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ICAR-NBSS&LUP Sujala SWs-LRI Atlas No. 27

# Land Resource and Hydrological Inventory of Kadechur Sub-watershed for Watershed Planning and Development Yadgir Taluk, Yadgir District, Karnataka (AESR 6.2)

Sujala – III  
Karnataka Watershed Development Project- II  
Funded by World Bank



ICAR - NBSS & LUP



ICAR - National Bureau of Soil Survey and Land Use Planning, Bangalore  
Watershed Development Department, Govt. of Karnataka, Bangalore



# About ICAR - NBSS&LUP

The National Bureau of Soil Survey and Land Use Planning (ICAR-NBSS&LUP), Nagpur, a premier Institute of the Indian Council of Agricultural Research (ICAR), was set up during 1976 with the objective to prepare soil resource maps at national, state and district levels and to provide research inputs in soil resource mapping and its applications, land evaluation, land use planning, land resource management, and database management using GIS for optimizing land use on different kinds of soils in the country.

The Bureau has been engaged in carrying out soil resource survey, agro-ecological and soil degradation mapping at the country, state and district levels for qualitative assessment and monitoring the soil health towards viable land use planning. The research activities have resulted in identifying the soil potentials and problems, and the various applications of the soil surveys with the ultimate objective of sustainable agricultural development. The Bureau has the mandate to correlate and classify soils of the country and maintain a National Register of all the established soil series. The Institute is also imparting in-service training to staff of the soil survey agencies in the area of soil survey, land evaluation and soil survey interpretations for land use planning. The Bureau in collaboration with Panjabrao Krishi Vidyapeeth, Akola is running post-graduate teaching and research programme in land resource management, leading to M.Sc. and Ph.D. degrees.

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# **PART-A**

**Land Resource Inventory of Kadechur Sub-watershed  
for Watershed Planning and Development  
Yadgir Taluk, Yadgir District, Karnataka (AESR 6.2)**



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## How to read and use the Atlas

The Land Resource Inventory of Kadechur Sub-watershed (Yadgir Taluk, Yadgir District) for Watershed Planning (AESR 6.2) was undertaken to provide comprehensive site-specific cadastral level information useful for farm level planning and integrated development of the area under Sujala – III, Karnataka Watershed Development Project- II.

This atlas contains the basic information on kinds of soils, their geographic distribution, characteristics and classification. The soil map and soil based thematic maps derived from soils data on soil depth, soil gravelliness, slope, land suitability for various crops and land use management maps are presented on 1:12,500 scale. The maps of fertility status (soil reaction, organic carbon, available phosphorus, available potassium, available sulphur, available calcium, available copper, available manganese, available zinc, available iron, available boron and salinity (EC) on 1:12,500 scale were derived from grid point sampling of the surface soils from the watersheds.

The atlas illustrates maps and tables that depict the soil resources of the watershed and the need for their sustainable management.

The user, depending on his/her requirement, can refer this atlas first by identifying his/her field and survey number on the village soil map and by referring the soil legend which is provided in tabular form after the soil map for details pertaining to his/her area of interest.

The atlas explains in simple terms the different kinds of soils present in the watershed, their potentials and problems through a series of thematic maps that help to develop site-specific plans as well as the need to conserve and manage this increasingly threatened natural resource through sustainable land use management. The Land Resource Atlas contains database collected at land parcel/ survey number level on soils, climate, water, vegetation, crops and cropping patterns, socio-economic conditions, marketing facilities *etc.* helps in identifying soil and water conservation measures required, suitability for crops and other uses and finally for preparing a viable and sustainable land use options for each and every land parcel.

For easy map reading and understanding the information contain in different maps, the physical, cultural and scientific symbols used in the maps are illustrated in the form of colors, graphics and tables.

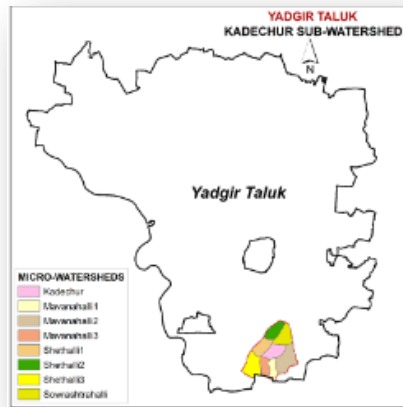


# Physical, Cultural and Scientific symbols used in the Atlas

Each map in the atlas sheet is complemented with the physical, cultural and scientific symbols to facilitate easy map reading.

## Inset map

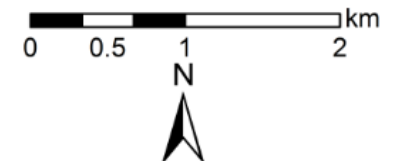
Inset provided in each map conveys its strategic location i.e. Taluk, Sub-watershed and Sub-watershed.



## Map title

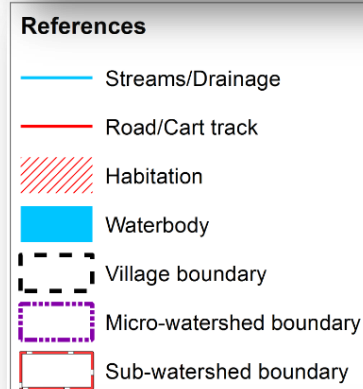
Map title conveys the relevance of thematic information presented along with a graphical scale, geographical location and watershed details in text form.

**SOILS**  
**Kadechur Sub-watershed**  
 (4D5B1Q : Area - 4609.21 ha)  
**YADGIR TALUK & DISTRICT**



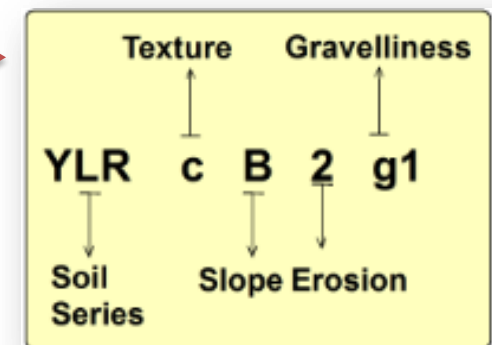
## Legends and symbols

Two legends accompany each map, a **map reference**, which depicts geographic features and a **thematic legend** which portrays spatial information. Picking up the symbol and colour of a particular enables one to go to the legends to obtain the required information.



## Soil Units

The soil map may be read at different levels. The most detailed level is that of the soil phase. Soil phases are distinguished within soil series mainly based on differences in surface of soil texture, slope, gravelliness, erosion, etc.



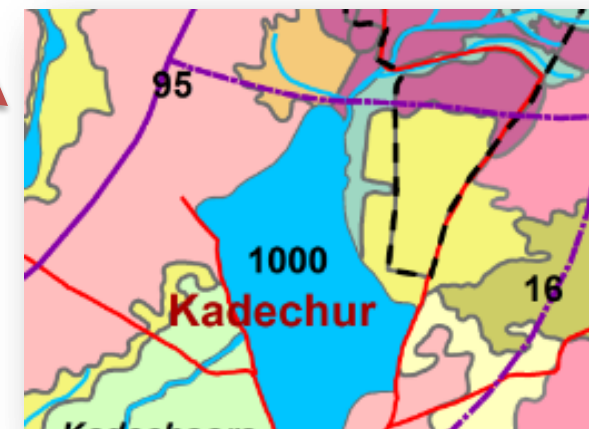
## Map colours

Different shades of colours are used as an aid to distinguish the different classes of soils, crop suitability and other maps.

Soil Phase	Area in ha (%)	Soil Phase	Area in ha (%)
2. BDLbB2	17 (0.36)	45. GDGbB3g1	2 (0.04)
5. BDLbB2	191 (4.15)	49. NGPmB2	71 (1.53)
9. VNkcB2	1 (0.02)	50. BGDdB2	32 (0.7)
15. HLGcB3	42 (0.91)	52. ANRbB3	43 (0.94)
16. HLGcB2	49 (1.06)	53. ANRbB2	30 (0.64)
17. HLGbB2	94 (2.03)	55. ANRbB2	17 (0.38)
18. HLGbB2g1	3 (0.07)	56. ANRbB3g1	23 (0.51)
20. JNKcB2	200 (4.35)	59. MDRcB2	14 (0.3)
22. JNKbB2	9 (0.19)	108. DSbB2	147 (3.2)
29. YLRcB2g1	0 (0.01)	120. BDPbB2	1 (0.02)
37. BLCcB2	62 (1.36)	125. SBRbB2	3 (0.07)
38. BLCbB2	46 (1.01)	150. GWDiB2g1	47 (1.02)
39. KBDdB3	13 (0.28)	161. HTKbB2g1	46 (0.99)
40. PGPcB2	79 (1.72)	111. HSLbB2	3 (0.08)
41. PGPbB2	22 (0.47)	176. HSLcB2g2	68 (1.47)
<b>Soil of Alluvial Landscape</b>			
70. RMPcB2	31 (0.67)	89. KDRmB2	2 (0.04)
79. RHNmB2	165 (3.57)	90. SWRcB2	20 (0.44)
82. MGLmB2	229 (4.97)	91. SWRmB2	417 (9.05)
84. KDRcB2	12 (0.26)	92. HGNbB2	30 (0.65)
87. KDRbB2	120 (2.6)	95. HGNmB2	931 (20.2)
<b>Low Land</b>			
100. VKSmB1137	(2.97)	994. Mining/Industrial	676 (14.67)
116. KDHB2	173 (3.75)	999. Rock outcrops	1 (0.02)
992. Railway	5 (0.11)	1000. Others	285 (6.18)

## Soil and plot boundaries

Soil units shown on the map are represented by both the color and a numeral. The soil boundaries are superimposed on land parcel with revenue survey number boundaries to visualize its spatial extent.



## Map key

There are many thematic types to be differentiated on the map solely based on colour. Therefore soils and suitability types and their limitations are distinguished by colours with a combination of alpha-numeric characters.

Key	
S1- Highly Suitable	TEXTURE
S2- Moderately Suitable	b - Loamy sand
S3- Marginally Suitable	c - Sandy loam
N1- Currently Not Suitable	h - Sandy clay loam
N2- Permanently Not Suitable	i - Sandy clay
	m - Clay
	SLOPE
	B - Very gently sloping (1-3%)
	EROSION
	1 - Slight
	2 - Moderate
	3 - Severe
	GRAVELLINESS
	g1 - Gravelly (15-35%)
	g2 - Very gravelly (35-60%)
	DEPTH
	BDP - Very shallow (10-25)
	HTK, BDL, DSb, VNk - Shallow (25-50 cm)
	SBR, HLG, JNK, RMP, YLR - Moderately shallow (50-75 cm)
	GWD, HSL, BLC, KDh, RHN, PGP, MGL, KBD - Moderately deep (75-100 cm)
	NGP, ANR, SWR, KDR, BGD, VKS, GDG - Deep (100-150 cm)
	MDR, HGN - Very deep (>150 cm)
	Limitations
g- gravelliness/stoniness	
n- nutrient availability	
r- rooting condition	
t- texture	
z- excess salt/calcareousness	

# 1. Introduction

Land is a scarce resource and basic unit for any material production. It can support the needs of the growing population, provided they use land in a rational and judicious manner. But what is happening in many areas of the state is a cause for concern to anyone involved in the management of land resources at the grassroots level. In India the area available for agriculture is about 51 per cent of the total area and more than 60 per cent of the people are still relying on agriculture for their livelihood. The limited land area is under severe stress and strain due to increasing population pressure and competing demands of various land uses. Due to this, every year there is a significant diversion of farm lands and water resources for non-agricultural purposes. Apart from this, due to lack of interest for farming among the farmers in many areas, large tracts of cultivable lands are turning into fallows and this trend is continuing at an alarming rate.

The watershed management programs are aimed at designing suitable soil and water conservation measures, productivity enhancement of existing crops, crop diversification with horticultural species, greening the wastelands with forestry species of multiple uses and improving the livelihood opportunities for landless people.

The objectives can be met to a great extent when an appropriate Natural Resources Management (NRM) plan is prepared and implemented. It is essential to have site specific Land Resources Inventory (LRI) indicating the potentials and constraints for developing such a site specific plan. LRI can be obtained by carrying out detailed characterization and mapping of all the existing land resources like soils, climate, water, minerals and rocks, vegetation, crops, land use pattern, socio-economic conditions, infrastructure, marketing facilities and various schemes and developmental works of the government. From the data collected at farm level, the specific problems and potentials of the area can be identified and highlighted, conservation measures required for the area can be planned on a scientific footing, suitability of the area for various uses can be worked out and finally viable and sustainable land use options suitable for each and every land holding can be prescribed to the farmer and other land users of the area.

The major landforms identified in the Sub-watershed are uplands and low lands. The database was generated by using cadastral map of the village as a base along with high resolution satellite imagery (IRS LISS IV and Cartosat-1). The objectives of the land resource survey, carried out in the Kadechur Sub-watershed covering an area of 4609.21 ha are indicated below.

- Detailed characterization of all the land resources like soil, water, land use, cropping pattern and other resources available at parcel level in the village.
- Delineation of homogenous areas based on soil-site characteristics into management units.
- Collection and interpretation of climatic and agronomical data for crop planning.
- Identification of problems and potentials of the area and strategies for their management.
- Assessment of the suitability of land resources for various crops and other uses.
- Establishment of village level digital land resources database in a GIS framework.
- Enable the watershed and other line departments to prepare an action plan for the integrated development of the watershed.



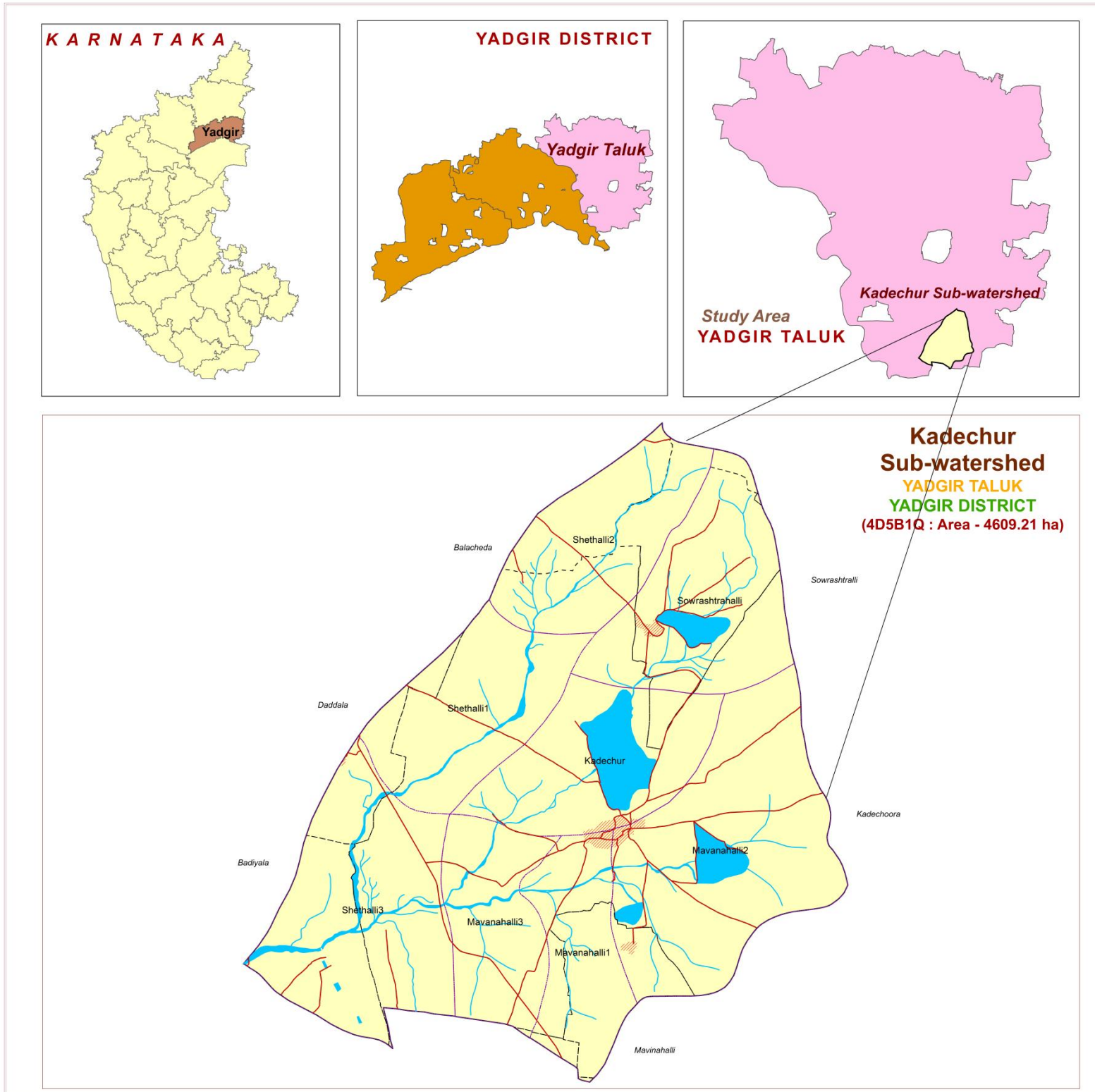
## 2. General Description of Sub-watershed

The Yadgir, popularly called as “Yadavagiri” by the local people, district came to existence on 30th Dec 2009 by carving out of erst-while Kalaburagi district of Karnataka with a geographical area of 5234.4 square kilometers, located in the northern part of the state. It lies between north latitudes' 16<sup>0</sup>57' – 16<sup>0</sup>59' and east longitudes 77<sup>0</sup> 12' – 77<sup>0</sup> 13'. The climate of the district is very hot and dry. The district has an average annual rainfall of 636 mm. Soils are well drained red sandy loam to medium deep black soils. This may be the weathering product of gneissic and granite terrain. Agriculture in Yadgir district is dependent upon rainfall, irrigation tanks, wells, streams etc. The major agricultural crops grown are Jowar, Groundnut, Cotton, Red gram, Bengal gram etc.

As a pilot study, **ICAR-NBSS&LUP, Bangalore** carried out the generation of SWs-LRI for the Kadechur Sub-watershed in Yadgir taluk, Yadgir district. It was selected for data base generation under Sujala III project. Kadechur Sub-watershed (code– 4D5B1Q ) is covering an area of 4609.21 ha and spread across Sowrashtralli,Kadechoora,Mavinahalli,Badiyala,Daddala and Balacheda villages.

## 2.1. Location and Extent

### LOCATION MAP OF KADECHUR SUB-WATERSHED



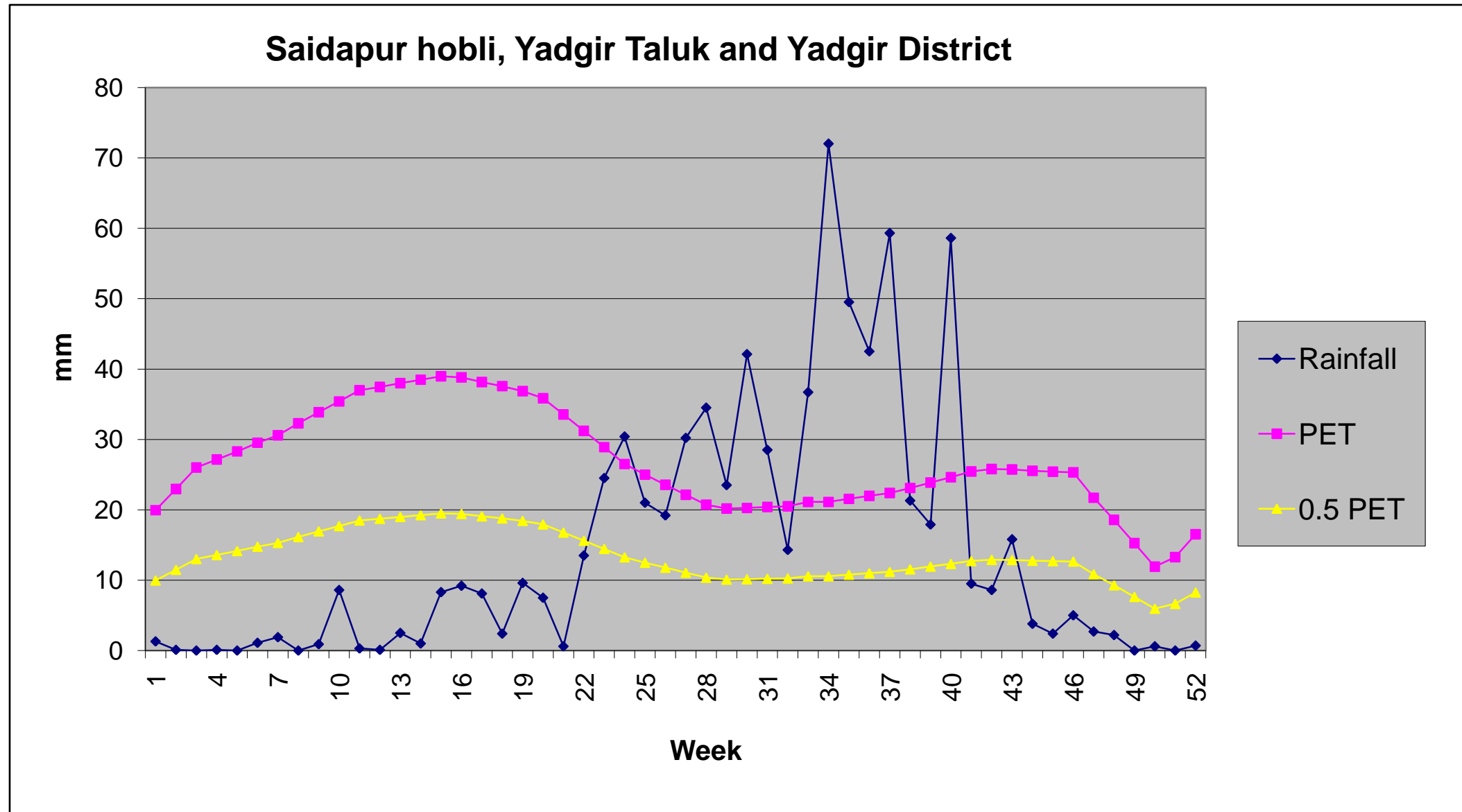
The Kadechur Sub-watershed (Yadgir taluk, Yadgir district) is located in between  $16^{\circ}29'$  –  $16^{\circ}34'$  North latitudes and  $77^{\circ}16'$  –  $77^{\circ}21'$  East longitudes, covering an area of about 4609.21 ha, bounded by Sowrashtralli, Kadechoora, Mavinahalli, Badiyala, Daddala and Balacheda villages.

**Agro Ecological Sub Region (AESR) 6.2:** Central and Western Maharashtra Plateau and North Karnataka Plateau and North Western Telangana Plateau, hot moist semi-arid ESR with shallow and medium loamy to clayey Black soils (medium and deep clayey Black soils as inclusion), medium to high AWC and LGP 120-150 days.

**Agro-climatic Zone 2: North-eastern Dry Zone:** The total geographic area of this zone is about 1.76 M ha covering 8 taluks of Gulbarga district and 3 taluks of Raichur. Net cultivated area in the zone is about 1.31 M ha of which about 0.09 M ha are irrigated. The mean elevation of the zone is 300-450 m MSL. The main soil type is deep to very deep soils with small pockets of shallow to medium black soils. The zone is cropped predominantly during rabi due to insufficient rainfall (465-785 mm). The principal crops of the zone are jowar, bajra, oilseeds, pulses, cotton and sugarcane.



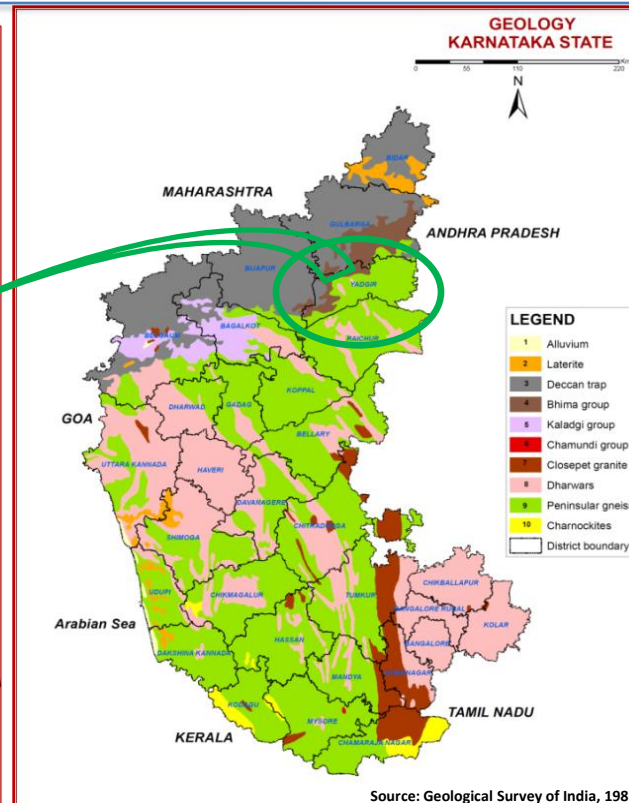
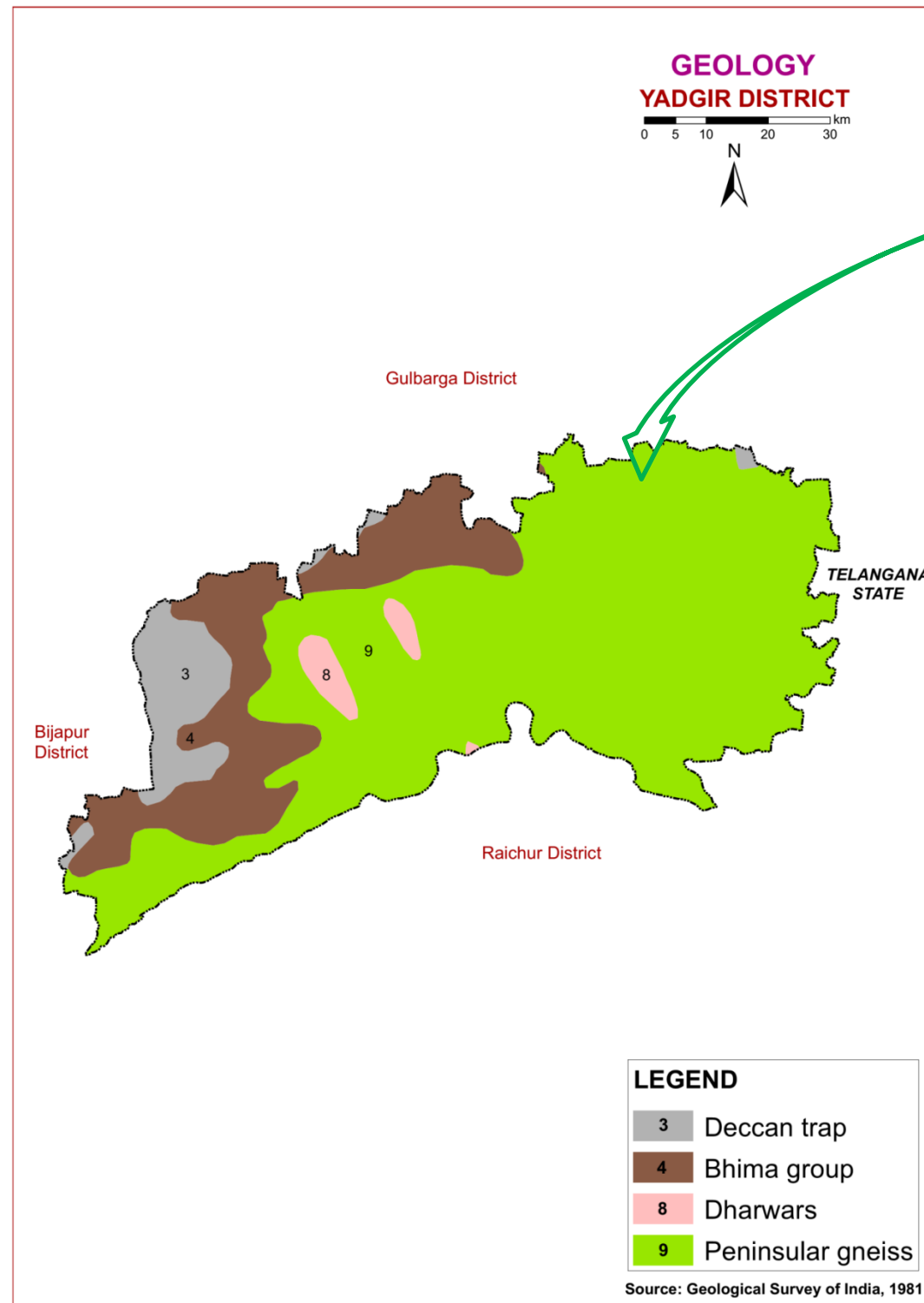
# Climate



Length of Growing Period (LGP) is varying from June 1<sup>st</sup> week to 4<sup>th</sup> week of October (120 - 150 days)

Annual Rainfall : 754 mm. in the Sydhapura Hobli, Yadgir Taluk & District

## 2.3. Geology



### GEOLOGY - KARNATAKA STATE

Karnataka forms part of the Peninsular Shield, which is an ancient stable block of the earth's crust. The shield is composed of geologically ancient rocks of diverse origin. These rocks have undergone various degrees of metamorphism and crushing. Overlying these ancient rocks are Proterozoic, late Cretaceous to Palaeocene, Palaeocene to Recent, and Recent sediments.

In the stratigraphic succession of rocks in Karnataka the Archaean group is the oldest, followed by Proterozoic, Mesozoic and Cainozoic formations.

### GEOLOGY - YADGIR DISTRICT

#### Mesozoic Group

Towards the end of the Cretaceous Period there was tremendous volcanic activity in the Peninsular part of India with eruption of a series of lava flows which came out through fissures and cracks. This formation is known as the Deccan Trap.

**Deccan Trap:** The Deccan Trap covers an area of 25,000 sq. km. Eight lava flows have been identified in Karnataka, horizontally overlying the older formations. The thickness of the individual flows averages about five metres. The Deccan Trap is relatively uniform in petrographic character. The most common type is augite basalt. Dominant colour is greyish green; texture ranges from cryptocrystalline to glassy. The rock is often vesicular and scoriaceous.

#### Upper Proterozoic Group

Formations of the Upper Proterozoic in Karnataka are closepet granites, Chamundi granites, Kaladgi series and Bhima series.

#### Bhima series

This series, equivalent to the Kurnool formations, is named after the Bhima river and occurs in Bijapur and Gulbarga districts. It covers an area of about 4200 sq. km and is overlain by the Deccan trap. The group consists of horizontal, unfossiliferous, unmetamorphosed sedimentary rocks such as sandstones, green, purple and black shales, and cream and bluish limestones. The thickness is about 477 metres.

#### Dharwar schists

The Dharwar schists consist of a complex series of crystalline schists associated with ultrabasic rocks such as amphibolite, peridotites and dunites. These schists are found in long, narrow bands of various dimensions running NW-SE through the Peninsular Gneiss. The Dharwars are divided into Upper and Lower.

Upper Dharwars are equivalent to the Archaean to Lower Proterozoic, and are divided into Bababudan.

Lower Dharwars occur in Mysore district and include amphibolite schist, quartzite, ironstone and marble.

#### Peninsular Gneiss

Exposed over a large area of Karnataka in all the districts except Bidar is the Peninsular Gneiss which is a heterogeneous mixture of several types of granitic rocks such as banded gneisses, granitic gneisses, granites and gneissic granites, granodiorites and diorites. The banded gneisses consist of white bands of quartz-feldspar alternating with dark bands of biotite, hornblende, and minor accessories. The granite group includes granites of all shades with varying composition. Peninsular gneiss seems to have formed by the granitization of the older rocks.



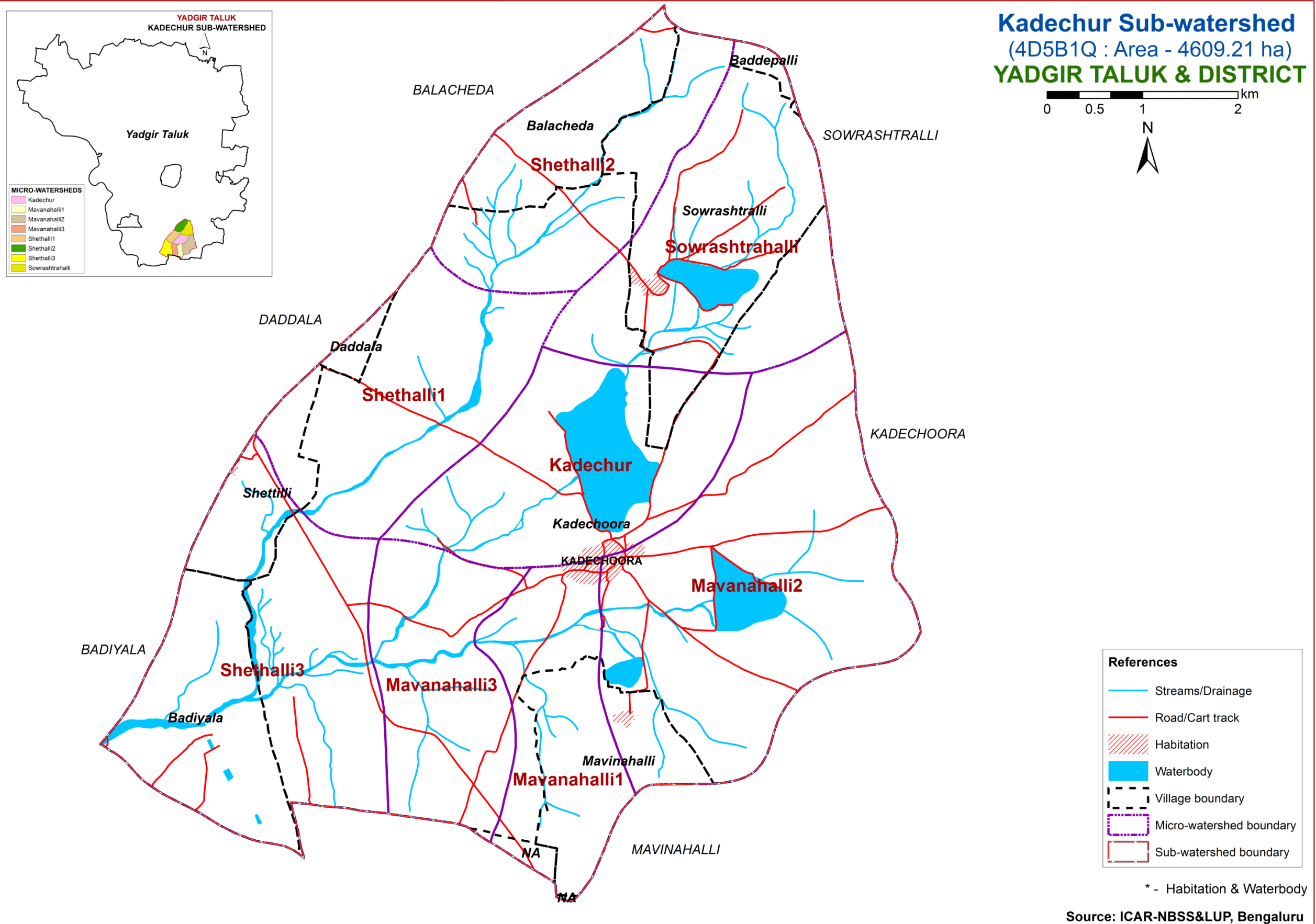
## 3. Survey Methodology

### Sequence of activities in generation of LRI

- Traversing the watershed using cadastral maps and imagery as base
- Identifying landforms, geology, land use and other features
- Selecting fields representing land units
- Opening profiles to 2 m depth
- Studying soil and site characteristics
- Grouping similar areas based on their soil-site characteristics into land management units
- Preparation of crop, soil and water conservation plan
- Socio-economic evaluation

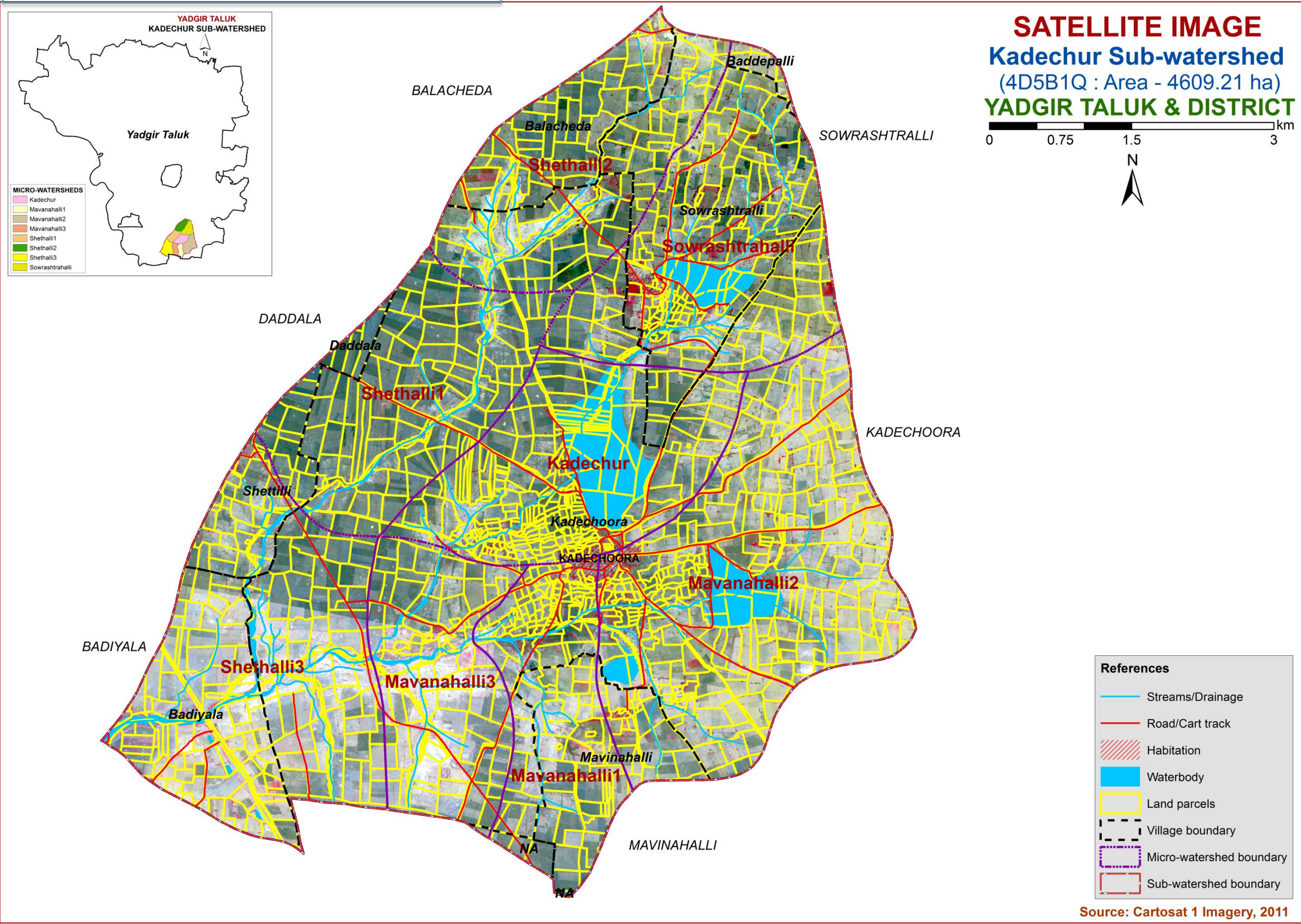
The required site and soil characteristics are described and recorded on a standard proforma by following the protocols and guidelines given in the soil survey manual and field guide. Collection of soil samples from representative pedons for laboratory characterization and collection of surface soil samples from selected fields covering most of the management units for macro and micro-nutrient analysis is being carried out (320m grid intervals). Further processing of data at chemical lab and GIS lab are carried out to generate various thematic maps for each of the study area.

### 3.1. Database Used - Cadastral map





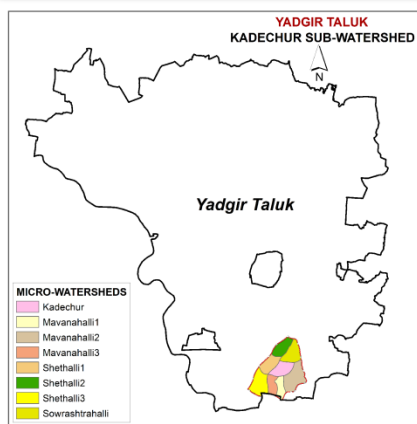
### 3.2. Database Used - Satellite Image



Source: Cartosat 1 Imagery, 2011

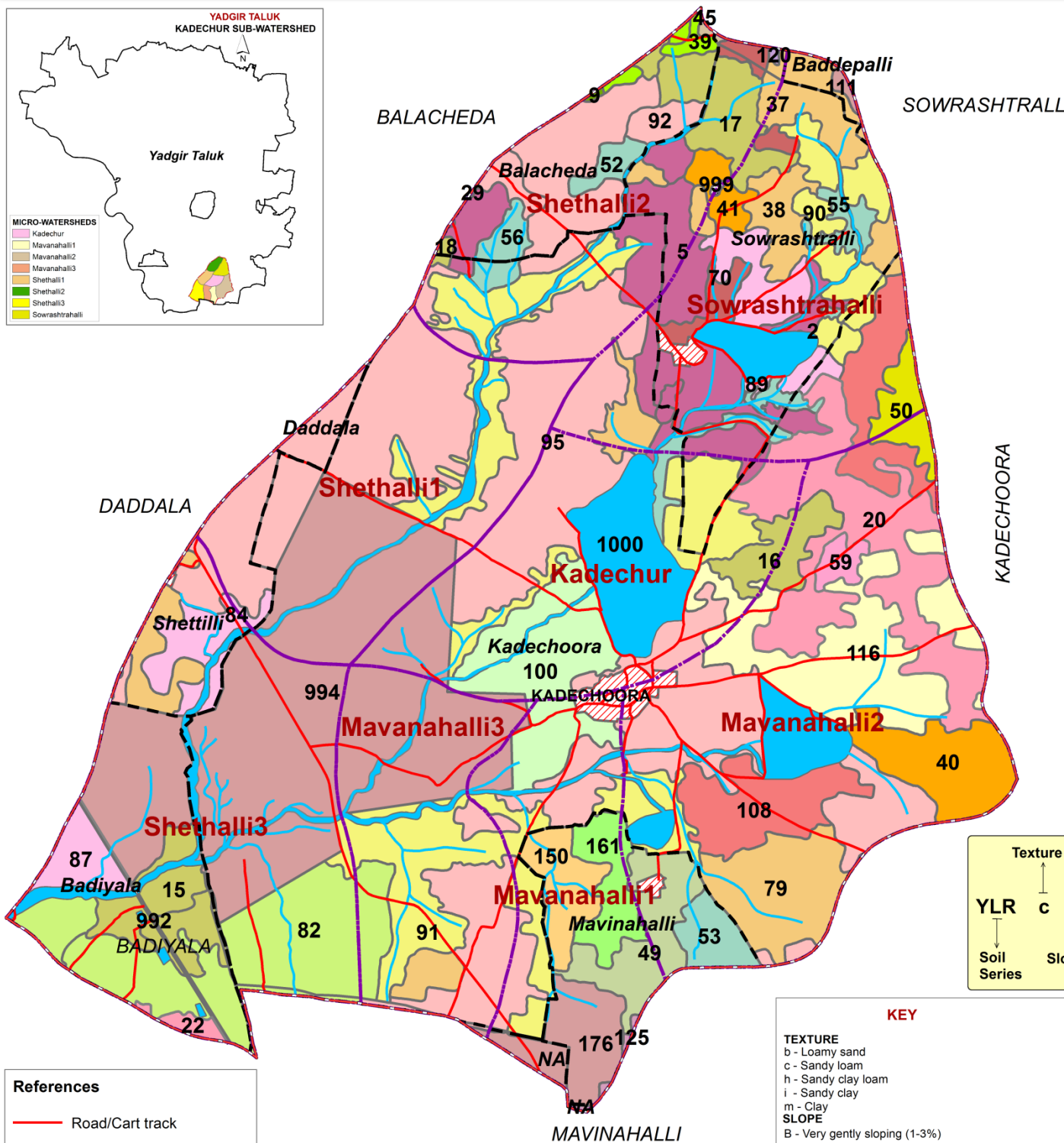
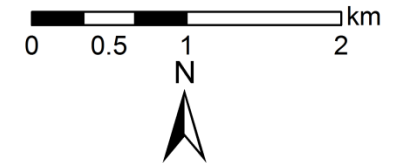


# 4. The Soils



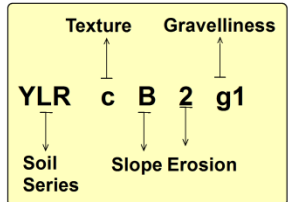
## SOILS

### Kadechur Sub-watershed (4D5B1Q : Area - 4609.21 ha) YADGIR TALUK & DISTRICT



- References**
- Road/Cart track
  - Streams/Drainage
  - Habitation
  - Waterbody
  - Village boundary
  - Micro-watershed boundary
  - Sub-watershed boundary

- KEY**
- TEXTURE**  
 b - Loamy sand  
 c - Sandy loam  
 h - Sandy clay loam  
 i - Sandy clay  
 m - Clay
- SLOPE**  
 B - Very gently sloping (1-3%)
- EROSION**  
 1 - Slight  
 2 - Moderate  
 3 - Severe
- GRAVELLINESS**  
 g1 - Gravelly (15-35 %)  
 g2 - Very gravelly(35-60 %)
- DEPTH**  
 BDP-Very shallow (10-25)  
 HTK,BDL,DSB,VNK - Shallow (25-50 cm)  
 SBR,HLG,JNK,RMP,YLR - Moderately shallow (50-75 cm)  
 GWD,HSL,BLC,KDH,RHN,PGP,MGL,KBD - Moderately deep (75-100 cm)  
 NGP,ANR,SWR,KDR,BGD,VKS,GDG - Deep (100-150 cm)  
 MDR, HGN -Very deep (>150 cm)



Soil Phase	Area in ha (%)	Soil Phase	Area in ha (%)
<b>Soil of Granite and Granite Gneiss Landscape</b>			
2. BDLbB2	17 (0.36)	45. GDGbB3g1	2 (0.04)
5. BDLiB2	191 (4.15)	49. NGPmB2	71 (1.53)
9. VNKcB2	1 (0.02)	50. BGDdB2	32 (0.7)
15. HLGbB3	42 (0.91)	52. ANRbB3	43 (0.94)
16. HLGcB2	49 (1.06)	53. ANRhB2	30 (0.64)
17. HLGiB2	94 (2.03)	55. ANRiB2	17 (0.38)
18. HLGiB2g1	3 (0.07)	56. ANRiB3g1	23 (0.51)
20. JNKcB2	200 (4.35)	59. MDRcB2	14 (0.3)
22. JNKiB2	9 (0.19)	108. DSBiB2	147 (3.2)
29. YLRcB2g1	0 (0.01)	120. BDPbB2	1 (0.02)
37. BLCcB2	62 (1.36)	125. SBRhB2	3 (0.07)
38. BLCiB2	46 (1.01)	150. GWDiB2g1	47 (1.02)
39. KBDdB3	13 (0.28)	161. HTKbB2g1	46 (0.99)
40. PGPcB2	79 (1.72)	111. HSLbB2	3 (0.08)
41. PGPiB2	22 (0.47)	176. HSLcB2g2	68 (1.47)
<b>Soil of Alluvial Landscape</b>			
70. RMPcB2	31 (0.67)	89. KDRmB2	2 (0.04)
79. RHNmB2	165 (3.57)	90. SWRcB2	20 (0.44)
82. MGLmB2	229 (4.97)	91. SWRmB2	417 (9.05)
84. KDRcB2	12 (0.26)	92. HGNcB2	30 (0.65)
87. KDRiB2	120 (2.6)	95. HGNmB2	931 (20.2)
<b>Low Land</b>			
100. VKSmB1137	(2.97)	994. Mining/Industrial	676 (14.67)
116. KDHiB2	173 (3.75)	999. Rock outcrops	1(0.02)
992. Railway	5 (0.11)	1000. Others	285 (6.18)

\* - Habitation & Waterbody  
 Source: ICAR-NBSS&LUP, Bengaluru

#### 4.1 Mapping unit description of Kadechur (4D5B1Q) Sub-watershed in Yadgir Taluk, Yadgir district

Soil map unit No*	Soil Series	Soil Phase Symbol	Mapping Unit Description	Area in ha (%)
<b>Soils of Granite and Granite gneiss Landscape</b>				
	MDR		Madhwara soils are very deep (>150 cm), well drained, have very dark gray to very dark brown, slightly calcareous sandy clay loam soils occurring on nearly level to very gently sloping uplands under cultivation	<b>14 (0.3)</b>
59		MDRcB2	Sandy loam surface, slope 1-3%, moderate erosion	14 (0.3)
	ANR		Anur soils are deep (100-150 cm), moderately well drained, have dark gray to dark brown, calcareous sodic clay soils occurring on very gently to gently sloping uplands under cultivation	<b>113 (2.4)</b>
52		ANRbB3	Loamy sand surface, slope 1-3%, severe erosion	43 (0.94)
53		ANRhB2	Sandy clay loam surface, slope 1-3%, moderate erosion	30 (0.64)
55		ANRiB2	Sandy clay surface, slope 1-3%, moderate erosion	17 (0.38)
56		ANRiB3g1	Sandy clay surface, slope 1-3%, severe erosion, gravelly (15-35%)	23 (0.51)
	BGD		Belagundi soils are deep (100-150 cm) well drained, have brown to dark yellowish brown, slightly calcareous clayey soils occurring on nearly level to very gently sloping uplands under cultivation	<b>32 (0.7)</b>
50		BGDdB2	Loamy sand surface, slope 1-3%, moderate erosion	32 (0.7)
	GDG		Gonedagi soils are deep (100-150 cm), well drained, have dark reddish gray to dark brown, sandy clay loam soils occurring on very gently to gently sloping uplands under cultivation	<b>2 (0.04)</b>
45		GDGbB3g1	Loamy sand surface, slope 1-3%, severe erosion, gravelly (15-35%)	2 (0.04)
	NGP		Nagalapur soils are deep (100-150 cm), moderately well drained, have very dark gray to very dark grayish brown, black calcareous cracking clay soils occurring on very gently sloping uplands under cultivation	<b>71 (1.53)</b>
49		NGPmB2	Clay surface, slope 1-3%, moderate erosion	71 (1.53)
	BLC		Balichakra soils are moderately deep (75-100 cm), well drained, have reddish brown to dark reddish brown, sandy clay loam red soils occurring on very gently sloping uplands under cultivation	<b>109 (2.36)</b>
37		BLCcB2	Sandy loam surface, slope 1-3%, moderate erosion	62 (1.36)
38		BLCiB2	Sandy clay surface, slope 1-3%, moderate erosion	46 (1.01)
	GWD		Gowdagera soils are moderately deep (75-100 cm), moderately well drained, have dark grayish brown to very dark grayish brown, calcareous sodic sandy clay loam soils occurring on very gently sloping uplands under cultivation	<b>47 (1.02)</b>
150		GWDiB2g1	Sandy clay surface, slope 1-3%, moderate erosion, gravelly (15-35%)	47 (1.02)

Soil map unit No*		Soil Series	Soil Phase Symbol	Mapping Unit Description	Area in ha (%)
<b>Soils of Granite and Granite gneiss Landscape</b>					
		HSL	Hosalli soils are moderately deep (75-100 cm), moderately well drained, have yellowish brown to dark yellowish brown, slightly calcareous sandy clay soils occurring on very gently sloping uplands under cultivation		<b>71 (1.4)</b>
111			HSLbB2	Loamy sand surface, slope 1-3%, moderate erosion	3 (0.08)
176			HSLcB2g2	Sandy loam surface, slope 1-3%, moderate erosion, very gravelly (35-60%)	68 (1.47)
		KBD	Kalabelagundi soils are moderately deep (75-100 cm), well drained, have reddish brown to dark reddish brown and dark reddish gray, gravelly sandy clay loam soils occurring on very gently sloping uplands under cultivation		<b>13 (0.28)</b>
39			KBDbB3	Loamy sand surface, slope 1-3%, severe erosion	13 (0.28)
		PGP	Poglapur soils are moderately deep (75-100 cm), well drained, have dark brown, dark reddish brown to yellowish red sandy clay soils occurring on very gently sloping uplands under cultivation		<b>101 (2.1)</b>
40			PGPcB2	Sandy loam surface, slope 1-3%, moderate erosion	79 (1.72)
41			PGPiB2	Sandy clay surface, slope 1-3%, moderate erosion	22 (0.47)
		HLG	Halagera soils are moderately shallow (50-75 cm), well drained, have very dark grayish brown to dark yellowish brown, calcareous sandy clay loam soils occurring on very gently sloping uplands under cultivation		<b>188 (4.0)</b>
15			HLGbB3	Loamy sand surface, slope 1-3%, severe erosion	42 (0.91)
16			HLGcB2	Sandy loam surface, slope 1-3%, moderate erosion	49 (1.06)
17			HLGiB2	Sandy clay surface, slope 1-3%, moderate erosion	94 (2.03)
18			HLGiB2g1	Sandy clay surface, slope 1-3%, moderate erosion, gravelly (15-35%)	3 (0.07)
		JNK	Jinkera soils are moderately shallow (50-75 cm), well drained, have dark brown to very dark grayish brown, slightly calcareous sandy clay loam soils occurring on very gently sloping uplands under cultivation		<b>209 (4.36)</b>
20			JNKcB2	Sandy loam surface, slope 1-3%, moderate erosion	200 (4.35)
22			JNKiB2	Sandy clay surface, slope 1-3%, moderate erosion	9 (0.19)
		SBR	Sambara soils are moderately shallow (50-75 cm), somewhat excessively drained, have light gray to pink, loamy sand soils occurring on very gently to gently sloping uplands under cultivation		<b>3 (0.07)</b>
125			SBRhB2	Sandy clay loam surface, slope 1-3%, moderate erosion	3 (0.07)
		BDL	Badiyala soils are shallow (25-50 cm), well drained, have dark brown to very dark brown and dark yellowish brown, slightly calcareous sandy loam soils occurring on very gently to gently sloping uplands under cultivation		<b>208 (4.4)</b>
2			BDLbB2	Loamy sand surface, slope 1-3%, moderate erosion	17 (0.36)
5			BDLiB2	Sandy clay surface, slope 1-3%, moderate erosion	191 (4.15)

To be continued....



Soil map unit No*	Soil Series	Soil Phase Symbol	Mapping Unit Description	Area in ha (%)
<b>Soils of Granite and Granite gneiss Landscape</b>				
	DSB	Dastharabad soils are shallow (25-50 cm), well drained, have dark brown to very dark brown, gravelly clay soils occurring on very gently to gently sloping uplands under cultivation		<b>147 (3.2)</b>
108		DSBiB2	Sandy clay surface, slope 1-3%, moderate erosion	147 (3.2)
	HTK	Hattikuni soils are shallow (25-50 cm), well drained, have dark yellowish brown sandy loam soils occurring on very gently sloping uplands under cultivation		<b>46 (0.99)</b>
161		HTKbB2g1	Loamy sand surface, slope 1-3%, moderate erosion, gravelly (15-35%)	46 (0.99)
	VNK	Vanakanahalli soils are shallow (25-50 cm), well drained, have dark reddish brown, sandy clay red soils occurring on very gently to moderately sloping uplands under cultivation		<b>1 (0.02)</b>
9		VNKcB2	Sandy loam surface, slope 1-3%, moderate erosion	1 (0.02)
	BDP	Baddeppalli soils are very shallow (<25 cm), well drained, have dark brown to dark reddish brown, calcareous sandy clay loam soils occurring on very gently sloping uplands under cultivation		<b>1 (0.02)</b>
120		BDPhB2	Sandy clay loam surface, slope 1-3%, moderate erosion	1 (0.02)
	YLR	Yalleri soils are moderately shallow (50-75 cm), well drained, have brown to reddish brown and dark reddish brown, clay red soils occurring on very gently to gently sloping uplands under cultivation		<b>0 (0.01)</b>
29		YLRcB2g1	Sandy loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)	0 (0.01)
	VKS	Vankasambar soils are deep (100-150 cm), well drained, very dark brown to brown, sodic calcareous sandy clay loam soils occurring on very gently to gently sloping lowlands under cultivation		<b>137 (2.97)</b>
100		VKSmB1	Clay surface, slope 1-3%, slight eroison	137 (2.97)
	KDH	Kadechoor soils are moderately deep (75-100 cm), moderately well drained, have very dark grayish brown to dark brown, slightly calcareous sandy clay soils occurring on very gently to gently sloping lowlands under cultivation		<b>173 (3.75)</b>
116		KDHiB2	Sandy clay surface, slope 1-3%, moderate erosion	173 (3.75)
<b>Soils of Alluvial Landscape</b>				
	HGN	Hegganakera soils are very deep (>150 cm), moderately well drained, have very dark gray to dark grayish brown, slightly calcareous cracking clay soils occurring on very gently sloping plains under cultivation		<b>961 (21)</b>
92		HGNcB2	Sandy loam surface, slope 1-3%, moderate erosion	30 (0.65)
95		HGNmB2	Clay surface, slope 1-3%, moderate erosion	931 (20.2)
	KDR	Kudlura soils are deep (100-150 cm), moderately well drained, have very dark gray to grayish brown, calcareous cracking clay soils occurring on nearly level to very gently sloping plains under cultivation		<b>134 (3.0)</b>
84		KDRcB2	Sandy loam surface, slope 1-3%, moderate erosion	12 (0.26)
87		KDRiB2	Sandy clay surface, slope 1-3%, moderate erosion	120 (2.6)
89		KDRmB2	Clay surface, slope 1-3%, moderate erosion	2 (0.04)

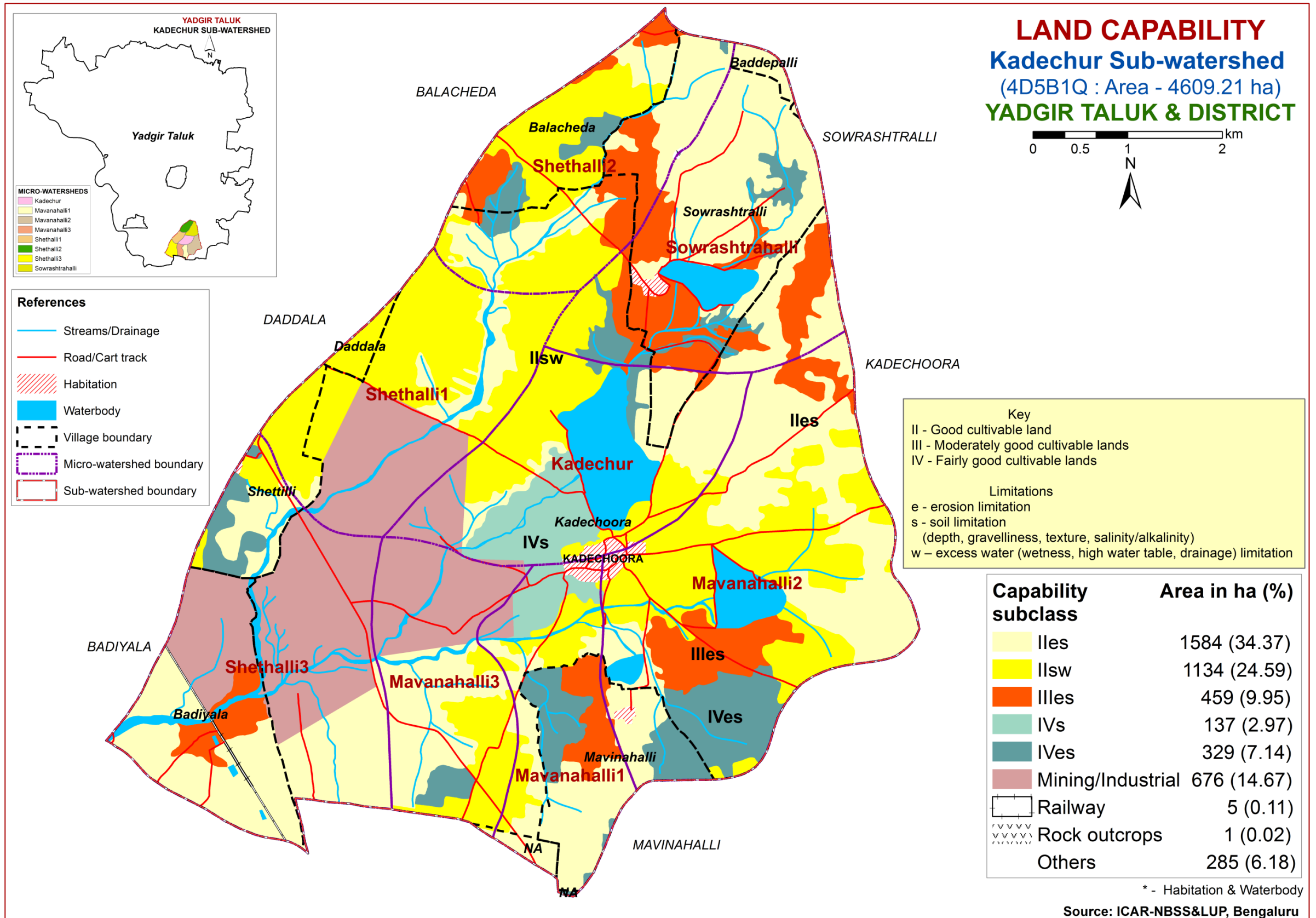
To be continued....

Soil map unit No*	Soil Series	Soil Phase Symbol		Mapping Unit Description	Area in ha (%)
<b>Soils of Alluvial Landscape</b>					
	SWR	Sowrashtahalli soils are deep (100-150 cm), moderately well drained, have very dark gray to dark gray, calcareous cracking clay soils occurring on very gently sloping plains under cultivation			<b>437 (9.4)</b>
90		SWRcB2	Sandy loam surface, slope 1-3%, moderate erosion		20 (0.44)
91		SWRmB2	Clay surface, slope 1-3%, moderate erosion		417 (9.05)
	MGL	Mungala soils are moderately deep (75-100 cm), moderately well drained, very dark gray to dark gray, slightly calcareous cracking clay soils occurring on very gently sloping plains under cultivation			<b>229 (4.97)</b>
82		MGLmB2	Clay surface, slope 1-3%, moderate erosion		229 (4.97)
	RHN	Rachanalli soils are moderately deep (75-100 cm), well drained, have very dark grayish brown to dark brown, slightly calcareous sodic sandy clay loam soils occurring on very gently sloping plains under cultivation.			<b>165 (3.57)</b>
79		RHNmB2	Clay surface, slope 1-3%, moderate erosion		165 (3.57)
	RMP	Rampur soils are moderately shallow (50-75 cm), well drained, have very dark to yellowish brown, sandy clay loam soils occurring on very gently sloping plains under cultivation			<b>31 (0.67)</b>
70		RMPcB2	Sandy loam surface, slope 1-3%, moderate erosion		31 (0.67)
992		Railway	Railway line		5 (0.11)
994		Mining/Industrial	Mining/Industrial area		676 (14.67)
999		Rock outcrops	Rock lands, both massive and bouldery with little or no soil		1 (0.02)
1000		Others	Habitation and Waterbody		285 (6.18)

\* Soil map unit numbers are continuous for the taluk, not for the sub-watershed

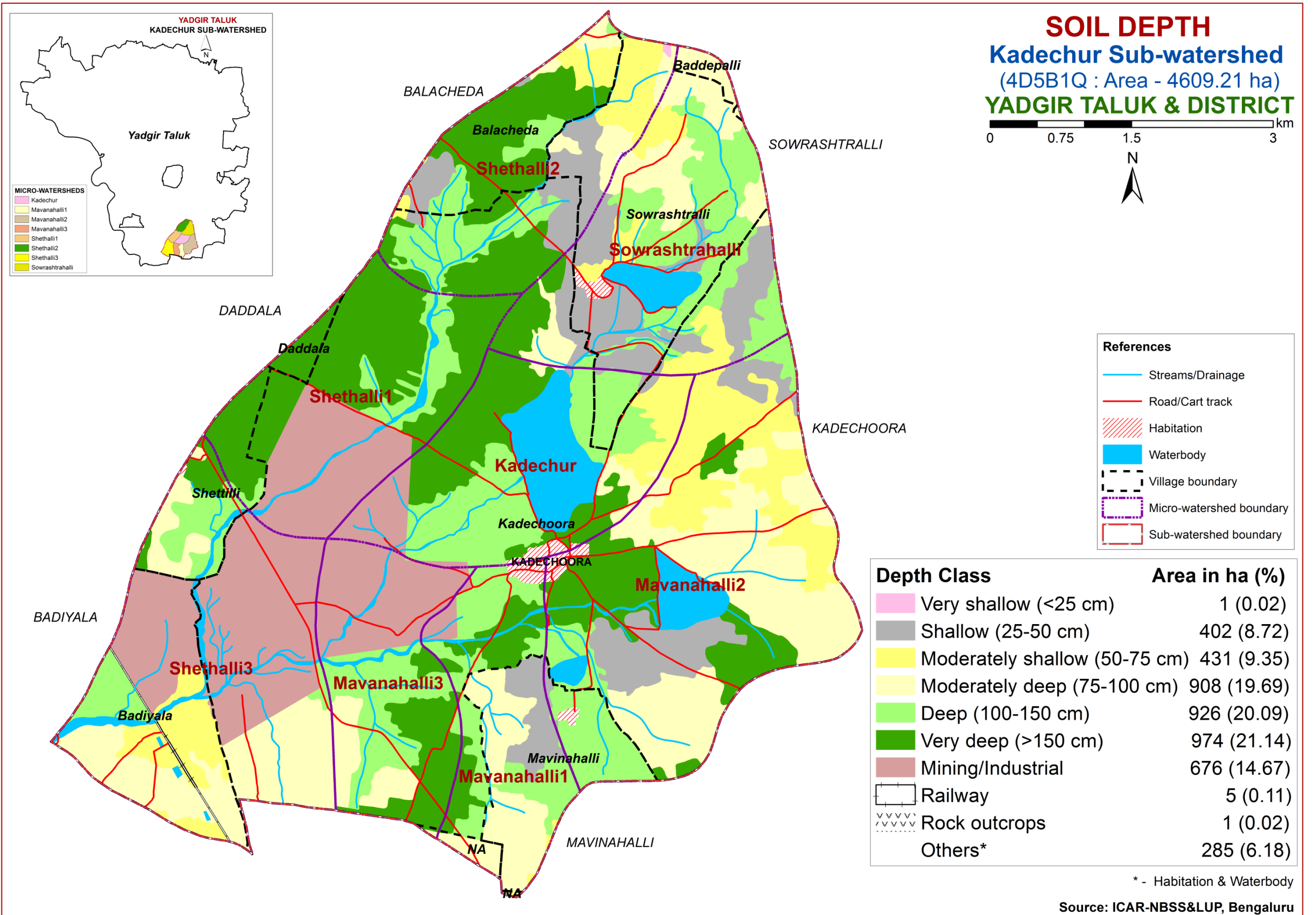
# 5. Soil Survey Interpretations

## 5.1. Land Capability Classification

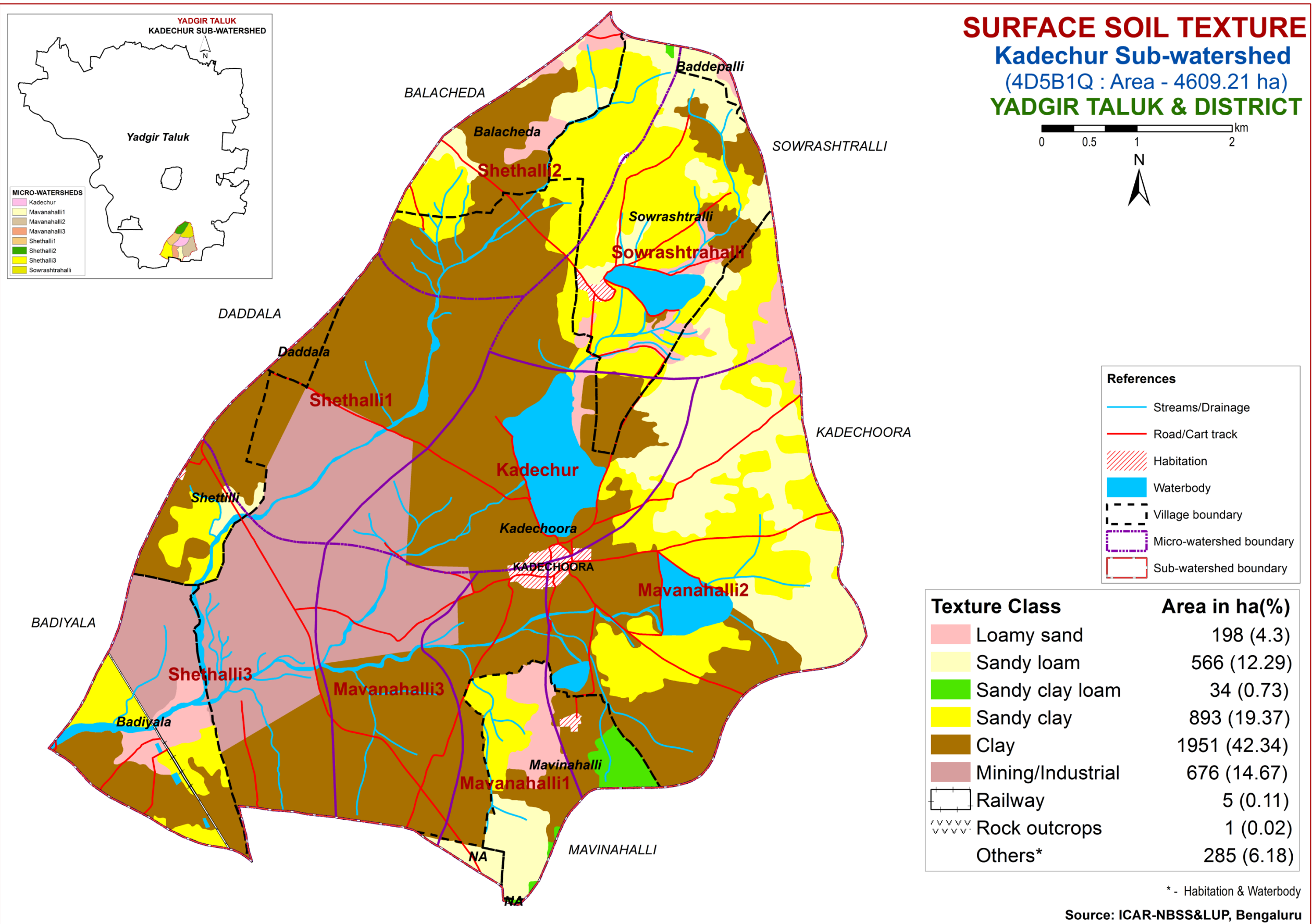




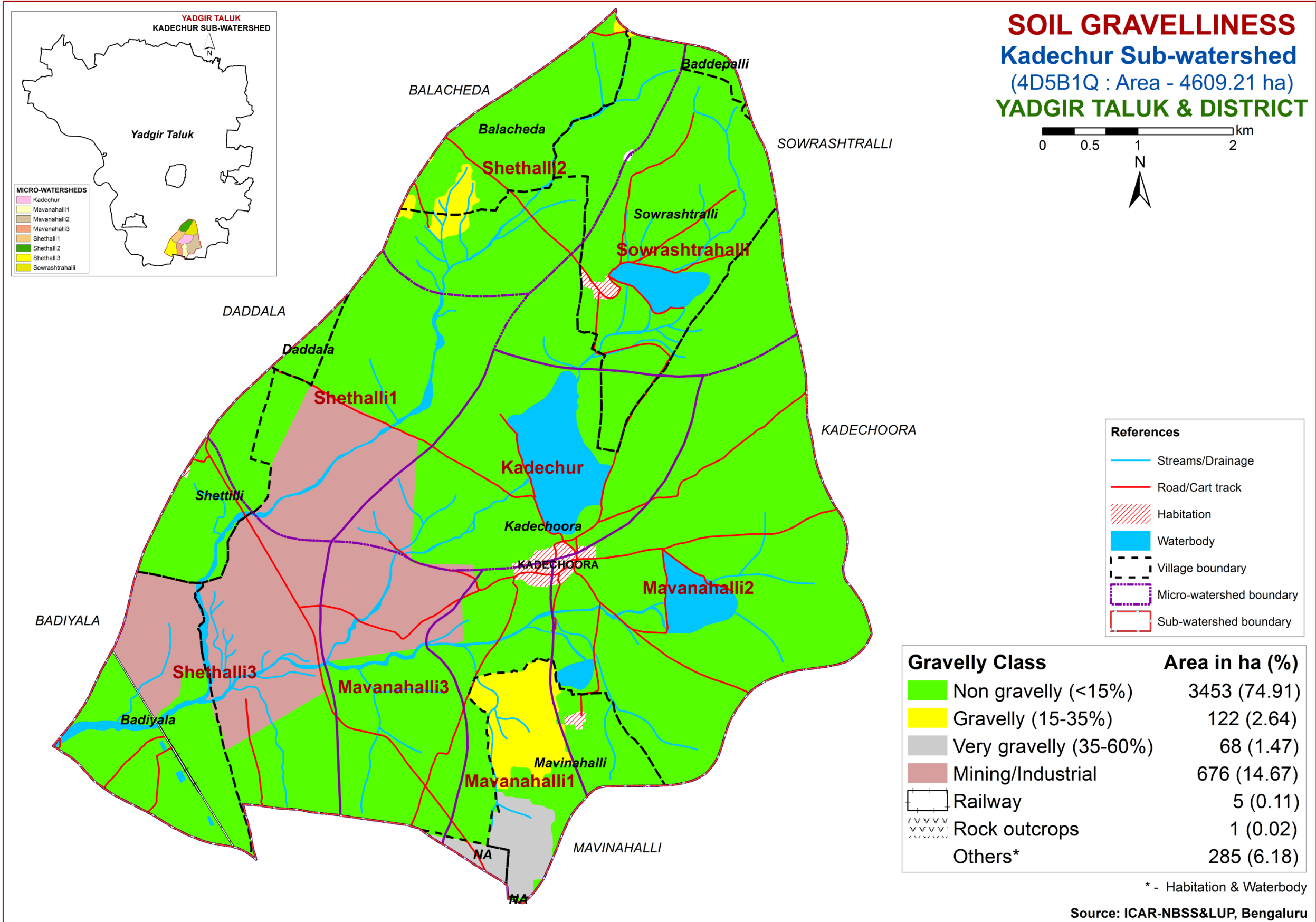
## 5.2. Soil Depth



### 5.3. Surface Soil Texture



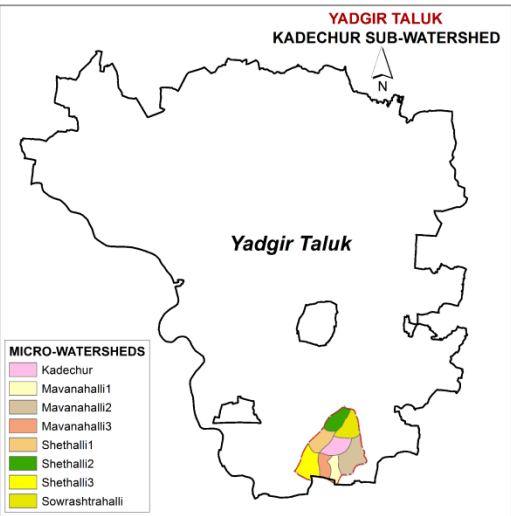
# 5.4. Surface Soil Gravelliness



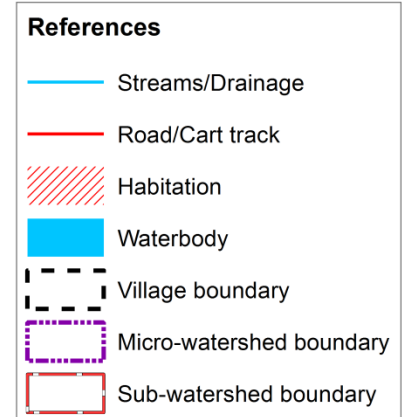
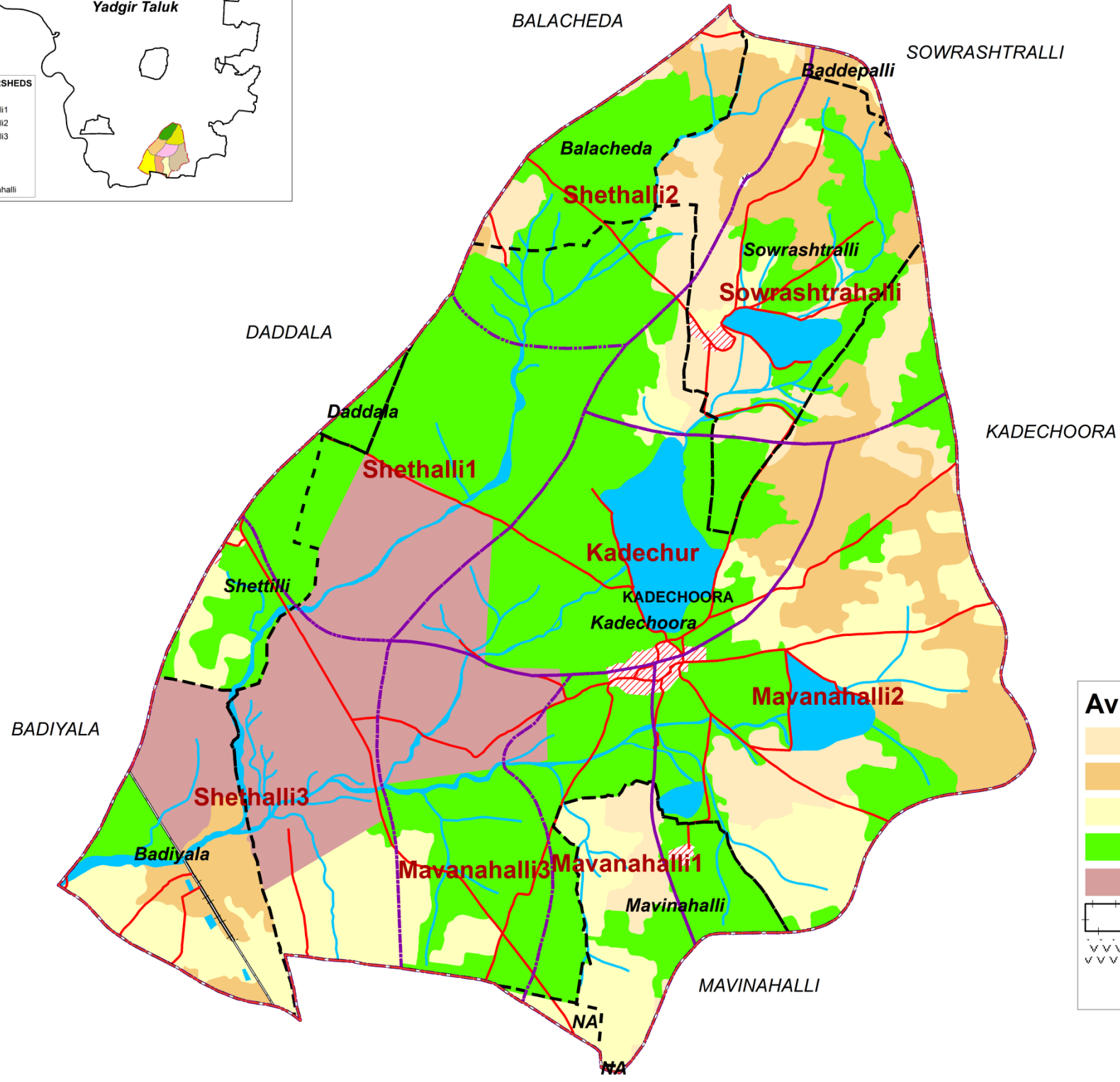
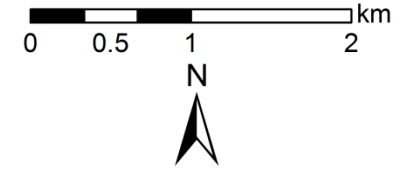
Source: ICAR-NBSS&LUP, Bengaluru



# 5.5. Available Water Capacity



## AVAILABLE WATER CAPACITY Kadechur Sub-watershed (4D5B1Q : Area - 4609.21 ha) YADGIR TALUK & DISTRICT

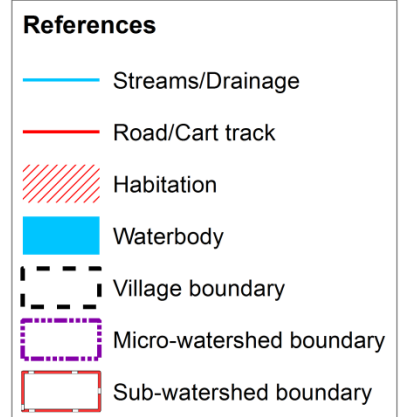
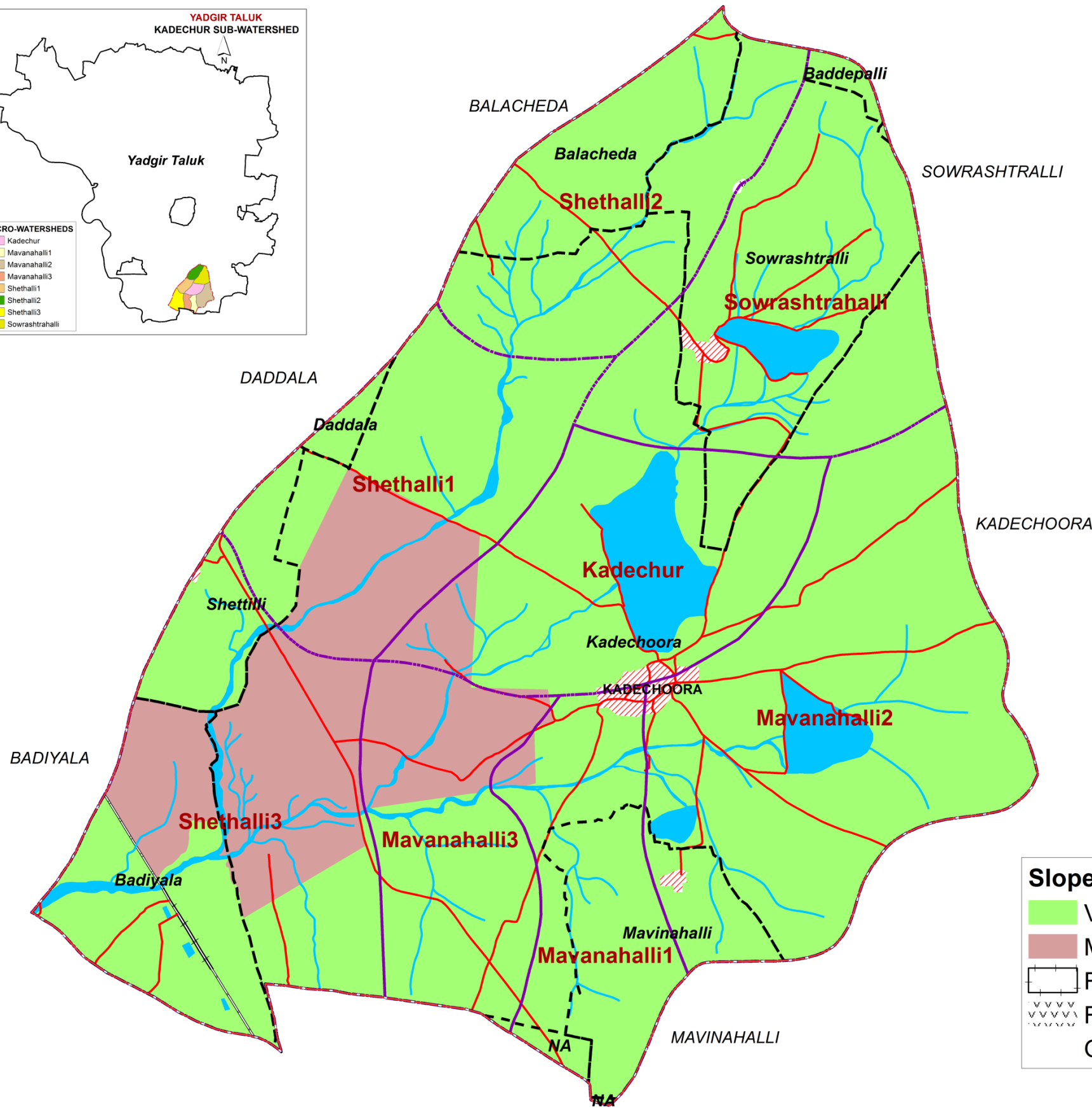
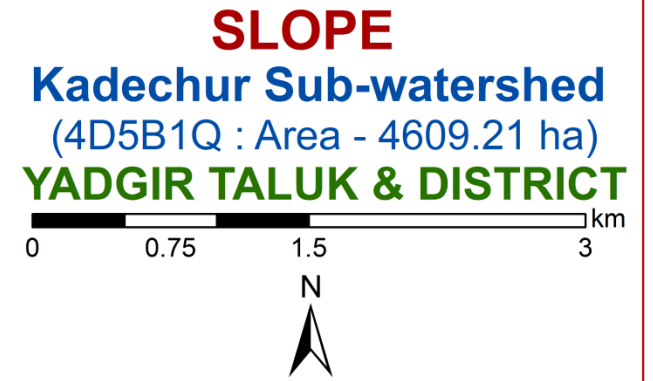
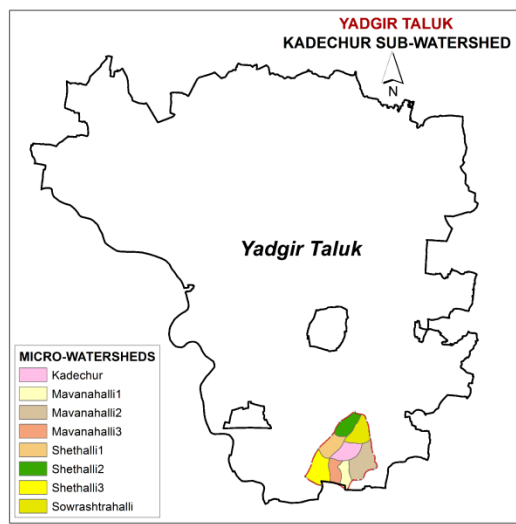


Available Water Capacity	Area in ha (%)
Very low (<50 mm/m)	419 (9.08)
Low (51-100 mm/m)	607 (13.18)
Medium (101-150 mm/m)	718 (15.57)
Very high (>200 mm/m)	1899 (41.19)
Mining/Industrial	676 (14.67)
Railway	5 (0.11)
Rock outcrops	1 (0.02)
Others*	285 (6.18)

\* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

# 5.6.Slope

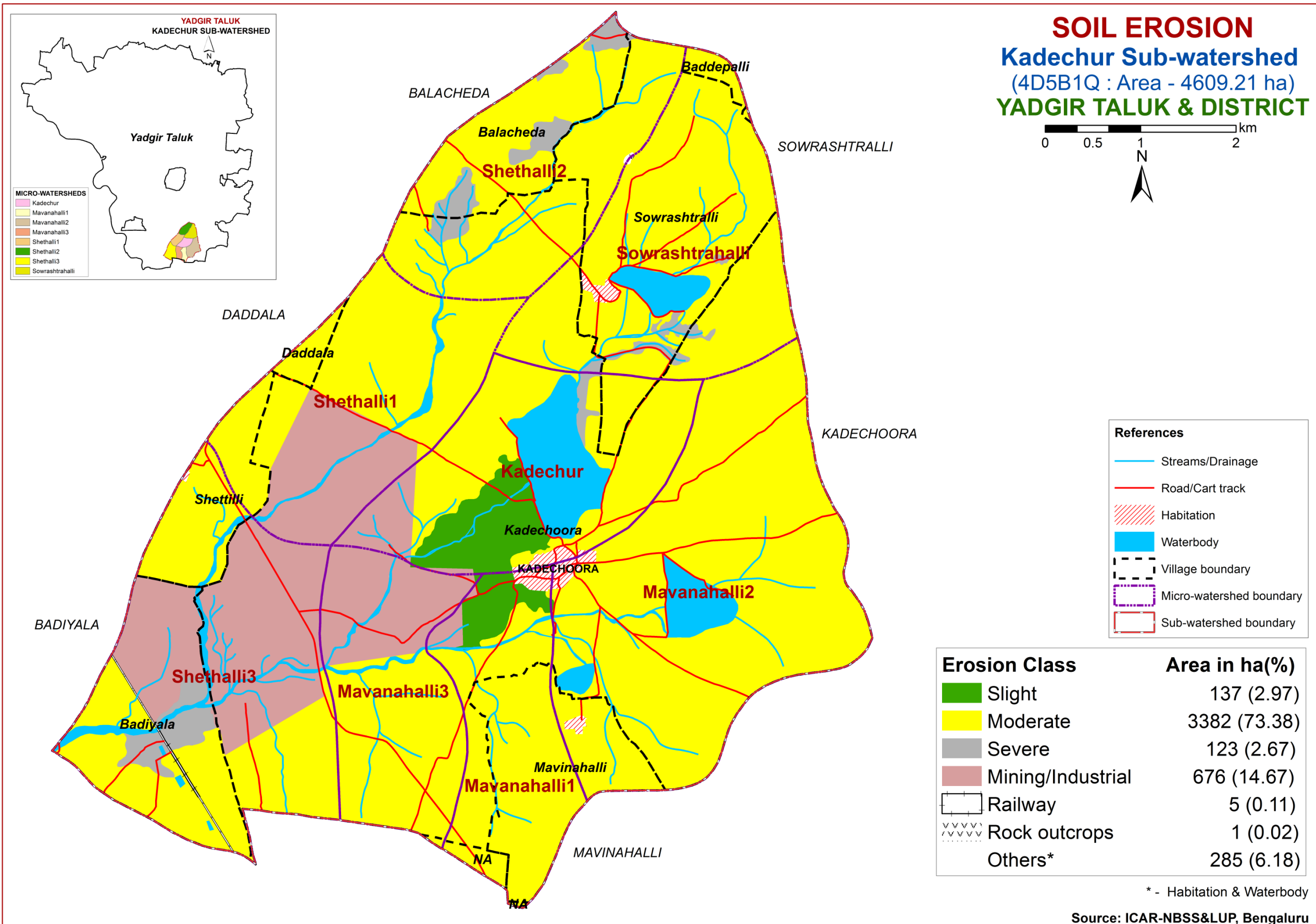


Slope Class	Area in ha (%)
Very gently sloping (1-3%)	3642 (79.02)
Mining/Industrial	676 (14.67)
Railway	5 (0.11)
Rock outcrops	1 (0.02)
Others*	285 (6.18)

\* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

# 5.7. Soil Erosion





# 6. Soil Fertility Status

## 6.1. Soil Reaction (pH)

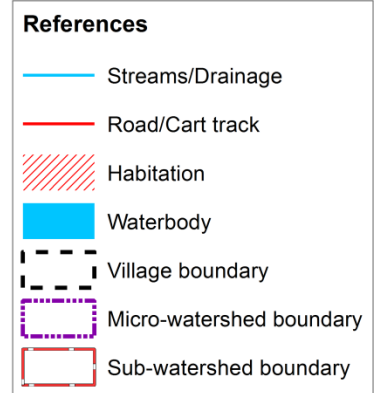
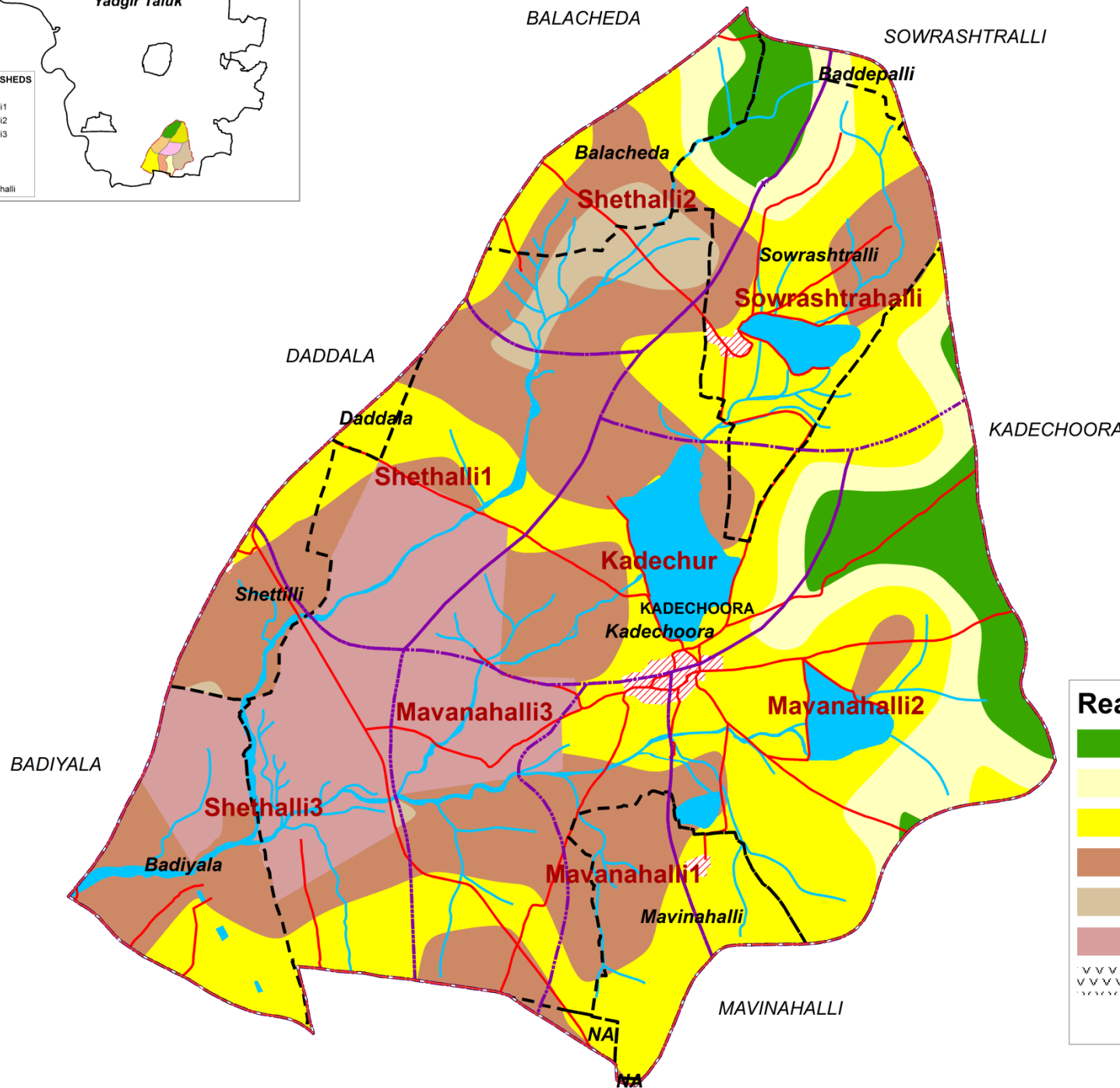
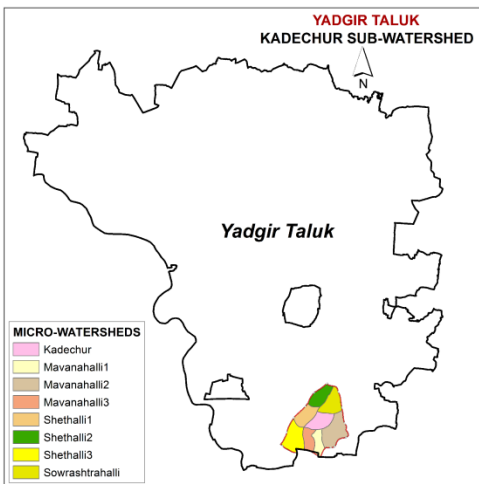
### SOIL REACTION (pH) (2018)

Kadachur Sub-watershed

(4D5B1Q : Area - 4609.21 ha)

YADGIR TALUK & DISTRICT

0 0.5 1 2 km

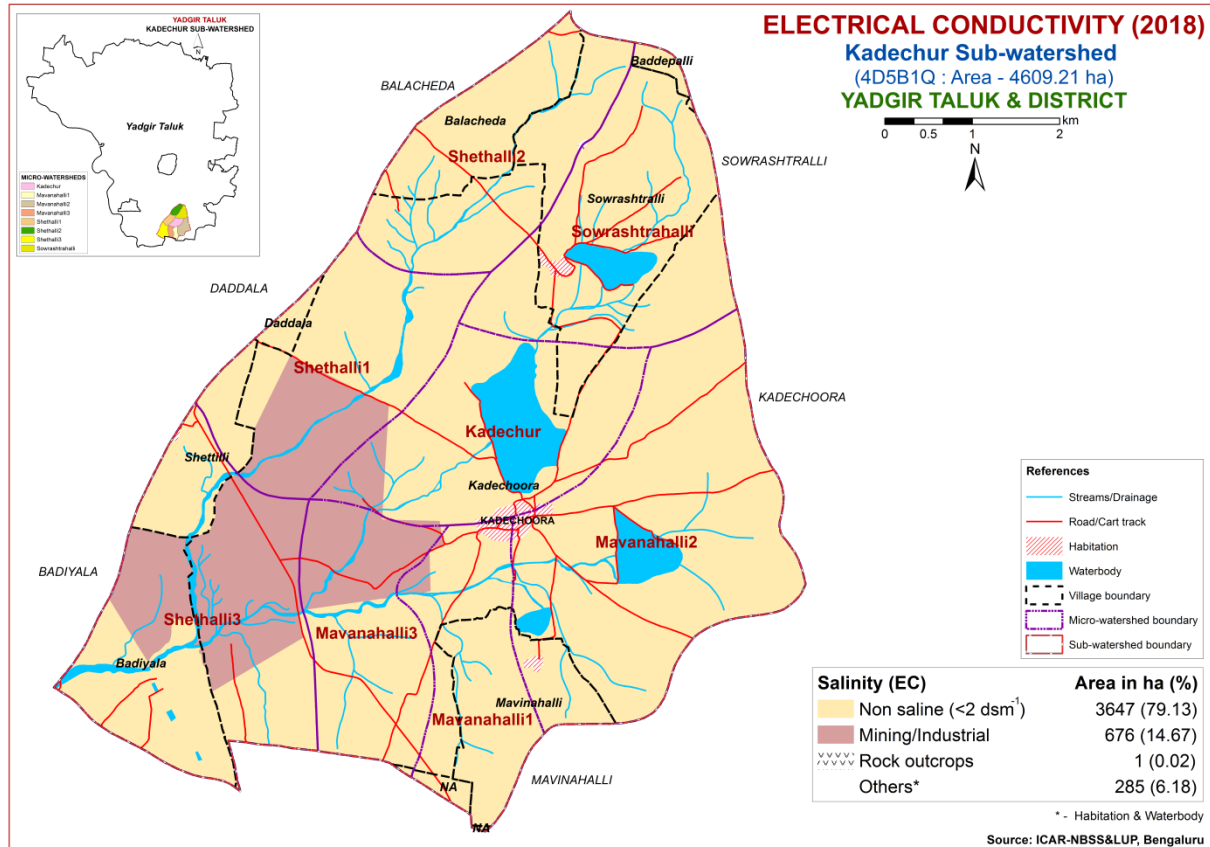


Reaction Class	Area in ha (%)
Neutral (pH 6.5 – 7.3)	274 (5.96)
Slightly alkaline (pH 7.3 – 7.8)	384 (8.34)
Moderately alkaline (pH 7.8 – 8.4)	1532 (33.24)
Strongly alkaline (pH 8.4 – 9.0)	1330 (28.87)
Very strongly alkaline (pH > 9.0)	126 (2.73)
Mining/Industrial	676 (14.67)
Rock outcrops	1 (0.02)
Others*	285 (6.18)

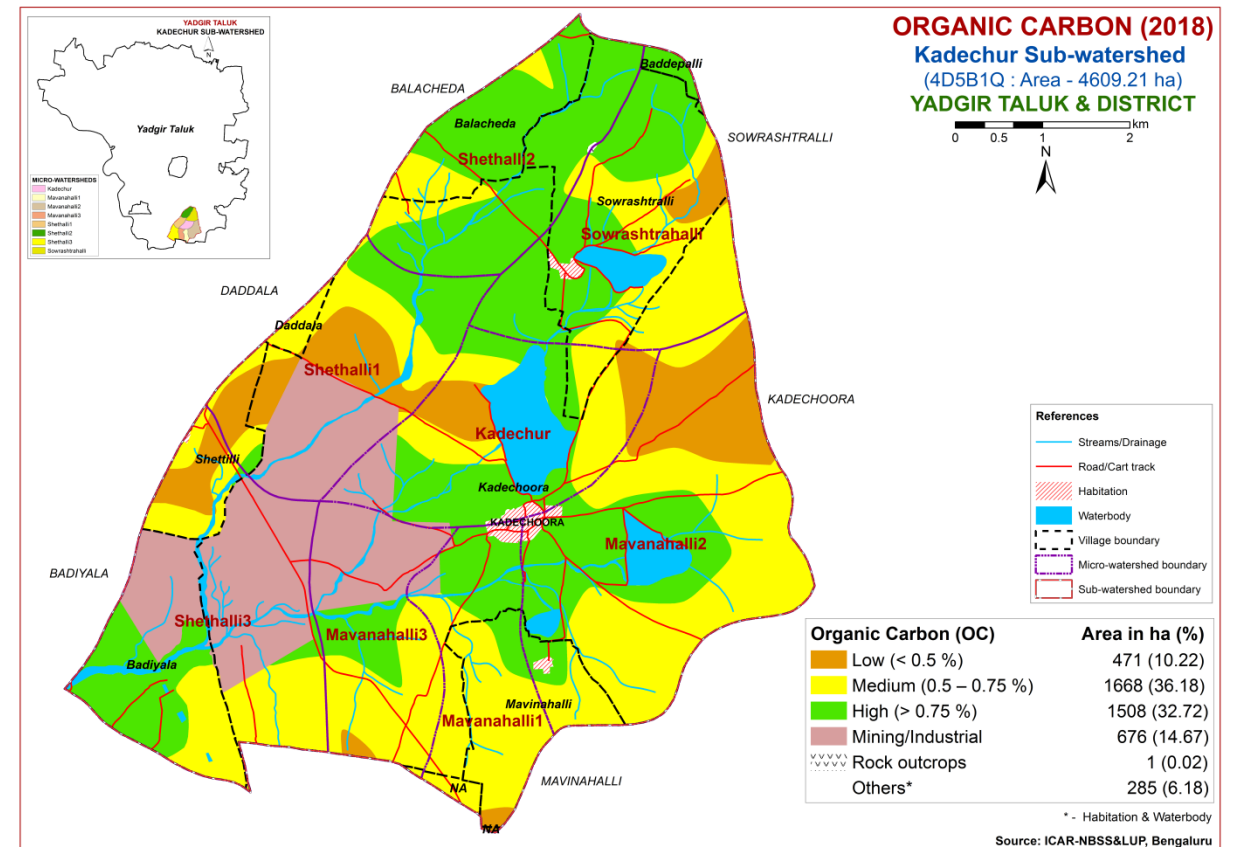
\* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

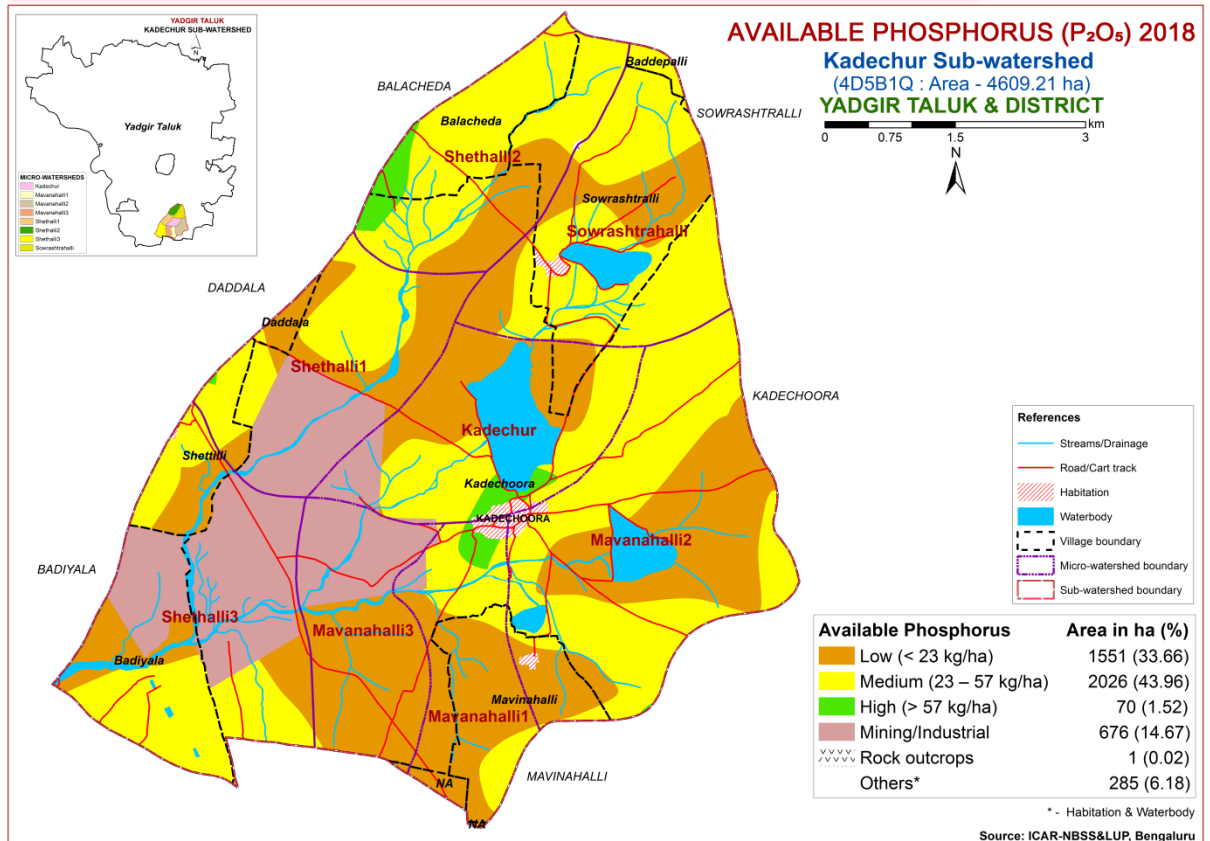
## 6.2. Electrical Conductivity (EC)



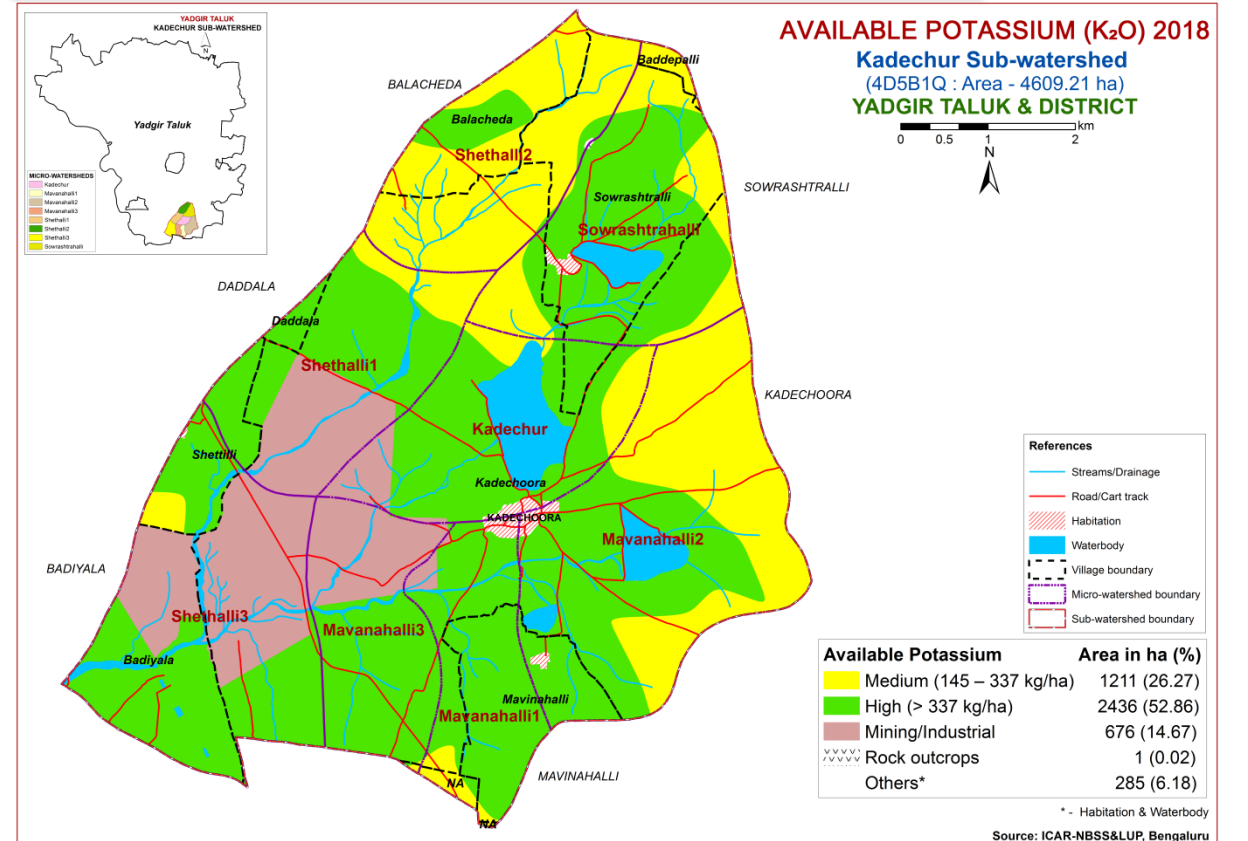
## 6.3. Organic Carbon



## 6.4. Available Phosphorus (P<sub>2</sub>O<sub>5</sub>)

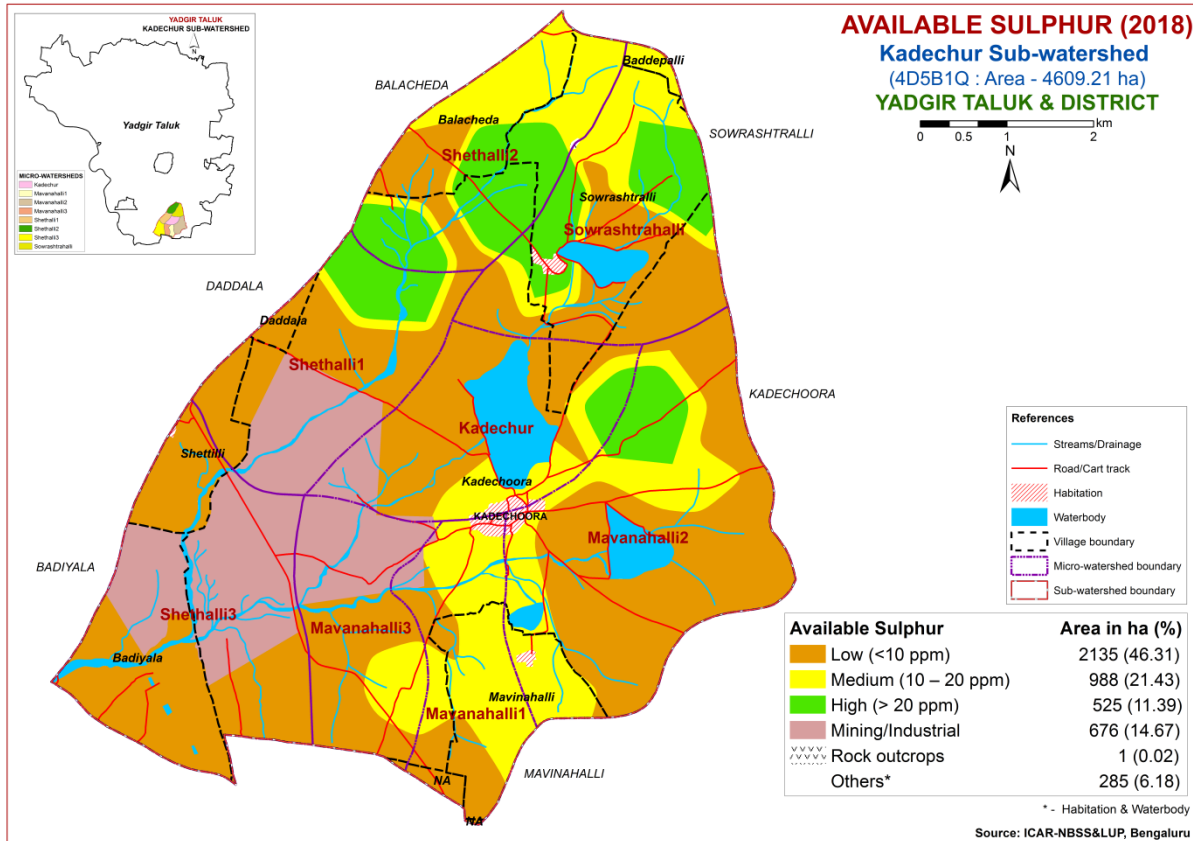


## 6.5. Available Potassium (K<sub>2</sub>O)

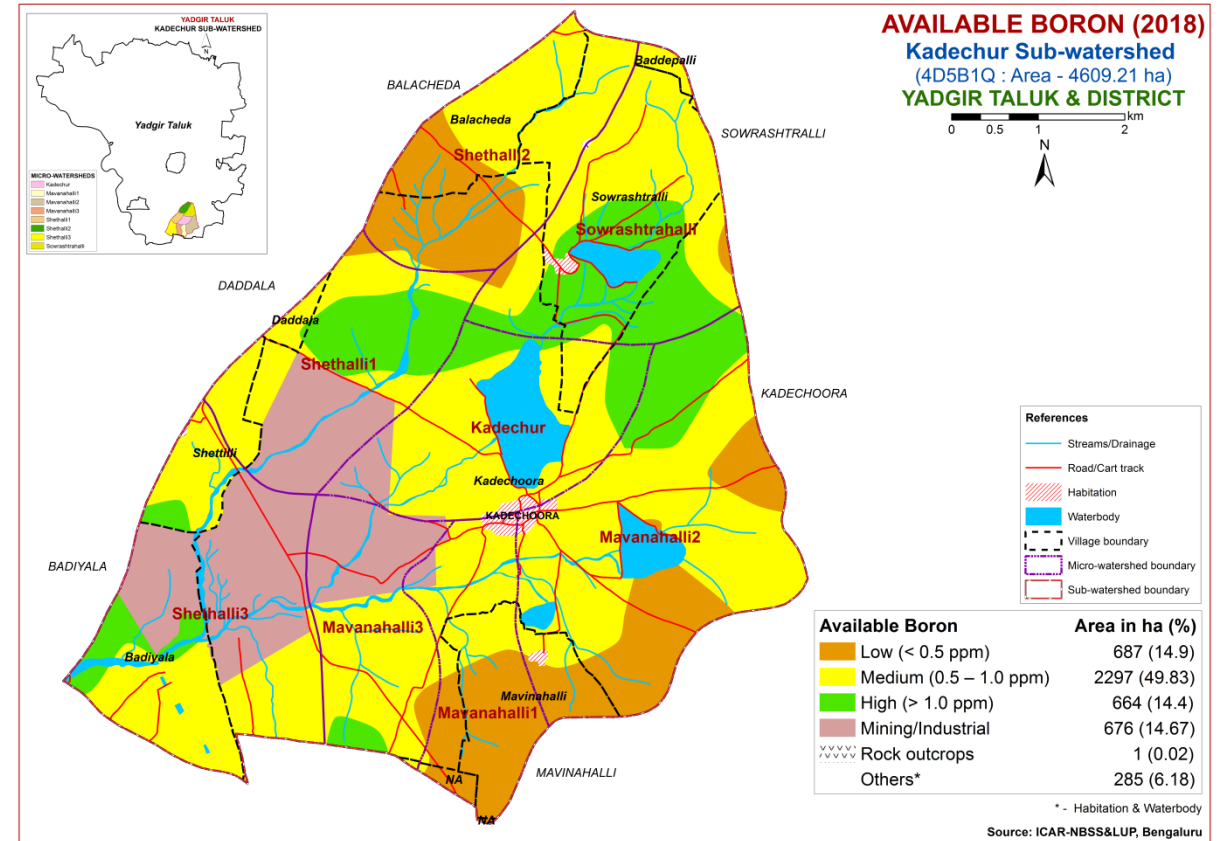




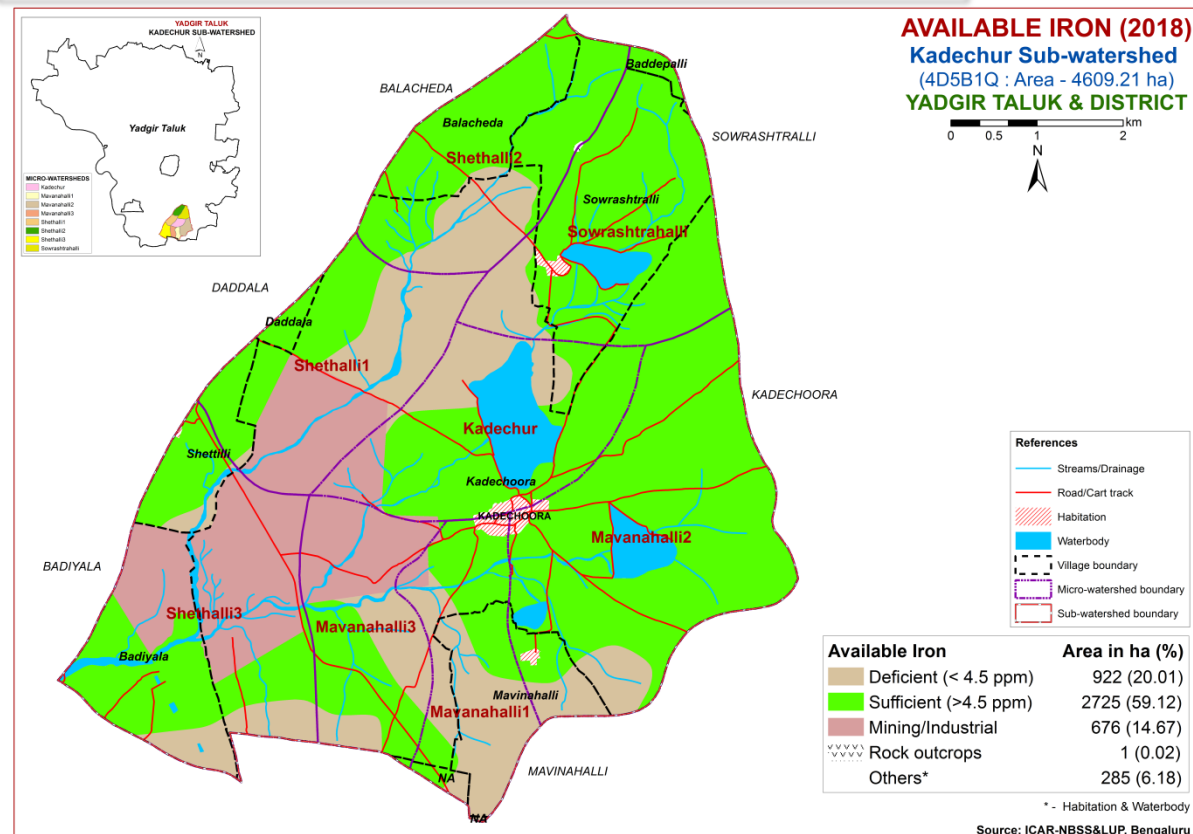
## 6.6. Available Sulphur



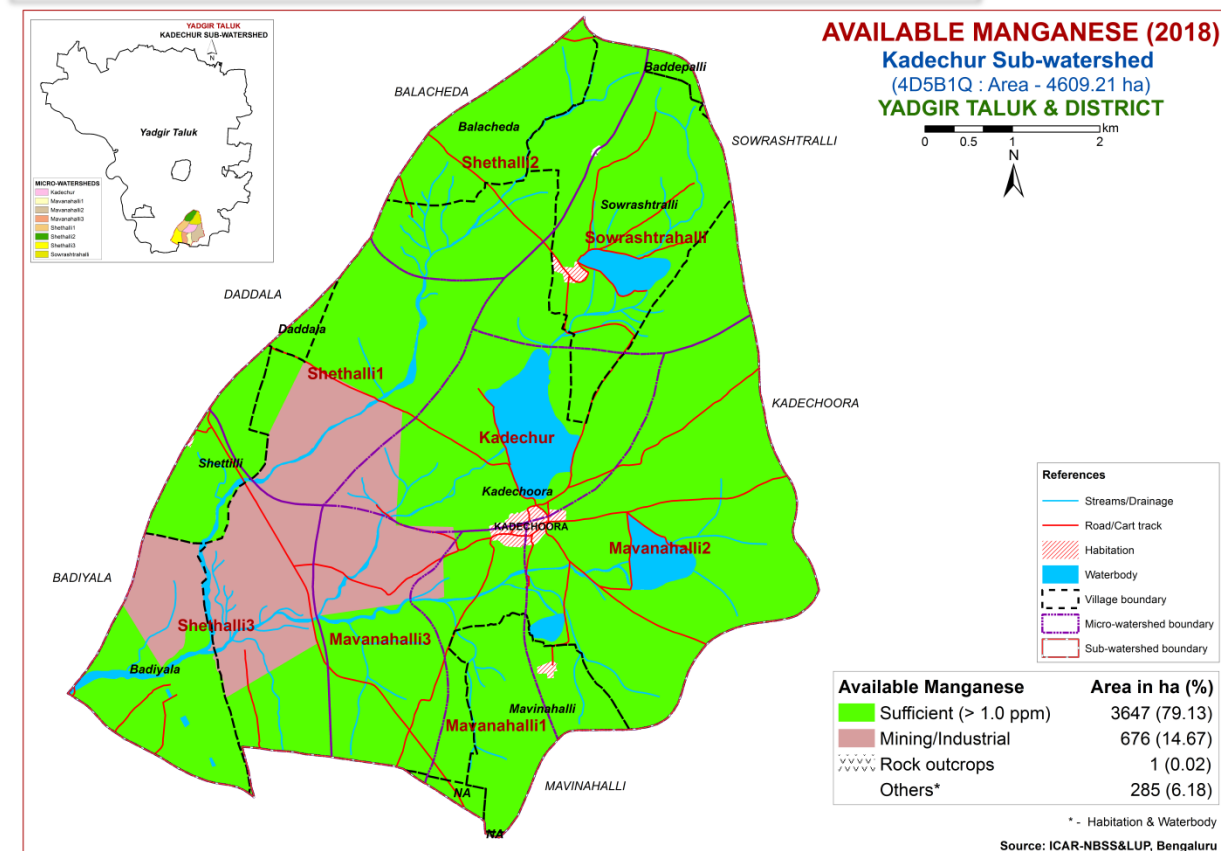
## 6.7. Available Boron



## 6.8. Available Iron

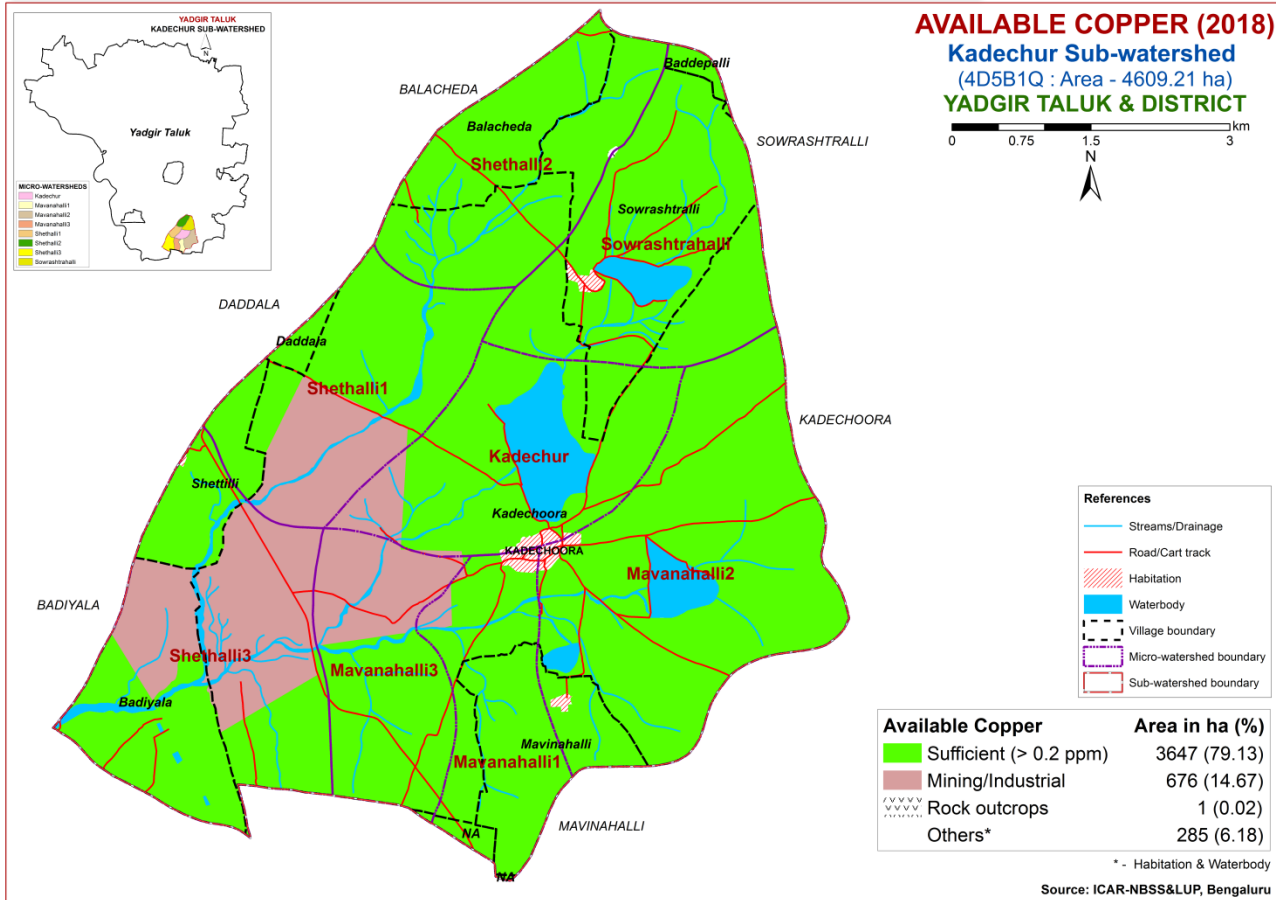


## 6.9. Available Manganese

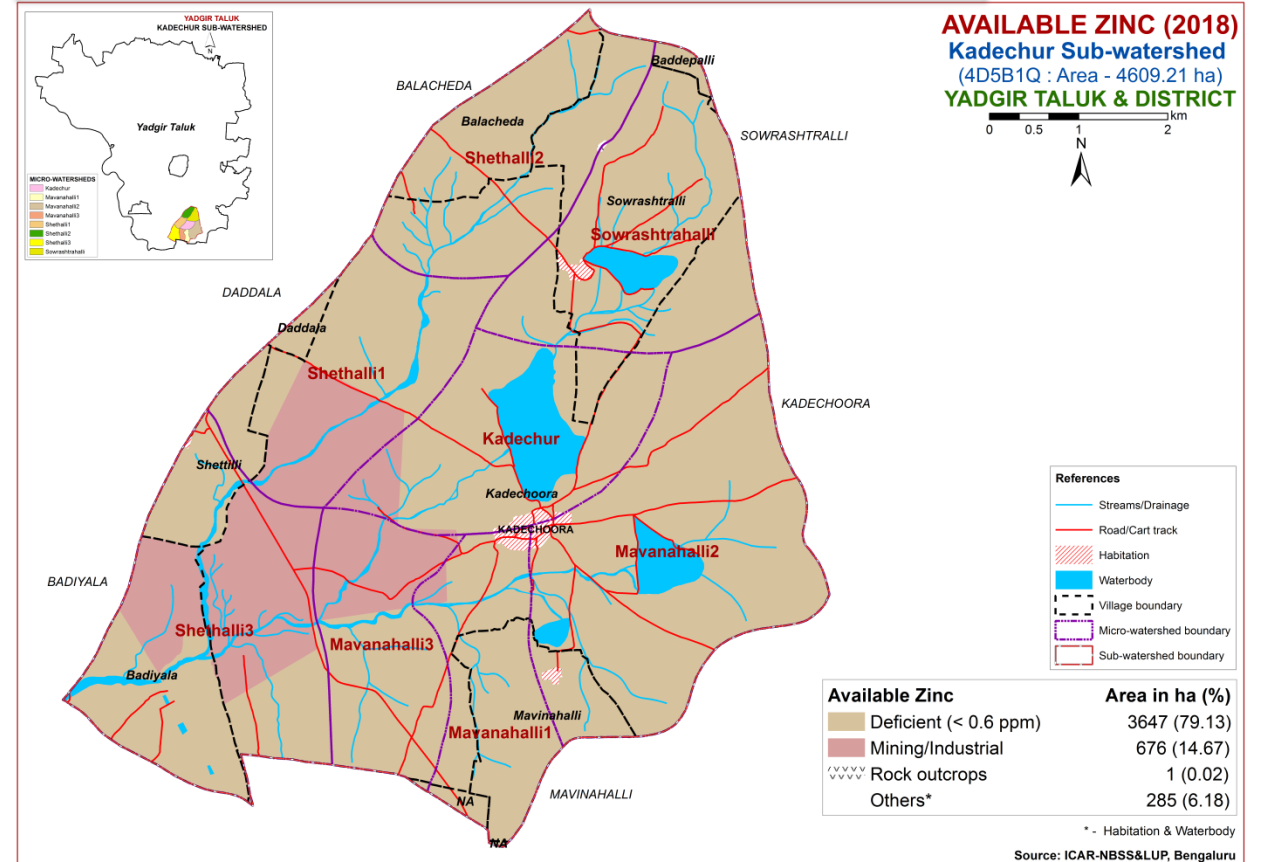




## 6.10. Available Copper



## 6.11. Available Zinc

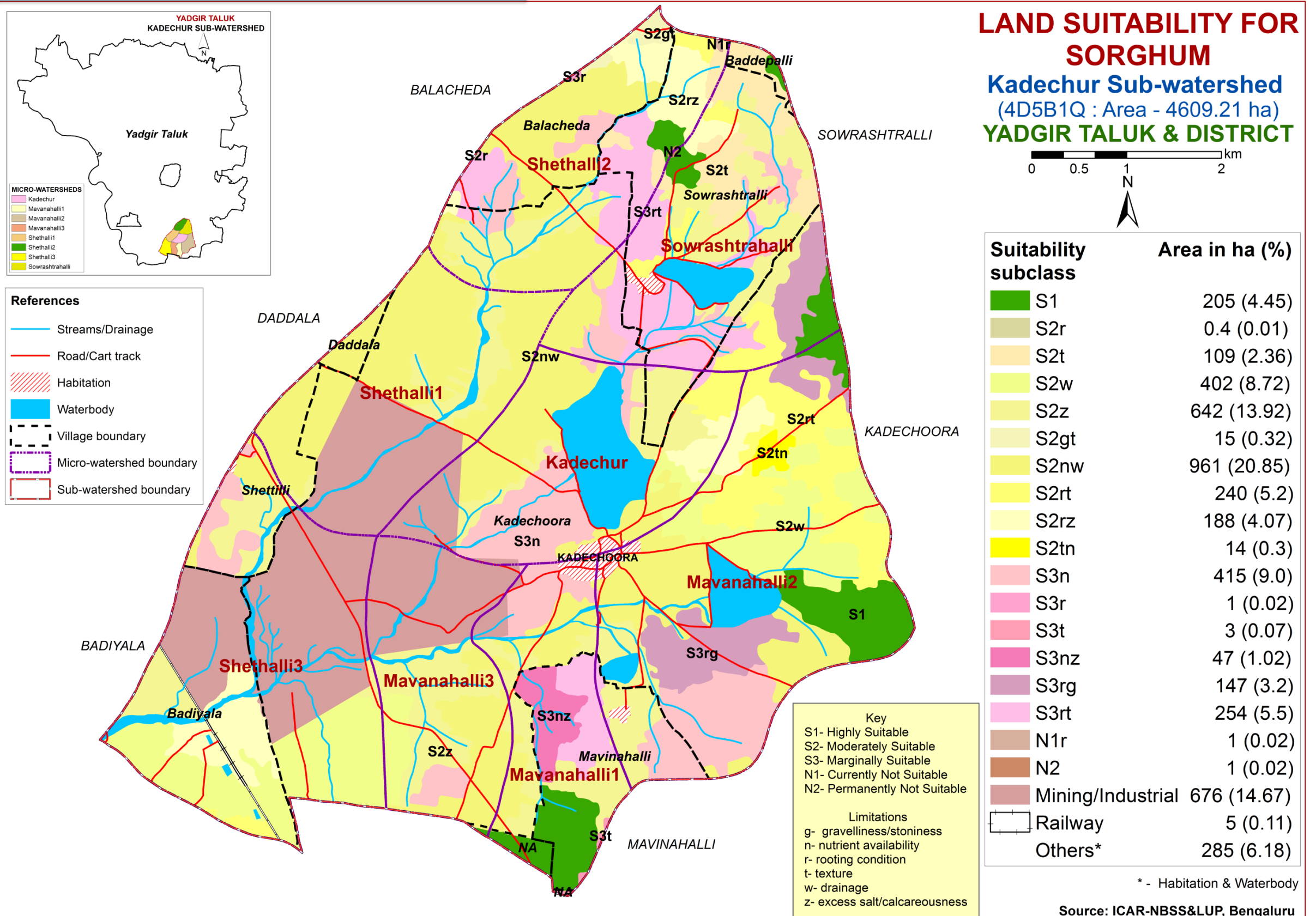


## 6.12. Correcting the Soil Nutrient Deficiencies

1. Reclamation of Salt affected soils
  - a) When the soil is having neutral pH (6.5-7.5), no need of adding amendments (lime or gypsum)
  - b) If the soil pH is <6.5, apply burnt lime to soil as per specifically recommended dosage and again after 2 years proper change has to be made based on soil test results.
  - c) If the soil pH is 7.5-8.5 due to excess calcium content, drain out the excess calcium from the soil with good quality irrigation water.
  - d) If the soil pH is more than 8.5 due to higher sodium content in soil, apply specifically recommended dose of gypsum & drain out the excess salts with good quality irrigation water.
2. In case of low & high content of major nutrients in the soil, follow the modifications as given below:
  - N: P: K (N: P<sub>2</sub>O<sub>5</sub>: K<sub>2</sub>O) **For low N content**, add 25 % extra to the Recommended Dose of Fertilisers (RDF).  
**For high N content**, reduce 25% from the RDF and apply to soil.  
Eg:- if 100kg N, then we have to apply
    - 100+25% for deficient soil.
    - 100% for medium available N content soil.
    - 100-25% for higher N content soil.
  - Follow the same in case of P & K.
3. Use or Incorporation of biofertilizers like Rhizobium, Azotobacter, Azospirillum, Phosphate Solubilizing Bacteria and mycorrhiza enhances normal available nutrients in soil to the plants and also reduce the input cost of cultivation.
4. For calcium deficient soil, apply N-fertilizers like calcium ammonium nitrate; Gypsum can also supply calcium (CaSO<sub>4</sub> · 2H<sub>2</sub>O)
5. Apply 405kg MgSO<sub>4</sub> per ha to the magnesium deficient soil. In case of perennial horticulture crops apply 150-200g/ plant.
6. In sulphur deficient acid soils (Humid region) apply phosphorus (in the form of) through SSP & use sulphur coated urea to the crops.
7. Apply 30-50kg ferrous sulfate (FeSO<sub>4</sub>) per ha to the iron deficient soils. In case of perennial Horticulture crops apply 3-5g/ litre FeSO<sub>4</sub>/plant as foliar spray.
8. Apply 30-40kg/ha – manganese sulfate (MnSO<sub>4</sub>) as soil application to the manganese deficient soils. In case of perennial Horticulture crops apply 3-5 g/litre MnSO<sub>4</sub> /plant as foilar application.
9. Apply Zinc – 10-25 kg/ha –ZnSO<sub>4</sub> – soil application to the Zinc deficient soils. In case of perennial Horticulture crops apply 3-5g/ litre – foliar application.
10. Apply Copper – 5-10 kg /ha – copper sulfate (CuSO<sub>4</sub>) soil application for the copper deficient soils and for Perennial horticultural crops 3-5g/ litre – CuSO<sub>4</sub>/plant as foliar application.
11. Apply borax 8-10 kg/ha in boron deficient soils and for Perennial horticultural crops as foliar application – 1g / litre.
12. Apply molybdenum – ammonium molybdate 200-250 gm/ha for Molybdenum deficient soils or dissolve 1g / litre ammonium molybdate for Foliar spray.
13. Soil sampling and testing needs to be done at every 2-3 years interval.

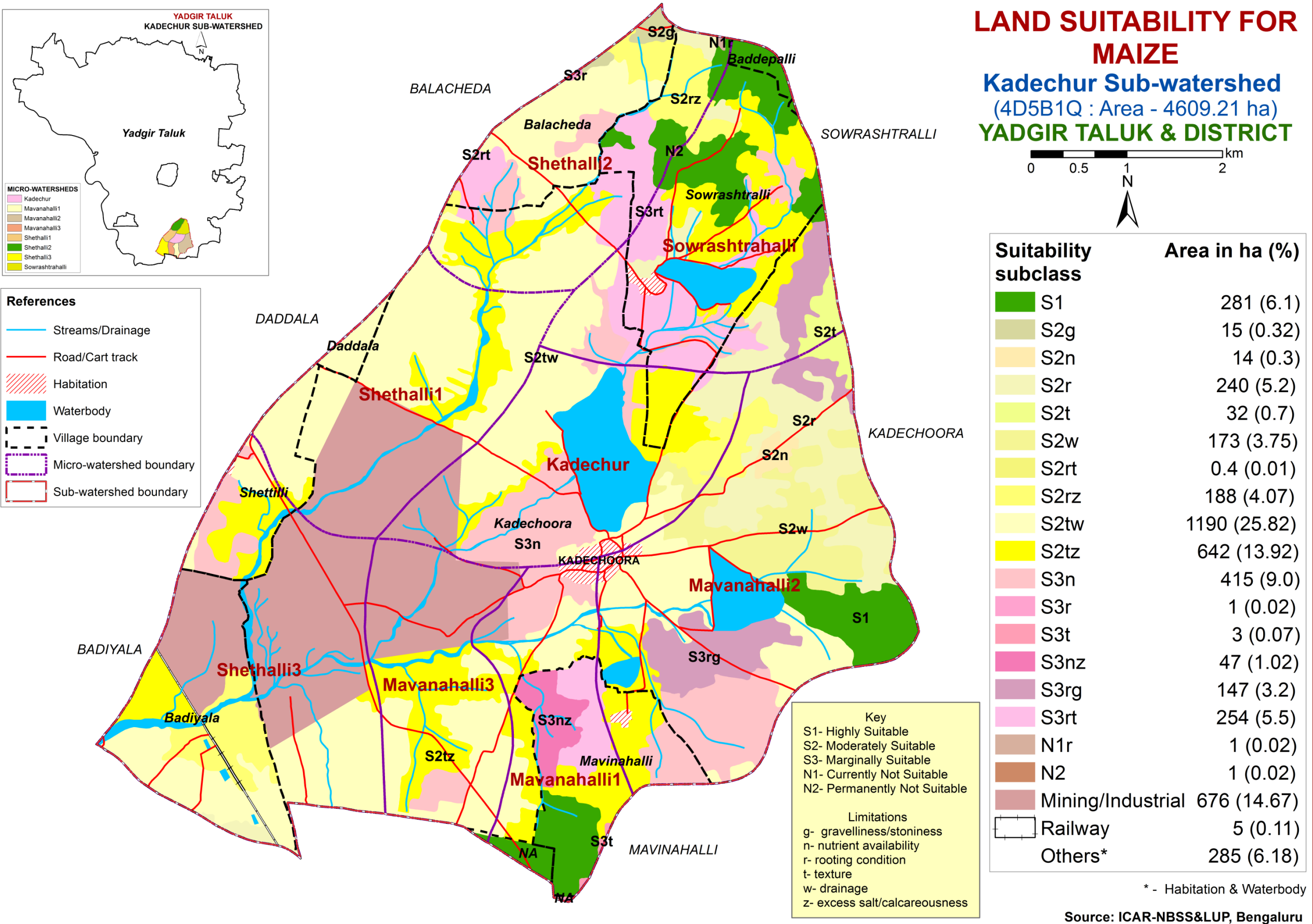
# 7. Land Suitability for Major Crops

## 7.1. Land Suitability for Sorghum

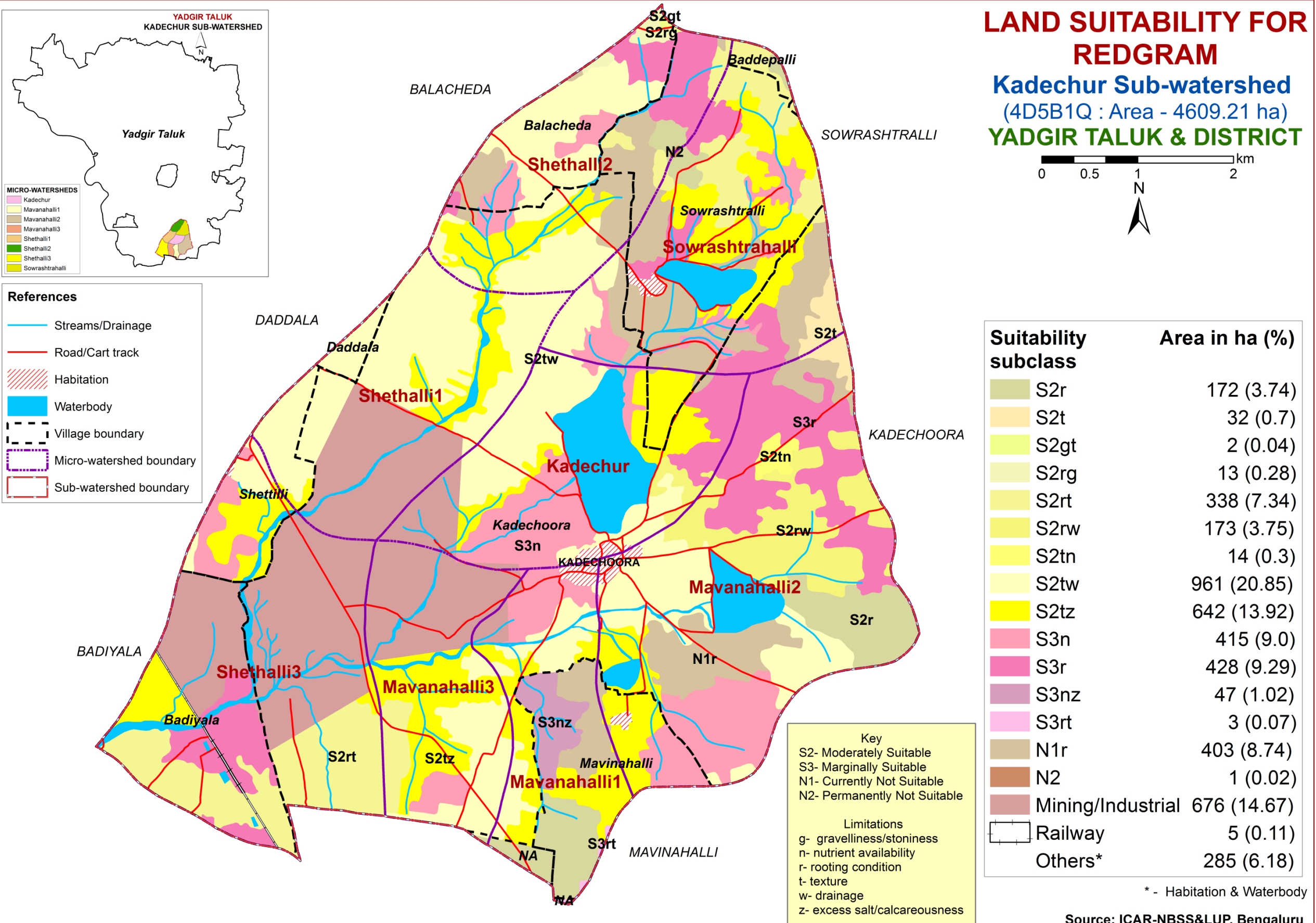




# 7.2. Land Suitability for Maize

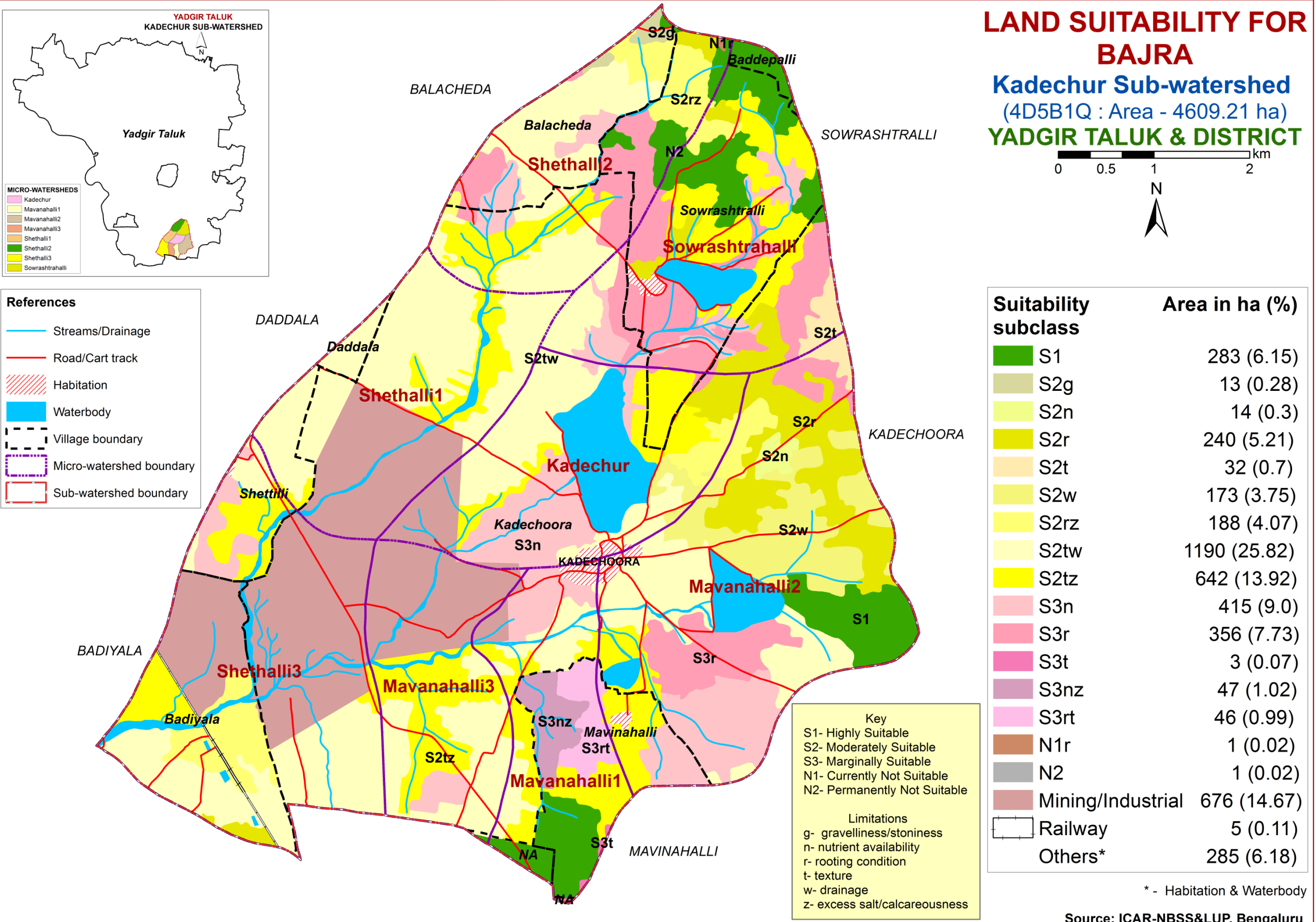


# 7.3. Land Suitability for Redgram



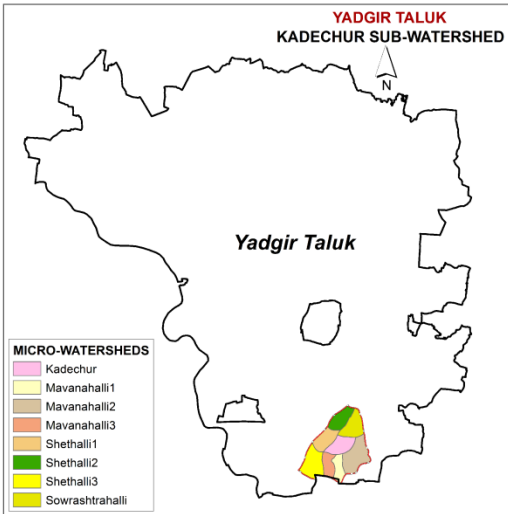


# 7.4. Land Suitability for Bajra





# 7.5. Land Suitability for Drumstick

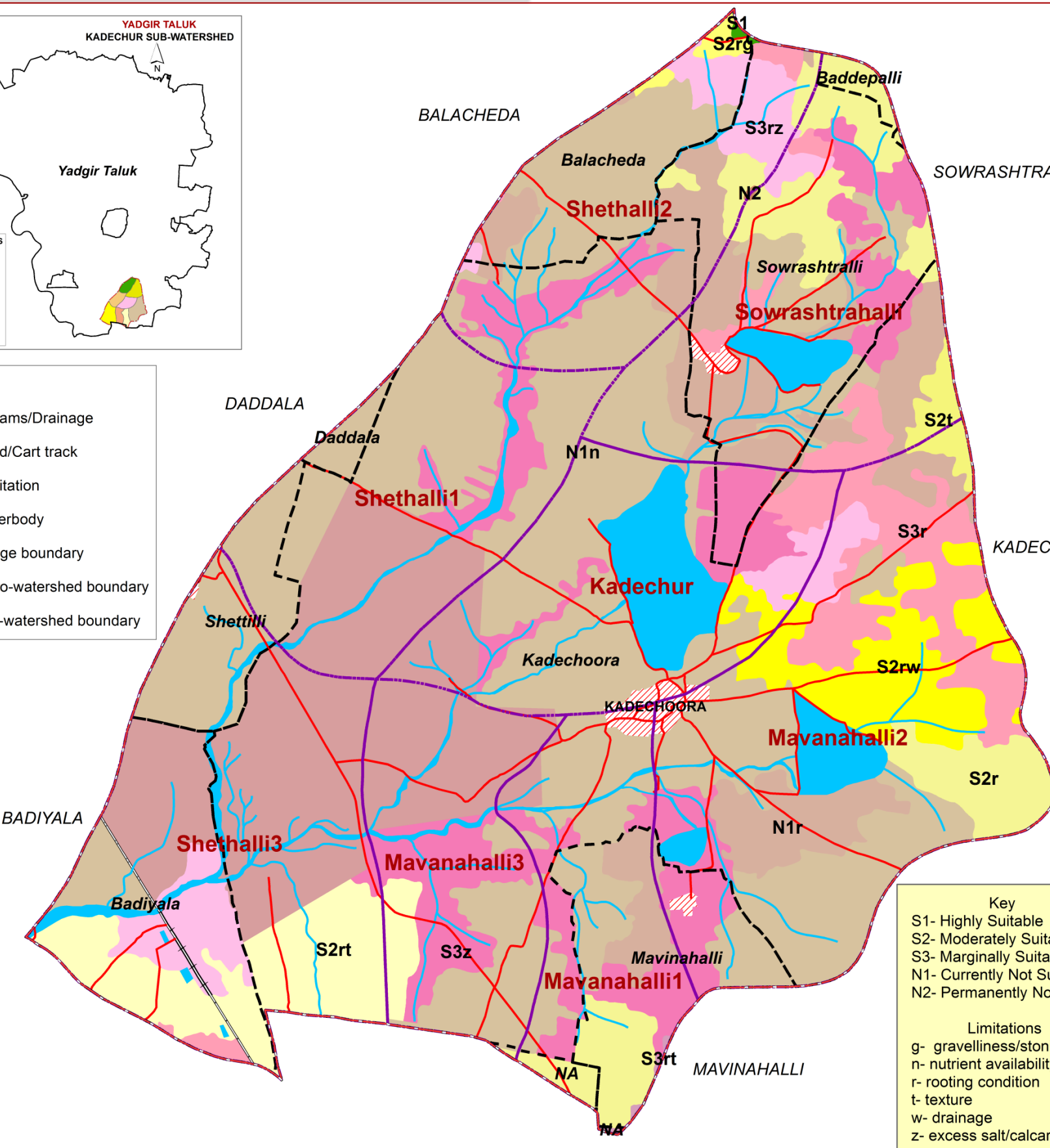
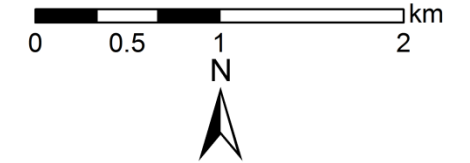


- References**
- Streams/Drainage
  - Road/Cart track
  - Habitation
  - Waterbody
  - Village boundary
  - Micro-watershed boundary
  - Sub-watershed boundary

## LAND SUITABILITY FOR DRUMSTICK

### Kadachur Sub-watershed (4D5B1Q : Area - 4609.21 ha)

#### YADGIR TALUK & DISTRICT



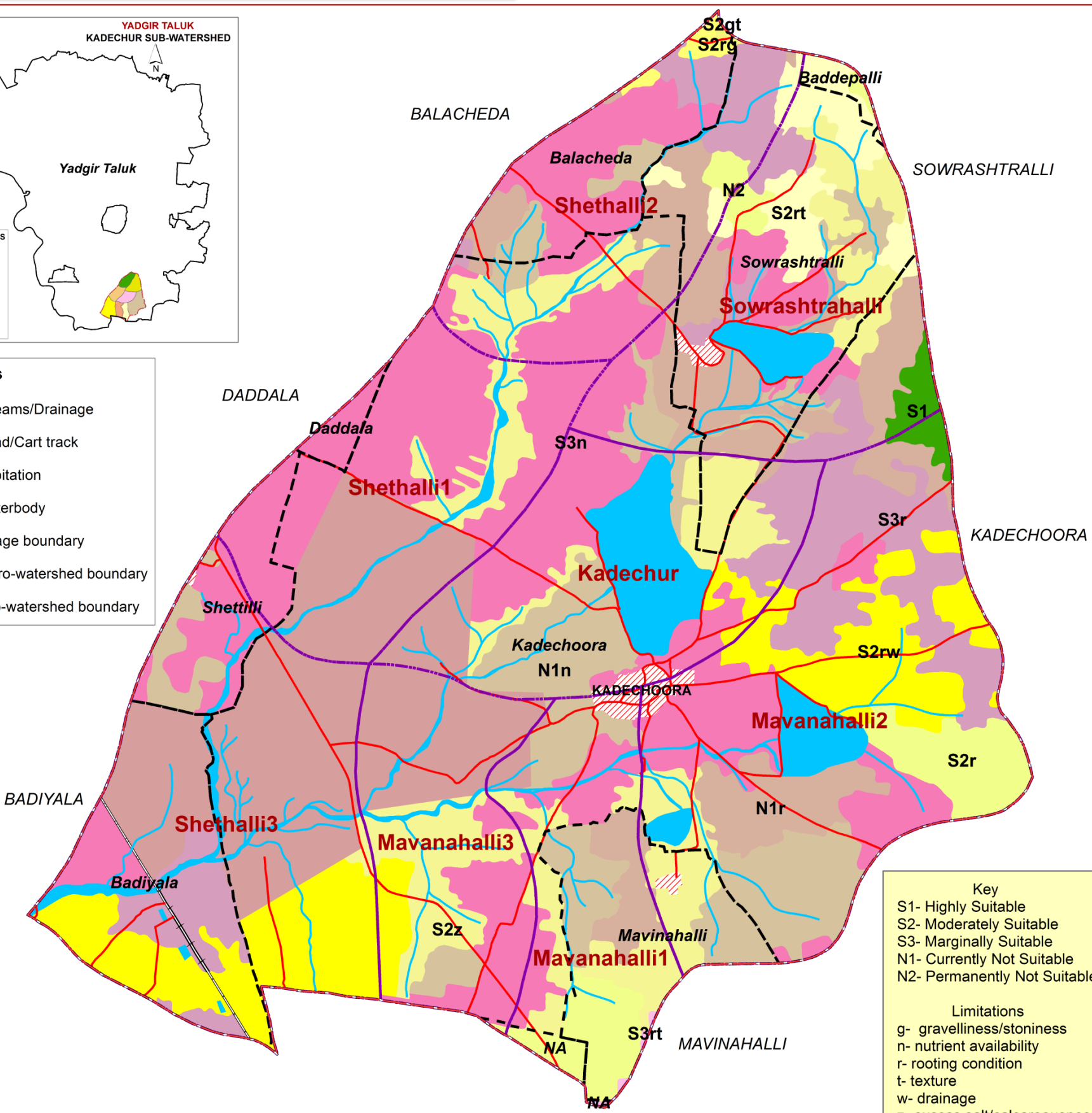
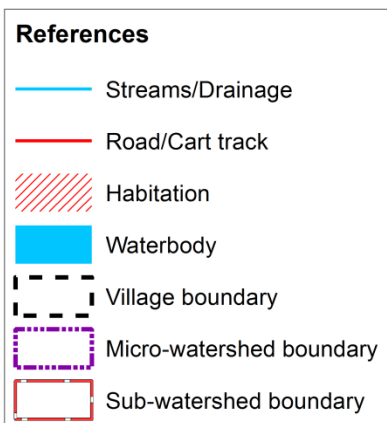
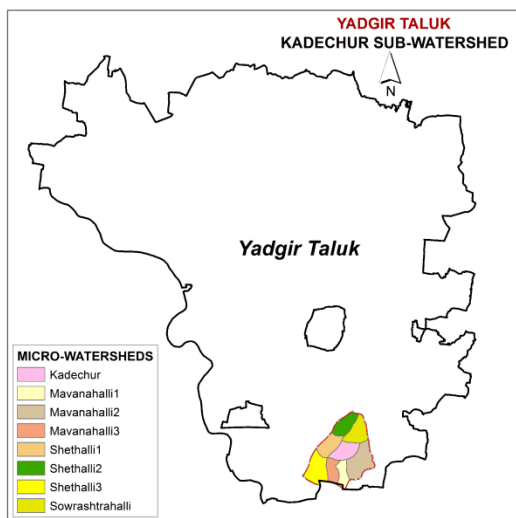
Suitability subclass	Area in ha (%)
S1	2 (0.04)
S2r	281 (6.1)
S2t	32 (0.7)
S2rg	13 (0.28)
S2rt	229 (4.97)
S2rw	173 (3.75)
S3r	240 (5.21)
S3z	508 (11.02)
S3rt	3 (0.07)
S3rz	188 (4.07)
N1n	1570 (34.06)
N1r	403 (8.74)
N2	1 (0.02)
Mining/Industrial	676 (14.67)
Railway	5 (0.11)
Others*	285 (6.18)

- Key**
- S1- Highly Suitable
  - S2- Moderately Suitable
  - S3- Marginally Suitable
  - N1- Currently Not Suitable
  - N2- Permanently Not Suitable
- Limitations**
- g- gravelliness/stoniness
  - n- nutrient availability
  - r- rooting condition
  - t- texture
  - w- drainage
  - z- excess salt/calcareousness

\* - Habitation & Waterbody

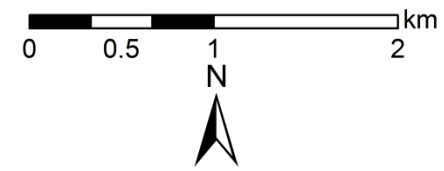
Source: ICAR-NBSS&LUP, Bengaluru

# 7.6. Land Suitability for Sunflower



## LAND SUITABILITY FOR SUNFLOWER

**Kadachur Sub-watershed**  
(4D5B1Q : Area - 4609.21 ha)  
**YADGIR TALUK & DISTRICT**



Suitability subclass	Area in ha (%)
S1	32 (0.7)
S2r	172 (3.74)
S2z	508 (11.02)
S2gt	2 (0.04)
S2rg	13 (0.28)
S2rt	109 (2.36)
S2rw	402 (8.72)
S3n	1108 (24.04)
S3r	428 (9.29)
S3rt	3 (0.07)
N1n	462 (10.02)
N1r	403 (8.74)
N2	1 (0.02)
Mining/Industrial	676 (14.67)
Railway	5 (0.11)
Others*	285 (6.18)

**Key**  
 S1- Highly Suitable  
 S2- Moderately Suitable  
 S3- Marginally Suitable  
 N1- Currently Not Suitable  
 N2- Permanently Not Suitable

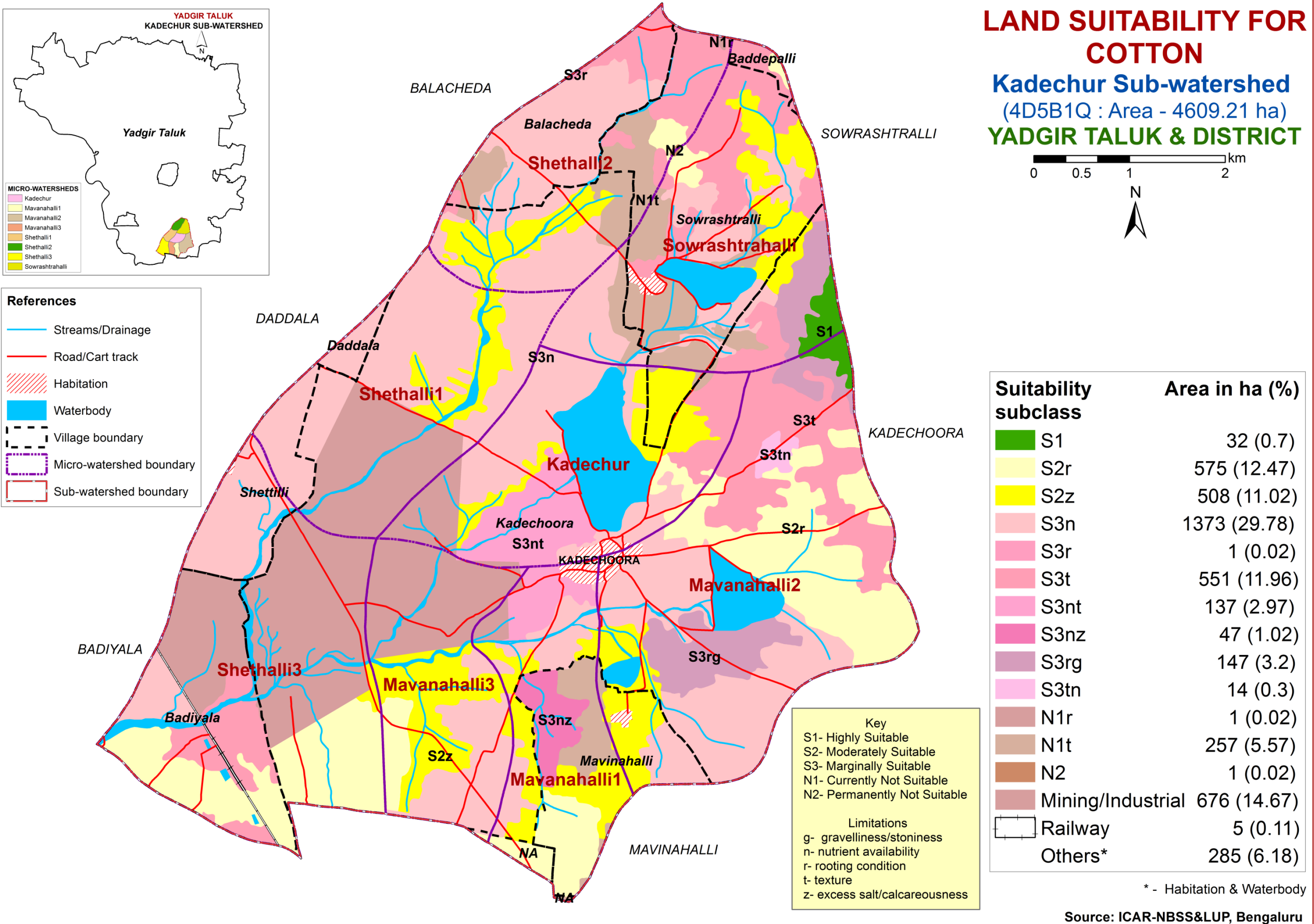
**Limitations**  
 g- gravelliness/stoniness  
 n- nutrient availability  
 r- rooting condition  
 t- texture  
 w- drainage  
 z- excess salt/calcareousness

\* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

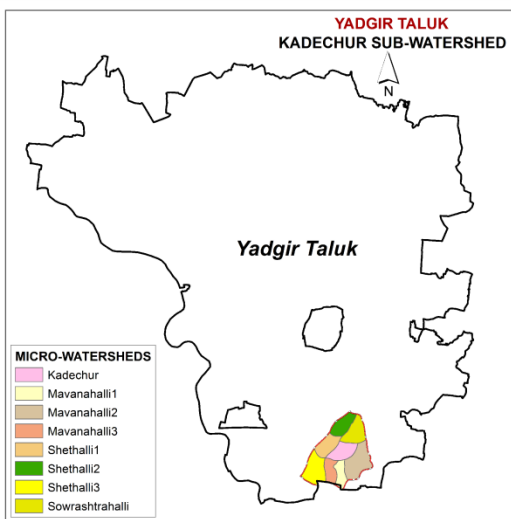


# 7.7. Land Suitability for Cotton





# 7.8. Land Suitability for Bengalgram



**MICRO-WATERSHEDS**

- Kadachur
- Mavanahalli1
- Mavanahalli2
- Mavanahalli3
- Shethalli1
- Shethalli2
- Shethalli3
- Sowrashtrahalli

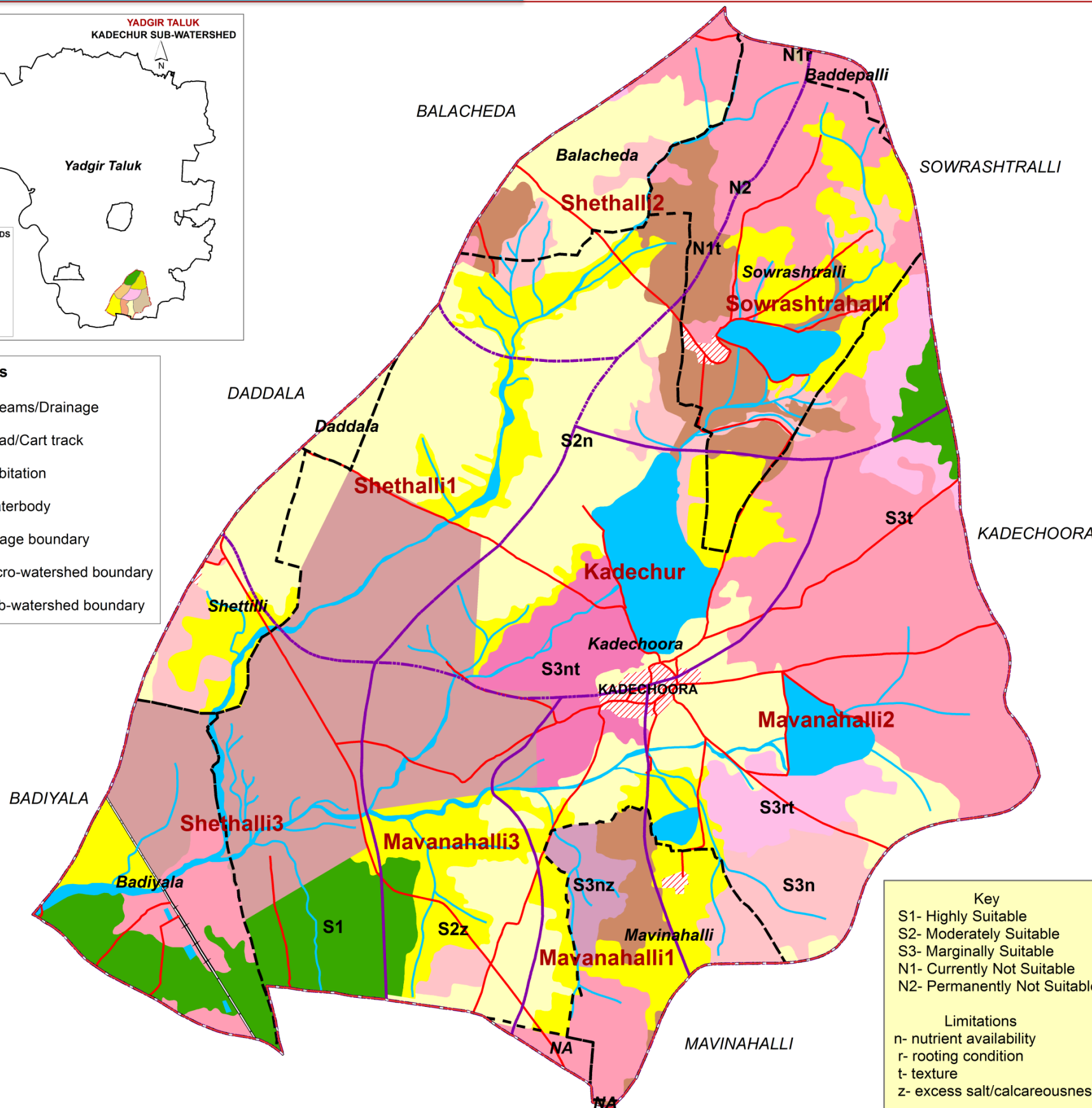
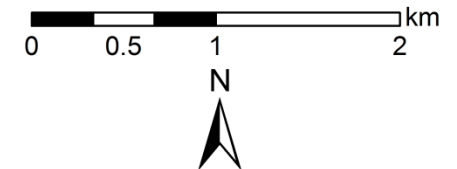
**References**

- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- Village boundary
- Micro-watershed boundary
- Sub-watershed boundary

## LAND SUITABILITY FOR BENGALGRAM

### Kadachur Sub-watershed (4D5B1Q : Area - 4609.21 ha)

### YADGIR TALUK & DISTRICT



Suitability subclass	Area in ha (%)
S1	262 (5.68)
S2n	961 (20.85)
S2z	642 (13.92)
S3n	278 (6.04)
S3t	910 (19.75)
S3nt	137 (2.97)
S3nz	47 (1.02)
S3rt	148 (3.22)
N1r	1 (0.02)
N1t	257 (5.57)
N2	1 (0.02)
Mining/Industrial	676 (14.67)
Railway	5 (0.11)
Others*	285 (6.18)

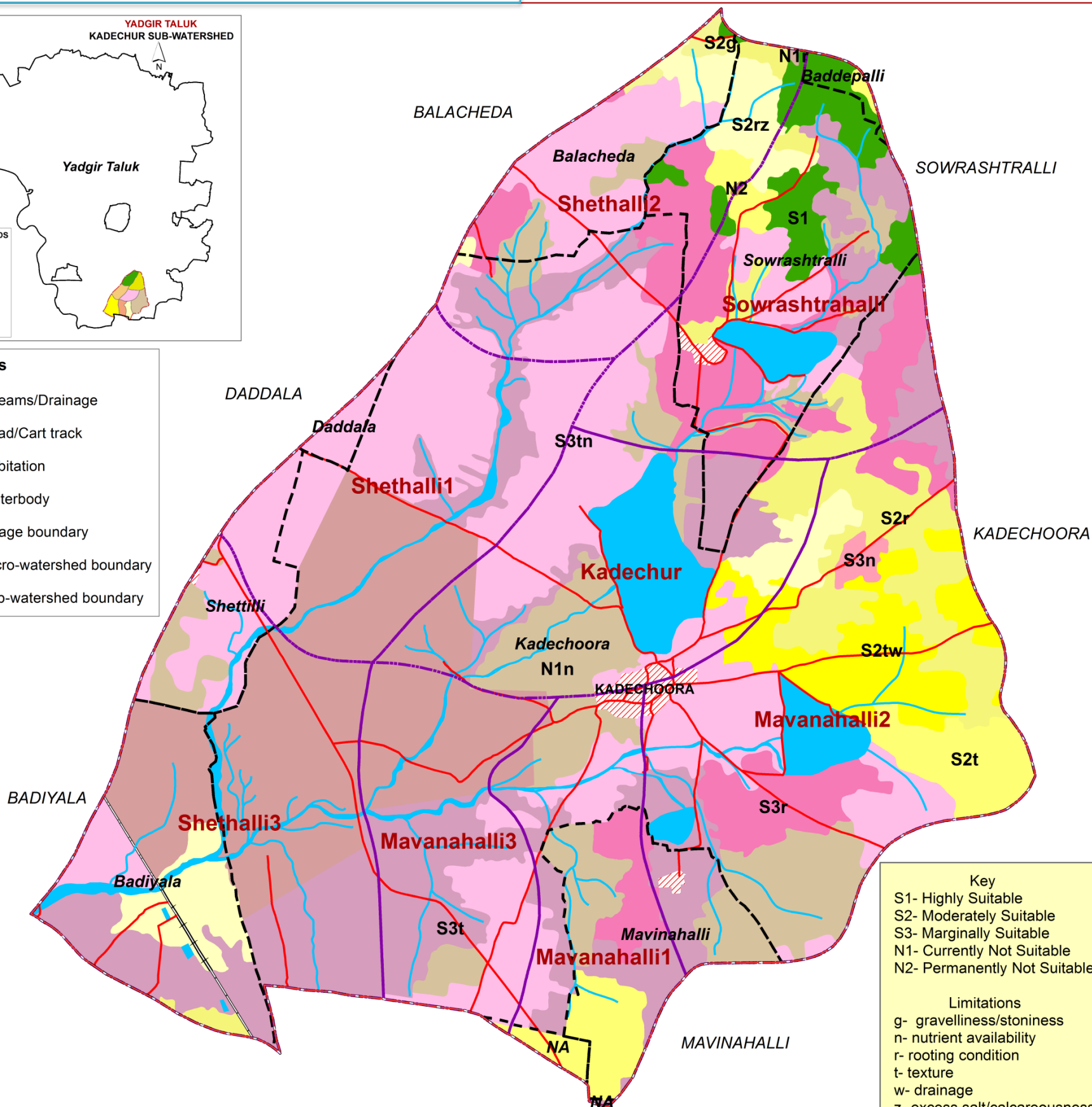
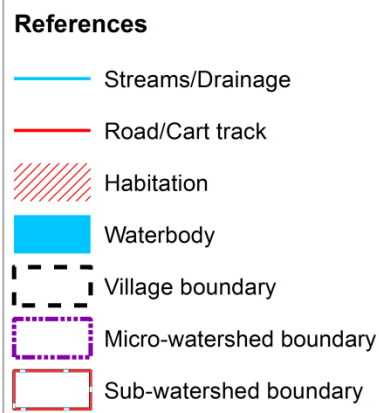
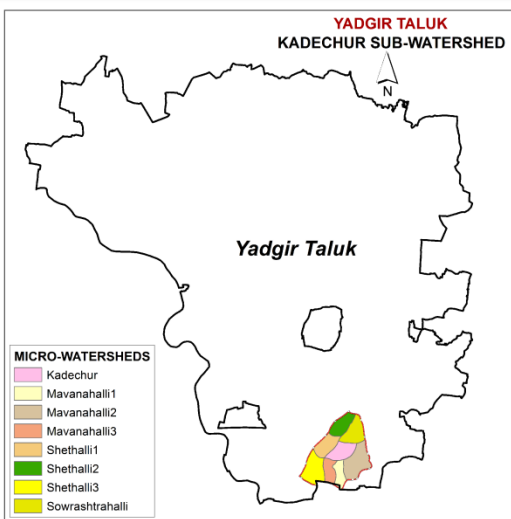
**Key**  
 S1- Highly Suitable  
 S2- Moderately Suitable  
 S3- Marginally Suitable  
 N1- Currently Not Suitable  
 N2- Permanently Not Suitable

**Limitations**  
 n- nutrient availability  
 r- rooting condition  
 t- texture  
 z- excess salt/calcareousness

\* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

# 7.9. Land Suitability for Groundnut

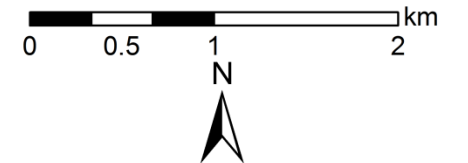


**Key**  
 S1- Highly Suitable  
 S2- Moderately Suitable  
 S3- Marginally Suitable  
 N1- Currently Not Suitable  
 N2- Permanently Not Suitable

**Limitations**  
 g- gravelliness/stoniness  
 n- nutrient availability  
 r- rooting condition  
 t- texture  
 w- drainage  
 z- excess salt/calcareousness

## LAND SUITABILITY FOR GROUNDNUT

**Kadechur Sub-watershed**  
 (4D5B1Q : Area - 4609.21 ha)  
**YADGIR TALUK & DISTRICT**



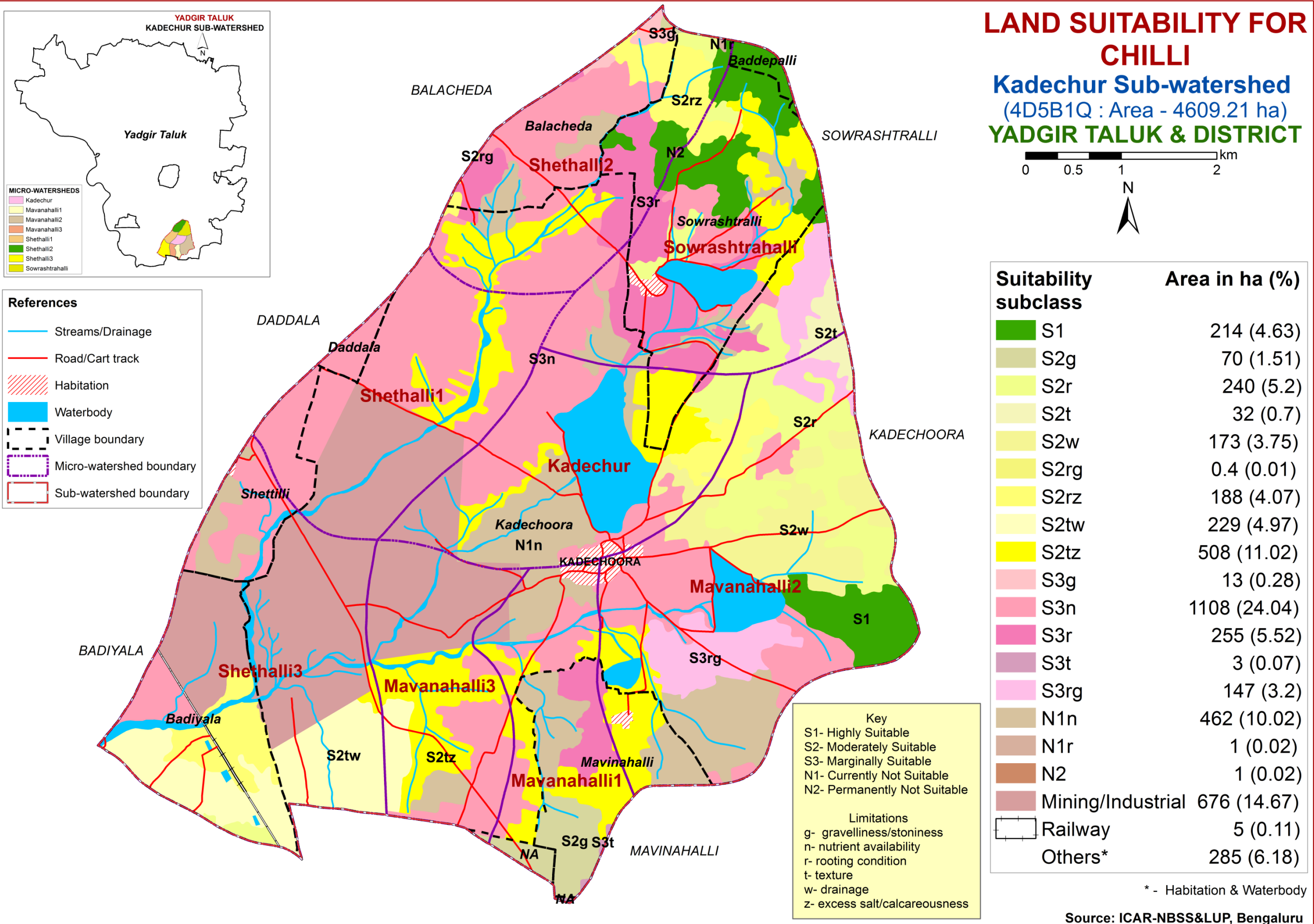
Suitability subclass	Area in ha (%)
S1	111 (2.41)
S2g	13 (0.28)
S2r	240 (5.2)
S2t	172 (3.74)
S2rz	188 (4.07)
S2tw	173 (3.75)
S3n	14 (0.3)
S3r	402 (8.72)
S3t	773 (16.77)
S3tn	1095 (23.75)
N1n	462 (10.02)
N1r	1 (0.02)
N2	1 (0.02)
Mining/Industrial	676 (14.67)
Railway	5 (0.11)
Others*	285 (6.18)

\* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

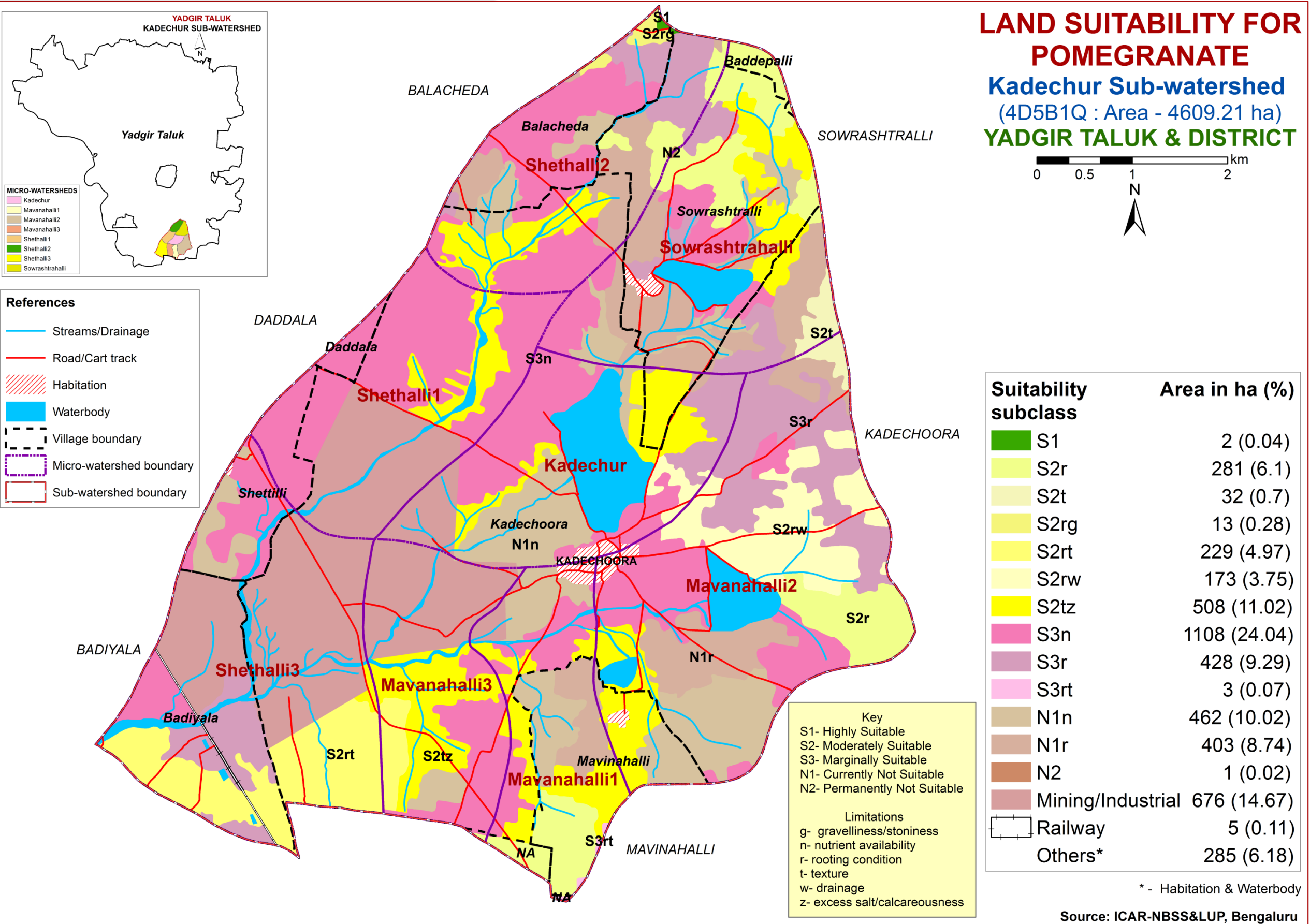


# 7.10. Land Suitability for Chilli





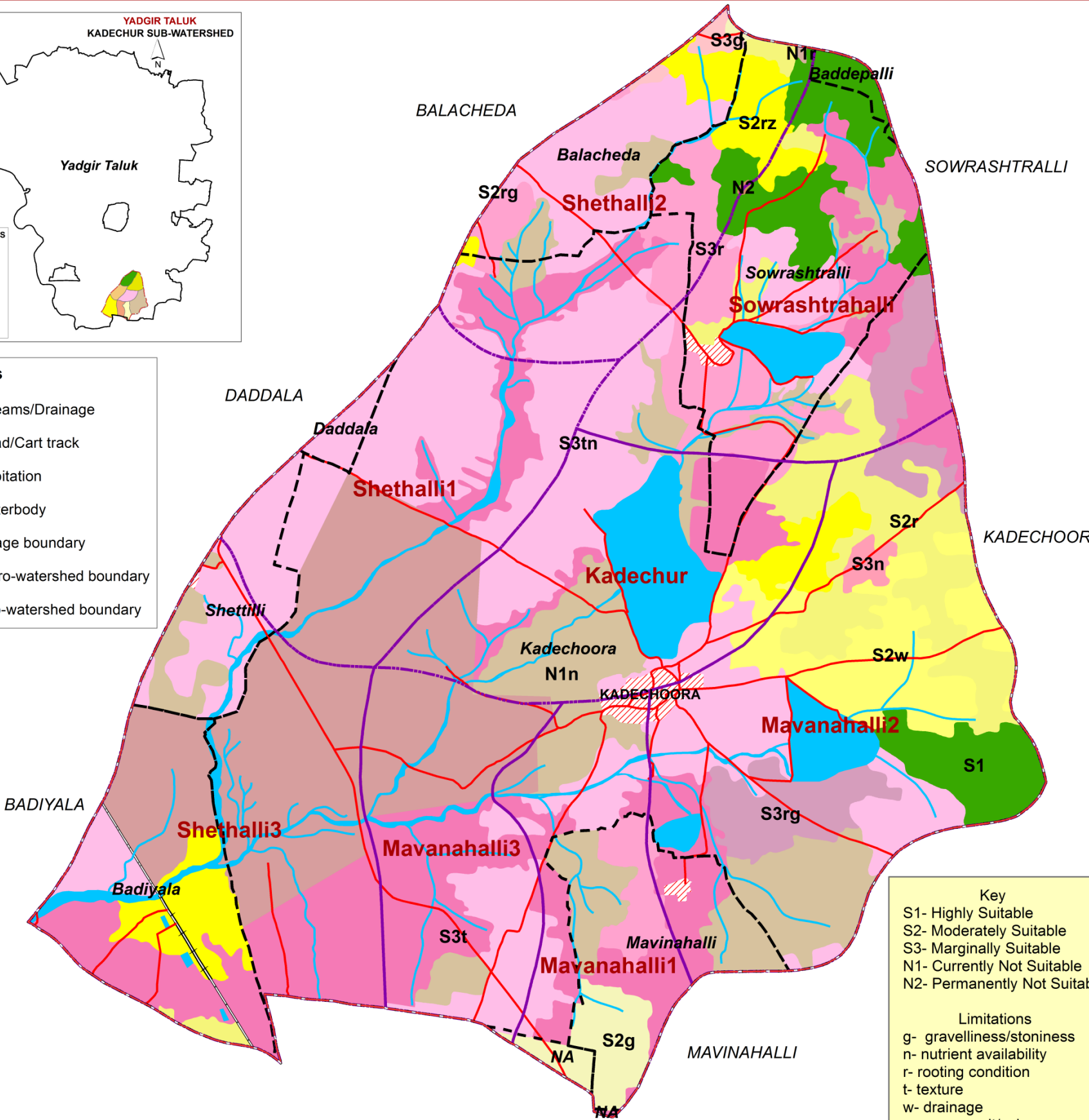
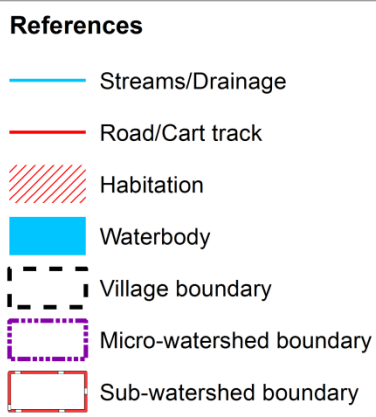
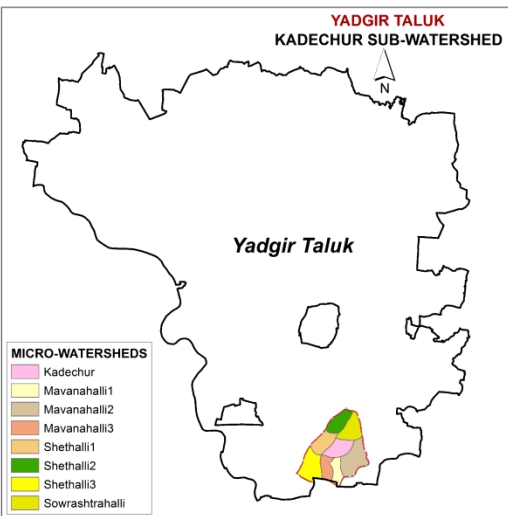
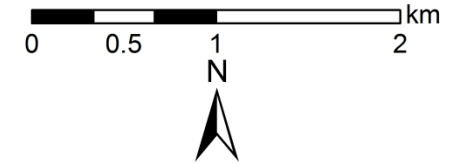
# 7.11. Land Suitability for Pomegranate



# 7.12. Land Suitability for Tomato

## LAND SUITABILITY FOR TOMATO

**Kadachur Sub-watershed**  
(4D5B1Q : Area - 4609.21 ha)  
**YADGIR TALUK & DISTRICT**



Suitability subclass	Area in ha (%)
S1	214 (4.63)
S2g	70 (1.51)
S2r	240 (5.2)
S2w	173 (3.75)
S2rg	0.4 (0.01)
S2rz	188 (4.07)
S3g	13 (0.28)
S3n	14 (0.3)
S3r	255 (5.52)
S3t	773 (16.76)
S3rg	147 (3.2)
S3tn	1095 (23.75)
N1n	462 (10.02)
N1r	1 (0.02)
N2	1 (0.02)
Mining/Industrial	676 (14.67)
Railway	5 (0.11)
Others*	285 (6.18)

**Key**  
 S1- Highly Suitable  
 S2- Moderately Suitable  
 S3- Marginally Suitable  
 N1- Currently Not Suitable  
 N2- Permanently Not Suitable

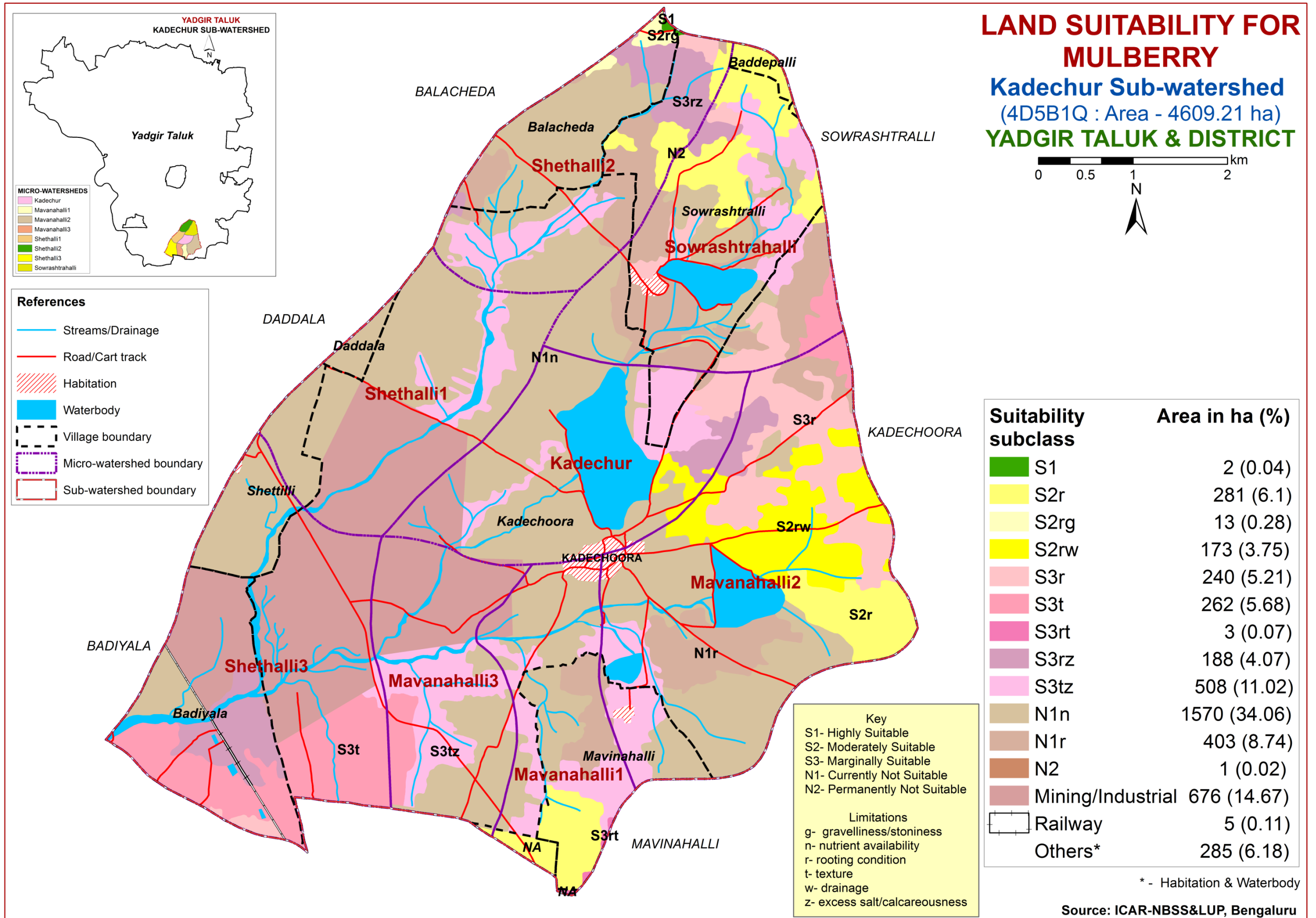
**Limitations**  
 g- gravelliness/stoniness  
 n- nutrient availability  
 r- rooting condition  
 t- texture  
 w- drainage  
 z- excess salt/calcareousness

\* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru



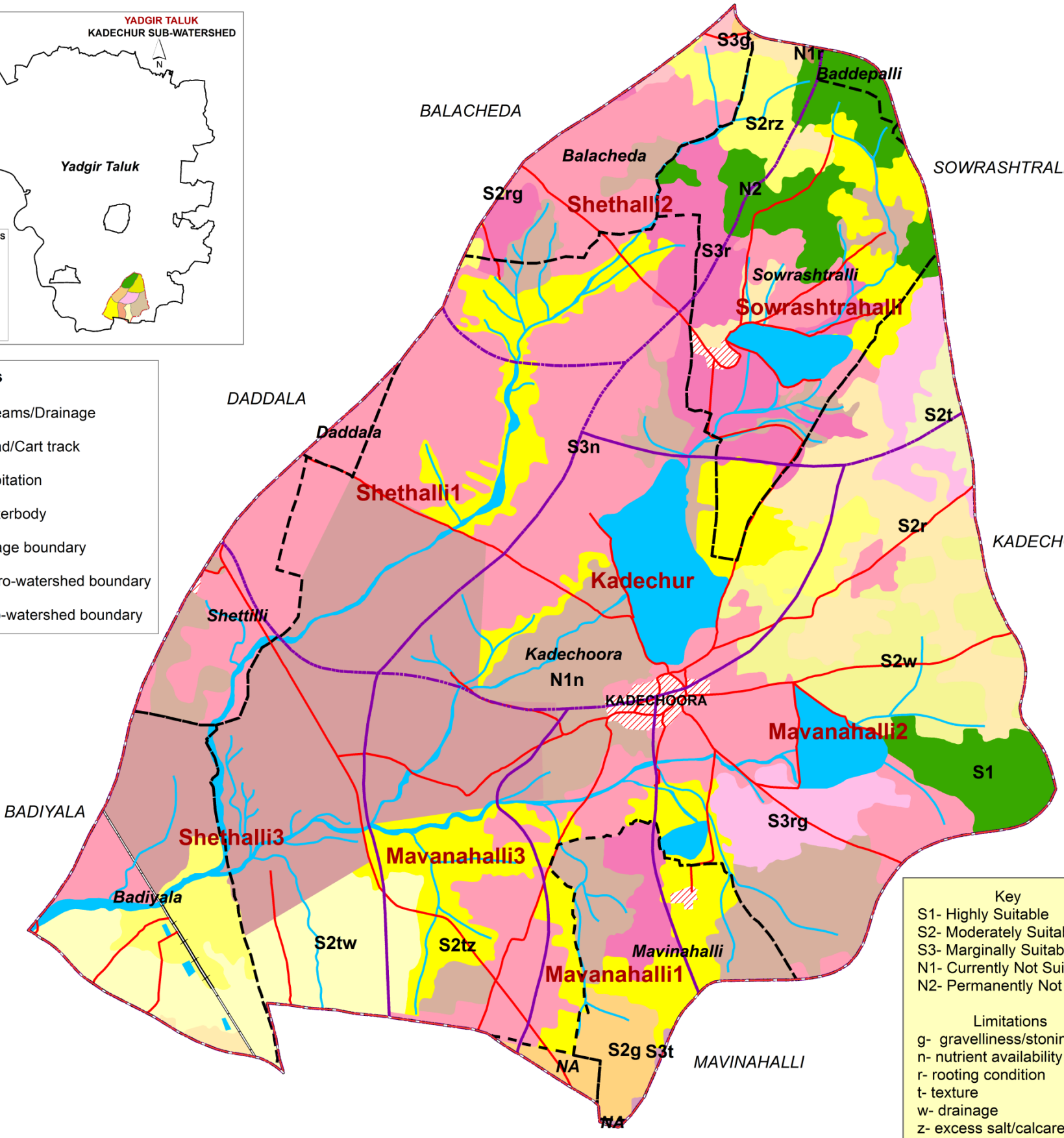
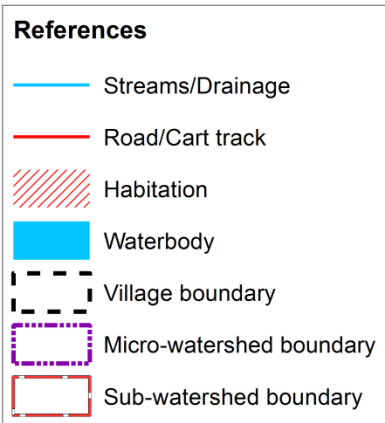
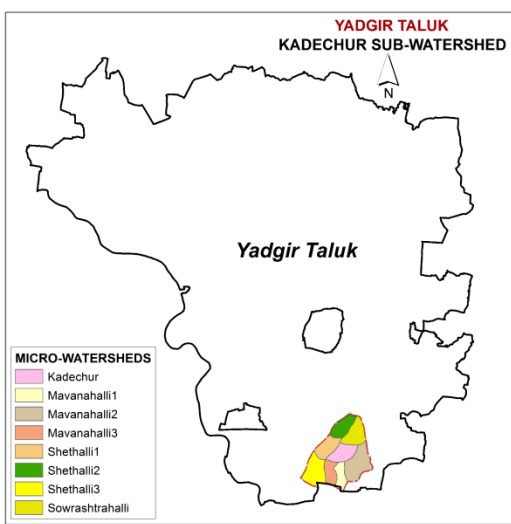
# 7.13. Land Suitability for Mulberry



NOTE: Mulberry suitability evaluation only for mulberry leaf, not for silkworm rearing



# 7.14. Land Suitability for Bhendi

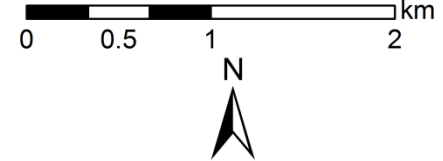


**Key**  
 S1- Highly Suitable  
 S2- Moderately Suitable  
 S3- Marginally Suitable  
 N1- Currently Not Suitable  
 N2- Permanently Not Suitable

**Limitations**  
 g- gravelliness/stoniness  
 n- nutrient availability  
 r- rooting condition  
 t- texture  
 w- drainage  
 z- excess salt/calcareousness

## LAND SUITABILITY FOR BHENDI

### Kadachur Sub-watershed (4D5B1Q : Area - 4609.21 ha) YADGIR TALUK & DISTRICT

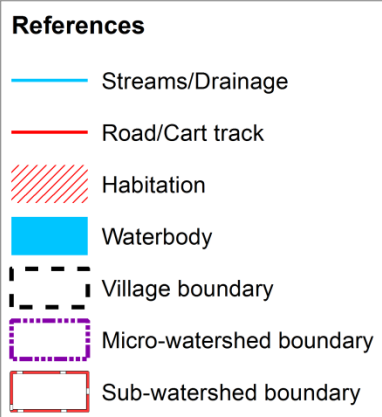
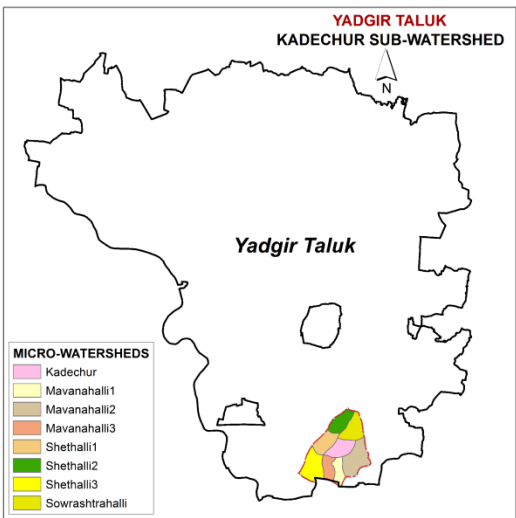


Suitability subclass	Area in ha (%)
S1	214 (4.63)
S2g	70 (1.51)
S2r	240 (5.2)
S2t	32 (0.7)
S2w	173 (3.75)
S2rg	0.4 (0.01)
S2rz	188 (4.07)
S2tw	229 (4.97)
S2tz	508 (11.02)
S3g	13 (0.28)
S3n	1108 (24.04)
S3r	255 (5.52)
S3t	3 (0.07)
S3rg	147 (3.2)
N1n	462 (10.02)
N1r	1 (0.02)
N2	1 (0.02)
Mining/Industrial	676 (14.67)
Railway	5 (0.11)
Others*	285 (6.18)

\* - Habitation & Waterbody

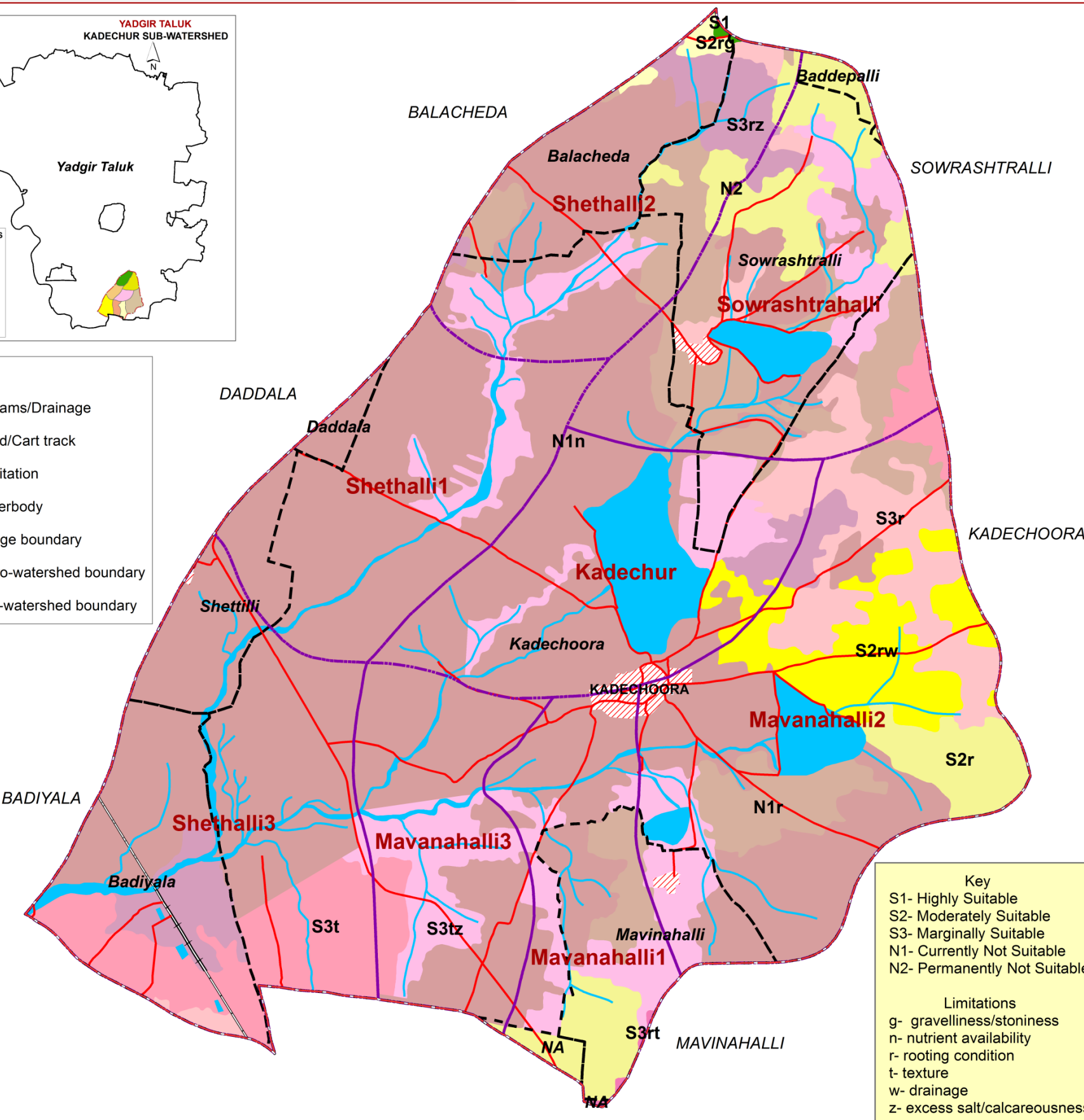
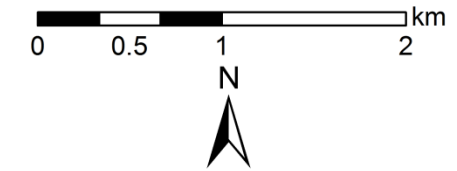
Source: ICAR-NBSS&LUP, Bengaluru

# 7.15. Land Suitability for Guava



## LAND SUITABILITY FOR GUAVA

**Kadechur Sub-watershed**  
(4D5B1Q : Area - 4609.21 ha)  
**YADGIR TALUK & DISTRICT**



Suitability subclass	Area in ha (%)
S1	2 (0.04)
S2r	281 (6.1)
S2rg	13 (0.28)
S2rw	173 (3.75)
S3r	240 (5.21)
S3t	262 (5.68)
S3rt	3 (0.07)
S3rz	188 (4.07)
S3tz	508 (11.02)
N1n	1570 (34.06)
N1r	403 (8.74)
N2	1 (0.02)
Mining/Industrial	676 (14.67)
Railway	5 (0.11)
Others*	285 (6.18)

**Key**

- S1- Highly Suitable
- S2- Moderately Suitable
- S3- Marginally Suitable
- N1- Currently Not Suitable
- N2- Permanently Not Suitable

**Limitations**

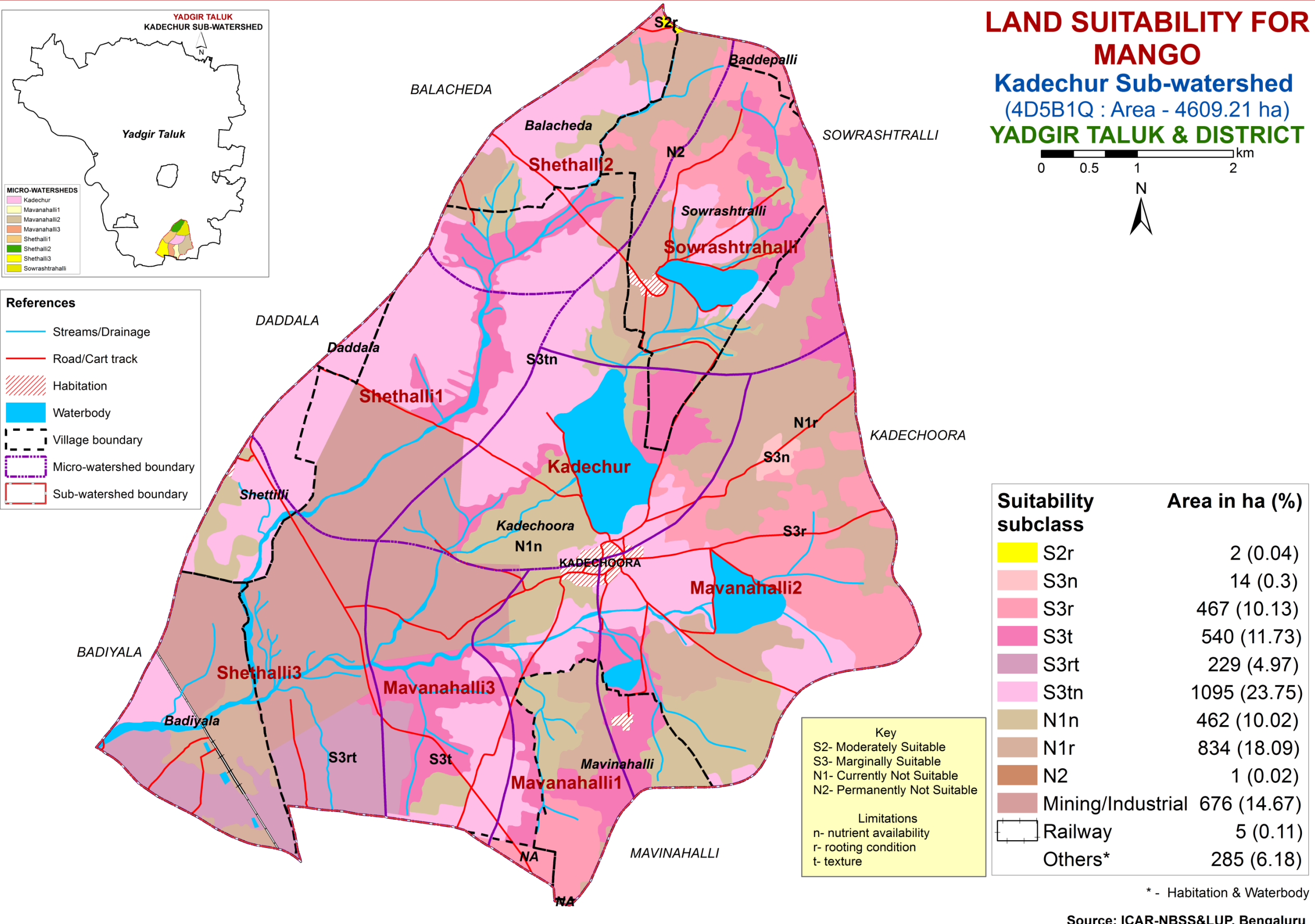
- g- gravelliness/stoniness
- n- nutrient availability
- r- rooting condition
- t- texture
- w- drainage
- z- excess salt/calcareousness

\* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

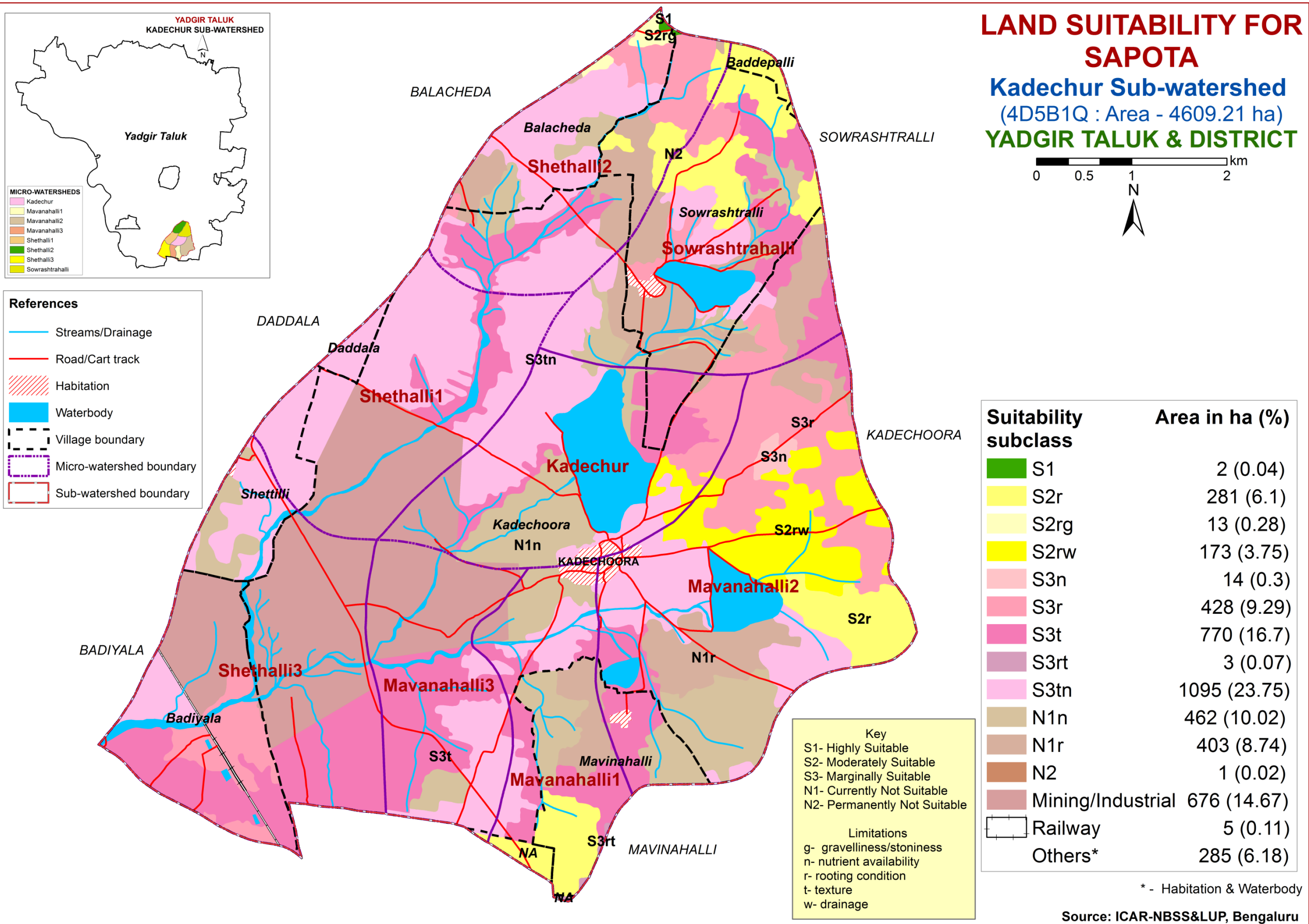


# 7.16. Land Suitability for Mango

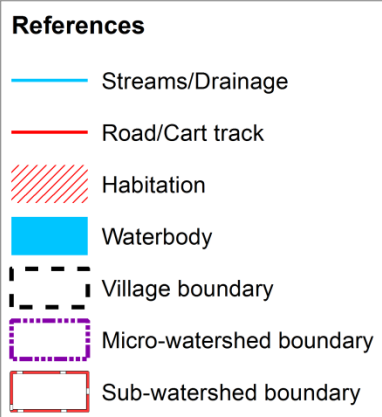
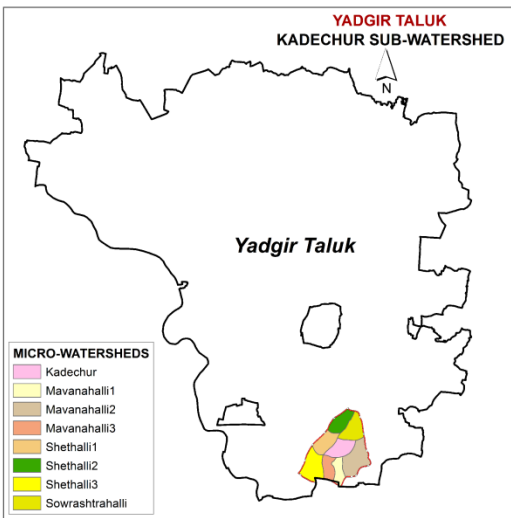




# 7.17. Land Suitability for Sapota

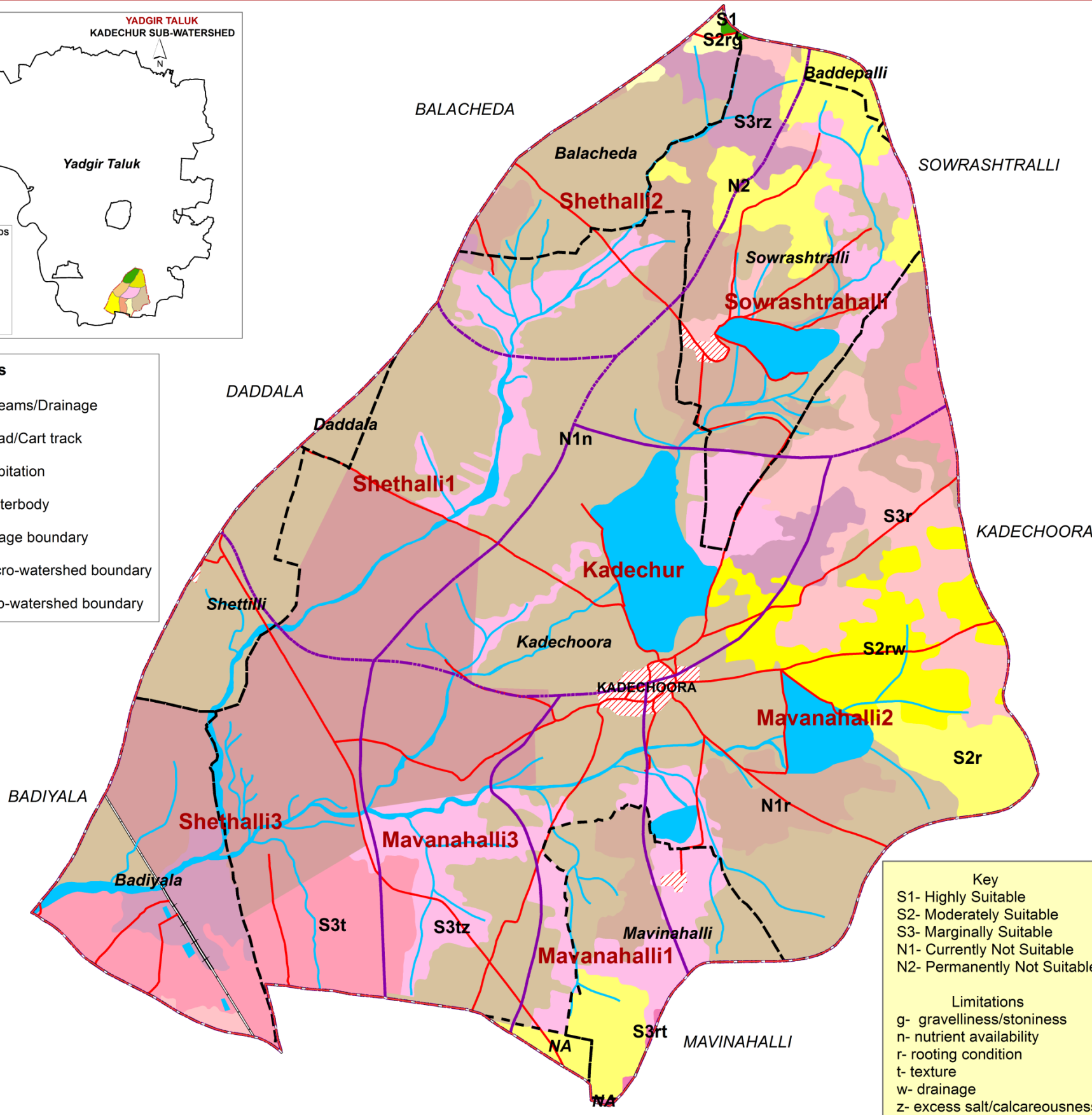
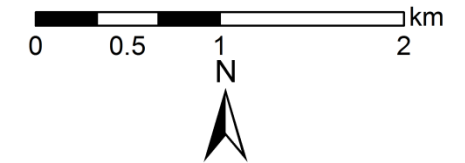


# 7.18. Land Suitability for Jackfruit



## LAND SUITABILITY FOR JACKFRUIT

**Kadachur Sub-watershed**  
(4D5B1Q : Area - 4609.21 ha)  
**YADGIR TALUK & DISTRICT**



**Key**

S1- Highly Suitable  
S2- Moderately Suitable  
S3- Marginally Suitable  
N1- Currently Not Suitable  
N2- Permanently Not Suitable

**Limitations**

g- gravelliness/stoniness  
n- nutrient availability  
r- rooting condition  
t- texture  
w- drainage  
z- excess salt/calcareousness

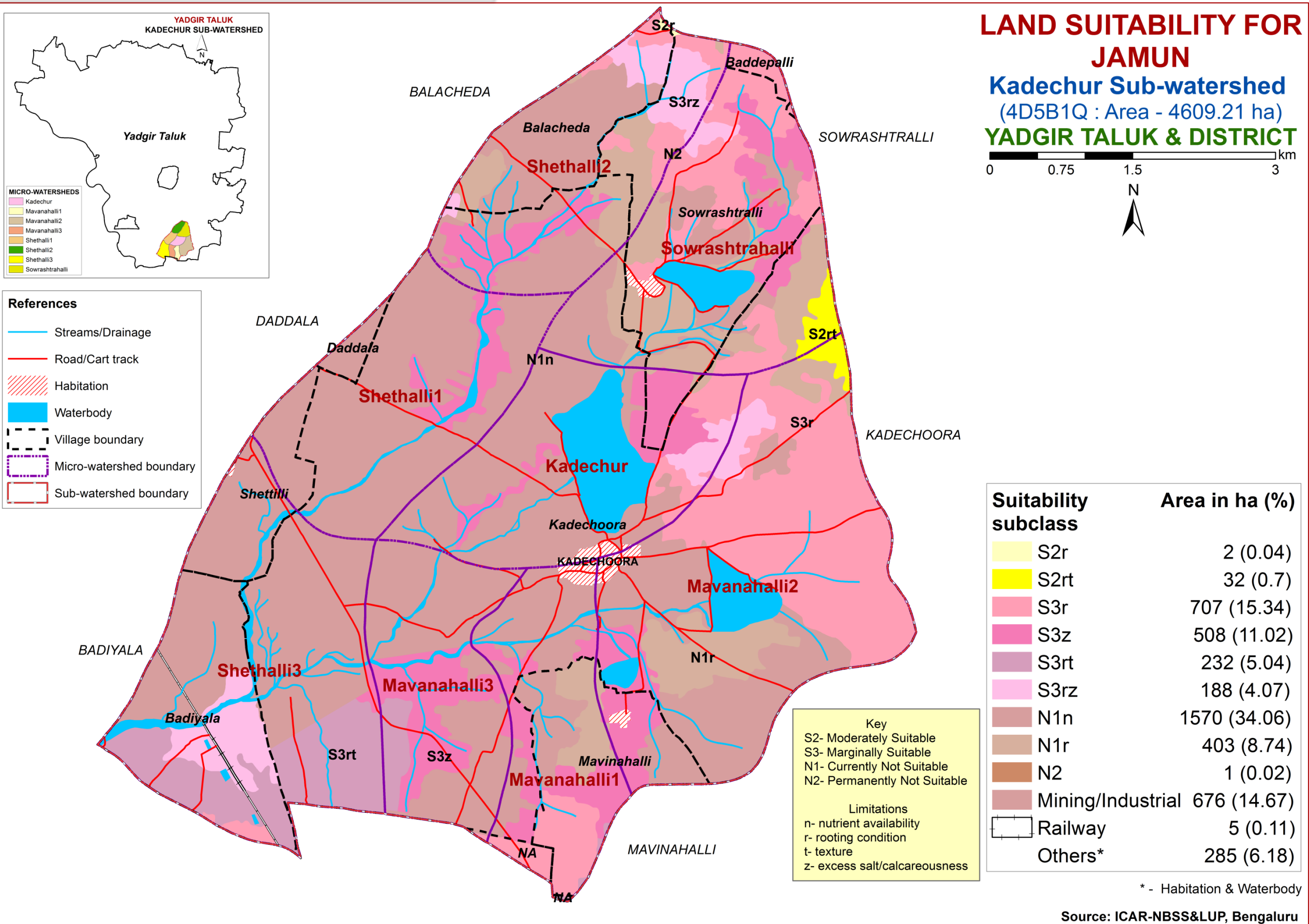
Suitability subclass	Area in ha (%)
S1	2 (0.04)
S2r	281 (6.1)
S2rg	13 (0.28)
S2rw	173 (3.75)
S3r	240 (5.21)
S3t	262 (5.68)
S3rt	3 (0.07)
S3rz	188 (4.07)
S3tz	508 (11.02)
N1n	1570 (34.06)
N1r	403 (8.74)
N2	1 (0.02)
Mining/Industrial	676 (14.67)
Railway	5 (0.11)
Others*	285 (6.18)

\* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

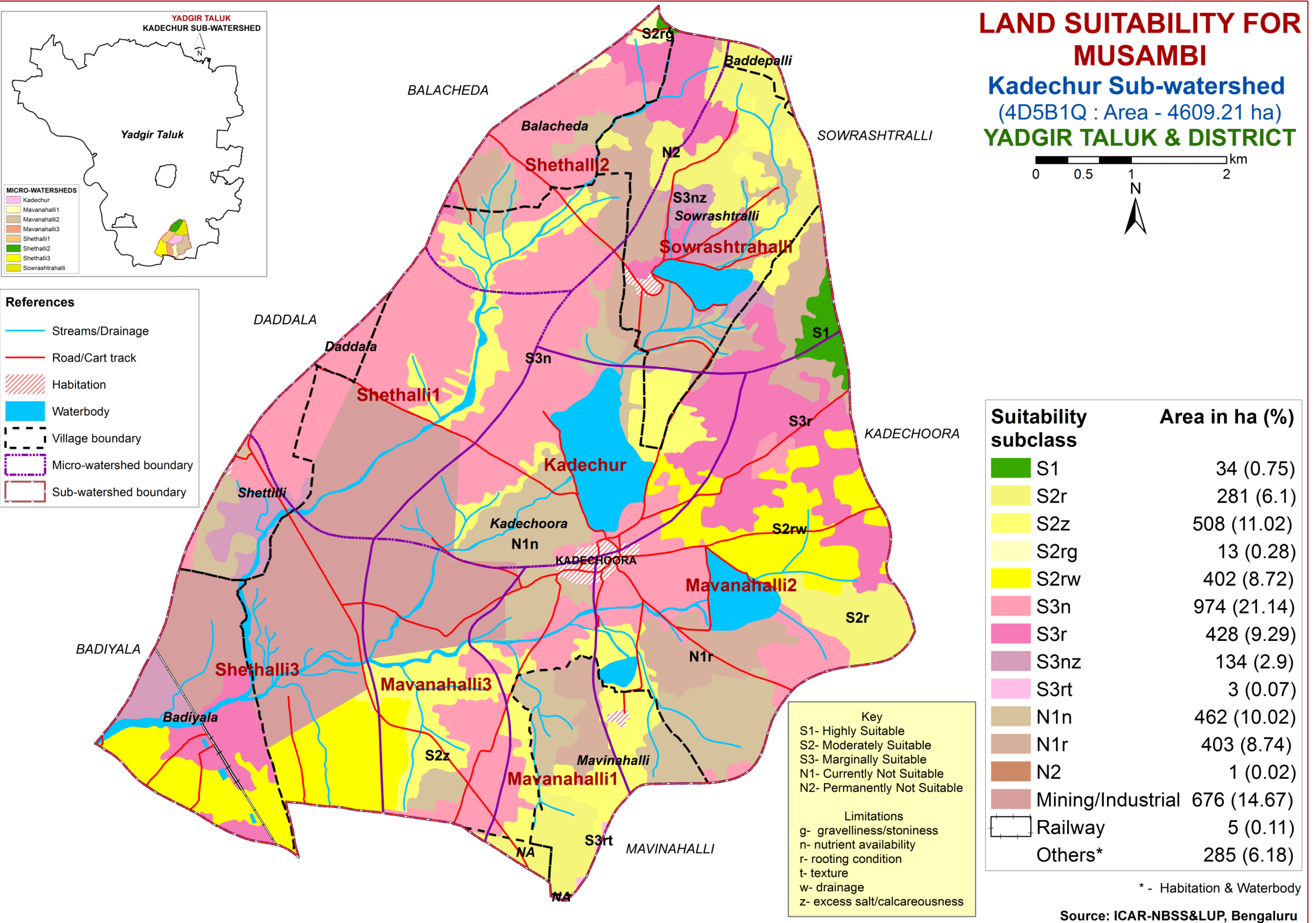


# 7.19. Land Suitability for Jamun

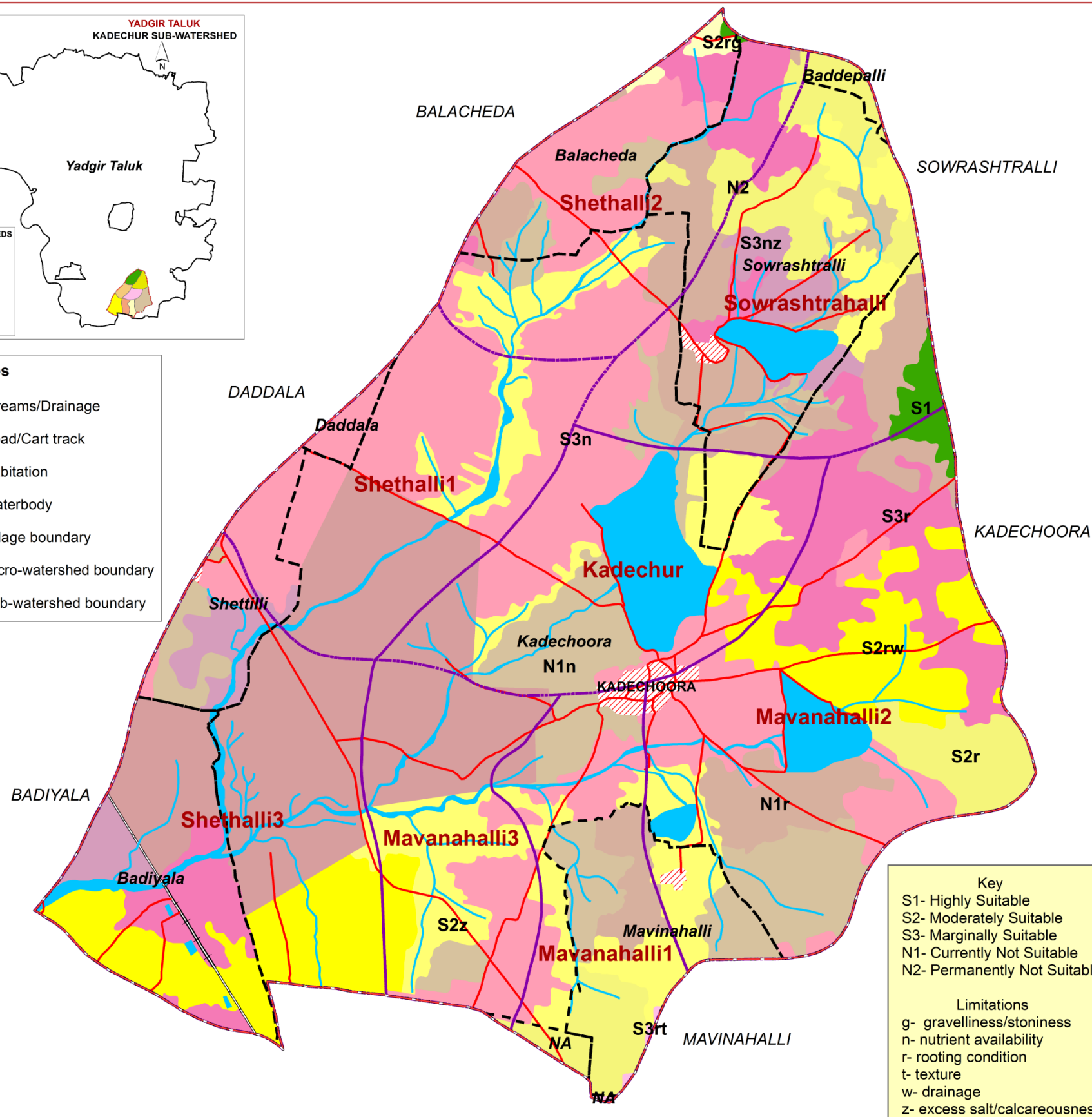
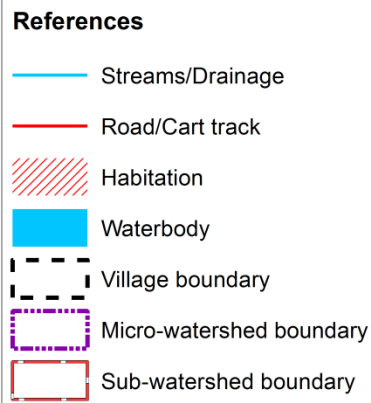
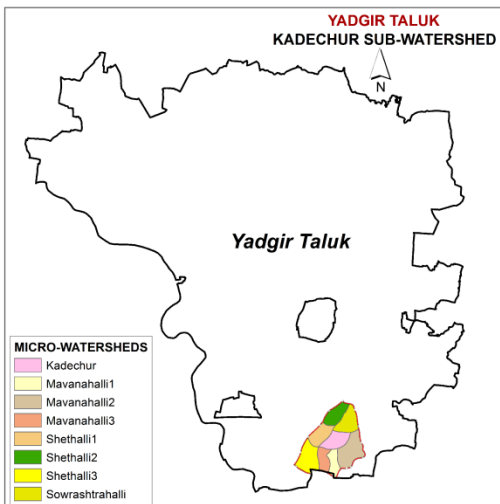




# 7.20. Land Suitability for Musambi



# 7.21. Land Suitability for Lime

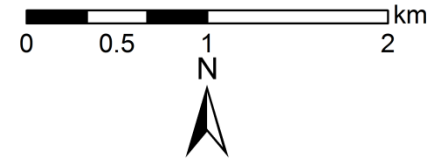


**Key**  
 S1- Highly Suitable  
 S2- Moderately Suitable  
 S3- Marginally Suitable  
 N1- Currently Not Suitable  
 N2- Permanently Not Suitable

**Limitations**  
 g- gravelliness/stoniness  
 n- nutrient availability  
 r- rooting condition  
 t- texture  
 w- drainage  
 z- excess salt/calcareousness

## LAND SUITABILITY FOR LIME

**Kadechur Sub-watershed**  
 (4D5B1Q : Area - 4609.21 ha)  
**YADGIR TALUK & DISTRICT**



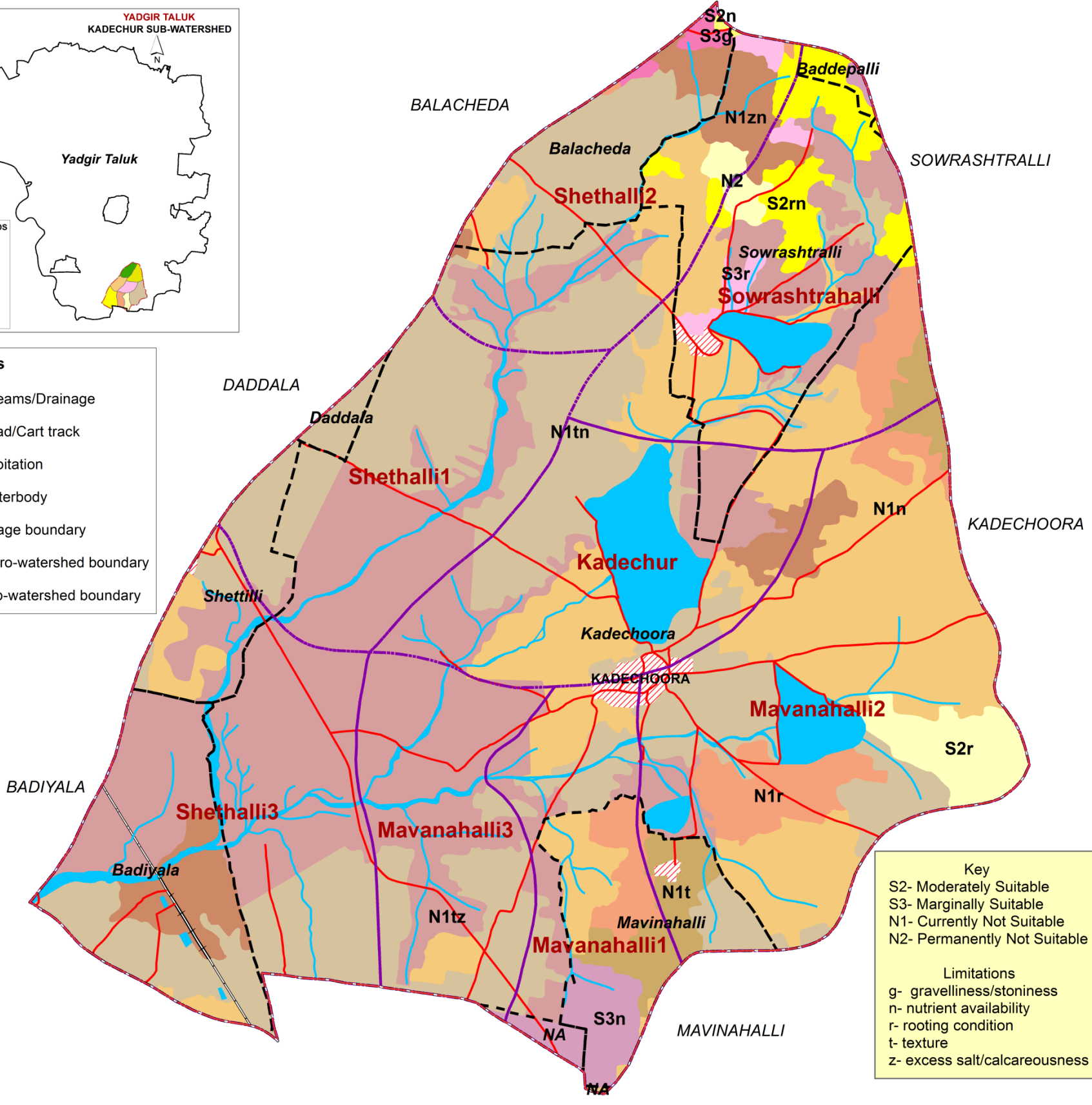
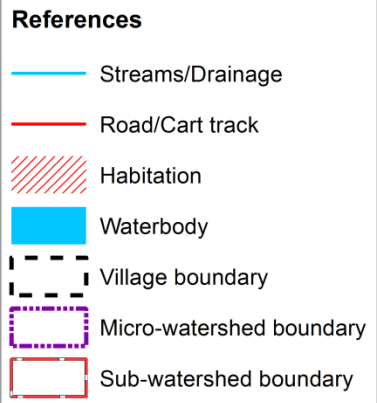
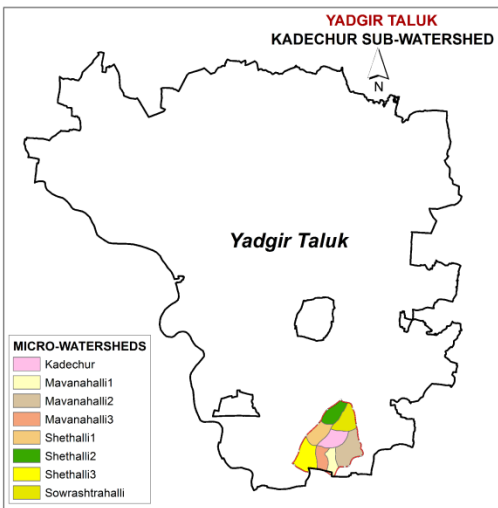
Suitability subclass	Area in ha (%)
S1	34 (0.75)
S2r	281 (6.1)
S2z	508 (11.02)
S2rg	13 (0.28)
S2rw	402 (8.72)
S3n	974 (21.14)
S3r	428 (9.29)
S3nz	134 (2.9)
S3rt	3 (0.07)
N1n	462 (10.02)
N1r	403 (8.74)
N2	1 (0.02)
Mining/Industrial	676 (14.67)
Railway	5 (0.11)
Others*	285 (6.18)

\* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

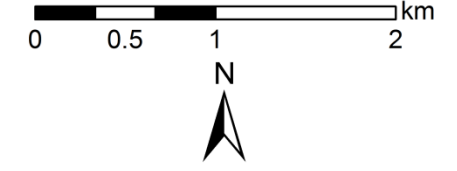


# 7.22. Land Suitability for Cashew



## LAND SUITABILITY FOR CASHEW

**Kadachur Sub-watershed**  
(4D5B1Q : Area - 4609.21 ha)  
**YADGIR TALUK & DISTRICT**



Suitability subclass	Area in ha (%)
S2n	2 (0.04)
S2r	101 (2.19)
S2rn	109 (2.36)
S3g	13 (0.28)
S3n	71 (1.55)
S3r	31 (0.68)
N1n	955 (20.71)
N1r	195 (4.23)
N1t	103 (2.24)
N1tn	1303 (28.28)
N1tz	571 (12.39)
N1zn	188 (4.07)
N2	1 (0.02)
Mining/Industrial	676 (14.67)
Railway	5 (0.11)
Others*	285 (6.18)

**Key**  
S2- Moderately Suitable  
S3- Marginally Suitable  
N1- Currently Not Suitable  
N2- Permanently Not Suitable

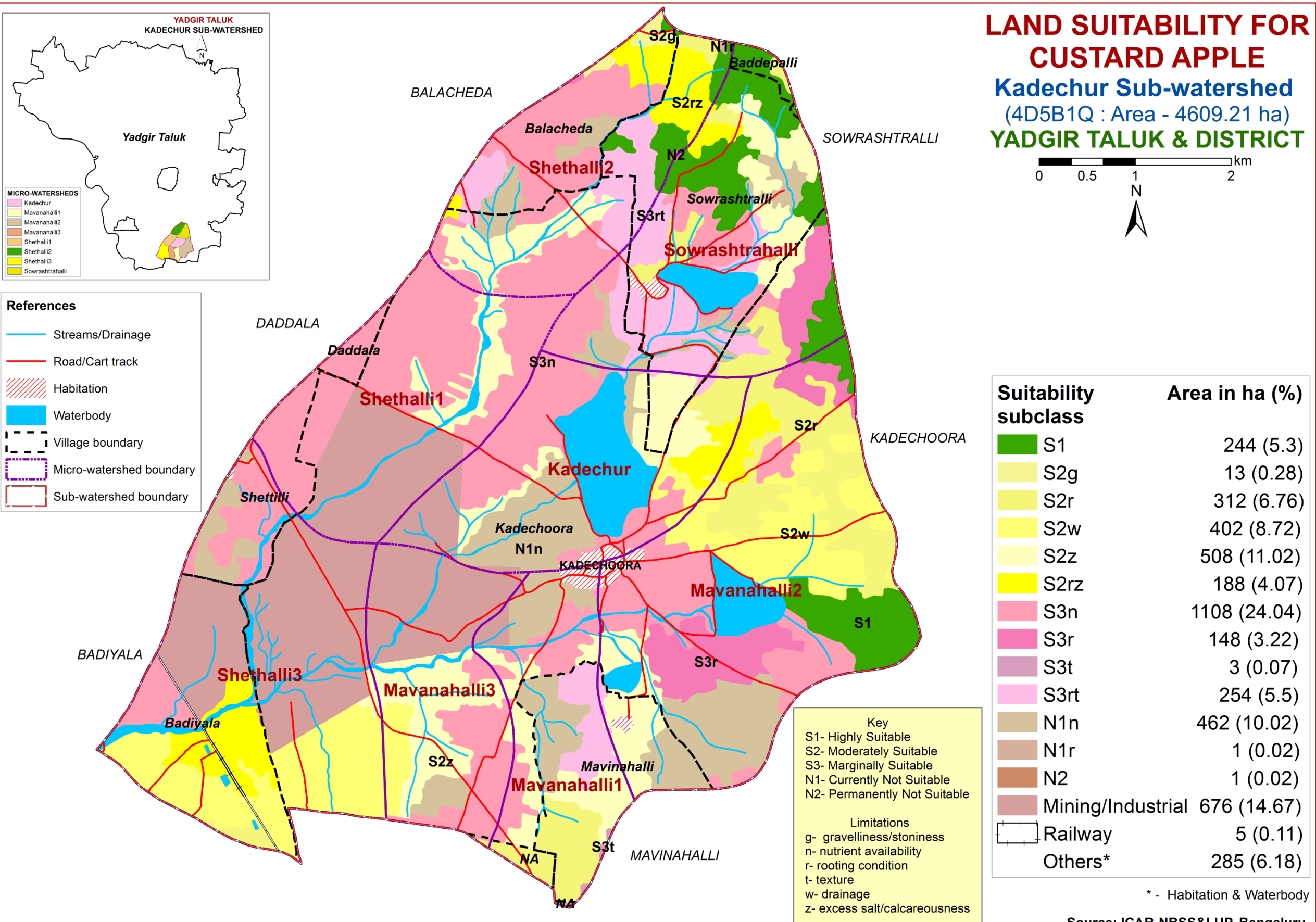
**Limitations**  
g- gravelliness/stoniness  
n- nutrient availability  
r- rooting condition  
t- texture  
z- excess salt/calcareousness

\* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

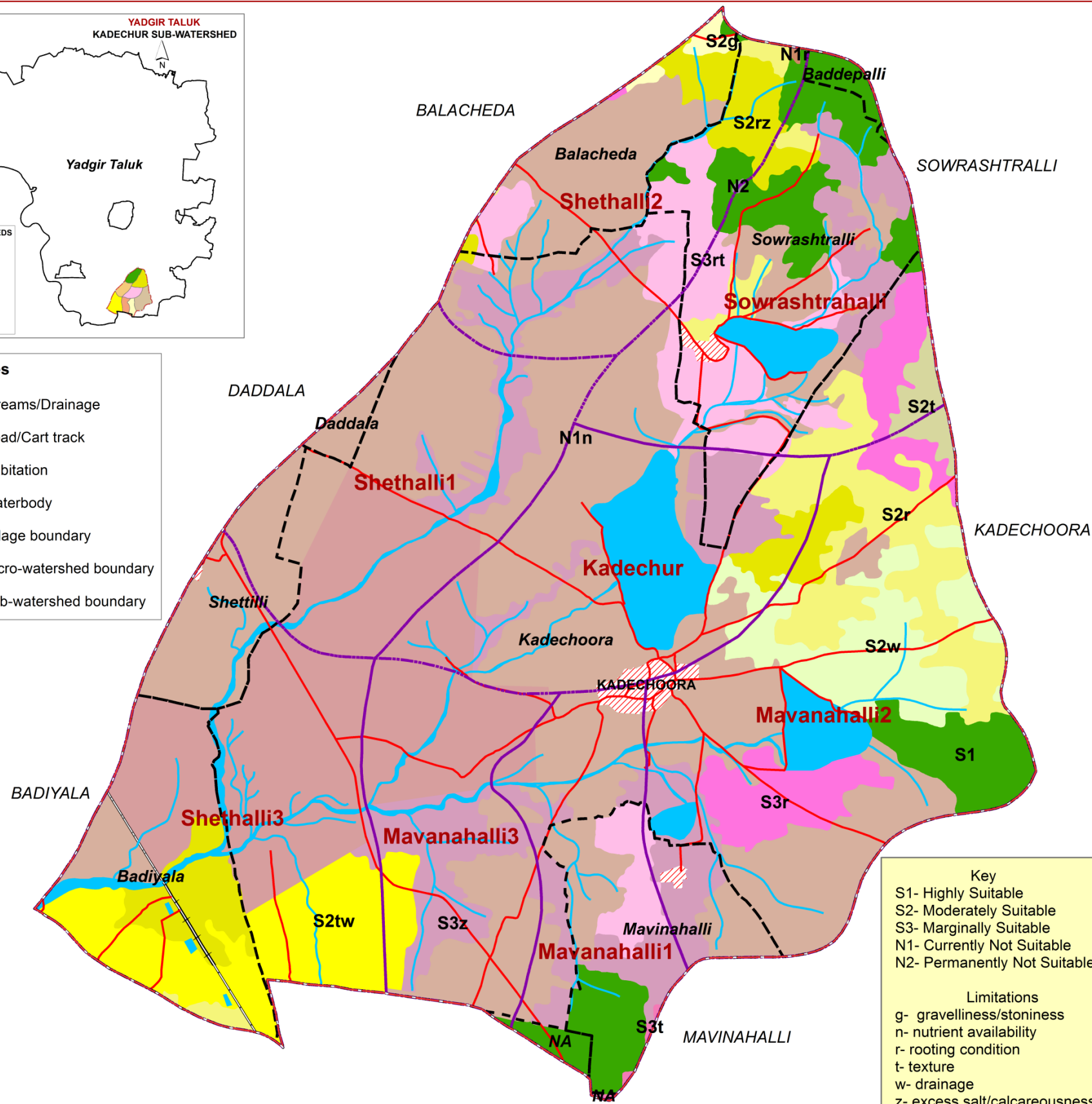
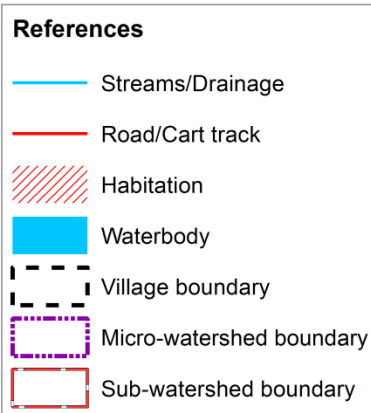
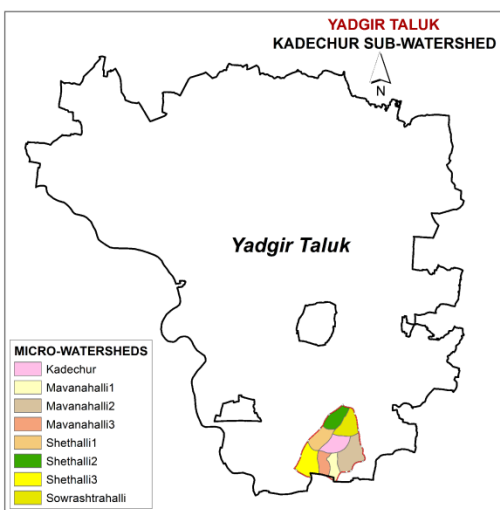


# 7.23. Land Suitability for Custard Apple



Source: ICAR-NBSS&LUP, Bengaluru

# 7.24. Land Suitability for Amla



Key

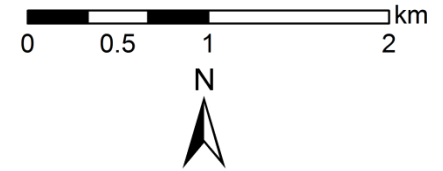
S1- Highly Suitable  
S2- Moderately Suitable  
S3- Marginally Suitable  
N1- Currently Not Suitable  
N2- Permanently Not Suitable

Limitations

g- gravelliness/stoniness  
n- nutrient availability  
r- rooting condition  
t- texture  
w- drainage  
z- excess salt/calcareousness

## LAND SUITABILITY FOR AMLA

**Kadechur Sub-watershed**  
(4D5B1Q : Area - 4609.21 ha)  
**YADGIR TALUK & DISTRICT**



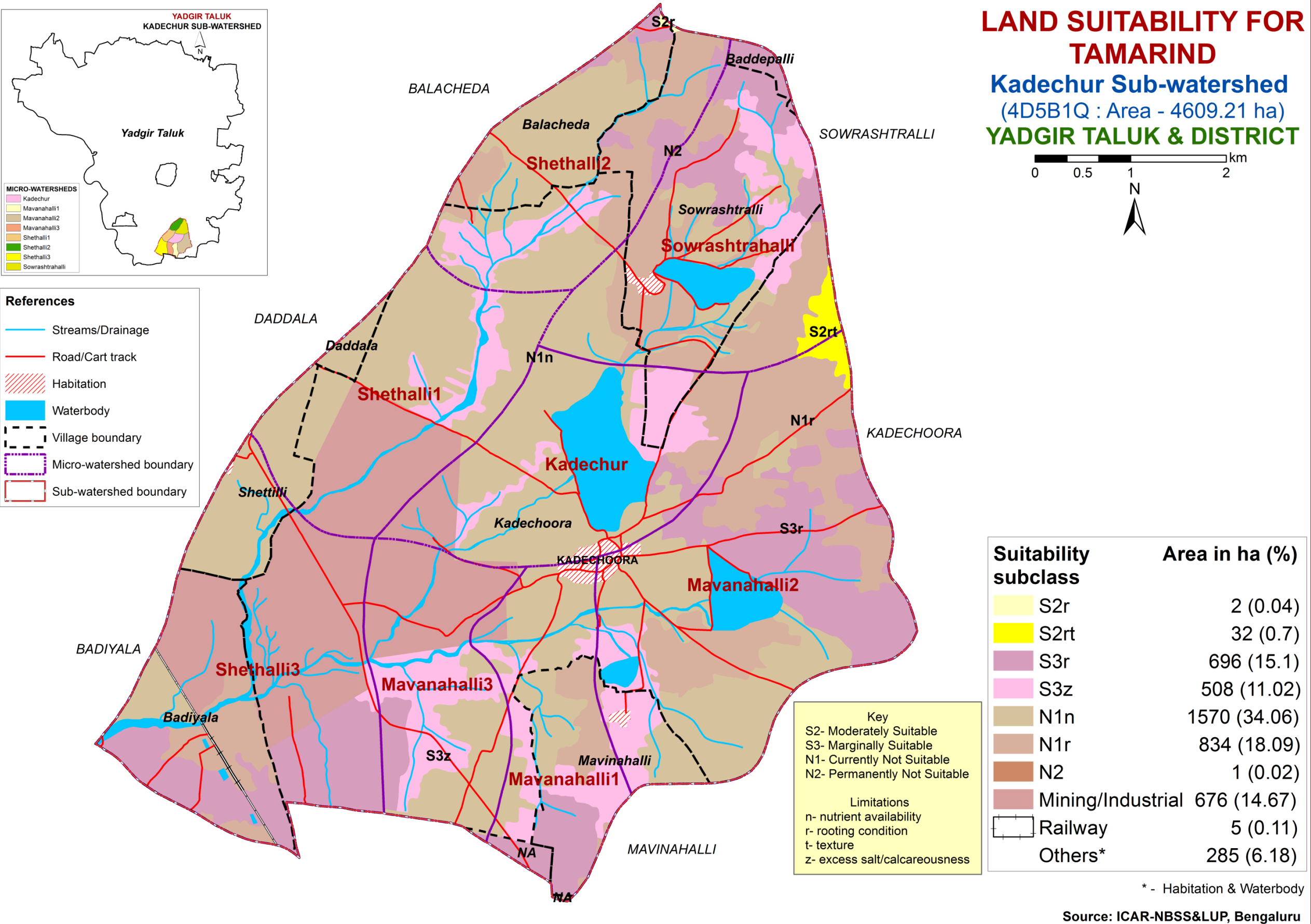
Suitability subclass	Area in ha (%)
S1	283 (6.15)
S2g	13 (0.28)
S2r	240 (5.21)
S2t	32 (0.7)
S2w	173 (3.75)
S2rz	188 (4.07)
S2tw	229 (4.97)
S3r	148 (3.22)
S3t	3 (0.07)
S3z	508 (11.02)
S3rt	254 (5.5)
N1n	1570 (34.06)
N1r	1 (0.02)
N2	1 (0.02)
Mining/Industrial	676 (14.67)
Railway	5 (0.11)
Others*	285 (6.18)

\* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

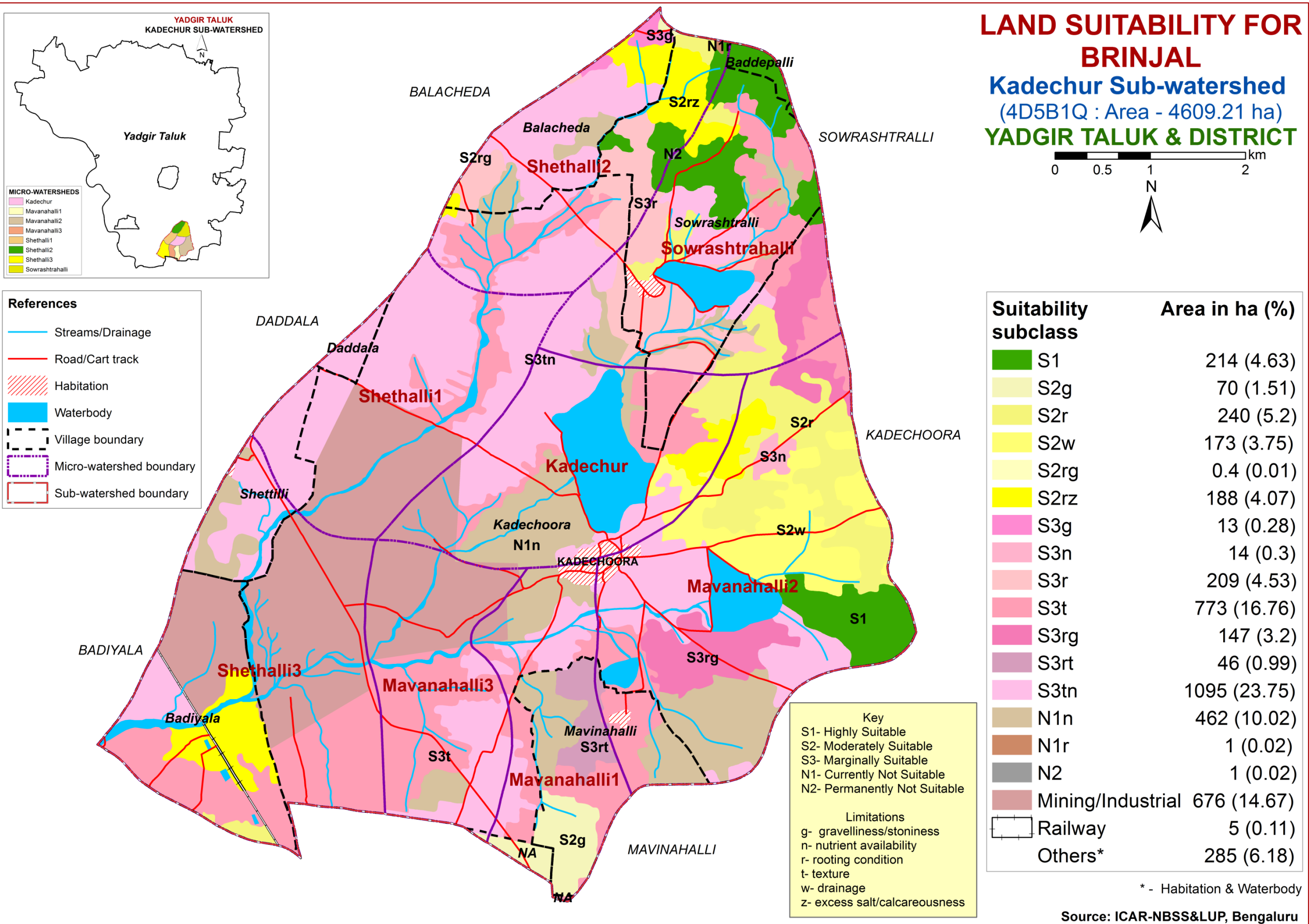


# 7.25. Land Suitability for Tamarind

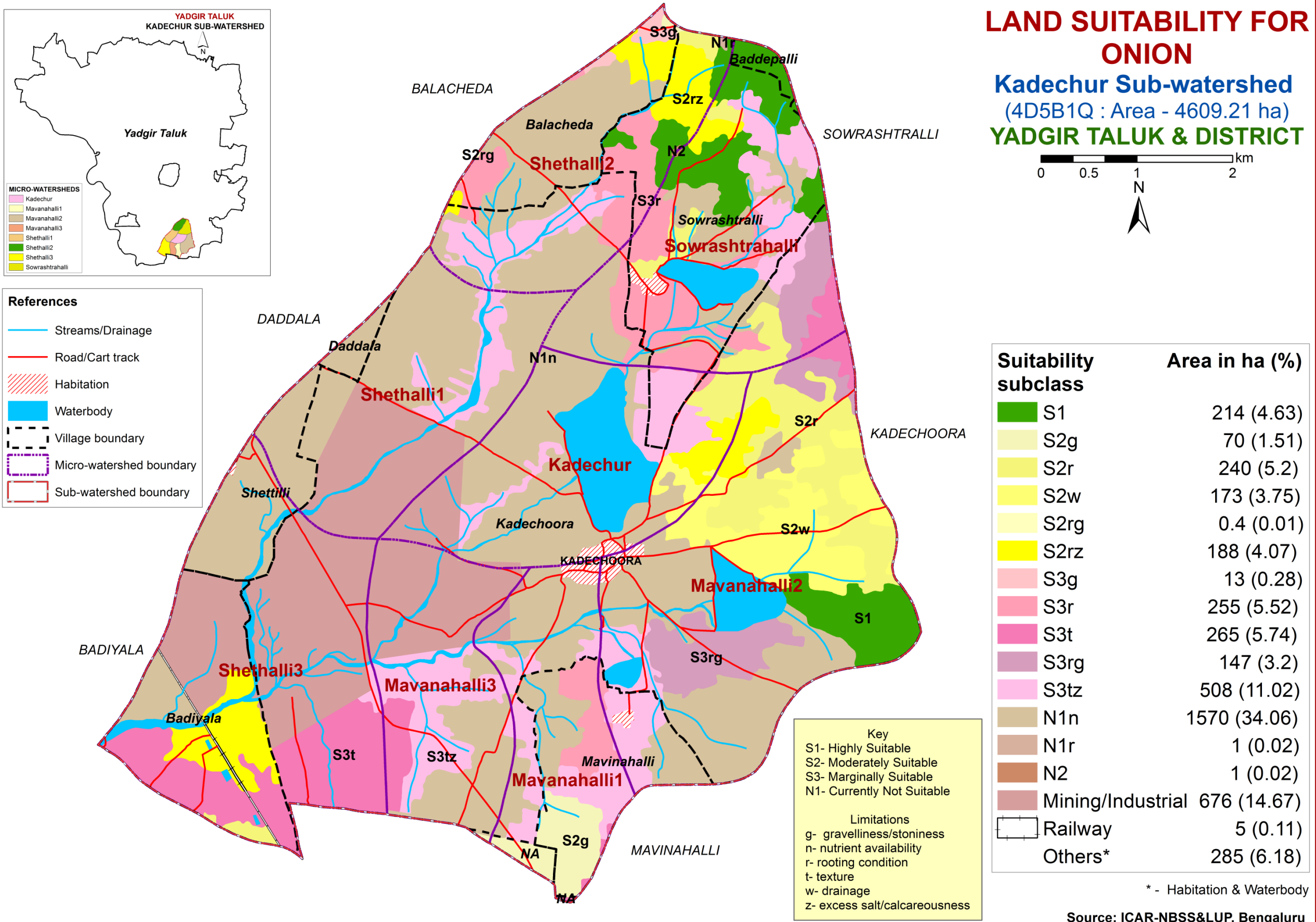




# 7.26. Land Suitability for Brinjal

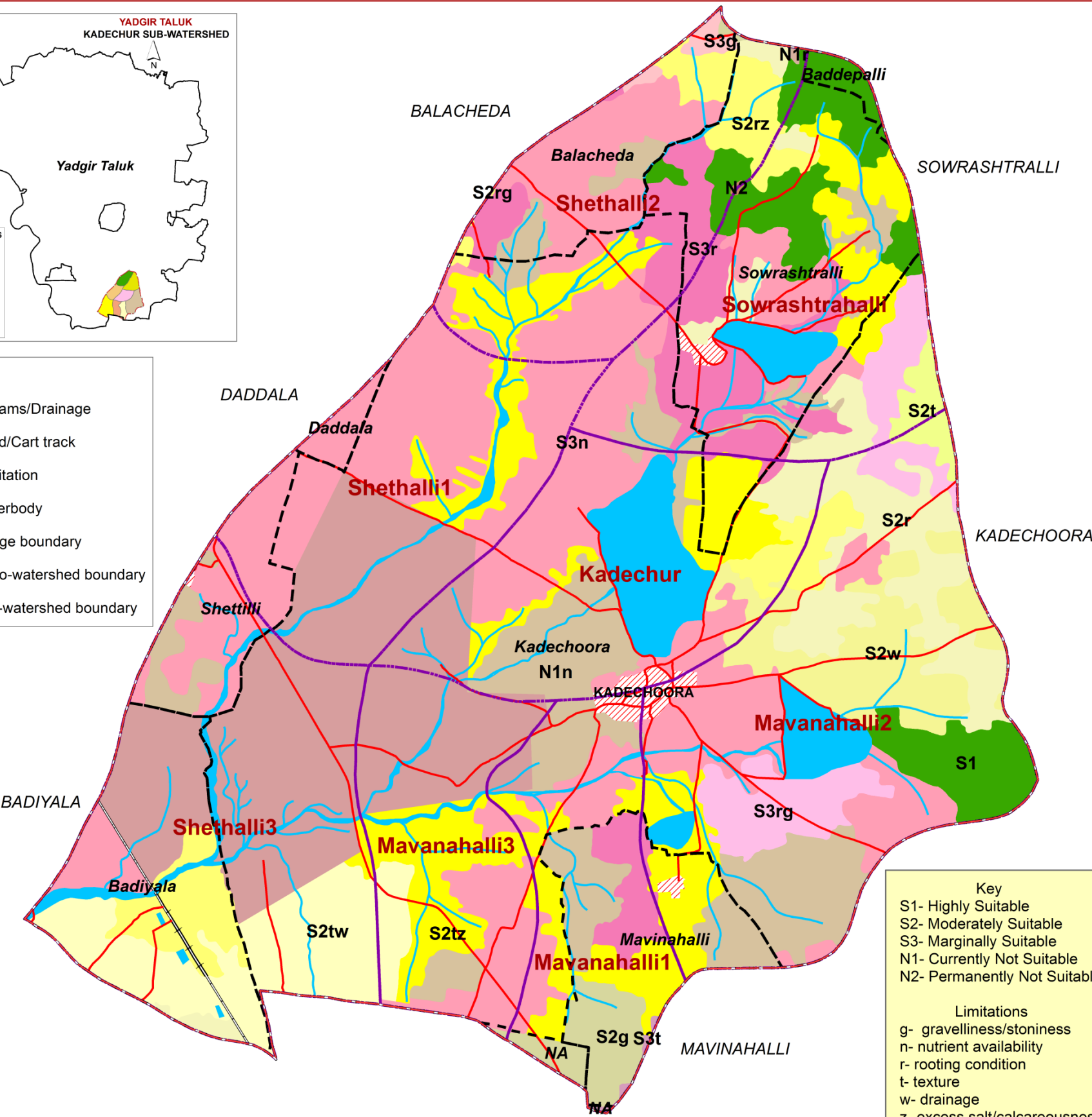
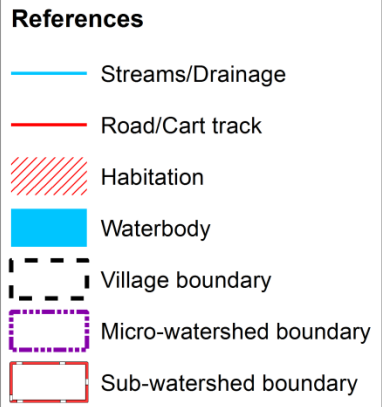
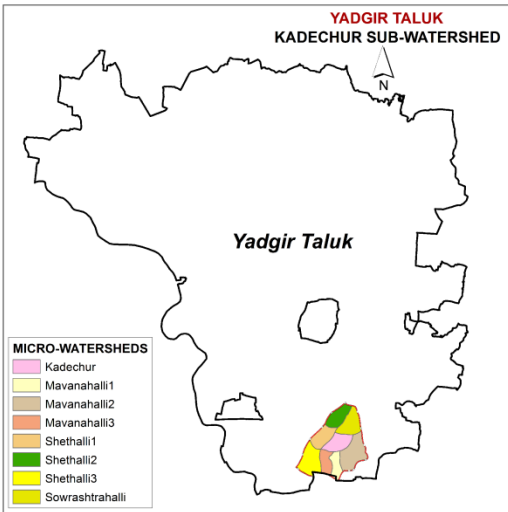


# 7.27. Land Suitability for Onion





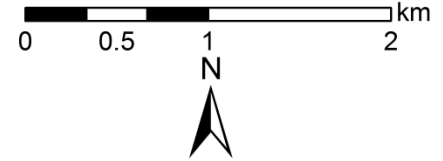
# 7.28. Land Suitability for Marigold



## LAND SUITABILITY FOR MARIGOLD

### Kadachur Sub-watershed (4D5B1Q : Area - 4609.21 ha)

### YADGIR TALUK & DISTRICT



Suitability subclass	Area in ha (%)
S1	214 (4.63)
S2g	70 (1.51)
S2r	240 (5.2)
S2t	32 (0.7)
S2w	173 (3.75)
S2rg	0.4 (0.01)
S2rz	188 (4.07)
S2tw	229 (4.97)
S2tz	508 (11.02)
S3g	13 (0.28)
S3n	1108 (24.04)
S3r	255 (5.52)
S3t	3 (0.07)
S3rg	147 (3.2)
N1n	462 (10.02)
N1r	1 (0.02)
N2	1 (0.02)
Mining/Industrial	676 (14.67)
Railway	5 (0.11)
Others*	285 (6.18)

**Key**

S1- Highly Suitable  
 S2- Moderately Suitable  
 S3- Marginally Suitable  
 N1- Currently Not Suitable  
 N2- Permanently Not Suitable

**Limitations**

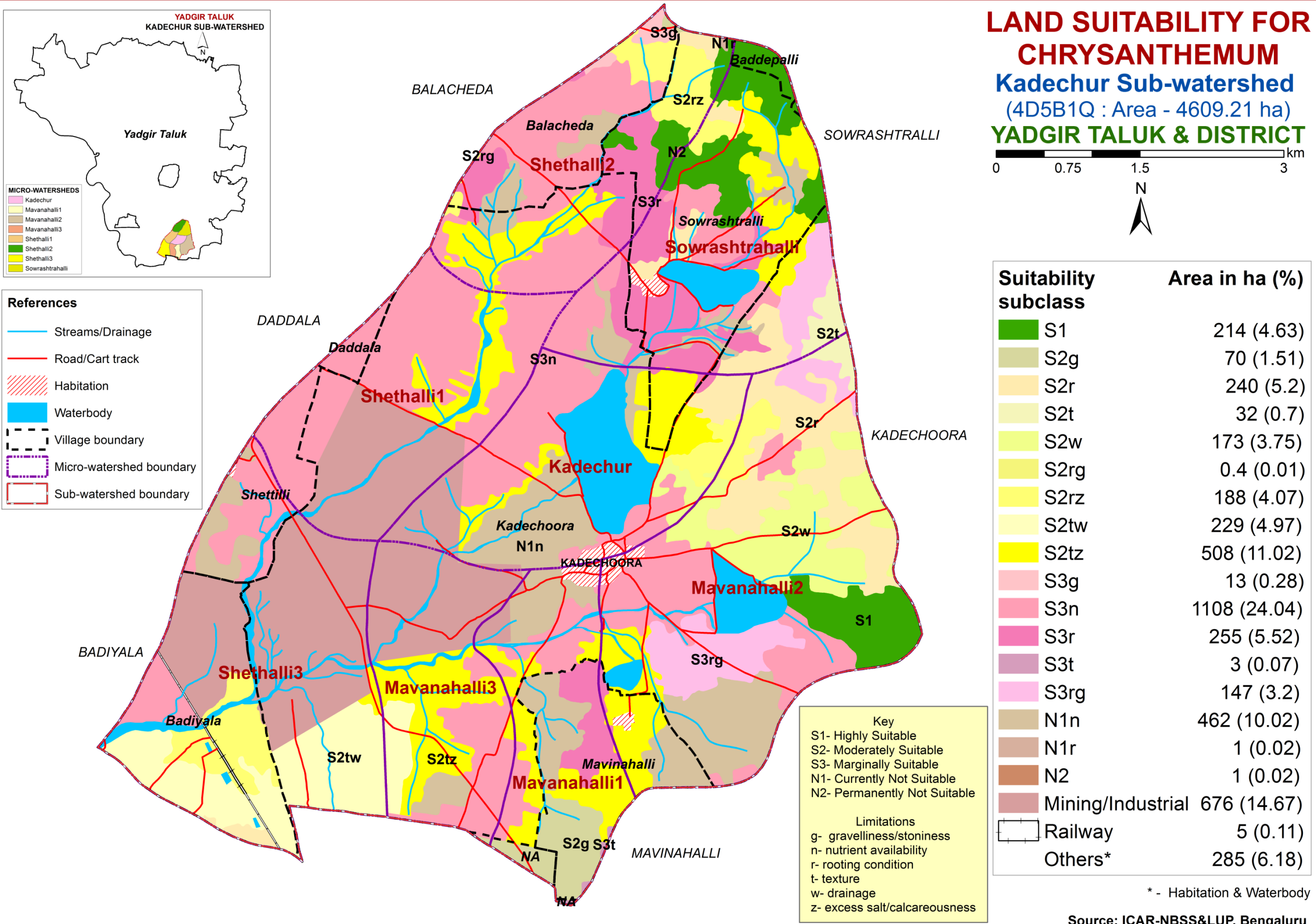
g- gravelliness/stoniness  
 n- nutrient availability  
 r- rooting condition  
 t- texture  
 w- drainage  
 z- excess salt/calcareousness

\* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

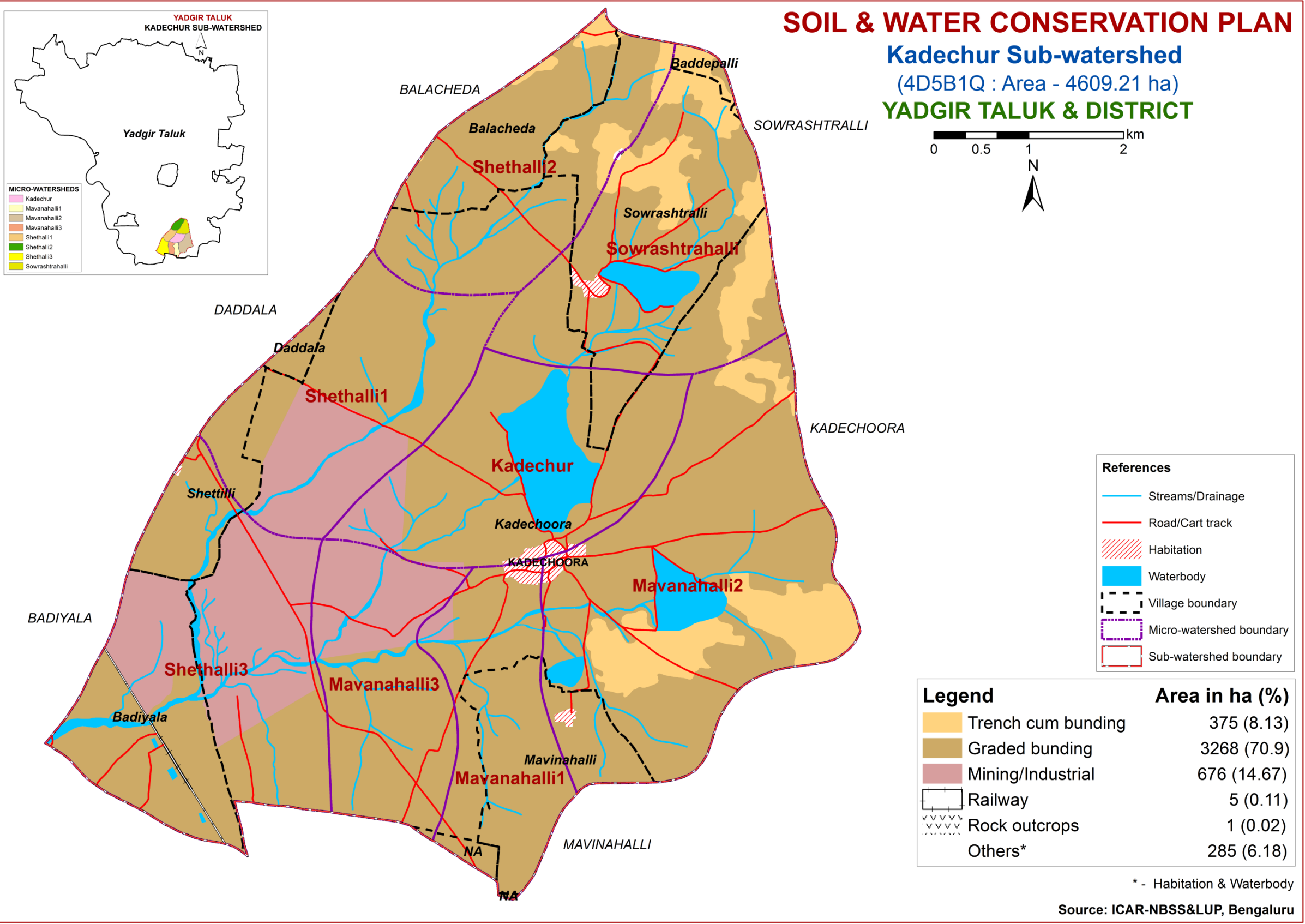


# 7.29. Land Suitability for Chrysanthemum



# 8. Soil and Water Conservation Measures

## 8.1. Soil & Water Conservation Plan



## 9. Table. Proposed Crop Plan for Kadachur Sub-watershed, Yadgir Taluk, Yadgir District based on soil-site–crop suitability Assessment

LMU. No	Soil Map Units	Field Crops/ Commercial crops	Horticulture Crops (Rainfed/Irrigated)	Suitable Interventions
1	52 ANRbB3 53 ANRhB2 55ANRiB2 56ANRiB3g1 150 GWDiB2g1 100VKSmB1 (Sodic soils)	-	<b>Agri-Silvi-Pasture</b> Ber, Aonla, Acacia sp, Dhaincha, Rhodes grass, Para grass ,Bermuda grass	Application of gypsum, iron pyrites and elemental sulphur. Addition of farm yard manures, green manures and providing subsurface drainage
2	50 BGDdB2 (Deep, black clay soils)	Maize, Sorghum, Sunflower, Groundnut, Red gram, Bajra, Bengal gram, safflower, linseed	<b>Fruit crops:</b> Musambi, Sapota, Pomegranate, Amla, Custard apple, Guava, Jackfruit, Lime <b>Vegetables:</b> Tomato, Onion, Bhendi, Chilli, Brinjal, Drumstick, Coriander <b>Flowers:</b> Marigold, Chrysanthemum	Application of FYM, Biofertilizers and micronutrients, drip irrigation, Mulching, suitable soil and water conservation practices
3	45.GDGB3g1 ( Deep, red sandy clay loams soils)	Sunflower, Sorghum, Maize, Groundnut, Red gram, Bajra	<b>Fruit crops:</b> Mango, Musambi, Sapota, Tamarind, Pomegranate, Amla, Custard apple, Guava, Jackfruit, Jamun, Lime <b>Vegetables:</b> Tomato, Onion, Bhendi, Chilli, Brinjal, Drumstick, Coriander <b>Flowers:</b> Marigold, Chrysanthemum	Application of FYM, Biofertilizers and micronutrients, drip irrigation, Mulching, suitable soil and water conservation practices
4	92.HGNcB2,95.HGNmB2 84.KDRcB2,87.KDRiB2 89.KDRmB2,59.MDRcB2 90.SWRcB2,91.SWRmB2 (Deep to very deep, strongly alkaline soils)	Sorghum, Maize, Bajra	<b>Agri-Silvi-Pasture</b> Ber, Aonla, Acacia sp, Dhaincha, Rhodes grass, Para grass ,Bermuda grass	Application of gypsum, iron pyrites and elemental sulphur. Addition of farm yard manures, green manures and providing subsurface drainage
5	111.HSLbB2,176.HSLcB2g2 82.MGLmB2,49.NGPmB2 79RHNmB2 (Moderately deep, black calcareous clay soils)	Maize, sorghum, Sunflower, Cotton, Red gram, Bengalgram, Bajra	<b>Fruit crops:</b> Lime, Musambi, Custard apple, Pomegranate <b>Vegetables:</b> Chilli, Bhendi <b>Flowers:</b> Marigold, Chrysanthemum	Application of FYM, Biofertilizers and micronutrients, drip irrigation, mulching, suitable soil and water conservation practices
6	39. KBDdB3 (Moderately deep, red gravelly sandy clay loam soils)	Groundnut, Bajra, Horse gram, Castor, Mulberry	<b>Fruit crops:</b> Musambi, Lime, Jamun, Jackfruit, Amla, Custard apple, Tamarind <b>Vegetable crops:</b> Drumstick, Curry leaves	Drip irrigation, mulching, suitable soil and water conservation practises (Crescent Bunding with Catch Pit etc)
7	37.BLCcB2,38BLCiB2 40.PGPcB2,41PGPiB2 (Moderately deep, red sandy clay to sandy clay loams oils)	Sunflower, Sorghum, Maize, Groundnut, Red gram, Bajra	<b>Fruit crops:</b> Mango, Musambi, Sapota, Tamarind, Pomegranate, Amla, Custard apple, Guava, Jackfruit, Jamun, Lime <b>Vegetables:</b> Tomato, Onion, Bhendi, Chilli, Brinjal, Drumstick, Coriander <b>Flowers:</b> Marigold, Chrysanthemum	Application of FYM, Biofertilizers and micronutrients, drip irrigation, Mulching, suitable soil and water conservation practices



LMU. No	Soil Map Units	Field Crops/ Commercial crops	Horticulture Crops (Rainfed/Irrigated)	Suitable Interventions
8	116 KDHiB2 (Moderately deep, lowland sandy clay soils)	Maize, Sorghum, Sunflower, Groundnut, Red gram, Bajra	<b>Fruit crops:</b> Amla, Tamarind <b>Vegetables:</b> Tomato, Onion, Bhendi, Chilli, Brinjal, Drumstick,, Coriander <b>Flowers:</b> Marigold, Chrysanthemum	Providing proper drainage, addition of organic manures, green leaf manuring, suitable conservation practises
9	15.HLGbB3, 16.HLGcB2 17.HLGiB2, 18.HLGiB2g1 20.JNKcB2, 22.JNKiB2 70. RMPcB2 (Moderately shallow, sandy clay loam soils)	Maize, sorghum Groundnut, Bajra	<b>Fruit crops:</b> Amla, Custard apple <b>Vegetables:</b> Tomato, Chilli, Brinjal, Bhendi, Onion <b>Flowers:</b> Marigold, Chrysanthemum	Application of FYM, Biofertilizers and micronutrients, drip irrigation, Mulching, suitable soil and water conservation practices
10	125.SBRhB2 (Moderately shallow, loamy sand soils)	-	<b>Agri-Silvi-Pasture:</b> Hybrid Napier, <i>Styloxanthes hamata</i> , <i>Styloxanthes scabra</i>	Application of FYM, Biofertilizers and micronutrients, drip irrigation, Mulching, suitable soil and water conservation practices
11	29.YLRcB2g1 (Moderately shallow, red clay soils)	Maize, sorghum Groundnut, Bajra, Cotton	<b>Fruit crops:</b> Amla, Custard apple <b>Vegetables:</b> Tomato, Chilli, Brinjal, Bhendi, Onion <b>Flowers:</b> Marigold, Chrysanthemum	Application of FYM, Biofertilizers and micronutrients, drip irrigation, Mulching, suitable soil and water conservation practices
12	2BDLbB2, 5BDLiB2 108DSBiB2, 161HTKbB2g1 9VNKcB2 (Shallow ,soils)	-	Custard apple, Hybrid Napier, <i>Styloxanthes hamata</i> , <i>Styloxanthes scabra</i>	Use of short duration varieties, sowing across the slope
13	120BDPhB2 (Very shallow soils)	-	<i>Styloxanthes hamata</i> , <i>Styloxanthes scabra</i>	Use of short duration varieties, sowing across the slope

## **PART-B**

# **Hydrological Inventory of Kadechur Sub-watershed, Yadgir Taluk, Yadgir District, Karnataka for Watershed Planning and Development**



**Sujala - III**

**Karnataka Watershed Development Project-II  
Watershed Development Department  
Government of Karnataka**



# Hydrological Inventory of Kadechur Sub-watershed, Yadgir Taluk, Yadgir District, Karnataka for Watershed Planning and Development



ICAR - NBSS & LUP

**Prepared by**

**ICAR-National Bureau of Soil Survey and Land Use Planning  
Regional Centre, Hebbal, Bangalore - 560 024**

**Phone:080-23412242**

**E-mail: [hd\\_rcb.nbsslup@icar.gov.in](mailto:hd_rcb.nbsslup@icar.gov.in)  
[nbssrcb@gmail.com](mailto:nbssrcb@gmail.com)**





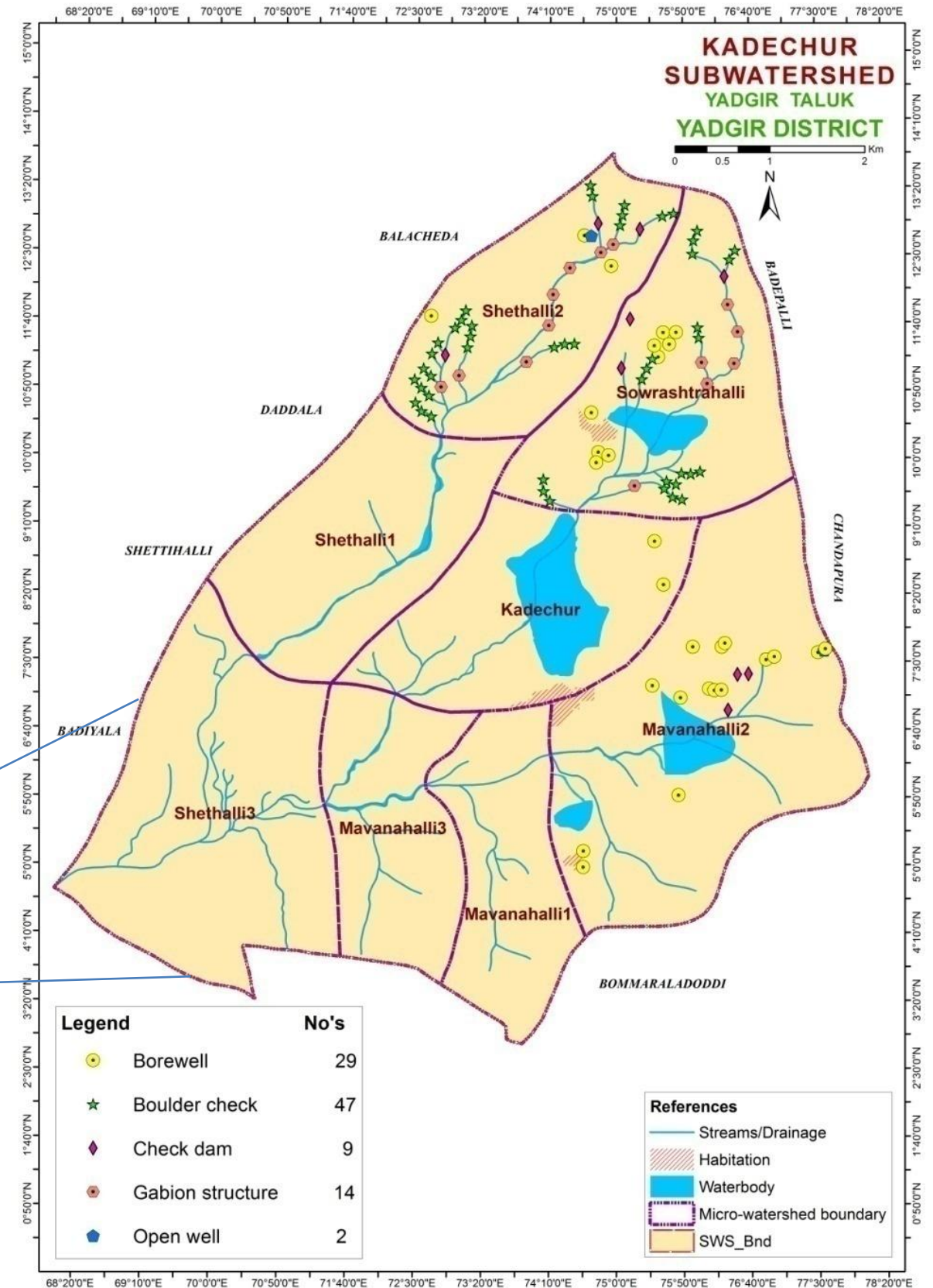
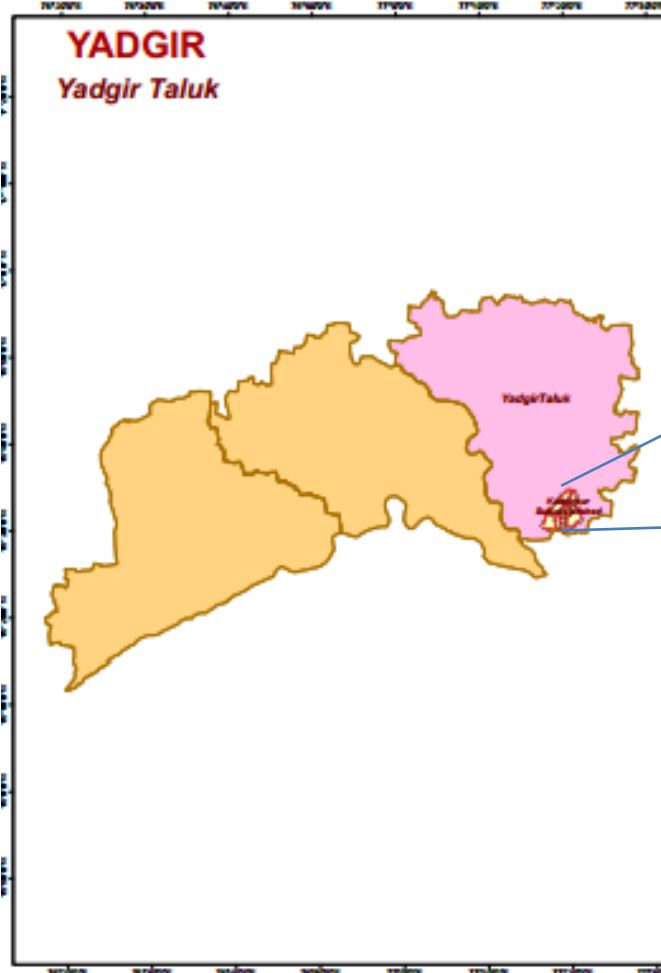
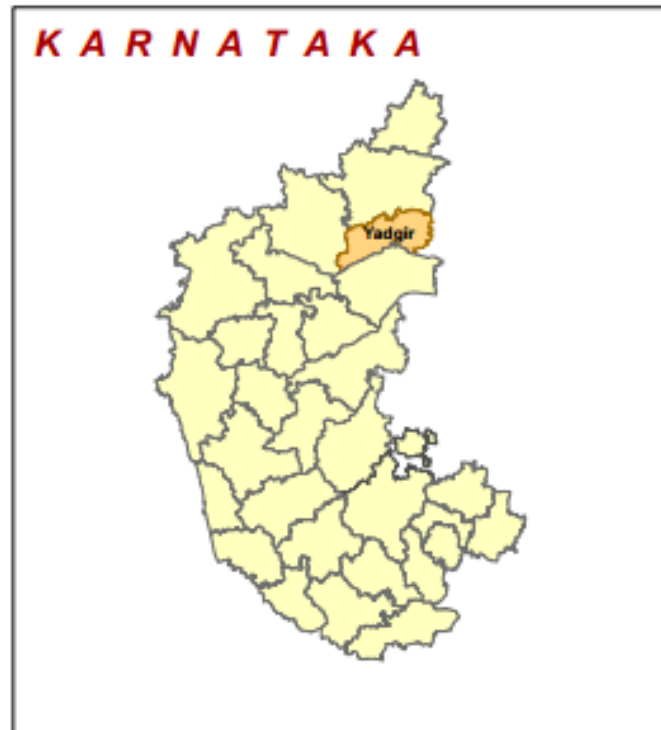
# Details of Hydrology Team of LRI Partner Responsible for Preparation of Atlas

Name	Designation
Dr. Rajendra Hegde	Principal Scientist & Head Coordinator
Dr. S. Srinivas	Principal Scientist
Dr. K .V. Niranjana	Chief Technical Officer
Sh. R.S.Reddy	Consultant
Sh. A.G.Devendra Prasad	Consultant
Smt. K.Karunya Lakshmi	Research Associate
Ms. Seema, K.V.	Senior Research Fellow
Dr. Sekhar Muddu (Reviewed and approved)	Professor & Lead Scientist, Dept. of Civil Engineering & ICWaR, IISc, Bangalore
<p style="text-align: right;"><b>Email:</b> <a href="mailto:hd_rcb.nbsslup@icar.gov.in">hd_rcb.nbsslup@icar.gov.in</a> <a href="mailto:nbssrcb@gmail.com">nbssrcb@gmail.com</a> <b>Phone: Office:</b> 080-23412242,23410993 <b>Fax:</b> 080-23510350</p>	

## INTRODUCTION

- The inventory and documentation of spatial and temporal changes in hydrological components of Kadechur sub-watershed (4D5B1Q) in Yadgir Taluk, Yadgir District, has been undertaken for integrated planning, development and management.
- Kadechur sub-watershed (Yadgir Taluk, Yadgir District) is located between  $16^{\circ}29'8''$ – $16^{\circ}34'17''$  North latitudes and  $77^{\circ}16'41''$ – $77^{\circ}21'39''$  East longitudes, covering an area of about 4607 ha.
- This sub-watershed encompasses of 8 MWs namely Kadechur (4D5B1Q1b), Mavanahalli-1 (4D5B1Q1d), Mavanahalli-2 (4D5B1Q1c), Mavanahalli-3 (4D5B1Q1e), Shethalli-1 (4D5B1Q2b), Shethalli-2 (4D5B1Q2a), Shethalli-3 (4D5B1Q2c) and Sowrashtrahalli (4D5B1Q1a). Land Resource Inventory (LRI) was generated for all the eight micro-watersheds .
- Average annual rainfall (1960-2014) of the Hobli (Block) pertaining to the sub-watershed is 887 mm.
- In this sub-watershed major *kharif* crops grown are Maize, Cotton, Sunflower, Groundnut, Red gram, Chilly, Soybean , Paddy and major *rabi* crops are Sorghum, Bengalgram, Bajra.
- Hydrological components namely rainfall (annual, *kharif*, *rabi* and summer), PET, AET, runoff, surface soil moisture, ground water status and water balance are presented.

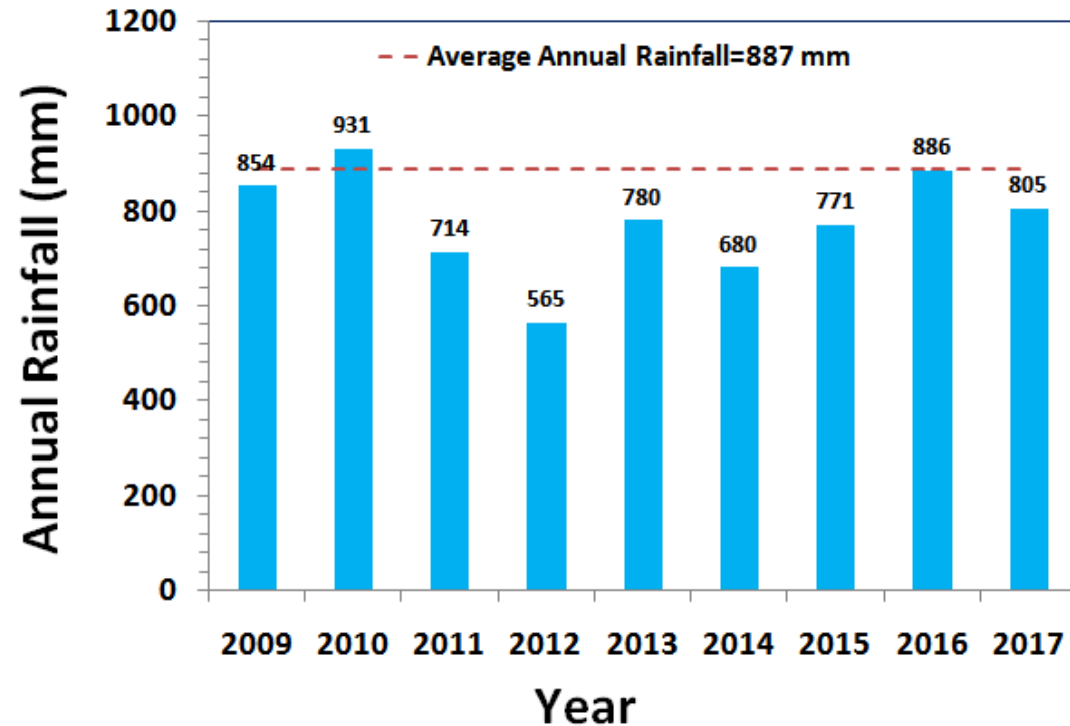
# LOCATION MAP OF KADECHUR SUB-WATERSHED



Soil & Water Conservation Structures in Kadechur sub-watershed, Yadgir Taluk, Yadgir District

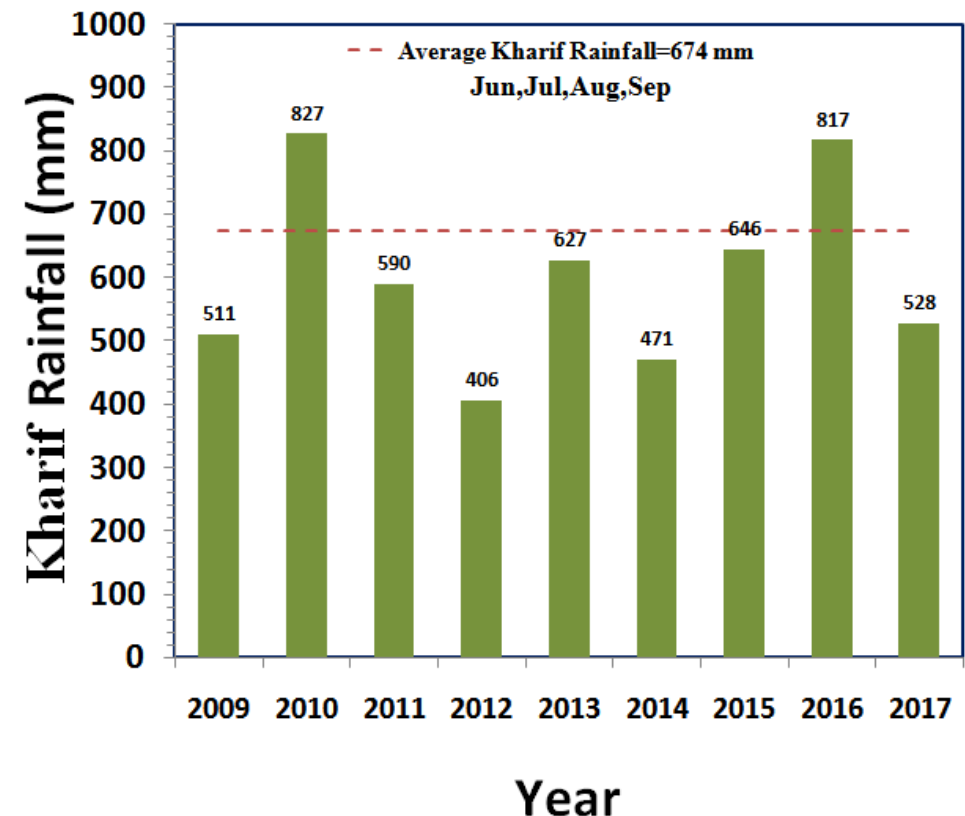


## RAINFALL INDEX

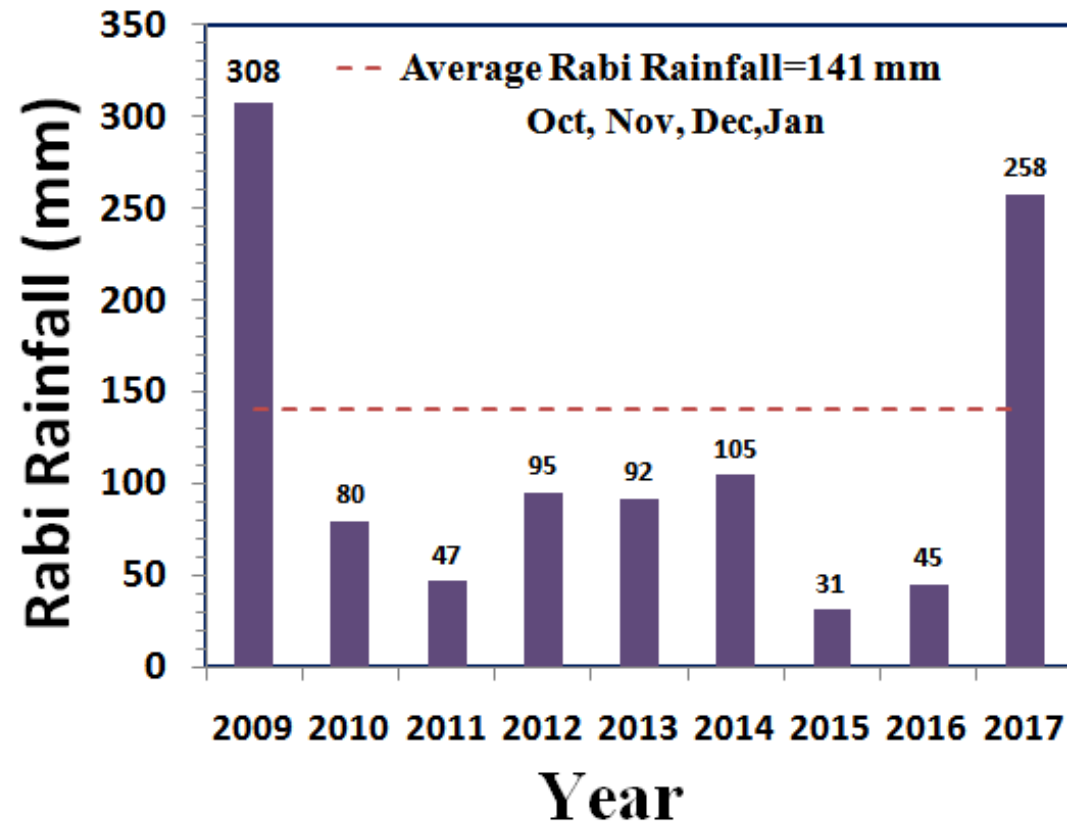


The average annual rainfall (1960-2014) recorded at the Yadgir station in Yadgir taluk of Yadgir district is 887 mm. The annual rainfall at Saidapur station (Hobli H.Q.) is presented. During the years 2009, 2011, 2012, 2013, 2014, 2015 and 2017 the annual rainfall was deficient by 5%, 27%, 51%, 17%, 33%, 18% and 13% respectively.

The *kharif* rainfall (Jun–Sep) is an average about 77% of the annual rainfall and it typically follows the annual rainfall patterns. During the years 2009, 2011, 2012, 2013, 2014, 2015 and 2017 the *kharif* rainfall was deficient by 24%, 12%, 40%, 7%, 30%, 4%, and 22% respectively.

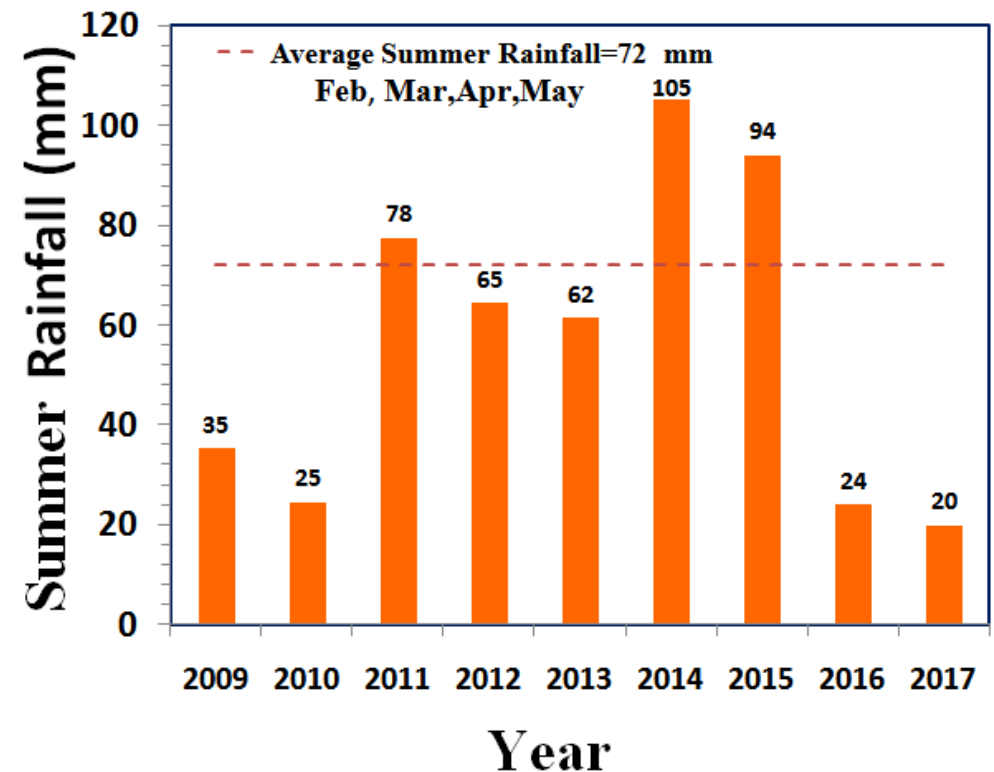


# RAINFALL INDEX

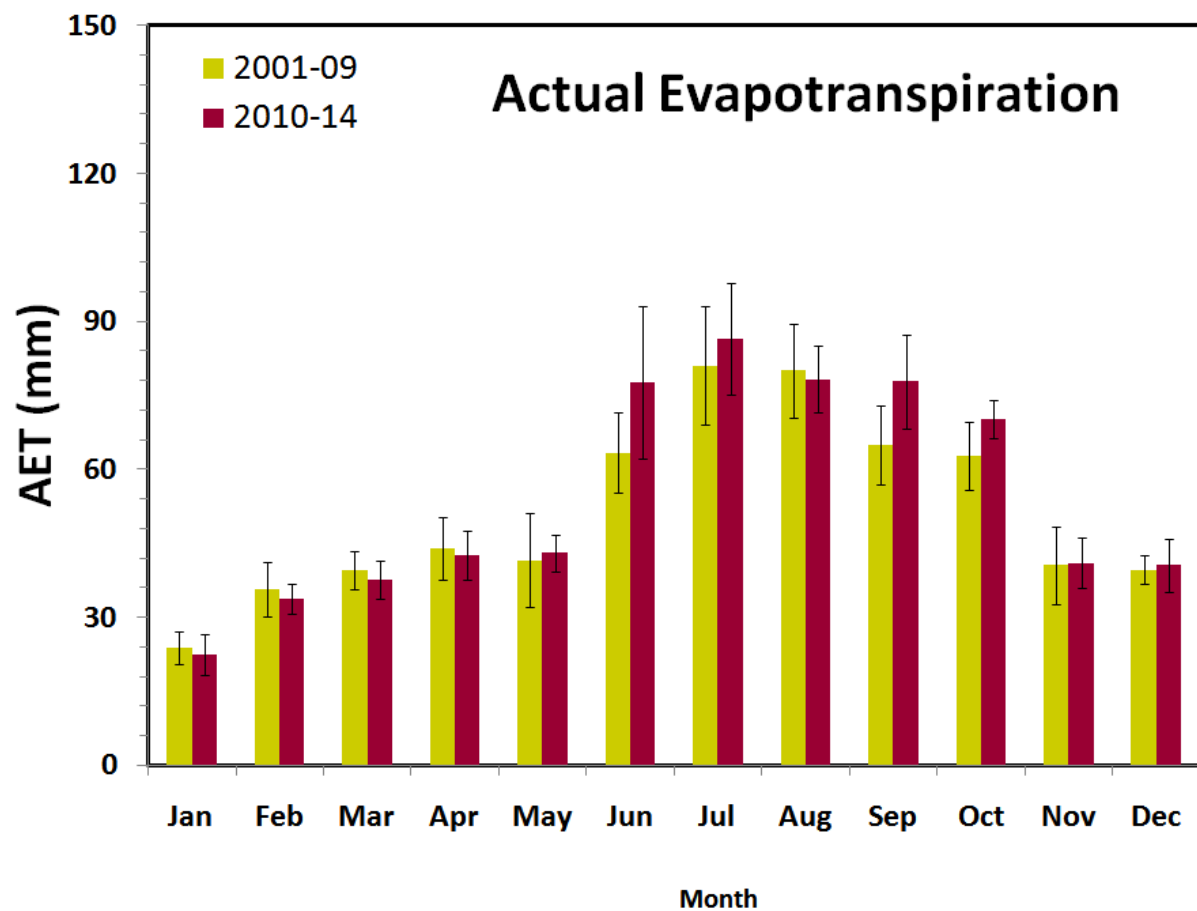
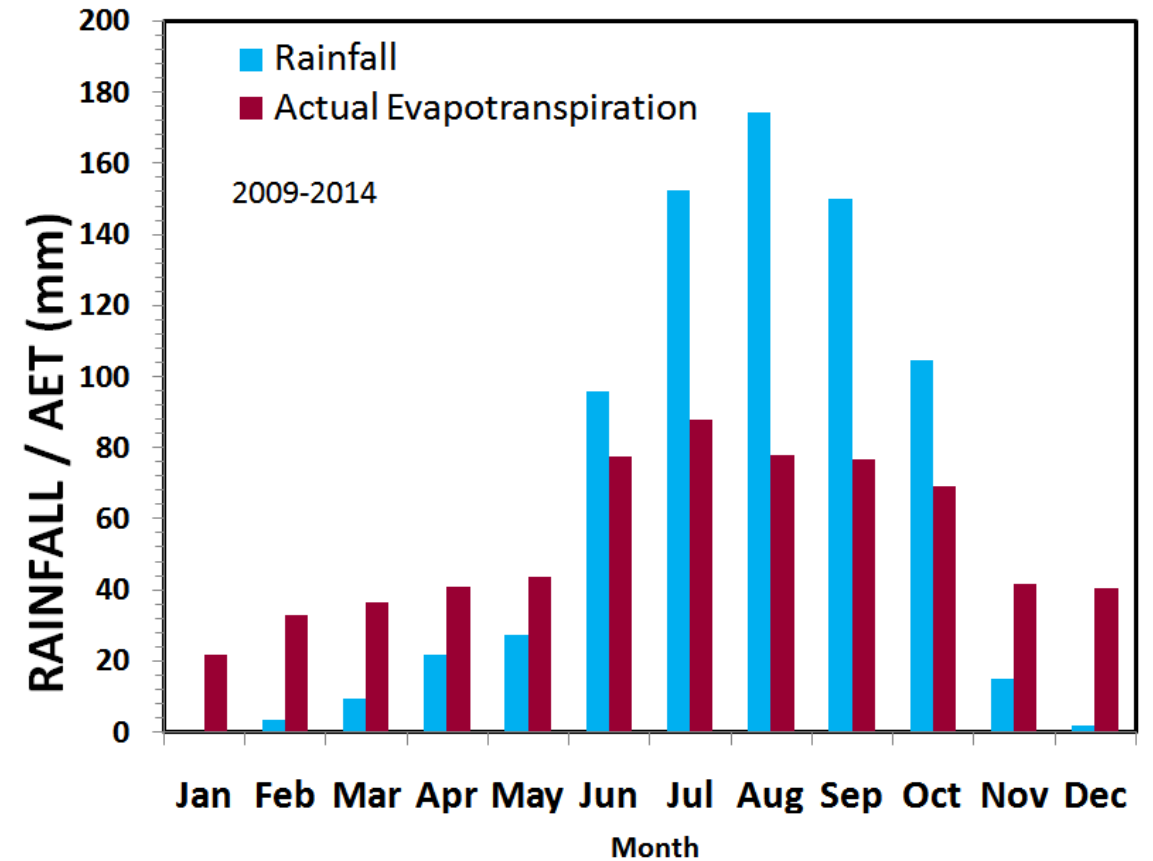
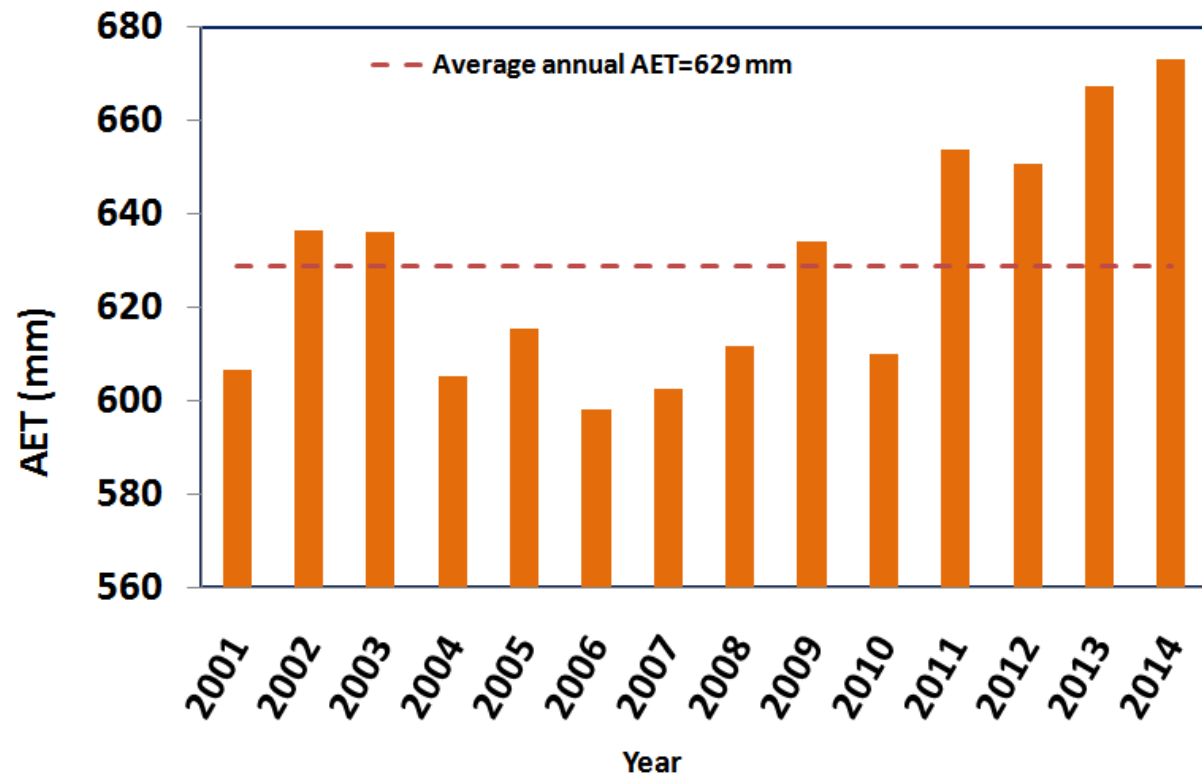


The average *rabi* rainfall (Oct-Jan) is about 15% of the average annual rainfall. During the years 2009 and 2017 high *rabi* rainfall was received, where as other years showed deficient rainfall.

The average summer rainfall (Feb-May) is about 8% of the average annual rainfall.



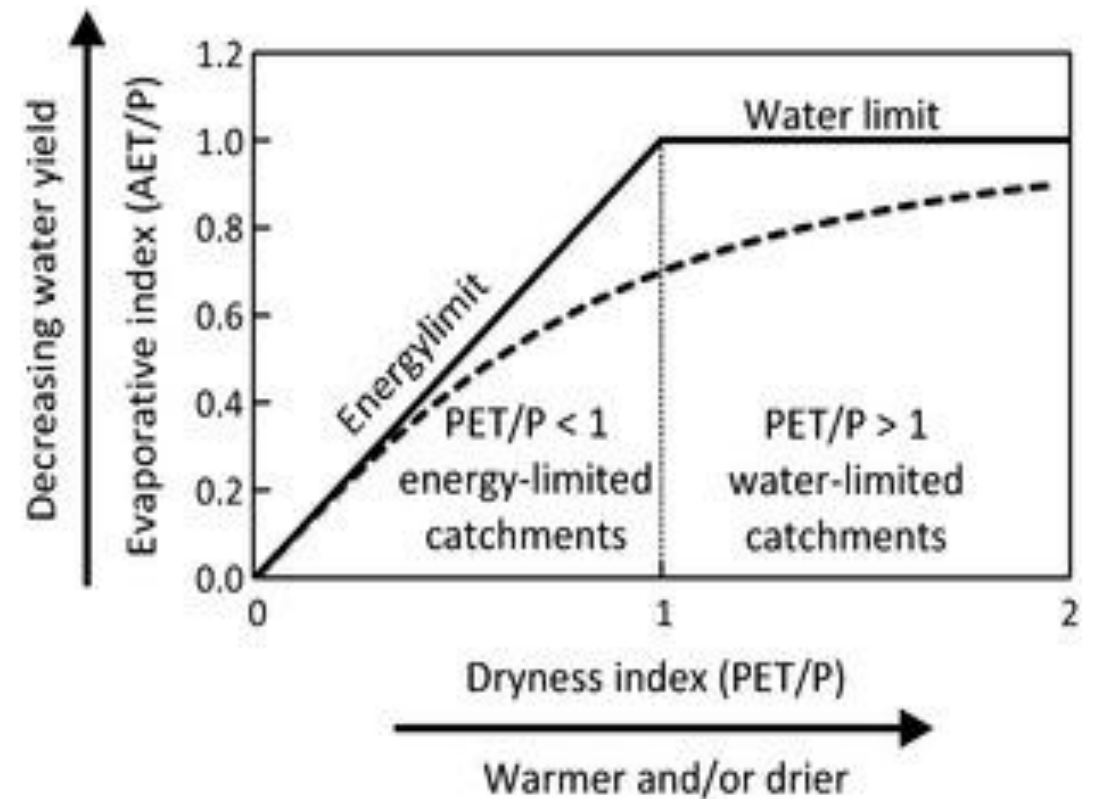
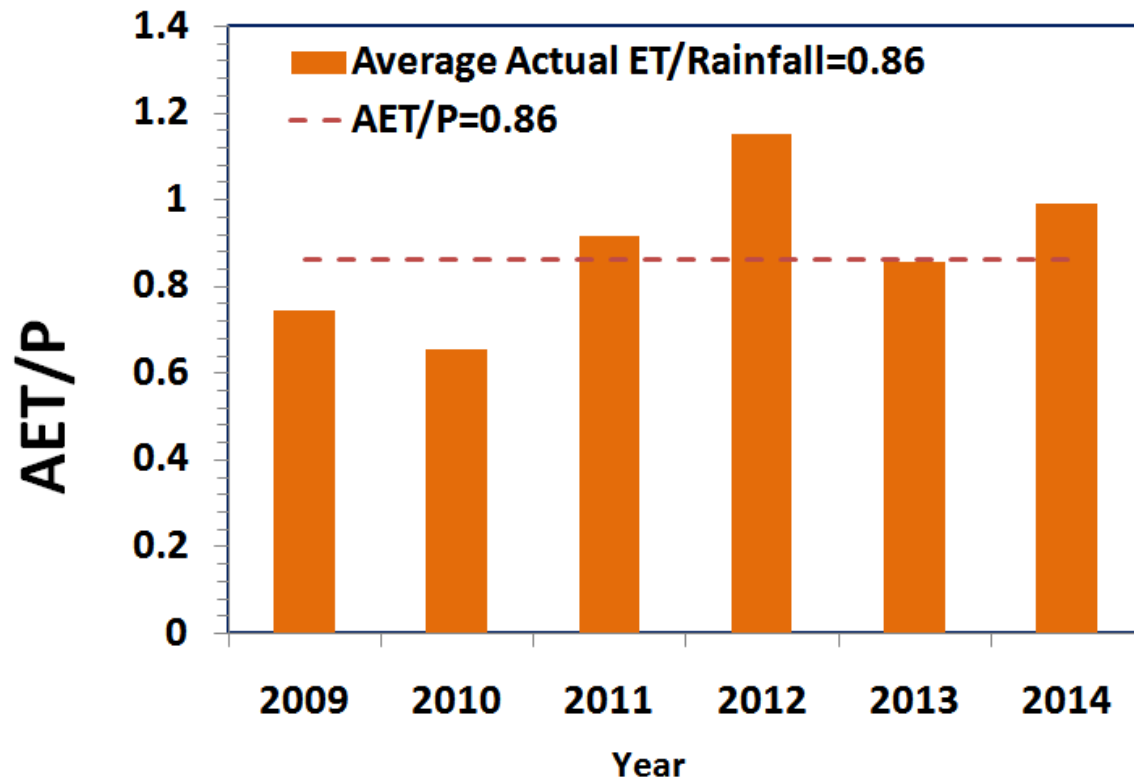
# EVAPOTRANSPIRATION



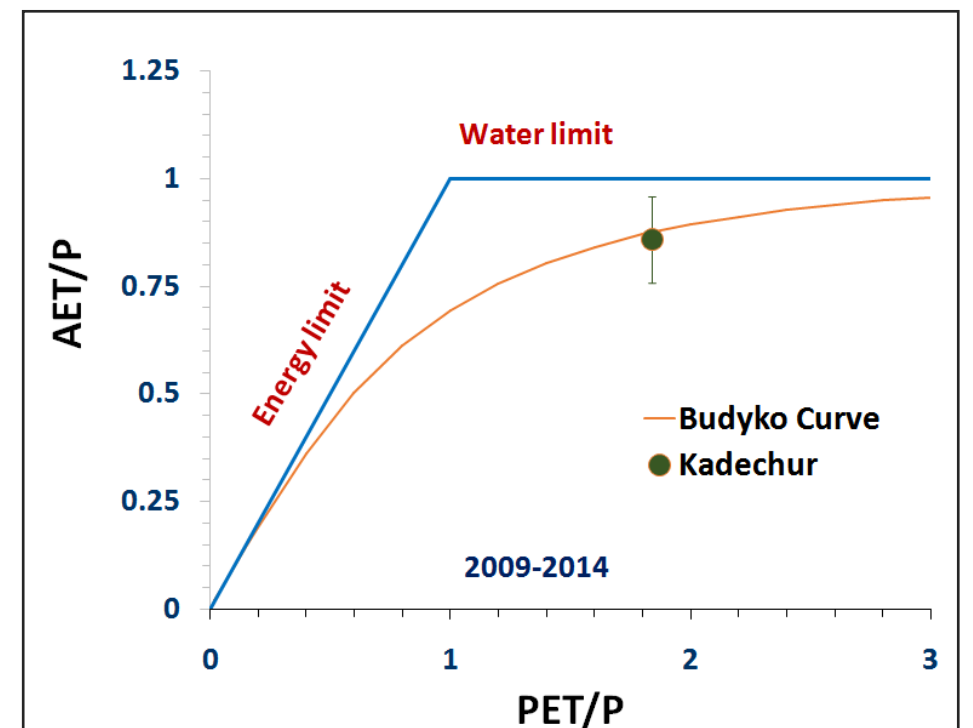
The average annual actual ET is lower than the average rainfall. During *kharif*, average rainfall and AET was found to be 674 mm and 320 mm respectively, whereas in *rabi* it was about 141 mm and 173 mm. The annual ET increased by 5% during 2010-2014 compared to 2001-2009 .



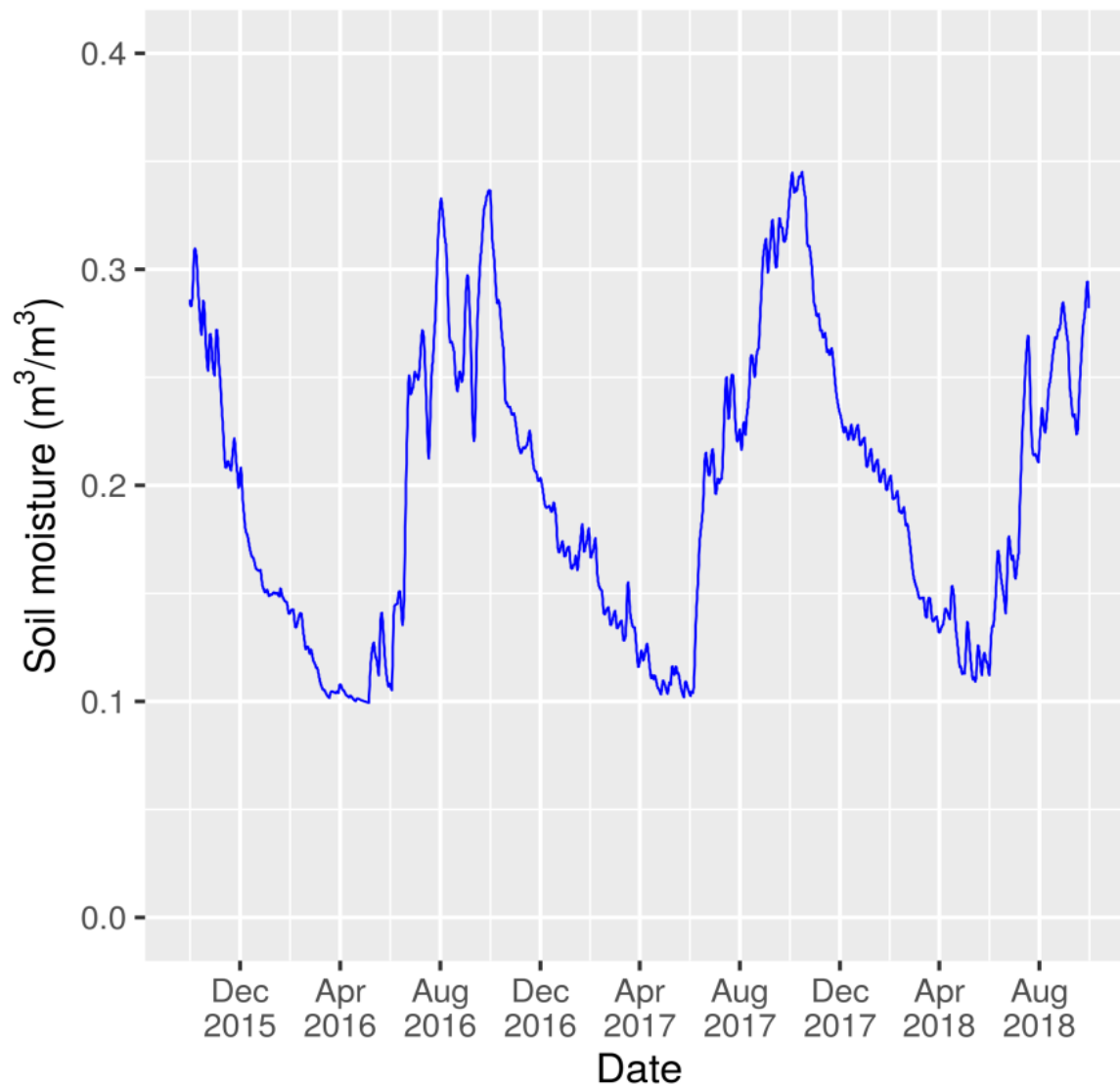
# EVAPOTRANSPIRATION INDEX



The average AET/P ratio was about 86%, which is slightly higher than the sustainable limit of about 80%. Even during extremely lower rainfall year of 2012, AET was 630 mm. This suggests the presence of water storage and utilization from other sources such as groundwater, which buffered the lower rainfall.

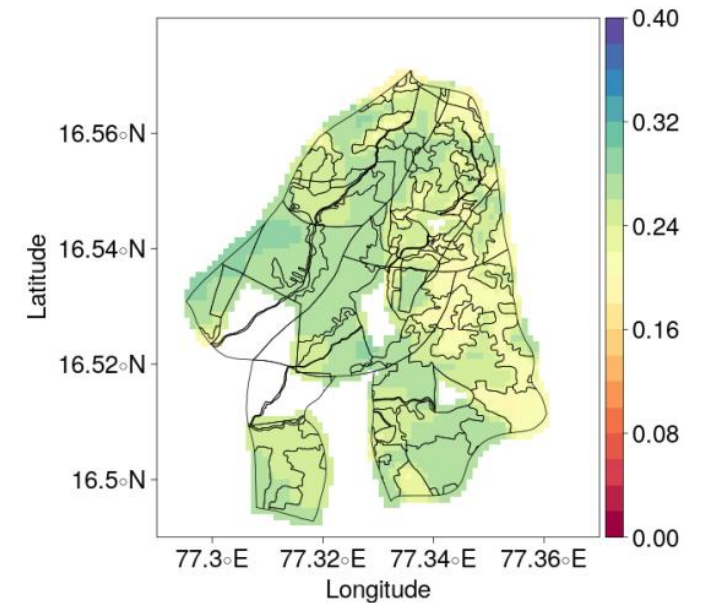


# SATELLITE RETRIEVED SOIL MOISTURE

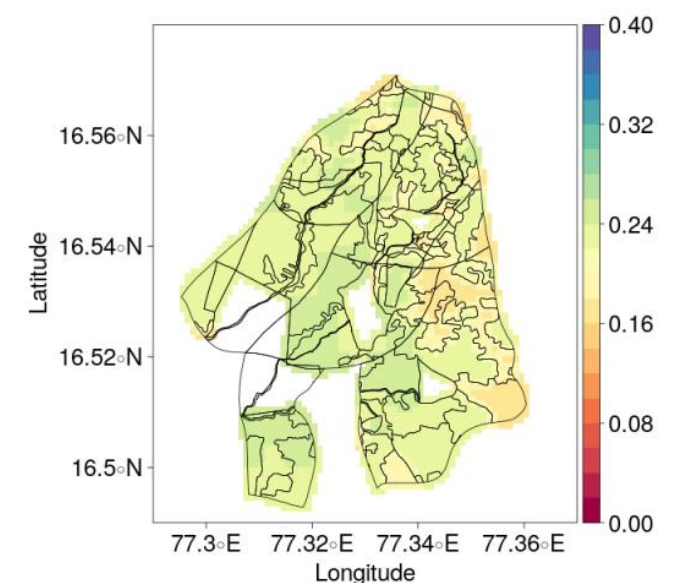


The method developed for retrieving soil moisture from multi-satellite observations allowed to map surface soil moisture behavior in the micro-watershed. The available surface moisture was varied in the range of 14-29 % in *kharif* and 15-33% in *rabi* seasons of 2016 and 12-32% in *Kharif* and 17-34% in *rabi* seasons of 2017.

Kadachur– Rabi Soil Moisture

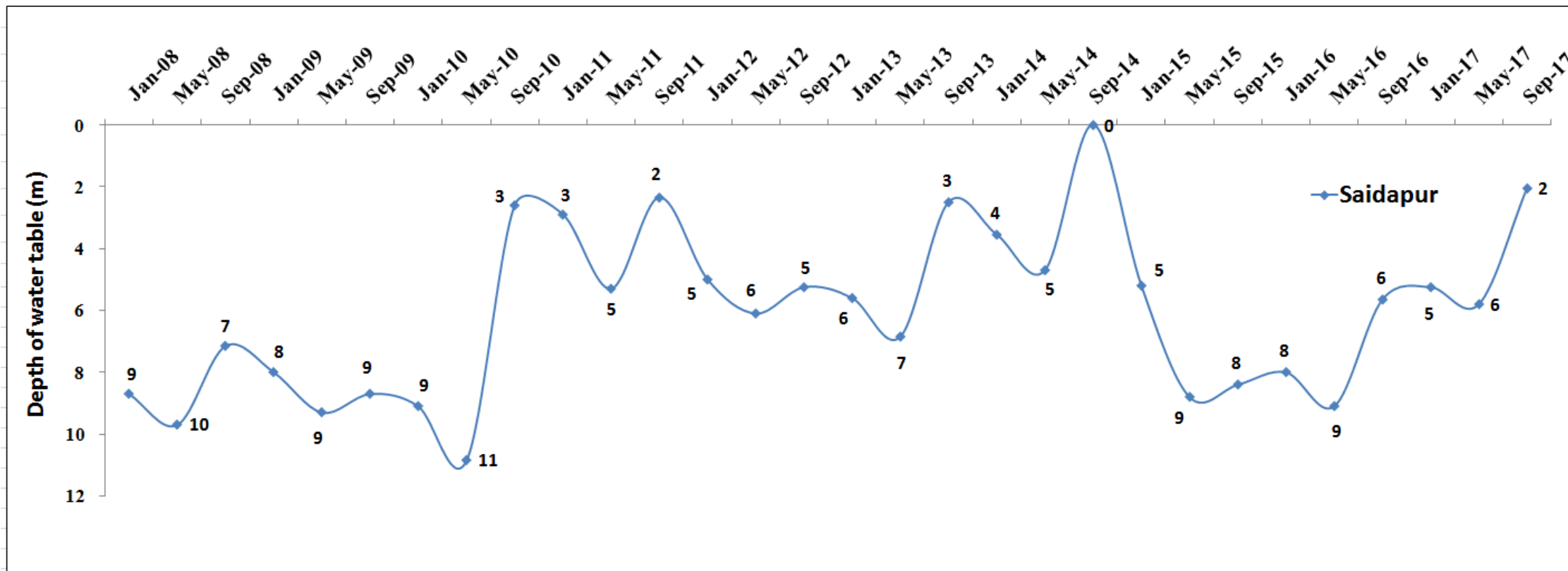


Kadachur– Kharif Soil Moisture



# GROUND WATER STATUS

## SAIDAPUR STATION



The total number of wells present in Kadechur Sub-watershed as per LRI data is 31 wells ( 29 Bore Wells & 2 Open wells ). The groundwater level shown above is from the data obtained from Dept. of Mines & Geology for the nearest station Saidapur. The graph depicts the groundwater level during the years 2008-2017 were slightly varying, where as during the year 2014 was found constant.



## SUMMARY

- The average annual rainfall of 887 mm in the Kadechur sub-watershed as recorded from the Saidapur station data.
- 77%, 15% and 8% of the annual rainfall occurs during *kharif*, *rabi* and summer seasons respectively and exhibited a higher temporal variability.
- The evapotranspiration estimation tool developed indicates that the watershed water balance is in sustainable condition.
- The total number of wells present in Kadechur Sub-watershed as per LRI data is 31 wells (29 Bore Wells & 2 Open wells). The groundwater level data obtained from Dept. of Mines & Geology for the nearest station Saidapur. The groundwater level during the years 2008-2017 were slightly varying, where as during the year 2014 was found constant.