LAND EVALUATION

Programme : Five year Integrated M.Sc., Geography / M.Sc., Geography

Course : Watershed Studies

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GEOGRAPHY VIEWS
LAND EVALUATION

?

Land Evaluation

- Landuse refers to the purpose of the land serves, for example, recreation, wildlife habitat, or agriculture.
- Land use applications involve both baseline mapping and subsequent monitoring, since timely information is required to know what current quantity of land is in what type of use and to identify the land use changes from year to year.
- Land cover refers to the surface cover on the ground, whether vegetation, urban infrastructure, water, bare soil or other.

What is our role ?

- Identifying, delineating and mapping land cover is important for global monitoring studies, resource management, and planning activities.
- Preparing Thematic maps for Planning Purpose

Landuse Studies : An Analysis of Timeline and Challenges

Land - Only 29% of the earth surface

Negative areas	Too Dry	38 million sq.km.
	Too Cold	31 million sq.km.
	Too Wet	5 million sq. km.
	Too Rugged	5 million sq.km.
	Badlands	2 million sq.km.
	Total	81 million sq.km.

Nearly 56 % of land unfit for habitation

Land is finite while population is exponentially increasing leading to extreme pressure on land.

Land as a Physical Entity

Land as a Biological Entity

Land as an Economic Entity

Land as a Spatial Entity

Last category dominates the domain of Geography

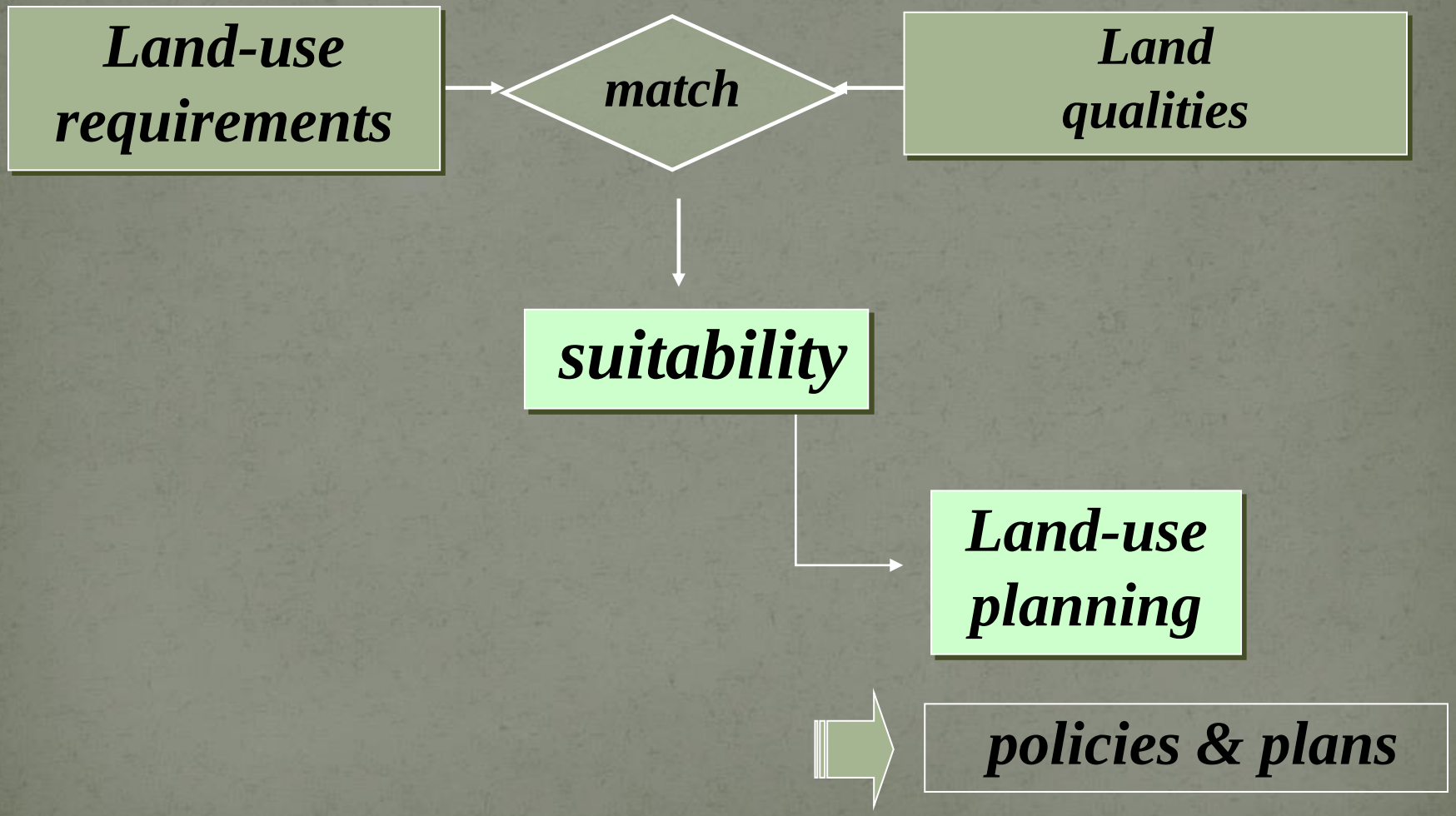
History of Land Use studies:

- Stamp – First to attempt land use survey
- Prepared land use maps for Britain
- Started in 1933 but completed only after Second World War
- Maps in the form of Monographs for each Country.
- Most important is that it had inventory data related to historical, economic, climatic, terrain and soil information of the area.

What is land evaluation?

- ***Land evaluation is aimed at assessment of land performance and its production potential for a specific purpose.***
- ***Land evaluation is only part of the process of land use planning.***
- ***The function of land use planning*** *is to guide decisions on land use in such a way that the resources of the environment are put to the most beneficial use for man, whilst at the same time* ***conserving those resources for the future****.*

Land Evaluation Structure



Land Suitability

- Land suitability is the **fitness of a given type of land** for a defined use.
- The land may be considered in its present condition or after improvements.
- The process of land suitability classification is the appraisal and grouping of specific areas of land in terms of their suitability for defined uses.
- If the land is not suitable for any defined purpose, then the land is called as not suitable for the purpose.

This Suitability and Not Suitability may mention according to United States Department of Agriculture (USDA) by “S” and “N”. The “S” letter could be used to mention Suitability and the “N” letter used to mention for Not-suitability.

Land Suitability Class	Description
S	Suitable
N	Not Suitable

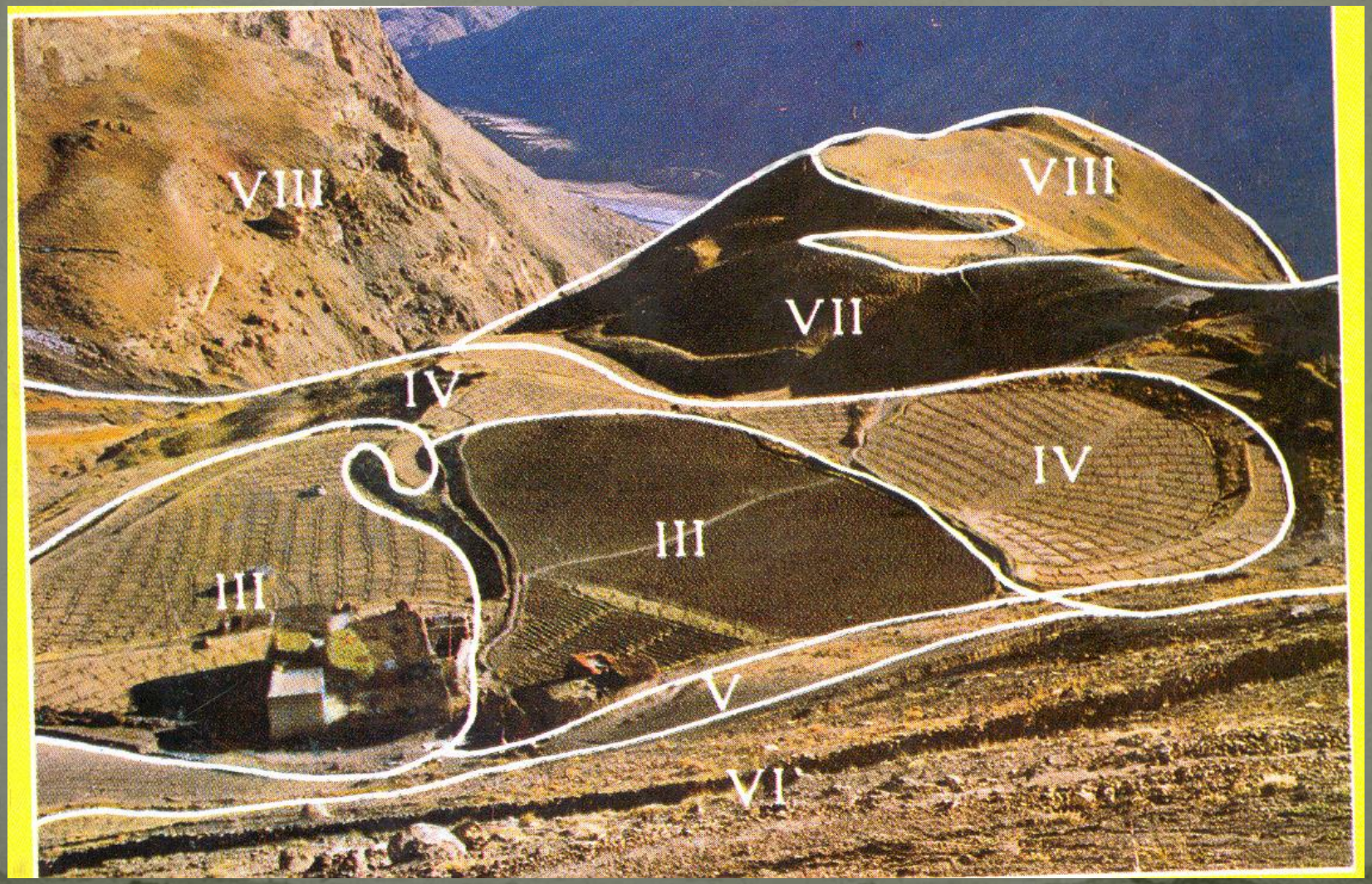
- **Class S1 Highly Suitable:** Land having no significant limitations
- **Class S2 Moderately Suitable:** Land having limitations which in aggregate are moderately severe for sustained application of a given use; the limitations will reduce productivity or benefits.
- **Class S3 Marginally Suitable** : Land having limitations which in aggregate are severe for sustained application of a given use and will so reduce productivity or benefits, or increase required inputs, that this expenditure will be only marginally justified.
- **Class N1 Currently Not Suitable :** Land having limitations which may be surmountable in time. The limitations are so severe as to preclude successful sustained use of the land in the given manner.
- **Class N2 Permanently Not Suitable:** Land having limitations which appear as severe as to preclude any Possibilities of successful sustained use of the land in the given manner.

Source: Food and Agricultural Organisation (FAO), 1976.

Land Capability

- The land capability classification has been analyzed based on land forms and their relationship to the other physical elements namely, Physiographic, Slope, Geology, Soils, Landuse, Land Systems, Land Irrigability, Soil erosion, Soil depth, Geomorphology, water capacity and so on.

Land Capability Classes



- The land capability classes are further divided into land capability subclasses based on the predominant limitations for land use namely, erosion (e), drainage (w), soil properties(s), and climate(c).
- The extent of the area under each association is given below.

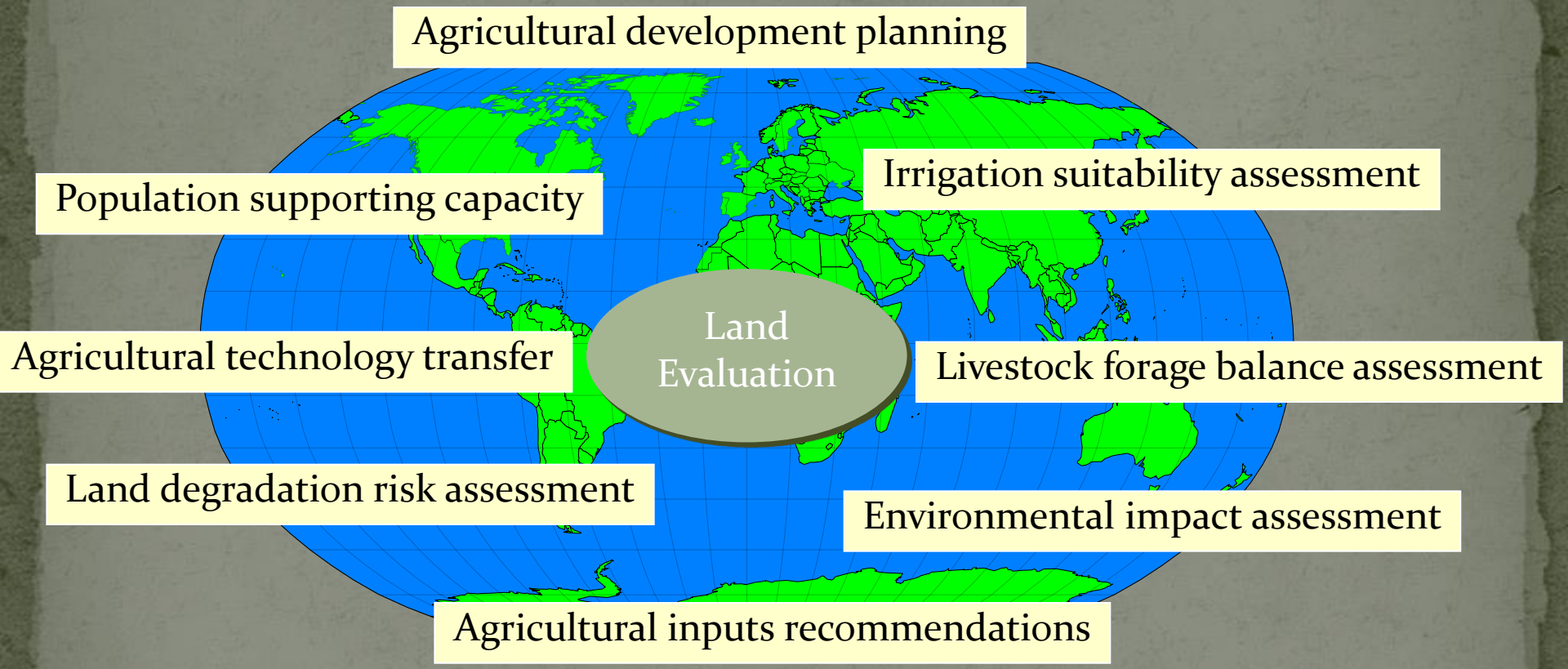
- Class I, (Good Cultivable Land).
- Class II(Moderately Good Cultivable Land)
- Class III(Fairly Good Cultivable Land)
- Class IV(Well Suited For Grazing)
- Class V(Fairly Well suited For Grazing &Forestry)
- Class VI(Lands Well Suited For Grazing& Forestry)
- Class VII(Lands Suited For Wildlife & Recreation)&
- Class VIII (Water Bodies).

ROLE OF GIS AND REMOTE SENSING IN LAND SUITABILITY ANALYSIS

- In recent years, remote sensing and Geographic Information Systems (GIS) have become an integral component of assessments and analysis of land resources for environmental planning efforts.

- Remote sensing imagery has become a viable source of gathering qualitative data on land cover information at local, regional and global scales. In addition, it also facilitates data collection in multi resolution as well as in multi spectral manner.
- GIS is the tool for input, storage and retrieval, manipulation and analysis, and output of spatial data (Marble et al. 1984). GIS functionality can play a major role in spatial decision making. (Ghafari et al. 2000).

Land Evaluation applications



GEOINFORMATICS BASED LAND SUITABILITY CLASSIFICATION FOR KORAIYAR WATERSHED OF TAMIL NADU, FOR SUSTAINABLE AGRICULTURE

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INTRODUCTION

- **Land Suitability Classification**
- Land Suitability refers to the ability of a portion of land to tolerate the production of Crops in a sustainable way. Such kind of analysis allows identifying the main limiting factors for the agricultural production and enables decision makers to develop crop Managements able to increase the land productivity.

Aim and Objectives

- ***LAND SUITABILITY CLASSIFICATION FOR KORAIYAR WATERSHED***
- To classify the study area according to the physical and climatic requirements to the crops.
- To refine the collected data and estimate the parameters.
- To study about the crop suitability analysis and identify the parameters of Koraiyar watershed using remotely sensed data.
- To analyse Land suitability classification for Koraiyar.

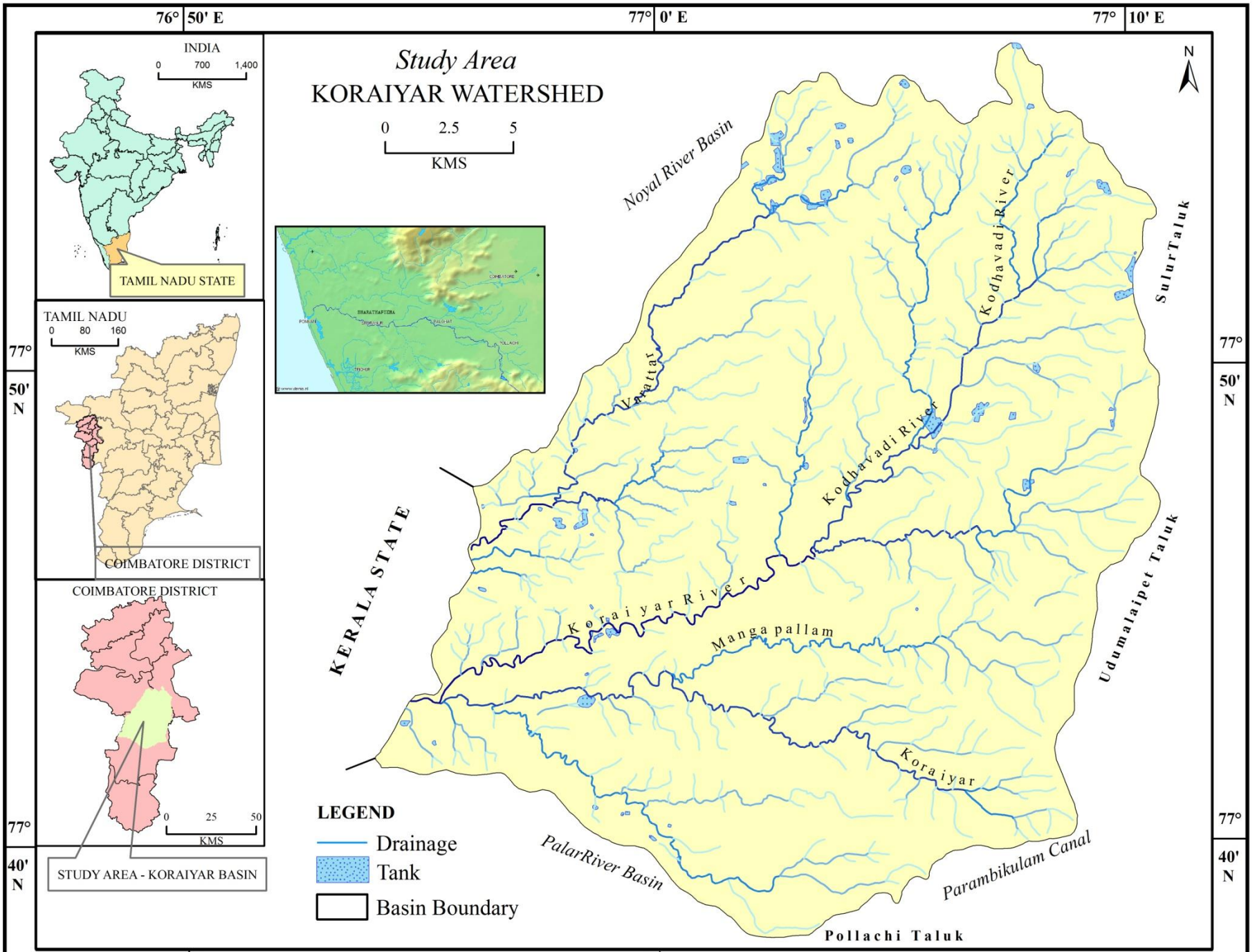
Study Area

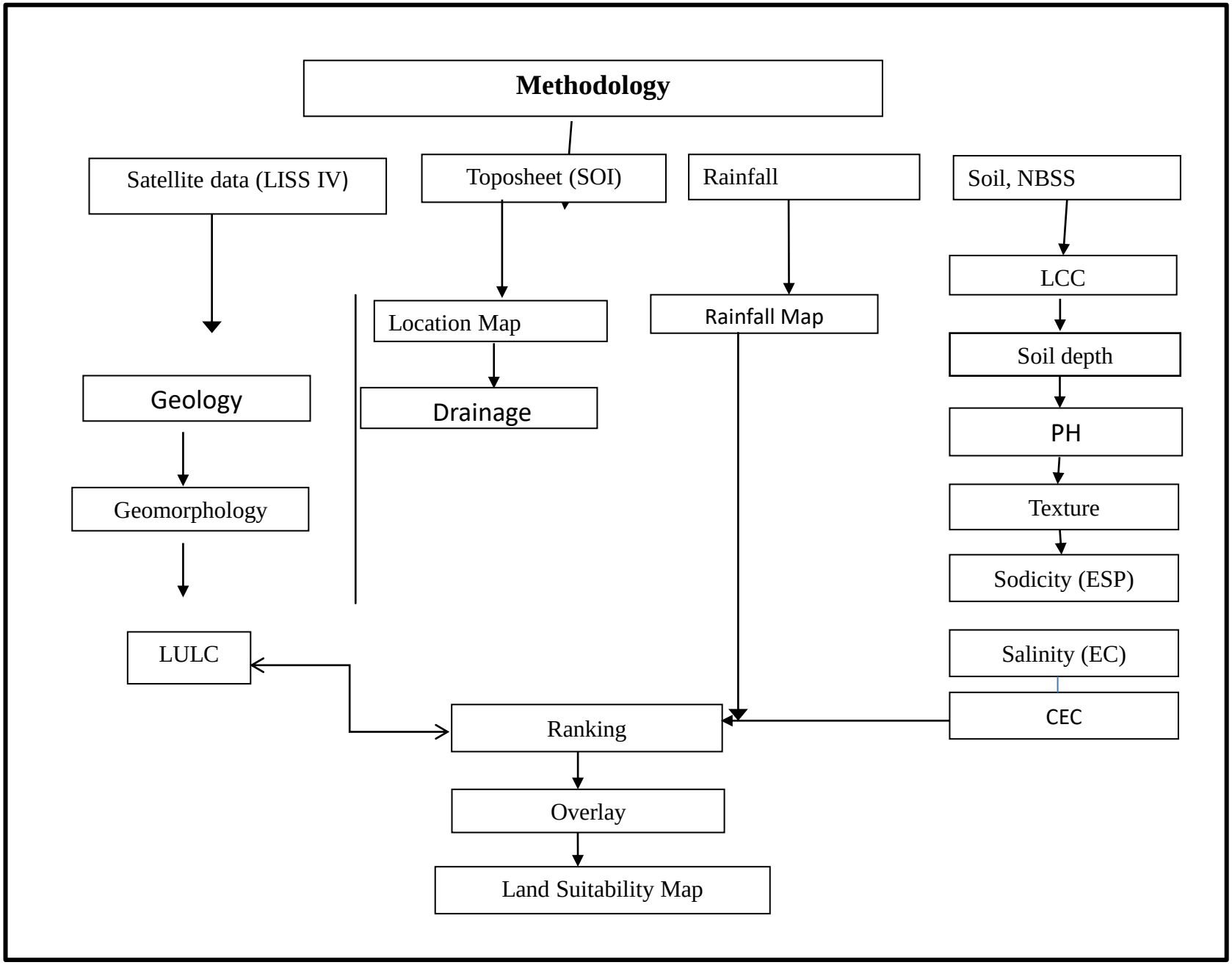
- The Koraiyar watershed is in the southwestern part of Coimbatore district. It is located between 10° 36'N and 10° 57'N and 76°48' E and 77° 09' E with an area of about 659sq.km.

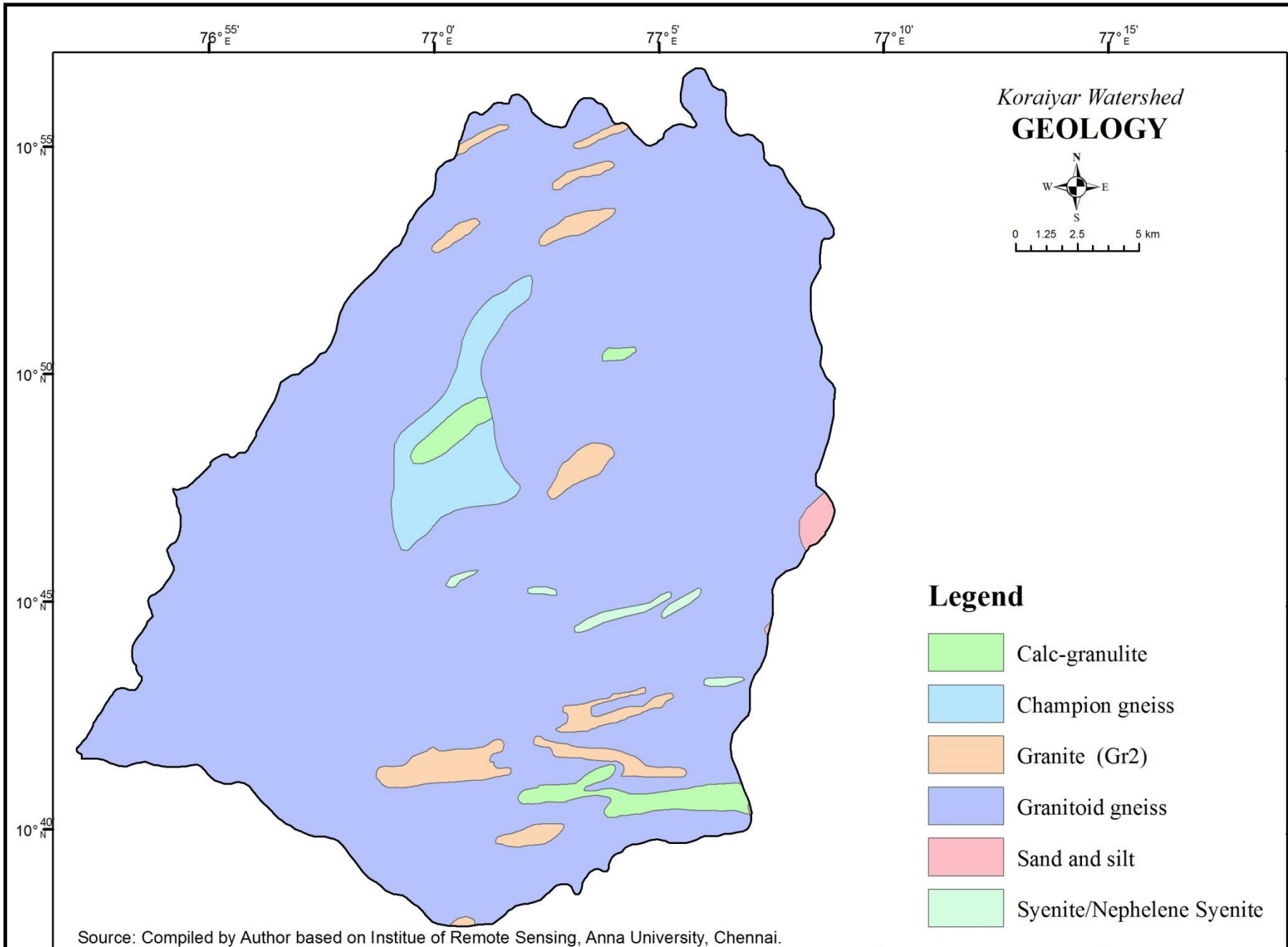
- It's originated from south western part of **Coimbatore near Cheetipalayam at the elevation of 420 meter above sea level.**
- Its covers **four taluk and five block.** The climate of the study area is hot and humid climate.
- Rainfall receives from south west and north east monsoon seasons.

- The Watershed is surrounded to the **north by the Noyyal river basin**; and **Palar river basin in the south**; on the **Valayar reserved forest in the Western Ghats in the west, and Parambikulam canal in the east.**
- Soils of the watershed can be classified into four order and 23 subgroups.
- The soil orders are **Entisols, Incept sols, Alfisols, and Vertisols.**

- The Population of the Watershed is 4, 43,783 in the 2011 census. The population is high in the villages nearer to the towns.

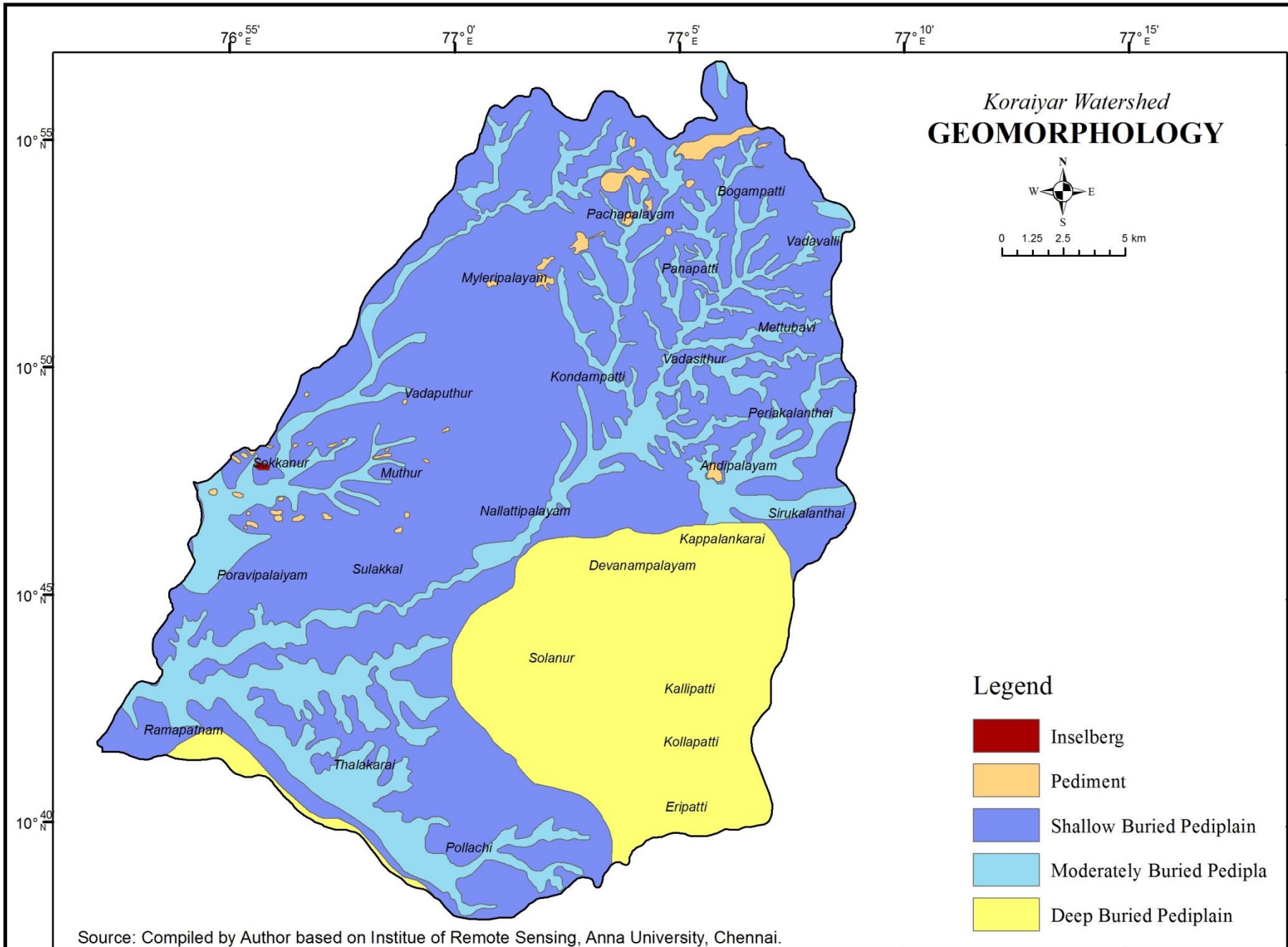

76° 50' E
77° 0' E
77° 10' E
77°
50' N
40' N
INDIA
0 700 1,400
KMS
TAMIL NADU STATE
TAMIL NADU
0 80 160
KMS
COIMBATORE DISTRICT
COIMBATORE DISTRICT
0 25 50
KMS
STUDY AREA - KORAIYAR BASIN
Study Area
KORAIYAR WATERSHED
0 2.5 5
KMS
N
Noyal River Basin
Kodhavadi River
SulurTaluk
Varattar
Kodhavadi River
KERALA STATE
Udumalaipet Taluk
Koraiyar River
Mangapallam
Koraiyar
PalarRiver Basin
Parambikulam Canal
Pollachi Taluk
LEGEND
Drainage
Tank
Basin Boundary


Methodology
Satellite data (LISS IV)
Toposheet (SOI)
Rainfall
Soil, NBSS
LCC
Soil depth
PH
Texture
Sodicity (ESP)
Salinity (EC)
CEC
Location Map
Drainage
Rainfall Map
Geology
Geomorphology
LULC
Ranking
Overlay
Land Suitability Map


76° 55' E
77° 0' E
77° 5' E
77° 10' E
77° 15' E
10° 55' N
10° 50' N
10° 45' N
10° 40' N
Koraiyar Watershed
GEOLOGY
N
W
E
S
0 1.25 2.5 5 km
Legend
Calc-granulite
Champion gneiss
Granite (Gr2)
Granitoid gneiss
Sand and silt
Syenite/Nephelene Syenite
Source: Compiled by Author based on Institue of Remote Sensing, Anna University, Chennai.

Geology of Koraiyar Watershed

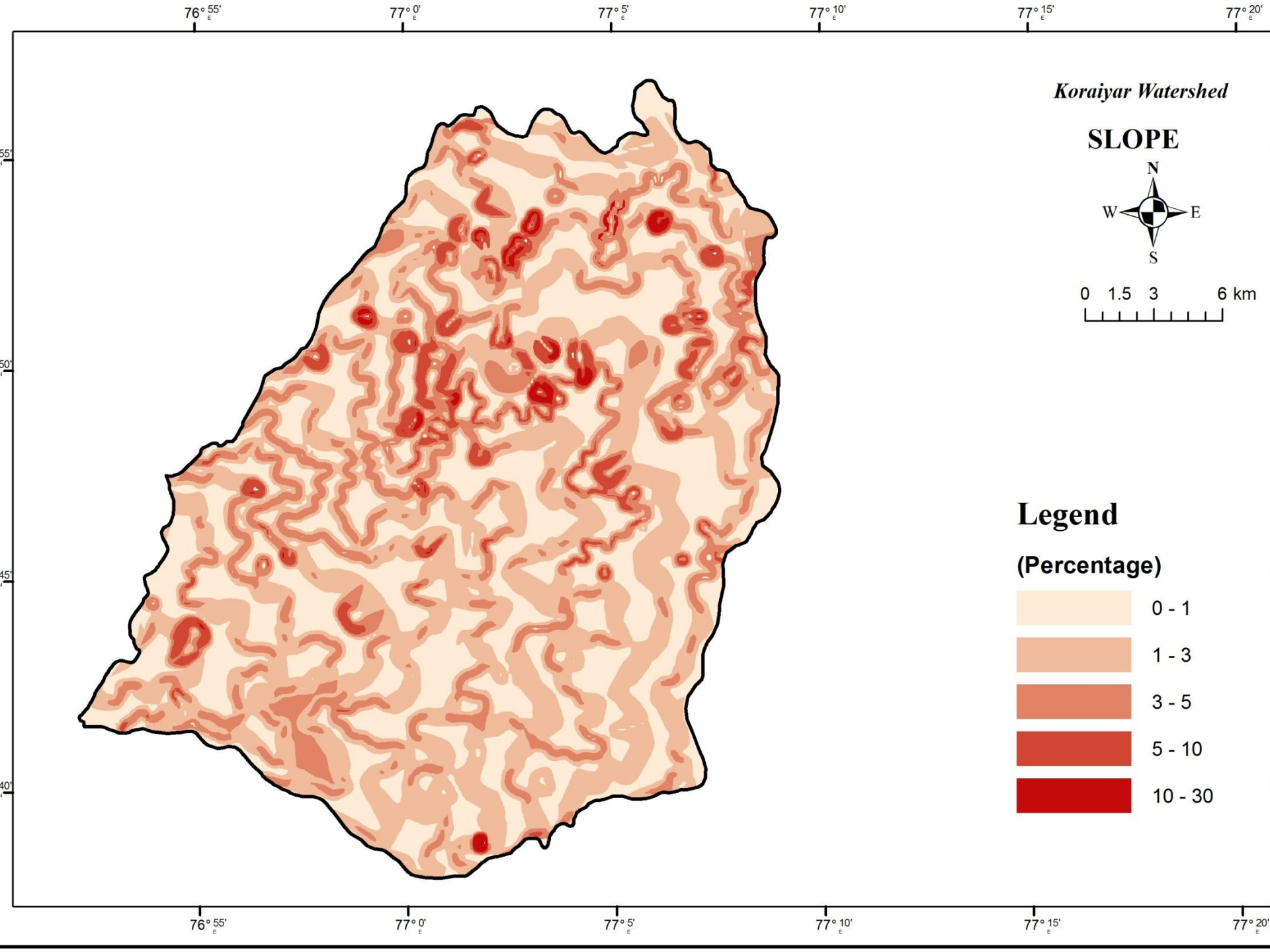
Formation	Lithology (Code)	Area in Sq. Km	Percentage
Khondalite Group	Calc-granulite	12	1.8
Dharwar Supergroup	Champion gneiss	23	3.4
Peninsular Gneiss (Bhavani Group)	Granite (Gr2)	22	3.3
	Granitoid gneiss	596	90.4
Alkali Rocks	Syenite/Nephelene syenite corrundun syenite	3	0.5
Alluvium-Fluvial	Sand and silt	4	0.6

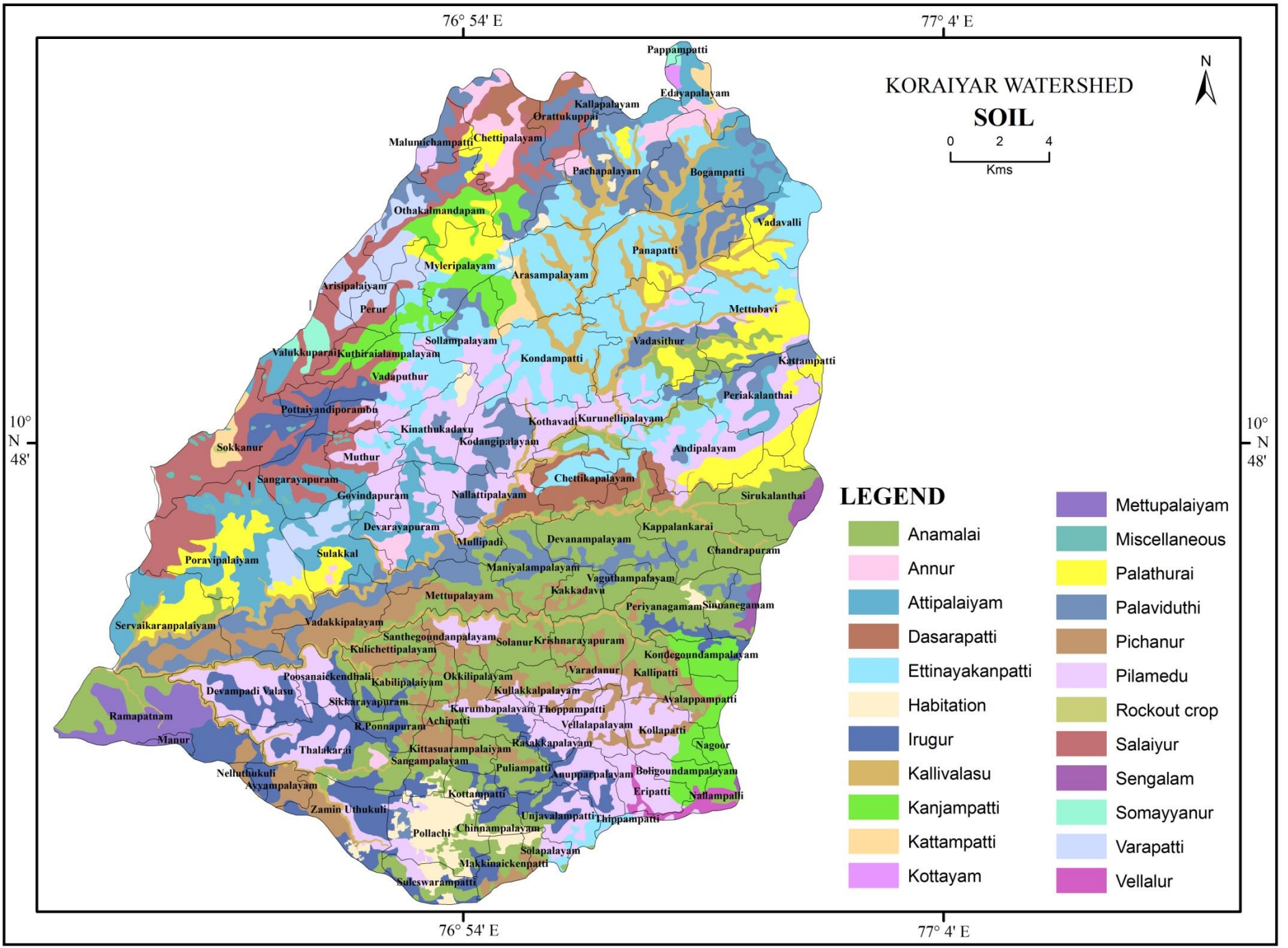


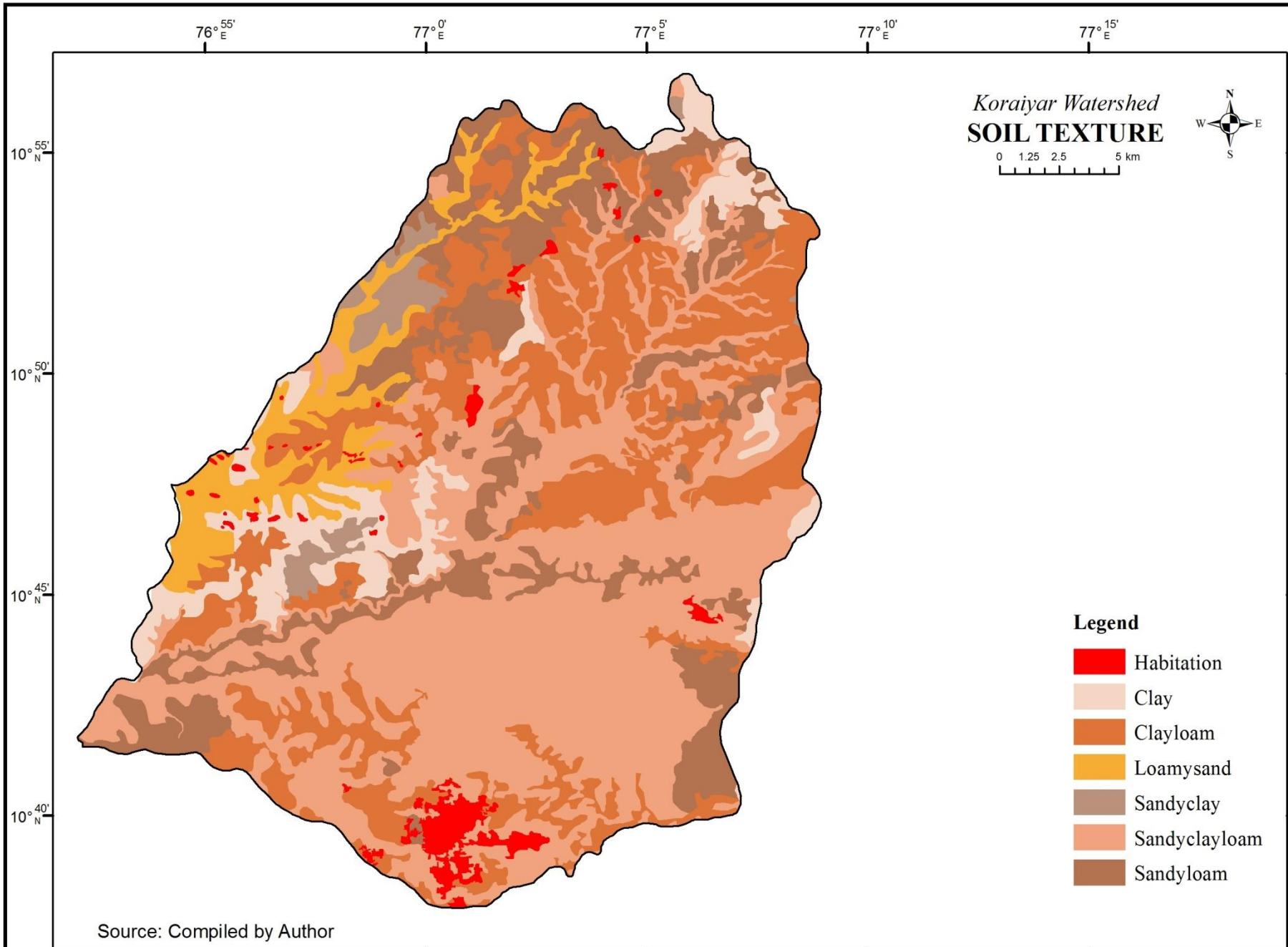
Source: Compiled by Author based on Institue of Remote Sensing, Anna University, Chennai.

Geomorphology and their areal extent of Koraiyar Watershed

S.No	Land forms		Area	
	Features	**Code**	**Sq.Km**	**%**
1	Inselbergs	I	0.1	0.0
2	Pediment	Pt	7.4	1.1
3	Shallow Buried Pediplains	SBP	374.7	56.8
4	Moderately Buried Pediplain	MBP	136.5	20.7
5	Deep Pediplain	P	141.3	21.4
	Total Area		**660**	**100**


76° 55' E
77° 0' E
77° 5' E
77° 10' E
77° 15' E
77° 20' E
55'
50'
45'
40'
Koraiyar Watershed
SLOPE
N
W
E
S
0 1.5 3 6 km
Legend
(Percentage)
0 - 1
1 - 3
3 - 5
5 - 10
10 - 30


KORAIYAR WATERSHED
SOIL
0 2 4
Kms
N
76° 54' E
77° 4' E
10° N 48'
Pappampatti
Edayapalayam
Kallapalayam
Orattukuppai
Malumichampatti
Chettipalayam
Pachapalayam
Bogampatti
Othakalmandapam
Vadavalli
Panapatti
Myleripalayam
Arasampalayam
Arisipalaiyam
Perur
Mettubavi
Sollampalayam
Vadasithur
Valukkuparai
Kuthiraialampalayam
Kondampatti
Kattampatti
Vadaputhur
Periakalanthai
Pottaiyandiporambu
Kothavadi
Kurunellipalayam
Kinathukadavu
Kodangipalayam
Sokkanur
Andipalayam
Muthur
Chettikapalayam
Sangarayapuram
Govindapuram
Nallattipalayam
Sirukalanthai
Devarayapuram
Kappalankarai
Mullipadi
Devanampalayam
Sulakkal
Chandrapuram
Poravipalaiyam
Maniyalampalayam
Vaguthampalayam
Kakkadavu
Mettupalayam
Periyanagamam
Sinnanegamam
Servaikaranpalaiyam
Vadakkipalayam
Santhegoundanpalayam
Solanur
Krishnarayapuram
Kulichettipalayam
Kondegoundampalayam
Varadanur
Kallipatti
Poosanaickendhali
Kabilipalaiyam
Okkilipalayam
Devampadi Valasu
Kullakkalpalayam
Sikkarayapuram
Avalappampatti
Kurumbapalayam
Thoppampatti
Ramapatnam
Achipatti
Vellalapalayam
R.Ponnapuram
Kollapatti
Manur
Rasakkapalayam
Nagoor
Thalakarai
Kittasuarampalaiyam
Sangampalayam
Puliampatti
Nelluthukuli
Anuppar palayam
Boligoundampalayam
Ayyampalayam
Kottampatti
Eripatti
Vallampalli
Zamin Uthukuli
Unjavalampatti
Thippampatti
Pollachi
Chinnampalayam
Solapalayam
Makkinaickenpatti
Suleswarampatti
LEGEND
Anamalai
Annur
Attipalaiyam
Dasarapatti
Ettinayakanpatti
Habitation
Irugur
Kallivalasu
Kanjampatti
Kattampatti
Kottayam
Mettupalaiyam
Miscellaneous
Palathurai
Palaviduthi
Pichanur
Pilamedu
Rockout crop
Salaiyur
Sengalam
Somayyanur
Varapatti
Vellalur


76° 55' E
77° 0' E
77° 5' E
77° 10' E
77° 15' E
10° 55' N
10° 50' N
10° 45' N
10° 40' N
Koraiyar Watershed
SOIL TEXTURE
0 1.25 2.5 5 km
N
W
E
S
Legend
Habitation
Clay
Clayloam
Loamysand
Sandyclay
Sandyclayloam
Sandyloam
Source: Compiled by Author

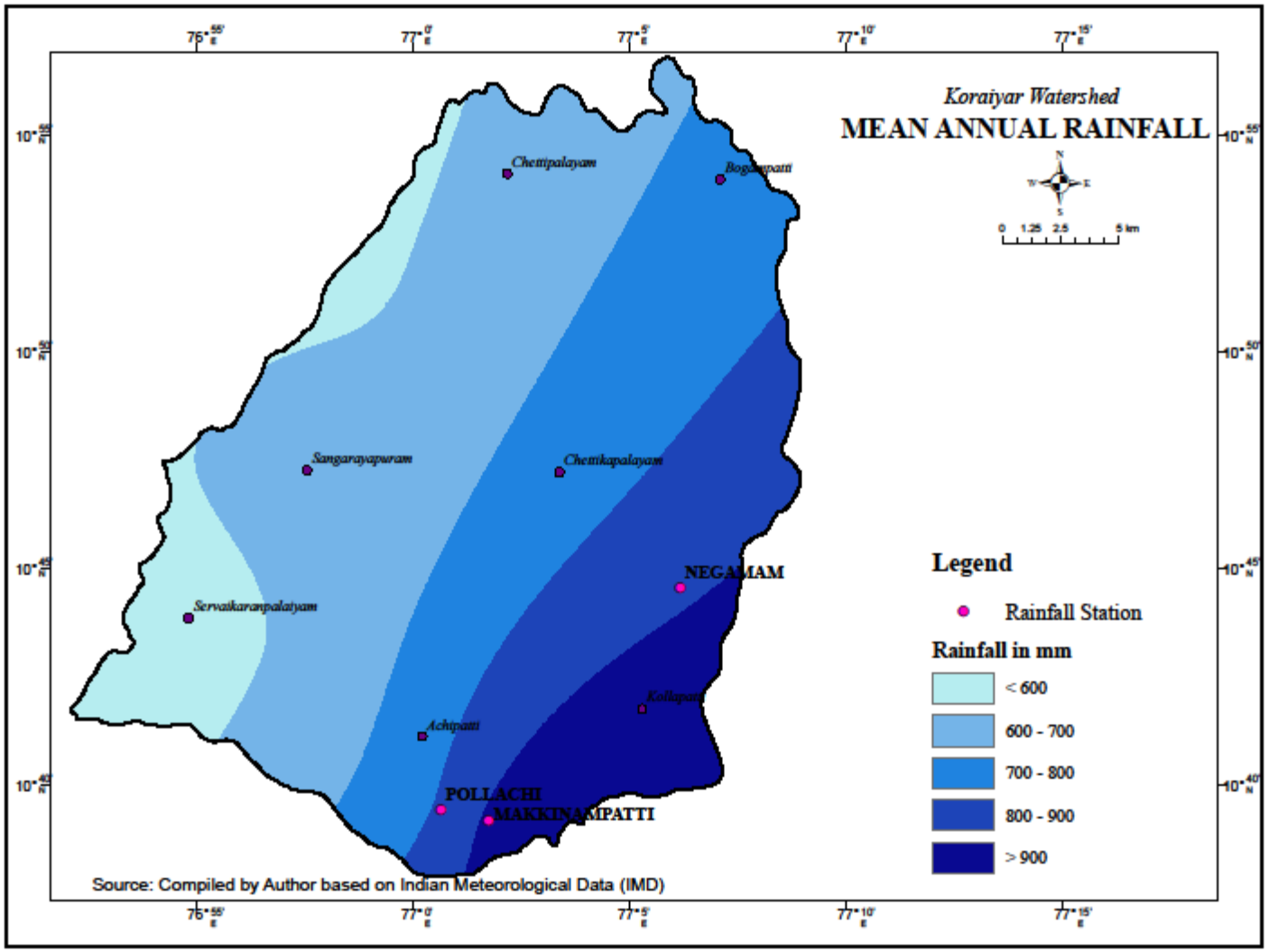
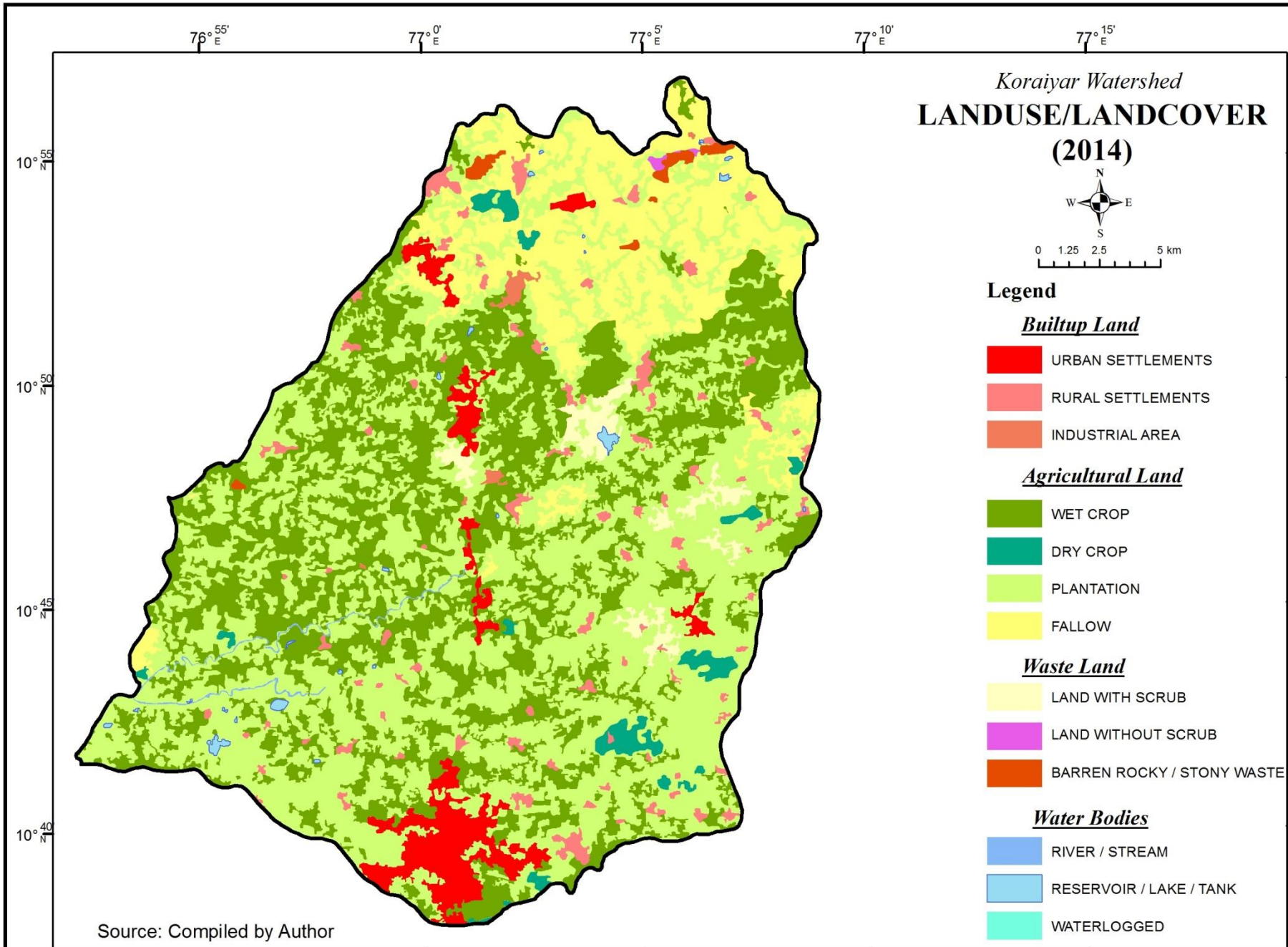

Koraiyar Watershed
MEAN ANNUAL RAINFALL
Chempalayam
Sangarayapuram
Chemkapalayam
NEGAMAM
Servaikaranpalayam
Achipatti
POLLACHI
MAKKINAMPATTI
Legend
Rainfall Station
Rainfall in mm
< 600
600 - 700
700 - 800
800 - 900
> 900
Source: Compiled by Author based on Indian Meteorological Data (IMD)

Fig.3.11


76° 55' E
77° 0' E
77° 5' E
77° 10' E
77° 15' E
10° 55' N
10° 50' N
10° 45' N
10° 40' N
Koraiyar Watershed
LANDUSE/LANDCOVER
(2014)
N
W
E
S
0 1.25 2.5 5 km
Legend
Builtup Land
URBAN SETTLEMENTS
RURAL SETTLEMENTS
INDUSTRIAL AREA
Agricultural Land
WET CROP
DRY CROP
PLANTATION
FALLOW
Waste Land
LAND WITH SCRUB
LAND WITHOUT SCRUB
BARREN ROCKY / STONY WASTE
Water Bodies
RIVER / STREAM
RESERVOIR / LAKE / TANK
WATERLOGGED
Source: Compiled by Author

Soil-Site Suitability Criteria (Crop Requirements) for Coconut

Soil-Site Characteristics		Rating				
		Unit	Highly Suitable S1	Moderately Suitable S2	Marginally Suitable S3	Not Suitable N
Climate Regime	Total Rainfall	mm	1500 - 2500	1000 - 1500	500 - 1000	< 500
Land Quality	Land characteristics					
Nutrient Availability to Roots	Texture	Class	ls, sl,	Sl,C	C,S,L	s
	Texture - Sub	Class	Sc,loamy	Sc, sic,c	S, ls,sl	
	pH	1:2.5	5.1 to 6.5	7.5 to 8.5	4.4 to 7.6	
Rooting Conditions	Effective Soil Depth	cm	>100	75 to 100	25-50	<25
Soil toxicity	Salinity (EC)	dS/m	<2.0	2.0 - 4.0	4.0 – 8.0	>8.0
	Sodicity (ESP)	%	Non-sodic	Slight	Strongly	

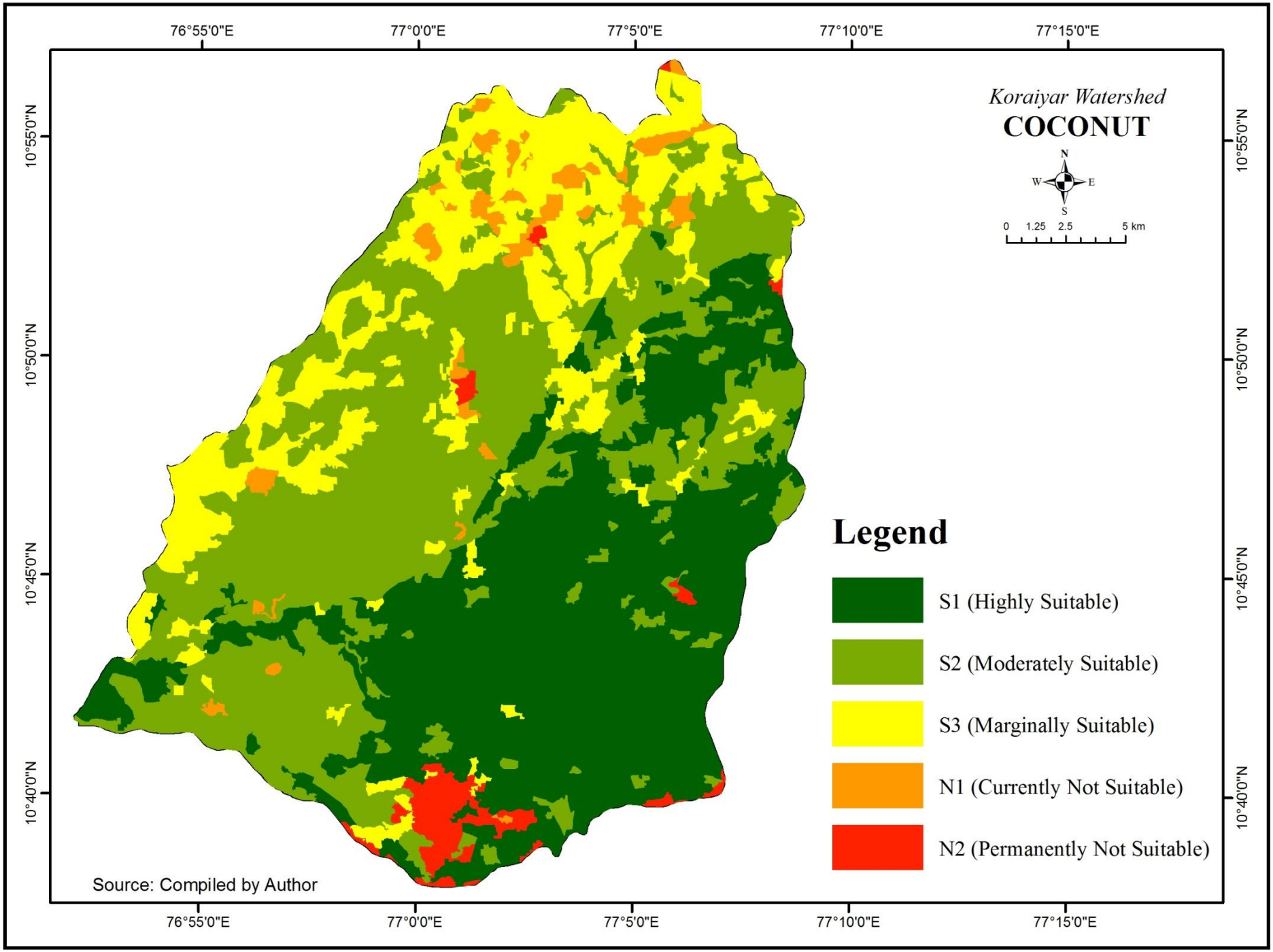
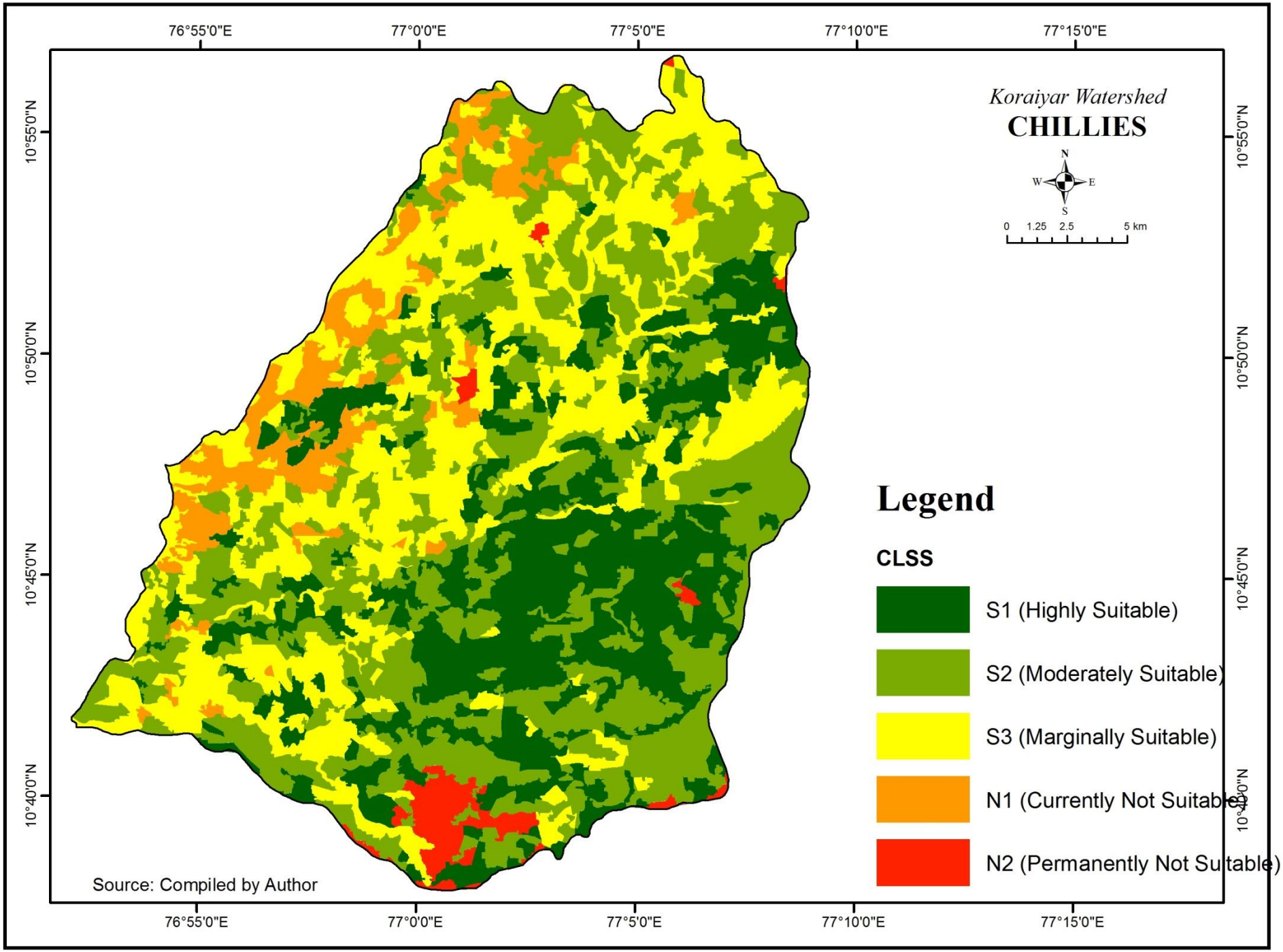
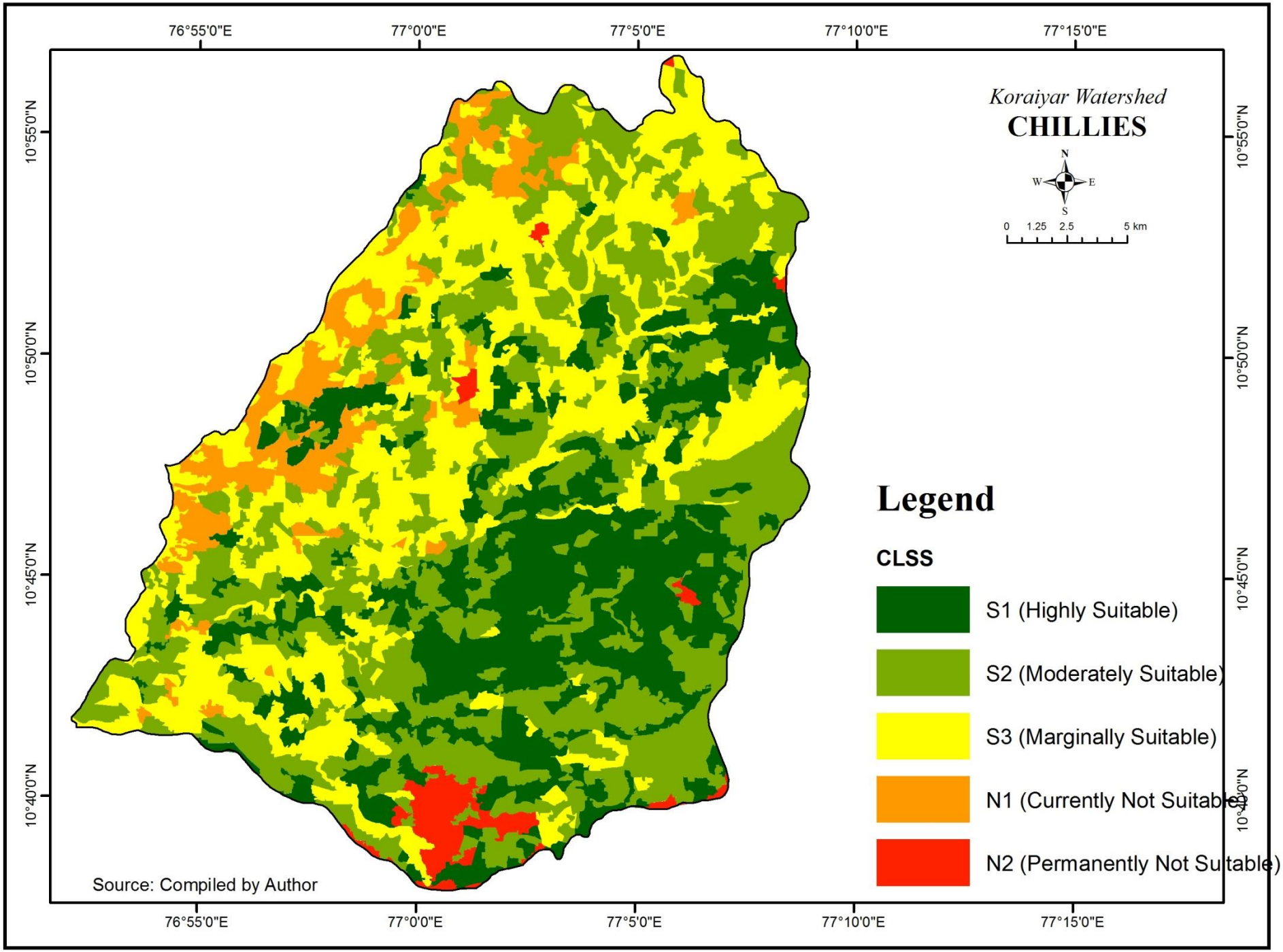

76°55'0"E
77°0'0"E
77°5'0"E
77°10'0"E
77°15'0"E
10°55'0"N
10°50'0"N
10°45'0"N
10°40'0"N
Koraiyar Watershed
COCONUT
N
W
E
S
0 1.25 2.5 5 km
Legend
S1 (Highly Suitable)
S2 (Moderately Suitable)
S3 (Marginally Suitable)
N1 (Currently Not Suitable)
N2 (Permanently Not Suitable)
Source: Compiled by Author

Fig 3.6

Land Suitability Class	Area(Sq/km)	%
Highly Suitable (S1)	243	36.7
Moderately Suitable (S2)	262	39.7
Marginally Suitable (S3)	123	18.6
Not Suitable (N)	32	5


76°55'0"E
77°0'0"E
77°5'0"E
77°10'0"E
77°15'0"E
10°55'0"N
10°50'0"N
10°45'0"N
10°40'0"N
Koraiyar Watershed
CHILLIES
N
W
E
S
0 1.25 2.5 5 km
Legend
CLSS
S1 (Highly Suitable)
S2 (Moderately Suitable)
S3 (Marginally Suitable)
N1 (Currently Not Suitable)
N2 (Permanently Not Suitable)
Source: Compiled by Author

Fig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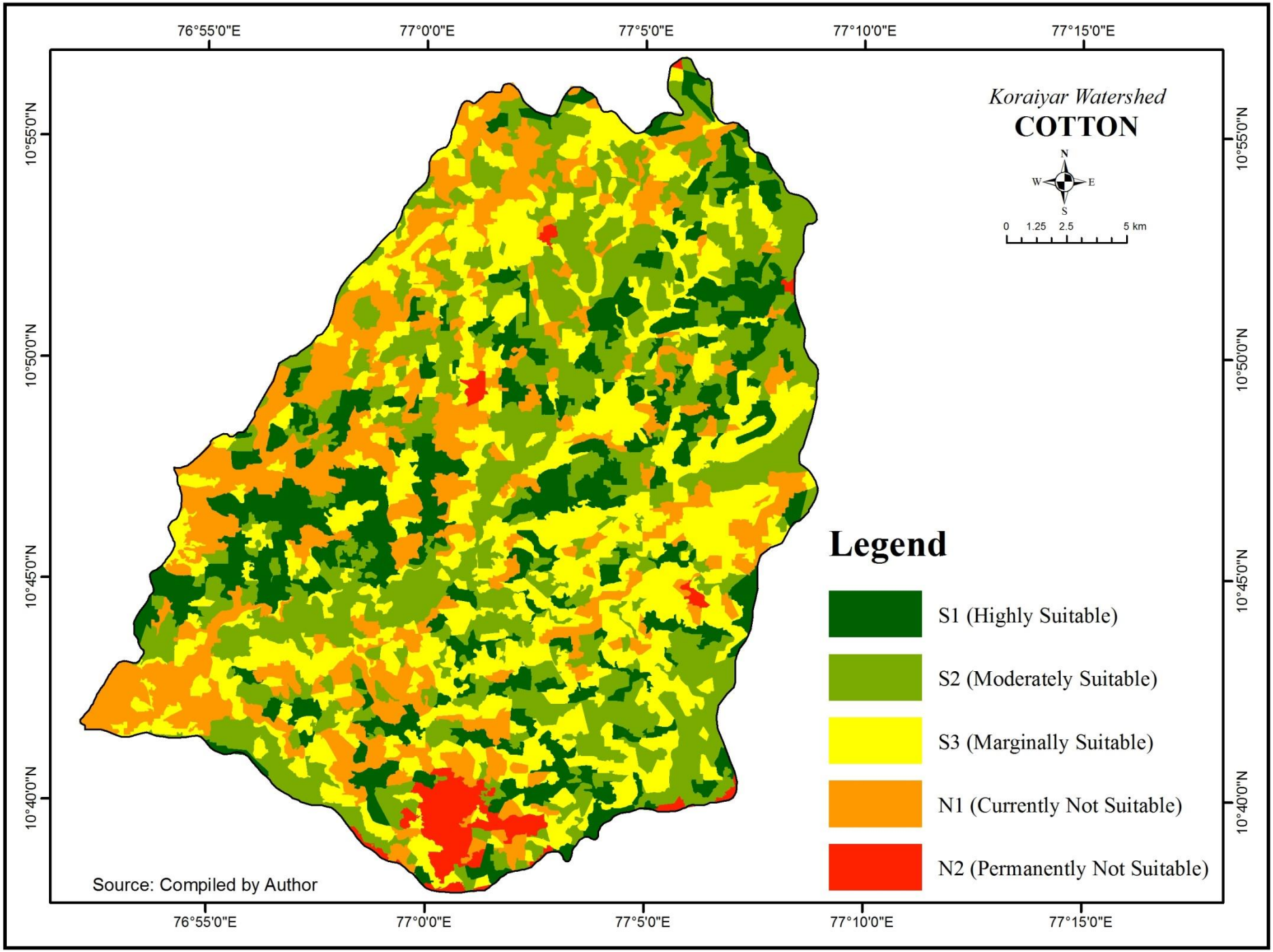
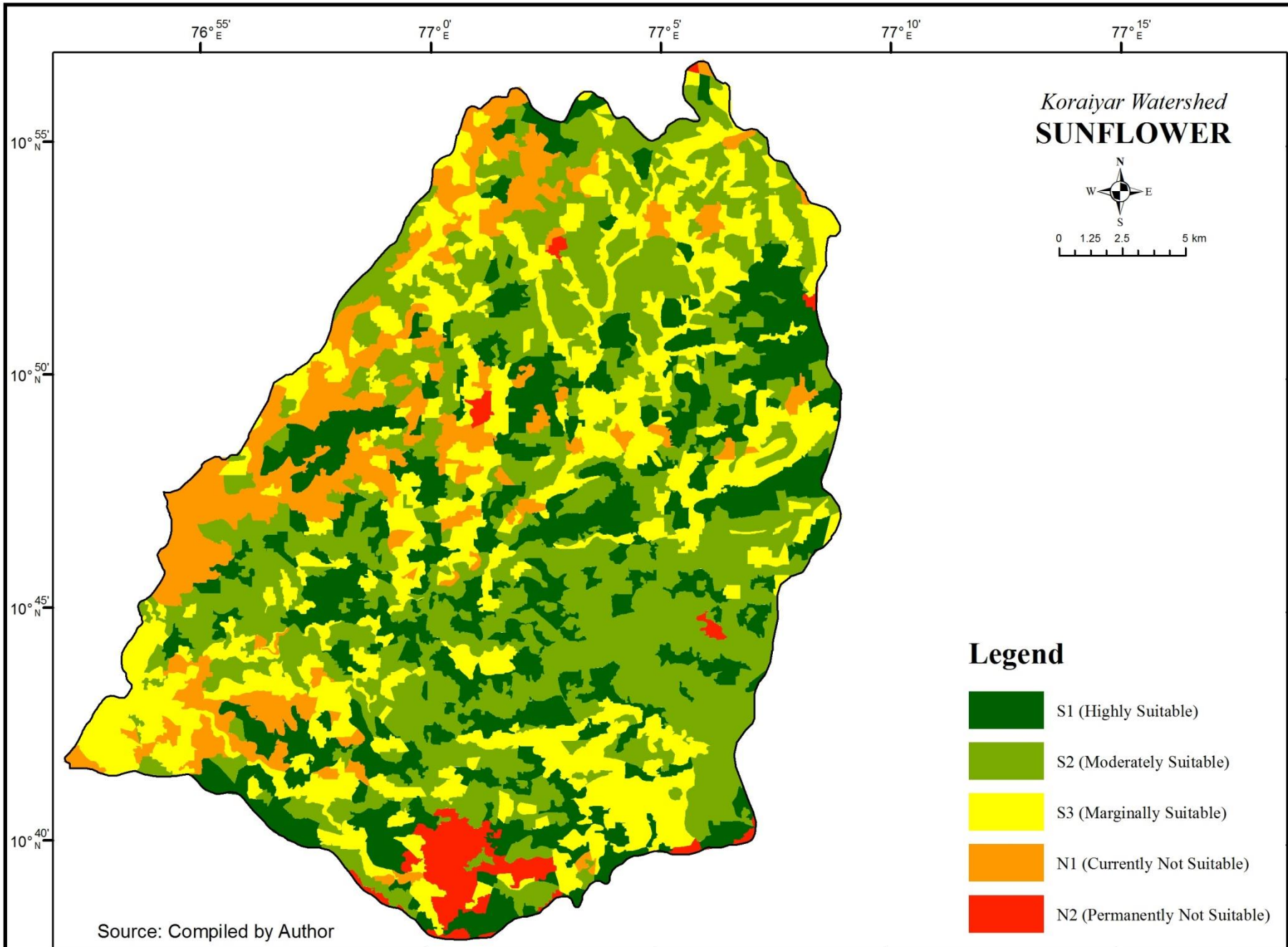
77°5'0"E
77°10'0"E
77°15'0"E
10°55'0"N
10°50'0"N
10°45'0"N
10°40'0"N
Koraiyar Watershed
CHILLIES
N
W
E
S
0 1.25 2.5 5 km
Legend
CLSS
S1 (Highly Suitable)
S2 (Moderately Suitable)
S3 (Marginally Suitable)
N1 (Currently Not Suitable)
N2 (Permanently Not Suitable)
Source: Compiled by Author

Fig


Koraiyar Watershed
COTTON
N
W
E
S
0 1.25 2.5 5 km
Legend
S1 (Highly Suitable)
S2 (Moderately Suitable)
S3 (Marginally Suitable)
N1 (Currently Not Suitable)
N2 (Permanently Not Suitable)
Source: Compiled by Author
76°55'0"E
77°0'0"E
77°5'0"E
77°10'0"E
77°15'0"E
10°55'0"N
10°50'0"N
10°45'0"N
10°40'0"N

Fig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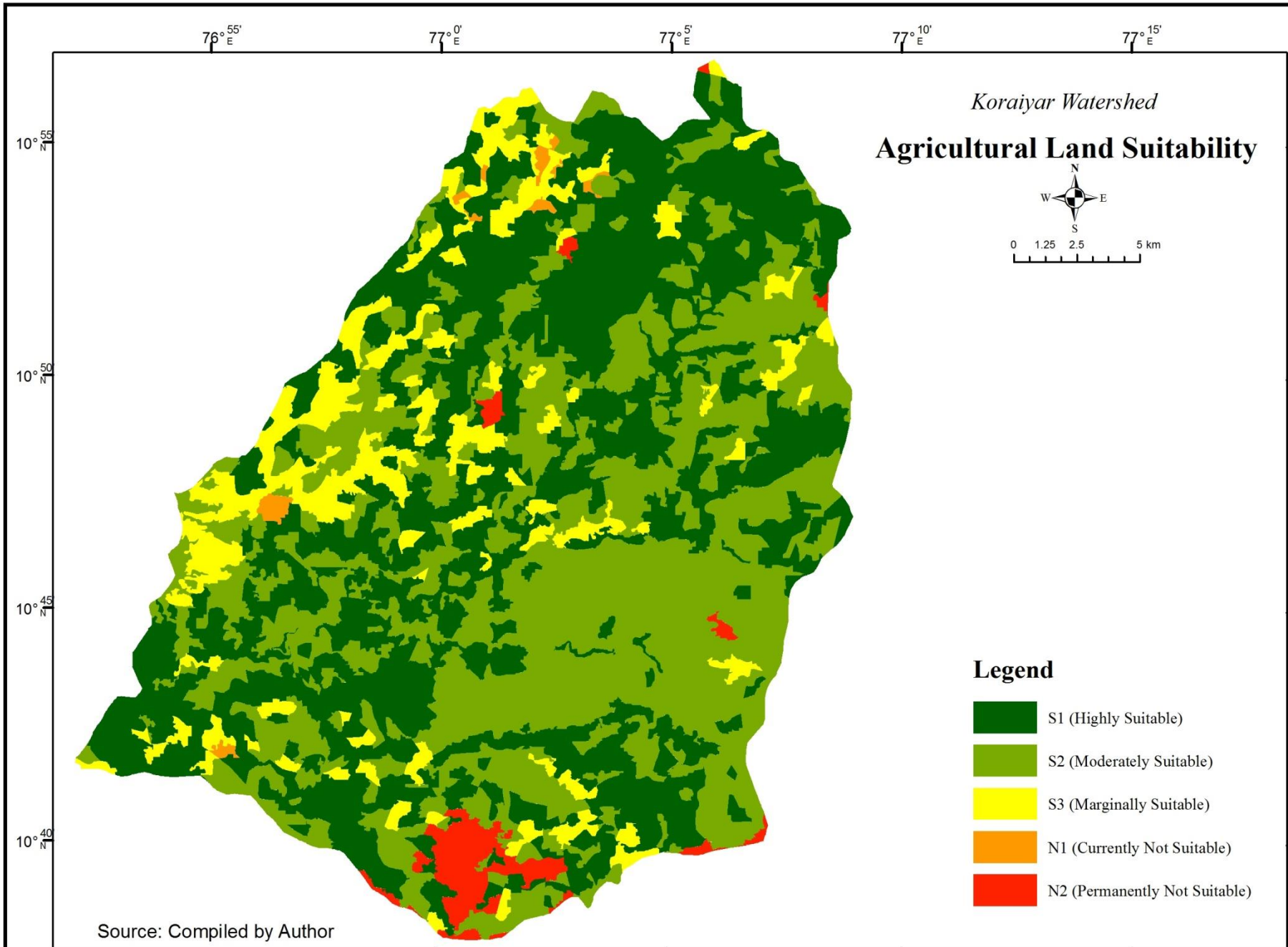
77° 0' E
77° 5' E
77° 10' E
77° 15' E
10° 55' N
10° 50' N
10° 45' N
10° 40' N
Koraiyar Watershed
SUNFLOWER
N
W
E
S
0 1.25 2.5 5 km
Legend
S1 (Highly Suitable)
S2 (Moderately Suitable)
S3 (Marginally Suitable)
N1 (Currently Not Suitable)
N2 (Permanently Not Suitable)
Source: Compiled by Author


76° 55' E
77° 0' E
77° 5' E
77° 10' E
77° 15' E
10° 55' N
10° 50' N
10° 45' N
10° 40' N
Koraiyar Watershed
Agricultural Land Suitability
N
W
E
S
0 1.25 2.5 5 km
Legend
S1 (Highly Suitable)
S2 (Moderately Suitable)
S3 (Marginally Suitable)
N1 (Currently Not Suitable)
N2 (Permanently Not Suitable)
Source: Compiled by Author

Thank You