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FRAMEWORK OF SMART RURAL INFRASTRUCTURE FOR MANIMANGALAM

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Abstract: The development of the country is dependent on the growth of the country's rural area. Our country's backbone is made up of villages. The gap between villages and cities is widening as a result of increasing urbanization, technological illiteracy, and a lack of fundamental social and physical infrastructure. The progress of technology in cities is due to widespread knowledge of technologies, whereas in villages, there is a lack of understanding of technological advancements. Villages that rely heavily on agriculture and other agro-based industries will benefit from the application of technology to these sectors. The smart semi-urban region concept will improve rural living standards by making them self-sustaining. Technology will be the catalyst in achieving the smart rural area status by providing one step ahead facilities in sanitation, health, education, transportation, water conservation, farm productivity, local business opportunities, and economic liberation for village youth, and better democratic engagement. Through a review of literature in the fields of smart RURAL concept, risk assessment, and management of rural infrastructure, this study aims to create a sustainable model of a smart RURAL area by studying the current state of infrastructure in Manimangalam and integrating all of the needs of the rural population. This study aims to meet the needs of the current generation without compromising the needs of future generations, and it proposes the risks associated with the development of smart semi-urban areas, as well as risk assessment and management plans for semi-urban areas and government schemes supporting rural development in our country.

Keywords – Urbanization, Technology, Education, Rural infrastructure

I. INTRODUCTION

Rural areas are the most peaceful, wonderful and beautiful place to live in our country. Rural areas survive on agriculture, pisciculture, sericulture, floriculture, weaving industry, dairying and an orchard. Rural areas provide the food on our table and also raw materials for various urban industries. Culture and traditions of our country are still alive due to our rural areas, they protect our heritage. Rural areas are the roots of development in a country, when a rural area flourishes it helps in improving the whole country. Development of a country can be visualized by current state of the rural area. More development and growth in rural area economy will help to increase the country's economy. The growth of the rural area are very important for a country to develop from a developing country to a developed country standard but these developments face many obstacles due to the rapid urbanization, growing gap between the rural and urban standards of living, lack of knowledge to the technologies available, climatic changes due to global warming, deforestation and expansion of urban areas for which the agricultural fields and water bodies are used. Due to these factors the development of the RURAL area becomes burdensome to the planners. The development of rural area should be planned in such a way it takes into account of the rural area characteristics and its environment. The schemes to be implemented should not be new to the rural area's knowledge; the scheme should focus on the key element of the rural area. Most of the rural areas depend on agriculture, the scheme to be implemented should have agriculture as their source. The scheme to be implemented should always be useful to the population of the RURAL area it should not forcefully implement any other mode of development on them. The rural areas of our country mostly consists of mixed population the scheme to be implemented should be easy to understand. The development schemes should focus on the manufacturing sectors with agriculture as its base product. The development schemes should be concerned with growth in the agriculture, creating job opportunities with adequate wages, good communication skills, should provide houses to the poor people and good healthcare facilities.

IMPORTANCE OF RURAL AREA DEVELOPMENT

Development of RURAL area is not only important for the majority of population residing in RURAL area but also for the overall economy of the nation. It is important to enhance the living standards of RURAL area people by utilizing the numerous amount of natural and human resources; though the resources are easily available proper use of resource is must which can be attained using the available technologies. RURAL area's development is important for poverty alleviation, better livelihood, provision of basic amenities and infrastructure facilities.

TABLE: 1 Total Population of Tamilnadu: 2001, 2011 and 2021

SI No	Category	Population in millions		
		2001	2011	2021
1.	Total population	34.92	37.23	46.8
2.	Male	17.54	18.68	22.58
3.	Female	17.39	18.55	22.42
4.	Child population (0-6 years)	4.92	3.91	1.8

Source: Director of Census operations (Tamilnadu) and Unique Identification Aadhar India

SMART RURAL AREA

A smart RURAL area is the one which uses technologies to enhance the livelihood of the people by providing the basic facilities and services such as quality drinking water, better sanitation, good solid waste management, hospitals and roads for better connection with their surrounding society and make them self-sustainable. The development of the RURAL area is very important since majority of the poor of our country reside in the RURAL area. When the backbone of our country is strengthened, the country will flourish in a faster rate.

Need for Smart RURAL Area

RURAL area development has a major importance in the Indian economy and has a considerable impact in the country due to the following reasons

- To eradicate poverty in RURAL area
- To maintain the tradition and heritage of our country
- To improve the participation of RURAL areas in the nations development
- To create awareness about the various government policies about the development of RURAL area
- To educate the RURAL area population about the technology development and its application
- To provide better standard of living to the RURAL area population
- To educate the youth of the RURAL area
- To provide better sanitation facilities
- To promote the regionally manufactured products
- To develop the local industries and handicrafts
- To create employment opportunities
- To motivate the youth in entrepreneurship
- To develop the infrastructure in RURAL area
- To create awareness about the vaccination for covid-19
- To create better society for living.
- To educate the farmers about the advancement in irrigation techniques.

Challenges in Smart RURAL Area

The meaning of smart RURAL area differs in each individuals view since their requirements changes and their lifestyle varies. The understanding of new technologies is difficult to the RURAL area population since many among the RURAL areas are still illiterate. The present youth generation urges to settle fast in their life; this creates lack of interest in the RURAL area lifestyle and acts as retarders for the development of the RURAL area. The improper management of resources in RURAL area is a hindrance to the rural development.

RISK ASSESSMENT AND SMART MANAGEMENT IN RURAL AREA

The Project Management Body of Knowledge (PMBOK) defines the risk as an uncertain event or condition that if it occurs has a positive or negative effect on projects objective and has also provided set of instructions to develop risk management plan for identifying the risks, to perform qualitative and quantitative analysis, plan risk mitigation and then control the risks. An active risk management plan should be carried out to identify the risks as soon as possible which will help to monitor and control the risks more easily. Risk assessment consist of risk identification, risk analysis and risk evaluation.

NEED FOR STUDY

RURAL areas are the backbone of the country, when the backbone isn't strong it becomes difficult for the nation to stand (develop).The infrastructures of the RURAL area are limited, education, travel and health facilities are limited. The basic facilities should be provided such as drinking water, education, hospitals and roads. Developing these facilities will help to increase the overall economy of the RURAL area, state and nation as a whole.

AIM

To make the RURAL area smart using the technologies and provide the required infrastructure for development of the economy of the RURAL area based on the risk assessment and smart management strategies.

OBJECTIVE

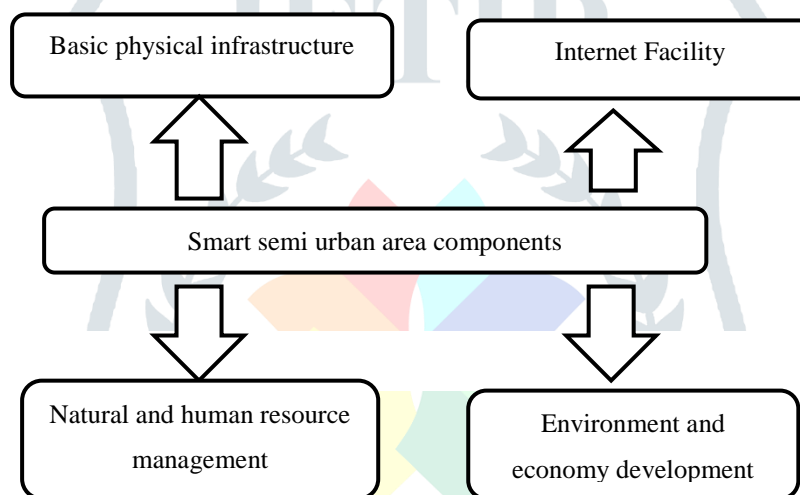
- To study the current level of infrastructure facilities in the particular RURAL area community.
- To identify the required infrastructure for developing the smart RURAL area.
- To develop infrastructure plan based on the risk assessment and management strategies.

SCOPE OF THE STUDY

- The project focuses on planning and designing the smart RURAL area plan for the selected RURAL area based on the risk assessment strategies
- Creating smart infrastructure that is appropriate for the community in the semi-urban area.
- To study constrains related to economy status of the RURAL area people and improve the RURAL area economy.

II METHODOLOGY

The methods used to arrange a model in this research were done through preliminary interview, literature review of previous studies, books and analysis of supporting regulations. Literature review was taken by selecting journals according to the definition of the model used and the examples of its applications. Then it was continued by an analysis of local regulations dealing with the research object, Manimangalam RURAL area, Kanchipuram district, Tamil Nadu.

COMPONENTS OF SMART RURAL AREA DEVELOPMENT**FIGURE:1**

METHODOLOGY FRAMEWORK

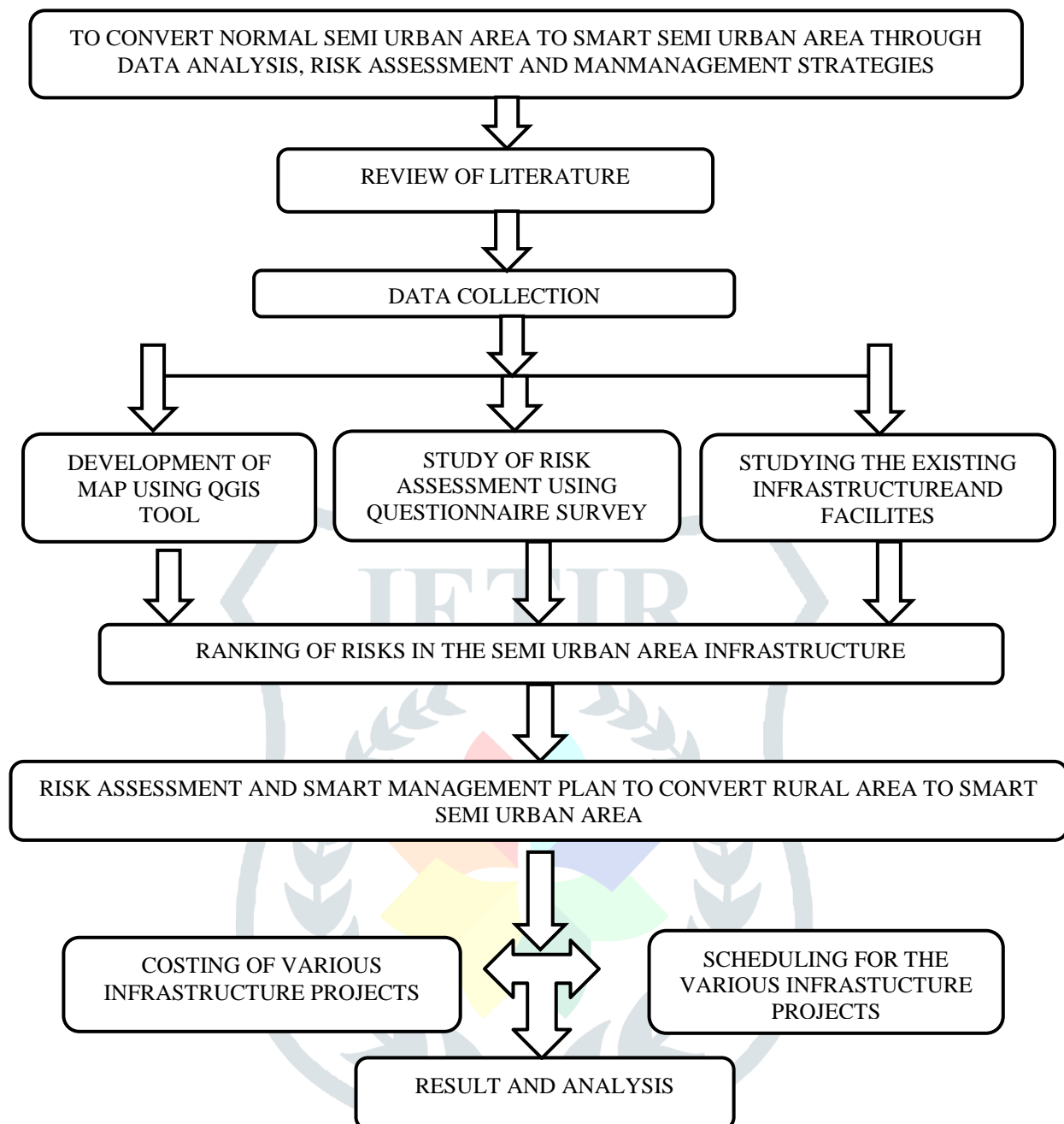


FIGURE:2

III DATA COLLECTION:

Manimangalam is a RURAL area located in Kundrathur taluk of Kanchipuram district of Tamilnadu. Size of the RURAL area is 110.7 sq. Km with a population of 8198 in which male population were 4117, female population 4081 and children of age 0-6 were Chennai International Airport. The soil type of Manimangalam RURAL area is lateritic soil. The average rainfall in the RURAL area located in Kanchipuram district is 1227.7 mm, 54% northeast monsoon and 36% southwest monsoon. The major crop cultivated in the RURAL area is paddy. The average maximum and minimum temperature during summer is 36.6°C 21.1°C and during winter is 28.7°C and 19.8°C806 as per 2011 census as shown in table 4.1. The nearest railway station to the RURAL area is Vandalur and nearest airport is.

CENSUS DATA OF MANIMANGALAM RURAL AREA

As per the 2011 census data children with age 0-6 are 806 which make up 9.83% of total population, literacy rate of Manimangalam RURAL area is 78.96% compared to 80.09% of Tamilnadu and male literacy stands at 86.01% while female literacy rate was 71.87%. Schedule caste constitutes 36.37% while schedule tribes were 1.74% of the total population. 67.52% of workers describe their work as main work while 32.48% were involved in marginal activity providing livelihood for less than 6 months. Of 3313 workers engaged in main work, 287 were cultivators while 288 were agricultural laborer. The collected data as per 2011 census are listed in the Table 3.1.

PARTICULARS	TOTAL	MALE	FEMALE
Total No. of Houses	1974	-	-
Population	8198	4117	4081
Child (0-6)	806	408	398
Schedule Caste	2982	1474	1508
Schedule Tribe	143	75	68
Literacy	78.96%	86.01%	71.87%
Total Workers	3313	2406	907
Main Worker	2237	-	-
Marginal Worker	1076	665	411
Disable persons in total population	27	15	12

As per table 3.1 In Manimangalam RURAL area, 3313 of the whole population was working with a preponderance of male labourers 2406. The total numbers of main workers in Manimangalam were 2237. The marginal workers in the Manimangalam were 1076 and the total number of disabled persons was 27.

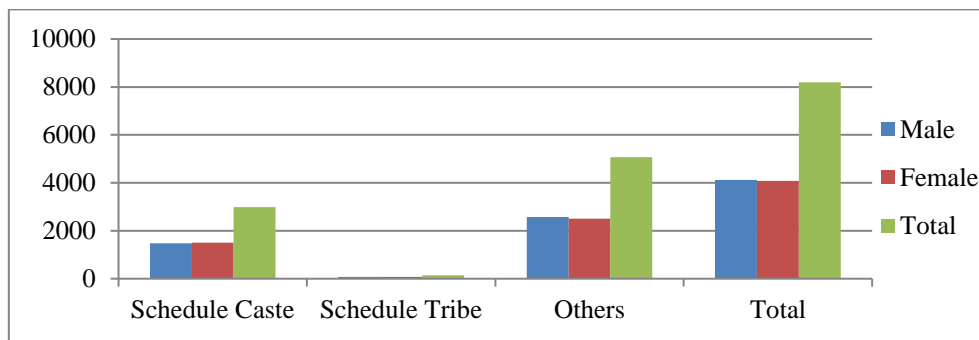


Figure 3.1: Population of the Manimangalam RURAL area 2011 census.

From FIGURE 4.1 as per 2011 census in Manimangalam RURAL area 63.6% of the total population is occupied by the schedule caste in which male population is 49.4% and female population is 50.6%. The majority of the population is occupied by the male population with 50.3% and female population was 49.7%. The lowest population in the Manimangalam RURAL area was schedule tribe with 1.74% of the total population.

MANIMANGALAM DATA AS PER 2020

As per 2020 data collected from the Manimangalam RURAL area panchayat the number of houses are 2151, number of schools are 2 (primary) and number of panchayat buildings are 11. The numbers of sanitary workers are 14, purity guards are 9 and drinking water supply is staff 8. Total numbers of public pipes are 262 in which 167 are in practice and 5 drinking water facilities extensions are provided to the households. From the public pipe lines there are 607 household connections. There are 654 light connections in which LED lights are 396, tube lights are 36, CFL lamps are 254, sodium lamps are 10, high tower lights are 5 and solar powered lights are 3.

Table 3.2: Population of Manimangalam RURAL area 2020

PARTICULARS	MALE	FEMALE	OTHER	TOTAL
Schedule Caste	1769	1810	3	3582
Schedule Tribe	90	82	-	172
Other Castes	3082	3006	-	6088
Total	4941	4898	3	9842
Disable persons in total population	18	16	0	34
Number of houses	2151	-	-	2151

As per table 3.2 the numbers of disabled persons in the Manimangalam RURAL area are increased compared to the 2011 census from 27 to 34 and the female population of the RURAL area is also increased from 4081 to 4898. The schedule tribe growth rate was low compared to other categories.

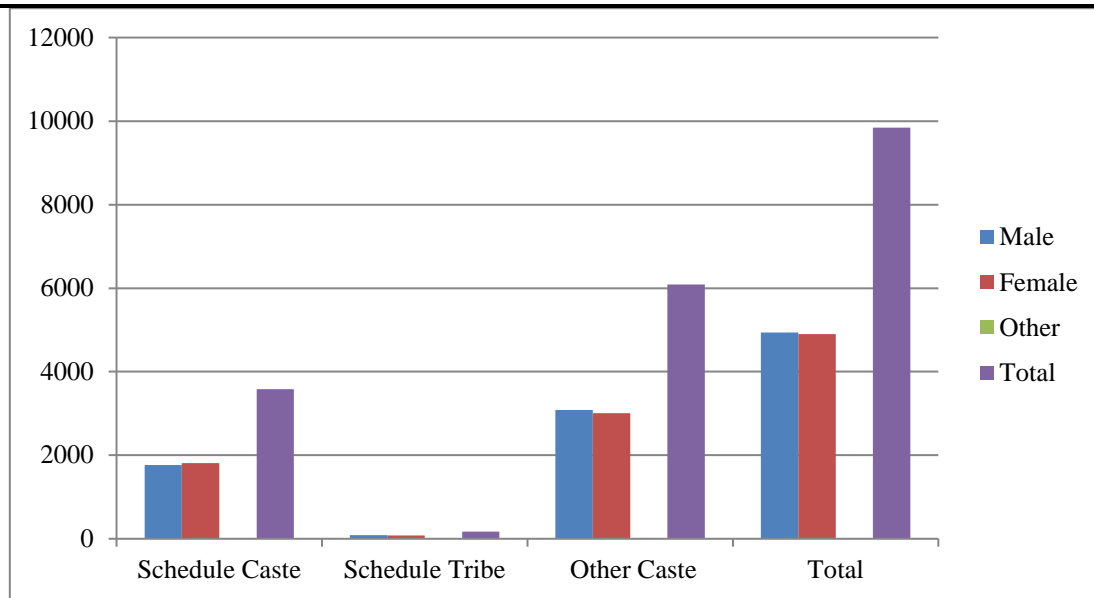


Figure 3.2: Population data of Manimangalam RURAL area 2020

As per FIGURE 3.2 in 2020 Manimangalam RURAL area the majority of the total population is occupied by the male population 50.2% and the female population is 49.2%. The schedule caste population in the Manimangalam RURAL area was 36.4% of the total population 49.38% was occupied by the male population and 50.53% was occupied by the female population. The lowest population in the Manimangalam RURAL area is schedule tribe with 1.74%.

Table 3.3: Comparison of male and female population 2011 and 2020

CATEGORY	MALE POPULATION DURING 2011	MALE POPULATION DURING 2020	FEMALE POPULATION DURING 2011	FEMALE POPULATION DURING 2020
Schedule caste	1474	1769	1508	1810
Schedule tribe	75	90	68	82
Others	2568	3082	2505	3006
Total	4117	4941	4081	4898

From the table 3.3 it can be understood that the male population of the Manimangalam RURAL area has increased, but the growth in schedule tribe is not much compared to other communities and the female population has been increased in similar manner compared to the male population.

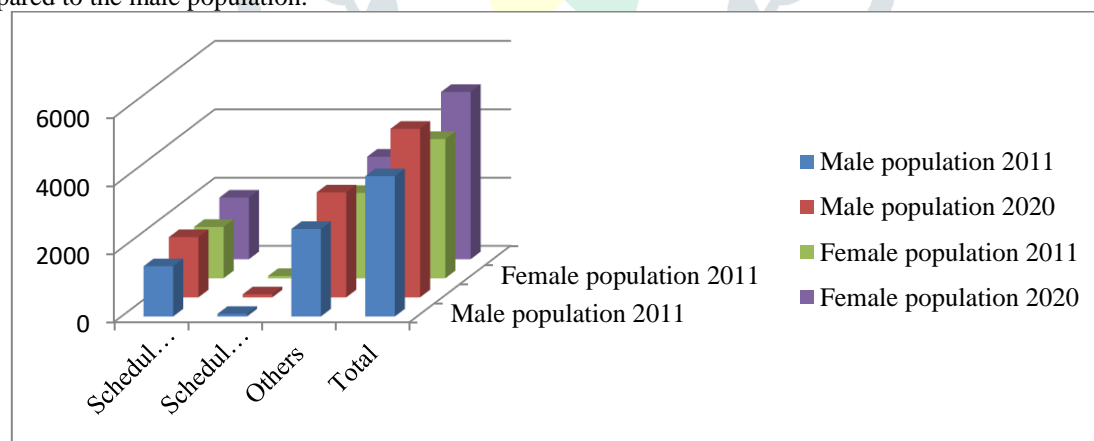


Figure 3.3: Comparison of male and female population 2011 and 2020

As per FIGURE 3.3 in Manimangalam RURAL area male population has increased by 16.7% and the female population has increased by 16.6%. The schedule caste female population has occupied 18.4% of the total population in Manimangalam RURAL area.

Table 3.4: Sources of Drinking Water in Manimangalam RURAL area

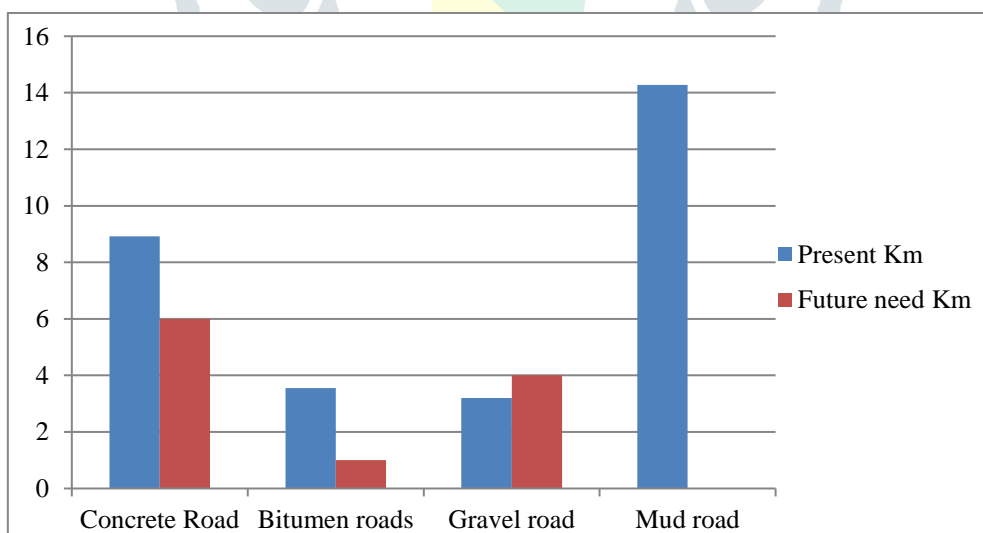
SOURCE TYPE	TOTAL NO OF SOURCE TYPE	NO OF SOURCES USED	SOURCES not in use REQUIRED IN THE FUTURE
Lake/Aquifers	8	6	2
Small Ponds	4	4	2
Wells	3	3	3
Hand pumps	14	13	5
Motor pumps	32	31	10
Max plus motor pumps	15	14	20
Total	76	71	42

From the table 3.4 it is clear that the Manimangalam RURAL area has a good water source and also the use of ground water is increasing which can be seen in the number of motor pumps and MPP motor pumps used.

Table 3.5: Infrastructural Details of Manimangalam RURAL area

PARTICULARS	NUMBER OF PARTICULARS
Dustbins	25
Electric vehicles for collecting waste	2
Waste collecting vehicles	8
Equipment's used for collection of waste	30
LED streetlights	396
CFL streetlights	254
Tube lights	36
Sodium lights	10
Solar lights	3
Cement roads	8.92 Km
Bitumen roads	3.55 Km
Gravel roads	3.2 Km
Mud roads	14.28 Km

From the table 3.5 it is clear that the Manimangalam rural area has some of the basic infrastructure facilities. The facilities aren't sufficient for the present population and needs development.



As per FIGURE 3.5 in Manimangalam rural area the mud road has occupied 52.3% of total road facilities and concrete road has occupied 29.8% of the total road facilities.

PREPARATION OF MAPS USING QGIS

Quantum Geographical Information System (QGIS) is used to study the geographic data of Manimangalam rural area.



FIGURE 3.6 Mud (earthen) roads in Manimangalam



FIGURE 3.7 The land used for agriculture in the Manimangalam rural area.



FIGURE 3.7 Water sources in Manimangalam rural area

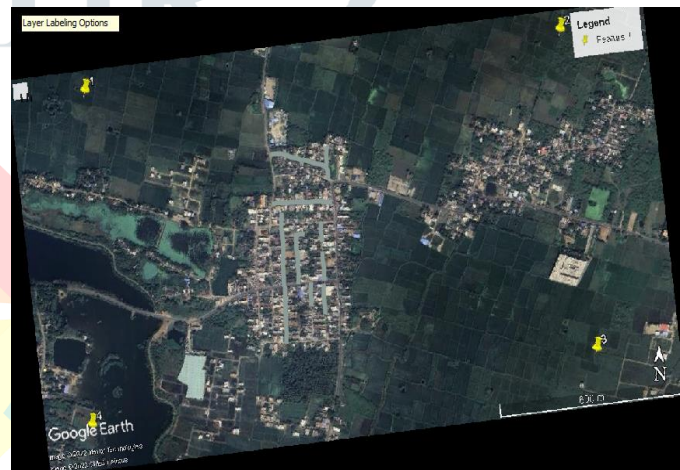


FIGURE 3.8 Concrete roads in Manimangalam rural area

CONCLUSION

In Manimangalam RURAL area there is lack off basic infrastructural facilities such as poor health facilities, sanitation facilities, improper solid waste management and road facilities. The study area still depends on agriculture majorly for their income. The major portions of road facilities in the area are still undeveloped and are of mud roads. Schedule caste population is the highest in the area with 63.6% and in the schedule caste the female population has 50.5% of its total population. In the Manimangalam RURAL area there is lots opportunities to develop the area using the technologies and smart management strategies. The female population in the area plays a significant role in boosting the Manimangalam's economy. The education standards can be improved using the smart education facilities in which internet facilities will help to educate the children. Agricultural productions can be improved using the modern technologies and smart irrigation techniques. The women empowerment and self-help programs can be implemented in the study area. The job opportunities of the youth can be improved and entrepreneurships can be motivated by developing small scale industries.

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