentage) i and x_i is the rate of factor i. The factors (thematic layers) were reclassified and combined according to the equation given above in the Model Builder (GIS) environment (Fig 20.19). The Flood susceptibility Map for Palakkad municipal region obtained after overlay analysis is given in fig 20.20.

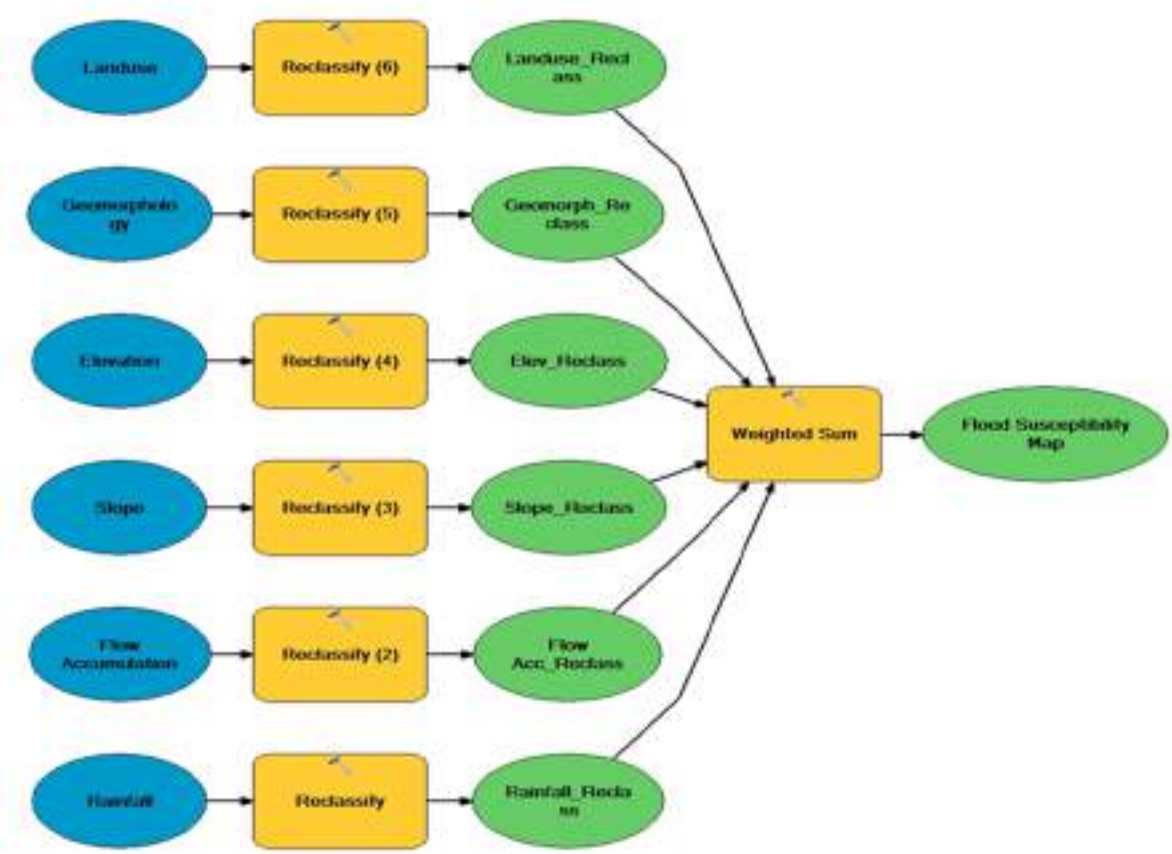


Fig 20.19 Flood Susceptibility Mapping Procedure as displayed in ArcMap Model Builder

As a verification procedure, the 2018-flooded regions were overlaid over the flood susceptibility map of Palakkad Town. The corresponding image is shown in Fig 20.21. The spatial locations of 2018 flood affected regions exactly match the very high risk and high-risk zones marked in the flood susceptibility map indicating the credibility of mapping results, which can be utilized for planning flood management measures in future.

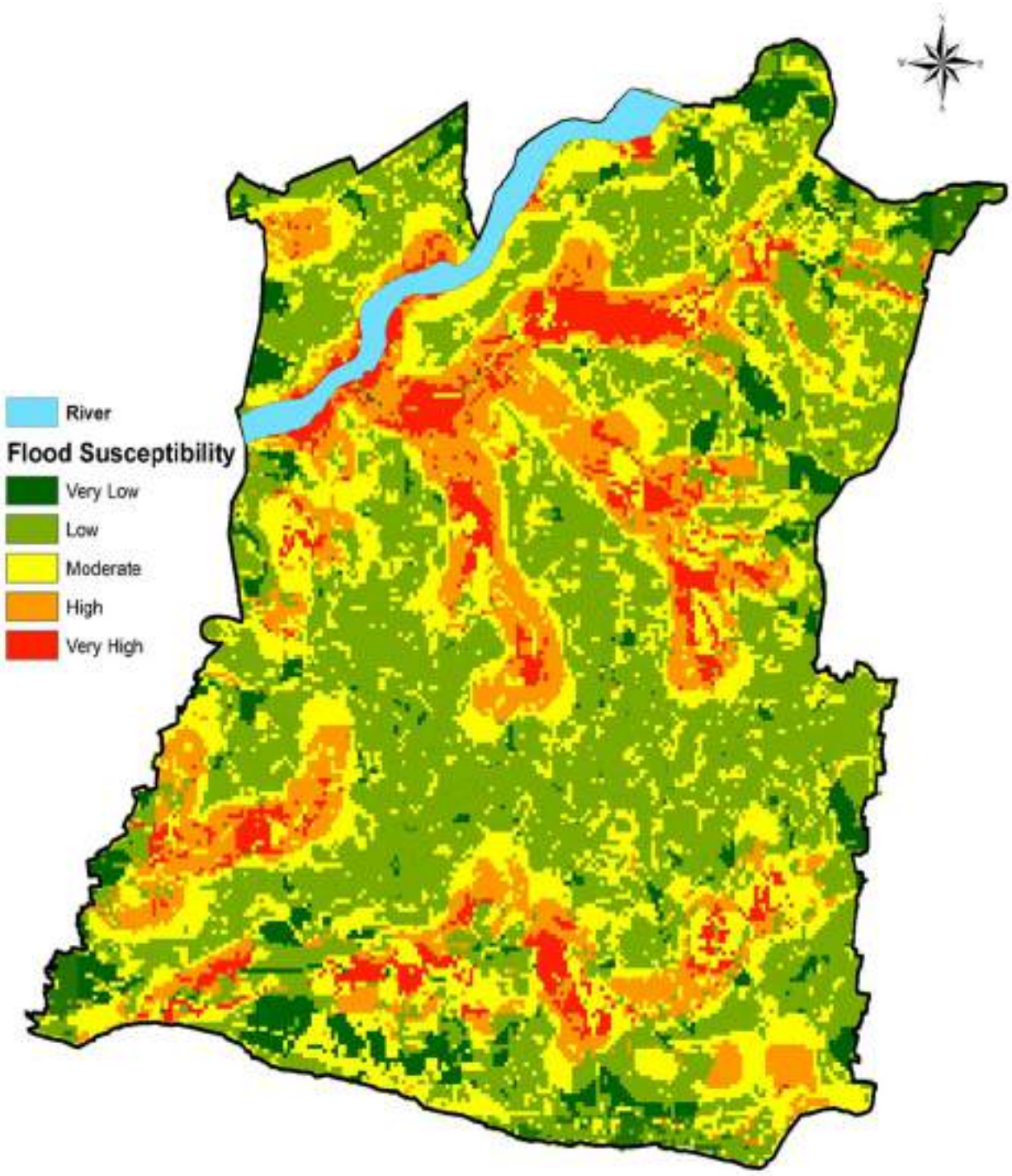


Fig 20.20 Flood Susceptibility map of Palakkad Town

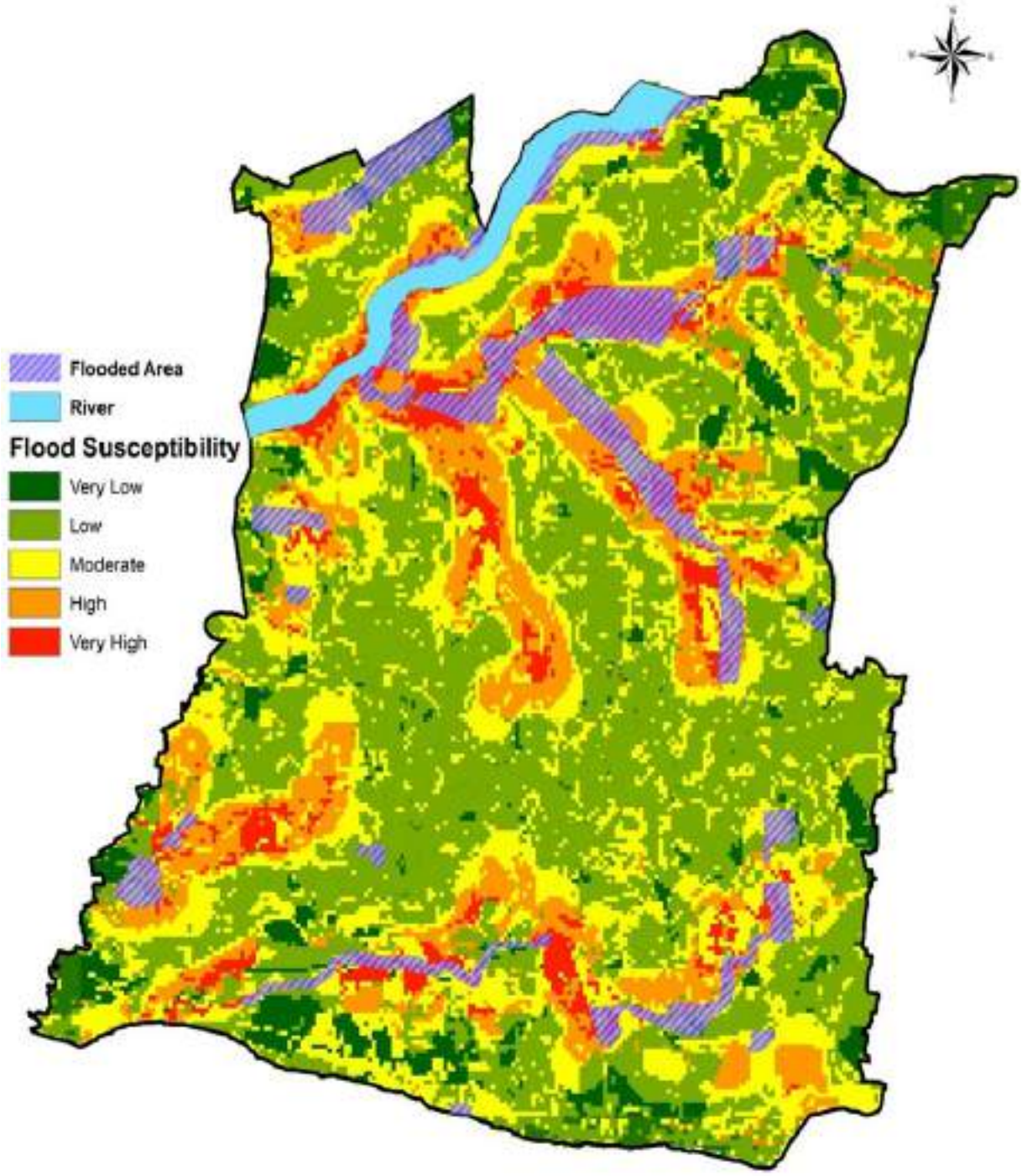


Fig 20.21. Flooded regions overlained over flood susceptibility Map

Figure 20.22 Shows the KSDMA 100 years flood probability regions overlained over the flood susceptibility map of Palakkad.The spatial locations of 2018 high risk flood susceptibility regions closely resemble the Ksdma 100 years of flood probability high risk zones

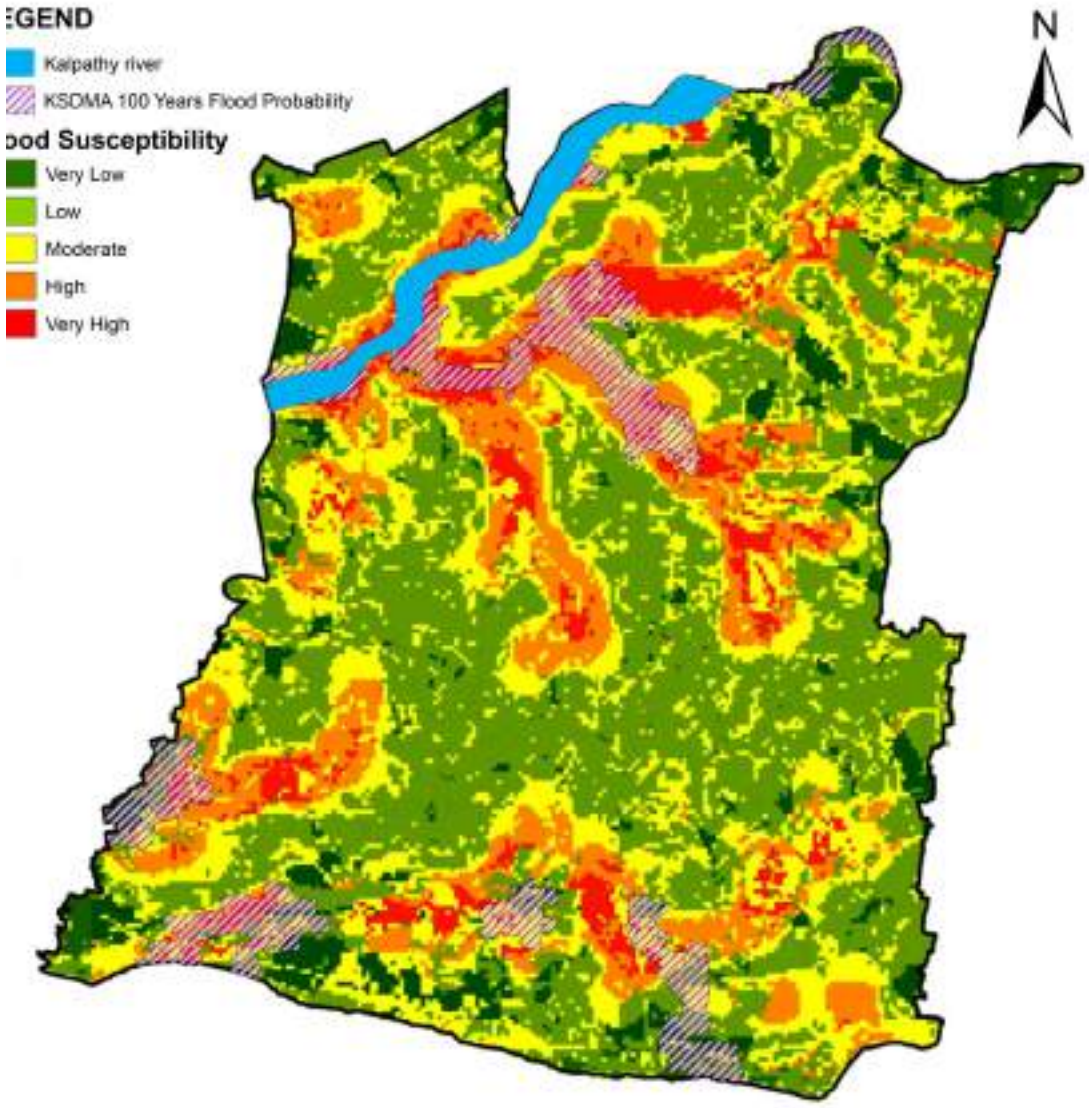


Fig 20.22. KSDMA 100 years Flood Probability regions overlained over flood susceptibility Map

20.4.1.1.3 Influence of Land use in flooding

Being the only manmade factor contributing flood, how land use influences flood should be analyzed in detail. For this purpose, another flood susceptibility map was made using the land use of 1971 (Fig 20.23) in the place of 2018 land use and by keeping, all other conditioning factors same as before. The procedure mentioned before was repeated to prepare the flood susceptibility map of 1971 land use (Fig 20.24).

The 1971 land use has 12.493 sq km of paddy, which is about 46.841% of the total area compared to 0.0154 sqkm (5.81%) active paddy of present land use. The residential area has increased to about 11.59% in the current land use. A tabular description (Table 20.11) showing areal coverage of 1971 and 2019 selected land use classes is given below.

Table 20.11 Areal coverage of 1971 and 2018 land use classes

1971 Land use	Area (Sq.Km)	Percentage	2018 Land use	Area (Sq.Km)	Percentage
Paddy	12.493	46.8	Paddy (Active &Non active)	4.75	17.8%
Residential	7.3297	27.5	Residential	10.42	39%
Pond	No. of ponds:150	--------	Pond	No. of ponds:99	--------
Religious	0.2214	0.8	Religious	0.2894	1.1%
Public & Semi -public	0.7174	0.7	Public & Semi-public	1.1729	4.4%
Industrial	0.2895	1.1	Industrial	0.1811	0.7%
Vacant Land	2.7463	10.3	Vacant Land	2.549	9.6%
Commercial	0.2526	0.9	Commercial	1.074	4%

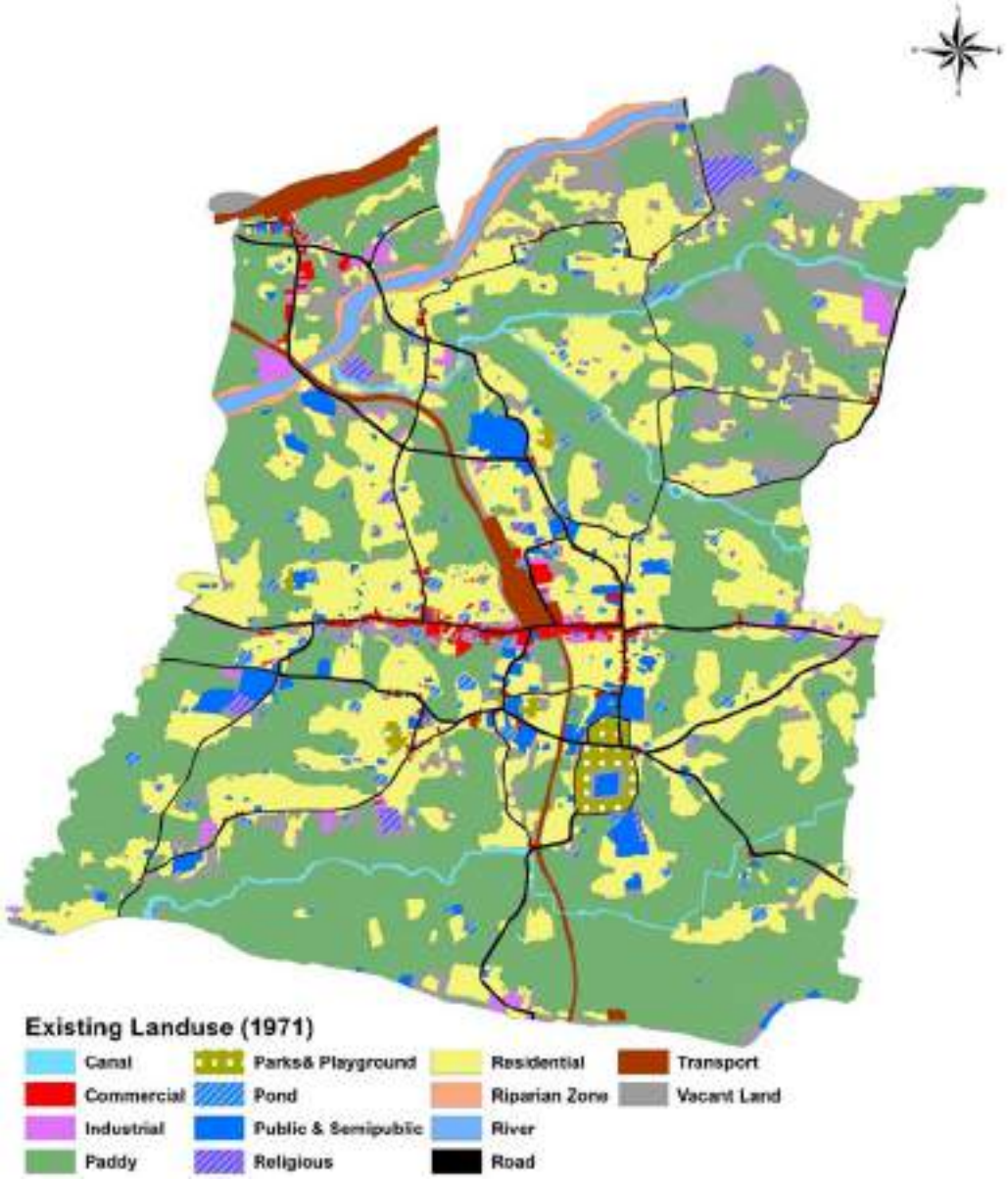


Fig 20.23 1971 Existing Land use Map of Palakkad Town

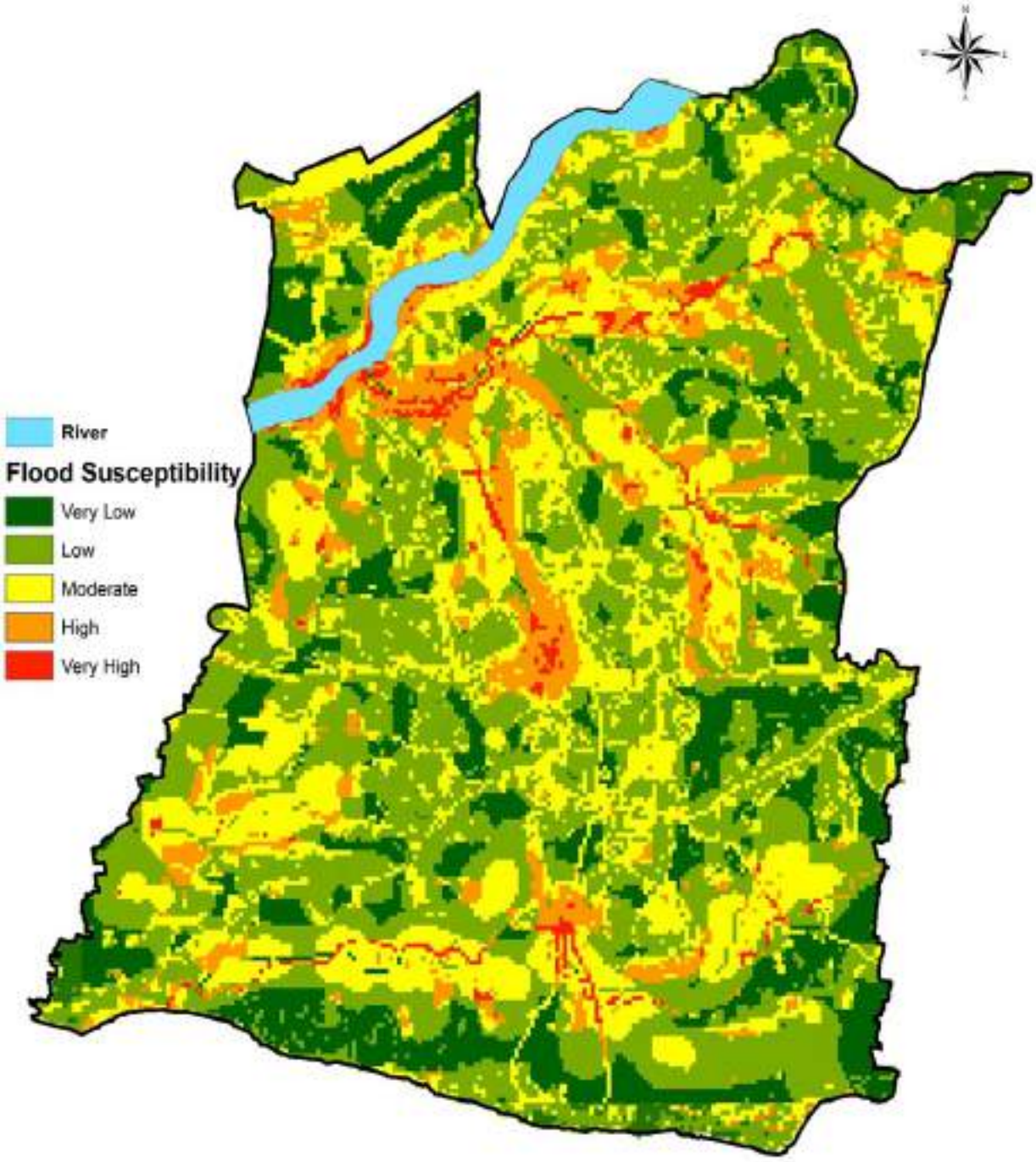


Fig. 20.24 Flood Susceptibility map made from 1971 land use

The flood susceptibility map of 1971 land use was compared with the flood susceptibility map made from the present land use to analyze the changes that occurred in flood risk. The percent wise differences in flood risk zones of two maps are given in table 20.12

Table 20.12 Variations in flood risk zones

Risk Category	Flood Susceptibility (%) (1971 Land use)	Flood Susceptibility (%) (2018 land use)	Difference
Very Low	14.1	6.2	-7.9
Low	39.2	41	+1.8
Medium	27.1	23.2	-3.9
High	14.1	17.9	+3.8
Very High	5.3	11.4	+6.1

From table 20.11 it is clear that the high and very high-risk regions have significantly increased in flood susceptibility map from recent land use compared to flood susceptibility map from previous land use. The very low-risk regions also mark an 8% decrease in the recent susceptibility map. This can be attributed to land use changes like extensive paddy conversion and the growth of residential areas.

20.4.1.1.4 What was the cause of 2018 Flood in the Palakkad Town?

While analyzing the causes of flood the most obvious reason that gets predicated is rainfall. As a natural phenomenon, rainfall cannot be predicted for a long term and cannot be controlled. And also rainfall cannot work alone as a contributing factor to the flood. The land is designed in such a way that the slope of the terrain leads any excess water to the low-lying water bodies. Floods/Water-logging occur when this natural slope is disrupted. When people built new structures, the terrain gets altered by the cutting of slopes and removal of soil. This transforms the natural runoff pattern and opens up new ways for water, which is a reason for urban flooding. When observing the flow accumulation map a connection can be found between the flow accumulation patterns and the canals. The flow accumulation pathways follow the spatial location of canals (fig 20.25 top) which implies that the water that is collected from the source regions (Blue lines) gets ultimately added to the canal which overflows and creates flood in the nearby regions. In 2018, large stretches of land covering portions of Ayyapuram west, Kalpathy East, Kunnumpuram, Koppam, Sulthanpett, Sekharipuram, Kumarapuram, Puthur South, Kalleppully North, Chirakkad, West Yakkara, Kenathparambu, Civil Station, Puthupallitheruvu and Thirunnelayi East wards got flooded from these canals (Fig 20.25 bottom). It is to be noted that the regions alongside these canals were previous active paddy fields.

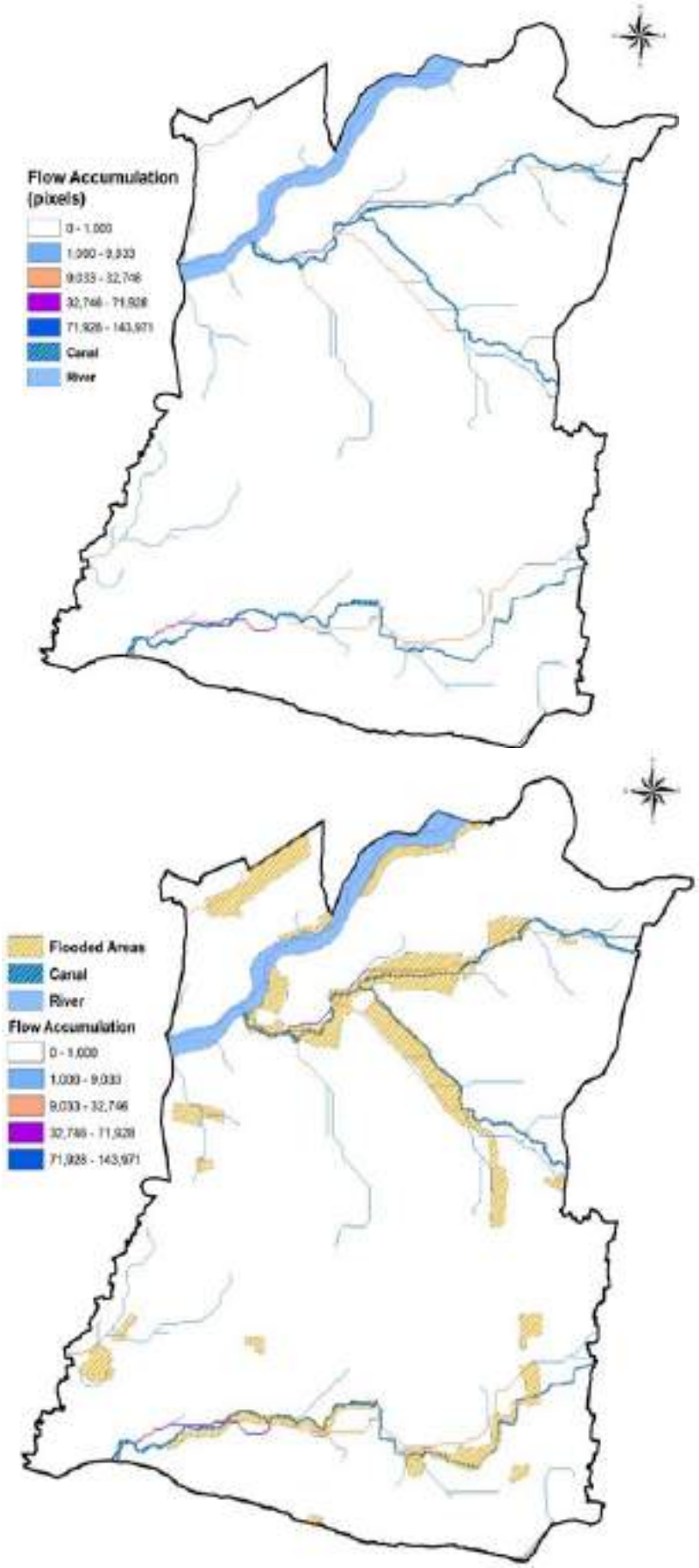


Fig 20.25 Spatial representation showing canals, river, flow accumulation and flooded regions

Likewise, the flooded regions in Kallikad ward were actually paddy converted residential areas fig 20.26 and lie in the flow path of water from/to the nearby ponds.



Fig 20.26 Google Earth image of Kallikad region taken in 2018. The image of same region taken in 2006 is given in the inset

The portions of Kalpathy (Fig 20.27) Thonipaalayam and valiyapadam (fig 20.28) wards got flooded due to their nearer proximity to the Kalpathy River and the encroachment into the river riparian area. The riparian area is the property of the river and just like flood plains, the riparian area is very likely to be inundated when the water level rises in the river.



Fig 20.27 Google Earth image of flooded region in Kalpathy ward



Fig 20.28 Google Earth image of flooded regions of Thonnipalayam & valiyapadam wards. The Kalpathy River flows right next to the flooded area

20.4.1.2 DROUGHT

Drought, also called 'the creeping disaster', implies a period of dry weather resulting in serious hydrological imbalance with consequences such as losses of standing crops and shortage of water without recharging of resources. The State of Kerala experiences seasonal drought-like conditions especially in summer every year. Even in the years of normal rainfall, water scarcity problems exist during summer in the midland and highland regions. Being categorized as a moderately drought-prone area and being surrounded by severely drought-affected areas, it is necessary to show some attention to the drought conditions of Palakkad Town. It is a fact that the city doesn't have any records of past severe droughts and associated damages but we should also note that the impact of drought is first reflected in the agricultural sector which is only 6% or less of the total municipal area. This makes it obvious that we have not experienced a visible drought yet but it does not mean we are not having one. The most common causes of drought are recognized to be the lack of rain and more frequent temperature anomalies. The annual temperature trend of the municipal region shows a 2˚C increment in a gap of 25 years (Fig 20.29) with the daily temperature hitting above 40˚C in the months of March-April every year. Even the excess rain we were receiving these years, was not enough to put out the scorching heat in the summer. During a dry spell, drainage and runoff are usually low, but potential evapotranspiration can increase due to increased radiation, wind speed, or vapor pressure deficit (e.g., caused by a decreased moisture availability or an increased temperature).

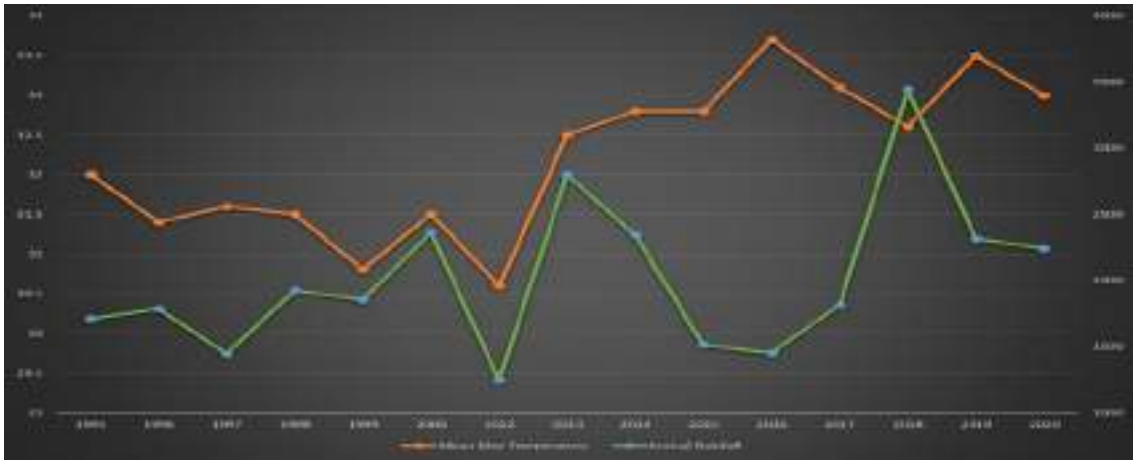


Fig 20.29 Graph showing mean maximum temperature and annual rainfall in Palakkad Town for a period of 25 years

This can lead to increased actual evapotranspiration, resulting in an extra loss of water from the soil and open water bodies leading to water shortages. Despite having serious water shortages during summer, there isn't any serious attempt to monitor the potential of groundwater resources in the specified area. The depletion of groundwater resources in a specific area termed hydrological drought is very complex as they are dependent not only on the atmosphere but also on the hydrological processes that feed moisture to the atmosphere and cause storage of water and runoff to streams. Reduced streamflow, inflow to reservoirs, lakes and ponds; Reduction in groundwater levels, Deeper pumping of water, ground subsidence as well as reduction in wetlands promotes hydrological drought. Fig 20.30 and 20.31 shows the hydrograph observations from the open well near Town Bus stand and bore well near DTPC ground respectively. From the hydrograph observations in the open well (Well no: 127), the average water level has increased from 6.1mbgl (1/06/2005) to 5.6 mbgl (1/06/2018) and this increase can be attributed to the increase in rainfall in recent years.

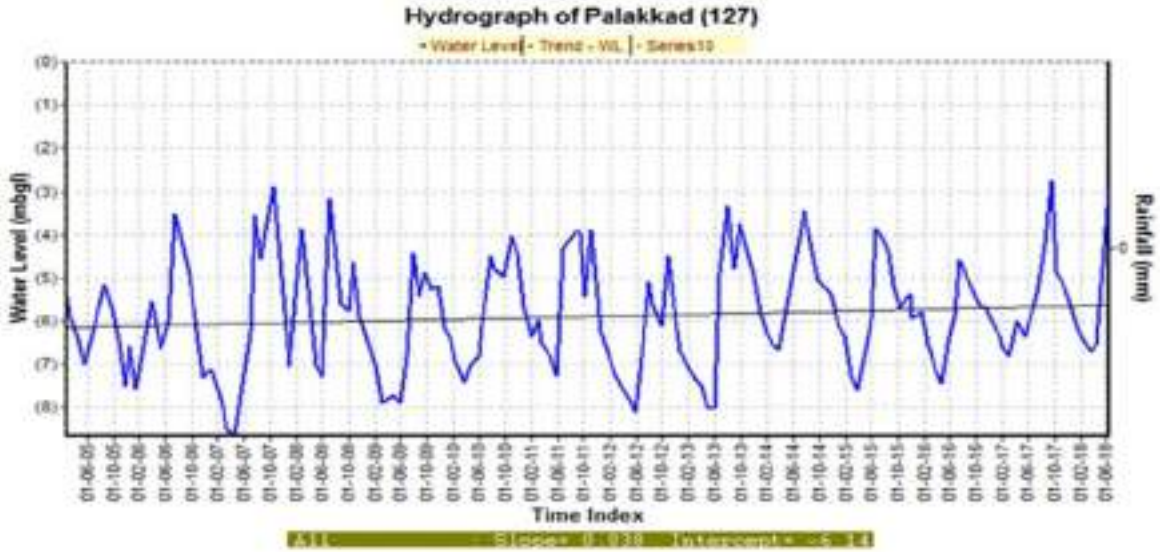


Fig 20.30. Hydrograph of well no 127 (Open well)

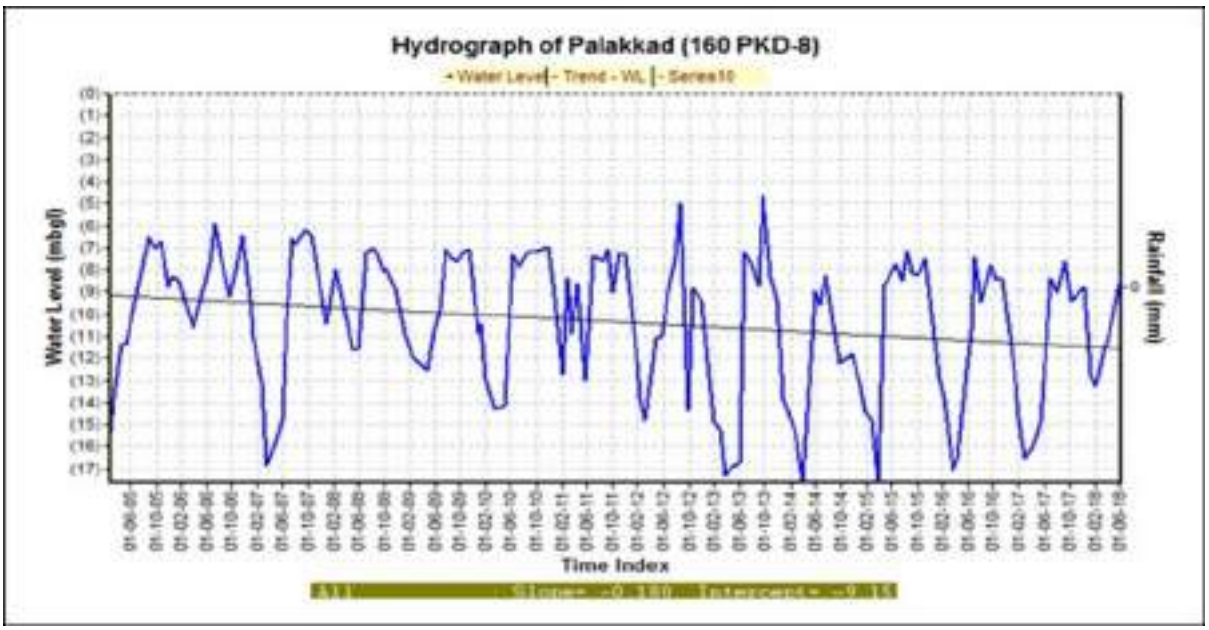


Fig 20.31. Hydrograph of well no 160 PKD-8 (Borewell)

The hydrograph observations from the bore well (well no: 160 PKD-8) located near DTPC however show a declining trend in groundwater level with a decrease of 9.1 mbgl (1/6/2005) to 11.5 mbgl (1/6/2018). This indicates the extent of overexploitation of groundwater without much focus on recharging. Both the wells show decline in water levels during the pre-monsoon periods. Hence, it is essential to look over the status of groundwater by mapping its potential zones across the Palakkad Town.

20.4.1.2.1 GROUNDWATER POTENTIAL MAPPING

The groundwater potential zones for the study area were generated through the integration of 10 thematic maps using remote sensing and GIS techniques. The layers were selected based on their significance in influencing the hydrology of a region.

Layers used:

i. Hydro geomorphology
ii**.** *Lineament Density*
iii. Land use
iv. Drainage Density
V. Slope
vi. Topographic Wetness Index (TWI)
vii. Rainfall
viii Curvature
ix. Topographic Position Index (TPI)
x. Roughness

The thematic layers generated were processed following the AHP (Analytic Hierarchy Process) method in ArcGIS software.

i. Hydrogeomorphology

The local hydrogeological settings of a region play a crucial role in the occurrence of groundwater and its spatial distribution. The water holding capacity and recharge/ discharge capability of a geological formation and aquifer layer is highly influenced by the aquifer characteristics (such as porosity, permeability and transmissivity), interconnectivity and rock types exposed to the surface and surface water sources. The hydro geomorphology map of Palakkad Town is shown in fig 20.32. Valley fill and Moderately dissected Lower plateau are the major hydromorphic units of the present region. The aquifer material of the valley fill region is mainly loose sediments and weathered and fissured rocks and owes good recharge conditions while the aquifer material of the lower plateau region is fissured rock with moderate recharge conditions.

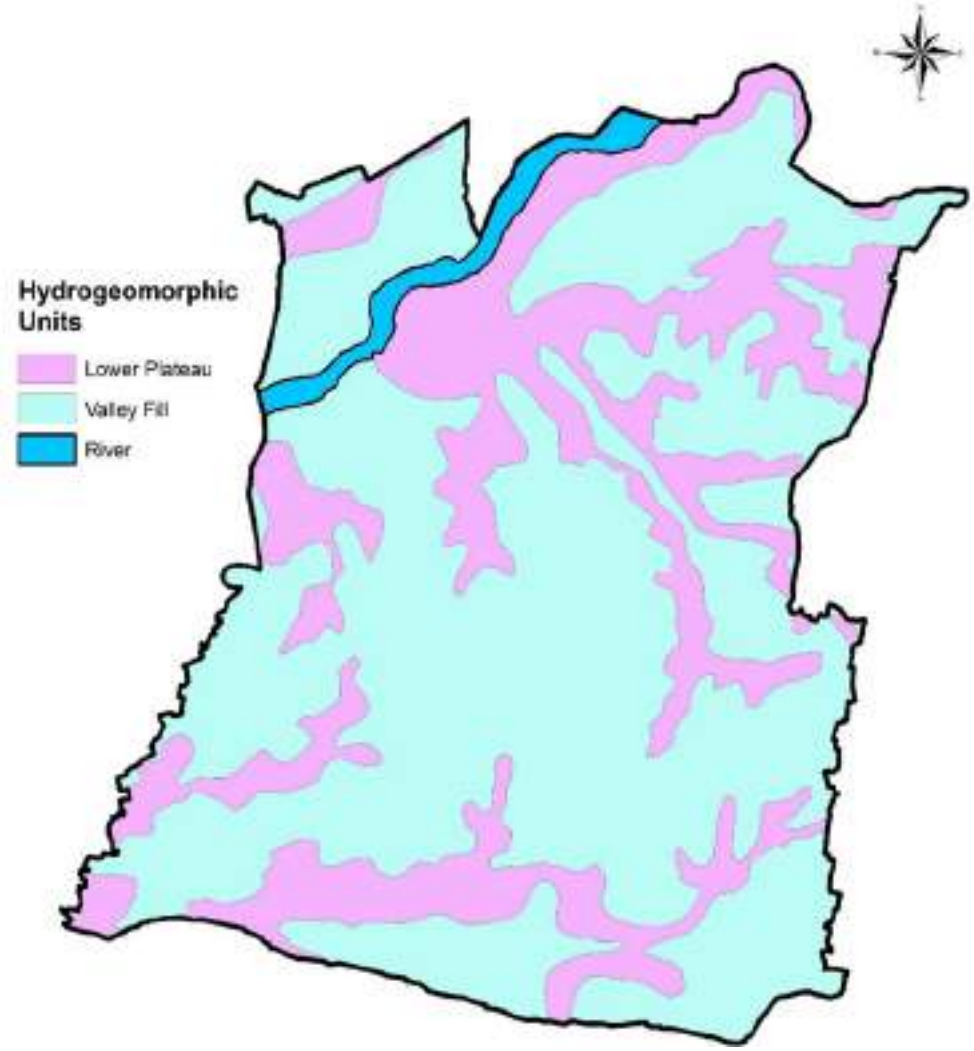


Fig 20.32. Hydrogeomorphology map of Palakkad Town. Source: NRSC

ii. Lineament Density

Lineaments are structurally controlled linear or curvilinear features and represent the zones of faulting and fracturing resulting in increased secondary porosity and permeability controlling the groundwater movement and storage. The lineaments in

and nearby the town were mapped from the NRSC groundwater prospects map and the density of lineaments was calculated using the line density tool in ArcGIS software (Fig 20.33). The ranks are given for lineament density based on the proximity of lineaments.

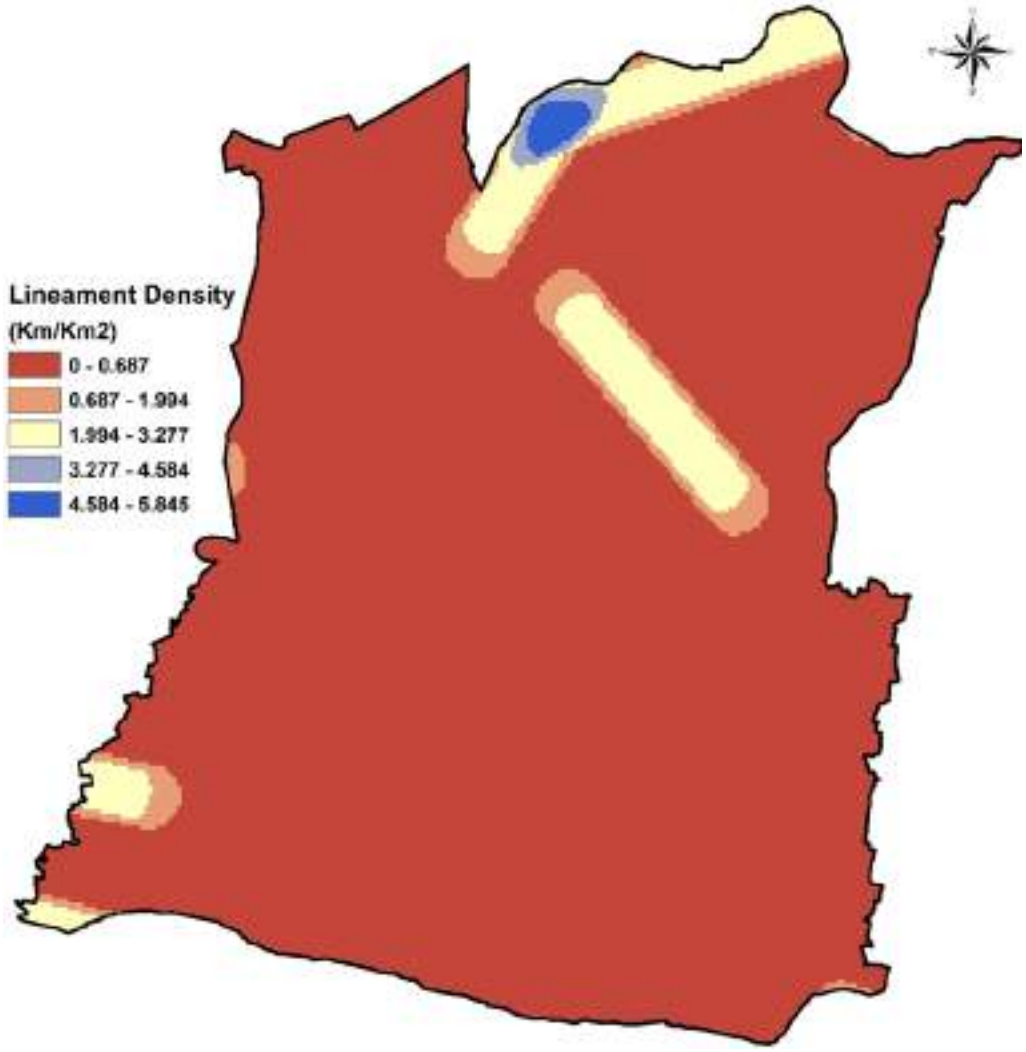


Fig 20.33. Lineament density map of Palakkad Town

iii. Land Use

Land use patterns provide information about infiltration and runoff, which are controlled by the nature of surface material. Cultivation fields with good vegetation density and forests play important roles in groundwater recharge of a region as they reduce the evaporation rate, prevent water loss through absorption via roots, prevent run-off and improve the infiltration rate. Furthermore, plant roots provide a pathway (through biological decomposition) for groundwater recharge and surface/rainwater leaching. Water bodies are also a good source of groundwater recharge. However, the infiltration rate is very low in rural and urban settlements and wasteland regions due to the presence of hard surfaces. The 2018 land use map of Palakkad town is given in fig 20.17.

iv. Drainage Density

Drainage density represents the closeness in the spacing of stream channels. Drainage density as an inverse function of permeability represents an area with concentrated runoff and low infiltration. The drainage density (Fig 20.34) of the study area was calculated using the line density analysis tool in ArcGIS software. The drainage density values for the area ranges from 0-6.962 km/km² and were classified into five classes using the natural breaks method.

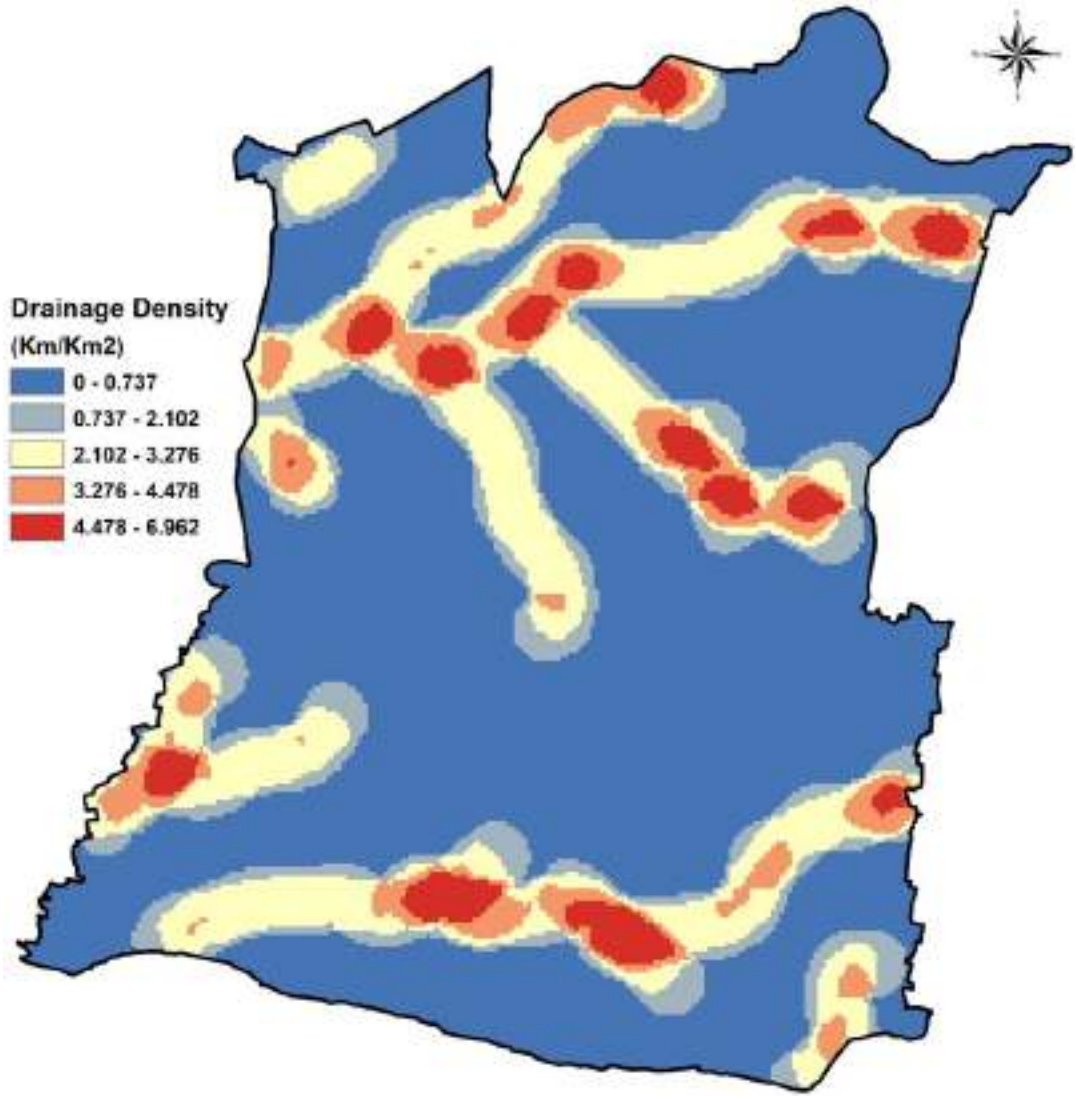


Fig 20.34 Drainage density map of Palakkad Town

v. Slope

The slope map (Fig 20.13) for Palakkad municipality was prepared from ALOS DEM using the surface tool of ArcGIS software. A higher slope provides insufficient residence time to infiltrate the rainwater/surface water due to rapid surface runoff and an augmented erosion rate. Therefore, steeper slopes are responsible for very poor groundwater recharge. In contrast, flat to decent slopes provide higher retention time

for rainwater/surface water infiltration and are responsible for a higher groundwater recharge yield. The slope values of Palakkad town range between 0-16.92˚, which is reclassified to 5 classes using natural breaks method.

vi. Topographic wetness Index

The Topographic wetness Index (TWI) is typically used to assess the role of topographic control on hydrological processes and is considered a secondary topographical attribute of the wetness conditions of a region. This index represents the water accumulation tendency in a catchment and the propensity to move the water downslope due to gravitational forces. Therefore, a higher value of the TWI reflects potential groundwater infiltration and groundwater recharge, caused by the effects of topography. The topographic wetness index (Fig 20.35) for the Palakkad municipal region is calculated using the equation

$$TWI = \ln\alpha/\tan\beta$$

where, α is the cumulative upslope area draining through a point and tan β is the slope angle at that point. The total wetness index value for the area ranges from 4.614-17.86. The values were reclassified into 5 classes using the natural breaks method.

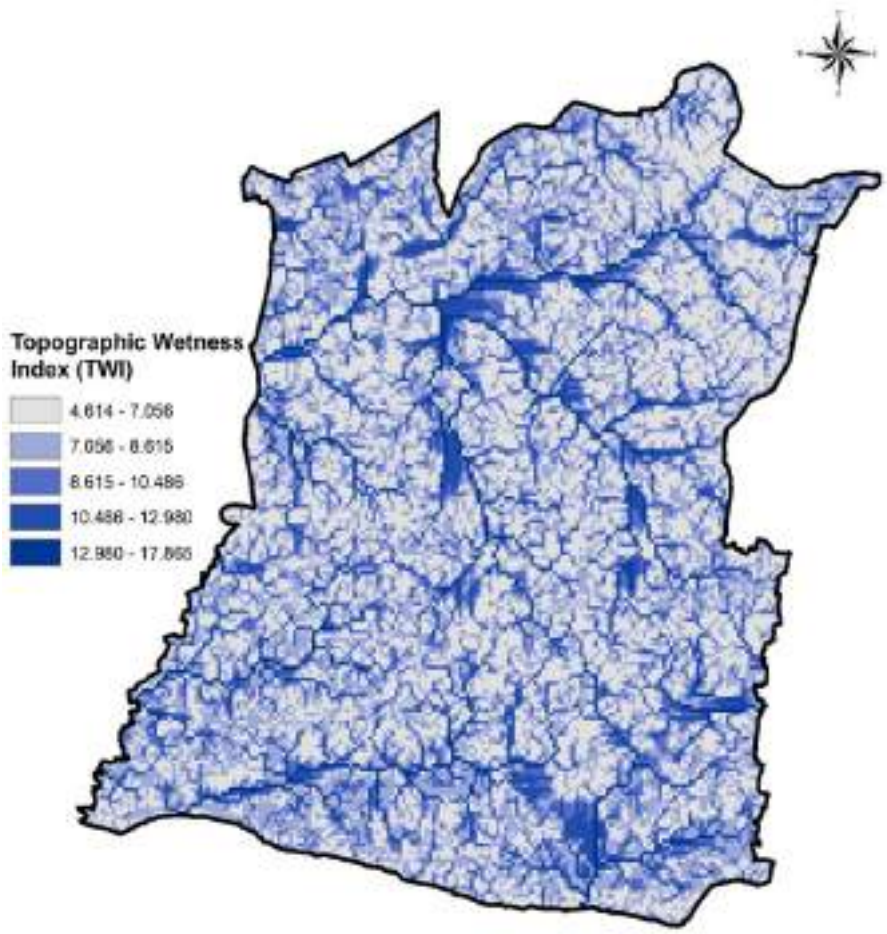


Fig 20.35. Topographic Wetness map of Palakkad Town

vii. Rainfall

Rainfall is a critical component of the hydrological process of a region as it is the source of water for the surface water bodies and groundwater recharge through the percolation of water. In addition, rainfall also determines groundwater fluctuation in a region. The Palakkad region experiences a serious deficit in pre-monsoon rainfall almost every year reducing the groundwater recharge and intensifying the drought conditions. The annual average rainfall of Alathur, Chittur, Palakkad, Olavakkode, Elappully, Peringottukurissi stations for four consecutive years (2016-2020) were collected and processed following the Inverse Distance Weightage (IDW) method to produce the average rainfall map of the municipal region (Fig 20.36). The average annual rainfall (2016-2020) for the area varies from 212.4-239.6 mm. Highest rank is given for highest rainfall class.

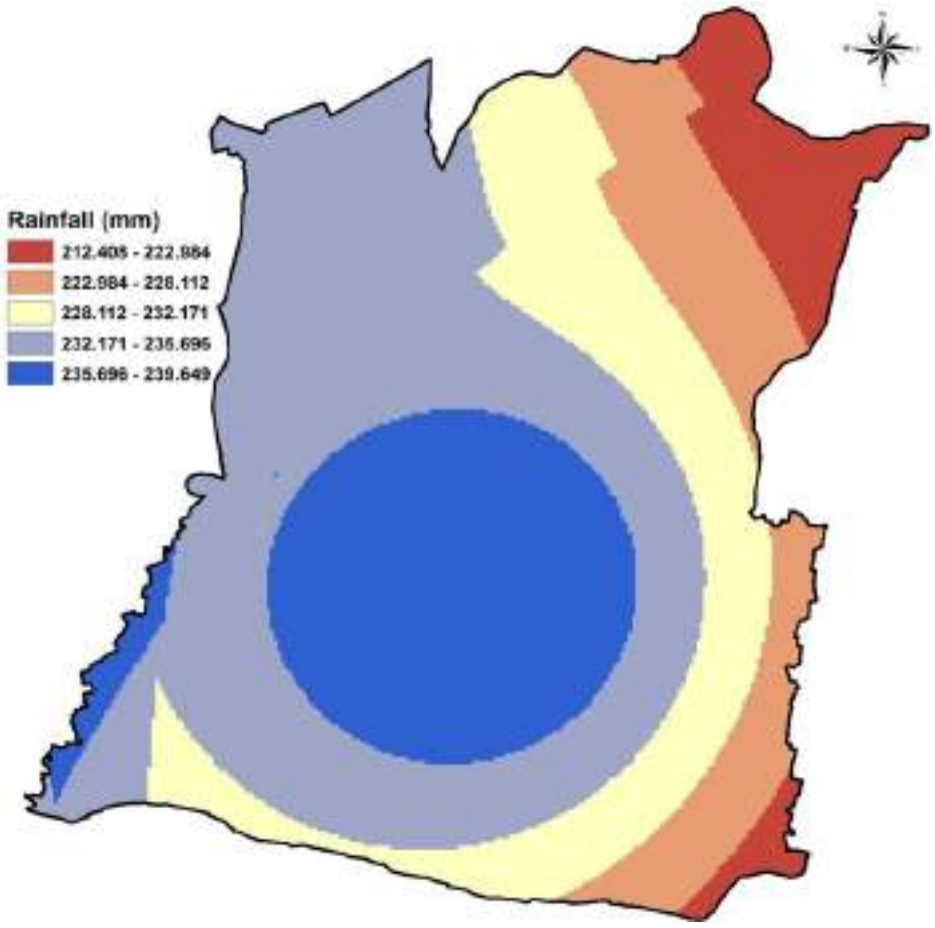


Fig 20.36. Average annual rainfall map of Palakkad Town

viii. Topographic Position Index

TPI is a widely used method for determining landform classifications and as an indicator of topographic slopes. Based on this index value, a region can be classified into ridgetops, hilltops, or midslope (TPI > a certain threshold), valley bottoms or depressions (TPI < a certain threshold) and flat plains (TPI = ~0). A higher value of this

index indicates higher surface runoff and lower infiltration, hence poor groundwater recharge. The TPI values for the area vary from -8.9 to 20.6 (Fig 20.37) and were divided into 5 classes using the natural breaks method. Reverse weightage is given for increasing topographic position index values.

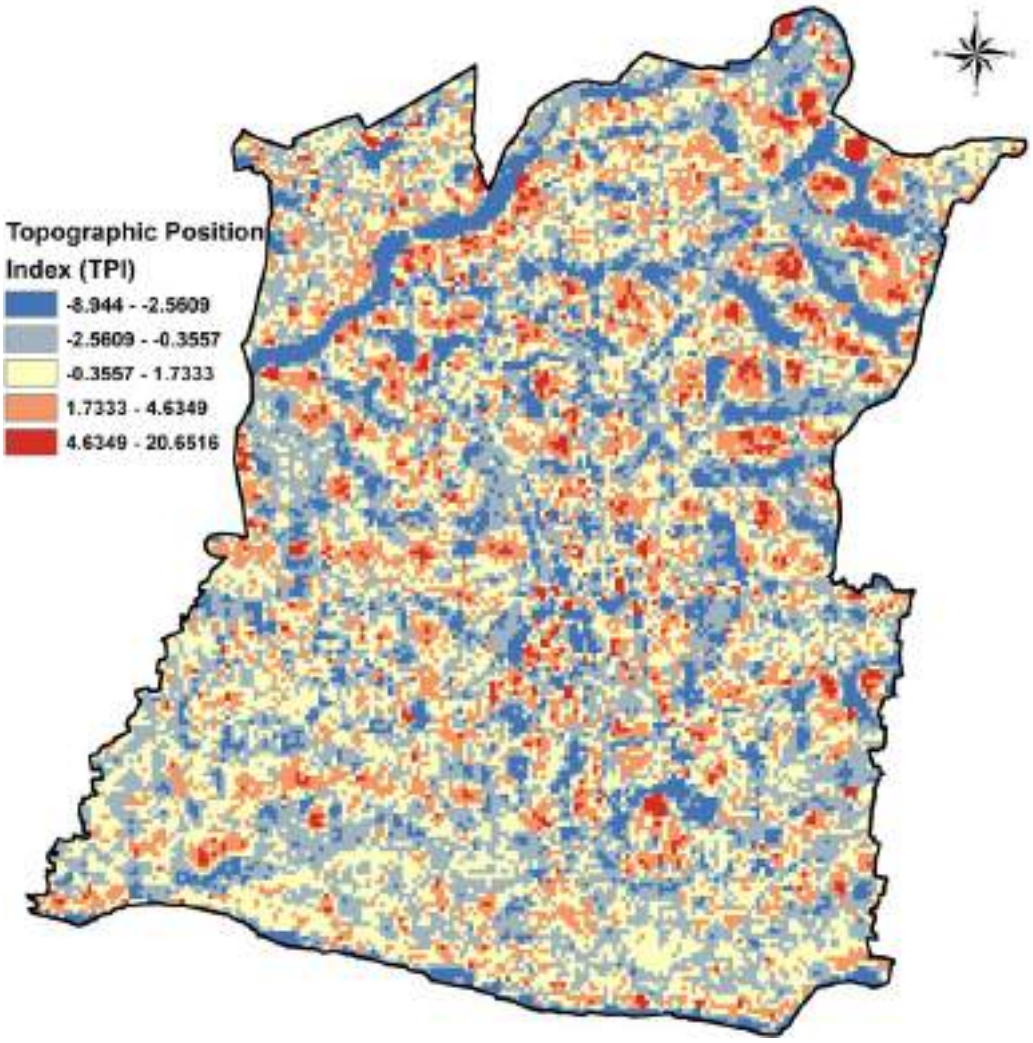


Fig 20.37. Topographic Position Index of Palakkad Town

ix. Curvature

Curvature determines the rate of change in slope gradient or aspect in a direction. A topographic curvature profile can represent an upward convex surface (positive curvature), upwardly concave surface (negative curvature), or a flat surface (zero curvature). In the convex profile, water tends to decelerate, and in the concave, upward profile water tends to accumulate, which is true for groundwater also. Curvature map was prepared from ALOS DEM using curvature tool of ArcGIS software. The curvature values (Fig 20.38) for the area range from -3.07 to 6.04. The values were reclassified into 5 classes using natural breaks method.

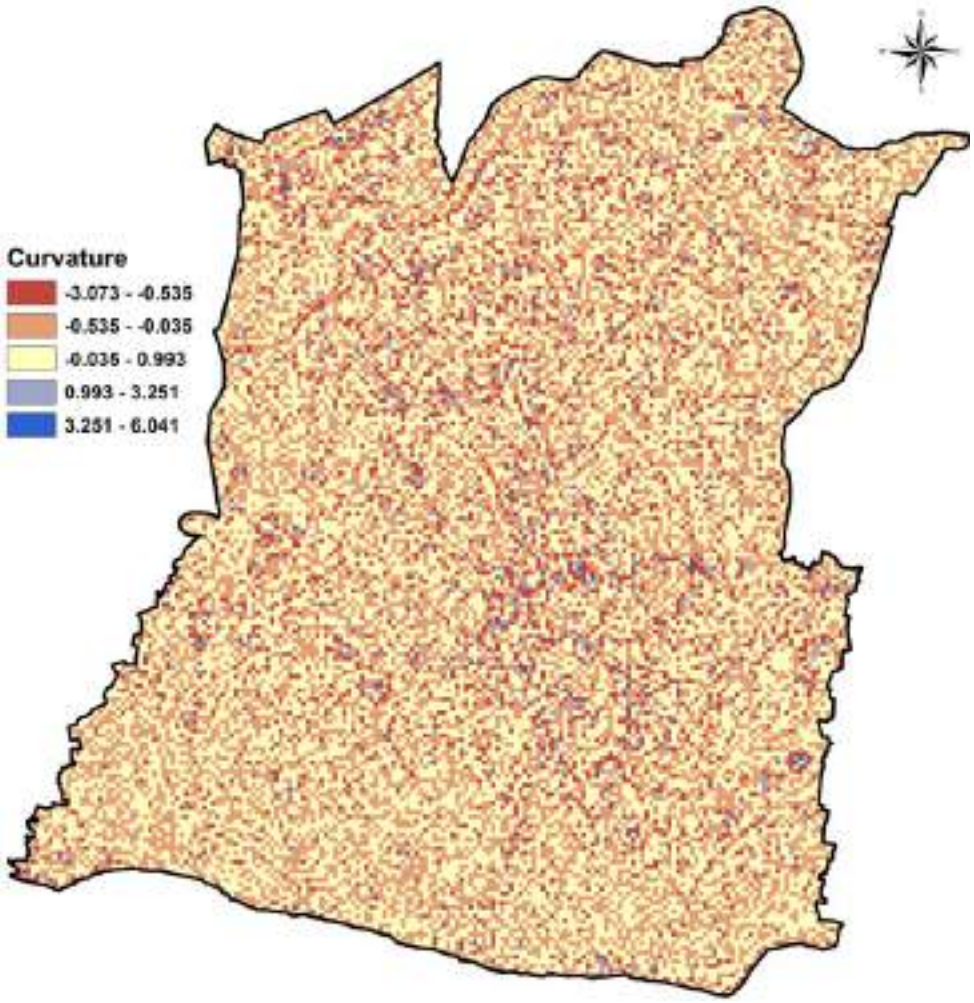


Fig 20.38. Curvature map of Palakkad Town

x. Roughness Index

Roughness represents the terrain heterogeneity or topographic undulations of a region. The roughness is mainly a characteristic of weathered rocks. An area rich with thick weathered rocks has comparatively high groundwater potential compared to a highly rough topography where usually a thin layer of weathered area dominates and therefore no scope for groundwater occurrence. High roughness means high undulation. Undulated topography is characteristic of a mountainous region where weathering and erosion processes continuously modify the landscape of a rugged into a smooth and plane surface in long run. In order to create the roughness layer, minimum (FS_{min}), maximum (FS_{max}) and mean (FS_{mean}) Focal Statistical layers were prepared using the Neighborhood tool in ArcGIS. The roughness index is calculated using the equation,

$$Roughness = (FS_{mean} - FS_{min}) / (FS_{max} - FS_{min})$$

The terrain roughness values (Fig 20.39) for Palakkad municipal region ranges from 0.111-0.888.

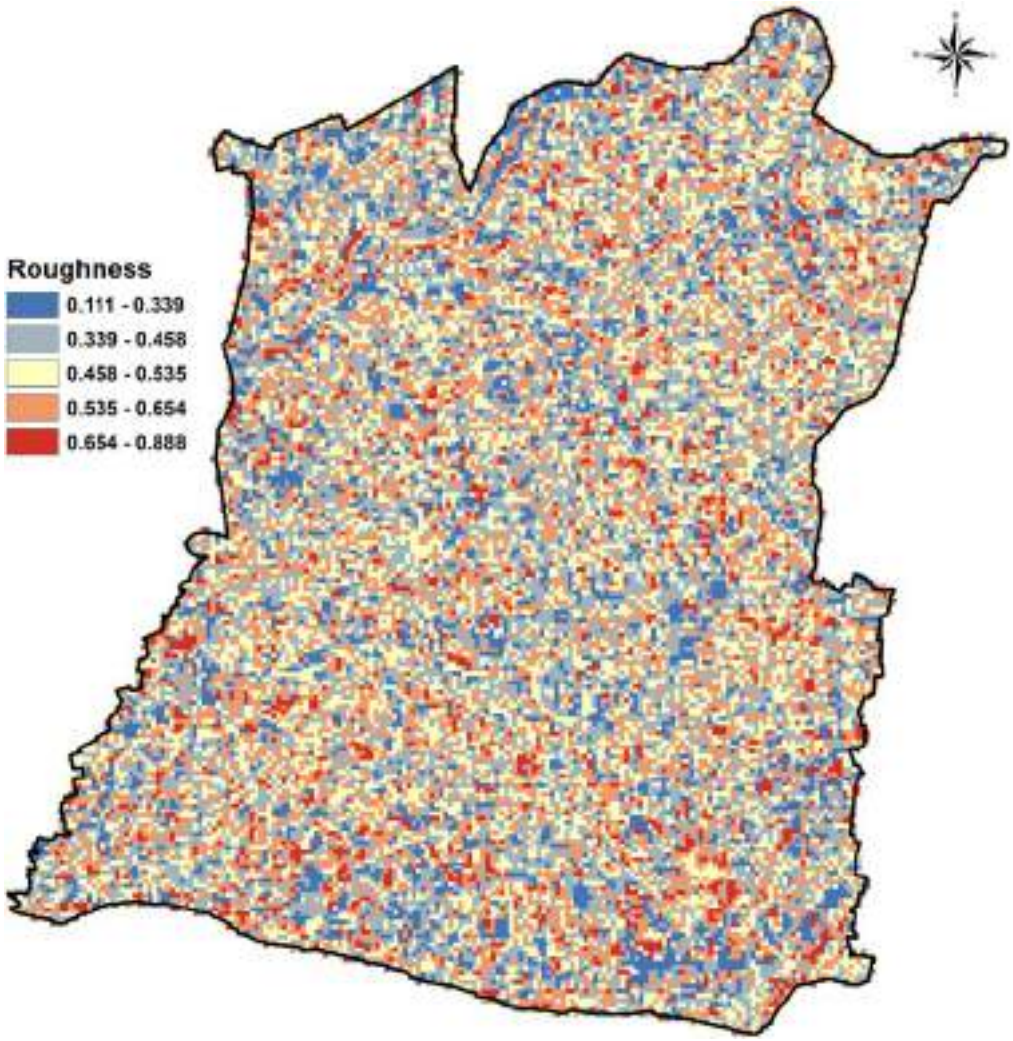


Fig 20.39 Roughness Index map of Palakkad Town

The influence of each factor in developing groundwater is not the same. Therefore, a relative weight was assigned to each thematic layer and its sub-classes according to Saaty's scale from 1 to 9 on the basis of their criticality and their water holding capacity. The Saaty's scale of relative importance value reveals that the value of 9 indicates extreme importance, 8 very, very strong, 7 very to extreme importance, 6 strong plus, 5 strong importance, 4 moderate plus, 3 moderate importance, 2 weak and 1 equal importance. Weightage and rank details of each theme and its sub-classes based on Saaty's scale are given in the table 20.12.

Table 20.13.Categorization of factors influencing Groundwater Potential Zones

Theme	Assigned Weight	Sub Class	Rank
Hydrogeomorphology	8	Moderately-dissected lower plateau	5
		Valley Fill	8
		Water Body	9

Lineament Density	7	0-0.687	2
		0.687-1.994	4
		1.994-3.277	6
		3.277-4.584	8
		4.584-5.845	9
Land use	7	Built-up	2
		Open spaces	4
		Vacant Land	5
		Paddy/Green areas/Dry agri-	7
		Water Bodies	9
Drainage Density	6	0-0.7372	8
		0.7372-2.102	6
		2.102-3.276	4
		3.276-4.478	3
		4.478-6.962	2
Slope	5	0-2.25	8
		2.25-4.38	6
		4.38-8.24	4
		8.24-13.28	3
		13.28-17.6	2
Total Wetness Index (TWI)	5	4.61-7.05	2
		7.05-8.61	3
		8.61-10.48	4
		10.48-12.98	5
		12.98-17.86	6
Rainfall	4	212.4-222.98	2
		222.98-228.1	3
		228.1-232.1	4
		232.1-235.6	5
		235.6-239.6	6
Curvature	3	-3.07- -0.53	2
		-0.53- -0.03	3
		-0.03-0.99	4
		0.99-3.25	5
		3.25-6.04	6
Topographic Position Index (TPI)	3	-8.94- -2.56	6
		-2.56- -0.35	5
		-0.35- 1.73	4
		1.73- 4.63	3
		4.63- 20.65	2
Roughness Index	3	0.11-0.33	6
		0.33-0.45	5
		0.45-0.53	4
		0.53-0.65	3
		0.65-0.88	2

The weights assigned to the thematic maps and their individual classes were normalized by using Saaty's AHP method by constructing a pairwise matrix (Table20.14). The normalization process reduces the subjectivity associated with the assigned weights of the thematic maps and their features.

The judgment on the pair-wise comparison of the thematic layers and sub-classes within the thematic layers was validated by evaluating the Consistency Index and Consistency Ratio after calculating the principal eigen value (λ_{max}) (Table 20.15).

$$\lambda_{max} = 100/10 = 10$$

$$\text{Consistency Index (CI)} = \lambda_{max}\text{-n / n-1}$$

Where λ is the principal eigenvalue and n is the total no. of themes.

$$CI = 10\text{-}10/10\text{-}1 = 0$$

Consistency Ratio is defined as CR = CI/RCI, Where RCI = Random consistency Index value, whose values were obtained from Saaty's standard scale (Table 20.16)

$$CR = 0/1.49 = 0$$

According to Saaty, if the Consistency Ratio (CR) is 0, there is a perfect level of consistency in the pairwise comparison. The threshold value is not exceeding 0.1, which means the judgments matrix is reasonably consistent. Based on the assigned weights, all 10 thematic layers were integrated with weighted overlay analysis in ArcGIS software to generate the groundwater potential map of Palakkad Municipality.

$$\text{Groundwater Potential Zone} = \sum_i^N (Xa \times Yb)$$

where, *X*- represents the weight of the thematic layers; *Y* – represents rank of the thematic layer subclass. The A term (A = 1, 2, 3, ……, X) represents the thematic map and B term (B = 1, 2, 3, ……, Y) represents the thematic map classes.

Table 20.14. Pair-wise comparison matrix table of ten thematic layers

Theme	Weight	HG	LU	LD	DD	SL	TWI	R	CV	TPI	RI	Geo. Mean	Nor. Weight
HG	8	8/8	8/7	8/7	8/6	8/5	8/5	8/4	8/3	8/3	8/3	1.779	0.157
LU	7	7/8	7/7	7/7	7/6	7/5	7/5	7/4	7/3	7/3	7/3	1.557	0.137
LD	7	7/8	7/7	7/7	7/6	7/5	7/5	7/4	7/3	7/3	7/3	1.557	0.137
DD	6	6/8	6/7	6/7	6/6	6/5	6/5	6/4	6/3	6/3	6/3	1.333	0.117
SL	5	5/8	5/7	5/7	5/6	5/5	5/5	5/4	5/3	5/3	5/3	1.113	0.098
TWI	5	5/8	5/7	5/7	5/6	5/5	5/5	5/4	5/3	5/3	5/3	1.113	0.098
R	4	4/8	4/7	4/7	4/6	4/5	4/5	4/4	4/3	4/3	4/3	0.89	0.078
CV	3	3/8	3/7	3/7	3/6	3/5	3/5	3/4	3/3	3/3	3/3	0.66	0.058

Table 20.15 Results of Consistency Ratio

Theme	HG	LU	LD	DD	SL	TWI	R	CV	TPI	RI	Weighted Sum	Row average	λ
HG	0.157	0.156	0.156	0.155	0.156	0.156	0.156	0.154	0.154	0.154	1.554	0.15	10
LU	0.137	0.137	0.137	0.135	0.137	0.137	0.136	0.135	0.135	0.135	1.361	0.13	10
LD	0.137	0.137	0.137	0.135	0.137	0.137	0.136	0.135	0.135	0.135	1.361	0.13	10
DD	0.117	0.117	0.117	0.117	0.117	0.117	0.117	0.116	0.116	0.116	1.167	0.11	10
SL	0.098	0.097	0.097	0.097	0.098	0.098	0.097	0.096	0.096	0.096	0.97	0.09	10
TWI	0.098	0.097	0.097	0.097	0.098	0.098	0.097	0.096	0.096	0.096	0.97	0.09	10
R	0.078	0.078	0.078	0.077	0.078	0.078	0.078	0.077	0.077	0.077	0.776	0.07	10
CV	0.058	0.058	0.058	0.058	0.058	0.058	0.058	0.058	0.058	0.058	0.58	0.05	10
TPI	0.058	0.058	0.058	0.058	0.058	0.058	0.058	0.058	0.058	0.058	0.58	0.05	10
RI	0.058	0.058	0.058	0.058	0.058	0.058	0.058	0.058	0.058	0.058	0.58	0.05	10

Table 20.16. Saaty's ratio index for different values of N

The consistency indices of randomly generated reciprocal matrices										
Order of the matrix										
N	1	2	3	4	5	6	7	8	9	10
RCI Value	0.00	0.00	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.49

The final groundwater potential zone map was classified into very low, low, moderate, high and very high zones (Fig 20.40).

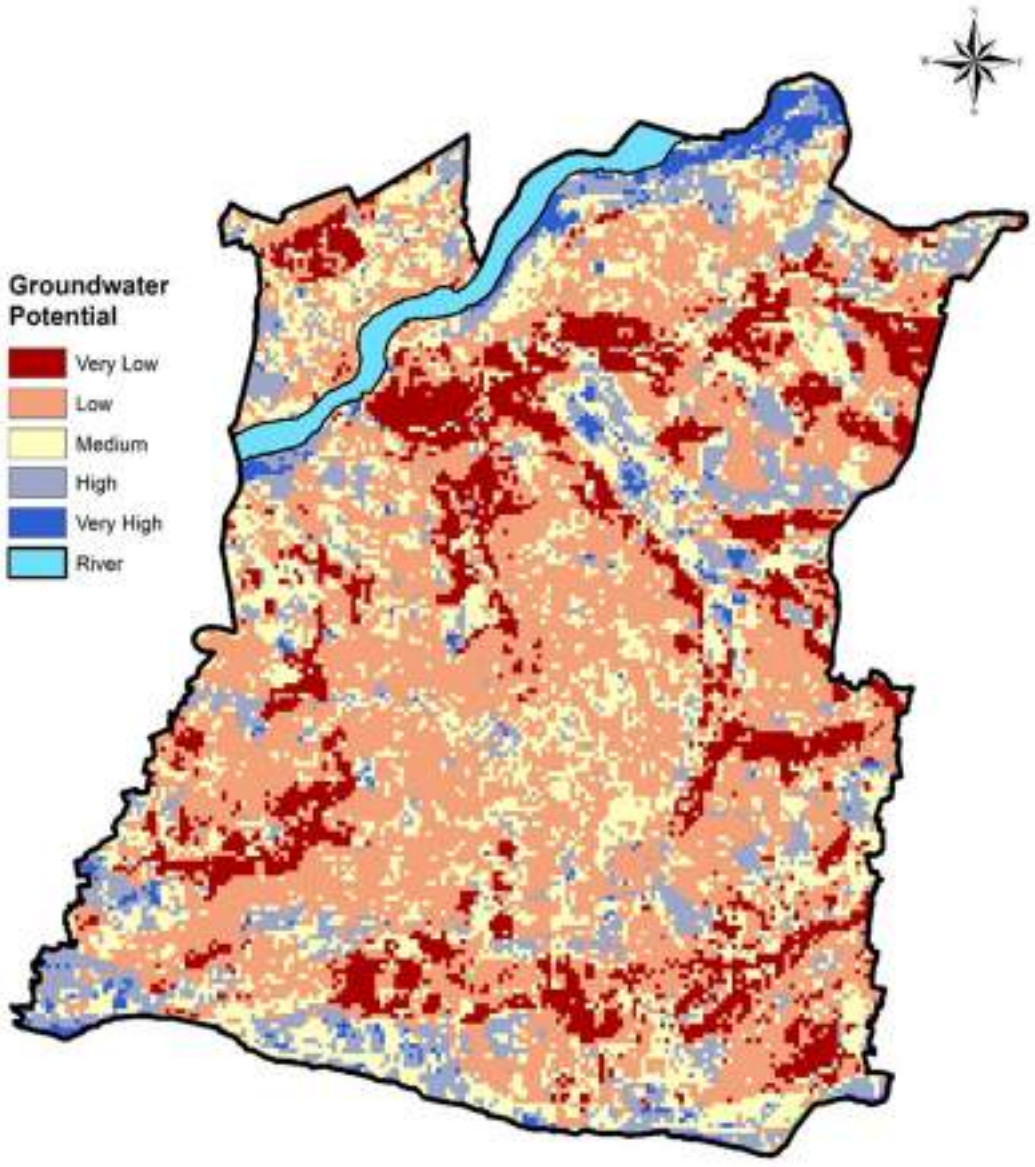


Fig 20.40 Groundwater potential zone map of Palakkad Town

Validation

(On availability of data from CGWB)

Most groundwater originates directly from excess rainfall infiltrating the land surface. Thus, land use has a major influence on both groundwater quality and recharge rates. Different land-use practices leave distinctive signatures on the quality of groundwater recharge and, in some instances; result in diffuse groundwater pollution, irrespective of climatic conditions. Similarly, land-use practices influence groundwater recharge rates, especially under more arid conditions. Increased urbanization increase impervious surfaces by using concrete and hard materials, which result in reduced infiltration that adversely affects groundwater recharge and storage. Among all major land-use change types, extending irrigated agriculture using a surface-water source has the greatest influence on groundwater – significantly increasing recharge and changing water quality as excess irrigation water infiltrates into shallow aquifers (Fig 20.41).

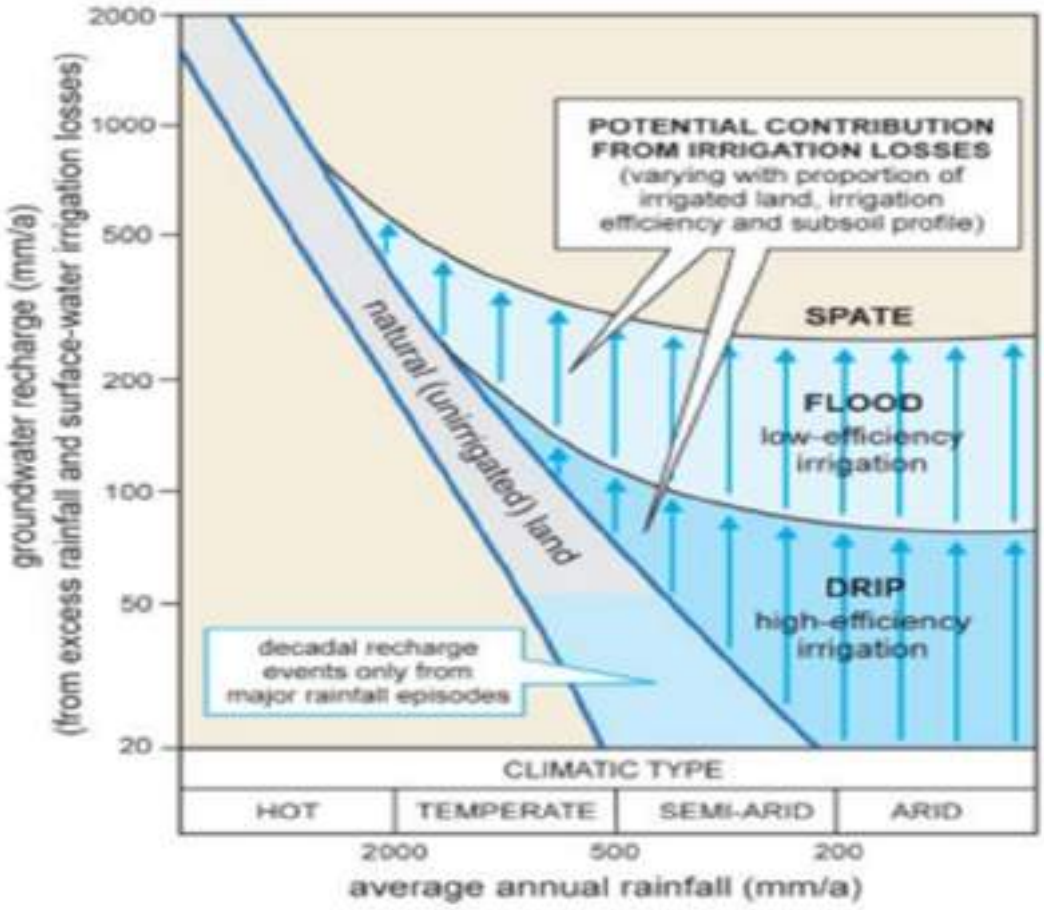


Fig 20.41. General relationship between groundwater recharge and annual rainfall and the potential increment from extensive surface-water irrigation. Source: GWP, 2014

Understanding the impacts of land-use change on the groundwater potential is needed for the optimal management of groundwater resources because land-use change can have long-lasting, and in some cases, irreversible impacts on aquifers. The link between land use and groundwater has long been recognized, but has not been widely translated into integrated policies and practices. By following the same method done in the case of flood, a comparative study was conducted using 1971 landuse to

analyze how much landuse has influenced the groundwater potential of the palakkad town. The 1971 landuse of Palakkad Municipality is given in fig 20.22. The groundwater potential map generated using 1971 landuse is given in fig 20.42.

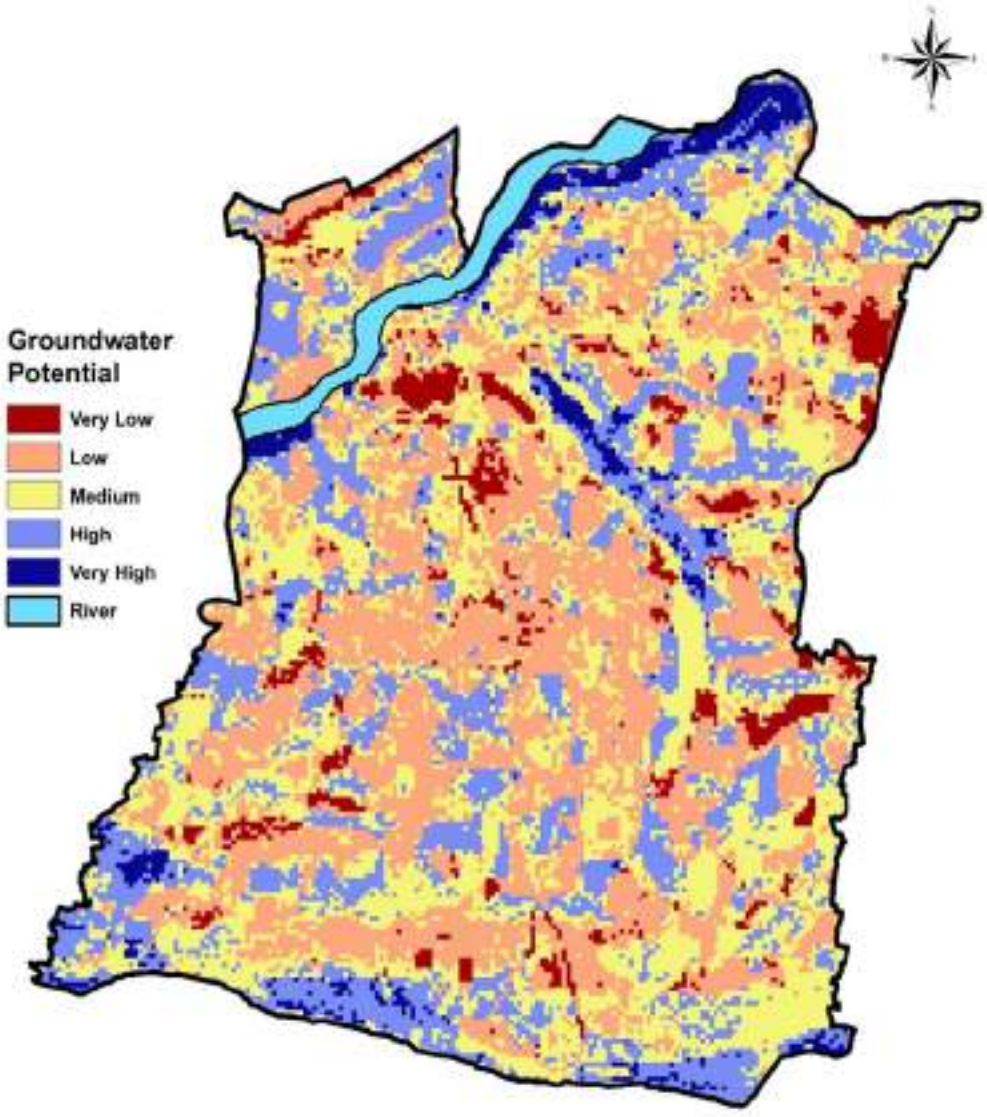


Fig 20.42 Groundwater Potential map made using 1971 land use

The areal coverage of groundwater potential zones in percentage from the maps created using both 2018 and 1971 land use is given in table 20.16

Table 20.16. Comparison of areal coverage of groundwater potential zones of 1971 and 2018 land uses

Groundwater Potential	1971 Land use	2018 Land Use
Very Low	5.22	14.85
Low	34.13	44
Moderate	33.5	24
High	22.5	13.5
Very High	4.61	3.6

The results imply that there is a significant increase in the area of very low groundwater potential zones in the updated groundwater potential map compared to the same made using 1971 land use and our groundwater resources are in a serious state of depletion. This may be attributed to the increase in residential and urban land and decrease in green spaces including paddy fields which may have reduced infiltration and enhanced runoffs.

20.4.1.3 Suggested Mitigation Measures for Flood and Drought

Paddy conservation; Adoption of Sponge City concept

Paddy fields themselves have an innate flood mitigation function to store rain waters and drain them gradually afterward rather than discharging them all at once (Abler, 2004, Matsuno, 2006, Groenfeldt, 2006, Kim et al., 2006, Huang et al., 2006). They are manmade wetlands that can store upto 40% of excess water (Osawa T et.al, 2021; Sujuno J et.al, 2010) by functioning as a dam thus playing a vital role in flood regulation. They also act as zones of groundwater recharge. As we look at the 1971 land use, we can find that the cultivation mostly covered the flow accumulation pathways utilizing natural slope and elevation conditions for effectively storing the water for irrigation (fig 20.43 left). When the water is stored at its source region itself, it will not accumulate further and meet other accumulation pathways eventually flooding the land. However, the current land use does not have enough paddy fields for such flow regulation, which permits the water to follow the pathways to reach the adjacent canals and water bodies thus causing flood (fig 20.43 right).

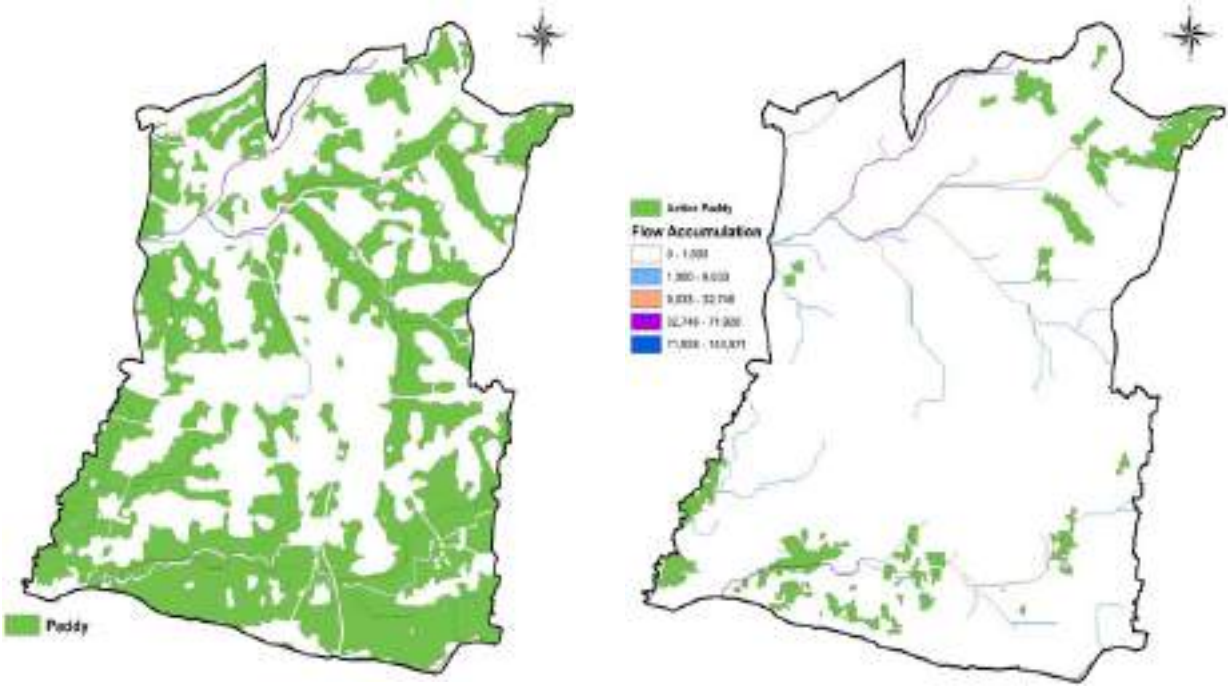


Fig 20.43 Spatial representation showing paddy fields of 1971 and current active paddy

And also, on analyzing the 2018 flooding patterns of the Palakkad town, it is found that the severity/areal extent of flooding has been significantly reduced in the regions where the flood water met active paddy regions (represented in circles in Fig 20.44). The paddy fields may have restrained the excess water without spreading it into nearby urban areas. The figure 20.45 shows the flood effect of non active paddy that could bring low response to flood



Fig. 20.44 Spatial representation showing Active paddy and flood-affected areas

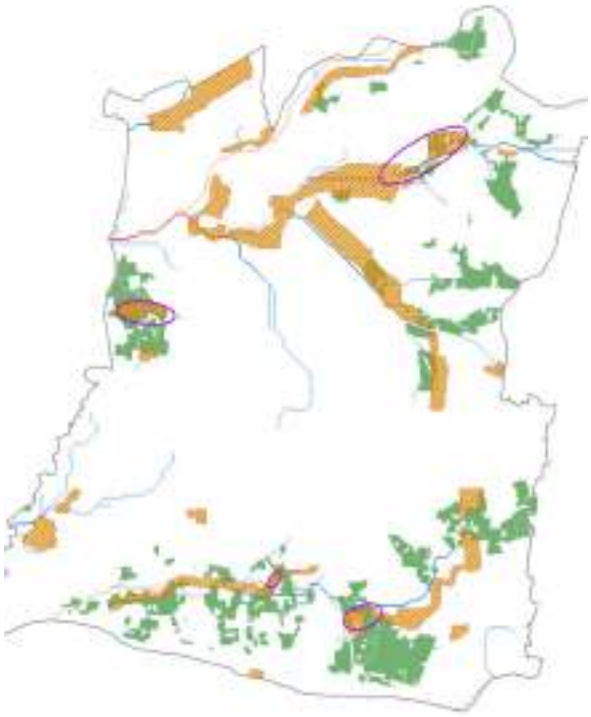


Fig. 20.45 Spatial representation showing also Non active paddy and flood-affected areas

The above mentioned inquests, points to the necessity of more wetlands including non active paddy regions that can collect and store the water at places where they get accumulated in order to decrease the magnitude of floods happening in the future. As mentioned earlier, to cope with both floods and droughts we need to make our grounds more permeable to water at least in some regions. This forms the basic principle of promoting sponge city. The selective parts of the town area, which we consider to be effective in regulating flood and promoting groundwater recharge through these analyses, need to be conserved. For this, we need to make a step on legalizing these regions as areas exclusive for water retention, where no activities other than paddy cultivation, agricultural practises and other incidental uses are only permitted. Such areas have to be connected with the water bodies as much as possible to ensure proper water balancing of excess runoff and act itself as a flood water collection basins creating a well distributed network. A series of ponds and

waterbodies have been linked to water retention area, the water flows through these channels is collected in nearby ponds forming a water balancing canal. Consequently, the flow accumulation could be minimised. The Spatial coverage of Water Retention Area is given in fig 20.46 Other flood mitigation activities such as conservation of river riparian zones with miyawaki forests, paddy dams, construction of culverts and drainages, community farming techniques to retain agriculture activities etc are also suggested.

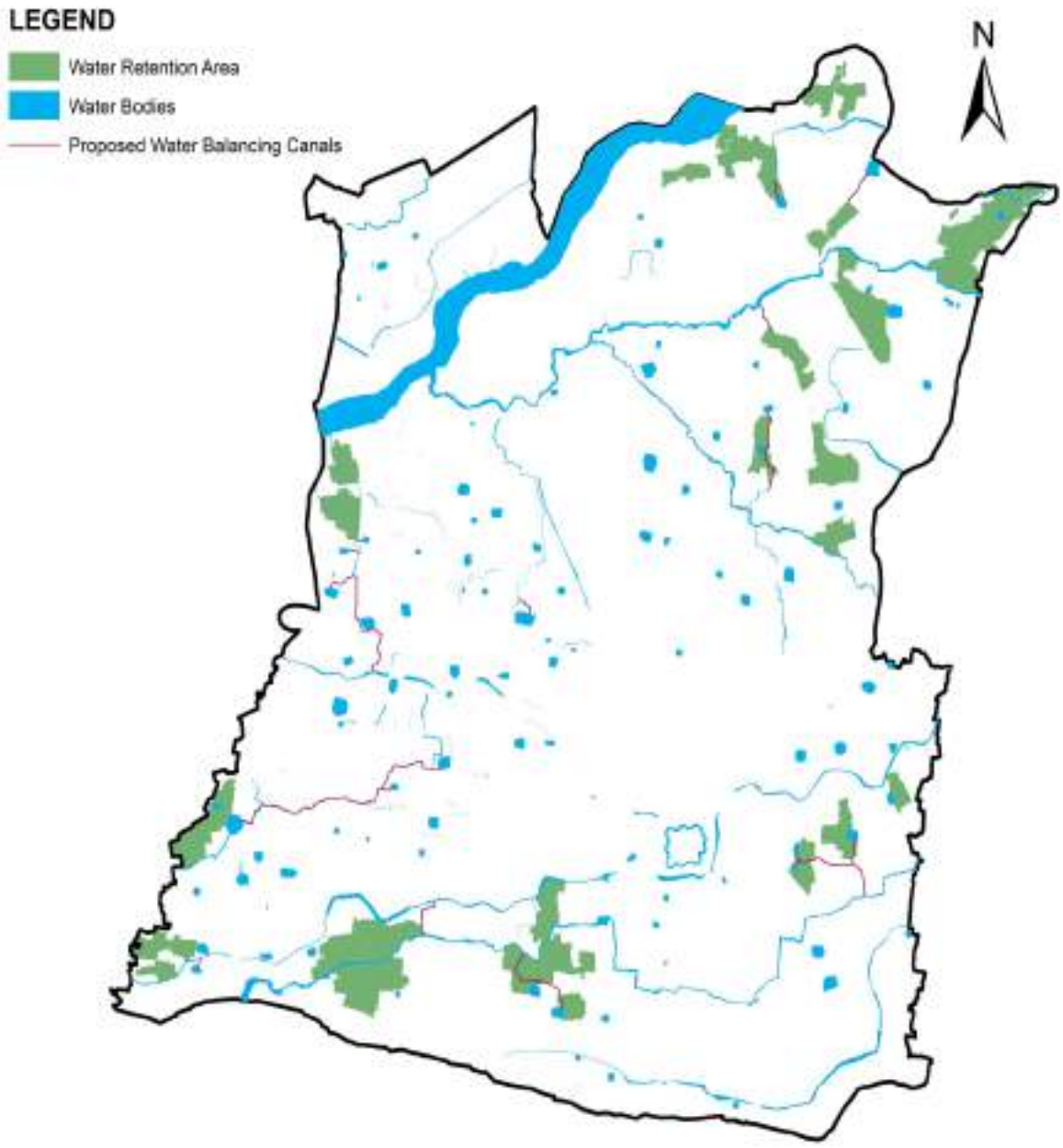


Fig 20.46. Water Retention areas and balancing canals

20.4.2 Disaster Preparedness

Coordinated action is essential when preparing for a disaster. This includes the development of plans or arrangements based on risk assessments done by Local governments, districts and the state through a continuous cycle of risk management, planning, coordinating, training, equipping, exercising, evaluating and taking corrective action to ensure the effective coordination and response during disasters. Effective disaster management planning for all hazards is a key element of being prepared. Disaster management planning establishes community networks and arrangements to reduce risks related to disaster preparation, response and recovery. State and district management authorities are the statutory bodies constituted under the Disaster Management Act, 2005 (Central Act 53 of 2005). The institutional structure of the District Disaster Management Authority (DDMA) is given in Fig 20.47.

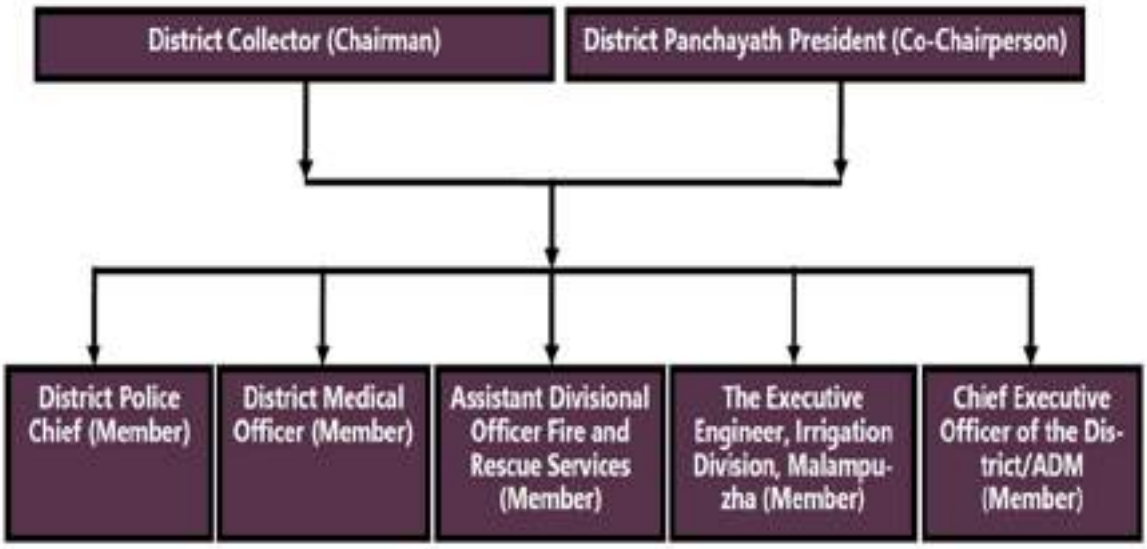


Fig.20.47 Institutional structure of DDMA

State Disaster Management Authority

The first KSDMA was constituted vide S.R.O No. 395/2007 dated 4th May 2007. Present Composition of KSDMA is notified vide S.R.O No. 583/2013 dated 17th July 2013. Vide Section 3 of the Kerala State Disaster Management rules (KSDMR), 2007 the authority is composed of ten (10) members, chaired by Chief Minister and convened by Additional Chief Secretary, Revenue and Disaster Management. The Chief Secretary (inter alia Chairperson of the State Executive Committee) is the Chief Executive Officer of KSDMA vide Section 14(4) of the DM Act, 2005.

District Disaster Management authority

The Palakkad disaster management authority is functioning under the chairmanship of the District Collector. District disaster management authority Palakkad prepared district disaster management plan, and Kerala state disaster management policy, 2010 vide G.O(MS) No. 240/2010/DMO dated 19-06-2010 has laid down the guiding principles for the District disaster management plan of Palakkad.

20.4.2.1 Strategies

20.4.2.1.1 State Interventions

- Regulations & compliance monitoring mechanisms to check overutilization of natural resources.
- Support and guidance for conducting scientific studies to identify the optional distance between quarry locations to ameliorate the disaster effects.
- Preparation of spatial plans at the district level in the context of disaster. Adopt policies to incentivize vertical growth in safe zones.
- Frame and implement policies to regulate developmental activities along risk zones.

20.4.2.1.2 District Interventions

- Revise draft integrated District Development Plan (IDDP), 2013 include the context of disaster and legalize the same by District Planning Committee (DPC).
- Ensure that local bodies prepare projects in the context of present disaster effects and implement them.
- Formulation of evacuation routes connecting to safe zones in the event of disasters and dissemination of the same to the public.
- Consolidate the high-risk zones of the district on a spatial platform. Place regulatory measures.
- Stronger monitoring & corrective actions – on unauthorized development along flood plains, natural drains & landslip hazard zones.
- Action plan for de-siltation of dams, deepening of rivers.

20.4.2.1.3 Local Interventions

- Every local body to have a Local development plan on a spatial platform and submission of projects including the disaster context.
- Compulsory buffer zones in high-risk regions of the floodway.

- Riverfronts in high-density habitations.
- Agricultural tracts/wetlands in medium to low-density habitations.
- Floodproofing of residential/commercial complexes in flood fringe regions.
- Sensitizing the local populace regarding the importance of buffer zones and floodproofing.

Only the local Interventions strategies above mentioned have been proposed to resolve through masterplan.

20.4.2.2 Activity plan for Drought

Table 20.17. Activity Plan for Drought

Anticipated Needs Pre-Drought		
Sl No	Structural	Non-Structural
1	Renovation of existing ponds and	Public Awareness Campaigns
2	Construction of check dams, cleaning and protection of existing water sources	Monitoring and updating drought-related parameters
3	Renovation of existing lift irrigation	Update resource inventories
4	Forestation	Storage of medicines
5	Promotion of Rainwater harvesting	Water supply
6	Watershed Management Programmes	Encourage farmers to understand crop patterns to be adopted in their area
7	Enactment and enforcement of laws regulating groundwater level and exploitation of natural resources	Disseminate drought risk to the public residing in drought-prone zones. Campaign for drought tips for agriculture, general public

20.4.2.3 Activity Plan for flood

Table 20.18: Activity plan for Flood

Activity Plan for flood	
1	Identification of flood prone areas and marking on maps
2	Documenting previous floods
3	Monitoring of landslides causing blockages in rivers
4	Assessment of area suffering drainage congestion
5	Assessment area prone to river erosion
6	Identify new safe areas and maintain existing shelters, making sure they have sanitary and other basic necessities
7	Implement public awareness activities to create a pro-active and prepared society, which can cope effectively with hazards and their aftermath
8	Educate the public on what to do and what not to do to prevent harmful activities in the floodplain
9	Inspect flood mitigation infrastructure

20.4.3 Disaster Response

The aim of emergency response is to provide immediate assistance to maintain life, improve health and support the morale of the affected population. Such assistance may range from providing specific but limited aid, such as assisting refugees with transport, temporary shelter, and food, to establishing a semi-permanent settlement in camps and other locations. It also may involve initial repairs to damaged infrastructure. The focus in the response phase is on meeting the basic needs of the people until more permanent and sustainable solutions can be found.

The disaster response activities are organized through Incident Response Systems (IRS). The Incident Response System (IRS) is an effective mechanism for reducing ad-hoc measures in response. It envisages a composite team with various Sections to attend to all the possible response requirements. The IRS designates officers to perform various duties and get them trained in their respective roles. It also emphasizes the need for proper documentation of various activities for better planning, accountability and analysis. This will greatly help in reducing chaos and confusion during the response phase. Everyone will know what needs to be done, who will do it and who is in command. The institutional framework of IRS for Palakkad is given in fig. Responsible Officers (ROs) have been designated at the State and District level as overall in charge of the incident response management. The Responsible Officer may delegate responsibilities to the Incident Commander (IC). Flow chart showing the institutional structure of IRS is depicted in fig 20.48. The Incident Response Team (IRT) is managed under IRS which will function at State, District, Sub-Division and Tehsil / Block levels. The IRTs will be pre-designated at these levels and on receipt of early warning, the corresponding Responsible Officer will activate them. In case a disaster occurs without any warning, the local IRT will respond and contact the Responsible Officer for further support, if required.

20.4.3.1 Operation Section

The Operations Section helps to prepare and execute different tactical operations required in response to the disaster. The duties include;

- Monitoring field level rescue and evacuation operations.
- Monitoring salvage operations.
- Requisition of accommodation, transport and other necessary equipment for relief groups.
- Maintain law and order.
- Regular updates to the EOC regarding relief operations

20.4.3.2 Planning Section

The Planning Section is responsible for the collection, evaluation, and display of incident information, maintaining the status of resources, and preparing the Incident Action Plan and incident-related documentation.

20.4.3.3 Logistics Section

The Logistics Section is responsible for providing adequate services and support to meet all incidents or event needs. The duties include;

- Assess the need in terms of manpower and resources and ensure regular supply.
- Ensure proper storage and transport facilities for relief materials.
- Maintain adequate supply of necessary transport and equipment.
- Coordinate with private transport associations and boat associations for emergency requirements.
- Organize transportation for rescue party, evacuated people medical terms and injured or sick people

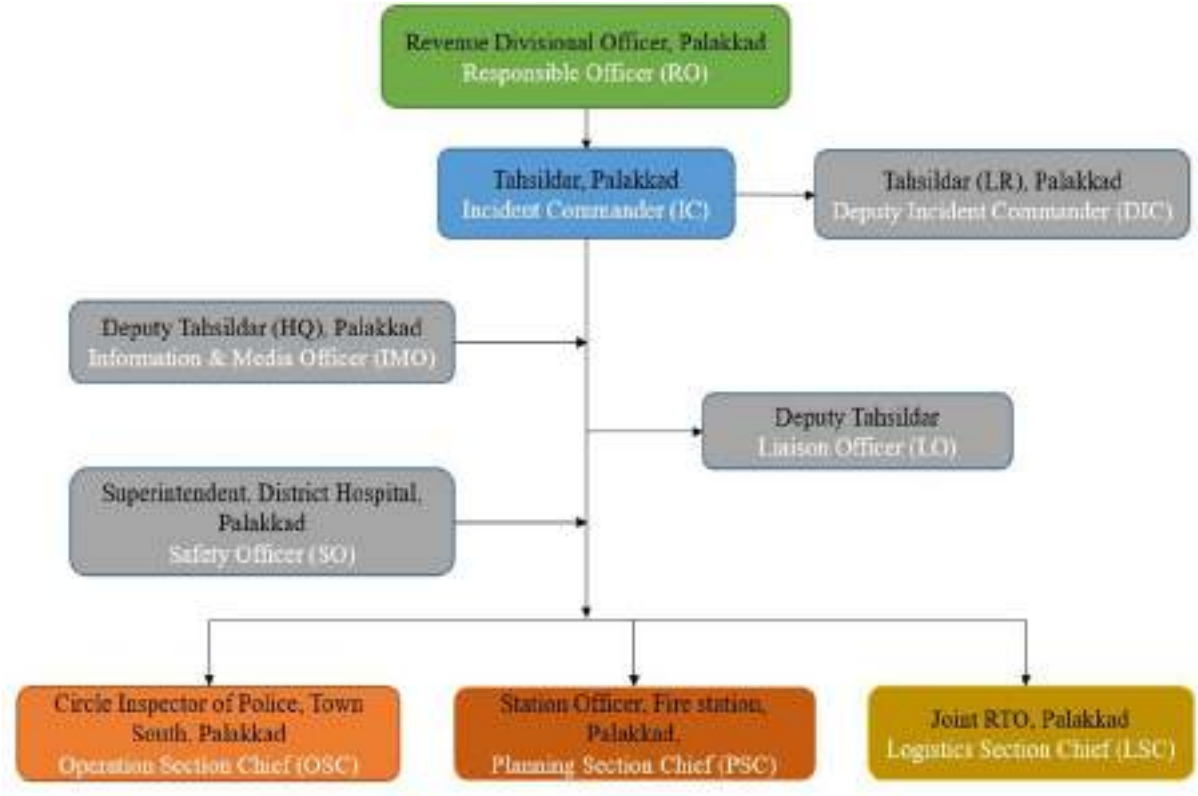


Fig 20.48 Incident Response System of Palakkad (Source: SDMA)

20.4.4 Recovery

This post-disaster phase aims in establishing the 3R's; Recovery, Rehabilitation and Reconstruction thus providing the opportunity to 'Build Back Better' (BBB) integrating disaster risk reduction into development measures, and making communities resilient

to disasters.

Recovery measures, both short and long term is a set of orderly actions triggered by the impact of a disaster upon a community taken by the integration of central, state and local level departments and NGOs. It will consist of several related activities such as the following:

- Damage assessments
- Debris clearance, removal and its environmentally safe disposal.
- Restoration and even upgrading utilities including communication networks
- Re-establishment of major transport linkages.
- Temporary housing
- Detailed building inspections
- Redevelopment planning
- Environmental assessments
- Demolition
- Reconstruction
- Integrating DRR (Disaster Risk Reduction) into various development initiatives.
- Financial management Economic impact analyses.

The major steps/ processes of the recovery process and the processes involved are summarized in Table 20.19

Table 20.19 Major steps of the recovery process and the key processes involved

	Major Steps	Process
1	Post-Disaster Needs Assessment (PDNA) and Credible Damage Assessment	• Preliminary assessment reports • Compilation and transmittal of damage and loss data • Disaster damage assessments led by government and assisted by humanitarian response agencies, and the initial damage surveys leading to a comprehensive assessment • Quantitative and qualitative baseline for damage, loss, and needs across sectors, blocks (taluk) and districts • Results monitoring and evaluation plan for the recovery program • Select the most appropriate and achievable processes and methodology for conducting early and credible damage and needs assessments

Table 20.19 Continued..

2	Developing a vision for Build-Back Better (BBB)	• High-level meetings as well as broad-based, wider consultations with experts, civil society, and key stakeholders • Build consensus among the range of stakeholders within and outside government
3	Ensure coherence of BBB with the development programs and	• Discussions at top level to align the recovery vision with the government's broader, longer-term development goals and growth and poverty reduction strategies
4	Incorporating resilience and BBB in recovery vision	• Consultations and background studies on: • Disaster resistant physical recovery • Options for fast economic recovery • Gender and equity concerns • Vulnerability reduction • Natural resource conservation and environmental protection
5	Balancing recovery across sectors	• Balance public and private sectors BBB programs • Promote norms for non-discriminatory and equitable asset disbursement among individuals and communities • Prioritize infrastructure reconstruction • Address the recovery of the lives and livelihoods of disaster-affected communities • Show sensitivity to the needs of the affected population with regard to public expectations from recovery
6	Prioritizing sectors for recovery	• Determine the relative importance of various sectors such as housing, water and sanitation, governance, transport, power, communications, infrastructure, environment, livelihoods, tourism, social protection, health, and education

20.5 INFERENCES

Palakkad witnessed unprecedented spells of rain in 2018 that resulted in the flooding of 1.974 sq. km of land. 27 out of 52 wards were inundated in flood. Meanwhile, the surrounding regions of the municipality is in hold of severe drought and the municipality itself faces serious water issues every summer. The severity of these disasters has made us look for its possible reasons. From the above findings, it is clear that land use has a direct influence on these disasters and the role of land use in contributing to both droughts and floods should not be neglected. Increased built-up land and reduction in paddy fields may have disrupted the natural hydrological behaviour of the terrain by creating more impervious areas thus reducing the infiltration and increasing the runoff. It is time for us to focus more on "Paddy Conservation" rather than "Paddy Conversion" to keep the surroundings resilient to such disasters. More priority should be given to sustainable development plans where the developments, as well as nature, would go hand in hand.



CHAPTER 21-ADMINISTRATION AND FINANCE

21. ADMINISTRATION AND FINANCE

21.1 DEVELOPMENT ADMINISTRATION

Local Self Government Institution is responsible for the routine development activities in that local area. The state must ensure the autonomy of the local bodies and their capacity for the routine activities. As the population increases, the local body has the responsibility to provide the basic amenities needed for that population. For the smooth functioning of local bodies, municipal reforms should focus on capacity building of urban local bodies especially in smaller and medium towns, standardization and computerization of municipal accounts, delinking local initiatives from political motives through involvement of community, unbundling of services especially for small towns should be taken up.

21.2 URBAN GOVERNANCE

21.2.1 Organizational Structure of Urban Local Body (ULB)

The structure of the Municipality consists of two Wings i.e., the Administrative Wing and the Executive Wing.

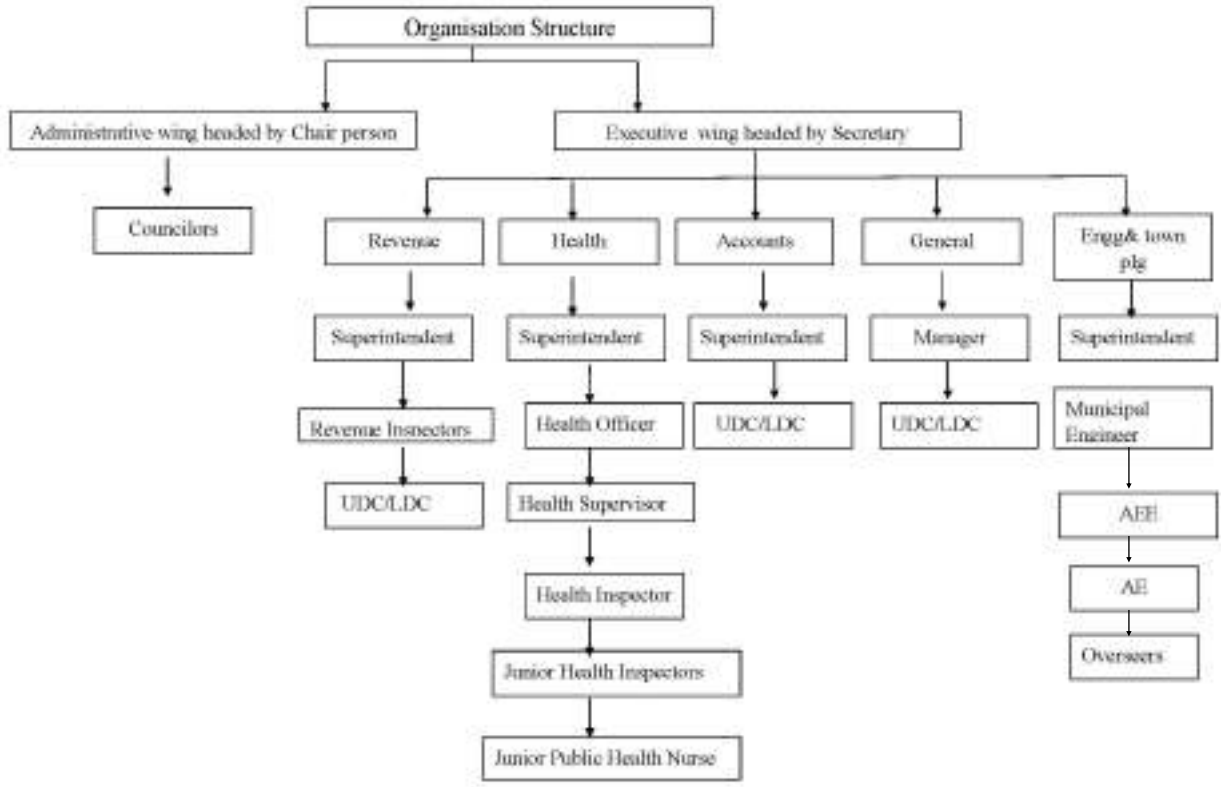


Figure 21.1 Organizational structure of urban local body

21.2.1.1 Administrative Wing

The municipal council, the political arm of the municipality consists of 52 elected councilors, each representing a division. The chairman/chairperson (elected from the councilors) heads the municipal council, which performs its duties as per the provisions of the Kerala Municipalities Act 1999. The political wing provides an overall direction to the municipality and performs its functions through a set of committees constituted for different purposes.

21.2.1.2 Executive Wing

The executive wing is responsible for day-to-day operations of the municipality, and is headed by the municipal secretary. The secretary is the administrative head of the municipality and is supported mainly by five departments in the operations. The organizational structure of the municipality comprises of five functional departments. The function of clerical staff dealing under each department/ section of the Municipality is coded for the sake of work allocation and standardization.

Various departments under the ULB share the responsibility of service delivery within the municipality. The functions of various officials/departments, under the administrative wing are elucidated here under:

(i) Secretary:

The Secretary is at the apex of this structure and is responsible for all activities carried out by the ULB. The Secretary is responsible for preparation and certification of all periodical records, returns and furnishes all information as may from time to time be required by the municipal council or the standing committees. He is also responsible for preparation of accounts. At each general meeting, the Secretary along with some other key officials, discuss various issues with the elected representatives.

(ii) General Administration Department

This department is headed by the Secretary and assisted by Personnel Secretary, Administrative officers, Superintendents and other officers. This department is responsible for establishment, other essential matters relating to office, officers, staff and their welfare like preparation of staff pay bills, maintenance of registers for advances, GPF, pension, PF's etc.

(iii) Engineering and Town Planning Department

The Municipal Engineer heads the engineering department, and is assisted by Assistant Executive Engineer, Assistant Engineer and other staffs. With regards to fieldwork, scheme works are delegated to one Assistant Engineer who also looks after regular works, related to public works, drains,

street lighting. A major function of the municipality is formulation and execution of works- like construction and maintenance of roads, buildings and other infrastructure systems. Another major function of this department is issue of building license, preparation and implementation of master plans and eviction of encroachments, urban planning and building regulation.

(iv) Revenue and Accounts Department

This department is headed by the Revenue Inspector and assisted by Junior Assistant. The accounts section is responsible for supervising all financial transactions related to the municipality, advising the Revenue Officers on all internal financial matters, updating financial receipts and expenditure details in accordance with the utilization of funds, reporting deviations in expenditure of funds in any of the allocated schemes, assisting preparation of the municipal budget, maintenance of accounts regarding stamp duty, SFC Grants, MP,MLA Grants, maintenance of petty cash book and general cash book and attending to audit requirements and other such accounts-related duties. Revenue Officer, heading the revenue section, is responsible for collecting taxes such as, trade tax, house tax, advertisement tax, and entertainment tax; development charges; transfer of properties collection of duty; issuing notices for recovery of tax; and monitoring revenue collections of the ULB.

(v) Public Health Department

The department is headed by Health Officer, and is responsible for ULB services such as solid waste management, public health related works like malaria control, family planning, mother and child health care, birth and death registration etc., and other government assisted programs related to health and poverty reduction and awareness programs. The Health Officer assisted by the Health Supervisor and Health Inspectors, Junior Health Inspectors and Junior Public Health Nurse. Junior Public Health Nurse Supervisors are in-charge of works execution at the field level, which includes monitoring and supervising the work of sanitary labourers in the wards under their charge and attending to specific local complaints. Besides, this department is responsible for the enforcement of the Public Health Act. The Public Health Department is vested with the responsibility of ensuring safe sanitation and cleanliness of the town. The department is also responsible for the maintenance of municipal dispensaries, burial grounds and slaughterhouses. One of the most crucial services of the municipality is maintenance of sanitation and cleanliness in the town. This involves mainly conservancy works involving sweeping of roads, garbage collection and disposal, cleaning of drains, and disinfecting of drains.

Table 21.1 Municipality staff details

Sl. No.	Name of Division	No. of staffs	No. of vacancies
1	Administration	68	2
2	Finance	9	1
3	Engineering	27	3
4	Public Health and Utilities	36	17
5	Contingent	189	45

Source: Palakkad municipality 2019

21.3 MUNICIPAL FINANCE

Municipality maintains a municipal fund for managing the finances of the municipality. The finance in the municipality is maintained by a cash based single entry system. Like every municipality the funds for different activities are allotted from state and central government. The main sources are taxes levied from land and buildings in the municipality. The financial status of the municipality is reviewed for the past 3 years from 2114-15.

The sources and uses of funds, and an assessment of municipal finances based on important financial indicators are explained. The transactions are carried out mainly under revenue and capital receipts and expenditure.

- Revenue Account

All recurring items of income and expenditure are included under this head. These include taxes, charges, salaries, maintenance expenditure, debt servicing etc.

- Capital Account

Income and expenditure items under this account are primarily nonrecurring in nature. Income items include loans, contributions by GoK, other agencies and capital grants under various state and central government programs, revenue account transfer for capital works and income from sale of assets. Expenditure items include expenses booked under developmental works and purchase of capital assets.

- Deposits and Advances or Debt Head

Under the municipal accounting system, certain items are compiled under advances and deposits. These items are temporary in nature and are essentially adjustments for the purpose of recoveries and payments. Items under this head include library cess, income tax deductions, pension payments, provident fund, payment and recoveries of advances to employees and contractors, etc.

Table 21.2 Detailed annual financial statement

Head of Account	2016-17	2017-18	2018-19
Opening Balance			
Bank/ Treasury	92085658.23	0.00	0.00
Bank/ Treasury	98,13,420.00	15,13,80,618.23	15,99,62,478.23
Cash	23,39,794.00	16,85,789.00	32,52,373.00
Total	**10,42,38,872.23**	**15,30,66,407.23**	**16,32,14,851.23**
Income			
Revenue Account /Operating Receipts			
Tax Revenue	5,36,22,269.00	3,64,13,735.00	3,22,86,454.00
Assigned Revenues & Compensation	0.00	1,00,10,622.00	40,907.00
Rental Income from Municipal Properties (Sundry debtors-Rent)	62,04,164.00	59,43,153.00	33,80,704.00
Fees & User Charges	1,90,32,046.00	5,22,24,316.00	1,95,51,509.00
Sale & Hire Charges	18,11,686.00	13,14,668.00	42,95,889.00
Other liabilities	0.00	18,500.00	76,198.00
Miscellaneous Expenditure to be written off	0.00	0.00	0.00
Other Liabilities	2,83,63,389.00	4,33,02,292.00	3,99,32,292.00
Fixed Assets	0.00	0.00	0.00
Total Revenue income	**10,90,33,554.00**	**14,92,27,286.00**	**9,95,63,953.00**
Capital income Receipts			
Revenue Grants, Contributions & Subsidies	6,00,66,320.00	37,76,30,770.00	47,41,54,626.00
Income from Investments	0.00	21,250.00	0.00
Interest Earned	37,82,338.00	8,77,194.00	2,76,975.00
Other Income	20,44,864.00	36,16,211.00	12,068.00
Municipal (General Funds)	0.00	0.00	47,10,000.00
Earmarked Funds	8,59,353.00	9,13,368.00	0.00
Reserves	1,13,43,576.00	0.00	0.00
Grants, Contribution for Specific Purposes	25,96,13,022.00	9,40,31,059.00	79,07,78,974.00
Loans, Advances and Deposits	1,82,218.00	1,15,918.00	2,22,059.00
Total capital income	**33,78,91,691.00**	**47,72,05,770.00**	**1,27,01,54,702.00**

Continued

Debt head			
Sundry Debtors (Receivables)	10,80,88,163.00	17,83,02,996.00	16,38,29,955.00
Deposits Received	17,71,177.00	41,53,675.00	56,04,468.00
Total debt head income	**10,98,59,340.00**	**18,24,56,671.00**	**16,94,34,423.00**
Grand Total	**55,67,84,585.00**	**80,88,89,727.00**	**1,53,91,53,078.00**
Grand total including opening Balance	**66,10,23,457.23**	**96,19,56,134.23**	**43,22,13,227.23**
Expenditure			
Revenue Operating Payments			
Establishment Expenses	3,36,99,616.00	3,89,09,028.00	4,68,27,643.00
Administrative Expenses	67,96,536.00	99,37,768.00	91,14,178.00
Operations & Maintenance	2,33,04,365.00	2,58,88,686.00	39,26,75,316.00
Interest & Finance Charges	46,446.00	14,66,632.00	97,050.00
Other Liabilities	8,90,94,880.00	10,18,58,689.00	10,95,55,455.00
Miscellaneous Expenditure to be written off	0.00	1,55,804.00	0.00
Other Liabilities	8,92,53,054.00	11,53,60,024.00	20,85,95,487.00
Fixed Assets	5,51,39,606.00	2,26,93,232.00	64,10,923.00
Capital Work In Progress	38,71,752.00	9,90,86,459.00	12,98,79,094.00
Prior Period Item	8,74,864.00	4,28,85,464.00	-2,07,98,505.00
Total revenue expenditure	**30,20,81,119.00**	**45,82,41,786.00**	**88,23,56,641.00**
Capital expenditure			
Programme Expenses	6,12,88,480.00	14,37,74,246.00	28,91,49,440.00
Decentralised Plan Programme - Service Sector	2,92,18,602.00	3,74,20,016.00	3,59,17,746.00
Decentralised Plan Programme - Infrastructure Sector	4,99,10,320.00	9,39,27,316.00	8,27,60,380.00

Decentralised Plan Programme - Projects not included in Sector Division	62,76,703.00	49,63,470.00	91,91,440.00
Revenue Grants, Contribution and Subsidies	23,46,912.00	0.00	0.00
Unsecured Loans	13,335.00	13,335.00	0.00
Stock-in-hand	0.00	0.00	3,070.00
Earmarked Funds	3,75,52,790.00	4,34,50,485.00	3,88,55,182.00
Reserves	1,14,04,880.00	0.00	0.00
Grants, Contribution for Specific Purposes	25,53,710.00	1,10,97,733.00	4,03,39,295.00
Secured Loans	0.00	18,54,399.00	0.00
Loans, Advances and Deposits	48,95,731.00	36,76,045.00	47,56,571.00
Total Capital Expenditure	**20,54,61,463.00**	**34,01,77,045.00**	**50,09,73,124.00**
Debt Head Expenditure			
Sundry Debtors (Receivables)	0.00	2,99,652.00	4,05,480.00
Deposits Received	4,14,468.00	22,800.00	5,35,501.00
Total Debt head Expenditure	**4,14,468.00**	**3,22,452.00**	**9,40,981.00**
Total Expenditure	**50,79,57,050.00**	**79,87,41,283.00**	**1,38,42,70,746.00**
Closing Balance			
Bank/ Treasury	14,42,19,038.23	0.00	0.00
Bank/ Treasury	71,61,580.00	15,99,62,478.23	31,44,24,075.23
Cash	16,85,789.00	32,52,373.00	36,73,108.00
Total	**15,30,66,407.23**	**16,32,14,851.23**	**31,80,97,183.23**
Grand Total including closing balance	**66,10,23,457.23**	**96,19,56,134.23**	**1,70,23,67,929.23**

Source: Palakkad Municipality

21.3.1 Sources of Fund

The main source of fund in the municipality are:

- Own source revenue which include taxes, duties, cess and surcharge, fees from licenses and permissions, income from municipal properties and income from miscellaneous items;
- Share of the taxes levied by the Government and transferred to the Local Bodies; Grants to the Local Bodies from the Government for the implementation of schemes, projects and plans formulated by them, under non-plan scheme;
- Grants realized to the municipality by the Government for implementation of schemes, projects and plans assigned or entrusted to the Municipality under the KM Act 1994;

21.3.2 Financial Status

Revenue Account

The revenue account comprises of two components, revenue income and revenue expenditure. Revenue income comprises of internal resources in the form of tax and nontax items and external resources in the form of shared taxes/ transfers and revenue grants from the state government. Revenue expenditure comprises of expenditure incurred on establishments, operation & maintenance and debt servicing.

The revenue sources of Municipality can be broadly categorized as own sources, assigned revenues and grants. From 2016 to 2019 revenue income in the municipality shows increasing trend. But the revenue account maintains deficit during this period. The reasons for this may be due to irrational rates, reductions given due to various non financial reasons, tax avoidable and evasion, leakages in collection system and improper records keeping and monitoring etc.

Revenue expenditure is broadly classified into expenditure for general management & collection of taxes, Public works, town planning, education, water supply & drainage, public health & sanitation, street lights, municipal properties, running expenses of transferred institutions, & miscellaneous expenses.

- Capital Account

Capital income comprises of loans, grants and own sources like revenue account revenue surplus transfer for capital works. An analysis of this account indicates that government grants and contribution and plan funds have contributed the maximum share of income under this account.

The majority of capital expenditure has been directed towards general purpose

includes all item of works excluding water supply and drainage and roads over the past four years. This is due to fact that state government funds are the main capital income, hence used for centrally sponsored schemes and infrastructure especially roads during the assessment period. Analysis of capital income and capital expenditure notes that the account was in surplus during the financial years 2016-17, 2017-18, and 2018-19 indicating lesser utilization of allocated funds.

Table 21.3 Finance statement summary

Item	2016-17	2017-18	2018-19
Opening balance	10,42,38,872.23	15,30,66,407.23	16,32,14,851.23
REVENUE ACCOUNT			
Revenue income	10,90,33,554.00	14,92,27,286.00	9,95,63,953.00
Revenue expenditure	30,20,81,119.00	45,82,41,786.00	88,23,56,641.00
Surplus/Deficit	-19,30,47,565.00	-30,90,14,500.00	-78,27,92,688.00
CAPITAL ACCOUNT			
Capital income	33,78,91,691.00	47,72,05,770.00	1,27,01,54,702.00
Capital expenditure	20,54,61,463	34,01,77,045	50,09,73,124
Surplus/Deficit	13,24,30,228.00	13,70,28,725.00	76,91,81,578.00
DEBT HEAD ACCOUNT			
Income	10,98,59,340.00	18,24,56,671.00	16,94,34,423.00
Expenditure	4,14,468.00	3,22,452.00	9,40,981.00
Surplus/Deficit	10,94,44,872.00	18,21,34,219.00	16,84,93,442.00
Closing balance	15,30,66,407.23	16,32,14,851.23	31,80,97,183.23
Total Income	66,10,23,457.23	96,19,56,134.23	1,70,23,67,929.23
Total Expenditure	50,79,57,050.00	79,87,41,283.00	1,38,42,70,746.00

Source: Palakkad Municipality

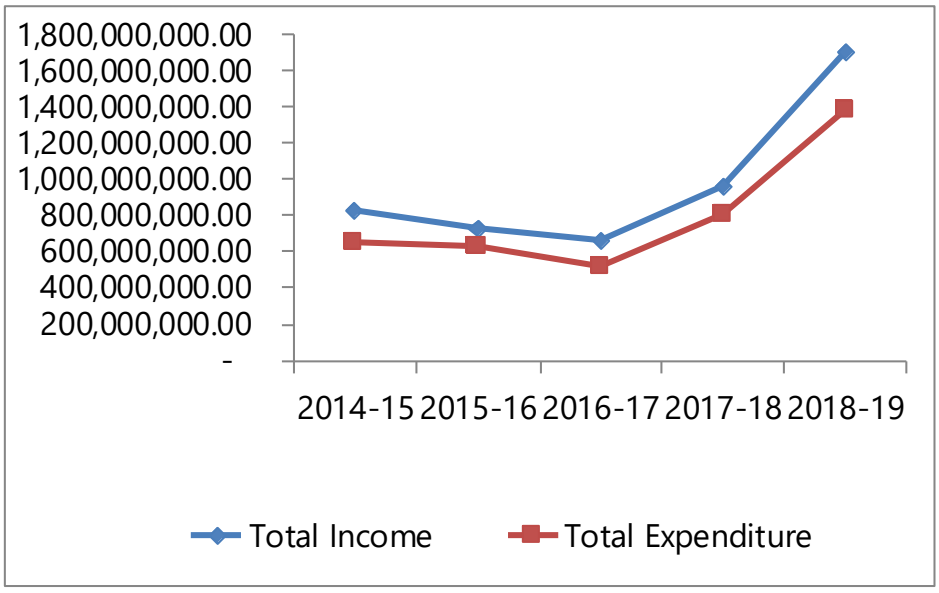


Figure 21.2 Temporal variation of total income and total expenditure

21.4 PROBLEMS AND POTENTIALS

The main problem faced by the municipality is tax leakage and this may be the reason behind the deficit amount in revenue income. Surplus in the capital head shows the under utilization of funds. Municipality must prepare financially viable and physically relevant projects according to the need of the town.

21.5 ASSET MANAGEMENT PLAN

Municipal assets are property owned, controlled or used by the local governments. They can be managed directly or indirectly for the benefits of their constituents in the attainment of local service delivery goals. Municipal asset management is the process of inventory, valuation, use, strategic portfolio reviews, reporting and auditing of municipal assets and, in some cases, state properties as part of the decision making process of local governments.

An effective asset management system can provide useful information to managers of the city government as well as other stakeholders, about the actual and potential net worth and asset base of a city.

21.5.1 Municipal Assets

- Water supply

Water supply in the town is operated and maintained by Kerala Water Authority. The main water source is water supplied from Malampuzha dam. 67 Public open wells and 3 ponds are owned and maintained by the municipality. Also, the municipality is paying the water charges for 1331 Nos of public taps.

- Irrigation

There are 126 ponds in the municipality and out of that 3 ponds are maintained by the municipality which is used for irrigation purposes. One open well and one bore well is used for irrigation purposes.

- Sewerage and Sanitation

There is no specific sewerage system for the town and the population is dependent on septic tanks and low cost sanitation units. The role of the municipality in this sector is limited to provision of public comfort station/latrines and giving financial aids through schemes. There are 6 public toilets in Palakkad municipality.

- Roads

Palakkad Municipality maintains a road length of 336 Km and all the roads are bitumen surfaced roads.

- Lands and buildings

The municipality owns 180 plots with a total area of 166.39 acres in the town. Total built up area of all municipal buildings is 78032.98 Sq. M. The details of Municipal assets - Lands and buildings is are presented in Table 21.4 and Table 21.5 respectively.

Table 21.4 Municipal Assets - Lands

Sl.No.	Name of asset (Land)	Area in Sq.M	Extent in Cents
1	Market Land (Olavakkodu Market Junction)	1092	26.98
2	Market Land (Dance Market)	2346	57.97
3	Market Land (Melamuri Vegetable Market)	4528	111.89
4	Kalvakkulam (Stadium)Bus stand	18200	449.73
5	Municipal bus stand	2533	62.59
6	Chetti street public toilet	259.08	6.40
7	Municipal town bus stand	7161	176.95
8	Slaughter house main building	18854	465.89
9	Burial ground West Yakkara	2416	59.70
10	Burial ground Vazha Kadavu	12461	307.92
11	Cremation ground Kunnumburam	38690	956.05
12	Cremation ground Mattumantha	4160	102.80
13	Cremation ground Pezhumkara	1314	32.47
14	Park and open space (Murikkavu Thottingal)	1327.42	32.80
15	Park and open space Kanikka matha road residential layout	1436.68	35.50
16	Park and open space Puthur oceanus	1481.2	36.60
17	Park and open space Melamuri	5372.97	132.77
18	Park and open space PVR Nagar	1120.46	27.69
19	Park Ganesh Nagar Sekharipuram Kalpathy	726.07	17.94
20	Park and open space ESI Dr. Hameed layout	732.14	18.09
21	Park and open space, Olavakkodu, Ayyapuram road	1015.29	25.09
22	Park and open space Calicut Coimbatore Bypasss Sekharipuram	1937.55	47.88
23	Open land North side Malampuzha road	18283.4	451.79
24	Open space Kalvakkulam PDA shopping complex	1176	29.06
25	Open space Venkideswara Gardens	11176	276.16
26	Open space Ramakrishna Ayyar layout	2400	59.31
27	Open space Gandhi Nagar Chakkanthara	3771.96	93.21
28	Open space Meena Nagar	3035	75.00
29	Open land , Ganesh Nagar, Sekharipuram	726.07	17.94
30	Open space Nila Nagar	1637.01	40.45

Table 21.4 Continued...

31	Open space Manaly	690.48	17.06
32	Open space and park Ayodhya Nagar extention	3074.2	75.97
33	Road and park Ayodhya Nagar extention	2536.21	62.67
34	Road and park	315.5	7.80
35	Road and park Ayodhya Nagar	335.73	8.30
36	Park and open space (opposite fort Maidan)	1144.73	28.29
37	Park and open space, New street, Nurani	857.96	21.20
38	Road and park and open space, Malampuzha Bypass, Mattumantha	1577.55	38.98
39	Park Sekharipuram	913.8	22.58
40	Park opposite to fort Maidan	1145	28.29
41	Park and open space, Anjali Nagar	817.09	20.19
42	Park and open space, Puthur	1040	25.70
43	Park	11505.54	284.31
44	Play ground, Kottekkad	1040	25.70
45	Park and open space Vadakkanthara, Palakkad	1436.08	35.49
46	Park road, Melamuri	5372.97	132.77
47	Acquired space for park, Gandhi Nagar, Chakkanthara	2276	56.24
48	Acquired space for park, Aiswarya Nagar, Kunnathur-	1274.3	31.49
49	Park and open space, Meena Nagar extention	93.53	2.31
50	Park land, Sekharipuram	304	7.51
51	Park and road	1385.5	34.24
52	Park	2428.2	60.00
53	Municipal Park	104.81	2.59
54	Sukumaran and Saumini park, Kottekkad	1679.5	41.50
55	Radha Krishnan and others park	2428.2	60.00
56	Jalatha Nagar Park	900	22.24
57	Park	404	9.98
58	Park near Poly technic	9300	229.81
59	Park and open space, Ayyapuram	726	17.94
60	Park and open space, Chakkanthara	4289	105.98

Table 21.4 Continued...

61	Park and open space, Nurani	558	13.79
62	Park and open space, Olavakkodu	906	22.39
63	Park and open space, Sreenivasa Garden, Thirunellayi	1133	28.00
64	Aiswarya park	1208	29.85
65	Park	1300	32.12
66	Park, Ayyapuram	1704	42.11
67	Park and road	8100	200.16
68	Manalmantha Park	612	15.12
69	Venkideswara Colony Park	113	2.79
70	Prasanth Nagar park	792	19.57
71	Park of open space, Easwar Garden	5174	127.85
72	Ayyapuram park of open space	1739	42.97
73	Park of open space, Manali road	690	17.05
74	Dr. Krishna Park	795	19.64
75	Sreenivas garden layout, Park	776	19.18
76	Anganwadi building, Thiru nellayi,Othungodu	60.67	1.50
77	Anganwadi building Kassim colony	50.56	1.25
78	Anganwadi, Choledu	118.9	2.94
79	Kudumbashree Anganwadi Place	153	3.78
81	Kumara swamy colony Anganwadi	162	4.00
82	Kavarathodi Anganwadi	75	1.85
83	Anganwadi, Malampuzha road	174	4.30
84	Bhumi Anganwadi	12549	310.09
85	Anganwadi	150	3.71
86	Parambithara Anganwadi	110	2.72
87	Sekharipuram Anganwadi	383	9.46
88	Mangavu Anganwadi	170	4.20
89	Anganwadi Building	60	1.48
90	Anganwadi	141	3.48

Table 21.4 Continued...

91	Moothanthara Anganwadi	82	2.03
92	Anganwadi	80	1.98
93	Kalapuzha Anganwadi	82	2.03
94	Ambala parambu Anganwadi	80	1.98
95	Jainumedu Anganwadi	80	1.98
96	Pookarathodam Anganwadi	33.48	0.83
97	Kunnathurmedu, Anganwadi	525	12.97
98	Parking space, Aiswarya Nagar,extention residential layout	995	24.59
99	Parking space, New street, Nurani	857.9	21.20
100	Parking space, Ayodhya Nagar extention	3033.91	74.97
101	Parking space Kalmandapam Polyclinic	1264.5	31.25
102	Hussain layout, west side of fort Maidan	406	10.03
103	Dasaradha layout, backside of sai hospital	2400	59.31
104	Ayyapuram Ganesh Nagar	726.07	17.94
105	Acquired land for Palakkad Municipality	1208	29.85
106	Municipality Land,Ayyapuram	726	17.94
107	IMA hall compound	1294.4	31.99
108	Kotta maidanam	32552.13	804.38
109	Commercial centre, melamuri, Golden Palace road	622.5	15.38
110	Public library, Sbi Junction	974.67	24.08
111	Trenching ground	33978	839.61
112	Land opposite to Olavakkodu Complex	777	19.20
113	SMR Colony, Land near Park	404	9.98
114	Sundaran Colony-Vacant land	890	21.99
115	Samskarika Nilayam	210	5.19
116	Vaidyanathapuram	29	0.72
117	Venkideswara colony Street No. 7	315	7.78
118	Premetric hostel	728	17.99
119	Shopping complex	1942	47.99
120	Kalmandapam shopping complex	4182	103.34

Table 21.4 Continued...

121	Erumakkara Shopping complex	313	7.73
122	Mini industrial estate, kalmandapam	1654	40.87
123	land near Mini industrial estate	6390	157.90
124	New building near workers quarters	12373	305.74
125	Municipal shopping complex	824	20.36
126	Ayyapuram layout	1094	27.03
127	Vandhana layout	1567	38.72
128	Municipal cattle farm	66	1.63
129	Municipality staff quarters	8825	218.07
130	Indoor Stadium	20882	516.01
131	Workers Quarters, anganwadi Samskarika Nilayam	2509	62.00
132	Indhira Gandhi Stadium	40955	1012.02
133	Acquired land for stadium	3599	88.93
134	Lane Houses	615	15.20
135	Workers Quarters	16800	415.14
136	Salamath Nagar	2508	61.97
137	Aiswarya Nagar	2408	59.50
138	Meena Nagar	3034.5	74.98
139	Yakkara Murikkavu	202	4.99
140	Cultural Building	280	6.92
141	Anjali Garden Colony	5947	146.95
142	Maithri residential layout	4896	120.98
143	Ayodhya residential layout	387	9.56
144	Vegetation Garden Layout	2347	58.00
145	Municipal Town Hall	4006	98.99
146	Town Hall Annexe	4006.3	99.00
147	Municipal shopping complex, Robinson road	16062.62	396.92
148	Municipal office	16062	396.90
149	Municipal shopping complex (opposite to District Hospital)	16062	396.90
150	Vrindhavan residential layout	776	19.18

Table 21.4 Continued...

151	PVR Nagar open space and park	4693	115.97
152	Extention, Ayodhya Nagar, park and open space	983	24.29
153	Nurani Gramam layout	857	21.18
154	Tribal Hostel	1803	44.55
155	Indhira Nagar	1147	28.34
156	Thirupurakkal Colony	2722	67.26
157	Chinmaya Nagar	289	7.14
158	Melamuri PH Centre	769	19.00
159	Koppam PHC	109	2.69
160	Health Centre	80	1.98
161	Moyan's LP School	3075	75.98
162	Moyan's Girls Higher secondary school	6475	160.00
163	Government LP School Parakkunnam	558	13.79
164	Government LP School Koppam	1456	35.98
165	GLP School, Kalpathy	1163	28.74
166	PMG Higher Secondary School	8539	211.00
167	Big Bazaar School	6441	159.16
168	Kumarapuram Government TTI	3399	83.99
169	Kumarapuram Government Higher secondary school	10115	249.95
170	Puthur GUP School	4249	105.00
171	GLPS Yakkara	1031	25.48
172	GLPS Kunnathurmedu	28300	699.31
173	GUPS Vennakkara	11007	271.99
174	UP School Nurani Gramam	2023	49.99
175	Girl's School LP, Nurani Junction	2011	49.69
176	GLP School, Sulthanpet	1323.7	32.71
177	Dr. Nair School	878	21.70
178	R B Koodam Government UP School	1312	32.42
179	Mepparamb GLP School	2060	50.90
180	Olavakkodu South School	993	24.54

Source: Asset Register, Palakkad Municipality

Table 21.5 Municipal assets - buildings

Sl.No.	Building Name	Total floor Area
1	Olakkadavu old market	30
2	Dance Market	266.61
3	Fish market	136.71
4	Fish Market (3 staffed building)	1478.85
5	Fish market	58.48
6	Fish market	33.04
7	Fish market (Toilet)	19.2
8	Shops- Melamuri Market	1546.5
9	Commercial Centre- Melamuri Golden Palace Road	204.48
10	Kalvakkulam Bus stand	2700
11	Municipal Bus Stand	1860.17
12	Municipal comfort station	157.43
13	Chetty Street public latrine	3.3
14	Municipal town bus stand	2934.93
15	Municipal town bus stand	2295
16	Pezhumkara crematorium building	7.2
17	Slaughter house main building	627.52
18	Slaughter house family quarters	69.19
19	Cattle shed	38.5
20	Modern Slaughter house (under construction)	391.43
21	Olavakkodu municipal complex	30
22	Anganwadi+ Cultural centre+Health centre	137
23	Anganwadi buiding - Kumara swamy colony	35
24	Public latrine -Chalakadavu	3.3
25	Anganwadi - Kavarathodi	27
26	Kumarapuram TTI	105.3
27	Kumarapuram TTI - Administration block	362.72
28	Kumarapuram TTI - Class room block 1	127.3
29	Kumarapuram TTI - Class room block 2	63
30	Kumarapuram TTI - Block under construction	5.3
31	Kumarapuram TTI - latrine	12
32	Kumarapuram GHSS - Main building	920
33	Kumarapuram GHSS - Sub building 1	112.7
34	Kumarapuram GHSS - Sub building 2	131.5
35	Kumarapuram GHSS - Latrine	6
36	Kumarapuram GHSS - Stage	35
37	Kumarapuram GHSS - Waiting shed	18
38	Kumarapuram GHSS - Waiting shed	19.8

Table 21.5 Continued...

39	Kumarapuram GHSS - Latrine	12
40	Pre metric hostel	364.7
41	Anganwadi	36
42	Anganwadi Polod	35.49
43	Parambithara Anganwadi	35.47
44	Puthur GUP School (Old building)	363.4
45	Puthur GUP School -SSA resource centre	182.2
46	Puthur GUP School - New block 1	736.8
47	Puthur GUP School - New block 2	168.3
48	Puthur GUP School - New block 3	159.6
49	Puthur GUP School - Stage	52
50	Sekharipuram Anganwadi	33
51	Shopping complex (VC)	1171
52	Mangavu Anganwadi	60.86
53	Kalmandapam shopping complex block 2	522.9
54	Shopping complex - Erumakkara	501.1
55	Mini industrial estate Kalmandapam	652.97
56	New building near workers quarters	115
57	Workers quarters building	259.84
58	6 Quarters (TA)	1559.04
59	Workers quarters (25 houses)	957
60	Kalmandapam shopping complex block 1	152
61	GLP School, Kalpathy	386.2
62	PMG Higher Secondary School	549
63	PMG Higher Secondary School - SSA Block 1	238.62
64	PMG Higher Secondary School - SSA Block 2	539.4
65	PMG Higher Secondary School - SSA Block 3	238.08
66	PMG Higher Secondary School - SSA Block 4	2356
67	PMG Higher Secondary School - SSA Block 5	150
68	PMG Higher Secondary School - SSA Block 6	98.6
69	PMG School Block 1	298.2
70	PMG School Block 2	58.4
71	PMG School Block 3	60.5
72	PMG School Block 4	163.8
73	PMG School Block 5	78.39
74	PMG School - Toilet	31.08
75	PMG School Block 6	27.52
76	PMG School Block 7	81.92
77	PMG School Block 8	98.58

Table 21.5 Continued...

78	PMG School Block 9	4710.45
79	Shopping complex, Sulthanpetta	1130
80	Shopping complex, Sulthanpetta	910
81	Dailed stored building	480
82	Building 3	80.5
83	Building 4	96.12
84	Public library	165.2
85	Moyan's LP School Block 1	63
86	Moyan's LP School Block 2	153
87	Moyan's LP School Block 3	987.5
88	Moyan's LP School Block 4	63
89	Moyan's LP School Block 5	153
90	Moyan's LP School Block 6	987.5
91	Moyan's LP School - Stage	50.4
92	Moyan's LP School - Toilet	9
93	Moyan's LP School - Toilet	10.5
94	Moyan's Girls higher secondary School	2496.4
95	Moyan's Girls higher secondary School - MP fund build-	169.65
96	Moyan's Girls higher secondary School - New block	214.4
97	Moyan's Girls higher secondary School - Temporary	435
98	Moyan's Girls higher secondary School - Building 1	182
99	Moyan's Girls higher secondary School - Building 2	800
100	Moyan's Girls higher secondary School - Building 3	682
101	Moyan's Girls higher secondary School - New building	816
102	Moyan's Girls higher secondary School - West block	230
103	Moyan's Girls higher secondary School - Mp fund block	248
104	Moyan's Girls higher secondary School - Building 4	405
105	Moyan's Girls higher secondary School - Toilet	40
106	Moyan's Girls higher secondary School - Toilet	50.24
107	Moyan's Girls higher secondary School - Toilet	45
108	Moyan's Girls higher secondary School - Toilet	20
109	Moyan's Girls higher secondary School - Cycle shed	60
110	Moyan's Girls higher secondary School - Building 5	60
111	GLP School, West block	331
112	GLP School, North block	331.02
113	Government LP School Parakunnam B-1	300.9
114	Government LP School Parakunnam B-2	300.98

Table 21.5 Continued...

115	Koppam PH Centre	632
116	Workers quarters	752.4
117	Workers quarters	459.36
118	Workers quarters	184.8
119	Health office quarters	121.2
120	Municipal engineer secretary	427.3
121	Indoor stadium shed	45
122	Indoor stadium - Toilet	36
123	Worker's Quarters	847.44
124	Anganwadi-USNP No.31	31
125	Cultural Centre	38
126	Manapullikkavu GLPS East Yakkara	376.48
127	GUPS, West Yakkara	287
128	GLPS, Kunnathurmedu	143
129	Anganwadi and cultural centre	46
130	Anganwadi and cultural centre	130.6
131	Lane houses	55.42
132	Anganwadi building	32
133	Cultural centre	59.4
134	GUP School, Vennakkara	1216
135	GUP School, Vennakkara	1216.11
136	Girl's school LP , Nurani Junction	554.2
137	Anganwadi	33
138	Big Bazaar	5028
139	Municipal office, Palakkad	2280
140	Municipal Town Hall	2248
141	Town Hall Annex	705.86
142	Municipal shopping complex	1503
143	Municipal shopping complex, opposite to District hospi-	2370.52
144	Health Centre	48
145	GLP School, Sulthanpetta	192
146	Dr. Nair School	233.37
147	Tribal Hostel	571.5
148	Anganwadi	80.12
149	RB Koodam Government UP School	305.9
150	Moothanthara Anganwadi	36
151	PHC Melamuri	291.6
152	Meparamb GLP School	1609.57

Table 21.5 Continued...

153	Anganwadi, Kalapuzha	31.31
154	Anganwadi, Ambalaparamb	50.42
155	Pookkarathodam Anganwadi	32.77
156	Olavakkodu South School	699.7
157	Mini Market Complex	648.88
158	Anganwadi Ward-32	31.9
159	Dr. Nair, GUP School	1254.57
160	Krishi Bhavan	203.4
161	IMA Hall	337.7
162	Solid waste Management	482
163	Solid waste Management	79
164	Solid waste Management	93

Source: Asset Register, Palakkad Municipality



Figure 21.3 Municipal Assets

21.6 INFERENCE

Revenue income in the financial year 2018-19 shows 32.28% decrease from the previous year whereas revenue expenditure shows 92.55% increase. The ratio of revenue expenditure to revenue income in the financial year 2018-19 is 8.86 and in 2017-18 the value is 3.07. This shows a healthy increment and financial improvement of the municipality.

The capital income in the financial year 2018-19 shows 166.17% increase than previous year and the expenditure shows an increase of 47.27%. The ratio of capital expenditure to capital income is on the decline. It has fell from 0.71 to 0.39 during the financial year 2017-18 to 2018-19, which is not very encouraging as it implies that rate of investment in fixed assets and capital works in progress are decelerating. This drop in fixed investments can weaken the administration from gaining financial independence on a long term perspective.



CHAPTER 22-SECTORAL LINKAGES

22. SECTORAL LINKAGES

This chapter provides a clear idea about the factors of relationship between various sectors for the overall development of municipality. The study of inter-sectoral linkages helps us to formulate a better development perspective and will give a possible feedback mechanism that will exist among sectors.

22.1 INTER SECTORAL LINKAGES

22.1.1 Trade and Commerce - Effect on Tourism and Environment

Even though trade and commerce is the main economic backbone of Palakkad municipality. Heritage tourism also provide a platform for a better economic development in the municipality. Palakkad fort, Kalpathy agraharam and Jain Temple are the main tourism destinations in the town. The commercial recreation is important in case of tourism sector. The main commercial activity in the town via tourism is the street vending activities. Especially in the Palakkad fort area, the street vending is predominant. Kalpathy agraharam in the festival time, also contributes to the commercial activities in the town. In heritage tourism, hospitality is important and the role of hotel accomodations, restaurants, taxis and other travelling aids are important. Trade and Commerce has an important part in the development of tourism sector.

Economic growth resulting from trade expansion and commercialisation can have an obvious direct impact on the environment by increasing pollution or degrading natural resources. It can be decreased with providing better policies and standards with commercial establishments regarding environmental protection.

22.1.2 Transportation - Effect on Trade & Commerce, Industries

The economical growth of the municipality is based mainly on the trade and commerce. Being the administrative head quarter, town attracts more and more commuters which clearly depicts the need for better transportation facilities. The existing connectivity to the major industrial hubs like Cochin, Coimbatore, and another major town Kozhikkode, through National highways are the major road transport network through Palakkad municipality.

The widening of these roads and other main roads within the municipality are necessary to improve the trade and commerce in the municipality. Bypasses will help when the traffic for which origin and destination is not Palakkad town. Also other transport infrastructures like parking facilities, foot paths for pedestrians and truck terminals etc. are needed for better transportation facility thereby increasing the economic stability of the municipality.

95.11% of the industries in the municipality are household industries. Better transportation facilities will influence the improvement of these household industries. Also providing improved marketing facilities will elevate the commercial and industrial activities within the town which benefit the adjacent local bodies and the entire district. Thereby helping to increase the employment opportunities in the transportation, commercial and industrial sectors.

22.1.3 Transportation - Effect on Tourism, Environment

Transportation networks greatly influence tourism sector. Road networks works as veins of tourism sector. In case of Palakkad municipality, heritage tourism is important and the main heritage locations in the municipality are fort and environs, Jain temple and Kalpathy. The linkage between these locations are scattered in the municipality and it is important that the transportation networks need to be well established for elevating the scope for heritage tourism within the municipality.

The developmental activities of the town mainly depend on the transportation networks and well defined road networks. The activities in the town are directly or indirectly depend on the transportation networks. It is important that the town should have well defined transportation network which should not affect or damage the environmental balance. Conversion of paddy fields for developmental activities will heavily affect the existing water table level. Hence care should be taken in selecting the routes of newly proposed road network.

Transportation is the important requirement of human which spread out directly with the growth of population, increase of industrial and business activity. Transportation system is one of the major consumption of energy due to its increasing effects on natural environment and arise environmental problems by producing CO2 which is the cause of global warming. On the other hand it is impossible to completely avoid the pollution of environment caused by the transportation system.

22.1.4 Tourism - Effect on Environment

Tourism can create great pressure on local resources like energy, food, and other raw materials that may already be in short supply. Greater extraction and transport of these resources exacerbates physical impacts associated with their exploitation. Because of the seasonal character of the industry, many destinations have ten times more inhabitants in the high season than in the low season. Also tourism can cause the same forms of pollution as any other industry: air emissions, noise, solid waste and littering, releases of sewage, oil and chemicals, even architectural/visual pollution.

The main tourism destination in the municipality is the Palakkad fort and to cater the needs of floating population more and more resources are needed. Also the

pollution due to the floating population in the central portion of the municipality is considerable.

22.1.5 Land use - Effect on Transportation

Land use planning and transportation are inter related. The transportation network affect the land use development along the roads and land use conditions affect transport activities. Land use patterns affect accessibility, people's ability to reach desired services and activities, which affects mobility, the amount and type of travel activity. Population pressure changed land use and demanded more social infrastructure facilities (shops, schools, jobs, parks, etc.) in an area ,hence more demand for traffic and transportation needs. Town's growth is mainly radially outwards from central area and like ribbon development on the sides of newly developed roads.

Land use patterns affect economic productivity and development. Accessible land along the roads and lower transport costs increase economic productivity. And land along the road becomes more accessible. This increased accessibility makes the land more valuable and attractive to developers. As land along the road is developed, traffic volumes and the number of driveways increase. This results in more congestion and a deterioration of the road's capacity to efficiently move people and goods. The reduced efficiency of the road eventually necessitates roadway capacity improvements that may encourage additional development .

22.1.6 Land Use - Effect on Trade and Commerce and Industries

Improvement of the commercial establishments affect the economic development of the municipality. In Palakkad municipality, the commercial land use concentrated along the Gandhi Bazaar road and Ponnani road (Sankunthala junction to Melamuri) which runs almost through the heart of the city. Also there is a gradual shifting of CBD area to Coimbatore road (Sulthanpet to Kalmandapam). KSRTC-Mercy college, KSRTC- Thirunellayi roads, Gandhi bazar and Ponnani road still remains as dominant hub for all commercial activities.

22.1.7 Land use - Effect on Environment

The predominant land use of the municipal area is residential registering 39.18%. Environmental degradation and pollution which leads to a decline in agricultural productivity, groundwater contamination, and other related impacts. These have long lasting effects on the health, economy and social lives of individuals and communities as a whole. As Palakkad is the administrative head quarters, the public and semi public areas and commercial areas in the central portion of the municipality cater more floating population in the municipality, which leads to more environmental problems.

Population growth often cause to resource exhaustion or depletion but also

equally to its under-use, over-use, and often even its misuse. In the municipality 310 Ha of paddy fields are reduced to 260 Ha from 2014 to 2019 and these paddy fields are converted to other development activities. Since paddy fields function as ground water recharge basins, urban open spaces get affected and cause ground water storage depletion and drainage problems. Land use changed to residential and commercial purpose make more waste generation which pollutes both water bodies and land.

22.2 LINKAGE BETWEEN SETTLEMENT CHARACTERISTICS AND SECTORAL DEVELOPMENTS

22.2.1 Effect of Population Growth on Various Development Sectors

Even though the population size of Palakkad municipality is increasing, population growth rate is decreasing. From the decadal analysis of population of Palakkad municipality, the population growth of the municipality is slowing down but its impact on land use trend is quite distressing. The distressing features are in the form of conversion of agricultural and water bodies into other non - agricultural activities. There is a shift from primary sector to tertiary sector in the municipality, The proximity of town to Kanjikode industrial area where industries are more attracted. This may be one of the reasons to less growth of industrial sector.

The rural/semirural character of town has changed over to pucca urban character. More than 90% of people are now involved in service sector activities. The proportion of the workers in non agricultural sector is an indicator of economic development. Since shortage of agricultural labourers caused paddy fields conversion to non agricultural purposes or keeping it fallow.

Construction activities have attracted immigrants from other states. Despite the population growth in the municipality, the floating population also indicates the need for more and more social and infrastructural facilities within the municipality.

22.2.2 Effect of Various Sectors on Employment

Employment has emerged as an important subject in the development agenda of most of the urban areas. The planned development in the area will create better job opportunities.

Since trade and commerce is the predominant sector within the municipality, the job opportunities are abundant in this sector especially as Palakkad municipality is the district head quarters people are attracted to the better job opportunities in the town itself.

In the municipality the main industrial sector is the household industrial sector and this household industries create a large amount of job opportunities within the municipality. The main industries in the municipality are food industry and engineering

industries. Tourism sector can contribute to indirect job opportunities like lodging facilities, restaurants, transportation and also the street vendors benefit from this sector.

22.3 INFERENCE

The linkages between various sectors are studied. The sectors trade and commerce, transportation and tourism can be improved for a better economic balance in the municipality. Since the municipality shows urban character especially as district head quarters, primary sectors play negligible role in the economic development of the municipality.



CHAPTER 23-SPATIAL STRUCTURE

23. SPATIAL STRUCTURE

Spatial structure of an urban area denote and discuss the distribution of activity within an urban area. The existing spatial structure of a town is derived from the activity pattern based on land use concentration and functional character, existing connectivity pattern and existing hierarchy of nodes.

23.1 FUNCTIONAL CHARACTER

Census applies three - fold criteria based on demography, to identify the character, be urban or not, of a settlement. If this criterion is applied for the study of settlement in Kerala, majority of the settlement will show urban character. Studies reveal that there are only a few areas in the State which are pucca urban or pucca rural. In between the pucca urban or pucca rural area, large area of land with mixed land use character, where in a combination of residential and agricultural land use, exists.

Settlements can be classified into urban, semi-urban, semi-rural and rural based on the land use, population distribution and average plot size in the town area.

Table 23.1 Functional character of Palakkad municipality

Ward No.	Ward Name	Functional Character	Ward No.	Ward Name	Functional Character
1	Olavakkode Central	Urban	27	Manappullykkavu	Urban
2	Kalpathy	Urban	28	Civil station	Urban
3	Kunnumpuram	Urban	29	Murikkavu	Urban
4	Ayyapuram West	Urban	30	West Yakkara	Rural
5	Kalpathy East	Urban	31	Puthuppallitheruvu	Urban
6	Thonipaalayam	Urban	32	Vennakkara South	Urban
7	Kumarapuram	Semi urban	33	Vennakkara Central	Urban
8	Valiyapadam	Urban	34	Othungodu	Urban
9	Mattumantha	Semi rural	35	Thirunellayi East	Semi rural
10	Kalleppully North	Urban	36	Thirunellayi West	Semi rural
11	Kalleppully South	Urban	37	Kallikkad	Urban
12	Puthur South	Semi rural	38	Kaikuthuparambu	Urban
13	Puthur North	Urban	39	Nurani	Urban
14	Sekharipuram	Urban	40	Vithuni	Urban
15	Ayyappuram East	Urban	41	Municipal Office	Urban
16	Parakunnam	Urban	42	Pattikkara	Urban
17	Narikuthy	Urban	43	Vadakkanthara East	Urban
18	Koppam	Urban	44	Sreeramapalayam	Urban
19	Sulthanpetta	Urban	45	Melamuri	Urban
20	Mankavu	Urban	46	Valiyangadi	Urban
21	Vadakkumuri	Urban	47	Pallippuram	Urban
22	Selvapalayam	Urban	48	Meparamba	Semi rural
23	Kunnathurmedu North	Urban	49	Karnaki Nagar West	Urban
24	Kunnathurmedu south	Urban	50	Vadakkanthara	Urban
25	Chirakkad	Rural	51	Kunnumpuram	Urban
26	Kenathparambu	Urban	52	Olavakkode South	Urban

Analysis based on land use and plot size shows that there exists semi urban and semi-rural character of settlement in addition to urban and rural character.

An area can be classified as Semi urban, if there exists both urban and rural character, but predominant activity is urban. If the predominant activity is rural, it is classified as semi rural area.

Figure 23.1 shows the functional character of Palakkad municipality. From the spatial analysis most of the wards in municipality shows urban character. Kumarapuram (ward 7) on the northern side of the municipality shows semi urban character. West Yakkara (Ward 30) and Chirakkad (Ward 25) shows rural character and this is because these areas has paddy fields and urban activity is not predominant in this area.

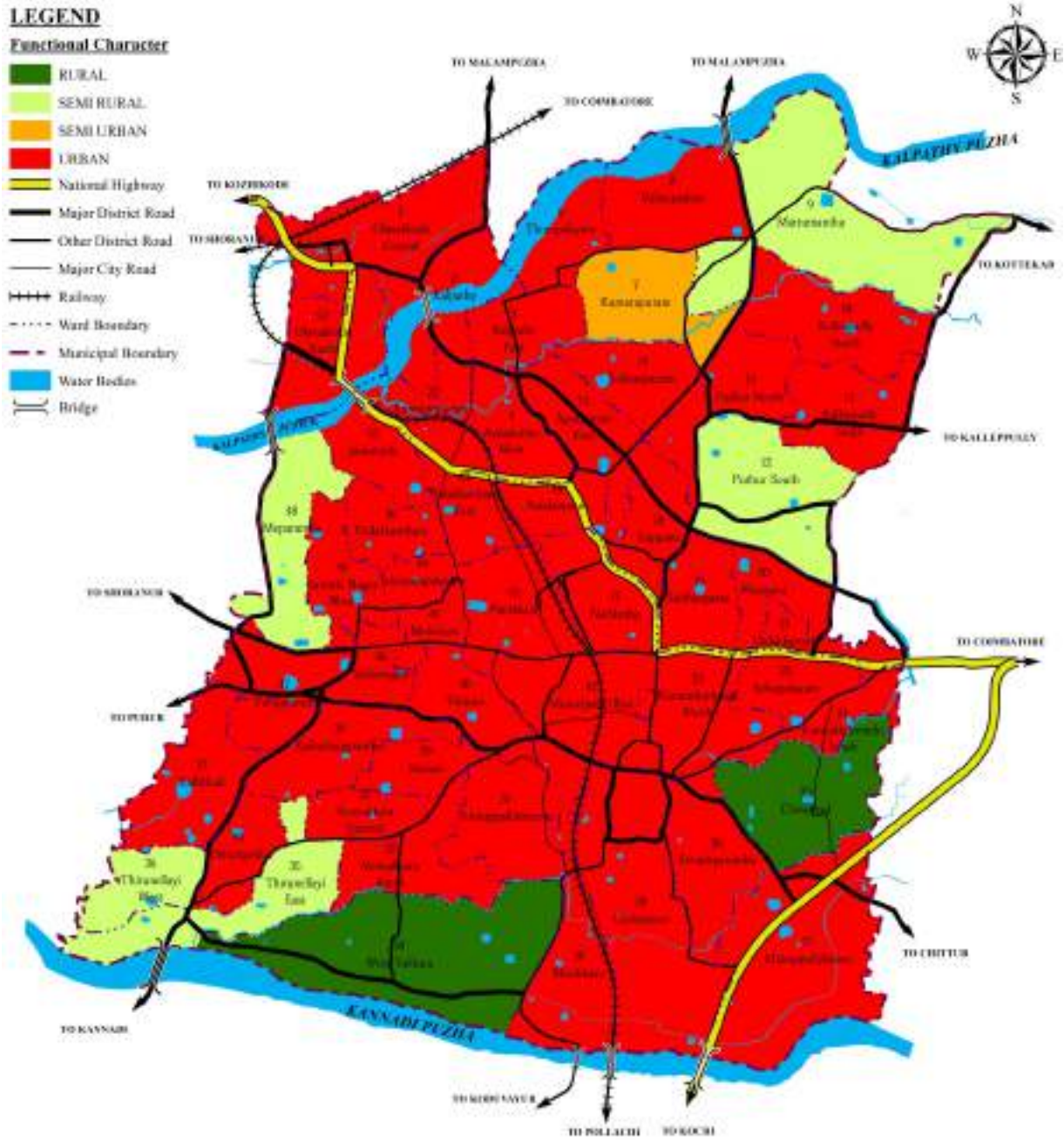


Fig. 23.1 Functional character of Palakkad Municipality

Thirunellayi East (Ward 35), Thirunellayi (Ward 36), Meparamba (Ward 48), Puthur South (Ward 12) and Mattumantha (Ward 9) shows semi rural characters.

23.2 ACTIVITY PATTERN

The activity pattern of an urban area is used to indicate the major economic activity of the area in the future profile. The activity pattern is derived from the land use concentration pattern and functional character of the town. Figure 23.2 shows land use concentration pattern of Palakkad municipality. The landuse pattern of the town is divided into 4 based on the concentration of land use in a ward. Figure Table 23.2 gives the land use concentration and table 23.3 gives the activity pattern of the Palakkad municipality. The activity pattern of the town is divided into primary activity, agro allied

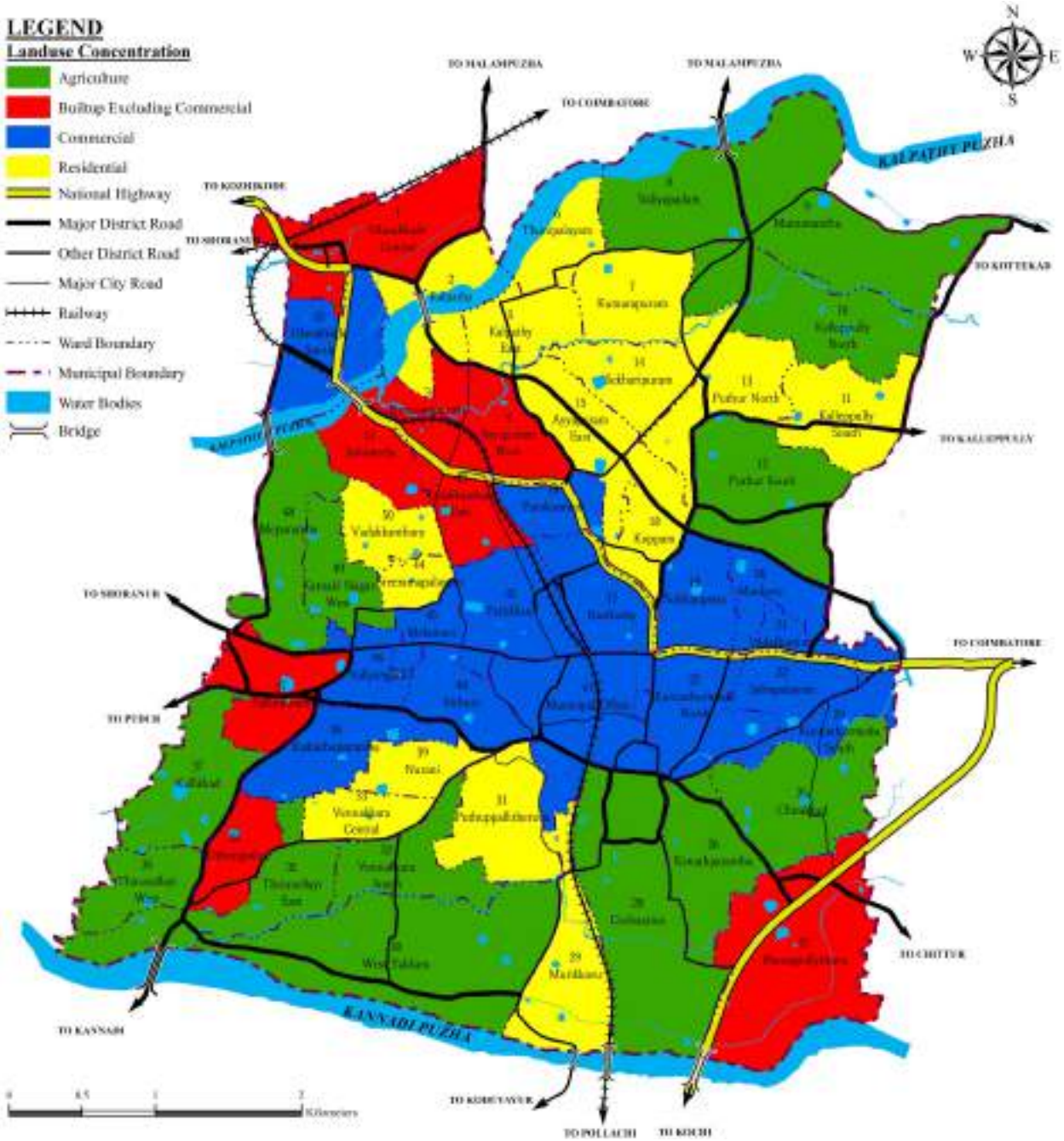


Fig. 23.2 land use concentration of Palakkad Municipality

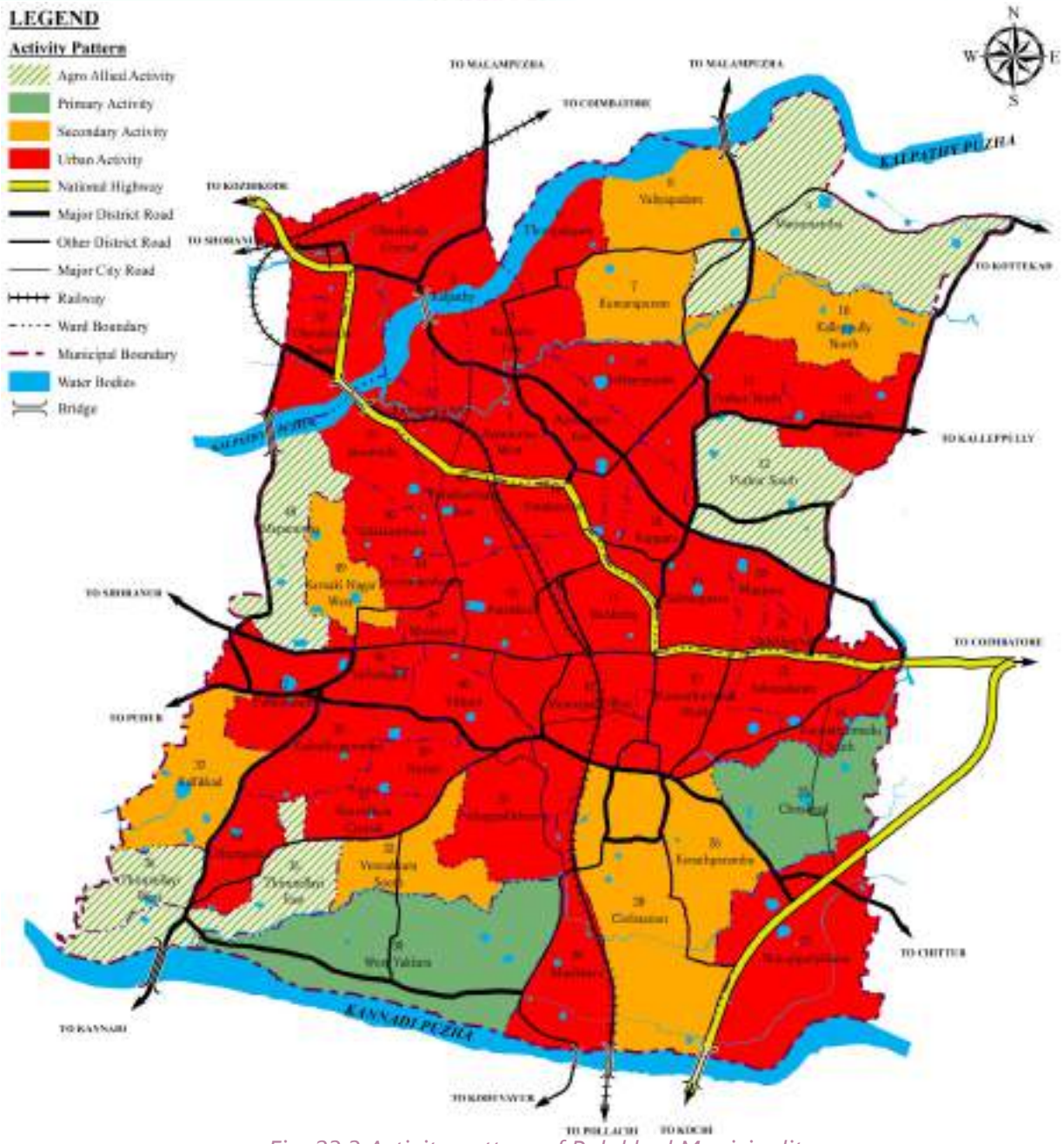


Fig. 23.3 Activity pattern of Palakkad Municipality

activity, secondary activity and urban activity. From the figure it can be observed that the urban activity is mainly concentrated on the central area and along the major traffic corridors. Primary and agro allied activities are concentrated at the peripheries of the town.

23.3 CONNECTIVITY PATTERN & HIERARCHY OF NODES

Palakkad municipality connected by road and rail. National highway 544 starting from Kanyakumari to Salem passes through Palakkad town and National highway 966 originates from Kozhikkode leads to Palakkad via Malappuram. Portion of bypass for Palakkad town lies within the northern side of municipal limits. There are two state highways connecting Palakkad to Pollachi and Ponnani. Another major road called 100 feet road is connecting Palakkad town to Malampuzha, an important tourism

Table 23.2 Activity pattern of Palakkad municipality

Ward	Ward Name	Activity pattern	Ward	Ward Name	Activity pattern
1	Olavakkode Central	Urban	27	Manappullykkavu	Urban
2	Kalpathy	Urban	28	Civil station	Secondary
3	Kunnumpuram	Urban	29	Murikkavu	Urban
4	Ayyapuram West	Urban	30	West Yakkara	primary
5	Kalpathy East	Urban	31	Puthuppallitheruvu	Urban
6	Thonipaalayam	Urban	32	Vennakkara South	Secondary
7	Kumarapuram	Secondary	33	Vennakkara Central	Urban
8	Valiyapadam	Secondary	34	Othungodu	Urban
9	Mattumantha	Agro allied	35	Thirunellayi East	Agro allied
10	Kalleppully North	Secondary	36	Thirunellayi West	Agro allied
11	Kalleppully South	Urban	37	Kallikkad	Secondary
12	Puthur South	Agro allied	38	Kaikuthuparambu	Urban
13	Puthur North	Urban	39	Nurani	Urban
14	Sekharipuram	Urban	40	Vithuni	Urban
15	Ayyappuram East	Urban	41	Municipal Office	Urban
16	Parakunnam	Urban	42	Pattikkara	Urban
17	Narikuthy	Urban	43	Vadakkanthara East	Urban
18	Koppam	Urban	44	Sreeramapalayam	Urban
19	Sulthanpetta	Urban	45	Melamuri	Urban
20	Mankavu	Urban	46	Valiyangadi	Urban
21	Vadakkumuri	Urban	47	Pallippuram	Urban
22	Selvapalayam	Urban	48	Meparamba	Agro allied
23	Kunnathurmedu North	Urban	49	Karnaki Nagar West	Secondary
24	Kunnathurmedu south	Urban	50	Vadakkanthara	Urban
25	Chirakkad	primary	51	Kunnumpuram	Urban
26	Kenathparambu	Secondary	52	Olavakkode South	Urban

destination within district. Other sub major roads are those leading to residential areas within town.

Palakkad town is well connected by a broad gauge railway line to all parts of the nation. The railway line passes through the southern part of the town. The railway stations located within the study area include Palakkad Junction (Olavakkode junction) and Palakkad town on the broad gauge line.

23.4 EXISTING HIERARCHY OF NODES

Commercial nodes are identified on all important intersections of roads where there is a concentration of commercial activities and in the case of linear development, where there is a commercial activity or physical development for a distance of 250 m is considered. For identifying existing hierarchy of nodes, the nodes are selected from junctions which enhances connectivity to different places in different direction. Node may contain one or more junctions which are closer and is having contiguous development of commercial establishments.

The number of roads joining a node from different direction is given marks according to the hierarchy of roads and cumulative weightage of node is calculated. Following are the existing commercial nodes in the Palakkad municipality (Table 23.4).

Table 23.3 Hierarchy of Nodes in Palakkad municipality

Hierarchy of Nodes			
Ist Order	Sulthanpeta	4th Order	Puthiyapalam Jn.
2nd Order	Melamuri Jn.		Mattumantha Jn.
	BEM Jn.		Kallepully Jn.
	IMA Jn.		Koppam bypass Jn.
	Olavakkode Jn.		Tharekkad Jn.
			Selvapalayam Jn.
	Stadium Jn.		Kanikkamatha Jn.
	KSRTC Jn.		Kunnathurmedu Jn.
	Kalmandapam Jn.	5th Order	Kavilpad Jn.
	HPO Jn.		Chathapuram Jn.
	Big Bazar		Puthur temple Jn.
	Municipal Bus stand		Jainumedu Jn.
	B.O.C Jn.		GPO Jn.
3rd Order	Mercy College Jn.		Koppam Jn.
	Nurani Jn.		SBI Jn.
	Puthur Jn.		Vennakkara Jn.
	Shekharipuram Jn.		Manappullikavu Jn.
	Victoria college Jn.		NH Jn.
	Chunnambuthara Jn.		West Yakkara Jn.
	Palat Jn.		Palayam Jn.
	Meparambu Jn.		Thanavu Jn

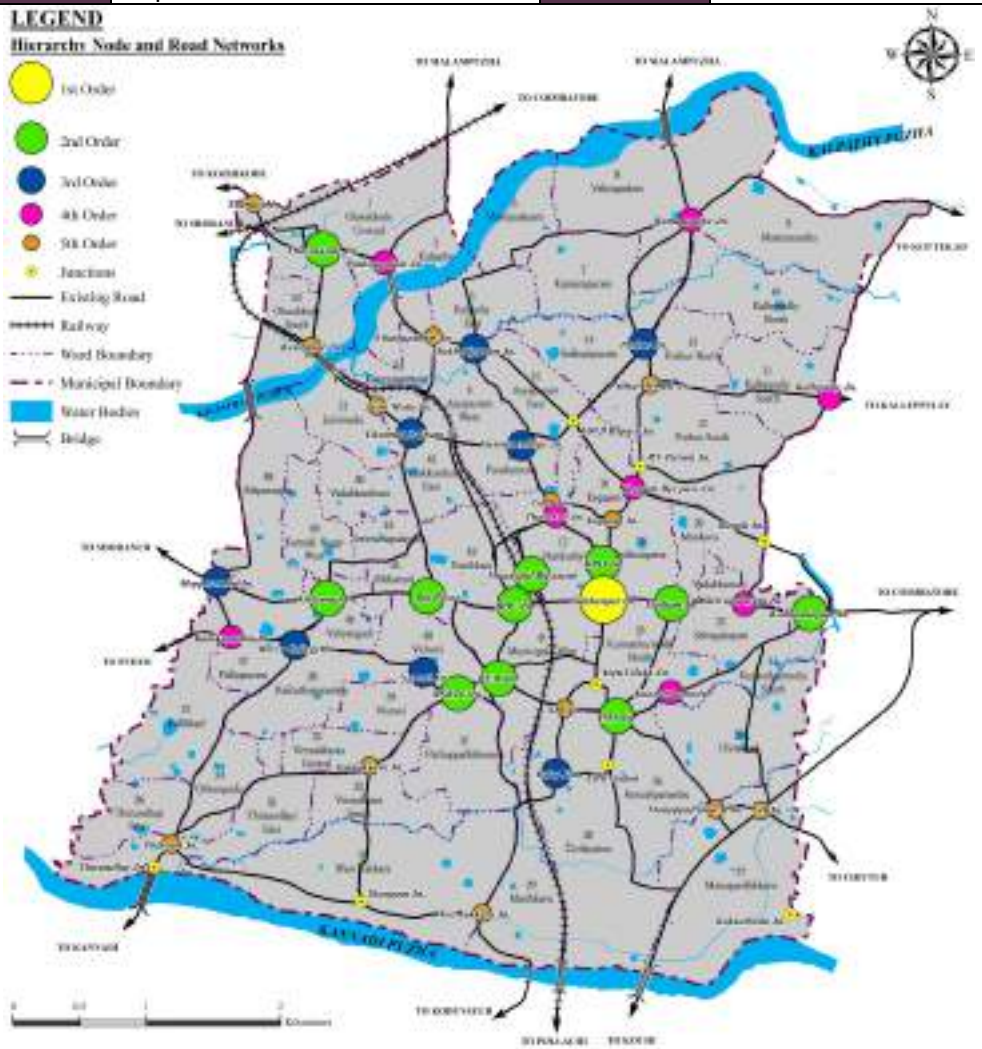


Fig. 23.4 Connectivity pattern and hierarchy of nodes of Palakkad Municipality

25.5 EXISTING SPATIAL STRUCTURE

Spatial structure of the municipal area is the superimposition of activity pattern, connectivity pattern and hierarchy of nodes. The spatial structure provides the development frame work of the municipality by determining the function and hierarchy of settlements and the connectivity network between them. Fig. 23.5 shows the existing spatial structure of the Palakkad town. Majority of the town is under urban activity. Primary and agro allied activities are mainly seen in the peripheral wards.

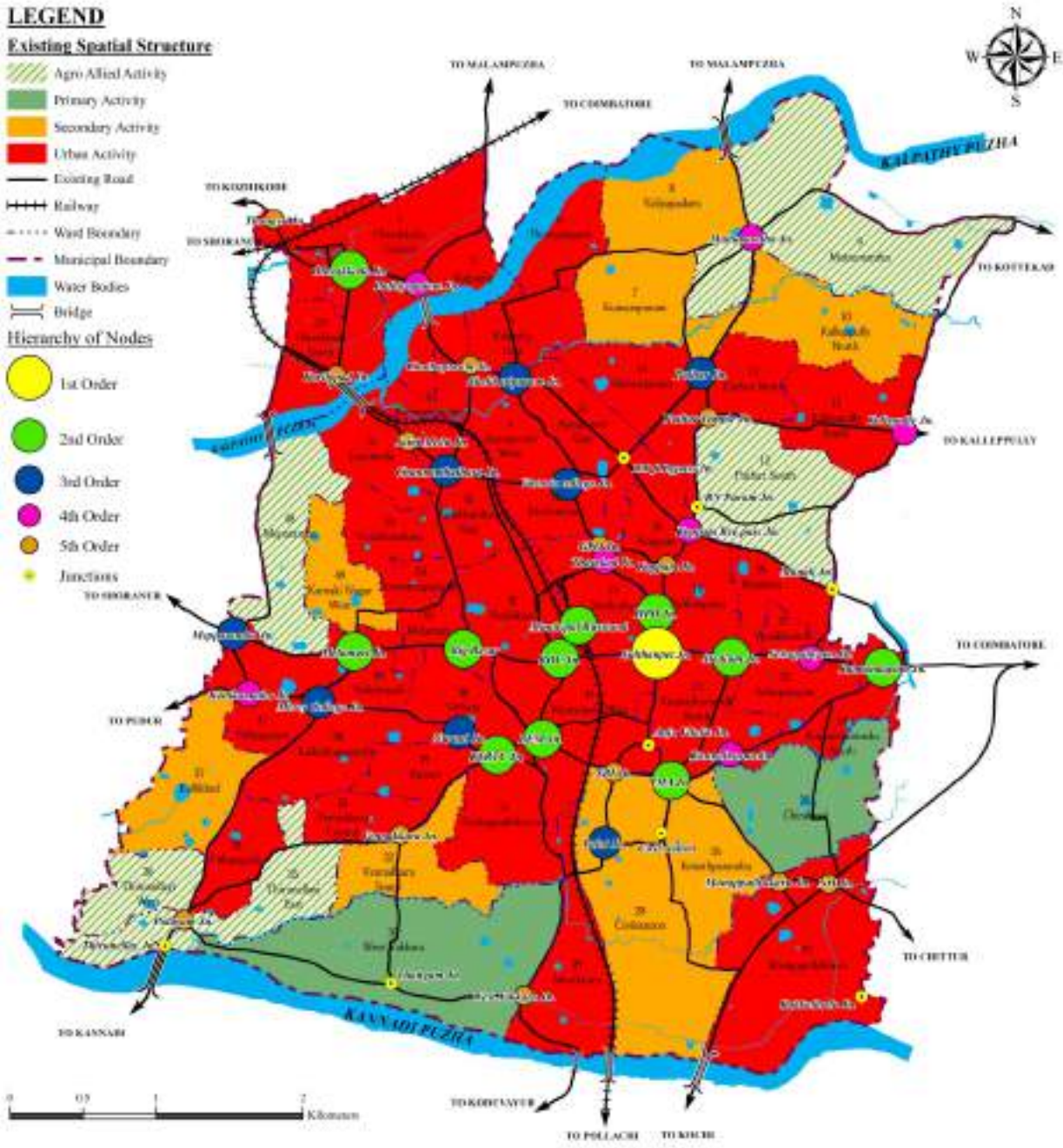


Fig. 23.5 Existing spatial structure of Palakkad Municipality



CHAPTER 24-SUMMARY OF FINDINGS

24. SUMMARY OF FINDINGS

24.1 FINDINGS AS PER DISTRICT PLAN FOR PALAKKAD

⇒ According to the Integrated District Development Plan for Palakkad, Palakkad municipality is the first order settlement and supposed to provide higher order facilities to entire district. Palakkad municipality not only functions as the administrative head quarters but also as the district commercial center.

⇒ As per Integrated District Development Plan for Palakkad, Palakkad municipal area is identified to have urban character.

⇒ Palakkad municipal area is included in the 1st order multi functional zone of Palakkad due to its multifunctional character (specialized and regional level facilities, status as administrative head quarters, trade and commercial centre of the district and art and cultural centre).

24.2 REGIONAL SETTING

⇒ Palakkad municipality act as a gate way of Kerala.

⇒ Palakkad municipality is located near to the north side of Palakkad gap in the Western Ghats.

⇒ Palakkad municipality is placed approximately 55 Km southwest of Coimbatore town which is the commercial hub of Tamilnadu state, south to Thrissur town which is the cultural capital of Kerala, 150 km north to Kochi known as the industrial hub of Kerala and 120 kms south to Kozhikode, the commercial capital of Malabar region.

⇒ The presence of national highways NH 544, NH 966 and two state highways gives the town a very strategic position with other districts in Kerala and Tamilnadu.

⇒ The town has rail connectivity with other districts and other metropolitan cities across the country.

24.3 DEMOGRAPHY

⇒ The population of Palakkad municipality as per Census 2011 is 1,30,955 which constitutes 63,833 males and 67,122 females.

⇒ Similar to Kerala state and Palakkad district, the municipality is also showing a steady decline in the rate of growth of population .

⇒ Growth rate of the municipality is lower than its neighbouring local bodies, this

indicates out migration of people.

⇒ The gross population density of the municipality is much higher than the district's gross & urban figures, state average and nearest local bodies.

⇒ The sex ratio of Palakkad municipality is lesser than that of state and district average. There is an increasing trend in sex ratio and child sex ratio showing betterment of socio economic conditions and gender equality in the city.

⇒ The average household size is 4.2. Similar to the state and district the municipality is also showing a decreasing trend in the household size indicating a shift from joint families to nuclear families.

⇒ The decreasing trend in growth rate may leads to higher old age population in the future.

24.4 OCCUPATIONAL STRUCTURE

⇒ The total number of workers in Palakkad municipality as per census 2011 is 45,696 which is 34.89% of the total population of the municipality .

⇒ Even though the number of total workers is increasing, the growth rate of total workers is showing a decreasing trend. However, the rate of growth in workforce is higher than that of population growth indicating increasing job opportunities and economic growth.

⇒ The work participation rate of Palakkad municipality is lower than the district average and approximately equals to state average. As opposed to the state of Kerala Palakkad municipality is showing a decline in the growth of WPR.

⇒ Municipality occupies the bottom position in WPR when comparing with other urban local bodies in the district.

⇒ The female participation in labour force is less compared to that of district, state and male participation. But the successful implementation of various women empowerment programmes like 'Kudumbasree' has lead to higher growth rate of female WPR than that of male workers in recent years.

⇒ The percentage increase in marginal workers indicate that the employment opportunities has to be improved for marginal workers in the municipality.

⇒ Dependency ratio of Palakkad municipality is lower than the state and similar municipalities in state but is higher than other local bodies in the district. Dependency ratio is decreasing over the years indicating economic growth.

⇒ Higher dependency ratio and lower WPR compared to other local bodies implies that the city doesn't absorb job creations.

⇒ Major share of workers are employed in tertiary sector. And there is a steady decrease in the number of cultivators , agricultural labourers and HHI's in the past year indicating a shift from primary and secondary sectors to tertiary sectors, increasing the urban nature of the city.

24.5 LAND USE

⇒ As per existing land use plan 2020, residential land use contributes the major share of land. The area under residential use constitutes 1040.404 Ha i.e 39.112% of the total area of the municipality.

⇒ The second highest land use is agriculture which is 23.556% of the total area of the municipality.

⇒ Dry agriculture (49.884 Ha) includes mainly coconut, vegetables and plantain cultivation.

⇒ Major wetland crop is paddy (576.749 Ha) in which 421.751 Ha is paddy non active. Active paddy is concentrated along the northern and southern end of the municipality where Kalpathy puzha and Kannadi puzha is flowing.

⇒ The commercial area (4.033% of total area) is concentrated in the central core area along the major roads running east west directions.

⇒ The concentration index values for paddy land varies from 0 to 2.53. Chirakkad, Thirunellayi, East, Civil station, and Meparamba has CI values greater than 2.

⇒ Residential area CI is ranges from 0.49 to 1.86. 35 wards have CI greater than or equal to 1. Highest concentration is in ward Sreeramapalayam (1.86) followed by ward divisions Vennakkara Central (1.73) & Sekharipuram (1.73).

⇒ The residential land use is mainly concentrated in between the central business area and the peripheral area.

⇒ The area under commercial use constitutes 4.033% of the total area which is 107.287 Ha.

⇒ The commercial CI value ranges from 0.05 to 5.02. 21 wards have concentration index value greater than one.

⇒ Commercial activities are high in wards municipal office (5.02), Narikuthy (4.69), Vadakkumuri (4.56), Vithuni (3.92), Melamuri (3.75) and Pattikkara (3.68); this includes Big bazaar and Sulthanpet areas.

⇒ The total area under industrial use is around 19.269 Ha, which is about 0.724% of the total area of the town.

⇒ The concentration index value ranges from 0 to 9.57. In wards 6,5,33 & 44 CI

values is zero.

⇒ It can be seen that high CI values are observed in 4 wards in which the large and medium scale industries are located; namely ward Kallepully North and Melamuri, Othungodu and Olavakkod South.

⇒ Public and semi public land use constitutes 6.548% of municipal area which includes public and semi public category (0.663%), state govt. properties (0.832%), central govt. properties(0.12%), educational institutions(1.865%), health institutions (1.855%), public utilities (0.126%), religious institutions (1.087%) and communication of total area of municipality.

⇒ The concentration index value ranges from 0.08 to 4.21 and is highly concentrated in wards Ayyapuram West(4.21), Manappullykkavu (3.94), Pallippuram (3.71) where Govt. medical college and important educational institutions are situated.

⇒ The mixed land uses and are mainly located in the central part of the municipal area. There are 9 mixed uses identified during the land use survey.

⇒ 349.83 hectares of the area which is 13.15% of the total municipal area of the city is under transportation network.

⇒ Railway account for 51.975 Ha (1.954%) and roads add up to 291.746 Ha (10.97%) of land area.

⇒ Transportation CI values range from 0.47 to 3.52. Highest concentration value seen in ward Olavakkode Central (3.52) followed by Pattikkara (2.69) where Palakkad junction and town railway stations are located.

⇒ The total area covered under heritage and recreational land use is about 29.498 Ha which is 1.10 % of the total municipal area. This land use includes heritage structures, heritage precinct, recreational built up and recreational open space.

⇒ Total extent of forest area comes to only 0.31 hectares which constitutes 0.012% of the total area.

⇒ The land under the use of water bodies accounts for 5.24% of total area which is 139.45 Ha.

⇒ The main water bodies Kalpathypuzha flows through the northern part and Kannadi puzha flows through the southern part of the municipality, remaining water bodies belongs to ponds and 'thodus'.

24.6 ECONOMIC SECTORS

24.6.1 Trade and Commerce

⇒ The trade and commercial activities of Palakkad municipality is mainly centered around the heart of the town and the major commercial area's of the town are Valiyangadi market (contains large number of wholesale Centre's and a Fish market) and Melamuri vegetable market.

⇒ Majority of commercial units in Palakkad are low density type (G, G+1 buildings). High density commercial establishments and malls are sprucing up but relatively their percentages are less.

⇒ Majority of buildings in the commercial area are old and dilapidated. Narrow and damaged roads, non availability of parking space, traffic congestions, lack of space for loading and unloading, inadequate storage facilities, cattle gracing on the road causing unhygienic conditions are the problems faced by this area.

24.6.2 Industries

⇒ Food processing and general engineering are the major industrial sectors in this Municipality. Household industries are the main industrial base of Palakkad Municipality.

⇒ Only two Large scale industries are there in Palakkad Municipality; Malayala Manorama Co-Oprerative limited and KSE Ltd at Othongode.

⇒ Palakkad is well connected to its neighboring district and state, this makes it a major processing, collection and distribution Centre.

⇒ Except electronic and engineering based industries all other industries are showing a declining trend in recent years.

⇒ Many SSI's are showing a declining trend or has stopped working. The problems faced by these type of industries are introduction of GST, high competition, marketing problems etc.

⇒ Lack of vacant land and increase in the residential land use prevents the establishment of large scale industries. Environmental issues related to the industries are a problem in this sector.

24.6.3 Agriculture

⇒ The agricultural sector of the municipality is on the decline due to rapid urbanization.

⇒ Paddy is the major crop in the municipality. The area under paddy cultivation is decreasing drastically due to conversion of paddy fields for residential and other dry cultivation purposes but the productivity of paddy has increased.

⇒ Dry agricultural area is very less and are scattered. The main dry agriculture crops in municipality are coconut, areca nut, banana, plantain etc.

⇒ The overall area of vegetable cultivation is also decreasing. Among this, area and productivity of coconut cultivation is increasing and that of other crops like pepper, banana, plantain etc remains constant.

⇒ Agricultural sector in the municipality mainly depends on Malampuzha dam for irrigation facilities .Also there are 1310 private wells and 126 ponds.

⇒ Padasekhara samithies are organisations with the aim of promoting paddy cultivation. There are 8 of them in the municipality.

24.6.4 Animal husbandry

⇒ Animal husbandry in Palakkad municipality is showing a declining trend. The main species of livestock found in Palakkad municipality are fowls and cattle's.

⇒ Reduction in grazing land and absence of diary farms in the municipality has lead to reduction in cattle population. Fowl population is also showing a declining trend. But buffalo population and goat population shows increasing trend from 2007.

⇒ Milk and meat are the main live stock produces in the municipality. There is an alarming gap between production and demand of live stock produces. Availability of low cost milk from other states in the market cop up the daily needs of people.

⇒ Meat produced in the municipality is mainly from cattle, buffalo, goat and chicken. There is only one slaughter house in the municipality but it has no proper facility for waste management. There is a proposal for meat processing unit in Puthupally street for meat waste treatment in Palakkad.

⇒ There is no registered poultry farms in Palakkad municipality. But the details of the poultry stock indicates there are unauthorized or unregistered poultry farms in the municipality.

⇒ Two animal husbandry related industries in the municipality are KSE Ltd to produce cattle feed and Malabar Region Co-operative Milk Producers Union (MILMA), Palakkad Diary.

24.6.5 Heritage and Tourism

⇒ Compared to main tourist destinations like Ernakulam and Thiruvananthapuram number of tourists are very less in Palakkad. And among the total number of tourists, number of foreign tourists are negligible.

⇒ Major tourist destinations within Palakkad municipality are Palakkad Fort and Kalpathy agraharam. There is a scope for promoting heritage tourism at Kalpathy agraharams and Jain temple.

⇒ Festivals like Kalpathy ratholsavam, Manapullikavu vela, Puthur vela, Valiya vilakku vela etc. also attracts devotees and tourists.

⇒ Major tourist destinations of Palakkad districts like Malampuzha dam, Chempai gramam, Dhoni water falls etc. are within 30kms from the municipality. So the municipality can act as a tourism service provider.

⇒ The quality and quantity of tourism infrastructure of the municipality is not satisfactory and thus needs improvement to attract more tourists.

24.7 PHYSICAL INFRASTRUCTURE

24.7.1 Water Supply

⇒ Surface sources and ground water sources together meet the water requirement for different purposes for municipality.

⇒ As per socio economic survey, 66.42% population of municipality depends on KWA water.

⇒ The main water source for Palakkad municipality is Malampuzha reservoir. The water supply system of municipality is divided into 3 zones: Mattumantha Zone, Moothanthara Zone, and Fort Zone or Kalmandapam Zone.

⇒ The municipality has a total of 72,441 water supply connections. In which 88.73% of connections belongs to residential category. The remaining 11.27% constitutes commercial, industrial, others categories and street taps.

⇒ Presently the municipality has 1,331 public stand posts (PSP) for water supply to the weaker sections of society, who cannot have individual house connections.

⇒ 96.39% of households reported no water scarcity and 3.10% has scarcity for a period of 1- 2 months and only 0.09% of HHs are facing scarcity for more than 6 months.

⇒ Households face shortage of water mainly in summer season. Ward wise scarcity analysis shows that portions of Puthur South (Ward 12), Civil station (Ward 28) wards were reported scarcity more than 6 months.

⇒ The total water demand in municipality is 25.93 MLD and the total amount of water available is 17.269 MLD. There is a gap between demand and supply. But the installed capacity of water is about 34 MLD.

⇒ The quality of Malampuzha water is poor even though rapid sand filter plant

with capacity of 20 MLD is there in the Municipality.

24.7.2 Drainage

⇒ The existing drainage system in the town comprises of a hierarchy of natural and manmade drains and water bodies that ultimately discharge surface run-off into rivers Kalpathy and Kannadi and its tributaries.

⇒ The drainage water is being discharged through 8 canals traversing the municipal area which in turn discharge into Kalpathy river and Kannadi river.

⇒ The natural canals serving as the primary canals have a total length of 25.75km. The secondary drains are mostly masonry drains joining the primary canals discharging the storm and the sullage from the tertiary drains in the town area.

⇒ The main problems in drainage network is mixing of sewage water with drainage water, chocking drains and water logging or flooding.

⇒ As per the study of municipal engineering wing, 80% of the drains are inadequate to carry the peak flow.

24.7.3 Sewerage and Sanitation

⇒ Palakkad municipality has no underground sewerage system so far.

⇒ The present system of sewage disposal and treatment is mainly through septic tank.

⇒ As per socio-economic survey, 99.65% households in the municipality have sanitation facilities within their compound.

⇒ In that 80.32% households use septic tank and 19.68% have pit latrine, which is the traditional low cost sanitation system.

24.7.4 Solid Waste Management

⇒ Palakkad municipality has its own solid waste management system.

⇒ Municipality provides door to door waste collection facility for all the households and institutions within the municipal area.

⇒ The waste generated is collected and dumped at the disposal site located at Kodumbu panchayath (8.5 acres). The site is about 8km from the town.

⇒ The health department of Municipality is mainly responsible for the collection, transportation, and disposal of solid waste. The engineering department handles the removal of construction and demolition waste, while they also provide technical and infrastructural support to the health department.

⇒ As per municipal health department, the total quantity of solid waste generated

in the town is 42.75 Tonnes per day.

⇒ 35.09% (15 Tonnes) of the waste is generated from domestic households.

⇒ As per socio economic survey, 65.06% of the households dispose their wastes within the compound, 13.35% used to dump wastes in public/barren lands and 13.35% dispose wastes in garbage bins provided by municipality . Only 0.62% make use of bio-gas plants

⇒ From commercial establishments, waste generated per day is 12 Tonnes (28.07%) and 11 Tonnes is from market places (25.73%). Remaining 11.13% include waste generated from slaughter houses (4.68%), hospitals (1.17%), street sweepings (1.17%), schools and institutions (0.58%) and others (3.51%).

⇒ The Municipal area has been divided into four zones: North, South, East and West zones for solid waste management system.

⇒ As part of the 'Swatch Bharath Mission' 8 units of material collection facilities are installed in Palakkad Municipality.

⇒ Solid waste is collected in two phases: one is primary collection by hand crafts and tipper, and second is street sweeping and door to door collection.

⇒ For cleaning of public places, there are 18 city cleaning units comprising about 90 members.

⇒ 16,750 households and commercial establishments waste is collected by door to door collection method by Palakkad municipality. i.e., 44.03% of house-holds and commercial establishments make use of this service.

⇒ Waste generated from market area are collected separately by the 'Kudumbasree city cleaning units'.

⇒ Bio medical waste is collected and processed by IMAGE (Indian Medical Association Goes Eco Friendly).

⇒ From the total quantity of waste generated (42.75 tonnes/day). 30 tonnes of waste is collected per day by the municipality. Municipality maintains a collection efficiency of 70.18%.

⇒ From the collected 30 tonnes of waste 25 tonnes is treated per day and remaining 5 tones is directed to the solid waste treatment plant situated in 2nd ward of Kodumbu grama pancha-yath. (Around 8km from the city centre). But the operations in the solid waste treatment plant is not properly done.

24.7.5 Energy

⇒ The power requirement of the town is being covered by Kerala State Electricity

Board.

⇒ Power to the town is supplied from Pallivasal and Peringalkuth Hydro Electric Projects.

⇒ There is one 110 KV substation at Vennakkara. Under which there 5 sub-section namely Sulthanpet, Big Bazar, Melamuri, Kalpathy and Marutharoad.

⇒ There are 528 transformers in the Municipality. For the supply of electricity there are 211.88 km length high tension lines and 714.67km low tension lines in the municipality under these 5 sections.

⇒ In the municipality totally 17,740 luminaries are used in the street light system.

⇒ The luminaries used: 58.63% are tube lights, 17.59% are SVL 250W, 23.78% are LED lights

24.8 SOCIAL INFRASTRUCTURE

24.8.1 Education

⇒ Palakkad municipality has a literacy rate of 93.9% which is greater than the district average 89.31% and almost same as the state average 94%.

⇒ From the gender analysis of literacy rate, male literacy rate (96.45%) is higher than the female literacy rate (91.42%).

⇒ As per socio economic survey only 17.15% of the total population are degree holders and this shows the backwardness in the educational status in the municipality.

⇒ Palakkad has more number of educational institutes than required. Spatial analysis of schools shows that almost all the areas in the municipality are covered.

⇒ Regarding higher educational institutes, there is a government medical college, 5 arts and science college, 3 teachers training institute and 2 nursing institute within municipality. There are no engineering colleges inside the municipality. But there is NSS college of engineering and Prime college of engineering within 11Km buffer.

24.8.2 Health

⇒ The existing health care facilities in the municipality are insufficient. There is only one district hospital available when there is a need of at least two district hospitals as per planning standards.

⇒ There are a lot of private hospitals in the municipality, but the cost of treatment in these hospitals can be difficult to afford for low income groups. There is 4

super specialty hospital in Palakkad municipality and all of them are private hospitals and no multy speciality hospital in the city.

⇒ Number of nursing home and PHC are less than that is required and the health care system also the existing ones suffers from Shortage of staffs.

⇒ Completion of the Government Medical College is an asset to Palakkad municipality as well as the whole district.

⇒ PHCs in Palakkad municipality are proposed to be converted into health and wellness center in the future for better healthcare within the town limit.

24.8.3 Housing

⇒ The total number of households is 39319 and the absolute shortage of housing is 627 as per NUHM 2019 data. This strengthens the demand for housing.

⇒ Major portion of the buildings are owned households which indicate successful implementation of housing schemes.

⇒ Many houses in slums lacks facilities such as water supply, latrines, electricity. Only 32.18% of the houses are pucca houses and there is no proper sewage treatment in these slums. Drainage channels are present in most of the slums. But these drains are clogged due to dumping of plastic wastes into it.

⇒ Agraharams are Brahmin settlements found in various parts of the municipality, characterized by row houses edging the street on either side and centered around a temple. Most of the houses are ill-ventilated, with low roofs and small window openings. These houses have heritage value.

⇒ Various slum improvement schemes are implemented in municipality are VAMBAY, NSDP, IHSDP, and various housing schemes implemented in the municipality are EMS housing scheme, Janakeeyasuthranam scheme, Asraya project, PMAY and LIFE Mission.

24.8.4 Recreational and Cultural Facilities

⇒ The existing condition of parks in the municipality are not satisfactory. There are 7 main parks and 16 parks associated with residential colonies. Among this, except Subix park, all other parks are not maintained properly . At present no programmes or schemes are available for the development of parks.

⇒ Under AMRUT scheme 39 new parks are proposed in the municipality

⇒ Municipal stadium is the main play ground used for sport related activities and for conducting political meetings.

⇒ Government owned indoor stadium with modern infrastructure facilities aimed

to promote sports in the district has stopped construction halfway and hence is in poor condition.

⇒ There are 48 public halls with seating capacity varying from 50-1500. Municipal town hall has a capacity of 950 seats and the existing town hall is demolished and new one is under construction.

⇒ 7 cinema halls concentrated around the CBD area, Rappadi, a well maintained open air auditorium used for cultural and community events, 14 libraries are some of the other recreational facilities available in the municipality.

24.8.5 Other Civic Amenities

⇒ Being the headquarters of the district almost all civic amenities are available within the municipality.

⇒ There are two police stations and a district police office, a fire station satisfying the needs of present population.

⇒ Communication facilities mainly include post and telegraph offices and telephone service. BSNL is the major telephone service provider in town. 18 post offices serve the municipal area.

⇒ 19 petrol/ diesel pumps functioning and five LPG gas godowns, 21 crematorium/ burial grounds, and 196 financial institutions are there within the municipality.

⇒ Only 6 comfort stations are there in the municipality . This is not sufficient for the present population.

24.9 TRAFFIC AND TRANSPORTATION

⇒ Palakkad municipality has a widespread road network connecting every nook and corner of the town but like any other town in Kerala Palakkad also faces many traffic problems.

⇒ Four bus stands within the CBD causes traffic congestion due to plying of large vehicles. Interconnectivity between bus stands is an issue to be addressed as the commuters have to depend on auto rickshaws/go by walk to commute between bus stands.

⇒ The state of affairs within the bus stands are not up to the mark and calls for improvement in terms of riding surface, platforms, segregation of passengers, passenger amenities etc.

⇒ Absence of proper parking facilities causes extensive unorganized parking all over the town.

⇒ Pedestrian facilities such as footpath, refuges, crossing facilities, pedestrian

markings are absent or inadequate, and thus needs improvement.

⇒ Non Motorized Transport (NMT) facilities have not been given due consideration in the town's transportation system.

⇒ Many intersections in the town are left uncontrolled or manually controlled and has no channelizing traffic islands. Some lack adequate turning radius causing visibility issues to drivers.

⇒ Traffic Signage and Road Markings are inadequate and the ones that are provided are scarcely maintained.

⇒ Most of the road stretches within the study area are over-utilized and requires widening .

⇒ Inter-mixing of local traffic with through traffic in the absence of alternate road links/ regional bypasses.

⇒ Improvement of loading and unloading facilities, provision of truck terminal, cycle tracks, provision of taxi stand also needs to be considered.

24.10 SPECIAL CONCERN AREAS

⇒ The BPL population is quite substantial and constitutes 33.13% of the total households in the municipality.

⇒ Majority of the population in SC colonies are illiterate (81.79%). 6.37% has SSLC education and 5.54% has higher secondary education. 6.30% of population has education level of degree or above.

⇒ Facilities available for disabled people are insufficient.

⇒ Inadequate infrastructural facilities affects the effective functioning of anganwadis.

⇒ There are five different pension schemes for the poor and from the analysis number of beneficiaries has increased from the year 2014 to 2019.

⇒ ADS under Kudumbasree is working in the municipality and self help groups is also functioning in the municipality as part of Kudumbasree.

⇒ Food for pregnant women, new born babies and lactating women is supplied through Anganwadi.

⇒ Planned development of the town has to be achieved by giving due consideration to economically and socially backward sections of the community.

24.11 ENVIRONMENT AND ECOLOGY

⇒ Water from bharthapuzha river shows level higher than permissible levels of

E-coli indicating pollution due to contamination from surface or shallow sub-surface sources such as soil, septic or cesspool leakage, animal feed lot runoff and treatment failures.

⇒ For both open well and bore well samples, parameters such as pH, hardness, Alkalinity etc. have crossed the acceptable limits.

⇒ Very low ground water levels during summer season indicate over exploitation of ground water.

⇒ Mounds of wastes are found on various parts of the city on empty plots and on road sides.

⇒ Palakkad municipality has its own solid waste management system and its own waste disposal. Non bio degradable waste generated is collected and dumped at the disposal site located at Kodumbu grama panchayat (8.5 acres). 70.18% of waste is collected and transported for disposal in the municipality.

⇒ There is no air quality monitoring station within town limits. Air pollution is within limits.

⇒ A low-lying area. 3.75 ha of area in Palakkad municipality is under water logged areas or wetlands

⇒ The main environmental problem is due to paddy reclamation. Paddy fields are being converted for non-agricultural activities.

24.12 DISASTER MANAGEMENT

⇒ Palakkad municipality belongs to midland region having an elevation between 20 - 100 m and has been majorly affected by floods. Increase in the water level of both Kalpathy river and Kannadi river that flows along the northern and southern boundary of the municipality caused major damage.

⇒ Olavakode central (Ward 1), Kalpathy (Ward 2), Ayyapuram west (Ward 4) and Kalpathy east (Ward 5) were severely damaged by the flood. Areas hit includes Sundaram colony, Pechiyamman nagar, Shanguvarathodu, Anachira colony, Thanavu, Sreenivasa garden, Abubacker road, Jainimedu, Chulliyad, LN puram, Shekharipuram, RK nagar, Vennakkara, Yakkara, Padath colony, Pookkarathottam etc.

⇒ Economic loss due to flood caused damage on housing, infrastructure facilities, agriculture and ecosystem were huge.

⇒ The development of Palakkad municipality cannot be sustainable unless disaster mitigation is built into the development process. Further, it is considered that investments in mitigation are much more cost effective than the expenditure on

relief and rehabilitation in the absence of mitigation measures.

24.13 DEVELOPMENT ADMINISTRATION AND FINANCE

⇒ The main source of municipal finance are taxes levied from land and buildings.

⇒ Financial status of municipality can be assessed by analyzing its revenue account and capital account.

⇒ From 2016 to 2019, revenue income in the municipality shows increasing trend. But the revenue account maintains deficit during this period. This may be due to irrational rates, reductions given due to various non financial reasons, tax avoidable and evasion, leakages in collection system and improper records keeping and monitoring etc.

⇒ Analysis of capital income and capital expenditure notes that the account was in surplus from 2016-2019, indicating lesser utilization of allocated funds.

24.14 SWOT ANALYSIS

The findings summarized which is evolved from settlement analysis and sector analysis is now attempted to SWOT analysis with the involvement of people representatives, stake holders and professional families with Palakkad municipality. The following are the summary of results of the analysis.

24.14.1 Strength

⇒ The presence of Salem - Cochin Highway (NH 544) and Kozhikkode - Malappuram - Palakkad Highway (NH 966) provides better connectivity with other districts in Kerala and Tamilnadu with Palakkad municipality.

⇒ The proximity to Coimbatore town which is a major hub for manufacturing, education and health care in Tamilnadu.

⇒ As per IDDP of Palakkad, Palakkad municipality act as the only first order settlement in the district providing higher order facilities to the entire district.

⇒ Town has a good railway connectivity to other metropolitan towns across the country.

⇒ Palakkad act as a commercial hub for the entire district and the commercial activities are concentrated in the central portion of the municipality.

⇒ Palakkad municipality has a literacy rate of 93.9% which is greater than the district average 89.31% and almost same as the state average 94%.

⇒ Since Palakkad municipality is the administrative head quarters of Palakkad district, it has a good base in high school, higher secondary and college education.

24.14.2 Weakness

⇒ Decrease in the number of cultivators and agricultural labourers.

⇒ Palakkad municipality shows high dependency ratio than district and almost similar to that of Kerala.

⇒ Commercial facilities are concentrated along Gandhi Bazaar road and Ponnani road (Sakunthala junction to Melamuri) which shows a ribbon development of commercial activities within the town.

⇒ Lack of industrial clusters.

⇒ Lack of parking facilities, footpaths for pedestrians and encroachment of roads for parking.

⇒ Inadequate drainage system.

⇒ Existing solid waste management system uses conventional method of disposal.

⇒ Lack of facilities for professional education.

⇒ There is no super speciality hospital in the town.

⇒ Severe traffic congestion along major roads especially on NH 966 along Kalmandapam to Olavakkode junction, College road between Sulthanpet and Kalpathy junction, Coimbatore road, and Palakkad Thrissur road via Palakkad fort and Yakkara.

⇒ Lack of open spaces and parks within the municipality.

24.14.3 Opportunities

⇒ Administrative head quarters of Palakkad district.

⇒ Shifting of primary sector to tertiary sector, helps to elevate the economy of municipality.

⇒ Municipality act as a commercial hub for the entire district.

⇒ Presence of Government Medical College helps to increase the health care facilities.

⇒ Heritage tourism

⇒ High potential for household industries.

24.14.4 Threats

⇒ There is no proper sewerage system in the municipality.

⇒ Huge volume of traffic, frequent jams, absence of efficient public transport, leads to air pollution.

⇒ Width of most of the roads is not enough to cater the traffic volume.

⇒ There are 22 slums identified by municipality under PMAY scheme.

⇒ There is shortage of housing in municipality.



अमृत

Atal Mission for Rejuvenation and Urban Transformation

Palakkad Municipality
Local Self Government Department Planning, Kerala

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