

IDENTIFICATION OF GROUND WATER POTENTIAL ZONE IN POONDI MICRO WATERSHED THIRUVALLUR,TAMIL NADU, SOUTH INDIA.

Submitted in partial fulfillment of the requirement for the
award of Bachelor of Engineering Degree of Civil Engineering

by

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**DEPARTMENT OF CIVIL ENGINEERING
SCHOOL OF BUILDING AND ENVIRONMENT
SATHYABAMA**

INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)

Accredited with Grade "A" by NAAC

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APRIL - 2021



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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of KALIDASAN S(37200029) and LOKESH V (37200035) who carried out the project entitled **“IDENTIFICATION OF GROUND WATER POTENTIAL ZONE IN POONDI MICRO WATERSHED, THIRUVALLUR, TAMIL NADU, SOUTH INDIA”** under my supervision from October 2020 to April 2021.

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DECLARATION

We KALIDASAN S (37200029) and LOKESH V (37200035) hereby declare that the Project Report “**IDENTIFICATION OF GROUND WATER POTENTIAL ZONE IN POONDI MICRO WATERSHED**” **THIRUVALLUR, TAMILNADU,SOUTH INDIA** done by us under the guidance of MS.P.ESHANTHINI is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in Civil Engineering.

DATE:

1.

PLACE:

2.

SIGNATURE OF THE CANDIDATES

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We are pleased to acknowledge our sincere thanks to Board of Management of **SATHYABAMA** for their kind encouragement in doing this project and for completing it successfully. We grateful to them.

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ABSTRACT

water is essential for all living organisms but in recent years groundwater is declining due to various manmade activities. During monsoon season not all the rainwater enter into the ground because of land type, flow type, flow direction, and environment. In the present Geographic information system (GIS) was used to identify groundwater potential zones and locations for artificial recharge structures in Poondi micro watershed, Thiruvallur district in Tamilnadu. The various maps which are prepared from ArcGIS will shows variation in slope from high to low, land use/ land cover, Lithology, Lineament density, Geomorphology, Drainage density, Rainfall and Soil type. The analytic hierarchy was used to give a rank and weightage for the all the created maps and every single characteristic in the map. ArcGIS overlay analysis was carried out Based on the assigned weight for different layers of map including Geomorphology, Slope, Soil, Land use & Land cover, Digital Elevation Model (DEM), Lineaments, lithology. The result shows that five groundwater potential zones exist in the area viz, good, moderate, low, and poor that and may be used for better planning and management of groundwater resources.

Key words: Ground Water, Arc GIS, Land use/Land cover, Drainage Density, Slope and Ground water potential zone.

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LIST OF ABBREVIATIONS

USGS	UNITED NATIONS GEOLOGICAL SURVEY
DEM	DIGITAL ELEVATION MODEL
LD	LINEAMENT DENSITY
GIS	GEOLOGICAL INFORMATION SYSTEM
DD	DRAINAGE DENSITY
LC	LAND COVER
LU	LAND USE
SOI	SURVEY OF INDIA

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CHAPTER 1

INTRODUCTION

Groundwater is a precious natural gift to all living beings. The subsurface ground water is fresh water source. India having 18% of the world's population but just 4% usable water supply. The Times of India recently published groundwater news, claiming that groundwater has provided 84 percent of the country's water for the past four decades. Groundwater is responsible for 80% of India's drinking water needs. Groundwater is overexploited in 60% of India's districts. Groundwater withdrawals for varied industries (irrigation, household, and industrial) have resulted in lower groundwater levels, long period water decline, and still well drying out. However, determining the best position and structure for artificial recharge schemes is critical to their success.

Artificial recharge is a successful method of can groundwater supplies. To recharge groundwater, a variety of techniques have been developed, the majority of which utilize variation of direct-surface, direct-subsurface. The advantage of direct surface techniques is the potential to refill under extreme groundwater overdraft, as well as the additional benefit of soil filtering and water transfer through the aquifer. Injection wells are used to provide direct subsurface groundwater recharge. Since the water is pumped directly into the groundwater, a high level of pretreatment is needed. Direct subsurface recharges have the benefit of assisting in the movement of extra salts that gather in the source zone to deeper soil layers either into the groundwater system. Water infiltration of groundwater is increased by tree roots, which decreases water flow. Spreading surface water on land allows it to penetrate the vadose zone (the unsaturated layer above the water table) and into the aquifer, resulting in circumlocutory recharge.

Groundwater exploration be dependent on land characteristics, as well as geology, geomorphology, land use, and other factors. RS and GIS techniques are often utilize to produce thematic information for the appraisal of subsurface water resources.

Groundwater potential zones are divided into four category: excellent, good, moderate, and bad. Several researchers have use combined spatial data to classify possible groundwater zone. Remote sensing and geographic information systems (GIS) cover a large and inaccessible region of the earth's surface with minimal time for identifying areas of artificial recharge sites. By interpret thematic layers such as geomorphology, groundwater studies can be conducted. Geology, drainage, lineament, soil, rainfall intensity, and slope are all important factors to consider. The presence of surface water supplies, such as winter and spring floods, can supplement groundwater resources. Surface storages may not be cost-effective in some areas because these projects require significant investment, and the detected storages would be filled with silt and rendered unusable after a few years. The recharge systems have been proposed to meet groundwater demand and to extend the groundwater reach for future generations.

CHAPTER 2

LITERATURE REVIEW

2.1 GENERAL

The primary aim of a study review is to give a summary of the research and in-depth knowledge of the research that has been conducted; this acts as the basis for carrying out work and developing strategies for assessing groundwater prospective zone. The research study on estimating ground water potential zone using the AHP method was identified in the following literature survey.

2.2 LITERATURE SURVEY

Nawawi M. N. M., & K. Abdullah., K. A. N Adiat, (2012) that was completed The spatial calculation of possible zones of groundwater supplies in a certain research area was use as a case study to achieve the set objectives. A total of five factor that are thought to influence the area's groundwater storage capacity were chosen. Each factor was given a weight base on Saaty's 9-point scale, and the weights be then normalized using the analytic hierarchy process method (AHP). To build the groundwater probable zone guess map for the study area, the process was incorporated into the GIS environment.

Garg, P. K. Agar wal, R., (2016) Remote sensing (RS) and geographic information systems (GIS) were found to be critical in understanding the separation of groundwater, a vital resource of water provide more or less the world. Groundwater capacity and recharge zone maps are delineate using Remote Sensing, GIS, and Multi-Criteria Decision Making (MCDM) technique for the Loni watershed and Morahi watershed in the Unnao districts and Rae Bareli districts of UP, India. To define the groundwater potential and recharge zone maps, Satty's Analytical Hierarchical Process method (AHP) is use as an MCDM method to calculate the weights of different thematic layers and their groups. Groundwater prospective and recharge zone maps were created by combining thematic layers in a GIS setting using weighted overlay. On the basis of their rank and weightage, the quality of the groundwater possible map is additional categorised into five zones: 'very bad,' 'poor,' 'nice,' 'very good,' and 'excellent.'

Ahmed, R., & Sajjad, H. (2018) The capacity of groundwater in Assam's Lower Barpani watershed was investigated. Through an empirical hierarchy procedure, weights were allocated to the top ten sites particular groundwater factor in the watershed. In a GIS setting, the biased factors were combined to organise groundwater probable zone. The north and northwest sections of the study region have high groundwater capacity, according to the findings. The key factor of far above the ground groundwater potential in these parts were found to be gentle slopes, flood plains, monsoon rainfall, and the location of various wetlands. In the watershed's southern portion, average groundwater capacity was discovered. Because of the superior drainage density other than steeper slope, the nature of the rock, and the small tide table, this section of the watershed has an average groundwater capacity.

Gupta, A., & Ghosh, S. Das, S (2017) In this analysis, possible zones in the Hingoli district of Maharashtra were delineated using a combination of remotely sensed data and traditional maps in GIS software. Several factors be given weightings, including geomorphology, lithology, soil type, rain fall division, land use slope, and so on. utilising the management information format technique All of the parameters were combined in a GIS setting to differentiate the study area's groundwater prospective zones. This study area is separated into good, moderate, poor, and very low ground water potential area based on ARCGIS rank and weightage.

Machiwal, D., & Sharma, A Rangi, N.. (2015) By combining remote sensing, geographical data systems, multi-criteria decision making (MCDM), and multiple rectilinear deterioration (MLR) techniques. This study scholar used a included knowledge-driven methods and data-driven methods for groundwater potential zone in the hard-rock terrain of the Ahar River catchment, Rajasthan, India. Geomorphology, soil, topographic elevation, slope, drainage rate, closeness to surface waterbodies, pre-monsoon and post-monsoon groundwater depths, net refill, transmissivity, and lulc were used to create thematic maps of the eleven hydrological factor that influence groundwater occurrence. The themes and their characteristics were given appropriate ranks and weights, which

were then normalised using the multiple criteria decision making technique. At last, the knowledge-driven groundwater potential map denotates that the great, moderate, and weak groundwater probable zones were revealed by weightage linear combination.

A., et al. (2016) For a coastal groundwater area in eastern India, a map of groundwater potential zones (GWPZ) was performed. The groundwater potential zone map is developed by integrating different factors layers, such as LU/LC map, soils map, geomorphology map, hydrogeology map, surface geology map, net recharge map, drainage density map, runoff map, slope map, surfacewater bodies map, lineament density map, and Normalized Difference Vegetative Index (NDVI). Values for recharge rates are derived from a hydrological water balance method. To create a GWPZ map of the study area, the overlaying weighted sum process method is used to incorporate all thematic layers maps. factors such as lithology, geomorphology, soil type, rainfall

Khare Y.D., Mondal N. C., & Thakare, S, Varade, A. M. Deshkar, R. K. (2017) To address this problem, a spatial database developed using remote sensing technique was used to study the groundwater recharge and extraction affecting factors in a waterbody in the Nagpur district of Central India. The study area's groundwater resources were assessed using the Ground Water Estimation Committee standard, which is a common practice in India, as well as a geo spatial database that took into account factors such as geology map, geomorphology map, lu/lc map, and hydrology map, among others. The variation in recharge, recharge by return flow, water yield, and extraction factors, among other things, can be seen in the comparison involving groundwater resources of the GEC norm and the come close to via spatial database.

CHAPTER 3

AIM AND SCOPE

3.1 AIM

- To identification of ground water potential zone in poondi micro watershed.
- To study the details of the area.
- To collect satellite data.
- To find the rank and weightage for every map.
- To identify the ground water potential zone.

3.2 SCOPE

The scope of the project is,

- To design zone for artificial ground water recharge zone.
- To plan adequate ground water management project in poondi micro watershed.
- To avoid water scarcity in poondi micro watershed

CHAPTER 4

METHODOLOGY

4.1 METHODOLOGY

The method of the present study is shown in fig (4.1), where the flowchart for the study is shown. There are various steps involved in this study. We need to collect the various data from various sources. First, we want to download the study area satellite images from USGS. Using Earth Explorer create a DEM map via extract all images and merge all images after clipping the image of our particular study area in the ArcGIS10.1 software. Use the DEM map to create the slope map and drainage density map. Next, create the rainfall map from the gridded data set and soil map from the SWAT data set. Land cover and land use map were taken from Landsat images, lithology, and lineament map from Bhukosh. At last, we collected a geomorphology map from a geological survey of India. Use the analytical hierarchy process method to calculate rank and weightage for soil map, slope map, drainage density map, soil map, lineament map, lithology map, land cover, and land use, geomorphology map. Then find the classes, potentiality, rank, normalized weight for every map. Finally, overlay analysis of all maps in ArcGIS. Next, we get the overall weightage of the water potential zone map.

METHODOLOGY

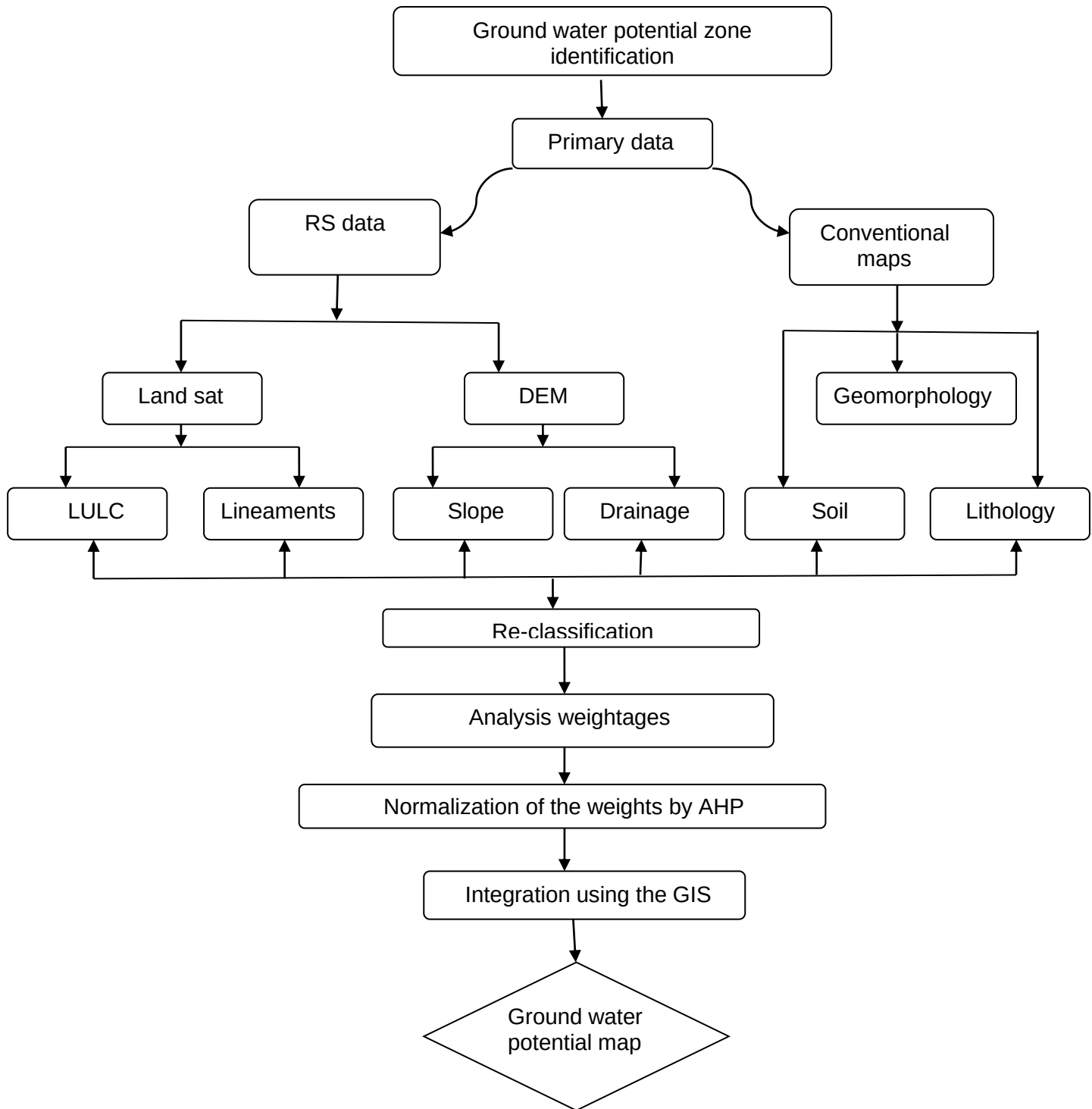


Fig 4.1: Flow Chart

4.2 DESCRIPTION OF STUDY AREA

Poondi micro watershed, the study region, is placed in the Thiruvallur district of Tamil Nadu, India. Its latitude range from 79 degrees 42 minutes to 79 degrees 54 minutes 36 seconds, and its longitude ranges from 13 degrees 1 minute 40.88 seconds to 13 degrees 12 minutes 50 seconds. It has a total area of 528.93 square kilometres. Fig:4.2 show the location map of study area. It has a average rainfall 604 mm.

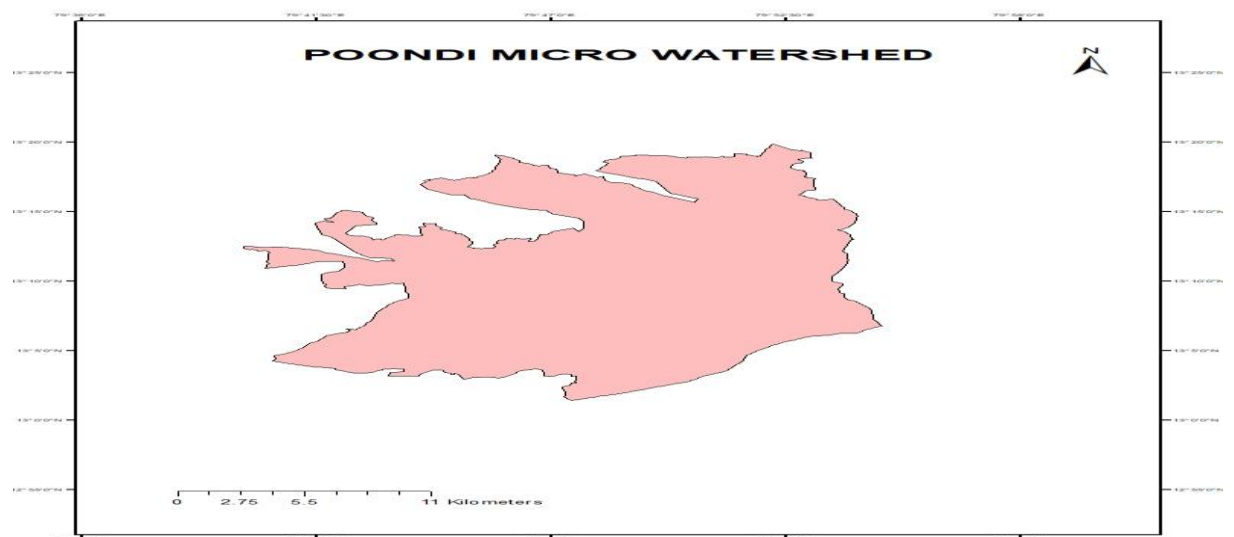
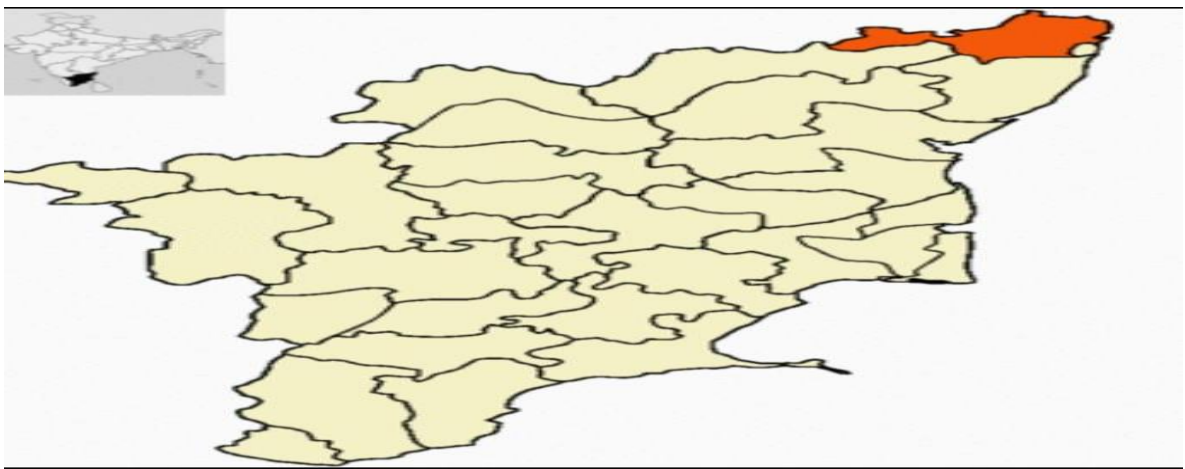


Fig 4.2 : poondi Micro Watershed Study Area

4.3 Digital Elevation Model

A satellite imagery model is a three-dimensional visual effects illustration of elevation data used to depict terrain on a planet. DEMs are the the majority general basis for digitally generated relief maps and are frequently used in geographic information systems. It shows in fig (4.3)

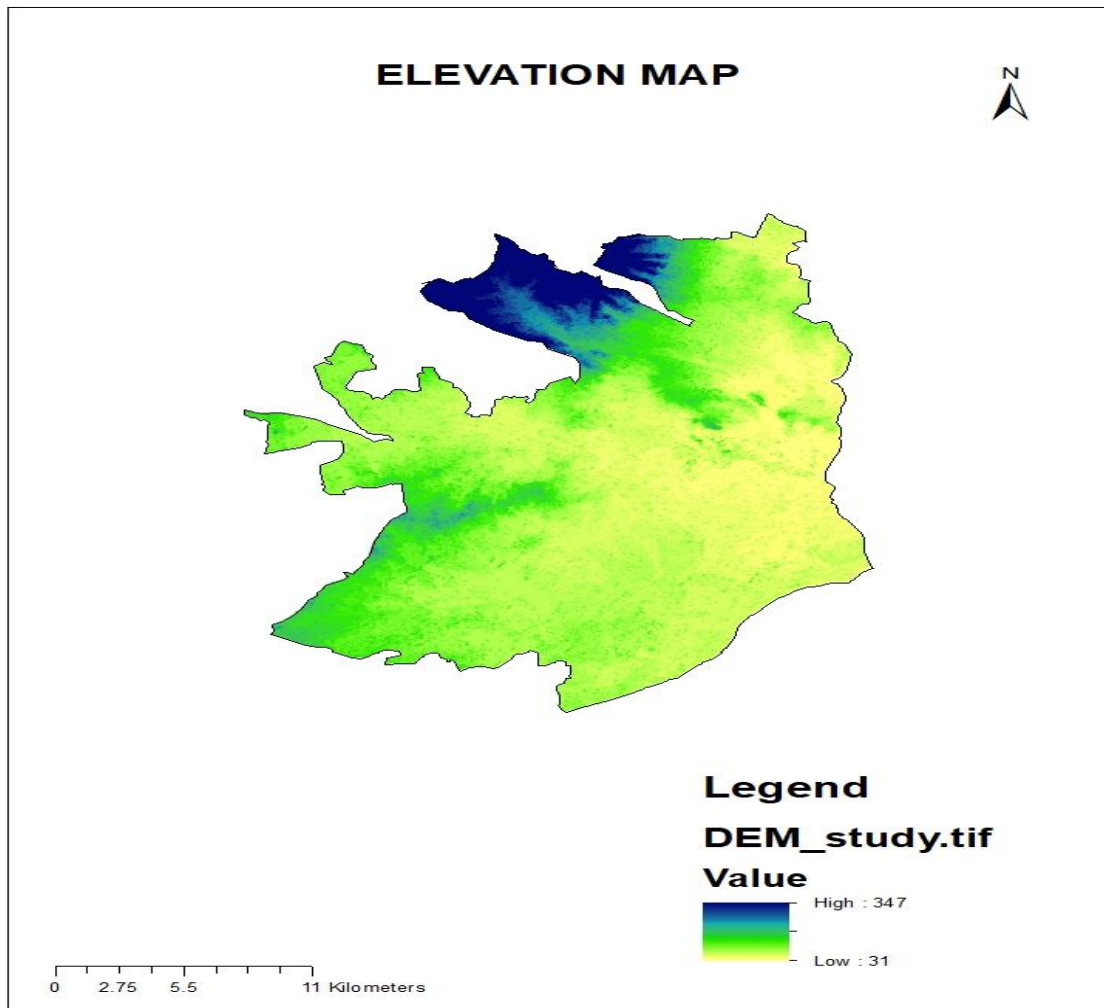


Fig 4.3: Digital Elevation Model

4.4 THEMATIC LAYERS

All thematic layers are taken into account for remote sensing data and traditional maps. Lulc, lineaments, slope, drainage density, soil, lithology, geomorphology, and DEM are the terms used.

4.4.1 Climate

The watershed has four seasons: winter season (Jan to Feb), spring season (March to May), and summer (June to August). The south western heavy rain occur from June to September, and the north eastern heavy rain occurs from Oct to Dec.

4.4.2 Lineament

while the existence of lineaments generally denote a prelude zone, the density layers of lineaments in a region may be indirectly connected to groundwater potential recharge zones. What areas with a high density of lineaments are best for groundwater development

4.4.3 Drainage Density

The channel spacing is revealed by the drainage density. Groundwater development is not feasible due to the high density. Water permeability and surface water runoff affect drainage density.

4.4.4 Geomorphology

Poondi micro watershed has a high-spread pediplain complex, as well as a deltaic plain and flood plain. Small, moderately dissected hills and valleys are also present. Geomorphologic areas are divided into five categories based on their recharge capacity based on the categories, that is very good, good, moderate, bad, and poor.

4.4.5 Slope

The rise and fall of the study region land surface is referred to as a slope. The ability to recharge groundwater is determined in part by the slope of a region. If the

study area having low degree size of slope or gentle slope, its help more water infiltrate to ground sub surface because low degree slope water runoff is low. At the same, If it have higher slope low amount of water only infiltrate to ground because here water runoff is more.

4.4.6 Land use and Land cover

Water bodies, urban areas, barren land, and woodland make up the majority of the study region. Agriculture lands are an ideal location for groundwater potential initial the point of view of land use.

4.4.7 Soils

Loam and clay loam are the two soil types present in this watershed. The groundwater recharge capacity varies due to various soil types.

4.4.8 Lithology

A rock component lithology is a explanation of the physical uniqueness apparent in projection under low magnification microscopy. shade, texture, grain range, and alloy are all physical characteristics.

4.4.9 Rain fall

Rainfall refers to the amount of precipitation in the form of rain that falls to the earth's surface, whether on land or water. It happens when a cloud of air travels over a warm body of water or wet ground.

CHAPTER 5

RESULT AND DISSCUSION

5.1 Thematic layer preparation

To build the map of groundwater recharge zones, thematic layers are such as lithology map, geomorphology map, slope map, soil map, lu/lc map, lineament density map, and drainage density map were reclassified and assign ranks and weightage.

5.2 Lithology

The study area is predominant with coarse sand and gravel followed by sand, laterite, sand stone, black silt clay, brown silt, charnockite, gneiss, amphibolites, shale and granite occupied mostly in small mound either linear domes in the study region. The rock distribution map.(Figure 5.2.2) in the study area.

The different of types rock distributed in the study region (Figure 5.2.1) shows that. 60 sq.km of the study region is enclosed by coarse sand and gravel followed by 48 sq.km sand, sand stone, laterite and 36 sq.km, black silt clay, brown silt, 24km.sq charnockite, The study area very less amount of rock is covered by gneiss, amphibolites, shale and granite.

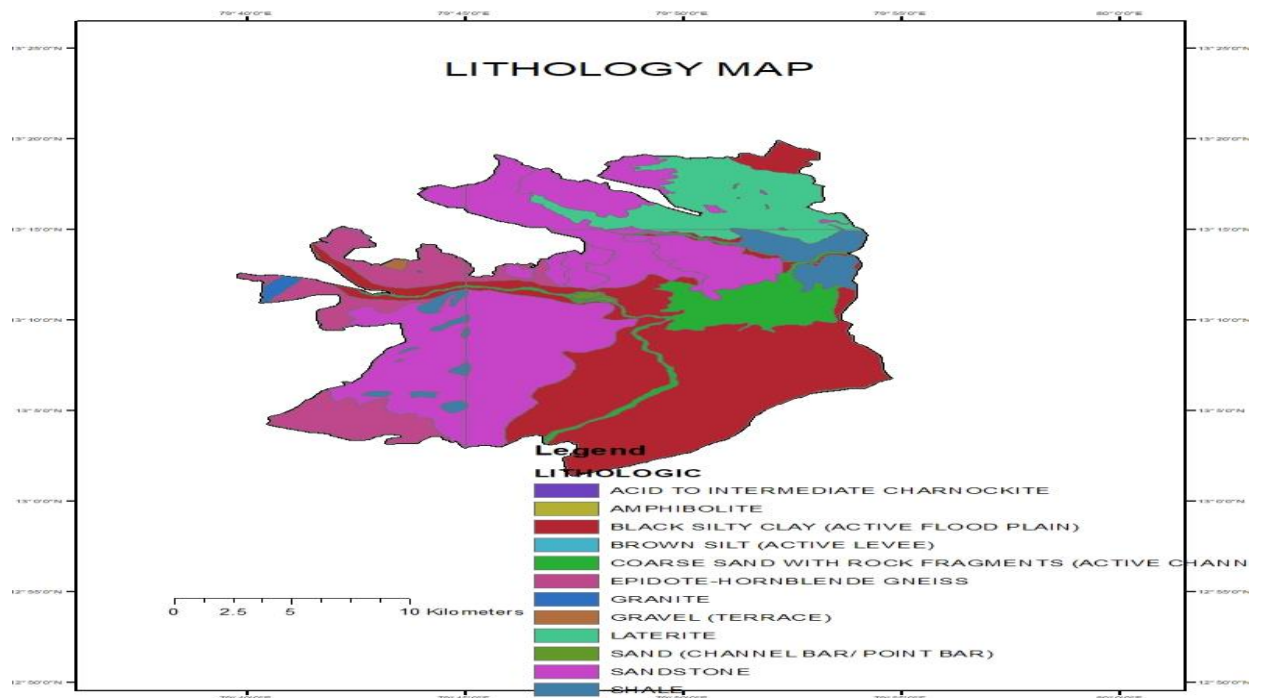


Fig 5.2.2: Lithology Map

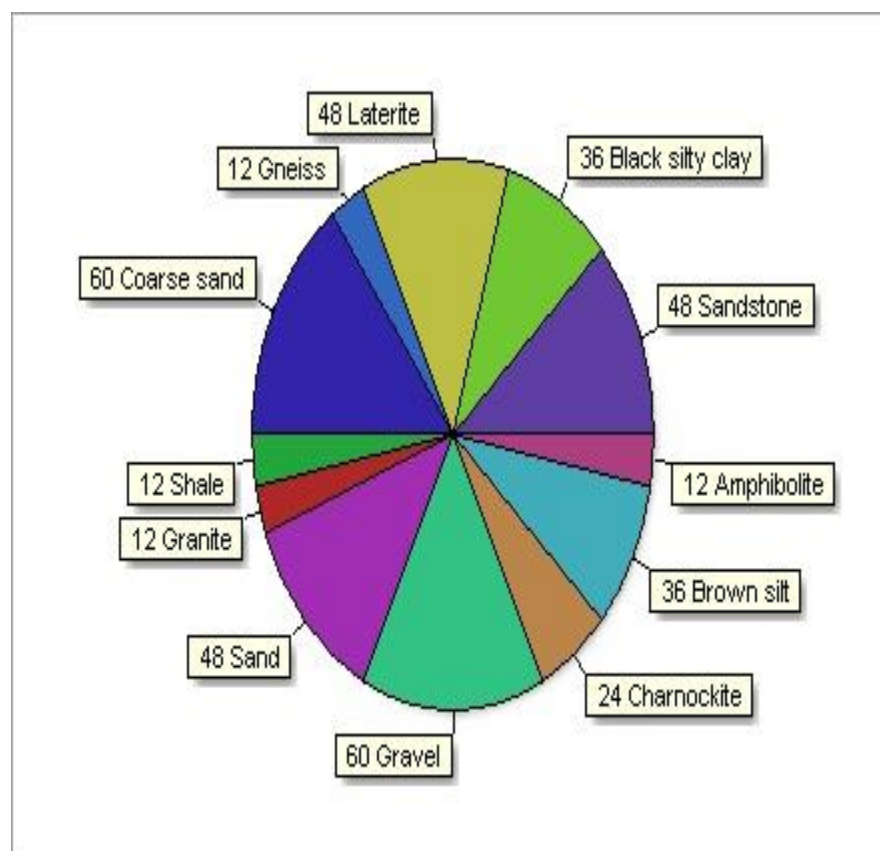


Figure 5.2.1 : Distribution of rock

5.3 Geomorphology

Geomorphology is a mainly significant factors of calculating the groundwater potential zone and probability. The geomorphology of the study region is mostly covered by unit of pediplain weathered / covered followed by deltaic plain. it showing fig (5.3.2).

The area distribution by geomorphological classes shows that pediplain weathered/buried which covers an extent of 258.474 sq.km, deltaic plain was covering around 99.084 sq.km and flood plain covering around 59.7 sq.km each of total study area and water bodies , dam, hills and river was covering minimum area of less than 50 sq.km . it shows figure (5.3.1).

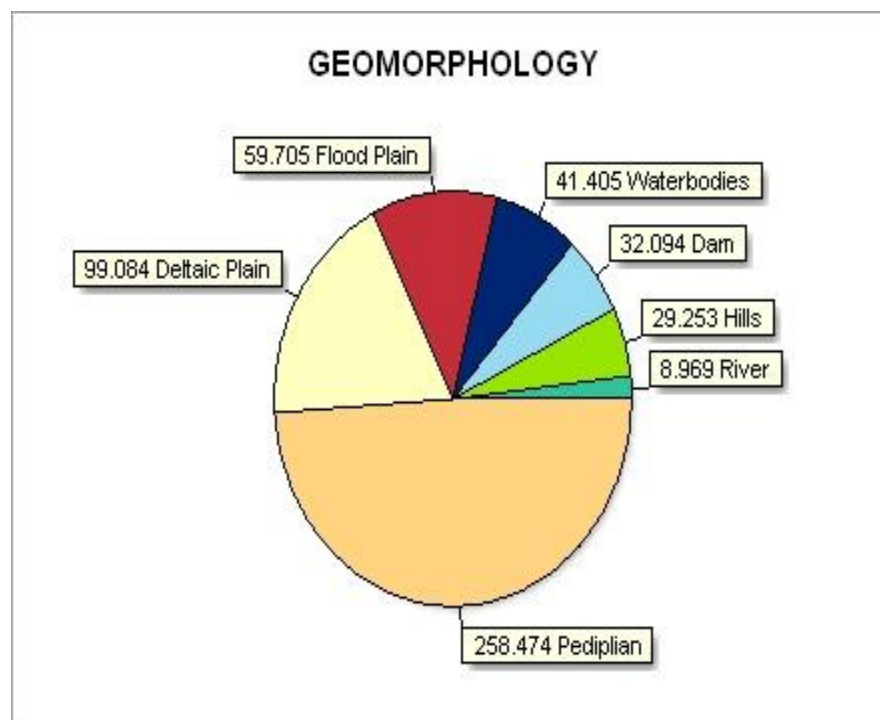


Figure 5.3.1: Distribution of Geomorphology

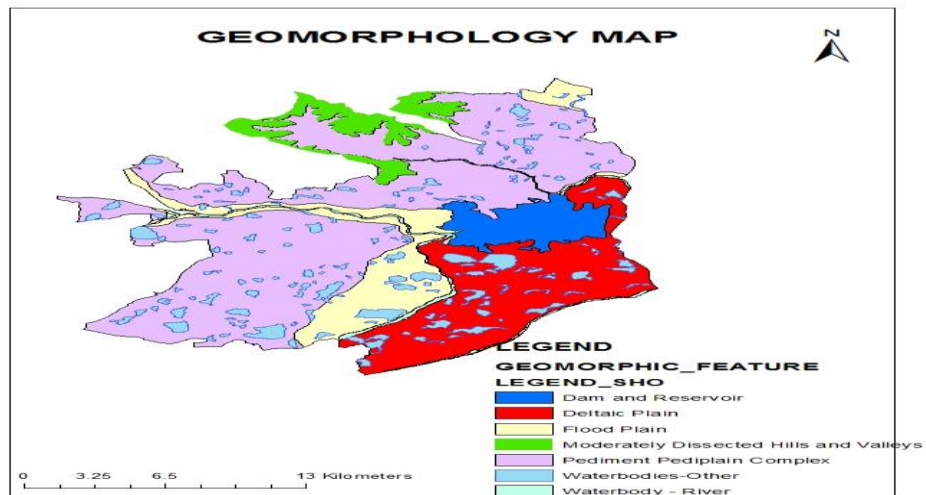


Figure 5.3.2: Geomorphology Map

5.4 Soil

The hydrological soil group categorization show in (Table1), soil grain groups, and groundwater recharge potential for each group were all investigated. Based on the groundwater recharge potential in the map, soil textures founded clay loam, loam were classified as very strong, low in this study field. It shows in (5.4.1).

The soil area distribution shown in Figure 5.4.2. Amongst the soils type found in the study region, clay loam is major contributing highest area of 414sq.km and loam contributing least amount area is 115sq.km.

Table 1: Hydrologic soil group classification.

Hydrological soil group	Soil textures class
A	Loam
C	Clay Loam

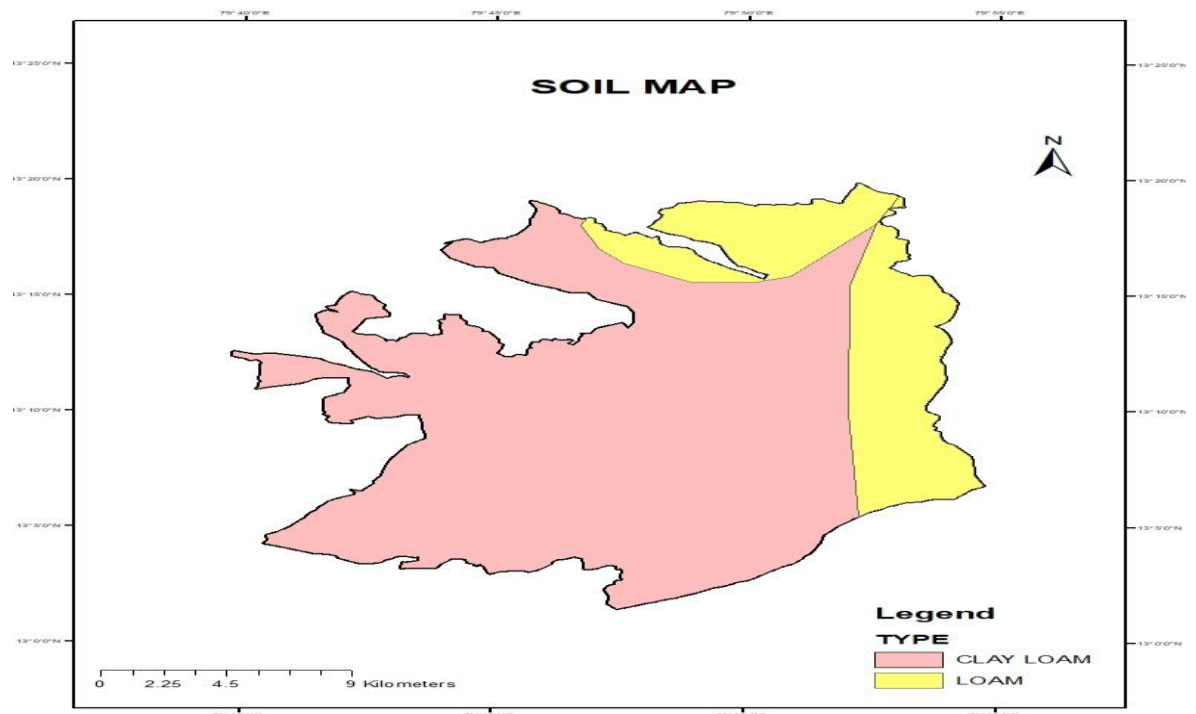


Figure 5.4.1: Soil Map

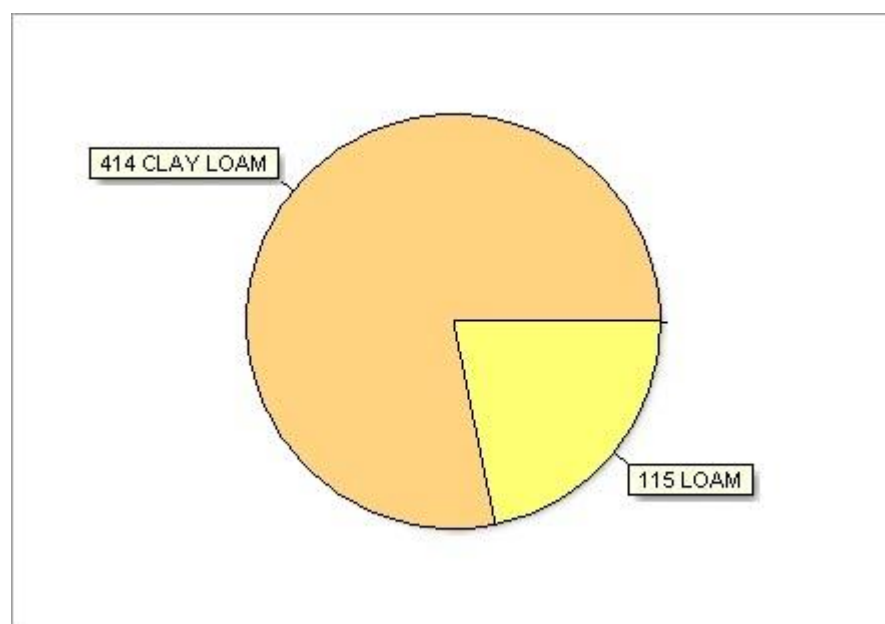


Figure 5.4.2: Distribution of soil

5.5 Slope

Slope is among the factor calculating the penetration of ground water into below surface; therefore an pointer for the appropriateness for ground water probability. In the gentle slope area suitable for slow surface water runoff is slow allowing more time taking for rain water to infiltrate in land, while high slope area help to high surface water runoff allowing less time for rain water therefore comparatively less infiltration. Table 2 shows slope water run off. It showing in fig (5.5.1)

Table 2: slope classes of Poondi Micro watershed

%Slope	Weightage	Implication of potential
Nearly Level	5	Low surface runoff
Gentle slope	4	Low surface runoff
Moderate slope	3	Medium surface runoff
Steep slope	2	High surface water runoff
Very steep slope	1	High surface water runoff

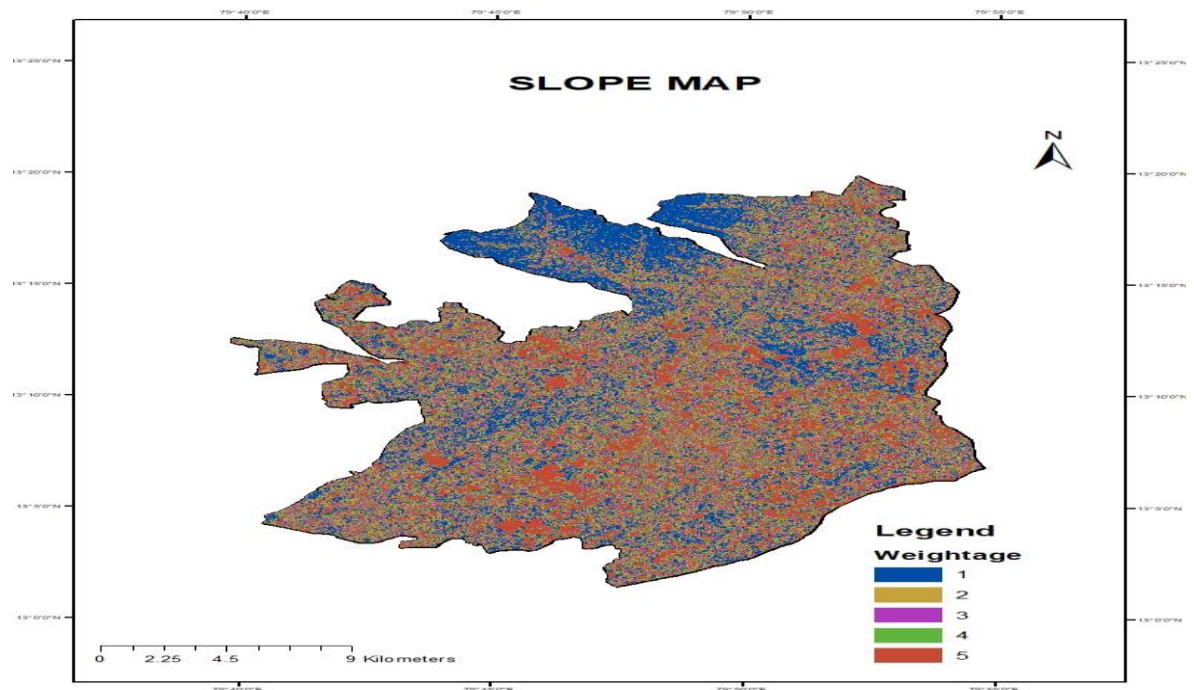


Figure 5.5.1: Slope Map

5.6 Land use and land cover

The impact of land use on infiltration, sand erosion, and water evaporation transpiration is a critical aspect of the runoff process. The land use model of the study area and different land use types are:

1. Barren lands
2. farming lands
3. Urban areas
4. Water bodies area
5. Forest lands

The land use map related with ground water recharge potential. it is shown in Figure(5.6.2) . Groundwater prospecting is strongly affected by land use. The value of penetration is comparative to the amount of flora cover present. For example, if infiltration is higher and runoff is lower, the land surface would be covered by dense forest. Water bodies are a plentiful but

limited source of land recharge. Forests, water bodies, and cropland were given the highest ranking for groundwater recharge. In the infertile rocky, wastelands, and built-up areas, groundwater recharge is not possible. The land use and land cover map shown in Figure(5.6.2). The agricultural land has maximum area of 265.688 sq.km followed by forest area which was 102.253 sq.km. Urban area was about 55.362sq.km and least amount area was waterbodies it is 51.653sq.km, barren land was about 53,945sq.km respectively. It shows fig (5.6.1)

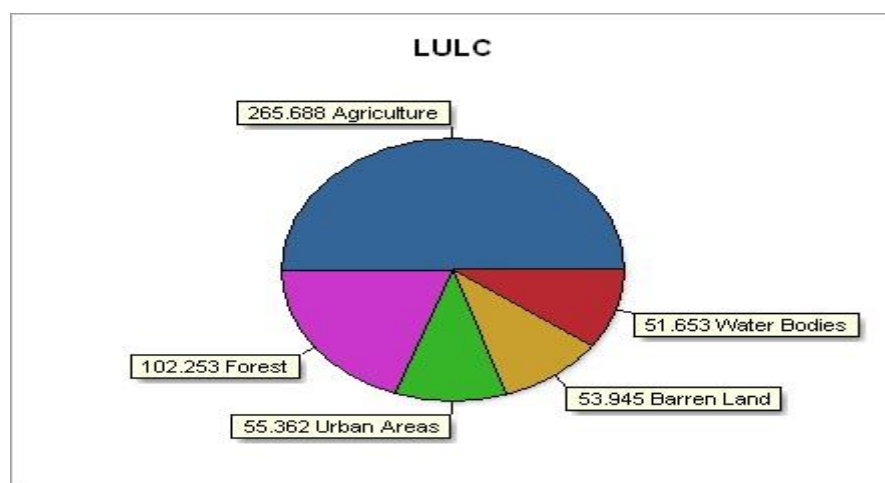


Figure 5.6.1: Distribution of Land use Land cover

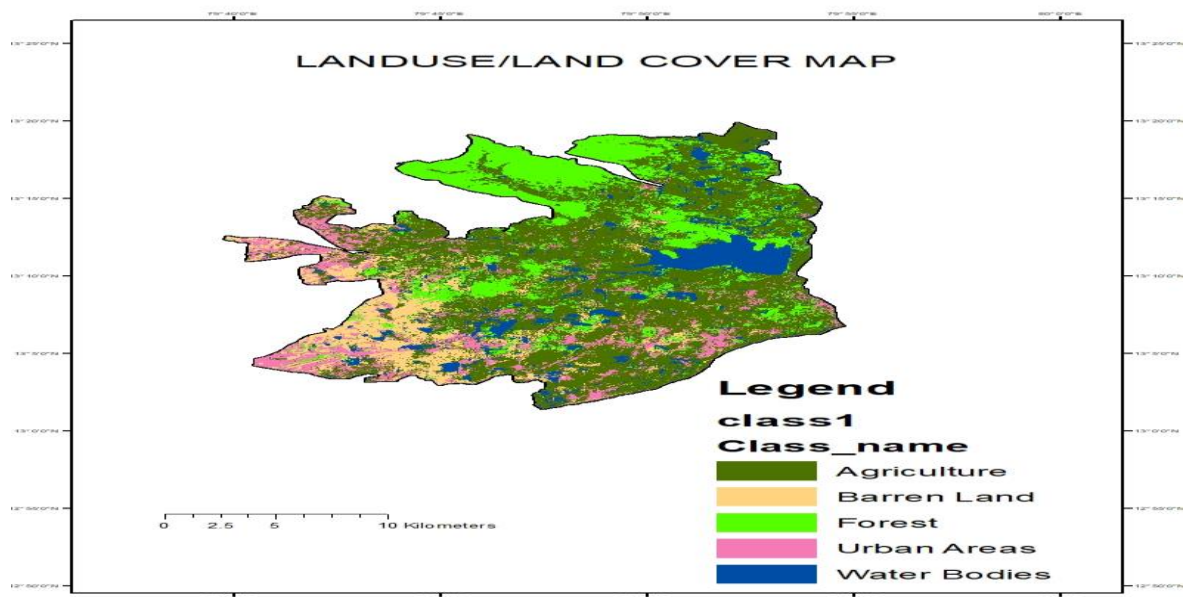


Figure 5.6.2 Landuse / land cover map

**Table 3: Land use and land cover classification system for use
with RS data**

Level-I	Level-II
Agriculture land	Pastureland, Orchards land, Groves land, Vineyards land, Nurseries area and, Ornamental Horticultural Areas, Cropland and Confined Feeding Operations areas, Vineyards land, and Plantation Other Agricultural Land
Barren land	Sandy Areas other than Beaches area, Dry Salt Flats area, Bare Exposed Rock land , Beaches, Strip Mines area. Quarries area, Gravel Pits Transitional Areas and Mixed Barren Land.
Forest	Evergreen Forest area Land and Mixed Forest area Land, Deciduous Forest area Land,
Urban land	Commercial and Services, Industrial, Transportation, Communications and Commercial Complexes, Residential area, Transportation area.
Water bodies	Lakes, Reservoirs, Bays and Estuaries, Streams and Canals.

5.7 Lineament density

The lineament density plays an vital function in influencing the groundwater recharge of any topography because it depicts the weaker zone that enable ground water to flow more freely. Lineaments are linear structure features on a large scale. Lineament plays a critical role in groundwater potential mapping because it regulates groundwater movement and occurrence. A rock's secondary porosity and permeability are increased by joints and fractures, increasing the water holding capability. It shows figure (5.7.1)

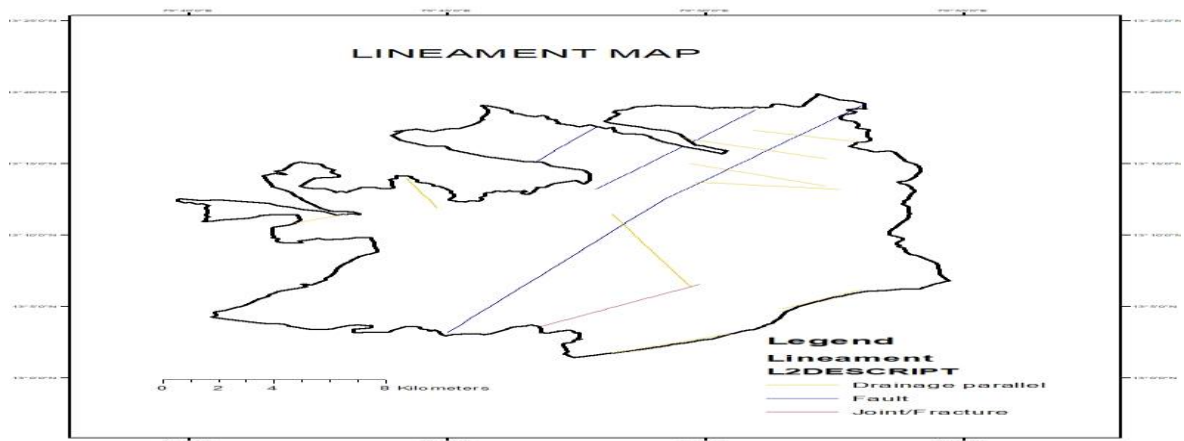


Figure 5.7.1: Lineament density map

5.8 Drainage density (km/km²)

The total length of a watershed separated by the total region of the watershed it's called as drainage density. Since drainage density is inversely proportional to permeability, it is a crucial parameter in determining the groundwater potential region. A low groundwater capacity zone is indicated by high drainage density levels, which are beneficial for runoff. In terms of recharge, very low drainage density regions are given more weight, while very high drainage density regions are given less weight. The drainage density is classify into five classes based on the ground water potential zone viz., VeryHigh, high, moderate, low, very low. it shows fig (5.8.1)

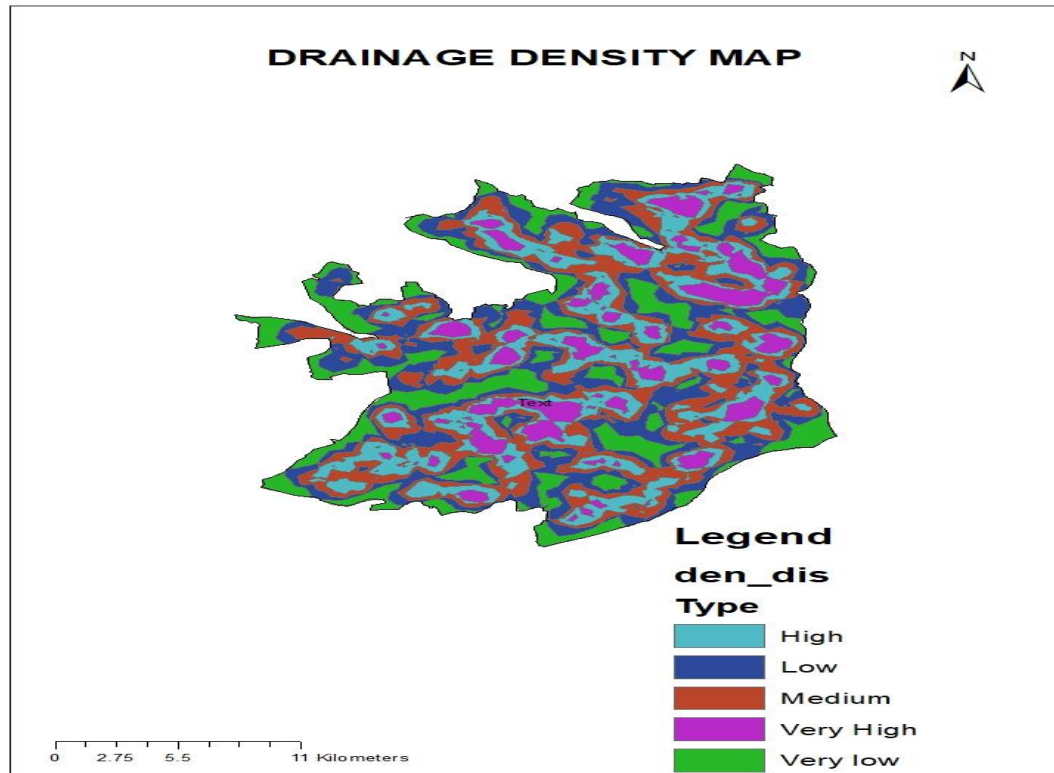


Figure 5.8.1: Drainage density map

5.9 Rain fall

All March and May, the study region has a subtropical climate with high temperatures. The study area's average temperature range from 20 to 35 °C, with moisture levels as high as 70%. Strong wind speeds, ranging from 7.4 to 12.6 km/h, are most common important months of July to August. precipitation in the study region occurs from June to Sep (southwest heavy rain) and Oct to Dec (winter heavy rain) (northeast heavy rain). Between the months of January and May, it rains heavily. The northeast monsoon is responsible for the most rain in the area. Low pressure area depressions cause heavy rain to fall. Rainfall is 604mm on average. it shows fig (5.9.1)

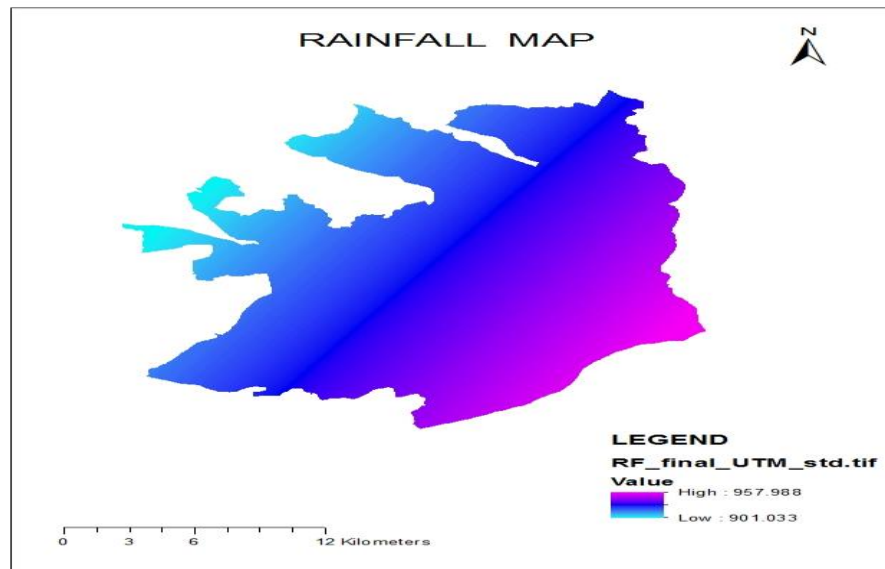


Figure 5.9.1 : Rainfall map

5.10 Weightage derivation

The most important part of integrated analysis is determining the rank and weightage Analytical Hierarchical Process method (AHP) for each class, since the performance is heavily reliant on the task of acceptable weightage. deliberation of the relation significance contributes to a more accurate depiction of the real situation on the ground. To define the groundwater potential zones seven influence factors have been identified such as lithology, slope, land-use/landcover, geomorphology, drainage, soil, and lineament. Each factor is given a weighting based on its relative importance. The amount of all weights from each factor determines a factor's representative weightage in the potential region A factor with a higher weight value has a bigger influence on groundwater potential areas than one with a lower weight value. Each

subclass has been assigned a rank, and all thematic maps have been reclassified. The Multi Influencing Factor method was used to calculate the weights for each thematic chart, and ground water recharge zones were defined using weighted overlay analysis in ArcGIS 10.1 software. The several influencing factors for groundwater recharge areas, such as lithology, slope, land-use/land-cover, geomorphology, drainage, soil, and lineament density, were examined and a weight was assign to them, as shown in Table 5. The outcome of each influencing factor will assist in the definition of groundwater potential zones. In addition, these variables are intertwined. The importance of every foremost and negligible factor is assigned a rank and weightage of 1 to 5, correspondingly. The cumulative weightage of both foremost and negligible effect is used to measure the relative weightage. This weighting is then added to the ranking of each influence factor.

5.11 Integration of thematic layers

Following the efficient derivation of weightage using several guiding variables, weighted throughout exploration in ArcGIS 10.1 was used to assign the derived weightage values and ranks to all the thematic layers, resulting in a single weight map of possible groundwater recharge areas.

5.12 Groundwater recharge potential zone map

Atlast obtained an output raster map after successfully integrating all of the thematic maps. The groundwater recharge zones are shown on that diagram. Individual groups of lithology map, geomorphology map, slope map, soil map, landuse/ land cover map, drainage depth map, and lineament density layers map were previously ranked from 1 to 5 based on their effect on water recharge, resulting in a final production map with 5 classes. According to the rank assignment, a value of 1 indicates a very low reclassified unit, a value of 2 indicates a low reclassified unit, a value of 3 indicates a moderate reclassified unit, a value of 4 indicates a high unit, and a value of 5 indicates a very high reclassified unit. Groundwater recharge zones were also delineate and graded as follows: value of 1 denote 'very low' rather decent recharge zones, value 2 denote 'low' recharge, 3 indicates 'moderate' recharge, 4 denotes 'high' recharge areas, and value 5 indicates 'very high' recharge areas.. it shows in (5.12.1)

Table 4: Normalized weight

Factors	Geomorphology	LD	Lithology	Slope	Soil	LULC	DD	Weight
Geomorphology	7	6	5	4	3	2	1	0.38
Lineament Density	7/2	6/2	5/2	4/2	3/2	1	1/2	0.19
Lithology	7/3	6/3	5/3	4/3	1	2/3	1/3	0.12
Slope	7/4	6/4	5/4	1	3/4	2/4	1/4	0.10
Soil	7/5	6/5	1	4/5	3/5	2/5	1/5	0.08
LULC	7/6	1	5/6	4/6	3/6	2/6	1/6	0.07
Drainage Density	7/7	6/7	5/7	4/7	3/7	2/7	1/7	0.06
Total								1

Table 5 : Rank and weightage

S.No	Influence Factor	Classes	Potentiality	Rank	Normalized weight
1	Geomorphology	Pediplain	Good	4	0.38
		Flood Plain	very good	5	
		Alluvial Plain	very good	5	
		Waterbodies	very good	5	
		Ridge type structural Hills	very poor	1	
2	Lineament Density (km/km²)	0-0.178	very poor	1	0.19
		0.179-0.495	poor	2	
		0.496-0.795	Moderate	3	
		0.796-1.106	Good	4	

		1.107-1.417	Good	4	
3	Lithology(km/km2)	Charnockite	Poor	2	0.12
		Amphibolite	Very poor	1	
		Black Silty clay	Moderate	3	
		Brown Silt	Moderate	3	
		Coarse Sand	very good	5	
		Epidote	very poor	1	
		Granite	very poor	1	
		Gravel	very good	5	
		Laterite	Good	4	
		Sand	Good	4	
		sand stone	Good	4	
		shale	very poor	1	
4	Slope	0-1	very Good	5	0.1
		1.1-2	Good	4	
		2.1-3	Moderate	3	
		3.1-5	poor	2	
		>5	very poor	1	
5	Drainage Density	very high	very poor	1	0.08
		High	poor	2	
		Moderate	Moderate	3	
		Low	Good	4	
		very low	very good	5	
6	LULC	Agriculture	Good	4	0.07
		baren land	Poor	2	
		Forest	Moderate	3	
		urban land	very poor	1	
		water body	very good	5	
7	Soil	Clay loam	poor	2	0.08
		Loam	very poor	1	
	TOTAL	998	908	90	1

Table 7: Area size of ground water potential zones

shape	Zone type	Area	Total area	Percentage
Polygon	high	223.53717	223	42.2
Polygon	Low	44.525183	44	83.2
Polygon	Moderate	189.331796	189	36
Polygon	Very high	61.381838	61	12
polygon	Very low	12.774409	12	22.6

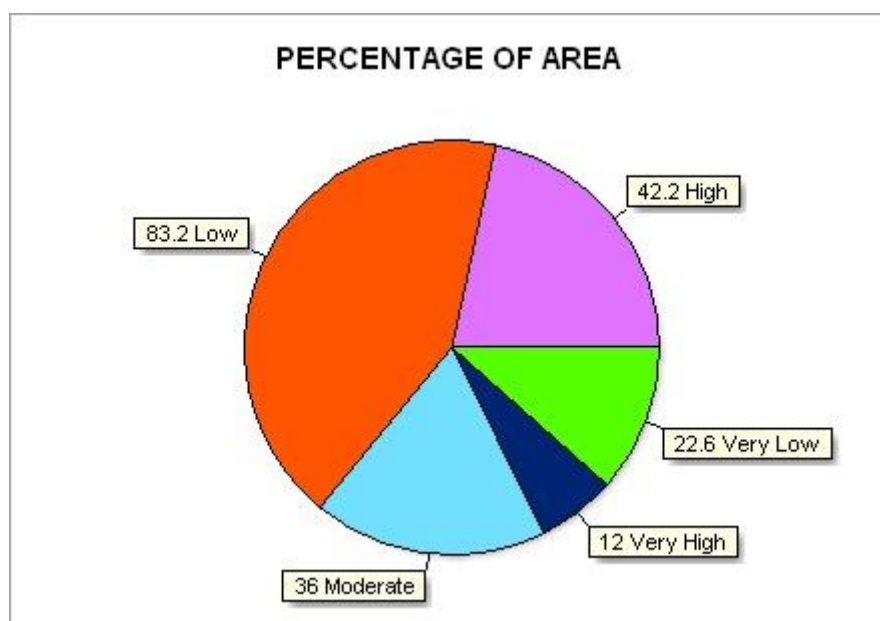


Fig 5.12.1 Percentage of Area

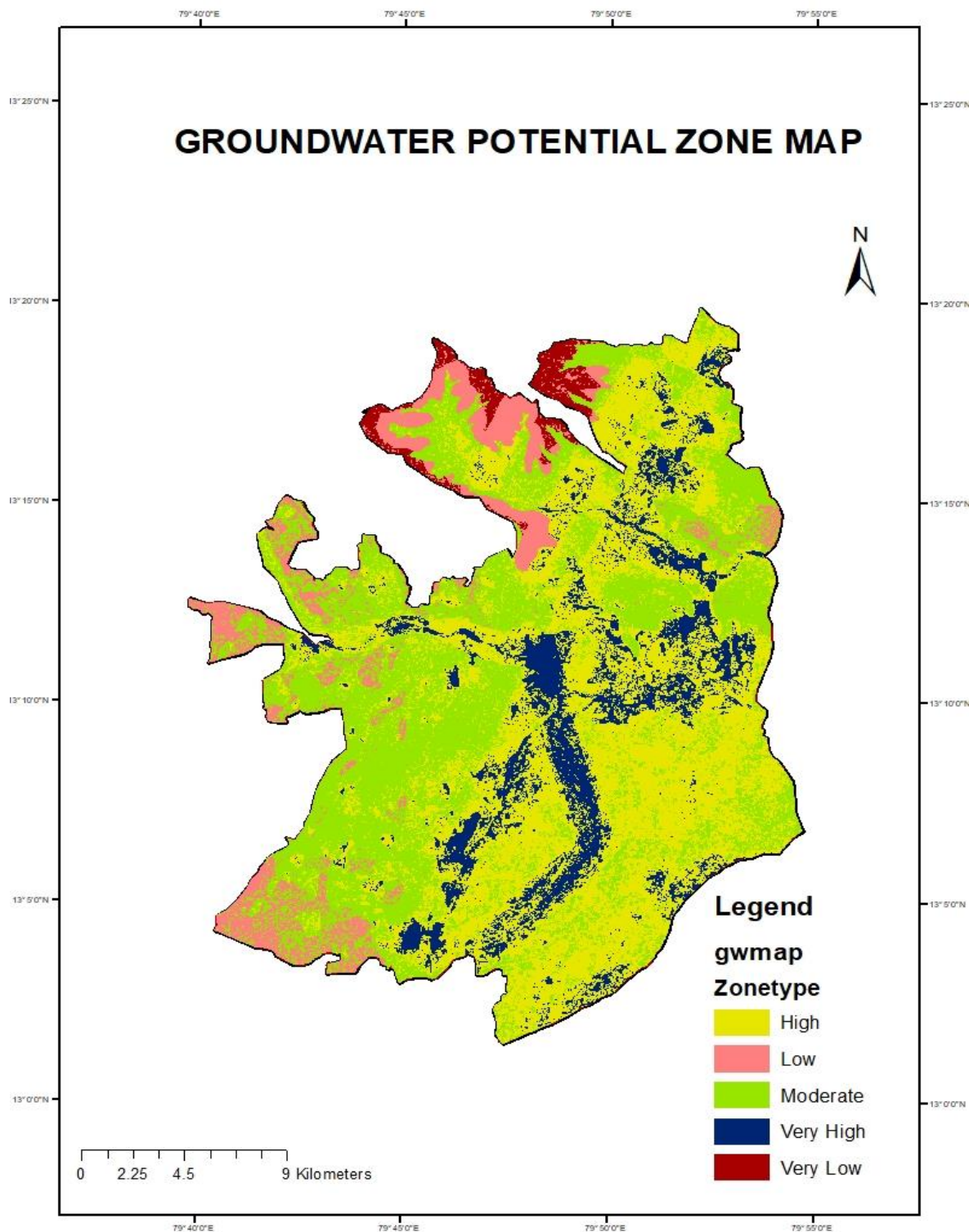


Fig 5.12.2 ground water potential zone

CHAPTER 6

SUMMARY AND CONCLUSION

6.1 SUMMARY AND CONCLUSION

- The principle of this study was to define groundwater recharge zones in Tamilnadu's Poondi micro watershed. Layers such as drainage density, slope, and so on were created using USGS DEM data..
- The thematic layers are land cover map, soil map, geomorphology map, lithology map and lineament density collected from division of RS and Tamilnadu agriculture university.
- The outcomes indicates that high recharge zones are associated with gentle slope, the soil type are loam texture, slow water runoff, high water penetration and high rain fall, while low recharge zones are associated with structural mountain, steep land slopes, clay loam ,speed water runoff, low water penetration and little rainfall.
- The overall findings indicate to remote sensing and geographic information systems can be used to investigate groundwater recharge zone and recommend effective recharge structure.
- This results in a extra practical groundwater recharge map that can be used in any groundwater production and management programme..

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