MASTER PLAN
FOR
SULTHAN BATHERY 2042



Prepared by

SULTHAN BATHERY MUNICIPALITY

&

LSGD PLANNING GOVERNMENT OF KERALA

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FOREWORD

Sulthan Bathery, previously known as Sultan's Battery, derives its present name from Tipu Sultan of Mysore who used the abandoned Jain temple here as his battery in the 18th century. This picturesque town, flanked by majestic hills with patches of cliffs, valleys and plains interwoven with the mountainous terrain is the centre of tourism in Wayanad district. Presently Sulthan Bathery is the hub of all tourism and commercial activities in Wayanad district. Being well connected with various places with the Kozhikode – Kollegal National Highway and the Bathery – Gudalur road, the town has very good connectivity with major centers around. It is the headquarter town of Sultan Bathery taluk and also a second order settlement in the district. Hence the town has a wider region to serve. The regional population predominantly comprises of tribes and the economy is essentially agrarian in nature.

Sulthan Bathery has immense potential for development due to its geographic location, tourism potentials, availability of economic infrastructure, regional linkages and propensities for accepting further investments and creating spread effects. However, the area needs an integrated approach to development issues whether it is in infrastructure, service delivery in various sectors etc. Environmental conservation shall be of prime importance. At the same time, development of the area through optimum utilization of the available resources is also important. Hence we have to strive for sustainable development of the area with thrust to the requirements of the service region. In other words, planned development is the need of the hour for the area. It is in this context that the then panchayat took the initiative to prepare this master plan. The efforts for preparing master plan were started while Sulthan Bathery was a grama panchayat and has now been materialized.

I appreciate the guidance and involvement of all the members of the municipality in this plan preparation exercise. Also, I place on record the efforts put in by the then Spatial Integration Committee & the Master Plan Committee in preparing this master plan carefully understanding the aspirations and expectations of the residents of Sulthan Bathery. I also appreciate the technical support rendered by the Office of the Town Planner, Wayanad LSGD Planning in the preparation of this comprehensive master plan.

The master plan emphasizes on the needs and aspirations of the resident population of Sulthan Bathery as well as the requirements of its service region. The plan strives for economic development of the area through optimum utilization of the available resources. Conservation of unique environment of the area is also given due respect. I hope this master plan shall be the road map for the development of Sulthan Bathery for the years to come.

T.K.Ramesh
Chairman
Sulthan Bathery Municipality

Sulthan Bathery
Date:

PREFACE

The settlement pattern of Kerala is unique in terms of urban rural continuum wherein the intervening nodes have to perform multiple functions. Sulthan Bathery is one such node. The District Urbanisation Report of Wayanad prepared by the Local Self Government Department Planning emphasis the need of developing Sulthan Bathery as a second order service settlement and also equipping it to cater the higher order demands of the entire taluk as the taluk headquarter town. In order to perform the complex multiple function and thus to ensure socio-cultural, economic and physical, orderly, planned, sustainable development of the urban and rural area with healthy forward and backward linkage with rural hinterland planning intervention is inevitable. Therefore, an integrated and coordinative spatial planning strategy based on comprehensive master plan effectively reflecting the socio-cultural environment, topographic and heritage fabric of every settlement is required.

The master plan has multiple objective in this backdrop to ensure efficiency of built form so as to augment economic development, to facilitate inclusive and faster development by the impetus given to various sectors of economy and put in place a regulatory mechanism for achieving the desired development as well as to minimise threats to the environmental resources, keeping the demands of development well within the carrying capacity of our precious environment.

Sulthan Bathery, one of the second order settlements in the district of Wayanad and falls under the resourceful fragile Western Ghat which is peculiar in terms of topography, environment, culture, wide range of flora and fauna, hill produces etc.

Preparation of this master plan is taken up under second phase of the 'Scheme of Preparation of Master Plans and Detailed Town Planning Schemes' as per administrative sanction obtained vide G.O (Rt). No.1376/2012/LSGD dated 17/05/2012. The process of preparation of this master plan include extensive collection and compilation of both primary and secondary data, local level and spatial analysis for the purpose of identification of problems and potentials of the planning area, setting up of goals and objectives, formulation of development concept and carving out policies and strategies followed by detailed sector wise proposals. The findings of the District Urbanisation Report of Wayanad played a crucial role in evolving the development concept of this plan.

In this regard I appreciate the guidance and support rendered by all the members of the Municipality in the preparation of this plan. The leadership provided by the Chairman of the Municipality **Sri.T.K.Ramesh,** former Chair Persons **Sri.C.K.Sahadevan & Sri.T.L.Sabu** and former President of Sulthan Bathery Panchayat **Sri.P.P.Ayoob,** is reckoned with gratitude which was crucial in the time bound preparation of this plan. Considering the tedious effort, multi-disciplinary "technical knowhow" required and above all necessity of stake holder participation at various stages of plan preparation, Spatial Integration Committee (SIC) & the Master Plan Committee was constituted by the municipality in connection with preparation of this plan. Both the committees extended all support and played a crucial role for the timely successful completion of the plan. An exclusive planning team was constituted in the Office of the Town Planner, Wayanad in connection with preparation of this plan under the leadership of District Town Planner. The collective

contribution of various line departments, NGO's, private agencies, people's representatives and above all the people of Sulthan Bathery acts as a crucial tool for carving out this plan.

I take this opportunity to appreciate **Sri. Anil Kumar.P, Sri. Rajesh T.N, Sri.J.Jayakumar** and **Sri.R.Ramachandran** former District Town Planners, **Sri.Sathyababu.K**, and **Sri.Sooraj.T.C** former deputy town planners for their efforts in the preparation of this plan in the initial stages. I appreciate the consistent efforts of all the officials of the Wayanad District Office especially **Dr. Athira Ravi**, Town Planner and **Sri.Renjith.K.S** Deputy Town Planner for their sustained efforts in the finalization of this plan.

The proposals and regulations in the master plan for Sulthan Bathery 2042 are framed for the sustainable development of this town and this master plan will provide a frame work for development for Sulthan Bathery.

H.Prasanth
Chief Town Planner (Planning)
Local Self Government Department Planning

Thiruvananthapuram

Date:

ACKNOWLEDGEMENT

Sulthan Bathery is unique in terms of topography, environment, natural resources, presence of reserved forest blessed with a wide range of flora and fauna, nearness to numerous tourist destinations, wide range of hill produces of the region and their markets, constraints in linkages imposed due to connectivity through a single mode of transportation etc. Being the taluk head quarter and a second order settlement in the district, the settlement has to cater the higher order requirements of a wider region. At the same time, environmental aspects shall be given due respect. Thus, a comprehensive approach that addresses all such aspects is adopted in this master plan. This master plan envisages planned, sustainable development of Sulthan Bathery. The efforts for preparing master plan were started while Sulthan Bathery was a Grama Panchayat and has now been materialized. It is hoped that this plan will pave way forward for the planned development of Sulthan Bathery for years to come.

The process of preparation of this Master plan 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 acknowledge with gratitude, the guidance and involvement of all council members of the municipality especially **Sri.T.K. Ramesh** Chairman and **Smt.Elsy Paulose** Vice chairperson, **Sri.C.K.Sahadevan** & **Sri.T.L.Sabu** former Chairpersons and **Sri.P.P.Ayoob**, former President of Sulthan Bathery Panchayat. The sincere efforts put forward by the Spatial Integration Committee & the Master Plan Committee under their leadership, paved way for the successful completion of the plan preparation and finalization. Contributions of **Prof.Thomas Thevara**, resource person, are also gratefully acknowledged. In this regard I extend my sincere gratitude to **Sri.Ali Asuhar.N.K** Secretary and all the staff members of the municipality especially the technical team headed by **Sri.Munavar.K** Municipal Engineer for their participation in various stages of plan preparation. I also express my sincere gratitude to various department of Wayanad district who supported this venture by giving required data and planning suggestions.

Further, I am extremely grateful to the encouraging leadership, support and motivation extended by our department head, **Sri.PramodKumar.C.P**. Chief Town Planner, **Sri.H.Prasanth** Chief Town Planner (Planning) beyond which the plan would not have been realized in time. The plan was finalized after a series of discussions, revisions, editing and modifications. I would like to thank all those who have participated in the discussions and moulding of the plan to the present stage. In this connection, I am extremely thankful to **Sri.Ajay Kumar.S** Senior 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**, **Smt.Sabithmini.C.K.** Town Planners and **Smt.Sindhurani** Deputy Town Planner of the Office of the Chief Town Planner.

The plan will not have been timely materialized without the dedicated efforts of **Sri.AnilKumar.P, Sri.T.N.Rajesh**, **Sri.J.Asok Kumar**, **Sri.P.Ravikumar**, **Sri.J.Jayakumar**, **Smt.V.P.Deepa**, **Sri.Abdul Malik.K.V**, **Sri.Ramachandran.A** and **Smt.Sumol.G**former District Town Planners. The untiresome efforts of **Sri.Renjith.K.S**, Deputy Town Planner and **Sri.Sooraj.T.C**, **Sri.Sathyababu.K** and **Sri.Nidheesh K.P** former Deputy Town Planners, **Smt.Sajana.A.V** Assistant Town Planner, **Sri.T.N.Chandrabose** and **Sri.Vishnu Nandakumar** former Assistant Town Planners also require special mentioning. The contributions of **Sri.Jayaprakash.V.J & Smt.Jithya.M.J** Town Planning Surveyors, **Sri.GopalKrishnan.P** Planning Assistant (GIS), **Sri.Babeesh.C** former Planning Assistant (GIS) and **Smt.Mincy.P.R** Statistical Assistant, **Smt.Nimisha.M.U** Typist, **Smt.Najiya.K** Tracer, **Smt Najla.M.K** Planner Associate and the support of Chainmen **Sri.Sunil Kumar.B**, **Sri.Gopinath.K**, **Sri.Ajesh.M.A** and Driver **Sri.Rajesh.V.V** during various stages of plan preparation, are also acknowledged. Last, but not the least, I also convey my thanks to all the staff members of the office for their participation in various stages without which this would not have been completed in the present form.

I once again express my gratitude to all those who were associated for the successful completion of this planning exercise. As we know, success of any planning effort is in its implementation. I strongly believe that this plan will contribute to the planned and sustainable development of Sulthan Bathery.

Kalpetta

Date:

Dr. Athira Ravi
Town Planner, Wayanad
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LIST OF ABBREVIATIONS USED

ANERT	Agency for Non-conventional Energy and Rural Training
BOT	Build Operate and Transfer
BPL	Below Poverty Line
CBD	Central Business District
CESS	Center for Earth Science Studies
CFI	Cumulative Functional Index
CI	Concentration Index
CWSS	Community Water Supply Scheme
DIET	District Institute for Educational Training
DN	Down
DPC	District Planning Committee
DPR	Detailed Project Report
DTP Scheme	Detailed Town Planning Scheme
DTPC	District Tourism Promotion Council
DUR	District Urbanization Report
E-long	East longitude
EWS	Economically Weaker Sections
Exp	Express
fig	Figure
FRL	Full Reservoir Level
GIS	Geographical Information System
GL	Ground Level
GLSR	Ground Level Service Reservoir
Govt.	Government
GP	Grama Panchayat
Ha	Hectare
HH	House Holds
HLWG	High Level Working Group
HPVT	High Pressure Valve Type
HS	High School
HSS	Higher Secondary School
IDDP	Integrated District Development Plan
IP	In Patients
IPT	Intermediate Public Transport
IT	Information Technology
ITI	Industrial Training Institute
ITC	Industrial Training Centre
Jn.	Junction
KCWWF	Kerala Construction Workers Welfare Fund
KINFRA	Kerala Infrastructure Development Corporation
km	Kilometer
KSEB	Kerala State Electricity Board
KSRTC	Kerala State Road Transport Corporation

KT&CP	Kerala Town and Country Planning
KV	Kilo Volt
KW	Kilo Watt
KWA	Kerala Water Authority
LCV	Light Carriage Vehicle
LDP	Local Development Plan
LENSFED	Licensed Engineers and Supervisors Federation
LIG	Low Income Group
LP	Lover Primary
lpcd	Liters Per Capita Per day
LPG	Liquefied Petroleum Gas
LSG	Local Self Government
LSGD	Local Self Government Department
MAT	Multi Axel Trucks
MDR	Major District Roads
MILMA	Milk Marketing
MIMS	Malabar Institute of Medical Science
MLA	Member of Legislative Assembly
MLD	Million Liters Per Day
MoEF	Ministry of Environment & Forest
MSL	Mean Sea Level
MSME	Micro Small and Medium Enterprises
NATPAC	National Transportation Planning and Research Centre
NGO	Non-Governmental Organization
NH	National Highway
NHAI	National Highway Authority of India
No.	Number
NREGP	National Rural Employment Guarantee Programme
OD	Origin Destination
OH	Over Head
OHSR	Over Head Storage Reservoir
OP	Out Patient
OR	Other Road
PCU	Passenger Car Unit
PHC	Public Health Centre
ppn.	Population
PPP	Public Private Partnership
PVC	Poly Vinyl Chloride
PWD	Public Works Department
Re.sy.nos	Re Survey Numbers
SBT	State Bank of Travancore
SC	Scheduled Caste
Sc/Mc	Scooter /Motor cycle
SH	State Highway
SIC	Spatial Integration Committee

SIDCO	Small Industries Development Corporation
Sq.Km	Square Kilometer
Sq.m	Square meter
ST	Scheduled Tribe
SWOT	Strength Weakness Opportunities and Threats
T	Tonnes
T.B	Tourist Bungalow
TTI	Teachers Training Institute
UDPFI	Urban Development Plans Formulation and Implementation
UIDSSMT	Urban Infrastructure Development Scheme for Small and Medium Towns
UP	Upper Primary
V/C	Volume/Capacity
VHSS	Vocational Higher Secondary School
WFPR	Work Force Participation Rate
WGEEP	Western Ghat Ecology Expert Panel
WIMS	Wayanad Institute of Medical Science
WPR	Work Participation Rate

CHAPTER 1

INTRODUCTION

1.1 General

Wayanad District is agrarian and located in a highland region. This limits the intensity of urbanization in the district. According to the 2011 census, this district had only one urban center viz. Kalpetta Municipality. Later in 2015, Sulthan Bathery and Mananthavady Grama Panchayats became Municipalities. So urbanization is slowly coming to Wayanad District as well. The district acts as a link between the Malabar region to Mysore and Bangalore of Karnataka State and Ootty of Tamil Nadu State. And nowadays, Wayanad District is identified as one of the major tourism destinations in South India.

Sulthan Bathery town is the headquarter of Sulthan Bathery Taluk and Sulthan Bathery Block. So the desired level of service provided by the town is high. The area to be served by the town extends beyond the state border since large numbers of Keralites are residing in the western parts of Tamil Nadu and Karnataka States. At present, the town lacks desired level of facilities as taluk/block headquarter. The economy of the town mainly depends on agriculture and the allied sector because a major part of the developable land (excluding forest) of the municipality is under agricultural use.

The presence of forest in the north and the high concentration of vegetation in the peripheral area indicates the ecological stability of the town. The core of the town is located along both sides of NH 766, Chulliyode Road, Cheeral Road, and Pulpally Road which are the main traffic corridors passing through or starting from the town. Major developments such as commercial establishments, courts, bus stands, banks, etc. are concentrated on the sides of NH 766 from Poomala Road Junction to Chungam Junction. The nature of development in the town is ribbon development along the major roads and the hinterlands are being developed as organic growth. This has resulted in clogged commercial areas, traffic congestion, and hindrance to the improvements of the infrastructure facilities in the core area. Hence haphazard nature of the development of the Sulthan Bathery has to be arrested. To ensure the sustainable development of the town, a planning intervention is essential to strengthen the agriculture and allied sector and to bring the efficiency of the built environment to support the local economy.

The development issue at the town level, as well as the regional level, can be tackled through a set of rules and regulations adopted with a long-term comprehensive Master Plan to ensure sustainable development and to maintain the ecological stability of the town.

1.2 Profile of the District

Wayanad District- The “green paradise”, (75° 47‘ 23” and 76° 26’ 40” East longitude and 11° 30’ 68” and 11°58’ 40” North Latitude, area of 2131 sq. Km) in Malabar is one of the border districts of Kerala fringing the Mysore Plateau to the northeast and contiguous with the Nilgiri of Tamil Nadu. Kozhikode District is on the southwest side and Kannur District is on the North West side and Malappuram District forms a small part of the southern perimeter.

The district was formed on November 1st, 1980 merging the north and South Wayanad taluk of Kozhikode and Kannur Districts. Fig 1.1 shows the location of the Wayanad District & Sulthan Bathery Municipality.

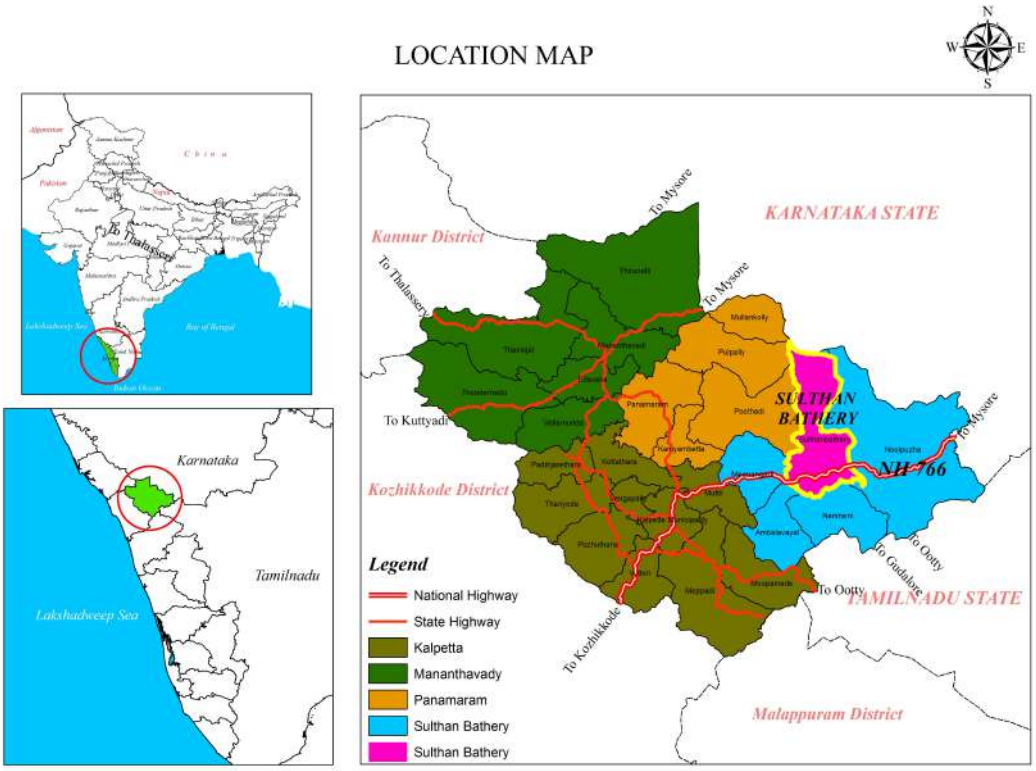


Figure 1.1: Location of Sulthan Bathery

Wayanad which is the southwest edge of the peninsular shield of India is distinctly marked by the Western Ghats where ground elevation above mean sea level range between 700-2100m. Whereby it is contained within the Highland region (Elevation >=750m) of the state with undulating topography.

The district has a salubrious climate. The mean rainfall in the district is 2322mm. Lakkidi, Vythiri, and Meppady are high-rainfall areas, ranging from 3000 to 4000mm. High-velocity winds are common during the southwest monsoon and dry winds blow in March-April. High-altitude region experiences severe cold. Some of the major peaks are Vellarimala, Banasura, Brahmagiri, Chembra, etc. ranging from 1500 to 2100m in height. Kabani River one of the three east-flowing rivers of Kerala, is an important tributary of the

Kaveri River. Kabani with its tributaries constitutes a powerful river system in the landscape of Wayanad.

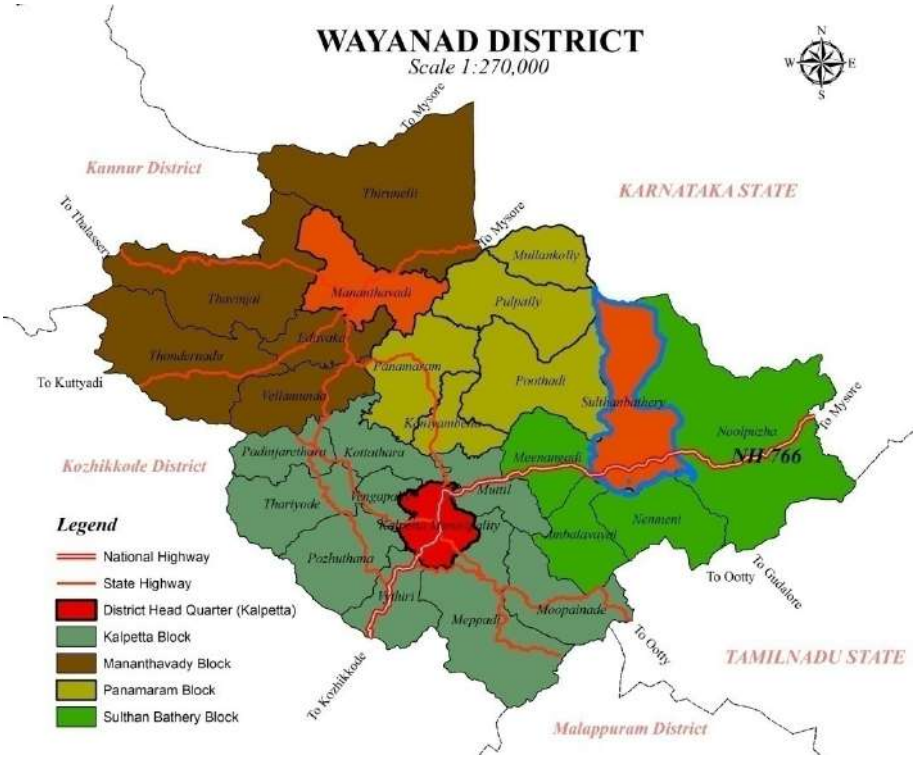


Figure 1.2: Grama Panchayats, Block Panchayats and Municipalities

The district comprises three municipalities, namely Kalpetta, Mananthavady, and Sulthan Bathery, four blocks, viz. Kalpetta, Sulthan Bathery, Mananthavady and Panamaram with 23 grama panchayats. Fig 1.2 shows grama panchayats, block panchayats, municipalities, and taluk headquarters. There are 49 villages distributed in three taluks namely Vythiri, Sulthan Bathery, and Mananthavady. The administrative map of Wayanad is shown in Fig.1.2. The land of Wayanad is rich in its cultural traditions and heritage. There is a considerable share of forest land in the district and the presence of a wide range of flora and fauna supports the fragile ecosystem. Wayanad is the homeland of the majority of the tribal population of the state. The district is blessed with various tourist spots such as Pookode Lake, Banasura Sagar Dam, Edakkal cave, Chembra Peak, Kuruva Island, Muthanga Wild Life Sanctuary, Tholppetty Wildlife sanctuary and Soochippara Waterfalls, etc. In addition to the above, the proximity to major tourist destinations like Mysore, Ooty, Bangalore, etc. supports the tremendous potential in the tourism sector. Fig 1.3 shows major tourism destinations in the district.

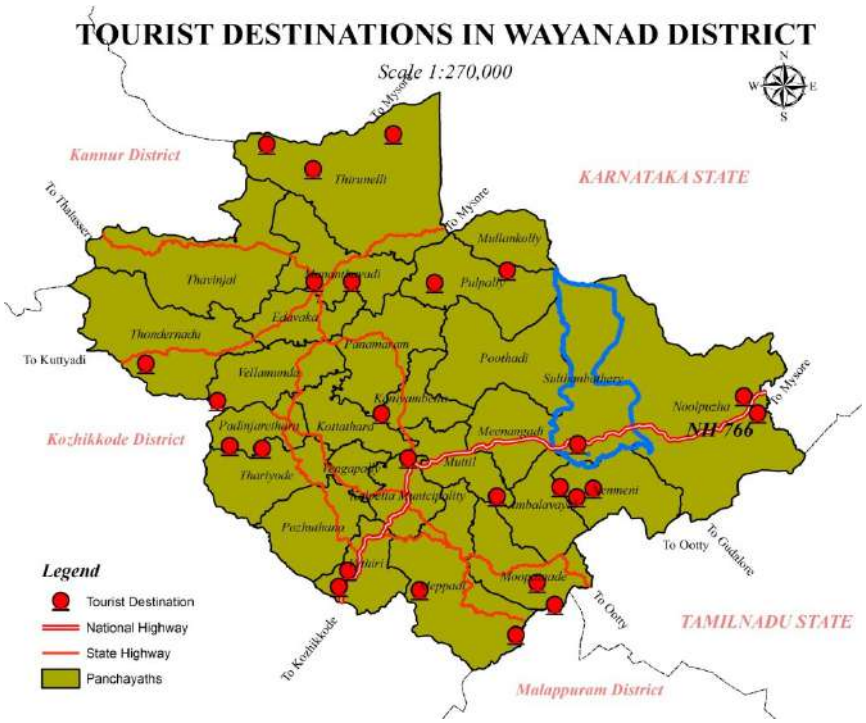


Figure 1.3: Major Tourism Destinations in the District

About 50% of the land of the district is under agricultural use. Hence the district has a strong agriculture base with the support of the animal husbandry sector and stands 2nd position in the case of the production of milk.

The main hindrance to the development of the district is the absence of rail connectivity and an airstrip. The only available mode of transportation is the road. To avail of all higher-order facilities district depends on the nearest commercial city Kozhikode.

1.3 Earlier Planning Efforts

The earlier planning effort in this area can be addressed on two levels i.e. district level and town level.

1.3.1 District Level

As per the 73rd and 74th constitutional amendments, District Planning Committee has to prepare a long-term comprehensive development plan for the entire district. **As per article 243ZD of the constitution of India, section 51(3) of Kerala Municipality Act 1994, and section 175 of Kerala Panchayat Raj Act 1994, it is also essential that every local body has to prepare a long-term development plan in line with the above legal provisions.** Kerala Government has decided to prepare an Integrated District Development Plan (IDDP) and Local Development Plan (LDP) for all districts in the state in a phased manner vide Order No. **GO (Rt) 354/07/LSGD dated 01.02.2007** and Wayanad district was included in the first phase of the Scheme. It is a comprehensive Programme of preparation of a development plan for all the local bodies of the district and the district as a whole. The project is under

implementation in the district. As part of this project, the settlement studies conducted were documented as the District Urbanisation Report by the Department of Town and Country Planning, which has been further updated to a District Spatial Plan. The spatial structure of the district is thus defined whereby the regional setting of the planning area which is a result of the function, hierarchy and connectivity of the area. Accordingly, Sulthan Bathery is one of the second order settlements in the district.

1.3.2 Town Level

The Sulthan Bathery Panchayat was previously carved out from the Kindanganad Panchayat as per order No. 62001/21/61/DD dated 01/12/1961, thereafter some portion of the Panchayat has been separated to form Noolpuzha Panchayat vide order No. WO 74104/P.T.Ele/1/68/DD dated 21/8/1968 and some other portion for Nenmeni Panchayat in the year 1974. The remaining portion of the former Kidanganad Panchayat after the separation of Noolpuzha and Nenmeni Panchayats forms erstwhile Sulthan Bathery Grama Panchayat which was upgraded to municipal status in the year 2015. No holistic approach has been attempted to formulate a master plan for Sulthan Bathery so far. This is the first attempt to make a long range comprehensive plan for the Sulthan Bathery Municipality. The work was taken up as a joint effort of the then Grama Panchayat and the Department of Town and Country Planning under the second phase of the Scheme of Preparation of Master Plan and DTP Schemes.

The 74th constitutional amendment and subsequent state legislation have put forward the decentralized planning process in the state. Hence the Sulthan Bathery has taken up various development projects such as bus stand, slaughter house, stadium with due consideration of stake holders aspiration as per people's campaign scheme. A new proposal for bypass road for NH has been taken up by the authorities for decongesting the core area of the town.

1.4 Need for the Master Plan

As far as Sulthan Bathery Municipality is concerned following are the three reasons behind an urgent requirement for a long range comprehensive development plan (Master Plan)

1.4.1 Lack of Holistic Plan for the Municipality

The analysis of the District Urbanization Report reveals that, even though Kalpetta was the only municipality, urban centre in the district with head quarter status and only 1st order settlement in the district, core area especially on the both sides of NH 766 and the hinter lands are developed organically. Sulthan Bathery and Mananthavady were two other Grama Panchayats with more or less equal developmental status. At present, the town experience haphazard nature of development instead of planned development. The earlier planning efforts attempted by the then Grama panchayats gave attention only to the core

area, which has not attained the desired result due to the absence of planning intervention. The presence of uncontrolled development activities in the core area as well as the hinter lands leads to exploitation of natural resources and haphazard development of the town. Hence considering visual spatial growth of the town as well as being the service town of the nearby local bodies and the western side of Tamilnadu and Karnataka where a large number of Keralites are residing, the town needs a long range comprehensive plan so as to ensure planned, sustainable and overall development of the town and the region.

1.4.2 Legal and Constitutional Requirements

The Constitutional Amendment Act, 1992 has put forward a new development paradigm. This calls for a total revamping of the development planning practice in the country.

The Kerala Municipalities Act, 1994 enacted subsequent to the constitutional amendment, prescribes that

- *Every municipality shall prepare a master plan for its development in the prescribed manner with focus on scientific spatial planning taking into account its resources and as per the fiscal investment (Section 51(3)).*
- *Municipality shall have the power to prepare and implement detailed town planning schemes as per the laws relating to Town planning for the time being in force subject to the master plan approved by the Government. [Section 51(4)]*

The Kerala Town & Country Planning Act 2016 deals with the preparation of master plans for the Local Planning areas in detail. According to this legislation, a master plan shall be prepared through a participatory process and shall generally indicate the manner in which development of the local planning area shall be carried out and also the manner in which the use of land shall be regulated. As per the said legislation also every Local Government Institution shall prepare a Master Plan for its local planning area.

The then Grama Panchayat has resolved to prepare master plan for the town by resolution number 2(1) dated 29-06-2012. Subsequently the grama panchayat was upgraded to municipality without any change in its boundaries or jurisdiction. Hence the resolution can be treated as one taken by the municipality as per section 36(1) and Section 113(2) (iii) of the Act.

1.4.3 Importance Due To Strategic Location and Taluk Head Quarter Status

As per the study of District Urbanization Report, Sulthan Bathery is the one out of the two 2nd order settlements in the district with municipality status. It is one of the major business centres in the district and has high potential in this sector due to the immediate vicinity of the Gundelpet and Gudalur of Karnataka and Tamil Nadu states respectively. Almost all the higher order facilities like Arts & Science College, speciality hospitals, taluk level government offices and professional institutions etc. of the region are mostly

concentrated in the town. The contiguous local bodies share the rural character; hence the town has to function as a facility and service provider for a larger area. At present the town lacks such desired level of facilities.

The town need due consideration to enhance the local economy based on agriculture and allied activities, promotion of tourism activities, promotion of eco-friendly industries, conservation of environmentally sensitive area and provision of facilities at the taluk head quarter status. Based on the above facts, the town needs a long term comprehensive plan (Master Plan) to ensuring planned harmonious and integrated spatial development along with optimum utilization of resources and providing total satisfaction to all stake holders and ensuring conservation of the bio diversity of the area.

1.5 Methodology & Community Involvement

1.5.1 Methodology

The guidelines issued by the government for the "Scheme of Preparation of Development Plan for Municipalities" aim to prepare statutory town planning schemes for towns as per Town Planning Act in force in a time bound and participatory manner. The general process of preparation of development plan involves four major steps which are thematically represented in the Fig 1.4.

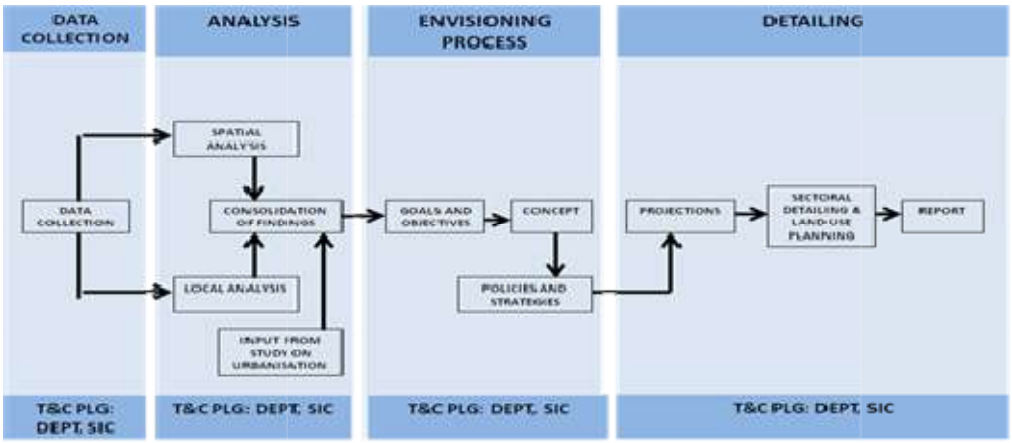


Figure 1.4: Stages of Preparation and Agencies Involved

The details of each steps and role of persons/ authority responsible for each stage are given below.

I – Data collection and Compilation

The primary data required for the preparation of master plan are land use survey, socio-economic survey and traffic survey. The land use survey was conducted by surveyors engaged on daily wages under the supervision of departmental surveyors and cross checked by officers of the department. Socio-economic survey was conducted on a format prepared at the state level for all the towns. The data collection was conducted by the enumerators under the supervision of the concerned ward members and the Statistical wing of the Town

& Country Planning Office Wayanad and verified by the officers of the department. The traffic survey and studies were out sourced to the NATPAC, Thiruvananthapuram which conducted the surveys and prepared comprehensive report in this regard.

II – Analysis

The analysis was done in two stages. The local level analysis focuses on the development trend of each sector, its potential and development problems associated with each sector. This includes development aspirations of the people also. The Spatial Integration Committee constituted in the then Grama Panchayat was responsible for this analysis. The spatial analysis concentrates upon regional setting of the settlement, distribution pattern of activities & population, land use and infrastructure network within the town. The findings of both the analysis and findings from the urbanization study (conducted by the Town & Country Planning Department for all the districts in the state) of the district are then integrated to form consolidation of findings in order to facilitate the envisioning process.

III – Envisioning process

The envisioning process starts with the identification of development issues from the consolidated findings of the study and proceeds with formulation of development goals and objectives for the town. Once the objectives are identified, development policies and strategies for fulfilling the objectives, be it in the form of land use policy or specific projects for addressing the issues identified, are developed. The detailing of the master plan follows these policies and strategies.

IV – Detailing

The detailing of the master plan is done at this stage. The detailing includes preparation of sector level proposals to be taken up during the plan period, a detailed land use plan giving out the land use policy for the town during the plan period, zoning regulations for regulating the land use, costing and phasing of the projects proposed in the master plan and details of implementation and monitoring including the provisions for monitoring of the master plan.

1.5.2 Community Involvement

The adopted methodology for the preparation of the master plan stresses on community involvement at every stage of plan preparation imbibing the spirit of 74th constitutional Amendment Act 1994 and subsequent State legislations. A spatial integration committee was constituted vide decision No. 9(1) dated 07/08/2012 of the then Sulthan Bathery Grama Panchayat under the President of grama panchayat. The secretary of the local body was the convenor of the committee and the Assistant Engineer acts as the joint convenor. The members of the committee are one representative from each working group, District Town Planner and Sri. Thomas Thevara (Retired Professor) nominated as the

resource person. A separate planning team was constituted in the district office of the LSGD Planning headed by Deputy Town Planner exclusively for the technical aid of the Scheme.

The Spatial Integration Committee convened on 18-9-2012 discussed about the various aspects of the scheme, as per the decision of the SIC various survey and data collection were carried out. A development seminar was conducted on 08-03-2013 at the then Panchayat Community Hall, Sulthan Bathery. The seminar was inaugurated by the then Hon'ble Minister of Urban Affairs and Welfare of Minorities, Sri. Manjalamkuzhi Ali. The meeting chaired by the then District Panchayat President Smt. A. Devaki and the then Grama Panchayat President Sri. P.P Ayoob welcomed in the function. There was a brief presentation about the preparation of master plan by the District Town Planner. The participants are from various walks of life like ward members, representatives of various political parties, service organizations etc. The presentation of master plan for Sulthan Bathery continued after the inauguration function. The resource person Mr. Thomas Thevara was the moderator of the discussion after the presentation. The participants expressed their opinion and aspirations about the development of Sulthan Bathery town besides highlighting the present problems and potentials. A number of representations from individuals and organizations were received during the preparation of the draft master plan. The draft master plan proposals were vetted by a special committee formed by the panchayat for the purpose. Even though the draft master plan approved by Chief Town Planner (Planning) was forwarded to the then grama panchayat for publication, the same got delayed due to the election to the local bodies and subsequent upgradation of local body as municipality. Hence the draft master plan was again presented before the new Municipal Council and got approved with modifications.

Planning Assistant and Computer Assistant were posted in the planning team and various surveys and data collection was done in the year 2012. The land use survey was conducted by the surveyors engaged under the supervision of the departmental staff and socio-economic survey and other data collection were done by the enumerators proposed by the then Grama Panchayat authorities. The survey materials and necessary training were given by the district office of the Department of Town and Country Planning. The traffic and transportation survey was entrusted to NATPAC under the supervision of the department. Combined work shop of SIC members, working groups and planning team were conducted on different occasions for local analysis. During the meetings the local level analysis dealing with the problems and potentials of the various development sectors were completed. The development proposals recommended by the subcommittee exclusively constituted for the purpose by the local body were also incorporated in the master plan.



District Town Planner addressing Grama Panchayat Committee



Hon'ble Minister Sri. Manjalamkuzhi Ali Inaugurating the Vikasana Seminar



Seminar on Published Master Plan for the Selected Representatives from the Wards



Seminar on Published Master Plan for the Selected Representatives from the Wards



Ward Level Meeting for Master Plan Discussion

1.6 Delineation of Planning Area

After taking a decision to prepare a master plan for Sulthan Bathery and finalizing the contents and planning process to be adopted, the next step is to decide up on the planning area. Delineation of planning area in the preparation of a master plan is done based on a regional level study. Sulthan Bathery being a taluk head quarter, the town has overall development of the region. The extent of Sulthan Bathery is 103.22 Sq km out of which 60.87 sq.km is forest. Hence considerable extent of land is available adjacent to the core area for future development by the horizon year 2042. So the planning area confined to local body limit itself. As per the study of DUR, Sulthan Bathery is one of the 2nd order settlements in the district and contiguous local bodies share the rural character. Unique topography and environment in the town as well as the region, point out the need for an eco-friendly agro oriented development. Moreover, the physical growth and visual spatial analysis clearly shows the availability of land for future planned growth of the town and the concept of urban town is more relevant in the context of Wayanad than urban local body. The analysis of above factors clearly ensures the fact that the planning area itself is to be confined in the local body limit. Above all, it facilitates more administrative convenience.

1.7 Scope and Limitations

The scope of the project includes

- To evolve strategies to equip Sulthan Bathery to efficiently perform its role as the taluk headquarters and as regional business centre.
- Study of the various socio-economic and physical features of Sulthan Bathery.
- Statistical and spatial analysis of the primary and secondary data collected.
- Probing people's aspirations and perception of problems.
- Understanding development issues from the scientific analysis as well as the people's perception.
- Probing the impact of the recommendations made by Dr. Gadgil Committee report/Dr. Kastoorirangan Committee/HLWG who is entrusted to study the environmental issues of Western ghat.
- Formulation of goals and objectives for the plan.
- Devising development strategy for realizing the objectives.
- Prepare land use plan, regulations and project proposals based on the strategies identified.
- Costing and phasing the implementation.

The preparation of this master plan has the following limitations:

- Study on land use parameters has been carried out with available data of 2012.
- Various secondary data collected from different sources have different base year and thus a direct comparison of data may not be accurate.
- Non availability of some data in regular time intervals affects the time series analysis of data.
- During the period of formulation of the scheme, the grama panchayat got upgraded to municipal status which requires certain modification.

1.8 Inference

Sulthan Bathery is the taluk head quarter, block panchayat head quarter, municipality and one of the growth centers in the district. At present the uncontrolled development activities taking place in the core area and the hinterlands are developed in an organic manner. Hence the town needs a holistic approach to prepare a long range master plan to ensure planned harmonious and integrated spatial development along with optimum utilization of resources and ensuring conservation of the bio diversity of the area so as to enhance the local economy.

CHAPTER 2

PROFILE OF THE TOWN

Wayanad, known as the green paradise, is one of the hill area districts in Kerala State- "God's own country". Sulthan Bathery is one of the municipalities and 2nd order settlement within the district. In this session, the location, area, population, administrative division, physiography, climate, history & evolution, and biodiversity of the town is described.

2.1 Location

"Wayanad" the 14th District of the state was formed as late as 1.11.1980 combining North Wayanad Taluk of Kannur District and South Wayanad Taluk of Kozhikode District with Kalpetta as headquarters. The district lies between 75°47' 23'' and 76° 26' 40" East longitude and 11°30' 68" and 11°58' 40" North latitude with an area of 2131 Sq Km. It is the border district contained in the highland region and shares its boundary with Tamil Nadu and Karnataka in the east. To its west and northwest are the districts of Kozhikode and Kannur while Malappuram district forms the Southern boundary. Sulthan Bathery Municipality, the headquarters of Sulthan Bathery Taluk, lies between 76°04' 10''and 76° 26' 11'' East longitude and 11°26' 28" and 11°48' 22" North latitude. It is located about 100 Km east of Kozhikode and is equidistant (about 115 km) from the famous tourist centers viz. Mysore and Ooty. The distance of the district headquarters and other important urban centers from Sulthan Bathery is shown in Fig 2.1.

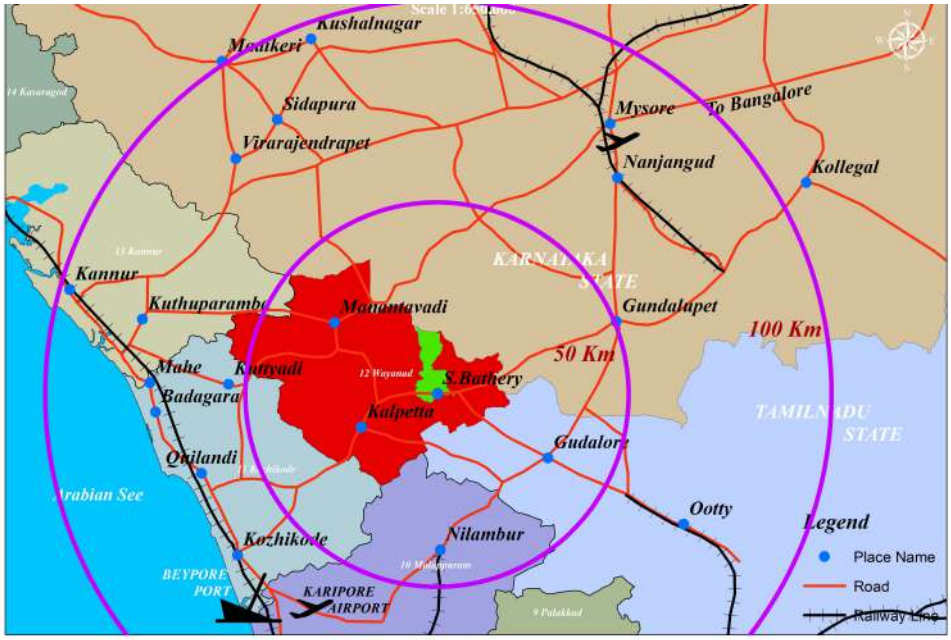


Figure 2.1: Location & Regional Linkages

Sulthan Bathery is the administrative headquarter of Sulthan Bathery Taluk. This emphasizes its importance in terms of an administrative town and as a provider of higher-

order services and so forth. The height from the mean sea level varies from 731m to 1371 m. The municipal area is surrounded by Karnataka state in the north, Noolpuzha Grama Panchayat in the east, Nenmeni and Ambalavayal Grama Panchayats in the south, and Meenangadi, Poothadi, and Pulpally Grama Panchayats in the west. The spatial location of the Sulthan Bathery in Wayanad District is shown in Fig 2.2.

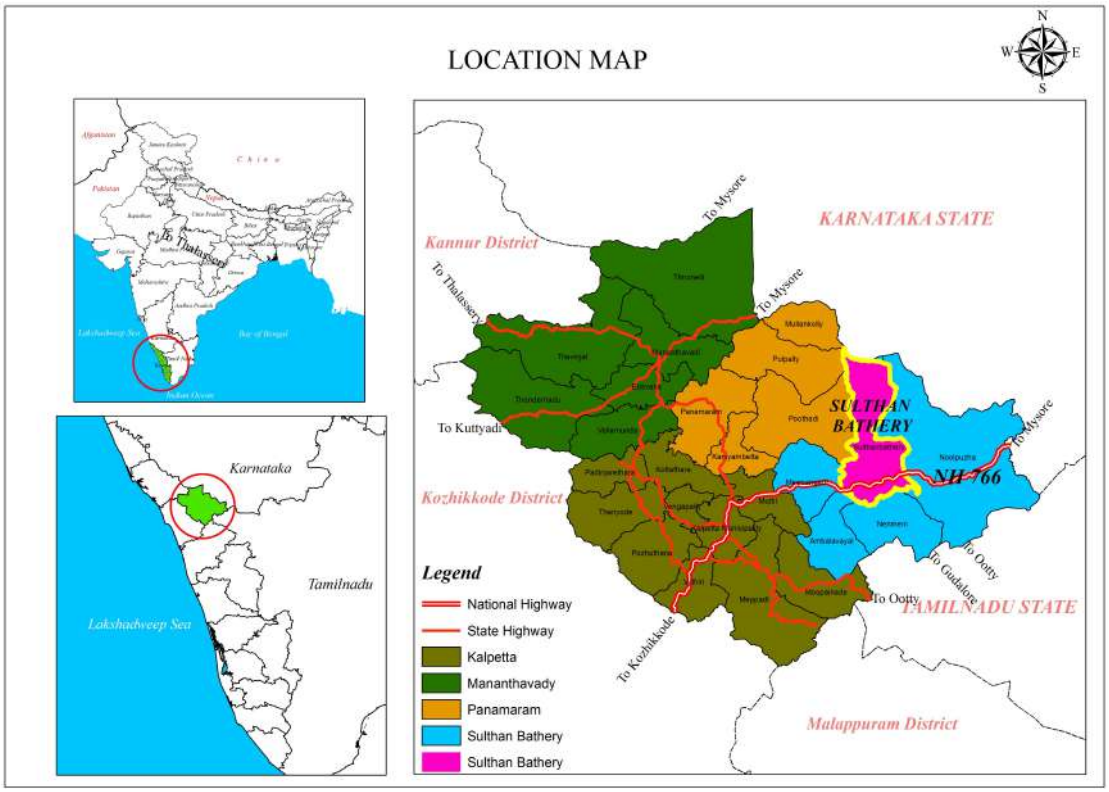


Figure 2.2: Location of Sulthan Bathery

2.2 Area, Population & Administrative Divisions

The geographical area of Sulthan Bathery is 103.22 (net area 40. 24sq.km) Sq km. which accounts for 4.84% (1.88%) of the total area of the district.

The population of the then Sulthan Bathery Grama Panchayat as per the 2011 census was 45417, which constitutes 5.56% of the district population. The male population is around 49.14% which indicates an almost equal male and female population. The population density is 440 persons per sq km, which is low compared to other towns in the state. But the actual habitable area excluding huge forest areas considered, the population density becomes 1535 persons per square kilome ter. It is specifically noted that the ward delimitation in the municipality was made by excluding the forest area. The other major growth centers in the district viz. Kalpetta and Mananthavady show less population density.

The total number of electoral wards as per the ward division in 2010 was 23. As per the 2001 ward division, there were 18 wards and there are 35 electoral wards for the newly constituted municipality. Since most of the census data are available for the 2001 ward

division, for the study and analysis, ward division in 2001 is considered. The spatial location of 18 wards and 23 wards of erstwhile Sulthan Bathery Grama Panchayat are shown in Fig 2.3 & Fig.2.4 respectively.

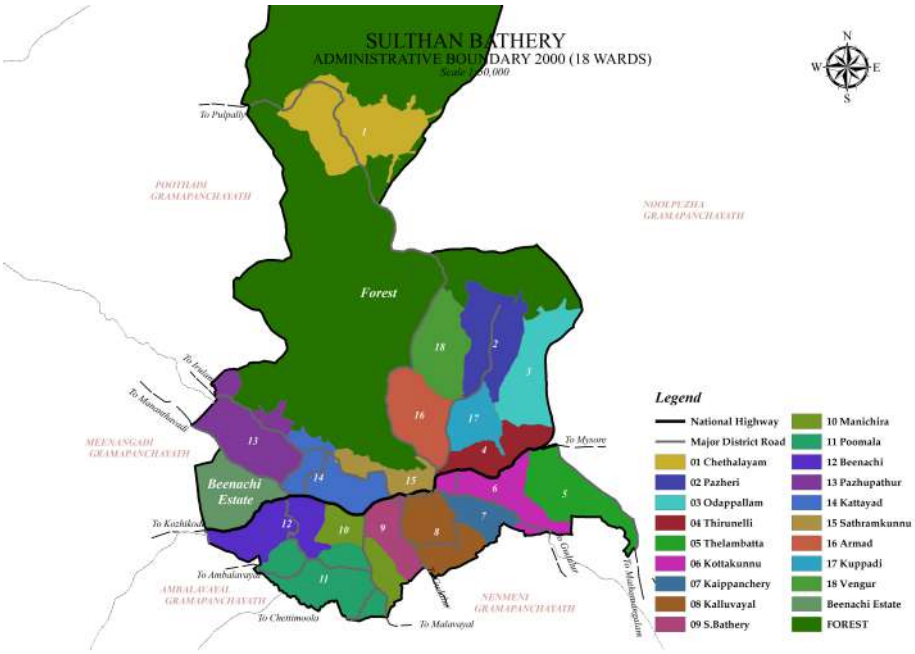


Figure 2.3: Administrative Map with 18 Wards

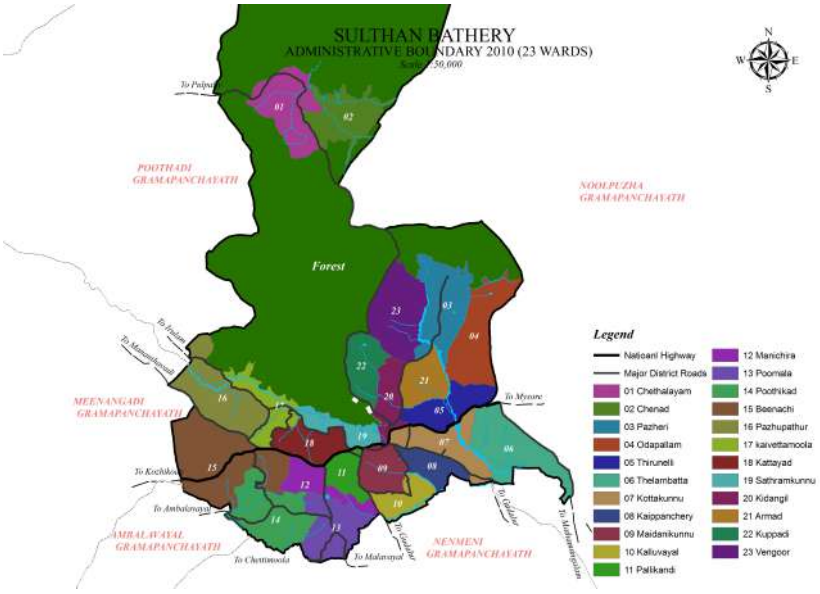


Figure 2.4: Administrative Map with 23 Wards

2.3 History & Evolution

The present Wayanad district was formed by merging the South Wayanad taluk of erstwhile Kozhikode district and North Wayanad taluk of erstwhile Kannur district on Ist November 1980. This section tries to explore the history and evolution of the Sulthan Bathery.

2.4 History of Governance

Recorded history of the district is available from the 18th century. In ancient times, the land was ruled by the Rajas of Veda tribe. In later days Wayanad came under the rule of Pazhassi Raja of Kottayam Royal Dynasty. When Hyder Ali became the ruler of Mysore, he invaded Wayanad and brought it under this way. During the period of Tippu, Wayanad was restored to the Kottayam Royal Dynasty. But Tippu handed over the entire Malabar region to the British, after the Sreerangapattanam Truce he made with them. This was followed by fierce and internecine encounters between the British and Kerala Varma Pazhassi Raja of Kottayam Dynasty. When the Raja was driven to the wilderness of Wayanad, he organised the war, like peoples militia with the help of Kurichiya tribal and engaged the British in several gorilla type encounters. In the end the British could get only the dead body of the Raja who killed himself somewhere in the interior of the forest.

Thus Wayanad fell into the hands of British and with that came a new turn in the history of this area. The British authorities opened up the plateau for cultivation of tea and other cash crops. Roads were laid across the dangerous slopes of Wayanad, from Kozhikode and Thalassery. These roads were extended to the cities of Mysore and Ootty through Gudalur. Through the roads poured in settlers from all parts of Kerala and the Virgin forest lands proved a veritable gold mine with incredible yield of cash crops.

Till the beginning of the 19th century Sulthan Bathery was known as “Ganapathivattam”, this was because of an old idol of lord Ganapathy found on that region. “Ganapathivattam” owes its new name “Sulthan Bathery” to the erstwhile ruler of Mysore - Tippu Sulthan. During his invasion of the Malabar region he dumped his ammunition and parked his artillery in an old Jain temple here. This place was hence named as Sulthan Bathery, which is a corrupted form of Sulthan’s Battery. During the middle ages itself many trade centres were developed around the Ganapathivattom temple, soon the town start to develop potentially.

A great historic event in the 1940’s was the immigration factor in the history of Sulthan Bathery from the Central Travancore and Southern Travancore in search of good life and hope, many families migrated to the Malabar region. Those were in search of fertile land, they bought in the cultivation of cash crops in the place of food crops. They slowly transformed wet lands and paddy fields to dry lands and started growing pepper, ginger, cardamom and rubber for the financial benefits. These migrants too gave their contribution in the development history of Wayanad. They started schools and churches and bought in new civilization to this land. They faced the dreadful forest, wild animals, malarial and hazardous diseases in the dense forests of Wayanad. For the ones who succeeded in settling their land and families, a new panchayat named Kidanganad was formed in 1934.

The erstwhile Sulthan Bathery Grama Panchayat and Noolpuzha Panchayat were formed on 1968 from Kidanganad Panchayat and Nenmeni Panchayat later on 1974. In 1995 under the head P.C. Ahammed a 13-member administrative group was elected and

later in 2015 it is upgraded to municipal status. Now Sulthan Bathery Municipality has a fast forward growth in the development of the district. Presently the municipality area comprises of 3 Revenue Villages viz. Sulthan Bathery (full), Kuppadi (part), Kidanganad (part) and is divided into 35 wards. Election to the municipality is held in every five years.

2.4.1 History of Development

The history of Sulthan Bathery and Wayanad is rather scattered and is primarily available through William Logan's *Malabar Manual* and a few British records. The administration over the Ganapathivattam province under the Malabar district board was transferred to Kidanganad Panchayat in 1968. As per H. S. Gramey's report Thalassery Sub Collector T.H.Balan was the one to initiate a revenue settlement for the first time in Wayanad. A report by Robinson after 34 years gave the change from an uncivilized state to slowly modernizing history of Wayanad. During the time of Gramey there was only certain divisions called as Moonanadu, Muthurnadu, Ilankurnadu, Nallurnadu, Idanashankur, Porannur, Kurumbala, Wayanad, Nambikolli, Ganapathivattam etc., for the administrative purpose these were divided into many sub divisions. The importance of Ganapathivattam in different forms has been stated in many reports like the police picketing at Ganapathipalayam referred in British manuals. As per the records during Hyders & Tippus invasion Ganapathivattam got a gradual change to Sulthan's Battery.

From 1968 Sulthan Bathery has an administrative era, a gradual transformation from Ganapathivattom to Kidanganad and finally to Sulthan Bathery. Many elected members gave their great hands in the field of development of this Panchayat initiated under P C. Ahammed Hajee and a committee of 8 other members during 1969. This continued for few years and new members came to their part of development for the rest years.

The place is well connected with various places with the NH 766 (formerly NH 212) Kozhikode – Mysore National Highway. There is also another road that branches off from Sulthan Bathery and leads to Gudalur in Tamil Nadu. Many factors had colourfully contributed to the development history of this Panchayat during different ages. The social cultural & political changes constitute the growth of Sulthan Bathery to a great depth. Now Sulthan Bathery is leaping to a face of glory and development with a present and future outlook. Fig.2.5 shows the regional connectivity of the town.

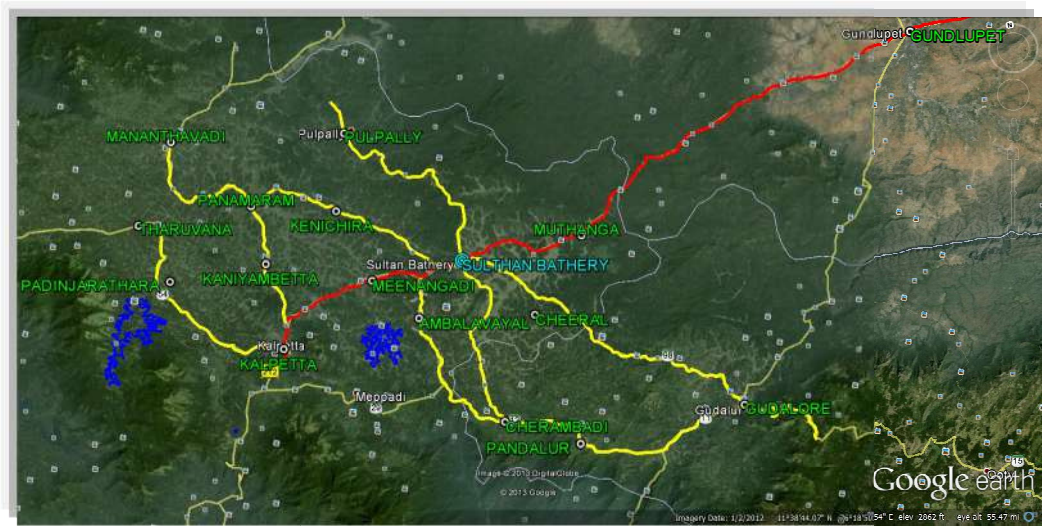


Figure 2.5: Regional Connectivity

2.4.2 Socio-Cultural History

To be proud historical monuments, Ganapathy temple & Jain temple have their own stand on the epics. Migrants of Tamil, Kodagu (Coorg), Karnataka villages too contributed their parts. Many memorial debris like veerakallukal, destructed temples, etc. give vital information of these migrants during the middle ages. These migrants promoted their own civilization culture along the paths which connected their trade routes. The cultural history of Sulthan Bathery proves that it has been contributed by the Tribal groups who lived here, these tribes has great ancestry story to tell about the kings invasion, the British invasion the migrants immigrations, and modernizations through the ages.

The Jain influence in the culture and life of Sultan Bathery is obvious and the history of Jain migration to the region started from 12th century. In the 16th century too there was a major migration of the Jain community to the region and they came here mainly as traders, managing the cash crops. Now there are only a few Jain families which remain here and they belong to the Digambar sect, locally known as Gowdas. The legacy of the earlier Jain settlers is revealed through the presence of Jain temples here. Most of them are now in ruins except two – one at Puthangadi (which lies about 20 km from Kalpetta on the Panamaram - Nadavayal Route) and the other at Sulthan Bathery. The beautifully carved pillars and mural paintings of the Puthangadi temple often lure tourists and the structure and ambience there exudes a feel of history. The Jain temple at Sulthan Bathery is believed to have been built in 13th century. The architecture of the temple has strong influence on the Jain culture. The carved square pillars built on a raised platform holds the stone slab roof and intricate cornices on all the sides and the exquisite carvings on the pillars are a connoisseur's delight. A square granite slab with a carving of Mahavir Jain can be seen in the inner sanctorum of the temple which is surrounded by an open verandah. There is a raised platform made of granite in front of the main entrance. This too holds carved pillars and their fluted columns end without any crown stones. The surrounding grounds too are paved

in granite. The temple has an interesting history. It first served as a shrine, and then became an important centre of commercial activity. Later in 18th century, it became a dumping ground of ammunitions by Tippu Sultan.

The Mariyamman Temple is the focal point of tribal population in the area; their lives revolving around the temple and its rituals. The temple, believed to have been gifted by Pazhassi Raja to the tribal as a gesture of thanks giving for helping him fight the British Empire, is a place of immense importance for the tribal.

En route from Sulthan Bathery to Mysore is the Wayanad Wildlife Sanctuary at Muthanga. The sanctuary is a safe heaven for a diverse variety of flora and fauna including many rare and endangered ones. This fragile eco-system falls under the Nilgiri Biosphere Reserve. The sanctuary shares borders with the Nagarhole and Bandipur reserves of Karnataka and with the Mudumalai reserve of Tamil Nadu. Wayanad Sanctuary puts much emphasis on scientific conservation measures that are eco-friendly and sustainable.

2.5 Physiography

Wayanad district forms the southern edge of peninsular shield. The topography is highly undulating and rugged with steep slopes and mountain ranges. It is distinctly marked by the Western Ghats where ground elevation above mean-sea level (MSL) range between 700-2100m and is totally contained within the high land region (Elevation ≥700m). The district has been topographically divided into three units viz. Very high (High range with rugged topography), moderately high (High range with moderately rugged topography) and mid region. The physiographic map of Wayanad is as shown in fig 2.6.

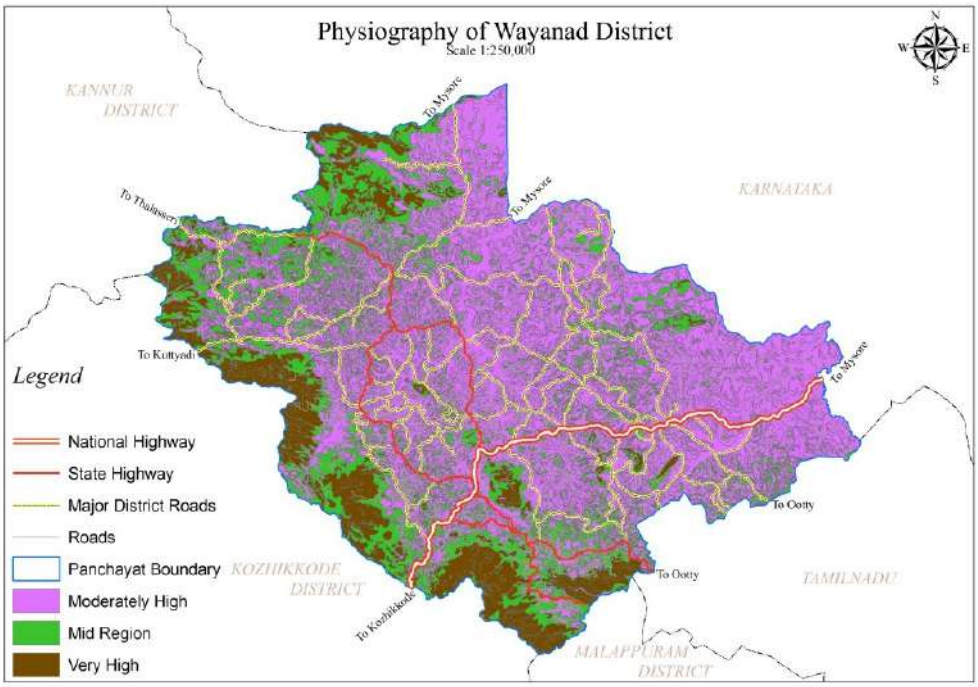


Figure 2.6: Physiography of Wayanad

From the physiographic map, most of the area belonging to moderately high region. Thus it is clear that Wayanad district is in high land region. Major area of Sulthan Bathery except some hilly portions falls within moderately high land region. Contour map of Sulthan Bathery is shown below as Fig 2.7 in which the ground level varies from 731m to 1371m.

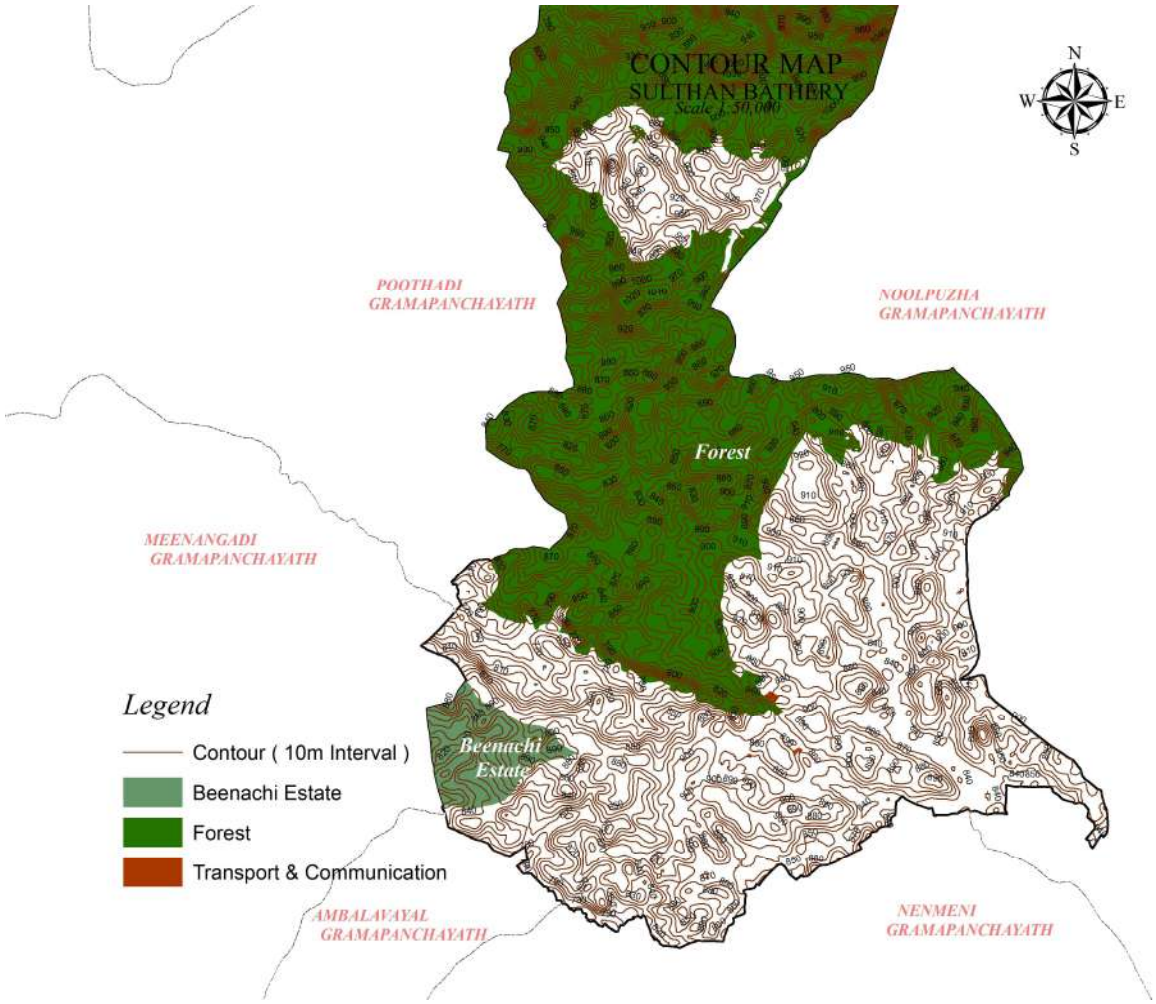


Figure 2.7: Contour Map of Sulthan Bathery

The slope profile of the Sulthan Bathery is shown in Fig 2.8. The town is also blessed with reserve forest area of 6087.42 Ha which comes around 58.98 % of the total geographical area.

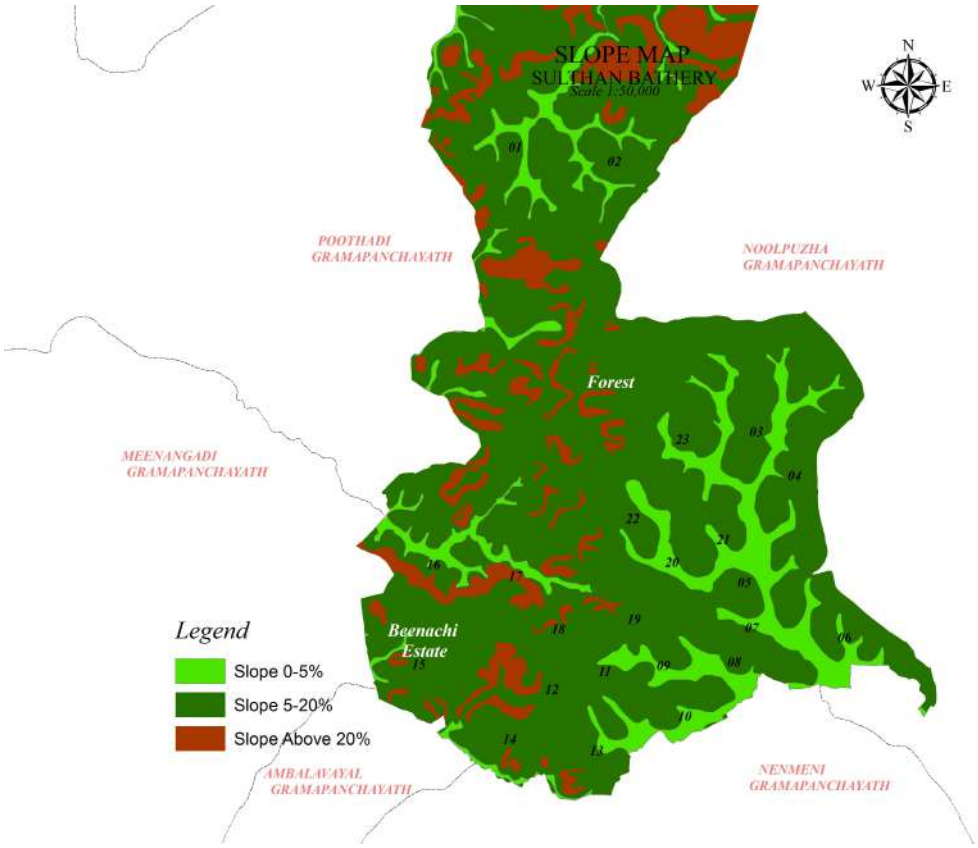


Figure 2.8: Slope Map of Sulthan Bathery

2.6 Climate

Due to the high altitude and presence of surrounding forest area, the district has a salubrious climate. The average rain fall in the district is 2322mm. The average wind speed is 3-8 km/h. High velocity winds are common during the south-west monsoon and dry winds blow in march-April. High altitude regions experience severe cold. During hot weather the temperature goes up to 36°C and the minimum temperature is 21°C.

Generally, the year is classified in four seasons, namely cold weather (December-February), hot weather (March-May), south-west monsoon (June-September) and north-east monsoon (October-November).

2.7 Bio-diversity

Sulthan Bathery is rich in bio-diversity. 58.98% of the planning area is covered with forest and 2.18% of the land area is covered with the Beenachi Estate owned by the Madhya Pradesh Government. The dense vegetation concentrated on the northern peripheral area keep it afresh with agrarian nature having a total area of 103.22sq.km. The developed area comes only 10.26% and the remaining area being occupied by forest, vegetation, paddy field and water bodies. The most important crops in the area are coffee, Pepper, Areacanut etc. and the paddy constitutes 8.14% of the total area. The town is blessed with reserve forest area of 6088 Ha and 225 Ha of estate with dense vegetation owned by the Madhya Pradesh

Government which comes around 61.16 % of the total geographical area with wide range of flora and fauna. The forest area accommodates wide range of aromatic and medicinal plants, endangered species, forest products etc.

The paddy has been largely converted for cash crops as well as construction purpose due to the cheap land value and economical loss in paddy cultivation. The predominant crop is coffee which accommodates indigenous crops also. Areacanut and banana cultivation have extensively come up recently especially in converted paddy areas.

2.8 Inference

The above descriptions clearly point out the importance of the Sulthan Bathery in terms of its strategic location, proximity to interstate and intra state urban centres and tourist places of national importance, unique topography, salubrious climate and unique bio diversity. The evolution of the town to the present status of taluk head quarter from an ancient hamlet of Ganapathivattam together with the historical aspect of this evolution is discussed in this chapter.

CHAPTER 3

REGIONAL SETTING

In this chapter regional linkage of the town with surrounding districts/states and the regional setting of the town within the district are probed into. The regional linkage of the town with surrounding districts/States is described in terms of connectivity and spatial location, whereas the regional setting of the town within the district is described based on the District Urbanisation Report prepared by Town and Country Planning Department.

3.1 Regional Linkage of the Town with Surrounding Districts/States

The eastern part of the district in which Sulthan Bathery is situated is included in the Muthanga Wild Life Sanctuary which forms part of the Bandipur National Park. Certain restrictions were proposed to be imposed in this area as per the recommendations of the Gadgil Committee Report /Dr. Kasturi Rangan report as it is classified as an ecologically sensitive area. The district is connected only by a single mode of transport i.e. road. NH 766 connects the district with Kozhikode district and Mysore of Karnataka state. The Connectivity to the south is very difficult due to the steep hills. The Calicut-Ooty Road and Bathery-Gudalur Road connect the district with Tamil Nadu. Recently the Karnataka govt. banned the night journey through NH 766 passing through Bandipur National park which resulted in the scheduling of maximum journeys during the daytime which makes the interstate as well as domestic journeys more difficult during the daytime. An alternate road proposal, Kalpetta-Panamaram-Mananthavady-Kutta-Gonikuppa-Hunsur-Mysore Road for night journey to Karnataka state which is under consideration.



Figure 3.1: Sulthan Bathery Town - An Overview

3.1.1 Road Connectivity

Wayanad is well connected to Mysore and Coorg districts in Karnataka, the Nilgiri in Tamil Nadu, Kannur, Kozhikode, and Malappuram districts in Kerala by road. There is no rail or air connectivity. Mananthavady- Bavali road and Sulthan Bathery-Mysore road (NH 766) connect the district to Karnataka. It is connected to the Nilgiri district in Tamil Nadu by Sulthan Bathery- Thaloor - Ayyankolly-Gudalur road and Vythiri-Vaduvanchal- Gudalur road. The three roads which connect with Kozhikode and Kannur districts of Kerala are Bavali-Thalassery ghat, NH 766, and Mananthavady-Kuttiyadi road (Kuttiyadi ghat).

The land sliding and road accidents happening in these ghats make the journey life-threatening. Hence alternate road proposals avoiding the ghat section are considered by the government. The following proposals are under consideration. Fig.3.2 shows the approximate alignment of the alternate roads.

1. Meppady-Chooralmala-Nilambur Road.
2. Meppady-Kalladi-Anakkampoyil Road.
3. Chippilithode-Maruthilavu-Thalippuzha Road.
4. Thondernadu-Kunhome-Vilangad Road.
5. Kalpetta – Varambetta- Poozhithode Road

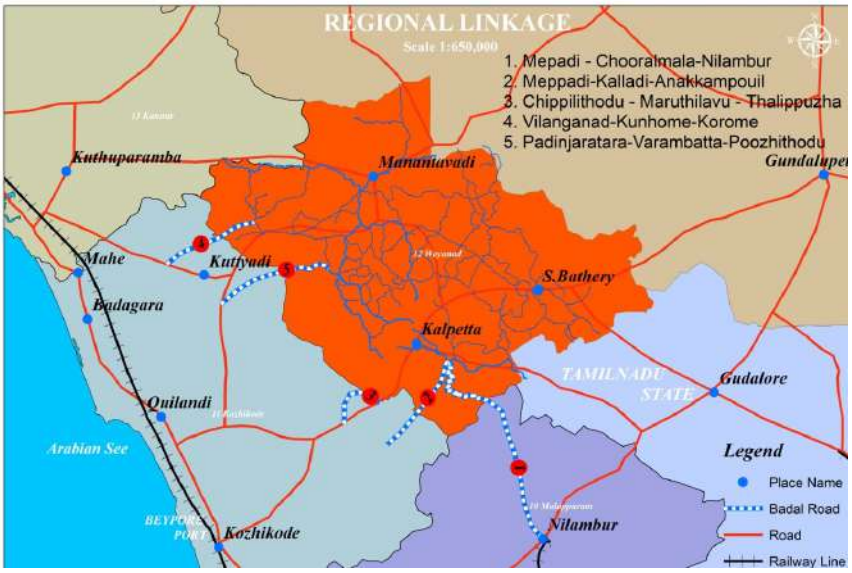


Figure 3.2: Alignment of Alternate Roads Considered

Though the above-said alternate proposals are worked out by district administration, all of them are touching forest land and so they require approval from MoEF New Delhi. So the existing Pakranthalam-Kuttiyadi Road could be improved and made use of an alternate proposal for the Ghat section.

3.1.2 Air Connectivity

The district is well-connected to the nearest International airports. Karippur International Airport in Malappuram district is about 115 km and Kannur international airport at 108 km away from Sulthan Bathery. Moreover, a proposal to establish an airstrip in the district has been considered by the government and a study has been going on in this regard.

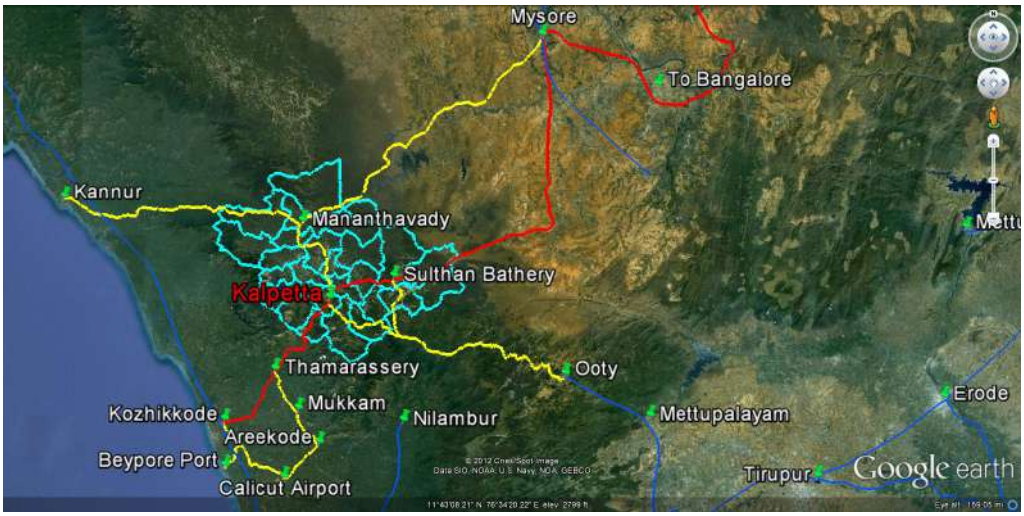


Figure 3.3: Regional Linkage of Sulthan Bathery with Surrounding District / State

The regional linkage of Sulthan Bathery with the surrounding district/state is shown in Fig 3.3 and the road network of Wayanad district is shown in Fig 3.4.

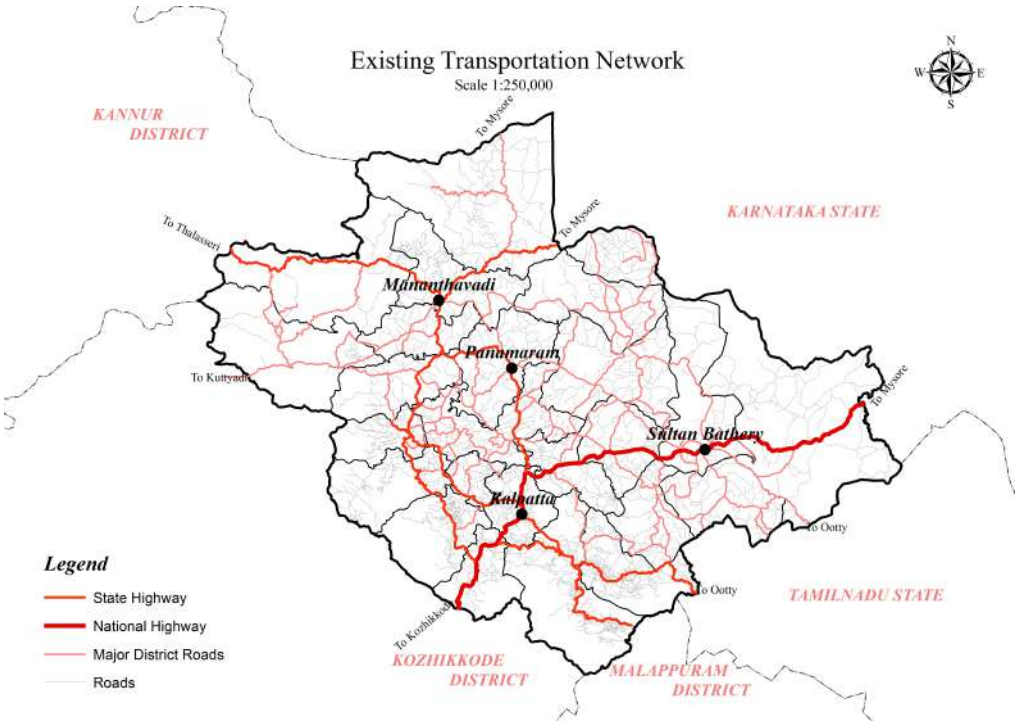


Figure 3.4: Transportation Network of Wayanad

The analysis of regional linkage emerges from the following fact.

- NH 766 (Kozhikode - Kalpetta - Sulthan Bathery - Gundelpet - Mysore - Kollegal) is the major transportation corridor connecting not only Sulthan Bathery town but also the whole district for the commutation of passengers and goods.
- NH 766 (Kozhikode-Kollegal) passes through Sulthan Bathery in the east-west direction and all the other transport corridors take off from the NH.
- Sulthan Bathery town is well connected with Kozhikode one of the commercial hubs of Kerala state, and Mysore world famous tourist spot and urban center in Karnataka State, Bengaluru known as the "Garden city" and IT hub of India by NH 766.
- Sulthan Bathery is well connected with Calicut International Airport situated at Karippur in Malappuram district (about 115 Km) and Mysore Airport in Karnataka state by NH 766
- Sulthan Bathery is well connected with nearby Port Beypore Port by NH 766.
- Sulthan Bathery is well connected with Ooty, a world-famous hill station and tourist spot in the Tamil Nadu district by SH (Sulthan Bathery –Pattavayal- Gudalur– Ooty Road).

Other regional linkages of Sulthan Bathery Town with the surrounding District / State are:

- Sulthan Bathery – Pattavayal – Gudalur Road.
- Sulthan Bathery – Thaloor – Gudalur Road
- Sulthan Bathery – Gundelpet Road
- Sulthan Bathery – Perikalloor Road
- Sulthan Bathery – Panamaram – Mananthavady- Boys town-Periya-Thalassery – Kannur
- Sulthan Bathery – Panamaram – Mananthavady- Thettu Road- Thirunelly (Famous pilgrim center).
- Sulthan Bathery-Panamaram-Mananthavady-Thettu Road -Tholpetti – Mysore
- Sulthan Bathery – Panamaram – Mananthavady – Ammani –Bavali – Kutta – Gonikuppa – Hunsur - Mysore (Presently alternative route to Mysore due to restriction for night journey in NH- 766)
- Sulthan Bathery – Mullankolly – Bairakkuppa – HD Kottai – Mysore. (It will act as an alternate route to Mysore if the Bairakkuppa bridge is completed)

3.2 Regional Setting of the Town within the District

The regional setting of the town within the district has been established by analyzing

1. Intra District connectivity pattern
2. Hierarchy of settlements derived from the District Urbanisation Report
3. The functional character of settlements derived from the District Urbanisation Report
4. Future urban profile of settlements derived in the District Urbanisation Report
5. Activity pattern of settlements derived from the District Urbanisation Report
6. The spatial structure of the district derived from the District Urbanisation Report

3.2.1 Intra-District Connectivity Pattern

Sulthan Bathery is well connected with various growth centers and tourist spots within the district by a fairly distributed road network. The NH-766 is the major transportation nerve that facilitates the above linkage. The planning area has 9.10 Km of NH 766 running west to east through the south-central part of the town from which all the other major roads take off. The night journey through NH 766 which passes through Bandipur National Park has been banned by the Karnataka government recently which adversely affected the life of the town. The alternate to NH considered is Bathery – Panamaram – Mananthavady – Kutta – Hunsur- Mysore Road. The Bairakkuppa Bridge if constructed will act as another easier route to Mysore which takes off from Sulthan Bathery. The second-order road network consists of Major District Roads viz. Sulthan Bathery – Thaloor Road runs towards the south, and Sulthan Bathery – Pattavayal Road running towards the east connects the town with Gudalur and Ooty respectively. Sulthan Bathery – Perikalloor Road, Sulthan Bathery – Panamaram Road, Sulthan Bathery – Ambalavayal Road, etc. connects the town with other growth centers within the district. Fig 3.3 shows the existing road network in the district and Fig 3.5 shows the existing road network within the town. The analysis of the road network of the district and town reveals the following facts:

- Sulthan Bathery is well connected with Tamil Nadu and Karnataka state by road.
- The town is well connected with the district headquarters and other major growth centers within the district.
- Sulthan Bathery is well connected with prominent tourist places within the district by a fairly distributed road network.

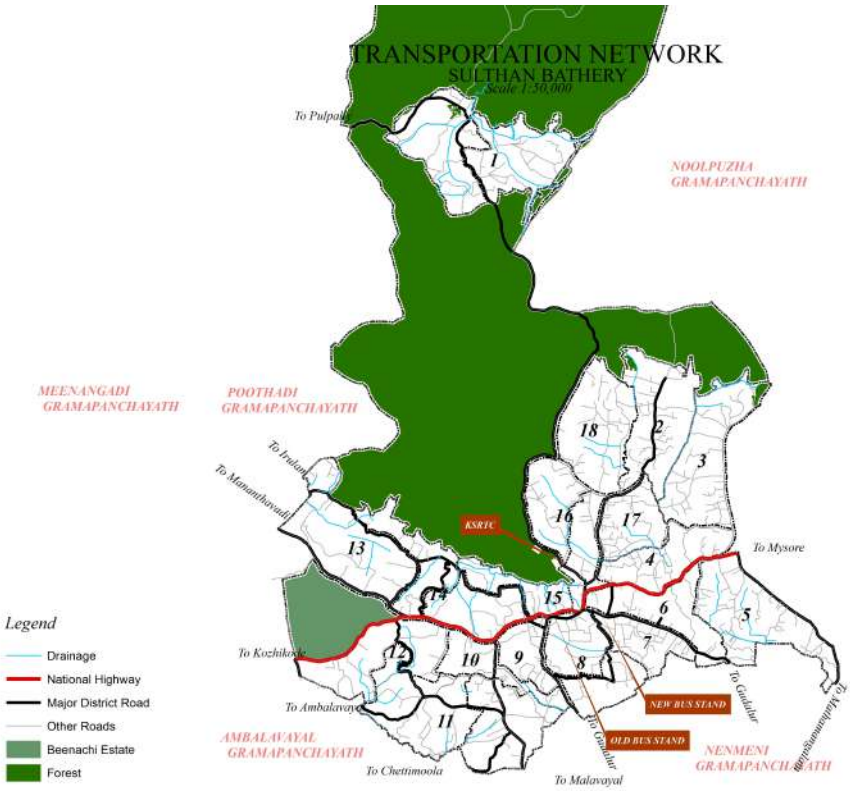


Figure 3.5: Transportation Network of Sulthan Bathery

3.2.2 Hierarchy of Settlements

The existing hierarchy of settlements within the district is determined based on the number and order of facilities. The cumulative functional index (CFI) method is used for this purpose. The CFI of a settlement is assessed based on the number and presence of education, health, market, agricultural, and allied sectors, and transportation and community facilities in the settlement. CFI is plotted against the number of settlements to find out the hierarchy of settlements. From the analysis, it is seen that Kalpetta Municipality comes as the Ist order settlement with a high CFI compared to other settlements in the district. Sulthan Bathery and Mananthavady Municipalities come in the IInd order category. 8 Local bodies come under IIIrd order settlements and the remaining 15 local bodies are grouped under IVth order settlements. The Ist order settlement is the meeting point of NH and SH and also is the district headquarter. The IInd order settlement identified is taluk headquarter. Fig 3.6 shows the spatial distribution of the Ist, II^{nd,} and IIIrd order settlements in the district. The Identified IInd order settlements are the major growth centers in the district.

The above facts point out the primacy of the Sulthan Bathery in terms of facilities and its functional importance as taluk headquarter to serve the entire taluk.

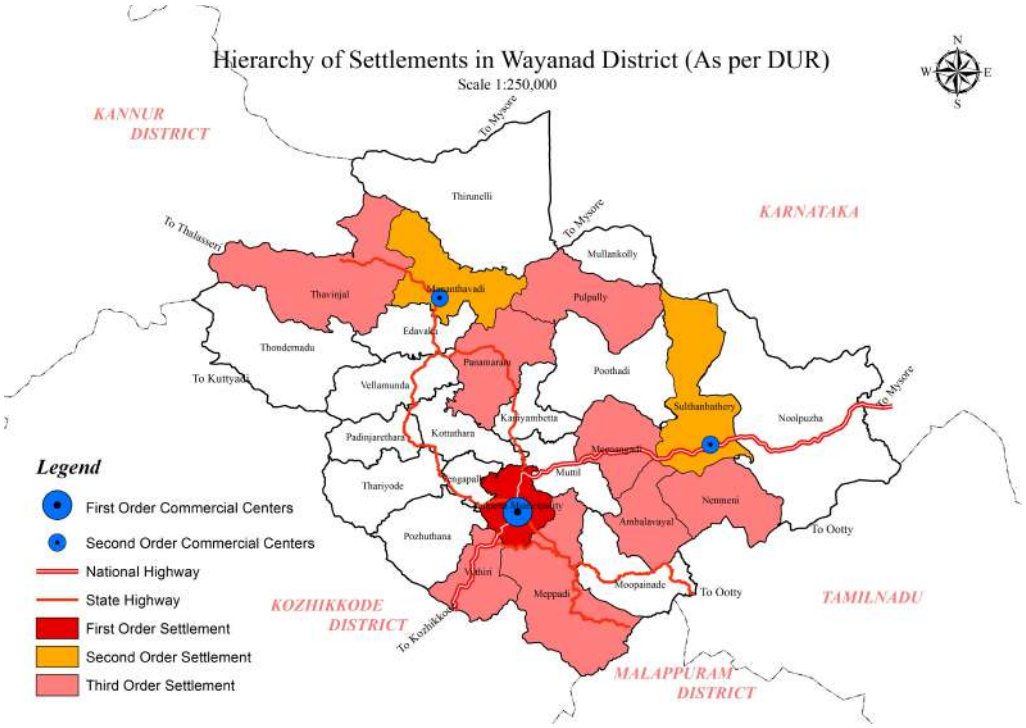


Figure 3.6: Hierarchy of the Settlements in Wayanad District

3.2.3 Functional Character of Settlements

The function of a settlement is the major activity within the settlement, be it agricultural and allied activity (Pucca rural) or secondary sector and tertiary sector activities (Pucca urban activities), or a combination of the two (Semi-urban or Semi-rural). The District Urbanisation Report derived the major functions of the settlements within the district after analyzing and scientifically synthesizing the land use and average plot size within the settlements.

Wayanad district is composed of local bodies with rural nature. The main activity taking place in this district is agriculture and plantation. There was only one census urban area in the district, the Kalpetta Municipality, where all its administrative setup is concentrated. Analysis for functional character reveals that all the Local bodies in Wayanad district show rural character. Fig 3.7 shows the functional character of the settlements in the district. This reveals the fact that the Sulthan Bathery has to perform the function of an urban center with due consideration to service sector activity, whereas in terms of land use, presence of vested forest, average plot size, unique topography, etc. the area has also to sustain agro-allied activity to ensure the optimum resource utilization and above all to ensure the ecological and environmental aspects.

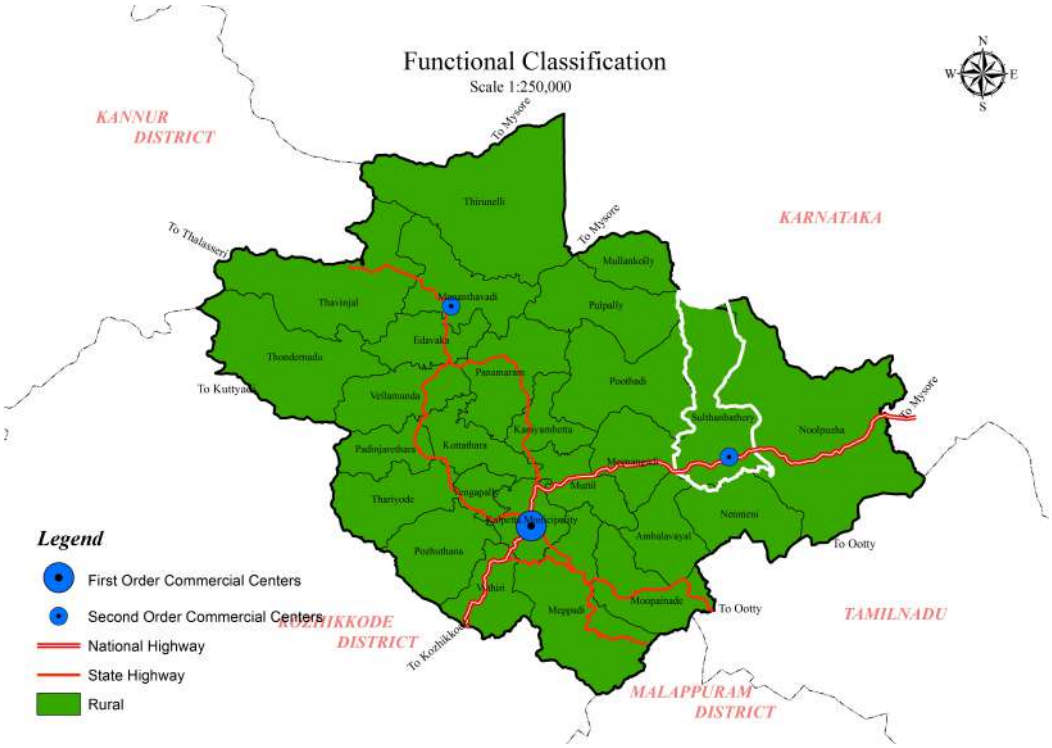


Figure 3.7: Functional Classification of the Local Bodies in the District

3.2.4 Future Urban Profile of Settlements

There was only one urban local self-government viz. Kalpetta Municipality in the district till 2015. The future urban profile of the district is determined based on criteria like existing statutory urban area, census urban area, grade of Local bodies, the hierarchy of settlements, and perspectives in urban developments. It is revealed that there will be 8 more urban Local bodies in the district by the end of the next two decades. The growth rate of population density and the present condition of the local body can be taken as deciding criteria by how fast it will attain urban nature. It is assumed that Local bodies showing good development potential and having an average growth rate of population density of more than 20% may attain urban status in the next decade. It can be inferred that the Wayanad district will urbanize as urban towns instead of urban panchayats or urban municipalities. Fig 3.8 shows the urban profile of the district. It can be noted that the taluk headquarters are assumed to be urbanized within 10 years. In other words, the urban profile of Sulthan Bathery in 2011 shows urban.

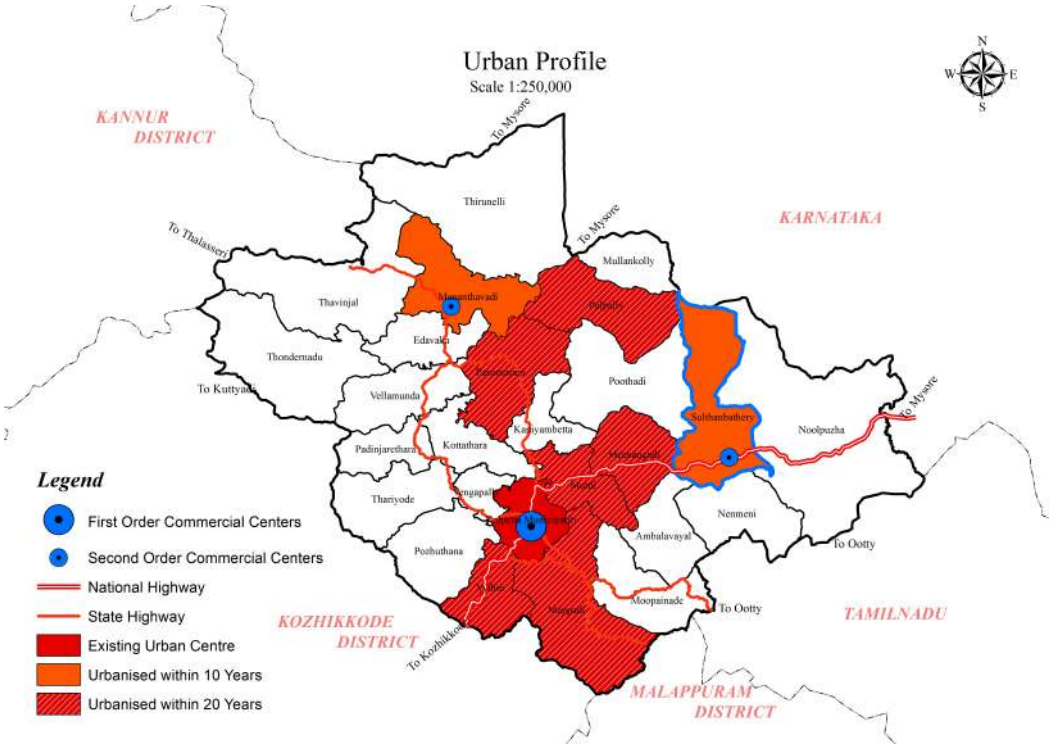


Figure 3.8: Urban Profile of the District

3.2.5 Activity Pattern

The activity pattern of the settlements of the district is determined based on the functional character, land use concentration, and urban profile. It is seen from the analysis, in the 10 Local bodies the predominant activity is primary (agriculture) in which agriculture and animal husbandry activity are predominant, and in another 8 Local bodies agriculture along with plantation and Forest activity are predominant. In 7 Local bodies, secondary and tertiary activities are predominant and only one Local Self Government (Kalpetta Municipality) shows urban activities. It can be seen that the activity pattern of Sulthan Bathery is secondary and tertiary. Fig 3.9 shows the activity pattern of the settlements of the Wayanad district.

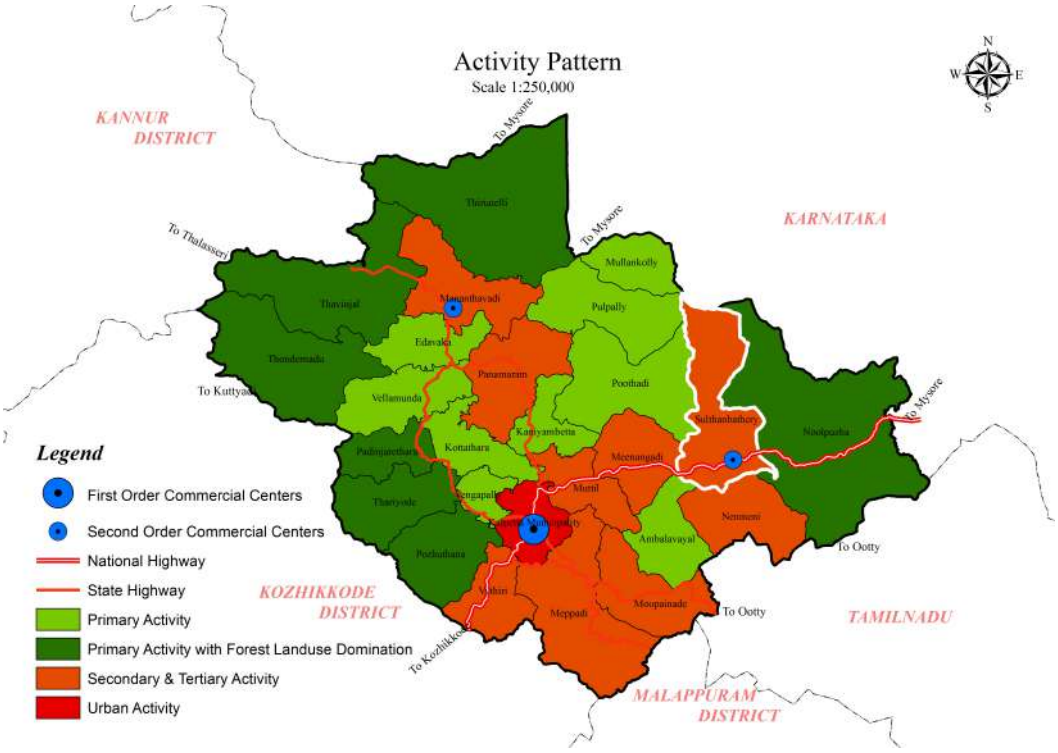


Figure 3.9: Activity pattern of the Settlements of Wayanad District

3.2.6 Spatial Structure of the District

The spatial structure of a region is defined as the geographical distribution of people and other uses of land across the region and the pattern of trips necessitated by their land uses. The spatial structure of a region defines the function within the sub-region, hierarchy, and connectivity. The spatial structure of the district can be obtained by overlaying the map of activity patterns, the hierarchy of settlements, and connectivity. This gives the spatial structure of the district in the present scenario.

The major activity in the Wayanad district is agriculture including a plantation. The concentration of forest land around the peripheral region limits urban as well as agricultural activities in these areas. The district is well connected with roads with a well-developed road network composed of NH, SH, district roads, and village roads. As per the proposed hierarchy of settlements in the District Urbanization Report (DUR), there was one first-order settlement, two second-order settlements, and eight third-order settlements in the district. Ist and IInd order settlements show urban nature whereas most of the third order settlements show semi-rural characteristics and the remaining Pucca rural.

A higher concentration of forest land, an agricultural environment, and a tourism-based economy hold this district in semi-rural character. Since there are no major industrial or commercial development proposals, in the district, Wayanad will continue the present spatial structure. Considering the geographical and environmental conditions of Wayanad, the projects introduced should be non-polluting and eco-friendly. The analysis of spatial structure reveals the entire spatial structure is based on the existing urban center and

district headquarters Kalpetta as a first-order settlement. Fig 3.10 shows the spatial structure of the district.

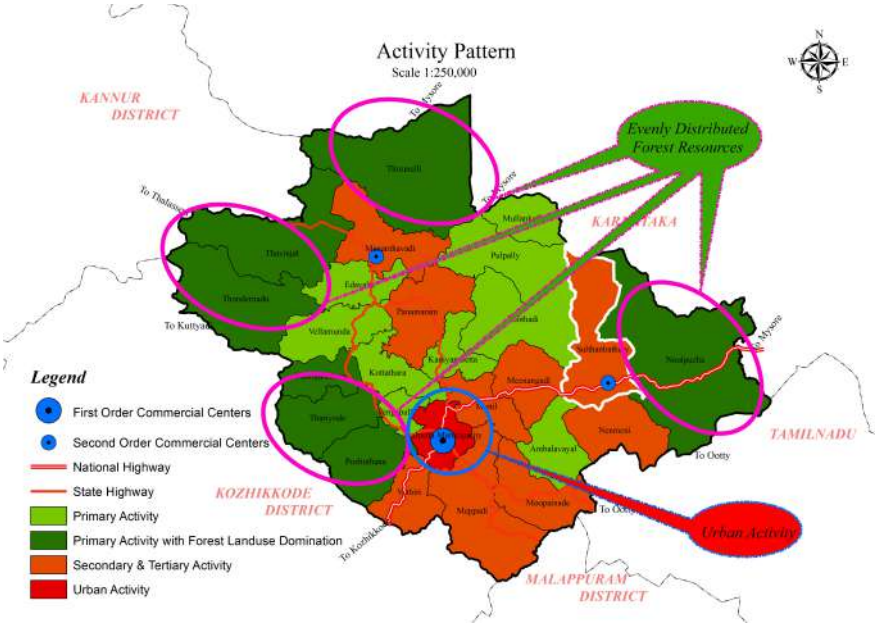


Figure 3.10: Spatial Structure of the District

As revealed from the figure, Sulthan Bathery is a second-order settlement in the district, which gets urbanized by 2011. The activity suitable for the settlement is secondary and tertiary activities.

3.3 Inference

The analysis of the regional linkage of the town with the surrounding district/state and regional setting of the town within the district based on the District Urbanisation Report points out the fact that the Sulthan Bathery is well connected with the surrounding District/State, Airport, Port, Tourist Spots, Growth centers within the district, etc. by road network. The town has to function not only as a taluk headquarters town but also to serve the entire taluk area for higher-order facilities also. Whereas in terms of land use, presence of vested forest, average plot size, and unique topography the town has also to sustain agro-allied activity to ensure the optimum resource utilization and above all to ensure the ecological and environmental aspects.

CHAPTER 4

DEMOGRAPHY

The population for whom we are planning is an important pillar and serves as the base for all development endeavors. One of the objectives of any planning effort is to provide a better quality of life to a maximum number of people. Hence it is essential to analyze the following parameters – the size of the population, its growth rate, population density, population concentration pattern, migration details, and population projection- which are described in this chapter.

4.1 Population Size and Growth Rate

Wayanad is the least populous district in the state and has the second-highest growth rate. The total population of the district as per the 2001 census is 7, 80,619 and that in the census 2011 is 8, 17,420. This accounts for 3.10%, and 2.45 % of the state population as of 2001 and 2011 respectively. Census 2011 placed Kerala's population at 3, 34, 06,061 persons which includes 1, 60, 27,412 males and 1, 73, 78,649 females. Although Kerala accounts for only about one percent of the total area of India, it contains about 2.76% of the population of our country. Wayanad ranks 13th position in population density and 12th in the area of the state. Though the population growth rate (16.14%) is declining, it is much higher than the state average (9.43%) as per the census in 2001. But in 2011 the population growth rate of Wayanad is 4.60% which is less than the growth rate of the state (4.86%). That is the growth rate of Kerala shows a gradual decrease and the growth rate of Wayanad shows a sudden decrease.

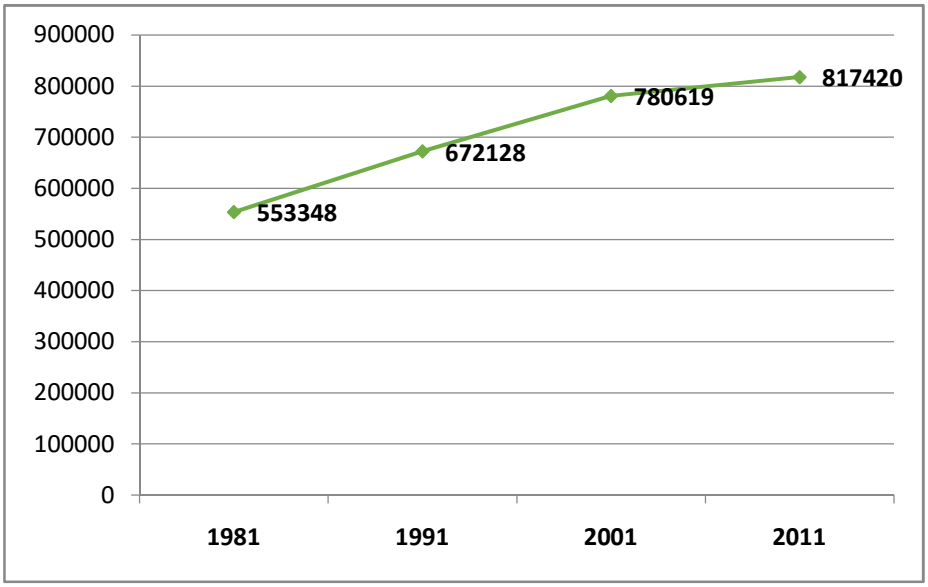


Figure 4.1: Decadal Variation of Population in Wayanad District

Source: Census data 2011

The variation in total district population over the last three decades is shown in Fig 4.1. It shows that the population of Wayanad district is gradually increasing from 1981 to 2001 and in 2011 it shows a lower rate of increase.

The variations in the population growth rate of the state, Idukki district, Wayanad district, and the nearby districts are shown in Fig. 4.2. It can be observed that the population growth rate of the State and districts are decreasing from 1981-2011 and the growth rate of 1991-2001 of Wayanad shows higher value than that of the state and nearby districts except for Malappuram district. In 2001-2011, Wayanad shows a sudden decrease in growth rate when compared to the state and neighboring districts except for Idukki (-1.93%).

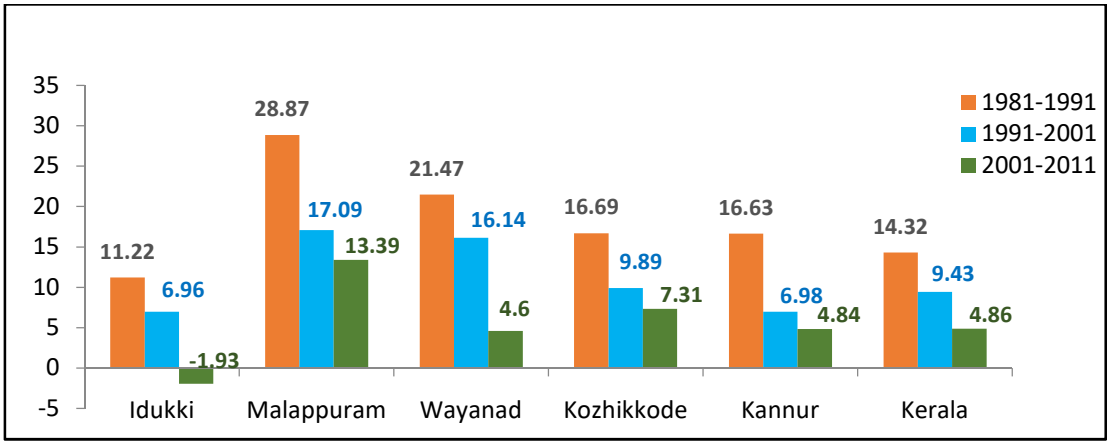


Figure 4.2: Variations of Population Growth Rate of Kerala, Wayanad,0 and Nearby Districts

Source: Census Data 2011

The distribution of the population growth rate of Local bodies within the district during the period 2001-2011 is shown in Fig 4.3 and the analysis of the same points out the fact that Sulthan Bathery Municipality has the sixth position in the growth rate of population in the district.

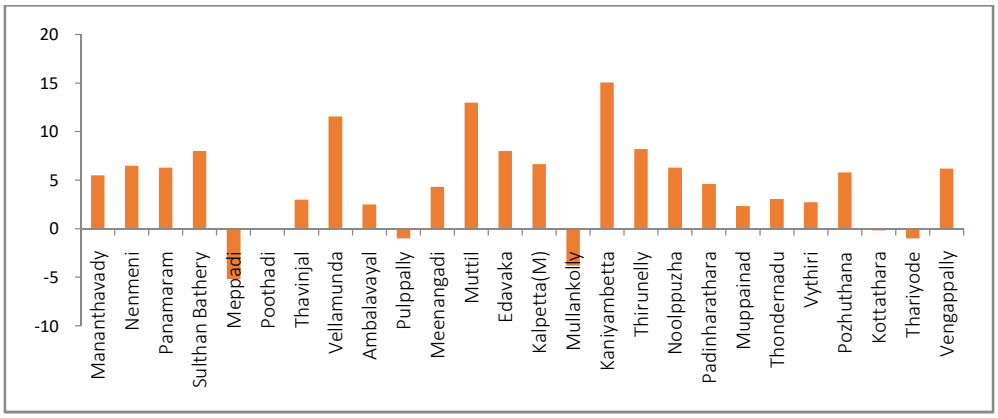


Figure 4.3: Population Growth Rate of Local bodies

Source: Census 2011

Fig 4.3 shows that Vellamunda, Muttil, Edavaka, Kaniyambetta, and Thirunelly Grama Panchayat have higher growth rates than Sulthan Bathery.

As per the census 2001, the total population of Sulthan Bathery is 42059 and is approximately 5.39% of the total population of the district where as Sulthan Bathery has 4.84% of the district area. As per the census 2011, the total population of Sulthan Bathery is 45417, which is 5.57% of the district population.

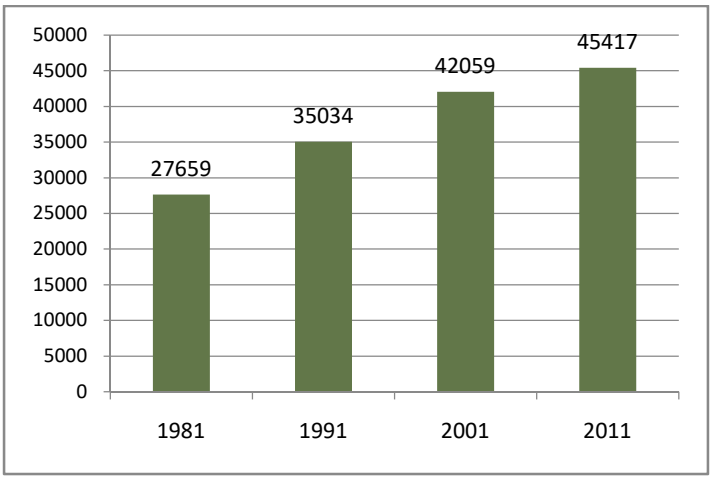


Figure 4.4: Temporal Variation of Total Population in Sulthan Bathery

Source: Census data 2011

The variation of the population of Sulthan Bathery during the period 1981-2011 is shown in Fig 4.4.

The population growth rate shows a decreasing trend in the municipality (26.67% to 20.05% and further decreases to 7.98%) and the district also shows a declining trend (21.47% to 16.14% and further decreases to 4.6%). But it can be observed that the population growth rate in Sulthan Bathery Municipality shows a higher value than that of the district. The growth rate of Sulthan Bathery Municipality is shown in Fig 4.5

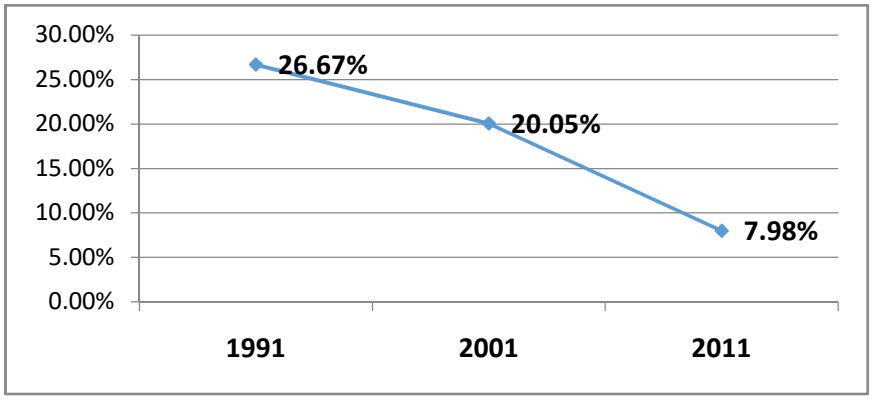


Figure 4.5: Growth Rate of Sulthan Bathery -Temporal variation

Source: Census 2011

From fig 4.5, it is observed that the growth rate of Sulthan Bathery Municipality is decreasing. The growth rate of the municipality declined from 26.67% to 20.05% in 1981-1991 to 1991-2001 and 2001-2011; it further declined to 7.98%.

While comparing the growth rate with nearby Local bodies, it is seen that the Sulthan Bathery Municipality has a higher growth rate. Fig 4.6 shows the comparison of growth rate with nearby Local bodies.

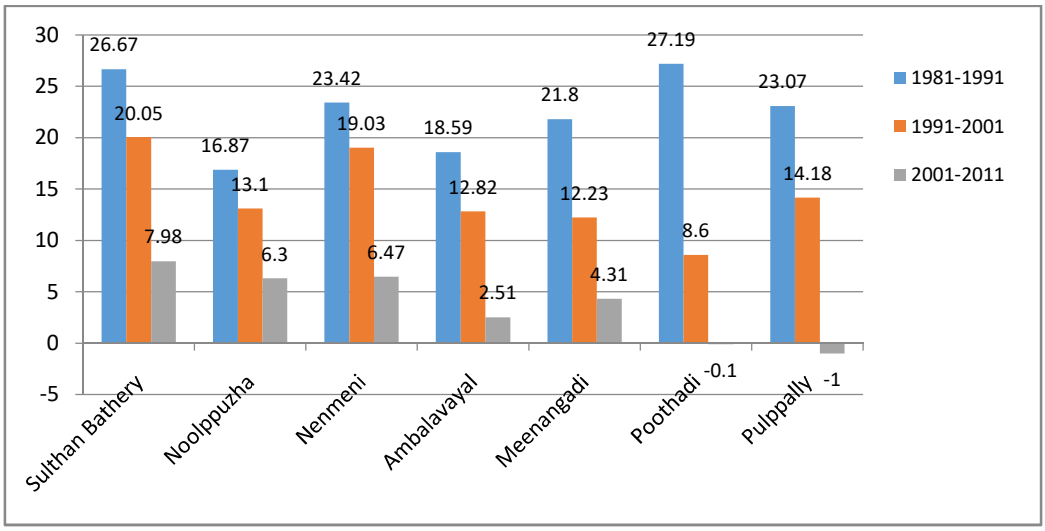


Figure 4.6: Population Growth Rate -Comparison with Nearby Local bodies

Source: Census 2011

Fig 4.6 reveals that in 2001-2011 the population growth rate of Sulthan Bathery Municipality is high when compared to nearby Local bodies and that of Poothadi and Pulpally Grama Panchayats shows a negative growth rate. This may be since Sulthan Bathery, during the last few years shown tremendous physical growth in terms of tourist-related resorts, and better social and physical infrastructure facilities.

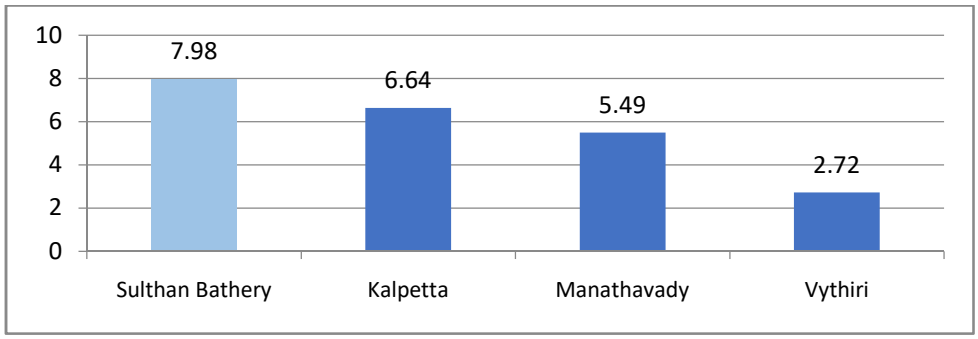


Figure 4.7: Population Growth Rate -Comparison with other Taluk Headquarters & Municipality.

Source: Census 2011

When compared with the Taluk headquarters such as Vythiri and Mananthavady, Sulthan Bathery shows a higher growth rate than other taluk headquarters. The growth rate compared with Sulthan Bathery and other taluk headquarters and municipalities in the district is shown in Fig 4.7, which shows that Sulthan Bathery Municipality is in the first position when compared to other taluk headquarters like Vythiri, Mananthavady, and Kalpetta.

The population of Sulthan Bathery Municipality is increasing at a higher rate when compared to other nearby/similar administrative headquarters. The comparison of the growth rate with other administrative Headquarters is shown in Fig 4.8.

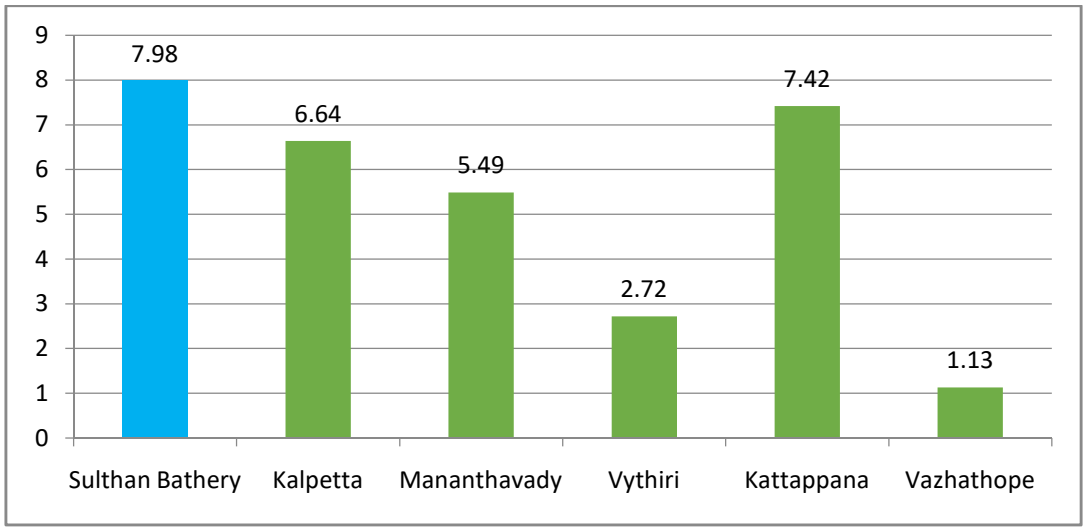


Figure 4.8: Population Growth Rate -Comparison with other Administrative Headquarters

Source: Census 2011

Fig 4.8 shows that the population growth rate of Sulthan Bathery Municipality is in the first position when compared to Kalpetta, Mananthavady, Vythiri, and other hilly areas like Kattappana and Vazhathope.

4.2 Spatial Distribution of Population

The then Grama Panchayat area has been divided into 23 electoral wards as per ward division in 2010 and further increased to 35 wards when it became a municipality in 2015. But all the data (including census data) are available for 18 wards only as per the 2000 ward division. Hence the population distribution as per the 2000 ward division has been taken up for study and analysis. The ward-wise distribution of the population is shown in Table 4.1. It ranges from 1757 to 3721. The spatial distribution of the population is shown in Fig 4.9.

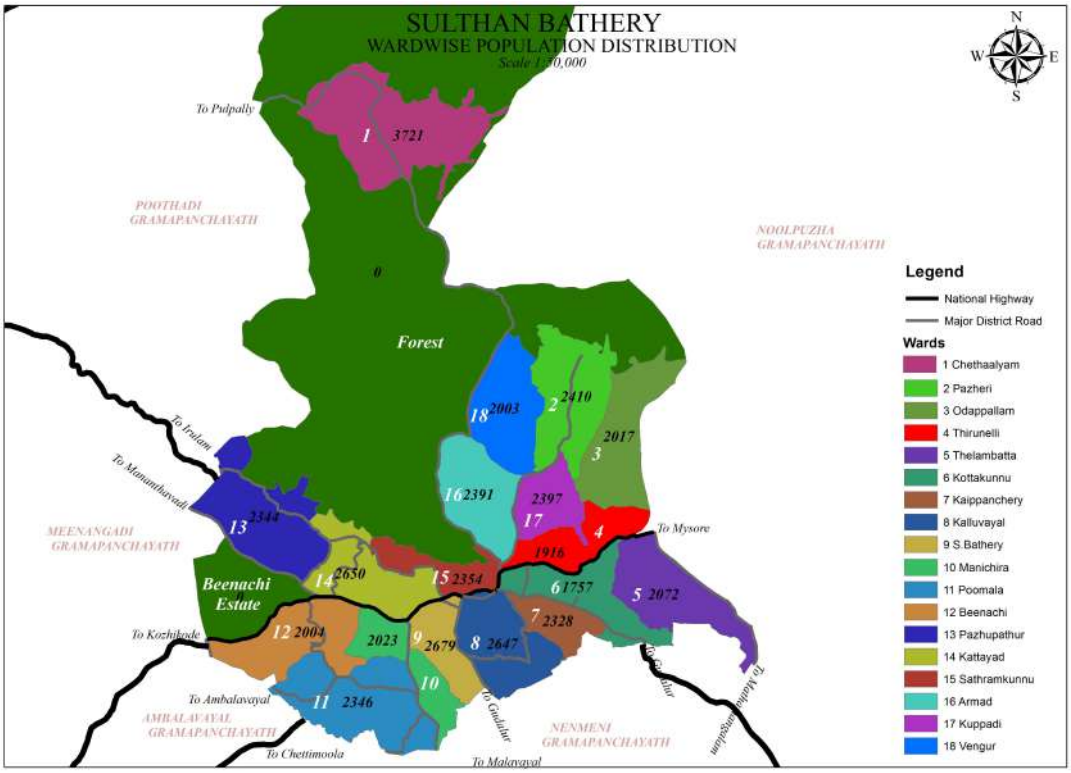


Figure 4.9: Ward-wise (18-wards) Population Distribution in Sulthan Bathery

Source: Census 2001

Table 4-1: Ward-wise Population in Sulthan Bathery

Ward wise population 2001 Sulthan Bathery				
Ward No	Ward Name	Population	Area	Density
1	Chethalayam	3721	4.41	844
2	Pazheri	2410	2.79	865
3	Odappallam	2017	2.58	782
4	Thirunelly	1916	1.55	1236
5	Thelampatta	2072	2.51	826
6	Kottakkunnu	1757	2.05	857
7	Kaippancheri	2328	1.02	2279
8	Kalluvayal	2647	2.31	1146
9	Bathery	2679	1.32	2032
10	Manichira	2023	1.55	1301

11	Poomala	2346	3.3	711
12	Beenachi	2004	2.44	821
13	Pazhupathur	2344	2.8	838
14	Kattayad	2650	2.32	1143
15	Sathramkunnu	2354	1.13	2090
16	Armad	2391	2.26	1056
17	Kuppadi	2397	1.31	1834
18	Vengoor	2003	2.29	873
	Total	42059	39.94	1053

4.3 Population Density

Higher population density puts greater pressure on the infrastructure and environment but reduces the per capita costs of the supply of public goods and services. The gross population density and net population density of the district are analyzed here. The gross population density is calculated by dividing the total population by the geographical area, whereas the net population density is calculated by dividing the total population by the net area which is calculated by subtracting the uninhabitable area like water bodies, forests, etc. from the geographical area.

Wayanad district ranks 13th position in population density as per the census 2001 and has the same rank as in the census 2011. The only district in Kerala having a lesser population density than Wayanad district is Idukki. The population density of Wayanad district is 366 persons/ Sq. Km as per the 2001 census, 384 persons/ Sq. Km as per the 2011 census and is well below the state average of 819 persons/sq Km(2001), & 1084 persons/sq Km(2011). The distribution of population density in various Local bodies within the district is shown in Fig 4.10.

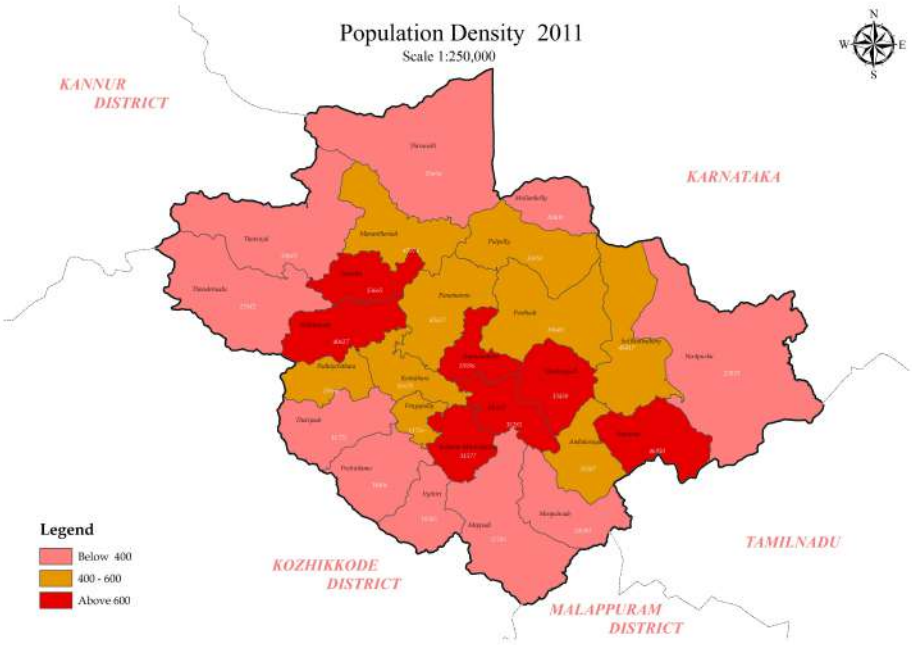


Figure 4.10: Distribution of Population Density in Various Local bodies within the District

Source: Census 2011

Within the district, Sulthan Bathery shows a population density of 440 persons/ Sq Km. The area of Sulthan Bathery Municipality is 103.22 Sq Km, but the major area of the local body is under Forest (60.72 sq Km) and 2.25 Sq Km is Beenachi Estate owned by the Madhya Pradesh govt. So it is not suitable to take gross population density for comparison. The actual forest area is 60.88 sq Km, out of this 0.15Sq Km of the forest is within the ward boundary. The temporal variation of net population density in Sulthan Bathery Municipality is shown in Fig. 4.11

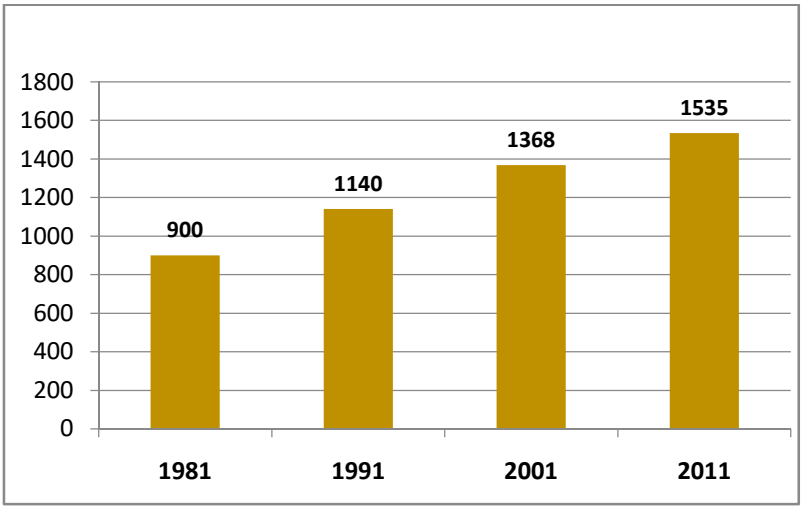


Figure 4.11: Temporal variation of Population Density in Sulthan Bathery

Source: Census data 2011

From Fig 4.11, the population density of Sulthan Bathery Municipality has been increasing from 900 in 1981, 1140 in 1991, 1368 in 2001, and finally, in 2011 it is 1535. The density of the population is an indicator of the pressure of the population on land which in turn is influenced by factors like accessibility, proximity to facilities, etc. In Sulthan Bathery, the ward-wise population density varies from 711 to 2279. Kaippancheri and Sathramkunnu are the Wards having the highest population density in the 2001 census. The proximity of the CBD area and facilities like schools, hospitals, etc. makes these wards the densest. The ward-wise distribution of population density is shown in Fig 4.12 and the ward-wise population is shown in Table 4.1

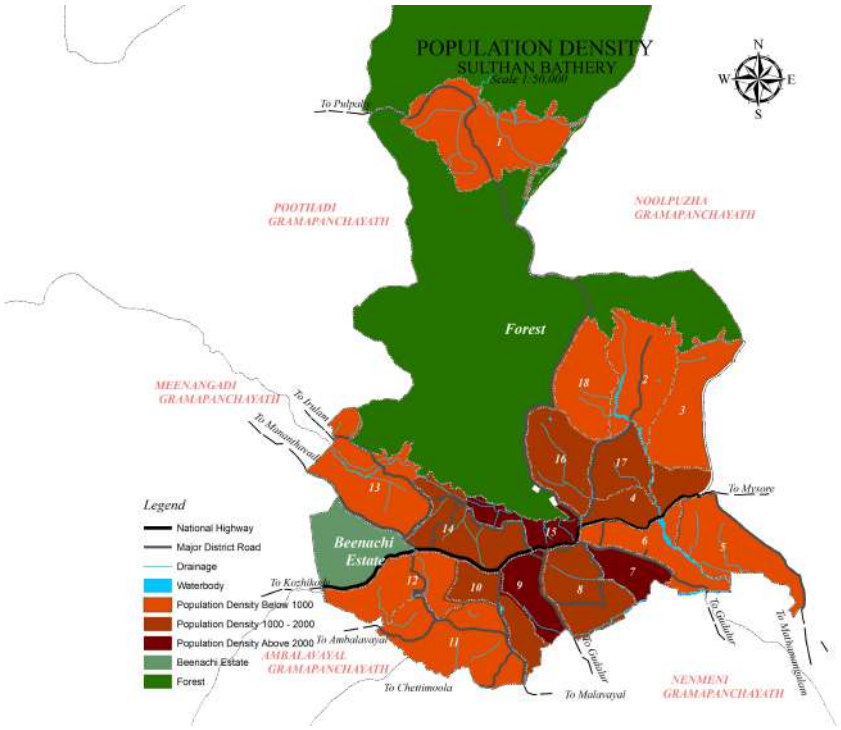


Figure 4.12: Ward-wise Distribution of Population Density in Sulthan Bathery Municipality

From the above Fig 4.12, it is seen that wards with high density are concentrated along the major traffic corridor. The outer peripherals of the Sulthan Bathery are less populated having high agricultural concentration and forest. It can be seen from the figure that the intervening space between the outer peripherals and core area can be considered a future developable area and strict development control has to be enforced in the outer peripheral area having low population density and high agricultural concentration to maintain the economy of the Local bodies as well as environmental fragility.

A comparison of the population density of Sulthan Bathery Municipality with the nearby local bodies is shown in Fig 4.13. Sulthan Bathery Municipality shows the highest population density.

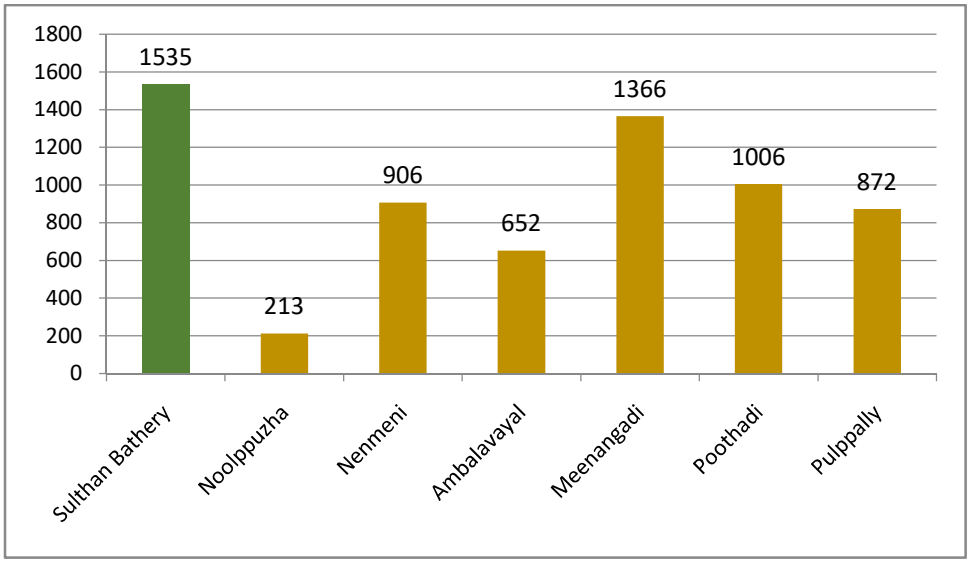


Figure 4.13: Population Density – Comparison with nearby Local bodies

Source: Census 2011

As per fig.4.13, it is seen that the population density of Sulthan Bathery Municipality is in the highest position among the nearby local bodies.

The comparison of the population density of Sulthan Bathery Municipality with other taluk headquarters and municipalities within the district is shown in Fig 4.14. Sulthan Bathery Municipality shows the highest population density among them.

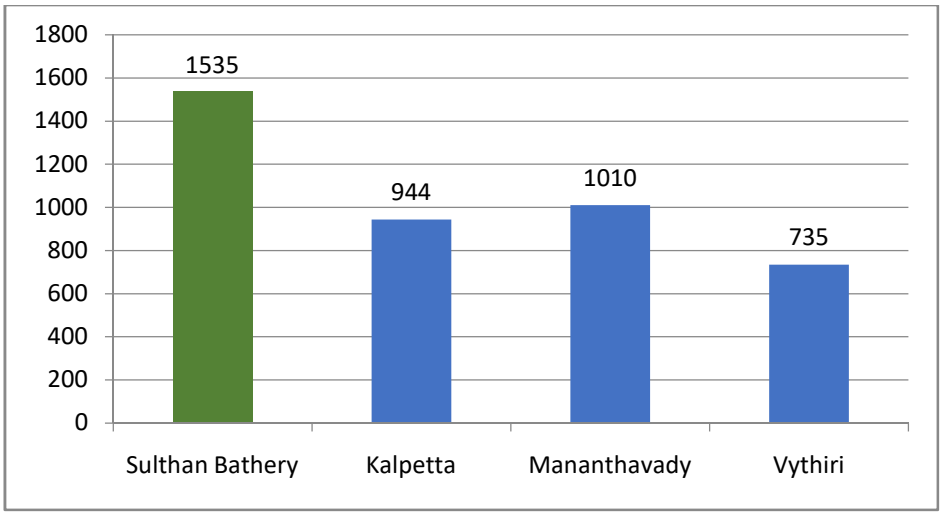


Figure 4.14: Population Density 2011- Comparison with Municipalities & other Taluk Headquarters

Source: Census 2011

Fig 4.14 shows that the Population density in Sulthan Bathery Municipality is high (1535) when compared to Kalpetta (944) Vythiri (735) and Mananthavady (1010). It reveals that people prefer to concentrate in Sulthan Bathery.

The comparison of the population density of Sulthan Bathery Municipality with other similar administrative headquarters is shown in Fig 4.15 and the analysis of the same shows

that the population density of Sulthan Bathery Municipality is high when compared to other administrative headquarters.

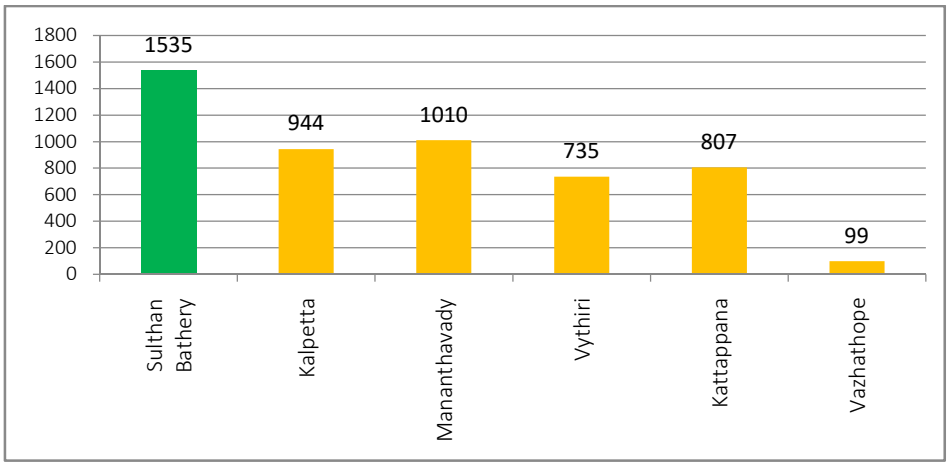


Figure 4.15: Population Density- Comparison with other Administrative Headquarters.

Source: Census 2011

4.4 Population Concentration Pattern

The population of Wayanad district is mainly concentrated at its central Local bodies. The concentration of the population in the boundary grama panchayats is very less, mainly because of the forest and plantation land use domination. The population concentration pattern of Wayanad district (census 2001) is shown in Fig 4.16.

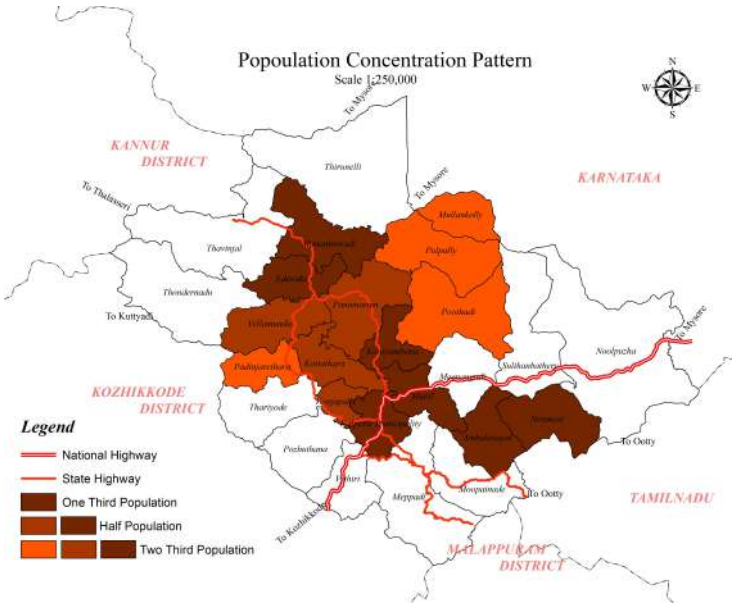


Figure 4.16: Population Concentration Pattern in Wayanad District

Source: Census 2001

Fig 4.16 shows that eight Local bodies constitute one-third population of this district. Out of this six are located in the southeast area. Half of the population of the district is

scattered among 13 Local bodies and 16 Local bodies constitute two third. Kalpetta and surrounding Local bodies contribute mainly to the one-third concentration pattern of the district. The population concentration pattern of the municipality is shown in Fig 4.17.

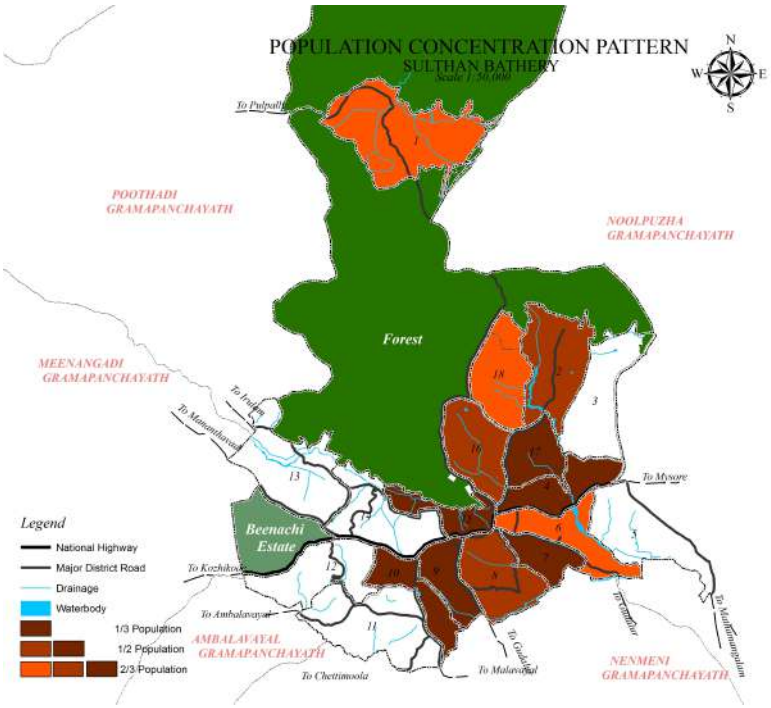


Figure 4.17: Population Concentration Pattern in Sulthan Bathery Municipality

Source: Census 2001

4.5 Age-Sex Ratio

The distribution of males and females in society has a direct bearing on the Social and economic conditions of a state. It also reflects the status of women in society. The sex ratio is the comparison between the number of males and females in the population. According to the 2011 census, the sex ratio of Sulthan Bathery Municipality is 1033, whereas the sex ratio of the district is 1035 and that of the State is 1084. Variation of the sex ratio of Sulthan Bathery in the previous decade is shown in Table 4.2.

Table 4-2: Decadal variation of Serration of Sulthan Bathery

Year	1981	1991	2001	2011
Sex ratio	906	943	986	1033

Source: Census Data

Data indicates that the sex ratio of Sulthan Bathery Municipality is gradually increasing over the last two decades. The sex ratio for the population in the age group 0-6 in 2001 is 966 and that of the district is 959.

The sex ratio of Sulthan Bathery Municipality is in the middle position when compared with that of other local bodies (12th position out of 26 local bodies). Sex ratio comparison of Sulthan Bathery Municipality with nearby local bodies, other Administrative Headquarters, and Taluk Headquarters are given in Fig 4.18, Fig 4.19, and Fig 4.20.

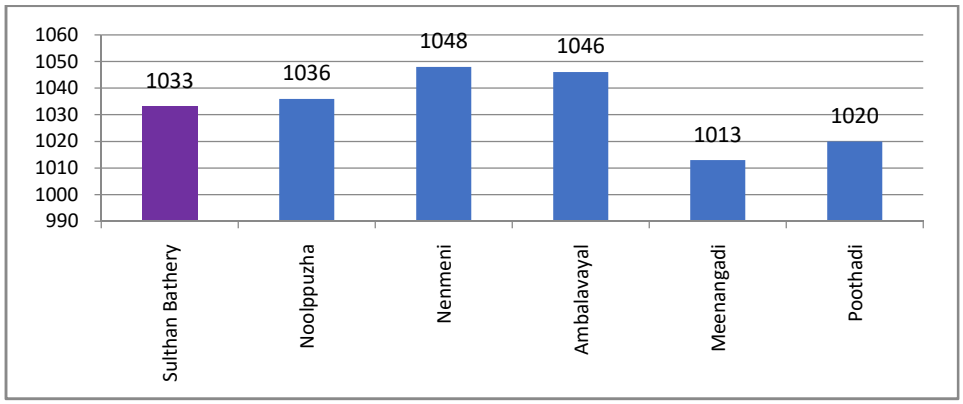


Figure 4.18: Sex Ratio 2011- Comparison with Nearby Local bodies

Source: Census 2011

Fig 4.18 shows that the Sex Ratio of Sulthan Bathery Municipality (1033) is in the fourth position when compared to nearby Local bodies. Among the surrounding local bodies, Nenmeni has the highest sex ratio (1048) and Meenangadi has the lowest (1013).

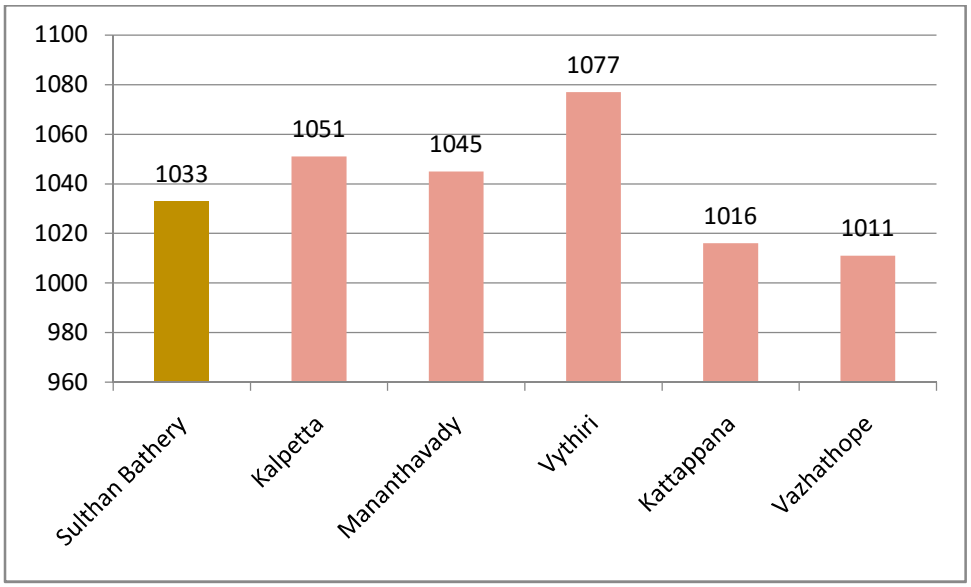


Figure 4.19: Sex Ratio 2011- Comparison with other Administrative Headquarters

Source: Census 2011

From Fig 4.19, it is revealed that the Sex Ratio of Sulthan Bathery Municipality is around the middle position when compared to other administrative headquarters. Vythiri has the highest Sex Ratio and the other hilly area like Vazhathope has the lowest sex ratio.

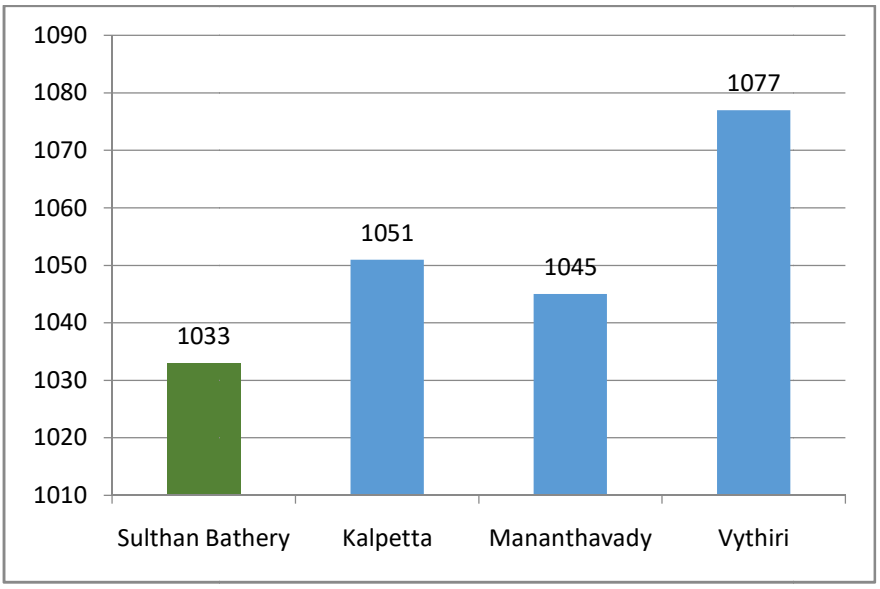


Figure 4.20: Sex Ratio 2011 –Comparison with Taluk Headquarters & Municipality.

Source: Census 2011

Fig 4.20 shows that the sex ratio of Sulthan Bathery Municipality is low when compared to Kalpetta, Vythiri, and Mananthavady.

From the socio-economic survey, the age structure of people is obtained. The values indicate that majority of people are within the age group 15 to 30. This is an indication of a healthy population. The age structure is given in Fig 4.21.

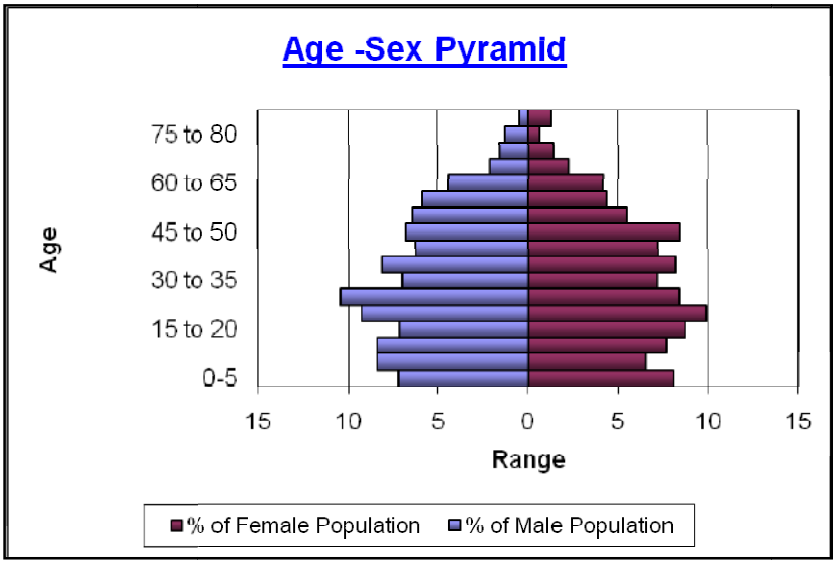


Figure 4.21: Age-Sex Pyramid

Source: Socio-economic Survey 2012

In Fig 4.21, the young population is high and in the age group of 60, the population is decreasing. The age group 75-80 has a very low population. From the figure, it is clear that the young working population of Sulthan Bathery has a strong position.

4.6 Literacy

Literacy is one of the most important social characteristics. Children in the age group of 0-6 are considered illiterate and excluded from the calculation of the literacy rate. Kerala is the most literate state in the country. The literacy rate of the district is 89.03% which is lower than the state average of 94%. The Sulthan Bathery Municipality shows a lower literacy rate than the district (80.61%). The literacy rate of the Sulthan Bathery Municipality in comparison with the state and district is shown in Fig 4.22.

The literacy rate of Sulthan Bathery Municipality is 80.61% as per the 2011 census, the male literacy rate is 82.42% and the female literacy rate is 78.86%. The literacy rate has increased over the past decades (1991-2001) but decreased over the last decade (2001-2011). Variation of literacy rate in Sulthan Bathery Municipality for the previous decades is given in Fig 4.23 which shows that the literacy rate of males decreased from 90.88% to 82.42% and the literacy rate of the female decreased from 84.23% to 78.86%. A comparison of the literacy rate of Sulthan Bathery Municipality with other taluk headquarters is shown in Fig 4.24.

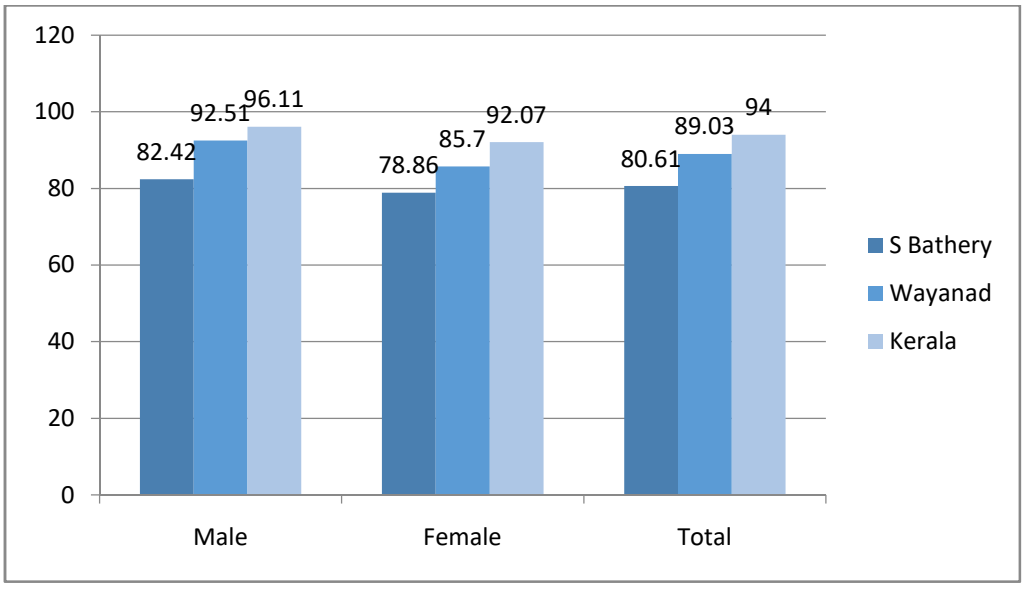


Figure 4.22: Literacy Rate 2011 – Comparison with District and State

Source: Census 2011

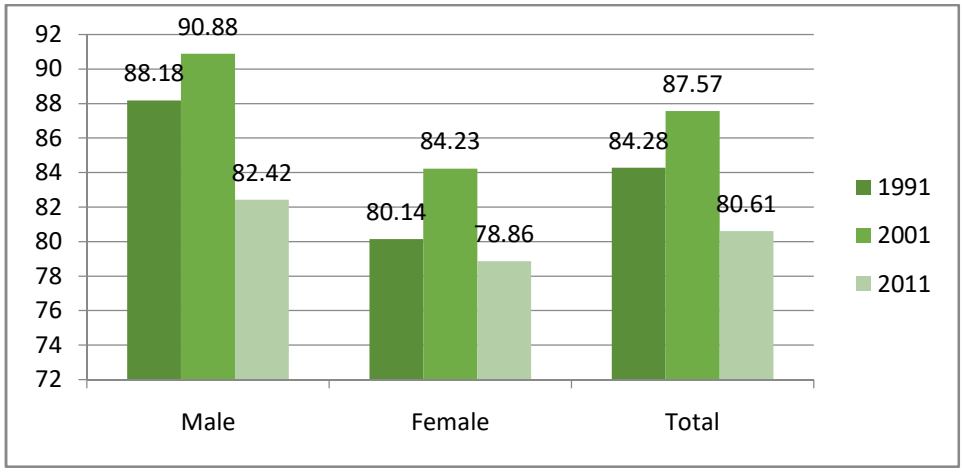


Figure 4.23: Literacy Rate -Decadal variation in Sulthan Bathery Municipality

Source: Census 2011

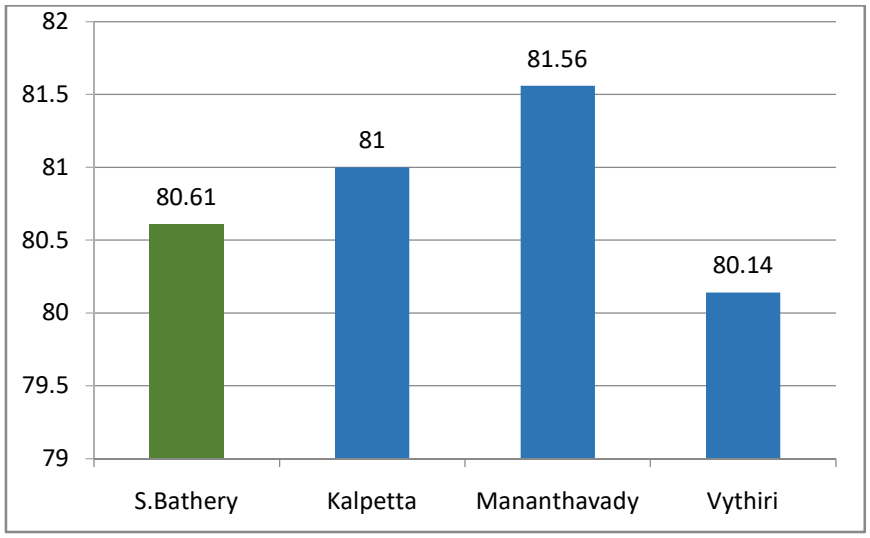


Figure 4.24: Literacy Rate 2011- Comparison with Taluk & Municipal Headquarters

Source: Census 2011

Fig 4.24 shows that the literacy rate of Sulthan Bathery Municipality is higher than Vythiri but lower than Kalpetta and Mananthavady. A comparison of the literacy rate of Sulthan Bathery Municipality with nearby Local bodies is shown in Fig 4.25

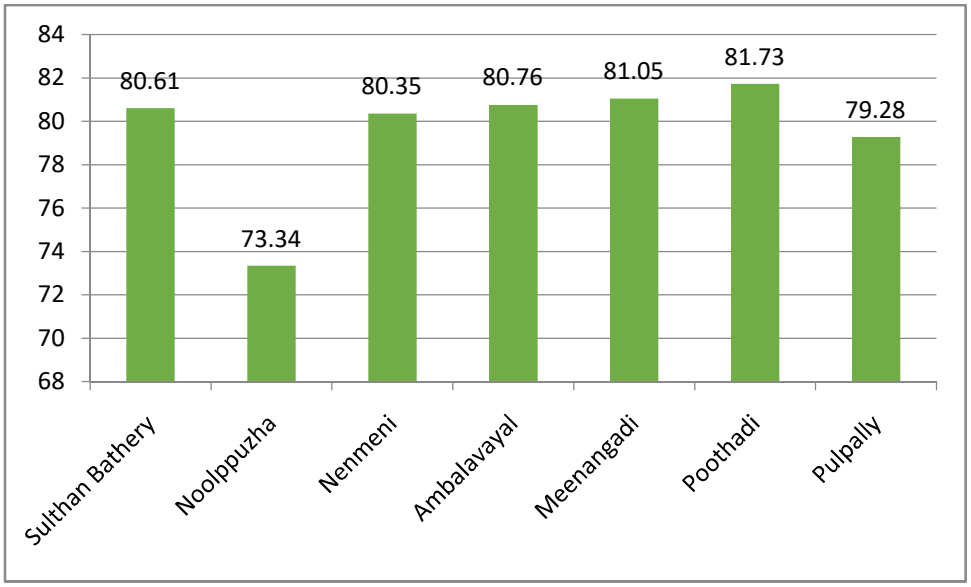


Figure 4.25: Literacy 2011- Comparison with nearby Local bodies

Source: Census 2011

The above graph shows that the literacy rate of Sulthan Bathery Municipality is high, except for Ambalavayal, Meenangadi, and Poothadi when compared to nearby Local bodies. Noolpuzha Panchayat has a low literacy rate (73.34%)

4.7 Household Size

The total number of households in Sulthan Bathery as per the 2011 census is 10848 and the total population is 45417, the average household size of the Sulthan Bathery Municipality is 4.19 whereas that of the district is 4.28. Hence it can be seen that the household size of Sulthan Bathery Municipality is lower than both the district (4.28) and state (4.25). The Sulthan Bathery Municipality has a low household size compared to nearby Local bodies. The household size of other towns (Taluk Head Quarters) within the district shows that the household size of Sulthan Bathery Municipality is less (Mananthavady - 4.22, Vythiri - 4.40, Kalpetta- 4.65). Comparison of Household size of Sulthan Bathery Municipality with nearby Local bodies, comparison with taluk headquarters and other administrative headquarters are shown in Fig 4.26, Fig 4.27, and Fig 4.28 respectively.

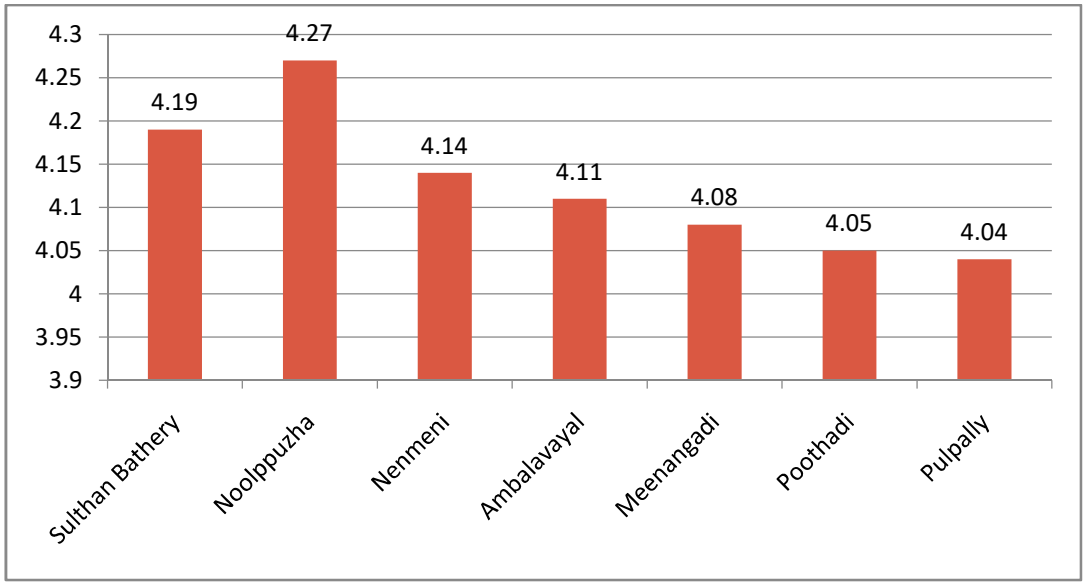


Figure 4.26: Household Size- Comparison with nearby Local bodies

Source: Census 2011

Fig 4.26 shows that the household size of Sulthan Bathery Municipality is high among the nearby grama panchayat except for Noolpuzha. Noolpuzha Grama Panchayat shows high and Pulpally Grama Panchayat shows the least household size.

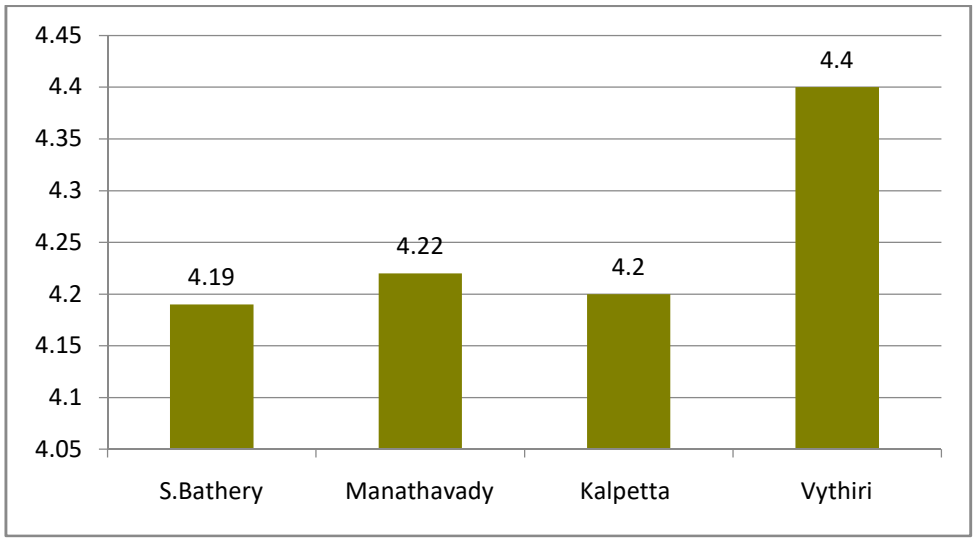


Figure 4.27: Household Size- Comparison with Taluk & Municipal Headquarters

Source: Census 2011

When compared to other Taluk headquarters and Kalpetta Municipality, Sulthan Bathery Municipality has a low household size and Vythiri Panchayat has the high household size

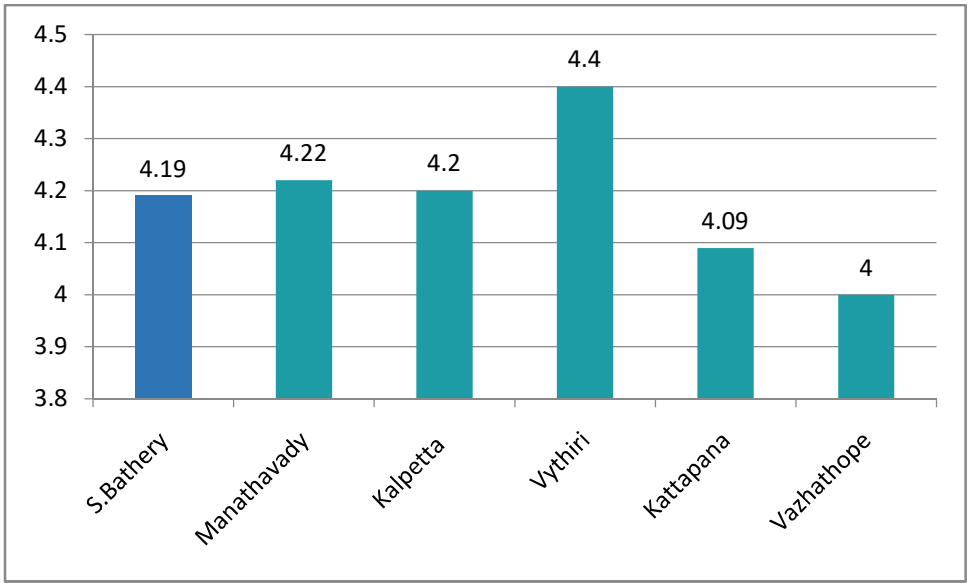


Figure 4.28: Household Size- Comparison with other Administrative Headquarters

Source: Census 2011

Compared to other administrative headquarters, the household size of Sulthan Bathery Municipality is middle in position and Kattappana & Vazhathope have low household sizes than Sulthan Bathery Municipality.

4.8 Inference

Study and analysis were conducted based on the available data as per the 2001 census and since the administrative boundary and extent of the newly formed municipality is the same as that of grama Panchayat, it is used for all studies and comparison.

The study reveals that for the last three decades the population growth rate of the district is gradually decreasing. The same situation is taking place in Sulthan Bathery Municipality also for the last three decades. The population distributions among the wards are uneven with a high concentration in central wards and a low in peripheral wards, where agriculture is the predominant activity. The municipality has the highest population density among the 26 local bodies. The sex ratio of Sulthan Bathery Municipality is high. Interestingly, the spatial distribution of population and land use of Sulthan Bathery is almost similar to that of the district. The literacy rate of Sulthan Bathery Municipality (80.61%) is lower than that of the state average (94%) and district average (89.03%) as per the 2011 census. The literacy rate of SC/ST is 27.33% (2001). The household size is lower than the state (4.25) and district (4.28) average as per the 2011 census.

CHAPTER 5

OCCUPATIONAL STRUCTURE

In this chapter, the existing economic base of the district and the town based on the occupational structure as per the census 2011 is studied. The changes that have happened in the economic base of the district over a while are also probed into.

5.1 Work Force and Occupational Structure of the District

The workforce participation rate (WFPR) of Wayanad district is more than the state average. As per the 2011 census, the WFPR of Kerala state is 34.78% whereas that of the district is 41.06%. The WFPR of Wayanad district shows a gradual increase in previous decades (Fig 5.1). The graph of total workers and main workers (Fig 5.2) shows that, though the total workers are gradually increasing over the last three decades (from 1981 to 2011), the number of main workers shows decreasing trend during 1991-2001 and an increasing between 2001 and 2011 indicating a picture about the strengthening of the current economic base of the district. Even though the number of total workers in the district shows an increasing trend during 1991-2011, the growth rate of the workers during this period (growth rate is 10.20%) is higher than the growth rate of the total population (growth rate of the total population is 4.6%) of the same period. This indicates that the opportunity of working is raised to a certain extent in proportion to the growth of the population. It is inferred that the economic base of the district is strengthening.

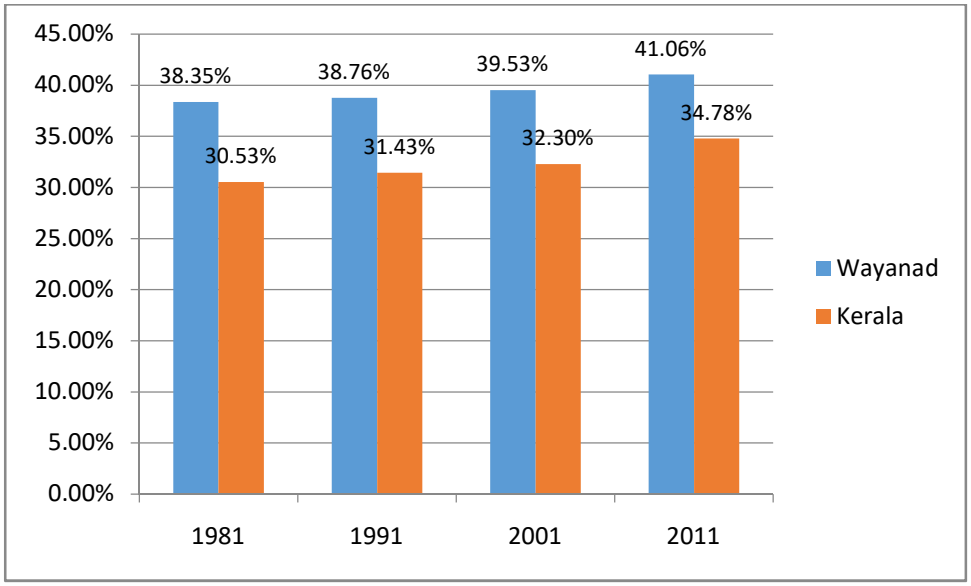


Figure 5.1: WFPR of Wayanad District and State

Source: Census data 2011

It can be noted from Fig 5.1 that, the WFPR of Wayanad district shows a gradual increase in each decade. The decadal variation of the total workers and main workers is shown in Fig 5.2.

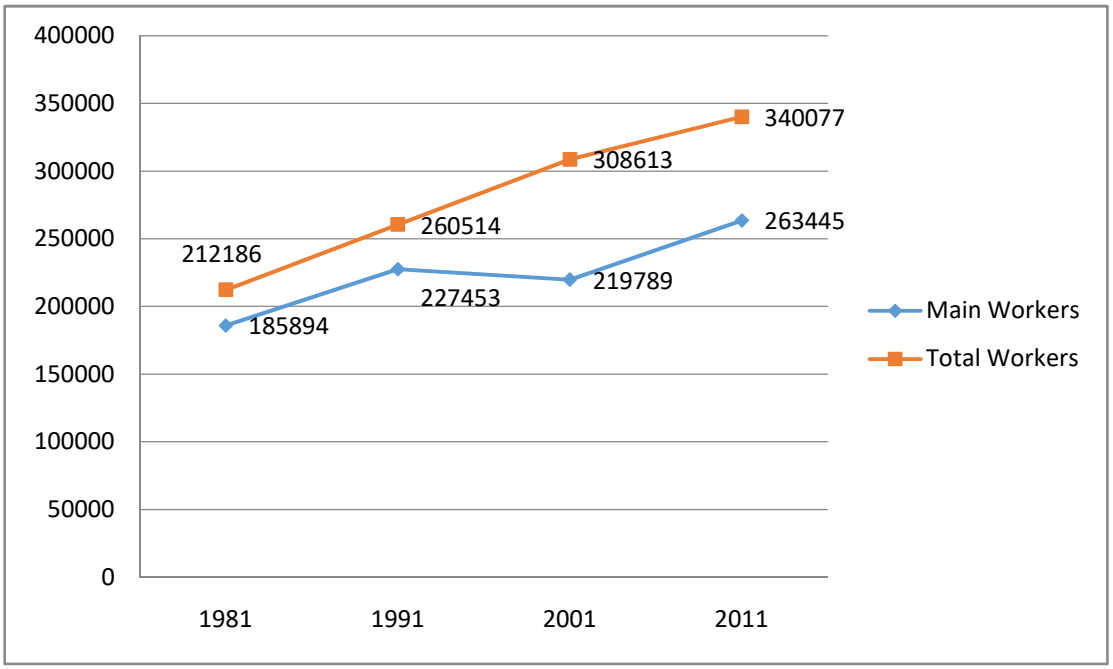


Figure 5.2: No. Of Total Workers and Main Workers in Wayanad

Source: Census data 2011

Fig 5.2 shows that the total number of workers is increasing during 1991-2001 and shows a slight decline during 2001-2011 whereas the main workers show a decline during 1991-2001 and a sudden increase during 2001-2011. The temporal variation of the growth rate of Total workers is shown in Fig 5.3.

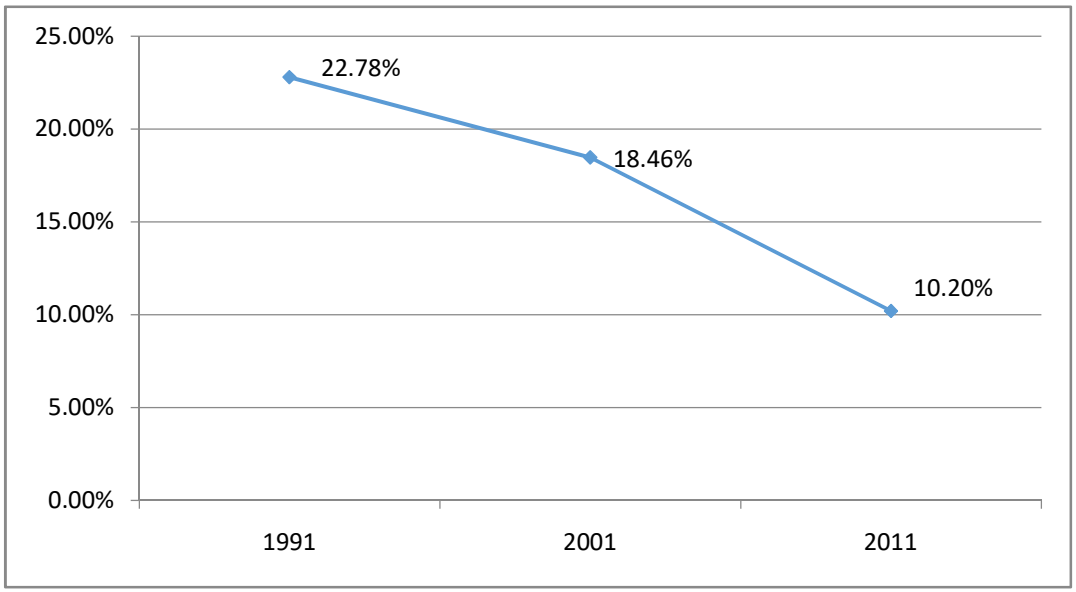


Figure 5.3: Growth Rate of Total Workers –Temporal Variation

Source: Census data 2011

From Fig 5.3 the growth rate of workers (10.20%) still shows at a higher level than that of population growth (4.60%) during 2001-2011 (Fig. 5.3) which shows the strengthening of the economic base during the decade.

As per the census 2011, the main workers are classified in to four categories viz. Cultivators, Agricultural Laborers, Household Industrial Workers and Other Workers. The other worker's category mainly includes the primary sector workers like workers engaged in Mining, Animal Husbandry and Plantation Works.

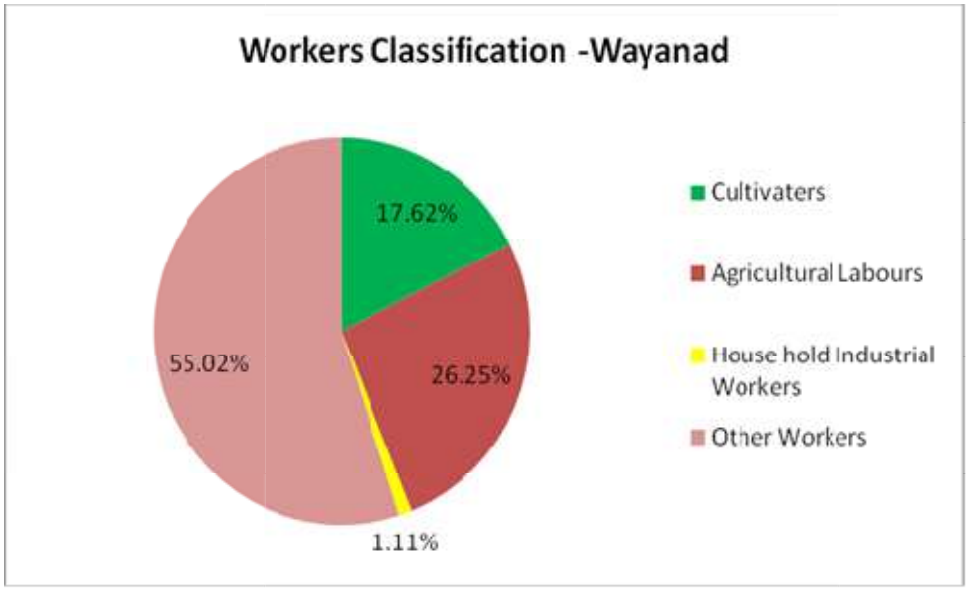


Figure 5.4: Classification of Main Workers in Wayanad

Source: Census 2011

From the Fig 5.4 the cultivators and agricultural laborers constitute 43.87 % of the total main workers whereas a major share of the main workers (55.02%) belongs to the other workers category.

The Fig 5.5 shows the variation of the number of different category of workers in the district from 1981 to 2011. There is a significant increase in the category of other workers during the period and at the same time agricultural laborers are also seen increasing after a sudden decrease during 1991-2001.

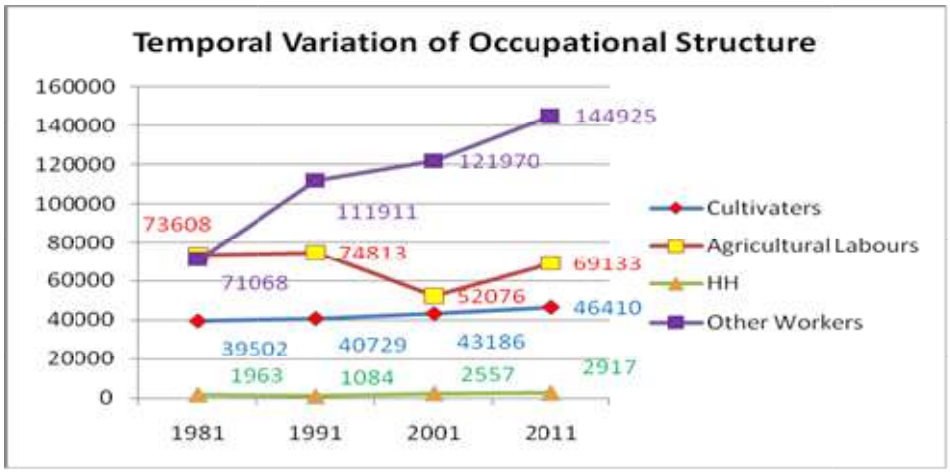


Figure 5.5: Decadal Variation of the no. of Different Category of Workers in Wayanad

Source: Census data 2011

From the Fig 5.5, it is seen that that the total no. of all workers in each category are increasing in the 2011.

From the work force analysis, it is seen that within the district, Sulthan Bathery Municipality shows high concentration index of Industrial Laborers (Fig 5.6) and other workers (Fig 5.7).

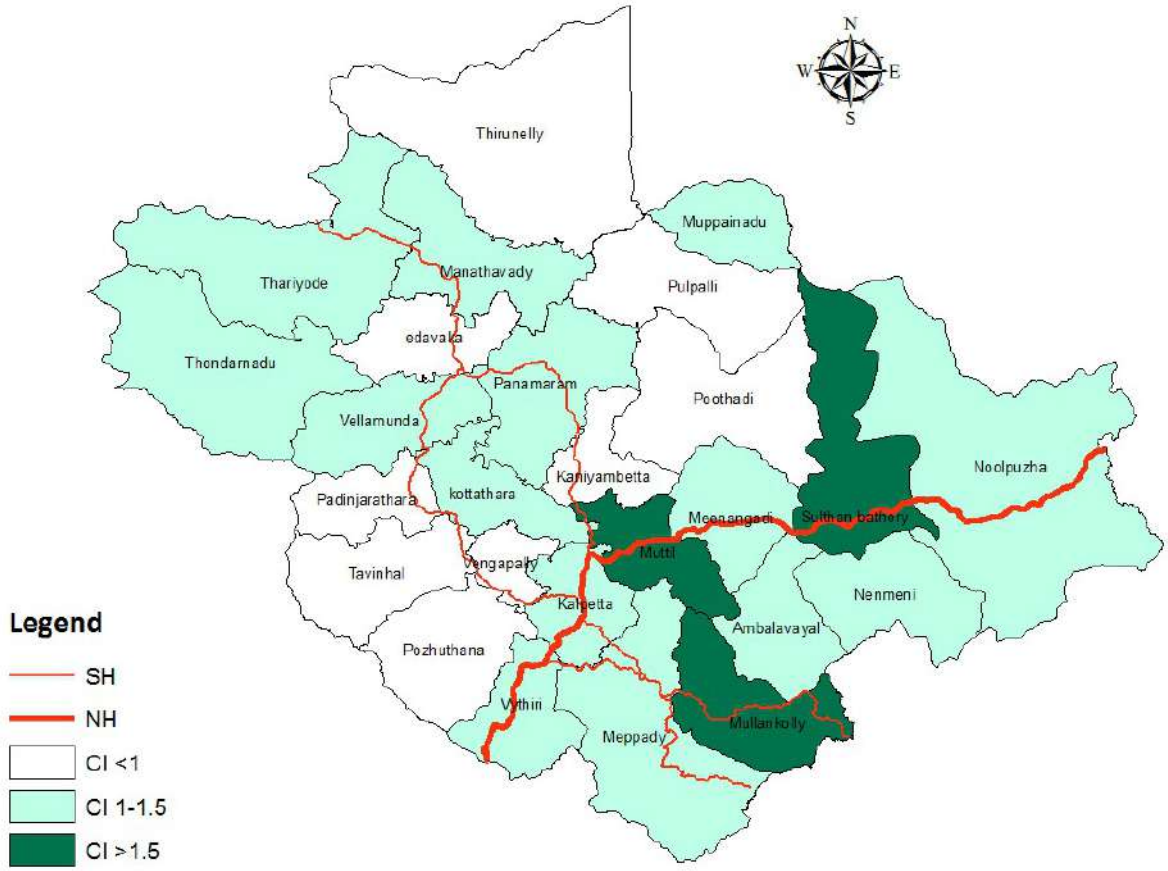


Figure 5.6: Concentration Index of Industrial Laborers

Source: Census data 2011

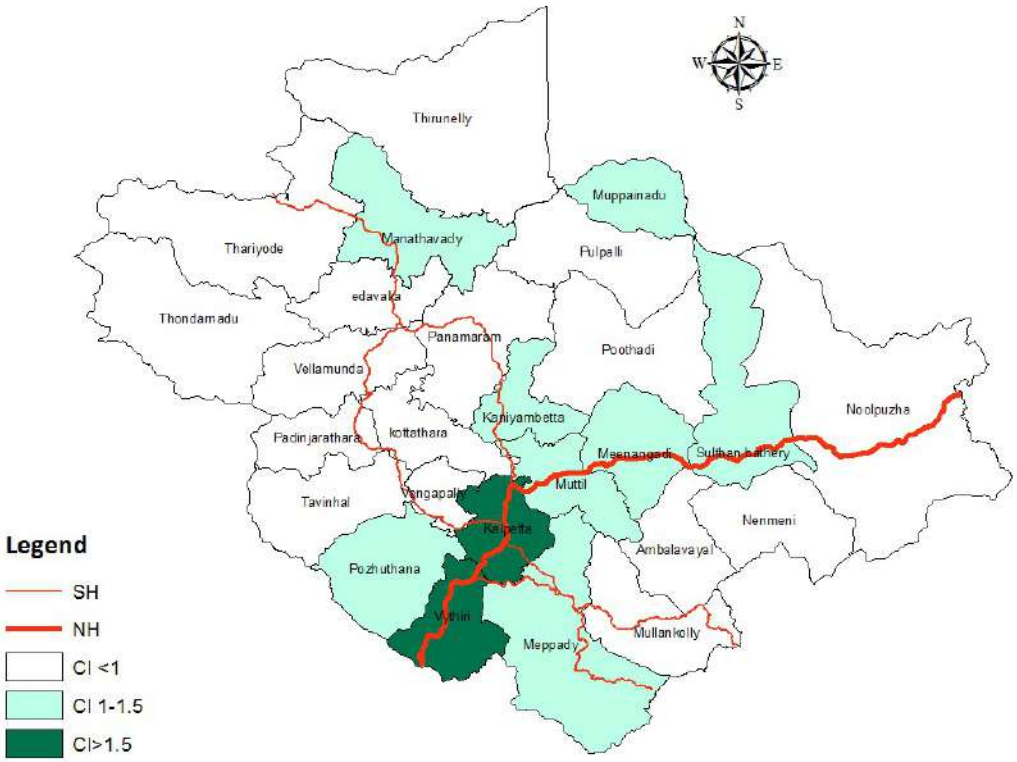


Figure 5.7: Concentration Index of Other Workers

Source: Census 2011

The activity pattern based on the workforce concentration of various local bodies is shown in Fig 5.8



Figure 5.8: Activity Pattern Based on Occupational Structure

Source: Census 2011

The figure 5.8 shows the main activity happening in each local body. The map clearly points out that Mananthavady and Kalpetta municipalities have workers concentration, who are not engaged in activities related to agriculture. Apart from these municipalities, Sulthan Bathery and some other grama panchayats are also having a concentration of industrial and other workers. Vellamunda, Muttil, and Ambalavayal show a predominance of industrial activity, and Pozhuthana, Vythiri, Meenangadi, Kaniyambetta Muppainad, and Meppady Panchayats show a predominance of the service sector (urban) activity.

5.2 Work Force Participation Rate (WFPR) of Sulthan Bathery Municipality

Wayanad is in the 2nd position in the state in the case of WFPR. The WFPR of Sulthan Bathery Municipality is 41.42 which is high when compared to the state average. Fig 5.9 shows the comparison of WFPR with that of district and state. It can be seen that the WFPR of Sulthan Bathery up to 2001 was greater than the state average and the district, which is higher than both the State and District average during 2001-2011. The high workforce participation rate indicates that the district as well as the municipality has a strong base of primary sector activity.

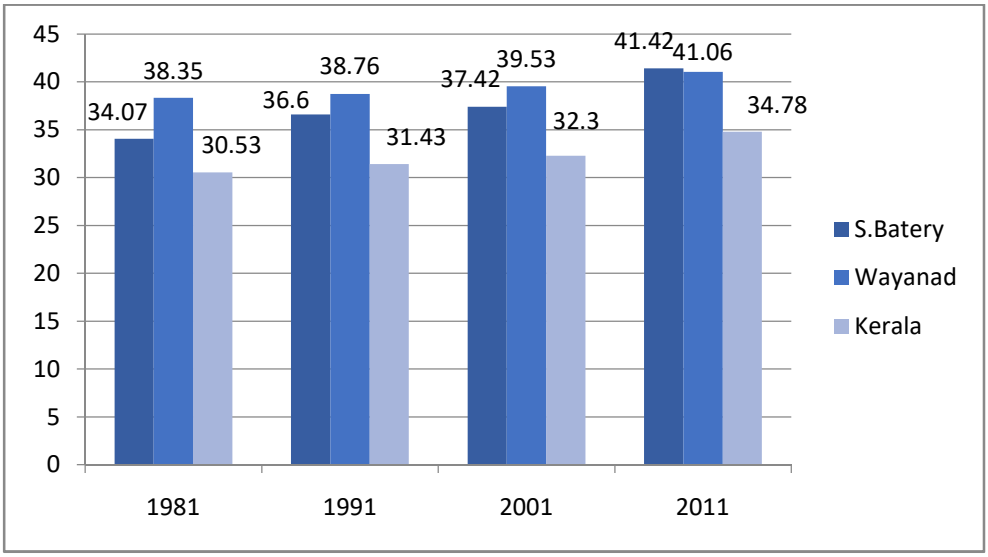


Figure 5.9: Comparison of the WFPR with the District & State

Source: Census data 2011

The temporal variation of WFPR in the Sulthan Bathery Municipality is shown in Fig 5.10. The WFPR is seen increasing trend in1981 to 2011and the rate of increase during 1991-2001 was seen lower then slightly increasing

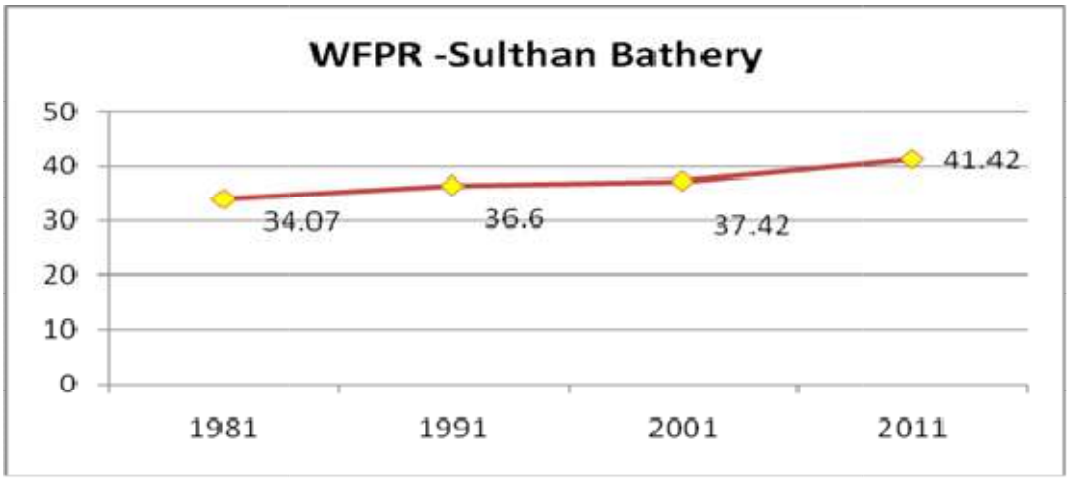


Figure 5.10: WFPR in Sulthan Bathery Municipality

Source: Census data 2011

Fig 5.10 shows that the primary activity base of Sulthan Bathery has increased during the period from 1981 to 2011 and the rate of increase is comparatively low in 1991-2001 and it can be inferred that the primary activity of planning area slightly shifted to secondary and tertiary sector during 1991-2001 and a regaining in the primary sector during 2001-2011. This may be the reason for the higher rate of increase of WFPR from 2001 to 2011.

WFPR of Sulthan Bathery Municipality is higher when compared to other taluk headquarters and other municipalities within the district and the same is lower when compared to similar the local bodies. The WFPR of Sulthan Bathery Municipality is in third position when compared to other similar towns. Comparison of WFPR of Sulthan Bathery Municipality with other administrative headquarters is shown in Fig 5.11

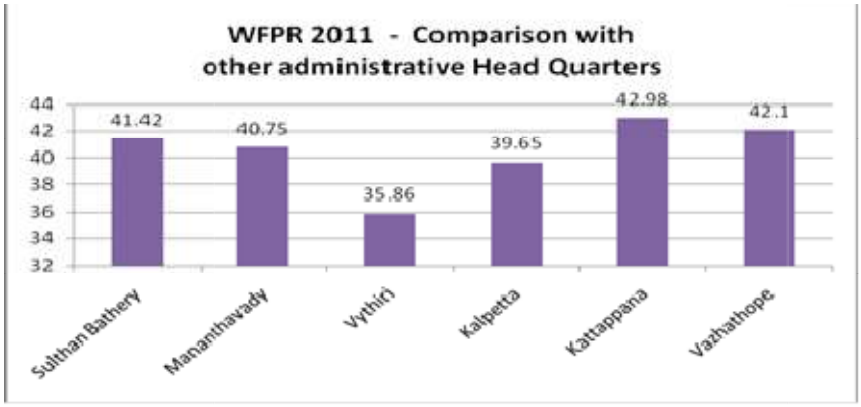


Figure 5.11: Comparison of WFPR in Sulthan Bathery with other Administrative Headquarters

Source: Census 2011

From the Fig 5.10, the work force participation rate is high in Kattappana (Idukki District) and the Sulthan Bathery Municipality is in the middle position. Comparison of WFPR with Sulthan Bathery Municipality with taluk headquarters and Kalpetta Municipality is shown in Fig 5.12

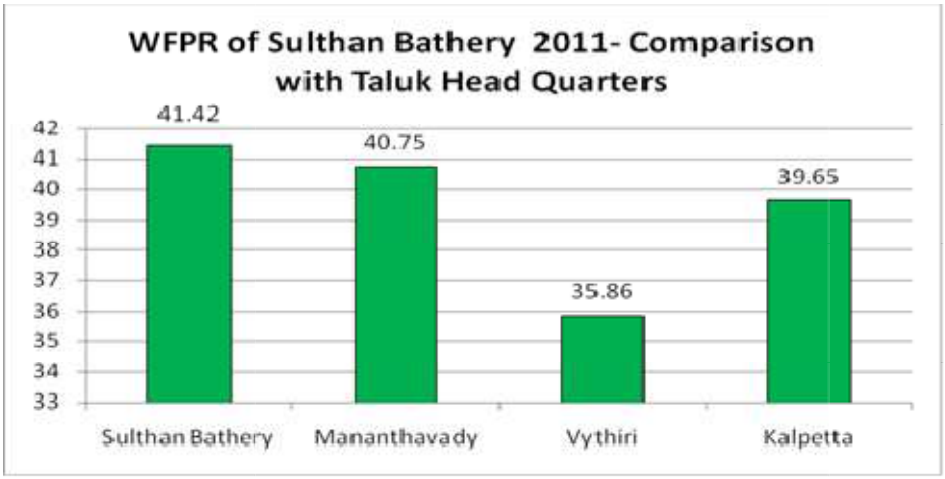


Figure 5.12: Comparison of WFPR of Sulthan Bathery with other Taluk Headquarters & Municipalities

Source: Census 2011

From the Fig 5.12, Sulthan Bathery Municipality has the highest WFPR when compared to Kalpetta, Vythiri and Mananthavady. Comparison of WFPR with Sulthan Bathery Municipality with nearby local bodies is shown below in Fig 5.13

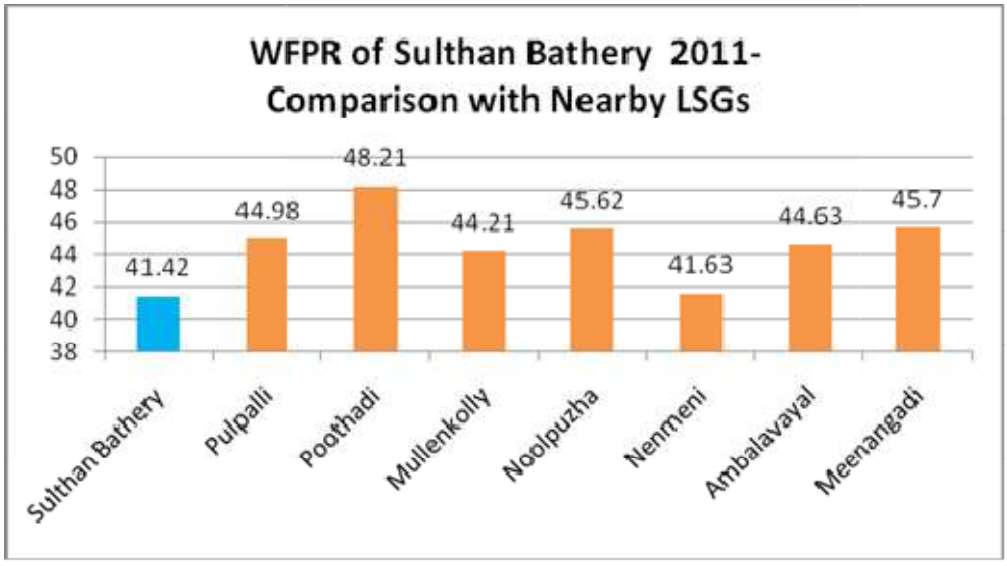


Figure 5.13: Comparison of WFPR in Sulthan Bathery Municipality with Nearby Local Bodies

Source: Census 2011

The Fig 5.13 reveals that the Poothadi Grama Panchayat has high WFPR while the Sulthan Bathery Municipality has the least.

The percentage of population engaged in economic activities is an indicator of the economic development and urbanization in an area. In Sulthan Bathery Municipality, the percentage of workers is seen increasing which is seen higher than the state average.

Total number of workers in Sulthan Bathery Municipality as per 2011 census is 18810. The total workers are further divided into main and marginal workers. The percentage of main and marginal workers is shown in Fig 5.14

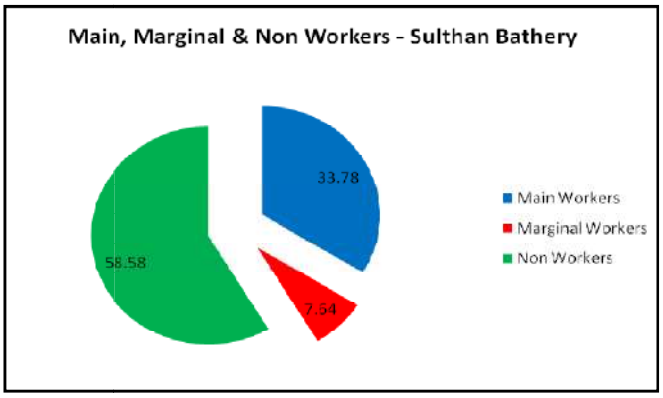


Figure 5.14: Main, Marginal & Non-Workers- Sulthan Bathery Municipality

Source: Census 2011

In Fig 5.14, the percentage of main and marginal workers constitute 33.78% and 7.64% respectively. 58.58% are non-workers. The change in the number of total workers and main workers over a while is shown in Table 5.1 and the graphical representation is shown in Fig 5.15

Table 5-1: Decadal variations in Total workers & Main workers

Year	1981	1991	2001	2011
Total Workers	9424	12822	15739	18810
Main Workers	8790	11410	11958	15340

Source: Census data 2011

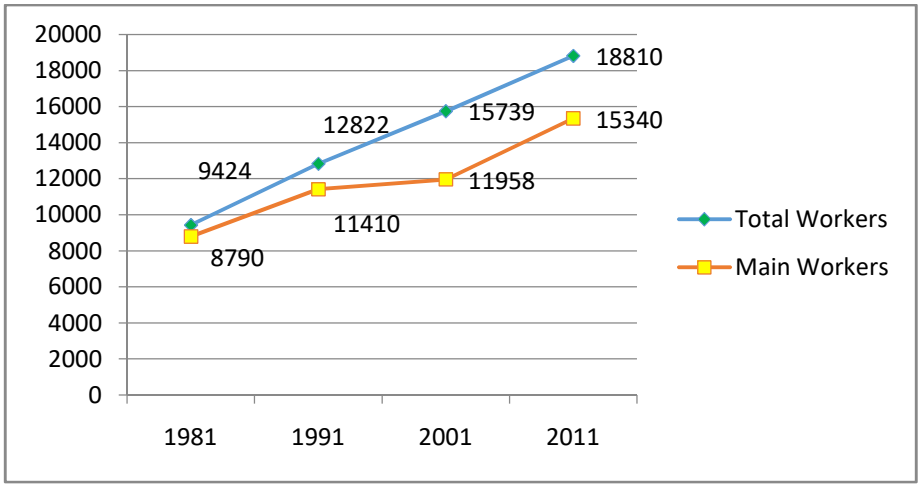


Figure 5.15: Decadal variations in Total workers & Main workers in Sulthan Bathery

Source: Census data 2011

Statistics reveal that the number of total workers & main workers is increasing faster than that of population growth (7.98% < 19.51%, 28.28%), the number of main workers is increasing faster rate than population growth/growth rate of total workers and marginal workers constitute 18.45% of the total workers. Hence it can be inferred that work opportunity is increasing proportionately. This may be an indication of the strengthening of the economic base. It is noted that a significant share of workers is from other states like Tamil Nadu, Karnataka, Orissa and West Bengal, etc. in the primary as well as tertiary sectors.

The share of female workers is very low in Sulthan Bathery Municipality. There is a clear dominance of male workers in all sectors. According to the census 2011, male workers constitute 67.73 % of total workers.

5.3 Occupational Structure

As per the census 2011, the main workers are classified into four categories viz. cultivators, agricultural laborers, household industrial workers, and other workers. The number of workers in each category is shown in Table 5.2 and its variation is shown in Fig 5.16

Table 5-2: Decadal Variations of Main workers

Year	Cultivators	Agricultural Laborers	HH Industrial Workers	Other Workers
1981	1390	3761	164	3475
1991	1344	2996	129	6941
2001	1482	2233	238	8005
2011	1890	2778	294	10378

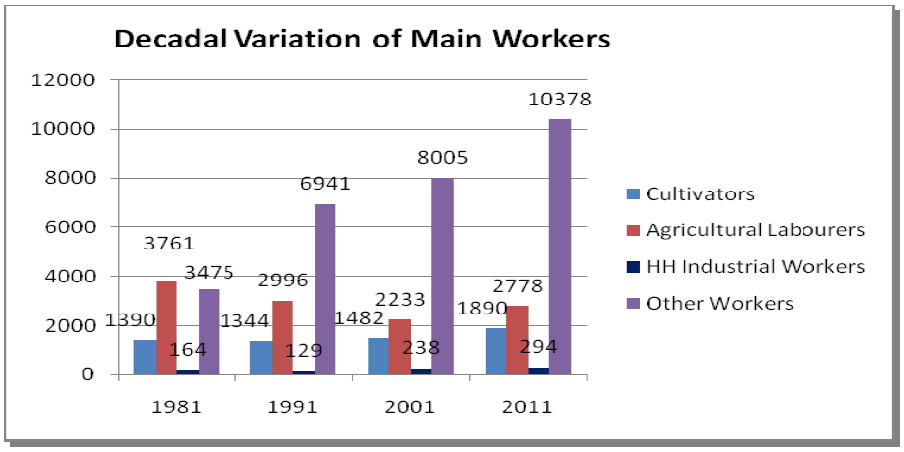


Figure 5.16: Variations in the number of Main Workers in Sulthan Bathery

Source: Census data 2011

The majority of the workers are coming under the "others" category and their number is seen increasing over decades. The number of agricultural laborers is showing a sudden decline after 1991 and shows an increase during 2001-2011. This shows the weakening of the agricultural sector during 1991-2001 and getting improvements during 2001-2011. Agricultural laborers and cultivators constitute 24.82% of the total workers as per the 2011 census, whereas other workers share is about 55.17% of the total workers. This shows an inclination of people towards the service sector. In the case of Wayanad district, the share of other workers is 42.62% and agricultural laborers and cultivators are approximately 33.98% of the total workers.

Workers are also classified into primary, secondary, and tertiary workers. The workers in another category can be considered tertiary workers and therefore the main reason for the increase in the total number of workers is an increase in the number of tertiary workers. From the Socio-economic survey analysis, it was found that the majority of workers are engaged in the tertiary sector. The percentage of workers is shown in Fig 5.17

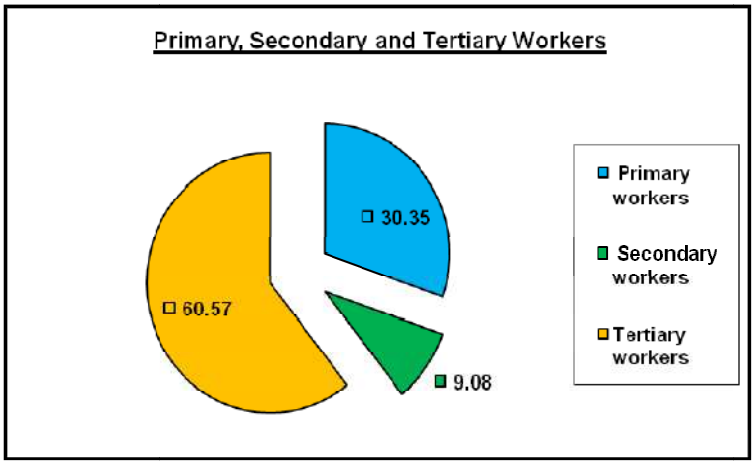


Figure 5.17: Workers Classification in Sulthan Bathery Municipality

Source: socio-economic survey 2012

5.4 Spatial Distribution of the Major Classes of Workers

The concentration index of the four classes of workers which are Cultivators, Agriculture Laborers, House Hold Industrial Workers, and Other Workers are calculated for each ward of the Sulthan Bathery Municipality and its spatial variation is analyzed. This gives an idea about where a particular class of workers is concentrated in the district.

The ward-wise distribution of different categories of workers is shown in the following figures. Fig 5.18 and Fig 5.19 gives the ward-wise concentration of cultivators and agricultural laborers. From fig 5.18, the concentration of cultivators is more in Chethalayam, Pazheri, Odappallam, Thirunelly, Thelampatta, Pazhuppathoor, and Vengoor wards. Agricultural labor concentration is high in Chethalayam, Pazheri, Odappallam, Thirunelly, Thelampatta, Sathramkunnu, Kuppadi, and Vengoor wards. It is shown in Fig 5.18

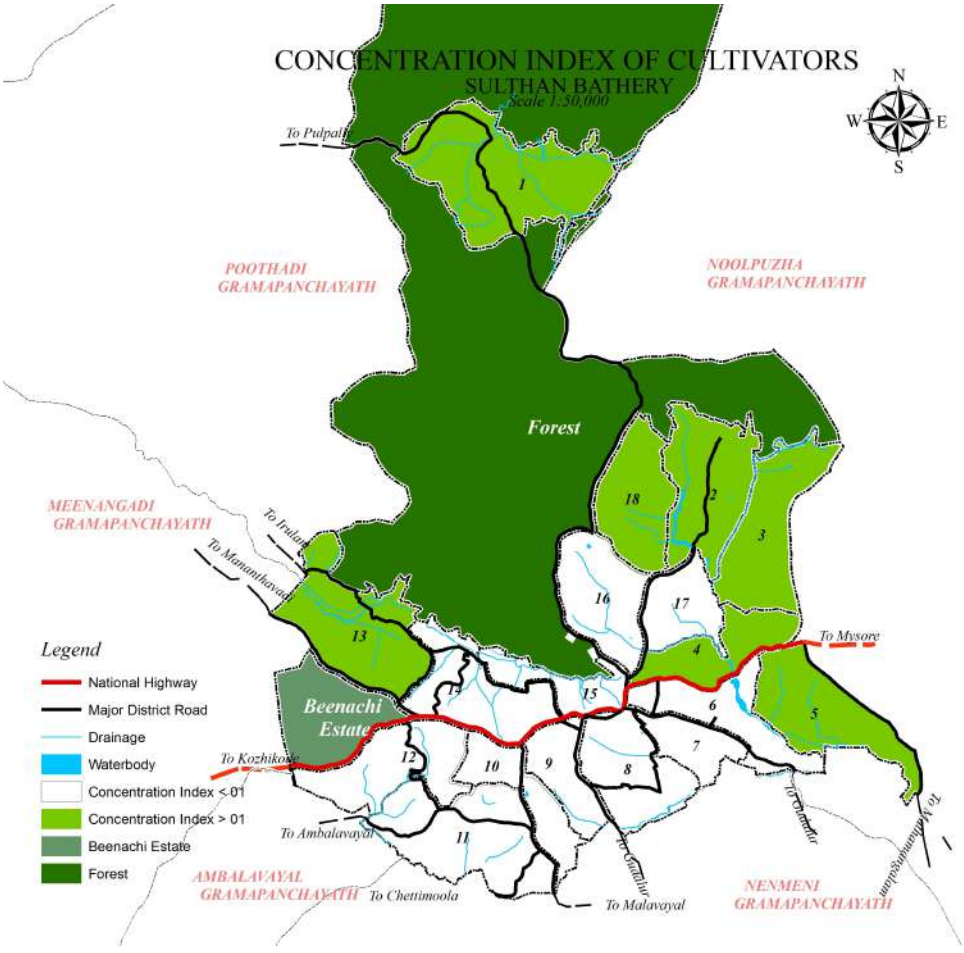


Figure 5.18: Concentration of Cultivators

Source: Census 2001

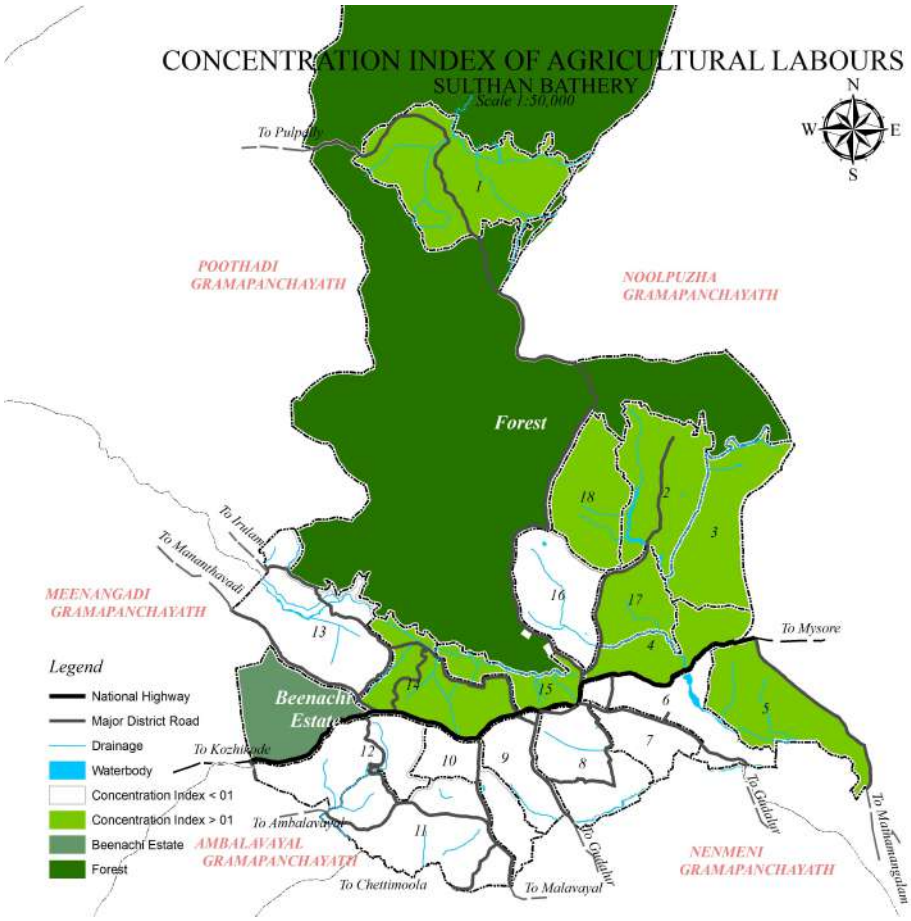


Figure 5.19: Concentration of Agriculture Laborers

Source: Census 2001

From Fig 5.18 and 5.19, it can be seen that both the category of workers are concentrated within the same or nearby wards.

Agricultural land is distributed more or less the same or in nearby wards where there is a high concentration of cultivators and agricultural workers except in the case of Kuppadi & Sathramkunnu wards where the agricultural land is less and the agricultural laborers are high. The distribution of agricultural land as obtained from the land use survey is shown in Fig 5.20

Household industrial workers constitute 2% of total workers. Fig 5.21 shows that the concentration of Households industrial workers is more in Odappallam, Kottakkunnu, Sathramkunnu, Armad & Kuppadi wards.

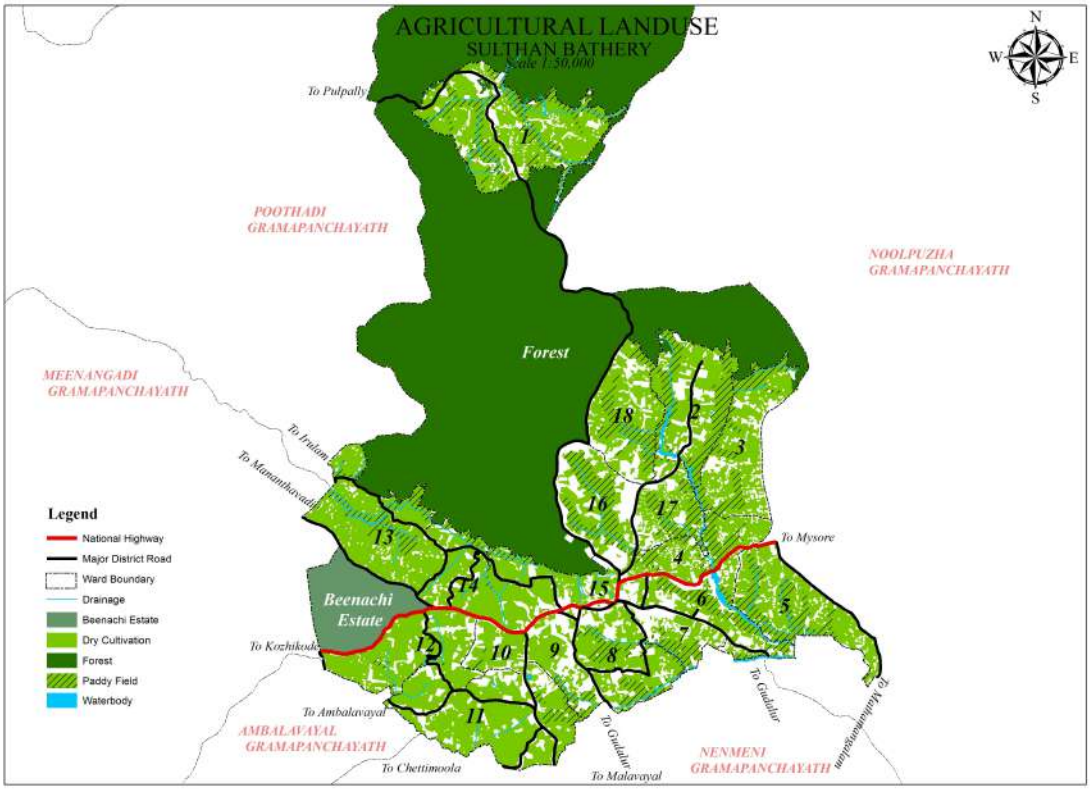


Figure 5.20: Spatial Distribution of Agriculture Land

Source: Land use survey 2012

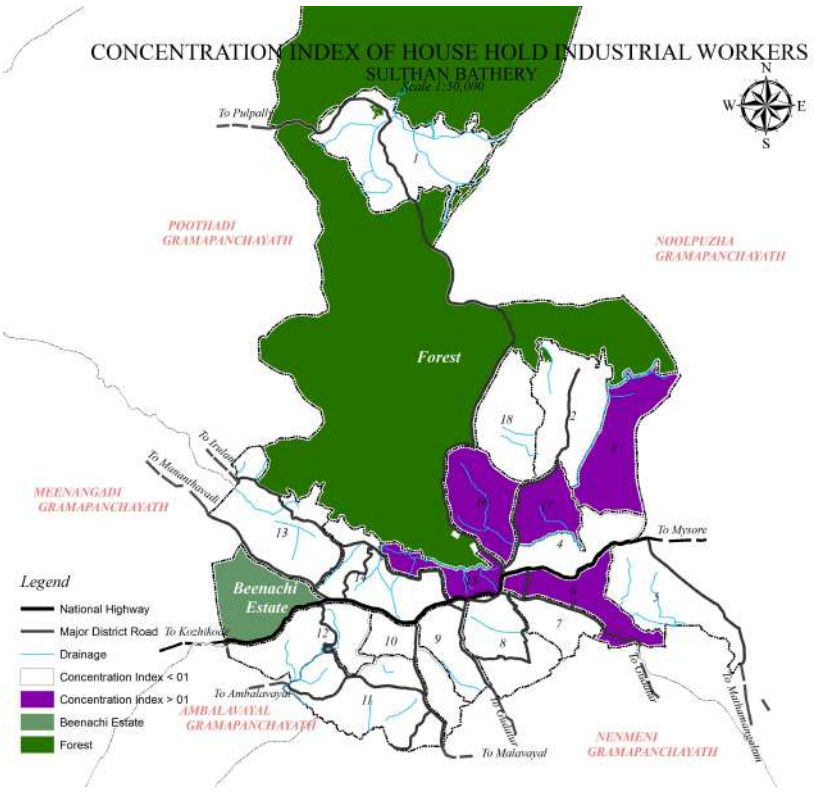


Figure 5.21: Concentration of Household Industrial Workers.

Source: Census 2001

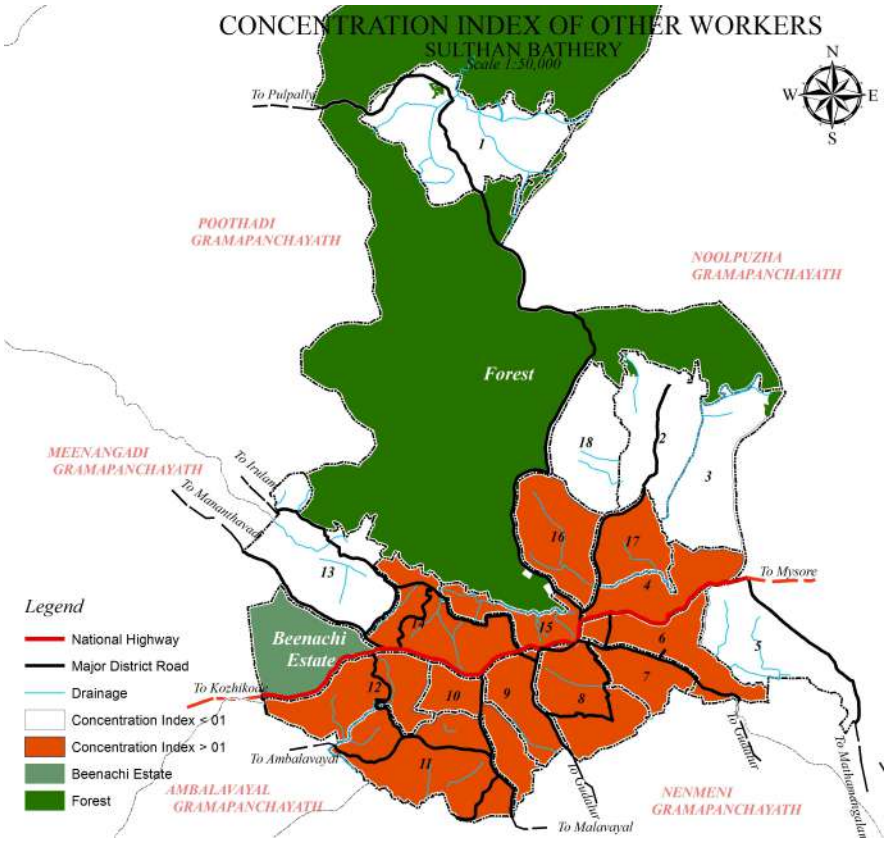


Figure 5.22: Concentration of Other Workers

Source: Census 2001

Fig 5.22 gives the ward-wise concentration of other workers. The other worker's concentration is high in Thirunelly, Thelampatta, Kottakkunnu, Kaippancheri, Kalluvayal, Sulthan Bathery, Manichira, Poomala, Beenachi, Kattayad, Sathramkunnu, Armad & Kuppadi wards.

5.5 Inference

Sulthan Bathery Municipality has a higher workforce participation rate than the district. Analyzing the decadal variation, we can see that the WFPR is increasing in the 1981-2011 period with a rate of increase low in 1991-2001 and a higher rate of increase in the year 2001 - 2011. The district is in 2nd position in WFPR and 8th in the case of per capita income; whereas Sulthan Bathery Municipality has higher WFPR and higher per capita income when compared to the district figure. The economy of the town mainly depends on the service sector as well as the agricultural sector.

CHAPTER 6

LAND USE

Land use depicts the distribution of people and their activities over space. For preparing the master plan, which is based on a spatial planning approach, thorough study and analysis of existing land use are very much essential for understanding the activity pattern and spatial structure which form the basis for formulating the concept for future development.

6.1 District Land Use

The total area of Wayanad district is 2131 Sq. Km and the major share of land use categories are agriculture plantation and vested forest, which constitutes 49.96% and 39.26% of the district area respectively. The forest land use is concentrated in the peripheral area of the district. Only 0.70% of the total area of the district is under residential land use. As per the DUR, it is stated that the people in Wayanad hold a large extent of land, hence the residential agriculture mix land use constitutes 6.39 % of the total area. It is observed that in Sulthan Bathery, 5.56% of the total population of the district is living in 4.84% of the total area of the district, and the actual habitable area without forest if considered, it can be seen that in Sulthan Bathery, 5.56% of the total population of the district is living in the 1.84% of the total area of the district. The major share of various land use categories of Sulthan Bathery, which are contributing to that of district land uses are Agriculture, Reserve Forest, Paddy, and Residential. The details of district land use are shown in Fig 6.1 and Fig 6.2.

6.2 Land Use Analysis of Sulthan Bathery

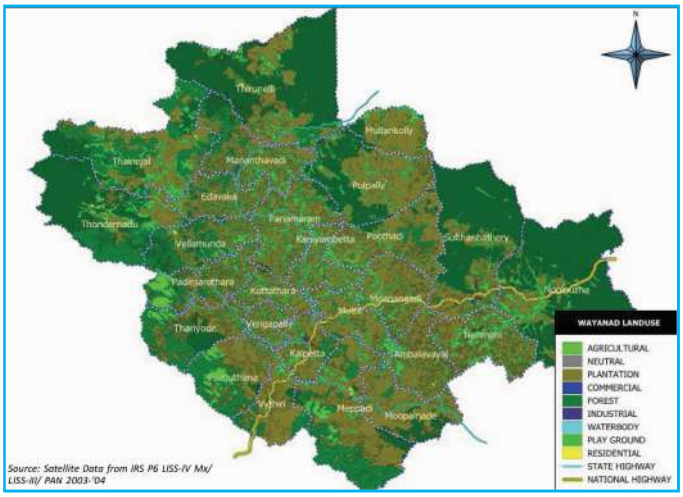


Figure 6.2: District Land Use Map

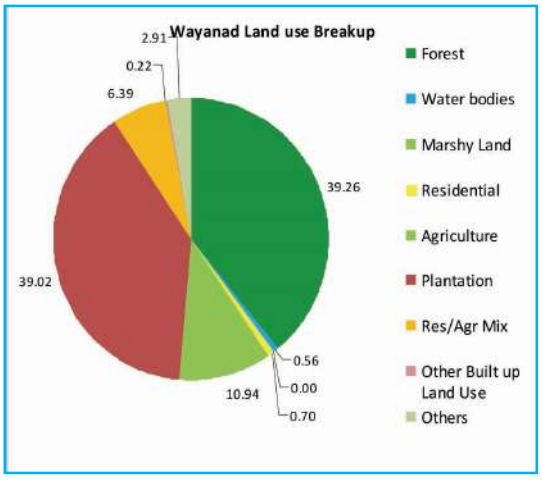


Figure 6.1: District Land Use Break up

The total area of Sulthan Bathery Municipality is 103.22 Sq.km. out of which 60.88 sq km is forest. Hence for study and analysis, the net area after deducting the huge forest area

may be taken. The existing land use map of Sulthan Bathery shows that more than half of the area is occupied by a reserve forest. Based on land use, the town has to perform a dual function, i.e. urban activities are concentrated in and around NH 766 and peripheral wards have strong agricultural-based activities. The same pattern is taking place in the case of district land use also. While studying the existing land use pattern of the town it is seen that more than half of the geographical area is covered by reserve forest and more than 1/5th of the area is covered by agricultural land. Paddy and water bodies constitute 8.58% of the total land area. This indicates the environmental quality of the place and emphasis the necessity of proper planning intervention to meet the present and future requirements without compromising the environmental quality. The existing land use map of Sulthan Bathery is shown in Fig 6.3.

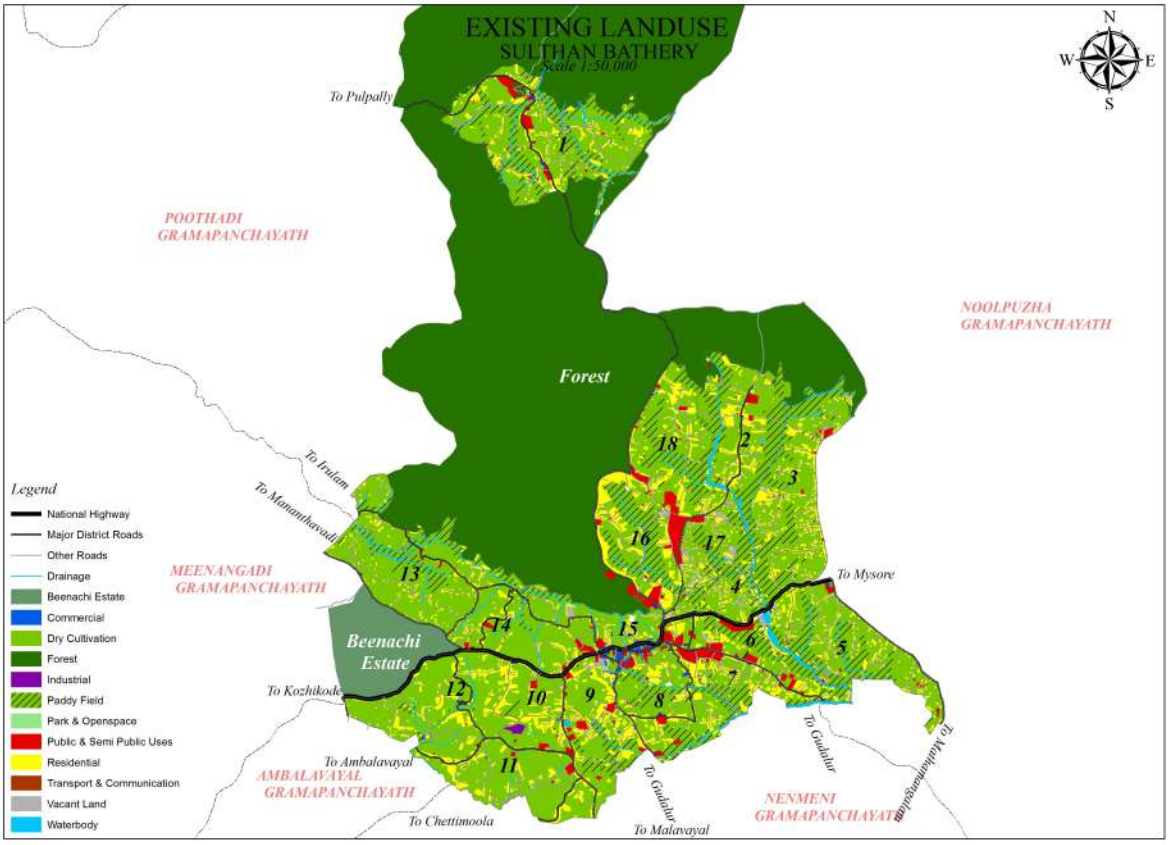


Figure 6.3: Existing Land Use of Sulthan Bathery-2012

Source: Land use survey 2012

The land use breaks up in terms of area as well as percentage concerning total area is shown in Table 6.1 and Fig 6.4.

Table 6-1: Existing Land Use Break-Up

Existing Land use break up 2012													
	Road	Water body	Vacant Land	Transport & Communication	Residential	Dry Cultivation	Public and Semi Public	Park & Open space	Wet Agriculture	Commercial	Industrial	Forest	Beenachi Estate
Area (Sq Km)	1.26	0.45	0.21	0.03	6.73	20.77	1.79	0.02	8.41	0.32	0.10	60.87	2.25
% of Total Area	1.22	0.43	0.21	0.03	6.52	20.12	1.74	0.02	8.15	0.31	0.10	58.98	2.18
% of net area	3.14	1.11	0.53	0.08	16.73	51.60	4.45	0.04	20.91	0.79	0.24		

Source: Land use survey 2012

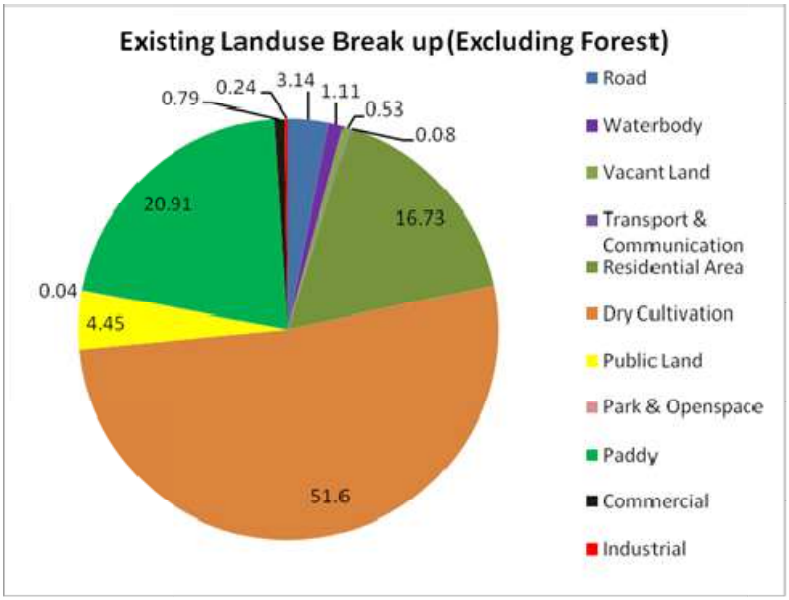


Figure 6.4: Existing Land Use break-up of Sulthan Bathery

Source: Land use Survey 2012

6.3 Ward Wise Land Use Analysis of Sulthan Bathery

Land use pattern of an area is the physical manifestation of the people and their activities. The concentration pattern of land use gives an idea about where that particular land use is concentrated within the area. 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 (CI) of a particular land use in the planning area =

Area of land use in a ward/ total area of the ward

Area of land use in the planning area /total area of the planning area

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. Table 6.2 shows the ward wise distribution of various types of land use and table 6.3 shows the ward wise concentration index of major land uses.

Table 6-2: Ward Wise Distribution of Land Use in Sq.km

Ward No	Ward Name	Road	Water body	Vacant Land	Transport & Communication	Residential Area	Forest	Public and Semi Public	Paddy	Park & Open space	Dry Cultivation	Commercial	Industrial	**Total**
1	Chethalayam	0.11	0.00	0.00	0.00	0.56	0.04	0.17	1.27	0.00	2.23	0.02	0.01	**4.41**
2	Pazheri	0.07	0.10	0.00	0.00	0.46	0.05	0.04	0.92	0.00	1.13	0.01	0.00	**2.79**
3	Odappallam	0.06	0.02	0.01	0.00	0.45	0.06	0.03	0.65	0.00	1.30	0.00	0.00	**2.58**
4	Thirunelly	0.04	0.01	0.02	0.00	0.28	0.00	0.01	0.52	0.00	0.66	0.01	0.00	**1.55**
5	Thelampatta	0.06	0.00	0.00	0.00	0.33	0.00	0.10	0.75	0.00	1.25	0.01	0.01	**2.51**
6	Kottakkunnu	0.15	0.13	0.03	0.00	0.39	0.00	0.32	0.54	0.00	0.46	0.03	0.00	**2.05**
7	Kaippancheri	0.07	0.03	0.00	0.00	0.26	0.00	0.13	0.22	0.00	0.31	0.01	0.00	**1.02**
8	Kalluvayal	0.06	0.03	0.00	0.01	0.41	0.00	0.10	0.56	0.00	1.06	0.07	0.01	**2.31**
9	Sulthan Bathery	0.05	0.00	0.03	0.00	0.37	0.00	0.10	0.17	0.01	0.52	0.06	0.00	**1.32**
10	Manichira	0.05	0.01	0.00	0.00	0.33	0.00	0.09	0.21	0.01	0.84	0.01	0.01	**1.55**
11	Poomala	0.07	0.00	0.00	0.00	0.57	0.00	0.17	0.00	0.00	2.45	0.00	0.04	**3.30**
12	Beenachi	0.09	0.00	0.00	0.00	0.40	0.00	0.00	0.06	0.00	1.88	0.01	0.00	**2.44**
13	Pazhuppathoor	0.08	0.05	0.00	0.00	0.23	0.00	0.01	0.48	0.00	2.24	0.00	0.00	**3.10**
14	Kattayad	0.07	0.02	0.00	0.00	0.33	0.00	0.08	0.10	0.00	1.69	0.02	0.00	**2.32**
15	Sathramkunnu	0.04	0.01	0.02	0.02	0.16	0.00	0.04	0.11	0.00	0.69	0.04	0.01	**1.13**
16	Armad	0.09	0.00	0.02	0.00	0.60	0.00	0.22	0.79	0.00	0.54	0.00	0.01	**2.26**
17	Kuppadi	0.05	0.02	0.08	0.00	0.22	0.00	0.04	0.46	0.00	0.44	0.00	0.00	**1.31**
18	Vengoor	0.07	0.01	0.00	0.00	0.40	0.00	0.12	0.60	0.00	1.09	0.00	0.00	**2.29**
	Total	**1.28**	**0.45**	**0.21**	**0.03**	**6.72**	**0.15**	**1.79**	**8.4**	**0.02**	**20.76**	**0.32**	**0.1**	**40.24**

Source: Land use survey 2012

Table 6-3: Ward Wise Concentration Index of Major Land Uses

Ward No	Ward Name	Road	Waterbody	Vacant Land	Transport & Communication	Residential Area	Forest	Public and Semi-Public	Wet Agriculture	Park & Open Space	Dry Cultivation	Commercial	Industrial
1	Chethalayam	0.75	0.00	0.00	0.00	0.76	2.26	0.89	1.38	0.00	0.98	0.50	0.46
2	Pazheri	0.82	3.19	0.19	0.00	0.98	4.99	0.34	1.59	1.01	0.79	0.25	0.00
3	Odappallam	0.67	0.68	0.63	0.00	1.03	6.64	0.30	1.20	0.00	0.98	0.18	0.30
4	Thirunelly	0.84	0.59	2.31	0.00	1.09	0.00	0.10	1.59	0.00	0.82	1.15	0.44
5	Thelampatta	0.78	0.16	0.21	0.00	0.79	0.00	0.87	1.43	0.00	0.97	0.28	0.80
6	Kottakkunnu	2.25	5.62	2.97	0.00	1.15	0.00	3.53	1.26	0.00	0.43	1.65	0.75
7	Kaippancheri	2.14	2.80	0.00	0.00	1.50	0.00	2.92	1.01	0.00	0.58	0.84	1.38
8	Kalluvayal	0.86	1.34	0.00	4.35	1.06	0.00	0.95	1.17	0.00	0.89	4.04	0.87
9	Sulthan Bathery	1.17	0.00	4.23	2.95	1.67	0.00	1.78	0.62	12.05	0.76	6.00	1.40
10	Manichira	1.10	0.43	0.00	0.00	1.28	0.00	1.29	0.66	6.47	1.04	1.05	1.29
11	Poomala	0.63	0.00	0.00	0.00	1.04	0.00	1.17	0.00	0.98	1.44	0.13	4.67
12	Beenachi	1.12	0.00	0.00	0.00	0.98	0.00	0.02	0.13	0.00	1.49	0.45	0.71
13	Pazhuppathoor	0.81	1.52	0.00	0.00	0.44	0.00	0.09	0.74	0.00	1.40	0.19	0.35
14	Kattayad	0.95	0.78	0.00	0.00	0.86	0.00	0.82	0.21	0.00	1.41	1.16	0.38
15	Sathramkunnu	0.99	0.40	3.76	23.57	0.83	0.00	0.84	0.47	0.00	1.19	4.44	2.39
16	Armad	1.19	0.18	1.34	0.00	1.59	0.13	2.17	1.66	0.98	0.46	0.17	1.14
17	Kuppadi	1.09	1.53	11.63	0.00	1.00	0.00	0.71	1.68	0.00	0.65	0.18	0.40
18	Vengoor	1.01	0.19	0.09	0.00	1.04	0.00	1.18	1.26	0.00	0.92	0.19	0.19

Source: Land use survey 2012

The concentration of different categories of land uses is described in detail in the following paragraphs.

6.3.1 Residential

Residential land use constitutes 16.73% of the net area of the planning area. Its spatial distribution is shown in Fig 6.5.

The residential areas are developed mostly in places with easy accessibility and proximity to facilities. As per the analysis, it shows that wards 03, 04, 06, 07, 08, 09, 10, 11, 16and18 having a high concentration of residential area (ci = >1) and followed by wards 01, 02, 05, 12, 13, 14, 15 and 17where ci = <1. The land value of the core area is high and the people are forced to move to the outer reach of the area there is a trend to convert the agricultural land for residential purposes. The hike in population will put pressure on the available resources in the already developed area. Hence strict development control has to be enforced in the area so the surrounding wards have to be open to accommodate more residents. The concentration pattern of residential land use is shown in fig. 6.6.

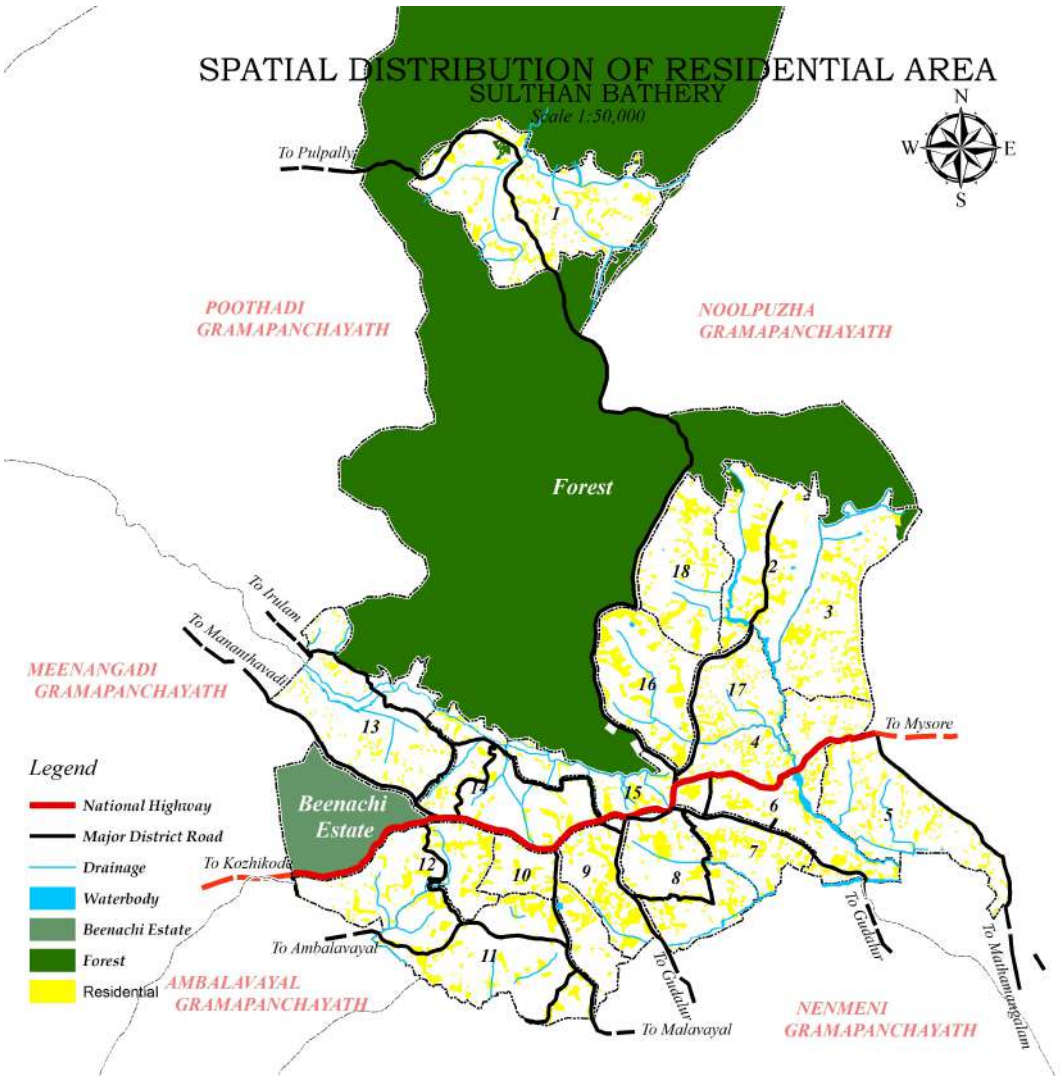


Figure 6.5: Spatial Distribution of Residential Land use

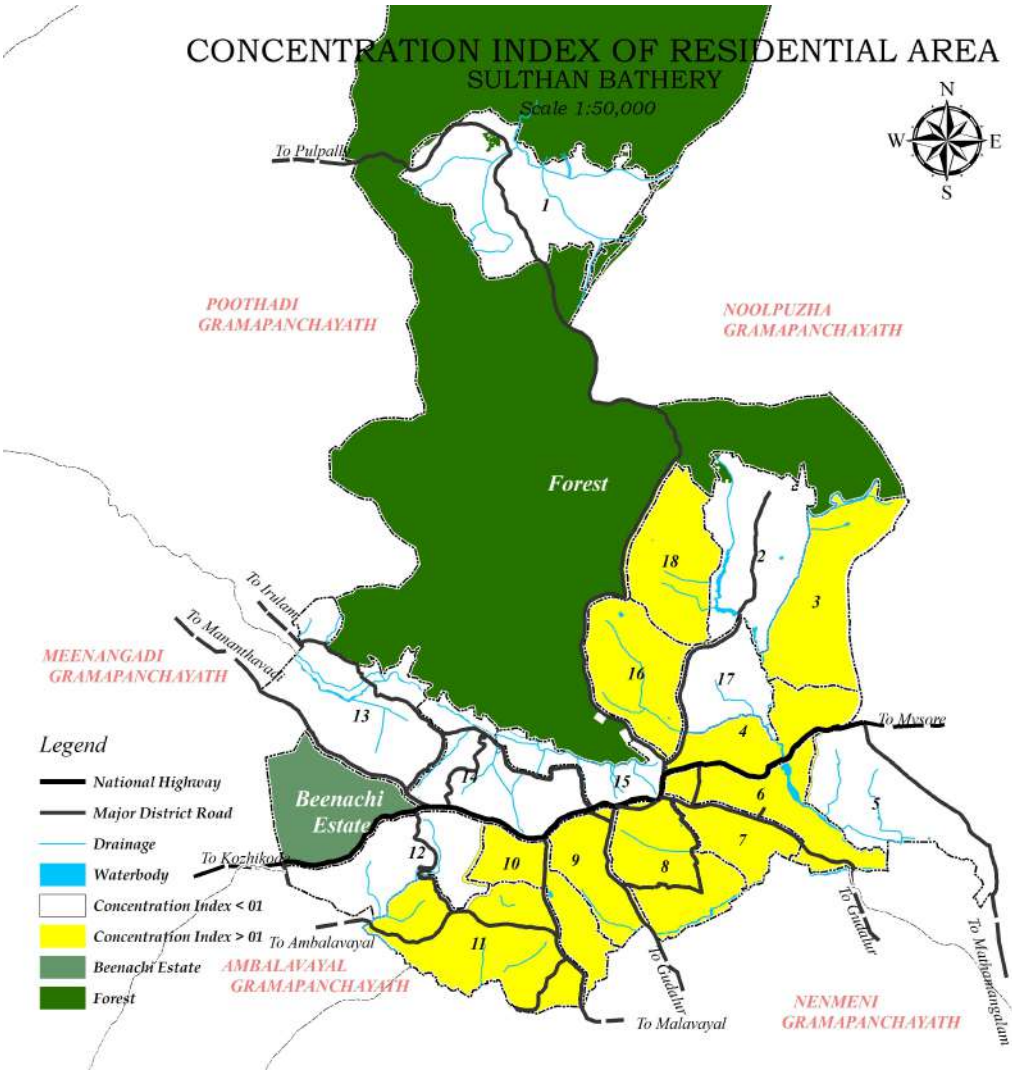


Figure 6.6: Concentration Pattern of Residential Land use

Source: Land use survey 2012

6.3.2 Commercial

The commercial area constitutes only 0.79% of the net area of the planning area, the spatial distribution of which is shown in Fig 6.7.

Fig 6.7 shows that the commercial developments are concentrated along major transport corridors especially NH 766 as ribbon development. The Traffic junction and Chungam junction can be treated as important commercial nodes within the town and commercial developments are mainly concentrated on wards 04,06,07,08,09,10,14 and 15. It is seen that commercial land use is concentrated in and around the main traffic corridors. The spatial distribution of the commercial land use and its concentration pattern is shown in Fig. 6.7 & Fig.6.8 respectively.

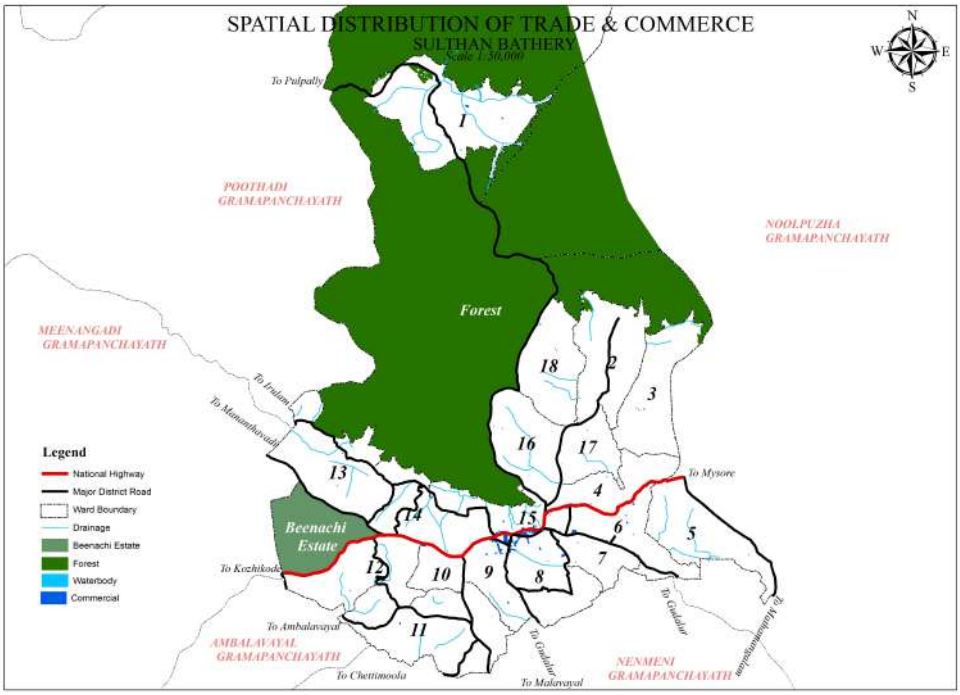


Figure 6.7: Spatial Distribution of Commercial Land use

Source: Land use survey 2012

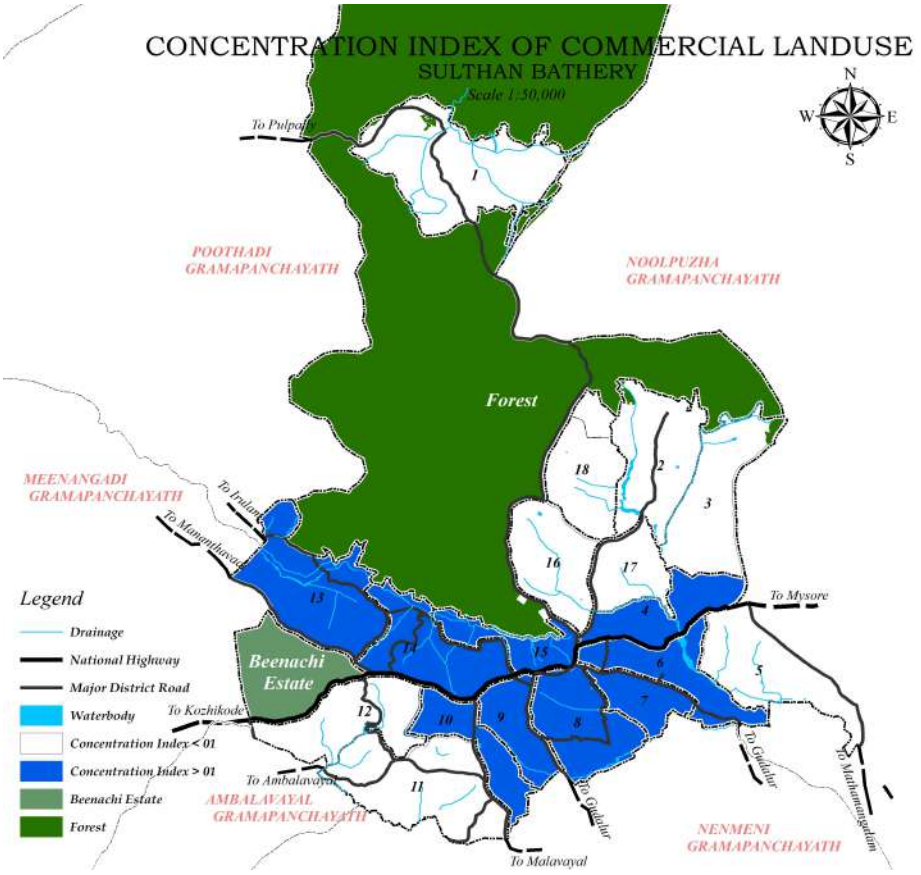


Figure 6.8: Concentration Pattern of Commercial Land use

Source: Land use survey 2012

6.3.3 Industrial

Industrial land use constitutes 0.24% of the net area of the planning area. The industrial predominant wards are 09, 11, 12, 15 & 16. Besides some small-scale service industries and wood-based industries are scattered in the area. From the survey, it is seen that the engineering & service industries are predominant in the area followed by garment making.

As per the spatial distribution of major industrial land use, high concentration is shown in ward 11 (Poomala) due to the presence of **Glady's Soap Factory**. The spatial distribution of industrial land use and its concentration pattern is shown in Fig 6.9 and Fig 6.10 respectively.

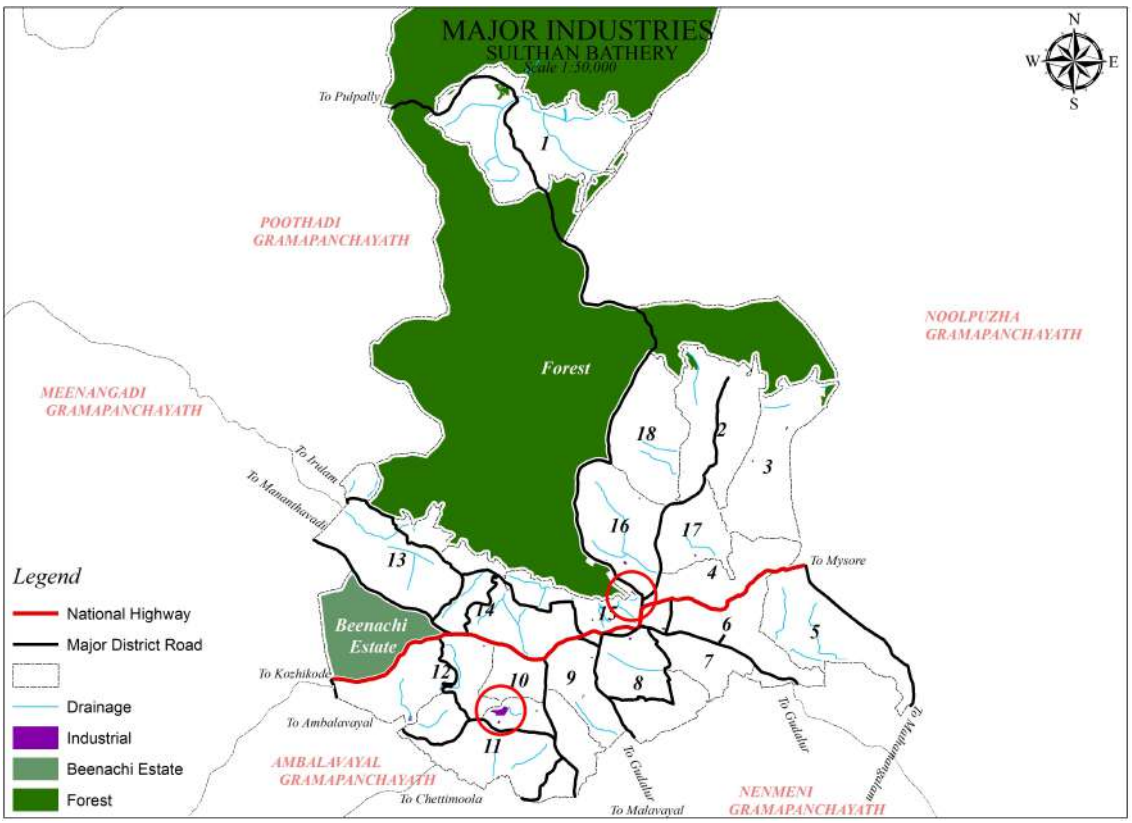


Figure 6.9: Spatial Distribution of Industrial Land use

Source: Land use survey 2012

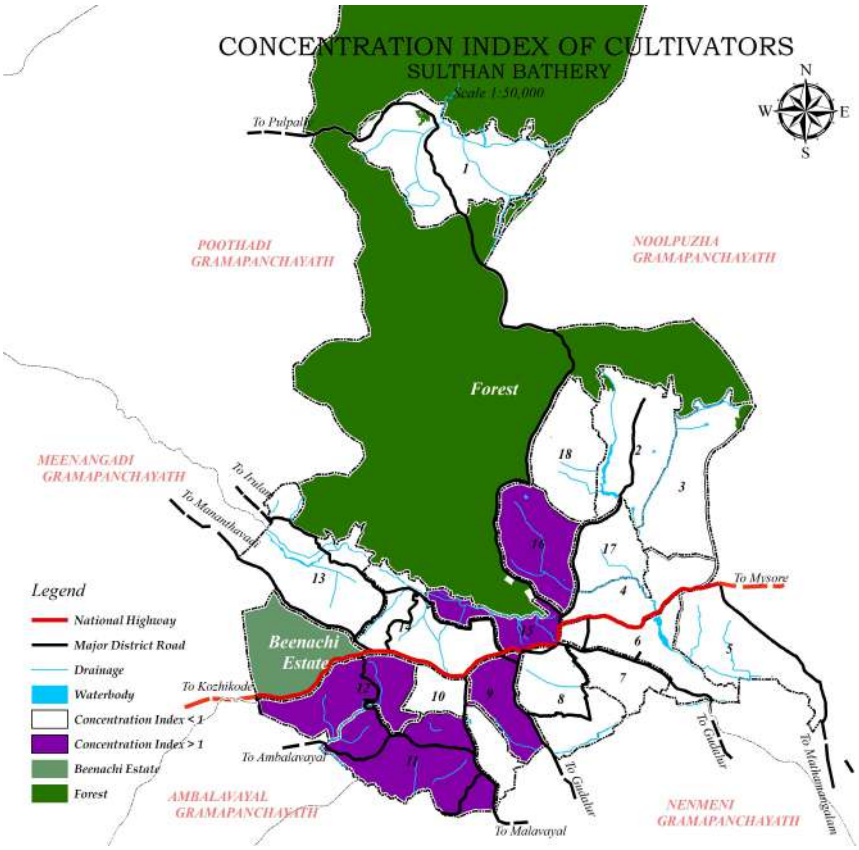


Figure 6.10: Concentration Pattern of Industrial Land Use

Source: Land use survey 2012

6.3.4 Public and Semi-Public

Offices, educational institutions, hospitals, and religious and cultural institutions are grouped under this category. There is a large number of govt. offices concentrated in the central core area due to the presence of the Mini Civil Station.

The educational facilities are ill-distributed in the town and almost all the higher-order facilities are concentrated in and around the core area. Almost all the higher-order educational institutions are concentrated at Kuppadi and only the “Helipad” is located there. The northwest, southwest, and southern areas are devoid of any educational institutions. It can be seen that almost all the health facilities are concentrated in and around the core area and the hinterlands are devoid of any health facilities except at Chethalayam. The taluk hospital Sulthan Bathery is located at the center of the town and it has a new block at Fair land and the existing govt. The ayurvedic hospital is located at Kottakkunnu.

The total extent of land occupied by public and semi-public use comes to 4.45% of the net planning area. The spatial distribution of public and semi-public use is shown in Fig 6.11. The major share of public &semi-public land use concentrated in the wards is 06, 07, 09, 10, 11 & 18.

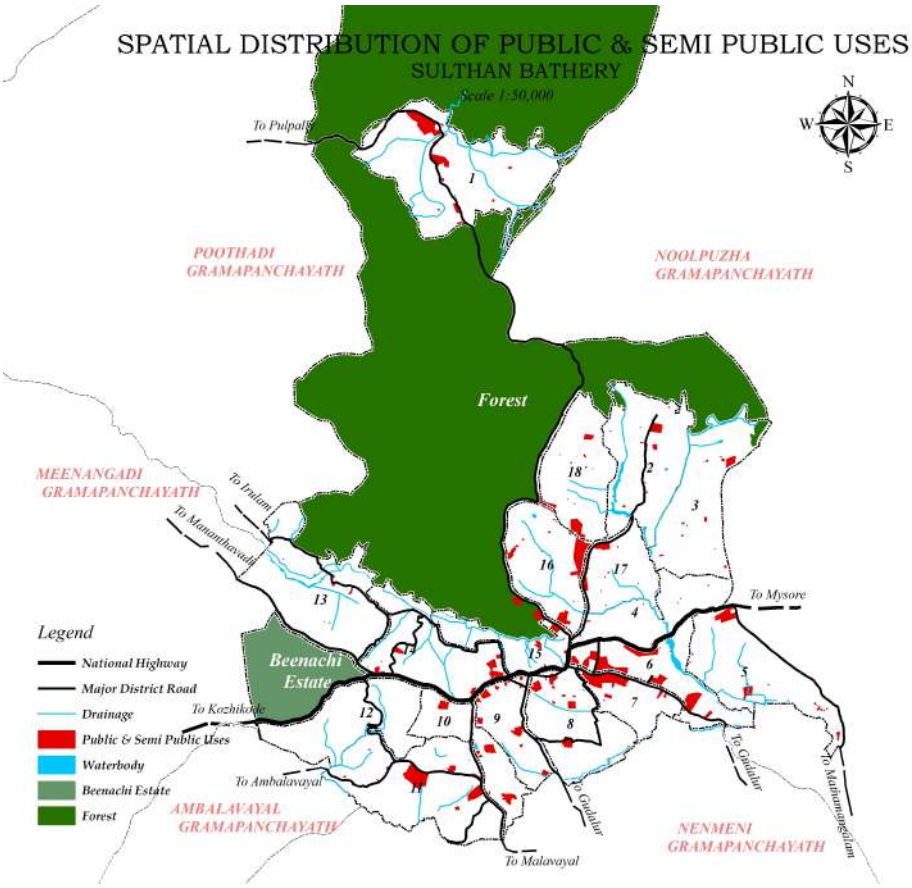


Figure 6.11: Spatial Distribution of Public & Semi-Public Land Use

Source: Land use survey 2012

6.3.5 Park and Open Space

The park and open space constitute 0.04% of the net planning area which includes a stadium, playgrounds, community halls, public libraries, and cinema halls. The stadium near the fish and meat market is the only stadium of this kind but has poor road accessibility. There is a Town Square near St Mary's College run by District Tourism Promotion Council and a park for disabled and senior citizens located at Kottakkunnu. There is no other organized park and open spaces in the planning area. The spatial distribution of the park and open space is shown in Fig 6.12.

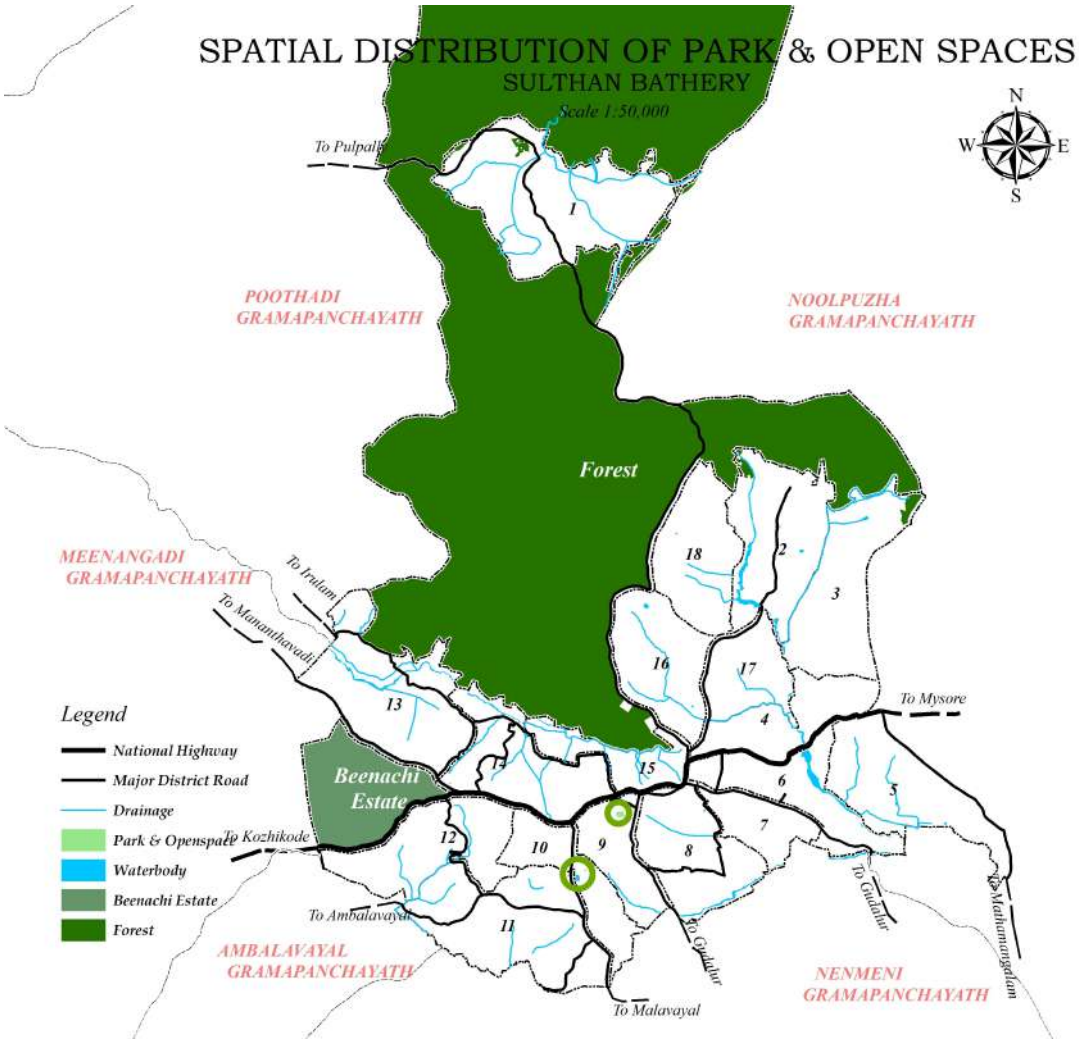


Figure 6.12: Spatial distribution of Park &Open Space

Source: Land use survey 2012

6.3.6 Transportation

The area covered by the transportation network comes to 3.22% of the net planning area. The total length of roads in the planning area comes to 261.22Km and the road density is 5.75 Km/1000ppn. The local body has a good road network with less carriage width, poor surface condition, and road geometry. The road network is of **spine and spurs type**. Almost all part of the area is served by a road network. Sulthan Bathery is well connected with other growth centers of the district by NH 766 and MDR. Bus traffic is available only through major roads. The existing road network with the spatial distribution of transport facilities is shown in Fig 6.13.

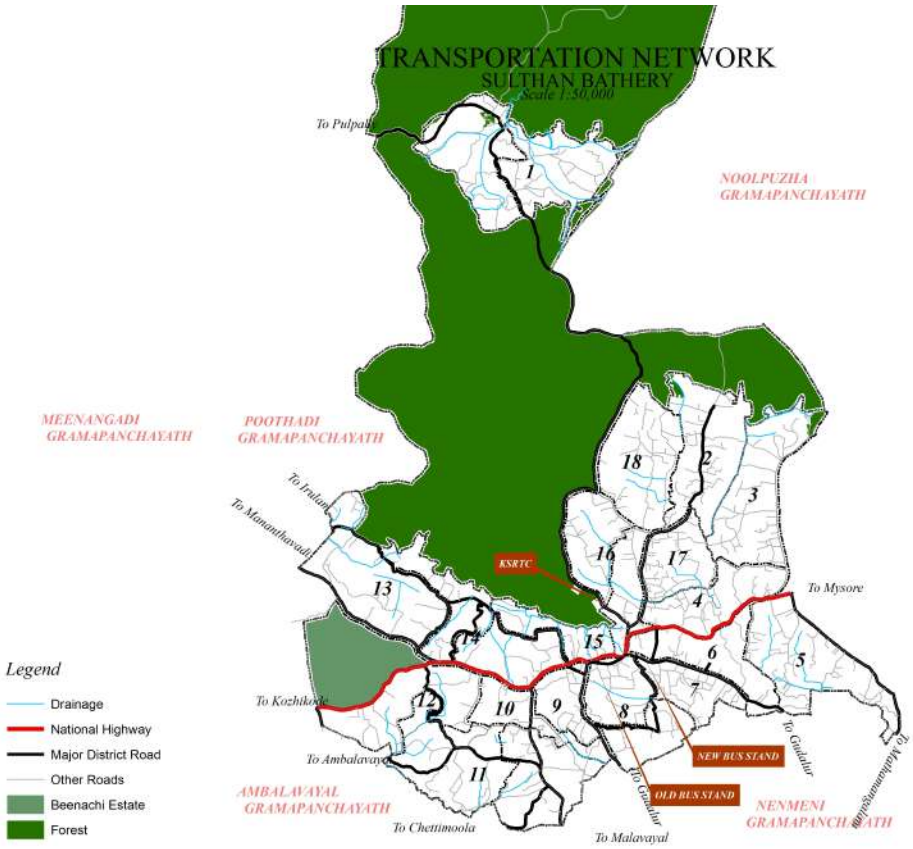


Figure 6.13: Spatial distribution of Transport Facilities

Source: Land use survey 2012

6.3.7 Agriculture

About 73% of the net planning area is occupied by agriculture. Wet agriculture constitutes 8.41 Sq Km. Paddy is predominant inwards in 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 16, 17 & 18**.** The wet agriculture lands are scattered mainly on the northeast side of the town and are being converted for residential purposes and other construction purposes. At present, agriculture mainly depends upon rain and no irrigation facilities are available. The spatial distribution of wet agriculture land use and concentration of wet agriculture lands are shown in Fig 6.14 and Fig 6.15 respectively.

The dry cultivation area is distributed in the entire habitable area except at the core area of the town. Still, a higher concentration is seen in the outer peripheral area except on the northern side where Vested Forest is located. These areas are characterized by undulating terrains and low population density. The Beenachi estate owned by the "Madhya Pradesh Government" located near Beenachi is cultivated with coffee with an extent of 2.25 sq km. Coffee is the most important crop in the planning area followed by areca nut, coconut, pepper, and banana. The spatial distribution of agricultural land is shown in Fig 6.16.

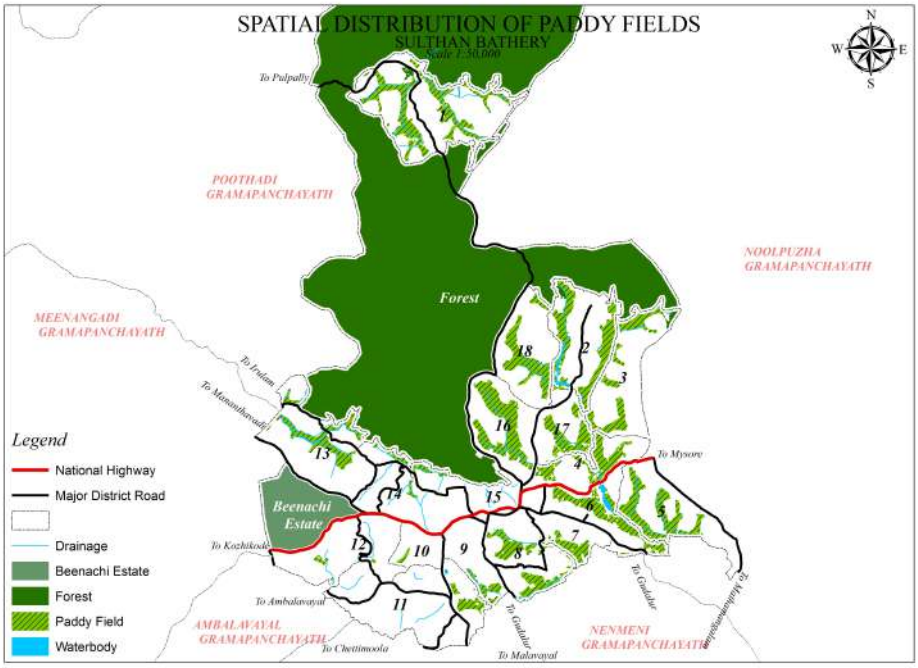


Figure 6.14: Spatial Distribution of Wet Agriculture

Source: Land use survey 2012

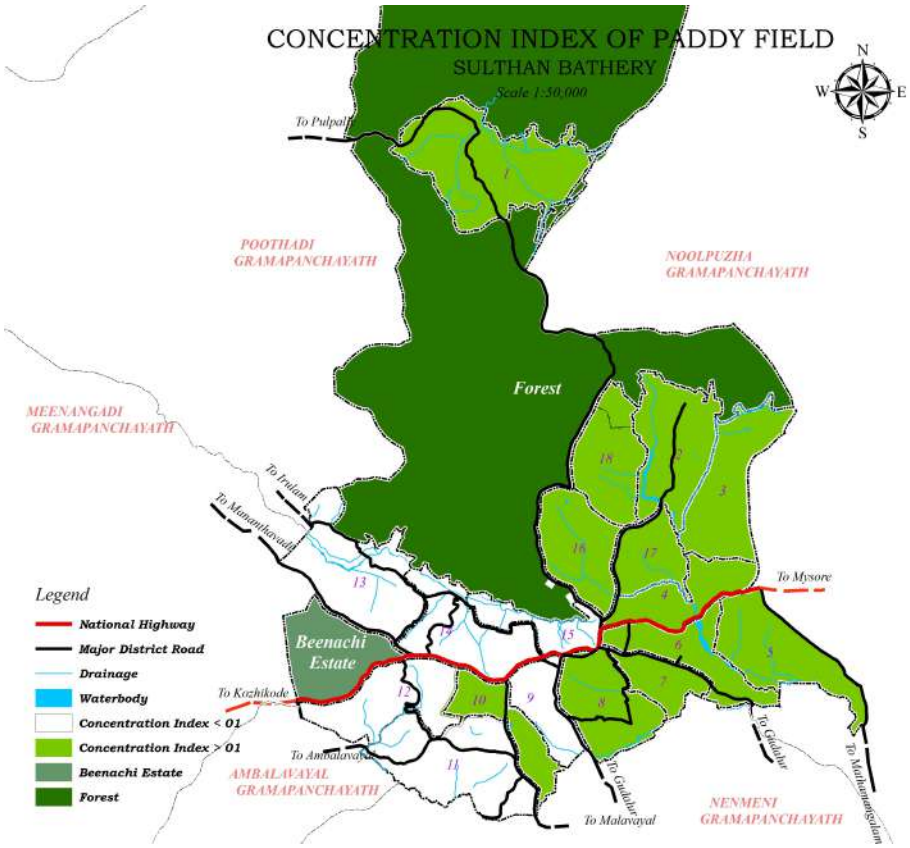


Figure 6.15: Concentration Pattern of Wet Agriculture

Source: Land use survey 2012

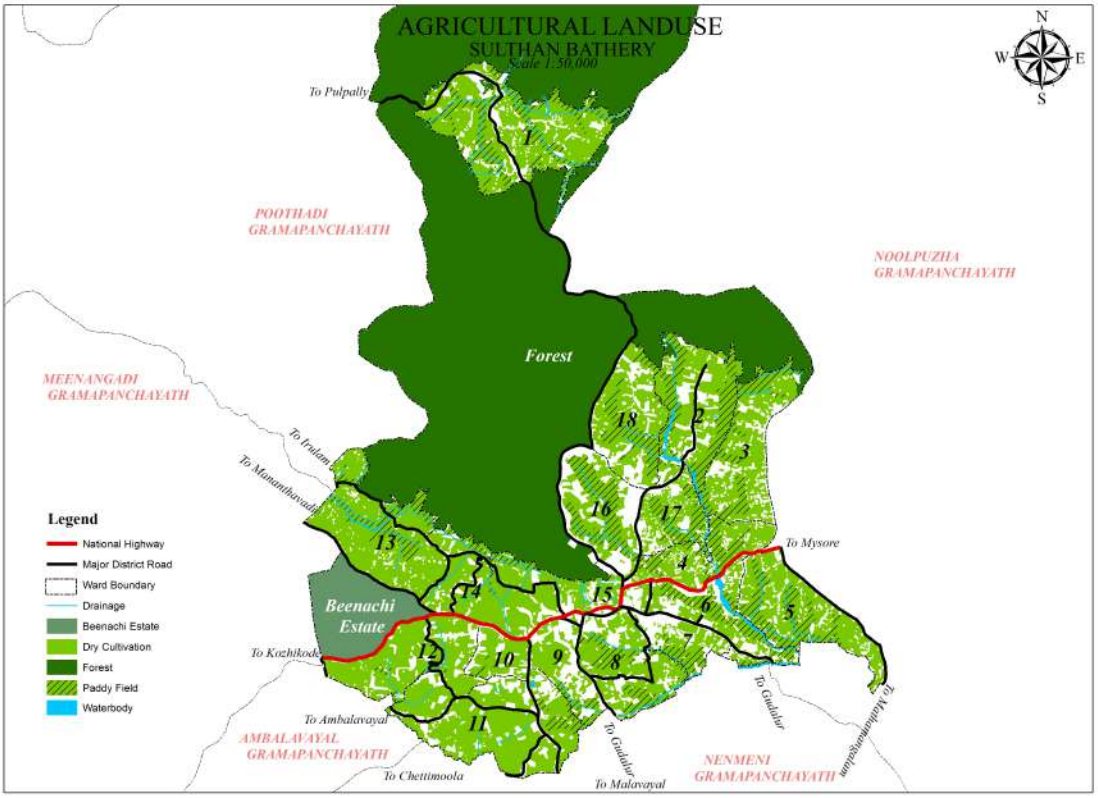


Figure 6.16: Spatial Distribution of Agricultural Land

Source: Land use survey 2012

6.3.8 Forest Land Use

The total extent of the forest area comes to 60.88 Sq.km which constitutes 58.98% of the total planning area in which all the construction activities are prohibited. The reserve forest which forms part of Wayanad Wild Life Sanctuary is scattered along the northern part of the local planning area. The two isolated wards viz. “Chenad” and “Chethalayam” are surrounded by forest land and about 6 km away from the core area. It is specifically noted that the ward delineation has been made without considering the forest land. The spatial distribution of forest land use is shown in Fig 6.17.

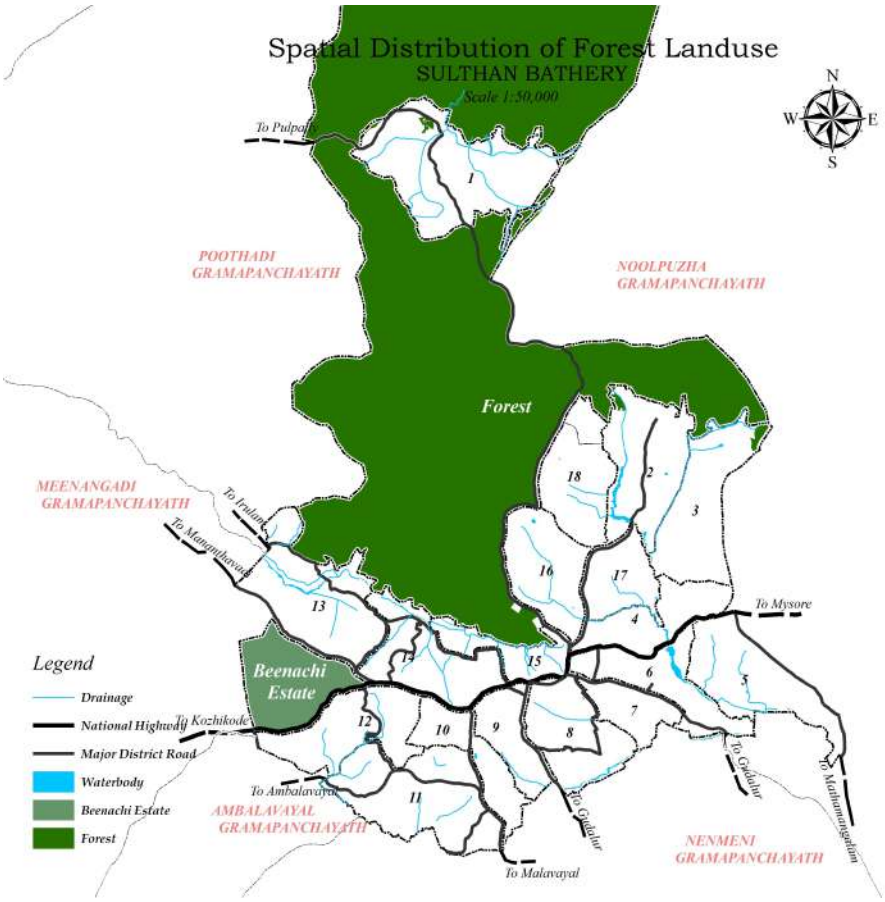


Figure 6.17: Spatial Distribution of Forest Land

Source: Land use survey 2012

6.4 Inference

The study of land use shows that there is enough scope for development in the future. The environmental quality of the place has not been degraded much due to the development activities. The depletion of agricultural land use is not very severe in the planning area even though paddy fields have been extensively filled up for various other purposes.

CHAPTER 7

TRAFFIC & TRANSPORTATION

7.1 Introduction

The efficiency of the transportation system is an indicator of development because the quality of a community is directly related to the quality of its transportation system. Roads are important channels of movement of people and the development of a road network in any settlement is the physical manifestation of the extent and the direction of the mobility of the people to satisfy their requirements in day-to-day activities for work, recreation, and living.

Physiographically, Wayanad is situated on the southwest edge of the Peninsular shield of India and is distinctly marked by the Western Ghat where ground elevation above mean sea level range between 700-2100m, whereby it is contained within the Highland region with rugged topography. The only mode of transport is road and no alternatives such as rail, air, and waterways are available.

7.2 Regional Transportation Network

Wayanad is well connected to Mysore and Coorg Districts of Karnataka, the Nilgiri and Ootty – the famous tourist place in South India in Tamil Nadu, Kannur, Kozhikode, and Malappuram Districts in Kerala by road. Kozhikode - Kollegal road (NH 766) and Mananthavady - Bavali road connect the district to Karnataka. It is connected to Nilgiri district in Tamil Nadu by Sulthan Bathery-Ayyankolly-Gudalur road, Sulthan Bathery – Thaloor – Gudalur road, and Vythiri-Vaduvanchal- Gudalur road. The three roads which connect the district with Kozhikode and Kannur Districts of Kerala are Thamarassery ghat (NH 766), Mananthavady – Thalassery Road through Periya ghat, and Mananthavady - Kuttiyadi Road through Kuttiyadi ghat. The district is well linked with Karippur International Airport in Malappuram district (115km from Sulthan Bathery) through NH 766 and Kannur International Airport in Kannur district (108 km from Sulthan Bathery) is within the nearest proximity to the district. There is a good linkage between the Beypore port at Kozhikode and Bengaluru the famous IT hub. The nearest railway station is Kozhikode about 75 km away from the district headquarters. Fig.7.1 illustrates the regional road network.

Transportation towards the south is difficult due to the steep hills and the land sliding and road accidents make the journey through ghat life-threatening. Hence alternate road proposals avoiding the ghat section are considered by the Government. The following proposals are under consideration.

1. Kalpetta – Varambetta - Poozhithode Road
2. Meppady – Chooralmala - Nilambur Road.

3. Thondernadu – Kunhome - Vilangad Road.
4. Chippilithode – Maruthilavu - Thalippuzha Road.
5. Meppady – Kalladi - Anakkampoyil Road.

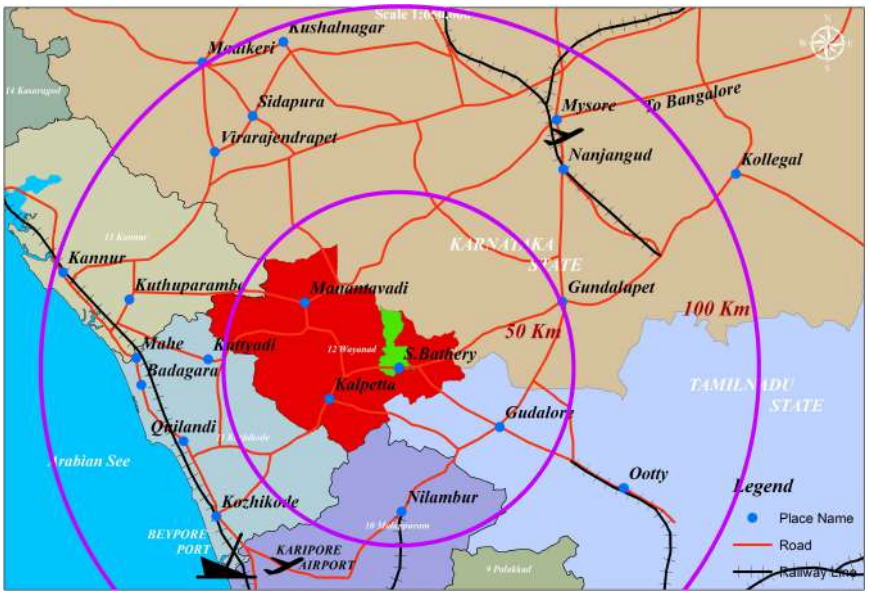


Figure 7.1: Regional Road Network

Though the above-said alternate proposals are prepared by the concerned department, all of them are touching forest land to require approval from **MoEF** New Delhi. So the existing Pakranthalam- Kuttiyadi Road could be improved and make use of an alternate proposal for the Ghat section.

Another proposal for railway connectivity connecting Nanjangud of Karnataka state to Nilambur of Malappuram District through Sulthan Bathery of Wayanad is being considered by the administration which if materializes will flourish the district by all means.

The Karnataka Government banned the night journey to Mysore through the Bandipur National park (NH766) and the alternative to this route considered is Mananthavady – Tholppetty – Kutta – Hunsur – Mysore Road. Also the proposed "Hill highway "(Proposed Hill Highway or State Highway 59 (SH-59) is the longest state highway in Kerala which extends from Nandarapadvu in Kasaragod District to Parassala in Thiruvananthapuram District, and will have a length of 1332.16 km.) passes through the district and the following road stretches form part of the Hill highway in the district.

1. Mananthavady – Panamaram – Kalpetta – Meppady – Arunappuzha Road.
2. Boys Town – Mananthavady – Tharuvana – Padinjarathara – Poozhithode Road.

7.3 District Transportation Network

The district has a fairly good road network comprising National Highways, State Highways, Major District roads, and other roads. All the roads are experiencing poor road geometry and surface condition. The NH 766 connects the district with Kozhikode and Mysore and other growth centers within the district are well connected with Major District Roads. The State Highways passing through the District are

1. CVG Road (Calicut - Vythiri-Gudalur –SH: 29)
2. Kalpetta - Varambetta Road –(SH: 54)
3. Thalassery - Bavali Road (68/200 to 81/000) - (SH: 59).
4. Mananthavady - Kalpetta Road 0/000 to 30/800 (SH: 59).
5. Kalpetta - Meppady road (SH: 59).
6. Meppady - Chooralmala Road (SH: 59).
7. Chooralmala - Arunappuzha Road (SH: 59.)
8. Vythiri - Tharuvana Road 23/600 to 31/590 (SH: 59.)
9. Mananthavady - Pakranthalam Road 6/470 to 10/240 (SH: 59).

Sulthan Bathery is one of the major transit centres in the district connected only by road and is well connected to other Growth centers and prominent tourist places of the district with Major District Roads shown in fig 7.2 namely -

1. Sulthan Bathery – Pattavayal – Gudalur Road
2. Sulthan Bathery – Thaloor – Gudalur Road
3. Sulthan Bathery – Pulpally – Perikalloor Road
4. Sulthan Bathery – Panamaram – Mananthavady Road

7.4 Local Transportation Network

Sulthan Bathery is provided with a fairly good road network with less carriage width, sharp curves, and poor road geometry. The road network within the planning area is of a "***Spine and spur"*** type with NH 766 acting as a spine and all other roads taking off from NH 766 as spurs. The NH 766 passes through the heart of the town. Sulthan Bathery is well connected to other parts of the district by MDR and other roads. The Sulthan Bathery – Pattavayal – Gudalur road and Sulthan Bathery – Thaloor – Gudalur road connects the Municipality with the famous tourist hill station Ooty in Tamil Nadu state. Moreover the Sulthan Bathery – Pulpally – Perikalloor Road and Sulthan Bathery – Panamaram – Mananthavady Roads are other Major District Roads that connect the town with Perikalloor and Mananthavady. The two isolated wards viz. Chenad and Chethalayam which are about 10 km away from the town are connected with MDR. Fig 7.3 shows the existing road

network within the Municipality. Apart from this, Major District Roads leading to places outside the town are-

1. Bathery – Malavayal – Ambalavayal Road
2. Bathery – Kuppadi Road

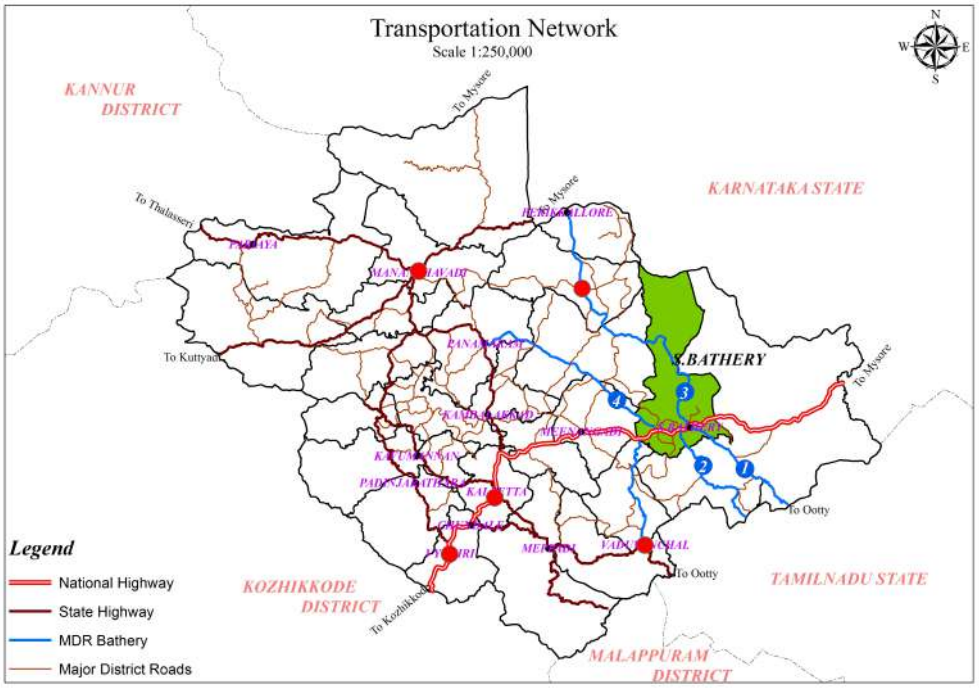


Figure 7.2: District Transportation Network

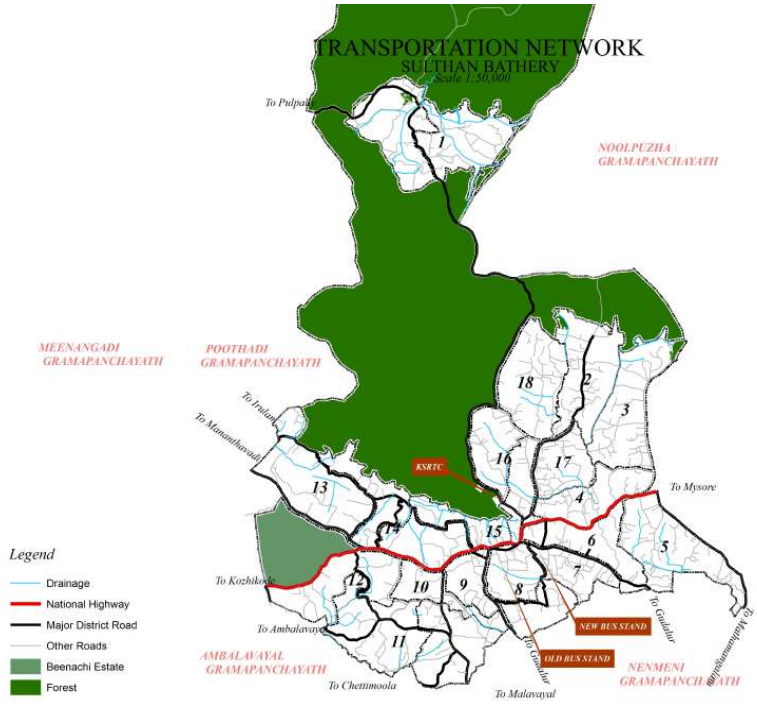


Figure 7.3: Existing Road Network in Sulthan Bathery

7.5 Transportation Study, Analysis and Findings

The analysis of the transportation network in the planning area is carried out based on the following studies.

1. Existing Road Network
2. Traffic analysis
3. Capacity utilization
4. Parking demand
5. Pedestrian traffic
6. Intercity /Intra city travel characteristics
7. Existing facilities.
8. Issues.

The Traffic and Transportation studies have been entrusted to the National Transportation Planning and Research Centre (NATPAC), Thiruvananthapuram, and the findings were derived based on their studies.

7.5.1 Existing Road Network

Sulthan Bathery is a major transit center in the district connected by road. The study area is served by public transport system consisting of both State-owned Kerala State Road Transport Corporation (KSRTC) and private buses. The buses are operated from both the old bus stand near the Traffic junction and the new bus stand at Chungam.

Sulthan Bathery town –An overview





Almost all the roads are experienced with narrow width, poor road geometry and surface condition. The town roads are maintained by both PWD and the local body. Major roads leading to places outside as well as within the town are:

- Panamaram Road
- Pulpally Road
- Mysore Road
- Kozhikode Road

- Pattavayal – Ootty Road,
- Thaloor – Ootty Road,
- Poomala - Malavayal – Ambalavayal Road,
- Beenachi – Pazhuppathoor Road
- Kattayad Road.
- Kuppadi – Vadakkanad Road
- Moolankavu – Thelampatta Road
- Kalluvayal – Maidani Kunnu Road
- Police Station Road
- Rahim Memorial Road

The existing road network is shown in fig 7.3 and the length of roads available in the planning area and their classification are given in table 7.1. The road density comes to 5.75/1000ppn which is high when compared with the district average (3.75 km/1000 population), the State average (4.7 Km/1000 pop), and the national average (2.6 Km/1000 pop).

Table 7-1: Length of Road within the Municipality

Sl No	Road Type	Length (Km)
1	National Highway	9.10
2	State Highway	00
3	Major District Roads	46.37
4	Other Roads	205.75

Source: Primary survey

7.5.2 Traffic Analysis

To understand the present scenario in the traffic and transportation sector and to formulate an efficient transportation network, the following parameters have to be analyzed.

7.5.2.1 Accident Prone Areas

Accidents are caused due to many reasons such as indiscipline of the road users, poor road geometric, visibility obstruction, weather changes, and encroachments. The details of accidents within the district and in the state are shown in table 7.2 below in which it can be inferred that major cases of accidents are caused by two-wheelers followed by cars and auto rickshaws.

Table 7-2: Comparison of Road Accidents of District with State

Details of road accidents in Wayanad for the period from 01/01/2012 to 31/12/2012			
		Wayanad	**Kerala**
Number of Accidents	Cases	828	36174
	Died	67	4286
	Gr Injured	387	26034
	Injured	355	15881
Type of road	NH(Nos)	158	9375
	SH(Nos)	156	6718
	OR(Nos)	265	20081
Type of vehicles involved in the accidents	KSRTC Bus	33	1435
	Private Bus	59	3819
	Lorry	21	2072
	Mini Bus	28	1967
	Car	156	10365
	Jeep	53	1019
	Auto	139	7222
	Two wheeler	305	25445
	Other	24	1841
	Not known	10	252
Cause of accident	Rush	565	35128
	Drunken	2	168
	Other	13	878
During	Day	434	27145
	Night	145	9029

Table 7-3: Road Accident Details in Wayanad during 2012

Year	No. of accidents	Death	Gr. injured	Type of Vehicles involved in the accident				
				Two wheeler	Three wheeler	Cars	Buses	Others
2010	787	52	376	278	134	217	93	65
2011	793	63	364	283	133	216	96	65
2012	828	67	387	305	139	209	113	62

From table 7.3, it can be seen that the majority of the accidents are caused by two-wheelers followed by cars. The total number of accidents shows unchanging and the death due to accidents are seen to increase.

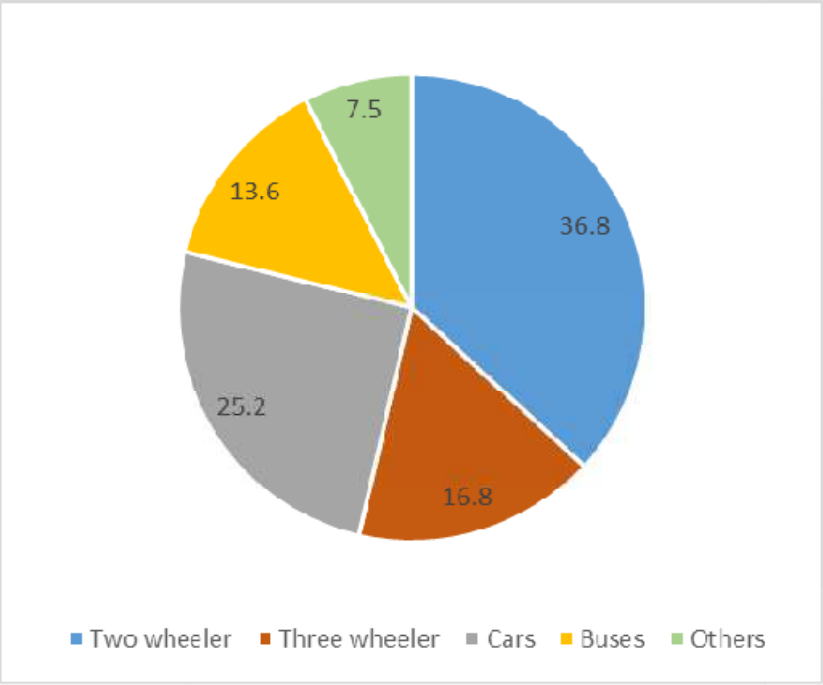


Figure 7.4: Distribution of Accidents According to the Type of Vehicles

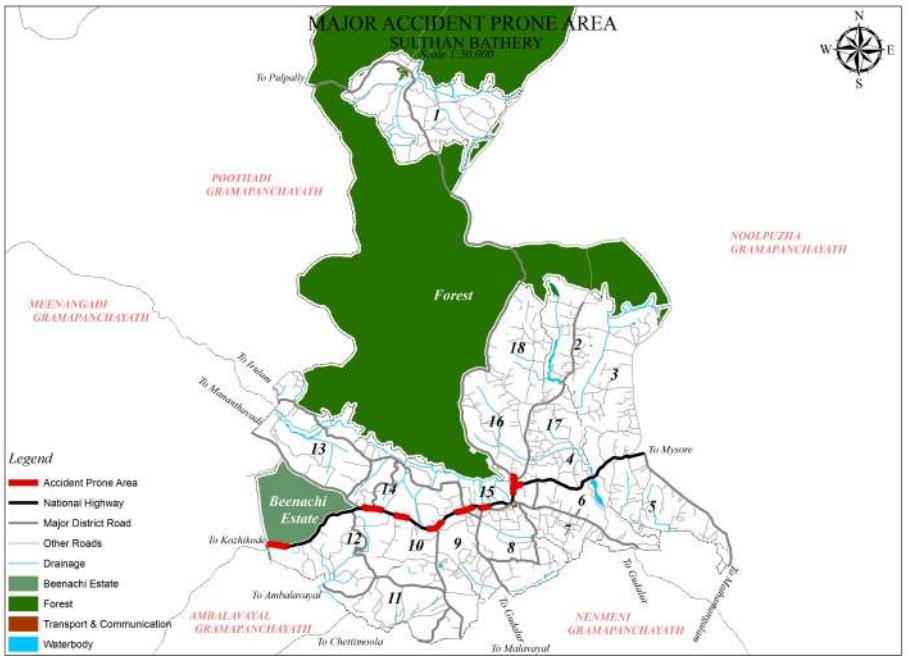


Figure 7.5: Spatial Distribution of Accident Prone Areas

Analysis of the distribution of accidents according to vehicle type shows that 35-40 percent of accidents involved two-wheelers. Places like the Traffic junction area, Kottakkunnu, Assumption junction, Poomala Road junction, Dhottappankulam, Beenachi junction, Ex-servicemen colony junction, etc. were the major accident-prone locations within the town. Fig.7.5 shows the spatial location of accident-prone areas in the town.

The major bottlenecks in the road network identified are the road stretches from Kottakkunnu to Chungam junction and in front of Swathantra maidani near the traffic junction which is spatially located in Fig.7.6.

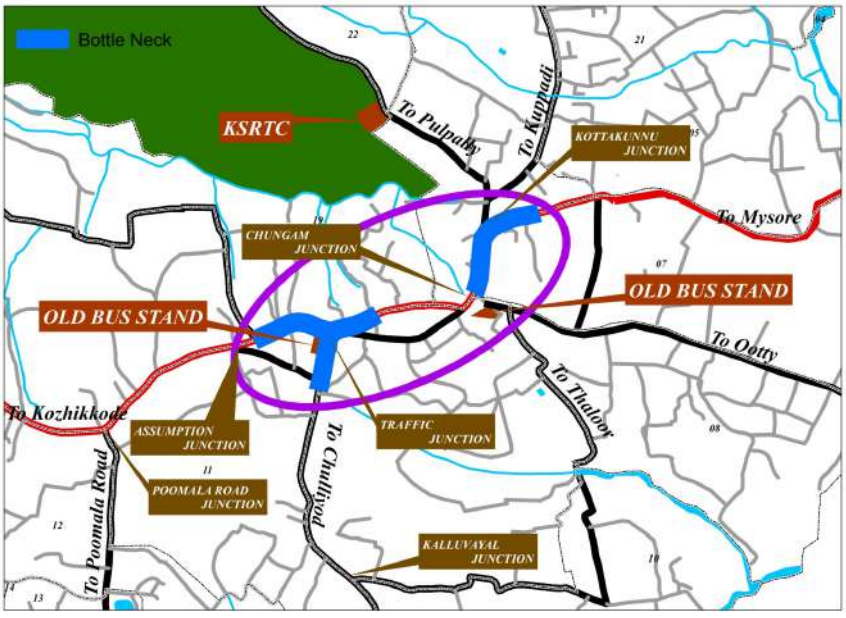


Figure 7.6: Bottlenecks within the Town

7.5.2.2 Vehicle Population

The trend in vehicular growth has been phenomenal all over the country and the Wayanad has no exception to this. The growth of motor vehicle in Wayanad District during the year 2007 to 2012 is given in Table 7.4 and fig.7.7. It could be seen that the vehicle population in Wayanad District has grown by nearly 1.6 times during the last five years.

Table 7-4: Growth of Motor Vehicle in Wayanad District during the year 2007 to 2012

Growth of the motor vehicles population		
Year	**Wayanad**	**Kerala**
2007-08	52171	4442387
2008-09	56607	4907495
2009-10	64495	5397652
2010-11	73362	6072019
2011-12	84007	6870354

Source:- NATPAC Report 2012

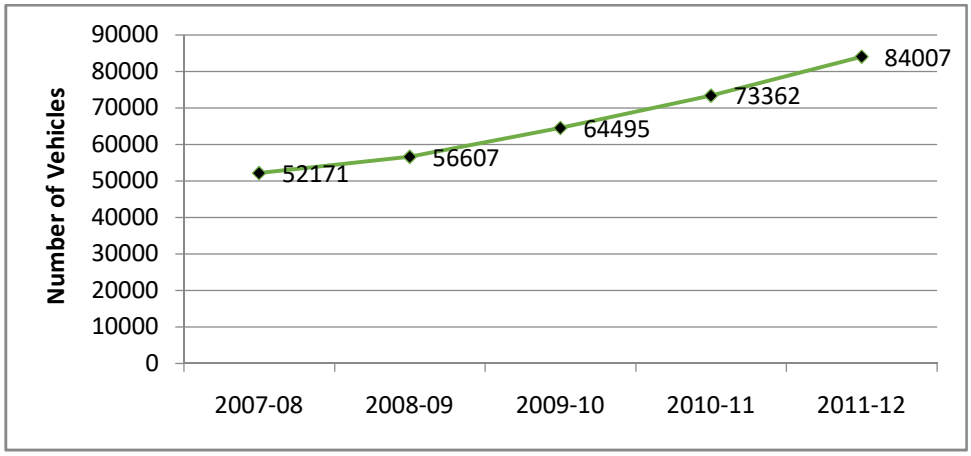


Figure 7.7: Growth of Motor Vehicles in Wayanad District since 2007-2012

The number of motor vehicles having valid registration in Wayanad District in 2012 is given in Table 7.5. An analysis of the existing vehicle population shows that the major share of i.e. nearly 49.26 percent of the total vehicle population in the district continued to be two-wheelers (41281) followed by cars (16 percent of the total vehicles in Wayanad district.

Table 7-5: Number of Vehicles Having Valid Registration

Number of motor vehicles having valid registration as on 31.03.2012			
		Wayanad	Kerala
Goods vehicles	Four Wheelers & above	4178	322450
	Three Wheelers including Tempos	2442	128452
Buses	Stage Carriage	181	21457
	Contract Carriages/ Omni Buses	1366	124290
Four wheelers	Cars	13479	1226691
	Taxis	3491	175638
	Jeeps	3874	73700
Three wheelers	Auto rickshaws	10632	575763
	Motorized Cycle Rickshaws	0	0
Two wheelers	Motorized Cycles	0	0
	Scooter/ Motor cycles	41281	4127227
Tractors/ Trailers	Tractors/ Trailers	158	13740
	Tiller	258	5399
	Trailers	142	2407
	Others	2311	68325
Total		83793	6865539

7.5.2.3 Road Inventory

To study the traffic characteristics of the study area, major travel corridors were identified and were divided into homogeneous sections on major roads in Sulthan Bathery town. The list is given in Table 7.6

Table 7-6: Details of Homogenous Sections Identified On Major Roads in Sulthan Bathery

Name Of Road	Homogeneous sections
1. N H - 766 from Moolankavu to Kolagappara-town boundary	Moolankavu – Kottakkunnu Jn. Kottakkunnu – Chungam Jn. Chungam Jn - Traffic Jn. Traffic Jn - Assumption Jn. Assumption Jn. – Beenachi Jn. Beenachi Jn - Kolagappara
2. Other Roads	Kottakkunnu Jn. – Pulpally Road Vadakkanad / Kuppadi Road Ootty Road Chulliyode Road Poomala Road Beenachi Jn. – Panamaram Road Pazhuppathoor Road Gandhi Jn – Assumption Jn. (One Way) Odappallam Road Thelampatta Road.

The NH766 lies east west direction has nearly 9.1 km of length of road within the study area. The carriage way width of this road varied from 7 m to 14 meters. There is no State highway passing through the Municipality and the length of MDR and other roads are 46.37 km and 205.75 km respectively. The road section between Chungam Road junction and Assumption Junction and Traffic junction and Gandhi junction were found to be congested due to heavy parking of all type of vehicles. Absence of foot path and shoulders were also noted during the inventory survey of this road. The inventory of major roads is presented in the **Annexure-III**

The analysis reveals that almost all the roads are experienced with insufficient carriage width, absence of foot path, shoulders and median, sharp curves which reduces sight distances and poor road geometry and thus creates road accidents. The incompatible method of road construction without considering the type of soil and poor workmanship causes early damage to the roads even after the renovation.

7.5.2.4 Speed and Delay Characteristics

This survey helps to evaluate congestion, capacity, level of service and the need for improvements in the road network. The "**Moving car observer**" method was used to determine the journey speeds and delays. Speed and delay survey was carried out on all the major roads in the town and based on the **Test Runs** made during the peak and off peak period during the day, the average travel speed of traffic with and without delay were worked out. Table 7.7gives the average running speed on different sections of the roads in the town

Table 7-7: Speed and Delay Characteristics of Major Roads in Sulthan Bathery Study Area

I. No	**Road section**	**Distance (kms)**	**Running time (second)**	**Delay time (second)**	**Speed. Kms/hr.**		**Causes of delay**
					With delay	**With Out delay**	
1	NH.766 from Moolankavu – Kolagappara						
	Moolankavu - Kottakkunnu Jn	3.1	239		47	47	
	Kottakkunnu - Gudalur Rd Jn (PN Bank)	0.3	45		24	25	Inter section
	Gudalur Rd Jn (PN Bank) - Traffic Jn	0.6	106	22	20	26	Congestion near Swanthra maithanam & inter section
	Traffic Jn - Assumption Jn	0.4	62	20	23	34	Bus stop in front of Municipal office & intersection
	Assumption Jn - Court Jn (Sb-Kuthani Road)	0.7	73	2	35	35	Intersection
	Court Jn (Sb-Kuthani Road)-Beenachi Jn	1.7	121	4	51	52	Inter section area
	Beenachi Jn - Kolagappara	2.3	152		55	55	Bus stop

	Average	9.1	798	50	41	44	
2	Panamaram Road - from Beenachi Jn - Nambeesan Kavala	3	257		42	42	
3	Pazhuppathoor Road (PMGSY Road - from Beenachi Jn - Town limit (Chappakolly)	4	485	5	30	30	Junction
4	Poomala Road						
	Court Jn (Sb-Kuthani Road) – Manichira	0.7	78		32	32	
	Manichira – Poomala	0.8	82		35	35	
	Poomala - Manivayal (Town limit)	1.1	115		34	34	
5	Chulliyode Road						
	Traffic Jn - Gandhi Jn	0.2	30		24	24	
	Gandhi Jn - Ammayipalalm Town limit)	2.1	190	12	40	42	Inter section & Bus stop
	Average	2.3	220	12	38	40	
6	Gudalur Road						
	NH.766 from Moolankavu - Kolagappara	0.9	81		40	40	
	Govt. guest house – Thoduvally (town limit)	2	137		52	52	
	Average	2.9	218		48	48	
7	Moolankavu - Thelampatta Road						
	Moolankavu Jn - Thelampatta Jn.	2.3	217		38	38	

8	Pulpally Road						
	Kottapally Road Jn - Kuppadi Road Jn.	0.1	16		23	23	
	Kuppadi Road Jn - Govt. UP School Road Jn	3.5	244		52	52	
	Govt. UP School Road Jn - Forest Check Post	1.9	128		53	53	
	Forest Check Post - PU Kalamalam(Town Limit)	7.9	585		49	49	
	Average	13.4	973		49	49	
9	Odappallam Road.						
	Kuppadi Road Jn-Moolankavu Jn.	3.9	533	22	26	27	Poor road condition & Inter section
	Via-Vadachira Road.						
10	Vadakkanad Road						
	Kottakkunnu-Govt. UP School Jn.	1.8	146		44	44	
	Govt. UP School Jn-Odappallam Road Jn	0.4	36		40	40	
	Odappallam Road Jn.-Pazheri(Town limit)	2.3	227		36	36	
	Average	4.5	409		40	40	
11	Chungam Jn-to-Traffic Jn-Via Police Station	0.6	100	33	22	32	Inter section
12	One way road						
13	One way road-from Gandhi Jn-Assumption Jn.	0.3	55	25	20	36	Parking & intersection

14	Thoduvetty Road from Gudalur Road- Moolankavu Jn on NH-766	2.2	265		30	30	Bad road surface and curves along the road
15	Beenachi-Kattayad Road from NH-766(Opp.Municipal office)-to-Bhavan's school Jn. Near Beenachi	4	473		30	30	Bad road surface, slope up area etc.
16	Kuppadi-college road from Kuppadi road Jn on Palapally Road-to-Govt.UP School Jn on Vadakkanad Road	1.5	195		28	28	Bad road surface

The maximum average journey speed of 55 km /hr. was observed between Beenachi Jn and Kolagappara Jn. The speed, however, was quite low in the following stretches.

1. Chungam Jn – Traffic Jn.
2. Traffic Jn. – Assumption Jn.
3. Kottakkunnu Jn – Moolankavu Jn.
4. Chungam Jn – Traffic Jn. Via police station.
5. One way road from Gandhi Jn. - Assumption Jn.

An analysis of delays and causes of delay reveals that nearness of road junctions, traffic congestion, haphazard parking of vehicles, narrow and bad road conditions were the major causes of delay for traffic flow on all most all roads in Sulthan Bathery town. It could be seen that the major delay of 50 seconds was observed on NH - 766 between Chungam junction and Traffic junction due to the nearness of junctions, presence of Ganapathivattam Temple, Hospital etc. Absence of off street parking and unorganized parking of two wheelers and four wheelers were the main reason of delay at this section. This is followed by 33 seconds of delay on police station road between Chungam Junction and Traffic junction due to narrow width and steep slope. Left / right turning of buses from / to Kalpetta / Panamaram direction to / from the new bus stand, unorganized parking of LCV (Light Commercial Vehicles) and passenger autos at auto stand were the major causes of delay at road section from traffic junction to Gandhi junction. Bad road condition, steep slope and frequent curves were the reasons for delay on Vadakkanad road.

7.5.2.5Traffic Volume at Major Intersections

The following are the major Junctions identified within the town limit.

- Traffic Junction
- Gandhi Junction
- Assumption Junction

- Chungam Junction
- Kottakkunnu Junction
- Beenachi Junction
- Kuppadi road Junction

Major junctions within the town are shown spatially in Fig.7.8 and peak hour volumes in each junction are shown in Table 7.8

Table 7-8: Peak Hour Traffic Flow at Major Intersections

Sl.No	Name of road intersection	No. of arms	Peak hour	Peak hour volume(PCU)
1	Chungam Junction	4	09.45 Am to 10.45 Am	4732
2	Traffic signal Junction	4	10.15 AM to 11.15 AM	3971
3	Kottakkunnu Junction	3	5 PM to 6 PM	3762
4	Kuppadi road Junction	3	09.15 Am to 10.15 Am	2492
5	Assumption junction	3	3.45 PM to 4.45 PM	2437
6	Beenachi junction	3	09.45 Am to 10.45 Am	1181
7	Gandhi junction	3	10.15 AM to 11.15 AM	1156

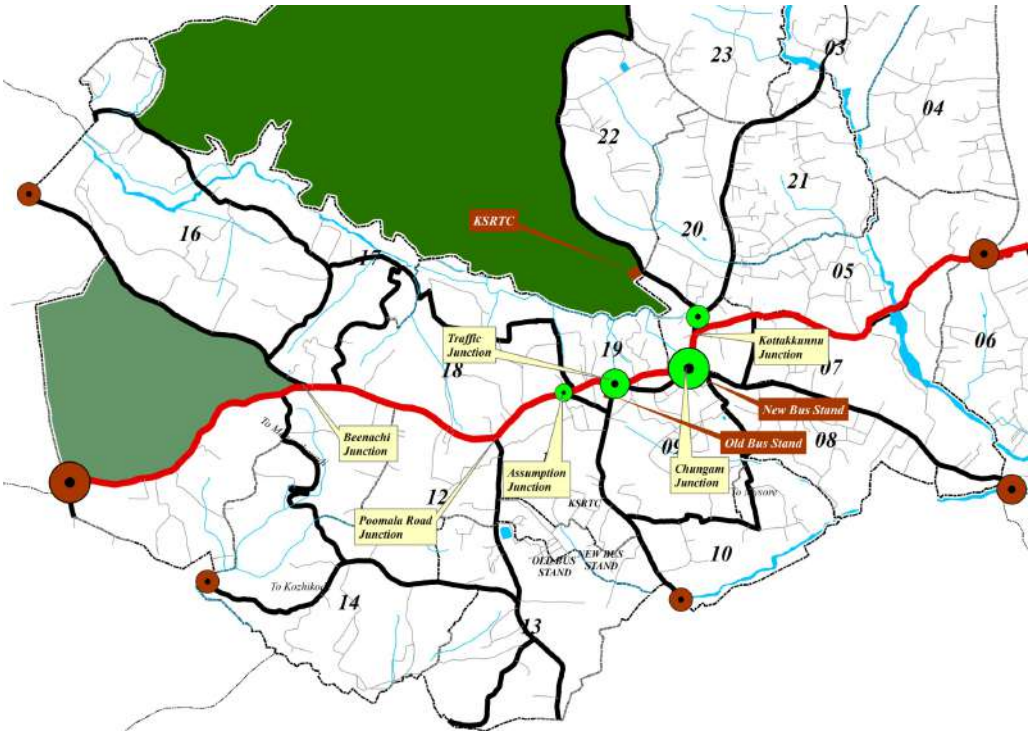


Figure 7.8: Major Junctions in Sulthan Bathery

The analysis shows that the peak hour traffic volume is maximum at Chungam junction and Traffic signal junction where the turning movement of NH is found high.

7.5.3 Link Volume and Capacity Utilization

Data about traffic volume and its composition was collected for all major road links of Sulthan Bathery town through a link volume survey. Traffic volume data collected from the field were converted into a single unit called "Passenger Car Unit (PCU)" using conversion factors suggested by IRC and analyzed for all major roads in Sulthan Bathery town as shown in **Annexure-IV**. Link volume survey reveals that On National Highway - 766, the daily traffic volume varied from 12560 PCU, observed at Chungam – Traffic junction section, to about 7297 PCU at Moolankavu – Kottakkunnu road stretch. The traffic volume witnessed by homogenous sections, Traffic junction – Gandhi junction (7184 PCU), Pulpally road (3941PCU), Ootty road (6127 PCU), Chulliyode road (4731 PCU), Manichira - Ambalavayal road (3184 PCU), Panamaram road (2433 PCU) per day.

A volume survey of all vehicles entering/exiting the study region was conducted at seven outer cordon points of the town. The classified volume of vehicles was recorded according to their direction of travel. The study reveals that the maximum daily traffic volume of 10292 PCU was observed on the Kolagappara survey location on the western side of NH 766, followed by 8031 PCU of vehicles through the Moolankavu location on the eastern side of NH 766. The Least PCU of vehicles (2284) was observed through Panamaram road. The composition of vehicles passing through the outer cordon point is given in **Annexure-IV**

7.5.3.1 Capacity Utilization

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

For working out the capacity of different road sections, the information compiled during the road inventory survey was compared with the specification of **IRC- 106 -1990** (guidelines for capacity on urban roads). While working out the capacities, due consideration was given to carriageway width, junctions, parking, lateral clearance, shoulders, surface conditions, etc. The traffic volume observed at different road stretches was compared with the capacity of road sections, to calculate the volume–capacity ratio (V/C ratio) of these road sections within the study area. The volume capacity ratio of major roads in Sulthan Bathery is presented in Table 7.9. On NH – 766 the homogenous sections between Kottakkunnu to Chungam junction, Chungam to Traffic junction, and Traffic junction to Gandhi junction (three sections) were found to be over-utilized. In all other sections of NH - 766 and other major roads, the V/C ratio was less than one.

Table 7-9: Peak Hour Volume Capacity Ratio of Selected Road Stretches in Sulthan Bathery Study Area

No	Road Link	Carriageway width(m)	Capacity (PCU)	Vehicle (PCU)	V/C
I	**Nh.766 Moolankavu - Kolagappara**				
1	Moolankavu - Kottakkunnu Jn	7.00	1500	1078	0.72
2	Kottakkunnu - Gudalur Rd Jn	7.00	1500	2487	1.66
3	Gudalur Rd Jn - Traffic Junction	7.00	1500	2732	1.82
4	Traffic Jn - Assumption Jn	10.00	3000	2572	0.86
6	Assumption Jn - Beenachi Jn	10.00	3000	2437	0.81
7	Beenachi Jn - Kolagappara	10.00	3000	947	0.32
II	**Panamaram Road**				
8	Beenachi Jn - Nambeesan Kavala	5.80	1200	478	0.40
III	**Pazhuppathoor Road**	3.80	900	125	0.14
IV	**Ambalavayal Road**				
9	Court Jn - Manivayal (Town Limit)	3.80	900	527	0.59
V	**Chulliyode Road**				
10	Traffic Jn - Gandhi Jn	6.00	1200	1447	1.21
11	Gandhi Jn - Ammayipalalm	12.00	2400	557	0.23
VI	**Gudalur Road**				
12	Moolankavu - Thoduvally	8.50	1500	662	0.44
VII	**Moolankavu - Thelampatta Road**				
13	Moolankavu Jn - Thelampatta Jn.	3.00	900	208	0.23
VIII	**Pulpally Road**				
14	Kottapally Road Jn - Pukalamalam	5.70	1200	397	0.33
IX	**Odappallam Road.**				
15	Kuppadi Road Jn – Moolankavu Jn.	3.00	900	396	0.44
X	**Thoduvetty Road**	7.00	1200	122	0.10

XXI	**Beenachi - Kattayad Road**	3.00	900	143	0.16
XXII	**Kuppadi - College Road**	3.00	900	55	0.06

7.5.4 Parking Demand

Annexure-V gives the summary of peak parking accumulation observed on major parking corridors in Sulthan Bathery town. Most of the parking activities were found to be along Chungam – Traffic junction, Gandhi junction – Assumption junction, Gandhi junction – MES College stretches. Of the seven corridors where parking accumulation survey was conducted, it was found that section between Chungam junction and Traffic junction had the highest parking accumulation of 245 vehicles parked on a normal working day. 50% of these vehicles were found to be two wheelers, followed by cars and passenger autos. Large numbers of cars are parked in Gandhi junction – Assumption junction and Chungam junction and bus stand entry. The parking accumulation of different vehicles on various road stretches is shown in the **Annexure-V.**

Majority of vehicles parked at most of the parking corridors on NH were found to be for short duration of less than 30 minutes. 56 to 72 percent of the vehicles parked on selected parking corridors were found to be parked for duration of less than 30 minutes. 14 to 25% of these vehicles were parked for a period ranging between 30 minutes and one hour. Long duration vehicles constituted between 9 to 22% of the total vehicles.

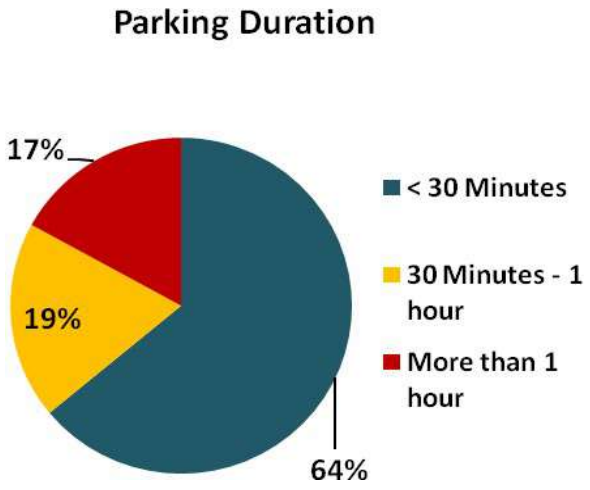


Figure 7.9: Parking Accumulation According to Duration of Parking

7.5.5 Pedestrian Traffic

Pedestrian Surveys were conducted at all the critical locations in Sulthan Bathery town. Analysis of the data on pedestrian cross movements revealed that a high volume of pedestrian cross movements totaling 2,976 occurred across various arms of Traffic junction during peak hour in a normal working day. Assumption junction is also carrying heavy pedestrian load.

Peak hour pedestrian cross and lateral movements observed at major locations of Sulthan Bathery town were given in Table 7.10 and its spatial locations shown in fig.7.10

Table 7-10: Peak Hour Pedestrian Cross Movements at Major Locations in Sulthan Bathery Town

SL No.	Name of location	Peak time		No. of pedestrians		
				Up	Down	Total
1	NH 766 Traffic Jn	05.00 PM	06.00 PM	1462	1514	2976
2	Nenmeni Road (In front of Bus Stand)	03.45 PM	04.45 PM	306	618	924
3	Gandhi Jn	11.00 AM	12.00 PM	463	431	894
4	Assumption Jn	08.45 AM	09.45 PM	1321	825	2146
5	Chungam Jn	08.30 AM	09.30 AM	511	470	981
6	Kottakkunnu Jn	09.00 AM	10.00 AM	393	353	746

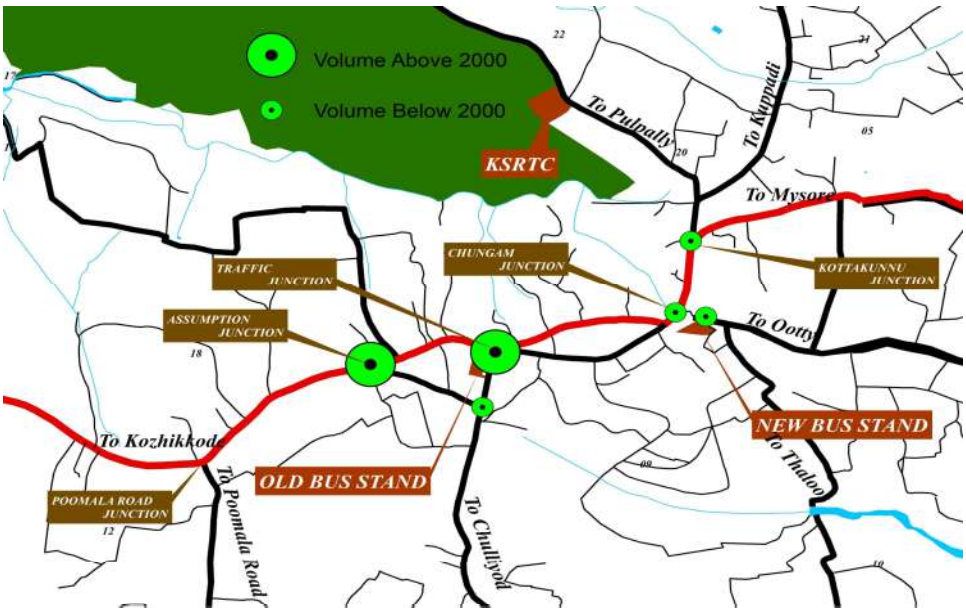


Figure 7.10: Junctions Showing Highest Pedestrian Traffic

Analysis of pedestrian cross movement at major activity/traffic generation areas revealed that a high volume of pedestrian cross movements occurred at Traffic Junction on NH 766, followed by Assumption Junction on NH 766. Pedestrian crossing in and around Chungam junction, Kottakkunnu junction, in front of the Municipal office area, Fish market area, and new and Old bus stand area were also found to be very high during peak hour**.** The reason for the high accumulation of pedestrians may be due to the presence of Bus stands, Schools, hospitals, and the Ganapathivattam Temple.

7.5.6 Intercity Travel Characteristics

Base year inter-city characteristics of passenger and goods movements were obtained by conducting origin–destination survey on a sample basis at outer cordon locations in Sulthan Bathery town. During the OD survey, buses were not stopped due to practical difficulty, and hence, the OD pattern of buses was estimated from the OD pattern of other vehicle types.

As the origin–destination survey was conducted on a sample basis, to get the total number of vehicles passing through the outer cordon locations; a traffic volume survey was also conducted simultaneously at these locations. Major outer cordon locations in Sulthan Bathery town as listed below.

- Kolagappara on NH 766 (West Town limit)
- Moolankavu on NH 766 (East Town limit)
- Nambeesan Kavala on Panamaram Road.
- Pukalamalam on Pulpally Road.
- Thoduvatty Palam on Ooty Road
- Ammayipalalm on Chulliyode Road
- Manichira Vayal on Poomala Road.

Fig 7.11 shows the location selected for conducting origin–destination survey in Sulthan Bathery town.

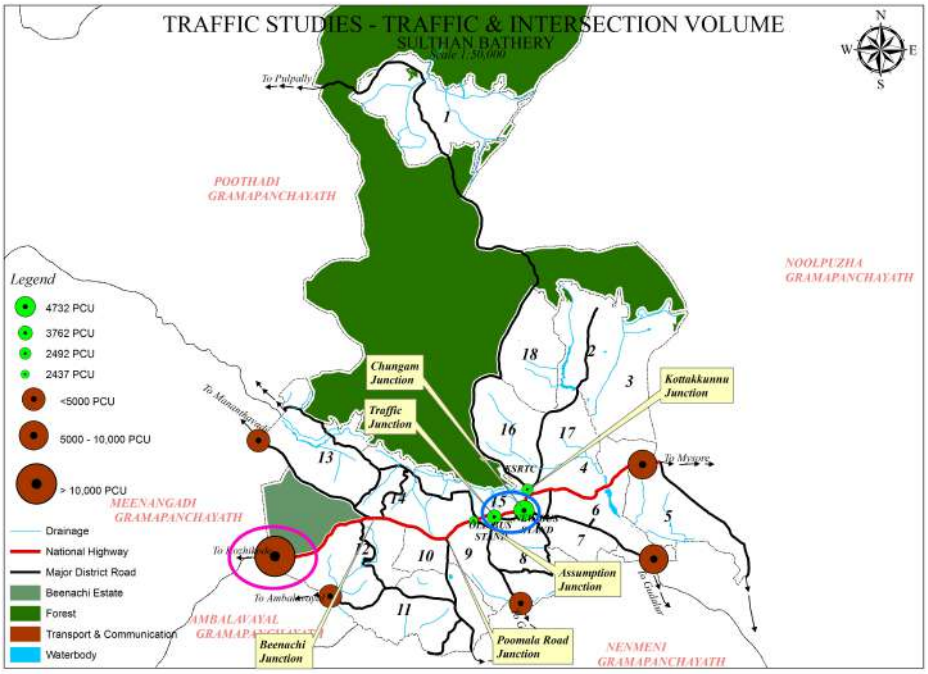


Figure 7.11: Location of Outer Cordon Points within the Town

The study was carried out to assess the quantum of inter – city passengers entering and exiting the town using different modes along with their socio-economic characteristics such as purpose, occupation, and frequency of trips. The study also helped to identify the trip production and attraction of different zones in the town.

For a meaningful analysis of OD survey data, the study region was divided into seven traffic zones, the boundaries of the zone corresponding to the boundary of one or more wards. Similarly, the outside study region was divided into 14 traffic zones, which included the immediate surrounding areas, adjoining Districts, and neighboring States. The study regions are as follows.

Zone 1: Pukalamalam, Chethalayam, Pazheri wards.

Zone 2: Thirunelly, Thelampatta wards.

Zone 3: Kottakkunnu, Kaippancheri, Maithanikkunnu and Kalluvayal wards.

Zone 4: Sulthan Bathery and Manichira wards

Zone 5: Poomala, Poothikkad and Beenachi wards

Zone 6: Pazhuppathoor, Kaivattamoola, Kattayad and Sathramkunnu wards.

Zone 7: Kidangil, Armadu, Kuppadi and Vengoor wards.

Further outer zones were delineated as follows:

Zone 8: Places in Poothadi Grama Panchayat

Zone 9: Places in Noolpuzha Grama Panchayat.

Zone 10: Places in Nenmeni Grama Panchayat.

Zone 11: Places in Ambalavayal Grama Panchayat

Zone 12: Places in Meenangadi Grama Panchayat.

Zone 13: Places in Kalpetta and surroundings.

Zone 14: Northern side of the district such as Kozhikode and Kannur Districts.

Zone 15: Southern side of the district such as Malappuram and Palakkad Districts.

Zone 16: Central Kerala – Ernakulum, Kottayam and Idukki Districts.

Zone 17: Alappuzha, Pathanamthitta Districts.

Zone 18: Kollam, Thiruvananthapuram Districts.

Zone 19: Karnataka, Goa and Maharashtra states.

Zone 20: Tamil Nadu, Pondicherry and Andhra Pradesh States.

Zone 21: Other states.

Fig 7.12graphically shows the zoning pattern adopted for the town and periphery under the study**.**

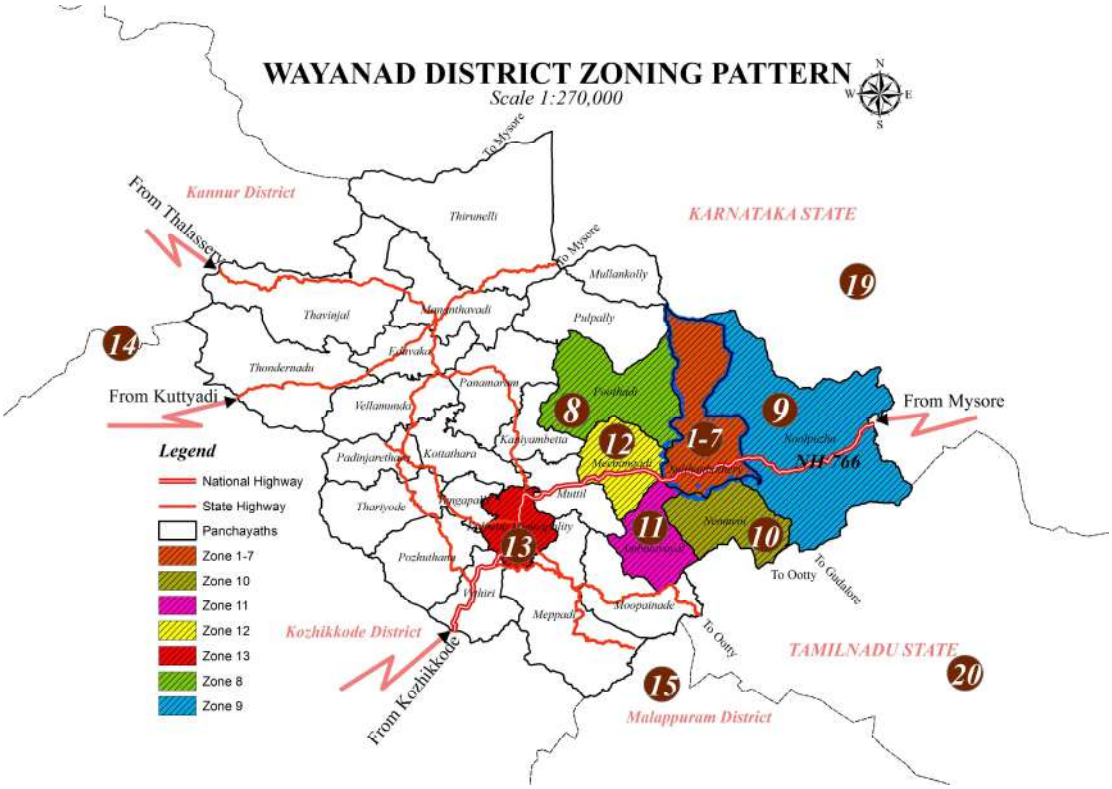


Figure 7.12: Zoning Pattern Adopted for Town and Its Periphery

The maximum daily traffic volume of 10,292 PCU was observed on the Kolagappara survey location on the western side of NH 766, followed by 8,031 PCU of vehicles through the Moolankavu survey location on the eastern side of NH 766. The Least PCU of vehicles (2,284) was observed through Panamaram Road.

The classified volume of vehicles was recorded according to their direction of travel. Distribution of vehicles passing through the outer cordon points in Sultan Bathery town is given in **Annexure – VI**

Volume count survey of all vehicles entering/exiting the study region reveals that the maximum daily traffic volume of 10292 PCU was observed at Kolagappara survey point on NH – 766 which included 4816 PCU of inbound vehicles and 5476 PCU of outbound vehicles. Car/jeep and van constituted the maximum followed by two-wheelers. As many as 8031 PCU of various types of vehicles were observed at the Moolankavu survey point on NH – 766 in which 4174 PCU were inbound vehicles and 3857 PCU were outbound vehicles.

About 6127 PCU of vehicles were observed on the Ooty road survey point at the Thoduvatty area, of which the inbound and outbound vehicles were found to be 2681 PCU and 3447 PCU respectively. The Total Passenger Car Unit (PCU) of the other two roads,

namely Chulliyode Road, Pulpally road, Ambalavayal Road and Panamaram Road were 4731, 3941, 3184 and 2284 respectively.

7.5.6.1 Intercity Passenger Travel Characteristics

Passenger vehicles making inter – city trips were intercepted at the outer cordon points and the volume of both inbound and out bound traffic were separately collected. Vehicle type wise total traffic according to survey station is presented in Table 7.9.

It was observed that a total of 28644 passenger vehicles were used for performing inter - city trips on an average in a day. Out of the total inter - city trips, a maximum of 22.46 percent was observed at Kolagappara survey point on NH - 766 towards Kalpetta direction followed by 20.19 percent at Moolankavu survey point on NH - 766 Mysore direction. Percentage distribution of passenger vehicles according to survey station in Sulthan Bathery town is presented in Fig 7.11.

Table 7-11: Distribution of Passenger Vehicles According to Survey Station

Survey station	**Car/jeep / van**	**SC / Mcj**	**Auto (P)**	**Bus/ other bus**	**Mini bus**	**Total**	**% of total passenger trips**
Kolagappara on NH 766 (West Town limit)	2548	2128	818	833	107	6434	22.46
Moolankavu on NH 766 (East Town limit)	2210	2069	1050	394	61	5784	20.19
Nambeesan Kavala on Panamaram Road.	794	899	384	159	16	2252	7.86
Pukalamalam on Pulpally Road.	961	1192	279	309	103	2844	9.93
Thoduvatty Palam on Ootty Road	1420	1709	931	369	90	4519	15.77
Ammayipalalm on Chulliyode Road	1283	1363	1133	373	50	4202	14.67
Manichira Vayal on Poomala Road.	740	911	698	161	99	2609	9.11
Total	**9956**	**10271**	**5293**	**2598**	**526**	**28644**	**100**

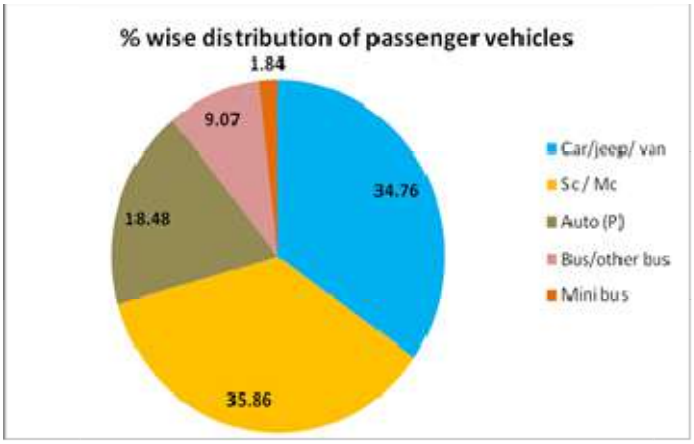


Figure 7.13: Percentage Wise Distribution of Passenger Vehicles According to Survey Station

7.5.6.2 Mode of Travel

Distribution of inter - city passenger traffic according to mode of travel is presented in Table 7.12. Distribution of inter – city passenger traffic by different modes is graphically presented in Fig 7.14.

In a day, as many as 178729 inter - city passengers traveling by different types of vehicles interacted with the town through the seven outer cordon points. Out of these, a maximum of 116910 (65.41 percent) passenger trips were performed by public transport buses, followed by 22279 trips by cars / jeeps which constituted 12.47 % of the total inter-city passenger trips. The contribution of passenger trips from / to the town by passenger autos and two wheelers were found to be 14737 trips (8.25 percent) and 14283 trips (7.99 percent) respectively.

Table 7-12: Modal Split of Inter-City Daily Passenger Trips in Sulthan Bathery Town

Sl.No.	Mode of travel	No. of passengers	% of passengers
1	Bus	116,910	65.41
2	Mini-Bus/ Tempo	10,520	5.89
3	Car/ Van/ Jeep	22,279	12.47
4	Auto Rickshaw	14,737	8.25
5	Two Wheeler	14,283	7.99
	Total	**78,729**	**100.00**

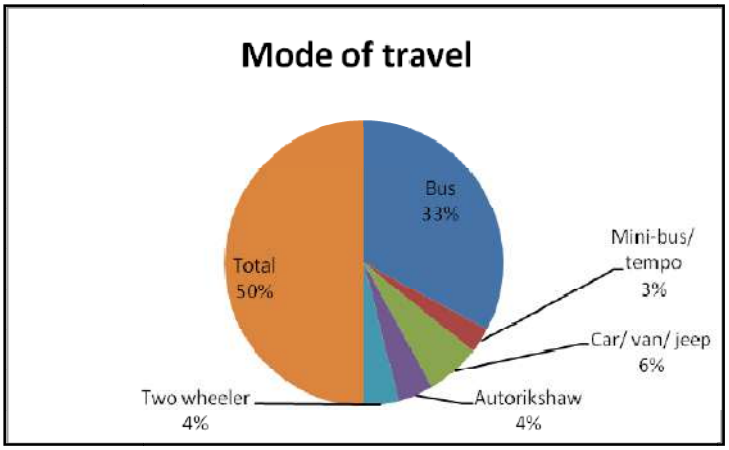


Figure 7.14: Distribution of Inter-City Passenger Traffic by Different Modes

7.5.6.3 Purpose of Travel

The distribution of intercity passengers according to the purpose of trips is shown in Table 7.13 and is graphically shown in fig.7.15.

Table 7-13: Distribution of intercity daily passenger trips according to the mode of travel and purpose of the trip

Sl.No.	Purpose of trip	Type of vehicle						
		Bus	Mini-bus	Car	Auto	Two wheeler	Total	Percent
1	Work	30,398	2,396	5,581	4,374	5,122	47,871	**26.78**
2	Part of work	4,182	291	719	459	692	6,343	**3.55**
3	Personal business	5,637	654	1,050	592	1,153	9,086	**5.08**
4	Shopping	6,436	505	1,217	1,994	800	10,952	**6.13**
5	Recreation	21,466	2,151	4,453	1,072	1,025	30,167	**16.88**
6	Social	12,138	1,201	2,415	534	860	17,148	**9.59**
7	Education	1,636	165	325	844	556	3,527	**1.97**
8	Back home	27,337	2,398	5,214	3,946	3,230	42,126	**23.57**
9	Serve passenger	384	23	68	-	140	614	**0.34**
10	Other	7,295	735	1,237	922	705	10,895	**6.10**
	Total	**116,910**	**10,520**	**22,279**	**14,737**	**14,283**	**178,729**	**100.00**

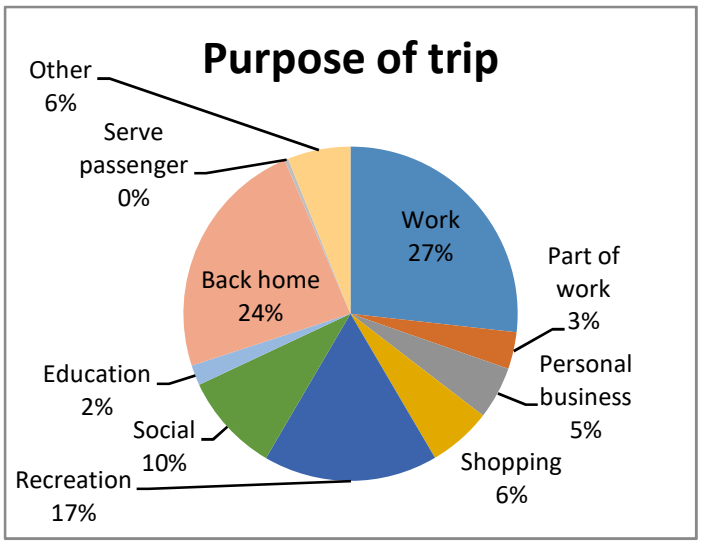


Figure 7.15: Distribution of Intercity Passengers According to Purpose of the Trip

In a day, as many as 178729 inter-city passengers traveled by different types of vehicles interacting with the town through the seven outer cordon points. Out of these, a maximum of 47871 (26.78 percent) passenger trips were performed for the work, followed by 42126 trips for back home trips, which constituted 23.57 % of the total inter-city passenger trips. The contribution of passenger trips for recreation and social purposes was found to be 30167 trips (16.88 percent) and 17148 trips (9.59 percent) respectively.

7.5.6.4 Occupation of Trips

The distribution of intercity passengers according to the occupation of trips is shown in Table 7.14 and is graphically shown in fig.7.16.

Table 7-14: Distribution of Intercity Daily Passenger Trips According to Occupation

Sl. No.	Occupation of trip	Type of vehicle						
		Bus	Mini-bus	Car	Auto	Two wheeler	Total	Per cent
1	Government service	10471	836	2022	333	1443	15,105	8.45
2	Private service	28116	2176	5103	4907	5488	45,790	25.62
3	Industry service	666	69	126	100	52	1,013	0.57
4	Business	38180	3544	7397	446	2297	51,864	29.02

5	Professional	5732	413	1002	267	195	7,609	4.26
6	Cultivator	16960	1891	3238	931	1244	24,264	13.58
7	Casual laborer	868	72	130	800	552	2,421	1.35
8	Retired	2340	204	465	999	353	4,362	2.44
9	Unemployed	2115	155	473	1306	362	4,411	2.47
10	Housewife	3762	469	715	3321	165	8,432	4.72
11	Student	4813	452	974	1245	1776	9,259	5.18
12	Others	2888	238	634	82	356	4,198	2.35
	Total	**116,910**	**10,520**	**22,279**	**14,737**	**14,283**	**178,729**	**100.00**

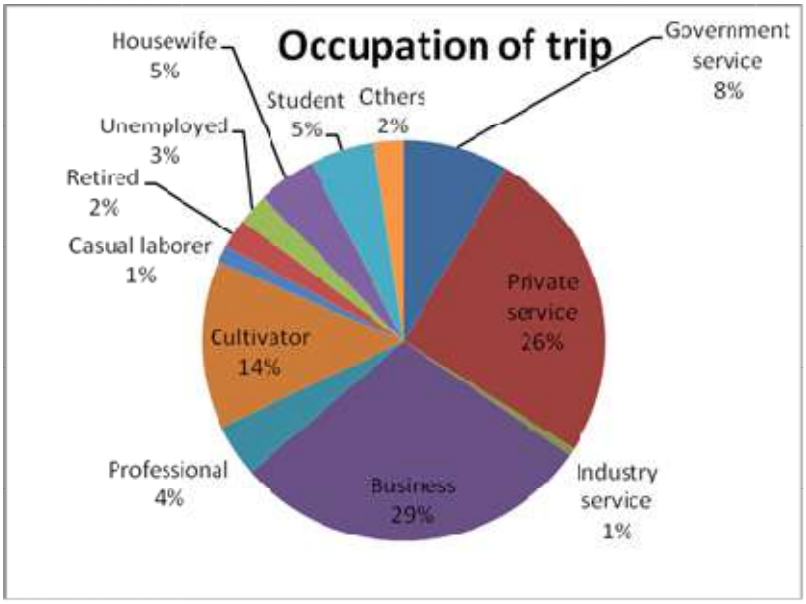


Figure 7.16: Distribution of Intercity Passenger Trips According to Occupation

In a day, as many as 178729 inter - city passengers traveling by different types of vehicles interacted with the town through the seven outer cordon points. Out of these, a maximum of 51864 (29.02 percent) passenger trips were performed by business personnel,

followed by 45790 trips (25.62%) by personnel working in private sector. The contribution of passenger trips performed by cultivators and government servants were found to be 24264 trips (13.58 percent) and 15105 trips (8.45 percent) respectively.

7.5.6.5 Pattern of Inter-City Passenger Trips

The study has further revealed total of 178,729 passenger trips were performed as inter-city trips in the study region on a reference day, of which 65,360 trips originated from Sulthan Bathery town. More than one lakh trips were originated from other places in Wayanad Districts. About 5,973 trips were originated from other districts in the State and 2,230 from other States. The origin-destination matrix of inter-city passenger trips is shown in Table 7.15**.**

In the case of trip attraction, 78,151 trips were attracted to Sulthan Bathery Town, while 91,000 trips were attracted to other places in Wayanad District; other districts in the State attracted 7,106 trips and other States 2,388 trips.

Table 7-15: Pattern of Inter-City Daily Passenger Trips in Sulthan Bathery Town

Sl. No	Originating Region	Terminating zones				Total	percent
		Sulthan Bathery Study Area	Wayanad District	Other Districts	Other States		
	Bus						
1	Sulthan Bathery Study Area	-	40368	2375	387	**43,130**	**36.89**
2	Wayanad District	49296	15764	2437	730	**68,227**	**58.36**
3	Other Districts	1597	2117	-	369	**4,083**	**3.49**
4	Other States	440	967	63	-	**1,470**	**1.26**
	Total	**51,333**	**59,216**	**4,875**	**1,486**	**116,910**	**100.00**
	per cent	**43.91**	**50.65**	**4.17**	**1.27**	**100.00**	
	Mini-bus						
1	Sulthan Bathery Study Area	-	3772	136	42	**3,950**	**37.55**
2	Wayanad District	4315	1581	220	93	**6,209**	**59.02**
3	Other Districts	91	152	-	22	**265**	**2.52**
4	Other States	32	58	6	-	**96**	**0.91**
	Total	**4,438**	**5,563**	**362**	**157**	**10,520**	**100.00**
	Per Cent	**42.19**	**52.88**	**3.44**	**1.49**	**100.00**	

	Car						
1	Sulthan Bathery Study Area	-	6435.5	480	106	7021.5	**31.52**
2	Wayanad District	7364.5	4458	1124	322	13268.5	**59.56**
3	Other Districts	426	809	-	180	1415	**6.35**
4	Other States	186	388	-	-	574	**2.58**
	Total	**7,977**	**12,091**	**1,604**	**608**	**22,279**	**100.00**
	Per Cent	**35.80**	**54.27**	**7.20**	**2.73**	**100.00**	
	Auto						
1	Sulthan Bathery Study Area		6016	35	-	**6051**	**41.06**
2	Wayanad District	7379	1307	-	-	**8686**	**58.94**
3	Other Districts	-	-	-		**0**	-
4	Other States	-	-	-	-	-	-
	Total	**7,379**	**7,323**	**35**	-	**14,737**	**100.00**
	Per Cent	**50.07**	**49.69**	**0.24**	-	**100.00**	
	Two wheeler						
1	Sulthan Bathery Study Area	-	5003.5	132	72	**5207.5**	**36.46**
2	Wayanad District	6915	1730	66	65	**8776**	**61.44**
3	Other Districts	65.5	144	-	-	**209.5**	**1.47**
4	Other States	43	15	32	-	**90**	**0.63**
	Total	**7,024**	**6,893**	**230**	**137**	**14,283**	**100.00**
	Per Cent	**49.17**	**48.26**	**1.61**	**0.96**	**100.00**	
	Total						
1	Sulthan Bathery Study Area	-	**61,595**	**3,158**	**607**	**65,360**	**36.57**
2	Wayanad District	**75,270**	**24,840**	**3,847**	**1,210**	**105,167**	**58.84**
3	Other Districts	**2,180**	**3,222**	-	**571**	**5,973**	**3.34**
4	Other States	**701**	**1,428**	**101**	-	**2,230**	**1.25**
	Total	**78,150**	**91,085**	**7,106**	**2,388**	**78,729**	**100.00**
	Per Cent	**43.73**	**50.96**	**3.98**	**1.34**	**100.00**	

The O-D pattern of inter-city passenger traffic revealed that there were 65,360 internal - external trips (Study region to outside study region), out of 178,729 inter-city passenger trips. They constituted 37 per cent of total trips. A total of 78,155 trips were external – internal trips (outside study region to study region) constituting 44 per cent of the total trips. External – external trips to the tune of 35,219 were performed through the study region and they were nearly 20 per cent of the total trips. Pattern of inter-city passenger movements through the town is given in Table 7.16.

Table 7-16: Pattern of Passenger Movements through Sulthan Bathery Town

Pattern of movement	No. of passengers	Percent of passengers
Internal to External	65,360	36.57
External to Internal	78,155	43.73
External to External	35,219	19.70
Total	178,729	100.00

7.5.7 Inter-City Goods Traffic

The number of goods vehicle and the quantum of commodities transported in to and out the town needs to be studied in detail to identify the deficiency in the road network and also to estimate the traffic pattern of the town. A total of 4122 goods vehicles (excluding empty vehicles) were used for transporting 8157 tonnes of various commodities through the outer cordon points of Sulthan Bathery town. Total1545 truck trips were observed at all the seven major outer cordon points. The analysis of data reveals that about 52% of these trips were through traffic which neither originating nor terminating within the town. Original destination matrix of goods transportation is given in **Annexure-VII.**

7.5.7.1 Modal Split of Goods Traffic

A total of 4,122 goods vehicles passed through various outer cordon points in Sulthan Bathery town, of which 1,545 were trucks, 1,353 mini-trucks and 1,224 goods autos. The quantum of goods handled by these goods vehicles was to the tune of 8,157 tonnes. Trucks carried the maximum volume of goods traffic (70.26%), followed by mini-trucks (20.72%). The remaining 9.02 per cent of goods traffic was handled by goods autos (Table 7.17& Fig.7.17).

Table 7-17: Modal Split Of Inter-City Daily Goods Traffic (in tonnes) in Sulthan Bathery Town

Sl. No.	Mode of travel	No. of vehicles		Quantity carried	
		No.	Per cent	Tons	Per cent
1	Truck	1,545	**37.48**	5,731	**70.26**
2	Mini-Truck/ tempo	1,353	**32.82**	1,690	**20.72**
3	Goods Auto	1,224	**29.69**	736	**9.02**
	Total	**4,122**	**100.00**	**8,157**	**100.00**

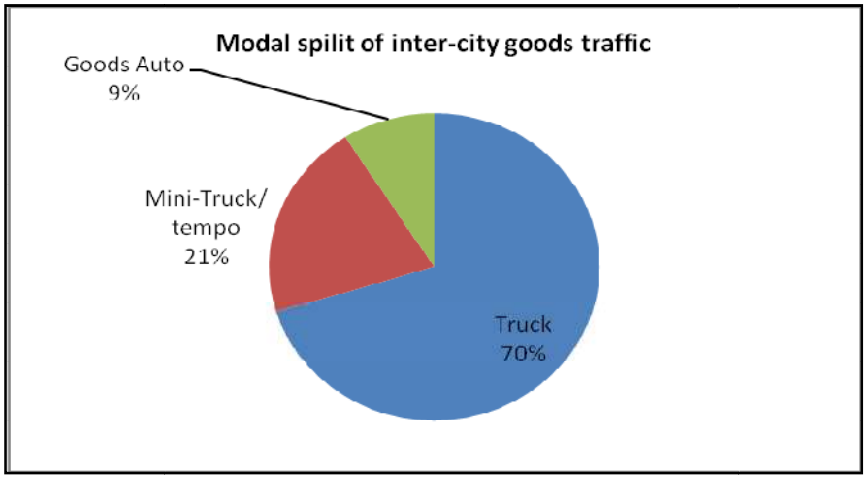


Figure 7.17: Modal Split of Goods Traffic

7.5.7.2 Intercity Goods Movements According To Commodity Carried

The analysis of commodity carried by trucks shows that a maximum of 1394 tonnes of cement, followed by 968 tonnes of Rice and Paddy and 788 tonnes of Fruits & vegetables were found to be transported by truck trips. Commodities like Bricks & tiles (366 tonnes), wheat (188 tonne), 547 tonnes of provisions, 220 tonnes of fertilizers etc. were found to be carried by the trucks.

Fruits and vegetables were the major commodity transported by goods auto through the outer cordon points in the town. About 788 tonnes of the commodity were transported in day time.

Cement was the major construction commodity transported by truck/multi axel truck- 1394 tonnes, followed by 169 tonnes of iron and steel, 366 tonnes of bricks & tiles, 316 tonnes of timber. Commodities like rice, vehicles (car/ two wheeler / autos) were also found to be transporting from other state to southern state of Kerala by MAT through Sulthan Bathery town. The commodity wise goods transported are shown in table 7.18.

Table 7-18: Distribution of Inter-City Goods Traffic in Tonnes According to Commodity Carrier

Sl. No	Name of commodity		Truck	Mini-truck	Goods Auto	Total
1	**Foods Grains**	Wheat	185.556	-	2.023	**188**
2		Rice & Paddy	608.293	322.036	37.287	**968**
3		Grains & Pulses	16.471	5.940	6.571	**29**
4		Other Food Grains	124.559	-	-	**125**
5	**Agricultural Products**	Fruits & Vegetables	488.743	181.654	117.617	**788**
6		Milk & Milk Products	26.618	12.916	1.020	**41**
7		Coconut & Copra	89.882	13.779	-	**104**
8		Meat	28.843	5.466	24.833	**59**
9		Fish	-	5.266	2.342	**8**
10		Eggs	-	-	0.831	**1**
11		Spices Including Rubber	-	4.900	-	**5**
12		Tea & Coffee	52.270	51.436	5.156	**109**
13		Sugar	131.613	83.294	-	**215**
14		Bakery Items	84.124	31.459	178.943	**295**
15		Beverages & Toddy	-	-	-	**-**
16		Soda & Drinks	17.255	14.043	-	**31**
17		Provisions	405.227	109.880	31.464	**547**
18		Hay	20.784	-	-	**21**
19		Cattle Feed	143.830	-	5.002	**149**
20	**Construction Materials**	Cement	1,289.345	100.667	4.023	**1,394**
21		Quick Lime (Kakka)	-	8.919	0.518	**9**
22		Earth & Gravel	80.000	-	-	**80**
23		Sand & Clay	19.192	0.140	-	**19**
24		Brick & Tiles	343.186	19.800	3.286	**366**
25		Granite & Rubbles	12.190	5.351	-	**18**
26		Sanitary Wares	37.745	26.558	3.720	**68**
27		Asbestos Sheets	33.288	-	2.838	**36**
28		Paints & Varnish	52.866	-	-	**53**
29		Timber	161.556	138.345	16.500	**316**
30		Firewood	79.992	102.523	45.407	**228**
31		Bamboo & Wood	91.392	18.237	1.874	**112**
32		Furniture	12.128	36.370	6.953	**55**
33	**Industrial Goods**	Steel Machinery	35.507	25.901	-	**61**
34		Iron & Steel	96.180	54.329	18.023	**169**

35		Aluminium	16.695	-	-	**17**
36		Electrical Goods	62.592	0.594	2.342	**66**
37		Tyres & Tubes	-	-	16.571	**17**
38		Spare Parts	-	0.234	-	**0**
39		Chemicals & Drugs	57.812	2.212	-	**60**
40		Medicines	-	1.229	-	**1**
41		Fertilizers	175.902	44.500	-	**220**
42		Soap	19.192	0.892	2.651	**23**
43		Rubber & Plastic Goods	36.720	4.167	6.507	**47**
44		Glass	37.726	-	4.944	**43**
45		Leather Goods	50.497	-	2.289	**53**
46		Ready-Made Garments	-	-	-	**-**
47		Stationery & Paper	17.255	29.423	11.589	**58**
48		Coir & Coir Products	18.848	-	4.257	**23**
49	**Petroleum Products**	Motor Spirit (Petrol)	49.026	-	-	**49**
50		Kerosene	61.282	-	-	**61**
51		LPG	-	77.228	-	**77**
52		Other POL Products	-	-	-	**-**
53	**Miscellaneous**	Empty Bags, Tins & Battles	73.405	38.038	47.340	**159**
54		Parcel	167.905	48.775	17.925	**235**
55		Ice	-	-	-	**-**
56		Miscellaneous	117.309	63.450	103.758	**285**
		Total	**5,731**	**1,690**	**736**	**8,157**

7.5.7.3 Pattern of Goods Traffic

A further study of the goods traffic pattern observed within the study region vis-a-vis the outside study region revealed that 1,812 tonnes of traffic originated from the study region and 2,093 tonnes of traffic terminated in the study region. Nearly 4,300 MT of traffic (52%) are of divertible nature, which was passing through the CBD area of the town area (Table 7.19).

Table 7-19: Pattern of Goods Movements through Sulthan Bathery Town

Pattern of movement	Quantity carried (MT)	Percent
Internal to External	1,813	22.2
External to Internal	2,093	25.7
External to External	4,252	52.1
Total	8,158	100.0

7.5.8 Traffic Projection

The fundamental principle of urban transportation planning is to formulate a long-term transportation plan serving the community in the future. Thus it becomes necessary to forecast the future travel pattern for the horizon year. Traffic projections help in evaluating the shortfall in the road network and accordingly plan the road network improvements, augment the facilities such as providing new roads, developing missing links, bypass road etc. This section gives an overview of various techniques available for traffic projections and the methodology adopted for this study.

7.5.8.1 Methods of Traffic Projection

Various methods of traffic projection employed in the transport planning include;

i) Growth factor methods.

ii) Regression method based on economic indicators like population, per-capita income growth rate, growth rate in industrial sector and land use parameter.

iii) Interpolation method based on past trend in traffic growth rates.

The relationship established between the various economic indicators for passenger and goods traffic movement can be used to estimate the future demand in an area. Also the growth rate of vehicular population in the area over the years will give a good estimate of the future trips. The traffic volume on links from the past years can be used to establish a growth rate for prediction of the future volume on links.

7.5.8.2 Techniques Adopted for Projection

In the case of Sulthan Bathery town, traffic projections were carried out according to the growth rates worked out on the following basis:

- Growth rate based on realistic estimates using influencing parameters.
- Studies conducted by NATPAC in different towns of similar size in Kerala in the past.
- Growth rate of vehicular population in Wayanad district over the years.
- Variation of AADT on major roads from biannual counts made by PWD periodically.

The growth rates estimated as per the above basis are given in the table 7.20 shown below.

Table 7-20: Traffic Growth Rates

Methods	Annual growth rate (%)
Studies conducted by NATPAC in similar towns in Kerala in the past (Peak hour traffic growth)	3 to 6
Growth rate of Motor vehicles registration in Wayanad district during 2005-2010	11.00
Biannual traffic count on major roads by PWD during 2007-08 (growth in AADT)	13.50

The impact of annual traffic growth on peak hour traffic was estimated based on the peak hour factors on daily traffic. On the basis of a critical evaluation of the above growth rates and also factors such as moderation in traffic growth over the years due to development of Information Technology in transportation sector, the following growth rates, given in table 7.21were adopted for Sultan Bathery Municipality for different categories of roads viz. arterial, sub-arterial and collector roads.

Table 7-21: Growth rates of Different Road Hierarchy

Hierarchy of Road	Traffic growth rate (%)	
	Up to 2020	Beyond 2020
Primary Road	5	4
Secondary Road	4	3
Tertiary Road	3	2

7.5.8.4 Projected link volume on existing network

Annexure –VIII presents the estimated daily traffic for different horizon years on various road stretches in the study area. Volume – capacity ratio for the horizon years is also given in this table. The section of roads between Moolankavu, Kottakkunnu, Chungam Jn and the stretch Traffic Jn- Gandhi Jn is presently congested (year 2013).In another ten years in addition to these roads the stretch till Kolagappara, Beenachi will be carrying vehicles more than twice of the road capacity. This implies NH 766 needs diversions.

7.6 Existing Facilities in Traffic & Transportation Sector

7.6.1 Transport Terminals

The town has two transport terminals owned by Municipality. The old bus stand located at the middle of the core (CBD) area near Traffic junction. The buses towards east viz. Pulpally, Noolpuzha, Cheeral etc. are now operated from this bus stand. The other bus

stand at east of core area near Chungam junction from which most of the buses leading towards the west viz. Kalpetta, Mananthavady, Ambalavayal etc. are operating. Both the terminals mainly caters to the inter district operation, interstate and intra district operations. The Bus stand attracts through traffic to the centre which creates congestion. Besides there is one KSRTC garage located at Kottakkunnu for parking, repair and maintenance of KSRTC vehicles. Long bus trips are (KSRTC) also operating from here.



K S R T C Depot at Kottakkunnu



Old bus stand



New bus stand

7.6.2 Truck Terminals

There are no organized truck terminals in Sulthan Bathery. Trucks are now operated from a road side of NH at Mysore road near Kottakkunnu junction and Mini trucks are operated from Chulliyode road. Hence there is a strong demand of truck terminal.

7.6.3 Taxi/Goods/Auto Rickshaw Stands

In Sulthan Bathery town there are no designated parking spaces for private/taxi vehicles. So the vehicle parked on the road which creates congestion. There are number of auto stands in the town. Major auto stands are as follows.

1) In Front of Doctors Corporate Hospital
2) Opposite to Kanhirandy Stores

3) Near Keerthy Tower.
4) Kottakkunnu Junction
5) Near Old Bus Stand
6) Beenachi Junction
7) Near Solar Hotel
8) Near Chungam Bus Stand
9) Gandhi Junction

Goods carrying auto rickshaw is also popular in Sulthan Bathery town catering to the goods movement in small quantities. They have parking facilities near Gandhi junction, Assumption junction and near new bus stand at Chungam.



Auto Rickshaw Stand near Old Bus Stand

7.6.4 Railways

There is no rail connection to the district. However, railway links extended up to Nilambur from Shornur and Nanjangud from Mysore. If Meppady-Nilambur rail materializes, it will go a long way-in improving the accessibility of Wayanad. Nilambur-Vythiri-Thalassery railway line is another important proposal which will have much greater impact on the development of the region. Kozhikode is the nearest railway station, which is 100km away from Sulthan Bathery.

7.6.5 Air Transport

The district is not connected with an air transport. The nearest Airports are Kannur International Airport and Karippur International Airport, they are located 108km and 115km away respectively. Besides the district authorities is seeking for a suitable land for the

construction of a feeder airport which will enhance the development of the district especially in tourism and Industrial sectors.

7.6.6 Water Transport

The district has no coastal area. The only stream which passes across the planning area is not suitable for water transport due to the undulated terrain and narrow width. Hence the water transport has no significance.

7.7 Major Issues in Traffic & Transportation Sector

Facilities for parking of private vehicles as well as public carrier are important for the smooth functioning of the traffic system of any town. In most of our towns commercial buildings have come up without adequate parking facilities due to various reasons. The vehicles coming to these commercial centres are forced to park in the sides of public roads. It seriously reduces the carrying capacity to these roads. The draft transport policy for the state, states that "For existing buildings/commercial complexes built without providing adequate parking space, such parking facilities will be built off-street by the local bodies at suitable location and costs from the building owners". Further the policy outlines the initiatives required by the government by saying "Open and Multi storied parking will be constructed by the Government at important terminals, Market centres, and multi modal logistic centres to promote inter-modal".

7.7.1 Bottlenecks and Missing Links

The major bottlenecks in the road network are the road stretch near Swathantra maidani and Kottakkunnu junction. Some missing links were identified in the road network such as road connection between Moolankavu and Thoduvatty. An inner bypass road connecting Dhottappankulam at NH 766 – Kalluvayal – Kaippancheri – Block office – Thirunelly at NH 766, is considered by the district administration for which administrative sanction has been obtained. When the road materializes it will reduce the traffic congestion in the central core area to certain extent.

7.7.2 Other Aspects

The road coverage is reasonably good within Sulthan Bathery but lesser width, poor road geometry and bad surface condition are the major problems. Besides the night journey through NH 766 is banned at Bandipur National Park. It will create an additional burden of through vehicles (more than 50% of total vehicles) including Goods traffic MAT at the day time. The draft transport policy for the State realizes this bottleneck in the case of urban roads and prescribes advance action to widen the existing arterial and sub arterial roads to 4/6 lane standards with provision for pedestrian walking and crossing facilities, cycle tracks and off-street parking. Due to the undulating topography of the town, straight stretches of road with properly developed junctions are not possible. This is a serious constraint in building an efficient road network in the town.

7.7.3 Major Issues

The major issues in the traffic and transportation system of Sulthan Bathery town identified are as follows.

- Even though the area has fairly good road network, most of them having inadequate width, poor road geometry and bad surface condition to meet the requirements.
- Lack of alternate mode of transport.
- Lack of pedestrian facilities & improper traffic management.
- The hinder lands are not served by public transport system. All residential areas are not connected with public transportation system.
- Absence of planned road junctions, organized parking
- Absence of Goods/Truck Terminals
- The through traffic (which is more than 50% of the total traffic) has to be diverted from the stretches of NH 766 at core area, so as to reduce to the traffic congestion and delay in NH 766.
- Mixing of inter-city and intra-city traffic and absence alternate link road
- In some of the prominent residential areas, the road network faces the problems of lack of adequate width and missing links.
- Serious inadequacy of parking space for Private/Taxi vehicles is another gap in the system.
- If the Bairakkuppa Bridge came into existence, the Sulthan Bathery – Pulpally – Perikalloor road will have great regional importance since it will be an alternate road to Mysore.
- Strengthening of ring roads, link roads and radial roads are necessary to facilitate easy vehicular movements with in the town.
- In the absence of by-pass for NH 766, “the through vehicles” are forced to passes through the core area which creates congestion

7.8 Inference

Sulthan Bathery is a major transit centre connected by road. The road network within the area is with limited inter-linkages. The Sulthan Bathery – Pattavayal – Gudalur road, Sulthan Bathery – Thaloor – Gudalur road connects the town with the world famous tourist centre viz. Ootty. NH 766 (old name NH 212) Connects the district with eastern and southern parts of the district, passes through the town and all of this shows the regional importance of the district as well as the town road network. The through traffic which forms part of the major traffic through the town creates traffic congestion. Insufficient carriage width, sharp curves, absence of footpath and shoulders, improper traffic management etc. are the major issues at present.

CHAPTER 8

PHYSICAL INFRASTRUCTURE

In this chapter, Housing, Water Supply, Sanitation, Power etc. are discussed in detail.

8.1 Housing

Housing is one of the basic needs of every human being. Article 21 of the Constitution of India recognizes the protection of life and personal properties as one of the fundamental rights which encompasses right to shelter since without safe shelter, one cannot protect his life.

8.1.1 Overview of Housing Sector

The area under residential use comes to around 16.73 % of the net area of the planning area (including satellite node at Chethalayam) which is scattered in 18 wards (at present 35wards). The densest wards are Odappallam, Thirunelly, Kottakkunnu, Sulthan Bathery, Manichira, Poomala, Beenachi, Armad, and Kuppadi & Vengoor. The spatial distribution of major residential land use shows that it is concentrated in the central part of the town and residential concentration is generally low in outer wards.

8.1.2 Existing Housing Condition

There are 9267 households and 9690 houses in the planning area as on 2012. From socio-economic survey, it is seen that majority of houses are either Pucca or moderate type which shares 89% of the total houses in the planning area. As per the socio economic survey it is found that 11% of the total houses are Kutcha and Hut. The percentage share of different type of buildings is given in Fig 8.1.

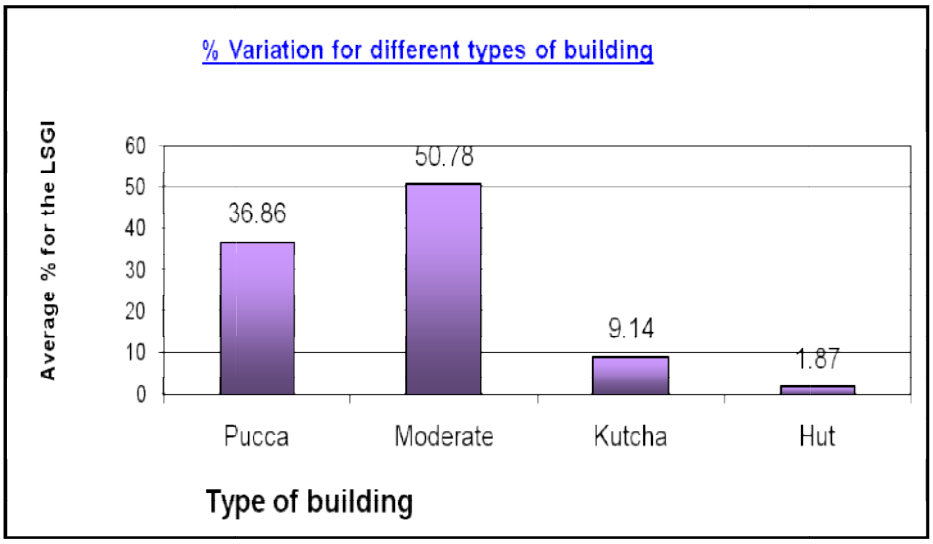


Figure 8.1: Percentage Type of Building

Source: Socio Economic Survey 2012

The houses are classified as Pucca and Moderate depending on the type of roofing provided. Therefore, this does not reflect the actual structural stability of the building. The Kutcha building and Huts are those having cheap roofing and weak in structural condition, so these houses require replacement immediately. The socio-economic survey indicates that the people, at all levels, giving high priority for quality housing. Further the survey reveals that most of the people have their own land for housing. The Fig 8.2 shows the nature of land ownership in housing.

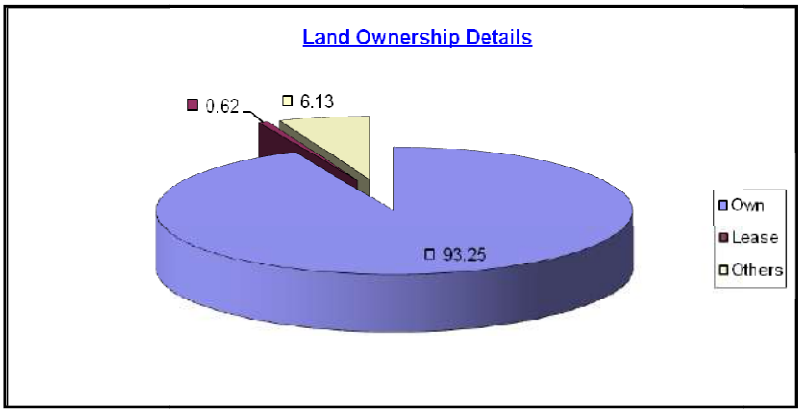


Figure 8.2: Nature of Land Ownership for Housing.

Source: Socio Economic Survey 2012

The share of 93.25% of the total house owners have own land in the planning area.

8.1.3 Housing Shortage

There are 9267 households as on 2012 and at present, total number of houses in the planning area is 9690 and all are occupied by owner, or otherwise given for rent. The data shows that number of houses is more than the households, hence it is assumed that there may be a chance of more than one houses owned by some of the high/middle income group category of population. The plinth area details of houses are given in Fig 8.3.

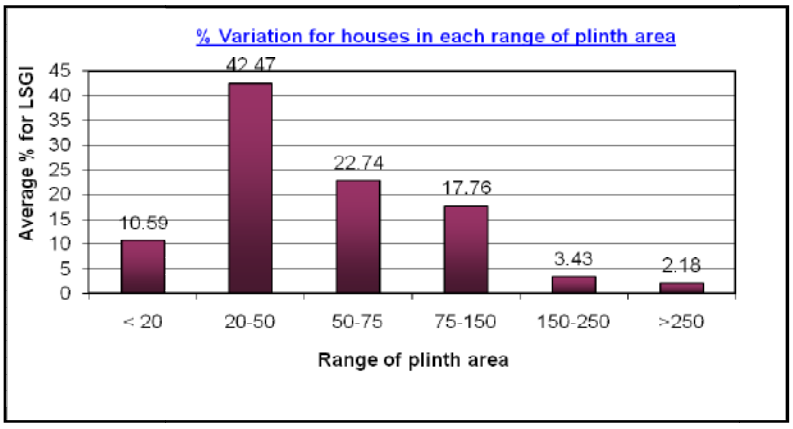


Figure 8.3: Houses in Various Ranges of Plinth Area

Source: socio economic survey 2012

According to socio-economic survey the share of houses in the range of plinth area 75 to 150 sq.m is 40.50%. It is also noted that major share of houses are in the range of 20-50 sq.m (42.47%) and this may be due to the presence of large number of tribal colonies. Hence the thrust area is low income group categories. According to socio-economic survey, total no. of houses is 9690 in which 11.01% under the category of Kutcha and hut. Hence the present housing need is

No. of families not having own house : 579

No. of families not having own land : 383

In addition to this it is assumed that 30% of the existing moderate house has to be replaced in 10 years i.e., 9690x50.78=4920x30%=1476 No.s

It is observed that, some extent of the employees working in the district both public and private sector are outsiders, since Sulthan Bathery being a taluk head quarter town, additional accommodation facilities are required for them. There are 102 tribal colonies existing in the planning area. The housing condition in these colonies is comparatively poor. Basic amenities such as roads, water, electricity and sanitation etc. in these colonies are not sufficient to meet the requirement. A detailed briefing about economically weaker sections including slums, colonies are addressed in the chapter 11 viz. Special concern areas.

8.1.4 Problems

- There is lack of basic amenities such as drinking water, road, drainage, sanitation, power etc. including some of the tribal colonies.
- The financial assistance given by govt. for the construction of houses not adequate for economically weaker sections.
- The construction of houses with the help of financial assistance from various agencies are not been completed in a time bound manner among the economically weaker sections.
- Issues related with man- animal conflict.
- There is need to promote town modification/beautification
- Now a day the collection of building materials itself is very expensive. Hence a system has to be developed for supplying the materials for a subsidized rate.
- To identify the most suitable area for habitation and promote housing layout.
- Ecofriendly and affordable building techniques has to be promoted.
- The competitions of people in social status have resulted in luxury homes almost becoming a social menace. It has huge environmental impact. In order to curtail this trend, increase on leviable tax amount for all residential buildings above 3000 sqft can be implemented.

8.1.5 Potentials

For future requirement, land is available adjacent to the core area of the town on the southern part of the town.

8.1.6 Inference

Almost 16.73 % of net area is under residential use. The demand for housing is increasing with time, which is clearly reflected in the change in habitation pattern. However, the land adjacent to the core area at the southern part can be made use of for developing new housing areas. Affordable construction techniques and materials have to be promoted in order to cut down construction cost. In view of the future housing demand, there is necessity for a planning intervention to arrest the uncontrolled development activities in the core area as well as in the hinterland, so as to ensuring agro-oriented, sustainable planned development and to eradicate the issues related with the poor housing conditions. Construction practices with minimum exploitation of resources must be considered. The issues related with slums and other colonies are discussed in the chapter 11.

8.2 Water Supply

One of the major challenges in front of all the cities is the scarcity of water. Inadequate supply of water adversely affects other economic sector and deteriorates human health. It is one of the prime responsibilities of all the local governments to ensure adequate supply of water for house hold activities, industries and other purposes. While analyzing the demand and supply of water to the planning area, floating population also has to be considered.

8.2.1 Important Sources, Treatment Facilities, Distribution System and Consumption

Majority of the population depends on domestic wells. In addition to this an existing water supply scheme is available in the area to provide clear water for drinking purpose by Kerala Water Authority (KWA). According to socio-economic survey, the various sources of water in the area were identified as in Fig 8.4.

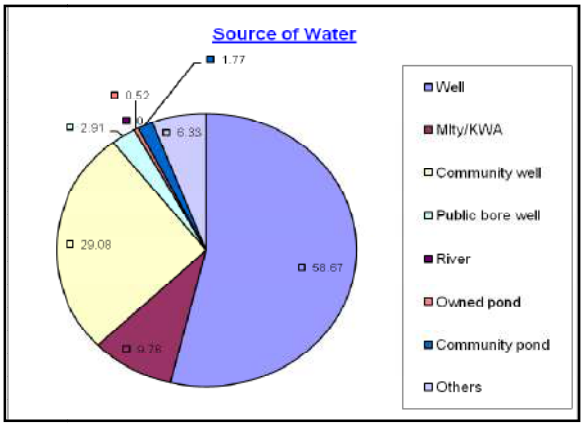


Figure 8.4: Sources of Water

Source: socio economic survey 2012

As per the above data it is revealed that major share of population (58.67%) depends upon open well followed by KWA connection (9.76%), community wells (29.08%) and bore wells (2.91%) as source of water. The existing water supply scheme is very old and commissioned long years back. The source of the existing water supply is the Muthanga River with intake located at Noolpuzha Grama Panchayat.

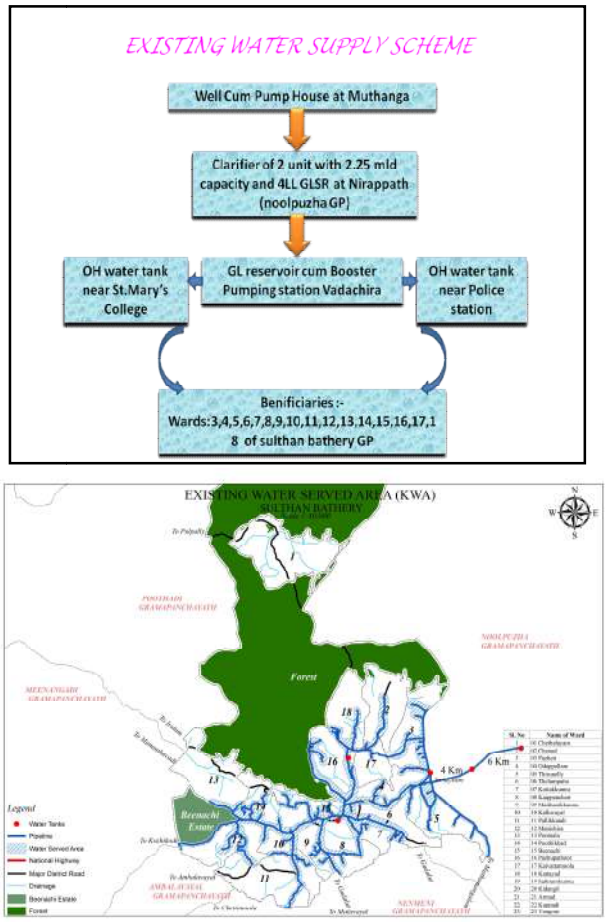


Figure 8.5: Location of Existing Water Tanks and their Distribution Network System

Source: socio economic survey 2012

Water collected from Muthanga River is pumped to 2 no's clarifiers with 2.25mld and 4LL GLSR at Nirappath at Noolpuzha Grama Panchayat. From there, with the use of GL reservoir cum booster pumping station at Vadachira, the clear water is being pumped to OH water tank near St. Mary's College and OH water tank near Police Station. The beneficiary wards are 3,4,5,6,7,8,9, 10, 11,12,13,14,15,16,17, 1 & 8. The existing distribution lines are made out of AC pipes which has been seen deteriorated since it was laid long years back. The total quantity of water supplied is 1.90 Lakhs liter with per capita usage 40 lpcd. No. of connections already given is 1318. The house connections are only given at distance of about 50 m from the main distribution lines. As per present system existing houses at the hinterlands cannot be covered due to the inadequate availability of water. There is no treatment made except chlorination. Location of water tanks and their distribution network system are shown fig.8.5. The distance to source of water is shown in the table 8.1.

In the distribution lines, the AC pipes are seen breaking frequently in the town area and the waste water entering in to the distribution line and hence water supply is interrupted many days. More over the lines are in almost centre portion of the road due to widening of road. The govt. has directed Kerala Water Authority to prepare a new scheme for this area.

Table 8-1: Distance to Source of Water

Distance to source of water	% Population depended
Within the compound	65%
Up to 50 M	23%
51M to 100 M	7%
101M to 250 M	2%
251M to 500 M	2%
501M to 1000 M	2%

Source: Socio economic survey -2012

From the above table 8.1, it is seen that 65 % of the population has water available in their compound. 23% of the population collecting water with in a distance of 50m. 7% of the population collecting water with in a distance 51m to 100m and balance 6% of population depends on water within the distance of101m to 1000m.

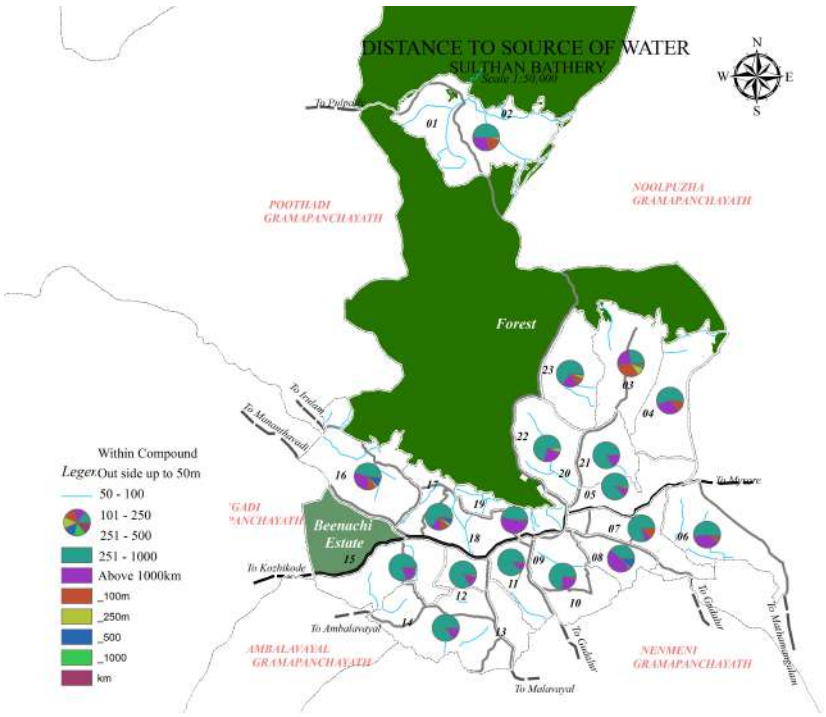


Figure 8.6: Ward Wise Details of the Distance to Water Source

Source: Socio economic survey-2012

From the above fig.8.6, it is seen that the wards 1, 2, 7, 13 & 15 have major issues related to water supply facilities.

8.2.2 Scarcity

According to the data collected in the socio-economic survey about 69.26% of the houses are not having water shortage, 10.80% of houses having scarcity for 1-2 months, 9.76 % of houses having scarcity 2-3 months, 3.95% of houses having scarcity 3-6 months and 6.02 % of houses having scarcity more than 6 months. The nature of water scarcity as per socio-economic survey is shown in Fig.8.7.

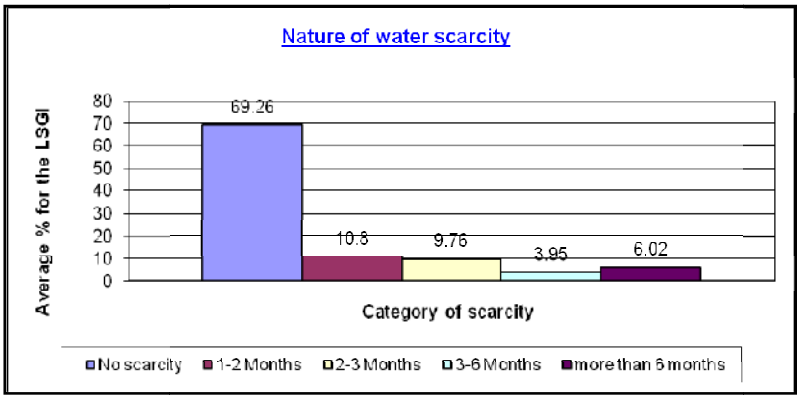


Figure 8.7: Water Scarcity as Per Socio - Economic Data

Source: Socio-Economic survey -2012

At present only 40 lpcd water is distributed by KWA with the provision of 1318 no's service connections, whereas 189 lpcd (Domestic use-135+ floating population-135X25% + for wastage, industrial, firefighting and street washing-135X15% = 189 lpcd) is the required supply demand as per standard specification. Hence the quantity of water required for the projected population of 62000 (as per DPR) will be 11.72 MLD (62000X189=11.72 MLD). It shows that as per the standards, the water requirement cannot be fulfilled with the present distribution system. However, a comprehensive water supply project under CWS scheme with 16MLD capacity costing Rs. 78 crores is proposed to be implemented for providing potable water to Sulthan Bathery, Noolpuzha and Muttil. This scheme will fulfill the requirements under this sector for the plan period.

8.2.3 Details of Ongoing Project

CWS scheme is a comprehensive water supply scheme for providing drinking water facilities to Sulthan Bathery, Noolpuzha and Muttil. The project details are as follows.

1. Name of Scheme : CWSS to Sulthan Bathery, Noolpuzha& Muttil GPs

2. LSG's benefited
   1) Sulthan Bathery
   2) Noolpuzha
   3) Muttil.

3. Wards benefited : All 35 Wards of Sulthan Bathery
   : All 16 Wards of Noolpuzha

4. Population as per 2001 census	: All 19 Wards of Muttil	
	: Sulthan Bathery	42,059
	: Noolpuzha	26,184
	: Muttil	31,227
Total		99,470

5. Base year of the scheme and total population	: 2015 / 1, 21,504
6. Design Period	: 30years
7. Projected ultimate population in the year 2045	: 1, 99, 561
8. Present water supply level	: less than 40 lpcd
9. Per capita water supply proposed	: 70 lpcd
10. Capacity of the scheme	: 16 MLD
11. Source proposed	: Karapuzha Reservoir
12. Treatment plant proposed	: 16mld capacity Rapid sand filter

8.2.3.1 The Proposal

The project proposal is to collect water from Karapuzha irrigation dam reservoir in Muttil Grama Panchayat by constructing a well cum pump house of 8m dia and 18m depth near to the fisheries IB. The raw water will be pumped in to the 16mld treatment plant proposed at 200m away from the well cum pump house through 500mm DI K9 pipe. The raw water pump set proposed is 125 HP VT Pump set.

The treated water then will be collected in a 7.00LL clear water sump cum pump house attached to the treatment plant, and conveyed to the 7.00LL OHSR at Kallupady, 5.00 LL GLSR at Vikas Nagar Colony and 1.0LL Existing GLSR at Swargam Kunnu through 450mm,300 mm and 100mm DI K9 pipes, of length 4675m, 5495m and 4140m respectively. From the GL sump at Vikas nagar colony the clear water will be conveyed to the OH service reservoirs at Kalluvayal, St. Mary's college compound at Bathery, Vadachira, Nirappath and GL Reservoir at 3rd mile through 200mm, 250mm 150mm DI K9 gravity mains of various lengths. Then clear water will be pumped to the OHSR at Chethalayam Kidanganad using 15HP clear water pump set.

From the OHSR at Kallupady the clear water will be conveyed to the OH Service reservoirs at "Kariyambady" and GL Reservoirs at "Karinkannikunnu", "Paralikunnu" and clear water sump cum pump house at "Mandad", through 200 mm to 300 mm dia DI K9 pipes. Then clear water is pumped to the existing clear water sump at Muttil mala using 15HP clear water pump set.

The existing distribution lines are to be used for the proposed distribution at Manikkunnumala, “Swargam Kunnu” areas. In other areas new distribution lines ranging from 300mm to 100mm DI k9, and PVC pipes of various classes will be used to distribute water.

The existing water supply level of the scheme area is 40lpcd considering the open well of the locality. The proposed water supply is 70lpcd. The layout of the proposed water supply scheme is shown in fig.8.8 and schematic diagram is shown in fig 8.9.

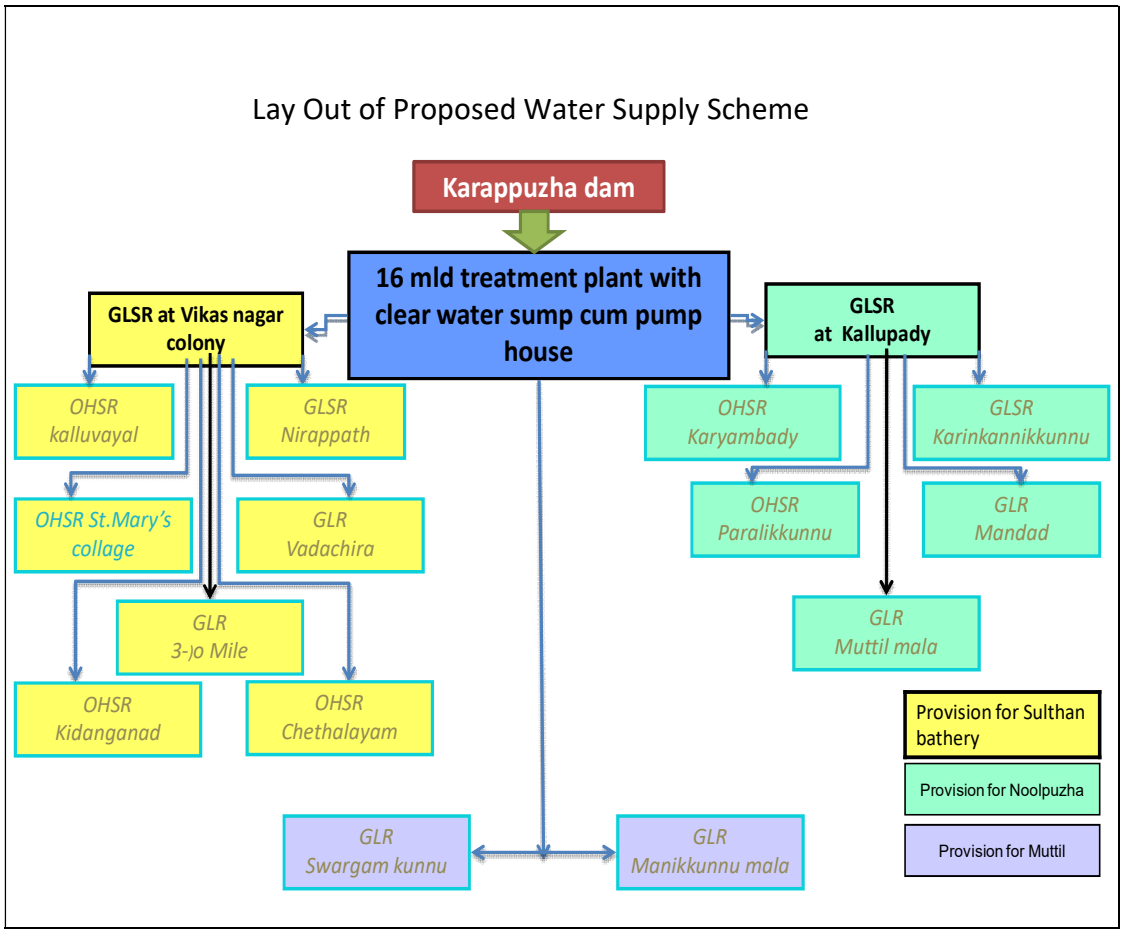


Figure 8.8: Layout of Proposed Water Supply Scheme

Source: KWA – 2012

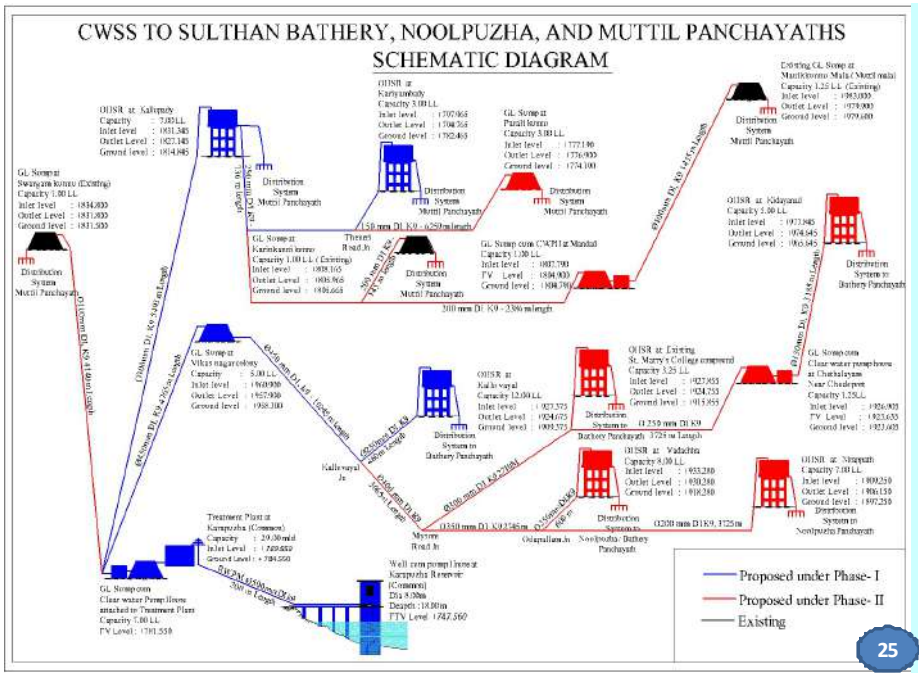


Figure 8.9: Schematic Diagram of the Proposed Water Supply Project

8.2.3.2 Source

Proposed source for the scheme is Karapuzha irrigation reservoir situated in Muttil Grama Panchayat. It is constructed under Cauvery Irrigation project and partially commissioned in 2011. The sources of existing schemes of Sulthan Bathery, Noolpuzha and Muttil areas gets dried up especially in summer season, resulting in acute scarcity of drinking water. Karapuzha Reservoir is proposed for this project as the source, because this source is very adequate and reliable to fulfill the requirement of entire project. The Karapuzha Reservoir, dam has a length of 650m and height of 28m with FRL +763.0m and total storage of the reservoir is 76.5mm^3.

8.2.3.2 Well cum Pump House

The proposal is to construct 8m dia RCC well cum pump house with total depth of 18mand fixed floor level of +764.0 m at Karapuzha reservoir. The location of the proposed intake structure is about 150m away from the upstream of dam point near to fisheries depot at Karapuzha. Main components of intake structure include, well cum pump house, intake pipe/ channel, panel room, Transformer and bridge to the pump house.

8.2.3.3 Treatment Plant

Considering the ultimate demand of 14.62 MLD in year 2045-AD and 2% of wastage and demand by floating population, the capacity of the treatment plant is worked out to 16mld. The proposal is to construct 16mld capacity rapid sand filter with sedimentation tank near to the fisheries IB at Karapuzha in Muttil Panchayat, which has an elevation of +800.0m. At treatment plants following treatment processes are proposed:

- Aeration

- Addition of Lime for PH value correction.
- Addition of Alum for coagulation
- Clarification.
- Filtration through Rapid sand filters
- Disinfection by Chlorination.

A 7.00 Lakhs liter clear water GL sump also attached with the treatment plant.

8.2.3.4 Raw Water Pump Sets

2 nos. 125 HP VT raw water pump set capable of discharging 152.66 lps of water against a total head 43.0m of pumping are proposed.

8.2.3.5 Clear Water Pump Set

There are 2 nos. of 360 HP clear water centrifugal pump set capable of discharging 102.21 LPs of water against a total head 185 m proposed for pumping water from the clear water sump cum clear water pump house to the GLSR at Vikas nagar colony. 2 no's of 10Hp centrifugal pump set with 3.14 lps discharge against 66m of total head, and 2 no's of 70 HP centrifugal pump set with 52.84 lps discharge against 66m of total head are proposed to pump clear water from sump near treatment plant to Swargam Kunnu and Kallupady respectively.

Due to the height variation more clear water pumping facilities are essential. Hence 2 no's of 10 HP centrifugal pump sets capable of discharging 3.575 lps of water against a total head of 186 m to the Muttil mala from Mandad clear water sum cum pump house and 2 no's of 15 HP centrifugal pump sets capable of discharging 7.826 lps of water against a total head of 61 m from clear water sump cum pump house at 3rd mile to GLSR at Chethalayam are also proposed.

8.2.3.6 Laying Raw Water Pumping Main

The raw water pumping main of 500mm DI-K9 pipe is to be laid for a length of 200 m from Well cum pump house to 16mld Treatment Plant located near to Fisheries IB.

8.2.3.7 Laying Clear Water Pumping Main

For Muttil zone there are three clear water pumping mains, which include 300mm DI K9 pipe of 5495m length from Plant to OHSR at Kallupady, 100mm DI K9 pipe of 4140m length from plant to GL sump at Swargam Kunnu, and 100mm DI K9 pipe of 1415m length from Mandad clear water sump cum pump house to GL Sump at Muttil mala.

For Sulthan Bathery and Noolpuzha zone, clear water pumping main 450mm DI K9 pipe of 4765m length from plant to GL sump at Vikas Nagar and clear water pumping main 150mm DI K9 pipe of 3185m from clear water sump cum pump house at 3rd mile to GL sump at Chethalayam are proposed

8.2.3.8 Routes of Pumping Mains Gravity Mains and Distribution System

Most of pumping mains, gravity mains and distribution pipe lines are passing through National Highway, PWD roads and Local body /Grama Panchayat roads.

The roads will have to be trenched for laying pumping mains, gravity main and distribution pipes, including road crossing, side cutting/ side road crossing and berm cutting.

8.2.3.9 Land

The land for the construction of well cum pump house and treatment plant at Karapuzha reservoir site is with Irrigation department and the land for other components such as OHSR, sump booster station are with local body and to be handed over to Kerala water authority for proposed project.

8.2.3.10 Distribution system

In this proposed scheme the distribution system in Sulthan Bathery consists of dia 350 mm to 200 mm DI K 7 pipe and 160 mm to 63 mm PVC pipe for a total length of 5302m. The per capita rate of supply is taken as 70 liters and the peak factor adopted is 2.50 times of average demand.

8.2.3.11 Power Line Extension

The power lines are almost near to head work site and treatment plant site. The total cost of the scheme comes to 7,800 Lakhs.

8.2.4 Problems

- 15 No's of Tribal colonies are not having adequate drinking water facilities.
- About 30% of population is affected by water scarcity for 1-3 months.
- Due to the high elevation at Beenachi School Kunnu, drinking water is not supplied in the area.
- The cost for supplying of water of 1000 liter is Rs 15/- but the water charge collected is @ Rs 4/- only.
- Construction of Bore well to be regulated/minimized.
- The existing distribution lines are laid along the centre of the NH. Hence maintenance not possible.
- Check dam has to be constructed at Thirunelly Thode.
- The water bodies available in the interior of forest are to be protected to ensure the availability of drinking water for wild animals.
- Centralized billing system to be developed.

8.2.5 Potentials

- 72.51 % of the net area is under agriculture use, predominantly paddy cultivation
- Availability of uncultivated paddy at a large extent.
- Possibility of constructing check dams, Gully plugs and bunds so as to ensure availability of water for paddy cultivation and ground water recharging.
- 70% of the municipal population not having water scarcity.
- Availability of plenty of rainfall. Strict enforcement has to be done for rain water harvesting system and to promote ground water recharging.
- Availability of large number of open wells.
- Possibility for promotion of roof top rain water harvesting.

8.2.6 Inference

These identified potentials may be made use of to overcome the scarcity of water to some extent. The proposed water supply project under CWS Scheme with 16 MLD capacity is expected to fulfill the projected demand.

8.3 Sanitation

The factors affecting sanitation like Drainage, Sewerage and Solid Waste Management are discussed in the following article.

8.3.1 Drainage

The average annual rainfall of Wayanad district is 2322mm. At present, road side drains are available only along the sides of the NH at the core area. In the rest of the area storm water is drained through natural drains or through thode. There is no record of major flooding in the area. It is seen that the existing drainage at the core area is being blocked due to the dumping of waste and absence of annual maintenance. At present waste water from the core area is being diverted to “Kaippancheri” and “Kattayad” Thode without treatment.

8.3.1.1 Existing Drainage Network

There is no organized drainage network in the town other than the road side drains along the sides of NH 766. There are 10 No.s natural drains/ thode available in the area. Because of the availability of these natural drains and undulating topography of the land, it creates a good natural drainage network in the town. But they are badly maintained. Solid and liquid wastes from market, hotels etc. are seen disposed in to the Kattayad Thode and Kaippancheri Thode, which results polluting of these water bodies. Fig 8.10 shows the existing drainage network of the town and Table 8.2 shows the available natural drains/thode.

Table 8-2: Existing Natural Drains/Thode

Sl. No	Ward No.	Name of Ward	Name of water Course
1	6	Kottakkunnu	Thoduvetty Thode
2	14	Kattayad	Kattayad Thode
3	13	Pazhuppathoor	Pazhuppathoor Thode
4	13	Pazhuppathoor	Manthamkolli Thode
5	7	Kaippancheri	Kaippancheri Thode
6	2	Pazheri	Puthuchola Thode
7	12	Beenachi	Kuppadi Thode
8	16	Armad	Karakkandi Thode
9	12	Beenachi	Poothikkad-Vattathimoola Thode
10	4	Thirunelly	Thirunelly Thode

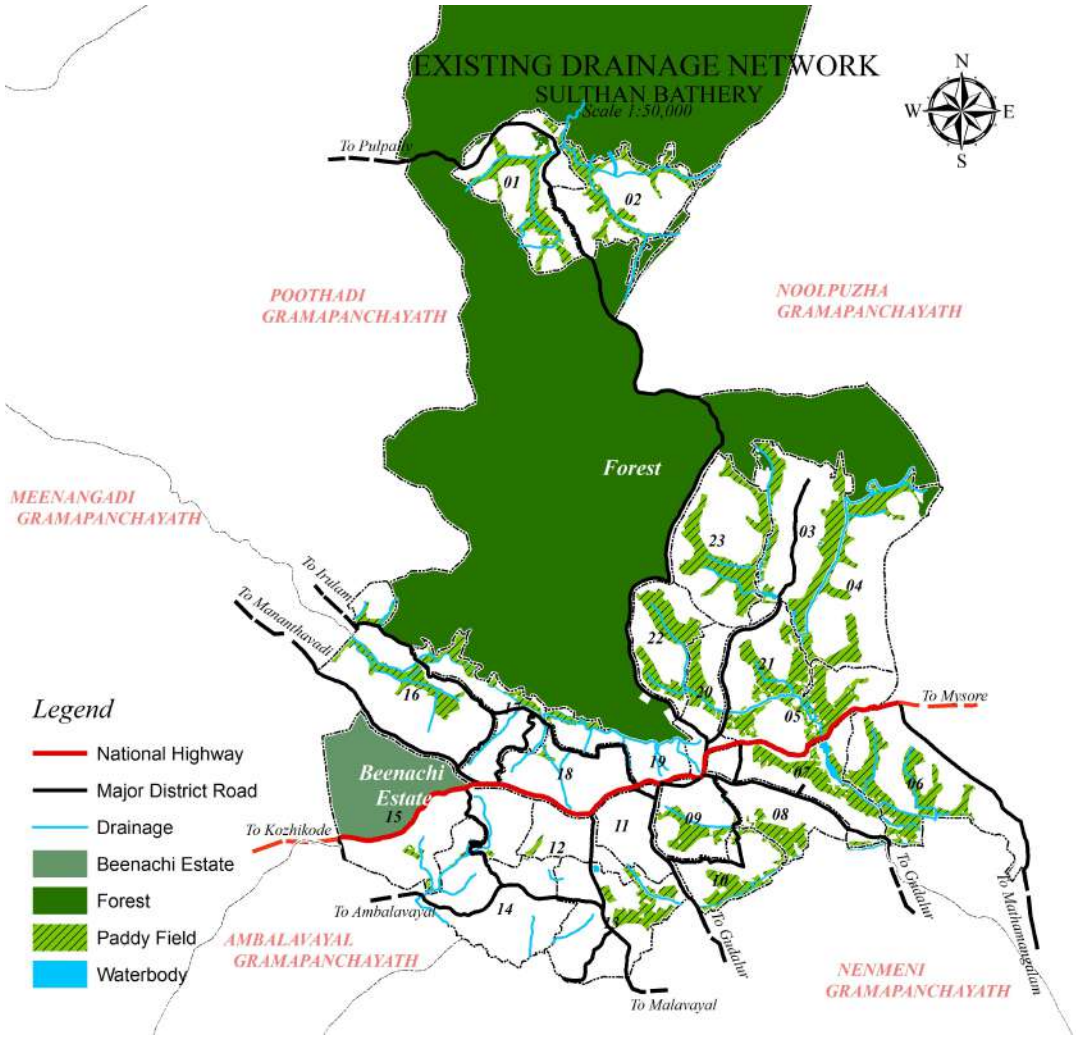


Figure 8.10: Existing Drainage Network

Source: Primary survey - 2012

8.3.1.2 Identification of Gaps in the Network

A cluster of drains/thode without interconnectivity or a hierarchical pattern does not form a proper network. This should be made into a proper network by correcting the geometry of existing drains and adding the missing links.

8.3.1.3 Inference

Depositing waste and absence of organized drainage network create nuisance. Hence there is a need for strengthening the existing drainage network and adding the missing links, so as to enhance proper drainage network in the area.

8.3.2 Solid Waste Disposal

Solid waste is mostly generated from market, shops, households etc. it is collected by contingent staff from pre designated points in the town and carried to the dumping yard at Karuvallikunnu using tractors. The waste collection centers and disposal land are shown in fig.8.11.



Karuvallikunnu Solid Waste Disposal Plant

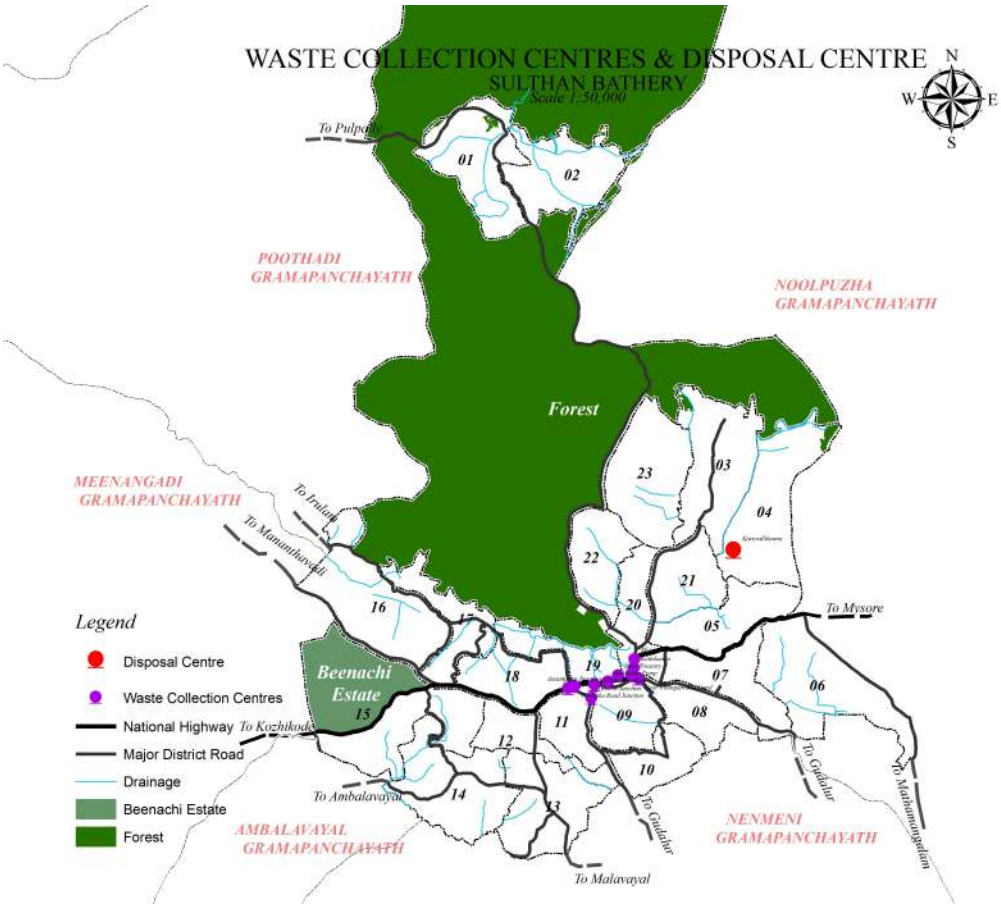


Figure 8.11: Location of Waste Collection Centers and Disposal Land

As per the secondary data collected, total quality of commercial waste generated is 8 tonnes/day of which 5 tonnes/day is been collected. The wastes are collected from the core area of the town; the covered wards are 4,5,8,9 & 15. This shows that 62% of the waste generated in the core area is collected. The waste disposal details are shown in Fig 8.12.



Figure 8.12: Place of Solid Waste Disposal

Source: Socio Economic survey -2012

It is observed from the socio economic survey that 98.86% of the households are depositing waste in their own compound and 0.62 % in the garbage bins.

8.3.2.1 Existing Treatment Facilities

The solid waste consists of both bio and non-bio degradable substances. Partial segregations of waste at source is been done at present. Waste bins are placed in the pre designated points in the town and waste is collected by means of two tractors, owned by the local body. The collected waste is deposited in the dumping yard at Karuvallikunnu and then incinerated. The present yard has an area of 0.5 acres only which is not sufficient to meet future requirement. In this circumstance it is suggested to acquire required land from the adjoining area in view of future needs.

8.3.2.2 Problems

- Solid waste is collected only from the core area. Even there also only partial segregation of waste at the source is done.
- Only 62% of the waste generated at the town centre is being collected.
- The available waste disposal land at Karuvallikunnu having limited area. It is not sufficient to meet the future requirement.
- Dumping of waste into public drains creates blockages.

- Increased usage of plastic carry bags.

8.3.2.3 Potentials

- The presence of large quantity of bio-degradable content in the waste makes it possible to introduce schemes for generating energy and manure.
- Since the availability of larger plot size "on-site waste disposal system" can be continued.

8.3.2.4 Inference

The waste collection system is not efficient and partial segregations at source only being attempted.

8.3.3 Sewerage System

Due to the increase in population as well as the developmental activities, the demand for supply of water is increasing. Hence there will be corresponding increase in the quantum of sewage to be dealt with.

8.3.3.1 Existing system

Sulthan Bathery has no sewerage system at present. Socio economic survey of Sulthan Bathery shows that about 92.83% of people are using leach pit and 6.54% of the people depend on pit latrine and use of septic tanks are minimum. This indicates the unhygienic practices of night soil disposal. The sullage generated from kitchen, bath rooms etc. is let out in to the own compound and to some extend to the storm water drains. The waste water is diverted without any treatment. The method of solid waste disposal identified by the socio economic survey is shown in the Fig 8.13.

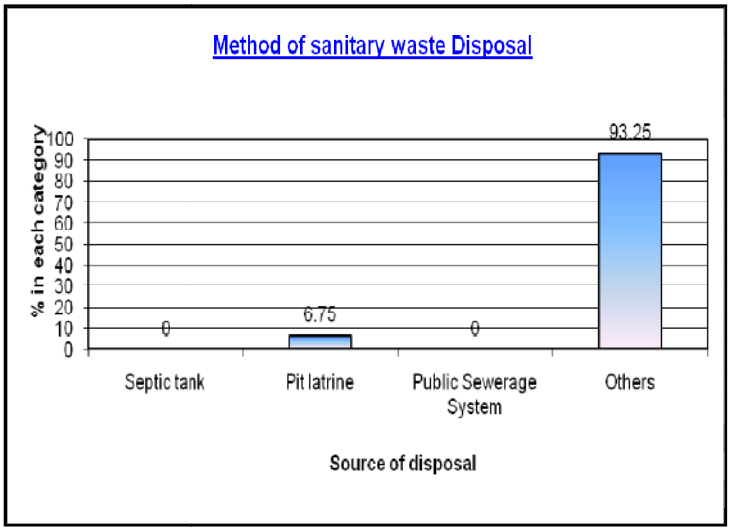


Figure 8.13: Method of Sanitary Waste Disposal

Source: Socio Economic data

8.3.3.2 Inference

The area doesn't have any facility for the treatment of sewage at present. The non-utilization of septic tanks for sewage disposal could trigger pollution of water courses by e-coli bacteria. Which possess a serious threat to public health and environmental quality. As per KMBR, there must be septic tank for every new building of built-up area above 100 sqft and Biogas plant for new building of built-up area above 300 sqft.

8.4 Power

Power sector is mainly handled by Kerala State Electricity Board which is the prime agency of the state to generate, transmit and distribute power to the consumers. Part of distribution like street lighting is vested with the local government. Availability of uninterrupted quality power is essential for the overall economic development of the area.

8.4.1 Power Consumption-Source Wise Break Up

The major power consumption is the electrical energy generated from hydroelectric project. No other non-conventional energy is fed in to the main grid. Petroleum products like diesel, petrol, biomass, solar energy etc. are also used.

8.4.2 Power Consumption-Sector Wise Break Up

Since the power consumption is mostly electrical energy, the consumption of electricity by various categories is considered.

8.4.2.1 Electricity

The Kerala state electricity board is the single agency responsible for power distribution in the area. There are two section offices under KSEB in the area viz. Sulthan Bathery East and Sulthan Bathery west. The details of power of consumers in Sulthan Bathery are shown in the Table 8.3 and Fig 8.14 shows variation in number of consumers.

Table 8-3: Power Consumption Details

Sl.No	Total Consumption (MKWH)	Domestic	Industrial	Commercial	Agricultural	Others
1.	Chethalayam	12,660	533	862	0	
2.	Valancheri	10,400	0	224	0	
3.	6th mile	11,600	0	1,814	491	
4.	Vengoor	11,638	0	260	213	
5.	Forest Kuppadi	13,294	0	978	04	

6.	Post Office Kuppadi	5,260	65	0	0	
7.	Armad	10,300	0	650	112	
8.	Sub Station	5,500	0	570	0	
9.	Fuel Briquette	1,540	3,394	480	0	
10.	KSRTC	6,660	0	2,882	160	
11.	Civil Station	0	0	3,733	0	
12.	Don Bosco	500	0	1,500	0	
13.	Mini Industries	700	13,370	2,776	0	
14.	Sandhi nagar	11,802	942	3,360	0	
15.	MLA WMO school	3,832	0	3,500	0	
16.	Police Station	15,479	1,707	8,940	0	
17.	St. Mary's Hospital	2,367	0	5,278	0	
18.	Kaippancheri	12,280	362	310	0	
19.	Guest House	20503	724	250	0	
20.	Pratheeksha	7,903	0	2,420	0	
21.	CG Mill	1,868	0	3,000	29	
22.	JTS	4,810	344	586	0	
23.	Poolavayal	14,451	0	639	13	
24.	Thirunelly	18,047	785	1,127	74	
25.	Moolankavu	6,605	3,343	850	85	
26.	Vadachira	3,900	0	0	0	
27.	Cochin Industries	8,582	0	3,350	24	
28.	Vattuvadi	5,645	175	84	15	
29.	Thelampatta Mill	3,195	455	212	136	
30.	Thelampatta	6,420	0	0	98	

31.	St. Mary's College	10,225	0	5,665	0	
32.	Golden Coffee	2,475	0	190	0	
33.	Kuppadi School	13,460	897	1,220	0	
34.	Kuppadi Tower	6,783	0	98	0	
35.	Pazheri	15,320	0	48	0	
36.	Pazheri II	7,445	0	12	0	
37.	Swathanthra maidani	8,300	145	19,500	0	
38.	P&T	0	218	6,800	0	
39.	Priya	10,580	4,878	38,675	0	
40.	Sagar	2,250	191	6,400	0	
41.	Alampalli	9,310	0	320	0	
42.	Thoduvetty	8,930	0	972	140	
43.	Block Office	13,410	0	826	0	
44.	Rehmath Nagar	8780	0	1,660	0	
45.	Odappallam	12,500	0	426	33	
46.	Karuvallikkunnu	18,580	44	926	0	
47.	KSEB West section	2,42,168	52,000	1,64,986	200	26,850
48.	**Total**	**6,28,257**	**84,572**	**2,99,359**	**1,827**	**26,850**

Source: KSEB

The number of consumers is highest in domestic category followed by commercial. The total number of transformers in the area is 47. There are no significant areas of frequent power cuts or low voltage, but often power failure occurs once in a week. The distribution of power is only through overhead lines. Implementation of underground power lines could cut down power leakages and safety risks. It is not been done due to various reasons.

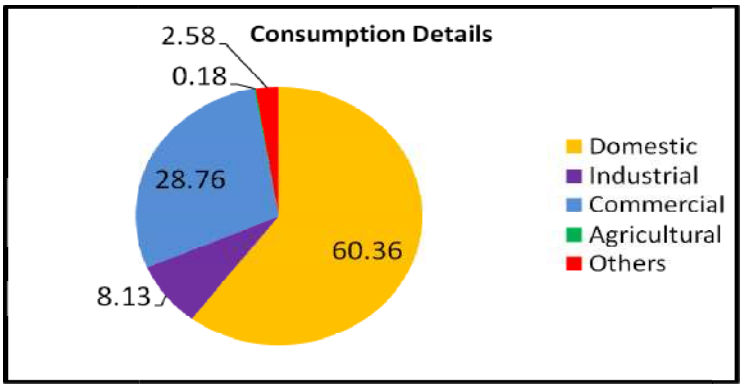


Figure 8.14: Variation in Number of Consumers

Source: KSEB - 2012

8.4.2.2 Petroleum

Petrol and diesel are the major products considered. There are 5 petrol pumps in the area. The total capacity of storage of petrol is less than that of diesel and this shows a preference for diesel vehicles. The number of petrol pumps is satisfactory to meet the present requirement and they are distributed along NH 766.

There are 4 LPG go downs functioning in the planning area which serves the surrounding local bodies as well.

8.4.3 Inference

No other non-conventional energy sources except solar energy are being utilized in the town. Even in the case of solar energy the use is limited to a few roof top solar water heaters. There is tremendous potential for the development of non-conventional energy sector. The town has tremendous potential for development of biogas plants also with a healthy cattle population.

The electricity transmission network needed to be strengthened. Transmission loss and voltage fluctuations must be reduced. The electric power supply could be improve with the implementation of underground transmission system

CHAPTER 9

SOCIAL INFRASTRUCTURE

Being a taluk head quarter and one of the emerging urban centers in the district, Sulthan Bathery has to perform as second order service centre of the whole district. Hence it is very important to see that the social infrastructure available in the town is adequate to cater to the entire service region. In this chapter, the important social infrastructure such as education, health, recreation facilities, other civic amenities etc. are analyzed.

9.1 Education

Education sector is very important social infrastructure which has vital role in the development of an area that heavily depends on secondary and tertiary sector. Wayanad is an educationally backward district and for all higher level of education, district depends on Kozhikode, Kannur, Mysore, Bangalore and other parts of Kerala. This session presents an assessment of educational facilities in Sulthan Bathery.

9.1.1 Level of Education

The literacy rate of Sulthan Bathery is 80.61% as per 2011 Census which is higher than that of Wayanad district (89.03%). When compared to the other local bodies in the district, Sulthan Bathery is in 8th position. The Mullankolly Grama Panchayat shows a highest rate of 82.51% followed by Mananthavady Municipality (81.56%). The literacy rate of the town is less than the state average (94%). The male and female literacy rates in Sulthan Bathery are 82.42% and 78.86% respectively. Comparison of literacy rate of Sulthan Bathery and other municipal headquarters are shown in Table 9.1.

Table 9-1: Literacy Rate of Sulthan Bathery with Other Municipal Headquarters

Town	Literacy Rate
Sulthan Bathery	80.61%
Kalpetta	80.80%
Mananthavady	81.56%

Source: Census 2011

When comparing with other taluk/municipal headquarters in the district, literacy rate of Sulthan Bathery is in the lower side. The socio economic survey- 2012 reveals the educational profile of the people of Sulthan Bathery as shown in Fig 9.1.

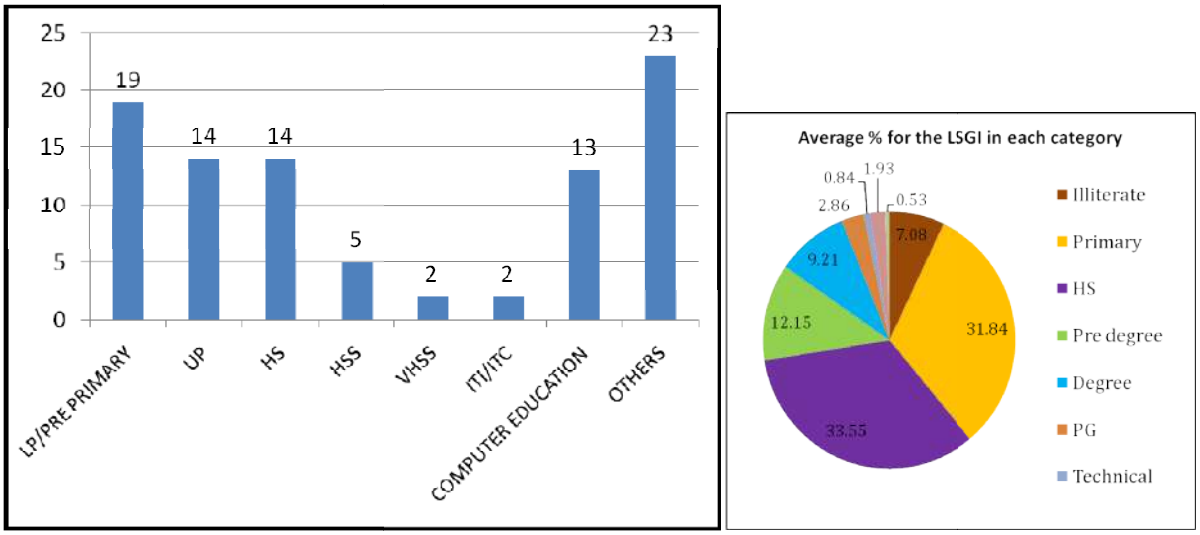


Figure 9.1: Educational Profile of People in the Sulthan Bathery

Source: Socio Economic Survey-2012

The figure indicates that majority of people are educated up to 10th standard (33.55%). It is also noted that 31.84% of population terminates education at primary level. While considering the technical and professional courses, only few people have attained technical or professional education.

9.1.1.1 Schools

There are 25 schools in municipality out of which 20 have LP/UP sections, 14 have high school sections and 05 schools are higher secondary schools. There are two vocational higher secondary schools (VHSS). The number and types of schools are shown in Table 9.2.

Table 9-2: Number and Type of schools in Sulthan Bathery

DETAILS OF SCHOOLS					
SL NO	**CATEGORY**	**GOVT**	**AIDED**	**UN AIDED**	**Total**
1	Pre Primary	6	1	11	18
2	LP/UP	8	2	10	20
3	HS	5	3	6	14
4	HSS	1	1	3	5
5	VHSS	2	_	_	2

9.1.1.2 Details of Existing Students, Teachers and Courses

The percentage of educational institutions in govt., aided & unaided categories is shown in the figure 9.2 which clearly shows the dominance of the unaided educational institutions in Sulthan Bathery where as in the district scenario the govt. institutions show its dominance. The number of students in each category is shown in Table.9.3. Percentage of students in each category is shown in Fig.9.3.

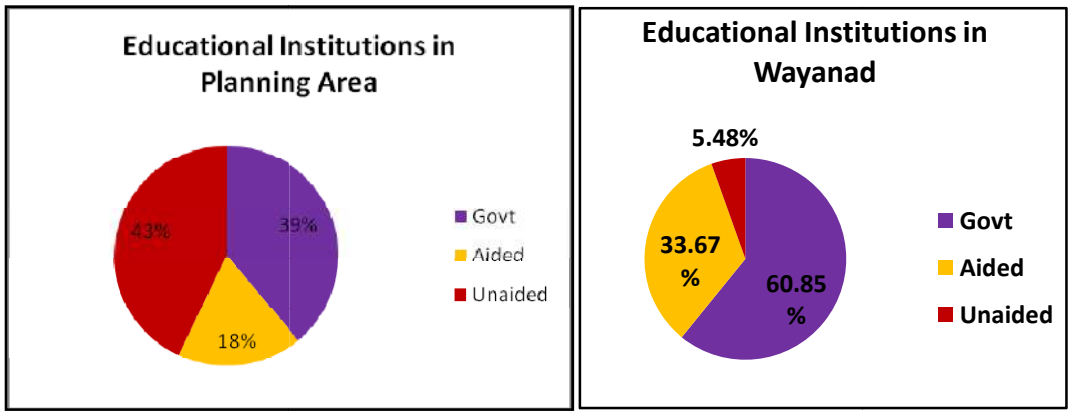


Figure 9.2: Schools under Various Categories

The total number of students studying in these schools is 12902. The number of teachers is 592. Total number of students in the schools up to 10th standard is 11758 including pre-primary.

Table 9-3: Number of Students in Various Categories

DETAILS OF STUDENTS			
CATEGORY	**GOVT**	**AIDED**	**UN AIDED**
Pre primary	214	12	1754
LP/UP	2368	1436	2117
HS	1111	1287	1459
HSS	240	294	250
VHSS	360		
	4293	3029	5580

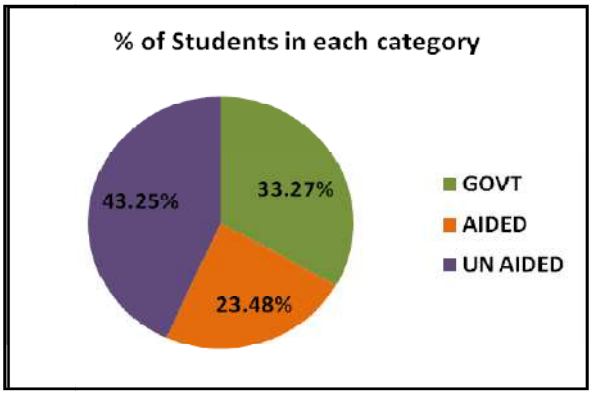


Figure 9.3: Percentage of students in Various Categories

Up to higher secondary level, percentage of students studying in government schools aided and unaided institutions are 33.27%, 23.48%, and 43.25% respectively. The details of the total number of teachers in each category of schools are given in the Table 9.4.

Table 9-4: Number of Teachers in Various Categories

DETAILS OF TEACHERS			
CATEGORY	GOVT	AIDED	UN AIDED
LP	35	50	33
UP	69	34	157
HS	70	14	67
HSS	13	16	7
VHSS	27	0	0

Source: Secondary data 2012

Comparison of educational institutions with respect to teacher-student ratio is given in the Table.9.5.

Table 9-5: Comparison of Educational Institutions with Respect to Teacher-Student Ratio

Sl No	Name of school	LP/UP	HS	HSS	VHSS
1	Govt. Sarvajana Higher Secondary School	1:30	1:20	1:30	1:20
2	Govt. L.P. School Kaippancheri	1:25			
3	Govt. Technical High School		1:10		
4	Govt. Vocational HSS (THS)				1:15

5	Govt. High School Odappallam	1:30	1:20		
6	Govt.HS Kuppadi	1:30	1:45		
7	St. Mary's College HSS		1:25	1:20	
8	Govt.High School Chenad	1:25	1:10		
9	MES English medium LP School	1:20			
10	St. Mary's English School	1:20			
11	WMO English School	1:20	1:20		
12	Assumption High School		1:30		
13	IDEAL English School	1:30			
14	St. Joseph's English HSS	1:30	1:30	1:30	
15	Assumption AUP School	1:30			
16	GLPS Pazhupathur	1:20			
17	GUPS Beenachi	1:30			
18	Bhavan's Vidya Mandir	1:40	1:40	1:40	
19	St Rossello's Central School	1:15			
20	St Rossello's Special High School	1:10	1:10		
21	Mc Leods English School	1:15	1:15		
22	Poomala GLPS	1:20			
23	Nirmal Jyothi Special School	1:05			
24	Nirmala Matha Public School	1:25	1:25		
25	Little Flower Nursery School	1:20			

Source: Secondary data 2012

9.1.1.3 Spatial Distribution of Educational Institutions

The schools are seen ill distributed in the planning area. Most of them are concentrated in the centre of core area. The Fig 9.4 shows the spatial distribution of educational facilities. When compared with the planning standards, number of educational institutions is sufficient.

Even though more numbers of Anganwadis and LP schools are available, their spatial location shows (Fig.9.5) that some of the wards are lacking these facilities. So the students in these wards have to travel more distance to reach the facility.

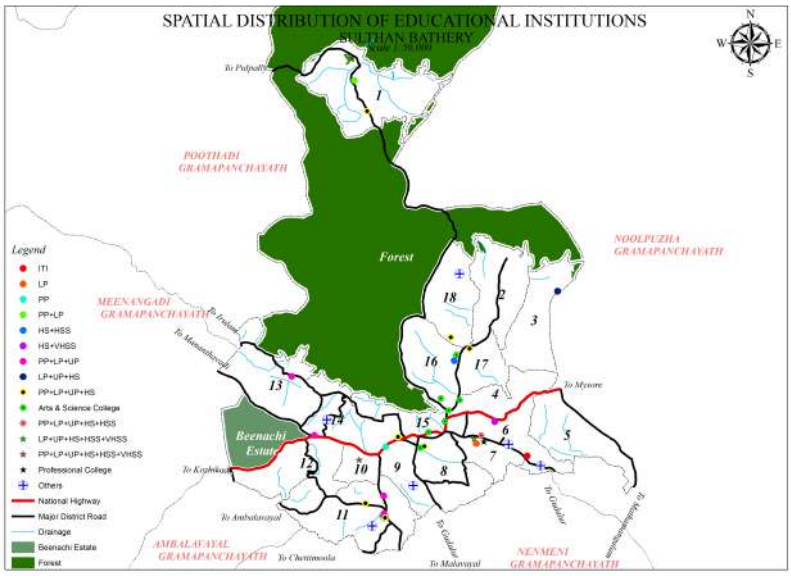


Figure 9.4: Spatial Distribution of Educational Facilities

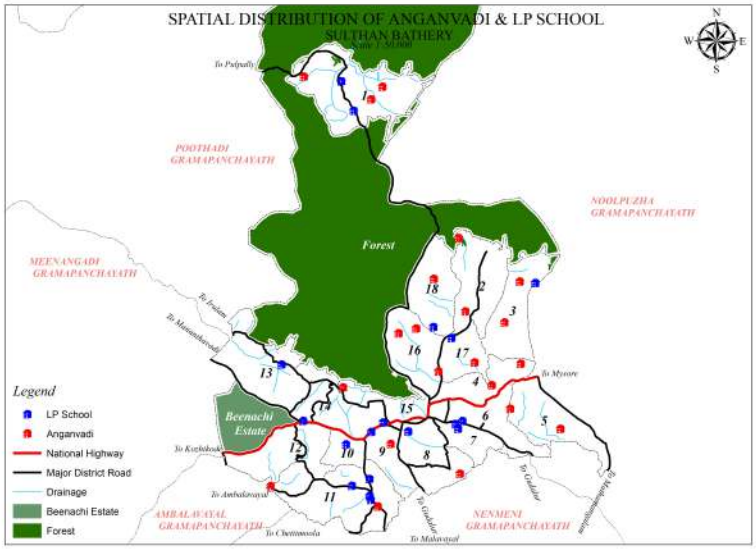


Figure 9.5: Spatial Distribution of Anganwadi & LP Schools

9.1.1.4 Infrastructure Details of Educational Institutions

The infrastructure facilities available in the schools are satisfactory. All schools have separate toilets for girls/boys and provided with water supply. All schools are having road connectivity, 24% of the schools are not having playground facility. 4% of the schools are not having computer lab facility. The details are given in **Annexure IX.**

9.1.1.5 Study Performance

The average pass percentage of the educational institutions in Sulthan Bathery for the year 2011 was 97%. The 10th standard results of high schools in Sulthan Bathery are given in Fig 9.6.

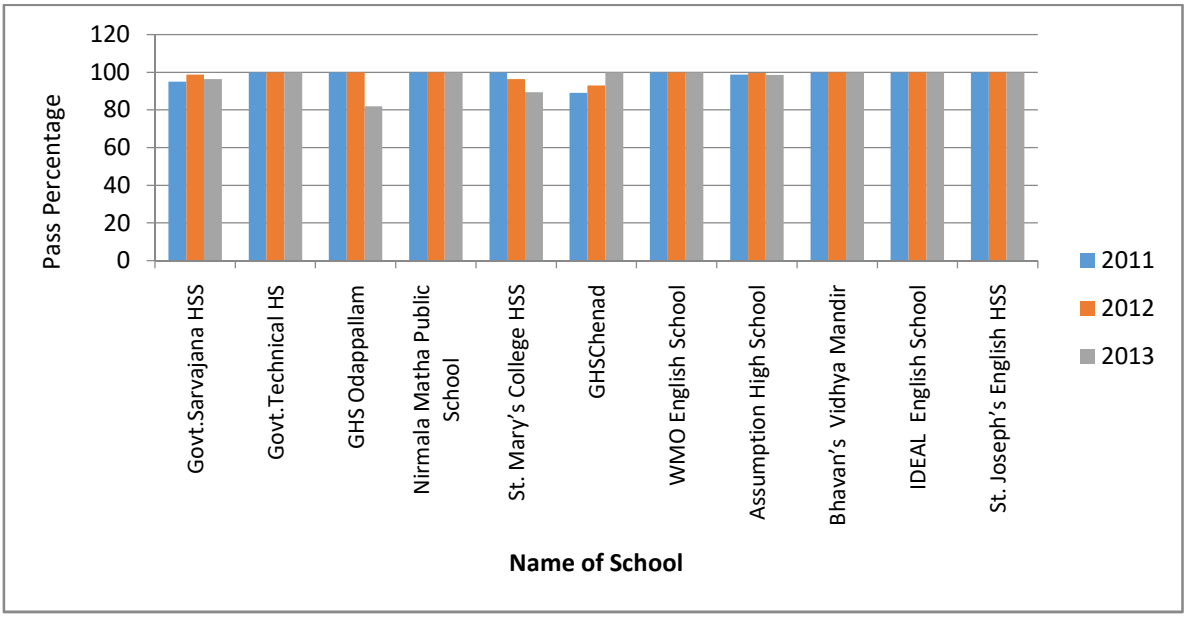


Figure 9.6: Average Pass Percentage over the Years

Source: Secondary data2012

From the above figure, it is found that the tenth standard result in the year 2011-2013 is not much varying.

9.1.1.6 Higher and Professional Education

St Mary's College Sulthan Bathery is the main higher education facility available in the area and offers seats for following courses viz. BA-English, BA-Economics, BA-Political Science, B.Sc.-Physics B.Sc.-Chemistry, B.Sc.-Botany, B.Com, BBA, BCA, MSc (Physics, Chemistry), MSc-Botany and MA Political Science. The total student strength is 1200.Details of higher and professional educational facilities are described in table 9.6 and 9.7 respectively.

Table 9-6: Details of Higher Educational Institutions

Sl No	Name of College	Location	Whether having PG course (Y/N)	Number of students course wise (UG)				Number of students course wise (PG)				Govt/ Aided/ Unaided
				BA	B.Sc	B.Com	BCA	MA	M.Sc	M.Com	BBA	
1	St. Mary's College Bathery	Kuppadi-16	Yes	468	372	132	87	30	72		108	Aided
2	Don Bosco College	Kottakkunnu Ward -16	Yes	134	100	175		08	MBA-60	20	30	Charitable Trust
3	Malabar College	Gandhi Jn. Ward -08	Yes	140	15	80		15	03	04		Private
4	Co Operative College	Kottkkunnu Ward -04	Yes	450		750		25		80	100	Co operative Society
	Darul Uloom Arabic College	WMO School road-08	No	MFB Degree, +1,+2, BA(Eng), BA(Sociology)- Total students-50, Staff- 11								
5	St. Mary's Institute of Advanced Studies & Computer Education	Kottakkunnu Ward-15	No	50		100						Private
6	Data Point	Ganapathivatam Ward -15					30		MCA-20			Private
7	Mahatma Hindi College	Ward-16 Kottakkunnu	No	Hindi Degree courses				Total 150 students, 05 staff				Private
8	AQSA College& MCF orphanage	Ward-09 Manikkuni	No	Ufsal Ulama				Students 19, Staff 04				Private
09	Kendreeya Hindi Maha Vidhyalayam	Ward-09 Manikkuni	No	Hindi TTC, BSS, NTTC				Students 25, Teachers 02				

Source: Secondary data 2010

Table 9-7: Details of Professional colleges

Sl No	Name of College	Details of owner-ship	Location	Specify the Professional courses offered	Number of students course wise				
1	B Ed College, Poomala	Calicut University	Poomala Ward - 09	B Ed Course	Maths-13	Eng. 35	Comm.13	SS 39	
2	Mar Baselleos College of Education	Private	Pattarpadi Ward- 06	B Ed + TTI Total - 100	Maths-10	Eng - 28	Comm 10	SS 32	Physical science – 10 Natural Science – 10
3	DIET , Wayanad	Govt.	DIET Jn Ward-07	TTI Courses – Total 80					
4	Assumption School of Nursing	Private	Kelapaji Road Ward-09	General Nursing	Students – 91 , Staff - 07				
5	Vinayaka College of Nursing	Private	Shafi road Kattayadu Ward- 14	B.Sc Nursing	Students-63-Staff-08				
6	Vinayaka school of nursing	Private	Kattayadu Ward -14	General Nursing	Students-44 staff-04				

9.1.1.7 Other Educational Institutions

Apart from the above mentioned colleges, there are about 38 educational institutions which are offering specialized short term job oriented courses such as computer courses, technical training, type writing, driving schools, training centres etc. A “Gothra Varga Sarvakalasala” exclusively for the tribal people is proposed at Chethalayam near the public health centre under Calicut University. There are no other major committed projects under education sector in the planning area. However, the newly opened Medical College at Muppainad Grama Panchayat under the ownership of MIMS Kozhikode and the proposed Govt Medical College in the district will be advantages in this sector.

9.1.1.8 Comparison with Planning Standards

While analysing the existing facilities with the planning standards, it can be seen that the facilities are commensurate with the population. But Sulthan Bathery being as a taluk headquarters, has to serve as a service provider to the whole taluk especially in higher order educational facilities. Hence the facilities in higher education and professional sector have to be enhanced. Planning standards as per UDPFI Guidelines is shown in table 9.8.

Table 9-8: Planning Standards as per URDPFI Guidelines

Comparison with planning standards				
Sl.No	**Type**	**No. of Schools.**	**No of Students**	**Standards**
1	HS	10	2818	1 H.S for 13000 ppn
2	HSS	4	845	1 H.S.S with 8 div: for 13000 ppn
3	Arts & Science College	1	520	1 Arts & Science College for 80,000 ppn
4	Technical College	Nil	_	1 Professional College for 2,50,000 ppn
5	Poly Technic College	Nil	_	1 Polytechnic for 36000 ppn
6	ITC/ ITI	1	563	1 I.T.I/ I.T.C for 35000 ppn
7	TTC	1	40	1 T.T.C for 120000 ppn

9.1.2 Problems and Potentials

The educational facilities in the town, especially at the school level are commensurate with the population of the town. However, professional education facilities are meagre in the town. Most of the colleges are offering only the conventional courses and that is the reason why the students move out of the district for higher level courses. As a hilly station with charming environment and healthy atmosphere, the district as well as the town has good potential for establishing higher level professional colleges.

9.1.3 Inference

The literacy rate of Sulthan Bathery is higher than that of the district but is lower than the state average. Literacy rate among the SC/ST population is only 27.33%. These call for necessary intervention so that higher literacy rate is achieved. Most of the colleges are offering only conventional courses. So there is potential for establishing a professional college in the town that can serve the whole district.

9.2 Health

Health is another sector in which the state of Kerala has achieved remarkable progress which is comparable to that of developed countries. However, Wayanad as a backward district in Kerala lacks sufficient health care facilities. Same scenario exists in Sulthan Bathery also; the available facilities are not commensurate with the population.

There is no Govt. Medical College in the district and people depends on nearest city, Kozhikode for super speciality facilities which is about 100Km from the town. The tedious journey through Thamarassery ghats creates barrier in this sector and number of patients lose their life during the journey. A private medical college opened at Muppainad area is the nearest place where super speciality facilities are accessible to the people in the district.

9.2.1 Health Care Institutions

The government taluk head quarter Hospital is the main Govt hospital situated in Sulthan Bathery. Govt Ayurvedic hospital and Govt homeopathic hospital are also present in the area. The district hospital is located at Mananthavady which is about 40Km away from the town. District lacks the super speciality hospitals. Details of hospitals in Allopathic sector are shown in table 9.9.

Table 9-9: Details of Hospitals in Allopathic Sector

Sl. No	Name of Hospital	Location	Category*	Number of beds	Number of Doctors	Govt/ Private/ Cooperative Society
1	Victory Hospital	Gandhi junction Ward 8	3	35	5	Private
2	MES Hospital	Gandhi junction Ward 8	4	125	7	Private
3	Alfa Hospital	Kottakkunnu Ward 15	4	100	7	Private
4	Dr.Appukkuttan Memorial Hospital	Police stn.Road Ward 8	4	40	2	Private
5	Karuna Hospital	Assumption Jn. Ward 14	3	15	2	Private
6	Assumption Hospital	Assumption Jn. Ward 14	4	100	6	Private
7	Doctors Hospital	Assumption Jn. Ward 08	3	10	1	Private
8	Govt Taluk Hospital	08- Fairland colony	4	106	15	Govt
9	Vismaya Hospital	Raheem memorial road-09	3	15	1	Private
10	Vinayaka Hospital	15-Sathramkunnu	4	94	10	Pvt
11	Eye Hospital (Evening Clinic)	Assumption Jn. Ward 09	1		1	Private
12	St.Mary's Dental Hospital	By pass road Ward 9	1		3	Private

13	PHC Chethalayam	Pukalamalam Ward 1	1		1	Govt.
14	Chithra Clinic	Assumption Jn. Ward 14	1		1	Private
15	Lipu Clinic	Chungam Ward 15	1		1	Private
16	Chithra Clinic, for piles and Arshas	Manikkuni – 09	1		1	Private
17	Viswas Poly clinic	09-near Jubilee Hotel	1		2	Do
18	Dr. Abdulla Clinic	Chungam Ward 8	1		1	Private
19	Mary Matha Dental Clinic	Police stn. Road Ward8	1		1	Private
20	Sastha Dental Clinic	Chungam Ward 16	1		1	Private
21	Dr.Asha's Dental Clinic	Chungam Ward 8	1		1	Private
22	Pearl's Dental Clinic	Police stn.Road Ward8	1		2	Private
23	Dentz Dental Clinic	08- Chulliyode road	1		1	do
24	Modisseril Dental Clinic	Pancht.office Ward 08	1		1	Private
25	Dr.Sudheerbabu's Dental Clinic	8- Chulliyode road	1		2	do
26	Cosmo Dental Clinic	Near Victory Hospital-08	1		2	Private
27	Sharada Eye Clinic	Assumption Jn.Ward 09	1		1	Private
28	Eye world Eye Clinic	09-near jubilee hotel	1		1	do
29	Sharada Eye Clinic	Assumption Jn.Ward 09	1		1	Private
30	Len's Farma Eye Clinic	Ganapathivattom Ward 15	1		1	Private
31	Amrutha Clinical Laboratory	Chungam Ward 8	1		1	Private

Source: Secondary data 2012

*Category**

Category- 1	Clinics (only OP)
Category- 2	Hospitals with 24 hrs service
Category -3	Hospitals with single Operation theatre
Category- 4	Hospitals with more than one OT
Category- 5	Hospitals with advanced diagnostic facilities like CT scan, EEG
Category -6	Super specialty hospitals
Category-7	Referral Hospital (Govt. Sector)

Table 9-10: Details of Hospitals in Ayurvedic Sector

Sl. No	Name of Hospital	Location	Category*	Number of beds	Number of Doctors	Govt/ Private/ Co-operative Society
1	Govt.Taluk Ayurvedic Hospital	Opposite Mini Civil station Ward16	2	50	5	Govt.
2	Aswini Ayurvedic hospital	08- Chulliyode road	1	1	1	do
3	Govt. Ayurvedic Dispensary	Fairland Colony Ward 8	1		1	Govt.
4	SDV Ayurvedic Clinic	09-near S bharath	1		1	do
5	Dr.Shajee's Ayurvedic clinic	15-Malabar Gold	1		1	do
6	Arsha Ayurvedic eye Clinic	Chungam 15	1		1	Private
7	Doctors Diagnostic Imaging centre (DDIC)	14-Near LIC	1		01	do
8	Budha Nursing Home	09-poomala	1	06	02	do
9	Traditional Ayurvedic treatment centre	Aramad road 16	1		1	Private
10	Aswini Ayurvedic pharmacy and Treatment Centre	6th mile Ward 1	1		2	Private

11	Cheriakkan smaraka marma Chikilsalayam	15-near Malabar Gold	1		1	do
12	CPM Kalari- Ayurvedic Marma chikilsa	Police station .road -08	1		1	Private
13	Arjun Ayurveda Kendra	15-Kattayad	1		1	do

Source: Secondary data *2012*

There are two Govt ayurvedic hospitals at Sulthan Bathery which are govt. ayurvedic dispensary at Fairland and govt. taluk ayurvedic hospital opposite to Mini Civil Station. Table 9.10shows the details of ayurvedic hospitals in the town.

In homoeopathic sector there is one govt. homoeo dispensary and six homoeo clinics in private sector. Table 9.11 shows the details of homoeopathic clinics/hospitals in the town.

Table 9-11: Details of Homoeopathic Clinics/ Hospitals

Sl. No	Name of Hospital	Location	Number of doctors	Govt/ Private/ Cooperative Society
1	New Homoeo Clinic	Near WMO English School Ward 08	1	Private
2	Govt.Homoeo Dispensary, Odappallam	Ward 03	1	Govt.
3	Kripa Homoeo and Allergy Clinic	By pass road Ward 18	1	Private
4	Devine Homoeo Clinic	By pass road Ward 09	1	Private
5	Karunya Homoeo clinic	Near Darul Uloom college-08	1	Private
6	Modern Homoeo Clinic	08- Chulliyode road	1	do
7	Prasanthi Homoeo Clinic	12-Beenachi	1	do

Source: Secondary data 2012

Major health institutions are functioning in the private sector and advanced diagnostic facilities such as CT scan, ECG etc. are available in private hospitals only.

There is sufficient number of hospitals in Sulthan Bathery except hospitals with super speciality facilities and most of them are in private sector.Fig.9.7 shows the spatial distribution of health facilities in the town.

From the Fig 9.7 it is seen that all the health institutions available are concentrated in the core area. Hinterlands are devoid of health facilities.

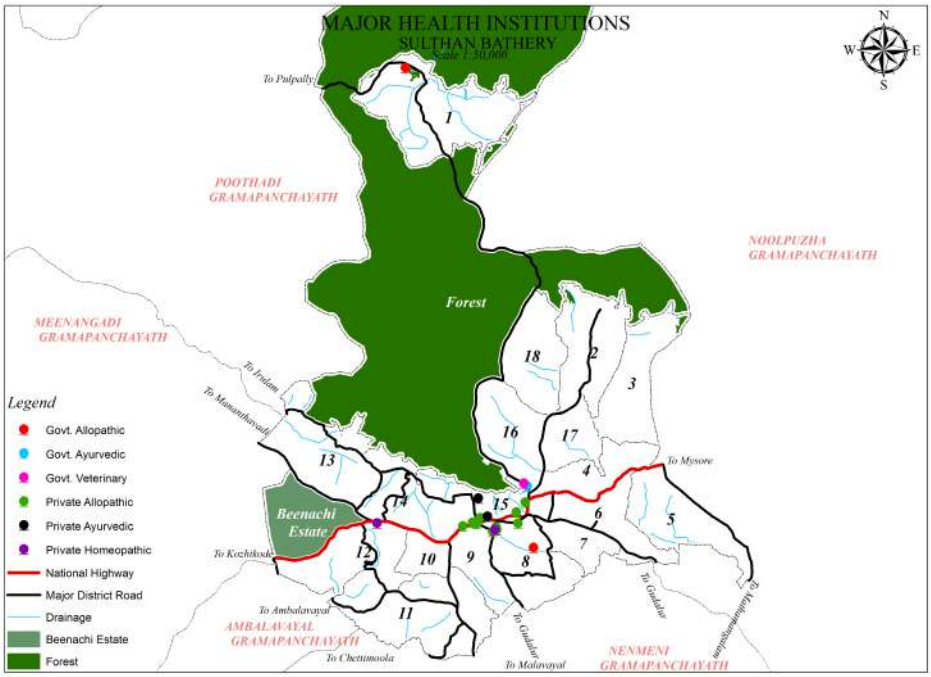


Figure 9.7: Spatial Location of Health Institutions

9.2.2 Comparison with Planning Standard

As per planning standard, one district hospital is required for a population of 11lakh. Wayanad district has a population of 8, 17 and 420 as per 2011 census; hence the available district level hospital is adequate to serve the population. As per standards one PHC is required for a population of 20,000 with 24 beds. The taluk hospital with bed strength of 60 will serve the future needs

As per standards, one nursing home, child welfare and maternity centre is required for a population of 45000 to 1 lakh. Sulthan Bathery has a population of 45417 as per 2011 census. Hence one such facility is required.

There are 29 private hospitals/clinics under allopathic sector including dental and eye hospitals out of which 9 has IP facilities, total number of beds available in govt. sector is 50. As per standard number of beds in private hospital for 1lakh population is 540. Hence these hospitals are sufficient to serve the present needs of Sulthan Bathery.

9.2.2.1 Problems and Potentials

Major problem in the health sector is unavailability of super speciality facilities. The distance and tedious journey through Thamarassery ghat to access super speciality facilities creates hindrance to the health sector. Another problem is the insufficiency of facilities in the existing hospitals. Most of the hospitals are in private sector. The taluk headquarter hospital is the only hospital with IP facility at Sulthan Bathery under government sector. The

analysis shows that even though the bed strength available in the hospitals at Sulthan Bathery can commensurate with the standards, people are depending the hospitals outside the district for speciality facilities. The Tribes who needs special care must be provided with access to tribal hospitals near their settlements since the district is the home land of major share of tribal population in the state.

9.2.3 Inference

There is no super speciality/speciality hospital in Sulthan Bathery. Hence people have to depend on hospitals outside the district. Major problem in the health sector is the inadequacy of facilities in the existing hospitals. Hence there is need for improving the facilities especially in the government hospital. The tribes need special care and hence separate wing can be set up in the taluk hospitals

9.3 Recreational Facilities

Recreation facilities includes parks and open space, sports centre and play grounds, botanical and zoological parks, water bodies/ other natural features and places of tourist interests. Following are details of recreational facilities available at Sulthan Bathery.

9.3.1 Parks and Open Spaces

There is no organized park and open space in the town except for the town square near St. Mary's college run by DTPC and a small park for senior citizens in the town centre. The development of town square having 2.5 acres land is being done by DTPC. Play grounds are attached to various schools being used for public functions especially of those schools located near the town centre. Since the town lacks such a facility in the town centre, there is public demand for requirement of open space/parks near to the town centre.

9.3.2 Play Grounds/Stadiums

There is a Municipal stadium at Manikuni having an extent of 0.0784 hectare near Assumption Junction. The access roads are too narrow. If the roads are widened to the desired level it can be utilized as an indoor stadium.

9.3.3 Ponds & Water Bodies

At present the Manichira Lake under the DTPC located about 3 km away from the town is used for tourism purpose and the KTDC beer parlor is located adjacent to it. The "Kadamanchira pond "near Kuppadi is utilized for training in swimming. This can be improved and utilized for the training at an international level as well as tourism purpose. The "Chethalayam waterfalls" is located within the forest near 6th mile lacks infrastructure facilities and proper accessibility. The DTPC envisages improving the Manichira Lake, Kadamanchira pond and the Town square in their budget.

9.3.4 Theatres and Auditorium

There are 5 cinema theatres in the town with a total capacity of 1993 seats. Apart from that, there are 9 auditoriums/community halls under private ownership namely Community Hall, Cosmo Sports Club Hall , IMA Hall, Aiswarya Auditorium, St Marys Hall, St Joseph Hall, Regency auditorium, Mc Leods Memorial Lions Club Hall, Community Hall Pazhupathur. The spatial distribution of recreational facilities is depicted in Fig.9.8.

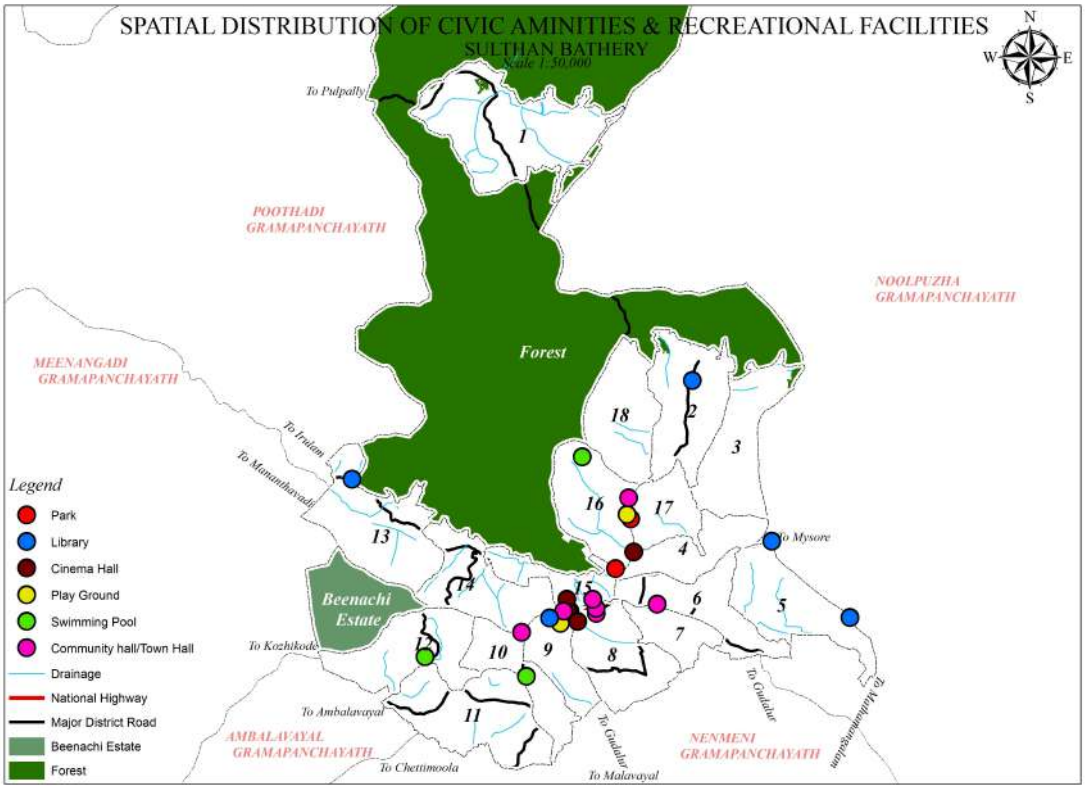


Figure 9.8: Spatial Distribution of Recreational Facilities

From the above figure it is observed that all the theatres and auditoriums are located along the sides of NH 766 in the core area of the town.

9.3.5 Problems and Potentials

The recreation facilities available in Sulthan Bathery are inadequate to meet the requirements. There is no park & open space in the core area. There is a strong public demand for such a space. Due to the fragmentation of residential properties, people have lesser open land attached to their houses, and hence there is a need for public open space for recreational purpose. Since all the theatres and auditoriums are located in the core area on the sides of NH, the resultant traffic causes traffic congestion especially in the peak hours. As far as the tourism potential of the district is concerned there is tremendous scope for Sulthan Bathery to function as tourism facilitation centre. More over the availability of natural resource to establish a botanical village /zoological garden, proximity of Muthanga wild life sanctuary, Ambukuthi hills & Jain Temple and proximity to Mysore and Ootty etc. should be considered.

The Beenachi Estate is located on the south west entry portion of the municipality and north to NH 766. The land is having an area of 2.25 Sq.Km under the ownership of "**Madhya Pradesh Government** ". The Estate is blessed with thick vegetation of indigenous species with wide range flora and fauna. There is coffee plantation also in this estate. The availability of such an important "**treasure of bio diversity**" in the Planning area can be considered as a potential and the possibilities of conserving the area as a district level "**Bio Park**" for the enhancement of tourism as well as for upliftment of the local economy. In this scenario, the local body with the support of district administration may take appropriate attempt to release the ownership of the estate from Madhya Pradesh Government. In case, the proposals are materialized, it will be a great achievement for the entire region.

9.3.6 Inference

Sulthan Bathery being a taluk headquarter, market town for surroundings local bodies and gate way point in terms of tourism there is a need to provide taluk level recreational facilities here. The available resources can be made use for this purpose.

9.4 Other Civic Amenities

In this head the details of facilities like town hall, reading room and library, crematorium & burial grounds etc. are addressed.

9.4.1 Town Hall

There is one town hall seating capacity 750. It is not sufficient to accommodate big public functions. Besides there are 8 halls available in the municipality under private ownership with total seating capacity more than 4000. The Table 9.12 shows the details of existing town hall and other auditoriums.

Table 9-12: Community Halls/Auditoriums in Sulthan Bathery

Sl.No.	Community Hall/Town Hall/Auditoriums	Locations	No.of Seats
1.	Community Hall	09- S Bathery.	750 seats
2.	Cosmo Sports Club Hall	07- Kaippancheri	300 seats
3.	IMA Hall	07- Kaippancheri	
4.	Aiswarya Auditorium	15- Sathramkunnu	500 Seats
5.	St Marys Hall	07- Kaippancheri	
6.	St Joseph Hall	04- Thirunelly	
7.	Regency auditorium	09- Bathery	200 seats
8.	Mc Leods Memorial Lions Club Hall	10-Manikkuni	
9.	Community Hall Pazhupathur	13-Pazhupathur	

9.4.2 Mini Civil Station



Mini civil station is located at Kottakkunnu having a site extent of 2.05 acres with a built up area 3810 Sq.m. Due to the availability of vast land in the mini civil station premises, there is possibility of accommodating more govt. offices those are currently functioning in rental buildings.

9.4.3 Fire Station

Fire force station is situated at Kottakkunnu; extent of land is 1.25 acres. Quarters facility is available at the fire force station premises itself.

9.4.4 Police Station

Police station is situated near old taluk office in 50 cents of land. Quarters facility is available in the station premises itself.

9.4.5 Reading Room and Library

Municipal reference library is located in Sulthan Bathery opposite Assumption school. There are 11 other libraries including public library in the planning area. The Table 9.13 shows the details of reading rooms/libraries.

Table 9-13: Details of Reading Room/Library in the Municipality

Sl.No.	Library/Reading Room	Location
1.	Municipal Reference Library	15- S Bathery
2.	Municipal Office Reading Room	15- Kottakkunnu
3.	Public Library	13- Pazhuppathoor
4.	Chappakkolli Gramodharana vayanasala	05- Thelampatta
5.	Rajeev Gandhi Library	02- Pazheri
6.	Sarvajana Library, Pazheri	04- Thirunelly
7.	Thirunelly Kuruma Colony Library	07- Kaippancheri
8.	Yuvarasmi Library	05- Thelampatta
9.	Nethaji Library	01 -Chethalayam
10.	Saima Library	-Thoduvetty
11.	Chaithanya Library	13- Pazhuppathoor
12.	Mahathma Library	

Source: Secondary Data 2012

There are 27 arts/ cultural/ sports clubs available in the Sulthan Bathery municipality, which are listed in Table 9.14.

Table 9-14: Clubs in Sulthan Bathery

Sl.No.	Name of the Club/ Institutions	Locations
1.	Kaippancheri Samskarika Nilayam	07- Kaippancheri
2. 3.	Mini Samskarika Nilayam, Pazhuppathoor Yuvasakthi Kalavadi	13- S Bathery 13- Pazhuppathoor
4.	Chinmaya Arts Club	
5.	Surya Arts & Sports	07- Kaippancheri
6.	Mahatmaji Samskarika Nilayam, Palakkara	05- Thelampatta
7.	Vengoor Samskarika Nilayam	18- Vengoor
8.	Vikram Arts Club	
9.	Yuvasakthi, Odappallam	18- Vengoor
10.	Srishti Arts & Sports, Poothikkad	12- Beenachi
11.	VRA Arts & Sports Club, Fairland colony	08- Kalluvayal
12.	Mini Samskarika Nilayam	07- Kaippancheri
13.	Cosmo Club & Navasruthi Kalarang, Palkkara	05- Thelampatta
14.	Kairali Arts & Sports Club,	
15.	Sarga Arts & Sports Club	07- Kaippancheri
16.	M C Paul Memorial Sarga Sudha Samskarika Nilayam	03- Odappallam
17.	Yuvarasmi, Kuppadi	17- Kuppadi
18.	Armad Samskarika Nilayam	16- Armad
19.	Kidanganad Youth Club	01-Chethalayam
20.	Thelampatta Samskarika Nilayam	05- Thelampatta

21.	Anaswara Kalasamithi	12- Beenachi
22.	Yuvasakthi, Arts & Sports Club, Valanchery	01 -Chethalayam
23.	Chaithnya, Thoduvatty	04- Thirunelly
24.	Rotary club	04-Thirunelli
25.	The city club	14-cheenapullu Estate
26.	Manthattikkunnu Samskarik Nilayam	03-Odapallam
27.	Archana Arts and Sports Club	

Source: Secondary Data 2012

9.4.6 Crematoria and Burial Grounds

There are three burial grounds in Sulthan Bathery. These are located at Manichira, near Sarvajana high school and Pazhuppathoor. There is no electric crematorium. But there are cemeteries attached with the Mosques and Churches.

9.4.7 Problems and Potentials

The existing town hall is inadequate to conduct bigfunctions and do not have sufficient parking facility. Libraries and reading rooms are inadequate to meet the requirements.

9.5 Inference

The civic amenities available are not adequate considering the status of Sulthan Bathery as a taluk headquarter and second order settlement. There is an urgent need for setting up of full equipped modern town hall in the town. Sulthan Bathery has to be equipped with sufficient higher order civic amenities so as to serve the entire service region.

CHAPTER 10

ECONOMIC SECTORS

The economic sector includes Industry, Trade and Commerce, Tourism, Agriculture, Animal husbandry and Fisheries, Construction Activities, Transportation, Storage and ware Housing, Other Service Etc. Among these Agriculture, Animal husbandry, Trade and commerce and Tourism are the most potential sectors in the case of Sulthan Bathery. In this chapter analysis of the significant sectors are discussed with respect to existing scenario.

10.1 Industry

Industrial land use constitutes 0.24% of the net area which is very less when compared with the suggested industrial land use share 8-10% for a medium town as per UDPFI guideline. The Only identified major industry in the area is the Glady's soaps & detergents" located at Poothikkad. Wood based industry owned by SIDCO and timber mill located at Kottakkunnu, Fuel briquette manufacturing unit at Armad are the other industries. There are 448 MSME units registered in Sulthan Bathery and the total employment potential from these units is 1725. The "Brahmagiri Meat Processing centre" at Nenmeni Grama Panchayat and the Agricultural wholesale market at Ammayipalam will help to promote the industrial as well as animal husbandry sector of Sulthan Bathery.

The MSME units are further classified into agro based, rubber based, plastic based, forest based, garments, chemicals, engineering, electronic based, minerals based, building materials based and others. The number of units in each class is as given in table 10.1 and its distribution is shown in fig10.1.

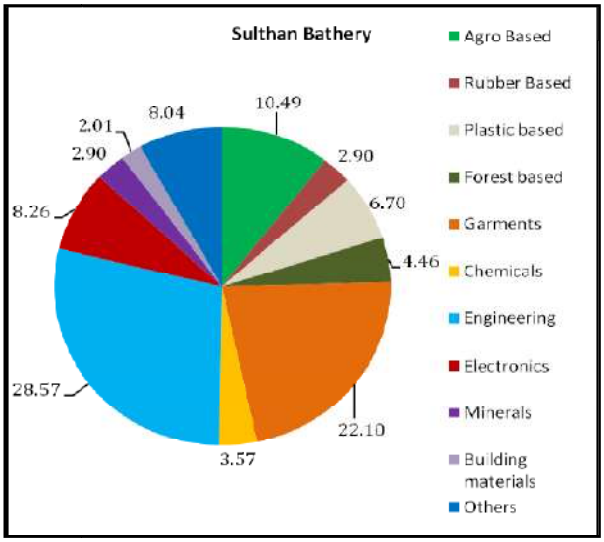


Figure 10.1: Existing MSME Units in Various Categories in Sulthan Bathery.

Source: Primary survey - 2012

Table 10-1: Existing MSME units in Various Categories

Sl No	Type of industry	No of units	No of employees	% of units
1	Engineering	128	494	28.57%
2	Garments	99	309	22.10%
3	Agro Based	47	162	10.49%
4	Electronics	37	86	8.26%
5	Plastic based	30	91	6.70%
6	Forest based	20	82	4.46%
7	Chemicals	16	259	3.57%
8	Rubber Based	13	31	2.92%
9	Minerals	13	22	2.90%
10	Building materials	9	34	2.00%
11	Others	36	155	8.03%
	Total	448	1725	

Source: Industries Dept. &Primary survey - 2012

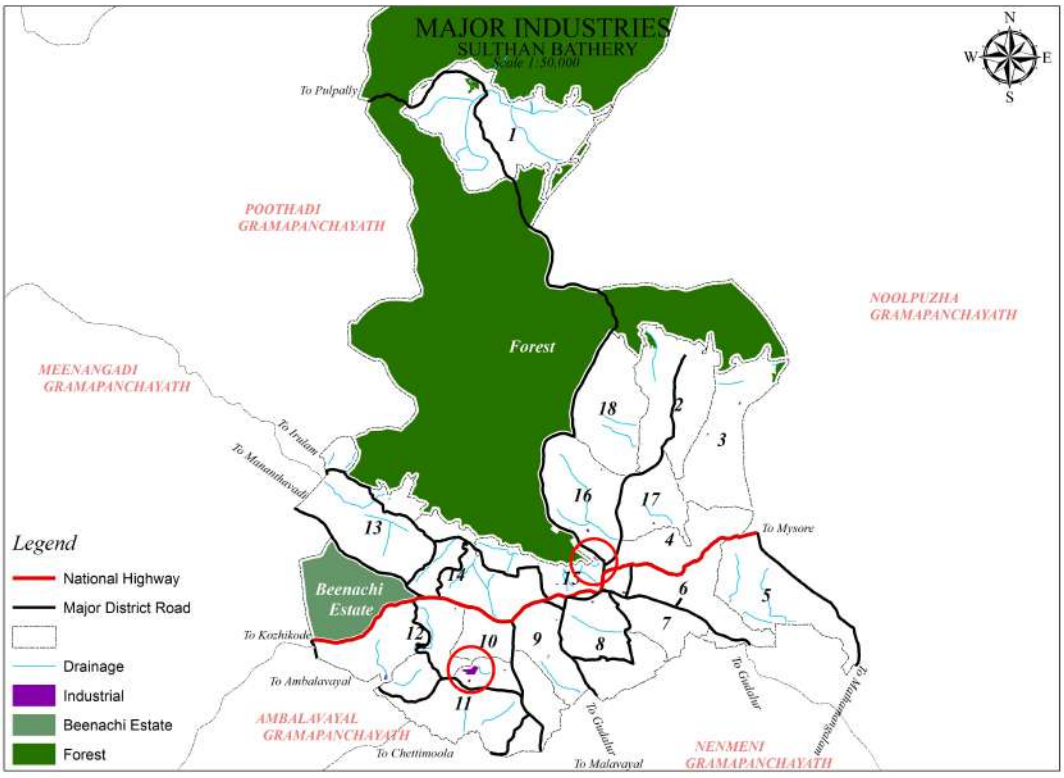


Figure 10.2: Spatial Distribution of Industrial Land Use

As per the records (Table 10.1), it is seen that engineering/service industries are dominant in the town and garment industrial sector stands second. Even though the

economy of Sulthan Bathery mainly depends upon agricultural sector, agro based industries are very less. Engineering and service Industries includes automobile workshops, welding workshops, and tyre retreading shops etc.

Fig 10.2 shows the spatial distribution of Industrial land uses in the town. It can be seen that the major industries are mainly concentrated in the core area except the Glady's Soap factory at Poothikkad. The hinterlands are devoid of industries except some flour and oil mills which are scattered within the area.

10.1.1 Problems and Potentials

Wayanad is a backward district in the case of industrial development. The lack of proper connectivity, absence of rail connectivity and air strip and restrictions imposed by different agencies with reference to the environment of the area discourages entrepreneurship. Recently the reports of Dr. Gadgil Committee and Dr. Kasturi Rangan Committee which deals with the environmental issues of the western ghat propose some restrictions for red category industries in the town as well as in the district. If the recommendation given by the aforementioned Committee is accepted by the government, it may lead to restriction for large and medium industries. The town has not attracted any large scale industry so far. Since the area is agrarian in nature and has good tourism potential, there is high potential for agro based, forest based and tourism based industries including cottage industries. However, diversification and value adding to products are not attempted to a significant scale. Moreover, there is ample scope of animal husbandry due to the presence of Brahmagiri meat processing centre at Malavayal which is very near to Sulthan Bathery.

The draft Industrial and commercial policy 2011 of Govt. of Kerala envisages bringing the state in top three position in per capita income in the country (the state is in the seventh position at present). The role of MSME's in employment generation is well established. Since the main economy of area is agriculture, it is essential to promote agro based industries and animal husbandry sector complementary to the agriculture sector to enhance the local economy. There are opportunities in bio-manure production, traditional handicrafts item, tourism and forest based industries. If the town is provided with good infrastructure facilities, it will attract MSME's based on local resources viz. agriculture produces, animal husbandry produces, cash crops etc. Even though sufficient data are not available in the case of traditional industries, there is a high potential especially for traditional utensils making since people are withdrawing from this trade because of less financial benefits.

10.1.2 Inference

The existing industrial base of the town is comparatively poor, mainly due to lack of proper connectivity and absence of infrastructure. If the recommendations of Dr. Kasturi Rangan Committee which deals with the environmental issues of western ghat accepted by

the government, it will further retards the industrial sector of the area in future. The Agro based and tourism based industries have good potential in the town.

10.2 Trade and Commerce

Wayanad district as well as Sulthan Bathery town is agrarian in nature. Sulthan Bathery is a taluk level marketing centre for agricultural produces and spices within the district. Moreover, the trade & commerce of the town is well linked with Gudalur in Tamil Nadu state and Gundelpet of Karnataka state. Commercial facilities are seen mainly concentrated on both sides of the major transportation corridors such as NH 766, Thaloor road and other major roads as ribbon development. Only about 32 Ha land (0.31% of the gross area /0.79% of the net area) is under commercial land use in the town. The problem faced by the town is lack of organized market, parking, loading and unloading space etc. The fish and meat market at Rahim Memorial road is very congested and create nuisance to the public. There is no organized market for fruit and vegetables. Commercial centres within the town are mostly characterized by congestion due to vehicular and pedestrian traffic beyond the capacity of existing facilities. The new constructions in the core area will attract more commercial activities which will again aggravate the problems; hence suitable measures are to be adopted to decongest the core area.

10.2.1 Existing Hierarchy of Commercial Centers and Nodes

The nodes are characterized by high concentration of commercial units. As per the District Urbanization Report, Sulthan Bathery is a second order settlement in the district and also a second order node. Sulthan Bathery acts as a taluk level marketing centre and serving neighboring local bodies (The hierarchy of nodes within the district is shown in fig 10.3 below). So, nodes are identified on all important intersection of roads where there is a concentration of commercial activity as linear development. As far as Sulthan Bathery is concerned the commercial activities are concentrated on both sides of the major transportation corridors especially in NH 766 from Assumption junction to Kottakkunnu junction. Most important commercial nodes in the town are Traffic junction and Chungam junction followed by Assumption junction, Gandhi junction, Kottakkunnu junction and Beenachi junction as second order nodes. The third order nodes are Dhottappankulam junction, Poomala road junction, Manichira junction, Kalluvayal junction, Moolankavu junction, Kuppadi junction and Chethalayam junction.



Assumption Junction

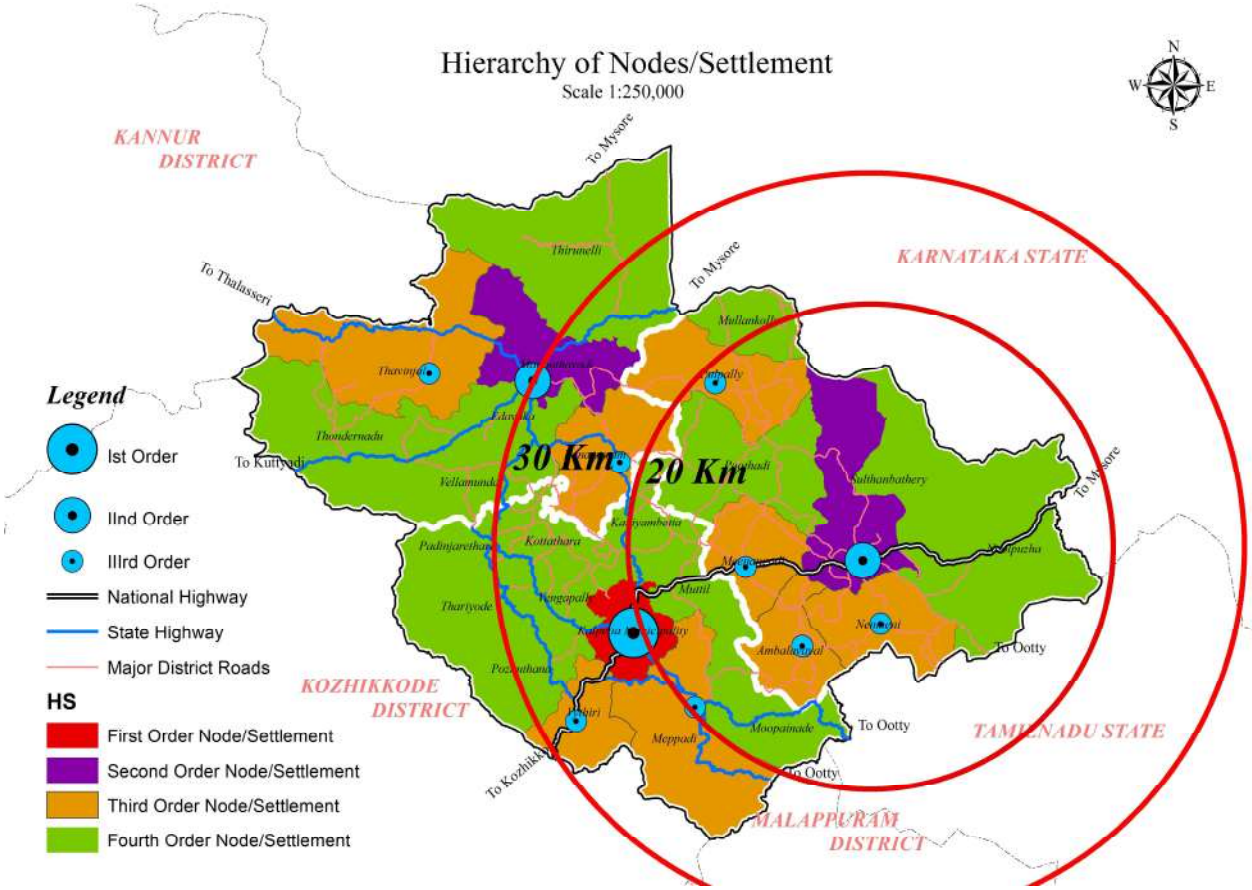


Figure 10.3: Hierarchy of Nodes within the District and Linkages

The commercial nodes within the town are spatially shown in fig.10.4.

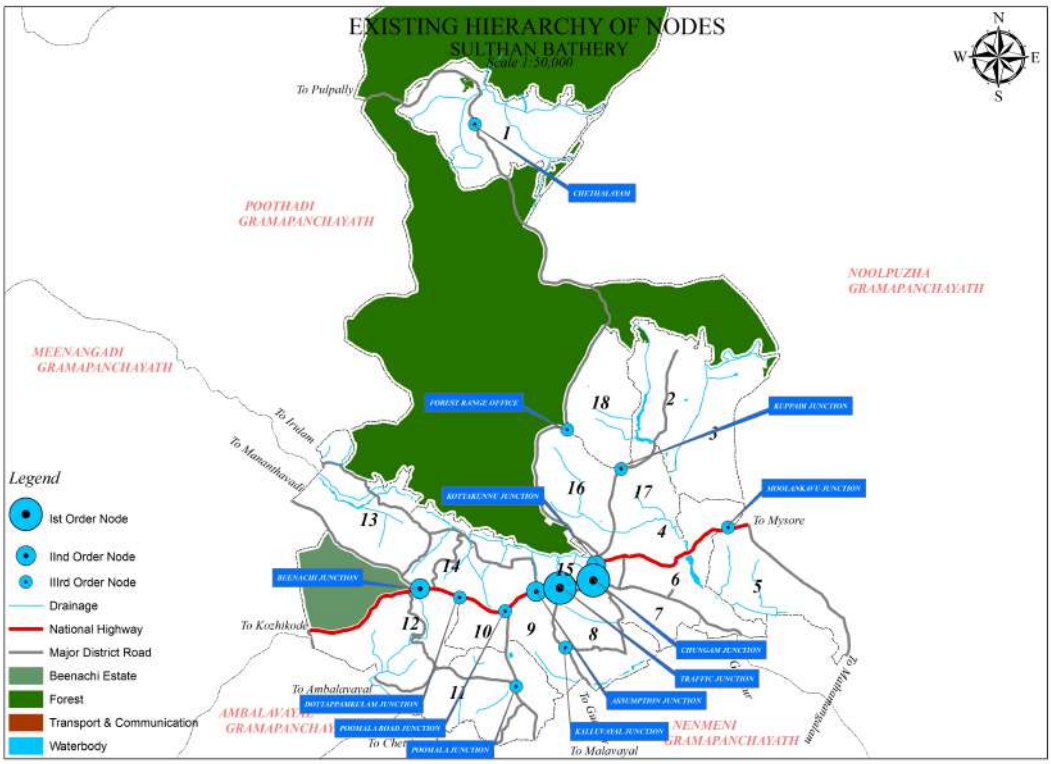


Figure 10.4: Spatial Distribution of Commercial Nodes.

It can be seen that the first order and second order nodes are located along NH766, the main traffic corridor, and others are located in the south east part of the town, where the concentration of residential land use is high.

10.2.2 Informal Trading Activities (Street Vending)

Street vendors are common sight in all towns. The National Policy on Urban Street Vendors, 2009 recognizes the positive role of street vendors being an integral and legitimate part of the urban retail trade and distribution system for daily necessities of the common man. The policy views street vending as a source of self-employment to the poor which gives affordable and convenient services to a majority of urban population.

Street vending activities are seen concentrated mainly at Chungam, near Traffic junction, Rahim memorial road and near Court complex. Majority of them are tea & snack stalls, fruit & vegetable stalls and home appliance. 45 persons are engaged in informal trading activities. Details of street vendors in the town are shown in table 10.2.

Table 10-2: Details of Street Vendors

Sl. No	Area of concentration of informal sector activities	Type of activity- fruits and vegetables, garments, tea and snacks, home appliances, books etc.	Extent of informal sector activity in each area (no of shops/cart), no of street vendors	No of units under informal sector activity having the approval of local body- location wise	Number of workers
1.	Cheeral Road Near Chungam	Tea and snacks, juice	5 Nos	Nil	5
2.	Chulliyode Road Near Old Bus Stand	Fruits and vegetables Tea and snacks, Lottery	21 Nos (all carts)	Nil	21
3.	Raheem Memorial Road	Tea and snacks, fruits	03 Nos	Nil	3
4.	Manikuni (Near Court)	Tea and snacks, fruits	04 Nos	Nil	4
5.	Near municipal office	Fruits, home appliance, seeds etc...	07 Nos	Nil	7
6.	Chungam Area	Tea and snacks	05 Nos	Nil	5

10.2.3 Problems and Potentials

Commercial facilities are seen mainly as ribbon development along the major transport corridor NH766. Problems faced by the town are insufficient space for parking, loading & unloading space. The present fish and meat market is congested and unhygienic and there is no organized fruit or vegetable market in the town. At present there is no data available on people engaged in informal trading such as their address, residing place etc. Hence necessary intervention as envisaged in the National Policy on Urban Street Vendors has to be made.

10.2.4 Financial Institutions

Table 10.3 shows the details of available financial institutions in the town.

Table 10-3: Financial Institutions in Sulthan Bathery

Nationalized banks	12 no
Co-operative banks	3 no
Other scheduled banks	3 no
Other non-banking financial institutions	5 no
Total	23 no

10.2.5 Inference

Sulthan Bathery is one of the two 2nd order settlements in the district and the taluk headquarter town. It acts as a market centre among the surrounding local bodies. Commercial nodes within the town are mostly congested due to vehicular and pedestrian traffic beyond the capacity of existing facilities. Being a taluk headquarter and a service facilitator in tourism sector, it has to be provided with sufficient higher order facilities in commercial sector such as shopping malls, complexes, adequate parking space including provision for mechanical parking etc.

10.3 Tourism

Wayanad district is considered as one of the important tourism destination in south India due to good connectivity to the world famous tourism spots such as Mysore, Ootty and availability of various tourism spots such as Pookode Lake, Edakkal cave, Banasura Sagar Dam, Chembra Peak, Kuruva Island, Wayanad Wild Life Sanctuary, Soochippara Waterfalls, Thirunelly Temple etc. The Jain Temple at Sulthan Bathery, one of the important heritage buildings is looked after by the Archaeological Department. Even though there are no identified tourism spots except “the Jain Temple” in the town, being a taluk headquarter and being the “Gate way of Wayanad”, the town has to act as a facility provider to the whole district. Almost all the tourist spots in the district are well connected from Sulthan Bathery. Table 10.4shows the distance to various tourism spots in the district from the town and the spatial distribution of these spots is given in fig.10.5. The District Tourism Promotion Council (DTPC) is located at Kalpetta which control the tourist activities in the district.

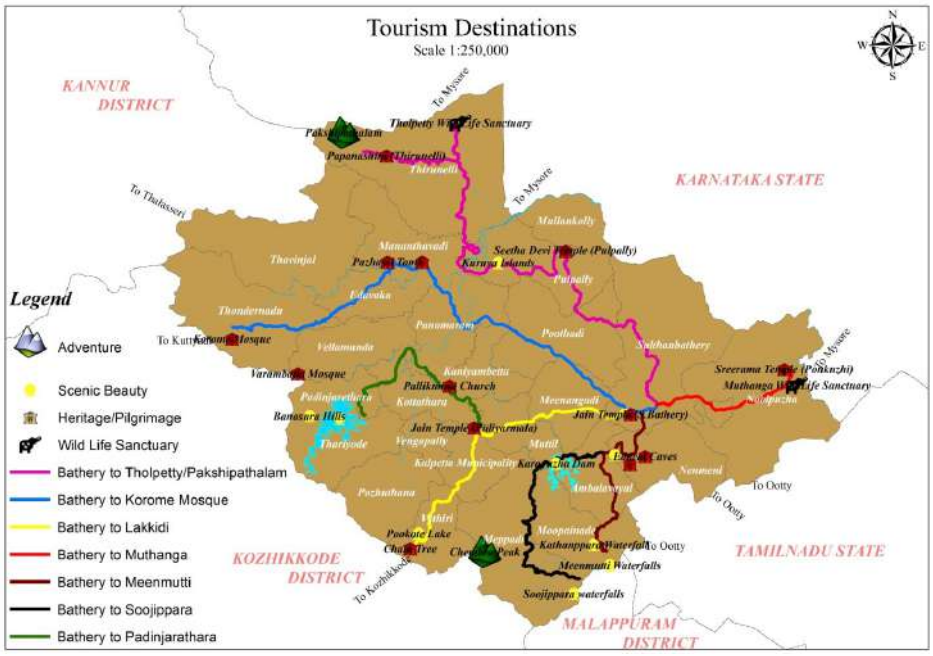


Figure 10.5: Spatial Distribution of Tourism Spots in the District

Table 10-4: Distance from Sulthan Bathery to Major Tourist Destinations in Wayanad

Sl.No	Name of Tourist spots	Distance from Bathery
1	Banasura Sagar Dam	50 km
2	Banasura Sagar Hills	53 km
3	Papanashini (Thirunelly Temple)	70 km
4	Puliyarmala Jain temple	27 km
5	Pallikkunnu Church	43 km
6	Cheengeri Hill	18 km
7	Ambalavayal Farm	10 km
8	Chain Tree	45 km
9	Pulpally Seetha Devi Temple	25 km
10	Soojippara Water Falls	29 km
11	Meenmutti Water Falls	23 km
12	Tholppetty Wild Life Sanctuary	55 km
13	Ponkuzhi Sri Rama Temple	16 km
14	Thirunelly Temple	70 km
15	Chembra Peak	43 km
16	Edakkal Cave	12 km
17	Jain Temple	1 km
18	Kanthan para Water Falls	27 km
19	Karapuzha Dam	19 km
20	Kuruva Island	45 km
21	Pazhassi Tomb	26 km
22	Muthanga Wild Life Sanctuary	15 km
23	Pookode Lake	40 km
24	Pakshi Pathalam	75 km
25	Valliyoorkavu Temple	27 km

10.3.1 Important Tourist Sites in the Town

As already mentioned, the Jain Temple in the town is the major tourist attraction in Sulthan Bathery. The Chethalayam waterfalls at Chethalayam and Manichira Lake have great tourism potentials. The Kadamanchira pond located near Kuppadi is a swimming pool in which training on swimming is being given.

The Ganapathivattam temple and Mariyamman temple have strong historical back ground and can be made part of the tourist network of the district. The spatial distribution of tourism spots in the town is shown in fig.10.6.

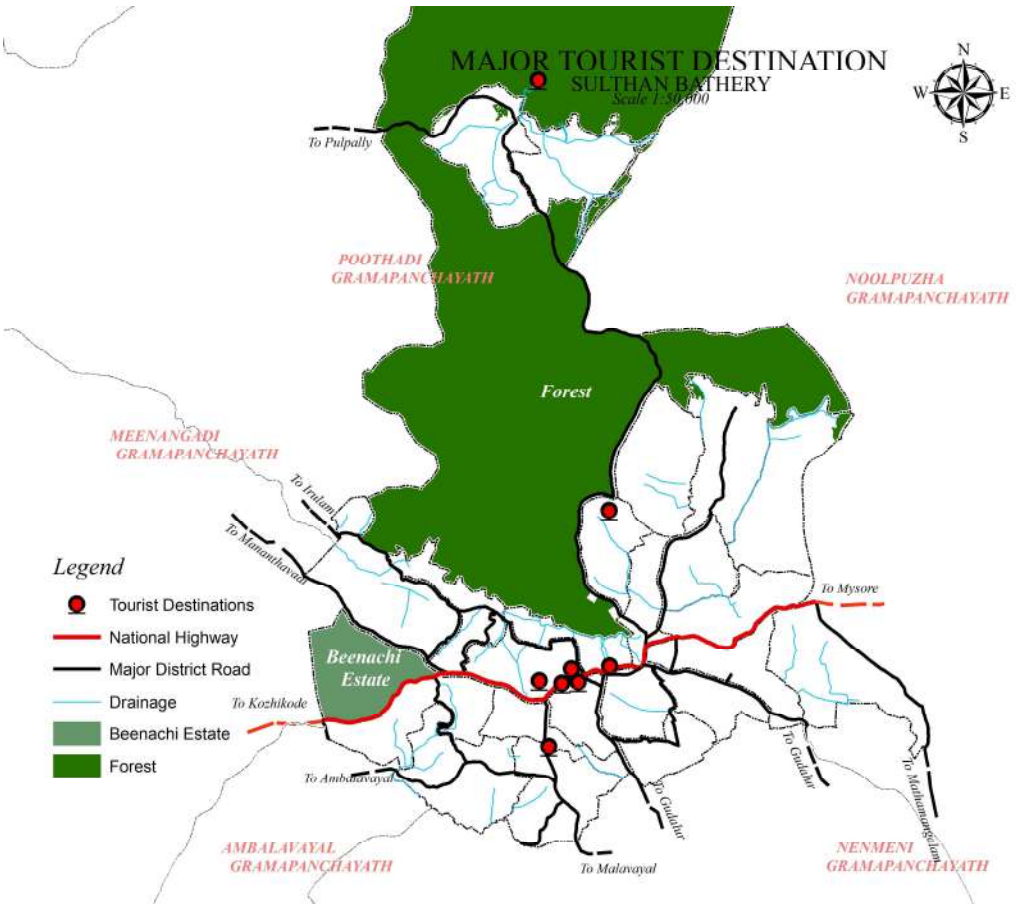


Figure 10.6: Spatial Distribution of Tourism Spots

10.3.2 Important Heritage sites in the Town

Jain Temple near Assumption junction is the only identified heritage site in the town. This temple is believed to have been built in 13th century. It is the place of worship of Jain Community in-migrants from Karnataka. The temple was used as the Battery of Tippu Sulthan during his invasion in Wayanad. The Temple is one of the protected monuments in the district and is under the ownership of Archaeological department. The name of Sulthan Bathery derives from the word “Sulthan’s Battery”.



Jain Temple, Sulthan Bathery



Figure 10.7: Temporal Variation of Tourist Arrival in the District

10.3.3 Tourist Arrival

As per the available data it is seen that the number of tourists visiting Wayanad district is increasing year by year. Hence district has an important role in the tourism sector. The table 10.5 & fig.10.7 shows detail of tourists' arrival to the district during 2008-09 to 2012-13.

Table 10-5: Details of Tourist Arrival

Year	No of visitors
2008-09	244755
2009-10	232186
2010-11	326571
2011-12	353280
2012-13	393688

Source: Police Dept. -2013

10.3.4 Problems and Potentials

Even though the economy of the district is much depends on tourism, the infrastructure facilities available are not sufficient to meet the requirement. The main problems faced in this sector are lack of accommodation facilities including budget accommodation, poor connectivity, and poor infrastructure in transportation sector, lack of marketing facilities etc.

Being a hill station with scenic beauty, Wayanad has several tourism as well as heritage spots, it is also noted that there is an immense scope for eco-tourism due to salubrious climate and presence of major share of forest content with wide range of flora and fauna. All the major tourism spots in the district are well connected from Sulthan

Bathery. Hence Sulthan Bathery has to act as a service facilitator to the tourists visiting the district. The “Chethalayam waterfalls” located within the forest can be utilized for tourism purpose if provided with infrastructure facilities and the Manichira lake can be improved by providing boating etc. The rich forest content and its flora and fauna has to be utilized for tourism and the forest products like honey, herbal medicines etc can be marketed.

The Beenachi Estate in Sulthan Bathery, a “treasure of bio diversity” if developed as a district level “Bio Park” Through proper government level interventions will be a booster for the tourism sector not only of Sulthan Bathery but for the entire district.

Urban design guidelines such as, building height, paint color etc. can be incorporated to boost the tourism potential of the district.

10.3.5 Inference

Being the gate way town to “The green paradise” Wayanad, Sulthan Bathery has major role in the tourism sector of the district as a tourist transit centre.

10.4 Agriculture

Wayanad is basically agrarian, with plantation economy playing a major role. In the total 2131 Sq.km the district has, 788 Sq.km, forming 37% of the total area, is covered by forest and 1142 Sq.km of the total area is used for agriculture. It forms 54% of the total land area of the district. The district is characterized by perennial plantation crops and spices with coffee forming the main agriculture crop of the district. Coffee is cultivated 66973 hectares. Coffee in the district shares 33.65 per cent of the total cropped area in the district and 78 per cent of the coffee area in the state. Other Major crops are pepper, coconut, rubber, areca nut, cardamom and ginger. Pepper is grown along with coffee in the north eastern parts of the district, especially in Pulpally and Mullankolly. Paddy, once the major crop of the district, is now cultivated in 12988 ha and only a single crop is harvested. Much of the paddy field of the district is being converted for banana cultivation. Ginger cultivation in Wayanad has also substantially increased in recent times and paddy fields are increasingly being converted for ginger cultivation. The land use breakup of the district is shown in fig.10.8.

As far as Sulthan Bathery is concerned, agriculture is the predominant activity. In the total area, 58.83% (60.88 sq.km.) is under forest and in the net area of 40.24 sq.km, about 72.51% constitute agricultural land. The Beenachi Estate owned by Madhya Pradesh Government occupies 2.18% of the total area. The spatial distribution of agricultural land is shown in Fig 10.9 and land use break up is shown in fig.10.10.

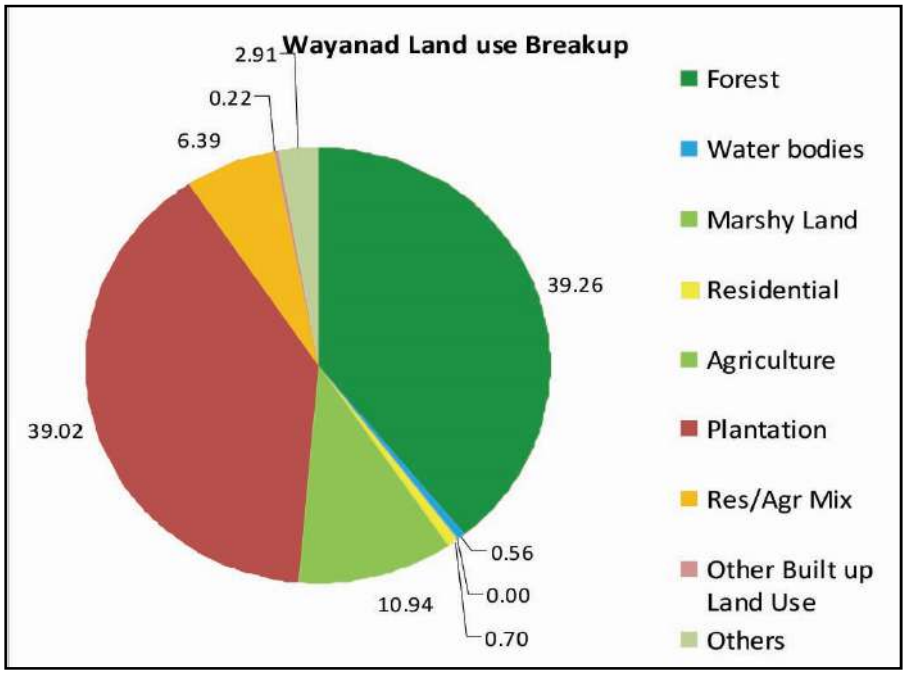


Figure 10.8: Land Use Break Up of Wayanad

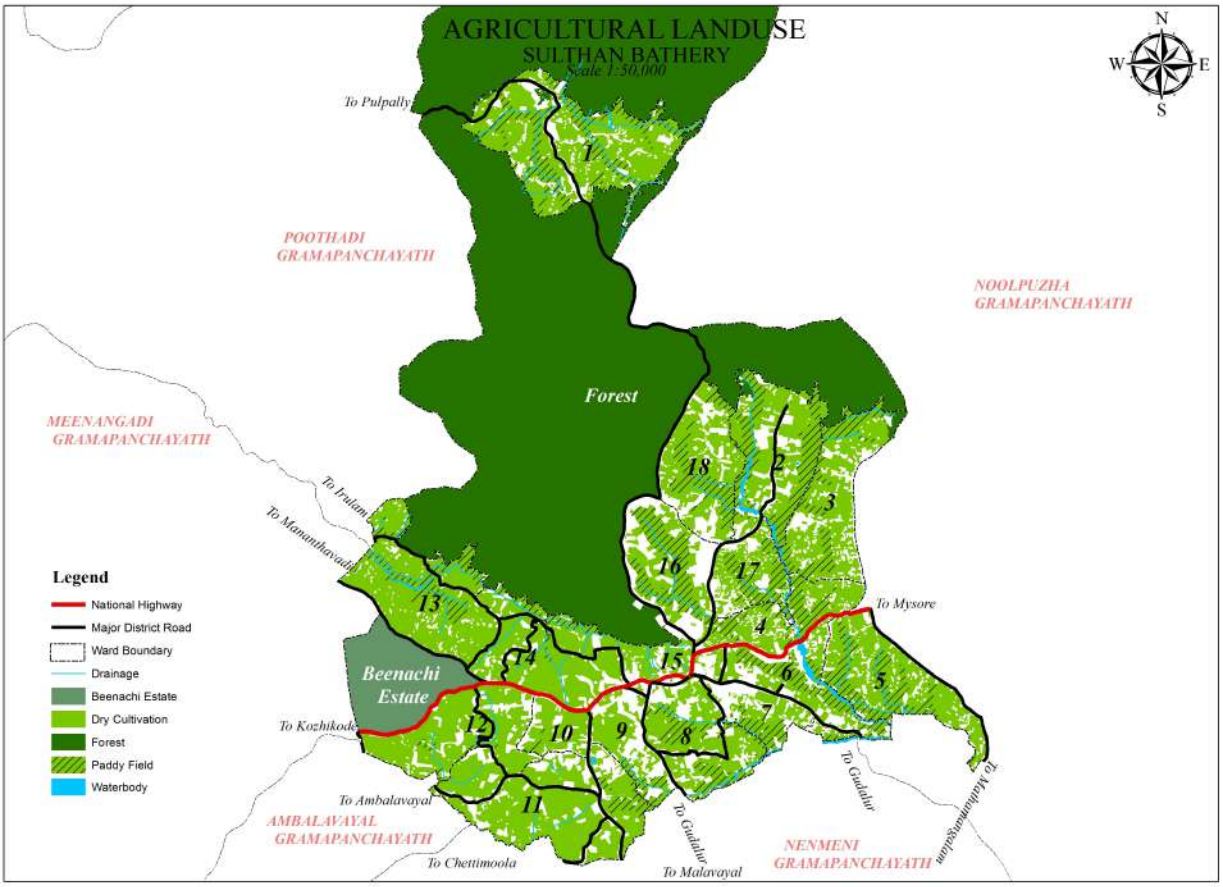


Figure 10.9: Spatial Distribution of Agricultural Land

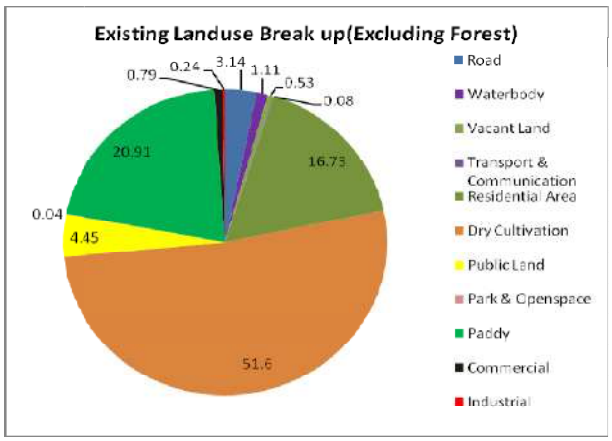


Figure 10.10: Land Use Breakup of Sulthan Bathery

Agricultural land is concentrated mainly in southern part of the town and on the two isolated wards viz. Chenad and Chethalayam. Concentration is higher in wards 5,9,11,12,13,14 and 15. Paddy constitutes 8.14% of the total area. The spatial distribution of paddy is shown in fig 10.11. High concentration of paddy is seen in wards 1,2,3,4,5,6,8,10,16,17 and 18

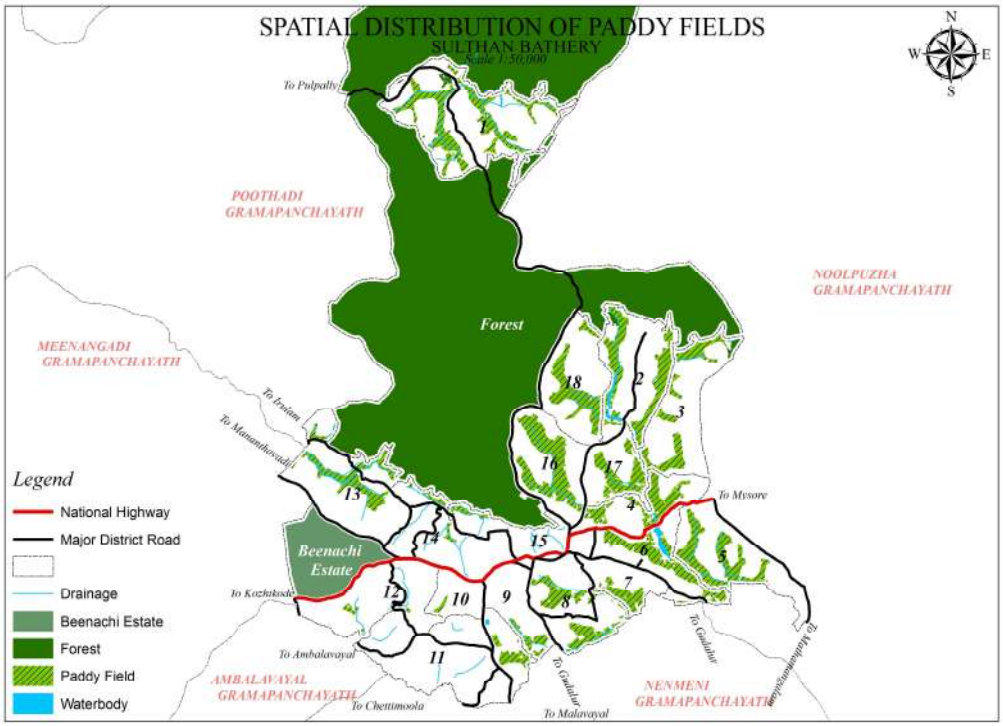


Figure 10.11: Spatial Distribution of Paddy

Source: land use 2012.

The general system followed in this sector is mixed crop pattern. The main crop is coffee followed by pepper. Besides paddy, coconut, ginger, cardamom, banana, areca nut etc. are also cultivated. The table 10.6 shows the important crops & annual production of each.

Table 10-6: Important Crops & Production

Sl. No	Type of crops	Area (HA)	Production/yr.
1	Paddy (Nanchang)	521.142	2084.568MT
2	Paddy (Puncha)	89.03	356.12MT
3	Coconut	460	782000Nuts
4	Banana	40	1000MT
5	Areacanut	600	200MT
6	Coffee	1200	2400MT
7	Pepper	1200	80MT
8	Ginger	220	880MT
9	Turmeric	12	48MT
10	Cardamom	6	5MT
11	Rubber	60	45MT
12	Vegetable	100	500MT
13	Tubers	240	600MT
14	Mango	50	10MT

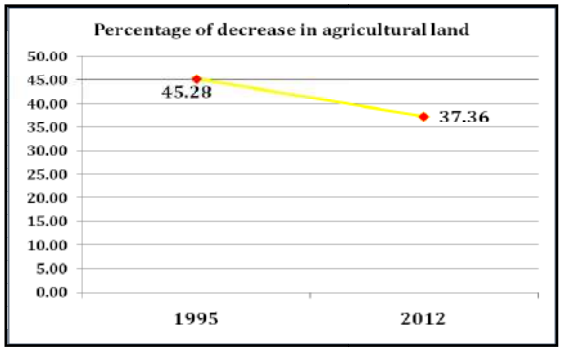
Source: Agriculture Dépit. 2013

Temporal variation of the area cultivated, is shown in the fig 10.12. Fig.10.13 shows the temporal variation of area under main crops.

From the above Fig 10.11, it is seen that the cultivable area under paddy is 610 Ha (Source: agriculture department) whereas the extent of paddy as per the existing land use map 2012 is 840 Ha. Hence it is inferred that about 130 Ha of paddy area is being kept as vacant. It is also noted that there is a drastic decrease in the agricultural land when compared with the 1995 data available in the case of crops like paddy, coffee, pepper and plantain also the area is seen decreasing. It may be assumed that paddy cultivation is not seriously attempted in the area as paddy production is not financially viable when comparing with the expenditure and the trend of shifting of labors from primary sectors to secondary and tertiary sectors.

10.4.1 Irrigation Facilities

The agriculture in Sulthan Bathery is mainly rain fed. Cultivation is being done mainly depending of the availability of monsoon (80% South-June to Aug+20% Sep to Nov). Even though there are 10 streams scattered in the area, at present there is no irrigation facilities.



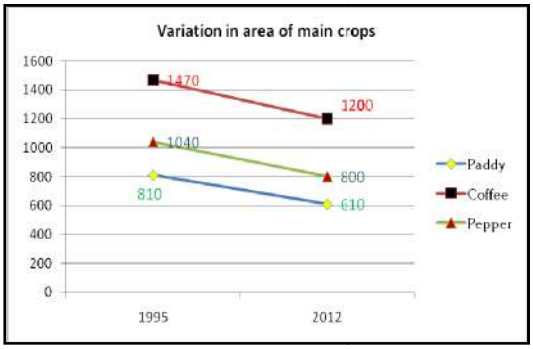


Figure 10.12: Temporal Variation of Agricultural Land *Figure 10.13: Temporal Variation of Main Crops*

As paddy area is 8.40 Sq km, it is essential that irrigation facility is made available, so as to enhance the paddy production. Table 10.7 shows the water courses in the planning area.

Table 10-7: Major Water Sources in the Sulthan Bathery

Sl. No	Ward No.	Name of Ward	Name of thodu /stream
1	6	Kottakkunnu	Thoduvetty Thodu
2	14	Kattayad	Kattayad Thodu
3	13	Pazhupathur	Pazhupathur Thodu
4	13	Pazhupathur	Manthamkolli Thodu
5	7	Kaippancheri	Kaippancheri Thodu
6	2	Pazheri	Puthuchola Thodu
7	12	Beenachi	Kuppamudi Thodu
8	16	Armad	Karakkandi Thodu
9	12	Beenachi	Poothikkad-Vattathimoola Thodu
10	4	Thirunelly	Thirunelly Thodu

10.4.2 Agriculture Inputs and Marketing Facilities

Agriculture input units include fertilizer, shops, market, units supplying machineries, seed farms etc. The Krishi bhavan located at Kottakkunnu, The Regional Agricultural Research Station at Ambalavayal, Coffee Board Laison office at Sulthan Bathery, 13 Padashekhara Samithi, 10 Kurumulaku Samithi, municipal level Kera Samrakshana Samithi, different NGOs and financial institutions plays are important role in the agricultural sector of Sulthan Bathery. More over there are 3 fertilizer/insecticides shops out of which one in cooperative sector, located in the town. The “Karshika Motha vyapara Vipanana Kendra“ located at Ammayipalam gives opportunity to the farmers to market their products without any intermediaries and this will help to get maximum price to the farmers for their products. There is no facility for value addition of the agriculture produces.

10.4.3 Problems and Potentials

72 % of the total agricultural area of Sulthan Bathery is under dry cultivation. There are no irrigation facilities. Other problems faced in this sector are the increased production cost, non-availability of agricultural laborers, destruction of crop by wild animals especially monkeys, absence of efficient mechanization for paddy cultivation, various diseases found, lack of marketing facilities etc. The cultivation without considering terrain of the land also causes soil erosion and thereby reduction in crops. Conversion and subdivision of agricultural land for other purposes is taking place considerably in the area.

About 59% of Sulthan Bathery is covered with reserve forest and most of the agricultural land is located in the nearby area of the forest. The incidents of men animal conflict are seen growing with years and there are no barriers obstructing wild animals entering into the agricultural farms except some trenches and solar fencing along the boundary of the forest. The preventive measures taken by the forest dept. is not functioning properly due to the absence of proper maintenance and monitoring.

Even though a large area is under cultivation in the town, the income generated is not commensurate with the production. Product diversification system and value addition process of the produce may be resorted to tackle the problem. The availability of large area of agriculture and the presence of higher level agricultural related agencies such as office of “Regional Agricultural Research Station” at Ambalavayal, “Karshika Mothavyapara Vipanana Kendra “located at Ammayipalam and Krishi bhavan may be considered as the potentials for this sector and there is scope for promoting urban agriculture activities such as production of vegetables for own use, export oriented floriculture etc.

The Dr.Kasturi Rangan Report which deals with the issues of western ghat recommends that long term agriculture such as coffee is preferred in the area having slope more than 20%.

10.4.4 Inference

Agricultural land covers 72.51 % of the net area of Sulthan Bathery. Coffee is the major cultivation in the area. Paddy cultivation also has dominant role in the agricultural sector. Labor migration especially to tertiary sector reduces the number of workers in agriculture sector. The destructiveness of wild animals is another cause of withdrawal from the sector. The product diversification system and value addition of hill produce have tremendous scope in the sector.

10.5 Animal Husbandry

Animal husbandry activities are considered as allied to agriculture activities. Since the agriculture sector is thrust area, animal husbandry sector also has an important role in Sulthan Bathery. The main livestock population includes cattle, buffalo, goat, pig, hen and duck etc. The physical status of livestock population in the district and Sulthan Bathery are

shown in table 10.8 &10.9. The temporal variation of livestock population is shown in fig.10.14 & 10.15.and its ward wise distribution is shown in fig.10.16

Table 10-8 : Temporal Variation of Livestock Population in the District.

Livestock population (Wayanad)		
	2007	*2012*
Cattle	*65459*	*76777*
Buffalo	*2880*	*5150*
Goat	*75375*	*34920*
Poultry	*369425*	*218813*
Duck	*9005*	*14149*
Quail	*3288*	*1028*

Figure 10.14: Temporal Variation of Livestock Population in Sulthan Bathery

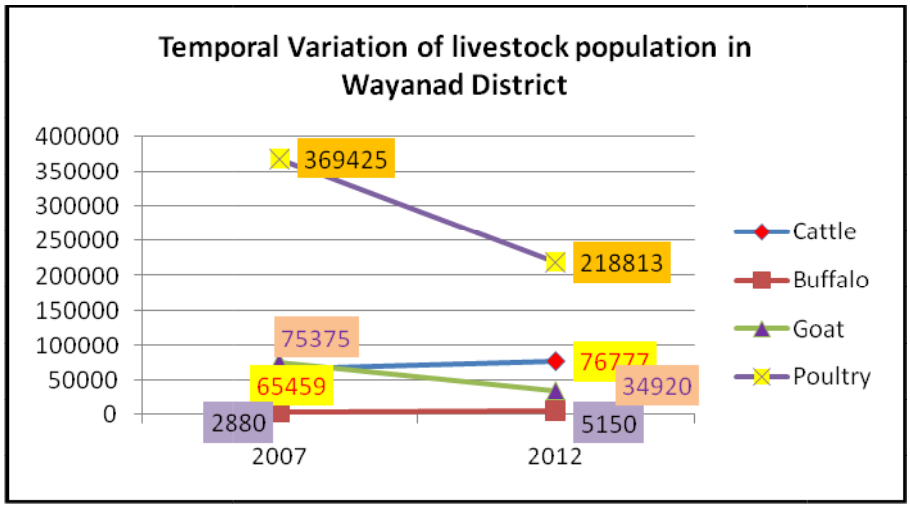


Table 10-9: Livestock Population in Sulthan Bathery

Livestock population (Sulthan Bathery)		
	2007	**2012**
Cattle	3731	2988
Buffalo	121	232
Goat	3372	1428
Pig	93	165
Duck	189	723
Poultry	16372	12176

Source: Animal Husbandry Department-year-2010

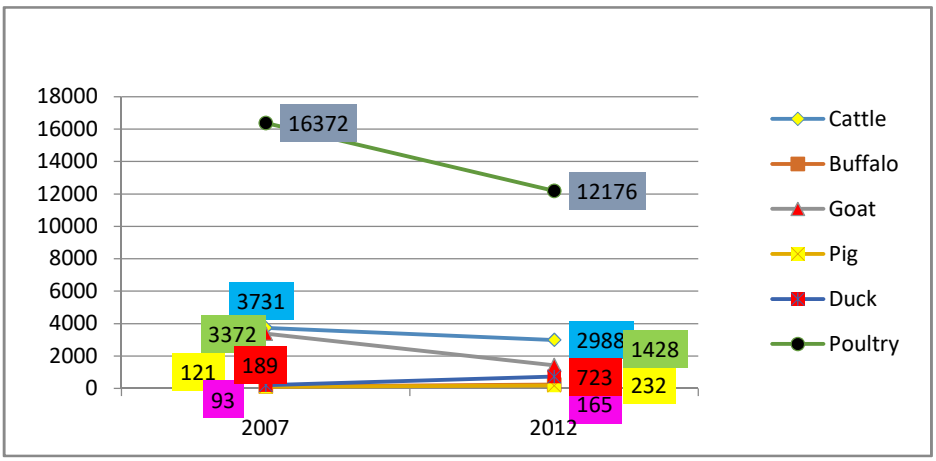


Figure 10.15: Temporal Variation of Livestock Population in Sulthan Bathery

From the figure 10.15, it can be seen that Cattle and buffalo population increasing whereas the population of goat is drastically decreasing in the district. In the case of Sulthan Bathery, the cattle and goat population is seen decreasing whereas buffalo, pig, poultry and duck population are increasing. It is inferred that the cow population is high in peripheral wards where agriculture activities are predominant. The central core area where land holding sizes are low has high goat population. Since animal rearing is done complementary to agriculture sector and due to the nearness to Brahmagiri meat processing centre at Manjadi, the sector has ample scope in this area. Promoting this sector will definitely boost the local economy of the area. Fig.10.16 shows the ward wise distribution of livestock population in Sulthan Bathery.

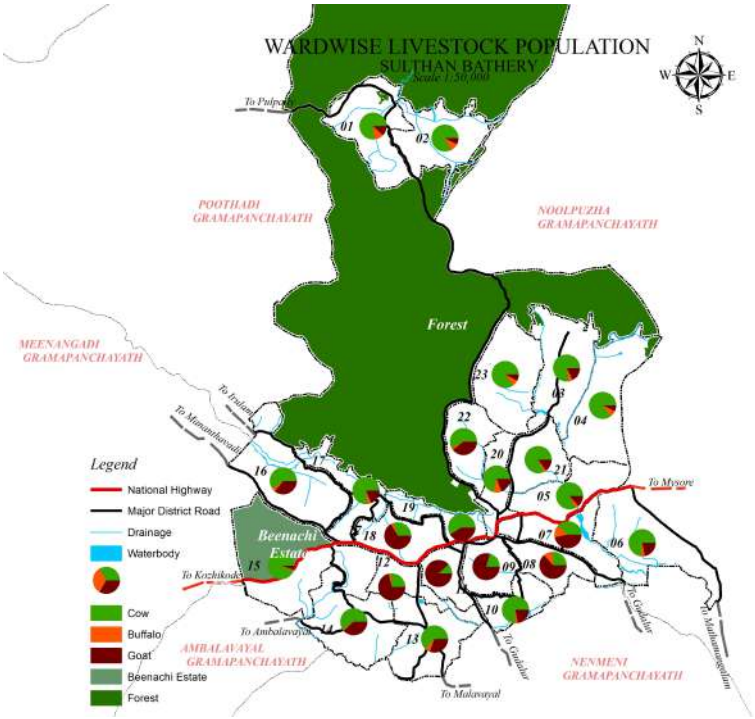


Figure 10.16: Ward Wise Distribution of Livestock in Sulthan Bathery

10.5.1 Production Status

The important livestock products are Meat, Milk, and Egg etc.

10.5.1.1 Meat

It is observed that at present there is a demand of 1.84 T of meat and 5900 nos of chickens and 11,800 egg/day in Sulthan Bathery and most of the cattle and poultry are imported from Tamil Nadu and Karnataka for domestic use. Consumption of Livestock produces in Sulthan Bathery is shown in table 10.10. At present there is no slaughter house in Sulthan Bathery and slaughtered meat is brought to the town from the hinterlands. The Brahmagiri meat processing centre at Manjadi near Malavayal has ample scope in this sector since it has a capacity to slaughter 300 buffalos, 300 goats and 4000 birds in a day. Processing and value addition of the slaughtered meat are also envisaged in the plant. The centre proposes to form Joint liability groups (JLGs) from among the farmers to produce animal stock for the purpose of the plant and the potential in this regard can be made use.

Table 10-10: Consumption of Livestock Produces

Cattle	37500 Kg
Goat	4500 Kg
Pig	2300 Kg
Chicken	120000 Kg
Duck	1500 Kg
Egg	240000 Nos

Source: Animal Husbandry Department-year-2010

There are 3 poultry farms in Sulthan Bathery producing 2020 hens. At present there is no organized meat market in Sulthan Bathery and the existing market near Rahim memorial road is very congested and creates nuisance to the public.

10.5.1.2 Milk

The district is 2nd in production of milk in the state and it is inferred that Sulthan Bathery is 1st in position in the production of milk in the district. There are 6 dairy farms with 70 cattle's that produces 400 liters of milk in a day. The milk from the farmers are collected mainly by the Sulthan Bathery Milk society affiliated to MILMA through their 4 collection centers located at different parts of the town. The present collection of the milk by the society is about 6600 liters per day. The collected milk is distributed locally and the balance is being exported to the central MILMA plant at Chuzhali, Kalpetta from where it is converted into value added products.

Milk production has become less attractive due to the price hike in the cattle feeds and various diseases affecting cattle. The quality of the food and drinking water, will affect

the quality of milk and the quality based fare system creates loss to farmers. More over the attack of wild animals are common in the area and at least 7 animals (4 Cattles, 2 Buffalos and 1 Goat) were killed due to the attack from wild animals during the year 2012-13. The details of cattle farms in Sulthan Bathery are shown in table 10.11

Table 10-11: Cattle Farms in Sulthan Bathery

Sl No	Ward No	Name of Ward/Place	Name of Dairy Farm	No of Cattle	Quantity of Milk produced per day (specify unit)
1	03	Odappallam-Karivallikkunnu	Shajahan Parackappara farm	17	90 Litre
2	03	Odappallam-Karivallikkunnu	Baby Varghese Palakkuzhi farm	10	50 Litre
3	02	Pazheri	Gopi's Dairy farm	10	70 Litre
4	12	Poothikkad	Thankamani	13	90 Litre
5	16	Kottakkunnu	Don Bosco	10	50 Litre
6	18	Kuppadi 3rd Mile	Saji	10	50 Litre

10.5.2 Physical Infrastructure

The Veterinary Poly Clinic located opposite to the mini civil station at Kottakkunnu and two sub centres located at Chethalayam and Kolagappara are the health care institutions in animal husbandry sector. The veterinary university located at Pookode in Vythiri Grama Panchayat is merely 36Km away from Sulthan Bathery. Even though a slaughter house was constructed at Sathramkunnu, it could not be put to use due to public protest and subsequent court orders. The Brahmagiri Meat Processing Centre at Manjadi has great impact in the sector and the presence of MILMA plant at Chuzhali, Kalpetta is another potential. Hence the infrastructure available is satisfactory with respect to present requirement.

10.5.3 Problems and Potentials

The cost of feed has increased in such a way that cattle rearing has become non profitable for small scale unorganized farmers. The attack from the wild animal also makes the farmers from withdrawing from the sector. However large extent of dry cultivation area availability of water, large area available for fodder cultivation and rising domestic demand for livestock produces etc, offer good potential for development of this sector. Moreover, the nearness to "Brahmagiri Meat Processing Centre" will enhance the potential under this sector.

Since the Sulthan Bathery has important role in the tourism map of the District, the by- products from milk such as sambaram, milk peda, etc. have huge demand. The presence of infrastructure such as MILMA processing plant, veterinary poly clinic, Pookode Veterinary University etc gives ample scope in the development of this sector.

10.5.4 Inference

There is high potential for animal husbandry sector due to the rising domestic demand as well as the presence of Brahmagiri meat processing unit at Nenmeni Grama Panchayat. Hence due consideration has to be given to promote the cattle farms, goat farms, pig farms and poultry etc. in order to enhance the local economy.

10.6 Fisheries

Sulthan Bathery has no coastal area, backwaters or large ponds. Hence fisheries do not have an important role in the town. The project “Matsya Kerala” launched by the fisheries department covers places where there is no scope for marine fisheries. The thrust is on fresh water and ornamental fish species. Under this scheme seeds are supplied to the farmer. This project can be utilized for the fisheries sector. A number of ponds scattered in the area, especially Manichira Lake can be made use of for the purpose. Formation of four farmers rearing units, formation of angling club at Manichira and formation of 2 farming schools are undertaken by the fisheries department.

10.6.1 Problems and Potentials

Due to the unavailability of large water bodies, fisheries sector has no significant role in the economy of Sulthan Bathery. The demand for fish is met by importing from Kozhikode. The ponds existing in the area can be utilized for fresh water fisheries and ornamental fisheries.

CHAPTER 11

SPECIAL CONCERN AREAS

Each planning area will have certain special areas of concern having economic, social or physical dimension. The areas of special concern have to be taken care with due regards in any planning attempt. In this chapter the special areas of concern for the planned sustainable socio-economic development of Sulthan Bathery is explored.

11.1 Special Concern Areas

Wayanad is one of the backward districts of the state with highest concentration of scheduled tribe population. The tribal settlements in the district are unique in terms of the socio cultural customs, lifestyle, indigenous technology and limited services. Sulthan Bathery, the taluk headquarter is one of the second order settlement in the district. Within the Sulthan Bathery 54.98 % of the total households come under BPL and 15.65% population belongs to scheduled caste and scheduled tribe community. Hence the social backwardness of the region and the town need special concern.

Wayanad, one of the hill districts of the state has rich resources and it is part of Western Ghat. So it is peculiar in terms of highly undulating topography. Sulthan Bathery, the taluk headquarter is also unique in terms of topography. The highly undulating topography together with high rainfall leads to natural hazards, a situation which poses a level of threat to life, health, property and/or environment. The impact of a natural or human-made hazard that negatively affects society and/or environment is known as disaster and should be mitigated to the extent possible by planned development. Hence natural hazard proneness of the town is another special area of concern

11.2 Social Backwardness

Social backwardness of Sulthan Bathery is analyzed on the basis of following parameters

- BPL household.
- Scheduled caste and scheduled tribe population concentration.
- Literacy rate.
- Spatial distribution of scheduled caste and scheduled tribe colonies.

11.2.1 BPL Households

Below Poverty Line (BPL) is an economic benchmark and poverty threshold used by Government of India to indicate economic backwardness and to identify individuals and households in need of government assistance and Kerala is the one of the state which has formulated its own criteria. In Kerala a family which lack access to four or more parameters

among nine parameters considered is classified as BPL. The parameters are shown in table 11.1.

Table 11-1: BPL Parameters

Sl No	BPL Parameters
1	No land or < 5 cents of land.
2	No house or dilapidated house.
3	No sanitation latrine.
4	Family without color television.
5	No regular employed person in the family.
6	No access to safe drinking water.
7	Women headed HH or presence of widows or divorcee.
8	SC & ST.
9	Mentally retarded or disabled member in the family.

In Sulthan Bathery, 4963 households have been categorized as BPL. The ward wise number of BPL households in Scheduled Tribe, Scheduled Caste, Minority and general category are shown in table 11.2. The analysis of the above data shows that nearly 32% of the BPL families are from scheduled caste and scheduled tribe community and nearly 40 % of the BPL families are from other minority community. The contribution of general community to the total BPL families comes around 28 %. The spatial distribution of BPL families in various wards of Sulthan Bathery is shown in Fig 11.1. According to the socio-economic survey conducted, the average monthly household expenditure comes to Rs. 9922/- This gives an insight into the economic status of the people of Sulthan Bathery.

As per Fig 11.1, Chethalayam, Chenad, Pazheri, Odappallam, Thirunelly, Kottakkunnu, Kalluvayal, Poomala, Beenachi, Kaivattamoola, Kidangil & Armad wards show the concentration of BPL families(CI>1).

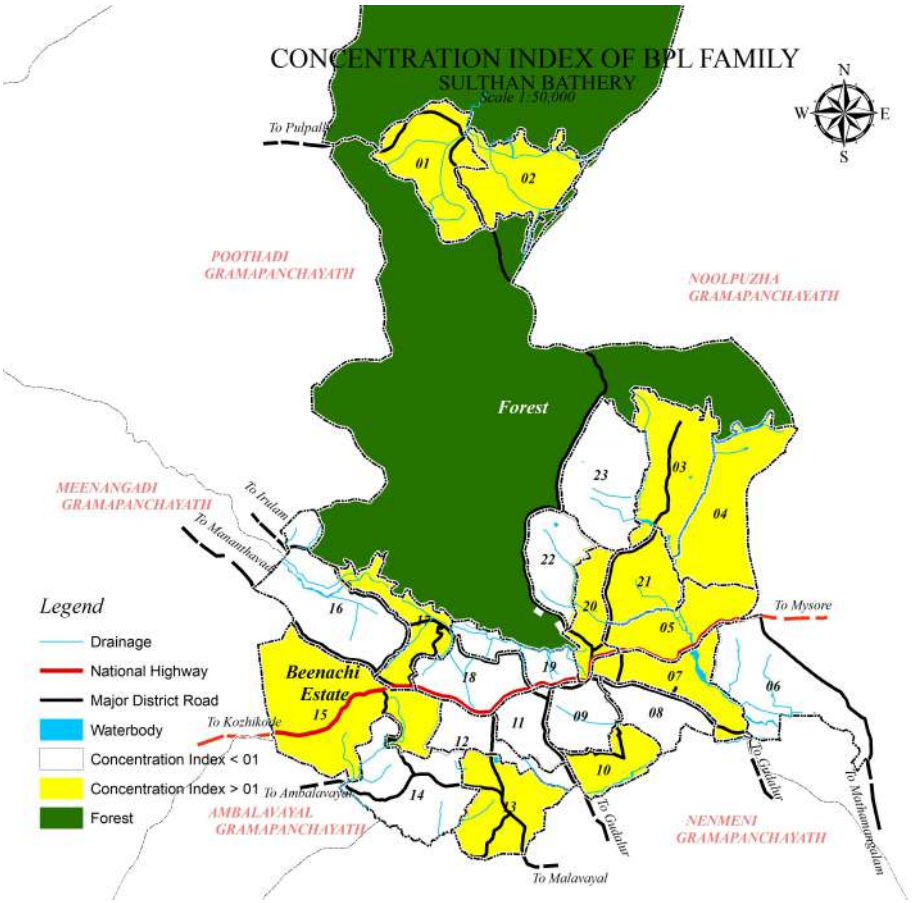


Figure 11.1: Concentration Pattern of BPL Families

11.2.2 Population Concentration

SC population constitutes nearly 3.87% of the total population in the Sulthan Bathery whereas ST population is 11.77%. Percentage of SC population of the district is 3.99% and that of ST population is 18.53%. The SC/ST population concentration indicates the social backwardness of a region. The comparison of SC/ST population in Sulthan Bathery, district and state is shown in Fig 11.2 and table 11.3 shows the list of tribal colonies in Sulthan Bathery.

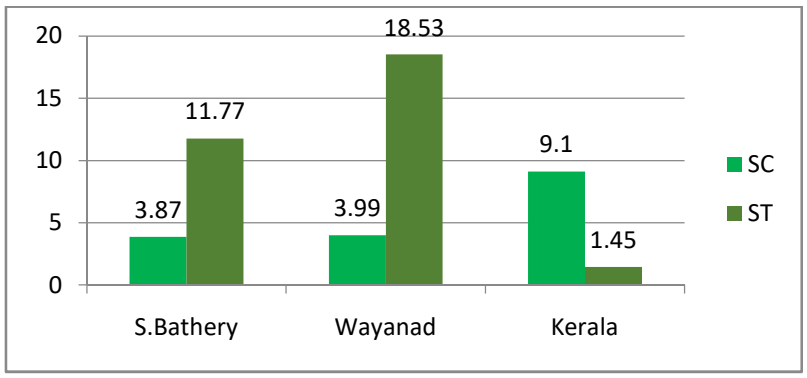


Figure 11.2: Percentage of SC /ST Population

Source: Census 2011

Table 11-2: BPL status of Sulthan Bathery

Ward no:	ST	SC	General	Minority community	TOTAL
1	103	10	86	97	296
2	115	6	102	72	295
3	138	18	80	112	348
4	112	14	89	93	308
5	135	3	97	47	282
6	77	41	17	85	220
7	20	18	28	66	132
8	29	9	18	105	161
9	_	3	32	99	134
10	54	12	36	151	253
11	48	5	36	81	170
12	50	3	33	64	150
13	6	23	57	88	174
14	11	14	81	47	153
15	9	14	120	113	256
16	40	21	152	71	284
17	48	21	61	131	261
18	5	2	24	50	81
19	34	1	44	58	137
20	51	16	47	112	226
21	117	39	108	99	363
22	66	7	69	137	279
TOTAL	1268	300	1417	1978	4963

Source: Sulthan Bathery Municipality2012

SC/ST population concentration is seen in the north and east peripherals of the planning area where concentration of agricultural laborers and cultivators are also observed. SC/ST population is concentrated in Chethalayam, Pazheri, Odappallam, Thirunelly, Thelampatta, Armad & Vengoor wards. The concentration pattern of SC/ST population, agricultural laborers and cultivators are shown in Fig 11.3, Fig 11.4 and Fig 11.5 respectively.

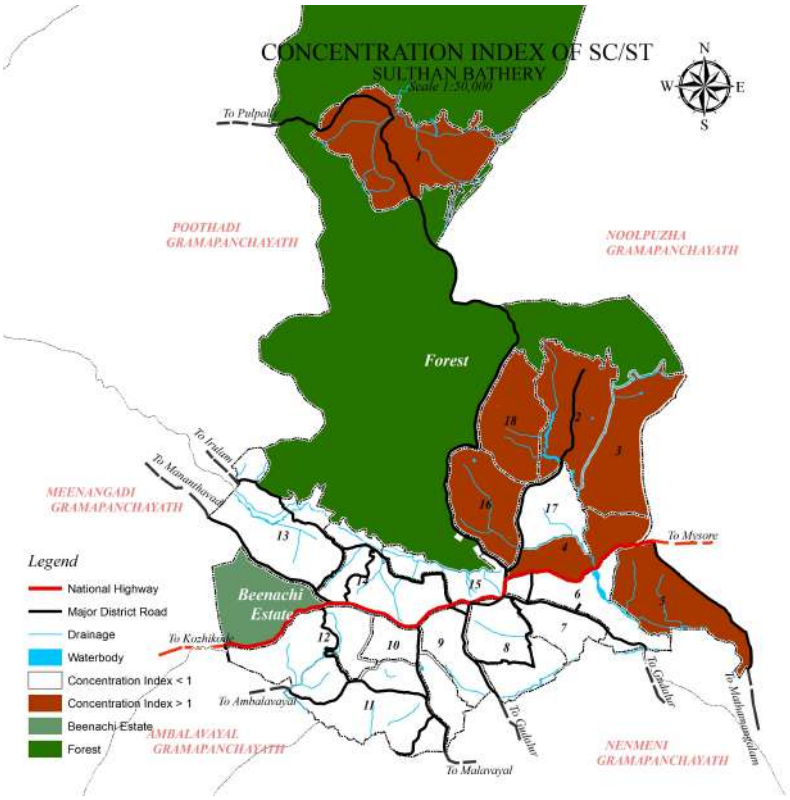


Figure 11.3: Concentration Pattern of SC/ST Population

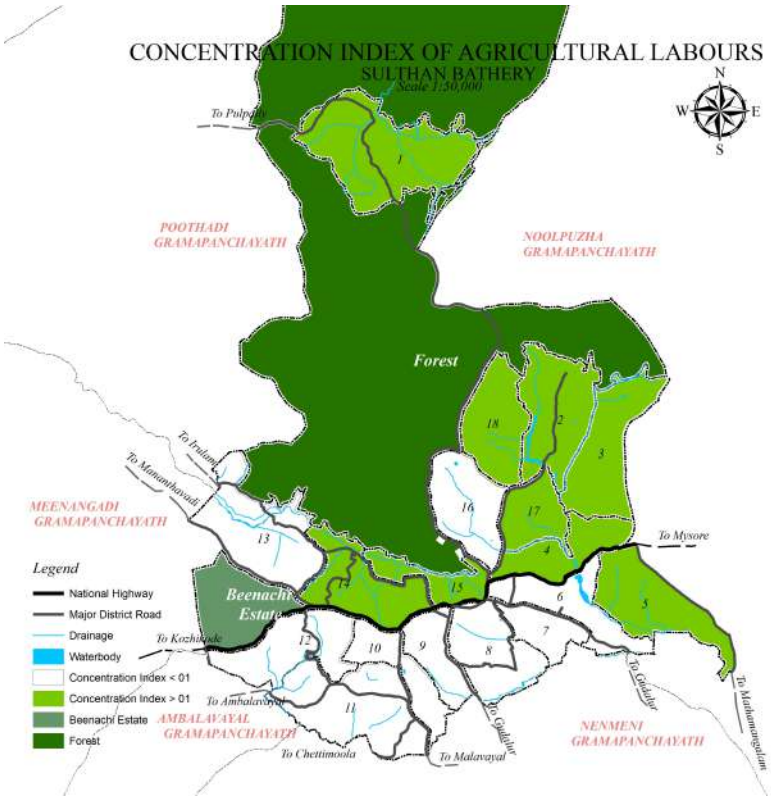


Figure 11.4: Concentration Pattern of Agriculture Laborers

Source: Census 2001

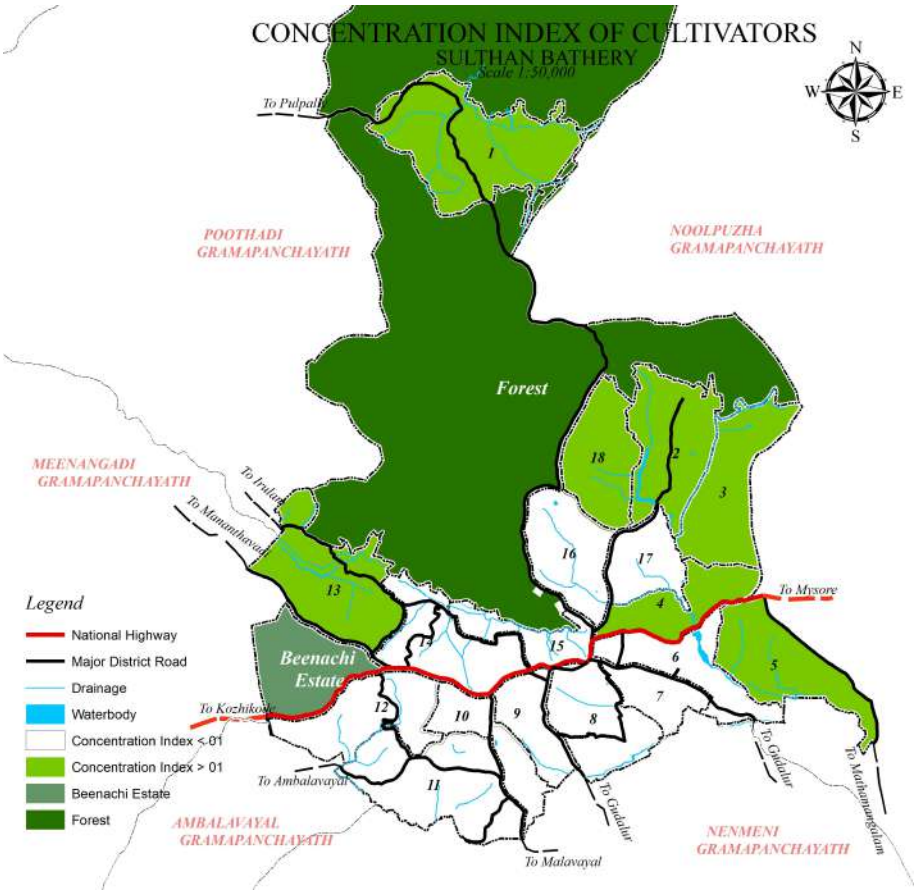


Figure 11.5: Concentration Pattern of Cultivators

Source: Census 2001

Study reveals that SC/ST population has increased over the past decades. ST population is high when compared to SC population. Sex ratio is 1031 for SC and 1048 for ST as per census 2011.

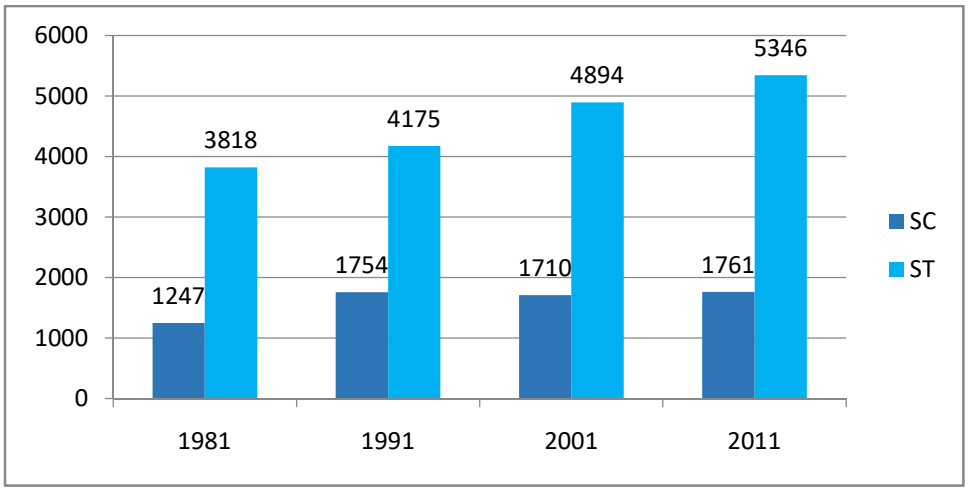


Figure 11.6: Temporal Variation of SC/ST Population.

Source: Census 2011

11.2.3 Literacy Rate

Even though the analysis of demographic features has been done based on 2011 census, the literacy rate has been analyzed based on the census 2001 data. The literacy rate of Sulthan Bathery is 80.61% and that of the SC and ST population is 27.33%. The ward wise literacy rate of SC/ST population is shown in the Fig 11.7.

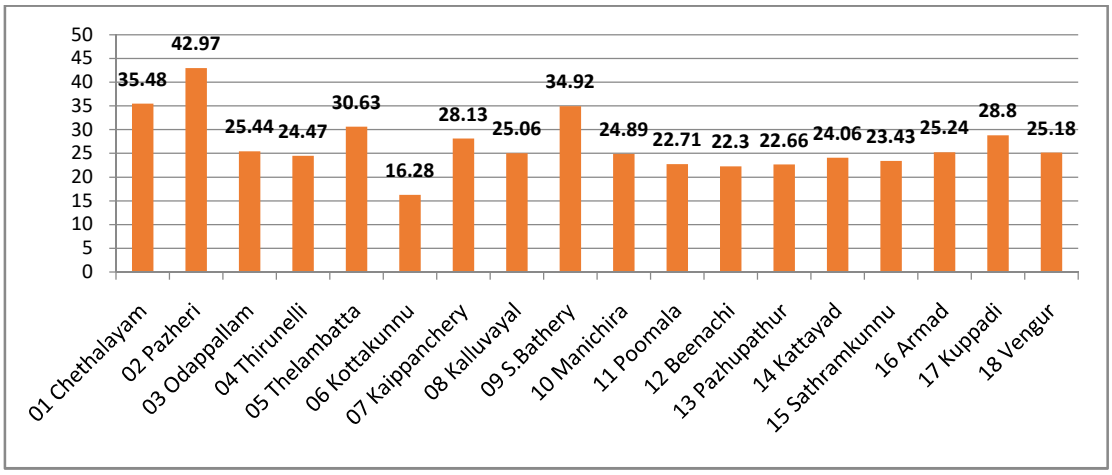


Figure 11.7: Ward wise Literacy Rate of SC /ST

Source: Census 2001

Fig 11.7 shows that Pazheri Ward (42.97%) has the highest Literacy rate followed by Chethalayam (35.48%) & Sulthan Bathery (34.92%) and the Kottakkunnu Ward (16.28%) shows the lowest literacy rate.

11.2.4 Spatial Distribution of Scheduled Caste and Scheduled Tribe Colonies

In Sulthan Bathery there are 102 SC/ST colonies. The details of colonies are shown in table 11.3 and their spatial distributions are shown in fig 11.9.SC/ST colonies are scattered in the area with higher concentration along the forest boundary which shows their friendly life with forest and wildlife. Chethalayam ward has a higher concentration which is surrounded by forest.

Table 11-3: List of Tribal Colonies

Sl No	Name of the Tribal colony	Ward (s)	Listed/ non listed tribal colony	Total area (Ha)	No of Houses	Housing Category			Number of HHS
						Pucca	Moderate	Kutcha	
1	2	3	4	5	6	7	8	9	10
	WARD -I								
1	Thachanchira Paniya Colony	1	Non listed	0.1214	17	9	6	2	22

2	Vattanchira Paniya Colony	1	"	0.0809	16	11	3	2	23
3	Madayanvayal Paniya Colony	1	"	0.0404	8	4	4	-	16
4	Kompanmoola Kattunayka colony	1	"	0.8094	17	4	13	-	25
5	Pullumala Paniya Colony	1	"	0.607	4	-	4	-	6
6	Malapady Kattunayka Colony	1	"	1.2141	30	10	20	-	35
7	Kemmamcheri Kattunayka Colony	1	"	1.6188	6	-	-	6	6
8	Padippura Paniya Colony	1	"	0.0404	4	2	2	-	4
9	Padippura Oorali Colony	1	"	0.0243	4	4	-	-	4
10	Pullumala Kattunayka Colony	1	"	8.9034	24	19	5	-	26
11	Kompanmoola Kuruma Colony	1	"	0.0809	2	1	1	-	2
12	Chundakkara Kuruma Colony	1	"	12.141	3	-	3	-	4
13	Poovanchi Paniya Colony	1	"	1.6188	36	19	15	2	46
14	Poovanchi Oorali Colony	1	"	0.4047	6	6	-	-	6
15	Poovanchi Kattunayka Colony	1	Non listed	1.6188	18	14	2	2	22
16	Thathoor Paniya Colony	1	"	0.4047	11	9	1	1	18
17	Thathoor Kattunayka Colony	1	"	0.2023	3	2	-	1	5
18	Nellippatta Paniya Colony	1	"	0.4047	14	9	3	2	20
19	Adivaram Paniya Colony	1	"	0.2023	8	4	2	2	12
20	Odamoola Paniya Colony	1	"	0.2023	8	6	1	1	11
21	Odamoola – Valanchery Paniya Colony	1	"	0.0404	2	1	-	1	2

22	Valancherikkunnu Paniya Colony	1	"	0.1214	3	2	1	-	4
23	Palamoola Paniya Colony	1	"	0.1619	6	-	6	-	12
24	Puthanoor Paniya Colony	1	"	0.2023	8	2	2	4	11
25	Puthanoor Kattunayka Colony	1	"	0.0808	6	5	-	1	7
	WARD -02								
26	Chakkala Kuruma Colony	2	"	2.0235	8	2	2	4	9
27	Pazheri Paniya Colony	2	"	0.2024	20	4	6	10	28
28	Thottakkara Nayka Colony	2	"	0.606	12	6	4	2	13
29	Veettikkutty Kuruma Colony	2	"	4.047	30	15	10	5	33
30	Pambramoola Nayka Colony	2	"	1.6188	20	5	5	10	26
31	Pambramoola Oorali Colony	2	"	0.0808	3	2	-	1	3
	WARD- 03								
32	Puthuveedu Paniya Colony	3	Non listed	2.0235	45	29	13	3	56
33	Puthuveed Nayka Colony	3	"	1.6188	28	14	13	1	32
34	Karuvallikkunnu Paniya Colony	3	"	1.2141	15	9	5	1	29
35	Vadachira Kuruma Colony	3	"	2.8329	26	21	4	1	29
36	Puthuveedu Kuruma Colony	3	"	0.4047	4	1	3	-	4
	WARD- 04								
37	Manthandikkunnu Paniya Colony	4	"	0.607	25	22	3	-	26
38	Thirunelly Paniya Colony	4	"	0.3035	9	9	-	-	12
39	Thirunelly Katunayka	4	"	0.2024	1	1	-	-	1

	Colony								
40	Kolimoola Paniya Colony	4	"	0.0202	1	1	-	-	1
41	Panthamchira Paniya Colony	4	"	0.0404	5	4	1	-	5
42	Thirunelly Kuruma Colony	4	"	8.094	48	25	23	-	54
	WARD-05								
43	Earamkolly Paniya Colony	5	"	1.6188	60	50	5	5	64
44	Palakkara Kuruma Colony	5	"	0.0202	1	-	1	-	1
45	Koottampali Paniya Colony	5	"	0.8094	29	20	2	7	30
46	Vattuvadi kattunayka Colony	5	"	0.8094	10	4	5	1	10
47	Vannathara Kuruma Colony	5	"	0.2024	3	2	1	-	3
48	Palakkara Kuruma Colony	5	"	6.0705	21	19	2	-	22
49	Vattuvadi Kuruma Colony	5	Non listed	4.047	12	6	5	1	14
50	Chempakappura Kuruma Colony	5	"	2.8329	9	7	2	-	9
	WARD- 06								
51	Thoduvatty Paniya Colony	6	"	0.2024	11	7	3	1	12
52	Thoduvatty Kuruma Colony	6	"	4.047	21	16	4	1	23
53	Thoduvatty Paniya Colony	6	"	0.4047	11	4	5	2	12
54	Thoduvatty Kuruma Colony	6	"	0.2024	6	1	5	-	6
	WARD- 07								
55	Fair land Colony Kaipencheri	7	"	0.0202	1	-	1	-	1
56	Kaipencheri Paniya Colony	7	"	0.4047	6	1	5	-	7

57	Kaippencheri Kuruma Colony	7	"	0.4047	12	10	2	-	18
	Ward- 08								
58	Kalluvayal Paniya Colony	8	"	0.607	30	10	12	8	34
	WARD- 09								
59	Manikkuni Paniya Colony	9	"	1.0117	47	40	7	-	64
60	Pallikkandy Paniya Colony	9	"	0.0404	2	2	-	-	2
	WARD -10								
61	Dhottappankulam Paniya Colony	10	"	0.8094	31	24	4	3	36
	WARD -11								
62	Mavady Paniya Colony	11	Non listed	0.4047	21	20	1	-	28
63	Chettimoola paniya Colony	11	"	0.1416	5	5	-	-	5
	Ward-12								
64	Athikkuni Kuruma Colony	12	"	0.0605	1	1	-	-	1
65	Vattathimoola Oorali Colony	12	"	0.607	11	8	2	1	11
66	Poothikkad Kattunayka Colony	12	"	0.2024	9	8	-	1	10
67	Kuniyil Kuruma Colony	12	"	0.0404	1	1	-	-	1
68	Muzhakkal Kuruma Colony	12	"	0.0605	1	1	-	-	1
69	Thuruthil Oorali Colony	12	"	0.0808	4	2	-	2	4
	WARD -13								
70	Ambalakkunnu Paniya Colony	13	"	0.0404	2	2	-	-	4
71	Kavumkara Kattunayka Colony	13	"	0.607	12	10	2	-	15
72	Chembakathani Kuruma	13	"	0.8094	5	3	2	-	7

	Colony								
73	Paleri Kuruma Colony	13	"	1.2141	10	7	3	-	15
74	Kumizhkolly Kuruma Colony	13	"	1.2141	4	2	2	-	6
75	Chappakkolly Kuruma Colony	13	"	0.8094	4	3	1	-	6
76	Chelamoola Paniya / Kuruma Colony	13	"	0.1214	5	2	3	-	7
	Ward-14								
77	Kavumkara Kattayad nayka Colony	14	"	0.1416	2	2	-	-	3
78	Pathivayal Paniya Colony	14	Non listed	0.0404	3	2	1	-	3
79	Kolimoola Nayka Colony	14	"	0.1214	9	2	7	-	11
80	Kariyottimoola Paniya Colony	14	"	0.0404	2	-	2	-	4
81	Pathivayal Paniya Colony	14	"	0.0808	6	5	1	-	8
82	Kayma Paniya Colony	14	"	0.2024	6	4	2	-	8
83	Kavumkara Paniya Colony	14	"	0.2024	6	4	2	-	9
84	Ambalakkunnu Paniya Colony	14	"	0.2024	4	3	1	-	5
85	Kavumkara Nayka Colony	14	"	0.3035	4	3	1	-	9
86	Manalvayal Nayka Colony	14	"	0.2024	9	6	3	-	12
	WARD- 15								
87	Kattayad Paniya Colony	15	"	1.3759	23	7	16	-	35
88	Mullenkunnu Kattunayka Colony	15	"	0.0608	6	3	3	-	6
	WARD- 16								
89	Kidangil Paniya Colony	16	"	0.1578	19	19	-	-	24

90	Chungamadam Paniya Colony	16	"	0.1214	9	9	-	-	9
91	Kidangil Kuruma Colony	16	"	3.2376	55	38	12	5	65
92	Armad Paniya Colony	16	"	0.1093	9	9	-	-	11
93	Vellimad Paniya Colony	16	"	0.0808	8	7	-	1	8
94	Armad Sarkar Paniya Colony	16	"	0.1335	11	10	1	-	15
95	Armad Kuruma Colony	16	Non listed	---	9	9	-	-	12
	WARD -17								
96	Puthuchola Paniya Colony	17	"	0.2024	7	5	-	2	14
97	Puthuchola Paniya Colony	17	"	0.2024	7	5	-	2	14
	Ward-18								
98	Vellayikkuzhi Paniya Colony	18	"	0.2024	34	31	3	-	37
99	Vellappat paniya Colony	18	"	3.2376	40	24	12	4	46
100	Vengoor paniya Colony	18	"	2.4282	34	28	4	2	37
101	Vengoor Nayka Colony	18	"	0.0607	6	2	4	-	8
102	Kolimoola Nayka Colony	18	"	1.6188	12	6	2	4	17

Source: Tribal Extension Office, S Bathery 2012

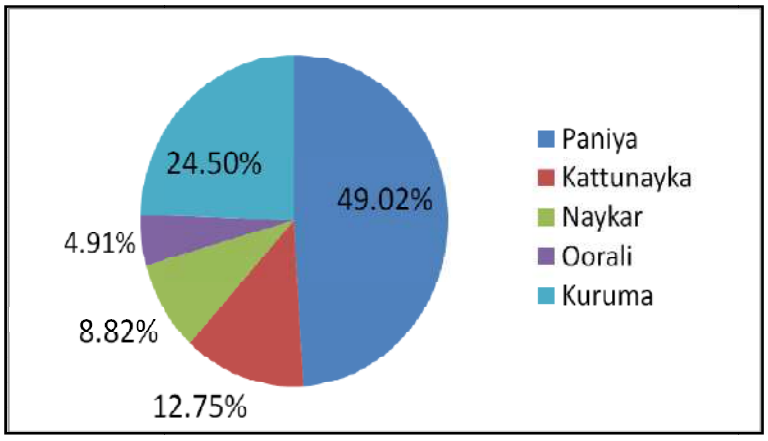


Figure 11.8: Community wise Break Up Of Tribes In Sulthan Bathery

Fig 11.8 shows that the majority of tribal colonies fall under Paniya community (49.02%) followed by Kuruma community (24.50%). Oorali community (4.91%) shows the least.

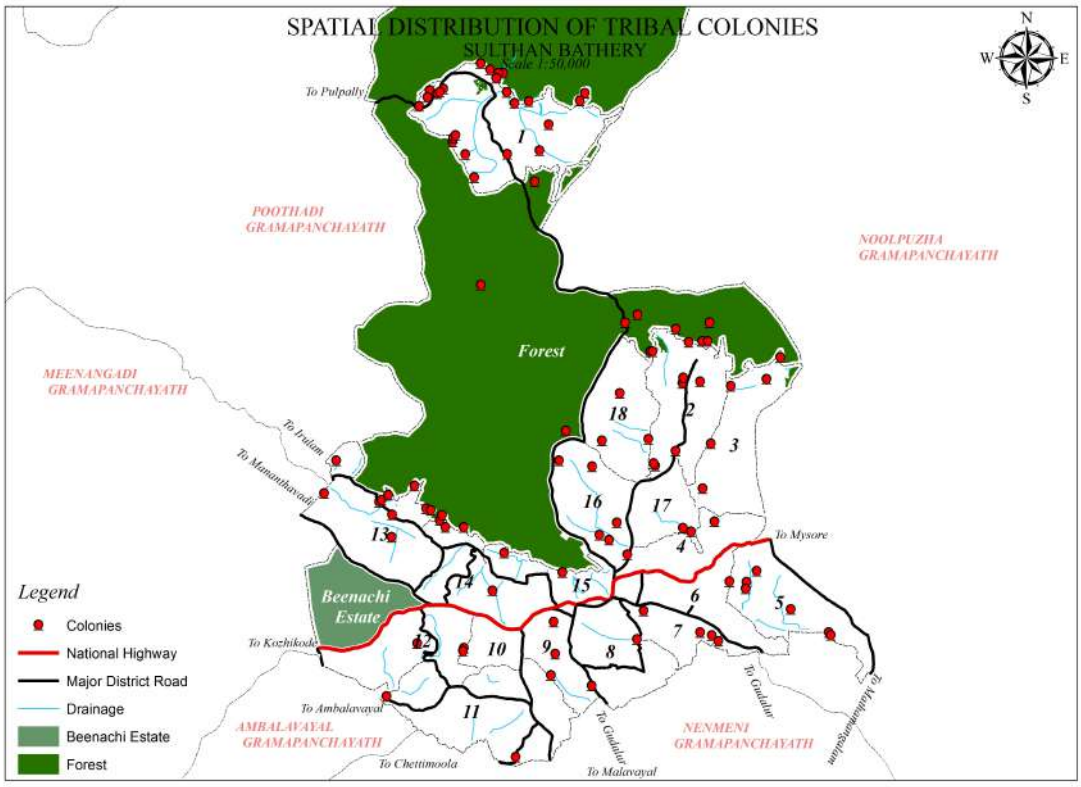


Figure 11.9: Spatial Distribution of Tribal Colonies in Sulthan Bathery

Source: Primary Survey 2012

Fig 11.9 shows the spatial distribution of tribal colonies in The SC/ST colonies in the municipality. These areas require special attention since the living conditions here are comparatively poor. So there is a need to provide basic infrastructure facilities to each colony to upgrade the living condition.

11.3 Inference

The analysis clearly reveals that planned development of the Sulthan Bathery has to be achieved by giving due consideration to economically and socially backward sectors of the community. Ways and measures for the provision of basic infrastructure facilities including a comprehensive housing package, boarding schools etc. aiming at bringing them to main stream activities shall be given priority. The thrust shall be for provision of economic development and ensuring better quality of life. Some of the areas of the town are prone to flooding and land sliding. Most of the areas prone to land slide are within the reserved forest where human activities are minimal. Mitigation measures should be incorporated in this master plan for addressing these issues.

CHAPTER 12

ENVIRONMENT AND DISASTER MANAGEMENT

The natural environment plays a curtail role in the planned development of any area. Usually the study of environment is more important for a hill area like Sulthan Bathery with presence of paddy, reserve forest and natural drainage system. In this chapter an attempt is made to describe the present scenario of natural environment of the area with spatial location of environmentally sensitive areas

12.1 Present Scenario

As per the existing land use of 2012, Sulthan Bathery has dry agricultural area of 20.77 Sq.Km. (20.12 %), paddy area of 8.41 Sq.km. (8.15 %), Beenachi Estate area of 2.25 Sq.km. (2.18 %) and forest area of 60.50 Sqkm. (58.61%). Due to the high vegetation the area is not very polluted so far. The area has the least industrial development and public conveyance is available only through major transportation corridors. Hence chances of pollution are comparatively less. The undulating topography of the town helps in avoiding water logging and flooding. The residential density is relatively low when compared to other towns of similar status. The town is provided with a good network of water bodies and paddy fields that serve as water basins in the area. The quality of water is comparatively good and most of the people depend on open wells for water. Even though the waste disposal system is not fool proof, it does not create any hazard to the public due to the large plot sizes. The general problem in this sector is letting out water by some residential and commercial establishments to the storm water drains. Flooding in heavy monsoon occurs in some places due to blockage in the streams due to deposition of solid wastes. The thick vegetation on the peripherals of the town and vast forest area on the north safe guard the environmental threats to certain extent.

12.2 Sensitive/Fragile Area

The environmentally sensitive areas in the Planning area are the vast reserve forest at the north side which form part of **“Wayanad Wild life sanctuary”.** The total extent of forest land comes to 60.88 Sq.Km. which contributes 58.98 % of total area of the local body. The total extent of paddy is 8.40 Sq.Km. (8.14 %). Most of the paddy lands have been converted to other purposes such as residential and dry cultivation. The incompatible Areacanut cultivation and Banana cultivation in paddy lands causes’ soil erosion and cause hazard to the water bodies. Also unscientific and indiscriminative use of pesticides and manure create threats to the environment. Besides almost all the streams are seen with either deposited waste or encroachments by the adjacent land owners or builders. Hence, water bodies above 1.5m width shall have a green belt of 2m. Fig 12.1 shows the environmental sensitive areas in Sulthan Bathery.

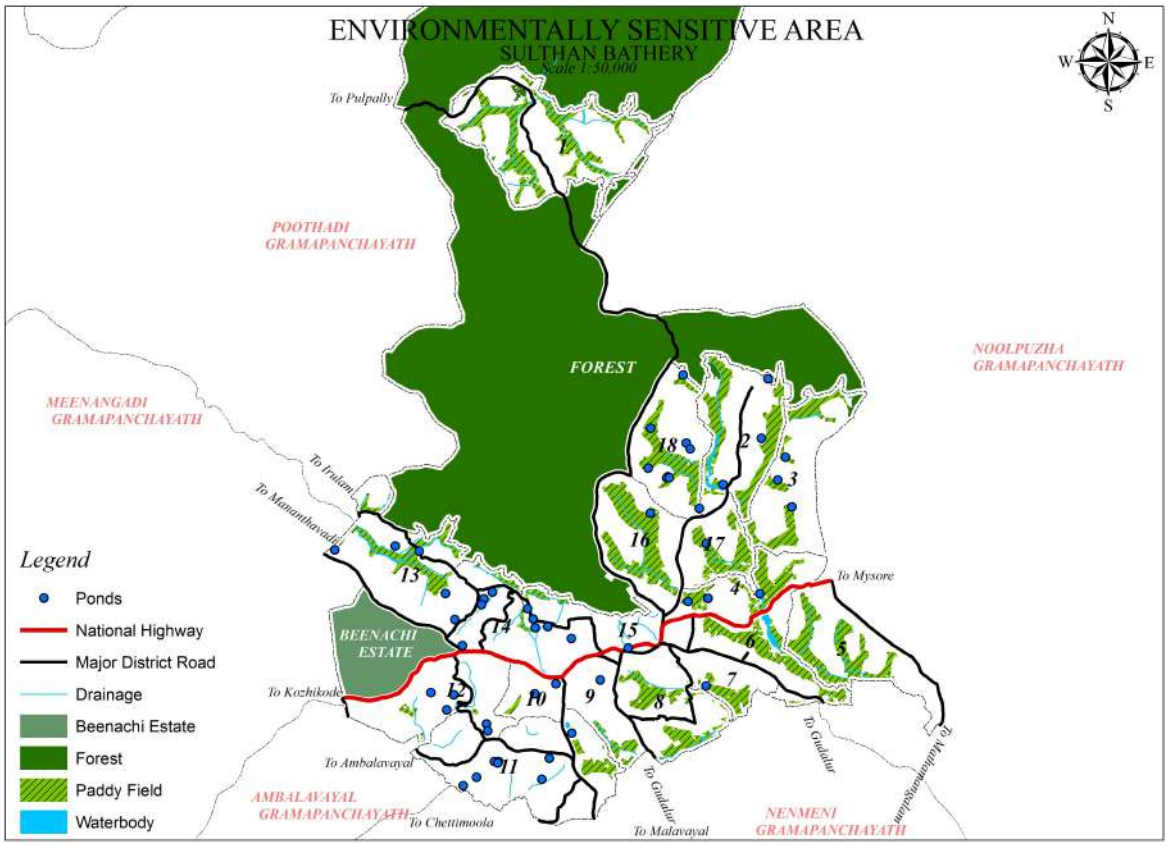


Figure 12.1: Environmental sensitive area

Source: Land use survey 2010

12.3 Report of the High Level Working Group on Western Ghats in the context of Sulthan Bathery

Western Ghats is a magnificent mountain range next only to Himalayas and is a biological treasure trove with a high degree of endemism (11% to 78%) and scenic beauty. This unique eco-system has been threatened by continuously increasing habitat pressures and declared as one of the world's hottest hotspots of biodiversity. Realizing the need to protect and rejuvenate the ecology and for sustainable development in Western Ghats, the Ministry of Environment and Forests (MoEF) constituted a Western Ghats Ecology Expert Panel (WGEEP). The mandate of WGEEP was to demarcate ecologically sensitive zones and suggest measures to conserve protect and rejuvenate the ecology of Western Ghats region. Taking into account the comments and suggestions made by different stakeholders including State Governments and Central Ministries on WGEEP Report, the MoEF constituted a High Level Working Group (HLWG) to suggest an all-round and holistic approach for sustainable and equitable development while keeping in focus the preservation and conservation of ecological systems in Western Ghats.

The High Level Working Group (HLWG) headed by Dr K. Kasturi Rangan brought out a detailed report comprising of two volumes. As per the report HLWG, out of the 4156

number of ecological sensitive units (revenue villages) 123 ecological sensitive units (revenue villages) are in Kerala and out of which 13 are in Wayanad district. The list of ecological sensitive units (revenue villages) in Wayanad district is shown in Table 12.1. The Kidanganad village in Sulthan Bathery taluk is one among them.

The spatial distribution of ecological sensitive units (revenue villages) in the western ghat area of Wayanad district is shown in fig 12.2.

Table 12-1: The List of Ecological Sensitive Units in the District

Sl.No	Name of Taluk	No. of village included	Name of Villages
1	Mananthavady	4	Thirunelly Thrissilleri Periya Thondernadu
2	Sulthan Bathery	2	Kidanganad Noolpuzha
3	Vythiri	7	Thariyode Achooranam Pozhuthana Kottappady Chundale Kunnathidavaka Vellarimala

The entire reserve forest area and the Chethalayam (Ward No: 1) and Chenad (Ward No: 2) wards of Sulthan Bathery comes under ecological sensitive units. The High Level Working Group (HLWG) recommended certain major controls/restrictions over the area for sustainable and equitable development while keeping in focus the preservation and conservation of ecological systems in Western Ghats such as:

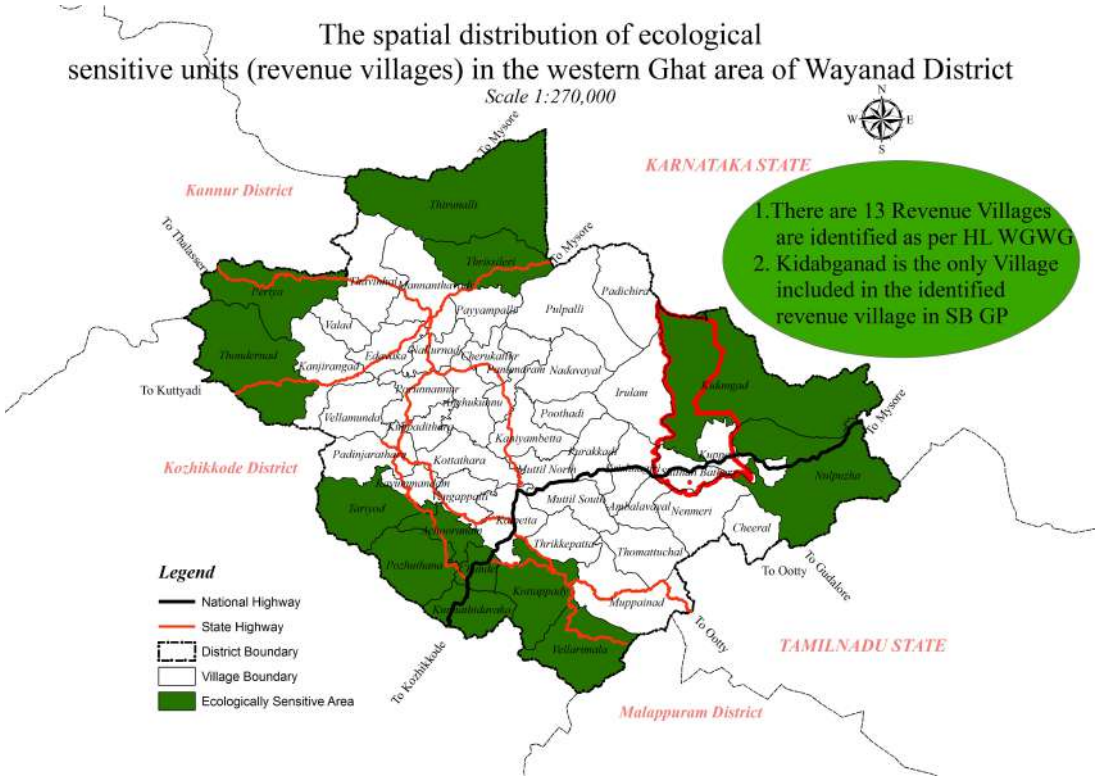


Figure 12.2: Spatial Distribution Ecological Sensitive Units.

Source: Kasthurirangan Report.

1. *Completely ban Mining, Quarrying and Sand Mining also thermal power plants and red category of industries in the Ecologically Sensitive Area*
2. *Hydro power, being a relatively clean source of energy has been recommended to be allowed in the ESA by the HLWG subject to stringent conditions.*
3. *Wind energy is permitted in the Ecologically Sensitive Area subject to applicable regulations.*
4. *New building and construction projects of above 20,000 sq. m., township and area development projects as well as other projects/activities recommended to be banned by the HLWG will be banned in the Ecologically Sensitive Area. However, projects already under consideration of the respective state level SEIAAS and SEACS of the concerned states and EACS of MOEF on the date of issue of draft notification will be considered under the then existing regulations.*
5. *Project/activities which are not specifically prohibited under the ESA shall be scrutinized and assessed for cumulative impacts and development needs, before granting environment clearance.*
6. *The Forest Rights Act shall be observed in letter and spirit. The consent of the gram Sabha for projects in ESA will be mandatory as recommended by the HLWG.*

7. *The boundary of the Ecologically Sensitive Area as also the regulatory regime would be fine-tuned after the draft notification to the effect is placed in the public domain for comments/views of stakeholders including state governments of the region.*

12.4 Disaster Management

Disaster is defined as a serious disruption of the functioning of a community or a society causing wild spread human, material, economic or environmental losses that exceed the ability of the affected community or society to cope. Disaster occurs when a hazardous event strikes a vulnerable human settlement, with the coping capacity of its inhabitants further influencing the extent and severity of damages received. The link between human settlements and disasters is increasingly becoming a focus of attention, particularly in the context of continuing urbanization. The extents to which these hazards turn into disasters depend on the level of vulnerability of human settlements and their inhabitants. Hence, the task of developing secure settlements cannot be achieved unless thoroughly understand the inter-linkages between disasters and built environment.

12.4.1 Flood

Floods are the most common of natural hazards that affect people, infrastructure and natural environment. Floods have frequented this district many times. Minor flooding has been disrupting normal course of life, during Monsoon. The flood occurred during the month of August 2018 was one of the most severe disaster experienced by this district in its recorded history. As per the District Disaster management authority, all the villages in the district are affected by 2018 flood. The figure 12.3 given below shows the multiple hazard zonation map.

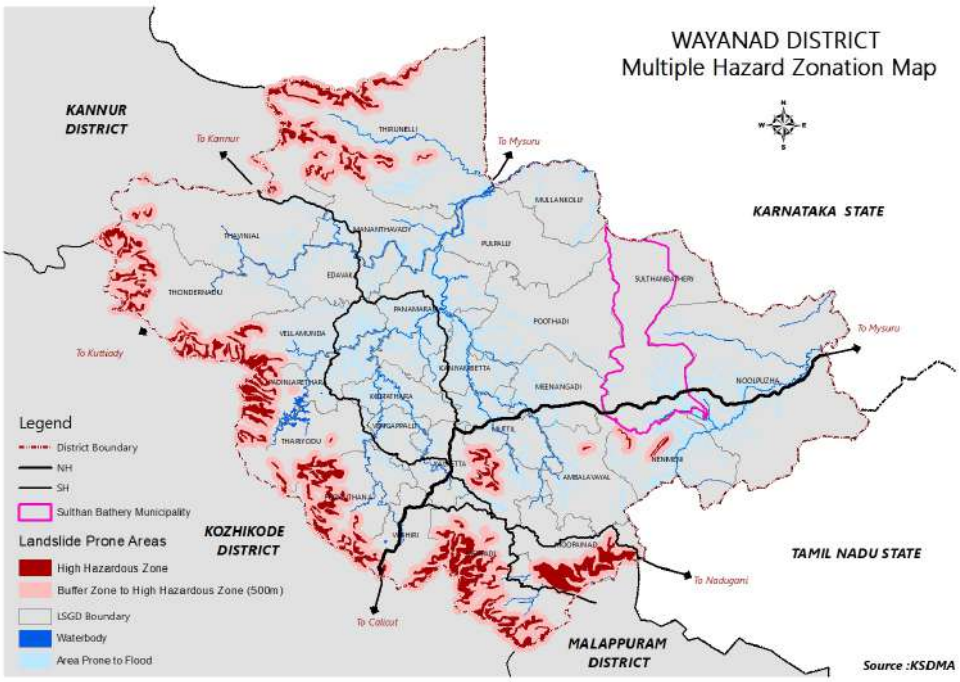


Figure 12.3: Multiple Hazard Zonation Map of Wayanad

From the fig 12.3, it can be see that low lying areas and land near water bodies are prone to flood. As per the DDMA more number of flood incidents happened in the 2018 mega flood in Kalpetta, Panamaram, Noolpuzha, Mananthavady, Padinjarathara and Kavumannam villages. Panamaram and Mananthavady river banks were seriously affected. There was no flood incidents happened in the municipal area as per the DDMA IN 2018 mega flood. Figure 12.4 shows the map of flood prone areas of Sulthan Bathery municipality

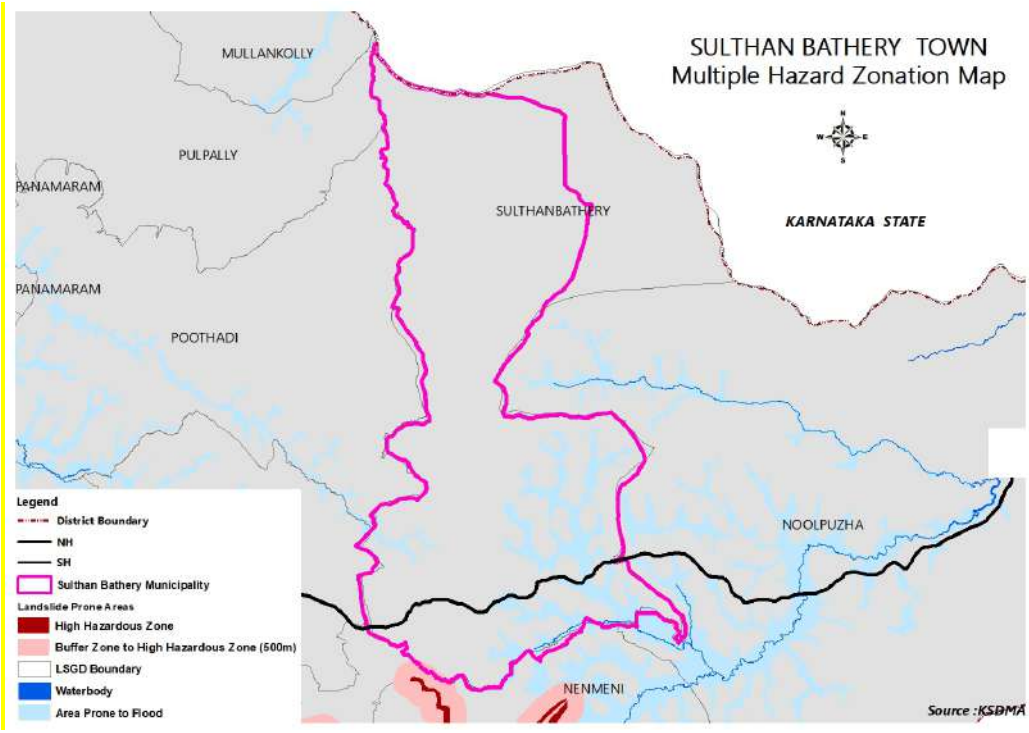


Figure 12.4: Multiple Hazard Zonation Map Sulthan Bathery

The eastern part of the municipality contains a network of streams. Land near this drainage network doesn't have any history of flood, even in the 2018 and 2019 mega floods. So there is no flood prone area in the municipality, except some low lying areas.

12.4.2 Land Slide

Landslides have created problems in Wayanad, many times in the past. The Wayanad-Kozhikode border has been identified by CESS as one of the most landslide prone areas in the state. The Mundakkai, Kappikkalam and Valamthode landslide/debris flows are notable one. Apart from this, many other Landslides of similar nature and of varying magnitude occurred in Wayanad in the past. Many landslides happened in 2018, 2019 mega floods. The southern-eastern border of the district, neighboring Malappuram and Kozhikode district is highly prone to landslides. They are of elevation more than 700m and of highly undulating topography with steep slopes and mountain ranges. Figure 12.3 shows the land slide prone areas of Wayanad district. Vythiri, Pozhuthana, Tavinjal, Vellamunda, Achooranam, Chundale and Kunnathidavaka are the most affected villages in case of landslides and related disasters.

There are no landslides reported in 2018 mega flood in the Sulthan Bathery municipal area. Majority of the area of Sulthan Bathery lies in the moderately high land. Lesser portion of land have slope more than 20% and it lies within the forest. In the landslide zonation of Wayanad district, smaller area of the municipality comes under moderate hazard zone and it is within the forest land. Figure 12.4 shows the multiple hazard zonation map of Sulthan Bathery. From that it is evident that, there are no land slide prone areas in Sulthan Bathery municipality.

12.4.3 Drought

Drought is another serious disaster which has affected the district during the past, many times. During the year 2016-17, the rainfall has recorded a new minimum. The annual rainfalls showing undulating tendencies, owing to the global climate change crisis. Sulthan Bathery Municipality falls under the category of most vulnerable to drought. This is a very alarming situation, which points toward the possibility of catastrophic draughts.

The state soil conservation department has planted reed clusters along banks of rivers and marshy areas in the nearby panchayats as part of the draught mitigation project. Apart from that the district administration has taken several steps to mitigate water scarcity and draught related issues ahead the summer. Such as, cleaning of kiosks and water tanks in such areas before the summer season, construction of temporary check dams in rivers and rivulets and repairing of bore well installation in tribal hamlets.

12.4.4 Biological Hazards

Another serious disaster, that affected the district in the recent past was the Kyasanur Forest Disease (KFD) *aka* Monkey Fever. This disease claimed 11 lives during the year 2014-15. Sulthan Bathery Municipality is among the worst hit areas by KFD. In these areas, if any monkey carcass is found outside forest area, then it shall be burned at the spot itself after duly sanitizing the area around it up to a radial distance of 50 meters with Malathion Dust or its chemical substitute. If it is found inside forest, then also proper sanitization shall be done to prevent spreading of the disease. With careful preventive steps and meticulous intervention, the disease was brought under control during the year 2015-16. In 2019, there are two confirmed and 10 suspected cases of KFD identified so far in Wayanad, but it is successfully treated to avoid casualties

12.4.5 Man Animal Conflict and Other Hazards

Man animal conflict is a common threat in the entire district and Sulthan Bathery has no exemption. A total forest area of 60.88 Sqkm comes under the municipality. Reason for increase in wild life attack are Increase in wild life population, Mono crop plantation after falling off natural forest, scarcity of water, loss of elephant corridors in the forest settlements and outside forest, destruction of bamboo grooves, invasion of exotic weeds and unrestricted grazing of a huge number of cattle from the newly established animal farms on the fringes of forest. During the year 2017 the district has suffered recorded

minimum rainfall that triggered drying up of natural water bodies. The forest department was refilling drying ponds within the forest with the help of a specially designed truck to mitigate the hazard.

Even though forest fire is not common in Sulthan Bathery at present, measures has to take to prevent forest fire need to be exercised. Installation of safety fire lines, engaging fire watchers and campaign to educate the public, especially to those in the fringes of forest need to be performed.

12.4.6 Earthquake

The district is classified under seismic Zone III of ISI classification, Moderate damage risk zone. As per the Kerala state disaster management authority there is no earth quake prone location within the municipal area. And there is no case of previous earth quake.

12.5 Inference

The district has faced many disasters in the past and some of the areas in it are highly prone to such incidents. The planning area doesn't have any of such areas of high disaster proneness. Since the municipality adjacent to forest area, there are circumstances for biological disasters and other disasters such as man animal conflict. Proper mitigation measures could held there disasters under control.

Report of the High Level Working Group on Western Ghats (Dr K. Kasturi Rangan Report) in the context of Sulthan Bathery has profound implication and impact over the planned sustainable development of Bathery.

CHAPTER 13

DEVELOPMENT ADMINISTRATION AND FINANCE

Governance plays an important role in the implementation and execution of development activities. Hence, good governance is an indicator of how the development activities are actually implemented in the local body. In this chapter an attempt is made to describe the development administration and finance of Sulthan Bathery Municipality within the limited available data.

13.1 Development Administration

The major development activities undertaken by the municipality are

1) Construction and maintenance of municipal roads
2) Public health
3) Water supply
4) Sewage disposal
5) Providing economic help for the construction and maintenance of houses to economically backward communities.
6) Street light
7) Administration of institutions owned by the municipality like schools, hospitals etc.

Besides the municipality level activities, functions of the various development departments are being controlled by the municipality and state plan schemes of these departments are channeled through the municipality.

13.2 Finance

The financial position of local self-governments throughout the nation is very precarious except for a few very large urban centers. Most of the local self-governments, especially the smaller ones like Sulthan Bather are not financially self-sustaining. Grants from central and state governments are the major source of funding for their day to day affairs and fulfilling their constitutional obligations. The major source of income for the local self-government institution is the property tax levied on the buildings.

A better system of collection of property tax can be ensured by digitizing the data base and managing this spatial information in a GIS platform with stakeholder interface. The timely detection of unauthorized construction, thus bringing the evaders to the tax net and ensuring compliance of regulations, also can be effectively carried out using remote sensing applications once the GIS data base is in position and regularly updated.

Another source of own revenue for the local body is entertainment tax. The scope of this source of revenue is shrinking due to reduction in public interest in cinema theatres.

Receipts from properties also could be a major source. In fact, the Sulthan Bathery has less income under this head than that from taxes. However, the full potential of this source of revenue is not utilized. The new bus stand and existing bus stand shares additional income.

Annual financial statement of the local body for the year 2008-09, 2009-10, 2010-11 and 2011-12 is shown in Table 13.1 Fig 13.1 shows summary of financial statement 2009-10 to 2011-12

Table 13-1: Annual finance statement of Sulthan Bathery Municipality for the year 2008-09, 2009-10, 2010-11 and 2011-12

Year	Opening balance	Income	Expenditure	Total balance
2011-12	28671508	101072571	89384936	40359143
2010-11	16982342	110666981	98977615	28671508
2009-10	19433818	77821719	80272995	16982542
2008-09	14092717	70532487	65191186	19434018

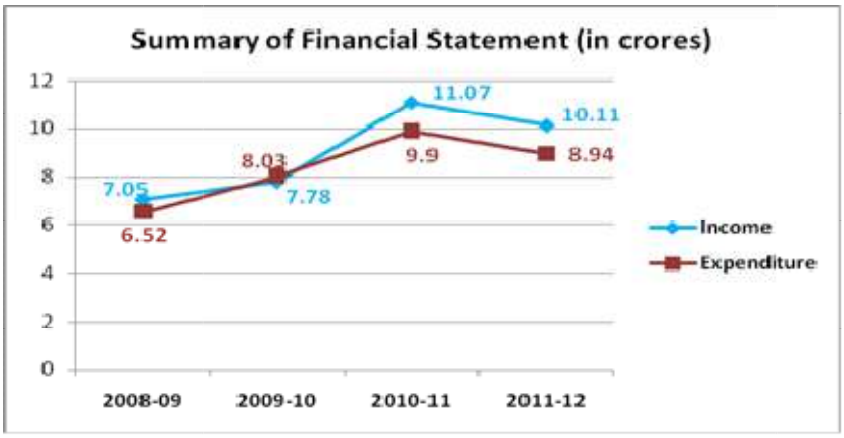


Figure 13.1: Summary of Financial Statement 2008-09 to 2010-11

Source: Sulthan Bathery local body 2012

The statements show that financial position of the local body is not very robust. The income is slightly increasing every year and expenditure is also growing from 2008-2009 to 2010-2011 and both had a sudden decrease in the year 2011-2012.

13.3 Governance

The available modern technologies are not much utilized to the maximum extent for ensuring efficient and effective governance. The tax administration is still based on manual

registers and assessment which causes heavy leakage and non-compliance. Reluctance in use of IT enabled solutions hampers seamless integration of various governance functions and efficient service delivery.

13.4 Existing Source of Funds

Major sources of revenue for the local body are taxes, income from properties and grants (revenue account) from the state government/ Central Government. The taxes contribute 45% of the revenue income. The income from properties comes to 15% and grant from state government is 8% of the total revenue income. This indicates the need to concentrate on efficient collection of taxes and enhancing income from properties for the financial health of the local body. In the capital account, funds are provided by the state plan schemes.

13.5 Problems and Potentials

The major problems faced by the local body in the finance sector are the leakage in taxes and paucity of funds for developmental activities. More revenue generating projects can be implemented for enhancing the income

13.6 Inference

The fiscal surplus is not an indication of financial health, but of poor financial management and a lack of fund utilization for major projects. But the local body has tremendous potential for development of financially remunerative projects for sourcing funds for urban development.

CHAPTER 14

LINKAGES AND SPATIAL STRUCTURE

While analyzing the different sectors in the planning area, intra sectoral linkages, inter sectoral relations and linkages between settlement characteristics and various sectors need to be addressed for carving out an integrated development vision. Also the existing spatial structure of the planning area which is the physical manifestation of all such linkages is to be analyzed for visualizing the most desirable spatial structure of the area which will minimize the adverse effects on the environment while ensure utilization of the existing potentials in a sustainable manner.

In this chapter, inter sectoral linkages between the core sectors and linkages between settlement character and sectoral developments are analyzed and a desirable spatial pattern is derived based on the following.

1. Environmentally sensitive area
2. Functional character
3. Hierarchy of nodes
4. Existing and future urban area
5. Activity pattern
6. Existing transportation network.

14.1 Inter Sectoral Linkages

From the analysis of different sectors in the planning area, the following core sectors were identified.

1. Topography, Environment and Strategic Importance
2. Social and Physical Infrastructure
3. Industries
4. Tourism
5. Trade and Commerce
6. Special concern areas
7. Agriculture.

Inter sectoral linkages between these cores sectors are described below.

14.1.1 Linkage between Topography, Environment and Strategic Importance

With other Core Sectors

The district as well as the Sulthan Bathery is totally contained within the highland region with rugged topography, blessed with thick vegetation and good forest content. Provision of physical infrastructure has direct linkage with the topography of the area. Being the taluk headquarters and one of the main 2nd order settlements, the town attracts a number of taluk level offices of the government and private sector institutions and hence the social infrastructures have to be strengthened. The major land use change affecting

environment identified in Sulthan Bathery is depletion of paddy field and conversion of dry cultivation area for construction purpose.

The relation between demand for traffic & transportation infrastructure and different sectors of economy is a very dynamic one. The growth in any sector of economy calls for instantaneous changes in the demand pattern for transportation infrastructure. Even though the back bone of the economy of the town is agriculture, the value addition of agricultural products and agro based industries are not available. Hence careful planning interventions has to be made while planning to give priority to agro based industries with value addition and allocation of land shall be made such a way to minimize the environmental destruction and to minimize the usage of public fund and to generate more job opportunities.

14.1.2 Linkage between Industries and Tourism

The main tourism attraction of the district is its scenic beauty and salubrious climate. Heritage tourism and trekking are also prominent in the district. The tourists are very interested in the district's traditional industrial products and herbal medicines. Wayanad is well known for its spices and organic agricultural products and forest related products such as honey etc. If value addition of organic hill produces traditional industrial sector and handicraft industries, marketing of spices etc. are promoted, it will generate more job opportunities and thereby create more economy.

14.1.3 Linkage between Industries and Trade & Commerce

Industries and commerce are mutually complementing sectors and hence industrial development will automatically boost the commercial activities. Strong network of commercial centers with proper infrastructural facilities is necessary for the development of industrial sector. At present commercial sector mainly depend in imported materials and industrial sector struggles for want of good marketing network.

14.1.4 Linkage between Industries and Primary Sector

The district being agrarian in nature has high potential in agro based industrial sector. Micro small and medium enterprises (MSME) sector is an important generator of employment. In Sulthan Bathery, the small scale enterprises are not concentrated in any particular location, except some industrial units like SIDCO, Gladys soap factory and timber mill near fire station etc. Even though Sulthan Bathery is dominant in agriculture products, potential of this resource is not utilized for employment generation in industrial sector to enhance local economy. Both agriculture and animal husbandry sector produces can be made use of as resources for value addition industries, which will lead to economy generation.

Considering the tremendous potential for employment creation, the MSMEs have to be promoted. Value addition and branding of "Wayanadan" hill produces and spices will create more income and job opportunities. The potential imposed by the "Brahmagiri meat

processing centre" at Nenmeni GP will strengthen the animal husbandry sector. Moreover, the centralised chilling plant owned by MILMA at 'Kalpetta' has great influence in the sector. Hence there is a well-established linkage between the two sectors.

14.1.5 Linkages between Industries and Social Physical Infrastructure

Well-developed transportation sector act as a vital infrastructure for industrial development. The proximity of "*IT hub Bengaluru*" and linkage to the "*Beypore Port*" at Kozhikode are not explored so far in the sector. If the proposed railway line from Nanjangud to Thalassery materializes, it will boost the industrial sector. Well-equipped hospitals, schools and higher educational institutions etc. will attract more industrialists. The infrastructure required for industrial developments such as good road connectivity, availability of water and electricity etc. has to be provided to promote industrial development in the area as well as in the district.

14.1.6 Linkage between Tourism and Trade and Commerce

Tourism plays a major role in the economic aspects of Wayanad district. The government of Kerala has identified Wayanad as a "Tourism district" and tourism is an emerging sector in Wayanad.

In tourism sector, town has to act as a service provider for the whole taluk and even to the district. Development of commercial sector will definitely encourage the tourism sector since large number of tourists with more purchasing power will be attracted to the area. Tourism villages well organized markets, marketing of organic hill produces, forest produces, spices, herbal medicines and handicrafts are the emerging needs in this sector.

14.1.7 Linkage between Tourism and Special Concern Area

The unique socio economic culture of Adivasi's (tribes) has a great impact in tourism sector. Tourists are very keen to study the unique Adivasi culture and their treatment based on herbal medicines. The health tourism is one of the emerging sectors in the district and if promoted it will create more job opportunities especially among the backward communities.

14.1.8 Linkage between Tourism and Primary Sector

District has high tourism potential due to its spectacular beauty, invigorating climate, and its spice wealth which is not explored effectively. The hinter lands of Sulthan Bathery have thick vegetation having variety of flora and fauna, which promotes farm tourism and thereby creates economy. There is high demand of spices and organic hill produces by the tourists and value addition and branding will create more job opportunities. Milk and milk produces also have demand in tourism sector.

14.1.9 Linkage between Tourism and Environment

Tourism and environment have a dual relationship. Certain level of environmental quality is meant for healthy development of tourism sector. But, unbridled development in tourism sector can adversely affect the environment. The land use also has profound impact on the micro climate. The main attraction of the district is its environment and scenic beauty. Hence eco-friendly and non-polluting tourism activities are preferred. The linkage between tourism and environment is to be made as balancing each other by proper planning intervention.

14.1.10 Linkage between Primary Sector and Trade and Commerce

As an agrarian district, the main trade is of hill produces and hence there is a strong linkage between them. Meat and meat products are mostly imported and hence the strengthening of animal husbandry sector and related trades are necessary. Study reveals that Wayanad is in 2nd position in milk production. The organic hill produces and its value addition will have trade and there by create more job opportunities and economy.

14.2 Linkage between Settlement Characteristics & Sectoral Developments

Settlement characteristics are derived out of complex activity pattern of an area. Hence following linkages need to be analyzed for understanding the existing spatial structure and also to visualize the most suitable spatial structure.

14.2.1 Effect of Population Growth on Various Development Sectors

The growth in population has an all evasive effect on all the development sectors since development is for the people and by the people. The effect of population growth is direct on sectors like water supply, electricity, housing, traffic & transportation, education, health care etc. where there is direct consumption.

With growth in population, the human activities increases and it reflects on the transportation needs of the people. The transportation needs grow exponentially with the increase in population. The physical improvements to the transport network shall be attempted with this in view. The demand for water supply, sewerage system, solid waste management system, energy, education, health care, recreational and other civic amenities has direct relation to the increase in population. But physical infrastructure for these services cannot be built incrementally. Hence these facilities are to be developed in a phased manner dovetailing with the respective threshold population. The housing sector also has direct relation to the growth in population. However, development in this sector can be taken up in an incremental manner to an extent.

14.2.2 Land Use Changes and Environment

The changes in land use affect the environment to a great extent. The major land use changes thus affecting environment, identified in Sulthan Bathery are the depletion of paddy field and conversion of dry cultivation area into construction purpose. There has been

a considerable decline in both the area of paddy field and the extent under cultivation. The agricultural production is not a very significant factor to be considered while formulating land use policy in an urban context. But, the paddy land essentially acts as green open space and also functions as reservoir of water during rains preventing floods and fast run off. Likewise, the dry cultivation area provides the necessary green cover in the area. Built land uses in the area shall be such that impact on the forest land use is minimal. Changes in this land use shall reduce the green cover and hence shall adversely affect the environmental quality. The land use policy decides the compactness of built form in the town. A less compact built form (with more than necessary intrusion of residential, commercial and such other land uses requiring built space to agricultural / open land uses) shall mean wider building foot prints. This calls for putting more land under manmade structures detrimental to environmental quality. Reducing the building foot print is the answer to this problem. Reducing the building foot print also shall mean compact development for which it is easier and less costly to provide basic amenities like water, sewerage system, energy, roads etc. Providing waste treatment facilities are also a lot easier for a compact development. All these have positive impact on the quality of environment. The land use also has profound impact on the micro climate. Lesser foot prints shall reduce the possibility of creating heat islands within a town.

The distribution of various land uses in the town decides the traffic pattern of the town and hence has environmental ramifications. So, the changes in land use shall be managed in such a way that traffic and transportation needs are optimized causing less pollution from vehicular traffic and less consumption of precious fossil fuels.

14.2.3 Industrial Sector- Effect on Environment, Land Use and Employment

Micro small and medium enterprises (MSME) sector is an important generator of employment. In Sulthan Bathery, the small scale enterprises are not concentrated in any particular location except few industrial units like SIDCO, Gladys soap factory and timber mill near fire station. Even though the region is dominant in agriculture products, there are no agro based industrial units existing here. Considering the tremendous potential for employment creation, the MSMEs have to be promoted. Besides the land use policy of allowing non-polluting and non-nuisance industries of small scale in residential and commercial areas, the development of necessary infrastructure required for industrial developments such as good road connectivity, availability of water and electricity etc. also should be attempted to promote industrial development in Sulthan Bathery.

14.2.4 Effect of Various Sectors on Employment

The small industrial sector is considered to be the prime provider of employment in small and medium towns. But in the case of many towns in Kerala, including Sulthan Bathery, the employment in industrial sector is not the prominent one. The tertiary sector, mostly various service employees are more than industrial workers. Trade and commerce is an important employment sector, both direct and indirect. However, the employees in

these sectors are mostly unorganized and hence are not much reflected in the statistics. The fluctuation in the employment level is also high in this sector. In tourism sector, town has to acts as a service provider for the whole district. So tourism has much potential in future for creating more jobs. Even though studies based on physical features suggest agriculture, animal husbandry, tourism and MSME are the thrust areas of employment in the town. The town being the administrative headquarters of the district attracts a number of district level offices of the government and private sector institutions. Even though the employment in this sector is at saturation level, the town has much potential of tourism and MSME units. Education and health care are the major providers of organized employment in the State. Agriculture and animal husbandry sectors also have good potential for employment.

14.2.5 Changes in Traffic &Transportation Needs Due To Growth in Various Sectors

The relation between demand for traffic & transportation infrastructure and different sectors of economy is a very dynamic one. The growth in any sector of economy calls for instantaneous changes in the demand pattern for transportation infrastructure. However, the transportation infrastructure cannot be provided in an incremental manner. Phase wise expansion is the only solution. Hence careful consideration is required in any master plan while dealing with development in major sectors of economy and social infrastructure.

The growth in industrial sector calls for increased freight traffic both in bound and out bound. So these locations shall be identified in such a manner that connectivity from the existing network is adequate, so that efforts in expansion of network to meet the additional demand are optimum. Since the increase in demand of freight transport, development of a truck terminal is essential. So, a truck terminal, easily accessible from the network is a pre-requisite for development of industrial sector. The increase in trade and commerce increases the intra city traffic also. So development of trade & commerce meant for local consumption should be decentralized to the maximum extent possible.

Development of education and health care sectors means establishment of institutions of higher order also. This shall increase the passenger traffic. The locational decisions of such institutions shall be taken so that the existing network is suitably used by the additional demand and development of the network is possible in a phased manner.

Additional tourism facilities also will result in changes in demand pattern. Hence the future transport network shall consider keeping the need to the demands from tourism sector also.

14.2.6 Changes in Traffic & Transportation Needs Due To Change in Land Use

The land use pattern and the traffic pattern are interwoven inexplicably. The traffic pattern is the dependent variable in the relation between various land uses. The changes in traffic pattern due to changes in land use can be studied using models to a reasonable level of accuracy. The land use pattern can change mainly in two ways. One is due to the growth in population and subsequent increase in economic activities. The other is due to changes or increase in the pace of economic activities due to other impetus rather than population

growth. The population growth is mainly reflected upon the residential land use, its geographic spread and densification. The trips generated increases in proportion to the growth in population and the origin of these trips are decided by the spatial distribution and density of residential land use. The change is generally increase in volume and not in pattern since the various destinations are normally in place and in the case of Sulthan Bathery no major shifts in social infrastructure is anticipated.

The land use changes attributable to changes in the pattern of economic activity recast the existing traffic pattern and needs special consideration. The distribution of commercial land use has a great impact on both the intra city and intercity traffic demand. This indicates need to locate commercial land use easily accessible from arterial and sub arterial roads. But the experience in the state in this regard is the occurrence of ribbon development which is detrimental to the proper development of roads and result in inefficient use of land. So care shall be taken to prevent ribbon development while considering development of commercial land use along the arterial and sub arterial roads. The attempt to bypass intra traffic away from NH also shall prompt to a good road network.

Another issue is the changes in land use due to large scale industries and higher level educational and healthcare institutions. These institutions are big enough to change the land use pattern in their vicinity. The possible locations of such institutions in Sulthan Bathery are kept in mind while deciding on the proposed road network so that easy connectivity can be assured to these institutions as and when they are established.

14.2.7 Spatial Distribution of Trade & Commerce: Effect on Real Property Values and Equitable Housing Policies

The draft housing policy 2011 of the Government of Kerala states that *"the International Covenant of United Nations on economic, social and cultural rights, to which India is a signatory, upholds the right to adequate housing as a human right. Article 21 of the Constitution of India which defines the protection of life and personal property encompasses the right to shelter and right to livelihood also which are integral to the dignified living of the individual."* The draft housing policy upholds the need for adequate and affordable housing for all. The increase in land value in commercial zones/ central business zone has a ripple effect on the price of residential plots also. Hence adequate spread of commercial land use such as central business zone shall be envisaged such that adequate area available for trade & commerce so that pressure on commercially developable area is released. This will affect the land value in residential area also since there will not be any unsaturated demand for commercial use and the resultant attempts by the trade and commerce activities to intrude in to the residential areas. The extent zoned for residential use also should be adequate so that the demand for more houses could be met. Another provision that shall reduce the pressure on land for housing is allowing low density EWS and LIG houses in a restricted manner in areas zoned for agriculture etc. These policy interventions through zoning (in extent and zoning regulations) are expected to increase the availability of land suitable for residential purpose and hence reduce demand driven increase in land value.

14.2.8 Tourism and Environment

Tourism plays a major role in the economic aspects of Wayanad district. The Government of Kerala has identified Wayanad as a Tourism district and tourism is an emerging sector in Wayanad.

Tourism and environment have a dual relationship. Certain level of environmental quality is meant for healthy development of tourism sector. But, unbridled development in this sector can adversely affect the environment. There are some major tourist destinations in the town such as Bathery Jain temple, wild life sanctuaries, and many other destinations along the border region of Sulthan Bathery. The places of tourist attraction are mostly in the environmentally fragile areas, thus maintaining environmental quality should be given top priority while formulating new tourism projects.

14.2.9 Inclusive Growth in Various Sectors

The concept of inclusiveness can be explained in terms of livability, poverty alleviation, access to health, education, basic amenities etc. in general. Housing is the most prominent component of inclusive growth in the context of a development plan. Adequate and affordable housing should be ensured to all by direct intervention and / or policy measures to promote affordable and decent housing for the poor. The road connectivity, availability of water supply, electricity, educational facilities, healthcare facilities, recreational options and other amenities are addressed by the development plan. An equitable distribution of such amenities is targeted by this development plan which shall improve the inclusiveness in urban development. In the trade and commerce sector, recognizing the street vendors as legitimate entrepreneurs addressing the shopping needs of the common man is a big step towards inclusive growth. By this initiative the street vendor is no more a person to be taken off the road for illicit occupation, but someone whose trade is to be facilitated by the public authority in the interests of the common man. The attempt is to share a part of the demand for trade and commerce and the profit there from with the poor who takes out a livelihood by peddling goods for day to day use. Besides, the common man receives his supplies at reduced prices since the overhead expenses are minimal for the street vendor.

In the industrial sector, allowing micro enterprises in residential and commercial zones is a policy measure for ensuring inclusive growth in the sector. The zoning regulations in general have to be lenient towards the housing needs of the poor, being inclusive. The spatial distribution of educational and healthcare facilities is also important from the inclusiveness point of view. Access to school and primary healthcare facilities at walkable distance is essential for bringing in inclusiveness in the growth of these sectors. Ensuring proper sanitation (by giving sanitary toilets, efficient collection of wastes, abatement of waste water logging etc.) should be given top priority in alleviating slum like conditions within the area. In the traffic & transportation front, widening of interior collector roads so

that mass transport systems like buses can reach the remote habitations, measures for the safe passage of pedestrian traffic etc. can be considered as attempts at inclusive growth.

14.2.10 Energy Efficiency and Land Use

The benefits of energy saved by land use planning measures are of long term and hence need careful consideration. The compact nature of development reduces intra city traffic and thus saves fossil fuel. Efficient layout of various land uses based on their compatibility and trip generation characteristics shall result in reduction in use of energy for transportation needs. The compactness and proper layout shall prompt pedestrian traffic also contributing to energy conservation. This also shall be help conserve energy in sectors like water supply, electricity etc. The formation of urban heat islands can be avoided by appropriate land use measures. This shall cause savings in energy by reduced demand for air conditioning and artificial ventilation.

14.3 Spatial Structure

The spatial structure of the planning area defines the development status and spatial distribution of population as well as facilities. The spatial structure can be derived out by taking care of the following factors.

1. Environmentally sensitive area
2. Functional character
3. Hierarchy of nodes
4. Existing and future urban profile
5. Activity pattern
6. Existing Transportation network.

14.3.1 Environmentally Sensitive Area

The thick vegetation on the peripheral area, reserved forest on the northern area and the paddy lands are the environmentally sensitive areas of Sulthan Bathery. The environmentally sensitive areas and impact on HLWG (Dr. K. Kasturi Rangan report) are shown in the Fig14.1 given below.

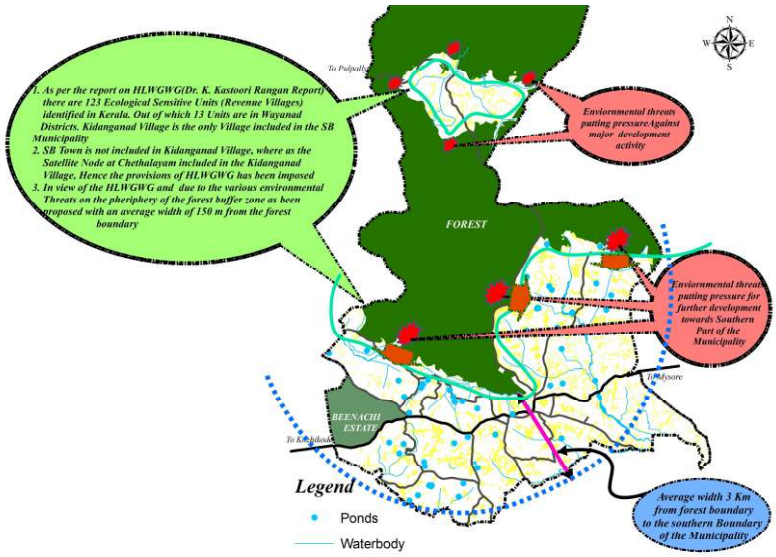


Figure 14.1: Environmentally Sensitive Area & Impact of Report on HLWG

14.3.2 Functional Character

The functional character is determined based on the land use, population distribution and average plot size within the settlement. It is classified as rural, semi-rural, semi urban and urban. At the regional level the functional character of Sulthan Bathery is determined as rural. The wards in Sulthan Bathery are studied in detail with respect to different aspects like total area under each land use category, concentration pattern of population, percentage of workers engaged in non- agricultural pursuit, average plot size in the residential/agricultural mix use category etc. The functional character of each ward thus derived is given in Fig. 14.2.

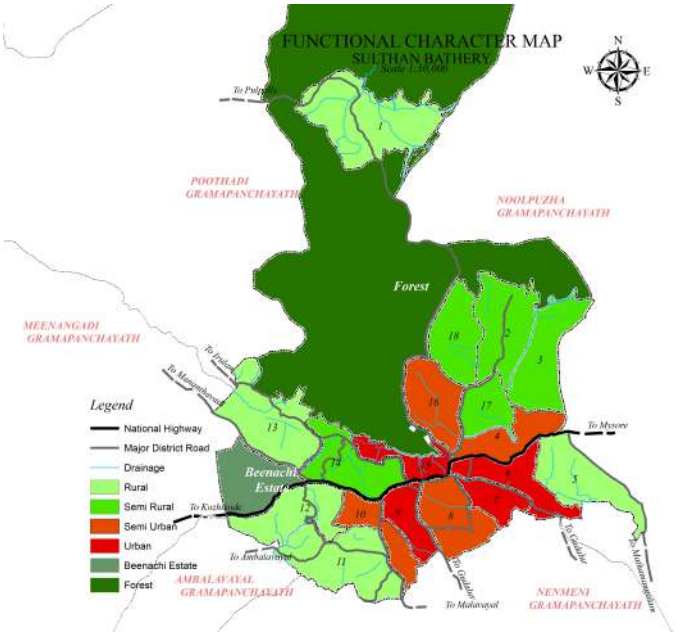


Figure 14.2: Functional Character of the Municipality.

From the above figures it can be inferred as follows

- Urban wards – 06,07,09 & 15
- Semi urban wards – 04,08,10 & 16
- Semi-rural wards – 02,03,14,18 & 17
- Rural wards – 01,05,11,12 &13

14.3.3 Hierarchy of Nodes

Commercial nodes are identified on all important intersections of roads where there is a concentration of commercial activities. The most important commercial nodes thus identified are Chungam Junction, Traffic Junction, Kottakkunnu Junction, Kuppadi Road Junction, Assumption Junction, Gandhi Junction and Beenachi Junction. The hierarchy of nodes is shown in Fig 14.3.

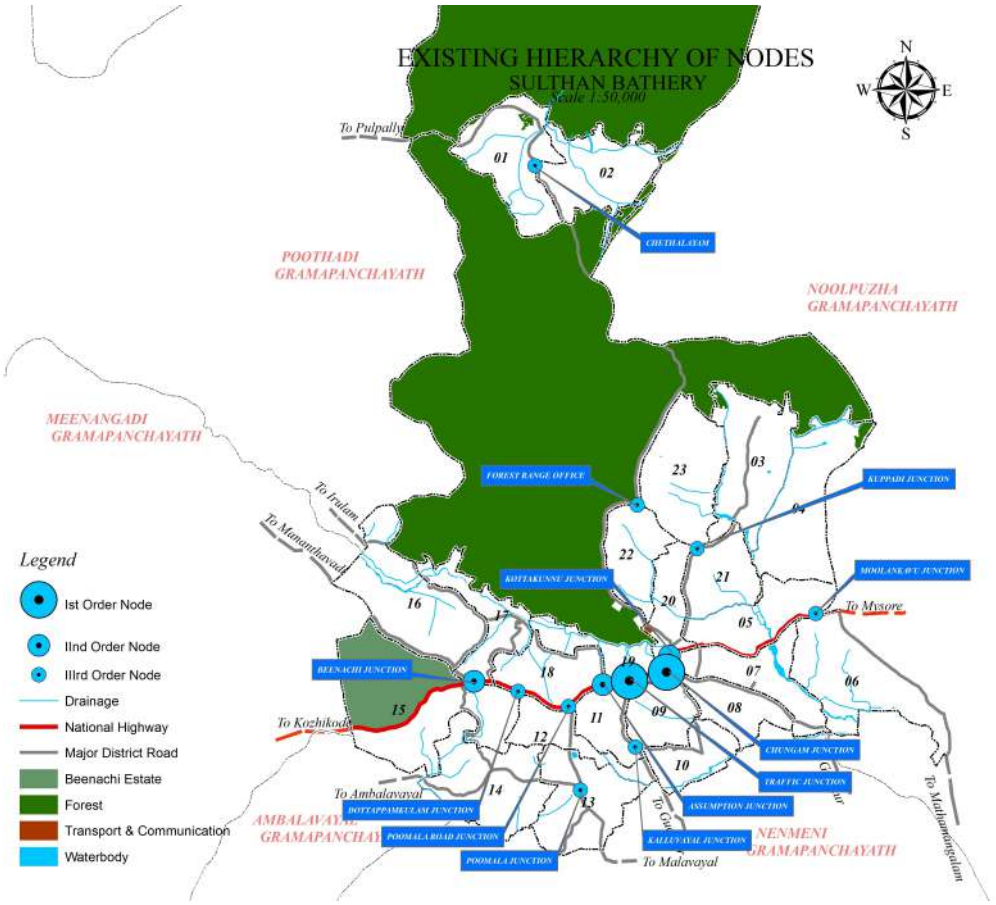


Figure 14.3: Existing Hierarchy of Nodes

14.3.4 Activity Pattern

The term activity pattern is used to indicate the major economic activity of a place or that can be brought there in future. It may be agriculture/ plantation (primary activity), industries (secondary activity), service activities (tertiary activity) or a combination of these like agriculture and animal husbandry and small scale industries. The activity pattern can be

derived through the integration of the land use concentration pattern, functional character and the urban profile.

From the activity pattern shown in Fig 14.4, it can be concluded as follows.

- Primary activities mainly concentrated in the wards 01,02,03,06,15,16 &23
- Tertiary activities mainly concentrated in the wards 08,09,11,12 &19
- Primary + secondary activities is mainly concentrated in the ward- 04
- Primary +tertiary activities mainly concentrated in the wards are 05,13,14,17,18& 22
- Secondary + tertiary activities mainly concentrated in wards 07,10,20 &21

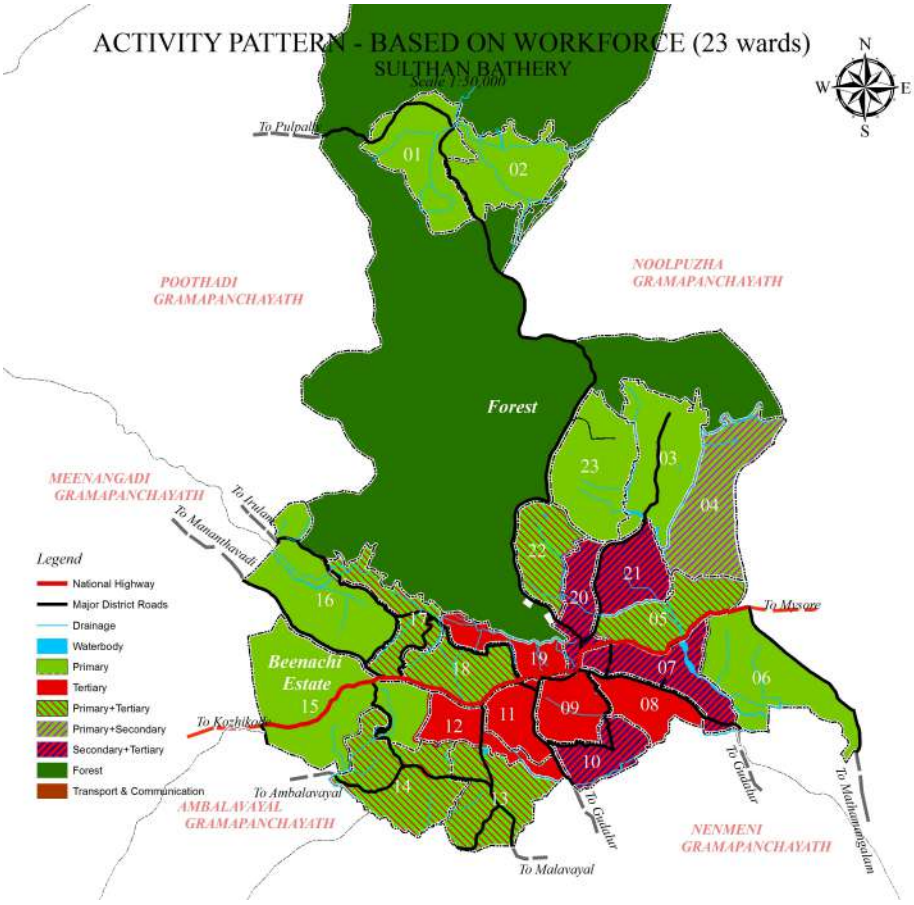


Figure 14.4: Activity Pattern of the Sulthan Bathery

14.3.5 Existing Transportation Network

Sulthan Bathery has good road connectivity. The main traffic corridor is NH 766, (Kozhikode to Kollegal) along the north – south direction. All the facilities are concentrated along the major roads in the form of ribbon development. KSRTC garage from which all the interstate transport operated is located at Kottakkunnu. The existing road network is shown in fig.14.5.

The major interstate district roads (MDR) starting from Sulthan Bathery are

1. Sulthan Bathery – Pattavayal – Gudalur – Ooty Road

2. Sulthan Bathery – Thaloor – Gudalur - Ooty Road
3. Sulthan Bathery – Gundelpet - Mysore Road
4. Sulthan Bathery – Perikalloor - Bairakkuppa – Mysore Road
5. Sulthan Bathery – Panamaram- Mananthavady - Kutta – Mysore Road

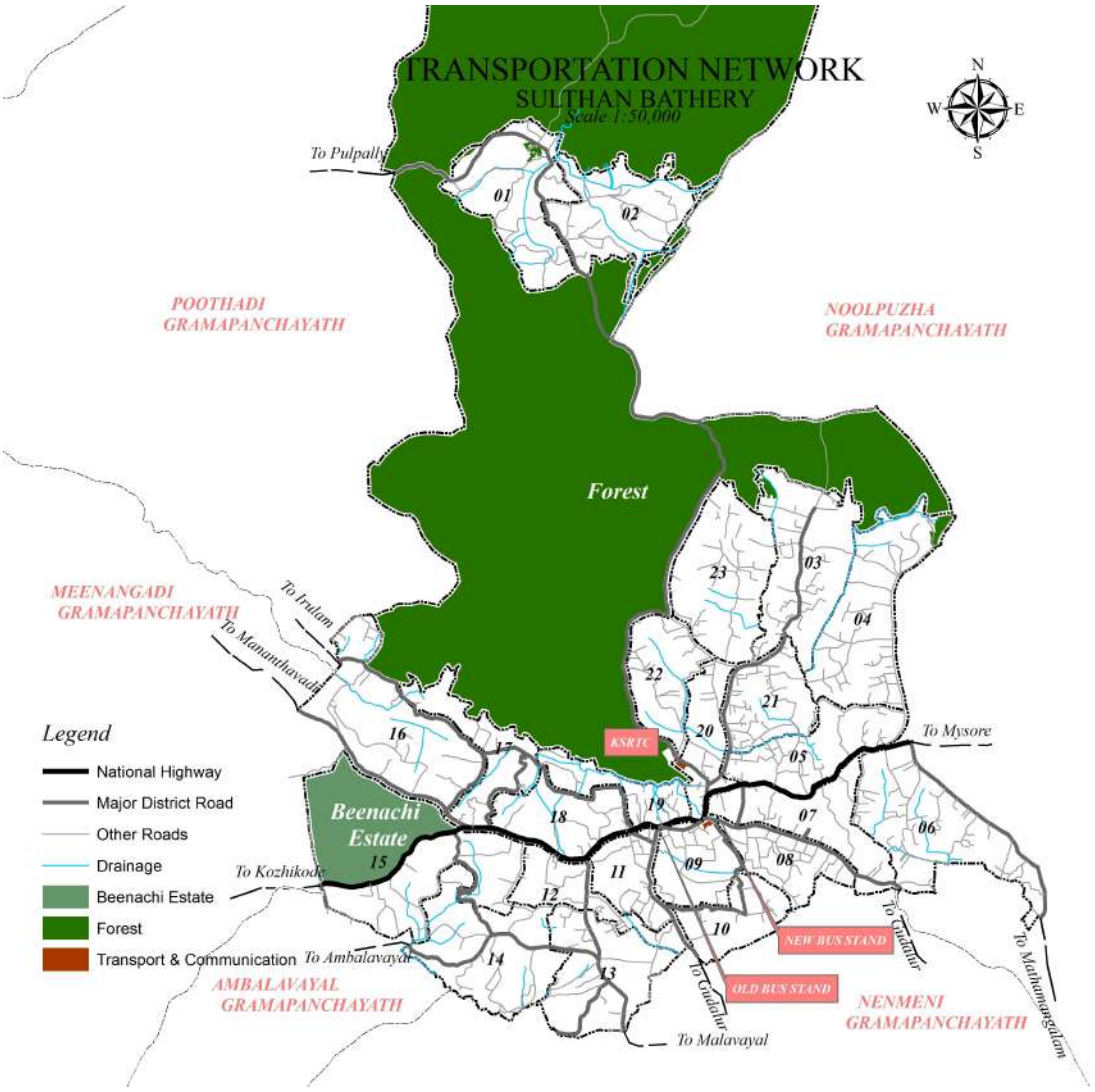


Figure 14.5: Existing Road Network

14.3.6 Existing Spatial Structure

The activity pattern, connectivity and hierarchy of nodes are considered together formulated the spatial structure of Sulthan Bathery. The spatial structure obtained by overlaying the maps of the above in the environmentally sensitive area will evolve the existing spatial structure and is shown in the Fig.14.6.

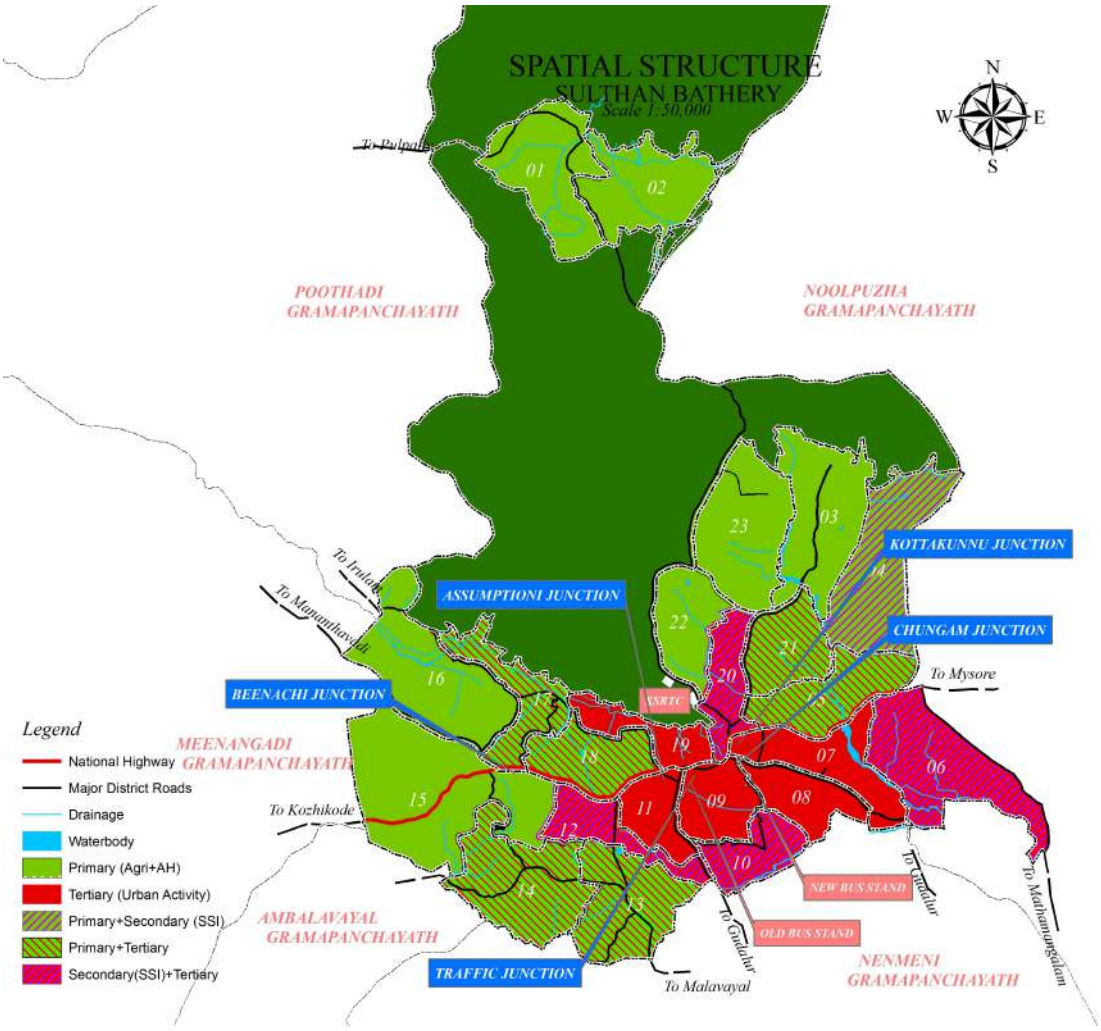


Figure 14.6: Existing Spatial structure

14.4 Inference

The study reveals the need of critical linkage between core sectors to ensure the optimal resource utilization and to trigger the local economic development. The spatial structure of Sulthan Bathery is evolved based on the study and spatially overlaying the road network and hierarchy of nodes over the spatially distributed activity pattern.

CHAPTER 15

SUMMARY OF FINDINGS

Various spatial and sectoral aspects pertaining to Sulthan Bathery have been analysed in depth and breadth in the previous chapters. This chapter briefs the major findings based on the analysis of settlement and various sectors.

15.1 General Findings of Regional Setting Study

The regional setting of Sulthan Bathery is described in the 'District Urbanization Report' of Wayanad. The findings are as follows.

- Wayanad is located on the south west edge of the peninsular shield of India, is distinctly marked by the western ghats where ground elevation above mean sea level range between 700-2100m, whereby it is totally contained within high land region (elevation >=750m) of the state with undulating topography.
- Sulthan Bathery is one among the 2nd order settlements and an emerging center of development located on the eastern edge of the district.
- The district as well as Sulthan Bathery is well connected to the surrounding states/ districts by road and rail or air connectivity is absent in the district.
- The proximity of famous tourist centers viz. Mysore, Ootty etc. and connectivity to the IT hub Bangalore highlights the regional importance of Sulthan Bathery.
- Sulthan Bathery is the taluk headquarter and one of the 2nd order settlements in the district. In other words, Sulthan Bathery has got dual function. That is as an administrative centre being the taluk headquarters and as a service provider and market centre for the entire service region comprising of vast agricultural land and forest content. Hence Sulthan Bathery has to sustain various agro allied activities with due regard to the environment and topography.

15.2 Profile of the town

Sulthan Bathery is the head quarter of Sulthan Bathery taluk, emphasizing its importance in terms of administrative town, provision of taluk level services and so forth. The major findings are as follows.

- The Sulthan Batheryis significant in terms of its strategic location, proximity to interstate and intra state urban centres and tourist places of national importance, unique topography, salubrious climate, and unique bio diversity.
- The extent of the local body is 103.22sq.km. But more than 58.61% of the gross area is covered by reserve forest (60.50 Sq. km)
- The peripheral wards have thick vegetation with low population and the central wards are built up and more populated.

- The road network is of "spine and spur type" with NH 766 acts as spine and the roads takes off from the NH acts as spurs. NH 766 acts as the main traffic corridor which connects the town with other districts as well as the states.
- The Sulthan Bathery - Pulpally – Perikalloor Road has a good regional importance once the proposed Bairakkuppa Bridge across the Kabani River is materialized by way of providing easy connectivity to Mysore.
- The town shows unique topography and environment resources.
- The town is connected to the hinterland and the region only by roads
- The town is blessed with wide range of flora and fauna with presence of reserved forest, paddy areas and rich agriculture land.

15.3 Demography

The parameters such as size of population, its growth rate, population density, population concentration pattern, migration details and population projection are analyzed and reached at the following findings.

- The study reveals that the population growth rate of the district has sudden decreasing trend. The same situation is taking place in Sulthan Bathery also in the last decade.
- The population distribution among the wards is uneven with high concentration in central wards and low at peripheral wards where agriculture is predominant activity.
- Sulthan Bathery stands in first for the net population density in the district.
- The sex ratio of Sulthan Bathery is comparatively low when compared with nearby local bodies.
- It is interesting that the spatial distribution of population and land use are almost similar to that of the district.
- The literacy rate of Sulthan Bathery (80.61%) is lower than state average (94.00%) and greater than that of district average (89.03%). The literacy rate of SC/ST is only 27.33%.
- The house hold size is lower than the state and district average.
- Concentration of SC/ST population is more in outer wards where agriculture and forest use are dominant.

15.4 Occupational Structure

The existing economic base of Sulthan Bathery, based on the occupational structure as per census 2011, is studied and the following findings emerged.

- Analysing the decadal variations, the WFPR of Sulthan Bathery is seen greater than the state average and more or less equal to that of district.

- The economy of the town mainly depends on service sector as well as agricultural sector. High work force participation rate indicate strong primary sector activity base.
- The outer peripheral wards shows primary activity dominance and the wards in & around the town shows dominance of tertiary activity.
- The lowering of WFPR of Sulthan Bathery is due to the shifting of workers from primary sector to secondary/ tertiary sector where as the surrounding local bodies show dominance in the primary activity.
- In 2001 - 2011, the growth rate of the workers (10.20%) is greater than the growth rate of the total population (7.98%). This indicates that the opportunity of working is increasing after a decline during the last decade. This shows the strengthening of economic base.
- The number of cultivators is seen increasing whereas number of agricultural laborers is increasing after a declination during the last decade. This shows a regain in the agricultural sector.
- The concentration of industrial workers is more in Kaippancheri, Kalluvayal, Sulthan Bathery, Poomala, Sathram Kunnu & Armad wards

15.5 Land Use

Land use depicts the distribution of people and their activities over space. Thorough study and analysis for existing land use is very much essential for understanding the activity pattern and spatial structure which form the basis for formulating concept for future development. The findings are given below.

- The district level land use analysis clearly shows that Sulthan Bathery is blessed with strong agro base, and functional character of the local body is rural. At the same time it is the second order settlement in the district with future profile as urban. The predominance of urban activity is on both sides of NH and centre area of the town.
- Existing land Use map shows that more than half of the geographical area covered by forest lands.
- More than 58.61% of the gross area is covered by forest (60.50 Sqkm)
- Paddy and water bodies constitute 8.57 % of the land area.
- The existing land use shows that Sulthan Bathery has a characteristic function. (Urban activities concentrated in and around NH 766 where the northern parts are rich with forest covers and peripheral wards have strong Agricultural based activities.)
- Commercial Land Use constitutes 0.31% of the net area. The Commercial Land Use concentrated is on the both sides of NH 766 (Beenachi – Kottakkunnu stretch).

- Industrial Land Use constitutes 0.24% of the net area. Industrial Land Use is mainly concentrated in the wards of Kaippancheri, Kalluvayal, Sulthan Bathery, Poomala, Sathramkunnu & Armad
- The study of land use pattern shows that there is enough scope for future development.
- The environmental quality of the place has not been degraded much due to the development activities.
- The depletion of agricultural land use is not very severe even though paddy fields have been filled up for various other purposes.

15.6 Traffic and Transportation

The efficiency of transportation system is an indicator of development. The only mode of transport is road and no alternatives such as rail, air and waterways are available in the Sulthan Bathery. The major findings are as follows.

- The only mode of transport is road and there is no rail or air connectivity.
- The District has fairly good road network comprises of National Highway, State Highways, Major District Roads and Other Roads.
- The NH 766 connects the town with Kozhikode and Mysore and other growth centers within the district are well connected through Major District Roads
- The transportation towards south is very difficult due to the presence of hairpin bents and steep hills and valleys.
- The road network within the area is of “spine and spur type” with limited inter-linkages.
- The presence of interstate roads like Sulthan Bathery – Gundelpet , Sulthan Bathery - Thaloor – Gudalur, Sulthan Bathery – Pattavayal _ Gudalur and Pulpally - Perikalloor Road shows the emerging regional importance of the town.
- The study reveals that most of the roads have narrow carriage way and poor road geometry and the NH 766 is seen over utilized.
- More than 50% of the traffic is through vehicles which are forced to the core area due to the absence of bypass.
- There are no organized parking facilities in the town.
- The through traffic attracted towards the bus stands creates congestion.
- The nearest airport are Karippur airport (115 Km away from town)and Kannur airport (105 Km away from town)
- Well linked with Beypore port, Kozhikode (Business hub), Mysore, Ootty (tourist place) and Bangalore IT hub with roads
- The major interstate district roads starting from Sulthan Bathery are.

1. Sulthan Bathery – Pattavayal – Gudalur -Ooty Road
2. Sulthan Bathery – Thaloor – Gudalur -Ooty Road

3. Sulthan Bathery – Gundelpet - Mysore Road
4. Sulthan Bathery – Perikalloor - Bairakkuppa – Mysore Road
5. Sulthan Bathery – Panamaram- Mananthavady - Kutta – Mysore Road

- Five alternatives for ghat road are under consideration.

(1) Kalpetta-Varambetta-Poozhithode Road

(2) Meppady-Chooralmala-Nilambur Road

(3) Thondernadu-Kunhome-Vilangad Road

(4) Chippilithode-Maruthilavu-Thalippuzha Road

(5) Meppady-Kalladi-Anakkampoyil Road

Since the alignments of all the above five alternate roads are touching the forest land, the Pakranthalam –Kuttiyadi Road may be treated as priority one.

15.7 Physical Infrastructure

Findings evolved from studies of housing, existing system of water supply, sanitation, power etc. of Sulthan Bathery is the following.

- There is a possible shortage of housing in the municipality.
- The blockage and encroachment of natural drains causes flooding in certain areas of the town.
- Sulthan Bathery doesn't have any facility for treatment of waste water at present which possess a serious threat to public health and environmental quality.
- The solid waste generated is not collected completely and the treatment system is inadequate. Plastic wastes are not collected properly. The waste collection system is not efficient and segregation at source is not being attempted.
- The infrastructure facilities in the electrical energy sector are sufficient.
- The existing water supply scheme run by KWA is quite insufficient to meet the requirement and the proposed scheme under the financial aid of NABARD if materialize will fulfill the requirement.

15.8 Social Infrastructure

It is very important to see that the social infrastructure available in the town is adequate to cater to the whole service region. The major findings of analysis of social infrastructure like education, health, recreation facilities and other civic amenities etc. are as follows.

- The literacy rate of Sulthan Bathery (80.61%) is lower than state average (94.00%) and district average (89.03%). The literacy rate of SC/ST population is only 27.33%.

- In the case of schools, teacher-student ratios more than 1:30. Infrastructure facilities are satisfactory but need quality enhancement.
- Most of the colleges are offering only conventional courses.
- There is no super speciality hospital, hence the people have to depend on hospitals elsewhere.
- There is no govt. medical college in the town or in the district
- Major problem in the health sector is the inadequacies of facilities in the hospital. Hence there is need for improving the facilities especially in the government hospital.
- The specific requirements of tribes in health care need special attention
- The recreational facilities are not adequate to cater to the present population and the also from tourism point of view.
- The developments of play grounds/ stadia are not undertaken so far. Residents from different wards do not have recreational facilities in a reachable distance. The town square is a good facility available in this respect in Sulthan Bathery.
- The Civic amenities available are not commensurate with the requirements. Being a taluk headquarter, a market town for surroundings local bodies and a gate way in terms of tourism there is need to provide more recreational facilities in Sulthan Bathery.
- The stadium located near to Assumption junction can be developed as an indoor stadium. However adequate width of access has to be ensured.

15.9 Economic Aspects

The major findings of analysis of significant sectors viz. industry, trade and commerce, tourism, agriculture, animal husbandry and fisheries in Sulthan Bathery are discussed below.

- The existing industrial base of the town is comparatively nil, mainly due to lack of proper connectivity and absence of infrastructure.
- The agro based, tourism based and IT based industries have good potential in the town.
- Absence of connectivity by rail and air transport is one of the reason for low industrial development.
- The town is the second order commercial node in the district. However, it is not as commercially developed compared with the other administrative headquarters towns in the neighboring districts.
- Commercial nodes within the town are mostly characterized by congestion due to vehicular and pedestrian traffic beyond the capacity of existing facilities.
- Being a taluk headquarters and a service facilitator in tourism sector, town has to provide sufficient higher order facilities in commercial sector such as shopping malls, shopping complexes etc. to the region. Adequate parking spaces including provision for mechanical parking, parking plazas etc. shall be provided to address the existing issues.
- Agricultural land covers 72.49 % of the net area of Sulthan Bathery. Coffee is the major cultivation here.

- Major Commodities including vegetable and fruits are imported from neighboring states.
- The number of cultivators and agricultural laborers are seen increasing and majority of workers are entering into tertiary sector which making agricultural production uneconomical due to no availability of laborers.
- There is no organized market in the town. The product diversification system and value addition of hill produce have tremendous scope in the sector.
- There is high potential in animal husbandry sector due to the rising domestic demand as well as due to the presence of Brahmagiri meat processing unit at Nenmeni Grama Panchayat.
- Even though there are no fish farmers in Sulthan Bathery due to the unavailability of large water bodies, the available ponds can be utilized in the sector.

15.10 Special Concern Areas

Each planning area has got spatial importance as well as special areas of concern having economic, social or physical dimension. The following are the major findings.

- Wayanad is one of the backward districts of the State with highest concentration of scheduled tribe population. Sulthan Bathery also reflects the same character.
- The tribal settlements in the district are unique in terms of the socio cultural customs, lifestyle, indigenous technology and limited services.
- The analysis clearly reveals that the planned development of the town has to be achieved by giving due consideration to economically and socially backward sectors of the community. Ways and measures to be taken for provision of basic facilities to them and to bring them to the main stream activities and to ensure their economic development and better quality of life.
- Some of the areas of the town are prone to flooding and land sliding.

15.11 Environment

Sulthan Bathery has an agricultural area of about 2916 hectares and 6088 hectares of forest area. Due to the high vegetation the area is not much polluted so far. The findings are given below.

- The environmentally sensitive areas of Sulthan Bathery are the reserved forest, paddy and water body.
- Even though Sulthan Bathery has fairly good environmental quality, some problems do exist and hence mitigation of the present problems as well as conservation of the environmental quality is of important concern.
- The recommendations of the Kasturirangan Committee with respect to the conservation of environmentally sensitive areas of Western ghat have to be taken care.

15.12 Development Administration and Finance

The development administration and finance of the local body within the limited available data are discussed and the findings are listed below.

- The fiscal surplus of the GP is not an indication of financial health, but of poor financial management
- There is tremendous potential for development of financially remunerative projects for sourcing funds for future development

15.13 Linkages and Spatial Structure

Studying different sectors in the planning area, intra sectoral linkages, inter sectoral relations, the existing spatial structure of the planning area and linkages between settlement characteristics and various sectors need to be addressed for carving out an integrated development vision. The following are the findings.

- The study reveals the need of critical linkage between core sectors to ensure the optimal resource utilization and to trigger the local economic development.
- Functional character of Sulthan Bathery is rural as per DUR.
- Commercial nodes are identified on all important intersections of roads where there is a concentration of commercial activities.
- Existing urban wards are 7,8,9,11&19
- Primary activities are mainly concentrated in the wards 1,2,6,13,14,15&16
- Primary + secondary activities mainly concentrated in the ward 4
- Primary + tertiary activities mainly concentrated in the wards 5,13,14,17,18 &21
- The spatial structure is evolved (see Fig 14.6) based on the study and spatially overlaying the proposed road network and hierarchy of nodes over the spatially distributed activity pattern.

CHAPTER 16

SWOT ANALYSIS

The findings summarized in the previous chapter which is evolved from settlement analysis and sector analysis is now subjected to SWOT analysis with the involvement of people representatives, stake holders and professionals. The results of the analysis are summarized in this chapter.

16.1 SWOT Analysis

The analysis clearly reveals the importance of Sulthan Bathery and the dual role that it has to perform viz. the role as taluk headquarter and the role as one of two 2nd order settlement in the district which shall provide various higher order services to the service region. In terms of land use, presence of vested forest, average size of plot and unique topography, the town has to sustain agro allied activities so as to ensure the optimum resource utilization meanwhile ensuring ecological and environmental sustainability. The analysis also highlights the opportunities in terms of interstate and intrastate connectivity, unique environment and climate and above all the tremendous tourism potential of the town as a tourism facilitation centre. At the same time there are limitations in terms of topography, ecologically sensitive area, unique environment and single mode connectivity.

16.2 Development Issues

Based on various studies and analysis the key development issues were identified as:

- Undulating topography
- Even though the economy mainly depends on agriculture, there are no agro-based industries.
- Low density of commercial development
- Absence of organized markets
- Inadequate infrastructural facilities in agricultural and animal husbandry sector
- Inadequate recreational facilities
- Haphazard nature of traffic network
- Lack of parking facilities
- Risky pedestrian traffic
- Water supply not commensurate with the requirements
- Underutilization of potentials
- Poor solid waste management
- Absence of provisions for waste water treatment

- Inadequate drainage
- Lack of facilities for professional/higher education
- Weak facilities in the health sector
- Land value inhibits low income housing
- Unauthorized land sub division and filling
- Lack of civic amenities.

Table 16-1: Results of the SWOT Analysis

STRENGTH	WEAKNESS	OPPORTUNITY	THREAT
• Regional connectivity through NH 766 • Forms one of the main focal point of spatial structure of district (2nd order settlement) • Spatial concentration of residential land use • Compact nature of civic facilities • shows relatively high concentration of net population • Well connected to nearby towns • Strong base in secondary and higher secondary education • Good literacy rate • Taluk headquarter • Place of scenic beauty • Proximity to major tourist centers like Mysore, Ootty etc. • Major tourist spots within the district are well connected. • Presence of vast forest and agriculture land.	• Hilly terrain • No rail/air/water connectivity • Low density commercial development • Lack of industrial clusters • Low road density • Lack of super specialty hospitals • Unscientific waste disposal system • Lack of facilities for professional education • Poor road geometry • Lack of recreational facilities • Absence of wholesale market • Lack of Infrastructure in health • Inadequate drainage System • Lack of parking facilities • No planned tourism facilities	• Only central wards are fully urbanized • Strong agricultural base • Increasing number of tertiary workers • Population below 35 age is substantial • Plenty of land available for development • High tourism potential • Taluk head quarters • Low population density except in few central area wards • High potential	• Fast depletion of paddy fields. • The core area is heavily built up. • Expected high share of old people in the population in the next 20 years, • Congested market • Plantation of cash crops which are not suitable for the terrain • Indiscriminate use of pesticides • Unhygienic & congested fish and meat market • Weak financial position of the local body • Instability in the price of Agro products. • Tradeoff

• Availability of developable land • Have good natural drainage • Strong presence of law enforcement machinery • Strong resource base of agriculture and allied activity • High potential in animal husbandry sector. • Proximity of Brahmagiri meat processing centre. • Salubrious climate and unique environment • Availability of plan fund for infrastructure development. • Availability of wide hinter land, wide range of flora & fauna and spices.	• Risky pedestrian traffic • Agro processing industry is nil when compared to agriculture production • Increasing ratio of marginal workers to total workers • Inadequate water supply system • Inadequate infrastructure in the slums. • Restrictions due to the presence of forest land and as part of the Western Ghat.	for agro based industries • Good terrain to develop an efficient drainage system.	between environment and development. • There is a strong restriction against the depletion of environmentally sensitive areas.

16.3 Inference

It can be revealed that Sulthan Bathery has got bountiful strength and opportunity to develop as a major administrative and market town in the region. It should be planned in such a manner to ensure optimum sustainable utilization of resources. Diversification of economic activity to the secondary and tertiary activity to create better job opportunities with due regard to ways and measures to increasing productivity, value addition, optimum utilization of resources and scientific intervention in primary sector may be resorted to promote local economic growth.

Realizing the ground realities, people's aspiration and potentials, a vision is envisaged for the development of Sulthan Bathery for next twenty years as "Development of Sulthan Bathery" with adequate facilities for taluk level administrative head quarter with efficient infrastructure system while conserving the serene environmental quality, reflecting the cultural ethos of the region and attracting tourists in an economically sustainable manner".

CHAPTER 17

GOALS AND OBJECTIVES

In this chapter, the development goals evolved for master plan of Sulthan Bathery and the development objectives set to achieve the goals based on the findings of analysis are discussed. The development goals emerged reflects the thrust areas where planning intervention is required and objectives clearly spell out how the goals can be achieved in a real to ground scenario.

17.1 Development Goals

The findings derived from the sector wise studies and settlement studies within the purview of SWOT analysis evolve the following facts:

As per the findings of the District Urbanization Report, Sulthan Bathery is one of the second order settlements in the district. Sulthan Bathery, as taluk headquarter town, has to perform strategic administrative functions. This area will cater the higher order service requirements of other settlements in the district. The analysis also clearly points out that any effort for planned development of Sulthan Bathery should consider the unique topography and environment of the town and its region. Hence the prime goal is ***"To develop Sulthan Bathery as an eco-friendly and economically vibrant second order service centre as well as an administrative centre with facilities to cater the demand of the green paradise 'Wayanad', the emerging tourism destination".***

The analysis of land use, resource base, topography and environment reveals the fact that this area and surrounding region is blessed with unique topography and environment. About 58.61 % of the land of Sulthan Bathery falls under reserve forest which is wild life sanctuary and the region as a whole is blessed with wide range of flora and fauna. This area is also blessed with rich bio diversity and presence of aromatic and medicinal plants and herbs. The town is also blessed with presence of paddy area and the unique topography. Wayanad district is one of the backward districts in the state with highest concentration of scheduled tribe population. The tribal settlements in the district are unique in terms the socio cultural customs, lifestyle, indigenous technology etc. Any effort for planned development without addressing the above aspect will disturb the environment, social and cultural ambiance prevailing in the region and generate adverse impacts. Hence one of the goals is ***"to conserve the unique environmental, topographical and socio cultural character of the town and the region"***

In terms of land use, presence of vested forest, average plot size, unique topography, vast hinterlands with agricultural activities and extensive availability of forest based resources etc. Sulthan Bathery has to sustain agro allied activities so as to ensure the optimum resource utilization meanwhile ensuring the ecological and environmental sustainability. The rich agro resource base of the region read with the facts that the

peripheral areas of Sulthan Bathery shows low population density and that the area has relatively large plot holdings indicates the potential resource of the town to sustain agro allied activities especially animal husbandry and value addition industries. Hence one of the development goals is ***"to preserve the agricultural and forest based resource base of Sulthan Bathery and sustainably utilize the same for local economic growth".***

In order to develop town to the status of an administrative and higher order centre we have to provide all kinds of higher order facilities in this area. This will surely attracts more population to this area. Hence the physical channel to be strengthened for better conveyance and connectivity to the people. Hence one of the goals is ***"to ensure healthy living condition with the provision of excellent infrastructure facilities".***

The district Wayanad is famous as a renowned tourist destination and attracts large number of domestic and international tourists. Even though Sulthan Bathery Municipality itself has only limited tourism spots, Sulthan Bathery is well connected to tourism potential spots within the district as well as in neighboring states. More over this area acts as the gateway to the district as well as the state from entire South India. Considering the above factors one of the development goals is ***"to develop the town as a tourism facilitation centre with state of art eco-friendly amenities".***

Another aspect of concern is that the Wayanad district is one of the backward districts in the state with highest concentration of scheduled tribe population and Sulthan Bathery also reflects this character. The tribal settlements here are unique in terms of the socio cultural customs, lifestyle, indigenous technology etc. Hence the goal is ***"to enhance the quality of life of the people, especially economically and socially weaker sections in the town".***

In a nut shell, the development goal for Sulthan Bathery shall be: ***to develop as an eco-friendly and economically vibrant administrative cum market town with excellent infrastructure facilities mean while preserving its agro allied and forest based resource base as well as the unique environmental, topographical & socio cultural character***.

The economic development of the area has to be accelerated by promoting key production sectors such as trade & commerce, agriculture &animal husbandry, industries with focus on nonpolluting resource based value addition units and tourism.

17.2 Development Objectives

In order to achieve the development goals set above, development objectives have to be formulated through synthesis with the findings evolved from sector wise and settlement analysis and general planning parameters. The major development objectives thus evolved are:

- To develop the town as an eco-friendly and economically vibrant taluk headquarter town with second order service centre facilities to cater the demand of the green paradise 'Wayanad' the emerging tourism destination.
- To facilitate planned development of the town ensuring the perfect harmony between people, flora and fauna so that all the components are mutually benefitted.
- To ensure healthy living condition with the provision of excellent infrastructure facilities such as water supply, solid waste and sewerage disposal facilities, drainage and power suitable to topographical and environmental ambiance of the town.
- To preserve the agricultural and forest based resource base of the town and sustainably utilize the same for local economic growth
- To preserve the environmental ambiance by selectively concentrating the urban and rural activities
- To diversify the economic base mainly through strengthening the agro based nonpolluting industrial units.
- To conserve the unique environmental, topographical & socio cultural character of the town and to minimize the environment pollution.
- To strengthen the agriculture &animal husbandry sectors in the town
- To develop the town as tourism facilitation center with state of art eco-friendly amenities.
- To enhance the quality of life of the people, especially economically and socially weaker sections in the town with quality social and physical infrastructure
- To minimize the conflict between the man and wild animals, a provision of forest wall/rail fencing including solar fencing also envisaged on the boundary of forest.

CHAPTER 18

DEVELOPMENT CONCEPT

In this chapter development concept of Sulthan Bathery master plan is derived by synthesis of the findings of spatial analysis and sector wise analysis over the spatial structure of the town that will provide required development framework for the integrated, sustainable and planned development of Sulthan Bathery. The development concept will clearly indicate how the planning area will develop in future and also will give an overall idea of the location of determinant development proposals. The key development aspects of the planning area identified through detailed analysis are Environment, Transportation, Agriculture & Animal Husbandry, Industry, Population Density Pattern, Tourism and Commercial Activities.

18.1 Formulation of Development Concept

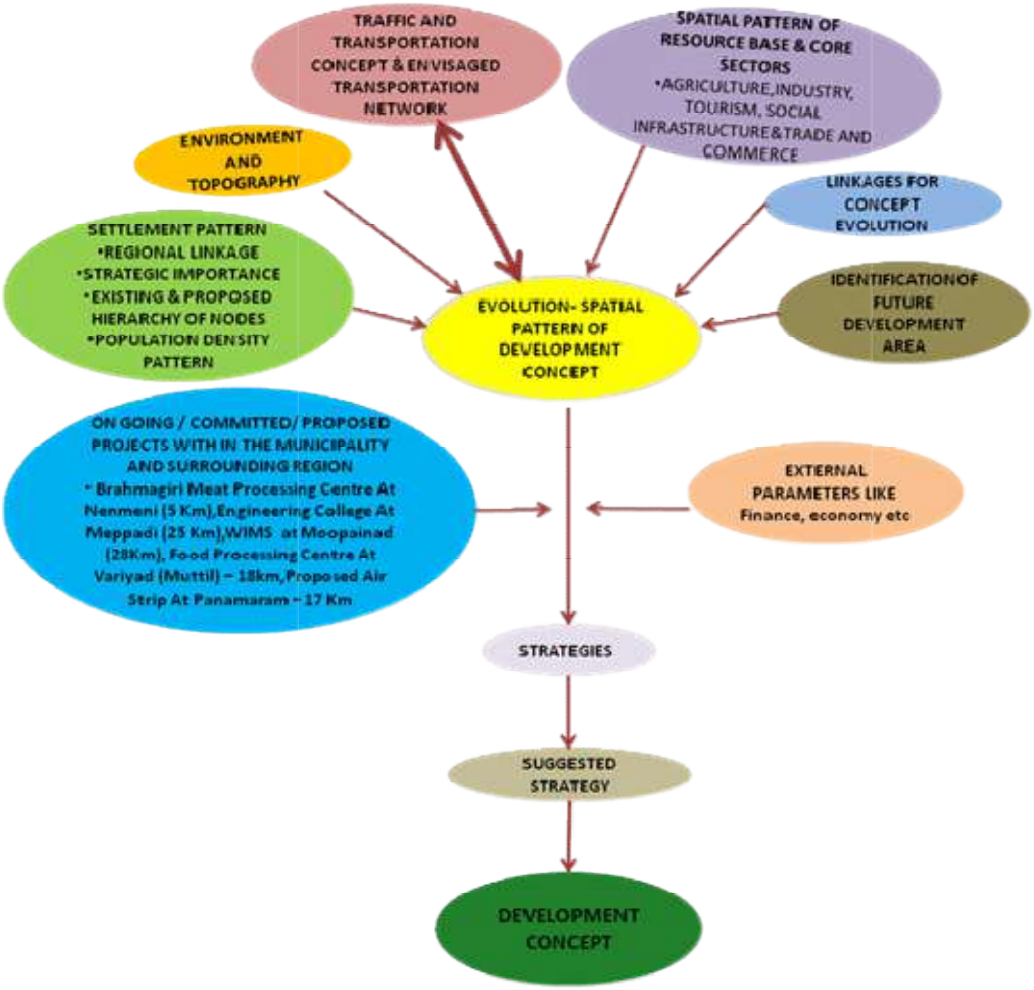


Figure 18.1: Factors Synthesized To Formulate Development Concept.

Findings of analysis of various parameters pertaining to the development of the area clearly shows that the town has underutilized or unutilized potential in primary and allied

secondary sector together with tourism potential. Sulthan Bathery has flourishing tertiary sector. But the sector lacks proper backward and forward linkage with primary and secondary sectors. More over the region is bestowed with natural resources, unique topography, environment, tourism potentials and socio – cultural uniqueness. At the same time there are areas of environment concern. The available resource base and integration of core sectors plays a crucial role in the planned development of the town. The transportation network has profound impact in the formulation of development concept. The impulses of ongoing / committed/ proposed projects within the town and surrounding region have to be given due consideration while formulating the development concept. The factors to be synthesized to formulate the development concept are described in Fig 18.1.

18.1.1 Environment and Topography

The town is unique with presence of environmentally sensitive area like reserve forests, paddy lands and streams. As per land use analysis, the reserve forest, paddy and water body together constitute 67.56% of total area. The spatial distribution of environmentally sensitive area is shown in Fig 18.2. Sulthan Bathery is situated in the region which form the part of western ghat, contained in highland region with height varies from 731m to 1371 m from mean sea level (MSL). As per multiple hazard zonation map of CESS, this area is prone to land slide, but such locations are within the forest area. Fig 18.3 indicates such topographical determinants of the area.

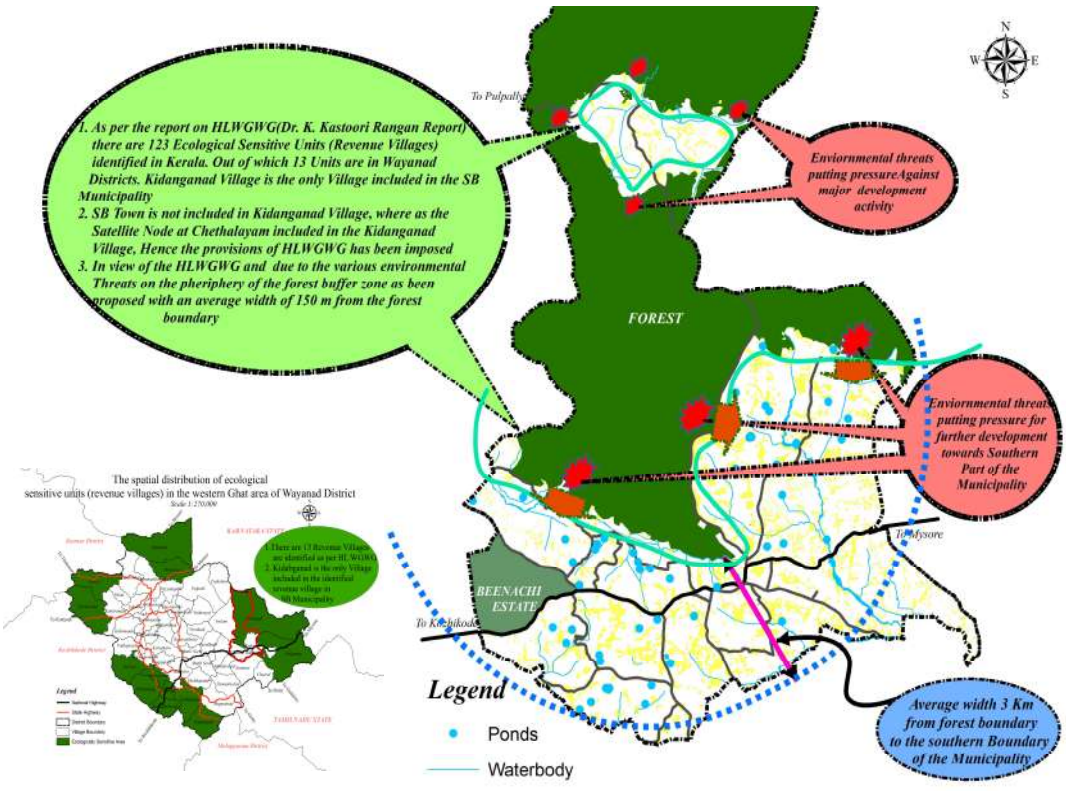


Figure 18.2: Spatial Distribution of Ecologically Sensitive Area

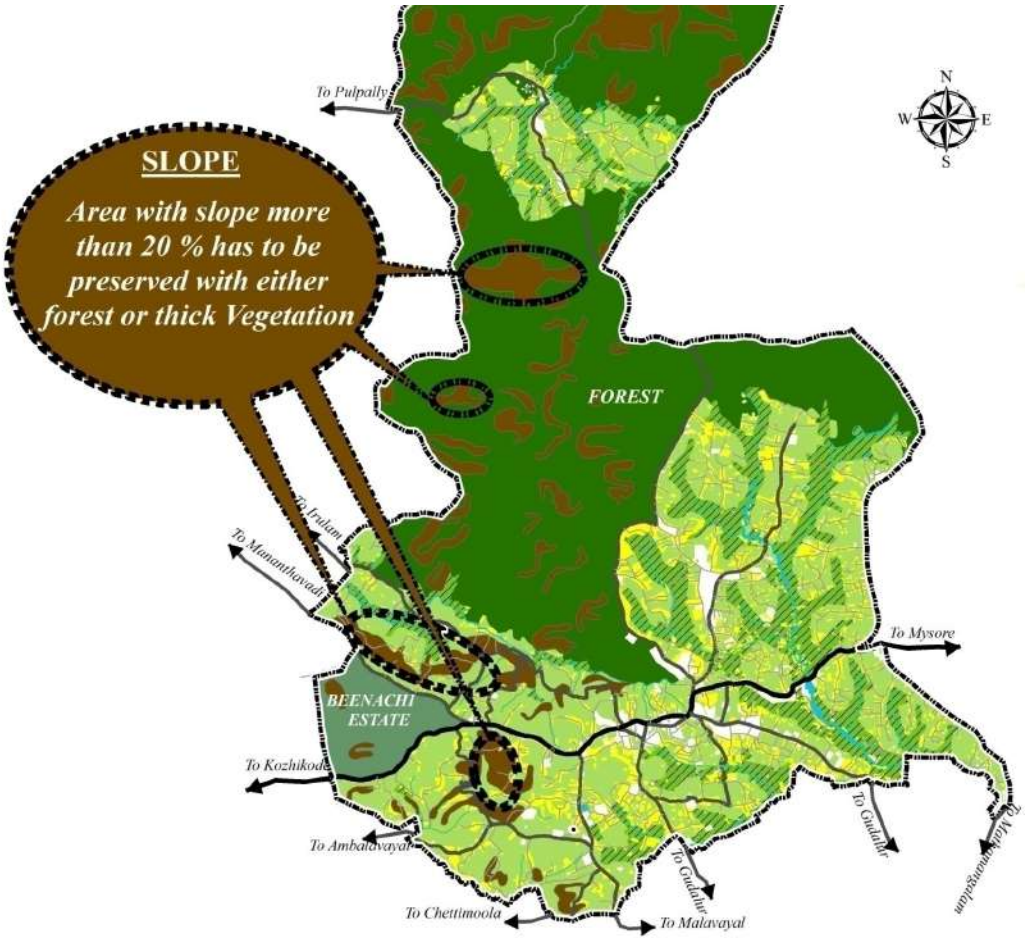


Figure 18.3: Topography of the Planning Area

18.1.2 Settlement Pattern

Following parameters are to be considered for evolution of development concept based on the study of settlement pattern:

1. Regional linkage
2. Strategic importance
3. Hierarchy of nodes
4. Population density pattern
5. Spatial structure

The descriptions of the above parameters are given below.

18.1.2.1 Regional Linkage

The analysis of regional linkage reveals the following facts.

- Well connected with Mysore and Coorg of Karnataka, Nilgiri of Tamil Nadu and "Ootty" the famous tourist place by road.
- Connectivity to south via, Kozhikode is very difficult due to steep hills and presence of hair pin bends.

- Nearest airport is Kannur international airport which is 108km away from the town
- Karippur international airport is 115 Km away from the town.
- Well linked with Beypore port, Kozhikode (Business hub), Mysore, Ootty (tourist place) and Bengaluru IT hub with roads.
- Well connected to the prominent tourist places by road
- NH 766 is the major transport corridor connecting the district with other States and districts.
- Well connected with important inter district and intra district tourist destination.
- Sulthan Bathery is the major transit centre in the district connected only by road.
- Road within the town is “spine and spur” type with poor road geometrics.
- The NH 766 is forced to carry intra town traffic also in the absence of bypass road.
- The night journey in NH 766 through Bandhipur National Park is banned which creates additional traffic in the day time.
- The important linkages are
    - Sulthan Bathery – Mananthavady- Boys town- Kannur road
    - Sulthan Bathery-Mananthavady - Thirunelly (famous pilgrim centre)
    - Sulthan Bathery – Perikalloor road
    - Sulthan Bathery- Mananthavady – Kutta – Hunsur – Mysore (alternate route for NH 766)
    - Sulthan Bathery – Pattavayal – Ootty road
    - Sulthan Bathery – Thaloor – Ootty road

The above facts clearly reveal the interstate and intra state regional linkage of the town. Sulthan Bathery is well connected to major growth centres (Kalpetta, Mananthavady) through NH/SH and well connected to the prominent tourist places within the district. The regional linkage and inter district transportation network are shown in Fig 18.4 and Fig 18.5.

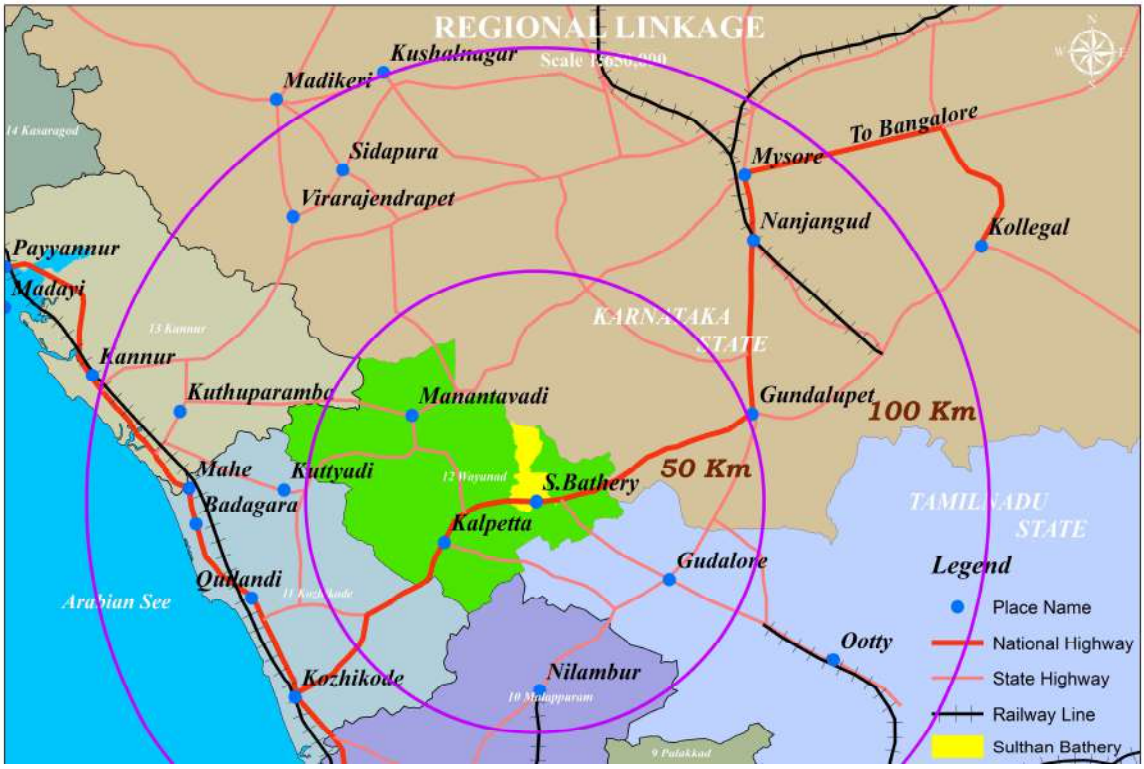


Figure 18.4: Regional Transportation Linkage

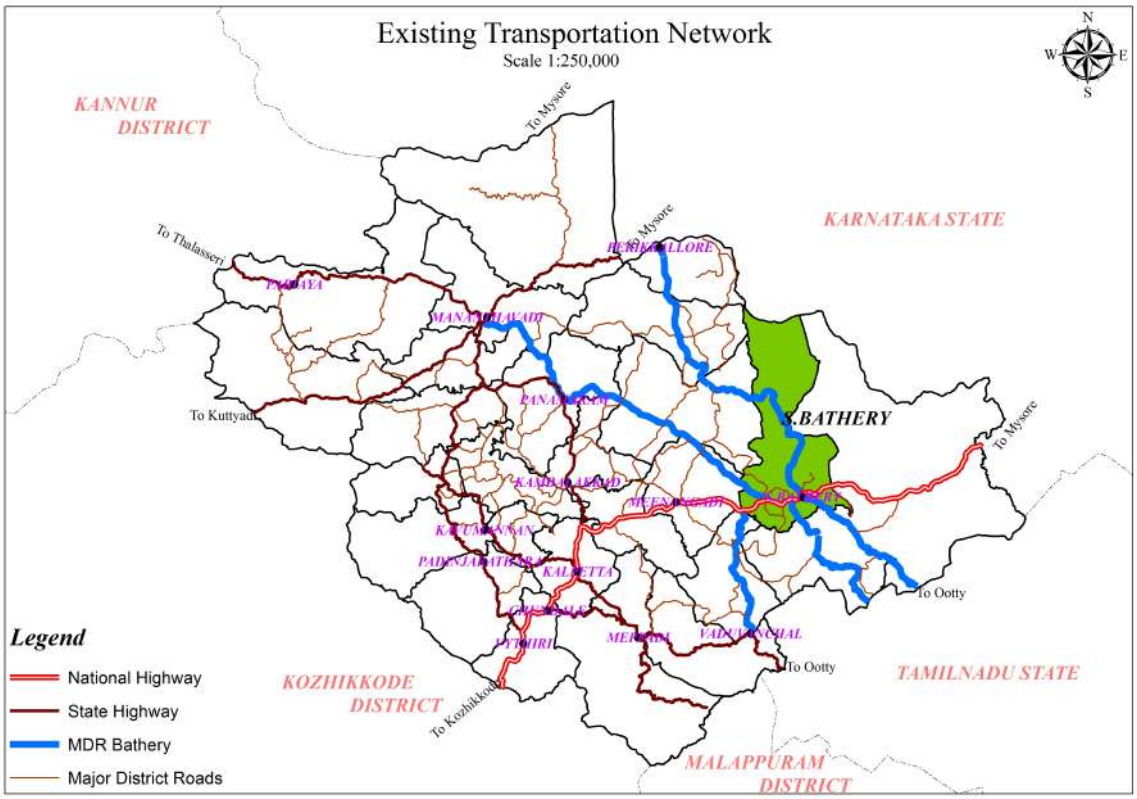


Figure 18.5: Inter District Transportation Linkage

18.1.2.2 Strategic Importance

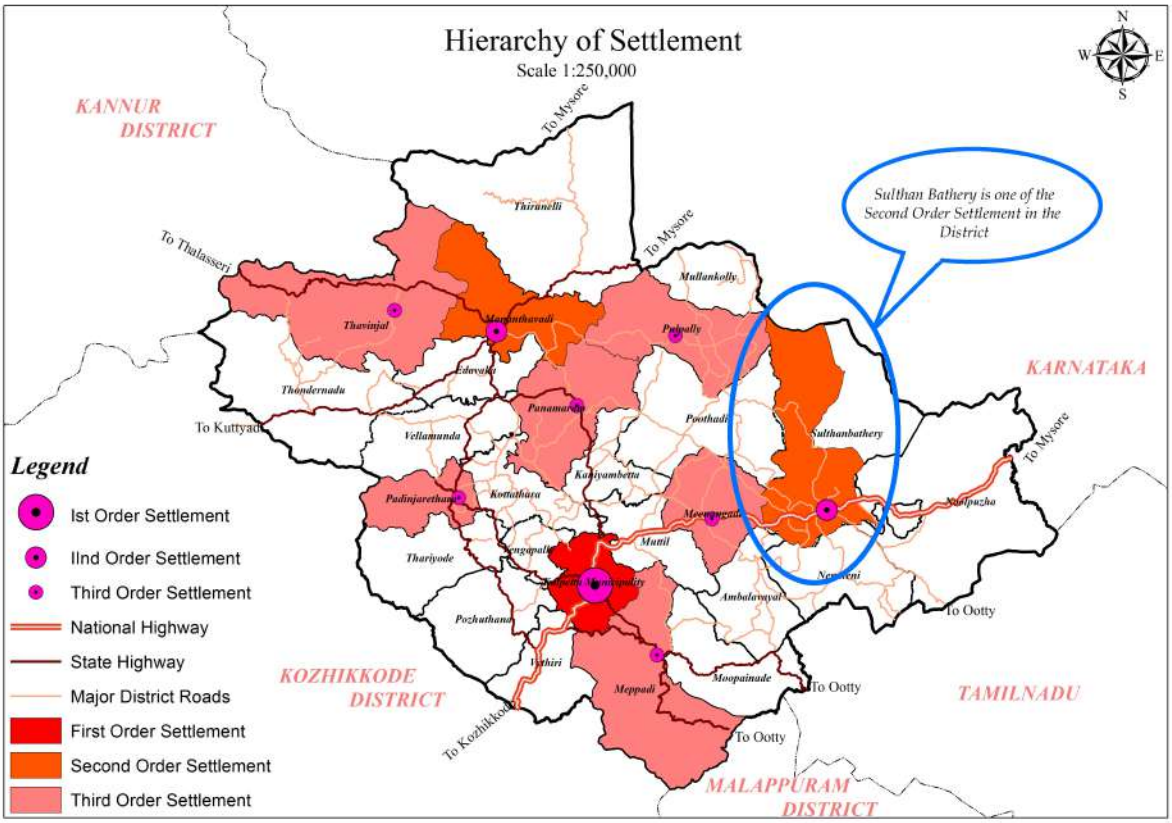


Figure 18.6: Strategic Importance of Sulthan Bathery

Sulthan Bathery is one of the two second order settlements in Wayanad district and is also the taluk headquarter town and a traditional market town.The town is 100Km north - east to Kozhikode and equidistant from Mysore and Ootty. The town is peculiar due to presence of reserve forest (58.61 %) and known for its scenic beauty with salubrious climate. The region is rich in bio diversity and dense vegetation. The town has to perform the function of an urban centre with due consideration to service sector activity. Where as in terms of land use, presence of vested forest, average plot size, unique topography, the Sulthan Bathery has also to sustain agro allied activity so as to ensure the optimum resource utilization and above all to ensure the ecological and environmental aspects. The strategic importance of Sulthan Bathery is shown in Fig 18.6.

18.1.2.3 Population Density pattern

The spatial distribution of population to whom we are planning plays an important role in the formulation of development concept. Sulthan Bathery has the highest net population density in Wayanad district. The spatial distribution of net population density within Sulthan Bathery is shown in Fig 18.7. The ward wise density varies from 711 persons per Sq.Km to 2279 persons per Sq.Km. Sulthan Bathery (09), Kaippancheri (07) and Sathramkunnu (15) are the wards having highest population density. The densest wards are

located in and around the town centre. The peripheral wards show lower density. The major portion of the population is concentrated along the NH 766 & Other major transportation corridors.

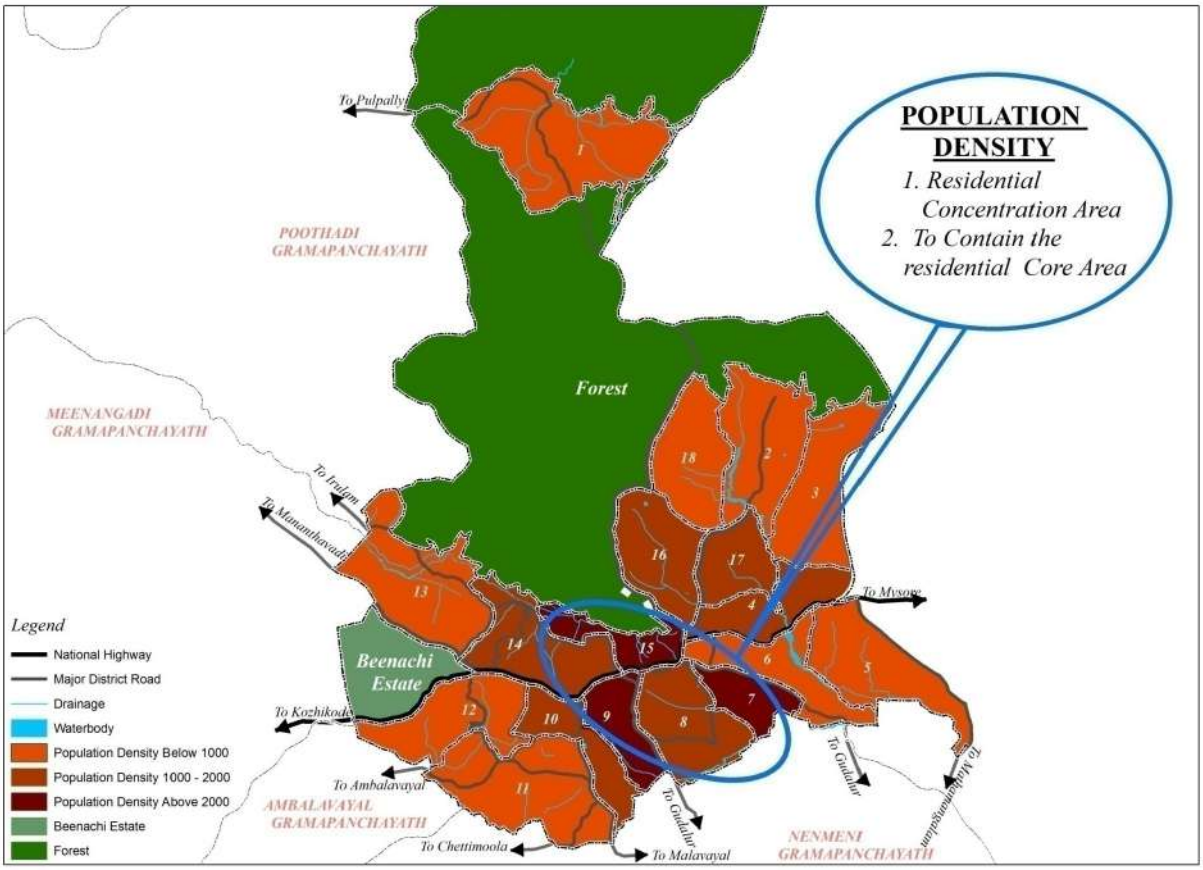


Figure 18.7: Spatial Distribution of Net Population Density in Sulthan Bathery

18.1.2.4 Hierarchy of Nodes and Spatial Structure

The spatial structure of the district is derived mainly from hierarchy of settlements and nodes, the transportation network and activity pattern. As per the study of the District Urbanization Report, Kalpetta is the only first order settlement in the district and Sulthan Bathery is one of the two second order settlements in the district.

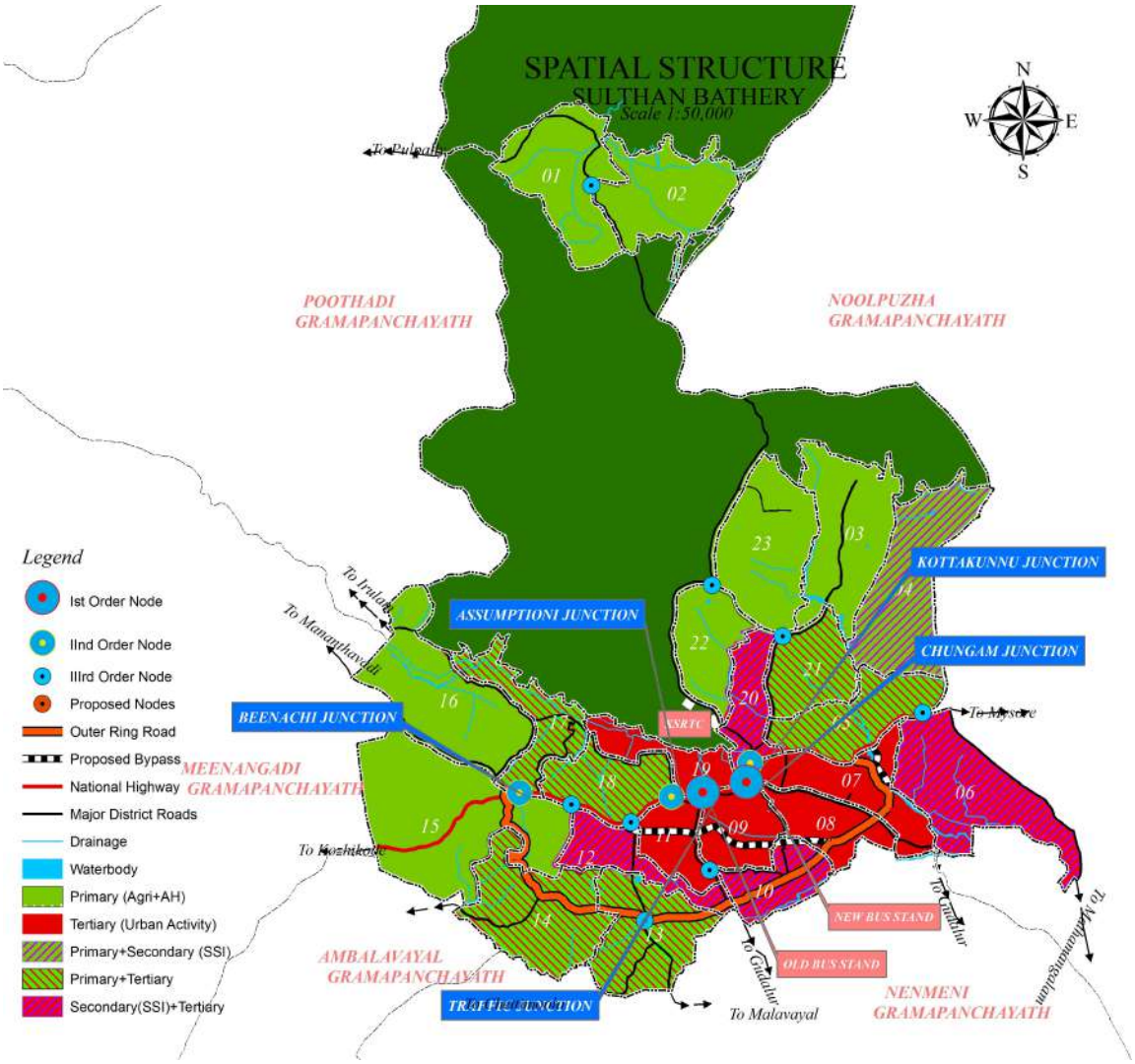


Figure 18.8: Spatial Structure of Sulthan Bathery

The spatial structure of the town defines spatial distribution of various activities such as primary activities, secondary activities, tertiary or service sector urban activities and combination of the same. The spatial structure is shown in Fig 18.8.

18.1.3 Traffic and Transportation Concept & Envisaged Transportation Network

Sulthan Bathery is well connected with fairly good single mode of road transportation network not only with major growth centres within the district but also interstate and intra state linkages. The rail, air and water mode of transport is not available in the town and district. Since road is the only mode of passenger and goods commutation, the existing road network has to be conceptually strengthened to evolve a future transportation network. The existing road network is shown in the Fig18.9.

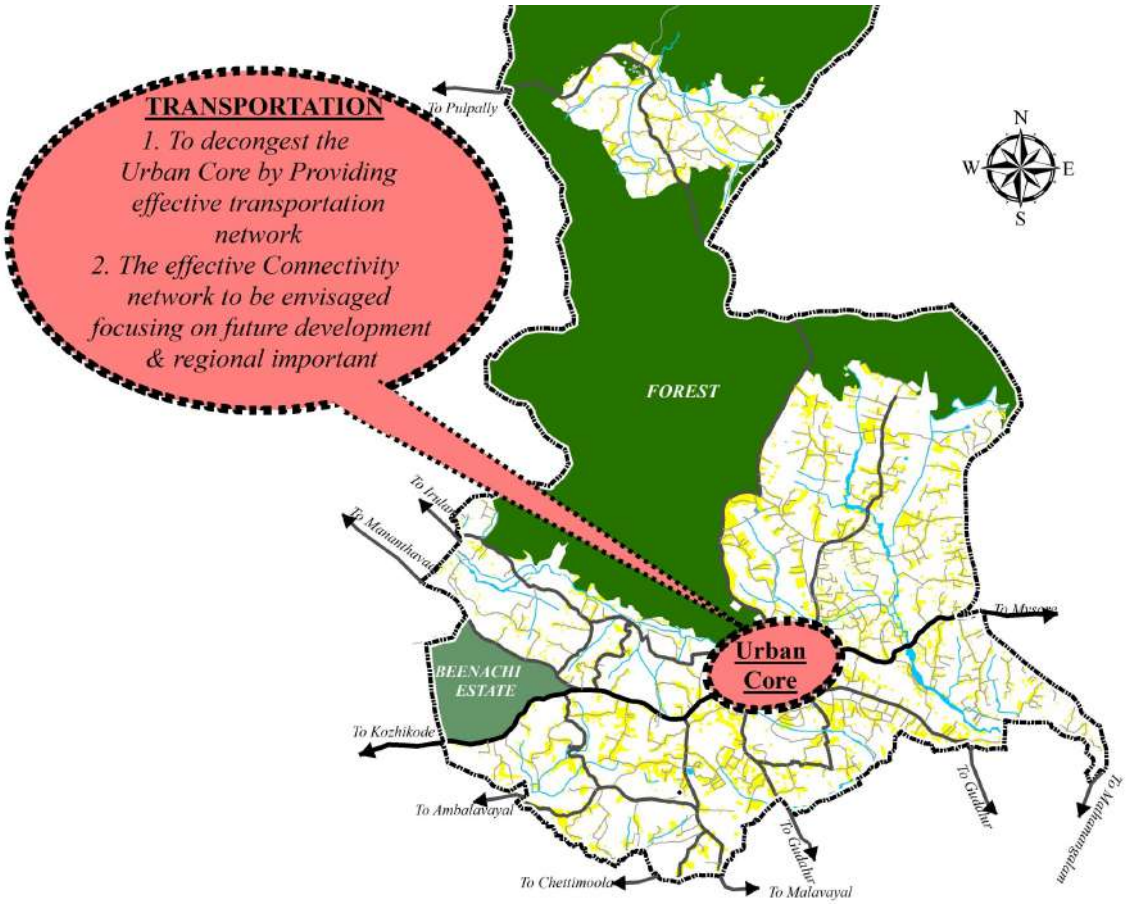


Figure 18.9: Existing Road Network of Sulthan Bathery

Considering existing transportation system, findings from studies and analysis, requirements of horizon period, existing land use and activity pattern, the Transportation Plan concept has been evolved giving thrust to:

- Formation of outer ring road to cater through traffic
- Inner ring roads for decongestion of central urban area
- Strengthening of radial roads
- Formation of missing links
- To direct the by- passable traffic through Ring road and by-pass
- Future emerging alternative regional transportation corridor to Kozhikode
- Topography
- Environmental factors
- A radial ring pattern with connecting link is proposed
    - To decongest the central core area.
    - To by-pass the through traffic.
    - To by-pass the goods traffic especially MAT and trucks.

The transportation concept of the Sulthan Bathery town can be envisaged as "***an efficient and effective road transportation system catering the present and future needs of the town as taluk head quarter and second order service centre, with a combination of radial and ring pattern so as to ensure the safe, speedy, continuous movement of vehicles that facilitate containing the urban core with due consideration to unique topography and environment.***"

18.1.4 Spatial Pattern of Resource Base &Core Sectors.

The findings of the analysis of various development sectors reveal the following sectors as resource base and core sectors of Sulthan Bathery.

- Agriculture
- Industry
- Tourism
- Social Infrastructure
- Trade and Commerce

The spatial distribution of resource base and core sector activity has to be taken care for formulating the development concept.

18.1.4.1 Spatial Pattern of Agriculture Resource Base

The study clearly reveals that the Sulthan Bathery is blessed with strong agriculture resource base. As per the land use analysis, paddy area constitutes 8.14% (20.89 % of net area) and dry cultivation constitutes 20.12% (51.60 % of net area) of the total area. The dry cultivation areas are mainly concentrated in the peripheral wards. Non-availability of Labourers & high wage rates, reduction in cultivable land, lack of Irrigation facilities, instability in the price of the agro product etc. are some of the critical issues faced by this sector. Spatial distribution of the agriculture areas of the town is shown in Fig 18.10.

In terms of land use, unique topography and presence of reserve forest with wild life sanctuary Sulthan Bathery has to sustain agro allied activity so as to ensure the optimum resource utilization and above all to ensure the ecological and environmental sustainability. The presence of paddy and dry agriculture land with the variety of various mixed crop which includes spices and cash crops reveals the potential resource of the area in the agriculture sector.

The low population density and relatively large area of plot holding in the peripheral wards shows the potential to sustain agro allied activities especially animal husbandry.

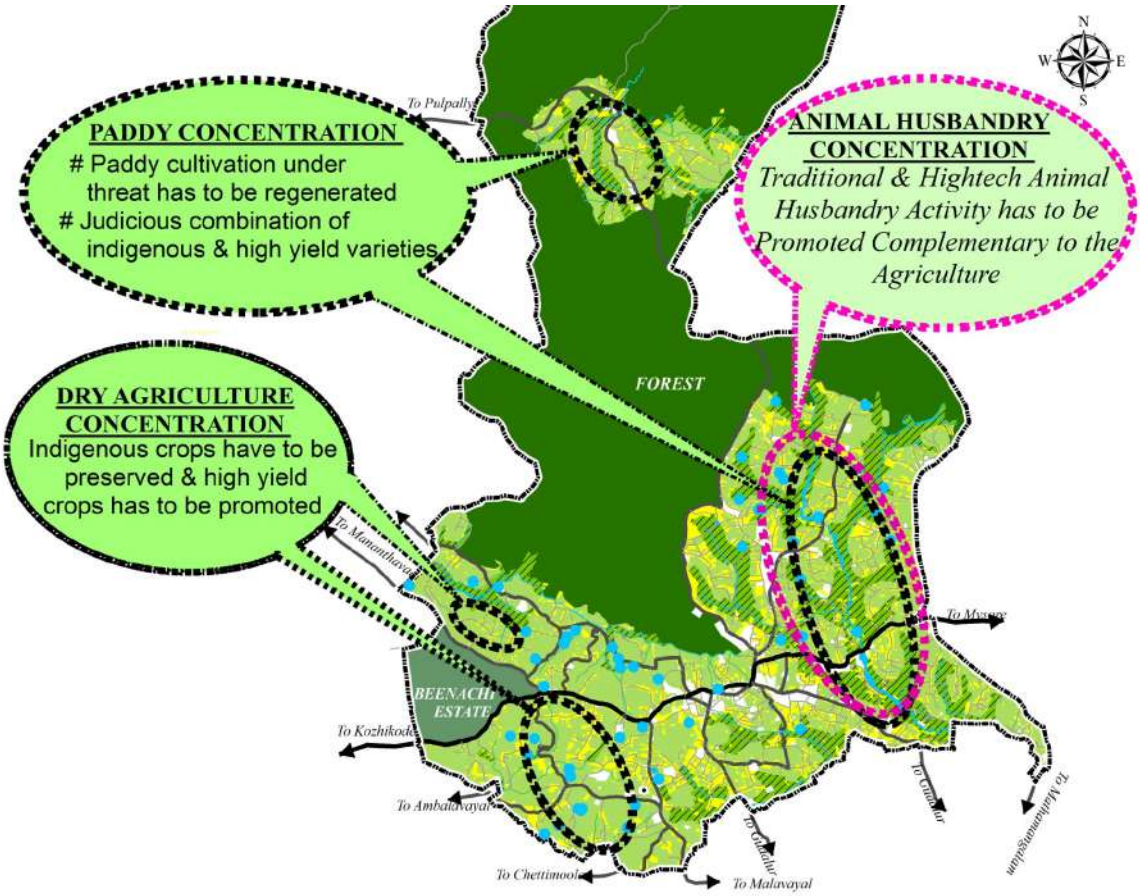


Figure 18.10: Spatial Distribution of the Agriculture Resource Base

18.1.4.2 Spatial pattern of industries

There are no large scale industries in the Sulthan Bathery. Existing major industries are Glady's Soap Factory, SIDCO, and timber mill near fire station. Even though the economy of the region mainly depends on agriculture and animal husbandry, the agro allied industries are comparatively less in Sulthan Bathery. This shows the potential for agro based industries here. Major determinants in this respect are:

- Salubrious climate.
- Locational importance i.e., proximity to major tourism destinations such as Ootty, Mysore, Coorg.
- Proximity to IT hub Bangalore, Karipur international Airport, Beypore port and the business hub Kozhikode.
- Availability of strong agriculture based resource (72.51 % of Agricultural land)
- Availability of tourism based resources in the district.
- Availability of strong forest based resources.
- Good regional linkages with NH 766.
- Availability of vast land.

The spatial distribution of industry in the town are shown in the Fig 18.11

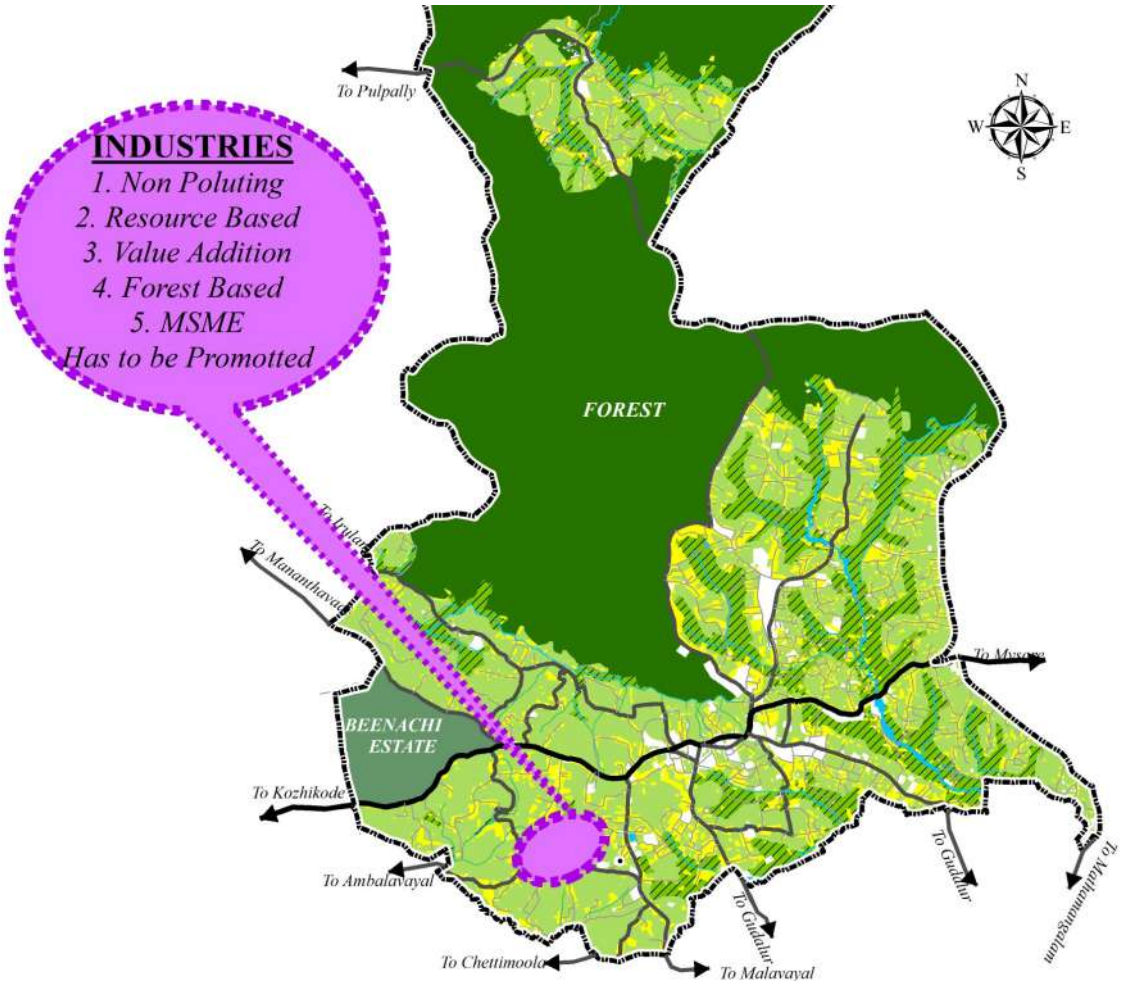


Figure 18.11: Spatial Distribution of Industrial Land Use

18.1.4.3 Spatial Pattern of Social Infrastructure

Social infrastructure plays an important role in the planned development of the Sulthan Bathery into the status of a taluk headquarter town. Within the social infrastructure, education and health are two core sectors to be considered.

The salubrious nature with “charming” environment creates a high potential to establish high level education /research institutions in the town. The availability of vast land and proximity of IT towns such as Mysore and Bangalore also enhance the possibilities. The literacy rate of Sulthan Bathery is comparatively high, when compared to the district. Special attention is required in providing education facilities for thetribal.

Major problem in the health sector is the insufficiency of facilities in the hospitals. For better and higher order facilities in health care people are compelled to depend on Kozhikode which is about 100 Km away from the town. The key concept for the social infrastructure development of the Sulthan Bathery is shown spatially in Fig 18.12.

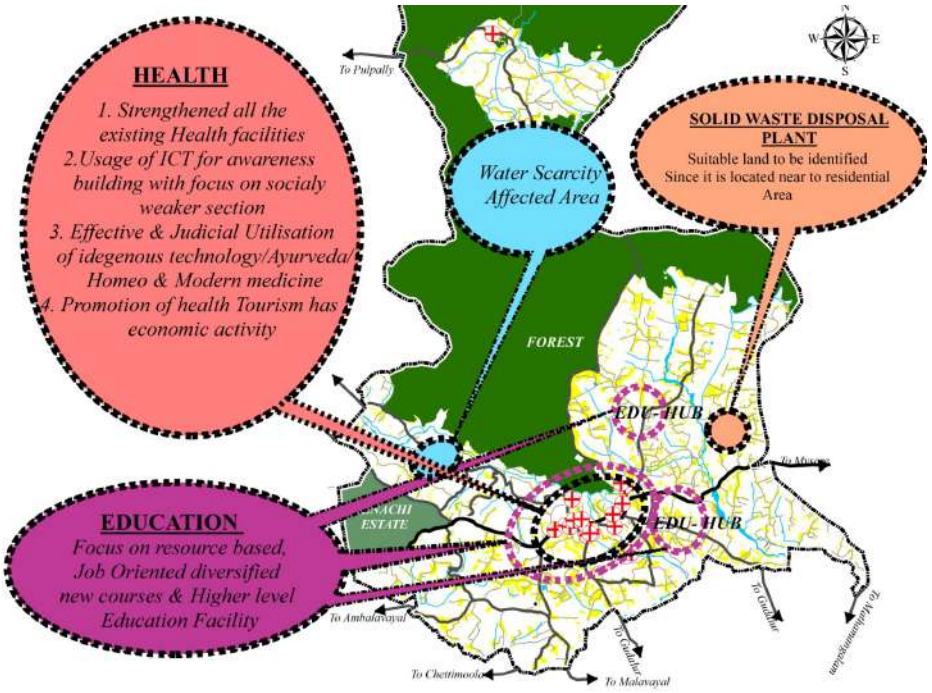


Figure 18.12: Key Concept for the Social Infrastructure Development of Sulthan Bathery

18.1.4.4 Social Backwardness

In Sulthan Bathery, 4963 households have been categorized as BPL. SC population constitutes nearly3.87%of the total population whereas ST population is11.77%.The SC/ST population concentration indicates the social backwardness of a region. The concept emerging out to ensure social equality and inclusive social planning is shown in Fig 18.13.

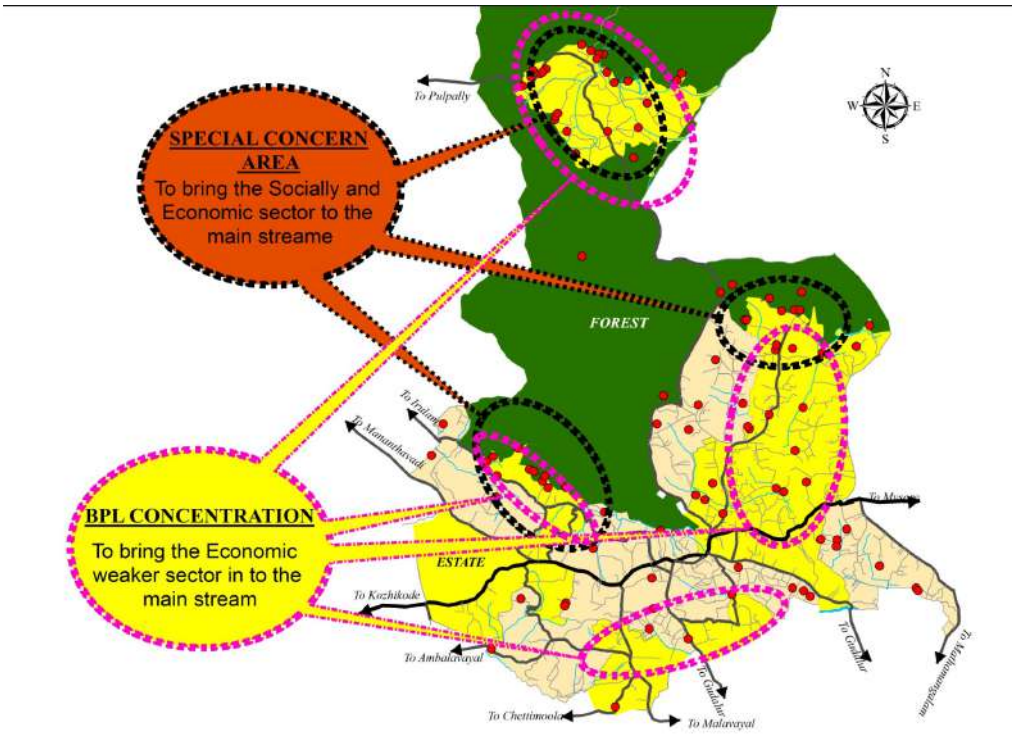


Figure 18.13: Concept Emerging Out To Ensure Social Equality and Inclusive Social Planning

18.1.4.5 Spatial Pattern of Trade and Commerce.

All the commercial establishments in Sulthan Bathery are located on both sides of NH 766 (on the sides of major transportation corridors) as a ribbon development. Only 0.31% of gross area is commercially developed now. Sulthan Bathery is developed as market town for hill produce. It is a taluk headquarter and act as service town for a wider area. Civic amenities, hospitals and so many taluk level govt. institutions are located in the core area. The fish and meat market at "Raheem Memorial Road" is very congested and create nuisance to the public.No organized market for fruits and vegetables. Commercial centers within town are mostly characterized by congestion due to vehicular and pedestrian traffic.There is presence of street vendors also. Town lack organized markets, parking, loading/unloading facilities etc. Sulthan Bathery is the one the second order settlement in the district out of two. Since the district is blessed with wide range of hill produces and spices, Sulthan Bathery renowned as the market town for such items in the district has ample scope for further development in trade and commerce. From tourism point of view also the town has to act as tourism facilitator by providing sufficient higher order commercial facilities since it is being considered as gate way of Wayanad. The spatial distribution of commercial activities is shown in Fig 18.14.

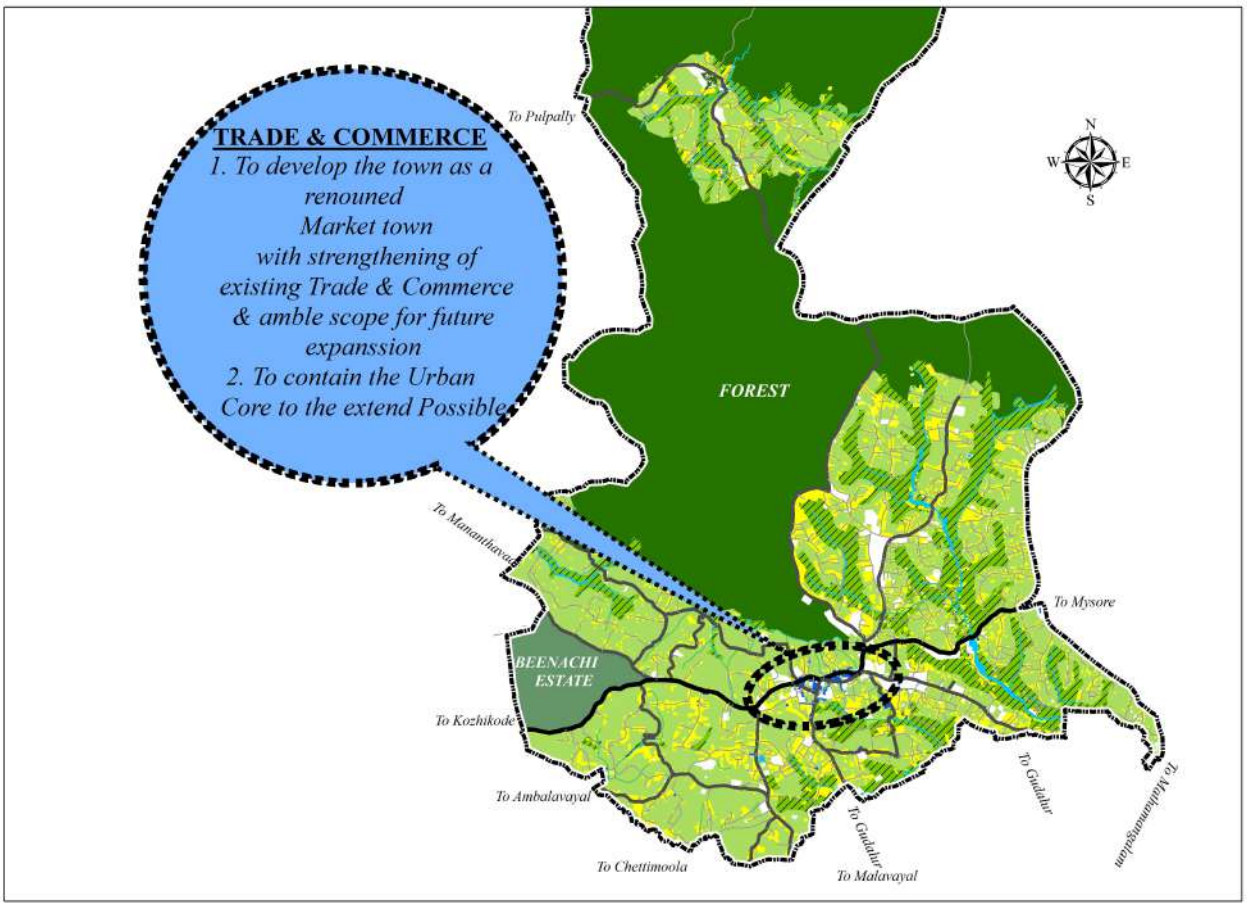


Figure 18.14: Spatial Distribution of Commercial Activities

18.1.4.6 Spatial Pattern of Tourism.

Wayanad **"The green paradise"** is a hill station with scenic beauty with high tourism

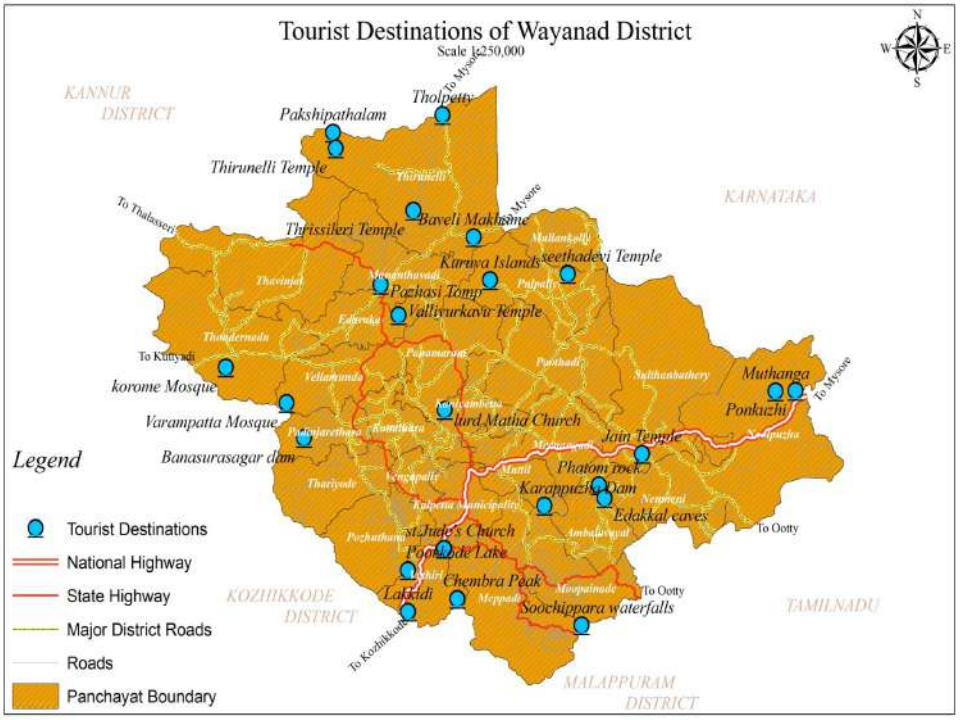


Figure 18.15: Major Tourist Spots in Wayanad

potential and Sulthan Bathery is reckoned as the gateway of Wayanad.



Figure 18.16: Spatial Distribution of Tourist Spot within the Region

The Jain temple, Ganapathy temple, Mariyamman temple, Kadamanchira, Manichira pond and Chethalayam waterfalls are major tourism spots in the town. The spatial distribution of tourist spots within the district & region are shown in Fig 18.15 & 18.16 and that of Sulthan Bathery is shown in Fig 18.17.

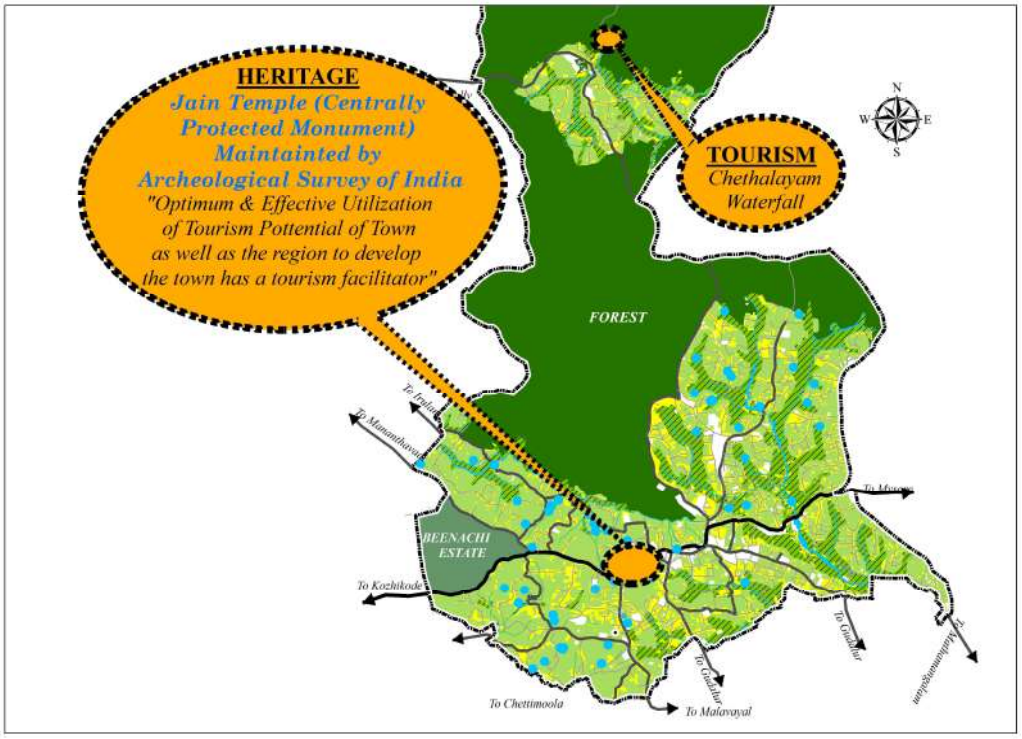


Figure 18.17: Spatial Distribution of Tourist Spot within Sulthan Bathery

18.1.5 Linkages for Concept evolution

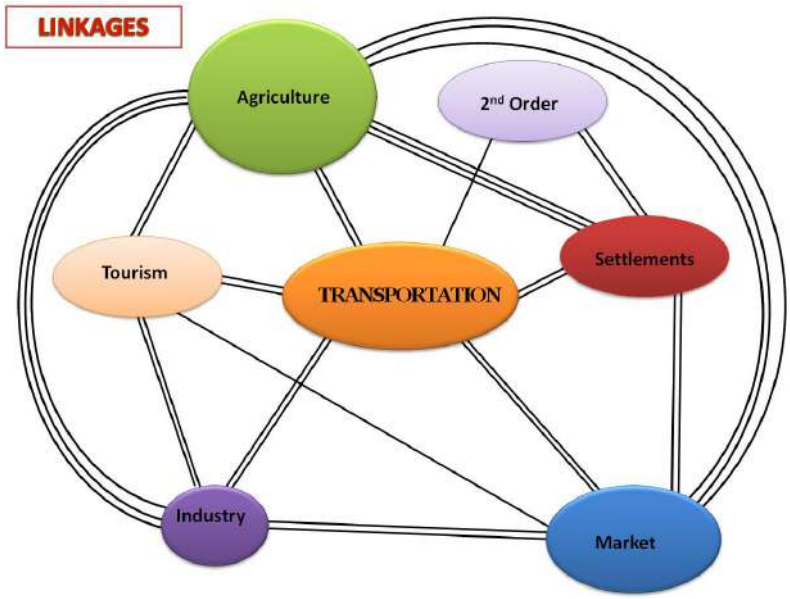


Figure 18.18: Linkages for Concept Evolution

At this point of time the various linkages and the relative weight given for each linkage to evolve a development concept is to be considered. The above analysis clearly shows the emerging linkage evolved between resource base (agriculture, tourism, industry, strategic important, trade & commerce), settlement characteristics and transportation. The evolved linkages are shown in Fig 18.18.

18.1.6 Identification of future developable area

At this point of evolution of planning concept, an attempt is made to evolve the spatial distribution of land which is already developed and saturated, land which has potential and carrying capacity to receive future development, and land which has constraint for further development in terms of sustainability, constraints in terms of infrastructure provision, topography and environment. This can be achieved by superimposing the resultant spatial pattern evolved from the analysis of environment, topography, resource base, physical infrastructure and settlements pattern. The process of evolution of spatial distribution of developable land is shown in Fig 18.19 with resulting spatial pattern.

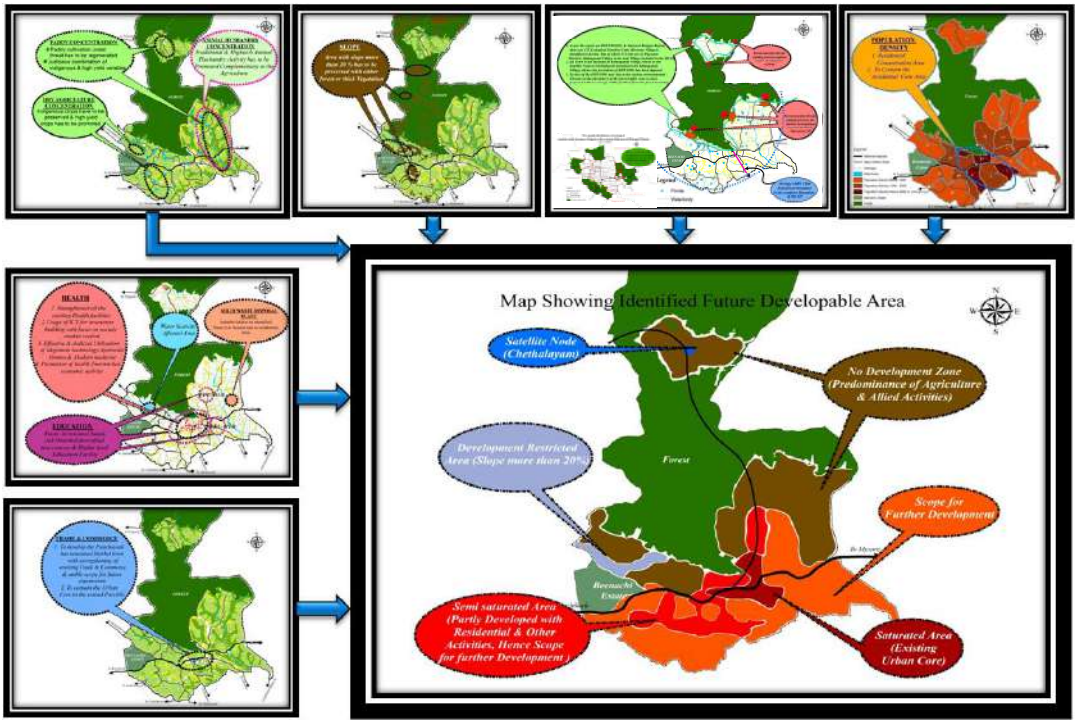


Figure 18.19: Spatial Distribution of Developable Land

18.2 Factors to be addressed in the Development Concept

The key factors that should be addressed in the development concept of Sulthan Bathery based on the above described analysis can be summarized as

1. Strategic importance of the town in terms of its role as taluk head quarter and one among the two 2nd order settlements of the district.

2. The strategic location of the town in terms of regional connectivity and as the gate way to Wayanad district and to the state of Karnataka.
3. Unique topography, salubrious climate and environment of the town as well as the wider region
4. The unique and critical character of the town as (i) a high density settlement (within the region), (ii) connectivity only through road,(iii) location amidst vast agriculture land in continuum with reserve forest comprising of wildlife sanctuary and (iv) environmental importance as part of western ghat.
5. The planning challenge to ensure perfect harmony between people, flora and fauna
6. Importance in terms of market town to cater the marketing demand of wider resource full influence region.
7. Need to arrest the present undesirable transportation corridor based ribbon development of the town and to contain the urban core to the extent possible so as to preserve the primary sector activity of the town with ultimate aim to protect the environment, agro base, local economy and topography.
8. Presence of renowned higher order educational institutions (St Mary's college, DIET etc.) and possibility of utilizing the unique resource base for specialized national level education centers and to serve as the education hub of the district.
9. Potential to serve as a tourism facilitation base town to enhance the potential trade mark of Wayanad as international tourist destination.
10. Potential of resource based agro allied industrial activity to ensure the value addition of resource base.
11. The presence of tribal population and the unique socio cultural importance.

18.3 Evolution of Development Concept

The development concept for the Sulthan Bathery is derived by spatially integrating the above factors. Hence the development concept embraces the aspects of:

- Environmental protection &sustainable development.
- Optimum resource utilization and integration of tertiary, secondary & primary activities.
- Provision of higher order physical and social infrastructure.
- Inclusive urban development ensuring the local economic development.
- Balanced development and equitable spatial distribution of facilities.

The process of spatially integrating the above aspects to evolve the spatial picture of the development concept is schematically shown in Fig 18.20 and the evolved spatial pattern of development concept is shown in Fig 18.21.

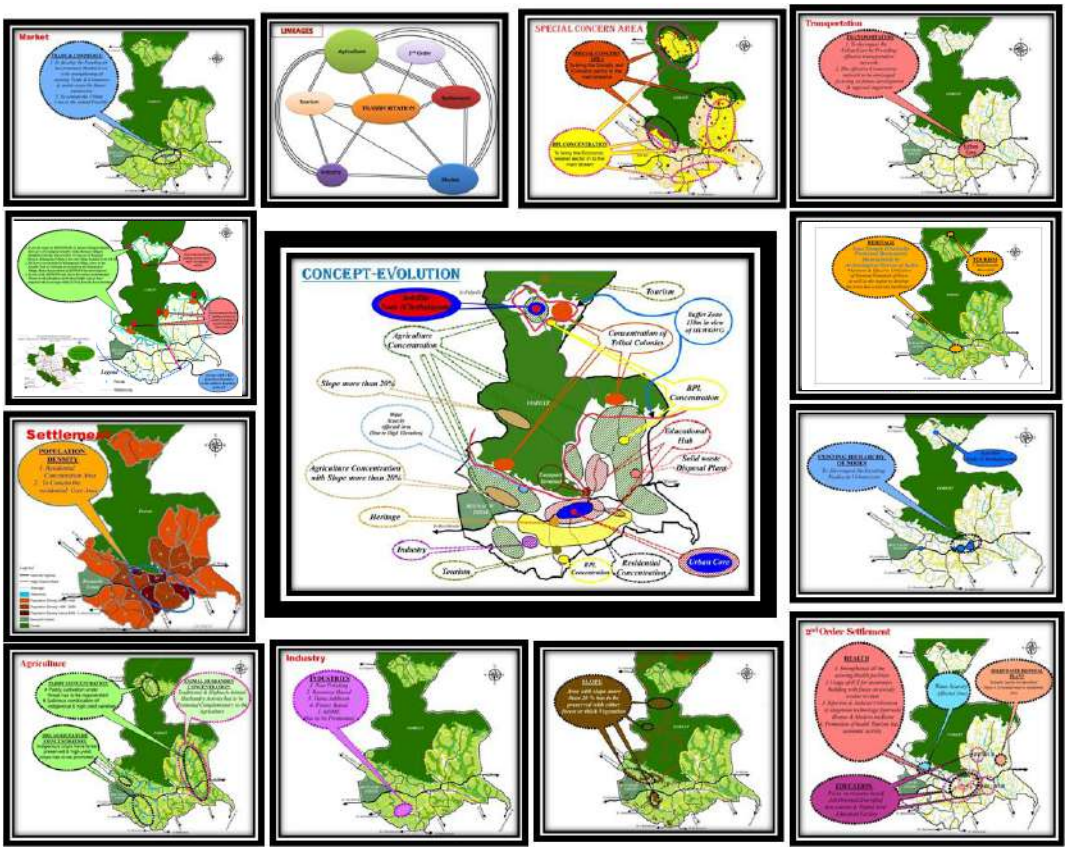


Figure 18.20: Development Concept – Process of Spatial Integration

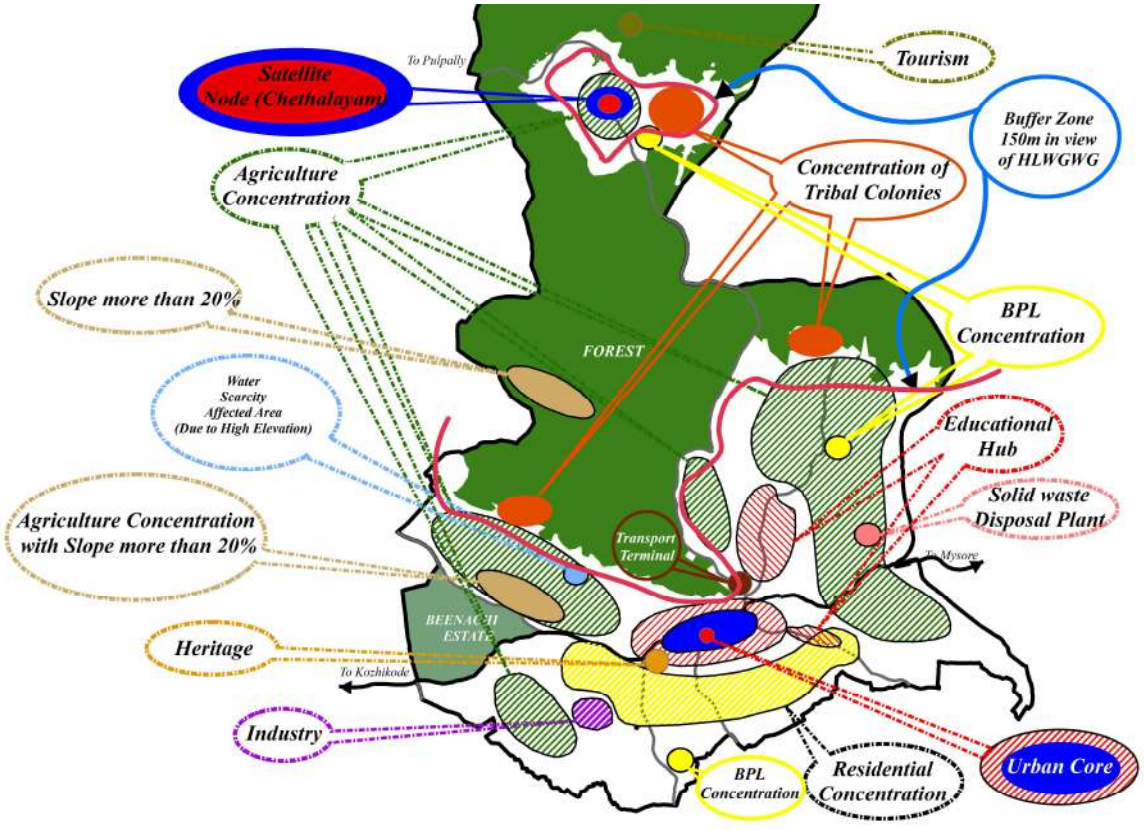


Figure 18.21: Evolved Spatial Pattern of Development Concept

18.4 Spatial impact of Ongoing / Committed/ Proposed projects

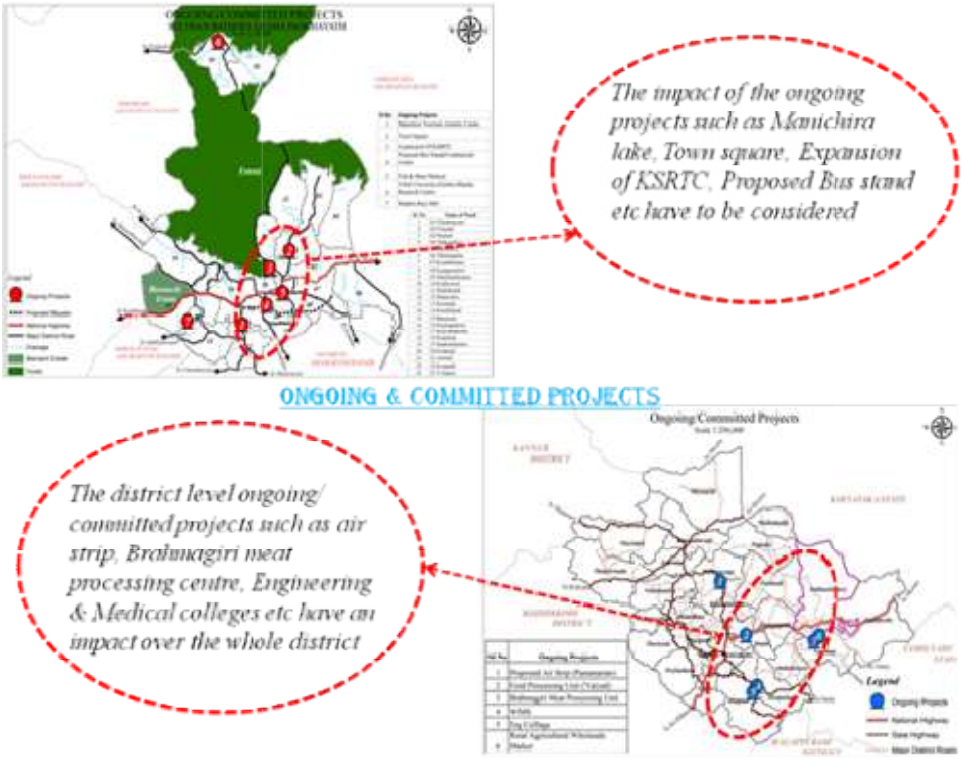


Figure 18.22: Spatial Distribution of Committed and Proposed Projects.

The spatial impact of the on-going / committed/ proposed projects within the town and surrounding region has to be given due consideration while formulating the development concept. The spatial distribution of committed and proposed project is shown in Fig 18.22.

The local self-governments (LSGs) in which such projects are located and the development sectors in which the impact of the projects can be envisaged is summarized in table 18.1 & 18.2. The ongoing and committed projects within the town are related to Tourism, Trade &Commerce, Social &Physical Infrastructure, Transport, Agriculture etc. The projects for the surrounding region are related to Animal Husbandry, Tourism, Trade &Commerce, Social &Physical Infrastructure, Transport, Agriculture etc.

Table 18-1: Details of Ongoing / Committed/ Proposed Projects in Sulthan Bathery

Sl. No.	PROJECT	STATUS	Location	DISTANCE FROM SBY	REMARKS
1	Manichira Tourism Amenity Centre	Committed	Manichira	1Km	Tourism, Trade & Commerce.
2	Town Square	On Going	Kuppadi	1Km	Social & physical Infrastructure, Trade & Commerce.
3	By-Pass (Dhottapan Kulam & Thirunelli)	Committed	DhottapanKulam to Thirunelli		physical Infrastructure, Trade & Commerce, Transport.
4	NABARD-KWA Water Supply Programme	Committed			Agriculture, Social & physical Infrastructure, Trade & Commerce.
5	Expansion of KSRTC Garrage	Committed	KSRTC Garrage	1 Km	Tourism, physical Infrastructure, Trade & Commerce.
6	NEW BUS STAND/ COMMERCIAL CENTRE (PPP)	Proposed	Near Gandhi Jn	0.2 Km	Agriculture, Trade & Commerce.
7	FISH & MEAT MARKET	Committed	Chungam(Near New Bus stand)	0.2Km	
8	TRIBAL UNIVERSITY / GOTHRA BHASHA RESERCH CENTRE	Committed	Chethalayam	17 Km	Social & physical Infrastructure,
9	MODERN RICE MILL	Proposed	Industrial Park, Poothikkad	3Km	Agriculture, Industry, Trade & Commerce.

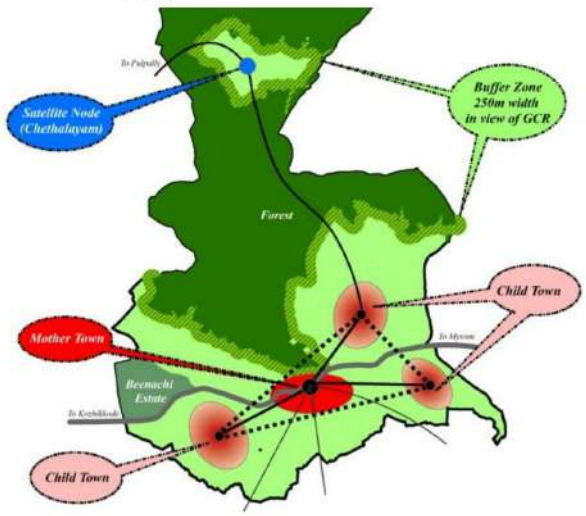
Table 18-2: Details of Ongoing / Committed/ Proposed Projects - Surrounding Region

Sl. No.	PROJECT	STATUS	LSG	DISTANCE FROM BATHERY	REMARKS
1	Wayanad Institute Of Medical Science.	On going	Muppainad	28Km	Social & Physical infrastructure. Trade and Commerce.
2	Food Processing Centre At varyad	Proposed	Muttil	18Km	Agriculture, Social & Physical Infrastructure, Trade & Commerce.
3	Proposed Air Strip	Proposed	Panamaram	17Km	Tourism, Physical Infrastructure, trade, Commerce
4	Rural Agricultural Wholesale Market	Ongoing	SB& Nenmeni	3Km	Agriculture, Trade & Commerce.

18.5 Evolution of Planning Strategy

The development concept evolved has to be transferred to alternative strategies considering various external factors including financial and economic aspects. The tradeoff between various alternatives thus evolved will help to identify the most effective, technically competent and real to ground strategy which is known as suggested strategy. The four strategies evolved with their relative advantage and disadvantages are shown in Fig18.23.

Strategy 1

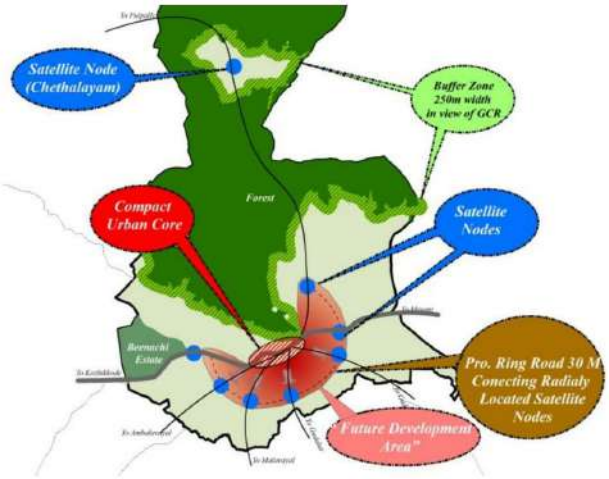


To uplift the Municipality a tourism facilitator with infrastructure facilities with a mother town and emphas urban core with further ur Towns on the southern par form with the provision of Towns from the Mother tov The supporting core act commerce, education & hea in these Child towns The r Sulthan Bathery Municipal ***Town"*** *of Wayanad.*

Advantage

- Regulate the development in the core area.
- Future development activities can be accommodated on southern side of C

Strategy.2A



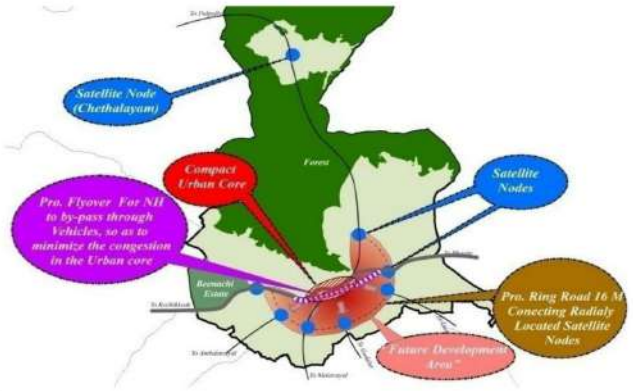
To uplift the Municipality and tourism facilitator v infrastructure facilities w a proposal for high de from NH, emphasizing urban core and urban ac satellite nodes on the connect these nodes by r

Advantage

- Regulate the development in the core area.
- Bye pass the through vehicles from NH through ring road

- The availabl of the ring roa

Strategy.2B



To uplift the Municipality a tourism facilitator with infrastructure facilities wi diverting high density of emphasizing to deconges urban activity laterally shi southern side of NH , and c (ROW-16M) & radial roads

Advantage

- Regulate the development in the core area.
- Bye pass the high density through vehicles from NH through Flyover.
- Future development activities can be accommodated on southern side of NH in view of Gadgil committee report
- Topography will not affect.

Strategy.2C



To uplift the Municipality a tourism facilitator with infrastructure facilities wit as a proposal for diverti vehicles from NH, empha urban core and urban a satellite nodes on the sou these nodes by ring road (

Advantage

- Regulate the development in the core area.
- Bye pass the high density through vehicles from NH through By Pass

The proposal is under the active consideration of the Govt.

- The proposed By pass road passing through the area identified for futur area.
- Future development activities can be accommodated on southern side

Figure 18.23: Alternate Strategies Evolved With Their Relative Advantages and Disadvantages

After analyzing the strategy 1, 2A, 2B & 2C it is suggested that strategy 2C is most suitable for the future development of the Sulthan Bathery. Following facts are taken into account for selecting the suggested strategy.

- Future development area can be accommodated on the southern side of the NH.
- The by-passable traffic is diverted through a bypass road (ROW 30m) which is under the active consideration of the govt.
- The satellite nodes are connected with ring road having width 18m, which can also

  Fulfill the need of bypass road. 60 % of the ring road is existing; hence land acquisition cost can be reduced at large extent.
- The recommendations of Dr. Kasthurirangan report have been followed to the maximum.
- Decongestion of existing urban core is ensured.
- Topography will not be a critical barrier.
- Conservation of environmentally protected area is ensured.

18.6 Development Concept

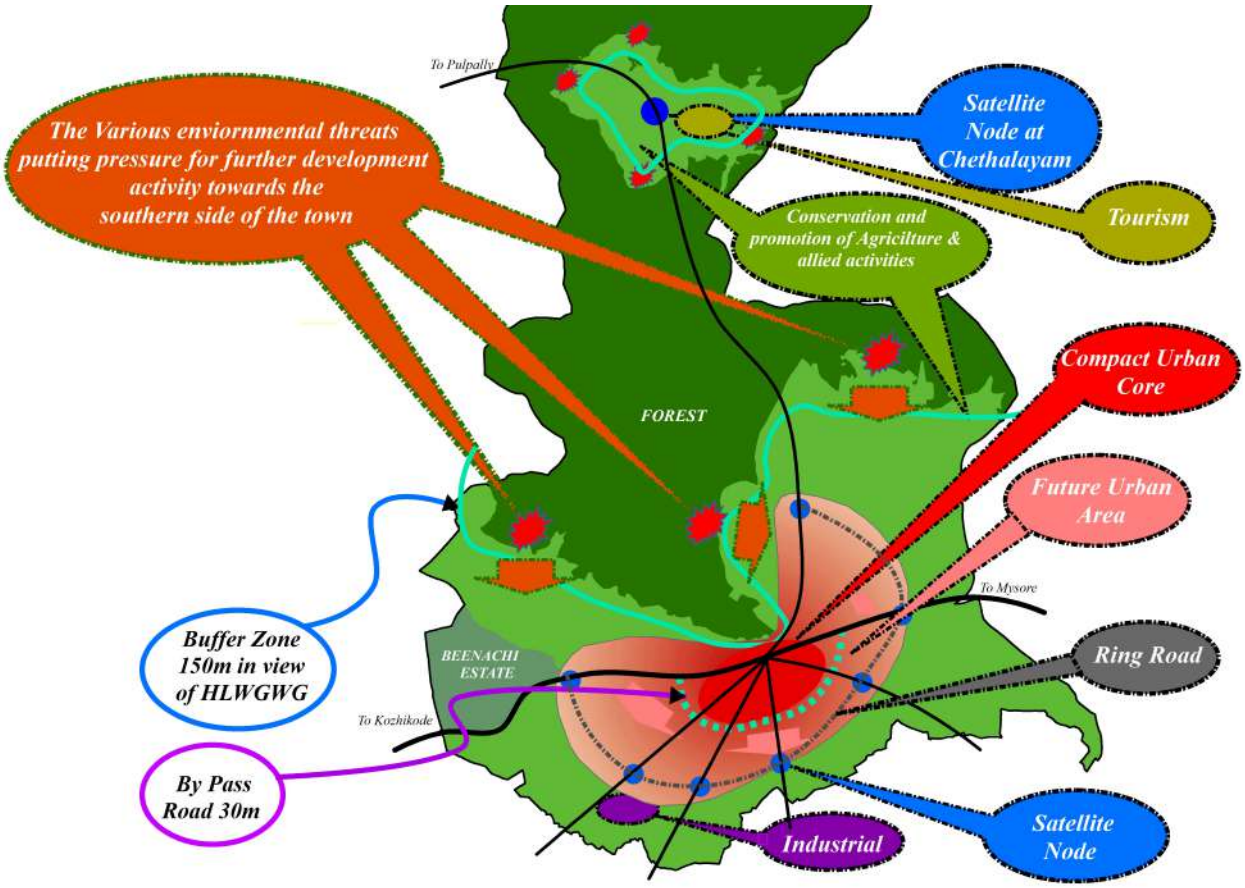


Figure 18.24: Evolved development concept for Sulthan Bathery

The strategy evolved has to be transferred to development concept. This process involves integrating the spatial pattern of development concept with strategy. The evolved development concept for Sulthan Bathery is shown in Fig 18.24 and the same can be summarized as

"***The development concept is to realize planned spatial development of Sulthan Bathery with a compact urban core and a series of satellite nodes equipped with higher order services in par with its roles as taluk head quarter, second order settlement and market town of the region with an efficient road network that ensure equitable accessibility to facilities to the service population, wherein local economic development is achieved through organized development based on available resources of agricultural and allied sectors, forest and tourism without compromising the environmental aspects and ensuring up-liftment of weaker sections of the society"***

18.7 Major Concept Zones

In order to transfer the development concept to the ground in a realistic and implementable manner the following broad concept zones are suggested

1. Environmental Sensitive Area.
2. Commercial Zone.
3. Industrial Promotion Zone
4. Public & Semipublic Zone.
5. Residential Zone
6. Agriculture Zone.
7. Park and open space
8. Hazardous zone
9. Buffer Zones

However, the spatial demarcation of these zones has to attempt by incorporating the existing land use within the orbit of development concept and goals and objectives set. This will lead to the proposed land use along with a set of development regulations.

CHAPTER 19

POLICIES AND STRATEGIES

Based on issues, problems and potentials evolved from the study of settlement and within the frame work of the goals and objectives, the key sectors of Sulthan Bathery, where planning interventions are essential are identified. We have also derived the spatial structure of the town which is evolved from the hierarchy of nodes, connectivity and activity pattern. Based on the above and involving the spirit of the goals set, the development concept has been formulated. Subsequently development zones were suggested for transferring the development concept into the ground. Now based on this development concept, general development policies, sector wise development policies and strategies have to be carved out. This chapter discusses the general policies, sector wise development policies and strategies for the planned development of Sulthan Bathery.

19.1 General Development Policy

The general development policy for Sulthan Bathery should take care of the following aspects as envisaged in the development concept and goals set.

- Environmental protection &sustainable development.
- Optimum resource utilization and integration of Tertiary, Secondary & Primary sectors.
- Provision of higher order physical and social infrastructure.
- Ensuring the local economic development.
- Balanced and inclusive development with equitable spatial distribution of facilities.
- The demand of the surrounding region especially in terms of tourism, service facilities, social and physical infrastructure.

Considering the above aspects within the orbit of goals, objectives and development concept the general development policy for Sulthan Bathery is evolved as ***"To develop Sulthan Bathery as a eco-friendly administrative cum market town equipped also to act as a second order settlement of the district through the provision of adequate physical and social infrastructure to cater the entire service population, and to diversify the resource based economic activities to ensure optimum sustainable utilization of resources, creation of more employment, local economic growth etc., and to act as the tourism facilitation centre of the district, meanwhile conserving the unique topography, environment and socio-cultural importance of the town and region."***

Based on the above general development policy, sector wise policies and strategies are evolved.

19.2 Sector Wise Policies and Strategies

In order to detail the general development policy, sector wise policies and strategies has to be formulated at least for the core sectors which play crucial role in realizing the general policy. The sector level policies and strategies for the following core sectors are described below.

- Commercial
- Industry
- Tourism
- Infrastructure
- Environment
- Agriculture and allied Activity
- Social Welfare.

19.2.1 Commercial Sector

The Sulthan Bathery has to cater the commercial demand of the town and also its wider region to satisfy the status of the administrative head quarter town of the taluk, one of the 2nd order settlements in the district and as a market town. Hence the policies and strategies can be stated as follows.

Policy

"To develop the core area of Sulthan Bathery as a major commercial node, well connected to the service region with good transport network, equipped with higher order commercial facilities in par with the respective roles of the town as administrative centre, 2nd order settlement in the district and as a market town, with due consideration to resource base of the region including its tourism potential and to have a well-defined hierarchy of commercial activities within the town to facilitate balanced development"

Strategy

- To develop the commercial hub in the core with state of art facilities.
- To develop a hierarchical order of commercial nodes within the town
- To develop existing markets so as to provide adequate facility to the public.
- To have synergic link of the commercial activity with resource base, spices, hill produces and tourism.
- To establish a brand name "*Wayanadan*" especially in the marketing of hill produces, value added agro & allied products and forest products.
- To maintain clean and pleasing environment in the market town.

19.2.2 Industrial Sector

Sulthan Bathery has got ample scope for resource based value addition industries and Information Technology / Tourism / Electronic based non-polluting industries in harmony with climate and environment. Hence the policies and strategies can be stated as follows.

Policy

"To develop Sulthan Bathery as a major industrial location for non-polluting MSME industries with priority to value addition units of agricultural and hill produces, IT and electronic based industries etc. so as to optimally utilize the resource base for local economic development"

Strategy

- To develop a mutually beneficial link between Industry, Agriculture and Allied activity and tourism to enhance the local economic development and penetration of the economy to the weaker sections of the community.
- To encourage the value addition, brand naming and marketing of the agro and allied products, spices and hill produces of the town and region.
- To strengthen and modernize traditional industries by diversification of product and implementing new technologies.
- To attract new entrepreneurs to Sulthan Bathery especially for investment in Information Technology / Electronic/ Agro based (value addition, food processing) sectors by creating entrepreneur friendly attitude, incentives and demarcation of area for cluster development.
- To strengthen the marketing network and marketing techniques.
- To utilize the potential due to the good connectivity of Beypore port, Karippur and Kannur airport airports.

19.2.3 Tourism Sector

The Sulthan Bathery has got tremendous scope for developing as a tourism facilitation centre of the district with state of art tourism infrastructure considering the tourism potential of the district. This sector can play crucial role in the local economic growth too. Hence the policies and strategies of tourism can be stated as follows.

Policy

"To develop the Sulthan Bathery as a major tourism facilitation centre to cater the demand of the district in an eco-friendly, manner to strengthen the local economy"

Strategy

- To develop as a transit point in the tourist circuits of the district equipped with quality tourism infrastructure.

- To provide proper, timely and spatially planned tourism information centers and tourism sign boards so as to enhance the tourism activities.
- To encourage the resource based tourism activities like farm tourism, estate tourism, health tourism, tribal tourism, cultural tourism etc…
- To encourage practices (like home stay) which are socially acceptable and ensure the penetration of economy to the weaker section.
- To evolve a tourism circuit with Sulthan Bathery as base station.

19.2.4 Infrastructure

The infrastructure plays supporting role for the planned development. Sulthan Bathery, being the taluk head quarter and one of the 2nd order settlements in the district, availability of physical, social or economic infrastructure plays crucial role. Hence the policies and strategies of infrastructure can be stated as follows.

Policy

"To provide adequate physical, social and economic infrastructure facilities so as to capacitate to efficiently deliver the functions of a taluk head quarter town and a 2nd order settlement and to trigger the planned spatial development of the town in a sustainable manner"

Strategy

- To plan an efficient, effective, road transportation network so as to cater the present and future needs of the area with a combination of radial road originating from urban core and ring road connecting the radial roads so as to ensure the safe, speedy, continuous movement of vehicles, to facilitate bypassing of through traffic, to avoid traffic congestion within the town and to contain the urban core with due consideration to unique topography and environment
- To provide bus terminals with adequate capacity and to ensure smooth traffic flow.
- To provide organized parking facilities at different parts
- To provide proper, timely and spatially planned tourism information centres and tourism sign boards so as to enhance the tourism activities.
- To provide higher order health and education facilities not only to cater the demand of the town but also the district so as to ensure the public health and quality education to all.
- To provide adequate drinking water supply with priority to improve the existing schemes.
- To plan and implement efficient waste management system with due regard to topography, waste reuse, waste recycle and waste reduction.
- To ensure properly functioning drainage network to the town.

19.2.5 Environment

The town is unique with presence of environmentally sensitive areas like reserve forest, paddy areas and streams. The town and the region are sensitive in terms of topography, reserve forest, wild life sanctuaries, bio diversity and aromatic & medicinal plants etc. Hence the policies and strategies of environment can be stated as follows.

Policy

"To make the town eco-friendly by deliberately conserving the unique environment and topography and to ensure sustainable utilization of the resources unique to the region"

Strategy

- To adopt suitable activity pattern and land use for ensuring sustainability of the environmentally sensitive areas.
- To effectively link the environmentally sensitive area with agriculture and tourism.
- Strict enforcement of laws and regulations in force in the area for protection of environment.
- To create strong awareness among local people about importance of environmental conservation with help of NGO's and educational institutions.
- To ensure effective periodical environment monitoring system.
- To adopt suitable measures like trenches, forest wall, fencing etc. to reduce the man animal conflict with strict monitoring of the local inhabitants.

19.2.6 Agriculture and Allied Activity

The study clearly reveals that Sulthan Bathery is blessed with strong agricultural resource base. As per the land use analysis paddy area constitutes 8.41 % of the municipal area and dry cultivation constitutes 20.77 % of the area. In terms of land use, presence of vested forest, average plot size, and unique topography the town has to sustain agro allied activity so as to ensure the optimum resource utilization and above all to ensure the ecological and environmental sustainability.

Policy

"To protect the agricultural resource base of the town and its hinterlands not only to enhance production and sustain agro allied activities but also to protect the environment and topography of the town and region"

Strategy

- To adopt suitable activity pattern and land use for ensuring sustainability of the existing agro base.
- To effectively link the agriculture and allied sectors with tourism and industry without disturbing the environment.

- To ensure the effective marketing network for agriculture products.
- To provide necessary infrastructure facilities in the sector

19.2.7 Social Infrastructure

The ultimate aim of any planning interventions is to achieve improved quality of life to people. Wayanad district is one of the backward districts in the state with highest concentration of scheduled tribe population. The tribal settlements in the district are unique in terms of the socio cultural customs, lifestyle, indigenous technology and limited services. Sulthan Bathery also reflects this character. The scheduled caste and scheduled tribe population of municipality is 3.87% and 11.77% respectively of the total population which are high compared to the state averages. 11.80% of the population is below poverty line. Hence the policies and strategies of social Infrastructure can be stated as follows.

Policy

"To enhance the quality of life of people by provision of quality social infrastructure with equitable access to the town population"

Strategy

- To adopt suitable activity pattern and land use for ensuring sustainability of the socially and economically weaker sections of the community.
- To document and market unique socio cultural customs, lifestyle, indigenous technology, traditional knowledge etc. for the social welfare.
- To provide adequate infrastructure facility and create additional employment opportunities for the economically and socially weaker sections of the society.

CHAPTER 20

PROJECTED REQUIREMENTS

20.1 Population Projection - 2042

The population projection for 2011, 2021 and 2031 and 2041 of Sulthan Bathery is made by assuming that the same trend in the population growth continues. The population is projected by five methods and the average of the five is taken to arrive at the population figures in 2011, 2021, 2031, 2041. The following methods are used.

a) Arithmetical method
b) Geometrical Increase method
c) Incremental increase method
d) Decreasing rate method
e) Graphical rate method

20.1.1 Arithmetical Method

This method is based on the assumption that the increase in population is constant. In this method, the average increase of population for the last three or four decades is worked out and then for each successive future decade, their average is added. This method gives low results, as such is applied for old and large cities. The population at the end of 'n' year 'or' decades is calculated by the equation.

Pn = P+ni

Where Pn = Population at the end of 'n' year or decades.

P = Present population

i = Average increase per year or decade.

The projected population by this method is shown in Table 20.1.

Table 20-1: Projected Population-Arithmetical Method

Year	Population	Increase in Population
1981	27659	
1991	35034	7375
2001	42059	7025
2011	45417	3358
Total		**17758**
Average		**5919**

Population for 2021= 45417+ 5919=51336
Population for 2031= 51336+ 5919=57255
Population for 2041= 57255+ 5919=63174

20.1.2 Geometrical Increase Method

In this method the percentage increase in population from decade to decade remains constant. From the available census records this percentage is fixed and then population of each future successive decade is worked out. This method gives high values and is applied to young and rapidly growing cities.

This method is avoided since it shows higher value than other methods.

20.1.3 Incremental Increase Method

It is suitable only for towns having increasing growth rate trend; Sulthan Bathery has decreasing growth trend, hence avoided.

20.1.4 Decreasing Rate Method

In this method, it is assumed that rate of percentage increases or decreases and the average decrease in the rate of growth is calculated. Then the percentage increase is modified by deducting the decrease in rate of growth. This method is applicable only in such cases where the rate of growth of population shows a downward trend. By this method, the population growth rate of 2021, 2031 & 2041 are calculated by assuming that the same percentage decrease in population growth prevails as that of 2011 for the succeeding decades. The projected population of Sulthan Bathery by this method is shown in Table 20.2 & 20.3

Change in growth rate is -0.60%. It is used to calculate the growth rate in 2021 and 2031. The population in the future decade with calculation is shown below in Table 20.3.

Table 20-2: Projected Population – Rate of Decrease

Year	Population	Growth rate	Change in growth rate
1981	27659		
1991	35034	26.67%	
2001	42059	20.05%	
2011	45417	7.98%	(7.98-20.05)/(20.05) = -0.60

Table 20-3: Projected Population-Decreasing Rate Method

Year	Growth rate	Population
2021	7.98x(1+-0.60/100) = 7.93	45417x(1+7.93/100) = 49019
2031	7.93x(1+-0.60/100) = 7.88	49019x(1+7.88/100) = 52882
2041	7.88x(1+-0.60/100)=7.83	52882x(1+7.83/100) = 57022

20.1.5 Graphical Method

In this method, a curve of population against time is drawn for the municipality under consideration. The known census records are put up on the graph to get the shape of the curve. The curve is then carefully extended from present to future decades and the population after each successive future decade is read from the curve. This extension has to be done carefully and it requires vast experience and good judgment. The projected population of Sulthan Bathery by this method is shown in Table 20.4 and Fig 20.1.

Table 20-4: Projected Population – Graphical Method

Year	Expected population
1981	27659
1991	35034
2001	42059
2011	45417
2021	48900
2031	52200
2041	58644

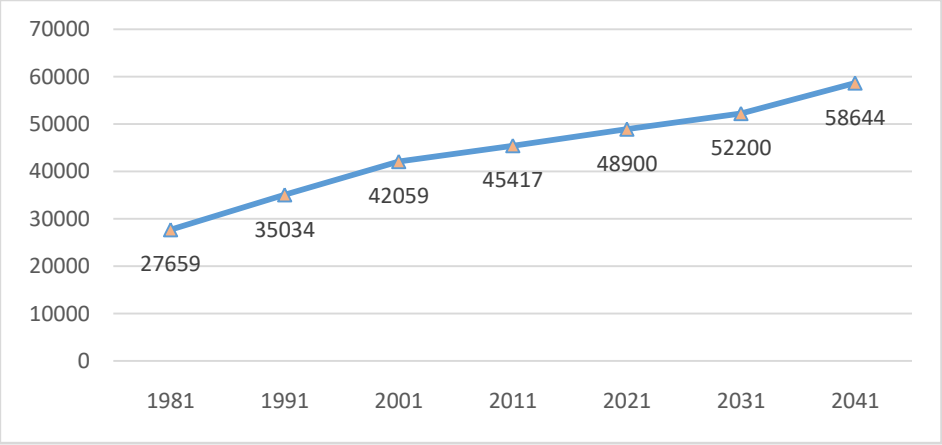


Figure 20.1: Projected Population – Graphical Method

The projected total population by the above mentioned methods differs slightly. The averages of these three projected values are taken as the population figures of the Sulthan Bathery Municipality and same is shown in Table 20.5.

Table 20-5: Projected Population of Sulthan Bathery

Sl no	Method Adopted	Total population						
		1981	1991	2001	2011	2021	2031	2041
1	Arithmetic method	27659	35034	42059	45417	51336	57255	63174
2	Decreasing rate method	27659	35034	42059	45417	49019	52882	57022
3	Graphical method	27659	35034	42059	45417	48900	52200	58644
Average projected population		27659	35034	42059	45417	**49751**	**54112**	**59613**

So it can be concluded that the total population of Sulthan Bathery Municipality will be 54112 and 59613 on 2031 and 2041 respectively based on the projection. However, the municipality shall attract migration of certain population to it due to the development projects envisaged in the some of the sectors. Hence, the population in the horizon year is considered to be 60000 for calculation purposes.

20.2 Sector Wise Requirement Projections

The projected population in 2041 is 59613 and for the purpose of assessment of sector wise requirements, this is rounded off to 60000.

20.2.1 Trade and Commerce

As per standards an area of 0.24 H/1000pop is required for the town like Sulthan Bathery for trade and commerce. In 2041, the population will reach 60000. Hence the land required for 60000 people for development purpose are 14.44 rounded to 15 Hectares.

20.2.2 Animal Husbandry

In 2011, the population is 45417 and we expect that in 2041, the population will be 54000. Thus the present requirements in animal husbandry sector are projected by adding the proportionate growth (47%) to the present requirement of meat/egg/milk for calculating the projected requirement.

Cattle - 44.5 tonnes/month (37.5Tonne/month for 45417)

Goat - 5.31 tonne /month (4.5Tonne/month for 45417)

Pig - 4.13 tonne/month (2.3Tonne/month for 45417)

Chicken - 208 tonne /month (120Tonnes /month for 45417)

Milk - 11505 Liters/day (6600 Liter/day for 45417)

Milk booth - 12 No.s (1 no /5000 population)

20.2.3 Traffic and Transportation

Survey conducted by NATPAC reveals that, Sulthan Bathery has a fairly good road network and almost all the roads except NH 766 will be sufficient to meet the present requirements. But there occurs an additional burden of traffic due to the ban of night journey through Bandhipur National Park. It is found that more than 50% of the vehicles are through vehicles which can be bypassed. It includes goods vehicles and MAT. The NATPAC observations are

1. NH 766 from Assumption junction to Chungam junction exceeds the carrying capacity by 2011 onwards and all other roads have v/c ratio less than 1.
2. It is estimated that all the major roads will cross the carrying capacity by 2020 onwards.
3. It is observed that the number of incoming vehicles and that passes through the towns are far greater than the trips originated from the town.

The Traffic volume and carrying capacity of different roads are shown in the Table 20.6

Table 20-6: Projected Daily Volume Capacity Ratio for Different Horizon Years in Sulthan Bathery

Road Link	Carriage way width(m)	Capacity (PCU)	2013		2023		2033	
			Vehicle (PCU)	V/C	Vehicle (PCU)	V/C	Vehicle (PCU)	V/C
NH.766 Moolankavu - Kolagappara								
Moolankavu - Kottakkunnu Jn	7.00	15000	10780	0.72	15957	1.06	23620	1.57
Kottakkunnu - Gudalur Rd Jn	7.00	15000	24870	1.66	36814	2.45	54493	3.63
Gudalur Rd Jn - Traffic Junction	7.00	15000	27320	1.82	40440	2.70	59861	3.99
Traffic Jn - Assumption Jn	10.00	30000	25720	0.86	38072	1.27	56356	1.88
Assumption Jn - Beenachi Jn	10.00	30000	24370	0.81	36074	1.20	53398	1.78
Beenachi Jn - Kolagappara	10.00	30000	9470	0.32	14018	0.47	20750	0.69

Panamaram road								
Beenachi Jn - Nambeesan Kavala	5.80	12000	4780	0.40	7076	0.59	10474	0.87
Pazhupathur road	3.80	9000	1250	0.14	1850	0.21	2739	0.30
Ambalavayal road								
Court Jn - Manivayal (Town limit)	3.80	9000	5270	0.59	7801	0.87	11547	1.28
Chulliyode road								
Traffic Jn - Gandhi Jn	6.00	12000	14470	1.21	21419	1.78	31706	2.64
Gandhi Jn - Ammayipalalm	12.00	24000	5570	0.23	8245	0.34	12205	0.51
Gudalur road								
Moolankavu - Thoduvally	8.50	15000	6620	0.44	9799	0.65	14505	0.97
Moolankavu - Thelampatta road								
Moolankavu Jn - Thelampatta Jn.	3.00	9000	2080	0.23	3079	0.34	4558	0.51
Pulpally road								
Kottapally road Jn - Pukalamalam	5.70	12000	3970	0.33	5877	0.49	8699	0.72
Odappallam road.								
Kuppadi road Jn - Moolankavu Jn.	3.00	9000	3960	0.44	5862	0.65	8677	0.96
Thoduvetty road	7.00	12000	1220	0.10	1806	0.15	2673	0.22
Beenachi - Kattayad road	3.00	9000	1430	0.16	2117	0.24	3133	0.35
Kuppadi - College road	3.00	9000	550	0.06	814	0.09	1205	0.13

20.2.4 Water Supply

At present there is a water supply scheme with clarifier of 2 units with 2.25 MLD capacity and 4LL GLSR at Nirappath that serves Sulthan Bathery Municipality and Noolpuzha GP. Source of this scheme is Noolpuzha and well cum pump house is located at Muthanga. The demand of taluk hospital Bathery has also met from this scheme. The source of the

scheme – Noolpuzha which gets dried up during summer and the water supply is interrupted frequently during summer season. More over the clarifiers are not working. Only 40 Lpcd Water is supplied. Acute scarcity of drinking water is being experienced during summer months. A water supply scheme under the financial aid of NABARD (CWSS) has been envisaged in the planning area which envisages distributing drinking water to Noolpuzha, Muttil Grama Panchayats and Sulthan Bathery Municipality.

Current water supply = 1,95000liters

Per capita requirement for small town = 100 lpcd.

Required by 2041 (for 60000Pop.) = 6000000 liters

Additional for Wastage, firefighting, street washing etc. @15% =900000liters.

Additional demand for floating population (@ 25%) = 1500000liters.

Grand total – 84,00000litres

=8.4 MLD

The demand of 8.4 MLD has to be met from the new scheme. The ultimate capacity of the CWSS scheme is 16 MLD and aims to supply 70 lpcd. So there will be a need to expand the project so as to supply water @ 100 lpcd on the year 2022 - 2041.

20.2.5 Solid Waste Management

Survey reveals that, around 98% of the total domestic waste is being disposed in own compound. Total waste generated in Sulthan Bathery town is 8 tonne; out of this approx. 5 tonne only is collected from different locations of the various wards in the core area of the town. This waste is transported to 'Karuvallikunnu' and disposed using the incinerator. 92.83% of the sanitary waste disposal is through leach pit in Sulthan Bathery Municipality. It may cause water contamination and lead to the spreading of communicable diseases. Land available at Karuvallikunnu is 0.5 Acres.

Rate of solid waste generation as per standard = 220gm/head/day

Waste generation in Sulthan Bathery by 2041 = (60000*220) =13.20 T/day

Add 30% for floating population – (13.2*0.3) = 3.96 T/day

Total waste generated in 2041 = 13.2+3.96=17.16 T/day

Present waste generated in the town = 8 T/day

Future quantity of solid waste is to be handled additionally by 2041 =17.16 - 8 = 9.16 Tonne /day. The above figure can be cut short by 50% i.e., by 5 tonnes since the survey shows that 93% of the inhabitants are disposing waste on their own compound and only the core area which is most urbanized will have a demand for 100% collection of solid waste generated.

20.2.6 Energy

As per standards, consumption of power works out to be 2 KW/Household/day. The consumption of power by 2041 is worked out to be 25 KW for a population of 60,000 with HH size of 5. The power requirement under different categories by 2041 is shown in Table 20.7

Table 20-7 : Power Consumption- 2042

Category	Existing nos	Standards recommended	Demand by 2041
11KV substation	1No (66 KV) substation & 47 Transformers	1 for 15,000 person	Nil
LPG Godown	2	1 for 40-50 thousand person	Nil
Petrol pumps	5	1/150 Ha of gross residential and 1/40HHs of Industrial area	Nil

20.2.7 Education

As per UDPFI standard, there should be one LP school for 2500 people, one UP school for 7500 people, 1 HS for 13000, 1 HSS for 13000, 1 Arts & science College for 80000, 1 poly technique for 36000, 1 ITI/ITC for 35000, 1 TTI for 120000, 1 professional college for 125000 people. In Sulthan Bathery, the only shortage is seen in LP schools, Polytechnic. Even though there are no professional colleges within Sulthan Bathery, there is one Engineering college situated in Thalappuzha in Tavinjal Panchayat which will serve the purpose as per the planning standards. The other educational facilities will be sufficient during the plan period. The details are shown in Table 20.8.

Table 20-8 : Demand on Education Sector - 2042

Sl No	Category	Existing No	Standards Recommended	Demand 2042	Shortage
1	LP	19	1/2500 Population	24	5
2	UP	14	1/7500 Population	9	0
3	HS	14	1/13000 Population	5	0
4	HSS	5	1/13000 Population	5	0
5	Arts & Science College	5	1/80000 Population	1	0
6	Poly Technique College	0	1/36000 Population	2	2

7	ITC/ ITI	4	1/35000 Population	2	0
8	TTI	2	1/120000 Population	1	0
9	Professional college	1(for the district)	1/1250000 Population	1	0

20.2.8 Health

In Sulthan Bathery, the health facilities are sufficient in number for the projected population. As per UDPFI standard, 1 PHC for 20000-25000 people, 1 taluk hospital for a taluk and 1 district hospital for 1100000 people. There are 1 primary health centre, 1 taluk hospital and 9 No.s private hospitals in the municipality. The numbers of medical institutions are given in Table 20.9.

Table 20-9 : Demand in Health Sector - 2042

Sl No	Category	Existing no	Standards recommended	Demand 2042	Shortage
1	PHC	1	1 for 20000-25000	3	2
2	Taluk Headquarters Hospital	1	1 in taluk	1	0
3	District Hospital	1 in district	1 for 1100000	1	0
4	District Co-Operative Hospital	0		0	0
5	MSP Hospital	0		0	0
6	Ayurvedic Hospital	1+8		0	0
7	Homoeo clinic	1+6		0	0
8	Private Hospital (Allopathic)	9		0	0

20.2.9 Housing

In Sulthan Bathery, the present net population density is 1535 pop./sq.km. As per standards the average density for the developed area is 100 to 150 persons / hectare. Hence the land needed for residential purpose for the projected population in 2041 will be **4.8 sq km**. Average plot size for a house hold is assumed to be 0.0607 Hectare.

Total No. of houses: 9690 in which 11.01% under the category of Kutcha and Hut (as per socio economic survey). Hence the present housing demand is approximately : 1075 No.s

- No. of families not having own house :579
- No. of families not having own land :383

Additional demand to Horizon period: 14583/4.54 = 3212 No.s

(PPN: 60000-45417=14583)

As per socio economic survey it is revealed that 50.78% of the houses are of moderate in nature and It is assumed that 30% of the existing moderate houses have to be replaced in 10 years i.e., 9690x50.78=4920x30%=1476

Hence the total estimated housing shortage = 1075+ 579+383+ 3212 + 1476

Total = 6725 No.s

No. of land less families: 383 No.s

No. of families who require houses for horizon year: 3212 No.s

Hence additional land required for residential purpose in the horizon year assuming 5 cents of land per house hold will be required for land less families and 10 cent land per house hold will be required for houseless is

383@ 5 cents/each: 1915 cents

3212 @ 10 cents/each: 32120 cents

Total: 34035 cents i.e. 137 hectare say 150 Hectare

The life mission by the state government shall address the house less and land less, and the municipality provides the sufficient house with in the plan period.

20.2.10 Recreational Facilities

At present there is no park & open spaces in Sulthan Bathery except the Town Square at Kuppadi. The senior citizens park located at Kottakkunnu have only 5 cents of land which is not commensurate with the needs. There is not enough space for refreshment facilities. Community hall, library and recreational clubs are sufficient for the projected population. Park & open spaces and community rooms have to be provided in a hierarchical manner.

Hence the projected requirement under recreational open space by 2042 is 75 hectares. Another criterion that can be adopted for medium town is 1.4-1.6 hectares /1000 population which will forecast the area as 87 hectares. Considering the different aspects such as the strategic and location importance of the town it is suggested an area of 87 hectares. The detailed demand in recreational sector by 2042 is shown in table 20.10.

Table 20-10 : Demand in Recreational Sector - 2042

Sl No	Category	Existing no	Standards Recommended	Demand 2042
1	Park & Open Space (Overall Town)	0	10-12 sq. m /Person	75Ha
2	Community Room	0	1 for 5000 persons	13 Nos (660 m^2 each)= 0.86 Ha
3	Community Hall	9	1 for 15000 persons	0
4	Library & Recreational Club	12	1 for 50000 persons	0
			1 for 15000 persons	0

20.2.11 Public & Semi-Public Land

At present the land used for public &semi public use comes to 149 hectares. As per UDPFI guide lines the area required for public &semi public land use for medium town is 8 – 10 % of the developed area. Hence the projected requirement comes to 0.10*40.02= 4.002 sq.km (400 hectares).

20.2.12 Industrial

At present the land used for industrial purpose is only 10 hectares and as per the UDPFI guide lines, land required for medium town is 4-5% of the developed area. Hence the projected land requirement for 2042 is 0.05 x 40.02 = 2.001 sq.km (100 hectares).

20.3 Inference

In this chapter a genuine attempt is made to find out the future demand under various sectors based on available norms and standards. However in the worked out demand, it is seen that some of the prescribed norms and standards are not suitable for a small town like Sulthan Bathery showing rural in character. Hence by realizing the facts like physical growth and the land use pattern of the of the town, appropriate standards or norms has been derived in perception of suggested policies and strategies to find out projected demand in case to case sectors, altogether projected requirement has to be synchronized with development concept and existing land use pattern to evolve a proposed land use.

CHAPTER 21

PROPOSED LAND USE PLAN

In order to accommodate the projected requirements based on the development concept for the horizon period, requirement of land for various uses is to be determined and located spatially. The land use plan is prepared considering the existing development scenario, development trend, future requirements in the horizon period and the need to uplift Sulthan Bathery as taluk headquarters status. The existing spatial structure, linkages of the town, trip generation characteristics of various land uses etc. were also considered.

21.1 Proposed Land Use Pattern

The category of land use proposed in line with the development concept is listed as follows and the spatial distribution of various land uses is shown in Fig 21.1. The proposed traffic and transportation plan 2042 has dealt in detail in separate (chapter 22) and hence not attempted in this chapter. The proposed land use break up is shown in Table 21.1.

- Residential Zone I
- Residential Zone II
- Commercial Zone
- Mixed Zone
- Public & Semi Public Zone
- Parks & Open spaces
- Preferred Industrial Zone
- Agriculture Zone
- Transport & Communication Zone
- Hazardous Zone
- Reserve Forest
- Beenachi Estate
- Wet Agriculture
- Water Body
- Green Belt
- Special Zones
    - Bus Terminal Complex
    - Stadium Complex
    - Town Park
    - Truck Terminal
    - Open Ground

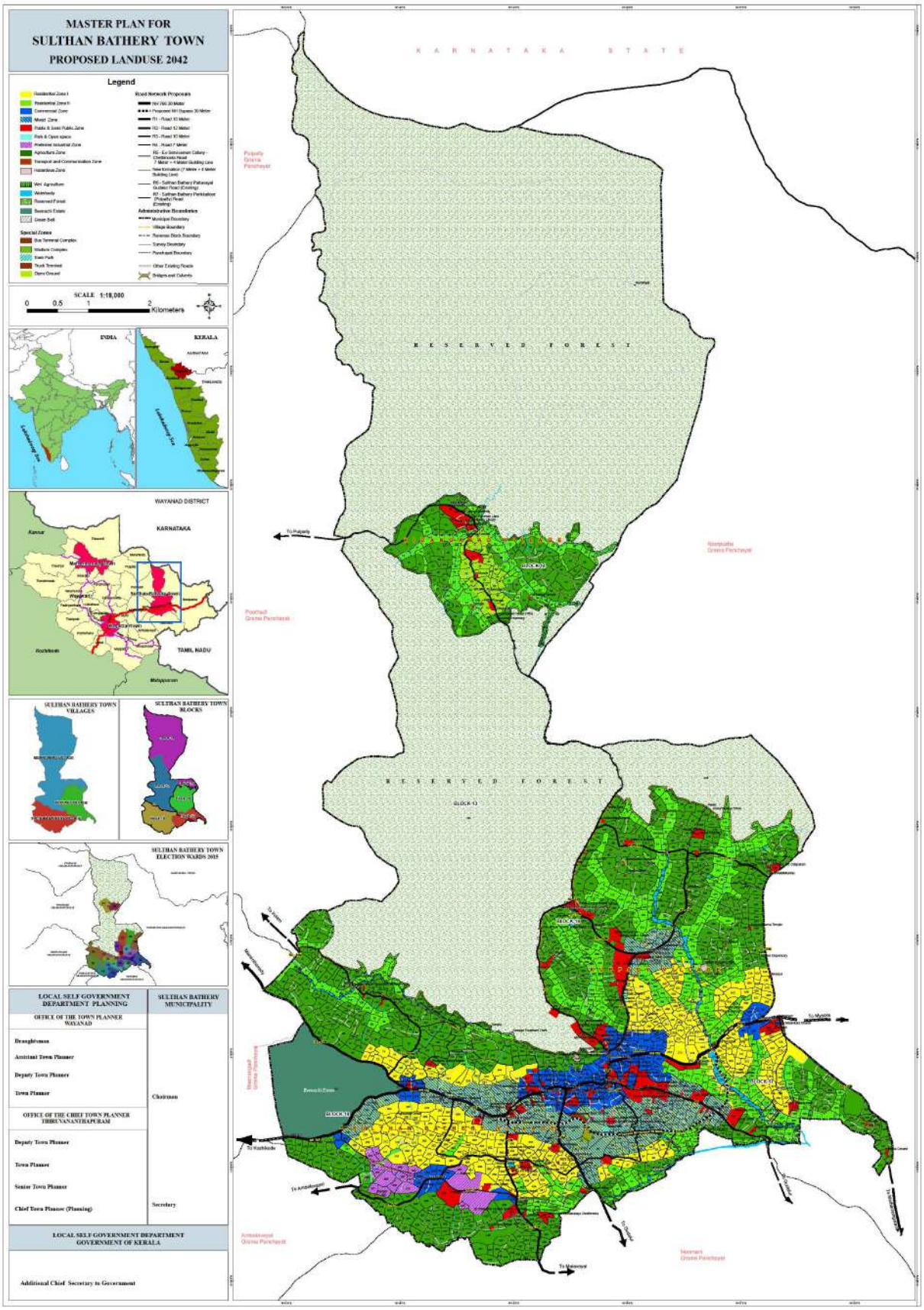

MASTER PLAN FOR
SULTHAN BATHERY TOWN
PROPOSED LANDUSE 2042
Legend
SCALE 1:18,000
0 0.5 1 2 Kilometers
INDIA
KERALA
WAYANAD DISTRICT
KARNATAKA
TAMIL NADU
SULTHAN BATHERY TOWN VILLAGES
SULTHAN BATHERY TOWN BLOCKS
SULTHAN BATHERY TOWN ELECTION WARDS 2015
LOCAL SELF GOVERNMENT DEPARTMENT PLANNING
SULTHAN BATHERY MUNICIPALITY
OFFICE OF THE TOWN PLANNER WAYANAD
Draughtsman
Assistant Town Planner
Deputy Town Planner
Town Planner
Chairman
OFFICE OF THE CHIEF TOWN PLANNER THIRUVANANTHAPURAM
Deputy Town Planner
Town Planner
Senior Town Planner
Chief Town Planner (Planning)
Secretary
LOCAL SELF GOVERNMENT DEPARTMENT GOVERNMENT OF KERALA
Additional Chief Secretary to Government
KARNATAKA STATE
RESERVED FOREST
RESERVED FOREST
BLOCK 1
BLOCK 2
BLOCK 3
BLOCK 4
BLOCK 5
BLOCK 6
BLOCK 7
BLOCK 8
BLOCK 9
BLOCK 10
BLOCK 11
BLOCK 12
BLOCK 13
BLOCK 14
BLOCK 15
BLOCK 16
BLOCK 17
BLOCK 18
BLOCK 19
BLOCK 20
BLOCK

Table 21-1: Proposed Land Use Break Up

Sl. No:	Proposed Land use	Net Area in Sq.km	Net Area in Ha	Area In %
1	Residential Zone I	6.2102	621.02	6.02
2	Residential Zone II	0.5906	59.06	0.57
3	Commercial Zone	1.9660	196.60	1.90
4	Mixed Zone	3.5292	352.92	3.42
5	Public and Semi public	1.7722	177.22	1.72
6	Park and open space	0.0243	2.43	0.02
7	Preferred Industrial Zone	0.7147	71.47	0.69
8	Agriculture Zone	15.7919	1579.19	15.30
9	Transport and Communication Zone	1.7783	177.83	1.72
10	Hazardous Zone	0.0111	1.11	0.01
11	Wet agriculture	7.5890	758.90	7.35
15	Water body	0.4425	44.25	0.43
16	Special Zones			
	1. Bus Terminal Complex	0.0215	2.15	0.02
	2. Stadium Complex	0.0275	2.75	0.03
	3. Truck Terminal	0.0053	0.53	0.01
	4. Town Park	0.0152	1.52	0.01
	5. Open Ground	0.0030	0.30	0.00
	TOTAL (Net Area – Excluding Forest)	**40.4924**	**4049.24**	**39.23**
17	Beenachi Estate	2.2291	222.91	2.16
18	Reserve Forest	60.5065	6050.65	58.61
	GRAND TOTAL	**103.2279**	**10322.79**	**100.00**

21.1.1 Residential Zone I

The basic concept of this zone is to contain the undesirable organic urban spread to the extent possible and to contain the urban core ensuring the effective planned utilization of land. At present the most populous wards in the planning area are those concentrated in and around the central core area due to the proximity to the facilities and good connectivity. These areas have intensive residential activity and are comparatively built up land. Hence further developments in this area has to be restricted to keep good living environment and this area is zoned as residential zone in which certain restriction have been imposed to other uses.

The residential zone comprises 621Hawhich is 6.02% of gross municipal area which is delineated to facilitate the housing demand in the horizon period.

21.1.2 Residential Zone II

Two wards in the planning area viz. Chenad and Chethalayam are isolated and surrounded by reserve forest is located about 10 km away from the municipal headquarters. The Bathery – Perikalloor road (MDR) gives access to the wards which passes through the reserve forest. Different committees constituted for the study of environmental impact in the western ghat recommends certain restriction on the development on such area. But necessary provisions have to be made in the plan to serve essential need of the community. Hence an attempt is made to provide commercial activities to fulfill the basic needs of the local community without compromising the environmental sustainability. Hence 59.06 hectares of land in this area has been zoned as residential zone II. The height of constructions in this zone shall be limited to 10m.

21.1.3 Commercial Zone

At present, all commercial activities are concentrated along the sides of NH766 and other major transportation corridors as ribbon development. It is necessary to control the undesirable and unplanned spread of the activities and to contain the urban core. Hence, it is attempted to contain the commercial activities within the core area with necessary lateral spread up to certain extent. It is assumed that the junctions like Beenachi, Ex–servicemen colony junction, Poothikkad, Poomala, Moolankavu etc. will be developed as commercial nodes. The commercial land use covers an area of 196.6 Ha. In addition to this area, commercial uses are permissible in the Mixed Zone. Moreover, the mixed zones are allowable along the sides of major roads. This shall cover the demand for commercial development in the town. The town has dual function as the taluk headquarters and the service facilitator to the whole taluk and hence the commercial area proposed in the plan may exceed the requirement to some extent.

21.1.4 Mixed Zone (Residential-Commercial)

An extent of 352.92 Ha land zoned as mix zone II which is delineated along the side of NH 766 towards west starting from Poomala road junction and up to ex-service men colony stop west to Beenachi. The places like Ammayipalam, Thoduvatty and Kuppadi is provided within the zone since, they will develop in such a way due to the provision of good connectivity. In this zone all residential and certain commercial activities can be permitted. The identified areas are ideal for both the use and the share of each use in this area shall be determined by the dynamics of development and their offers maximum flexibility in land use regulation.

21.1.5 Public & Semi Public Zone

The area under public and semi public land use comes to 177.22 Ha land which is 1.72% of the gross municipality area. Land under public ownership and private land intended for extension of existing facilities are envisaged in this zone. The municipality anticipates a number of higher level institutions to be set up in the town. No specific land can be set apart for this purpose since the point of time and nature of ownership of these institutions cannot be ascertained at present. Anyhow a suitable location for civic amenities complex is identified on the side of Gudalur road at Kalluvayal which is not earmarked in the plan. A provision for tribal promotion centres is also provided in the plan. The extension of existing public/semi public activities are permitted in all other zones also irrespective of the zoning regulations.

21.1.6 Parks and Open Spaces

At present there are no parks and open spaces in Sulthan Bathery except a town square under construction by DTPC near the St. Mary's College at Kuppadi. Also there is a demand for an open space to convene public meetings and exhibitions. Parks and open spaces occupy 2.43 Ha of land which is land under private ownership located along the northern side of the proposed NH by pass and near to the taluk hospital. More over suitable location for Science Park has been pointed out at the Ex- service men Colony junction near Beenachi but the land is not earmarked in the master plan.

21.1.7 Preferred Industrial Zone

Micro small and medium enterprises (MSME) sector is an important generator of employment. In Sulthan Bathery, engineering and service industries are dominant and there is no specific location for small scale enterprises at present. Even though the economy of the town mainly depends on agriculture, depletion in the agriculture activities can be seen due to the low income generated from the sector. Hence more agro based industries and marketing facilities have to be introduced in this sector to make it profitable and to strengthen the secondary sector. At present there is no industrial area in the town except the Glady's soap factory at Poothikkad and hence suitable land has to be identified for the purpose. An area of 71.47 Ha near to the Glady's soap factory marked for this purpose

which comes to 0.69 % of the gross municipal area. In these areas large and medium industries are proposed. However small scale nonpolluting industries are also allowed in residential zones.

21.1.8 Agriculture Zone

The agriculture zone has an extent of 1579.19Ha which constitutes 15.30% of the gross municipal area. This area besides its economic value due to agriculture production, is significant since large tracts of land is available in this zone within the municipal area. Low density residential building and other compatible uses are permitted in this area with strong regulatory measures and thereby maintain the environmental quality. Also large investments with certain conditions and public and semi public building are permitted.

21.1.9 Transport & Communication Zone

An extent of 177.83 hectares is coming under the traffic and transportation zone. Radial roads and link roads are also proposed to strengthen the internal road network. Widening of existing roads and providing missing links are attempted. The land under this zone also covers bus stand, truck terminal etc.

21.1.10 Hazardous Zone

The hazardous zone includes waste dumping yards, land for sewerage treatment proposed at Kattayad and Kaippencheri, slaughter house, burial grounds and cemeteries.

21.1.11 Reserve Forest

The planning area has a good forest content (6050 Ha) which protects the town from the environmental threats and makes the town afresh and is considered as environmentally sensitive area. Generally, no activities other than that undertaken by the forest department are permitted in this area. To conserve the forest and to protect against encroachments, it is proposed to provide a Buffer zone along the boundaries of forest in which no activities are permitted.

21.1.12 Beenachi Estate

The Beenachi Estate owned by Madhya Pradesh Government located on the western boundary of the planning area at Beenachi is a thickly vegetated plantation with mixed crop and having an extent about 2.22 sq.km. The land is rich for its bio diversity due its peculiar flora and fauna. The rare species of plants and animals are seen here. Hence the land is proposed to bring in possession of the Kerala Govt and to establish a zoological/botanical garden.

21.1.13 Wet Agriculture

The extent of wet agriculture comes to 758 Ha. Conservation of wet agriculture for economic reason is not relevant in an urban context. However, wet agriculture area works as water sinks and undisturbed open land influencing ground water management and micro

climate. Hence this area has environmental significance. The pressure on paddy field for conversion to other urban land uses is tremendous. So conservation of Paddy fields is proposed for maintaining environmental quality and the land use in these areas are to be strictly regulated. Some areas that were under paddy cultivation earlier and release for which of urban land use shall be desirable from the development perspective are included in the appropriate land uses.

21.1.14 Water body

The planning area has 10 small streams (Thodu). The streams passing through the core area are being polluted by the deposition of garbage and are vastly encroached by the adjacent land owners. Hence these are to be preserved considering as an environmentally sensitive area. The banks of the streams are environmentally sensitive and since any polluting activity in this area shall directly pollute river and the steep slopes pose threats to stability. A green belt of 2m width is provided along the both sides of streams having width 1.50m or more to protect them from any encroachments in which no other uses are permitted.

21.1.15 Green Belt

For regulating development of the area adjacent to reserve forest, and to preserve environmental quality and taking advantage of the forest land use, a green belt of 25m width on sides of reserve forest is provided in which development activities are regulated by area and height (the green belt is provided with underlying land use). Also it is insisted to follow the restrictions imposed by **MoEF** time to time in addition to the regulations insisted in this plan. Both the sides of Chethalayam road from Kottakkunnu Jn to Kidanganad village office are not included in the green belt area.

For the streams passing through the planning area are being polluted by the deposition of garbages and are vastly encroached by the adjacent land owners. Hence these are to be preserved considering as an environmentally sensitive area. The banks of the streams are environmentally sensitive and since any polluting activity in this area shall directly pollute river and the steep slopes pose threats to stability. A green belt of 2m width is provided along both sides of streams having width equal to or more than to protect them from any encroachments in which no constructions are permitted. The extent of land under green belt comes to 4 hectares.

21.1.16 Special Zone

Special Zone includes land earmarked for Bus Terminal Complex at Kalluvayal, Truck Terminal at Thirunelly, Town Park near taluk headquarters hospital, Open ground and Stadium Complex near taluk headquarters hospital etc. In these areas all incidental uses also are permitted. It is specified that if the project not materializes within 7 years, from the date of coming into operation of the master plan, the land use shall be deemed under various uses specifically mentioned under special zones in chapter 25 of the report.

CHAPTER 22

TRAFFIC AND TRANSPORTATION PLAN 2042

Sulthan Bathery has a fairly good road network. But most of the roads are inadequate due to the poor road geometry, poor road surface, absence of road drainage, low carriage width etc. The projected traffic volume for 2042 exceeds the carrying capacity of most of the roads. Since the only mode of transport in the district is road, the night journey ban in the NH 766 through Bandhipur National Park exists and the economy of the district mainly depends on the tourism which relies on the transportation network, alternate route to the Karnataka has to be explored. In this scenario the potential of the road viz. Sulthan Bathery – Pulpally – Perikalloor – Bairakkuppa – Mysore has to be explored. The Sulthan Bathery – Pulpally – Perikalloor- Ponnammana Ghatta - Mysore Road has great regional importance since it will act as an alternate road to Karnataka without much forest. But the intervening bridge at Bairakkuppa for which foundation stone was laid jointly by the Kerala and Karnataka Government has yet to be constructed. The interstate connectivity through Pattavayal Road and Thaloor Road shows the emerging need for the strengthening the regional road network. The hinterland of the town has comparatively poor road network which have to be strengthened. Hence formation of missing links and widening of existing roads are attempted to cater to the increased traffic volume in the plan period. The proposal considered by the authorities to construct a Bypass Road connecting Poomala Road junction and Thirunelly junction have also incorporated. Fig.22.1 shows the regional road network in the district.

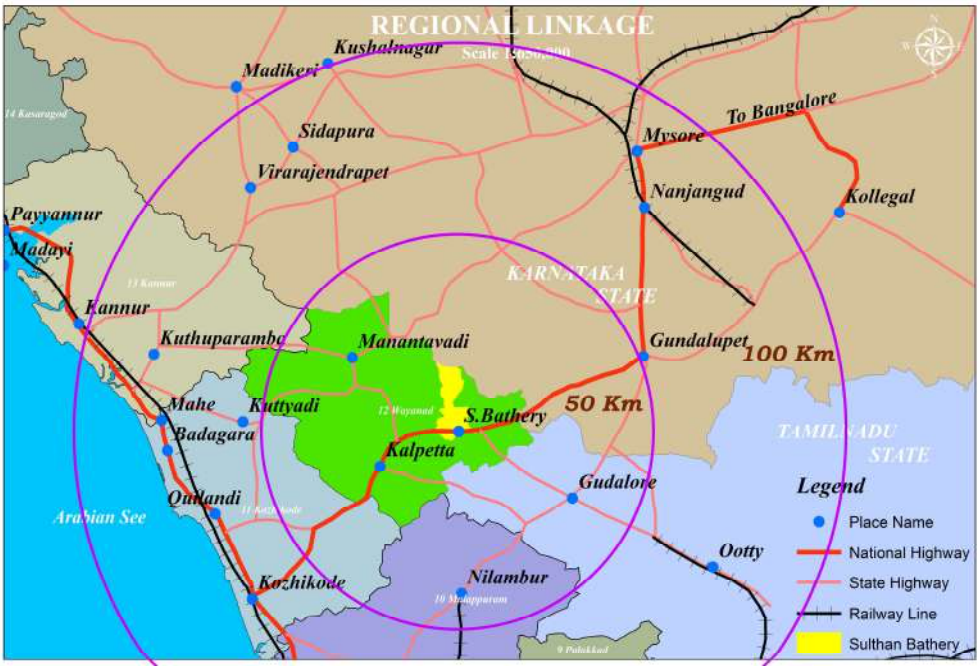


Figure 22.1: Regional Road Network

22.1 Road Network

The transportation planning concept evolved for Sulthan Bathery is "***an efficient and effective road transportation system catering the present and future needs of the town as taluk head quarter and second order service centre, with a combination of radial and ring pattern so as to ensure the safe, speedy, continuous movement of vehicles that facilitate containing the urban core with due consideration to unique topography and environment.***"

The district as well as Sulthan Bathery town is served by public transport system consisting of both state owned Kerala State Road Transport Corporation (KSRTC) and private buses. KSRTC runs inter-state and inter-district service. There are fairly large numbers of private buses meeting the travel demand of district. Sulthan Bathery has two bus stations – Old Municipal Bus stand near Traffic junction and the new bus stand at Chungam. Intermediate Public Transport Modes (IPT) like auto, taxi is serving the local travel needs of Sulthan Bathery town.

From the analysis of existing features and the projected volume, it can be seen that the capacity of current road sections are insufficient to meet the future demand. This will lead to heavy congestion and traffic jams. In order to remedy this, road widening and new link roads to be established with the help of new Master plan. Bus bays and bus stops shall be provided at suitable location as the part of road development. But due to the objections from the public after publishing the master plan, the width of some road has been reduced, and some of the roads eliminated from the master plan. A detailed road alignment and junction improvement plan and traffic management system shall be prepared based on the master plan proposals. The Table 22.1 shows the list of NH and MDR in the planning area.

Table 22-1: List of MDR and NH in the Planning Area

Sl. No	Name of the Road	Average Width in m	Length km
	National Highway		
1	Kozhikode – Kollegal Road NH766	16.00 m	9.12
	Major District Roads		
1	Beenachi – Panamaram Road	12.70 m	2.96
2	Bathery – Pulpally – Perikalloor Road	17.30 m	13.16
4	Bathery – Noolpuzha Road	24.60 m	2.89
5	Bathery – Thaloor Road	17.50 m	2.04

6	Bathery – Malavayal – Ambalavayal Road	10.00 m	4.87
7	Rahim Memorial Road	8.00 m	0.41
8	TB – Chungam Road	5.00 m	0.61
9	Bathery – Kuppadi Road	7.00 m	1.94
10	Kalluvayal – Manthandikkunnu – Chungam Road	7.00 m	2.69
11	Moolankavu – Thelampatta Road	8.00 m	3.23
12	Bathery – GHS – Kottakkunnu Road	4.00 m	0.6
13	Bathery – Kattayad – Pazhuppathoor Road	7.00 m	5.62
14	Beenachi – Kattayad Road	9.00 m	2.43
15	Manichira – Poothikkad – Beenachi Road	7.00 m	2.57

22.2 Proposed Road Network

To reduce the mixing up of intra-city and inter-city traffic, proposals of bypass roads are made. This will help to reduce the congestion in the core area of the town where road widening is not possible. Thus to divert the traffic from the major roads, alternate link roads have to be strengthened within the area. The width of Sulthan Bathery – Cheeral – Ootty Road (24.6m) is found sufficient to meet the future requirements and the Sulthan Bathery – Pulpally Road (17.3m) passing through the reserve forest which is not recommended for widening. The alignment of ring roads and link roads are shown in Fig.22.2.Even though, the study and analysis were carried out with respect to the 2000 ward divisions i.e. 18 wards, attempt is made to distribute the proposals among the latest 35 municipal wards for administrative convenience.

22.2.1 National Highway NH 766 (Old Name NH 212)

The national highway (NH 766) passing through the town act as the main transportation corridor at present. This road has varying width at present but an average width of 18m. The National Highway Authority of India had fixed the width of National Highways as 45m. Presently both sides of NH 766 of the Core (CBD) area are heavily built up and undulated so as to unable further widening. Hence a proposal to construct a bypass road starting from Dhottappankulam and ends at Thirunelly has been taken up by the authorities for which the administrative sanction has been awarded and alignment has been tentatively fixed with the proposed width of 30m. The existing portion of the NH within the

core area (from the starting point of NH Bypass to Ending point of NH Bypass) is proposed keep with the existing width of 18m considering the above facts.

22.2.2 Major District Roads (MDR)

Majority of the roads within the planning area owned and maintained by the PWD are categorized as Major District Roads. Out of the 15 MDR three are interstate roads Viz. Sulthan Bathery – Thaloor road, Sulthan Bathery – Pattavayal road and Sulthan Bathery – Perikalloor Road out of which Sulthan Bathery – Pattavayal Road have adequate width to carry the present and future traffic and hence not proposed for widening. At the same time the Bathery – Perikalloor Road which passes through the wild life sanctuary is not proposed for widening due to the restrictions imposed by various agencies like MoEF. Presently most of the roads are inadequate to carry the projected traffic volume and have insufficient carriage width.

22.2.3 Proposed NH Bypass Road

A bypass road connecting Dhottappankulam at NH 766 passing through Kalluvayal – Kaippencheri – Block office – Thirunelly at NH 766 are considered by the local administration for which administrative sanction has been awarded and alignment has been tentatively fixed by PWD with a width of 30m. In the event of change in alignment of NH bypass proposal in the master plan, after the commencement of land acquisition of the new alignment, the land parcels in stretches excluded from the original alignment may be changed to adjacent suitable land use zone with the concurrence of the Town Planner.

22.2.4 Link Roads

Link roads are intended to connect the central core area with the ring roads, inner link roads etc. to facilitate easy movement of both vehicles and pedestrians and to decongest the central core area. The major link road and their existing and proposed widths are shown in table 22.2.

22.2.4.1 Chungam -Kaippencheri-Kalluvayal-Manichira-Poothikkad-Dhottappankulam Link Road

This is an existing road starting from Chungam near the new bus stand, passing through high density residential areas at Kaippencheri, Maithanikkunnu, Kalluvayal - Manichira – Poothikkad and ends at Dhottappankulam at NH 766. The road serves access to the bus stand and connects the proposed NH bypass road at Kaippencheri. If the road is materialized, it will give motor access to the hinterlands of the town. Presently the road has varying width and is proposed to be widened as 10 m.

22.2.4.2 Moolankavu – Thoduvatty Road

A link road connecting Moolankavu at Noolpuzha Panchayat area (within the administrative limit of Sulthan Bathery) and Thoduvatty is proposed which is an existing one having average 4m width. The road is proposed to be widened as 7m.

22.2.4.3 Beenachi – Panamaram Road

This road takes off from Beenachi junction of NH 766 and leading to Panamaram which shows the least traffic volume among the MDRs. But due to BAN of night journey through Muthanga, the Mananthavady – Kutta – Hunsur road will be the alternate route to Mysore and hence this road has much regional importance. At present the average carriage width is 8 m and is suggested to widen to 18 m.

22.2.4.4 Sulthan Bathery – Kattayad Road

This road takes off from Vinayaka Hospital junction at NH 766 and passing through Kattayad and leads to Beenachi forming a ring road and is passing through a residential area. The road at its starting has less carriage width and both sides are heavily built up. Major institutions like Vinayaka Hospital and Vidhya Mandhir School are located by the side of this road. All the existing road stretches are proposed to be widened to a width of 7m after considering the topography, future needs and the restrictions imposed by WGEEP report.

22.2.4.5 Moolankavu – Odappallam – Pazheri – Moonnam Mile Road

This is an existing link road starting from Moolankavu at NH 766 and passing through Odappallam – Pazheri – and reaches at Moonnam mile at Sulthan Bathery – Perikalloor Road. This road will facilitate easy traffic to the commuters from the Mysore side towards Pulpally side without touching the core area. This will become another major transportation corridor towards the St. Mary's College, St. Mary's Higher Secondary School and Kuppadi High School. The whole stretch of the road has an average width of 6m and is proposed to widen to 12m.

22.2.4.6 Sulthan Bathery – Poomala – Malavayal Road

The road is starting from Poomala road junction at NH 766, passing through Manichira, Poomala and leading towards Malavayal and Chulliyode. The road gives access to Manichira lake, Soap factory at Poothikkad and the Brahmagiri Meat Processing Centre at Malavayal. It is a connecting link of Sulthan Bathery with nearest Ambalavayal and Nenmeni Panchayat areas. The proposed Ring road will intersect the road at Poomala. Presently the road has varying width and it is proposed to be widened as 12 m.

22.2.4.7 Sulthan Bathery – Poothikkad – Ambalavayal Road

The road connects Sulthan Bathery with Ambalavayal Panchayat area in which the famous "Edakkal Caves" located. It will create a short cut to the Ambalavayal which will facilitate the easy movement of tourists touching the Manichira Lake. The existing stretch is proposed to be widened to 12m.

Table 22-2: List of Roads Proposed For Widening/ Formation

Sl.No.	Road Proposals	Existing Width in m(ROW)	Length in Km	Proposed widening in M.
1	Proposed NH Bypass	New Formation	4.143	30
2	National Highway 766	18.00	5.363	30
R1-Roads (18m)				
1	National Highway 766 (From NH By pass starting to NH Bypass Ending)	18.00	4.119	18
2	Beenachi – Panamaram Road	8.00	2.960	18
3	Bathery – Thaloor - Gudalur Road	10.00	2.000	18
4	Bathery -Kuppadi Road	12.00	2.166	18
R2-Roads(12m)				
1	Malavayal Road	10.00	2.560	12
2	Ambalavayal Road	10.00	2.842	12
3	Kuppadi - Post Office Road	7.00	1.300	12
4	Vadakkanad Road	10.00	1.951	12
R3-Roads (10m)				
1	Beenachi - Pazhuppathoor Road	10.00	1.300	10
2	Pazheri Road	7.00	1.731	10
3	Odappallam-Pazheri Road	6.00	1.450	10
4	Odappallam-Valluvaadi Road	8.00	2.524	10
5	Mathamangalam Road	6.00	3.620	10
6	Dhottappankulam Road	6.00	1.348	10
7	Kalluvayal - Maidani Kunnu Road	6.00	1.119	10
8	Chungam-Kaippancheri-Maithanikkunnu Road	6.00	1.565	10
R4-Roads(7m)				
1	Kaivattamoola-Bathery Road	7.00	3.076	7
2	Kattayad-Vidhiyabavan Road	5.00	1.627	7
3	Gurukulam Road	4.00	0.600	7
4	Thoduvetty Road	4.00	1.860	7
5	Ex-servicemen Colony – Poomala Road	5.00	3.243	7+4m Building line
6	Pallikkandy Road	6.00	1.300	7

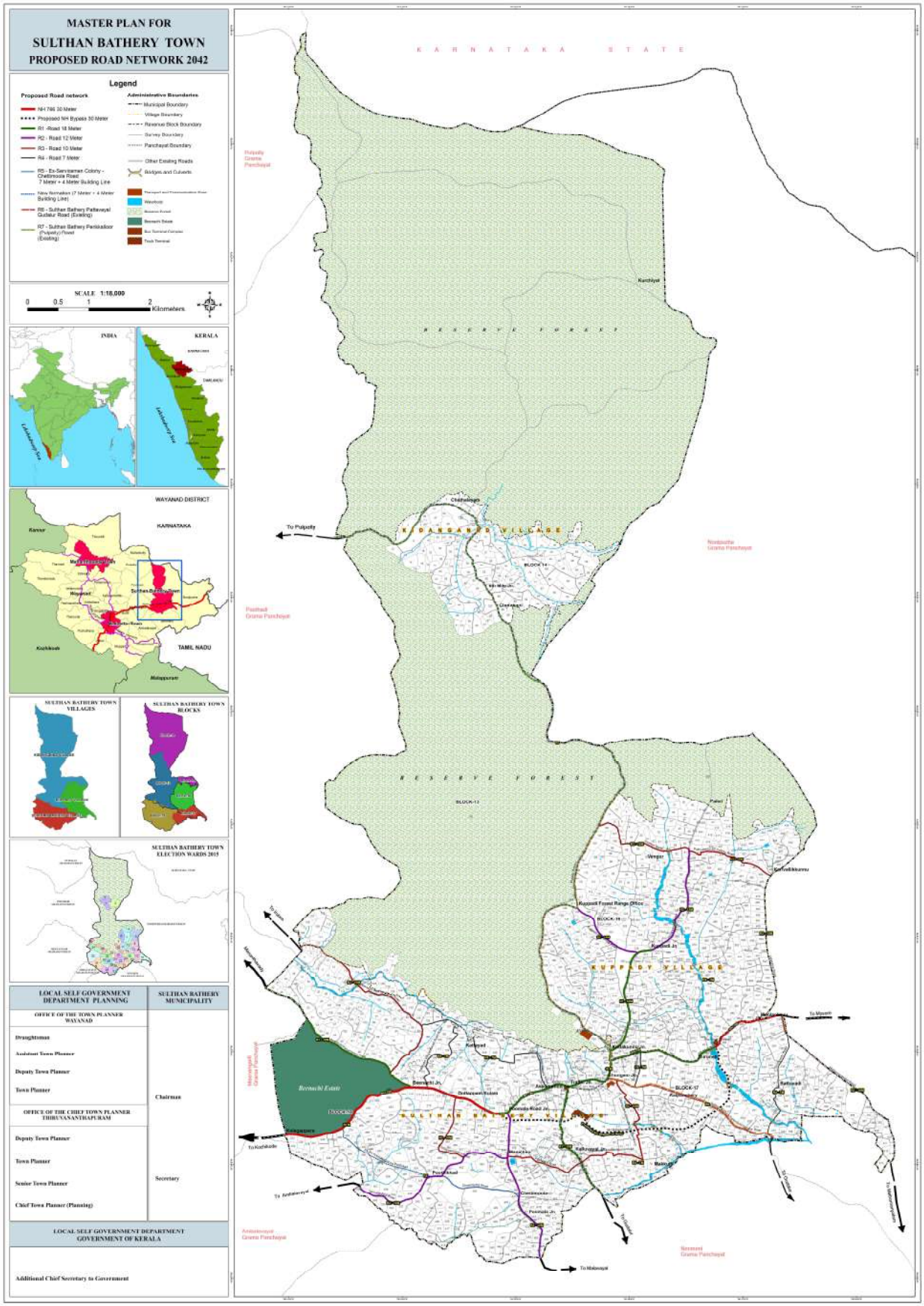


Figure 22.2: Proposed Road Network Map

22.3 Other Proposals

The basic concept of the road network plan are to strengthen the existing road network and ensure the safe, speedy, continuous movement of vehicle and to facilitate bypass the through traffic, avoid the congestion within the town providing bypass, radial roads and link roads, improvement in geometry, width, providing missing links etc. and to divert intra town traffic from the National Highway and other arterial roads. Improvements of major junction are also to be taken up while widening the existing roads for which separate plan has to be prepared. A separate transportation plan has to be prepared to connect all the interior areas by bus routes. All residential area has to be served with public transportation. More over the proposals and restrictions imposed by different committees constituted to study the environmental issues in the western ghat have to be taken into account. A new link between Moolankavu and Thoduvatty is proposed 7m width in the plan to facilitate easy movement of vehicles. The proposed road network with its proposed width is shown in Fig 22.2.

22.3.1 Junction Improvements

The capacity of roads in urban areas is governed by the capacity of intersections to a great extent. Most often, it is the intersection which is a major cause of delay apart from being an accident prone location. Thus the designing of intersections have an important role to play in efficient and smooth flow on road network. At present there are no planned road junctions in the town and absence of traffic islands, traffic signals and other controlling devices makes the junctions congested. Hence all the junctions have to be modified scientifically for which separate improvement plan has to be initiated. The following junctions need improvement.

1. Chungam Junction
2. Traffic Junction
3. Assumption Junction
4. Gandhi Junction
5. Beenachi Junction
6. Poomala Road Junction
7. Kottakkunnu Junction
8. Kapyarumala Junction
9. Manichira Junction
10. Kalluvayal Junction

22.3.2 Bus Terminals

22.3.2.1 Municipal Bus stand

At present there are two Municipal bus stands viz. Old bus stand near Traffic junction and Chungam bus stand which are quite inadequate to meet even for the present requirement. The KSRTC Garage near Kottakkunnu serves only as a terminal of long trips conducted by the Corporation. Hence the possibility of another bus stand has to be explored. In this context the local body took initiatives to construct a bus Terminal Complex under BOT system near Gandhi junction and to convert the existing old bus stand for commercial purpose. An extent of 2 Ha of land earmarked in the plan. This is located near to the proposed NH bypass proposed by the PWD. If the NH bypass considered by the PWD from Dhottappankulam to Thirunelly materializes, it will give access to the proposed bus stand.

22.3.2.2 Truck Terminal

Since there is no truck terminal/ lorry parking area in Sulthan Bathery, a suitable location for truck terminal has been identified on the northern side of the NH766 at Thirunelly. The proposed land of extent 0.5 Ha is earmarked in the plan.

22.4 Traffic Control Devices

Traffic control devices are all signs, signals, markings and devices places on or adjacent to a street to regulate calm or guide traffic.

22.4.1 Traffic Signs

Traffic signs are traffic control devices fixed or portable for conveying warning, information, requirements, restrictions or prohibitions to traffic on road. No such sign boards were seen at intersections in Sulthan Bathery town. Hence it is suggested to place sign boards at Kottakkunnu Junction, Chungam Junction, Traffic Junction, Assumption Junction, Gandhi Junction, Poomala Road Junction, Beenachi Junction and Manichira Junctions, Kuppadi Junction, Moolankavu Junction, Poomala, Poothikkad and Ex-Service Colony Road Junction.

22.4.2 Traffic Signals

A traffic signal, which alternately directs to stop and proceed, when properly designed, located and operated will achieve the following advantages.

- Effective orderly traffic movement
- Provide for the continuous flow of traffic in small platoons
- Allow other vehicles and pedestrian to cross heavy traffic stream
- Reduce incidence of right angle and pedestrian accidents.

Therefore, in Sulthan Bathery town, it is advisable to install traffic signal system at all the major junctions. Along with that speed humps, Zebra crossing, Road marking, Night road reflector, Road safety mirror etc. has to be provided to ensure safety of the people.

22.4.3 Pedestrian - Vehicle Segregation Technique

Pedestrians can be segregated from main traffic flow by the following methods, imparting greater safety.

1. Raised foot paths are always preferable for segregating pedestrian from traffic flow. Where it is not possible, segregate the foot path from carriageway by using guard stones and railing. Railings along foot path and central dividers are particularly important near the intersections so as to force pedestrians to cross only at the designated crossing.
2. Absence of proper foot paths were seen in Sulthan Bathery town during the inventory survey. It is suggested to provide foot paths with railing at major junctions. Marked cross walks indicate optimal or preferred locations for pedestrian to cross and help designated carriageway for motorists to yield pedestrians. Chungam junction, Traffic junction and Assumption junction on NH 766 were seen to be high pedestrian crossing locations in town. Hence zebra crossing facilities are to be provided at all arms of these junctions.

22.4.4 Parking Control Measures

From the road inventory and analysis of parking data, it is evident that much of the parking problems are due to shortage of road space. Locations of auto rickshaw stands at the bell mouth of junctions and haphazard parking of vehicles on the curb space are some of the causative factors for traffic chaos in this town. Un-organized parking of vehicles creates traffic congestion in NH. The parking of two wheelers and Auto Rickshaws in the bell mouth of junctions along road should be restricted.

At present there is no organized taxi parking in the town. Taxi parking can be accommodated in the place where existing old bus stand when it is converted into commercial space. Also space should be made available in the premises of New Bus Stand. The local body shall promote pay and use Parking space for both private and taxi vehicles in the core area. Since the land value is comparatively high in the core area, multilevel parking system has to be adopted. Necessary parking space shall be provided in the Mini Civil Station premises also.

Auto rickshaws and taxi parking on the kerb of external roads shall be made into separate bays while widening these roads. All the major roads shall be given adequate foot path for pedestrian traffic to ensure pedestrian safety.

CHAPTER 23

SECTORAL PROPOSALS

As per the findings of the District Urbanization Report, Sulthan Bathery is one of the 2nd order settlements in the district. Since it is a taluk headquarter town, Sulthan Bathery has to perform urban activities along with its strategic administrative function. This area will also provide higher order service requirements of other settlements within the taluk. The analysis also clearly points out that any planning effort for planned development of Sulthan Bathery should consider the unique topography and environment of the town and its region. Hence the town has to develop as an eco-friendly and economically vibrant taluk headquarter town with taluk level service facilities.

The development goals emerged reflects the thrust areas where planning intervention is required so as to cater the present and future need of the district, taluk headquarter and second order service centre town. Based on the studies and analysis, discussions made with stake holders and projected future requirements, the following sectoral proposal has been made to tackle the existing problems and to cater the future demands. The requirements in transportation sector is dealt in separate chapter and hence not attempted in this chapter.

23.1 Industry

As an agro based area blessed with salubrious climate having thick vegetation and good forest content, eco-friendly – nonpolluting – non-hazardous – agro based industries are preferred. Proper connectivity with rail and air transport has to be provided to ensure the development of the town as well as the district. To generate more job opportunities micro small and medium enterprises (MSME) sector have to be promoted. The major proposals made in this sector are as follows.

- The transportation sector has to be strengthened.
- Value addition of hill produces, branding and its marketing may be promoted.
- Exhibition cum trading centre for MSMEs has to be established.
- Entrepreneurship development training centre has to be set up.
- Units for promotion of eco-friendly portable bio-gas plant, bio-manure production and setting up of handicrafts units.
- Group based industries such as cottage industries incorporating SHG's such as Kudumbashree can be promoted to strengthen the economically weaker sections and women.
- Engineering and service industries which are dominant in the town may be strengthened by providing infrastructure facilities.

- Exporting value added products by exploring the proximity of Beypore Port and International Airport at Karippur.
- Traditional handicraft item and tourism based industries may be promoted.
- In Animal husbandry sector, cattle farms under group basis and single entrepreneurs can be promoted and thus the potential created due to the Brahmagiri meat processing centre at Nenmeni Panchayat area may be utilized.
- Production of milk and milk based products has to be promoted.
- Since there is enormous potential for traditional industries, herbal medicines and spices in tourism sector, its production, value addition and marketing may be promoted.
- IT based industries can be promoted since the proximity of the IT hub viz. Bangalore can be explored.
- Single window clearance system to issue permit for industries shall be implemented effectively.
- Data regarding sick industries has to be taken and adequate measures have to be taken for the revival and rehabilitation of those industries.
- Industries for processing of plastic waste, such as those who produce granules, have to be promoted.
- An extent of 0.3 Ha land available at Poothikkad can be used for Industrial Estate

So an area of 71.47 Ha land near Poothikkad Glady's Soap Factory has been earmarked as "Preferred Industrial Zone" for industrial purpose in this plan. Along with other land use a preference is given for industrial in this area. So the major industrial projects may be directed to this preferred industrial zone in future. The project may be mobilized either by the local body or P.P.P Scheme or by private parties. The development of this sector is made by providing regulatory/ promotive measures in the plan.

23.2 Trade and Commerce

The commercial developments are concentrated along the sides of NH 766 and other major transportation corridors as ribbon development and the hinterlands are thereby obstructed. Since the town has to perform as a taluk headquarters, 2nd order settlement of the district and to provide facilities to the tourism sector, more land has to be earmarked in the master plan as commercial use to meet the future needs. The development of this sector shall be ensured by the land use policies and projects to be taken up by the LSGI. The zoning for commercial use provided in the land use plan shall ensure the supply of land for commercial development in private sector.

An area of 196.60 Ha of land within the core area of the town is delineated for commercial zone in the plan. In addition to the commercial activities, budget accommodation to the tourists such as studio apartments, hotels and restaurants of International level, fish and meat market, vegetable market, markets for collecting, processing, value addition and marketing of hill produces etc. are envisaged. Parking lots and parking plazas also were proposed. All the projects are either taken by LSGI or P.P.P or individuals. All these projects may be considered either by LSGI or PPP or individuals after study on viability and preparation of the detailed project reports.

In order to decongest the core area it is required to open more land for commercial development in order meet the future development needs so, more areas are delineated as mixed zone (either commercial or residential). They are along the sides of NH 766, in and around the proposed nodes in which all the commercial activities are permitted. And an area of 352.92 ha land earmarked for mixed zone in this master plan. The recent trend of commercial development is seen along the sides of major roads. So the mixed zone has been extended to both the sides of all major roads also according to the width of the road. The other proposals are

- Comfort station/E-toilets/community toilet shall be constructed at different location especially near new bus stand and old bus stands, mini civil station etc.
- More parking areas such as parking plazas and multilevel parking facilities are to be developed at the existing old bus stand and the core area of town and loading/unloading area at different locations has to be provided.
- An area of 0.53 hectare is earmarked for truck terminal and its allied activities such as dormitory, toilet and budget accommodation etc. on the northern side of the NH 766 at Thirunelly to satisfy the future need in this sector.
- Well-equipped fish and meat market shall be set up by the municipality.
- A fruit and vegetable market has to be established.
- The LSGI with private participation may promote economy shops at prominent places in the municipality to control the price fluctuations in the market and to ensure supply of the quality products. This may be treated as a joint venture of NGOs, Kudumbashree units with LSGI.
- Strict measures have to be imposed to make the town as a “clean city-green city” by adopting suitable waste management system.
- 10 acre of the existing agriculture market at Ammayipalam can be utilized for further extension such as nursery, seed farm and training centers (including field level training of modern techniques).
- Open ground or exhibition ground to be promoted to enhance the commercial activity in the area.

- Land adjacent to the proposed bus terminal complex extends up to 0.3 hectare is delineated for open ground for conducting common programs, exhibitions and for accommodating street vendors.

23.3 Tourism

Town has no identified tourism spot except the Jain Temple. But Sulthan Bathery being a taluk headquarters town and the "**Gate way to the Wayanad**", should act as a facilitator to promote the tourism sector. The only identified heritage site in the town is Jain Temple which is protected by the Archaeological Department which has to be conserved and converted to tourism spot. The development of tourism infrastructure like home stays, resorts, serviced villas etc. has given emphasis is all the zones, because tourism is the next income generator after Agriculture. Number of projects is formulated in tourism sector with a view to promote tourism facilities in the town are as follows.

- Strengthen the tourism circuit connecting all the tourism spots within the district which can be operated by DTPC.
- In the proposed land use plan, it is proposed to construct recreational open space named as "Town Park" near the proposed stadium.
- The Beenachi Estate under the ownership of Madhya Pradesh Government if released to the state government, can be make use of for a botanical / zoological park which will enhance the tourism and there by enhance the local economy.
- Budget accommodation for tourists such as studio apartments, hotels and restaurants etc. are proposed in the core area.
- The "Chethalayam waterfalls" under the custody of the forest department may be developed as a tourism spot. This may be taken as a combined venture with DTPC and Forest Department.
- The thick vegetation on the peripheral wards can be utilized for farm tourism in which plantation of medicinal plants, floriculture and spices etc. may be promoted.
- The existing pond at Manichira can be used for boating and improvements also can be done with the provision of garden facilities.
- Watch tower has to be constructed in the interior of the forest to watch the wild animals.
- Promote monsoon tourism, folk art forms, cultural tourism, responsible tourism, village experience etc.
- Estate tourism or farm tourism can be promoted
- A proposal for town beautification has to be prepared to encourage tourism.
- GIS based data base of tourism sector has to be prepared.

23.4 Agriculture

The economy of the town mainly depends on agriculture. 71.18 % of the total agricultural area is dry cultivation, which depends upon rain. At present, there are no irrigation facilities. Other problems faced in this sector are the increased production cost, non-availability of agricultural laborers, crop destruction by wild animals especially elephants and bears, absence of efficient mechanization for paddy cultivation, various diseases, lack of marketing facilities etc. The cultivation without considering terrain of the land causes soil erosion and thereby reduction in crops. From physical analysis it is seen that conversion and subdivision of agricultural land for other purposes were taking place in the planning area.

The major proposals in the sector are -

- Providing markets with facility to collect, store, process, make value addition, branding and marketing of hill produces. The project can be taken as a joint venture of both LSGI and co-operative sector.
- Now there is no irrigation facility. Irrigation facility can be introduced by constructing check dams at various locations (number and locations are to be decided based on a detailed study)
- Water bodies shall be conserved by constructing “gully plugging”/brush wood check dam from the origin itself.
- Suitable measures like contour bunding, turfing, planting of bamboos and “kaitha” etc. can be resorted to prevent soil erosion.
- Indigenous crops are to be retained and market based crops such as medicinal plants, areca nut, horticulture and mushroom cultivation etc. can be enhanced.
- Homestead cultivation may be promoted in the hinterlands and roof top vegetable cultivation may be enhanced.
- Existing paddy fields shall be conserved and vegetable cultivation shall be enhanced.
- Unauthorized land subdivision shall be prevented by introducing zoning regulation measures.
- Product diversification in agricultural sector shall be introduced, i.e. Farmers group containing 10 to 20 members shall be constituted and supply of raw materials, processing, value addition collection etc. shall be done on the leadership of one such group. The products shall be branded and marketed by the leader group.
- Mechanization in agricultural sector shall be made so as to get extra income to the jobless youths especially for ladies.

- Incompatible cultivation, indiscriminate use of pesticides and manures shall be prevented and awareness campaign in this regards may be done with the help of Krishi bhavan and NGOs.
- Paddy cultivation shall be enhanced by introducing group farming and make use of NREGP and make profitable by introducing high yield seeds, manures and adopting new farming techniques.
- Cultivation based on bio manure may be promoted and marketed.
- Planting of fruit trees along the periphery of forest land will serve food to the monkeys and the destruction caused by them in this sector can be minimized.
- Necessary protective works such as solar fencing, bio fencing, rail fencing, forest wall etc. may be constructed through the boundary of the forest to reduce man animal conflict.
- Formation of labor bank at ward level for convenient supply of labors for agriculture and other sectors.
- Promotion of export oriented floriculture.
- Precision farming and protected farming shall be promoted.
- Agro clinical centers and agriculture training institute shall be established.
- Unscientific method of constructing ponds to be prevented and action has to be taken for preserving the existing ponds.
- The existing agriculture market has to be strengthened and there is a need for establishing a cold storage.
- Effective utilization of rain water harvesting system to promote the cultivation in the summer season.
- Estate tourism/ farm tourism can be promoted.

23.5 Animal Husbandry

Even though the people of Sulthan Bathery are good consumers of meat as revealed by the studies, most of the cattle and chickens are imported from the neighboring states at present. Hence meat production has to be enhanced. Moreover, the potential due to the presence of Brahmagiri meat processing centre at Nenmeni Grama Panchayat area has to be explored. The major proposals in this sector are -

- The construction of slaughter house has to be initiated.
- The existing fish and meat market at Assumption junction is congested and cause nuisance to the public and hence a new fish and meat market has to be established.

- Cattle farms and poultry farms under group venture incorporating SHG's and Kudumbashree units etc. can be promoted.
- The distributions of calf among the farmers by Brahmagiri Development Society (Though JLG) have to be encouraged.
- The presence of doctors shall be ensured at slaughter house.
- Waste disposal and drainage facilities of the fish and meat market shall be ensured.
- Hatcheries of suitable capacity shall be established for ensuring availability of seeds.
- Facilities of the veterinary hospital have to be modernized to meet the future requirements.
- Mobile veterinary clinics may be introduced to make available the service to the hinterlands.
- Digitized data regarding the animal stock in the LSGI may be prepared and to be updated periodically.
- A comprehensive plan to ensure the immunization and periodical monitoring.
- Fodder (high breed) cultivation shall be promoted.
- Construction of bio gas plants may be promoted.
- Milk production has to be increased by introducing group based ventures and automatic system of milk collection to be promoted.
- A centralized laboratory has to be established to ensure the quality of the milk.

23.6 Fisheries

The fisheries sector is not prominent in the town, the town not being a coastal one and has no major water bodies like back waters or lakes. Any how the available ponds within the planning area can be utilized for fish farming. These are used for ornamental fish cultivation also. So no major intervention by the development plan is necessary in this sector.

23.7 Water Supply

The existing water supply scheme was established in long year back which served only on the central wards of the town. Water level in the wells and other sources is seen decreasing during summer season and there by creates water scarcity. The present scheme is not at all sufficient to fulfill the demand of Sulthan Bathery and the distributing components of the existing scheme is very old and augmentation of the scheme is not possible. Acute scarcity of water is being experienced especially during summer months. More over the open wells located here and there also dries up during summer. A project under CWS scheme is being considered by the authority with the financial aid of NABARD

and DPR has been prepared by the KWA and got approved. The proposed Scheme under CWS Scheme with 16 MLD capacities is expected to fulfill the projected demand. Hence the scheme is safer side.

The project aims to collect water from the Karapuzha reservoir at Muttil Grama Panchayat area and to store and treat water from the storage tank at "Swargam Kunnu" at Thrikkaippatta and to supply the treated water to the entire Planning area along with Noolpuzha and Muttil Grama Panchayat areas

- On sight remedies such as chlorination shall be made to domestic wells to prevent the contamination
- Construction of septic tank may be made mandatory.
- Proper awareness campaign has to be made to prevent contamination of wells.
- The water distribution pipes shall be properly laid to prevent contamination from the road drains.
- Rain water harvesting arrangements to the building shall be made mandatory.
- Bring the various agencies such as KWA, BSNL, PWD and LSGD on the single platform for developing long term integrated vision for the provision of distribution system.
- Periodic awareness campaign has to be organized about the importance and consumption of safe drinking water and its protection.
- Construction of bore well to be regulated/minimized.
- The water bodies available in the interior of forest have to be protected to ensure the availability of drinking water for wild animals.

23.8 Drainage

Even though Sulthan Bathery has a good network of natural drainage, all of them are blocked with deposition of garbage or by encroachments by the adjoining land owners. Hence all the "thodu puramboke" has to be conserved and a buffer zone along the side of the drains have to be provided to protect them from further encroachments in which construction activities are prohibited.

- Sulthan Bathery is blessed with a well established natural drainage system which comprising of streams originating from peaks and flowing through the agriculture land and joining at valleys which is ultimately stored either in paddy area. The above system is in tune with the topography and environment of the town. Hence instead of envisaging a manmade drainage necessitating large capital investment to cater the rugged topography, priority should be given to the surveillance of existing natural drainage system. This approach in the sector have twin engine of benefits i.e. Ensuring a natural drainage system with less capital investments and second is an

eco-friendly development and above all it will facilitate maximum opportunity for the penetration of the storm water into the ground which will facilitate the ground water recharge and fertile quality of the soil.

- LSGI should take care in their annual budget that sufficient amount should be set apart for cleaning and maintenance of rivers and streams.
- Ways and means to link the maintenance and cleaning of natural drains with centrally sponsored NREGP scheme and this will reduce the financial burden of the LSGI.
- Construction of concrete drainage on the side of major urban corridors.
- Provision of sewage treatment plant near the core area.
- Construction of drainage in core area and missing links.
- A drainage master plan has to be prepared for the efficient drainage network.

23.9 Sewerage

There is no organized sewerage network in Sulthan Bathery. Some of the commercial establishments let out waste water to the drainage channels and this practice shall be strictly prevented. Majority of this issue was identified in Kaippencheri and Kattayad. Considering the topography of the planning area, it is better to provide a decentralized system of sewerage disposal for the planning area. Hence waste water treatment plant is proposed to be constructed near Kaippencheri and Kattayad and the waste water generated in the town centre shall be directed to the treatment plant before letting out into the streams. Hence an extent of 0.74-hectare land has been earmarked for the proposed sewerage treatment plant.

23.10 Solid Waste Disposal

Sulthan Bathery has a waste dumping yard at Karuvallikkunnu near Odappallam and presently the collected wastes are burnt using incinerators without proper segregation. Even though the waste disposal method of the LSGI is not scientific or fool proof, it did not create any public protest so far. The area of the land is only 0.5 acres which is quite insufficient to meet the requirements. Hence the additional area for future expansion may be procured in the plan period.

At present the waste generated is 8T/day but collection is only about 5 T/day at the predetermined points in the core area of the town. The solid waste consists of both bio and non-bio degradable substances. Segregation of waste at source has not been done and waste is simply burnt at the yard.

Other proposals are-

- Separate waste collecting bins for bio degradable and non-degradable materials have to be placed at all prominent places in the town.

- Depositing waste on the roads, drains, streams and public places has to be restricted by proper enforcement mechanism.
- Decentralized approach in waste disposal shall be made and the programs like pipe composting, bio gas plants, community bio gas plants at colonies etc. can be implemented.
- Installing plastic shredding machine at the waste dumping yard owned by the local body.
- A campaign for "onsite scientific disposal of waste" shall be engaged which will reduce the burden on local body in this sector.
- Vermi-composting shall be encouraged.
- Scientific treatment plant with modern technologies shall be installed in the waste dumping yard.
- The approach road to the waste dumping yard shall be widened to 7 m.
- The service of NGOs and Kudumbashree units can be utilized for the collection, separation and disposal of wastes.
- Adequate measures have to be adopted for disposal of e-waste.

23.11 Energy

The energy position in the town is seen commensurate with the requirement. It is presumed that the routine expansion programme of the KSEB shall be adequately covering the increased energy demand in the town. Other proposals in this sector are-

- Usage of non-conventional energy shall be encouraged.
- More trees should be planted to make availability of fire wood.
- Chimneys with low consumption of fire wood as initiated by ANERT shall be introduced among the community.
- Usage of solar energy has to be promoted.
- The power distributing system shall be strengthened to reduce distribution loss.
- A data base of the consumers shall be prepared and the billing system shall be modernized.
- Necessary steps are to be taken to reduce energy consumption to meet the demand from existing resources.
- An efficient street light system using the solar energy is proposed in the master plan.

23.12 Education

It is estimated that the existing educational institutions are sufficient to meet the requirement of Sulthan Bathery in plan period. But the town lags facilities for higher education and professional education sector. Hence the planning area needs one Polytechnic college and ITI as well as the institutions in higher education sector. So the local body shall initiate setting up of these institutions either in private or public sector.

The other proposals are-

- Computerization with internet facilities (multimedia class rooms) should be made available to the schools.
- New and job oriented courses shall be introduced.
- Training centers at district level for teachers have to be established.
- TTI and B-Ed colleges shall be established.
- The infrastructure facilities shall be strengthened to meet the future requirements.
- Separate dining halls, library halls and gymnasiums in the schools shall be provided
- Infrastructure related to sports has to be strengthened.
- Public transportation facilities shall be extended to the schools.
- Separate parking space for vehicles shall be provided in the schools and on road parking should be avoided.
- Children parks shall be introduced in the primary schools.
- The school premises shall be kept eco-friendly by planting suitable species of plants.
- Facilities to safe drinking water shall be ensured.
- School buses shall be provided especially to the hinterlands.
- PTA has to be strengthened and proper training shall be provided.
- Vocational training in school level shall be initiated.
- A special school for mentally and physically retarded children shall be established
- The student police scheme shall be strengthened.
- Periodical classes and seminars shall be conducted in schools to make awareness about laws related to road safety.
- Auditorium, Library and reading room, counseling room, incinerator, craft room-learn and earn-marketing room, eco-park & rain water harvesting etc. shall be initiated.
- Provision of establishment of a central food preparation unit in all sub districts to supply noon meals to all schools.

- An institution for world class establishment of Central Students Amenities Complex with placement and counseling centre and a coaching centre for all competitive exams shall be established.
- Establishment of an Institute for Modern and Alternative Medicine and for the popularization and conservation of medicinal plants.
- Establishment Tribal promotion centre cum residential school including the study centre for tribal languages and culture.
- Provision of "public place" to interact the old generation and new generation and should have an association between them.
- Municipal level committee should be formed to verify the physical and educational quality of institutions in unaided sector.

23.13 Health

According to the standards, health facilities available in the town are seen adequate. But Sulthan Bathery being a taluk headquarter town has to serve as a regional level facilitator. Major problems in this sector are the insufficiency of facilities in the hospitals. The taluk hospital, the only allopathic hospital in public sector is recently shifted to the new hospital complex, at Fairland and it is proposed to convert the existing old hospital into a women and children hospital. There is no super speciality hospital in the town and hence the taluk hospital at "Fairland" has to be upgraded to the status of general hospital.

Since the district is dominant in ST population (18.53% as per 2011 census) who are hesitate to get treatment from the health centers due to their unique culture, it is essential to establish a separate wing for the tribes in the taluk hospital which will serve the whole taluk. Super speciality facilities should be introduced in the taluk hospital.

Other proposals in this sector are-

- Mobile clinics shall be introduced to serve in the hinterlands especially in tribal areas.
- A blood bank shall be provided.
- A laboratory with modern facilities shall be introduced under Govt.sector.
- A cancer detection centre shall be established in the proposed hospital complex.
- Health sub centers shall be provided in the hinterlands at prominent places.
- Old age homes should be established.
- Ambulance with 24 hours service shall be introduced.
- A regional analytical laboratory with modern facilities shall be established.
- Mosquito eradication programme shall be strengthened and periodical monitoring shall be made.

- Facility to provide essential medicines at low price to economically weaker section.
- Periodical maintenance of hospitals shall be made.
- Treatment based on herbal medicines and indigenous treatment shall be promoted.
- Quarter's facility to the doctors and staff in the hospitals shall be provided.
- Planting medicinal plants shall be promoted.
- Health institutions in homoeopathy sector shall be promoted.
- In patient wing of every hospital shall be strengthened to accommodate the future needs.
- Enhance health tourism and traditional Ayurvedic systems in the municipality.
- To provide drainage, public sewerage and centralised treatment system in Sulthan Bathery Municipality.
- Enhance the usage of septic tank instead of leach pit to reduce the communicable diseases.
- To reduce the life style diseases by providing health club in every wards.
- A proper involvement in the sector of basic knowledge – basic solution to reduce disease.
- Provide dormitory for other state workers, collect the details of them and hand over to the health department.
- To issue health card to all individuals in the planning area.

23.14 Housing

Sulthan Bathery has a possible shortage of 5396 houses in the plan period including existing Kutcha buildings/huts and the 30% of the existing moderate houses that have to be replaced. The local body has operating various schemes such as IHSDP, EMSHS, and RAY etc. to overcome the housing shortage. The housing sector is given adequate thrust in the land use plan. More over projects envisaging housing projects for economically weaker sections has to be initiated by the local body. So the housing shortage does not occur in future.

23.15 Recreation

Recreation is like a rain shower during the days of scorching heat. It is like a ray of moonlight in the dreadful darkness. Recreation is moreover the time to get together to have fun. Devoting some time for recreation on a daily basis helps in the long run in maintaining health and achieving a peace of mind. Participate in some regular physical activity, play a sport or exercise. These recreational activities serve as a means of relaxation. Research has shown that recreation on a daily basis reduces risks of diabetes and hypertension, enhances physical and mental health and improves the quality of life. At present the town has no

recreational facilities. So proposals such as park and open spaces near the proposed stadium included and various projects proposed under the tourism sector.

Other proposals are-

- Construction of Town Square at Kuppadi has to be completed.
- "The Jain Temple" can be utilized for heritage tourism and necessary infrastructure facility has to be provided.
- The stadium owned by the municipality near Manikkuni may be utilized for constructing an indoor stadium.
- A zoological/ botanical park at Beenachi Estate has to be considered and attempt has to be made for releasing the land from the Madhya Pradesh Government.
- The Chethalayam waterfalls may be utilized as a tourism attraction and necessary infrastructure facilities have to be provided.
- A science park (planetarium, museum and convention centre etc.) may be constructed near the Ex-service men Colony road junction.
- A sports academy/stadium complex may be established near the existing Kadamanchira Pond.
- The existing park for disabled and senior citizens at Kapyarumala junction has to be modernized.
- A swimming training centre with state of art facilities may be established near to the Kadamanchira.
- Land adjacent to the proposed bus terminal complex extends up to 0.50 hectare is delineated for open ground for conducting common programs, exhibitions and for accommodating street vendors.
- Wet agriculture land, in which cultivation is not possible, can be utilized for recreational purpose.

23.16 Other Civic Amenities

The Sulthan Bathery being the taluk headquarter, civic amenities has to be provided as taluk level service provider in the proposal for accommodating new projects are envisaged in this sector.

- A well-equipped town hall with sufficient capacity shall be constructed.
- A planetarium shall be considered within the proposed Science Park and adjacent to the Ex-servicemen Colony junction.

- An office complex for civic amenities may be constructed near the existing Kerala Water Authority Office.
- The municipal office with adequate facility shall be constructed in the civic amenities complex.
- A multimedia theatre in govt. sector shall be considered.
- An office complex to accommodate various offices functioning in rented building may be considered.
- Due to the availability of vast land in the mini civil station premises there is a possibility of accommodating more govt. institutions those are functioning in the rental building.
- A crematorium can be constructed at existing burial ground (near Sarvajana School) for which attempt has to be made.

23.17 Forest Related Proposals

The reserve forest in the planning area is 58.98% of the total extent and it is the part of "Wayanad wild life sanctuary". Since a large number of incidences of man-animal conflict have been occurred frequently, there is a necessity of providing remedial measures to ensure living harmony between the man and animal and measures to be taken care for the upliftment of tribal community, who depend forest for their livelihood.

The proposals are given below.

- Buffer zone has to be provided along the boundary of forest.
- Forest wall, rail fencing including solar fencing to be provided along the boundary forest.
- Bio- fencing /trenches to be provided along the boundary of forest.
- Honey collection and other forest resources among the tribal community may be promoted.
- Tourism related activity can be promoted.

23.18 Environment & Disaster management

Even though the flood and land slide of 2018 or the recent disasters did not affect Sulthan Bathery, special care has to be taken in the development of the town. The DDMA height regulations are existing in the municipality as per the orders of District Disaster Management Authority Wayanad. Apart from that a green belt of 25 m along the reserve forest boundary has been provided. The height and area of constructions are restricted in the green belt to reduce both the density of population and building. A green belt of 2m also provided along the streams/rivers of the municipality where no construction, as a part of conservation of water bodies for flood management.

CHAPTER 24

IMPLEMENTATION, MONITORING AND REVIEW

Implementation of the Master plan of Sulthan Bathery is equally or more important than preparation of the Master plan. In order to ensure timely implementation of the provisions of Master plan, a permanent system for monitoring and review is envisaged.

24.1 Implementation

Implementation plays a crucial role in transferring the envisaged planned development real to the ground. Implementation of the Master plan in its true spirit is one of the prime responsibilities of the Municipal administration. The important parameters to be taken care while implementing the development plan of Sulthan Bathery are discussed below.

24.1.1 Environment Aspects

The development plan put forward a multi-pronged approach with due to regard to environmental protection and management. The conservation of wet land (paddy fields) and protection of streams are given due priority. A Green Belt of 2m width along the boundary of streams/thodu of width more than 1.5m is provided to prevent illegal encroachment to the streams/ water body. Another 25m along the boundary of reserve forest has been envisaged in the Master plan.

The industries are well isolated from the areas of inhabitance and institutional developments, like-wise hazardous uses such as treatment plants are also isolated from residential and institutional areas.

A drainage network is also proposed in the Master plan. Improvement of solid waste collection, installation of the solid waste treatment plant and construction of waste water treatment plant shall help to preserve the serenity of environment of the town.

24.1.2 Disaster Preparedness and Management

At present Sulthan Bathery has not experienced any disaster. The proposed road network shall ensure reaching of every nook and corner of the Planning area in case of a calamity. Due to the terrain of the town, normally flooding will not occur during monsoon. However, the proper drainage network shall be prepared and implemented especially along the arterial roads. Being the Taluk head quarter, the town has well organized disaster preparedness under the revenue department. The town also has fire and rescue station with adequate staff and equipments.

24.1.3 Governance

The issues in governance are almost uniform across the local bodies in the state. The weak financial position of the local body affects the service delivery. Transparency in service delivery is often suffered due to the system of keeping manual registers and avoidance of digitization. Even though sufficient funds were made available by the government under various schemes for the last few decades, the computerization and modernization of the local body is in a very slow pace. This affects the quality of service and prompts unhealthy, unethical practices and evades transparency. The problem in assessment and collection of property tax, which is the main income of the local body, is very acute. Evasion of assessment also does happen and could not be quantified. With the introduction of the GIS based property tax management system 100 % tax collection is observed elsewhere. Unauthorized construction also do come up which are public hazards and drains on the Municipal revenue. Another issue is lack of information system for planning and implementing development activities and providing various relief measures to the citizens at large. All these issues can be addressed by a properly coordinated management information system and property tax management system in a GIS platform with user interphase and constant updating of the data base.

So a GIS based system of governance shall be put in place in Sulthan Bathery. The first step towards this is creation of an interactive plot level GIS data base for the Planning area and training of Municipality staff for the usage and updating the same. In the subsequent phases the local body shall add various layers and applications to the data base like utility mapping, property tax management system, Management information system, birth registration, death registration, various other registrations, building permit applications, issue of various certificates, utilities management, other service delivery etc. and enable web GIS with user interface. This is expected to solve many of the urban governance issues prevailing in the local body

24.1.4 Financial Resource Mobilization and Planning

The Master plan details, land use regulation and development activities to be taken up by the various agencies and stake holders. Hence projects are proposed to be taken up by various agencies and local body is not the only agency responsible for the implementation of the plan. The projects coming under the scope of the local body itself may be financed by other schemes/ agencies etc. The **annexure X** gives broad phasing and approximate costs at 2014 prices of the proposed projects and indicates the implementing agencies. The source of funds for projects indicated against various plan schemes of central/ state governments, borrowings from leading agencies etc. This will be taken up by the local body on a case to case basis.

Total cost of road proposals = 21905 Lakhs

Grand Total of Proposals = 55463 Lakhs

Out of the Rupees 55463 Lakhs, Rupees 21905 Lakhs is required for road development, in which 69.21 % is to be met from PWD. 45.12% of the total outlay for implementation of the master plan has to be met from the state government. Realizing this there shall be constant pressure by the local body and political leadership at large on the state government for making sufficient funds.

The cost of proposals under various source of funds are summarized as follows

Table 24-1: Summary of Cost Proposals under Various Sources of Funds

Sl No	Name of Source	Amount in Lakhs
1	Own (Municipality Fund)	22465
2	External Source	1690
3	BOT	2460
4	State/PWD	25048
6	KSEB	1400
7	Forest department	2400
Total		**55463**

24.2 Monitoring

A monitoring committee shall be set up as follows

Municipal Chairman	Chairman
Chairman/Chairpersons of all Standing Committees of the Municipality Town Planner of the State Town and Country Planning department having jurisdiction in the area	Members
Municipal Secretary	Convener

The monitoring committee shall meet as and when required. The committee shall also scrutinize the annual plan proposals of the Municipality for compatibility with the Master plan and also make suggestions regarding projects listed in the development plan that may be included in the annual plan proposals to the concerned working groups.

24.3 Review

The sanctioned master plan shall be reviewed after ten year or before with permission of the government. Hence the first review shall be in 2032 as per the section 50 of Kerala Town and Country Planning Act 2016. A committee shall be constituted for the review of the master plan as follows.

Municipal Chairman/Chairperson	Chairman
Municipal Vice Chairman/Chairperson, Standing committee chairman for public works	Members
Town Planner of the LSGD planning wing having the jurisdiction in the area	Convener

Senior Town Planner of the LSGD planning wing in charge shall be the special invitee to the committee.

The committee shall review the implementation of the master plan, direction of growth, new major investments that have come up in the planning area, financial position of the local body, adherence to development regulation etc. and shall advice the municipal council regarding maintaining status quo, making minor variations or revision in to

CHAPTER 25

ZONING REGULATIONS

25 Zoning Regulations

25.1. All future development/constructions shall be in conformity with the provisions of the Master Plan for Sulthan Bathery 2042, Kerala Municipality Building rules, Kerala Conservation of Paddy and Wet Land Act-2008, Kerala Land Utilisation Order-1967, Kerala Land Reforms Act -1963, Kerala Forest Act – 1961, AMASR Act, Aircraft Act 1934, Environment Protection Act 1986, Disaster Management Act, Orders of District Disaster Management Authority (DDMA) Wayanad and other applicable statutes and clearance as amended from time to time.

25.2. For the implementation and enforcement of the proposal envisaged in this Master Plan, areas have been zoned under various zones such as *Residential zone I, Residential zone II, Commercial zone, Mixed zone, Public and semi-public zone, Park and open space, Preferred industrial zone, Agriculture zone, Transport & Communication zone, Hazardous zone, Reserve forest, Beenachi estate, Wet agriculture, Water body, Green belt and Special zones*. Details regarding the nature of uses *'permitted'* and uses *'restricted'* in each zone are given in Table 25.2. These regulations shall be enforced in conjunction with other specific provisions if any mentioned elsewhere in the Master Plan.

25.3. Uses *'permitted"* in a zone cover the uses that can be normally accommodated in the relevant zone. Such uses may be permitted by the Secretary, Sulthan Bathery Municipality (hereinafter referred to as Secretary). In some cases, it may be possible to permit some other uses also, which are not likely to affect the quality and environment in a zone specified for a particular use. Such cases have to be individually examined based on their performance characteristics and special locational factors. Such cases which come under this category are classified as "Uses Restricted".

25.4. Uses restricted- 1 Category deals with the restricted uses that may be permitted by the Secretary with the concurrence of the District Town Planner of the Local Self Government Department Planning having jurisdiction over the area (hereinafter referred to as Town Planner).

25.5. Uses Restricted- 2 Category deals with the restricted uses that may be permitted by the Secretary with the concurrence of the Chief Town Planner of Local Self Government Department Planning.

25.6. **"**Used prohibited" are various objectionable uses in each zone which shall not be permitted under normal circumstances. All uses which does not come under 'Uses Permitted' or 'Uses Restricted' will be considered as 'Uses prohibited'

25.7. Any use not specified either in the 'uses permitted' or 'uses restricted' category of a particular use zone but which is of a similar nature to any use 'permitted' or 'restricted' in that particular use zone, may be permitted by the Secretary with the concurrence of the Town Planner.

25.8. Zoning regulations are not intended to prohibit existing uses that have been lawfully established prior to the enforcement of these regulations, unless otherwise specifically mentioned in this Master Plan. Zoning Regulations are essentially intended to help the competent authority in taking decisions regarding granting or refusal of permits for land development and construction of buildings/ structures. In case of minor deviations from the permit plan, the tolerance allowable in the prevailing building rule may also be permitted by the secretary to such buildings.

25.9. If any portion of a zone is put to a "Use Prohibited" as stated in Para 6, before coming into operation of this Master Plan, such use shall be termed as *non-conforming use*. A non-conforming use may be allowed to continue in its existing location and essential repairs and maintenance for the structure may be permitted by the Secretary, provided that the said use create no adverse environmental influence in the zone. Addition, alteration or reconstruction, if found necessary as part of any mitigation measures may be permitted for such uses by the Secretary with the concurrence of the Town Planner. The total built up area of such non-conforming use shall not exceed 1.5 times the existing built up area.

25.10. Existing areas and structures of archaeological importance and religious uses may be permitted to continue in all the zones and shall be treated as permitted uses.

25.11. Subject to the zoning regulations of the respective use zones, more than one use may be combined in a building/ plot, provided that the area of individual uses shall be limited to that prescribed for each such use in the zoning regulation for the respective zone.

25.12. All future developments shall also be in conformity with the provisions of Kerala Municipality Building Rules, unless otherwise specified in these regulations or in any Detailed Town Planning Scheme in force.

25.13. Silence zone, as prescribed by the Noise Pollution (Regulation and Control) Rules, 2000 as amended from time to time, shall be applicable to such areas under this Master Plan.

25.14. Regulation of constructions and land developments on the sides of new roads / roads proposed for widening as per the scheme shall be governed by the distance from the centreline of the road, unless otherwise specified in the Master Plan or Detailed Town Planning Scheme in force or any Detailed Road Alignment approved by Government. If widening on one side of any stretch of the road is constrained due to

the physical barriers of water body zone, protected archaeological monuments/sites, forest etc. the road widening in that stretch shall be accounted from the other side.

25.15. In the event of change in alignment of NH Bypass and the road connecting Ex Service Men Colony Jn to Poomala Jn (Ex Service Men Colony Road-Poomala Road) proposal in the Master Plan, after the commencement of land acquisition of the new alignment, the land parcels in stretches excluded from the original alignment may be changed to adjacent suitable land use zone with the concurrence of the Town Planner.

25.16. A building line of 4 m is to be kept for the proposed 7 m road from Ex Service Men colony Jn to Poomala Jn (Ex Service Men Colony Road-Poomala Road)

25.17. Operational constructions as defined in the Kerala Town & Country Planning Act 2016 and the Kerala Municipality Building rules shall be treated as permitted use in the Master Plan Area.

25.18. The Government shall have the power to issue clarifications in respect of technical interpretations, if any, required on any of the provisions of the Master Plan in consultation with the Chief Town Planner concerned of the Local Self Government Department Planning.

25.19. Only the existing areas under Public and Semi Public uses are intended to be included under Public and Semi Public zone. If any private property put under uses other than those permitted or restricted in the above zones has got included within such zones, the Secretary may after verification of the revenue ownership documents, accord sanction for development by adopting the regulations of the surrounding land use zone in the proposed land use map, subject to the provisions as per applicable Acts, Rules and Government Orders in force in the State.

25.20. Expansion of Public and Semi Public Institutions and their incidental uses to adjacent plots shall be treated as permitted use irrespective of the zone in which such adjacent plot lies, except in Water Body zones.

25.21. If public activity or hazardous activity ceases or do not exists in a private land, uses permitted/ restricted in the surrounding land use zone shall be allowed in the plot with the concurrence of the Town Planner, if no records are available with Sulthan Bathery Municipality regarding any proposal for acquiring that particular land for any public or hazardous use at the time of application for building construction or land development.

25.22. Uses Permitted in Mixed Zone may also be permitted by the Secretary, if not allowable otherwise as per the zoning regulations applicable, on both sides of the following roads (as per the Master Plan for Sulthan Bathery-2042) except Water body, Reserve forest, Park & Open space and Green belt in land up to a depth shown against each road in the table25.1.

Uses restricted in Mixed Zone may also be permitted by the Secretary if not allowable otherwise as per the zoning regulations applicable, but with the concurrence of the Town Planner or the Chief Town Planner as the case may be, on both sides of the following roads (as per this Master Plan) in such applicable zones as mentioned above in land up to a depth shown against each road in the table below

Table 25-1: Details of Roads Where the Provisions of Mixed Zone are Applicable.

Sl. No.	Name of Road	Depth (in metres measured from the proposed road boundary) on both sides of the road up to which provisions of Mixed Zone is applicable
1	NH	200 m
2	having the proposed width of 12 metres or more including the Gudalur road & Pulpally road	150 m
3	having the proposed width of 10 meters or more	100 m

If more than 50% of the area of a plot is included within the mixed zone**,** the entire plot shall be deemed to be included under such mixed zone.

25.23. Disaster mitigation projects by competent authorities shall be permitted in all zones.

25.24. Transmission / telecommunication towers, wireless station, ATMs, water tanks, waste management units, electric charging stations and public utility buildings/structures shall be treated as permitted uses in all zones.

25.25. Projects of Central/ State Government, Local Self Government Institutions, Public Sector Undertakings and other Government Institutions may be permitted with concurrence of the Town Planner in all zones without any height or floor restrictions, but as per DDMA orders, if such uses are not included in the permitted uses or restricted uses as per the zoning regulations applicable.

25.26. In case of uncertainty in identifying the alignment and boundary of thodu, canal, river, existing public road and in the absence of survey boundaries for the same in the Proposed Land Use Maps, it shall be referred to the actual position on ground as well as revenue records and decision taken by the Secretary in this regard shall be final.

25.27. The areas specially demarcated for certain projects as Special Zones such as Bus Terminal Complex, Stadium Complex, Town park, Truck terminal, Open ground are to be procured as per the provisions of the Kerala Town & Country Planning Act 2016, by Sulthan Bathery Municipality or other agencies concerned. If the proceedings to procure such land have not been initiated within 7 years from the date of sanctioning

of this Master Plan, the areas so specifically demarcated may be released and assigned to a use permitted/restricted in the surrounding land use zone in the Proposed Land Use Map by the Secretary with the concurrence of the Town Planner, based on the application for building permit received.

25.28. If different land use zones fall within a single plot, all uses permitted as per zoning regulations of such land use zones may be permitted by the Secretary in the plot. If application submitted includes any of the restricted uses and not included in such permitted uses, the Secretary shall issue permit with the concurrence of the Town Planner/Chief Town Planner, as the case may be.

25.29. In Wet Agriculture zone, permitted and restricted uses in adjacent land use zone may be permitted by the secretary if that particular land in Wet Agriculture zone is not classified as paddy land or wet land as per revenue records at the time of issuance of permit. The same provision may also be applied to the land converted as per the Kerala Conservation of Paddy & Wet land act - 2008.

25.30. If different land use zones fall within a single plot, the major land use zone (more than 50% of the plot) applicable to that plot may also be extended to the remaining portion of the plot, if so required by the applicant.

25.31. For the purpose of zoning regulation, the total floor area means the total floor area as per the prevailing Kerala Municipality Building rules.

25.32. Large Scale development projects in an area not less than one hectare, exceeding an investment of Rs.50 Crores, which provide direct employment (after commissioning of the project) to the tune of not less than 500 may be permitted in all zones other than Water body & Reserve forest, if not included in the permitted uses or restricted uses as per zoning regulation applicable. In such cases, the recommendation of a committee with constitution as below shall be obtained, subject to satisfying the procedures laid out here under and the Secretary shall comply the same while issuing permit.

Also, adequate provision shall be made for supporting infrastructure such as water supply, sewerage, solid waste management, power supply etc. Separate systems for management of solid waste and sewage shall be provided and maintained by the developer at his cost. The project shall be completed within a period of 5 years or as suggested by the Committee.

Procedure to be followed

a. The developer shall submit the project report, detailing the demand, feasibility and Environmental Impact Assessment aspects of the project, together with the approval, if necessary, obtained from the Ministry of Environment and Forests, Government of India to the Convener of the committee and the Convener shall make all arrangements for convening meeting of the committee at the earliest and the committee shall consider

and dispose of the project report within a period of one month from the date of receipt of the same.

b. The constitution of the committee shall be as given under:

Principal Secretary/Secretary to Government, Local Self Government Department	-	Chairperson
The Director, Local Self Government Department (Urban)	-	Member
The Chief Town Planner, Local Self Government Department Planning	-	Convener
The District officer of the LSGD Planning having jurisdiction over the district concerned	-	Member
Secretary of Local Self Government concerned	-	Member(s)

c. The Convener shall fix the venue, date and time of the meeting in consultation with chairperson and shall be responsible for safe custody of records and communications thereof.

d. The meeting shall be presided over by the Chairperson or in his absence by a member to be authorised by him.

e. The quorum of the meeting shall be majority of the total number of members of the committee for the project.

f. The developer shall also produce before the committee, all required clearances from the State and Central Government agencies concerned.

Table 25-2: Zoning Regulations in Different Zones

Sl. No	Uses permitted	Uses restricted-1	Uses restricted-2	User Prohibited
1	**Residential Zone I**			
1	All Residences including apartments, Home stay, Serviced villas, Resorts, Guest house, Night Shelters, Orphanages, Old Age Homes, Dharmasala, Residential Quarters, Hostels and Boarding houses, Ashram, Mutts.			Any other use not specified
2	Shops, Restaurants, Professional Offices, Commercial Offices& establishments, Banking and Financial institutions, IT Software units - All the above uses with total floor area of the building limited to 1000 sq.m	Multiplex complex		
3	Places of Worship – Total floor area of the building below 500 Sq.m	Places of Worship Total floor area of the building above 500 Sq.m		
4	Cottage Industries, IT industries, Service Industries of non-nuisance Nature (See Annexure-I)			

5	All educational institutions	Utility installations and Civic amenities other than those included in the permitted category.		Any other use not specified
6	All Health institutions essentially serving the needs of residential community such as Dispensaries, Clinics, Nursing homes, Diagnostic centres - All the above uses with total floor area of the building limited to 1000 sq.m			
7	Community facilities such as Community halls, Recreational clubs, Gymnasium, Yoga centres, Libraries - All the above uses with total floor area of the building limited to 500 sq.m.	LPG distribution centres (excluding bottling plants and bulk storage)- Total floor area limited to 100 sq.m		
8	Recreation facilities including turf, Tennis/badminton courts, swimming pool.	Indoor outdoor stadiums		
9	Markets to serve the needs of local community.			
10	Plant nursery, Pump House, Tot Lots, Parks, Play Grounds, zoological botanical garden, bird sanctuary			

11	Automobile workshops for two/three wheelers – Total floor area limited to 200 sq.m			
12	Convention Centres, Auditorium, Wedding Halls, Community halls, Movie halls, Exhibition Centres and Art Gallery- All the above uses with total floor area of the building limited to 1000 sq m.	Fuel Filling Stations		
13	Poultry farm, Dairy farm, Cattle farm, Piggery farm and Fish ponds			
2	**Residential Zone II**			
	For all construction in Re. survey numbers 1 to 104 in block no 13 and Re survey numbers 1 to 102 in block no 14 of Kidanganad village, the maximum floors shall be limited to 3.			
1	All Residential Buildings including apartments & quarters, Orphanages, Old age homes, Dharmasala, Homestay, Serviced villas, Resorts, Ashram, Mutts, and Madrassa.			
2	Shops, Restaurants, Hotels, Professional offices, Commercial Offices & Establishments, Banking and Financial institutions, IT Software units - All the above uses with total floor area of the building limited to 1000 sq.m	Fuel Filling Stations		Any other use not specified

3	Places of Worship – Total floor area of the building below 500 Sq.m	Places of Worship Total floor area of the building above 500 Sq.m		Any other use not specified
4	Cottage Industries, IT Industries, Service Industries of non-nuisance Nature (See Annexure – I).			
5	Godowns, Warehouse, Storage of non-hazardous materials, Stacking yards.	Other Utility installations and Civic amenities		
6	All health institutions, health centers, Clinics and Diagnostic centres- All the above uses with total floor area of the building limited to 500 sq.m.			
7	Govt. or Public sector offices, Expansion of existing Educational institutions, Day care and Creche, Nursery, Kindergarten, Schools up to Higher secondary, Technical training institutions.			
8	Poultry farm, Dairy farm, Cattle farm, Piggery farm and Fish ponds.			
9	Social Welfare centres, Museum, Auditorium, Wedding Halls, Movie halls, Community halls - All the above uses with total floor area of the building limited to 500 sq.m.			

10	Recreation facilities including turf, Tennis/badminton courts, swimming pool.			
11	Markets to serve the needs of local community.			
12	Plant Nursery, Storage of agricultural produces and seeds, Pump house, Wells and Irrigation ponds			
13	Parks & Playgrounds, Open air Theatres, Fair Grounds, Parking ground.			
3	**Commercial Zone**			
1	All Shops including Shopping Complexes, Shopping malls, Hypermarkets, Cinema halls, Restaurants, Hotels, Professional offices, Commercial Offices & Establishments, Banking and financial institutions, IT Industries.	Fuel filling stations	Multiplex complex	
2	Expansion of existing residential buildings, Single Family Residences, Residential flats/apartments with lower floor(s) for commercial use only, Night shelters, Orphanages, Old age homes, Dharmasala, Hostels and Boarding houses, Lodges and Guest houses, Ashram, Mutts, Madrassa.			

3	Cottage Industries, Automobile workshops, Automobile Service Stations, Cold storage, Service Industries of non-nuisance Nature (See Annexure I) Weigh Bridges, Printing Press.	Outdoor Games Stadium, Indoor stadium.		Any other use not specified
4	Godowns, Warehouse, Storage of non-hazardous materials, Stacking yards.	Other Utility installations and Civic amenities		
5	All health institutions	Saw mills with Timber yard		
6	All Educational institutions	Slaughter house		
7	Social Welfare centres, Library and Reading Rooms, Exhibition Centres, Art gallery, Museum, Auditorium, Wedding Halls, Community halls and Convention Centres.			Any other use not specified
8	Recreation facilities including turf, Tennis/badminton courts, swimming pool.			
9	Parking Plazas, Transport terminals			

10	Markets			
11	Fair Grounds, Parks & Playgrounds, Open air Theatre			
12	Plant Nursery, Storage of agricultural produces and seeds, Pump house, Wells and Irrigation ponds.	Dairy farm, Poultry farm, Cattle farm, Piggery farm, Fish ponds		
4	**Mixed zone**			
	All uses permitted & restricted in residential zone I and commercial zone			Any other use not specified
5	**Public & Semi Public Zone**			
	For all construction in Re. survey numbers 1 to 104 in block no 13 and Re survey numbers 1 to 102 in block no 14 of Kidanganad village, the maximum floors shall be limited to 3.			
1	Local, State, Central Government, Public Sector Offices and Other related Public Buildings	Cremation Ground, Crematorium, Burial Ground, Common Vault		
2	Educational buildings, health institutions, sports facilities, Public Utilities and Civic amenities.			
3	Additions and alterations to the existing Public and Semi-Public	Fuel filling stations		

	buildings including addition of new blocks without altering the use.			Any other use not specified
4	Residential Quarters and other buildings incidental to Public and Semi-Public use.			
6	**Parks & Open Space**			
1	Any construction, land development essential for the development, improvement of open air recreational facilities.	Public Utilities and Civic amenities which will not affect the character of the area.		Any other use not specified
2	Tot Lots, Park, Play Grounds, Swimming Pools, Open Air Stadium, Open Air Theatre, Zoological and Botanical Garden, Bird Sanctuary, Eco Walk Way etc.			
7	**Preferred Industrial Zone**			
1	Information Technology buildings (Information technology building refers to building occupied by industries and other business establishments, whose functional activities are in the field of information technology, information technology enabled services (IT/ITES) and communication technology service) - total built up area in such buildings at least 70% of the area should be ear marked for this purpose and the remaining shall be utilised for supporting activities restaurants, food courts, meeting rooms, guest houses, recreational facilities etc.	Cremation ground, Crematorium, Burial ground, and Common vault.		

2	Minor storage of Explosive and Fireworks, Gas godowns, Saw mills with timber yard, Smoke house, Fish, Meat processing centers.	Crusher units, Tar Mixing plant, manufacturing plants		Any other use not specified
3	Dairy farm, Poultry farm, Piggery farm, Cattle farm, Fish ponds			
4	Cottage industries, Service industries of non-nuisance nature (See Annexure -I), Automobile workshops & Automobile service stations, Spray painting workshops, Saw mills, Ice factory, Cold storage, Printing press, Water treatment plants, Marble and granite storage, cutting centers, Industrial estates & Industrial parks of non-obnoxious and non-nuisance type industries	Sewage treatment plants, Utility installations and civic amenities other than those included in the permitted use		
5	Storage of non-nuisance nature, Sale of goods, Commercial and business offices incidental to the manufacturing activity	Fuel filling stations		
6	Markets, Parking plazas, Other parking areas	LPG distribution & collection centers		
7	Automobile showrooms, Weigh bridge.			
8	Shops, Professional Offices, Banking and Financial Institutions, Commercial Offices & Establishments, Restaurants, Canteen, Hotels – All the above uses with total floor area of the building floor area limited to 1000 Sq.m.			
9	Nursery schools, Kindergartens and Schools offering General education (up to High Secondary School level).			
10	Single family residences, Other Residential buildings –floor area limited to 500 Sq.m.			

11	Community facilities such as Community halls, Social welfare centers, Recreational clubs, Gymnasium, Yoga centers, Libraries - All the above uses with total floor area of the building having floor area up to 500 Sq.m,	Ashram, Mutt, Places of worship		Any other use not specified
12	Dry cleaning plants, Power plant substation etc.			
13	Diagnostic Centres, Dispensaries, Clinics, Nursing homes and hospitals– All the above uses with total floor area of the building having floor area up to 500 Sq.m.			
14	Plant nurseries, Green houses, Storage of agricultural produces and seeds, Pump houses.	Obnoxious industries (See annexure II)		
15	Transport terminals incidental to industrial use			
16	Tot lots, Parks and Play grounds			
8	**Agriculture Zone**			
	For all construction in Re. survey numbers 1 to 104 in block no 13 and Re survey numbers 1 to 102 in block no 14 of Kidanganad village, the maximum floors shall be limited to 3.			
1	All Agricultural, Plantation activities, Horticulture, Fodder cultivation, Fish Farms, Dairy farm, Poultry farm, Cattle farm, piggery farm, Storage of agricultural produces etc.	Fuel filling stations		
2	Retail shops, commercial establishments -floor area limited to 500 sq.m			

3	Single family residential buildings.	Storage of Explosives and Fireworks, Gas Godown, Brick kiln.		Any other use not specified
4	Home stays, Serviced villas, quarters, apartments, resorts – All the above uses with total floor area of the building limited to 1000 sq.m.	Tourist resort in connection with Farm tourism/Estate tourism activity without affecting the environmental quality of the area.		
5	Nursery schools, Kindergarten, Anganwadi			
6	Health care institutions with floor area limited to 1500 sq.m.			Any other use not specified
7	Science Park, All educational institutions up to higher secondary schools, Sports Academy			
8	Community facilities with floor area limited to 1500 sq.m.			
9	Tot lots, Parks, Play grounds, Zoological and Botanical Gardens, Bird Sanctuary			
11	Recreation facilities including turf, Tennis/badminton courts, swimming pool.	Indoor & Outdoor Stadium	Multiplex complex	

9	**Transport & Communication zone**			
1	All uses connected with Traffic & Transportation such as Bus terminals, Stand, Truck, Lorry stand, Auto rickshaw stands, Taxi, Jeep stands.	Public Utility Areas and Buildings		Any other use not specified
2	Offices, ATMs, any other incidental uses to the transport terminals such as Retail Shops, Restaurants, Canteen, Automobile garage- All the above uses with total floor area of the building limited to 1000 sq.m.'	Fuel Filling Stations	Transport Terminal cum shopping complex	
3	Staff Quarters, Night Shelters, Guest Houses etc. incidental to the transport terminals			
4	Parking Plazas, parking ground			
10	**Hazardous zone**			
1	Solid and liquid waste treatment plants and related constructions. Parking grounds incidental to the activity, Public Utility Areas & Buildings.			Any other use not specified
2	Cremation Grounds, Crematorium, Burial Grounds and related constructions, Sewage Treatment Plants, Manure Storage, Garbage Dumping, Junk yards, Slaughter Houses etc.			

11	**Reserve forest**			
1	Forest related activities of the Forest Department shall be are permitted.			Any other use not specified
12	**Beenachi Estate**			
1	All Agricultural, Plantation activities, Horticulture, Fodder cultivation.			
2	Tot lots, Parks, Play grounds, Zoological and Botanical Gardens, Bird Sanctuary, Eco walk way.			
3	All agricultural nurseries, Plant nursery, Ponds, Well, Pump house.			
13	**Wet Agriculture**			
	For all construction in Re. survey numbers 1 to 104 in block no 13 and Re survey numbers 1 to 102 in block no 14 of Kidanganad village, the maximum floors shall be limited to 3.			
1	Paddy cultivation, Agriculture, Horticulture, Fodder cultivation, Fish Farms, Seed Farms, Pump House, Wells and Irrigation Ponds without any building construction.	Minor Public Utility areas which will not affect the character of the area.		Any other use not specified

14	**Water body**			
1	All existing water bodies shall be conserved. Bridges, Side protection walls, Bathing Ghats, Floating jetty etc. may be permitted based on community level requirements.			Any other use not specified
15	**Green belt**			
1	25m green belt along the boundary of Reserve Forest in the land marked in Proposed land use map. Number of floors for all constructions in this zone shall be limited to 3 and floor area limited to 300 sq.m.			
2	Constructions are not permitted up to a depth of 2m from water bodies with width more than 1.5 m			
16	**Special zones**			
	Special zones include the areas specially demarcated for certain projects namely Bus Terminal Complex, Stadium Complex, Town park, Truck terminal, Open ground etc. Development in this zone may be permitted by the Secretary, Sulthan Bathery Municipality.			
1	Bus Terminal Complex	All uses connected with Traffic & Transportation such as Bus terminals/Stand, Auto rickshaw stands, Taxi/Jeep stands, Automobile garages, Offices, ATMs, any other incidental uses to the transport terminals such as Shopping complexes, Restaurants, Canteen, Staff Quarters, Night Shelters, Guest Houses etc. and Parking lots/Parking plazas which are planned as integral part of the project. Public utility areas and other buildings incidental to main use.		

		If the proceedings to procure this land have not been initiated within 5 years from the date of sanctioning of this master plan the land shall be deemed to be under commercial zone.
2	Stadium Complex	Outdoor/Indoor stadium, Sports complex, Dormitories, Boarding houses, Canteen, Multiplex, Shopping complex etc. which are incidental to the main use, Public utility areas and other buildings incidental to main use. If the proceedings to procure this land have not been initiated within 5 years from the date of sanctioning of this master plan, the area may be released and assigned to a use permitted or restricted in the surrounding land use zone in the proposed land use map by the secretary with the concurrences of the town planner, based on the application for the building permit received.
3.	Town Park	All uses which are integral part of the Town Park such as aquarium, open air theatre, Reading room, Gymnasium, Yoga centre, Cafeteria, ATM etc., Tot lots, Play grounds, Swimming pool, Amusement parks, Botanical garden, Eco walk way, Parking incidental to main use and parking plaza, sewage treatment plant below 5 MLD, public utility areas and other buildings incidental to main use. If the proceedings to procure this land have not been initiated within 5 years from the date of sanctioning of this master plan, the area may be released and assigned to a use permitted or restricted in the surrounding land use zone in the proposed land use map by the secretary with the concurrences of the town planner, based on the application for the building permit received.

4	Truck terminal	Lorry parking, Dormitories, Canteens, ATM, Automobile workshops etc. which are planned as integral part of the project, Public utility areas and other buildings incidental to main use. If the proceedings to procure this land have not been initiated within 5 years from the date of sanctioning of this master plan, the area may be released and assigned to a use permitted or restricted in the surrounding land use zone in the proposed land use map by the secretary with the concurrences of the town planner, based on the application for the building permit received.
5	Open Ground	Exhibition grounds/Fair grounds, Stages, Open Air Theatre, Public utility areas and buildings, Sewage treatment plant below 5MLD, If the proceedings to procure this land have not been initiated within 5 years from the date of sanctioning of this master plan the land shall be deemed to be under commercial zone.

ANNEXURE I	
TYPE OF NON-OBNOXIOUS AND NON-NUISANCE TYPE OF SERVICE OR	
LIGHT INDUSTRIES PERMISSIBLE IN VARIOUS ZONES.	
1	Production of copra
2	Processing of Areacanut
3	Rice and Flour Mills.
4	Production of rice, flour etc., by hand pounding.
5	Processing of Cardamom, ginger, pepper etc.
6	Production of Khandsri for sugar-cane
7	Carrying and preservation of fruits and production of jam, jelly etc.
8	Processing of and preservation of cashew nuts.
9	Bakeries.
10	Production of Dairy Products.
11	Oil mills (vegetables)
12	Extraction of oil by ghani.
13	Manufacture of hydrogenated oil.
14	Manufacture of “aval” (Beaten rice) appalam.
15	Production of vinegar.
16	Manufacture of soda, water, lemonade etc.
17	Manufacture of Ice.
18	Manufacture of ice cream.
19	Processing, packing and distribution of tea.
20	Processing, grinding, packing and distribution of coffee.
21	Manufacture of syrup.
22	Manufacture of beedi.
23	Manufacture of Cigar.
24	Manufacture of tobacco snuff.
25	Manufacture of chewing tobacco.
26	Cotton ginning, clearing, pressing etc.
27	Cotton spinning other than in Mills

28	Cotton spinning and weaving in Mills.
29	Cotton weaving in handloom.
30	Cotton weaving in power looms.
31	Handloom weaving.
32	Khadi Weaving in Handloom.
33	Printing of cotton textiles.
34	Manufacture of Cotton thread, rope twine etc.
35	Jute spinning.
36	Manufacture of jute products including repairing of gunny bags.
37	Weaving of silk by Handloom.
38	Manufacture of hosiery goods.
39	Making of embroidery products
40	Tailoring
41	Manufacture of quilts and mattresses.
42	Manufacture of Coir and Coir Products.
43	Manufacture and assembling of umbrellas and production of spare parts of umbrellas.
44	Repairing of umbrellas.
45	Manufacture of wooden furniture and fixtures.
46	Manufacture of structural wooden goods such as doors, beams etc.
47	Manufacture of wooden industrial goods such as parts of handloom ambarcharka, bobbirs etc.
48	Manufacture of wooden utensils, choto frames, toys, etc., and photo framing.
49	Cane industry including baskets, weaving etc.
50	Manufacture of miscellaneous wooden articles such as sticks, sandals, rules etc.
51	Manufacture of paperboard and paper hand.
52	Making of paper boxes, bags, envelopes etc.
53	Printing and publishing of newspapers and periodicals.
54	Printing and publishing of books.
55	Miscellaneous printing works including type cutting, book binding.

56	Manufacture and repairing of leather shoes and chap pals.
57	Manufacture of leather products such as suitcase, bag etc.
58	Vulcanizing and repairing of tyres and tubes.
59	Manufacture of rubber gloves.
60	Manufacture of Rubber products such as rubber sheets, nipples and rubber shoes including smoke-rubber.
61	Manufacture of pharmaceuticals, chemicals, Ayurvedic medicine etc.
62	Manufacture of agarbathi and other cosmetics.
63	Manufacture of plastic products such as nameplates etc.
64	Manufacture of lemongrass oil, candles etc.
65	Manufacture of cement products such as well-keros, tube, closets etc.
66	Manufacture of structural stone goods, stone crushing, stone carving, stone dressing, marble carving etc.
67	Manufacture of stone wares.
68	Manufacture of stone images.
69	Manufacture of chinaware's and crockery.
70	Manufacture of large containers and chinaware.
71	Manufacture of glass and glass products.
72	Manufacture of clay models
73	Manufacture of iron and steel furniture.
74	Manufacture and repairing of brass and bell metal products.
75	Manufacture of aluminum utensils and other products.
76	Manufacture of tin cars and copper vessels.
77	Electroplating, tinplating, welding etc.
78	Manufacture of agricultural implements, screws etc. (blacksmith and foundry)
79	Manufacturing assembling and repairing of machinery such as water pumps, oil mill chuck etc.
80	Manufacture of small machine tools and machine parts.
81	Manufacture of sewing machine parts and assembling and repairing of sewing machine.
82	Manufacture of electrical machinery and repairing of electric motors armature winding etc.

83	Manufacture and repairing of electric fans.
84	Charging and repairing of batteries.
85	Repairing of radios, microphones etc.
86	Manufacture of electric meters, production of electric and allied products, repairing and servicing of electrical appliances.
87	Bodybuilding of motor vehicles.
88	Manufacture and repairing of motor engine parts and accessories.
89	Serving and repairing of motor vehicle
90	Manufacture of cycles, parts and accessories.
91	Manufacture and repair of boats and barges.
92	Manufacture and repairing of animal drawn and hand drawn vehicles.
93	Repairing of photographic equipments, spectacles etc.
94	Manufacturing of medical instruments
95	Repairing of watches and clocks.
96	Manufacture of Jewelry.
97	Manufacture, repair and tuning of musical instruments.
98	Manufacture of sports goods, balloons etc.
99	Ivory, carving and ivory works
100	Miscellaneous industries.
101	Chicken rendering Plant
All industries categorized into Green and Non-hazardous by Central and State Governments	

ANNEXURE II	
LIST OF OBNOXIOUS OR NUISANCE INDUSTRIES SUBJECT TO OBJECTIONABLE ODOURS, FUMES EFFLUENTS OR PROCESSORS TO BE LOCATED IN PREFERED INDUSTRIAL ZONE.	
(Grouped under Indian Standard Industrial Classification)	
I	**Manufacture of Food Stuff :**
1	Preservation of meat and fish and canning of fish.
II	**Manufacture of Beverages:**
1	Production of distilled spirits, wines, liquor etc., from alcoholic malt, fruits and malts in distillery and brewery.
2	Production of country liquor and indigenous liquor such as toddy, liquor form mahua, palm juice.
III	**Manufacture of Textiles :**
1	Dyeing and bleaching of cotton
IV	**Manufacture of Wood and Wooden Products :**
1	Sawing and planing of wood.
2	Wood seasoning and creosoting
3	Manufacture of veneer and plywood.
4	Paper, pulp and straw board.
VI	**Manufacture of Non-metallic mineral products other than petroleum and coal :**
1	Manufacture of cement products
2	Manufacture of Lime
3	Manufacture of Plaster of Paris.
VII	**Manufacture of machinery (other than transport) and electrical equipments:**
1	Manufacture of all kinds of battery
VIII	**Miscellaneous items not covered above.**
1	Bone meal, bone grist and bone powder.
2	Manufacture of cashew nut shell oil.
3	Other similar types of nuisance industries.

Annexure –III

Inventory details of major Roads in Sulthan Bathery town

Sl. No.		Length (km)	Width (m)		Footpath		Shoulder (m)		Surface type	Bus Stop	Street light	Adjoining land use	
			CW	ROW	L	R	L	R				L	R
	I. National Highway (NH-766) MOOLANGAVU - KOLAGAPARA ROAD												
1	Moolankavu - Kottakkunnu Jn	3.10	7.0	16.0					BT	5	Yes	Resi/Com	Resi/Com
2	Kottakkunnu - Gudalur Rd Jn (opp.Punjab National Bank)	0.30	7.0	16.0					BT		Yes	Resi/Com	Resi/Com
3	Gudalur Rd Jn (opp.Punjab National Bank)-Traffic Jn	0.60	7.0	16.0	1.5	1.5	1.0	0.5	BT	3	Yes	Resi/Com	Resi/Com
4	Traffic Jn - Assumption Jn	0.4	10.0	14.0					BT	4	Yes	Resi/Com	Resi/Com
5	Assumption Jn - *Poomala Road junction*	0.7	14.0	17.0					BT	2	Yes	Resi/Com	Resi/Com
6	Court Jn - Beenachi Jn	1.7	10.0	16.0					BT		Yes	Resi/Com	Resi/Com
7	Beenachi Jn - Kolagappara	2.3	10.0	16.0					BT		Yes	Resi/Com	Estate
	II. Beenachi - Panamaram Road												
8	Beenachi - Panamaram Road	3.00	5.8	12.7					BT	5		Estate	Resi
	III. Chulliyode Road												
9	Traffic Jn - Gandhi Jn	0.90	16.5							1	Yes	Resi/Com	Resi/Com
10	Gandhi Jn - Ammayipalam (Town limit)	2.10	18.5			1.5	1.4	1.8	BT	1	Yes	Resi/Com	Resi/Com
	IV. Gudalur Road (Ootty Road)												
11	NH.766 from Moolankavu – Kolagappara (Pl. check)	0.90	8.5	24.6			1.0	0.5	BT	1	Yes	Resi/Com	Resi/Com
12	Govt. guest house – Thoduvally (town limit)	2.10	8.5	24.6			1.0	0.5	BT	3	Yes	Resi/Com	Resi/Com
	V. Pulpally Road												
13	Kottapally Road Jn - Kuppadi Road Jn.	0.10	5.7	17.3			1.0	0.5	BT	6	Yes	Resi/Com	Resi/Com
14	Kuppadi Road Jn - Govt. UP School Road Jn	3.50	5.7	17.3			1.0	0.5	BT	5	Yes	Forest	Forest

15	Govt. UP School Road Jn - Forest check post	1.90	5.7	17.3			1.0	0.5	BT	6	Yes	Forest	Forest
16	Forest check post - PU Kalamalam (town limit)	7.90	5.3	7.7			1.0	0.5	BT	4	Yes	Forest	Forest
	I. Vadakkanad Road												
17	Kottakkunnu-Govt.UP School Jn.	1.80	5.0	8.2			1.0	0.5	BT	2	Yes	Resi	Resi
18	Govt.UP School Jn-Odappallam Road Jn	0.40	3.7	10.0			1.0	0.5	BT	1		Resi	Resi
19	Odappallam Road Jn- Pazheri (Town limit)	2.30	3.5	9.5			1.0	0.5	BT	1		Resi	Resi
	II.Odapallam Road												
20	Kuppadi Road Jn-Moolankavu Jn.	3.90	3.0	8.6			0.5	0.5	BT	5		Resi/Agri	Resi/Agri
	III. Moolankavu- Thelampatta Road												
21	Moolankavu- Thelampatta Road	2.3	3.0	7.5			0.5	0.5	BT	4		Resi/Agri	Resi/Agri
	IV .Pazhupathur Road from Panamaram Road												
22	Pazhupathur Road (PMGSY Road-from Beenachi Jn)	4	3.8	9			1.0	1.0	BT	9	Yes	Resi/Agri	Resi/Agri
	V. Chungam Jn-to_ Traffic Jn												
23	Chungam Jn- to_ traffic Jn Via Police station	1	5.3	9.7			0.5	0.2	BT		Yes	Com	Com
	VI. Other Roads												
24	Gandhi Junction- Assumption Road	1	7.5	10.4					BT			Com	Com
25	Thoduvatty-Moolankavu Road	2.2	7	0			0.5	0.5	BT			Resi/Agri	Resi/Agri
26	Kattayad- Beenachi Road	4	3	10					BT			Resi/Agri	Resi/Agri
27	Kuppadi- College Road	1.5	3	7					BT			Resi.	Resi

Annexure – IV

Volume of daily vehicular traffic on major road links within Sulthan Bathery study Area

Sl. No	Road Link	Type of vehicle												Total vehicles/ day (No)	Total PCU/ day
		Bus	Minibus/ Tempo	Car/ Jeep	Passenger auto	Two Wheeler	MAT	Truck	Mini truck	Goods auto	Bicycle	Hand cart	Others		
I	**NH.766 Moolankavu - Kolagappara**														
1	Moolankavu - Kottakkunnu Jn	496	61	2210	1050	2069	44	207	231	181	21	0	11	6581	7297
2	Kottakkunnu - Gudalur Rd Jn	456	102	1638	1276	2268	38	134	809	1965	18	0	0	8704	9330
3	Gudalur Rd Jn - Traffic Jn.	774	86	2714	1648	2397	42	222	1089	1970	24	0	13	10979	12560
4	Traffic Jn - Assumption Jn	597	92	888	1330	1264	51	238	826	1034	16	0	6	6342	8040
6	Assumption Jn - Beenachi Jn	637	101	1076	1702	1295	47	210	888	1279	22	0	0	7257	8952
7	Beenachi Jn - Kolagappara	695	107	2530	816	2117	26	217	338	265	0	0	0	7111	8190
II	**Panamaram road**														
8	Beenachi Jn - Nambeesan kavala	191	286	238	307	297	0	13	142	473	25	0	0	1972	2433
III	**Pazhupathur road**	138	54	40	111	66	0	0	0	22	0	0	0	431	701
IV	**Ambala vayal road**														
9	Court Jn - Manivayal (Town limit)	161	99	740	698	911	42	60	113	120	0	0	0	2944	3184
V	**Chulliyode road**														
10	Traffic Jn - Gandhi Jn	868	357	399	1132	743	0	106	521	1034	16	0	0	5176	7184
11	GandhiJn - Ammayipalam	373	50	1283	1133	1363	14	23	87	177	0	0	0	4503	4731
VI	**Gudalur road**														
12	Moolankavu - Thoduvally	369	90	1420	931	1709	60	240	325	202	0	0	0	5346	6127
VII	**Moolankavu - Thelampatta road**														
13	Moolankavu Jn - Thelampatta Jn.	162	0	55	194	161	0	0	0	218	0	0	0	790	1034
VIII	**Pulpally road**														
14	Kottapally road Jn - Pukalamalam	309	103	961	279	1192	29	124	212	203	0	0	0	3412	3941
IX	Kuppadi road Jn - Moolankavu Jn.	113	286	136	356	230	0	46	121	134	21	0	0	1443	1839
X	**Thoduvetty road**	0	179	50	132	94	0	0	74	112	17	0	0	658	729
XXI	**Beenachi - Kattayad road**	54	173	25	82	67	0	0	4	6	0	0	0	411	574
XXII	**Kuppadi - College road**	0	0	8	48	50	0	0	0	87	0	0	0	193	168

Annexure-V

Parking accumulation at different road sections in Sulthan Bathery Town

Sl. No.	Road section	Peak parking time	Type of vehicles								
			Bus	Mini Bus	Car	Pass auto	Two-Wheeler	Truck	Mini Truck	Goods auto	Total (No of Vehicles)
1	Chungam - Traffic Jn (Left)	11.00 AM	0	1	10	20	32	0	0	2	**65**
2	Gandhi Jn - Assumption Jn (Left)	12.00 PM	1	2	22	5	7	2	4	3	**46**
3	Kottakkunnu Jn - Kuppadi Road (Right)	12.00 PM	0	0	4	4	5	0	0	0	**13**
4	Kottakkunnu Jn - Kuppadi Road (Left)	11.00 AM	0	0	1	2	5	0	0	0	**8**
5	(Ootty Road) Chungam Jn - Bus Stand Entry (Left)	10.30 AM	0	1	17	0	23	0	3	2	**46**
6	(Ootty Road) Chungam Jn - Bus Stand Entry (Right)	12.00 PM	0	1	25	0	30	2	1	1	**60**
7	(Nenmeni Road) Traffic Jn - MES College Jn (Left)	04.00 PM	0	0	4	4	58	4	2	1	**73**
8	(Nenmeni Road) MES Jn - Malabar College (Left)	10.00 AM	0	0	13	0	19	5	2	2	**41**
9	(Nenmeni Road) MES Jn - Malabar College (Right)	10.30 AM	0	0	18	3	13	6	4	2	**46**
10	(NH 212) Kottakkunnu - Chungam Jn (Left)	10.30 AM	0	0	9	3	10	0	0	0	**22**
11	(NH 212) Kottakkunnu - Chungam Jn (Right)	11.00 AM	0	0	15	7	16	0	0	0	**38**
12	(Mysore Road) Kottakkunnu - YMCA Building (Left)	11.30 AM	0	0	7	3	4	0	4	0	**18**
13	(Mysore Road) Kottakkunnu - YMCA Building (Right)	12.00 PM	0	0	4	2	7	0	2	0	**15**
14	Ootty Road Jn - Prince Hotel Jn (Right)	04.30 PM	0	0	11	0	37	0	0	1	**49**
15	Prince Hotel Jn - Petrol Pump (Right)	03.30 PM	0	0	11	5	40	0	0	1	**57**
16	Petrol Pump - Traffic Jn (Right)	06.00 PM	0	0	1	3	14	0	0	1	**19**
17	Traffic Jn - Jubilee Hotel (Right)	06.00 PM	0	0	32	5	36	0	0	0	**73**
18	Jubilee Hotel - Assumption Jn (Right)	03.30 PM	0	0	6	4	4	0	2	0	**16**
19	Jubilee Hotel - Assumption Jn (Left)	06.00 PM	0	0	4	4	5	0	0	0	**13**

Annexure –VI

Distribution of inbound and outbound traffic at outer cordon survey points in Sulthan Bathery Town

Sl. No	Type of vehicle	Ootty Road			Moolankavu			Kolagappara			Panamaram Road			Pulpally Road			Chulliyode			Ambalavayal Road		
		In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total
1	KSRTC Bus	71	65	136	144	177	321	391	369	760	23	29	52	44	33	77	89	91	180	-	-	-
2	Private Bus	77	66	143	-	-	-	-	-	-	52	46	98	100	77	177	33	39	72	32	24	56
3	Education Bus	30	15	45	10	10	20	6	6	12	6	3	9	9	6	15	-	-	-	19	41	60
4	Other Buses	14	31	45	33	20	53	32	29	61	-	-	-	31	9	40	15	106	121	30	15	45
5	Minibus/Tempo (Education)	26	5	31	7	6	13	9	16	25	6	-	6	40	5	45	31	19	50	31	6	37
6	Minibus/Tempo(Other)	10	49	59	29	19	48	27	55	82	-	10	10	39	19	58	-	-	-	31	31	62
7	Car/Van/Jeep	594	826	1,420	1,063	1,147	2,210	1,360	1,188	2,548	493	301	794	558	403	961	686	597	1,283	361	379	740
8	Passenger auto	422	509	931	534	516	1,050	381	437	818	216	168	384	174	105	279	665	468	1,133	324	374	698
9	Two-wheeler	798	911	1,709	1,010	1,059	2,069	1,136	992	2,128	584	315	899	741	451	1,192	795	568	1,363	415	496	911
10	MAT	16	44	60	143	64	207	61	159	220	-	-	-	20	9	29	7	7	14	21	21	42
11	Truck	80	160	240	181	128	309	159	319	478	-	5	5	67	57	124	15	8	23	45	15	60
12	Minitruck/tempo	147	178	325	99	132	231	177	165	342	33	10	43	120	92	212	52	35	87	63	50	113
13	Goods auto	103	99	202	92	89	181	149	116	265	31	45	76	114	89	203	88	89	177	61	59	120
14	Bicycle	-	-	-	12	9	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	Hand cart	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	Others(Specify)	-	-	-	4	7	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total (No)	**2388**	**2958**	**5,346**	**3361**	**3383**	**6744**	**3888**	**3851**	**7739**	**1444**	**932**	**2376**	**2057**	**1355**	**3412**	**2476**	**2027**	**4503**	**1433**	**1,511**	**2944**
	Total (PCU)	**2681**	**3447**	**6127**	**4174**	**3857**	**8031**	**4816**	**5476**	**10292**	**1334**	**951**	**2284**	**2358**	**1583**	**3941**	**2449**	**2283**	**4731**	**1614**	**1570**	**3184**

Annexure-VII

Origin-destination matrix of intercity daily goods traffic (in tonnes) in Sulthan Bathery Town

	Origin	Destination																				
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	Total
1	Pukalamalam,Chethalayam,Pazheri	-	-	-	-	-	-	-	-	15	5	-	-	-	-	-	-	-	-	-	-	-	**20**
2	Odappallam,Thirunelly,Thelampatta	-	-	-	-	-	-	-	-	26	-	1	22	-	-	-	-	-	-	-	-	-	**50**
3	Kottakkunnu,Kaippancheri,Maithanikkunnu,Kalluvayal	-	-	-	-	-	-	-	-	-	15	-	-	-	-	-	-	-	-	-	-	-	**15**
4	Sulthan Bathery,Manichira	-	-	-	-	-	-	-	156	765	160	110	107	281	72	-	11	-	-	-	12	-	**1,672**
5	Poomala,Poothikkad,Beenachi	-	-	-	-	-	-	-	-	14	18	13	-	-	-	-	-	-	-	-	10	-	**55**
6	Pazhuppathoor,Kaivattamoola,kattayad,Sathramkunnu	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**-**
7	Kidangil,Armadu,Kuppadi,Vengoor	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**-**
8	Poothadi GramaPanchayath	-	15	-	199	-	57	57	-	28	62	15	3	74	-	-	-	-	-	9	12	-	**530**
9	Noolpuzha GramaPanchayath	-	-	-	260	1	48	48	17	-	7	22	134	103	626	217	235	47	-	-	-	-	**1,763**
10	Nenmeni GramaPanchayath	-	-	2	219	25	-	-	36	6	-	1	35	28	33	55	-	-	-	-	-	-	**441**

11	Ambalavayal Grama Panchayat	28	-	8	61	-	-	-	12	25	7	-	-	-	21	-	2	-	-	-	-	-	**164**
12	Meenangadi Grama Panchayat	10	-	17	62	2	-	-	-	2	51	9	-	20	-	49	-	-	-	-	7	-	**228**
13	Kalpetta,Wayanad	-	-	-	95	5	-	-	5	19	101	-	5	-	-	-	-	-	-	3	-	-	**234**
14	Kozhikode,Kannur,Kasaragod	-	-	-	320	-	-	-	23	228	38	-	-	-	-	-	-	26	-	6	67	69	**777**
15	Malappuram,Thrissur,Palakkad	-	-	-	55	-	-	-	1	-	9	-	-	-	-	-	-	-	-	15	26	-	**106**
16	Ernakulum,Kottayam,Idukki	-	-	-	104	-	-	-	-	28	-	-	-	-	83	-	-	-	-	-	-	-	**215**
17	Alappuzha,Pathanamthitta	-	-	-	20	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-	-	-	**20**
18	Kollam,Thiruvananthapuram	-	-	-	-	-	-	-	-	13	-	-	-	-	-	-	-	-	-	-	30	-	**44**
19	Karnataka,Goa,Maharashtra,Niloor	-	-	-	129	-	-	-	-	-	-	-	-	25	285	167	115	-	56	-	24	-	**802**
20	Tamil Nadu,Pondicherry,AP	-	-	-	246	-	-	-	5	-	-	3	21	40	177	83	47	-	37	-	-	-	**660**
21	Other Northern States,Gujarat,Haryana	-	-	-	-	-	-	-	-	-	-	-	-	-	196	9	121	-	36	-	-	-	**362**
	Total	37.9	15	27.9	1770	32.7	104	104	256	1169	471.3	174	327	569.7	1495	581	531.1	72.4	128	33.8	188	68.6	**8,157**

Annexure –VIII

Projected daily volume capacity ratio for different horizon years in Sulthan Bathery study Area

Sl. No	Road Link	Carriage way width(m)	Capacity (PCU)	2013		2023		2033	
				Vehicle (PCU)	V/C	Vehicle (PCU)	V/C	Vehicle (PCU)	V/C
I	**NH.766 from Moolankavu - Kolagappara**								
1	Moolankavu - Kottakkunnu Jn	7.00	15000	10780	0.72	15957	1.06	23620	1.57
2	Kottakkunnu - Gudalur Rd Jn	7.00	15000	24870	1.66	36814	2.45	54493	3.63
3	Gudalur Rd Jn - Traffic Junction	7.00	15000	27320	1.82	40440	2.70	59861	3.99
4	Traffic Jn - Assumption Jn	10.00	30000	25720	0.86	38072	1.27	56356	1.88
6	Assumption Jn - Beenachi Jn	10.00	30000	24370	0.81	36074	1.20	53398	1.78
7	Beenachi Jn - Kolagappara	10.00	30000	9470	0.32	14018	0.47	20750	0.69
II	**Panamaram Road**								
8	Beenachi Jn - Nambeesan kavala	5.80	12000	4780	0.40	7076	0.59	10474	0.87
III	**Pazhupathur Road**	3.80	9000	1250	0.14	1850	0.21	2739	0.30
IV	**Ambalavayal Road**								
9	Court Jn - Manivayal (Town limit)	3.80	9000	5270	0.59	7801	0.87	11547	1.28

V	**Chulliyode Road**								
10	Traffic Jn - Gandhi Jn	6.00	12000	14470	1.21	21419	1.78	31706	2.64
11	Gandhi Jn - Ammayipalam (Town limit)	12.00	24000	5570	0.23	8245	0.34	12205	0.51
VI	**Gudalur Road**								
12	Moolagavu - Thoduvally (Town limit)	8.50	15000	6620	0.44	9799	0.65	14505	0.97
VII	**Moolagavu - Thelampatta Road**								
13	Moolagavu Jn - Thelampatta Jn.	3.00	9000	2080	0.23	3079	0.34	4558	0.51
VIII	**Pulpally Road**								
14	Kottapally Road Jn - Pukalamalam	5.70	12000	3970	0.33	5877	0.49	8699	0.72
IX	**Odappallam Road**								
15	Kuppadi Road Jn - Moolagavu Jn.	3.00	9000	3960	0.44	5862	0.65	8677	0.96
X	**Thoduvetty Road**	7.00	12000	1220	0.10	1806	0.15	2673	0.22
XXI	**Beenachi - Kattayad Road**	3.00	9000	1430	0.16	2117	0.24	3133	0.35
XXII	**Kuppadi - College Road**	3.00	9000	550	0.06	814	0.09	1205	0.13

Annexure – IX

Infrastructure facilities of Educational Institution with in the Municipality

Sl No	Name of School	Location	Category*	Number of Students				
				Pre Primary	Primary	High school	HSS	VHSS
1	Govt.Sarvajana Higher Secondary School	DIET Stop Ward 07	5		170	272	240	160
2	Govt. L.P.School Kaippancheri	Kaippencheri Ward 07	2	26	171			
3	Nirmal Jyothi Special School	Thoduvatty Ward 06	2	8	13			
4	Govt.Technical High School	Thirunelly Ward 05	3			290		
5	Govt. HSS (THS)	Thirunelly Ward 05	5					200
6	Govt.High School Odappallam	Odappallam Ward 03	3		249	146		
7	Govt.HS Kuppadi	Kuppadi Ward 17	3	48	834	251		
8	Nirmala Matha Public School	Kuppadi Ward 18	3	80	365	80		
9	St. Mary's College HSS	Kuppadi Ward 16	4			341	294	
10	Govt.High School Chenad	6th Mile Ward 01	3	28	343	152		
11	St. Mary's English School	Chethalayam Ward 01	2	60	80			
12	WMO English School	Chethalayam Ward 08	3	666	148	18		
13	Assumption AUP School	Assumption Jn Ward 14	2		1387			
14	Assumption High School	Assumption Jn Ward 14	3			921		
15	GLPS Pazhuppathoor	Pazhuppathoor Ward 13	2	14	65			
16	GUPS Beenachi	Beenachi Ward 14	2	73	462			
17	Bhavan's Vidhya Mandir	Beenachi Ward 14	4	237		907	54	
18	IDEAL English School	Snehagiri Ward No.10	4	151	450	135	30	
19	St. Rossellos Central School	Poomala Ward 11	2	72	54			

ANNEXURE -X

Sectoral proposals

Sectoral Proposals (Phasing And Costing)																										
Sl No	Project	Approximate Cost in Lakhs		Duration (Year)	Source Of Funds	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
		Activity Involved	Amount																							
1	Bus Terminal	LA& CW	2460	3	BOT																					
2	Tribal Promotion Centre cum Residential School	CW	1600	3	State																					
3	Sports Academy	LA & CW	800	2	Own																					
4	Comfort Station(4Nos)	LA& CW	210	7	Own																					
5	Science Park	LA & CW	3870	9	Own																					
6	Crematorium	CW	400	2	State																					
7	Drainage Network	CW	2000	13	State																					
					Own																					
8	Indoor stadium at Manikuni	CW	910	4	State																					
					Own																					

9	Stadium Complex	LA& CW	8800	6	Own																			
10	Town Park	LA& CW	500	5	Own																			
11	Sewage Treatment Plant (2Nos)	LA& CW	380	6	EXT																			
12	Open Ground	LA& CW	610	6	EXT																			
13	Soild Waste Treatment Plant	LA& CW	700	5	EXT																			
14	Junction Improvements	CW	350	13	Own																			
15	Industrial Estate	CW	978	3	State																			
16	Civic Amenities	LA&CW	2100	4	State																			
17	Street Lighting	CW	1400	11	KSEB																			
18	Community toilet	CW	70	11	Own																			
19	Truck Terminal	LA& CW	1900	6	State																			
20	Parking Plaza	CW	350	3	Own																			
21	Town beatification	CW	280	18	Own																			
22	Traffic Management System	CW	420	20	Own																			
23	GIS Data base	CW	70	2	Own																			
24	Forest Wall/Rail fencing including Solar fencing	CW	2400	20	Forest																			

* Note: - LA- Land acquisition, CW – Construction Work

-Own - BOT -KSEB

-State - State/Own - Forest

- EXT

Road Proposal																												
Sl No	**Road Proposals**	**Length of Roads**	**Existing width of Roads**	**Proposed width of Roads**	**Approximate Cost Rs in Lakhs**	**Source of funds**	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	Proposed NH By Pass	4.143	New	30m	4775	PWD																				
2	National Highway 766	5.363	18m	30m		PWD																				
R1-Roads(18m)																										
1	National Highway 766 (From NH By pass starting to NH By pass Ending)	4.119	18m	18m		PWD																				
2	Beenachi-Panamaram Road	2.960	8m	18m	1140	PWD																				
3	Bathery -Kuppadi Road	2.166	12m	18m																						
4	Bathery – Thaloor - Gudalur Road	2.000	10m	18m	892	PWD																				
R2-Roads(12m)																										
1	Malavayal Road	2.560	10m	12m	607	PWD																				
2	Ambalavayal Road	2.842	10m	12m	1168	PWD																				
3	Kuppadi-Post Office Road	1.300	7m	12m	265	OWN																				
4	Vadakkanad Road	1.951	10m	12m		OWN																				
R3-Roads(10m)																										
	Beenachi - Pazhupathoor Road	1.300	10m	10m		OWN																				

	Pazheri Road	1.731	7m	10m		OWN																		
9	Puthuveedu ST Colony Road	5.326	6m	10m	1727	OWN																		
10	Vadachira Road	2.524	8m	10m	936	OWN																		
11	Mathamangalam Road	3.620	6m	10m	827	OWN																		
	Dottappamkulam Road	1.348	6m	10m		OWN																		
	Pallikandi Road	1.300	6m	10m		OWN																		
	Kalluvayal - Maidanikunnu Road	1.119	6m	10m		OWN																		
12	Chungam-Kaipanchery-Maidanikun Road	1.565	6m	10m	915	OWN																		
R4-Roads(7m)																								
	Kaivettamoola-Bathery Road	3.076	7m	7m		OWN																		
	Kattayad-Vidhiyabavan Road	1.627	5m	7m	160	OWN																		
	Gurukulam Road	0.600	4m	7m	79	OWN																		
	Thoduvetty Road	1.860	4m	7m	177	OWN																		
	Ex-servicemen Colony - Chettimoola Road	3.243	5m	7m		OWN																		

- Own

- PWD