हर कदम, हर डगर
किसानों का हमसफर
भारतीय कृषि अनुसंधान परिषद
भाकृअनुप ICAR
Agrisearch with a human touch

Land Resource and Hydrological Inventory of Nagalapur 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

THE WORLD BANK

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 Nagalapur Sub-watershed for Watershed Planning and Development

Yadgir Taluk, Yadgir District, Karnataka (AESR 6.2)

CONTENTS

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How to read and use the Atlas

The Land Resource Inventory of Nagalapur 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.

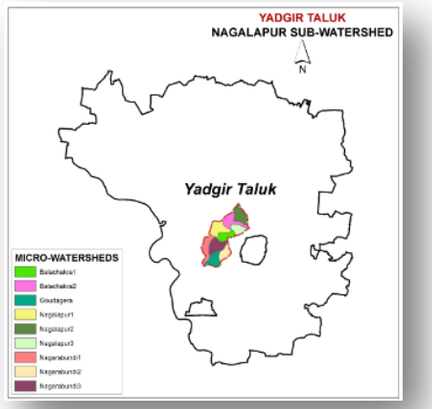
For easy map reading and understanding the information contain in different maps, the physical, cultural and scientific symbols used in the maps are illustrated in the form of colors, graphics and tables.

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.

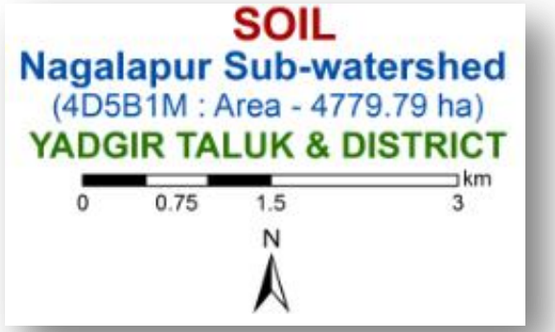
Inset map

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



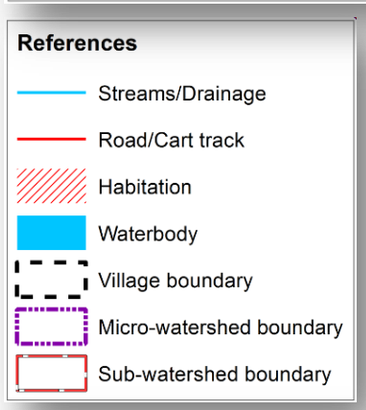
Map title

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



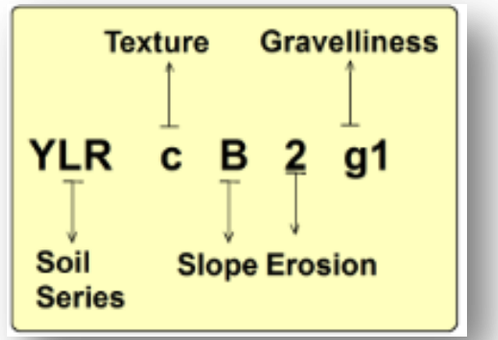
Legends and symbols

*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.*



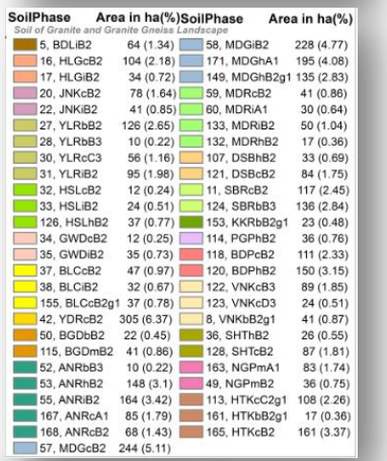
Soil Units

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.



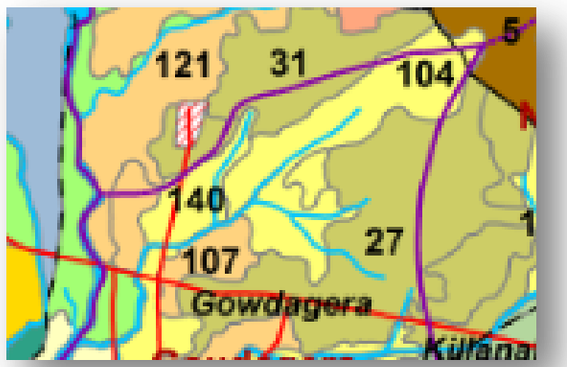
Map colours

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



Soil 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.

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 Nagalapur Sub-watershed covering an area of 4779.79 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.

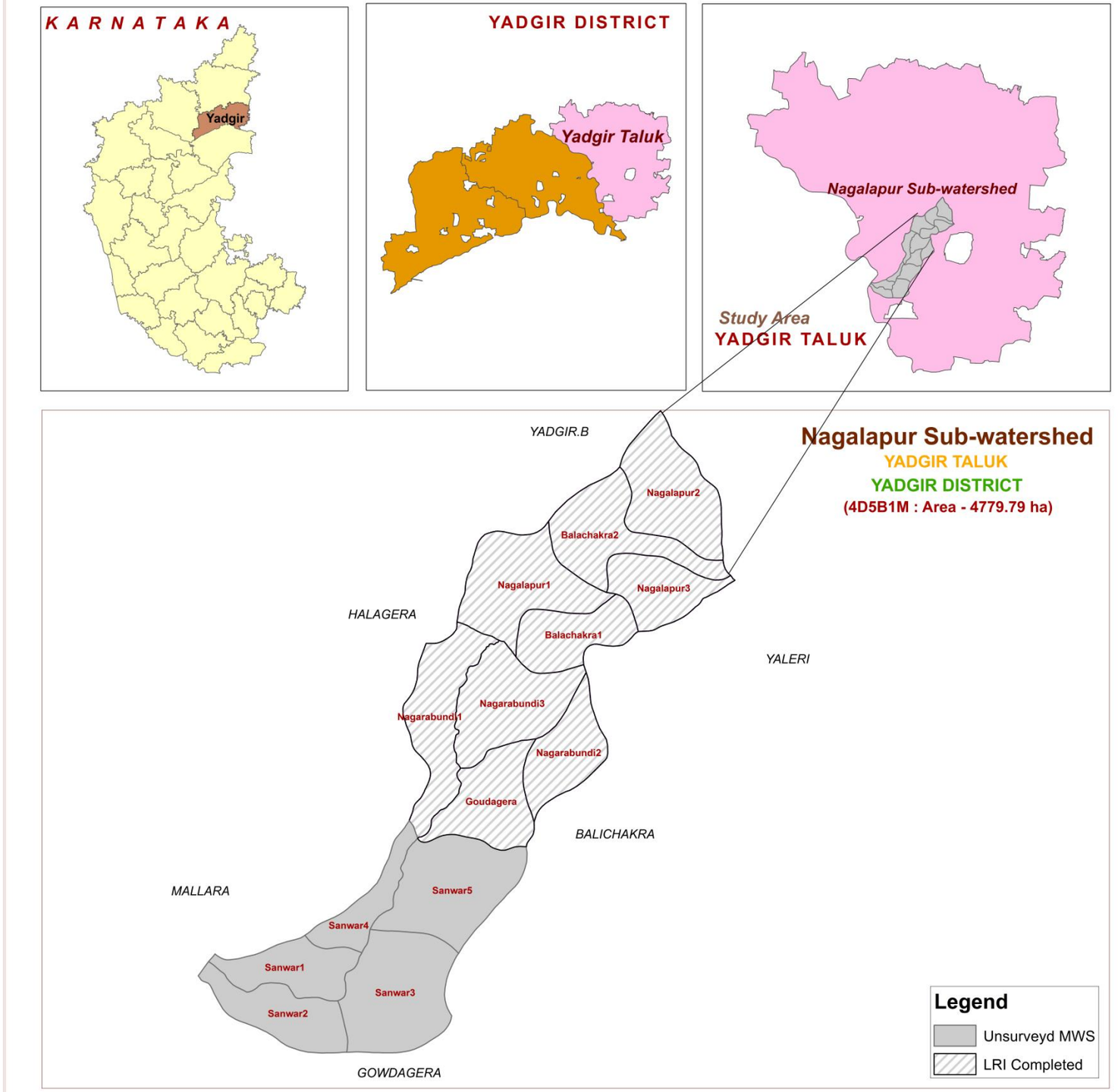
2. General Description of Sub-watershed

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’ $16^0$57’ – $16^0$59’ and east longitudes 77^0 12’ – 77^0 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 Sub-watershed (SWs) - LRI for the Nagalapur SWs in Yadgir taluk, Yadgir district. It was selected for data base generation under Sujala III project. Nagalapur sub-watershed (Yadgir Taluk, Yadgir District) covering an area of about 7364 ha. This sub-watershed encompasses of 14 MWs namely Balachakra-1 (4D5B1M2b), Balachakra-2 (4D5B1M1a), Goudagera (4D5B1M1b), Nagalapur-1 (4D5B1M1c), Nagalapur-2 (4D5B1M1e), Nagalapur-3 (4D5B1M1d), Nagarabundi-1 (4D5B1M2d), Nagarabundi-2 (4D5B1M2a), Nagarabundi-3 (4D5B1M2f), Sanwar-1 (4D5B1M2e), Sanwar-2 (4D5B1M2g), Sanwar-3 (4D5B1M2h), Sanwar-4 (4D5B1M2i) and Sanwar-5 (4D5B1M2c). Land Resource Inventory (LRI) was generated for nine among the fourteen micro-watersheds.

2.1. Location and Extent

LOCATION MAP OF NAGALAPUR SUB-WATERSHED



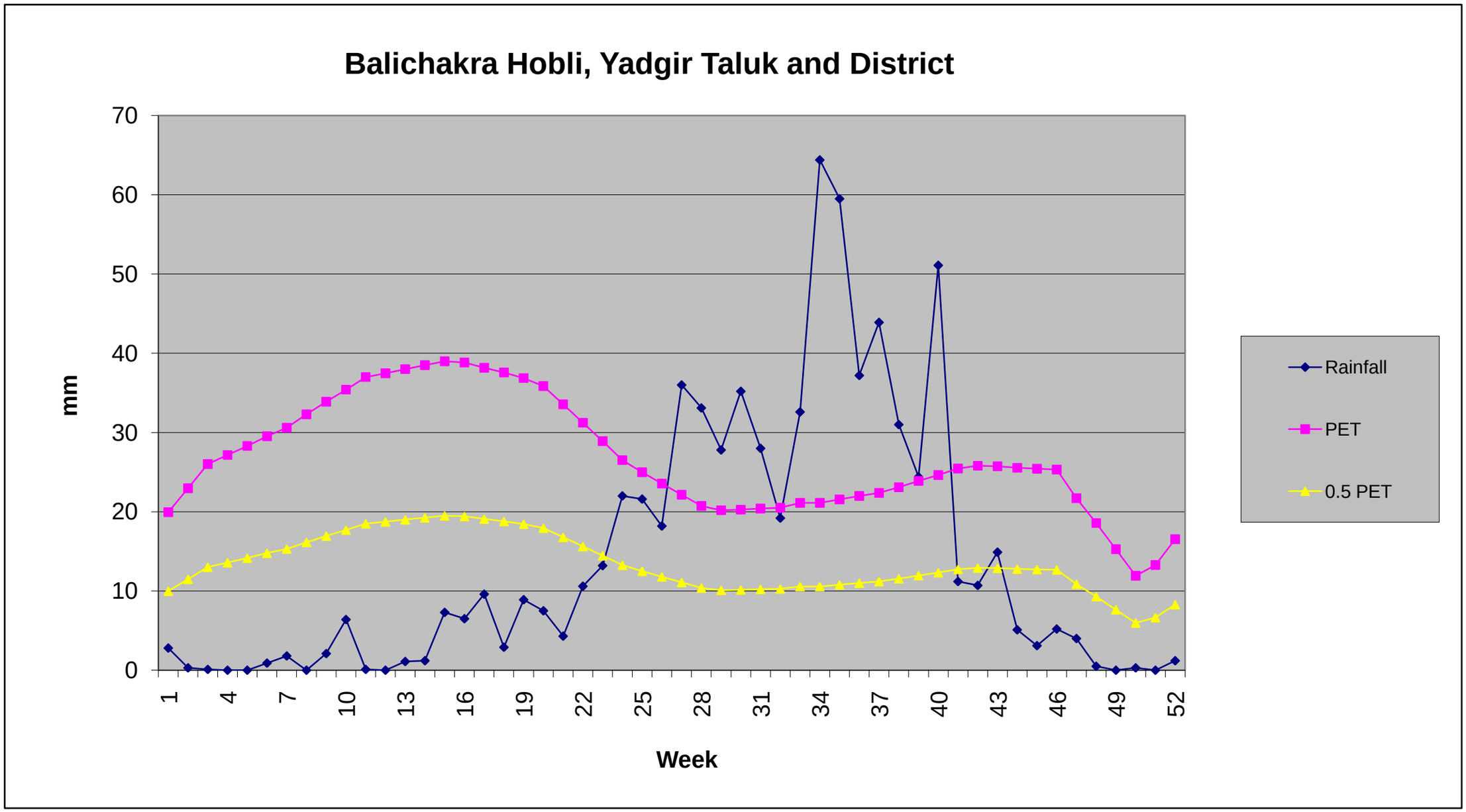
Nagalapur sub-watershed (Yadgir Taluk, Yadgir District) is located between $16^0$35'5''-$16^0$44'5'' North latitudes and $77^0$10'2''-$77^0$18'2'' East longitudes, covering an area of about 7364 ha.

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.

NOTE: Land Resource Inventory (LRI) was generated for nine among the fourteen micro-watersheds.

Climate

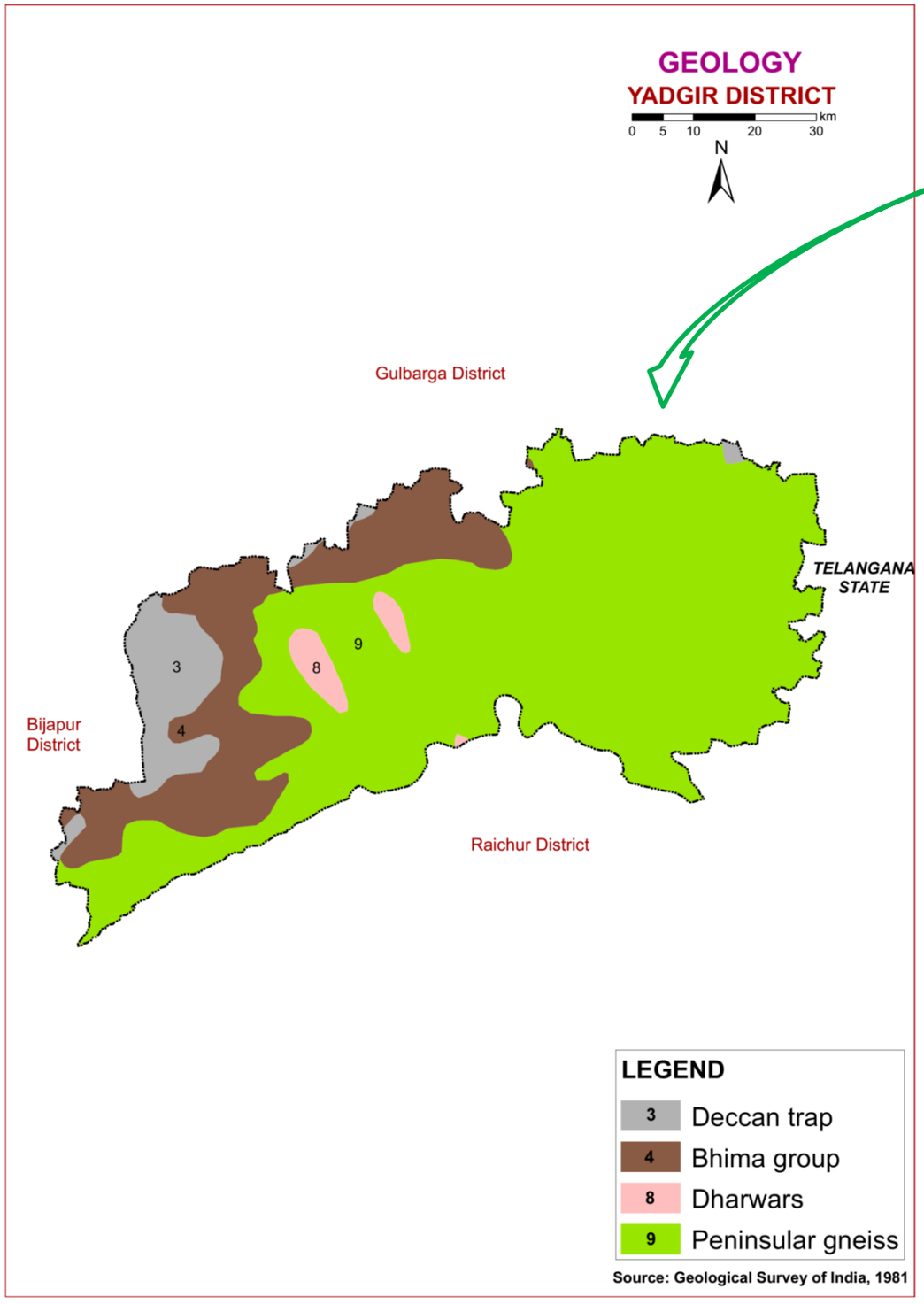


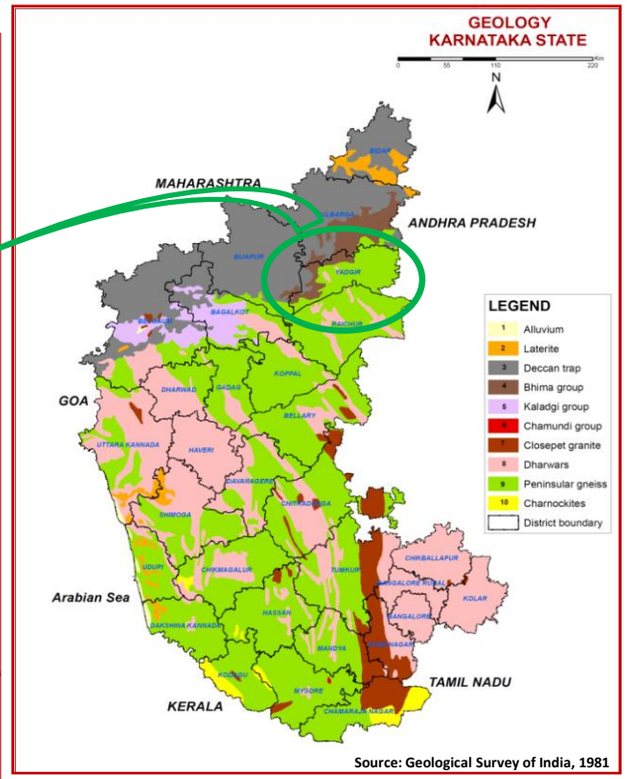
Length of Growing Period (LGP) is varying from June 2nd week to Last week of October (120 - 150 days)

Annual Rainfall : 729 mm. in the Balichakra Hobli, Yadgir Taluk & District

Source: KSNDMC (1980-2011)

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, lete Creteceous 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 visicular 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.

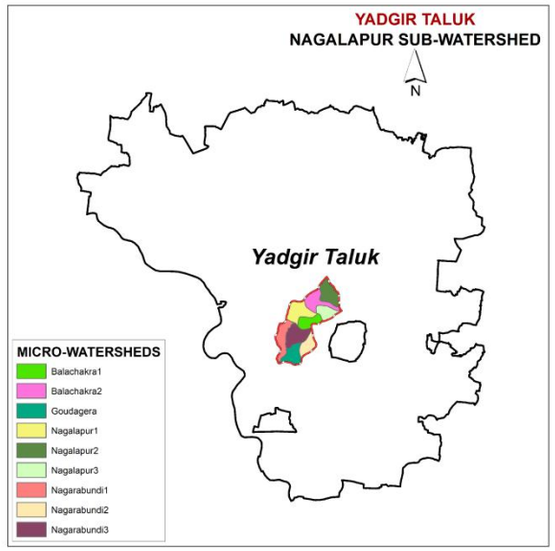
3. Survey Methodology

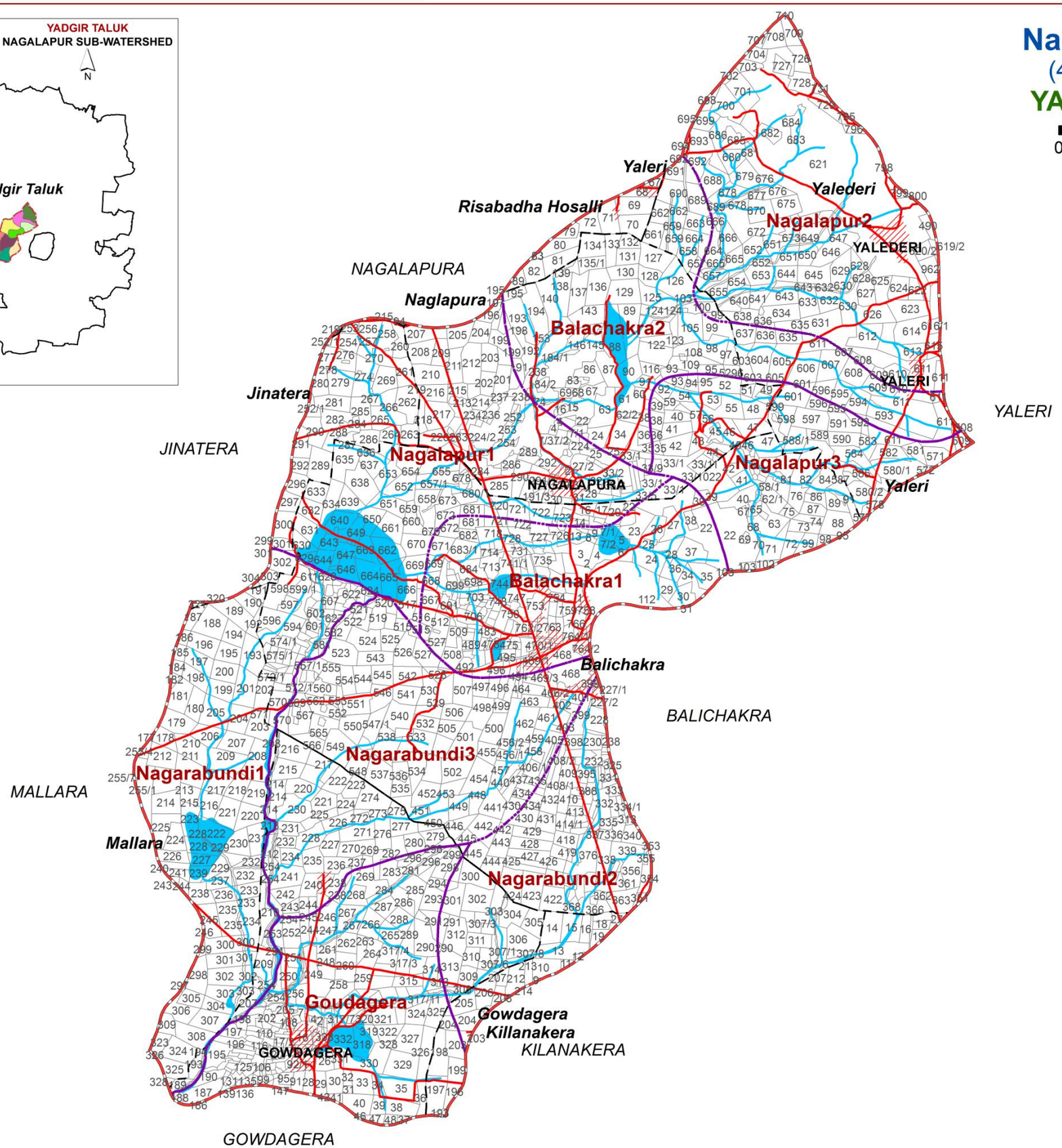
Sequence of activities in generation of LRI

- 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

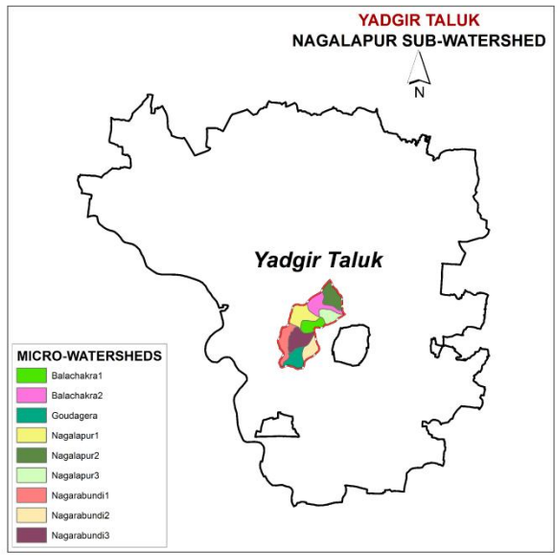
The required site and soil characteristics are described and recorded on a standard proforma by following the protocols and guidelines given in the soil survey manual and field guide. Collection of soil samples from representative pedons for laboratory characterization and collection of surface soil 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.

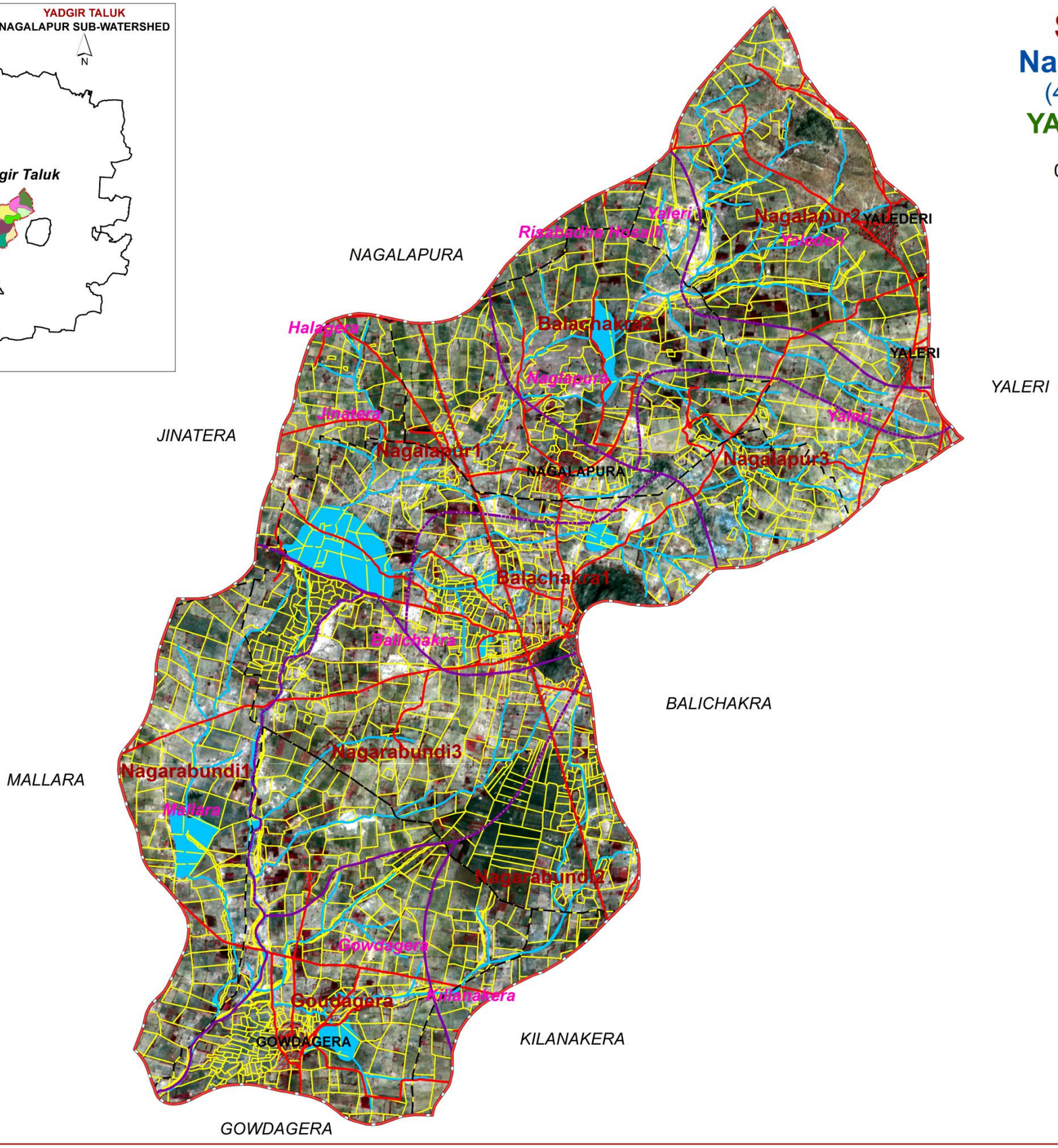
3.1. Database Used - Cadastral map





3.2. Database Used - Satellite Image





SATELLITE IMAGE

Nagalapur Sub-watershed

(4D5B1M : Area - 4779.79 ha)

YADGIR TALUK & DISTRICT

km
0 0.75 1.5 3

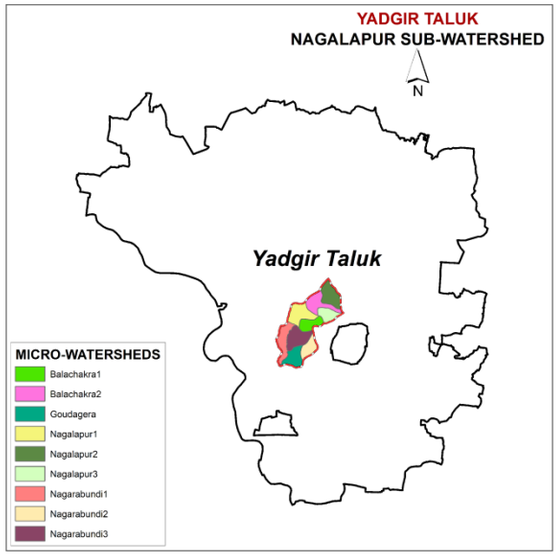
N

References

- Streams/Drainage
- Road/Cart track
- Land parcel's
- Habitation
- Waterbody
- Village boundary
- Micro-watershed boundary
- Sub-watershed boundary

Source: Cartosat 1 Imagery, 2011

4. The Soils



KEY

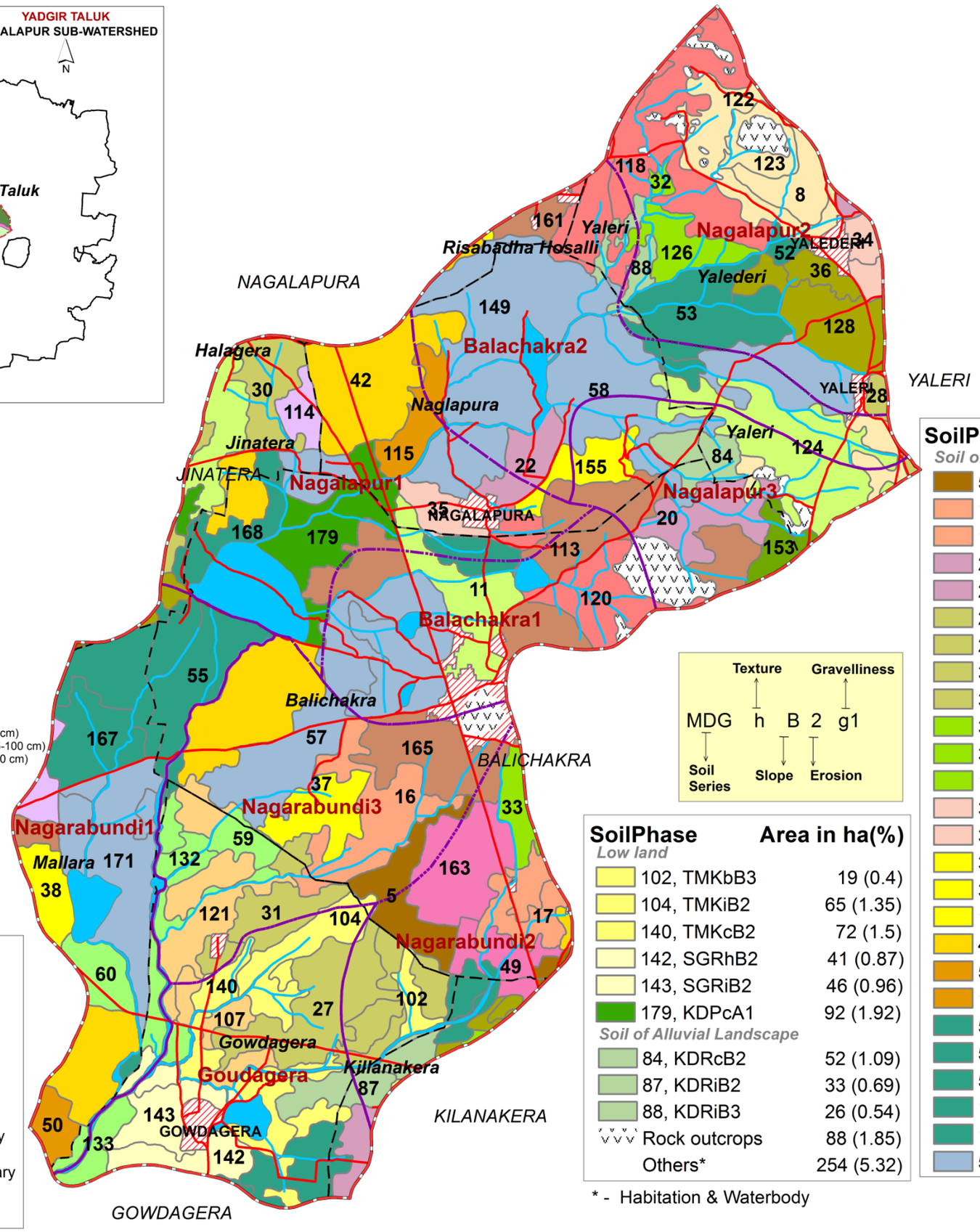
TEXTURE
b- Loamy sand
c -- Sandy loam
i – Sandy clay
h – Sandy clay loam
m – Clay

SLOPE
A - Nearly level (0-1%)
B - Very gently sloping (1-3%)
C - Gently sloping (3-5%)
D - Moderately sloping (5-10%)

EROSION
1 - Slight
2 - Moderate
3 - Severe

GRAVELLINESS
g1 – Gravelly (15-35 %)

DEPTH
BDP,KKR,- Very shallow (<25 cm)
BDL,DSB,HTK,VNK, - Shallow (25-50 cm)
HLG,JNK,SBR,YLR, -Moderately shallow(50-75 cm)
BLC,GWD,HSL,PGP,SHT - Moderately deep (75-100 cm)
ANR,BGD,MDG,KDR,YDR,NGP - Deep (100-150 cm)
TMK,SGR,MDR,KDP - Very deep (>150 cm)



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

SOIL
Nagalapur Sub-watershed
(4D5B1M : Area - 4779.79 ha)
YADGIR TALUK & DISTRICT

0 0.75 1.5 3 km

N

Texture Gravelliness
MDG h B 2 g1
Soil Series Slope Erosion

SoilPhase	Area in ha(%)
Low land	
102, TMKbB3	19 (0.4)
104, TMKiB2	65 (1.35)
140, TMKcB2	72 (1.5)
142, SGRhB2	41 (0.87)
143, SGRiB2	46 (0.96)
179, KDPcA1	92 (1.92)
Soil of Alluvial Landscape	
84, KDRcB2	52 (1.09)
87, KDRiB2	33 (0.69)
88, KDRiB3	26 (0.54)
Rock outcrops	88 (1.85)
Others*	254 (5.32)

* - Habitation & Waterbody

SoilPhase	Area in ha(%)	SoilPhase	Area in ha(%)
Soil of Granite and Granite Gneiss Landscape			
5, BDLiB2	64 (1.34)	58, MDGiB2	228 (4.77)
16, HLGcB2	104 (2.18)	171, MDGhA1	195 (4.08)
17, HLGiB2	34 (0.72)	149, MDGhB2g1	135 (2.83)
20, JNKcB2	78 (1.64)	59, MDRcB2	41 (0.86)
22, JNKiB2	41 (0.85)	60, MDRiA1	30 (0.64)
27, YLRbB2	126 (2.65)	133, MDRiB2	50 (1.04)
28, YLRbB3	10 (0.22)	132, MDRhB2	17 (0.36)
30, YLRcC3	56 (1.16)	107, DSBhB2	33 (0.69)
31, YLRiB2	95 (1.98)	121, DSBcB2	84 (1.75)
32, HSLcB2	12 (0.24)	11, SBRcB2	117 (2.45)
33, HSLiB2	24 (0.51)	124, SBRbB3	136 (2.84)
126, HSLhB2	37 (0.77)	153, KKRbB2g1	23 (0.48)
34, GWDcB2	12 (0.25)	114, PGPhB2	36 (0.76)
35, GWDiB2	35 (0.73)	118, BDPcB2	111 (2.33)
37, BLCcB2	47 (0.97)	120, BDPhB2	150 (3.15)
38, BLCiB2	32 (0.67)	122, VNKcB3	89 (1.85)
155, BLCcB2g1	37 (0.78)	123, VNKcD3	24 (0.51)
42, YDRcB2	305 (6.37)	8, VNKbB2g1	41 (0.87)
50, BGDbB2	22 (0.45)	36, SHThB2	26 (0.55)
115, BGDmB2	41 (0.86)	128, SHTcB2	87 (1.81)
52, ANRbB3	10 (0.22)	163, NGPmA1	83 (1.74)
53, ANRhB2	148 (3.1)	49, NGPmB2	36 (0.75)
55, ANRiB2	164 (3.42)	113, HTKcC2g1	108 (2.26)
167, ANRcA1	85 (1.79)	161, HTKbB2g1	17 (0.36)
168, ANRcB2	68 (1.43)	165, HTKcB2	161 (3.37)
57, MDGcB2	244 (5.11)		

Source: ICAR-NBSS&LUP, Bengaluru

4.1 Mapping unit description of Nagalapur (4D5B1M) Sub-watershed in Yadgir Taluk, Yadgir district

Soil map unit No*	Soil Series	Soil Phase Symbol	Mapping Unit Description	Area in ha (%)
Soils of Granite and Granite gneiss Landscape				
	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		**139 (2.9)**
132		MDRhB2	Sandy clay loam surface, slope 1-3%, moderate erosion	17 (0.36)
60		MDRiA1	Sandy clay surface, slope 0-1%, slight erosion	30 (0.64)
133		MDRiB2	Sandy clay surface, slope 1-3%, moderate erosion	50 (1.04)
	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		**475 (9.9)**
52		ANRbB3	Loamy sand surface, slope 1-3%, severe erosion	10 (0.22)
167		ANRcA1	Sandy loam surface, slope 0-1%, slight erosion	85 (1.79)
168		ANRcB2	Sandy loam surface, slope 1-3%, moderate erosion	68 (1.43)
53		ANRhB2	Sandy clay loam surface, slope 1-3%, moderate erosion	148 (3.1)
55		ANRiB2	Sandy clay surface, slope 1-3%, moderate erosion	164 (3.42)
	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		**63 (1.3)**
50		BGDbB2	Loamy sand surface, slope 1-3%, moderate erosion	22 (0.45)
115		BGDmB2	Clay surface, slope 1-3%, moderate erosion	41 (0.86)
	MDG	Mundargi soils are deep (100-150 cm), well drained, have brown to dark yellowish brown, sandy clay loam soils occurring on very gently sloping uplands under cultivation		**803 (16.8)**
57		MDGcB2	Sandy loam surface, slope 1-3%, moderate erosion	244 (5.11)
171		MDGhA1	Sandy clay loam surface, slope 0-1%, slight erosion	195 (4.08)
149		MDGhB2g1	Sandy clay loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)	135 (2.83)
58		MDGiB2	Sandy clay surface, slope 1-3%, moderate erosion	228 (4.77)
	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		**119 (2.49)**
163		NGPmA1	Clay surface, slope 0-1%, slight erosion	83 (1.74)
49		NGPmB2	Clay surface, slope 1-3%, moderate erosion	36 (0.75)
	YDR	Yadgir soils are deep (100-150 cm), well drained, have brown to dark yellowish brown and olive brown, sodic sandy loam soils occurring on very gently sloping uplands under cultivation		**305 (6.37)**
42		YDRcB2	Sandy loam surface, slope 0-1%, moderate erosion	305 (6.37)
	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		**116 (2.4)**
37		BLCcB2	Sandy loam surface, slope 1-3%, moderate erosion	47 (0.97)
155		BLCcB2g1	Sandy loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)	37 (0.78)
38		BLCiB2	Sandy clay surface, slope 1-3%, moderate erosion	32 (0.67)
	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		**47 (0.98)**
34		GWDcB2	Sandy loam surface, slope 1-3%, moderate erosion	12 (0.25)
35		GWDiB2	Sandy clay surface, slope 1-3%, moderate erosion	35 (0.73)

To be continued….

Soil map unit No*	Soil Series	Soil Phase Symbol	Mapping Unit Description	Area in ha (%)
	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		**73 (1.5)**
32		HSLcB2	Sandy loam surface, slope 1-3%, moderate erosion	12 (0.24)
126		HSLhB2	Sandy clay loam surface, slope 1-3%, moderate erosion	37 (0.77)
33		HSLiB2	Sandy clay surface, slope 1-3%, moderate erosion	24 (0.51)
	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		**123 (2.56)**
114		PGPhB2	Sandy clay loam surface, slope 1-3%, moderate erosion	36 (0.76)
128		SHTcB2	Sandy loam surface, slope 1-3%, moderate erosion	87 (1.81)
	SHT	Shettalli soils are moderately deep (75-100 cm), well drained, have very dark gray, slightly calcareous gravelly sandy clay soils occurring on very gently sloping uplands under cultivation		**26 (0.55)**
36		SHThB2	Sandy clay loam surface, slope 1-3%, moderate erosion	26 (0.55)
	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.		**138 (2.9)**
16		HLGcB2	Sandy loam surface, slope 1-3%, moderate erosion	104 (2.18)
17		HLGiB2	Sandy clay surface, slope 1-3%, moderate erosion	34 (0.72)
	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		**119 (2.4)**
20		JNKcB2	Sandy loam surface, slope 1-3%, moderate erosion	78 (1.64)
22		JNKiB2	Sandy clay surface, slope 1-3%, moderate erosion	41 (0.85)
	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		**253 (5.2)**
124		SBRbB3	Loamy sand surface, slope 1-3%, severe erosion	136 (2.84)
11		SBRcB2	Sandy loam surface, slope 1-3%, moderate erosion	117 (2.45)
	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		**287 (6.0)**
27		YLRbB2	Loamy sand surface, slope 1-3%, moderate erosion	126 (2.65)
28		YLRbB3	Loamy sand surface, slope 1-3%, severe erosion	10 (0.22)
30		YLRcC3	Sandy loam surface, slope 3-5%, severe erosion	56 (1.16)
31		YLRiB2	Sandy clay surface, slope 1-3%, moderate erosion	95 (1.98)
	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		**64 (1.34)**
5		BDLiB2	Sandy clay surface, slope 1-3%, moderate erosion	64 (1.34)
	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		**117 (2.44)**
121		DSBcB2	Sandy loam surface, slope 1-3%, moderate erosion	84 (1.75)
107		DSBhB2	Sandy clay loam surface, slope 1-3%, moderate erosion	33 (0.69)
	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		**286 (5.9)**
161		HTKbB2g1	Loamy sand surface, slope 1-3%, moderate erosion, gravelly (15-35%)	17 (0.36)
165		HTKcB2	Sandy loam surface, slope 1-3%, moderate erosion	161 (3.37)
113		HTKcC2g1	Sandy loam surface, slope 3-5%, moderate erosion, gravelly (15-35%)	108 (2.26)

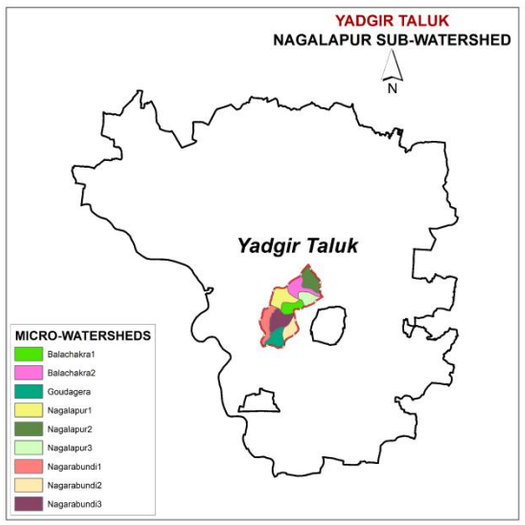
To be continued….

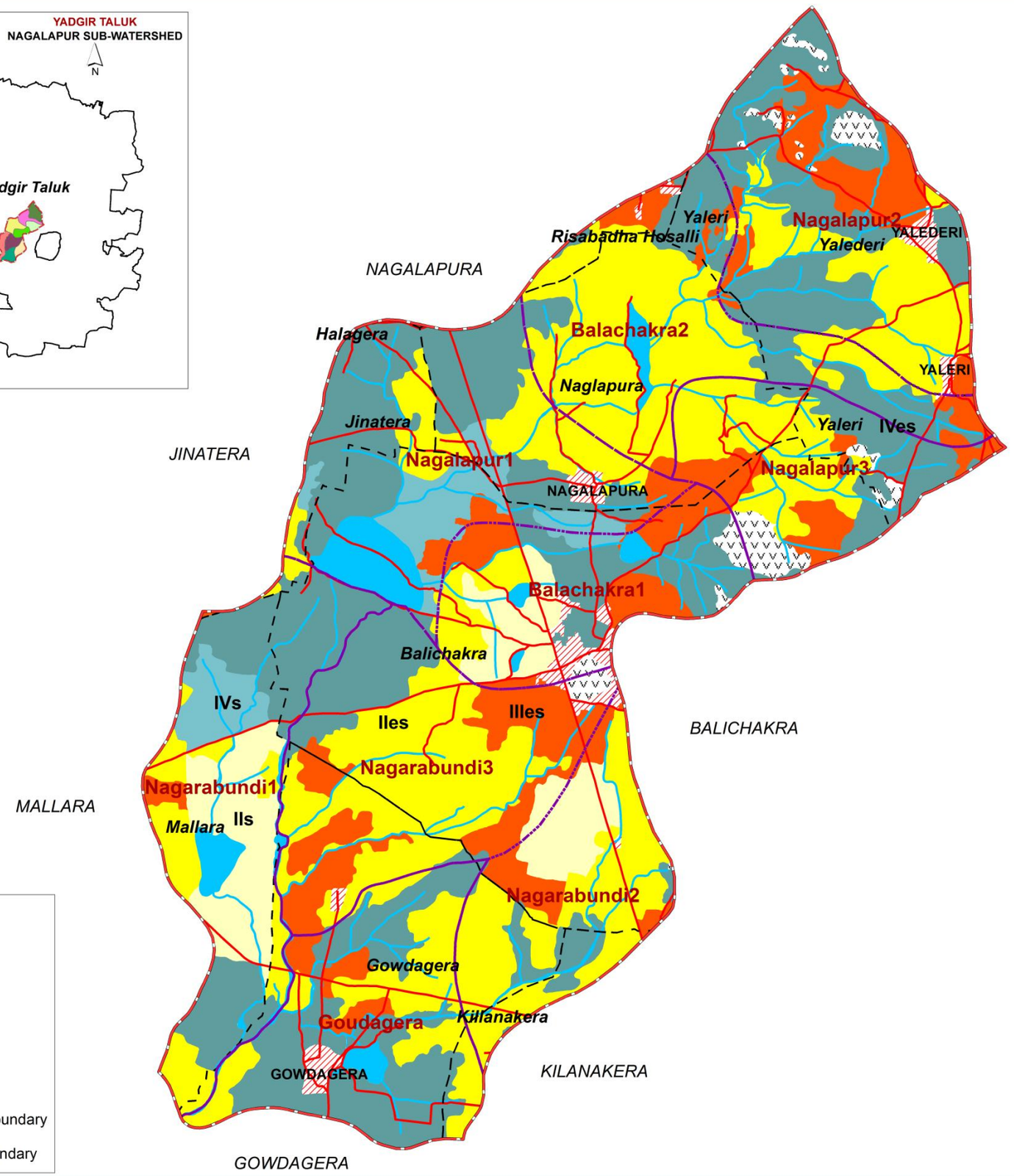
Soil map unit No*	Soil Series	Soil Phase Symbol	Mapping Unit Description	Area in ha (%)
	VNK	Vanakanahalli soils are shallow (25-50 cm), well drained, have dark reddish brown, sandy clay red soils occurring on very gently to moderately sloping uplands under cultivation		**154 (3.2)**
8		VNKbB2g1	Loamy sand surface, slope 1-3%, moderate erosion, gravelly (15-35%)	41 (0.87)
122		VNKcB3	Sandy loam surface, slope 1-3%, severe erosion	89 (1.85)
123		VNKcD3	Sandy loam surface, slope 5-10%, severe erosion	24 (0.51)
	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		**262 (5.4)**
118		BDPcB2	Sandy loam surface, slope 1-3%, moderate erosion	111 (2.33)
120		BDPhB2	Sandy clay loam surface, slope 1-3%, moderate erosion	150 (3.15)
	KKR	Kakalawar soils are very shallow (<25 cm), well drained, have dark brown sandy loam soils occurring on very gently sloping uplands under cultivation		**23 (0.48)**
153		KKRbB2g1	Loamy sand surface, slope 1-3%, moderate erosion, gravelly (15-35%)	23 (0.48)
	KDP	Kondapur soils are very deep (>150 cm), somewhat excessively drained, have strong brown, dark grayish brown to brown sandy soils occurring on very gently to gently sloping lowlands under cultivation.		**92 (1.92)**
179		KDPcA1	Sandy loam surface, slope 0-1%, slight erosion	92 (1.92)
	SGR	Sangwar soils are very deep (>150 cm), moderately well drained, have dark gray to very dark gray, calcareous sodic cracking clay soils occurring on nearly level to very gently sloping lowlands under cultivation		**87 (1.2)**
142		SGRhB2	Sandy clay loam surface, slope 1-3%, moderate erosion	41 (0.87)
143		SGRiB2	Sandy clay surface, slope 1-3%, moderate erosion	46 (0.96)
	TMK	Thumakur soils are very deep (>150 cm), moderately well drained, have very dark gray to dark brown, slightly calcareous sodic clay soils occurring on nearly level to very gently sloping low lands under cultivation		**155 (3.2)**
102		TMKbB3	Loamy sand surface, slope 1-3%, severe erosion	19 (0.4)
140		TMKcB2	Sandy loam surface, slope 1-3%, moderate erosion	72 (1.5)
104		TMKiB2	Sandy clay surface, slope 1-3%, moderate erosion	65 (1.35)
Soils of Alluvial Landscape				
	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		**111 (2.3)**
84		KDRcB2	Sandy loam surface, slope 1-3%, moderate erosion	52 (1.09)
87		KDRiB2	Sandy clay surface, slope 1-3%, moderate erosion	33 (0.69)
88		KDRiB3	Sandy clay surface, slope 1-3%, severe erosion	26 (0.54)
999		Rock outcrops	Rock lands, both massive and bouldery with little or no soil	**88 (1.85)**
1000		Others	Habitation and Waterbody	**254 (5.32)**

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

5. Soil Survey Interpretations

5.1. Land Capability Classification





References

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

LAND CAPABILITY

Nagalapur Sub-watershed

(4D5B1M : Area - 4779.79 ha)

YADGIR TALUK & DISTRICT

0 0.75 1.5 3 km

N

Key

II - Good cultivable land
III - Moderately good cultivable lands
IV - Fairly good cultivable lands

Limitations

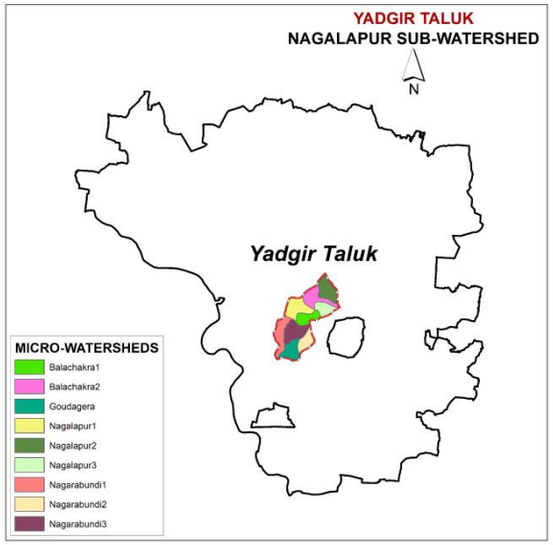
e - erosion limitation
s - soil limitation
(depth, gravelliness, texture, salinity/alkalinity)

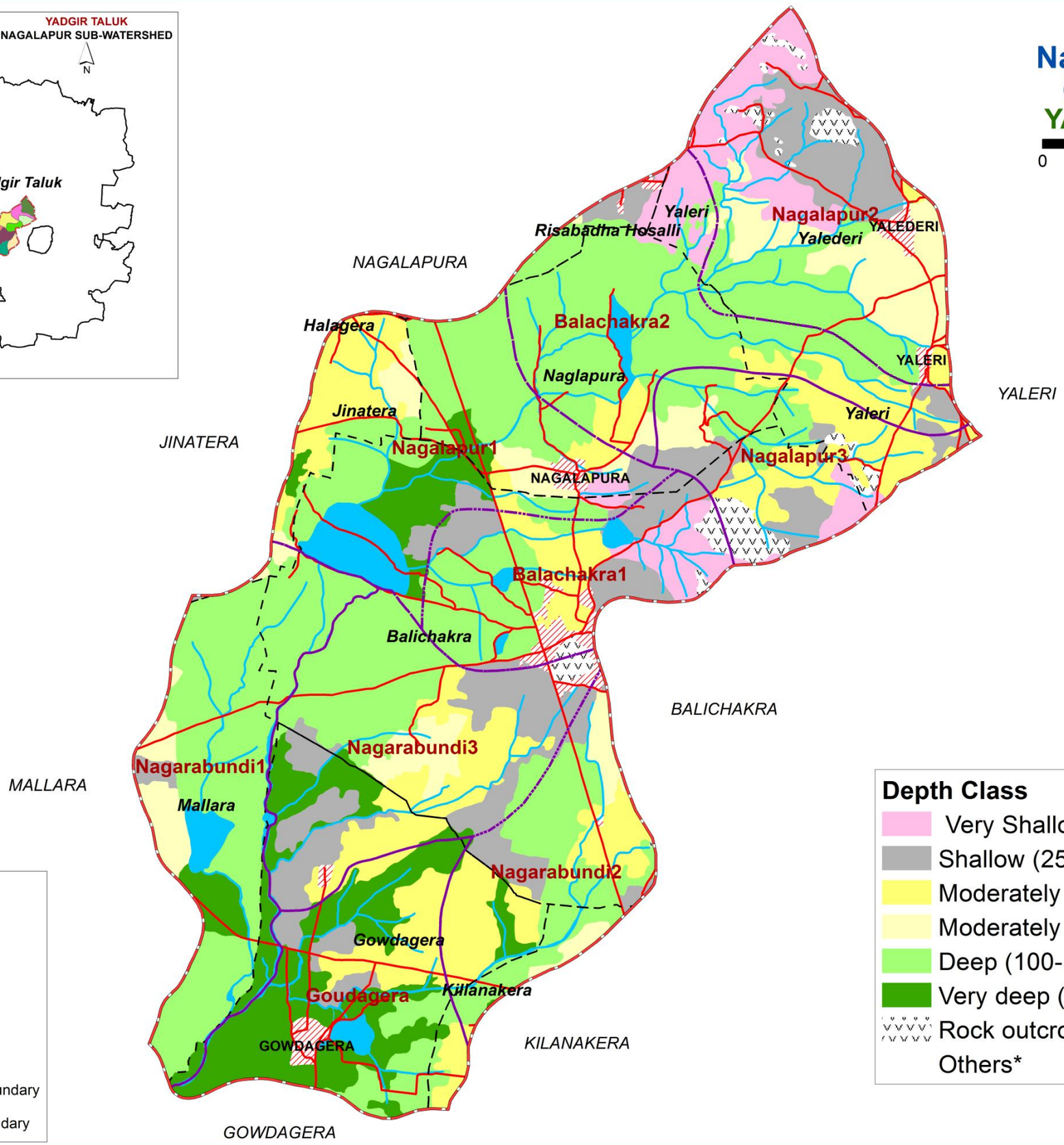
Capability subclass	Area in ha (%)
IIs	309 (6.46)
IIes	1717 (35.91)
IIIes	633 (13.24)
IVs	177 (3.7)
IVes	1602 (33.51)
Rock outcrops	88 (1.85)
Others*	254 (5.32)

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

5.2. Soil Depth





SOIL DEPTH

Nagalapur Sub-watershed

(4D5B1M : Area - 4779.79 ha)

YADGIR TALUK & DISTRICT

km
0 0.75 1.5 3

N

References

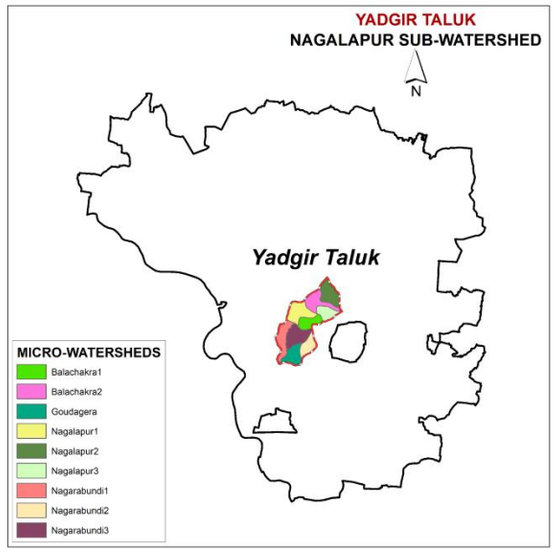
- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- Village boundary
- Micro-watershed boundary
- Sub-watershed boundary

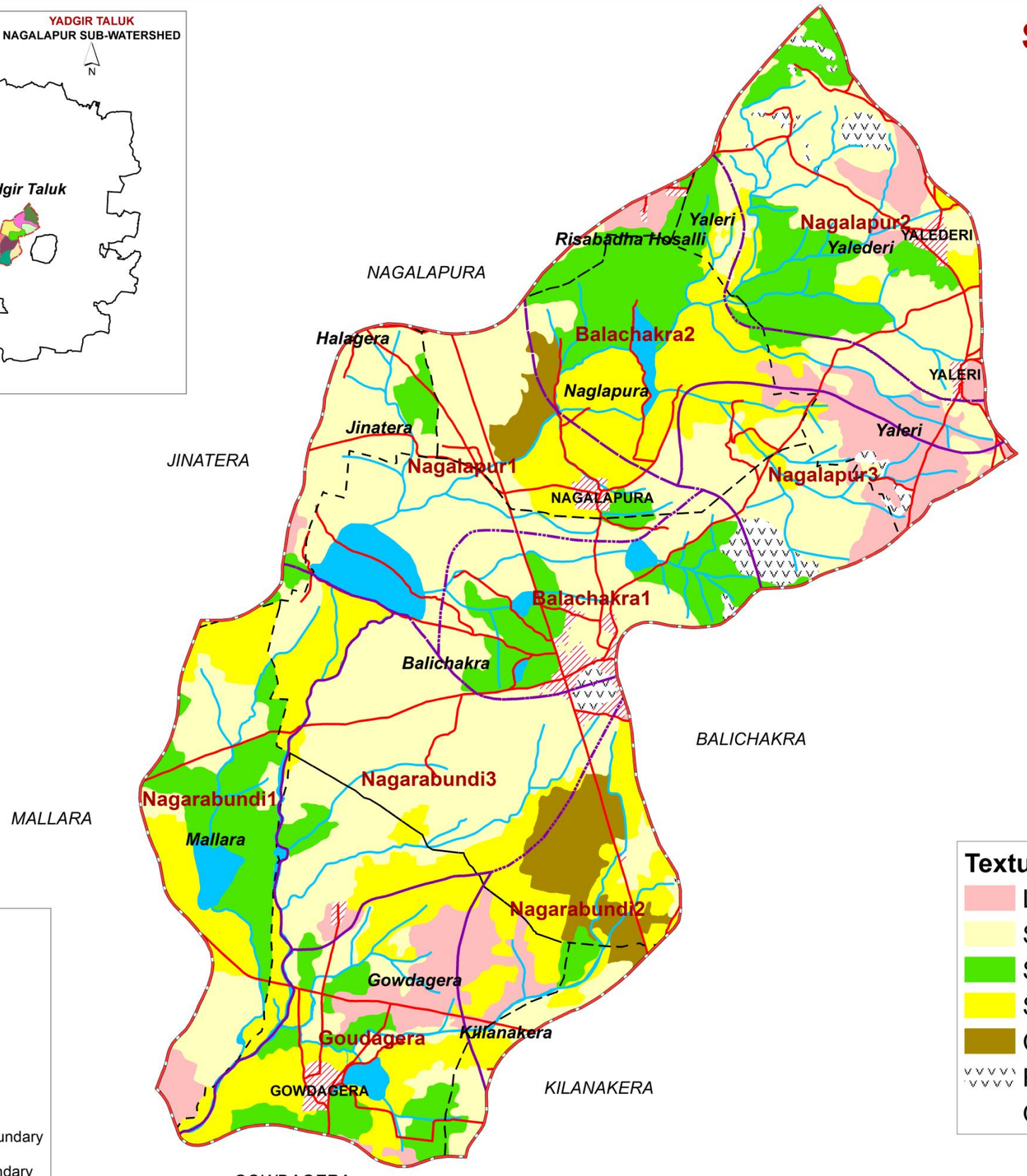
Depth Class	Area in ha (%)
Very Shallow (<25 cm)	285 (5.95)
Shallow (25-50 cm)	621 (12.99)
Moderately shallow (50-75 cm)	798 (16.7)
Moderately deep (75-100 cm)	385 (8.05)
Deep (100-150 cm)	1876 (39.24)
Very deep (>150 cm)	473 (9.89)
Rock outcrops	88 (1.85)
Others*	254 (5.32)

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

5.3. Surface Soil Texture





SURFACE SOIL TEXTURE

Nagalapur Sub-watershed

(4D5B1M : Area - 4779.79 ha)

YADGIR TALUK & DISTRICT

km
0 0.75 1.5 3

N

References

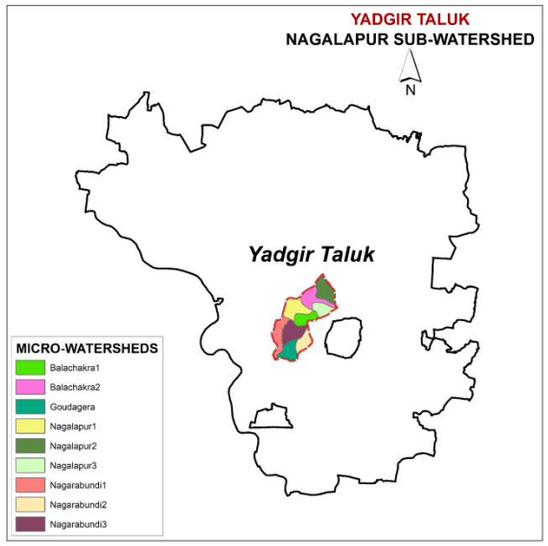
- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- Village boundary
- Micro-watershed boundary
- Sub-watershed boundary

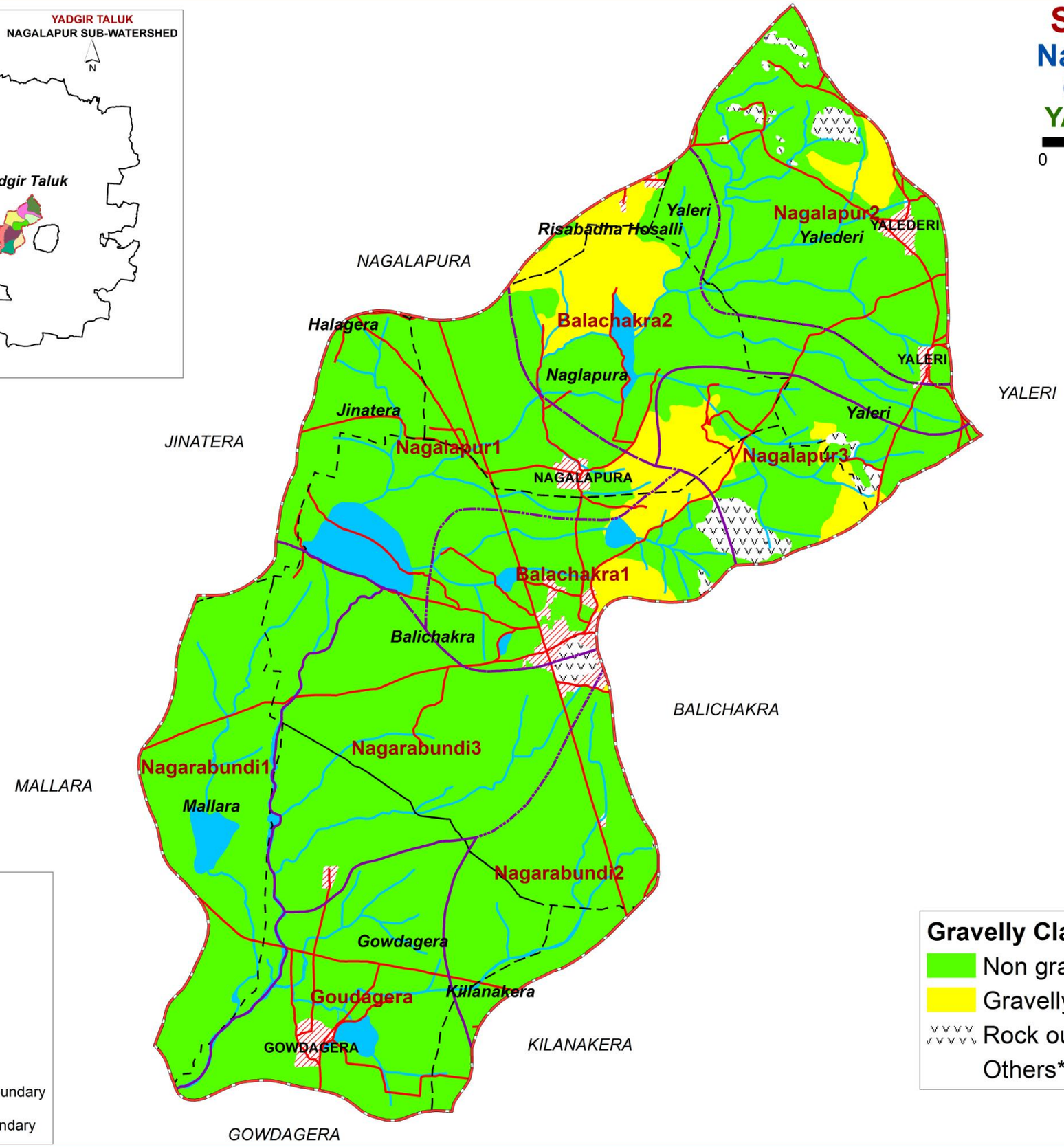
Texture Class	Area in ha(%)
Loamy sand	405 (8.47)
Sandy loam	2085 (43.62)
Sandy clay loam	820 (17.15)
Sandy clay	967 (20.23)
Clay	160 (3.36)
Rock outcrops	88 (1.85)
Others*	254 (5.32)

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

5.4. Surface Soil Gravelliness





References

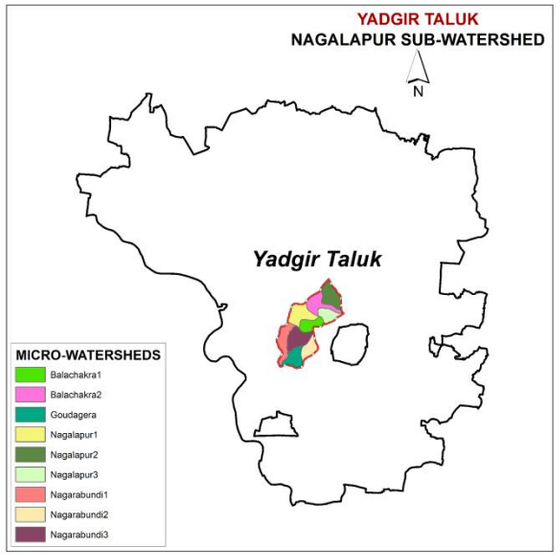
- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- Village boundary
- Micro-watershed boundary
- Sub-watershed boundary

Gravelly Class	Area in ha (%)
Non gravelly (<15%)	4075 (85.26)
Gravelly (15-35%)	362 (7.57)
Rock outcrops	88 (1.85)
Others*	254 (5.32)

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

5.5. Available Water Capacity



AVAILABLE WATER CAPACITY

Nagalapur Sub-watershed

(4D5B1M : Area - 4779.79 ha)

YADGIR TALUK & DISTRICT

km
0 0.75 1.5 3

N

NAGALAPURA
JINATERA
YALERI
MALLARA
BALICHAKRA
GOWDAGERA
KILANAKERA
YALEDERI

Risabadha Hosalli
Yaleri
Nagalapur2
Yalederi
Halagera
Balachakra2
Naglapura
Jinatera
Nagalapur1
Yaleri
Nagalapur3
Balachakra1
Balichakra
Nagarabundi3
Nagarabundi1
Mallara
Nagarabundi2
Gowdagera
Goudagera
Killanakera

References

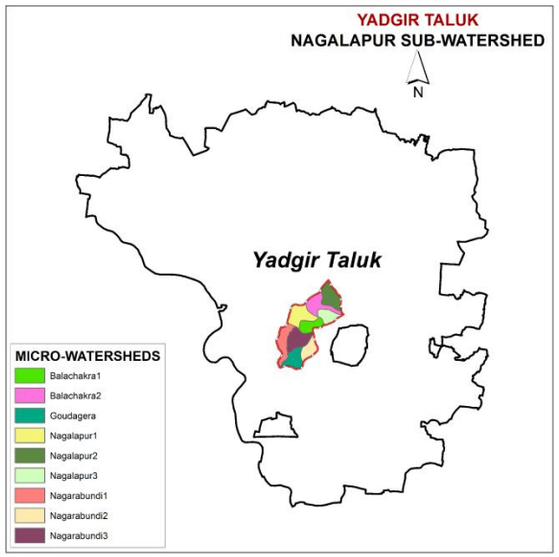
- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- Village boundary
- Micro-watershed boundary
- Sub-watershed boundary

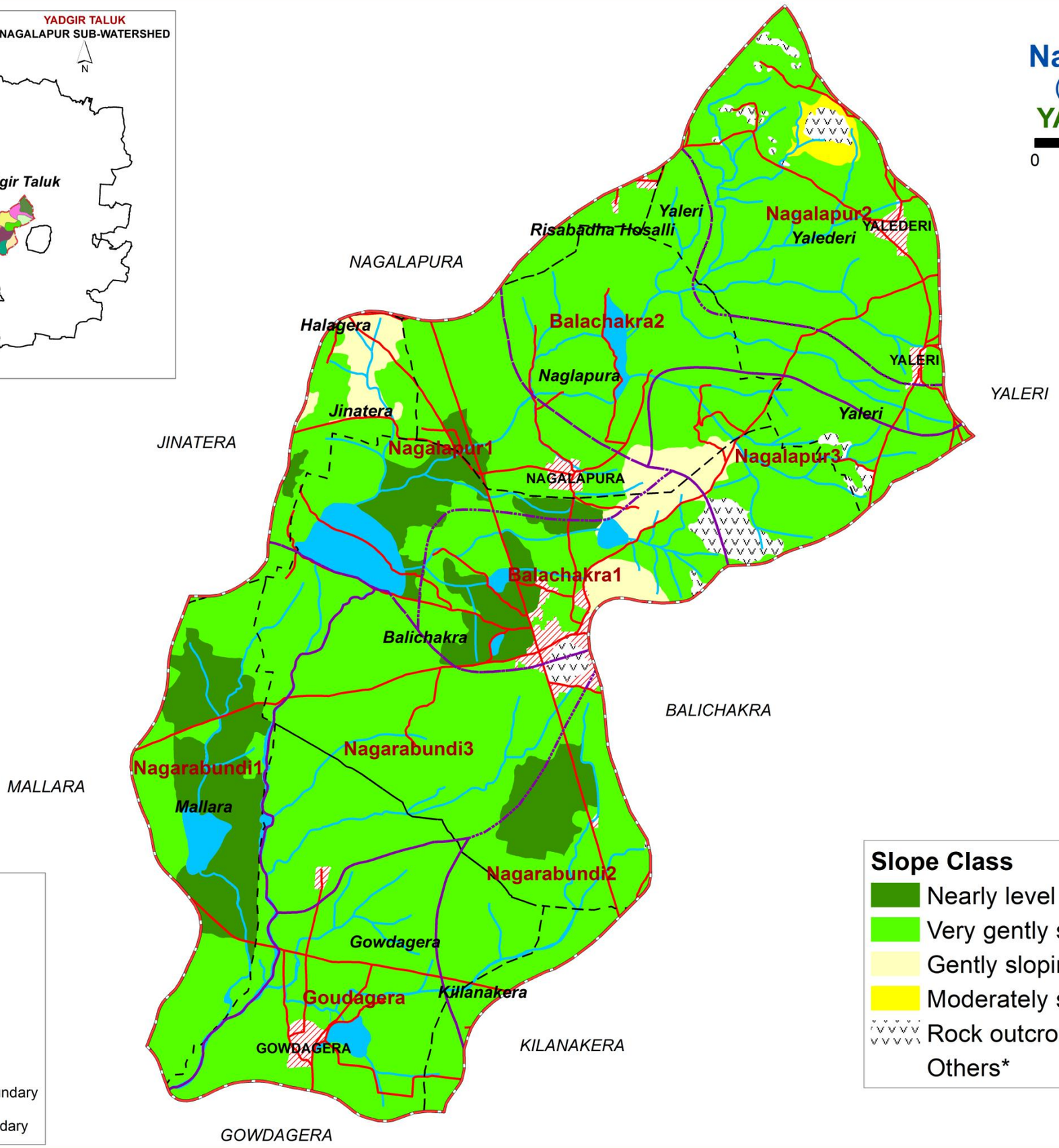
Available Water Capacity	Area in ha (%)
Very low (<50 mm/m)	1159 (24.24)
Low (51-100 mm/m)	1207 (25.24)
Medium (101-150 mm/m)	120 (2.51)
Very high (>200 mm/m)	1952 (40.84)
Rock outcrops	88 (1.85)
Others*	254 (5.32)

* - Habitation & Waterbody

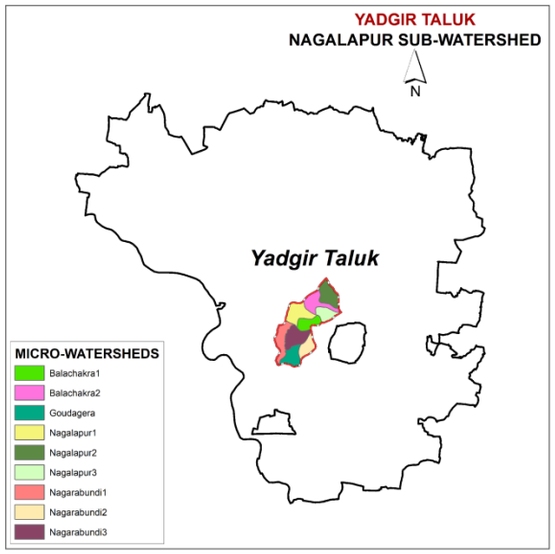
Source: ICAR-NBSS&LUP, Bengaluru

5.6.Slope


YADGIR TALUK
NAGALAPUR SUB-WATERSHED
N
Yadgir Taluk
MICRO-WATERSHEDS
Balachakra1
Balachakra2
Goudagera
Nagalapur1
Nagalapur2
Nagalapur3
Nagarabundi1
Nagarabundi2
Nagarabundi3


SLOPE
Nagalapur Sub-watershed
(4D5B1M : Area - 4779.79 ha)
YADGIR TALUK & DISTRICT
km
0
0.75
1.5
3
N
NAGALAPURA
JINATERA
YALERI
BALICHAKRA
MALLARA
GOWDAGERA
KILANAKERA
Risabadha Hosalli
Yaleri
Nagalapur2
Yalederi
YALEDERI
Halagera
Balachakra2
Naglapura
YALERI
Jinatera
Yaleri
Nagalapur1
Nagalapur3
NAGALAPURA
Balachakra1
Balichakra
Nagarabundi3
Nagarabundi1
Mallara
Nagarabundi2
Gowdagera
Goudagera
Killanakera
GOWDAGERA
References
Streams/Drainage
Road/Cart track
Habitation
Waterbody
Village boundary
Micro-watershed boundary
Sub-watershed boundary
Slope Class
Area in ha (%)
Nearly level (0-1%) 486 (10.16)
Very gently sloping (1-3%) 3764 (78.74)
Gently sloping (3-5%) 163 (3.42)
Moderately sloping (5-10%) 24 (0.51)
Rock outcrops 88 (1.85)
Others* 254 (5.32)
* - Habitation & Waterbody
Source: ICAR-NBSS&LUP, Bengaluru

5.7.Soil Erosion



SOIL EROSION

Nagalapur Sub-watershed

(4D5B1M : Area - 4779.79 ha)

YADGIR TALUK & DISTRICT

0 0.75 1.5 3 km

N

NAGALAPURA
YALERI
JINATERA
BALICHAKRA
MALLARA
GOWDAGERA
KILANAKERA

Risabadha Hosalli
Yaleri
Nagalapur2
Yalederi
YALEDERI
Halagera
Balachakra2
Naglapura
YALERI
Yaleri
Jinatera
Nagalapur1
Nagalapur3
NAGALAPURA
Balachakra1
Balichakra
Nagarabundi3
Nagarabundi1
Mallara
Nagarabundi2
Gowdagera
Goudagera
Killanakera
GOWDAGERA

References

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

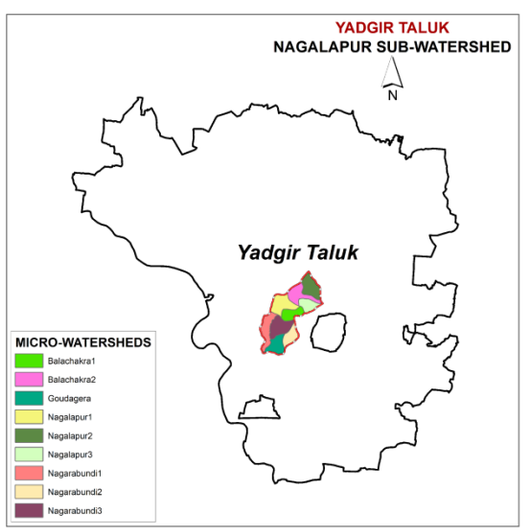
Erosion Class	Area in ha(%)
Slight	486 (10.16)
Moderate	3581 (74.93)
Severe	370 (7.74)
Rock outcrops	88 (1.85)
Others*	254 (5.32)

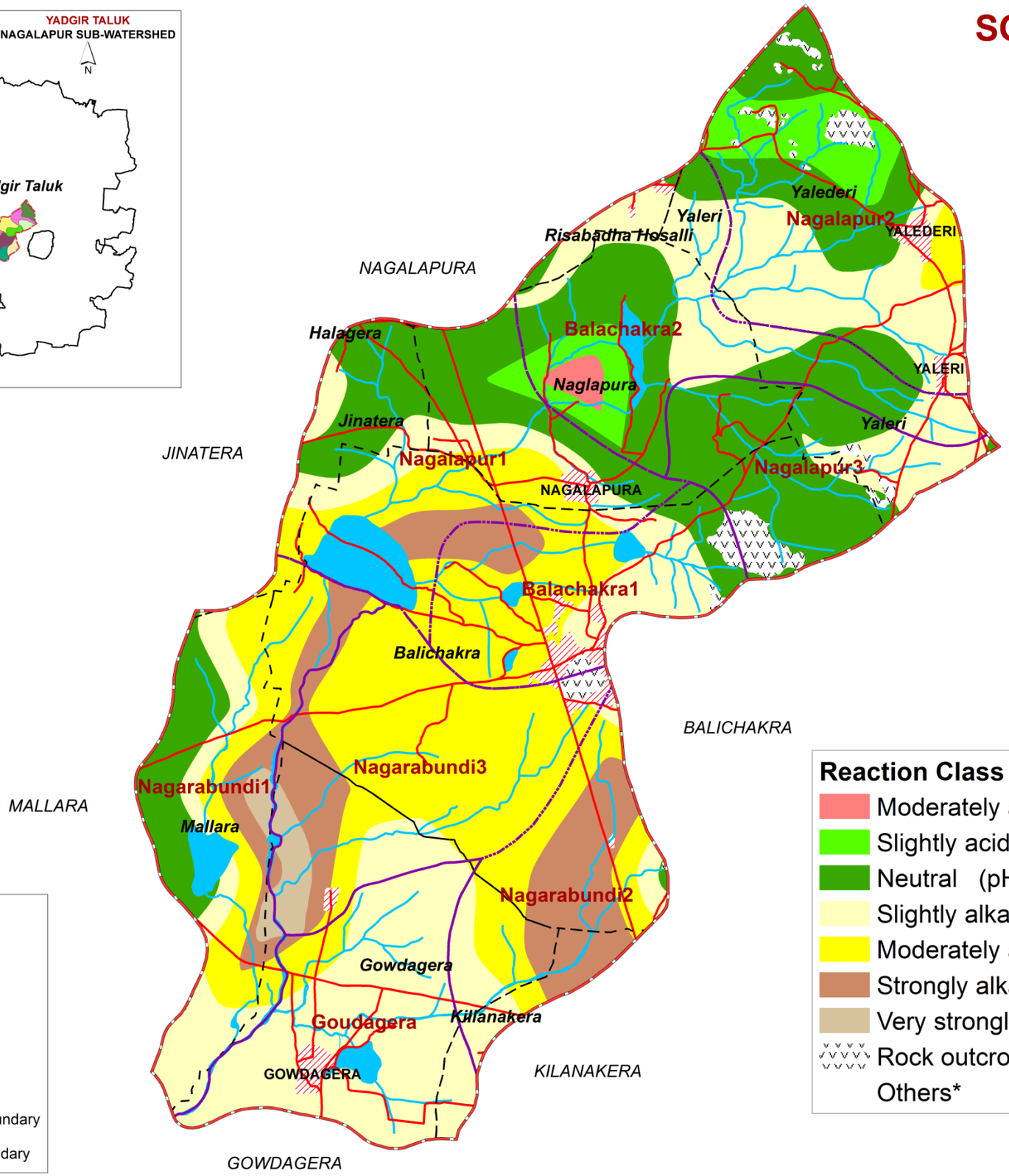
* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

6. Soil Fertility Status

6.1. Soil Reaction (pH)





SOIL REACTION (pH) (2018)

Nagalapur Sub-watershed

(4D5B1M : Area - 4779.79 ha)

YADGIR TALUK & DISTRICT

km
0 0.75 1.5 3
N

References

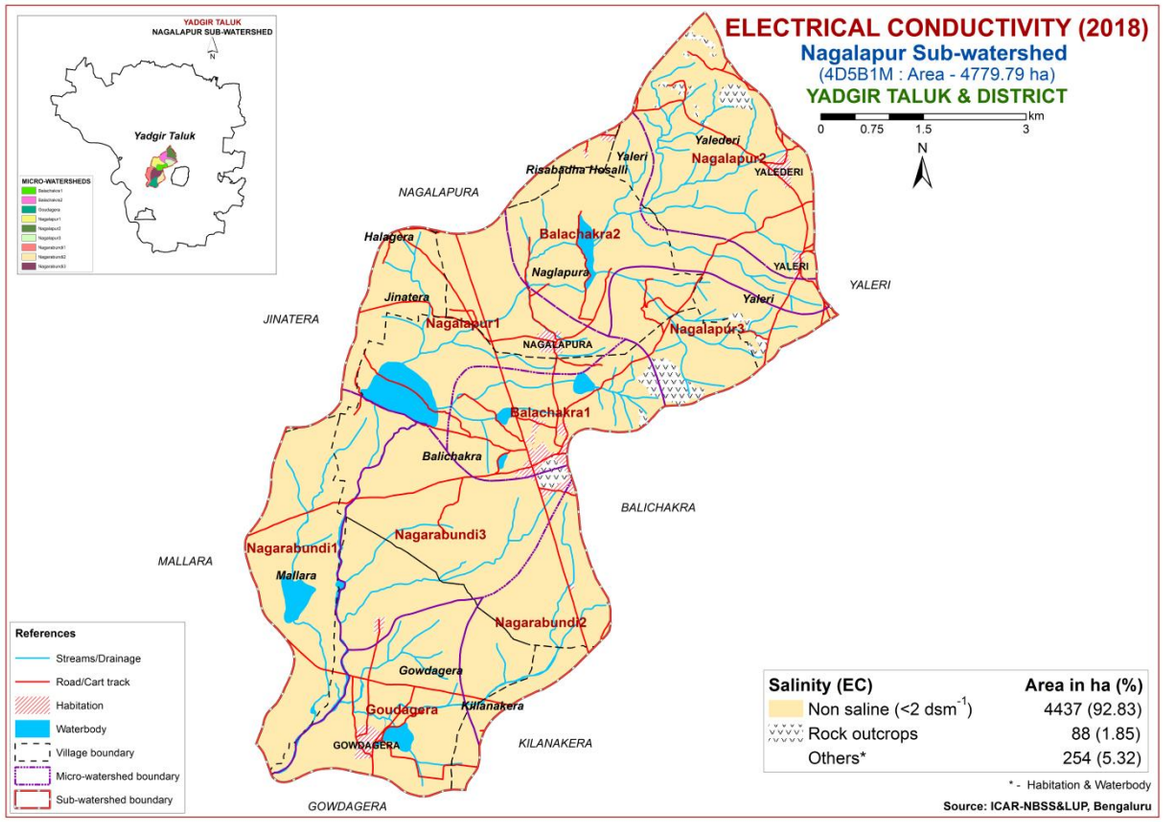
- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- Village boundary
- Micro-watershed boundary
- Sub-watershed boundary

Reaction Class	Area in ha (%)
Moderately acid (pH 5.5 – 6.0)	21 (0.43)
Slightly acid (pH 6.0 – 6.5)	188 (3.93)
Neutral (pH 6.5 – 7.3)	1145 (23.95)
Slightly alkaline (pH 7.3 – 7.8)	1442 (30.18)
Moderately alkaline (pH 7.8 – 8.4)	1162 (24.32)
Strongly alkaline (pH 8.4 – 9.0)	419 (8.77)
Very strongly alkaline (pH > 9.0)	60 (1.25)
Rock outcrops	88 (1.85)
Others*	254 (5.32)

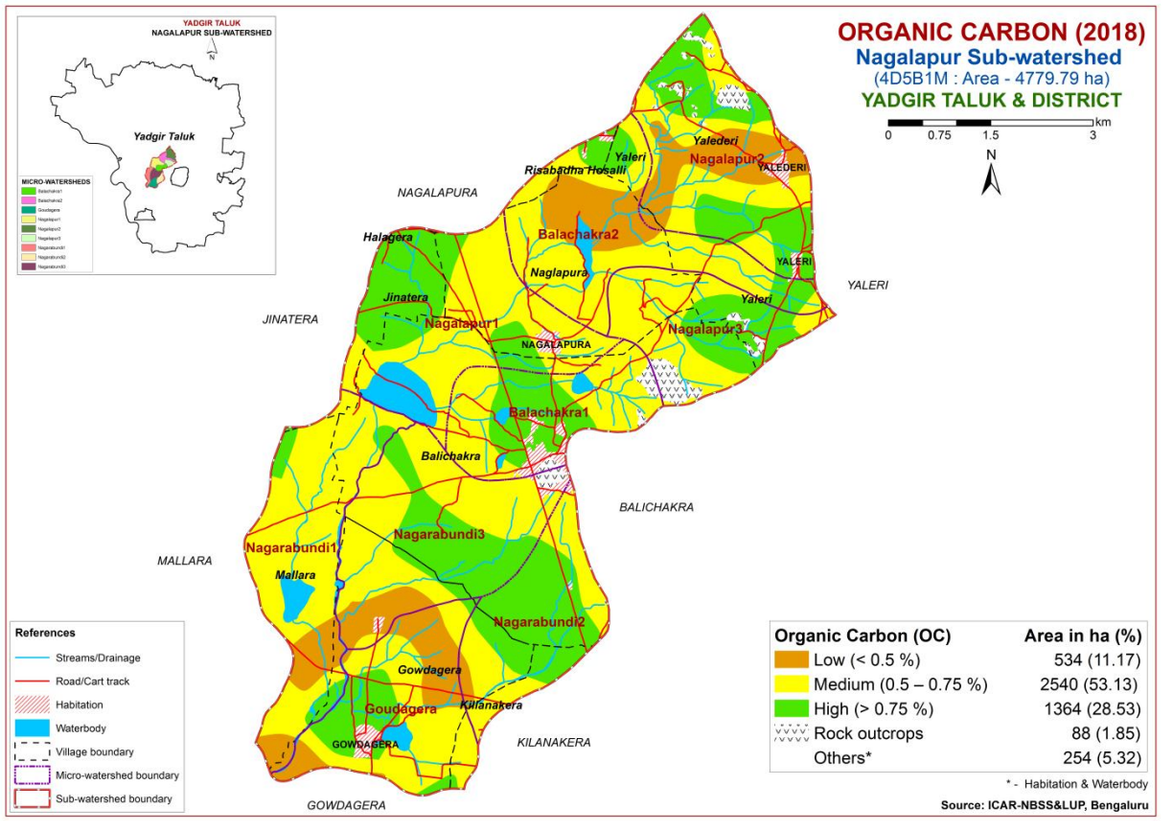
* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

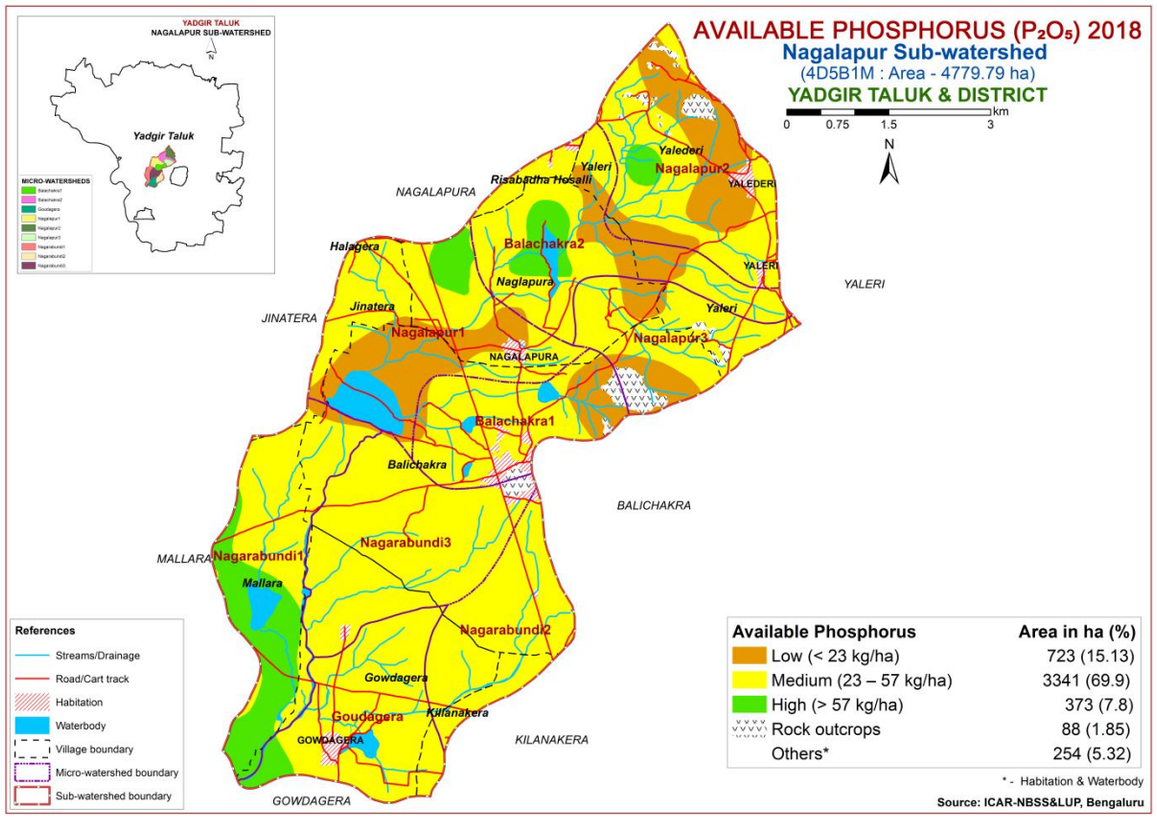
6.2. Electrical Conductivity (EC)



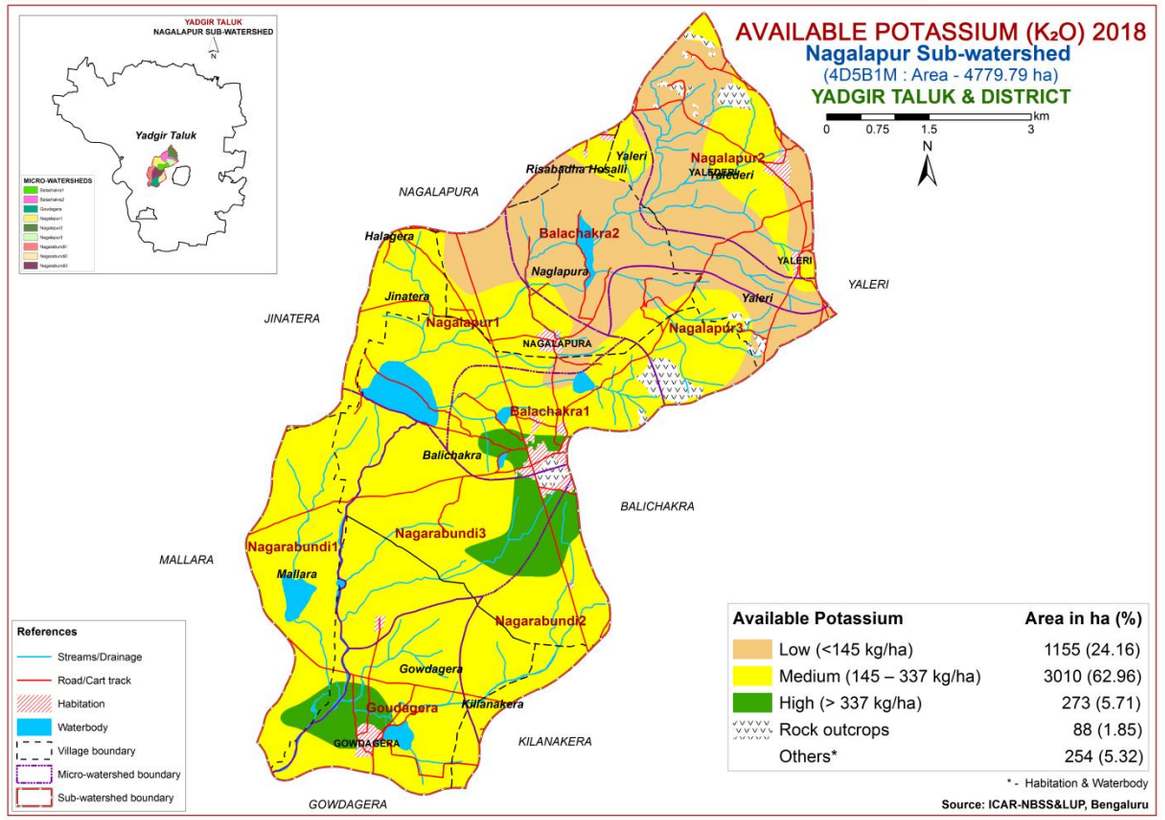
6.3. Organic Carbon



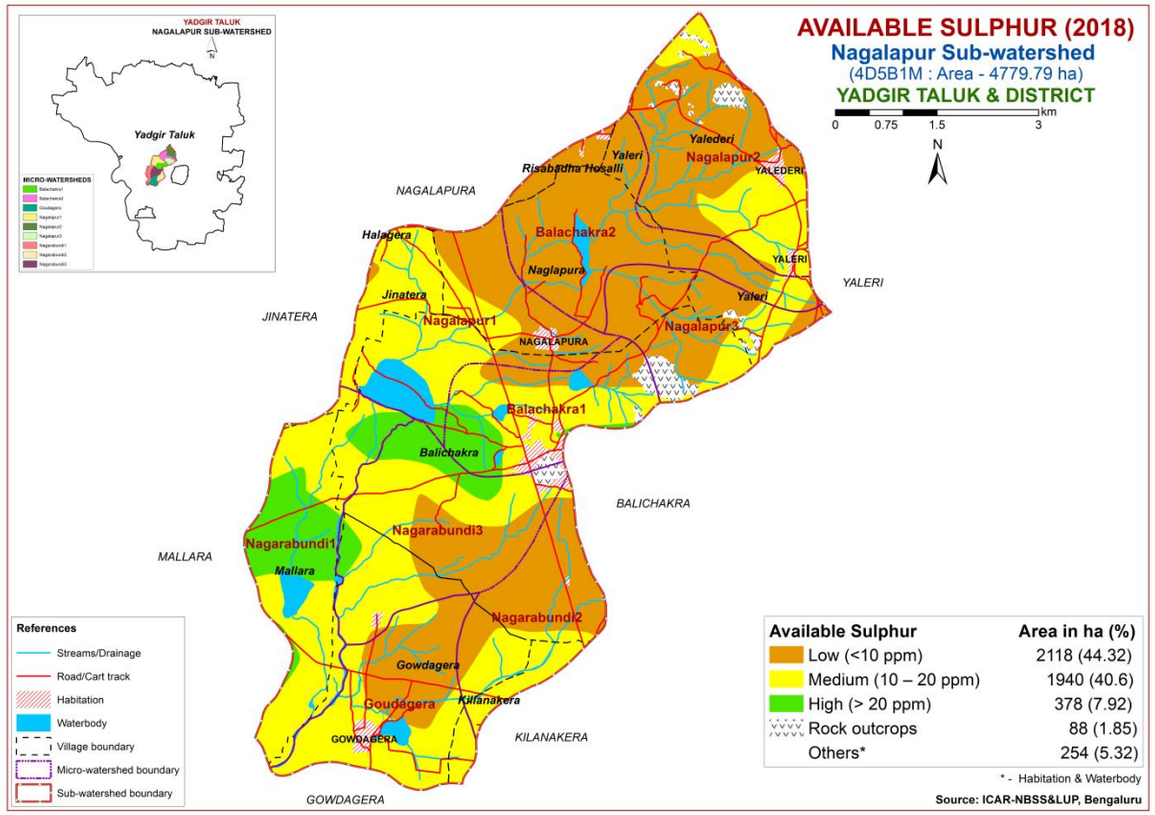
6.4. Available Phosphorus (P_2O_5)



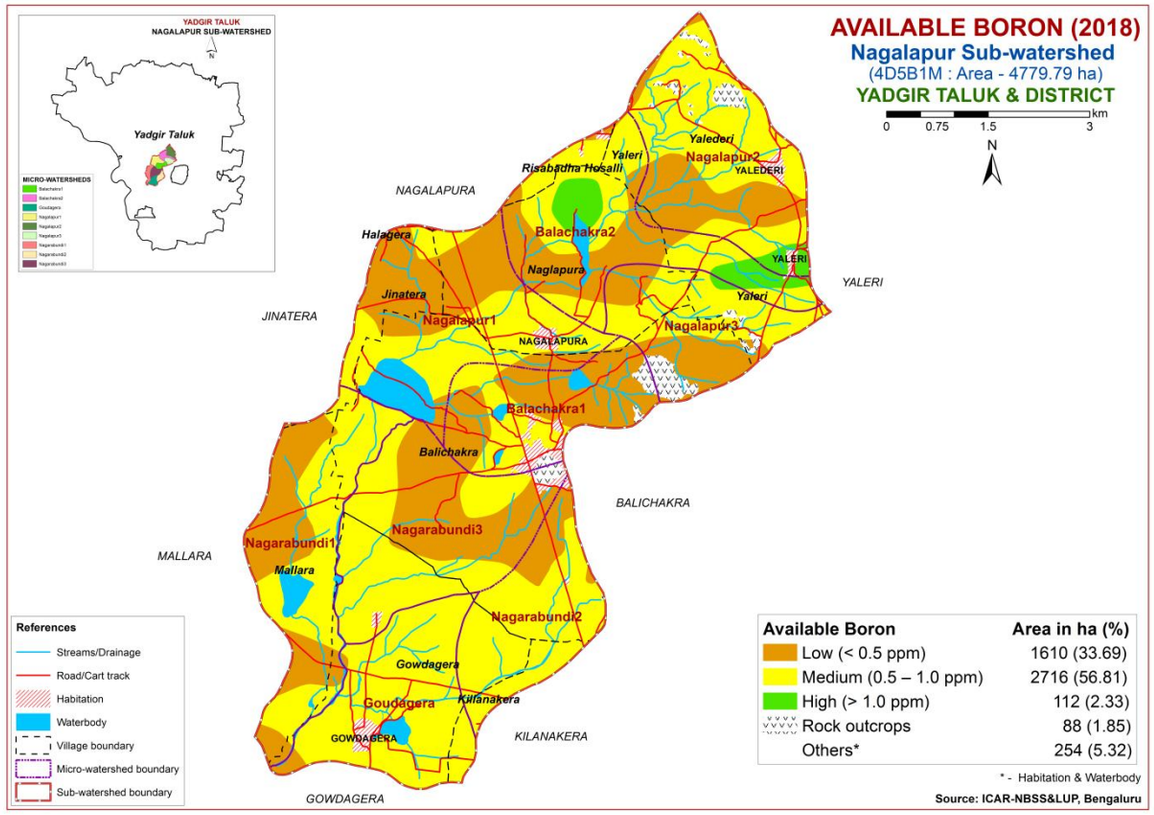
6.5. Available Potassium (K_2O)



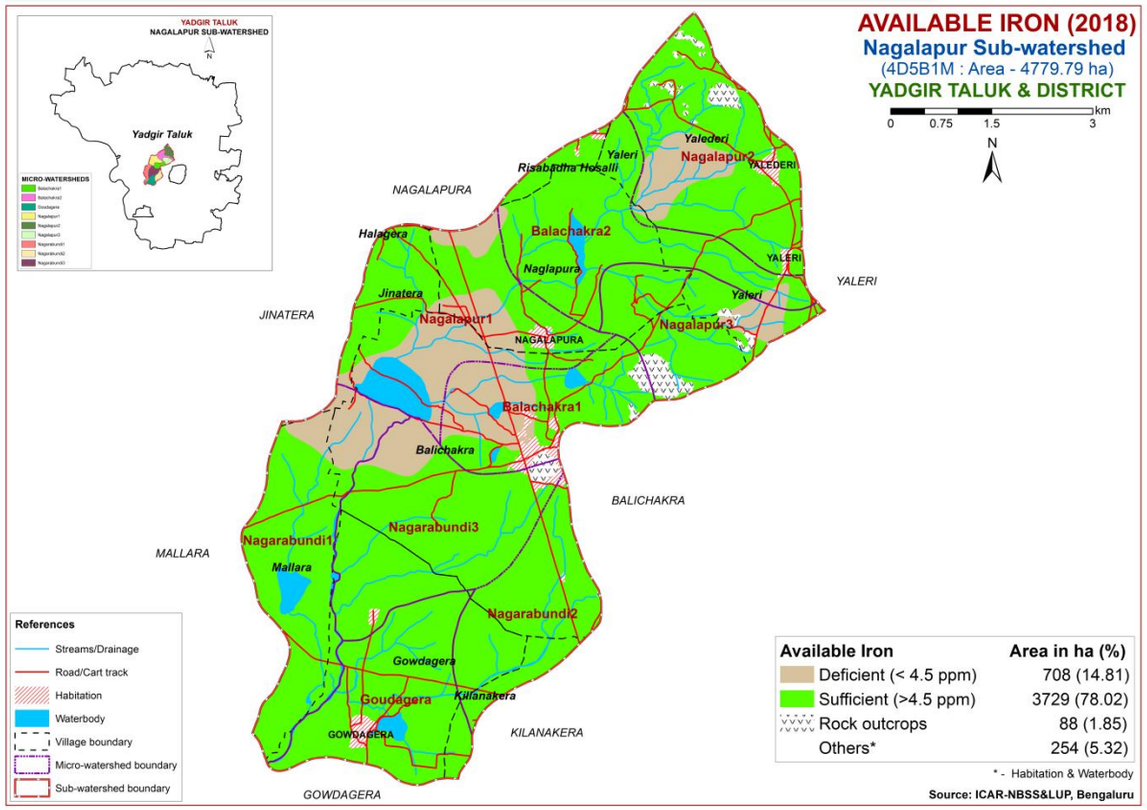
6.6. Available Sulphur



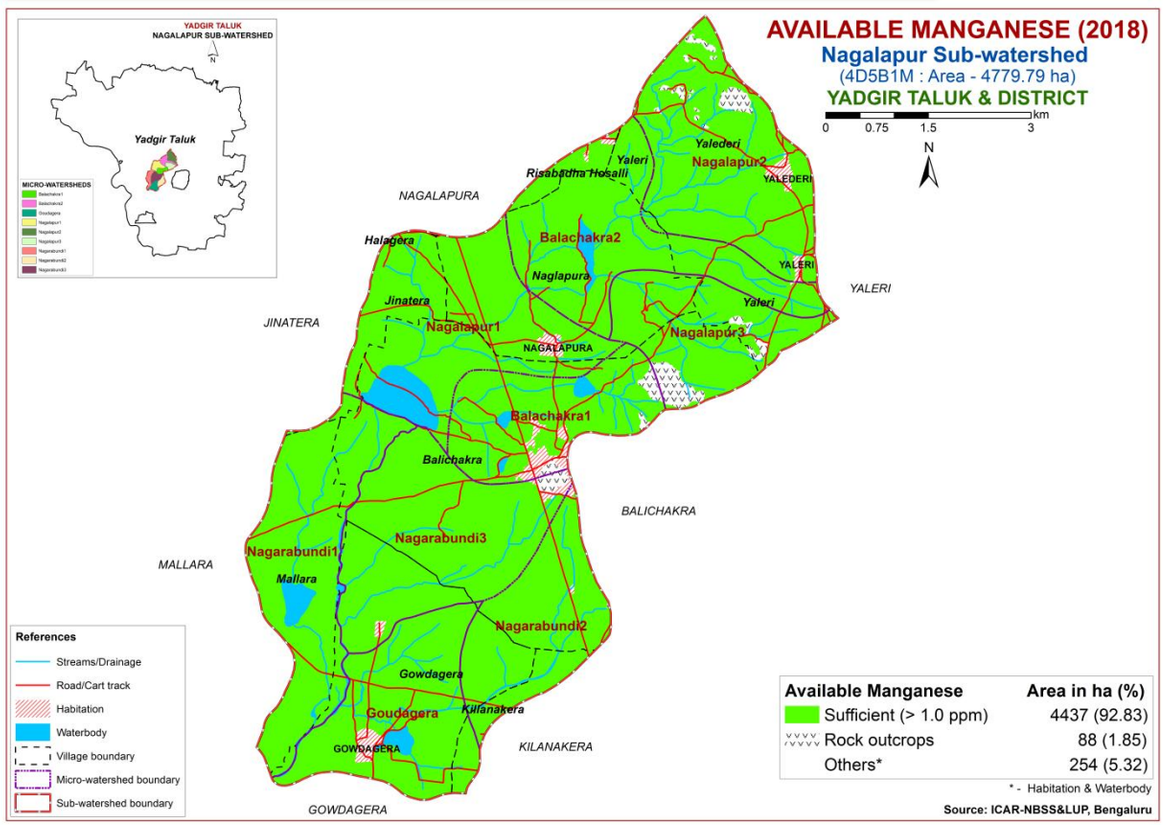
6.7. Available Boron



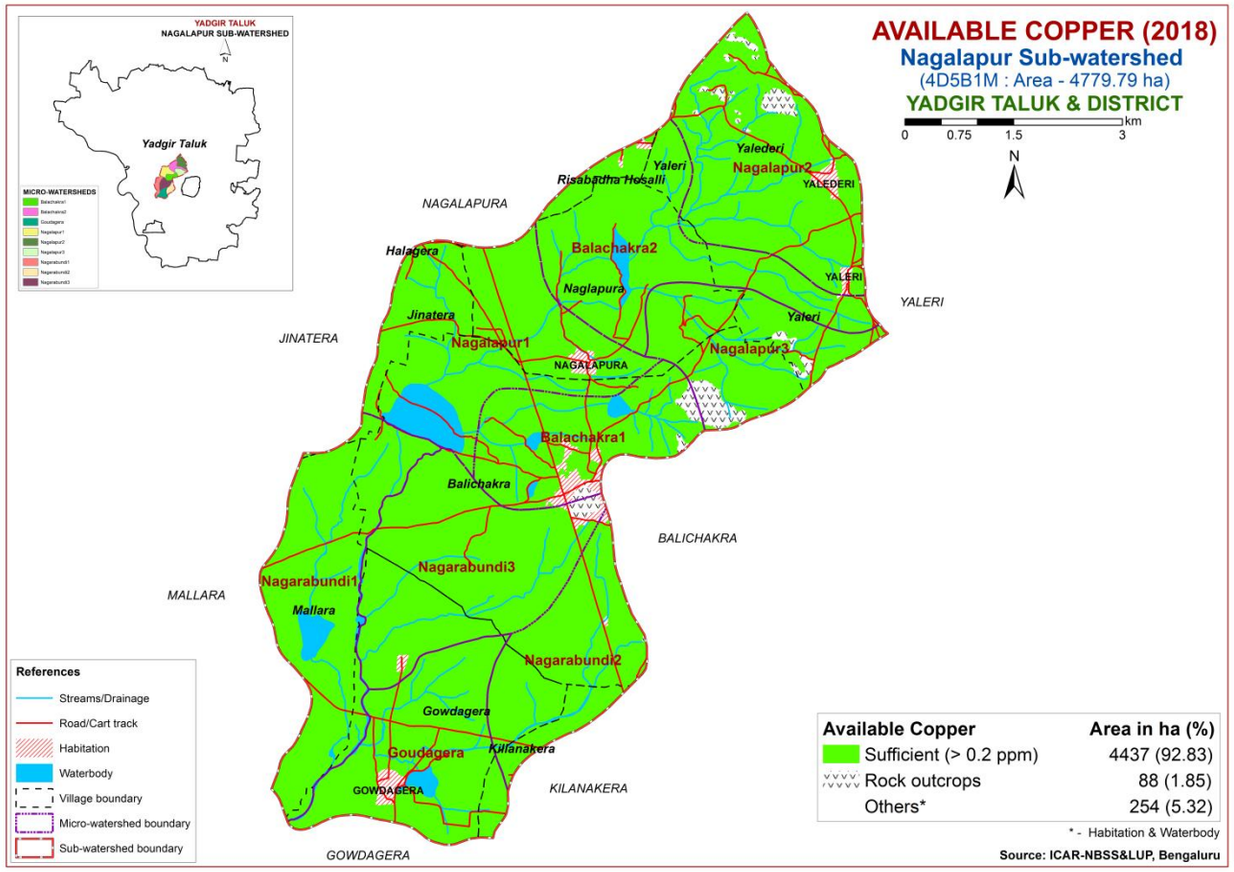
6.8. Available Iron



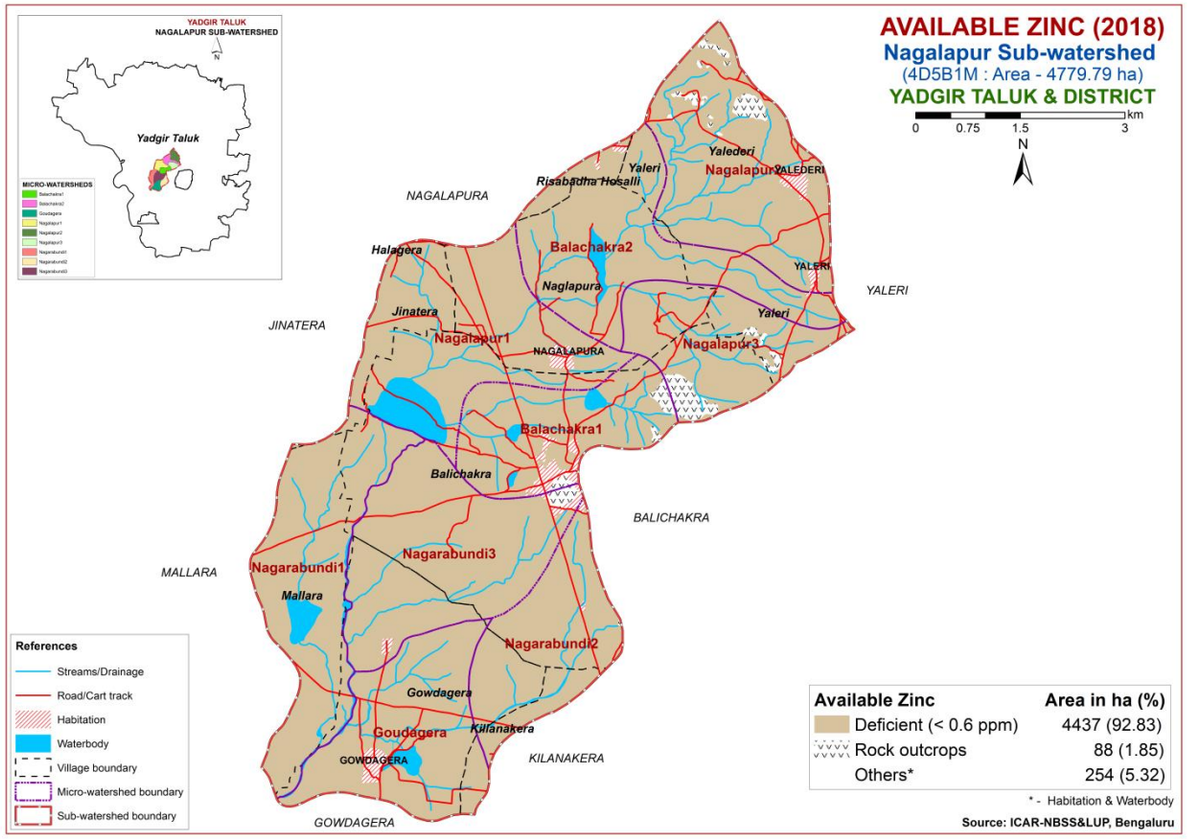
6.9. Available Manganese



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 form 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 bellow:

   - N: P: K (N: P_2O_5: K_2O) **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

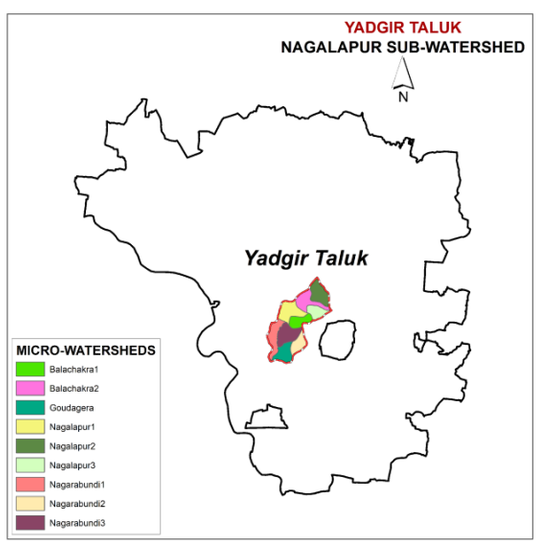
     100+25% for deficient soil.
     100% for medium available N content soil.
     100-25% for higher N content soil.

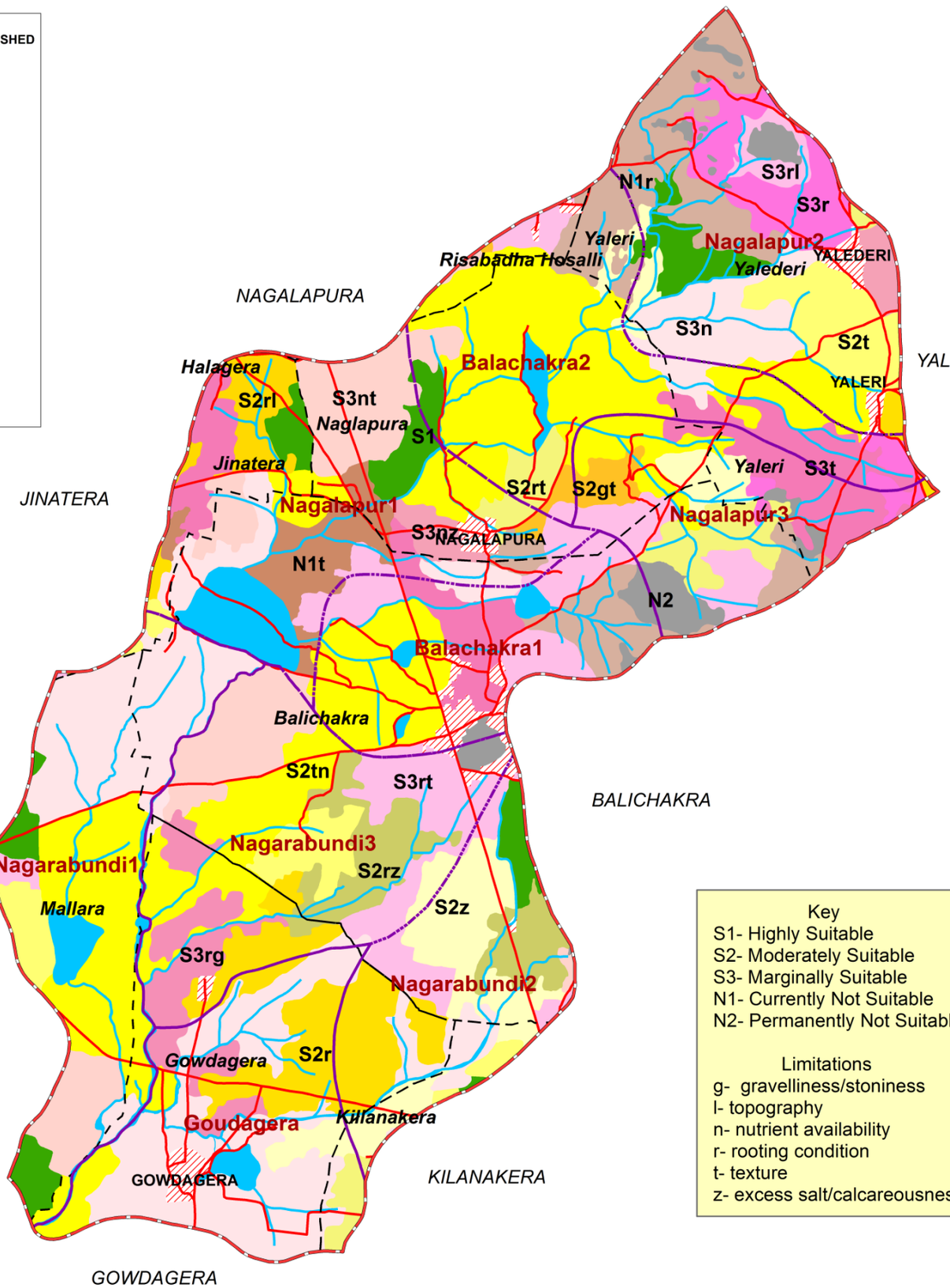
   - Follow the same in case of P & K.

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 ($CaSO_4$. $2H_2O$)
5. Apply 405kg $MgSO_4$ 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 ($FeSO_4$) per ha to the iron deficient soils. In case of perennial Horticulture crops apply 3-5g/ litre $FeSo_4$ /plant as foliar spray.
8. Apply 30-40kg/ha – manganese sulfate ($MnSO_4$) as soil application to the manganese deficient soils. In case of perennial Horticulture crops apply 3-5 g/litre $MnSO_4$ /plant as foilar application.
9. Apply Zinc – 10-25 kg/ha –$ZnSO_4$ – 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 ($CuSO_4$) soil application for the copper deficient soils and for Perennial horticultural crops 3-5g/ litre – $CuSO_4$/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





LAND SUITABILITY FOR SORGHUM

Nagalapur Sub-watershed

(4D5B1M : Area - 4779.79 ha)

YADGIR TALUK & DISTRICT

km
0 0.75 1.5 3
N

Suitability subclass	Area in ha (%)
S1	171 (3.59)
S2r	232 (4.85)
S2t	191 (4.01)
S2z	230 (4.81)
S2gt	37 (0.78)
S2rl	56 (1.16)
S2rt	119 (2.49)
S2rz	139 (2.9)
S2tn	942 (19.7)
S3n	718 (15.02)
S3r	130 (2.72)
S3t	253 (5.29)
S3nt	305 (6.37)
S3nz	47 (0.99)
S3rg	117 (2.44)
S3rl	24 (0.51)
S3rt	350 (7.32)
N1r	285 (5.95)
N1t	92 (1.92)
N2	88 (1.85)
Others*	254 (5.32)

* - Habitation & Waterbody

References

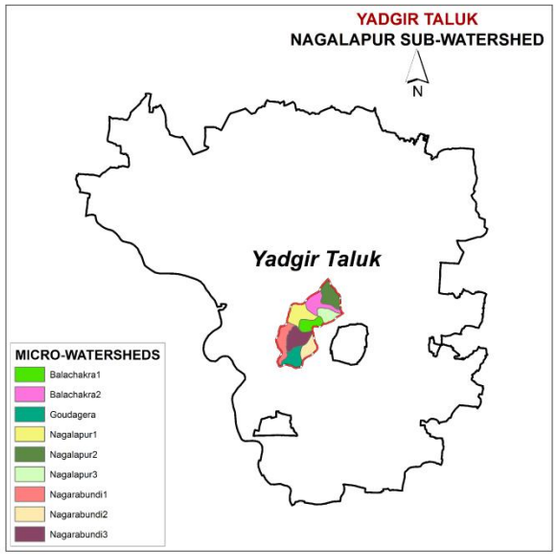
- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- Village boundary
- Micro-watershed boundary
- Sub-watershed boundary

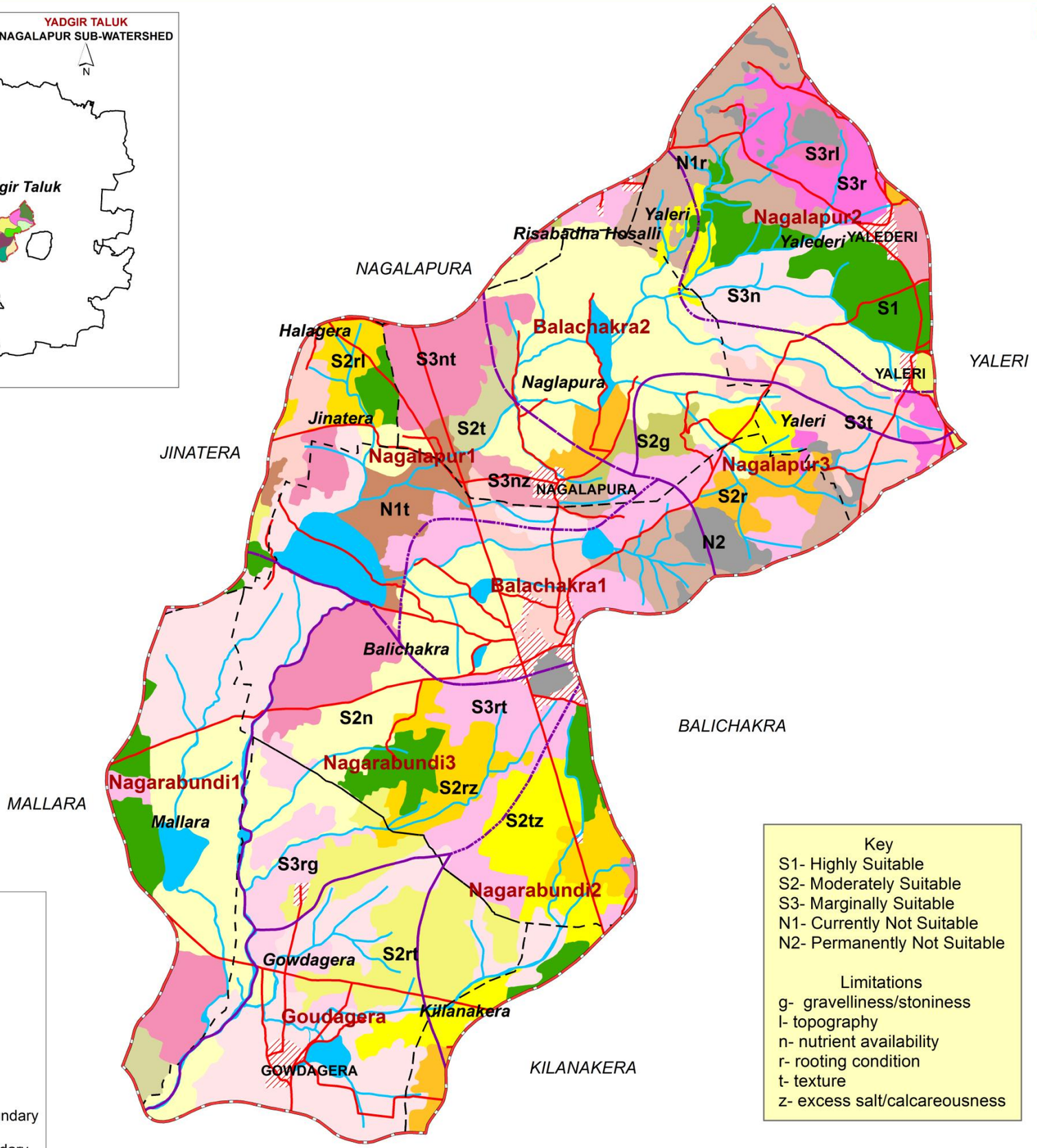
Key
S1- Highly Suitable
S2- Moderately Suitable
S3- Marginally Suitable
N1- Currently Not Suitable
N2- Permanently Not Suitable

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

Source: ICAR-NBSS&LUP, Bengaluru

7.2. Land Suitability for Maize





LAND SUITABILITY FOR MAIZE

Nagalapur Sub-watershed

(4D5B1M : Area - 4779.79 ha)

YADGIR TALUK & DISTRICT

0 0.75 1.5 3 km

N

Suitability subclass	Area in ha (%)
S1	300 (6.28)
S2g	37 (0.78)
S2n	942 (19.7)
S2r	119 (2.49)
S2t	63 (1.31)
S2rl	56 (1.16)
S2rt	232 (4.85)
S2rz	139 (2.9)
S2tz	230 (4.81)
S3n	718 (15.02)
S3r	130 (2.72)
S3t	253 (5.29)
S3nt	305 (6.37)
S3nz	47 (0.99)
S3rg	117 (2.44)
S3rl	24 (0.51)
S3rt	350 (7.32)
N1r	285 (5.95)
N1t	92 (1.92)
N2	88 (1.85)
Others*	254 (5.32)

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

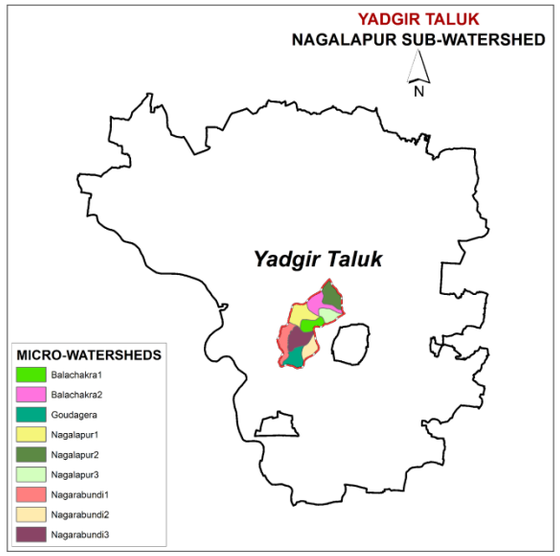
References

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

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

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

7.3. Land Suitability for Redgram



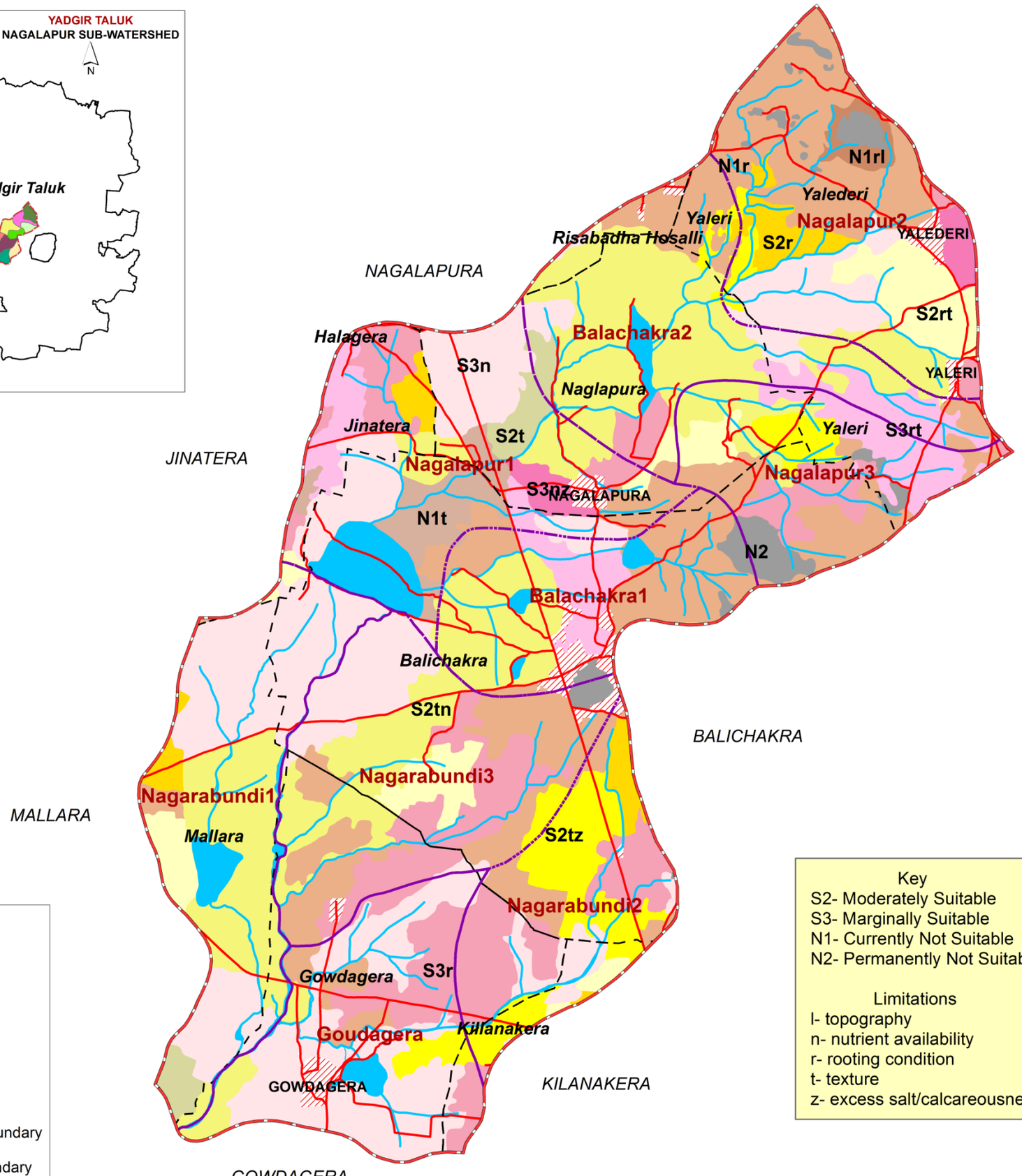
LAND SUITABILITY FOR REDGRAM

Nagalapur Sub-watershed

(4D5B1M : Area - 4779.79 ha)

YADGIR TALUK & DISTRICT

km
0 0.75 1.5 3
N



References

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

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

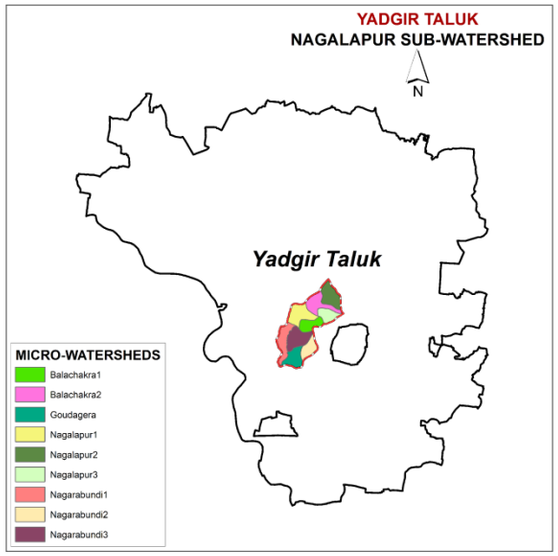
Limitations
l- topography
n- nutrient availability
r- rooting condition
t- texture
z- excess salt/calcareousness

Suitability subclass	Area in ha (%)
S2r	109 (2.28)
S2t	63 (1.31)
S2rt	229 (4.79)
S2tn	942 (19.7)
S2tz	230 (4.81)
S3n	1022 (21.39)
S3r	545 (11.4)
S3nz	47 (0.99)
S3rt	253 (5.29)
N1r	881 (18.44)
N1t	92 (1.92)
N1rl	24 (0.51)
N2	88 (1.85)
Others*	254 (5.32)

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

7.4. Land Suitability for Bajra



LAND SUITABILITY FOR BAJRA

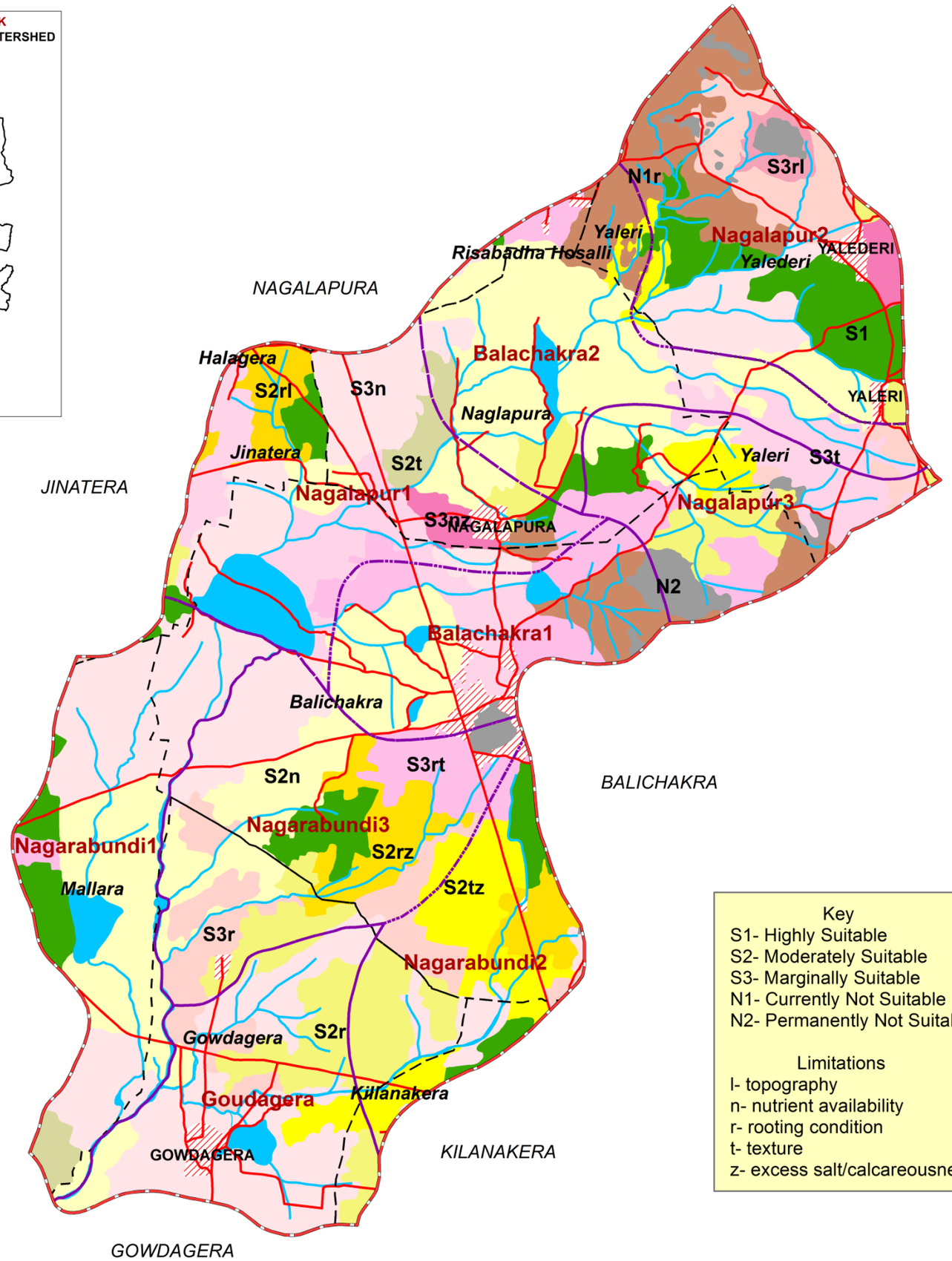
Nagalapur Sub-watershed

(4D5B1M : Area - 4779.79 ha)

YADGIR TALUK & DISTRICT

km
0 0.75 1.5 3

N



References

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

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

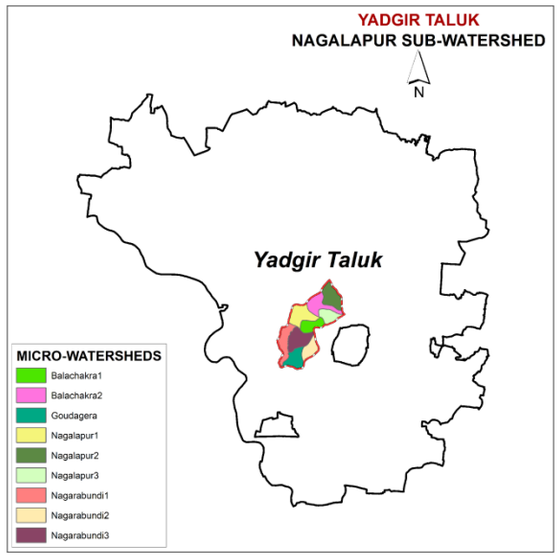
Limitations
l- topography
n- nutrient availability
r- rooting condition
t- texture
z- excess salt/calcareousness

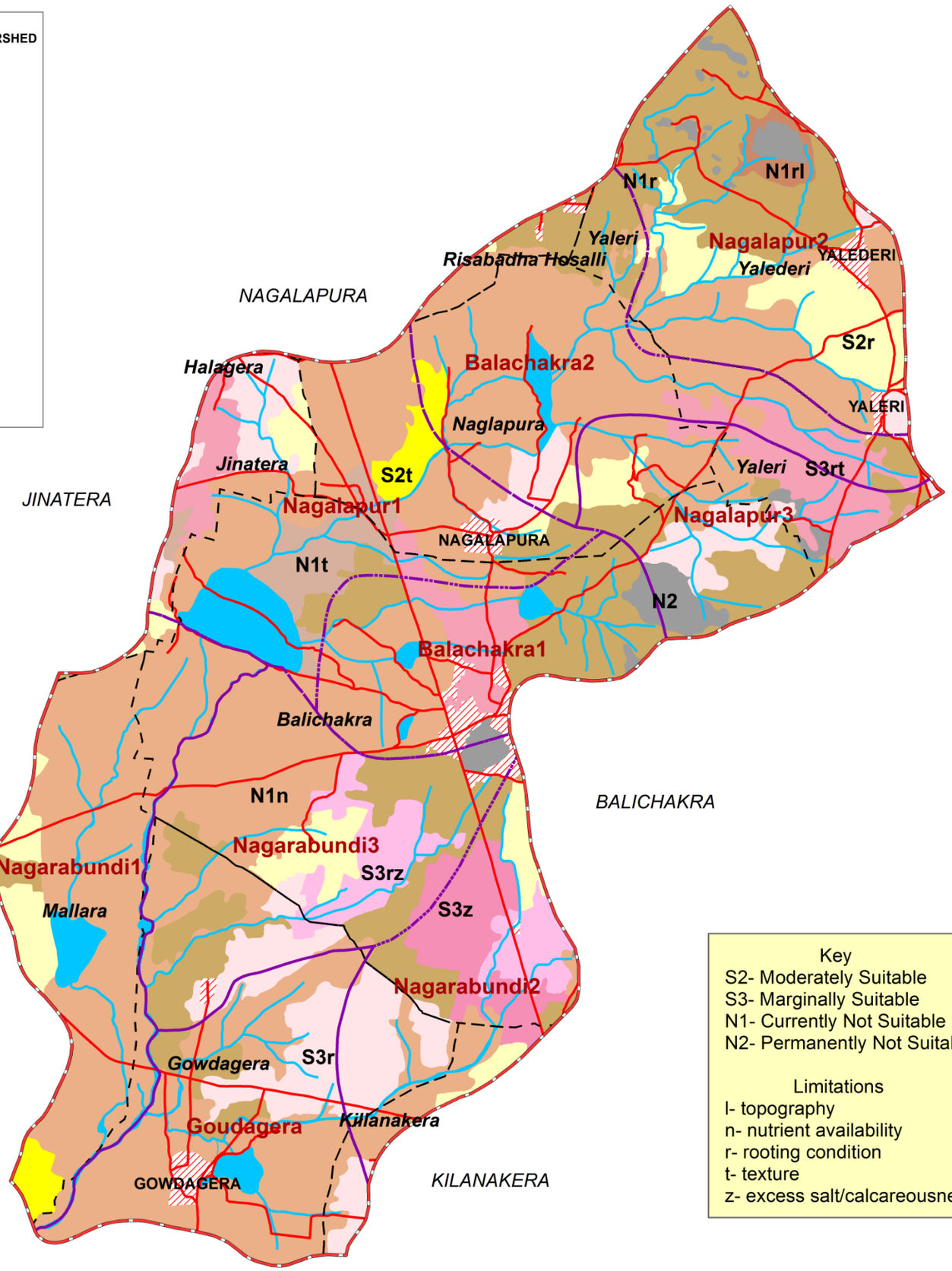
Suitability subclass	Area in ha (%)
S1	338 (7.07)
S2n	942 (19.7)
S2r	351 (7.34)
S2t	63 (1.31)
S2rl	56 (1.16)
S2rz	139 (2.9)
S2tz	230 (4.81)
S3n	1022 (21.39)
S3r	311 (6.5)
S3t	345 (7.21)
S3nz	47 (0.99)
S3rl	24 (0.51)
S3rt	286 (5.98)
N1r	285 (5.95)
N2	88 (1.85)
Others*	254 (5.32)

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

7.5. Land Suitability for Drumstick





LAND SUITABILITY FOR DRUMSTICK

Nagalapur Sub-watershed

(4D5B1M : Area - 4779.79 ha)

YADGIR TALUK & DISTRICT

km
0 0.75 1.5 3
N

Suitability subclass	Area in ha (%)
S2r	338 (7.07)
S2t	63 (1.31)
S3r	406 (8.5)
S3z	119 (2.5)
S3rt	253 (5.29)
S3rz	139 (2.9)
N1n	2122 (44.39)
N1r	881 (18.44)
N1t	92 (1.92)
N1rl	24 (0.51)
N2	88 (1.85)
Others*	254 (5.32)

* - Habitation & Waterbody

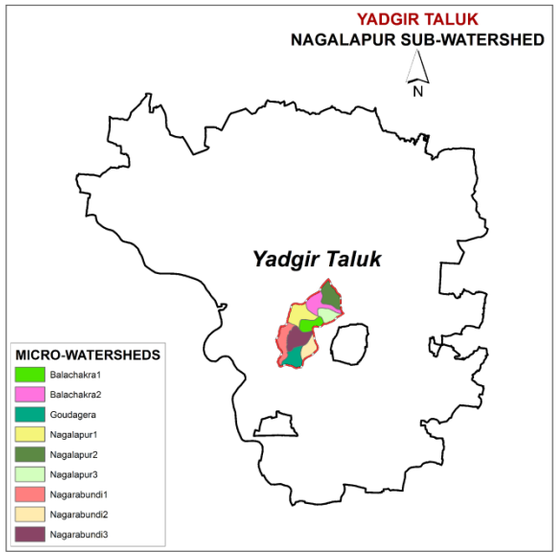
Key
S2- Moderately Suitable
S3- Marginally Suitable
N1- Currently Not Suitable
N2- Permanently Not Suitable

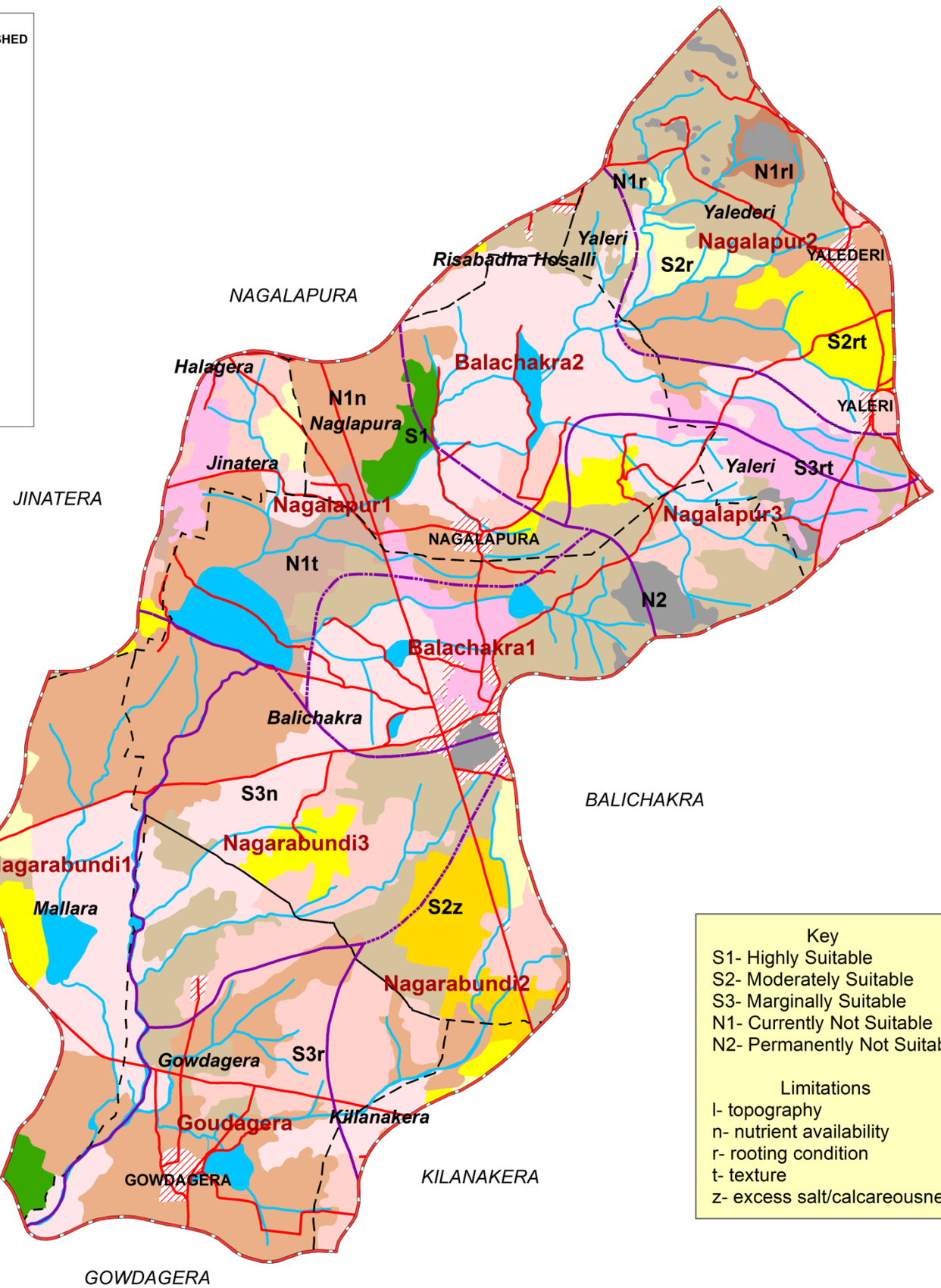
Limitations
l- topography
n- nutrient availability
r- rooting condition
t- texture
z- excess salt/calcareousness

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

Source: ICAR-NBSS&LUP, Bengaluru

7.6. Land Suitability for Sunflower





LAND SUITABILITY FOR SUNFLOWER

Nagalapur Sub-watershed

(4D5B1M : Area - 4779.79 ha)

YADGIR TALUK & DISTRICT

km
0 0.75 1.5 3

N

References

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

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

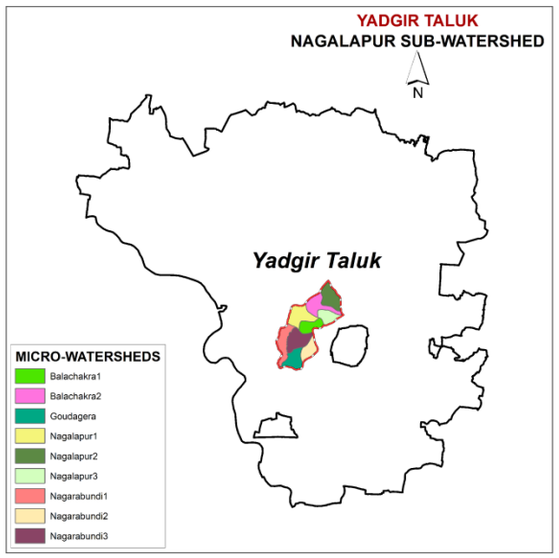
Limitations
l- topography
n- nutrient availability
r- rooting condition
t- texture
z- excess salt/calcareousness

Suitability subclass	Area in ha (%)
S1	63 (1.31)
S2r	109 (2.28)
S2z	119 (2.5)
S2rt	229 (4.79)
S3n	1052 (22.02)
S3r	545 (11.4)
S3rt	253 (5.29)
N1n	1069 (22.38)
N1r	881 (18.44)
N1t	92 (1.92)
N1rl	24 (0.51)
N2	88 (1.85)
Others*	254 (5.32)

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

7.7. Land Suitability for Cotton



LAND SUITABILITY FOR COTTON

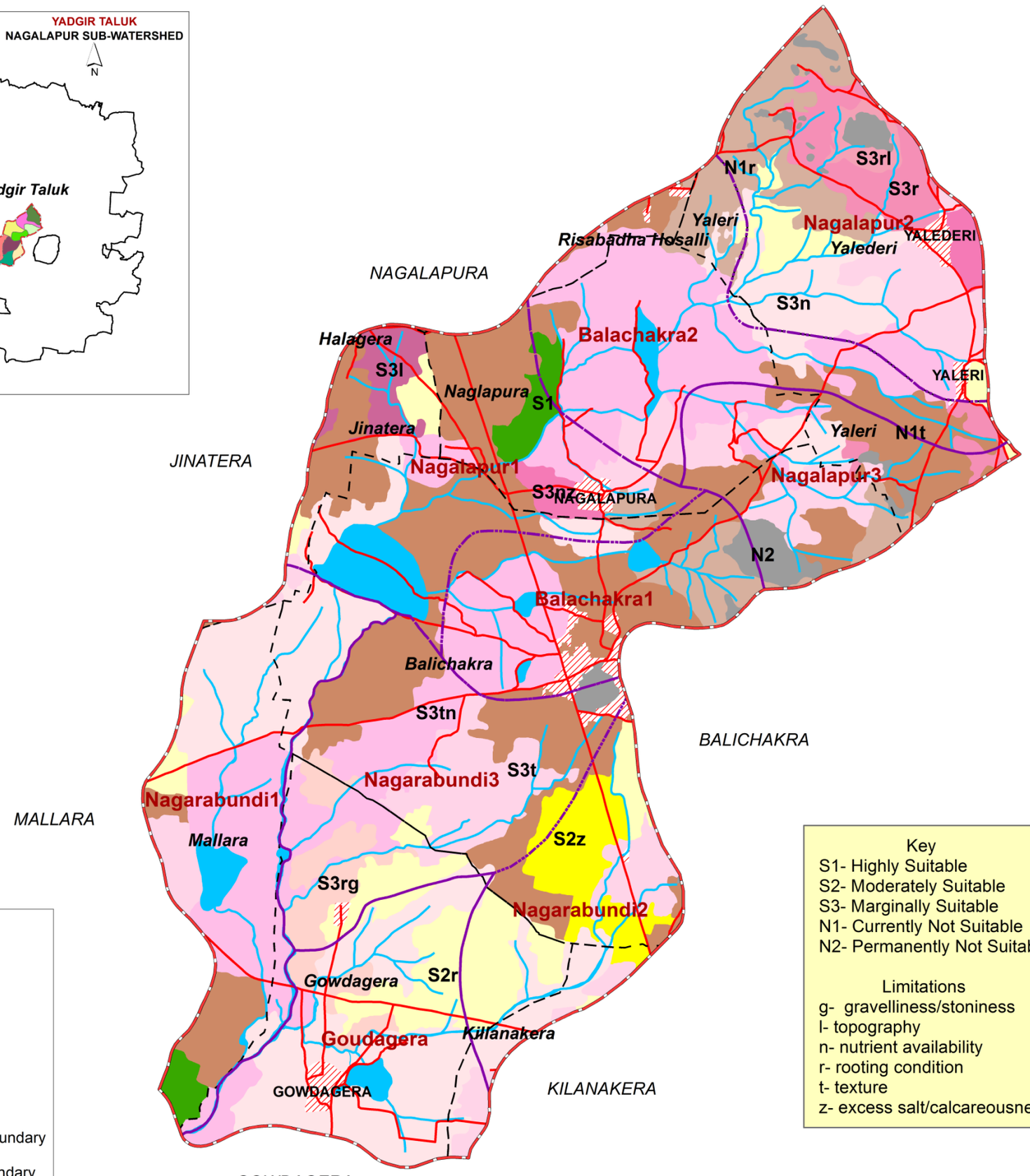
Nagalapur Sub-watershed

(4D5B1M : Area - 4779.79 ha)

YADGIR TALUK & DISTRICT

0 0.75 1.5 3 km

N



Suitability subclass	Area in ha (%)
S1	63 (1.31)
S2r	341 (7.13)
S2z	119 (2.5)
S3l	56 (1.16)
S3n	828 (17.33)
S3r	130 (2.72)
S3t	487 (10.18)
S3nz	47 (0.99)
S3rg	117 (2.44)
S3rl	24 (0.51)
S3tn	942 (19.7)
N1r	285 (5.95)
N1t	999 (20.91)
N2	88 (1.85)
Others*	254 (5.32)

* - Habitation & Waterbody

References

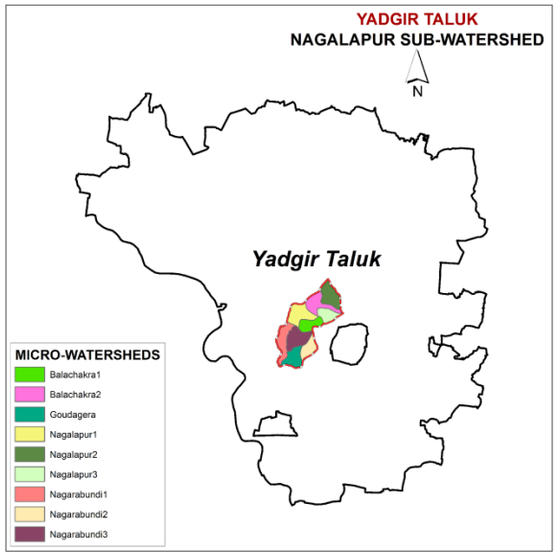
- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- Village boundary
- Micro-watershed boundary
- Sub-watershed boundary

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

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

Source: ICAR-NBSS&LUP, Bengaluru

7.8. Land Suitability for Bengalgram



LAND SUITABILITY FOR BENGALGRAM

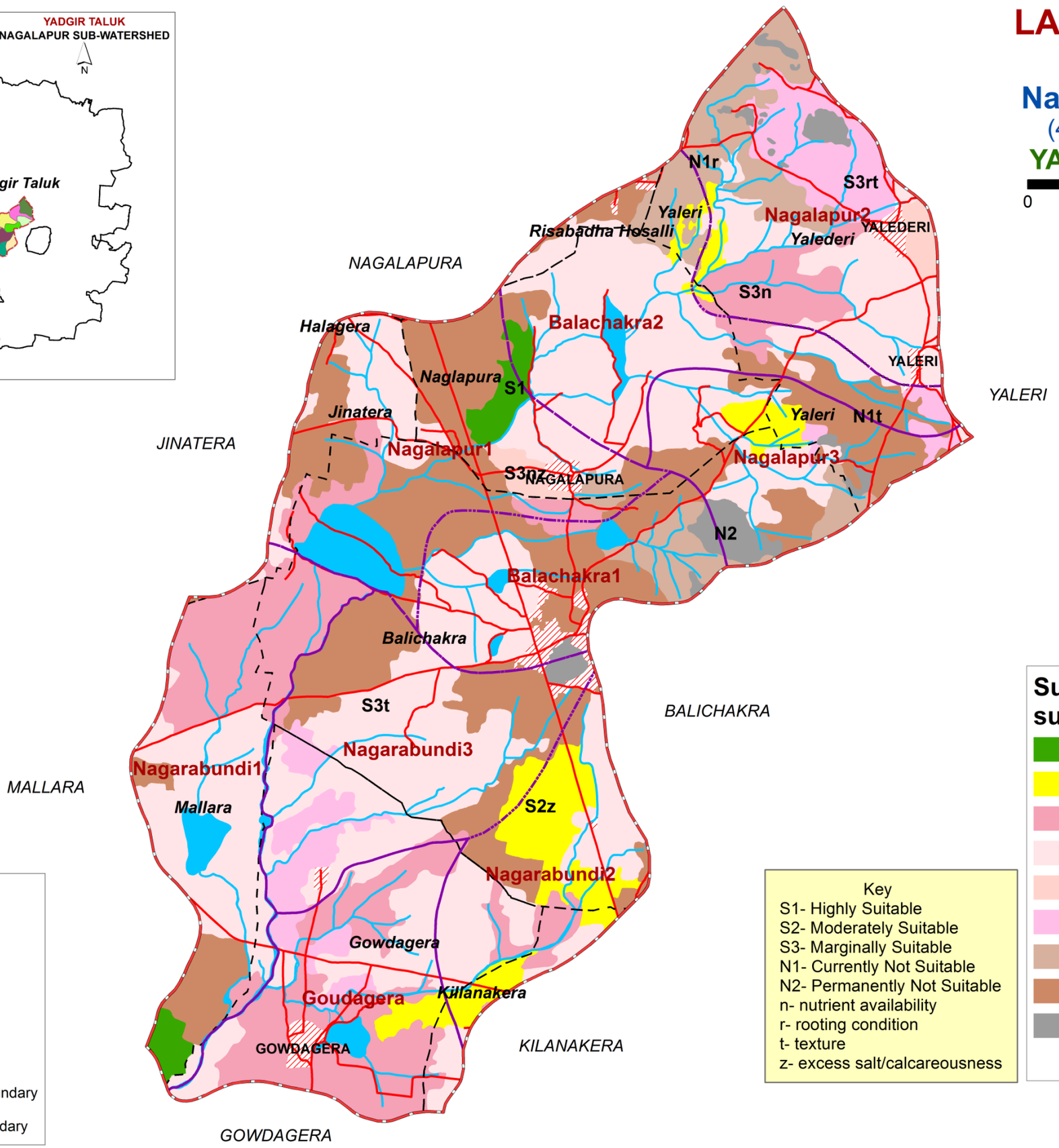
Nagalapur Sub-watershed

(4D5B1M : Area - 4779.79 ha)

YADGIR TALUK & DISTRICT

km
0 0.75 1.5 3

N



References

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

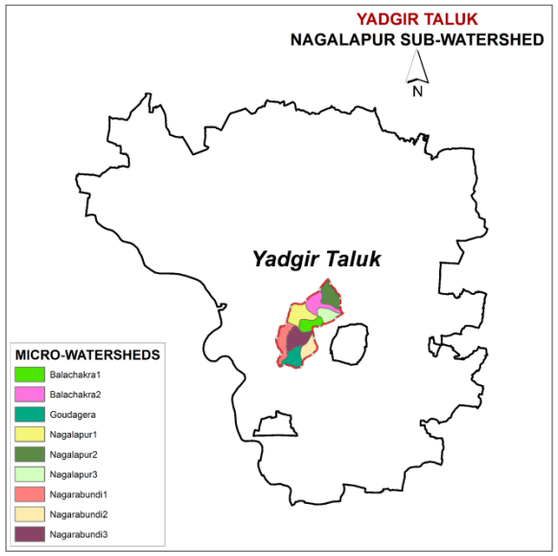
Key
S1- Highly Suitable
S2- Moderately Suitable
S3- Marginally Suitable
N1- Currently Not Suitable
N2- Permanently Not Suitable
n- nutrient availability
r- rooting condition
t- texture
z- excess salt/calcareousness

Suitability subclass	Area in ha (%)
S1	63 (1.31)
S2z	230 (4.81)
S3n	718 (15.02)
S3t	1825 (38.17)
S3nz	47 (0.99)
S3rt	271 (5.67)
N1r	285 (5.95)
N1t	999 (20.91)
N2	88 (1.85)
Others*	254 (5.32)

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

7.9. Land Suitability for Groundnut



LAND SUITABILITY FOR GROUNDNUT

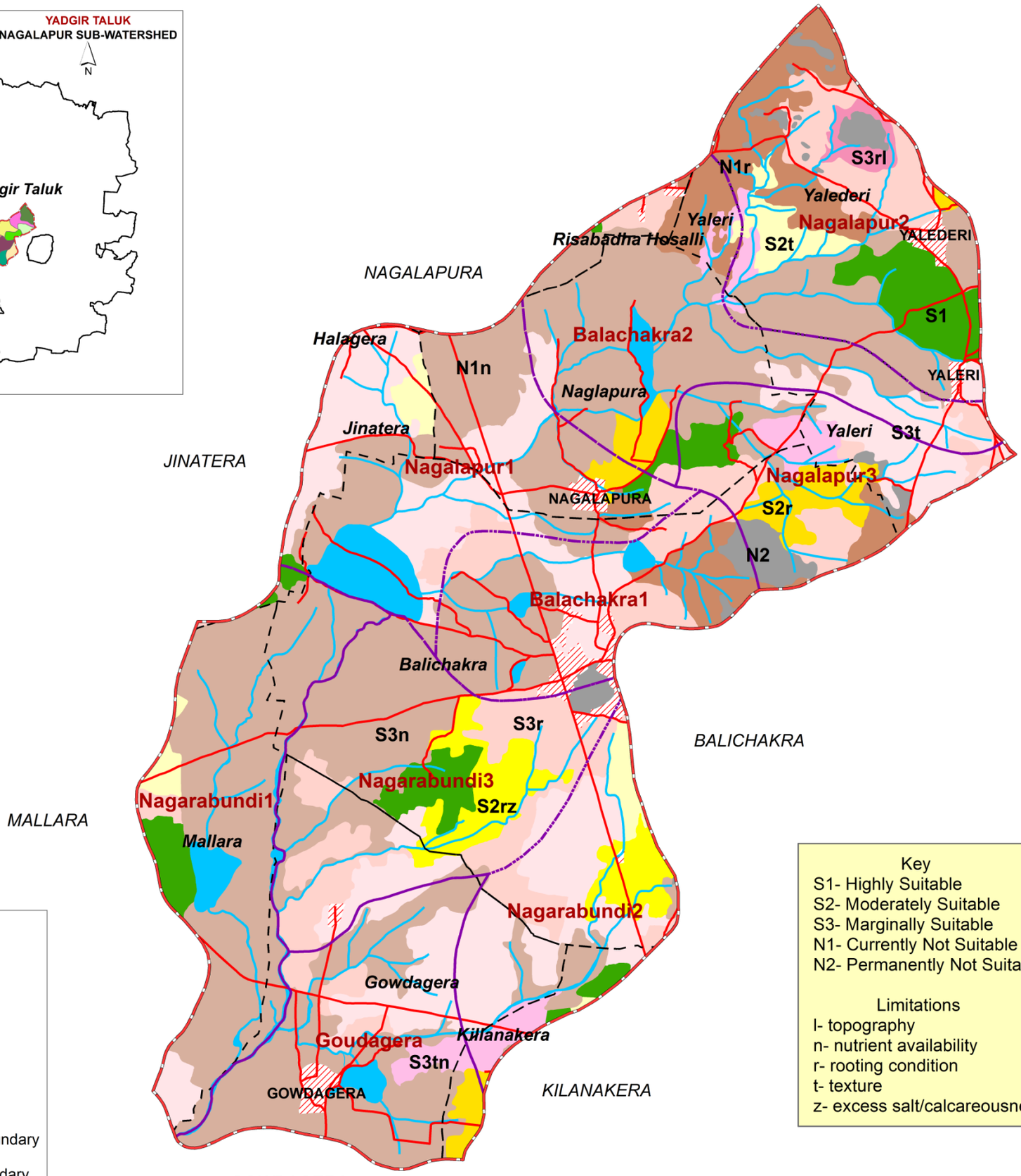
Nagalapur Sub-watershed

(4D5B1M : Area - 4779.79 ha)

YADGIR TALUK & DISTRICT

0 0.75 1.5 3 km

N



References

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

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

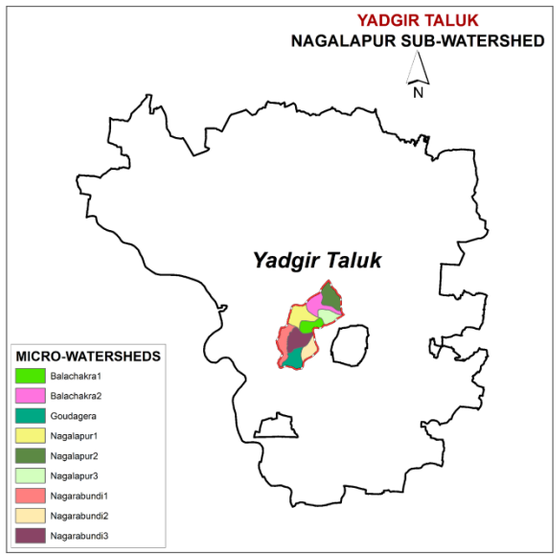
Limitations
l- topography
n- nutrient availability
r- rooting condition
t- texture
z- excess salt/calcareousness

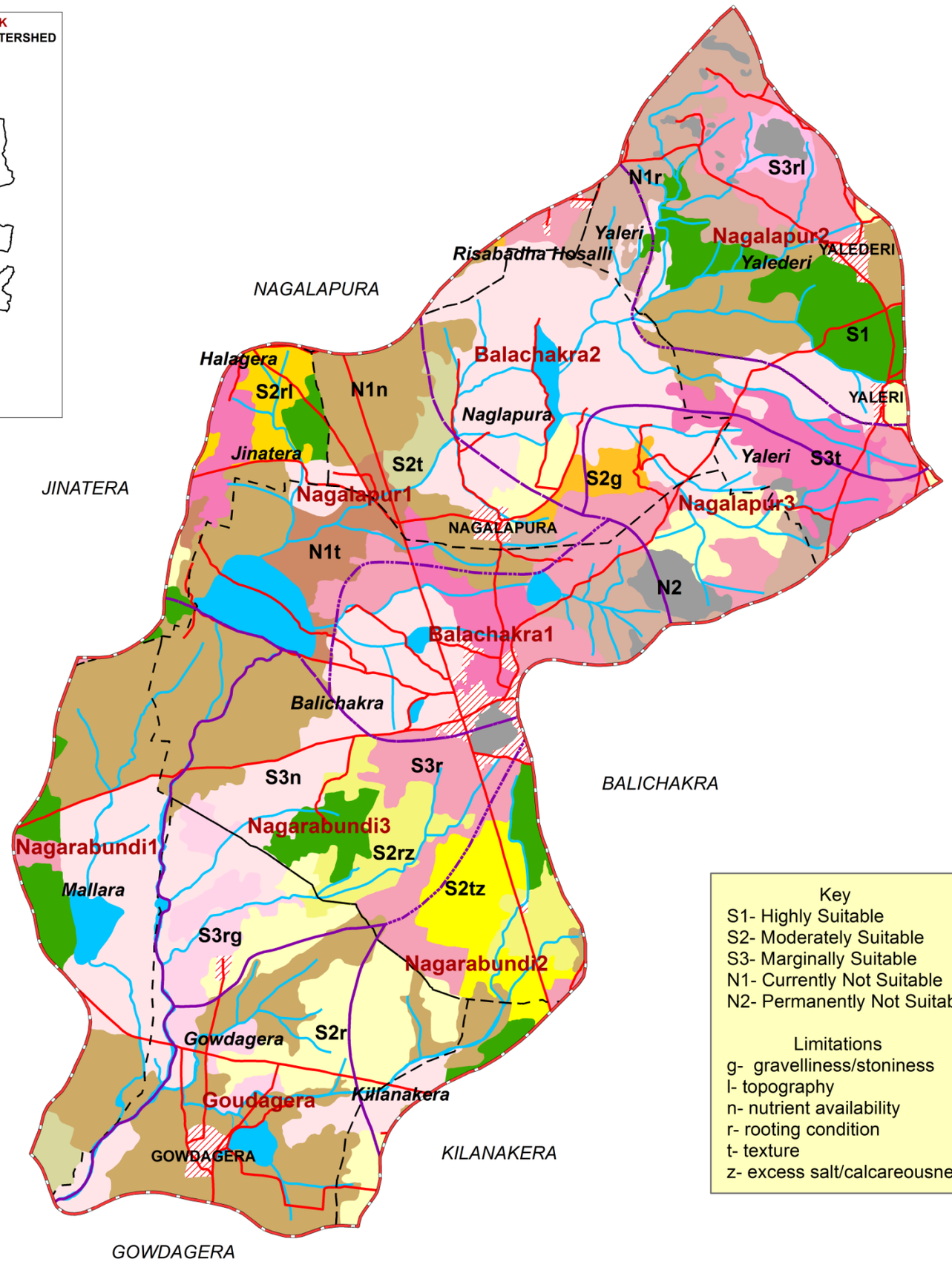
Suitability subclass	Area in ha (%)
S1	229 (4.79)
S2r	119 (2.49)
S2t	109 (2.28)
S2rz	139 (2.9)
S3n	942 (19.7)
S3r	597 (12.48)
S3t	814 (17.03)
S3rl	24 (0.51)
S3tn	111 (2.31)
N1n	1069 (22.38)
N1r	285 (5.95)
N2	88 (1.85)
Others*	254 (5.32)

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

7.10. Land Suitability for Chilli





LAND SUITABILITY FOR CHILLI

Nagalapur Sub-watershed

(4D5B1M : Area - 4779.79 ha)

YADGIR TALUK & DISTRICT

0 0.75 1.5 3 km

N

Suitability subclass	Area in ha (%)
S1	300 (6.28)
S2g	37 (0.78)
S2r	351 (7.34)
S2t	63 (1.31)
S2rl	56 (1.16)
S2rz	139 (2.9)
S2tz	119 (2.5)
S3n	1052 (22.02)
S3r	480 (10.04)
S3t	253 (5.29)
S3rg	117 (2.44)
S3rl	24 (0.51)
N1n	1069 (22.38)
N1r	285 (5.95)
N1t	92 (1.92)
N2	88 (1.85)
Others*	254 (5.32)

* - Habitation & Waterbody

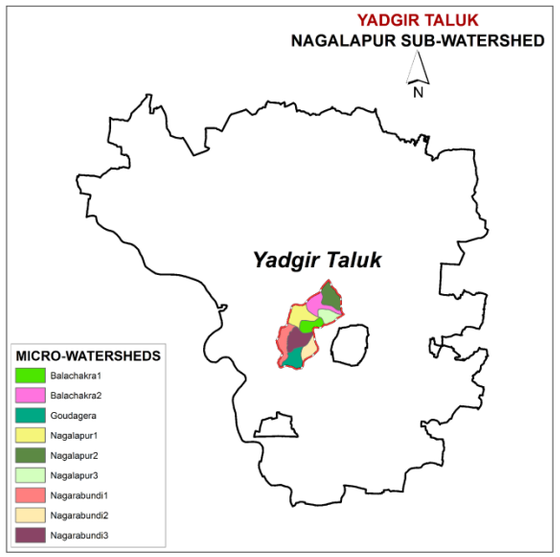
Key
S1- Highly Suitable
S2- Moderately Suitable
S3- Marginally Suitable
N1- Currently Not Suitable
N2- Permanently Not Suitable

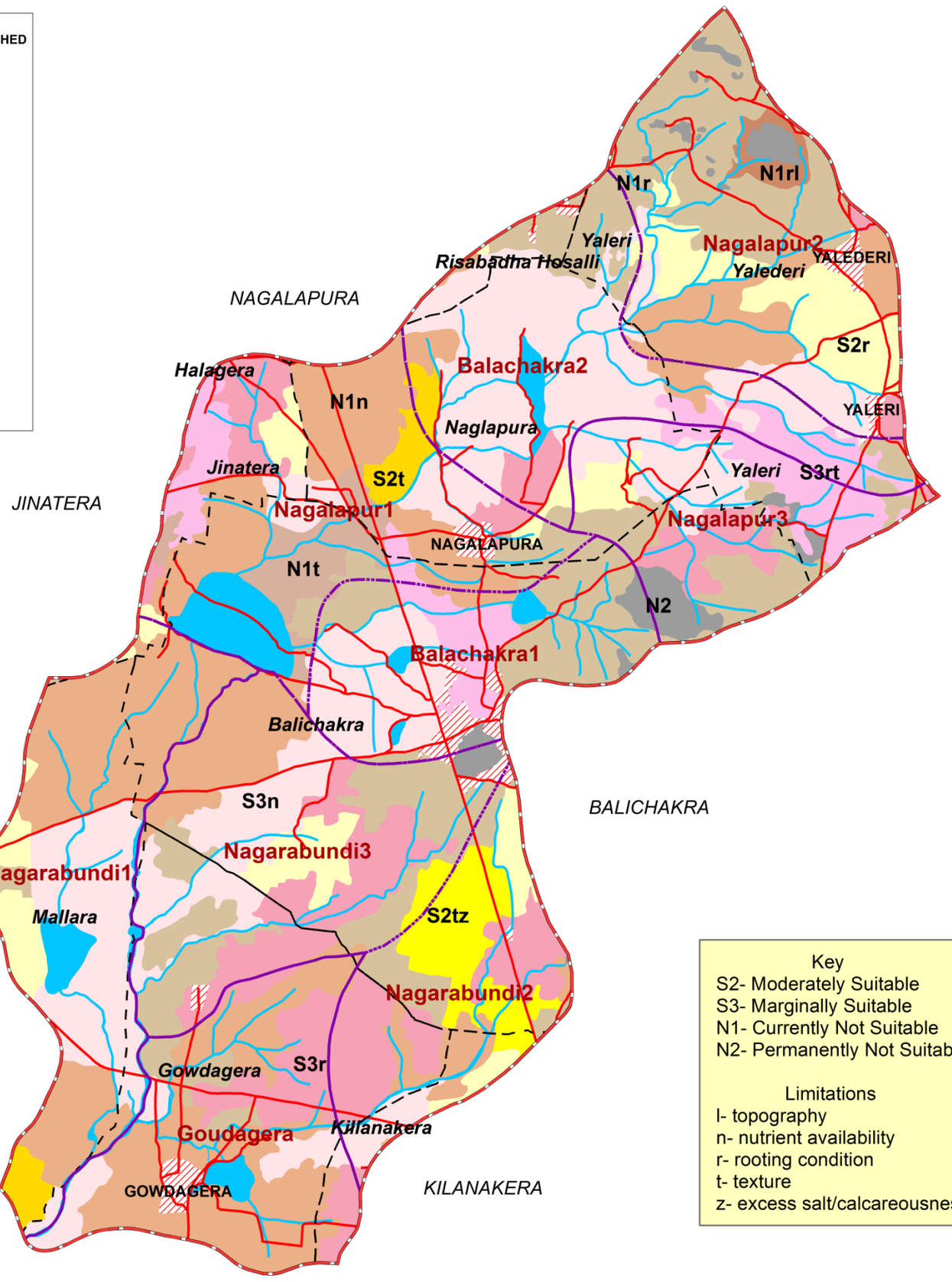
Limitations
g- gravelliness/stoniness
l- topography
n- nutrient availability
r- rooting condition
t- texture
z- excess salt/calcareousness

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

Source: ICAR-NBSS&LUP, Bengaluru

7.11. Land Suitability for Pomegranate





LAND SUITABILITY FOR POMEGRANATE

Nagalapur Sub-watershed

(4D5B1M : Area - 4779.79 ha)

YADGIR TALUK & DISTRICT

0 0.75 1.5 3 km

N

References

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

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

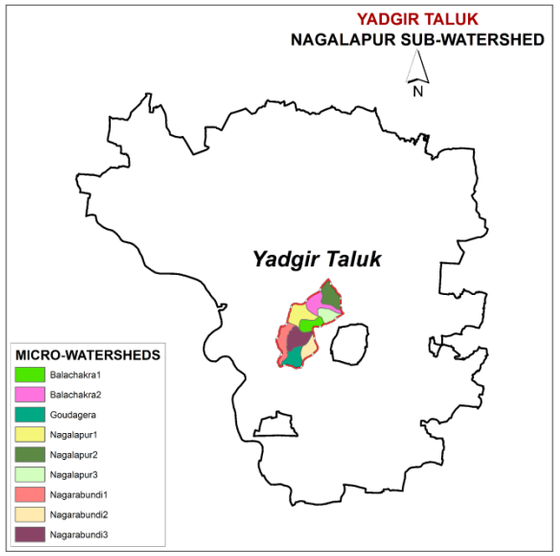
Limitations
l- topography
n- nutrient availability
r- rooting condition
t- texture
z- excess salt/calcareousness

Suitability subclass	Area in ha (%)
S2r	338 (7.07)
S2t	63 (1.31)
S2tz	119 (2.5)
S3n	1052 (22.02)
S3r	545 (11.4)
S3rt	253 (5.29)
N1n	1069 (22.38)
N1r	881 (18.44)
N1t	92 (1.92)
N1rl	24 (0.51)
N2	88 (1.85)
Others*	254 (5.32)

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

7.12. Land Suitability for Tomato



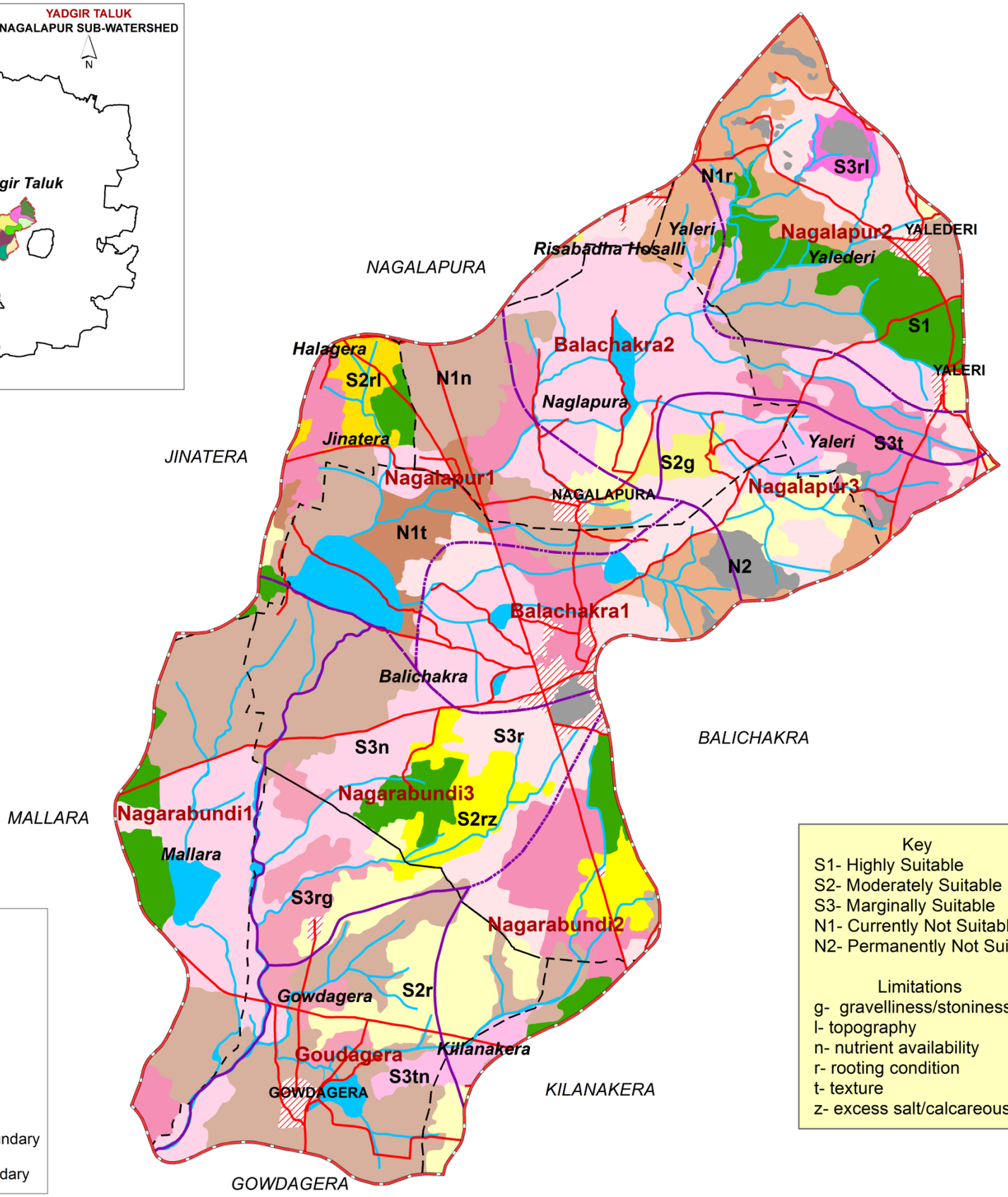
LAND SUITABILITY FOR TOMATO

Nagalapur Sub-watershed

(4D5B1M : Area - 4779.79 ha)

YADGIR TALUK & DISTRICT

km
0 0.75 1.5 3
N



Suitability subclass	Area in ha (%)
S1	300 (6.28)
S2g	37 (0.78)
S2r	351 (7.34)
S2rl	56 (1.16)
S2rz	139 (2.9)
S3n	942 (19.7)
S3r	480 (10.04)
S3t	435 (9.1)
S3rg	117 (2.44)
S3rl	24 (0.51)
S3tn	111 (2.31)
N1n	1069 (22.38)
N1r	285 (5.95)
N1t	92 (1.92)
N2	88 (1.85)
Others*	254 (5.32)

* - Habitation & Waterbody

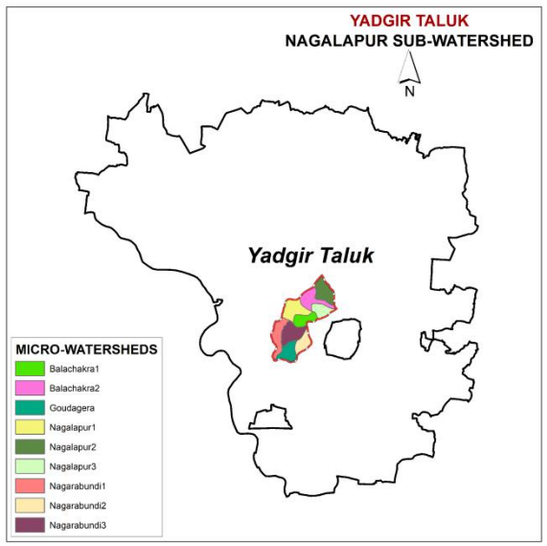
Key
S1- Highly Suitable
S2- Moderately Suitable
S3- Marginally Suitable
N1- Currently Not Suitable
N2- Permanently Not Suitable

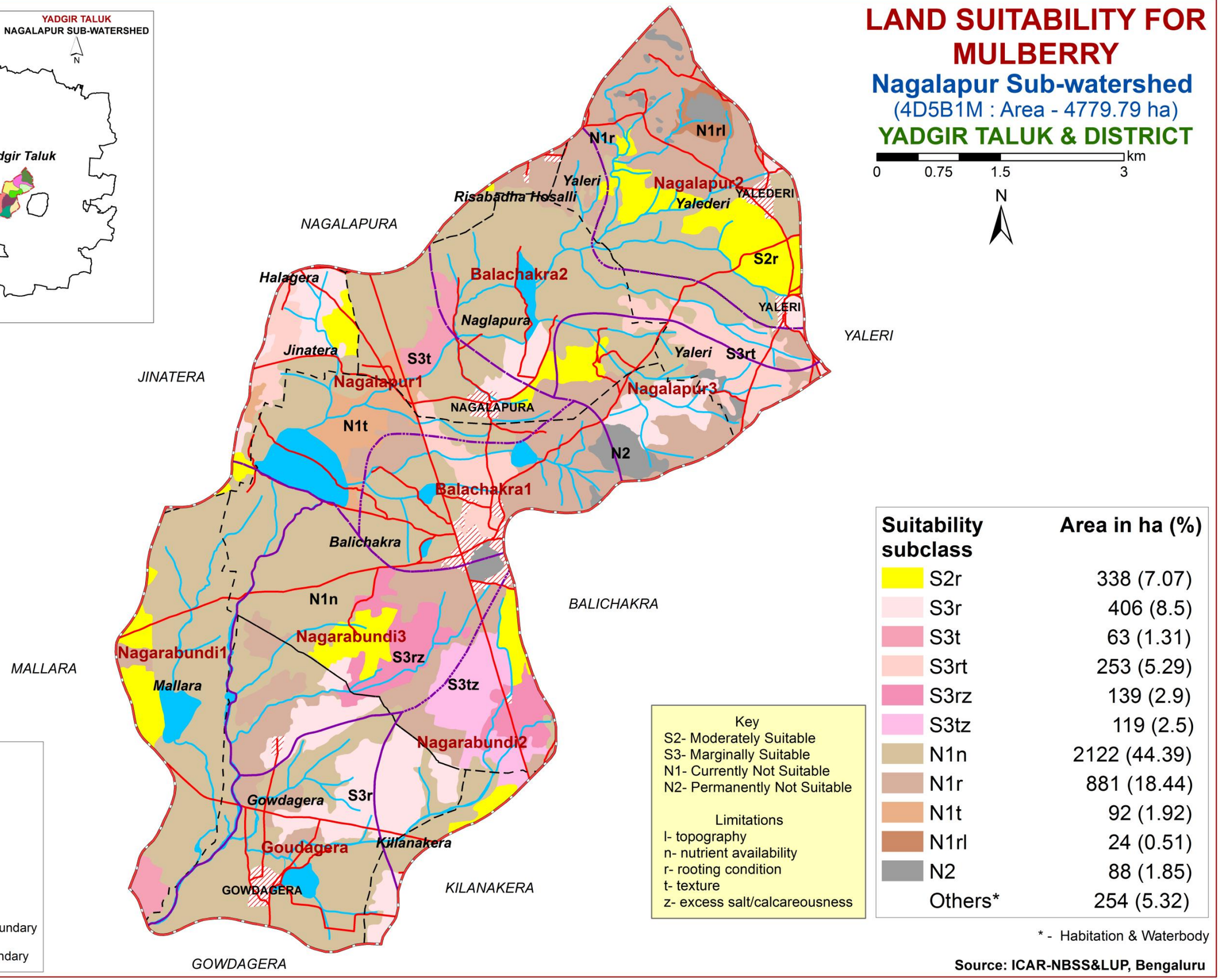
Limitations
g- gravelliness/stoniness
l- topography
n- nutrient availability
r- rooting condition
t- texture
z- excess salt/calcareousness

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

Source: ICAR-NBSS&LUP, Bengaluru

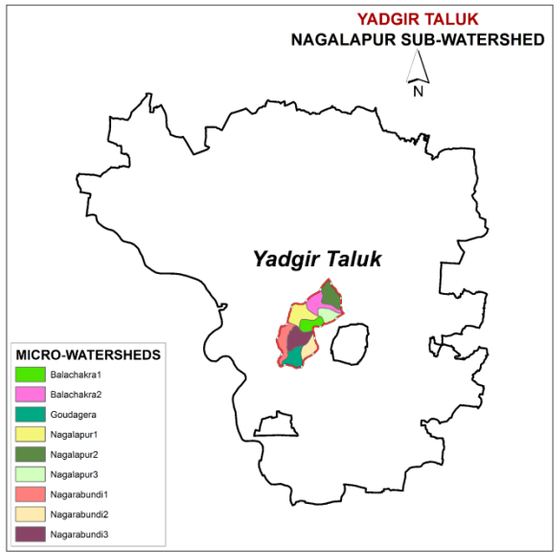
7.13. Land Suitability for Mulberry





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

7.14. Land Suitability for Bhendi



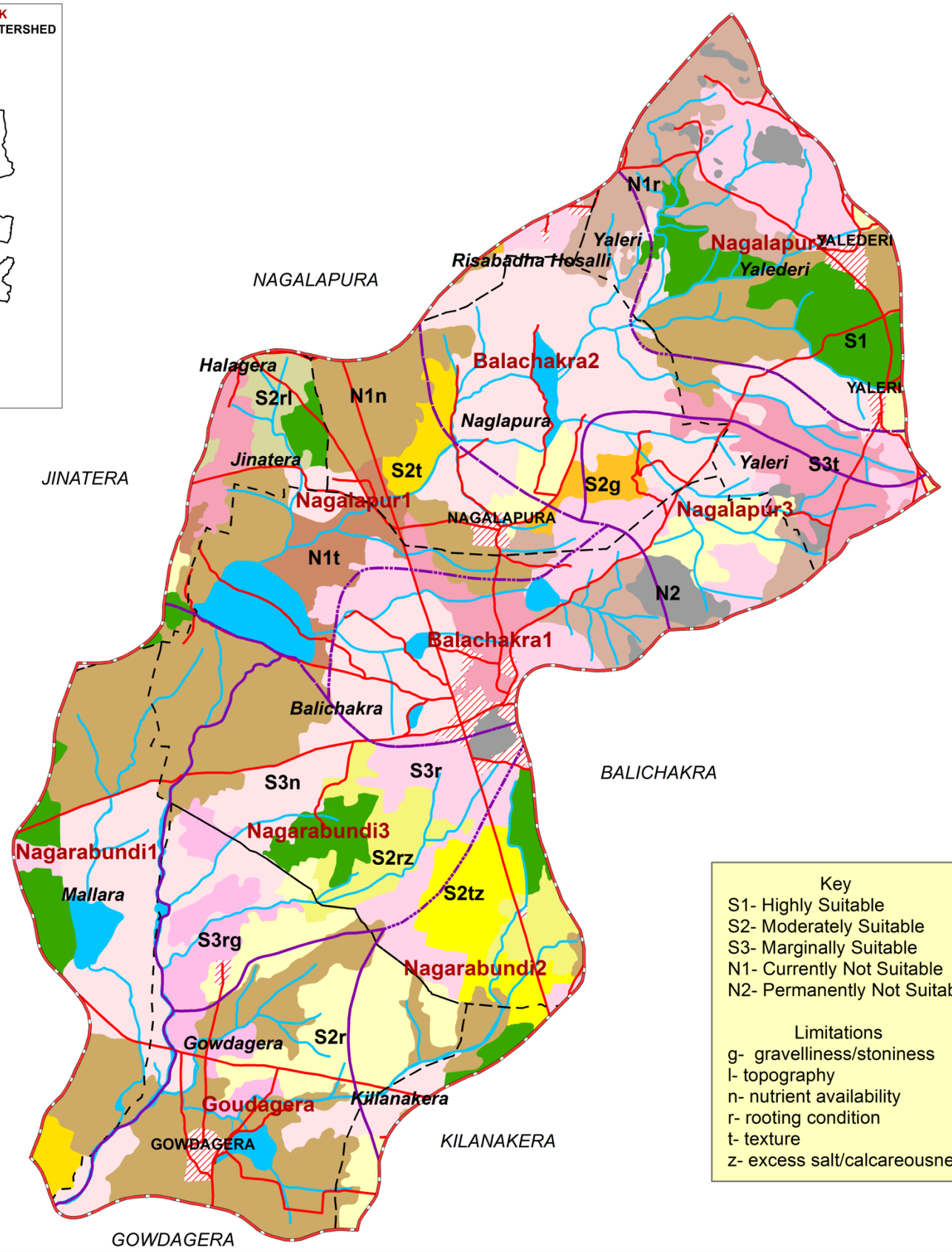
LAND SUITABILITY FOR BHENDI

Nagalapur Sub-watershed

(4D5B1M : Area - 4779.79 ha)

YADGIR TALUK & DISTRICT

km
0 0.75 1.5 3
N



Suitability subclass	Area in ha (%)
S1	300 (6.28)
S2g	37 (0.78)
S2r	351 (7.34)
S2t	63 (1.31)
S2rl	56 (1.16)
S2rz	139 (2.9)
S2tz	119 (2.5)
S3n	1052 (22.02)
S3r	504 (10.55)
S3t	253 (5.29)
S3rg	117 (2.44)
N1n	1069 (22.38)
N1r	285 (5.95)
N1t	92 (1.92)
N2	88 (1.85)
Others*	254 (5.32)

* - Habitation & Waterbody

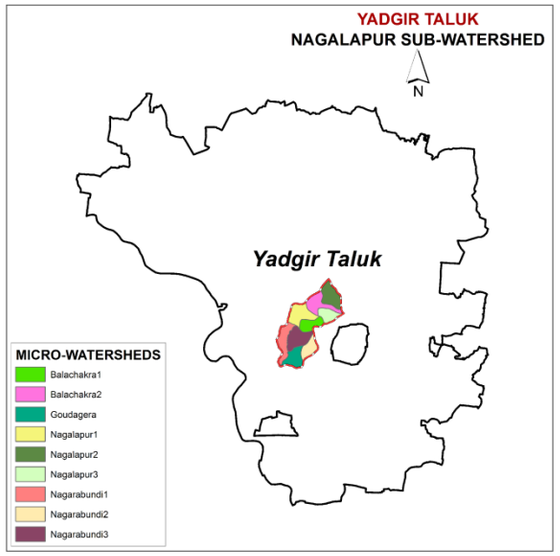
Key
S1- Highly Suitable
S2- Moderately Suitable
S3- Marginally Suitable
N1- Currently Not Suitable
N2- Permanently Not Suitable

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

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

Source: ICAR-NBSS&LUP, Bengaluru

7.15. Land Suitability for Guava



LAND SUITABILITY FOR GUAVA

Nagalapur Sub-watershed

(4D5B1M : Area - 4779.79 ha)

YADGIR TALUK & DISTRICT

0 0.75 1.5 3 km

N

NAGALAPURA
JINATERA
YALERI
BALICHAKRA
MALLARA
KILANAKERA
GOWDAGERA

N1r
N1rl
Yaleri
Risabadha Hosalli
Nagalapur2
Yalederi
YALEDERI
S2r
YALERI
Halagera
Balachakra2
Naglapura
Jinatera
S3t
Nagalapur1
Yaleri
S3rt
Nagalapur3
NAGALAPURA
N1t
N2
Balachakra1
Balichakra
N1n
Nagarabundi3
S3rz
Nagarabundi1
Mallara
S3tz
Nagarabundi2
Gowdagera
S3r
Goudagera
Killanakera
GOWDAGERA

References

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

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

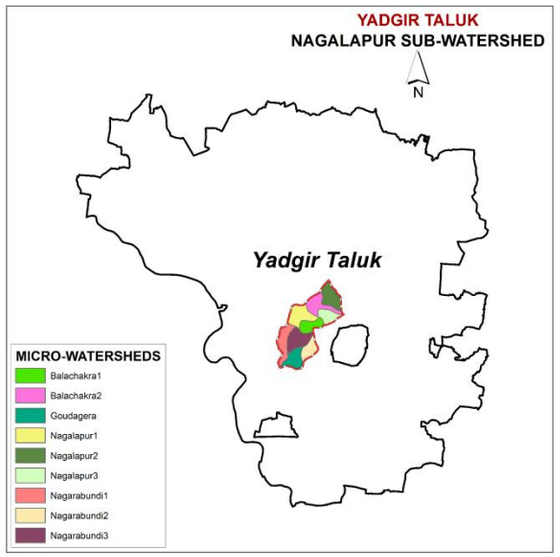
Limitations
l- topography
n- nutrient availability
r- rooting condition
t- texture
z- excess salt/calcareousness

Suitability subclass	Area in ha (%)
S2r	338 (7.07)
S3r	406 (8.5)
S3t	63 (1.31)
S3rt	253 (5.29)
S3rz	139 (2.9)
S3tz	119 (2.5)
N1n	2122 (44.39)
N1r	881 (18.44)
N1t	92 (1.92)
N1rl	24 (0.51)
N2	88 (1.85)
Others*	254 (5.32)

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

7.16. Land Suitability for Mango



LAND SUITABILITY FOR MANGO

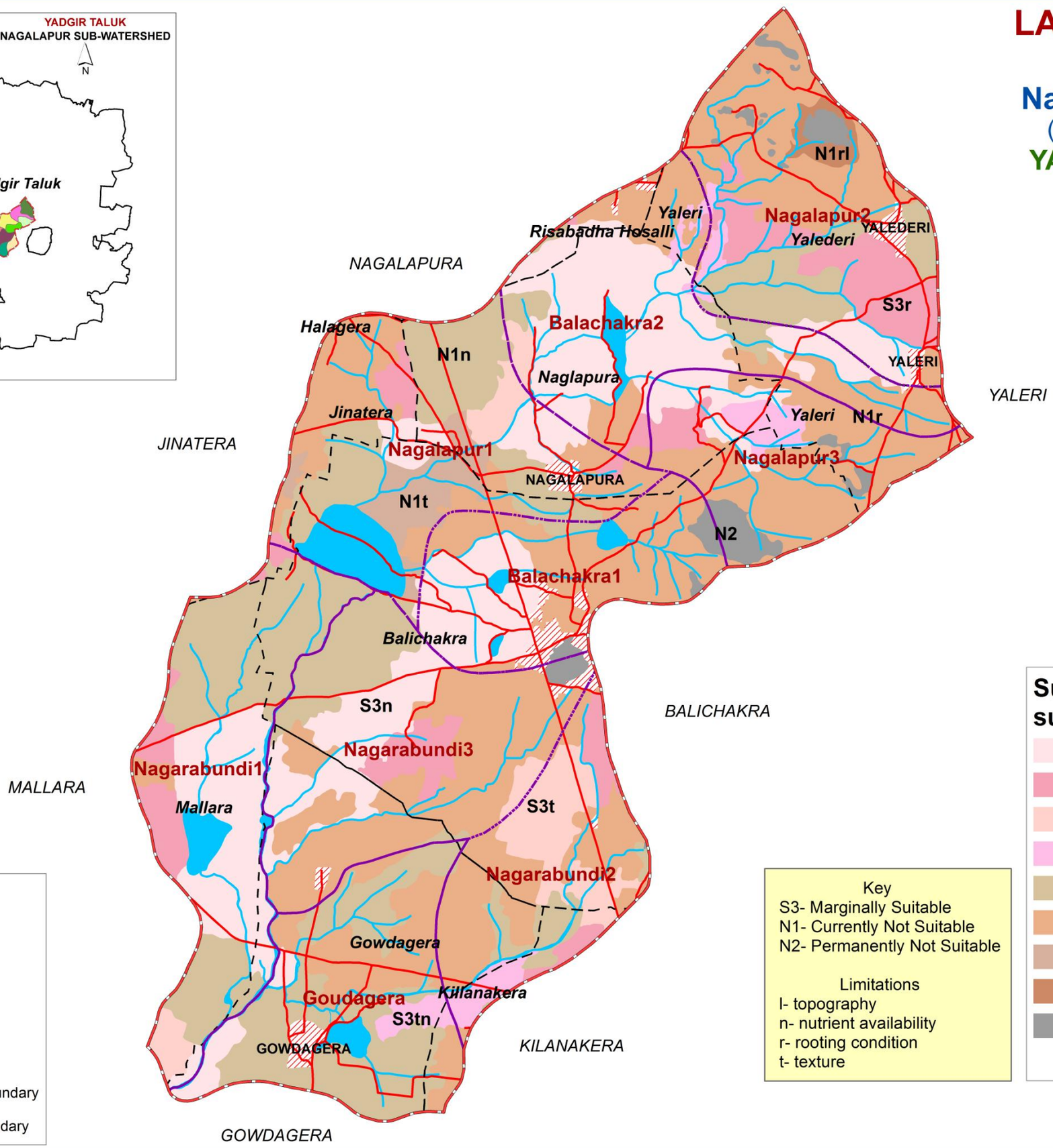
Nagalapur Sub-watershed

(4D5B1M : Area - 4779.79 ha)

YADGIR TALUK & DISTRICT

0 0.75 1.5 3 km

N



References

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

Key
S3- Marginally Suitable
N1- Currently Not Suitable
N2- Permanently Not Suitable

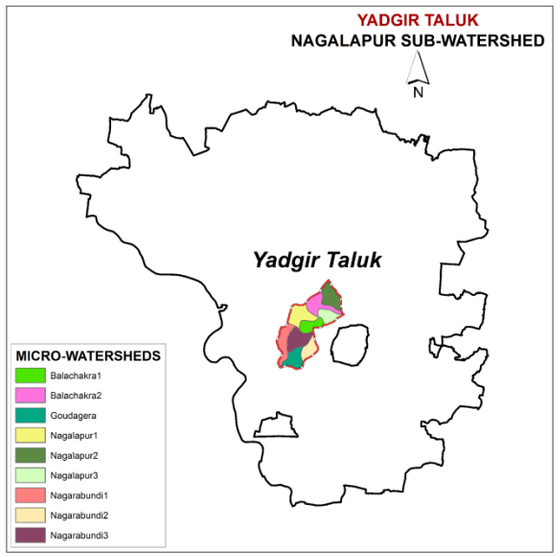
Limitations
l- topography
n- nutrient availability
r- rooting condition
t- texture

Suitability subclass	Area in ha (%)
S3n	942 (19.7)
S3r	338 (7.07)
S3t	182 (3.81)
S3tn	111 (2.31)
N1n	1069 (22.38)
N1r	1679 (35.13)
N1t	92 (1.92)
N1rl	24 (0.51)
N2	88 (1.85)
Others*	254 (5.32)

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

7.17. Land Suitability for Sapota



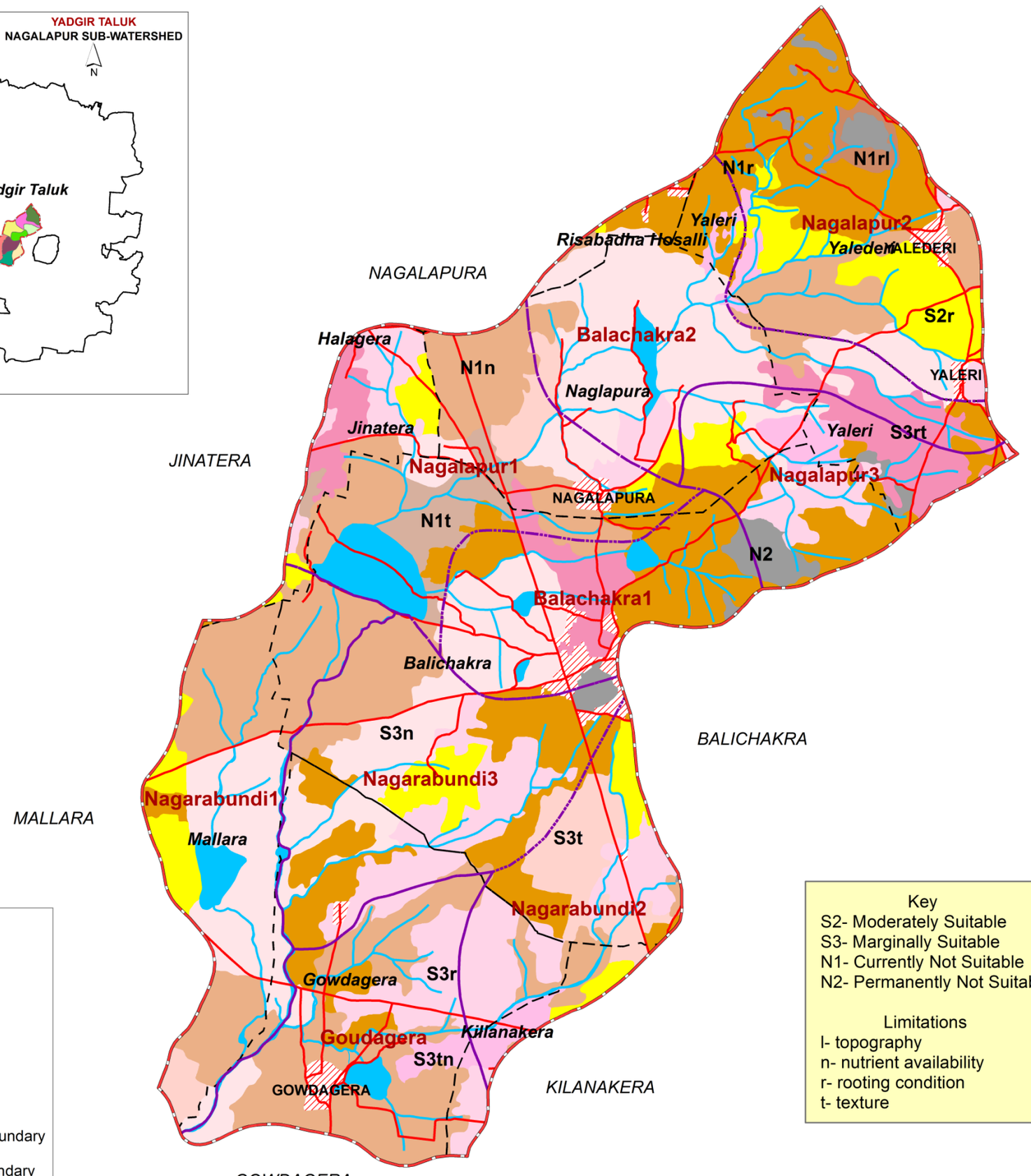
LAND SUITABILITY FOR SAPOTA

Nagalapur Sub-watershed

(4D5B1M : Area - 4779.79 ha)

YADGIR TALUK & DISTRICT

km
0 0.75 1.5 3
N



References

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

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

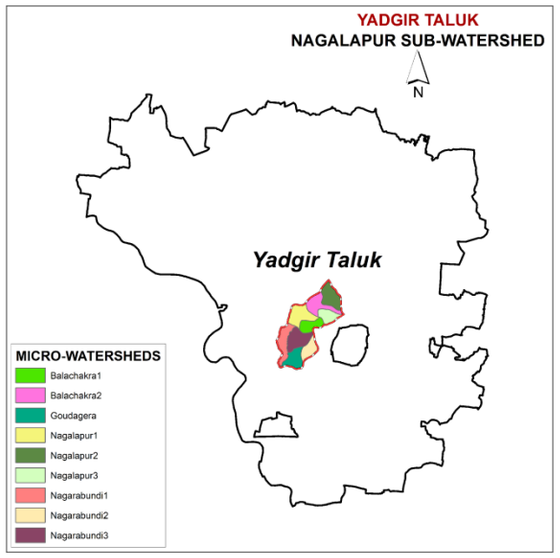
Limitations
l- topography
n- nutrient availability
r- rooting condition
t- texture

Suitability subclass	Area in ha (%)
S2r	338 (7.07)
S3n	942 (19.7)
S3r	545 (11.4)
S3t	182 (3.81)
S3rt	253 (5.29)
S3tn	111 (2.31)
N1n	1069 (22.38)
N1r	881 (18.44)
N1t	92 (1.92)
N1rl	24 (0.51)
N2	88 (1.85)
Others*	254 (5.32)

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

7.18. Land Suitability for Jackfruit



LAND SUITABILITY FOR JACKFRUIT

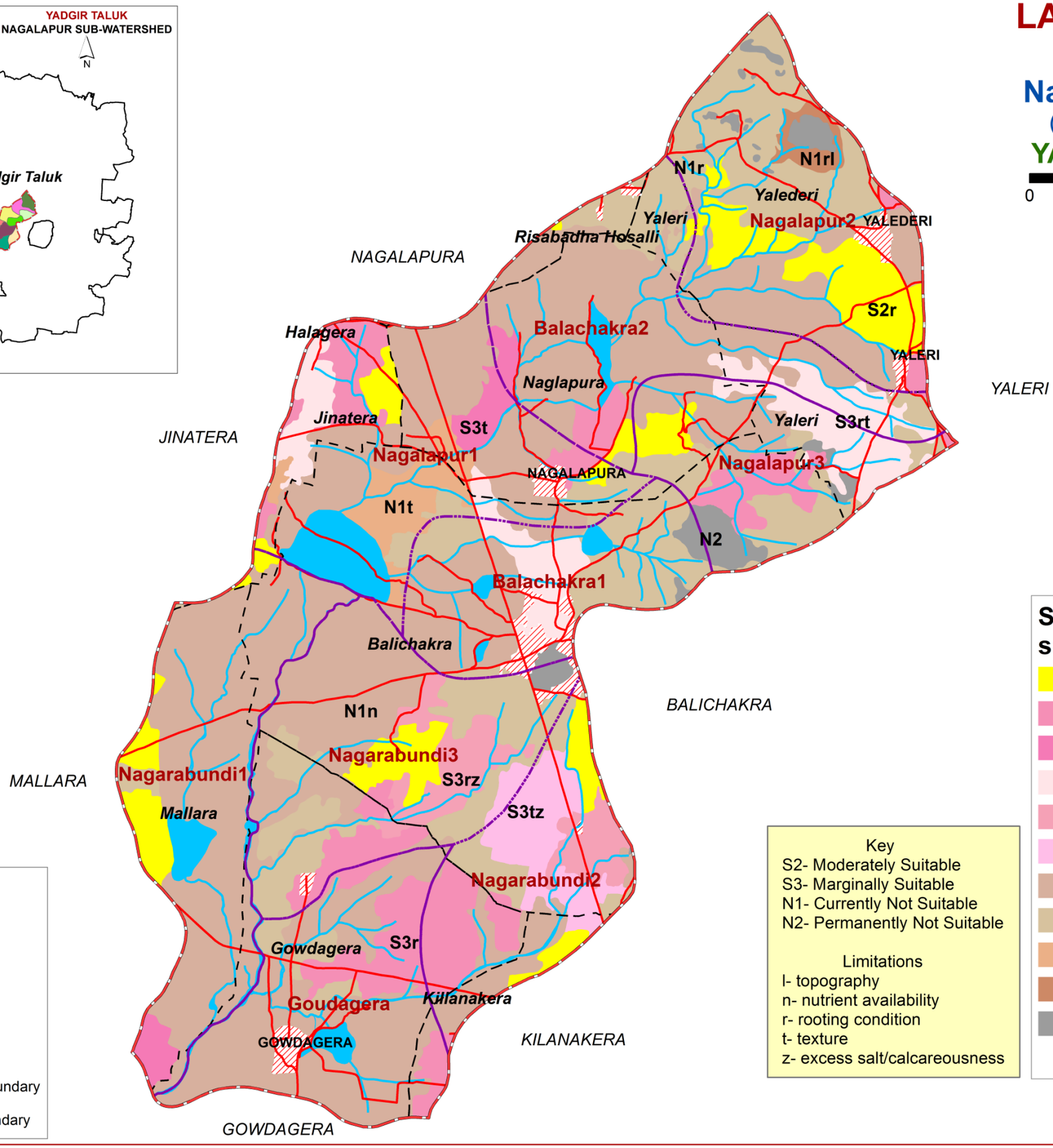
Nagalapur Sub-watershed

(4D5B1M : Area - 4779.79 ha)

YADGIR TALUK & DISTRICT

0 0.75 1.5 3 km

N



References

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

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

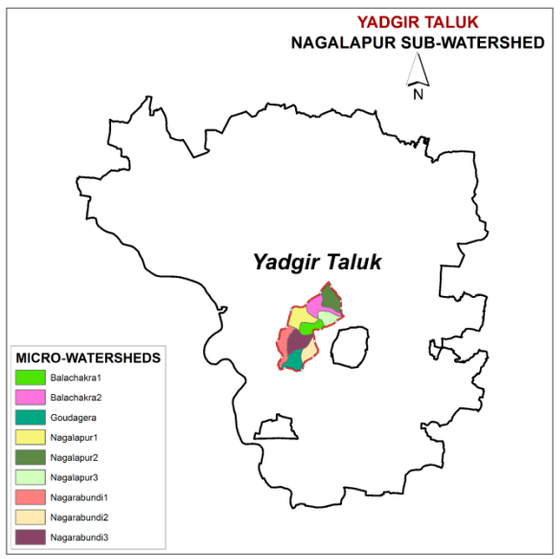
Limitations
l- topography
n- nutrient availability
r- rooting condition
t- texture
z- excess salt/calcareousness

Suitability subclass	Area in ha (%)
S2r	338 (7.07)
S3r	406 (8.5)
S3t	63 (1.31)
S3rt	253 (5.29)
S3rz	139 (2.9)
S3tz	119 (2.5)
N1n	2122 (44.39)
N1r	881 (18.44)
N1t	92 (1.92)
N1rl	24 (0.51)
N2	88 (1.85)
Others*	254 (5.32)

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

7.19. Land Suitability for Jamun



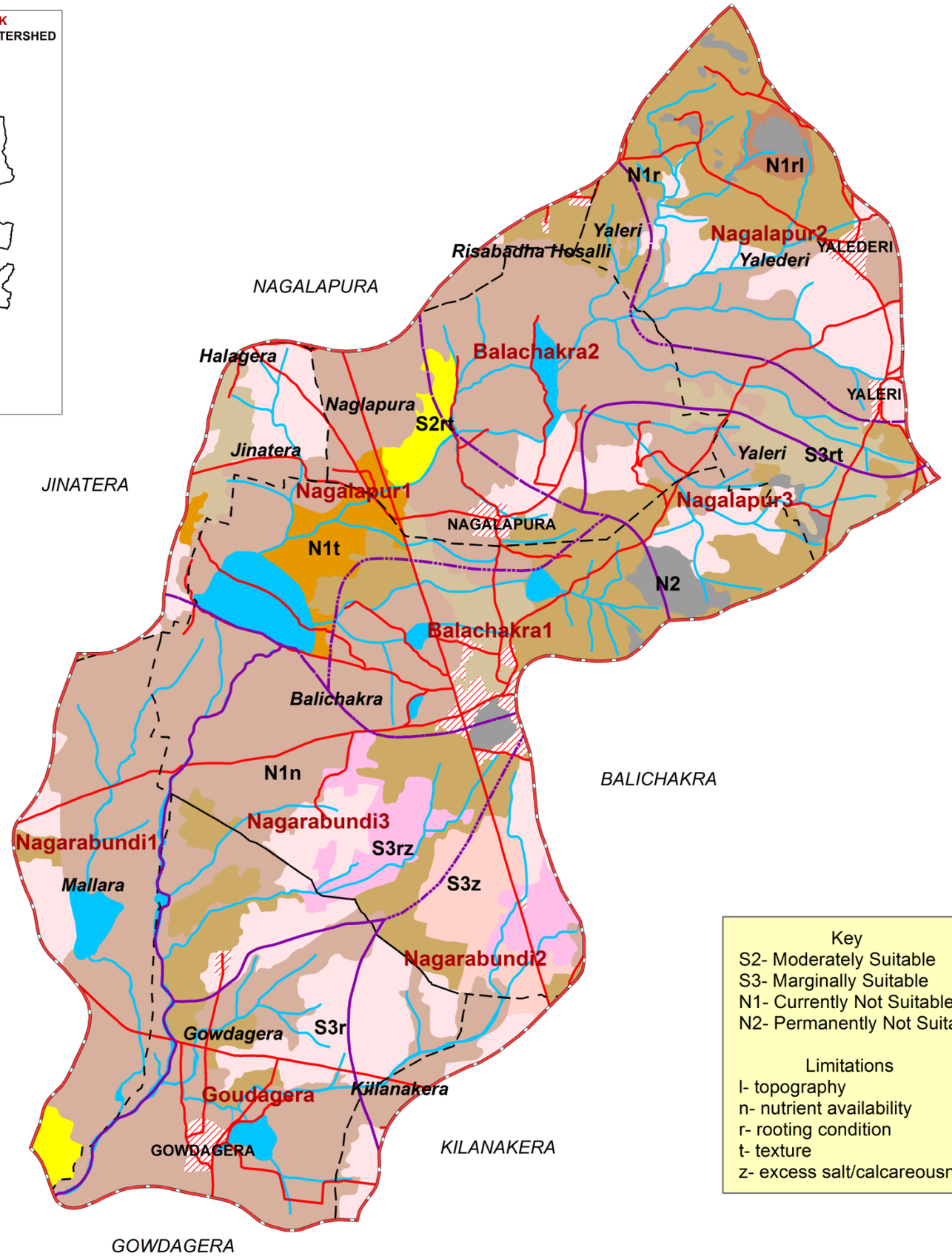
LAND SUITABILITY FOR JAMUN

Nagalapur Sub-watershed

(4D5B1M : Area - 4779.79 ha)

YADGIR TALUK & DISTRICT

km
0 0.75 1.5 3
N



Suitability subclass	Area in ha (%)
S2rt	63 (1.31)
S3r	744 (15.57)
S3z	119 (2.5)
S3rt	253 (5.29)
S3rz	139 (2.9)
N1n	2122 (44.39)
N1r	881 (18.44)
N1t	92 (1.92)
N1rl	24 (0.51)
N2	88 (1.85)
Others*	254 (5.32)

* - Habitation & Waterbody

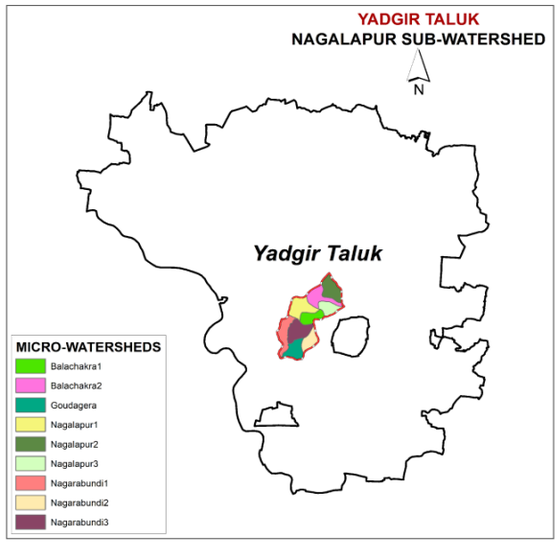
Key
S2- Moderately Suitable
S3- Marginally Suitable
N1- Currently Not Suitable
N2- Permanently Not Suitable

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

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

Source: ICAR-NBSS&LUP, Bengaluru

7.20. Land Suitability for Musambi



LAND SUITABILITY FOR MUSAMBI

Nagalapur Sub-watershed

(4D5B1M : Area - 4779.79 ha)

YADGIR TALUK & DISTRICT

0 0.75 1.5 3 km

N

NAGALAPURA
JINATERA
YALERI
BALICHAKRA
MALLARA
GOWDAGERA
KILANAKERA

Halagera
Naglapura
Jinatera
Risabadha Hosalli
Yaleri
Yalederi
Nagalapur
YALEDERI
YALERI
Balichakra
Mallara
Gowdagera
Killanakera
GOWDAGERA

N1n
N1r
N1rl
N1t
S1
S2r
S2z
S3n
S3r
S3nz
S3rt
N2
Balachakra1
Balachakra2
Nagalapur1
Nagalapur3
Nagarabundi1
Nagarabundi2
Nagarabundi3
Goudagera

References

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

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

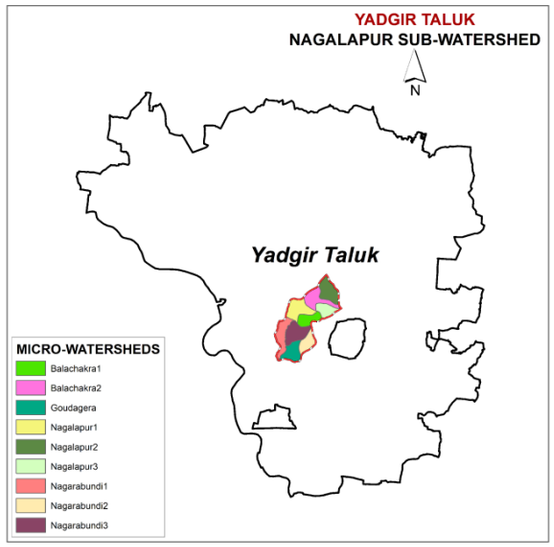
Limitations
l- topography
n- nutrient availability
r- rooting condition
t- texture
z- excess salt/calcareousness

Suitability subclass	Area in ha (%)
S1	63 (1.31)
S2r	338 (7.07)
S2z	119 (2.5)
S3n	942 (19.7)
S3r	545 (11.4)
S3nz	111 (2.31)
S3rt	253 (5.29)
N1n	1069 (22.38)
N1r	881 (18.44)
N1t	92 (1.92)
N1rl	24 (0.51)
N2	88 (1.85)
Others*	254 (5.32)

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

7.21. Land Suitability for Lime



LAND SUITABILITY FOR LIME

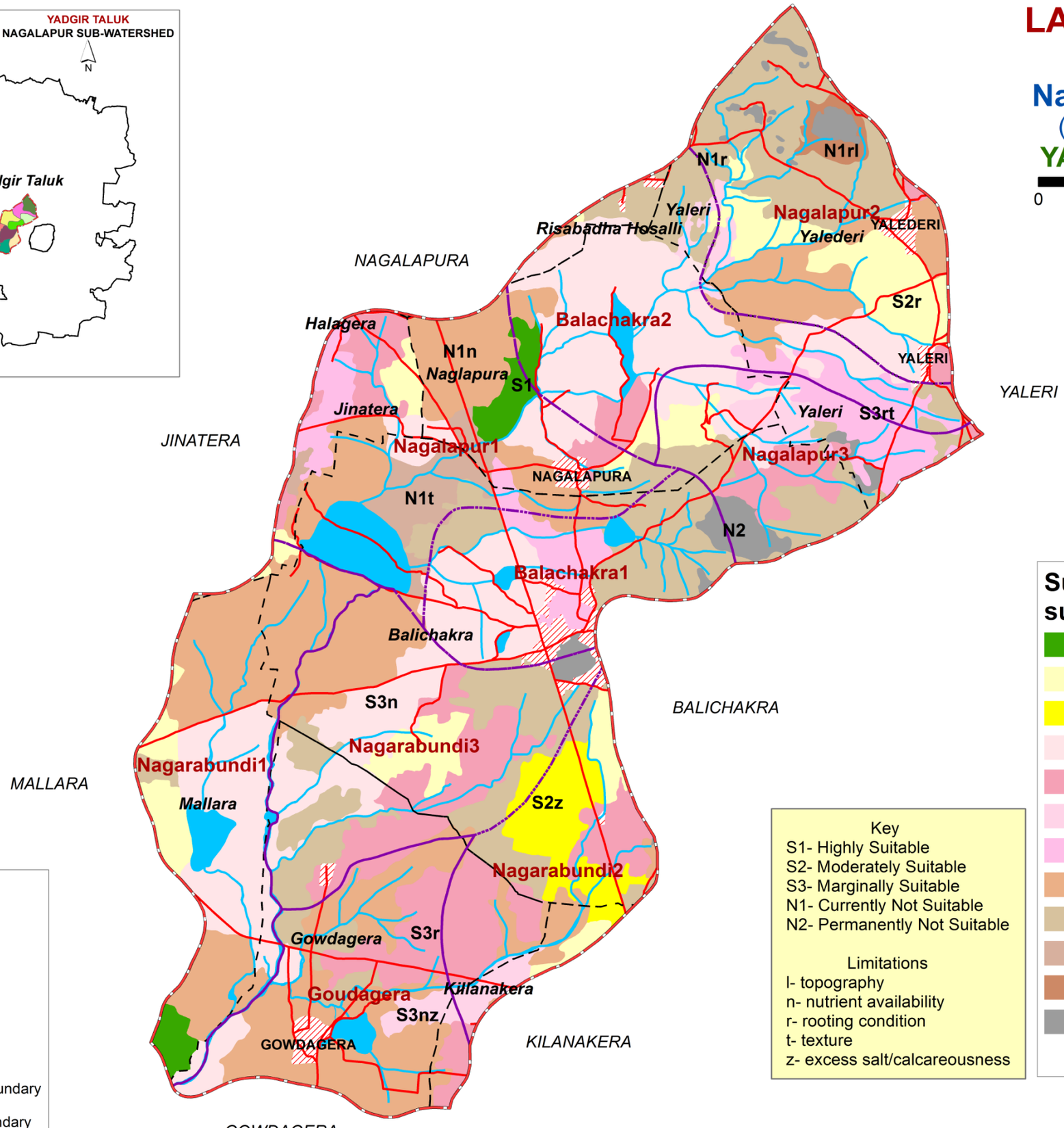
Nagalapur Sub-watershed

(4D5B1M : Area - 4779.79 ha)

YADGIR TALUK & DISTRICT

0 0.75 1.5 3 km

N



References

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

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

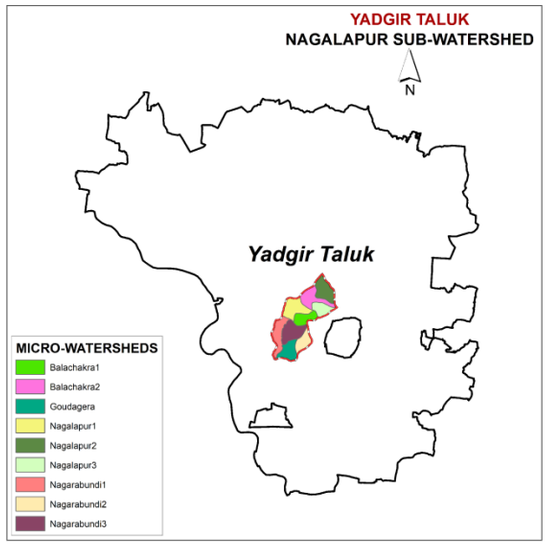
Limitations
l- topography
n- nutrient availability
r- rooting condition
t- texture
z- excess salt/calcareousness

Suitability subclass	Area in ha (%)
S1	63 (1.31)
S2r	338 (7.07)
S2z	119 (2.5)
S3n	942 (19.7)
S3r	545 (11.4)
S3nz	111 (2.31)
S3rt	253 (5.29)
N1n	1069 (22.38)
N1r	881 (18.44)
N1t	92 (1.92)
N1rl	24 (0.51)
N2	88 (1.85)
Others*	254 (5.32)

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

7.22. Land Suitability for Cashew



LAND SUITABILITY FOR CASHEW

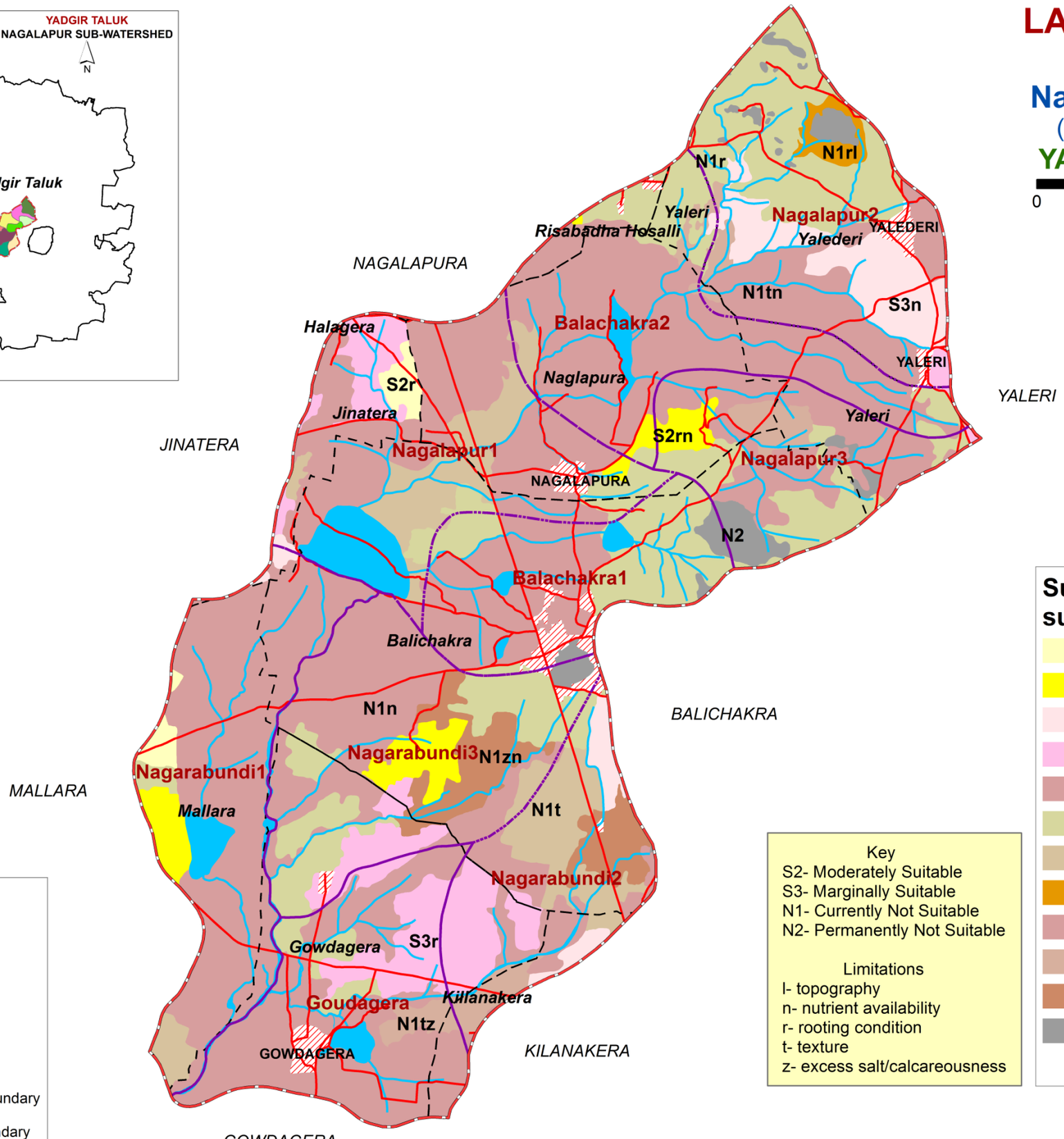
Nagalapur Sub-watershed

(4D5B1M : Area - 4779.79 ha)

YADGIR TALUK & DISTRICT

0 0.75 1.5 3 km

N



References

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

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

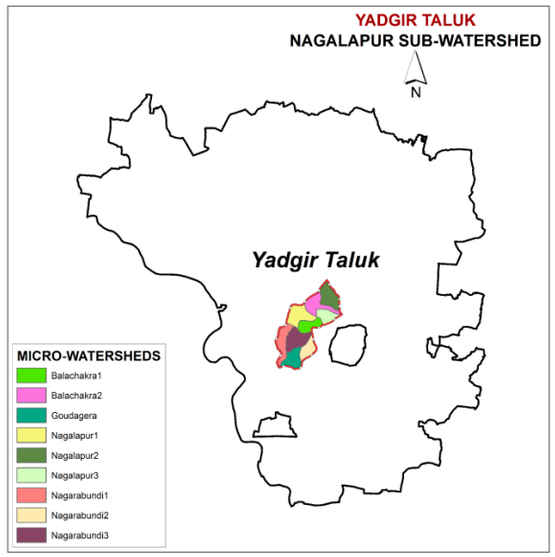
Limitations
l- topography
n- nutrient availability
r- rooting condition
t- texture
z- excess salt/calcareousness

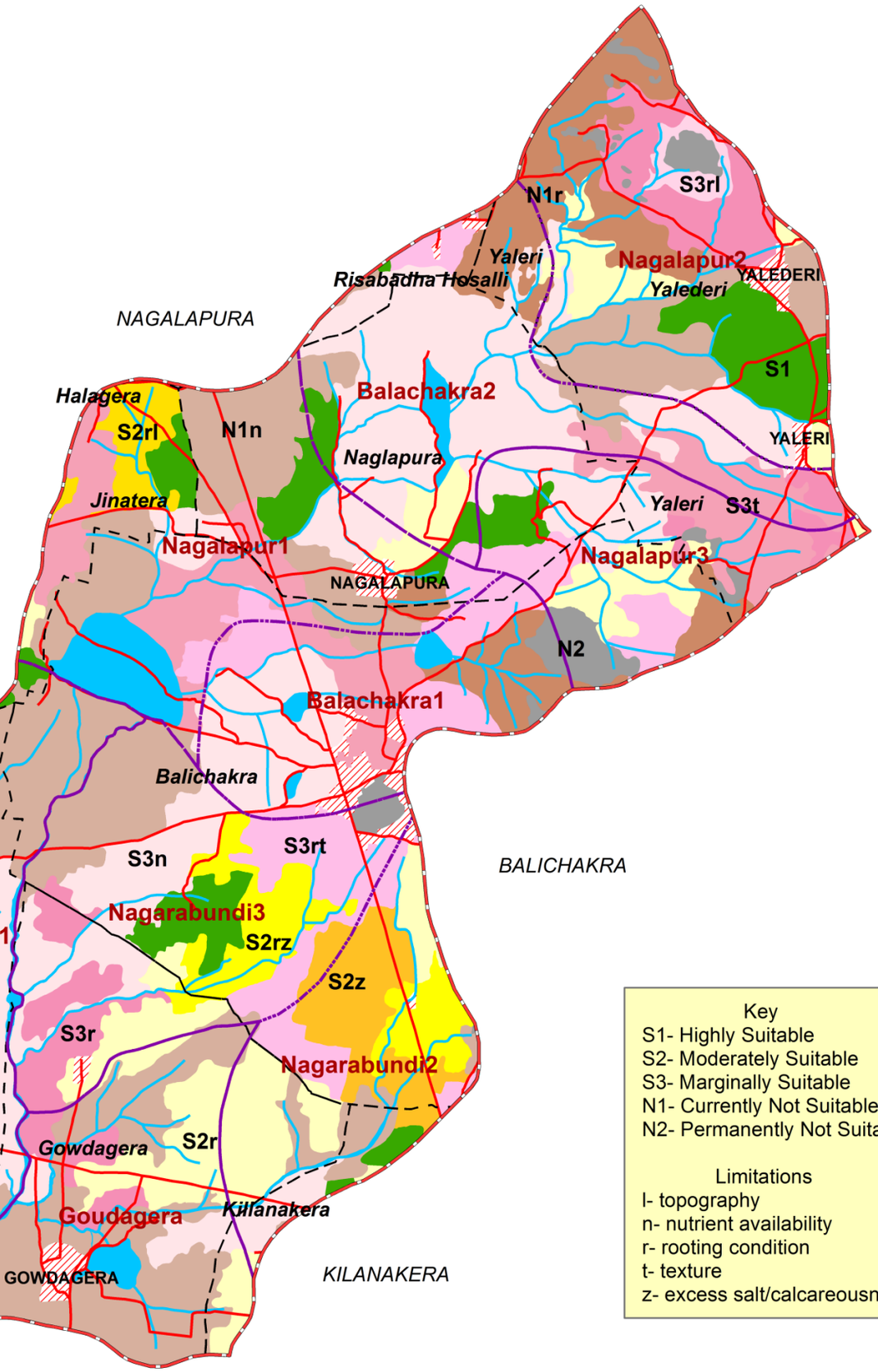
Suitability subclass	Area in ha (%)
S2r	36 (0.76)
S2rn	116 (2.43)
S3n	186 (3.88)
S3r	287 (6.01)
N1n	1730 (36.19)
N1r	817 (17.1)
N1t	274 (5.73)
N1rl	24 (0.51)
N1tn	718 (15.02)
N1tz	111 (2.31)
N1zn	139 (2.9)
N2	88 (1.85)
Others*	254 (5.32)

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

7.23. Land Suitability for Custard Apple





LAND SUITABILITY FOR CUSTARD APPLE

Nagalapur Sub-watershed

(4D5B1M : Area - 4779.79 ha)

YADGIR TALUK & DISTRICT

km
0 0.75 1.5 3

N

Suitability subclass	Area in ha (%)
S1	328 (6.86)
S2r	423 (8.86)
S2z	119 (2.5)
S2rl	56 (1.16)
S2rz	139 (2.9)
S3n	1052 (22.02)
S3r	247 (5.16)
S3t	345 (7.21)
S3rl	24 (0.51)
S3rt	350 (7.32)
N1n	1069 (22.38)
N1r	285 (5.95)
N2	88 (1.85)
Others*	254 (5.32)

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

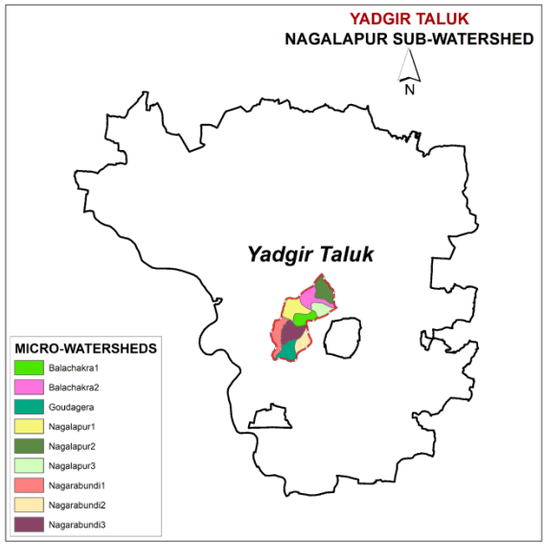
Limitations
l- topography
n- nutrient availability
r- rooting condition
t- texture
z- excess salt/calcareousness

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

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

7.24. Land Suitability for Amla



LAND SUITABILITY FOR AMLA

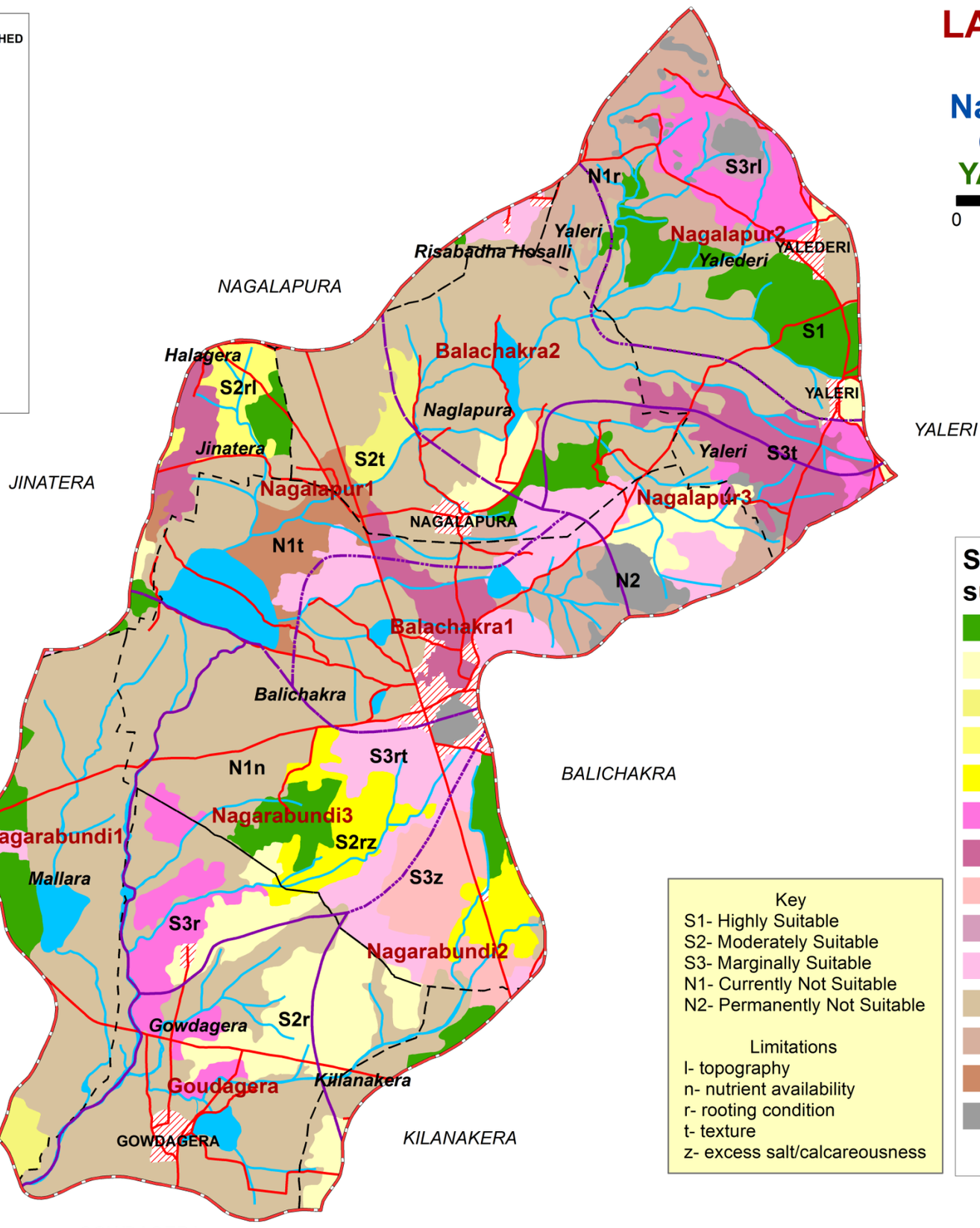
Nagalapur Sub-watershed

(4D5B1M : Area - 4779.79 ha)

YADGIR TALUK & DISTRICT

0 0.75 1.5 3 km

N



References

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

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

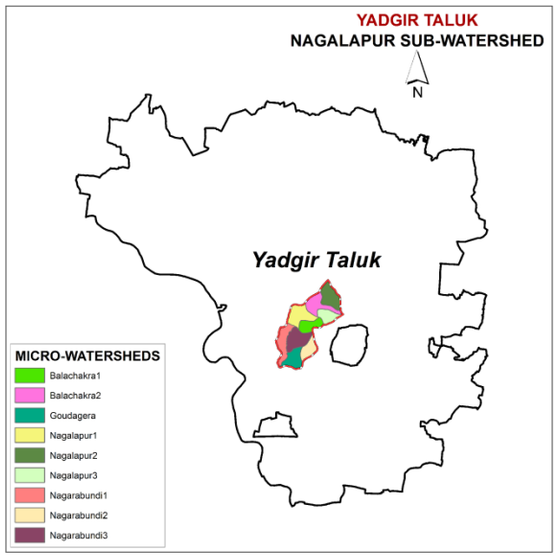
Limitations
l- topography
n- nutrient availability
r- rooting condition
t- texture
z- excess salt/calcareousness

Suitability subclass	Area in ha (%)
S1	338 (7.07)
S2r	351 (7.34)
S2t	63 (1.31)
S2rl	56 (1.16)
S2rz	139 (2.9)
S3r	247 (5.16)
S3t	253 (5.29)
S3z	119 (2.5)
S3rl	24 (0.51)
S3rt	350 (7.32)
N1n	2122 (44.39)
N1r	285 (5.95)
N1t	92 (1.92)
N2	88 (1.85)
Others*	254 (5.32)

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

7.25. Land Suitability for Tamarind



LAND SUITABILITY FOR TAMARIND

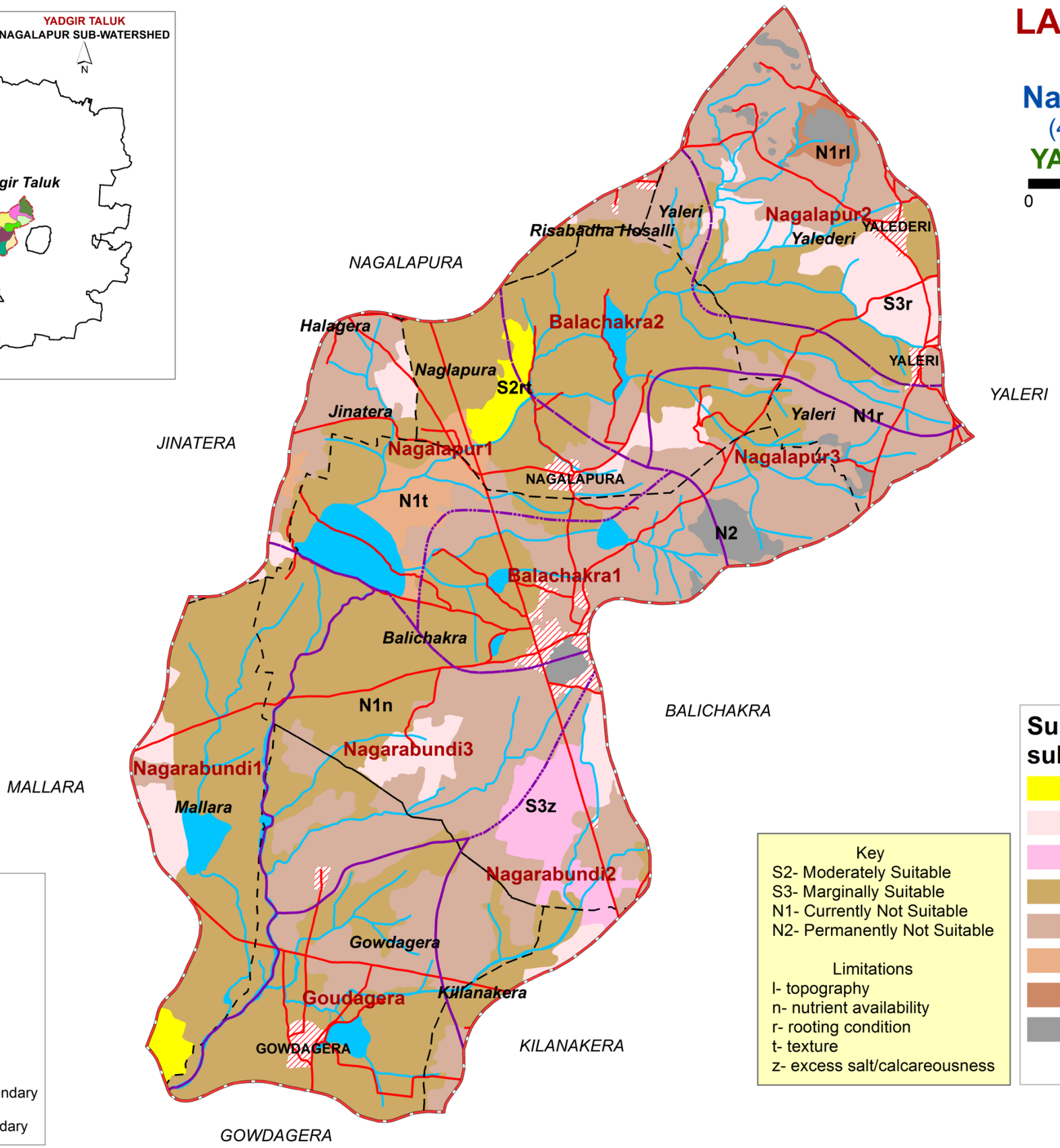
Nagalapur Sub-watershed

(4D5B1M : Area - 4779.79 ha)

YADGIR TALUK & DISTRICT

0 0.75 1.5 3 km

N



References

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

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

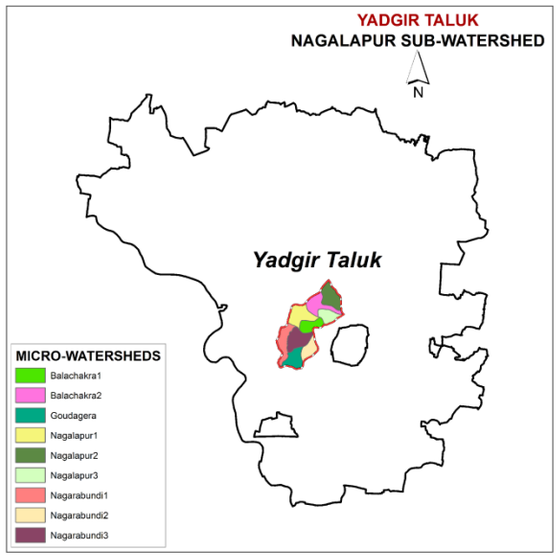
Limitations
l- topography
n- nutrient availability
r- rooting condition
t- texture
z- excess salt/calcareousness

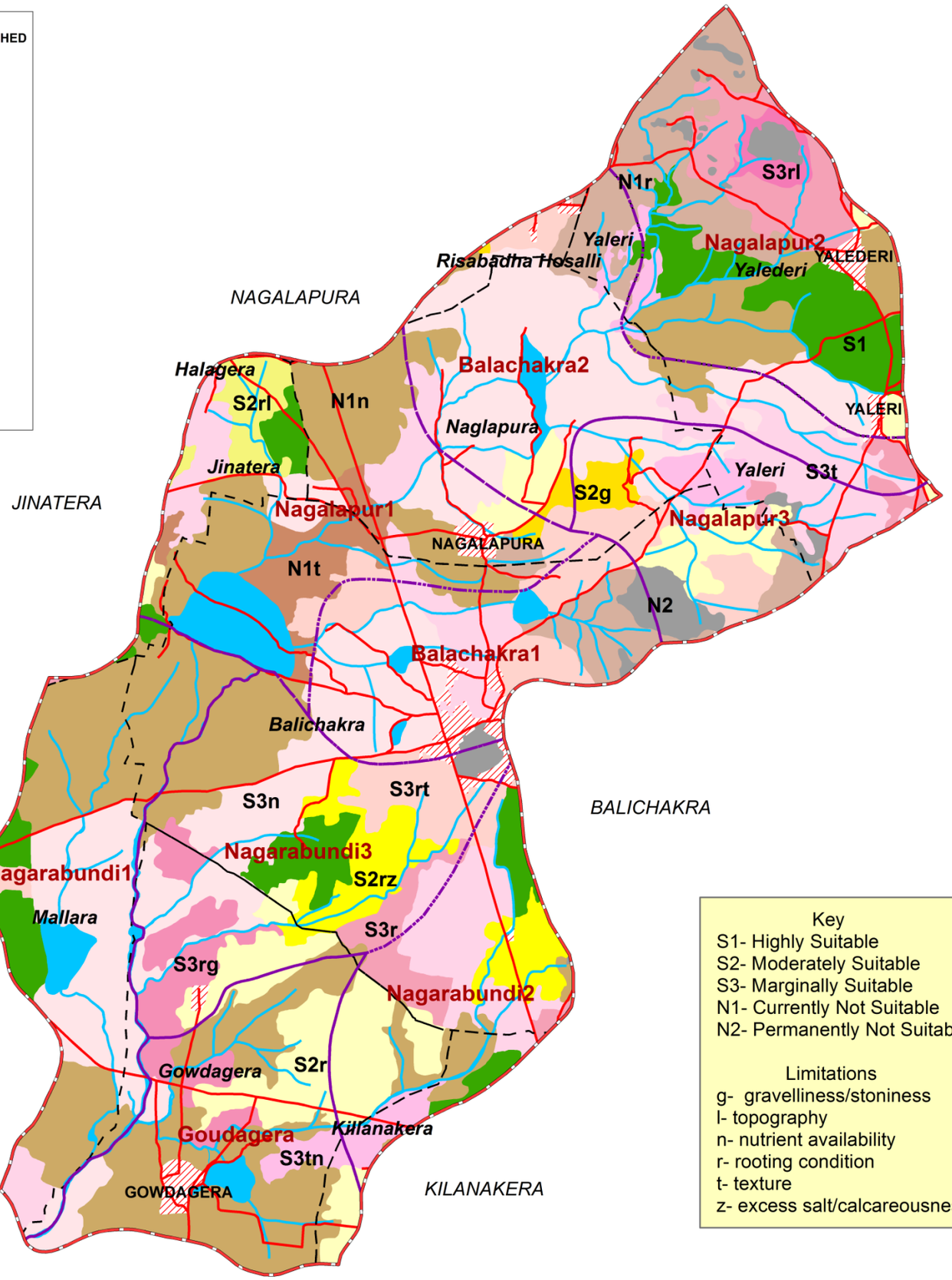
Suitability subclass	Area in ha (%)
S2rt	63 (1.31)
S3r	338 (7.07)
S3z	119 (2.5)
N1n	2122 (44.39)
N1r	1679 (35.13)
N1t	92 (1.92)
N1rl	24 (0.51)
N2	88 (1.85)
Others*	254 (5.32)

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

7.26. Land Suitability for Brinjal





LAND SUITABILITY FOR BRINJAL

Nagalapur Sub-watershed

(4D5B1M : Area - 4779.79 ha)

YADGIR TALUK & DISTRICT

0 0.75 1.5 3 km

N

References

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

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

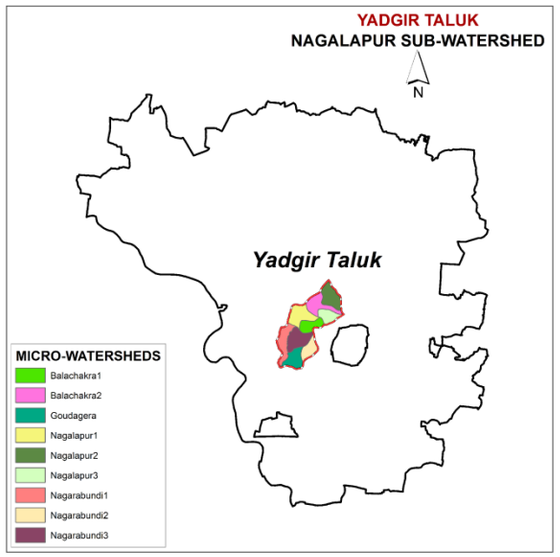
Limitations
g- gravelliness/stoniness
l- topography
n- nutrient availability
r- rooting condition
t- texture
z- excess salt/calcareousness

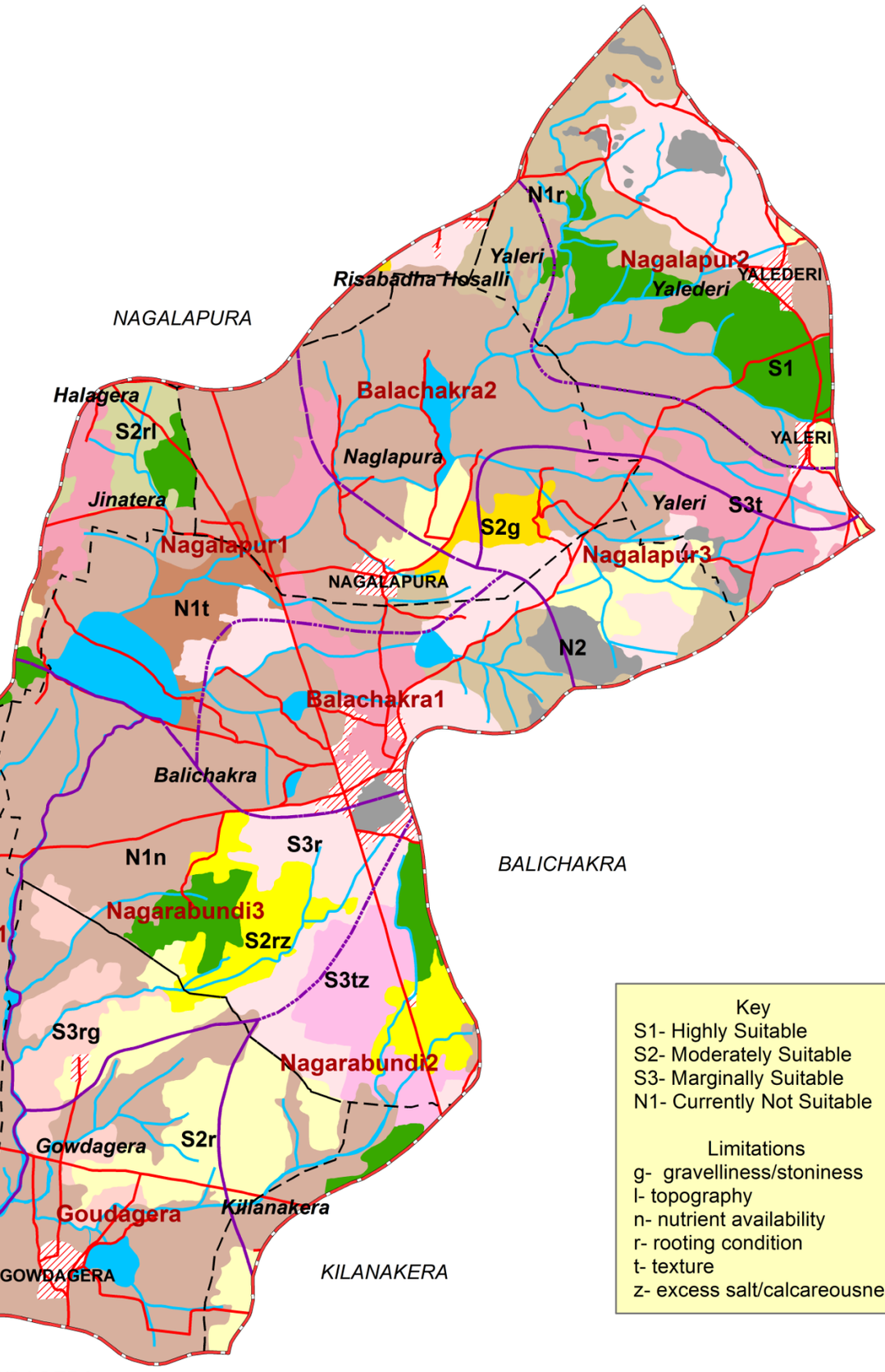
Suitability subclass	Area in ha (%)
S1	300 (6.28)
S2g	37 (0.78)
S2r	351 (7.34)
S2rl	56 (1.16)
S2rz	139 (2.9)
S3n	942 (19.7)
S3r	194 (4.06)
S3t	435 (9.1)
S3rg	117 (2.44)
S3rl	24 (0.51)
S3rt	286 (5.98)
S3tn	111 (2.31)
N1n	1069 (22.38)
N1r	285 (5.95)
N1t	92 (1.92)
N2	88 (1.85)
Others*	254 (5.32)

* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

7.27. Land Suitability for Onion





LAND SUITABILITY FOR ONION

Nagalapur Sub-watershed

(4D5B1M : Area - 4779.79 ha)

YADGIR TALUK & DISTRICT

0 0.75 1.5 3 km

N

References

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

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

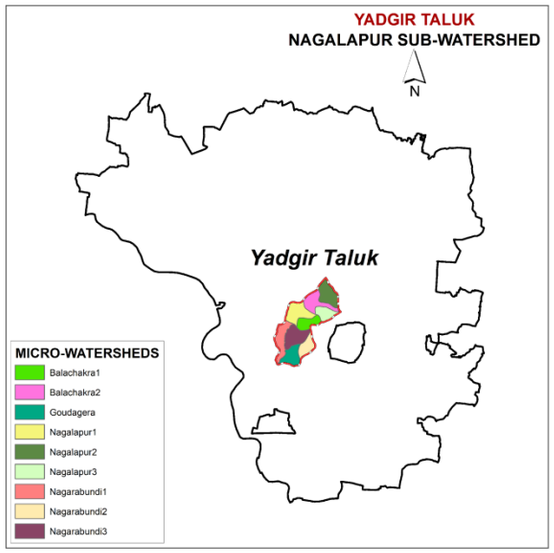
Limitations
g- gravelliness/stoniness
l- topography
n- nutrient availability
r- rooting condition
t- texture
z- excess salt/calcareousness

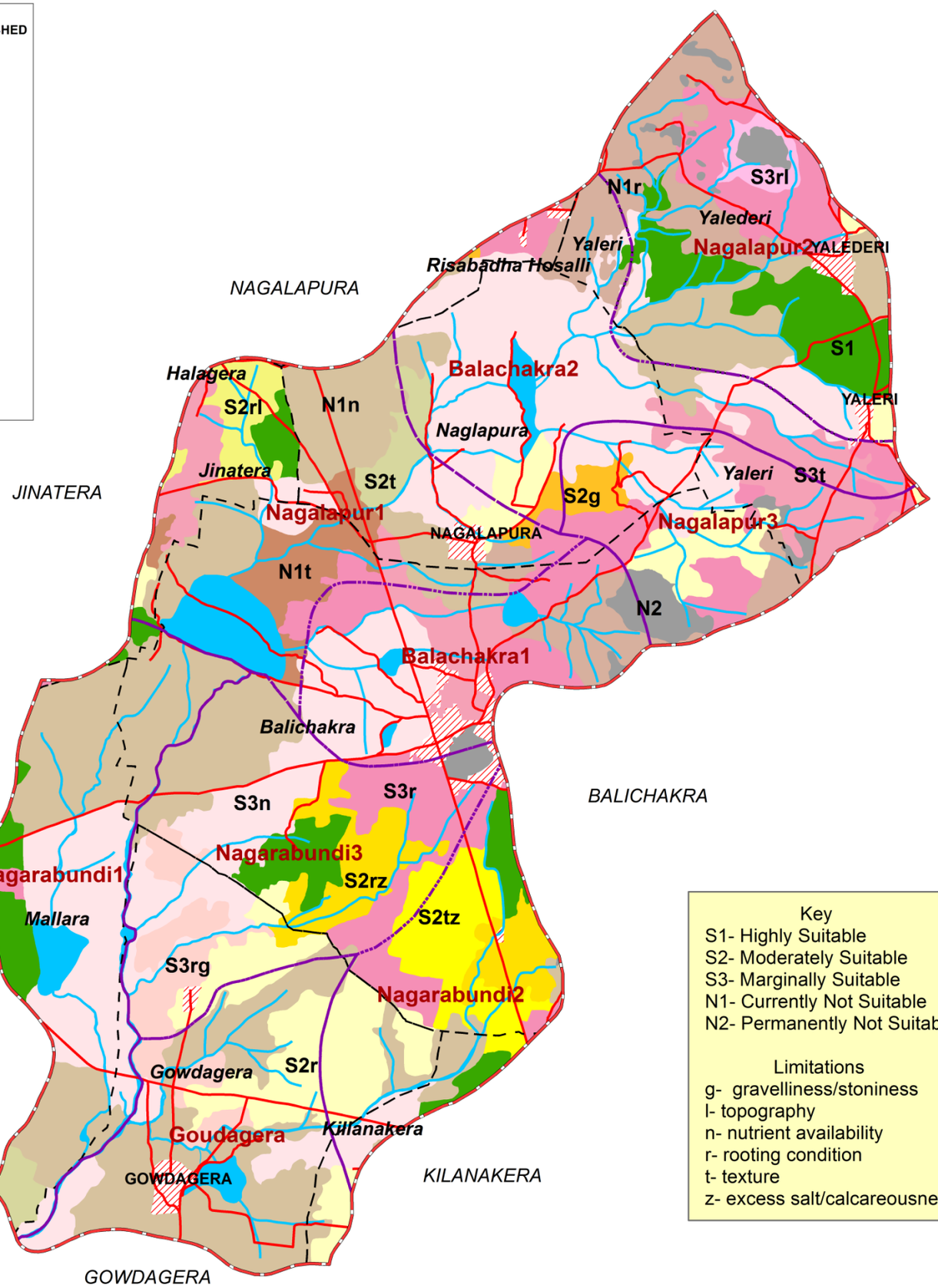
Suitability subclass	Area in ha (%)
S1	300 (6.28)
S2g	37 (0.78)
S2r	351 (7.34)
S2rl	56 (1.16)
S2rz	139 (2.9)
S3r	504 (10.55)
S3t	316 (6.6)
S3rg	117 (2.44)
S3tz	119 (2.5)
N1n	2122 (44.39)
N1r	285 (5.95)
N1t	92 (1.92)
N2	88 (1.85)
Others*	254 (5.32)

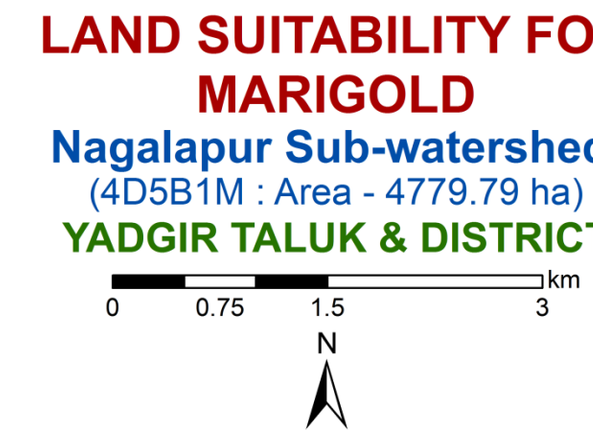
* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

7.28. Land Suitability for Marigold







LAND SUITABILITY FOR MARIGOLD

Nagalapur Sub-watershed

(4D5B1M : Area - 4779.79 ha)

YADGIR TALUK & DISTRICT

Suitability subclass	Area in ha (%)
S1	300 (6.28)
S2g	37 (0.78)
S2r	351 (7.34)
S2t	63 (1.31)
S2rl	56 (1.16)
S2rz	139 (2.9)
S2tz	119 (2.5)
S3n	1052 (22.02)
S3r	480 (10.04)
S3t	253 (5.29)
S3rg	117 (2.44)
S3rl	24 (0.51)
N1n	1069 (22.38)
N1r	285 (5.95)
N1t	92 (1.92)
N2	88 (1.85)
Others*	254 (5.32)

* - Habitation & Waterbody

References

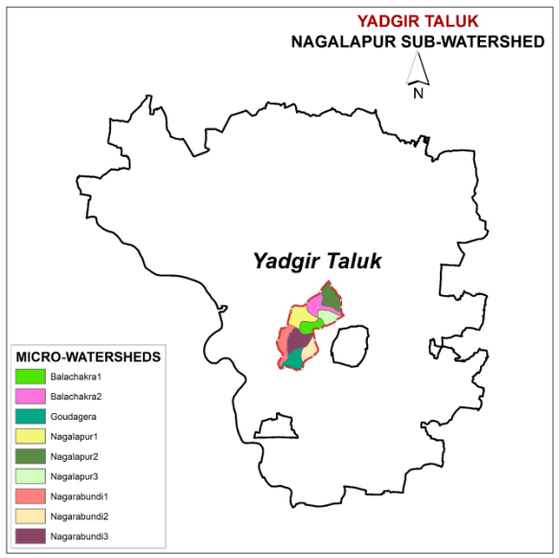
- Streams/Drainage
- Road/Cart track
- Habitation
- Waterbody
- Village boundary
- Micro-watershed boundary
- Sub-watershed boundary

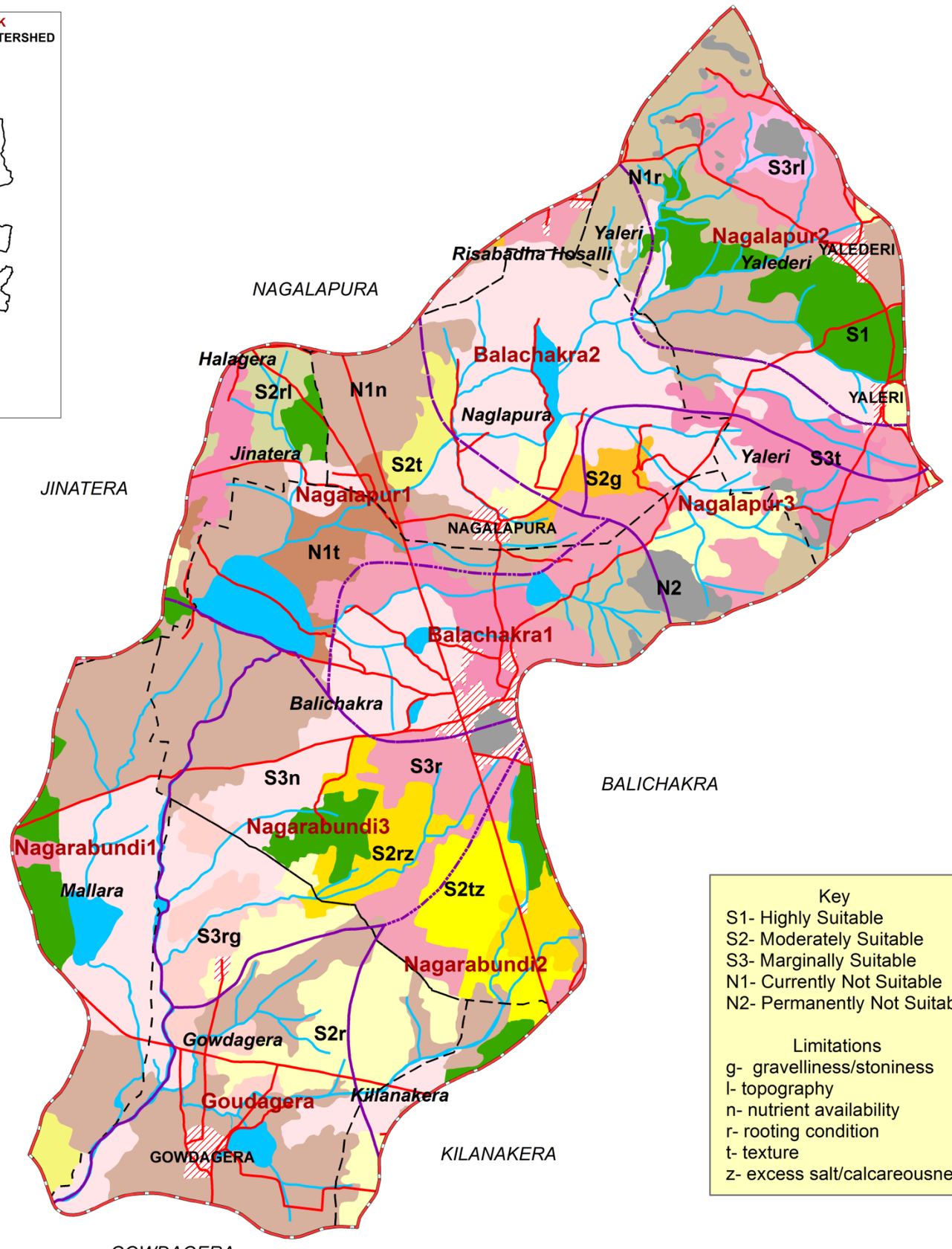
Key
S1- Highly Suitable
S2- Moderately Suitable
S3- Marginally Suitable
N1- Currently Not Suitable
N2- Permanently Not Suitable

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

Source: ICAR-NBSS&LUP, Bengaluru

7.29. Land Suitability for Chrysanthemum





LAND SUITABILITY FOR CHRYSANTHEMUM

Nagalapur Sub-watershed

(4D5B1M : Area - 4779.79 ha)

YADGIR TALUK & DISTRICT

0 0.75 1.5 3 km

N

References

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

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

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

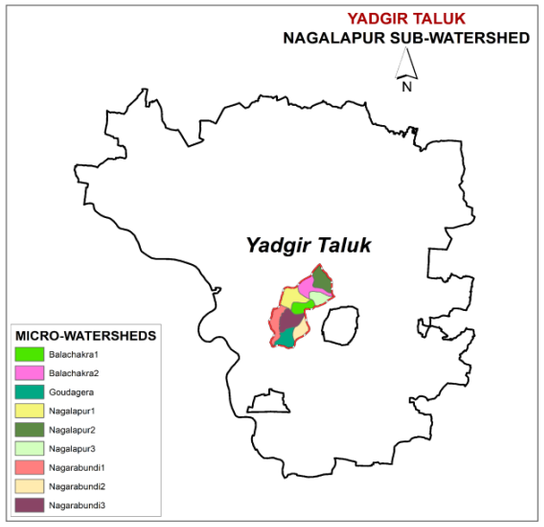
Suitability subclass	Area in ha (%)
S1	300 (6.28)
S2g	37 (0.78)
S2r	351 (7.34)
S2t	63 (1.31)
S2rl	56 (1.16)
S2rz	139 (2.9)
S2tz	119 (2.5)
S3n	1052 (22.02)
S3r	480 (10.04)
S3t	253 (5.29)
S3rg	117 (2.44)
S3rl	24 (0.51)
N1n	1069 (22.38)
N1r	285 (5.95)
N1t	92 (1.92)
N2	88 (1.85)
Others*	254 (5.32)

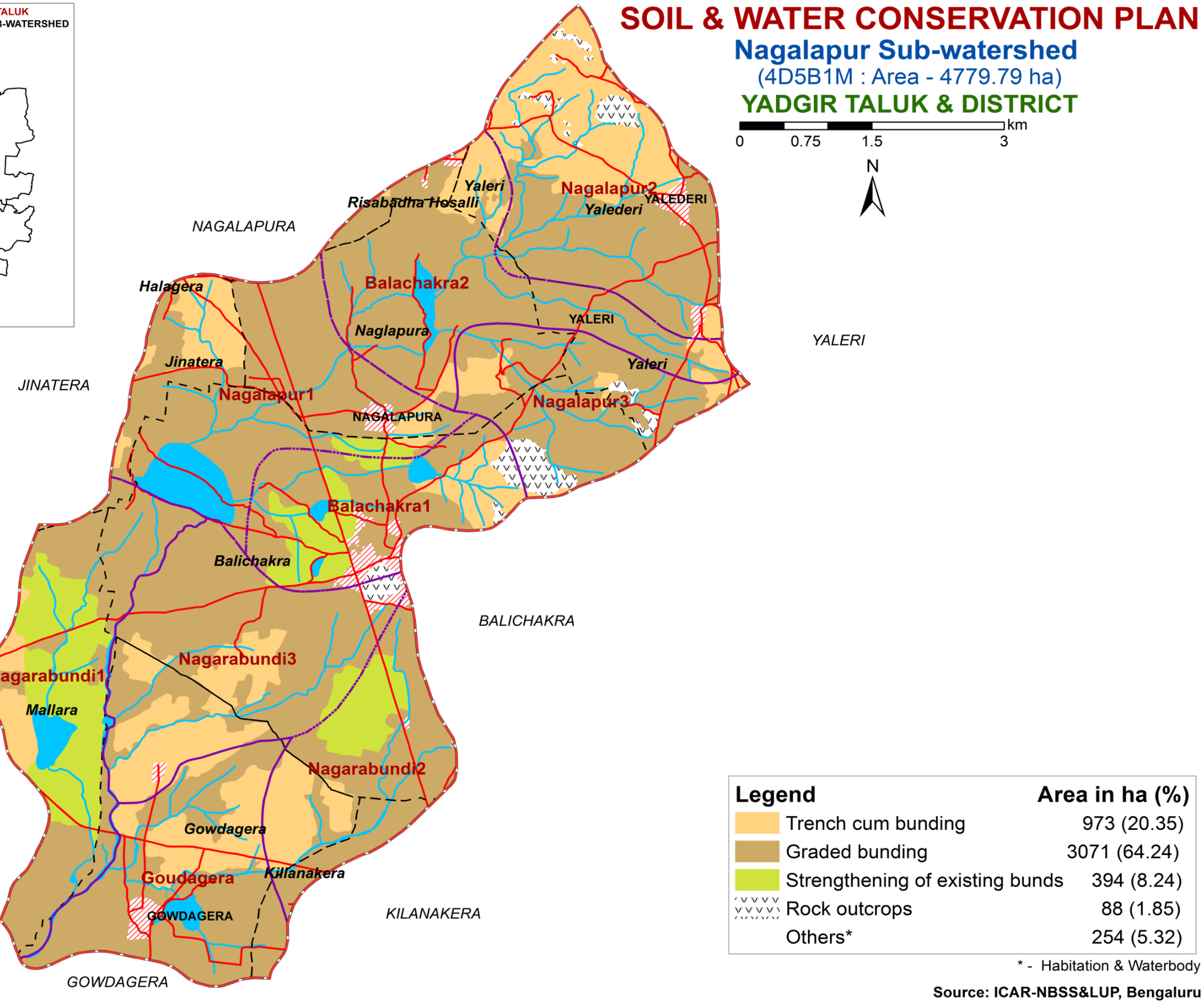
* - Habitation & Waterbody

Source: ICAR-NBSS&LUP, Bengaluru

8. Soil and Water Conservation Measures

8.1. Soil & Water Conservation Plan





9. Table. Proposed Crop Plan for Nagalapur Sub-watershed, Balichakra Hobli, 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 ,167.ANRcA1, 168.ANRcB2,53.ANRhB2, 55.ANRiB2,34.GWDcB2, 35.GWDiB2,142.SGRhB2, 143.SGRiB2,102.TMKbB3, 140.TMKcB2,104.TMKiB2, 42.YDRcB2 (Sodic soils)	-	**Agri-Silvi-Pasture** 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.BGDbB2, 115.BGDmB2 32.HSLcB2, 126.HSLhB2 33.HSLiB2, 163.NGPmA1 49.NGPmB2 (Moderately deep to deep, black clay soils)	Maize, sorghum, Sunflower, Cotton, Red gram, Bengalgram, Bajra	**Fruit crops:** Lime, Musambi, Custard apple, Pomegranate **Vegetables:** Chilli, Bhendi **Flowers:** Marigold, Chrysanthemum	Application of FYM, Biofertilizers and micronutrients, drip irrigation, mulching, suitable soil and water conservation practices
3	37.BLCcB2, 155.BLCcB2g1, 38.BLCiB2, 114.PGPhB2 128.SHTcB2, 36.SHThB2 (Moderately deep, red sandy clay to clay soils)	Sunflower, Sorghum, Maize, Groundnut, Red gram, Bajra	**Fruit crops:** Mango, Musambi, Sapota, Tamarind, Pomegranate, Amla, Custard apple, Guava, Jackfruit, Jamun, Lime **Vegetables:** Tomato, Onion**,** Bhendi, Chilli, Brinjal, Drumstick, Coriander **Flowers:** Marigold, Chrysanthemum	Application of FYM, Biofertilizers and micronutrients, drip irrigation, Mulching, suitable soil and water conservation practices
4	179.KDPcA1 (Very deep, lowland sandy soils)	-	**Agri-Silvi-Pasture:** *Styloxanthes hamata*, Glyricidia, *Styloxanthes scabra*	Application of FYM, Bio fertilizers and micronutrients, drip irrigation, Mulching, suitable soil and water conservation practices
5	84.KDRcB2, 87.KDRiB2, 88.KDRiB3, 57.MDGcB2, 171.MDGhA1, 49.MDGhB2g1, 58.MDGiB2, 59.MDRcB2, 132.MDRhB2, 60.MDRiA1 133.MDRiB2 (Deep to very deep, strongly alkaline soils)	Sorghum, Maize, Bajra	**Agri-Silvi-Pasture** 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

To be continued….

LMU.No	Soil Map Units	Field Crops/ Commercial crops	Horticulture Crops (Rainfed/Irrigated)	Suitable Interventions
6	16.HLGcB2, 17.HLGiB2, 20.JNKcB2, 22.JNKiB2 (Moderately shallow, sandy clay loam soils)	Maize, sorghum Groundnut, Bajra	**Fruit crops:** Amla, Custard apple **Vegetables:** Tomato, Chilli, Brinjal, Bhendi, Onion **Flowers:**Marigold, Chrysanthemum	Application of FYM, Bio fertilizers and micronutrients, drip irrigation, Mulching, suitable soil and water conservation practices
7	124.SBRbB3 11.SBRcB2 (Moderately shallow, loamy sand soils)	-	**Agri-Silvi-Pasture:** Hybrid Napier, *Styloxanthes hamata*, *Styloxanthes scabra*	Application of FYM, Bio fertilizers and micronutrients, drip irrigation, Mulching, suitable soil and water conservation practices
8	27.YLRbB2, 28.YLRbB3, 30.YLRcC3 31.YLRiB2 (Moderately shallow, red clay soils)	Maize, sorghum Groundnut, Bajra, Cotton	**Fruit crops:** Amla, Custard apple **Vegetables:** Tomato, Chilli, Brinjal, Bhendi, Onion **Flowers:** Marigold, Chrysanthemum	Application of FYM, Bio fertilizers and micronutrients, drip irrigation, Mulching, suitable soil and water conservation practices
9	5.BDLiB2, 121.DSBcB2, 107.DSBhB2, 161.HTKbB2g1, 165.HTKcB2, 113.HTKcC2g1, 8.VNKbB2g1, 122.VNKcB3, 123.VNKcD3 (Shallow soils)	-	Custard apple, Hybrid Napier, *Styloxanthes hamata*, *Styloxanthes scabra*	Use of short duration varieties, sowing across the slope
10	118.BDPcB2, 120.BDPhB2, 153.KKRbB2g1 (Very shallow soils)	-	*Styloxanthes hamata*, *Styloxanthes scabra*	Use of short duration varieties, sowing across the slope

PART - B

Hydrological Inventory of Nagalapur 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

THE WORLD BANK

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

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

ICAR - NBSS & LUP

Phone:080-23412242

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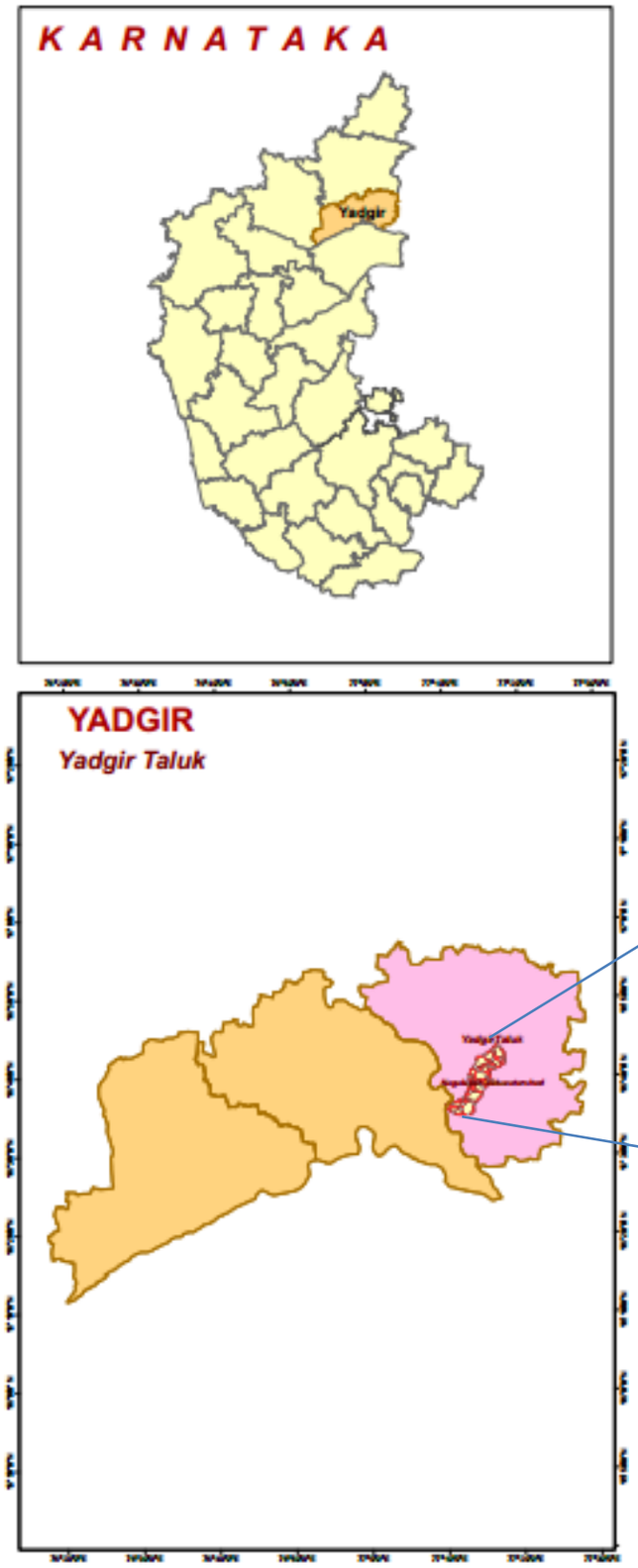
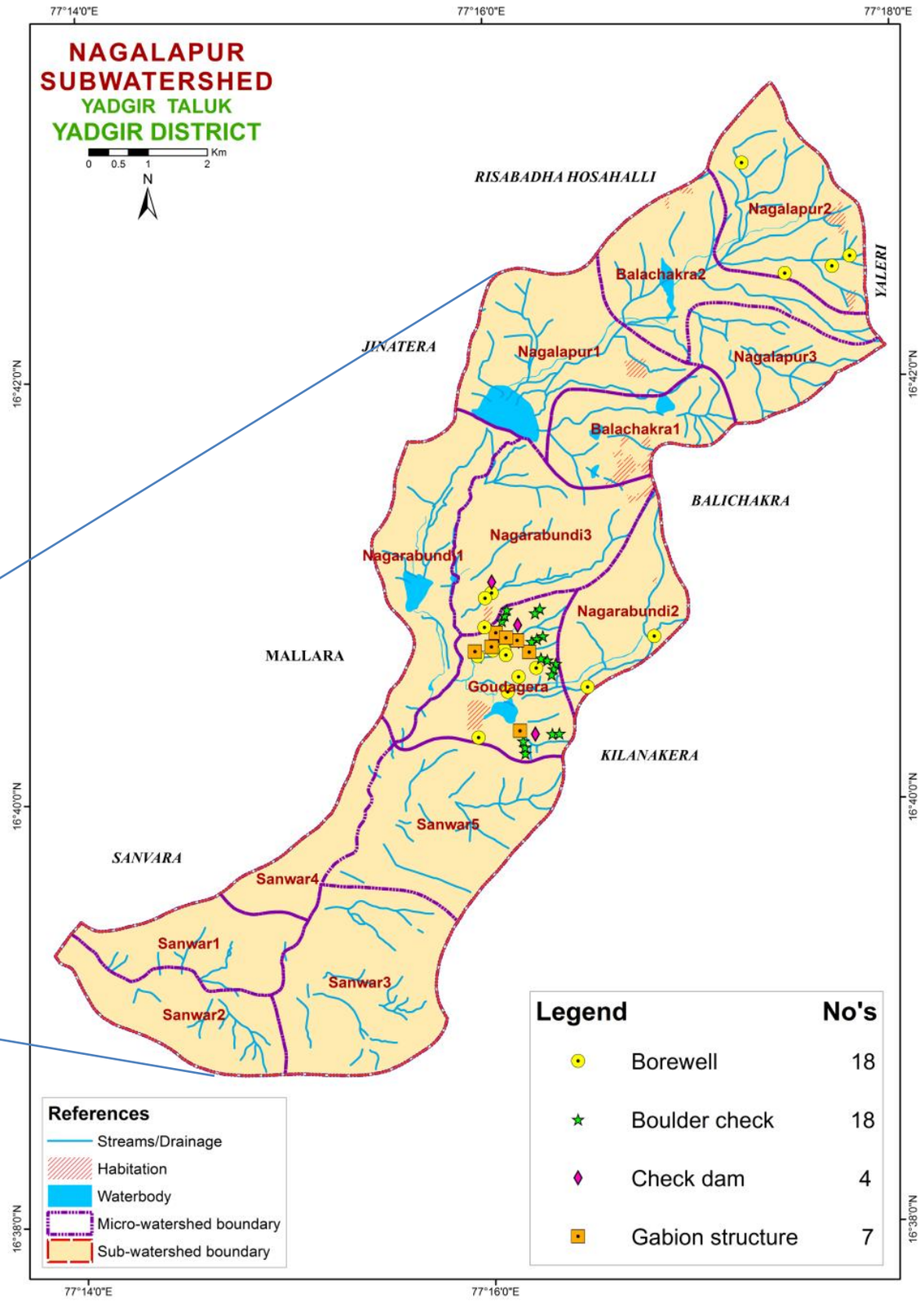
INTRODUCTION

- The inventory and documentation of spatial and temporal changes in hydrological components of Nagalapur sub-watershed (4D5B1M) in Yadgir Taluk, Yadgir District, has been undertaken for integrated planning, development and management.
- Nagalapur sub-watershed (Yadgir Taluk, Yadgir District) is located between $16^0$35'5''-$16^0$44'5'' North latitudes and $77^0$10'2''- $77^0$18'2'' East longitudes, covering an area of about 7364 ha.
- This sub-watershed encompasses of 14 MWs namely Balachakra-1 (4D5B1M2b), Balachakra-2 (4D5B1M1a), Goudagera (4D5B1M1b), Nagalapur-1 (4D5B1M1c), Nagalapur-2 (4D5B1M1e), Nagalapur-3 (4D5B1M1d), Nagarabundi-1 (4D5B1M2d), Nagarabundi-2 (4D5B1M2a), Nagarabundi-3 (4D5B1M2f), Sanwar-1 (4D5B1M2e), Sanwar-2 (4D5B1M2g), Sanwar-3 (4D5B1M2h), Sanwar-4 (4D5B1M2i) and Sanwar-5 (4D5B1M2c). Land Resource Inventory (LRI) was generated for nine among the fourteen 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.

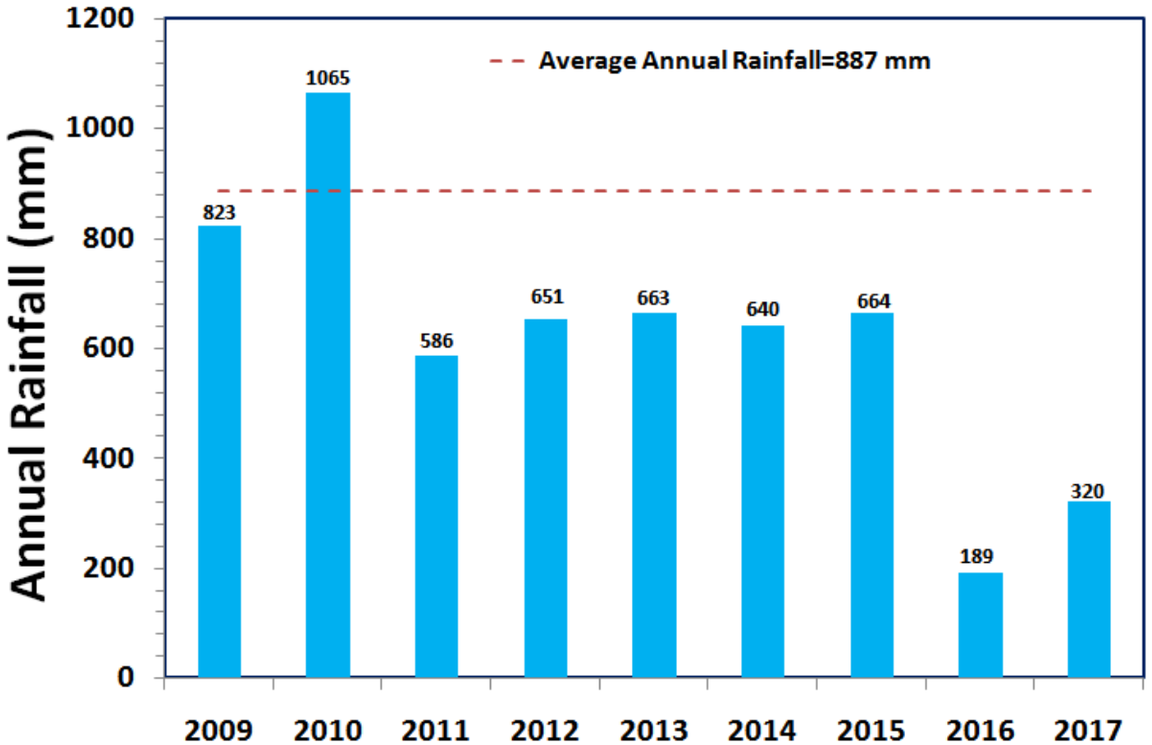
LOCATION MAP OF NAGALAPUR SUB-WATERSHED





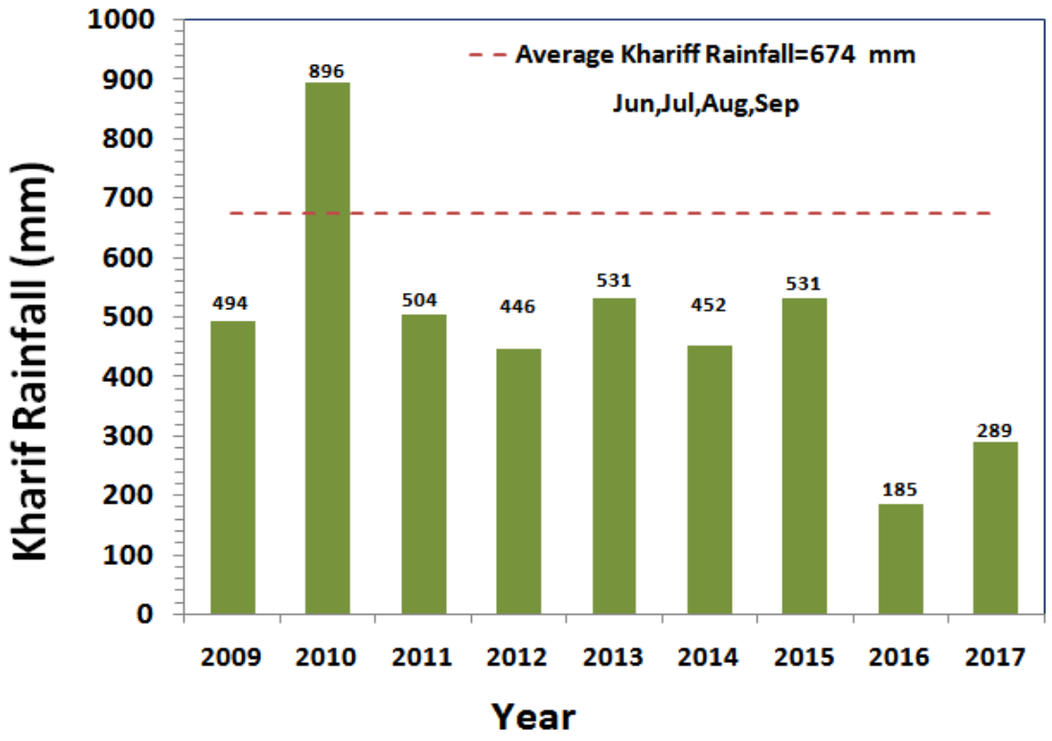
Soil & Water Conservation Structures in Nagalapur sub-watershed, Yadgir Taluk, Yadgir District

RAINFALL INDEX

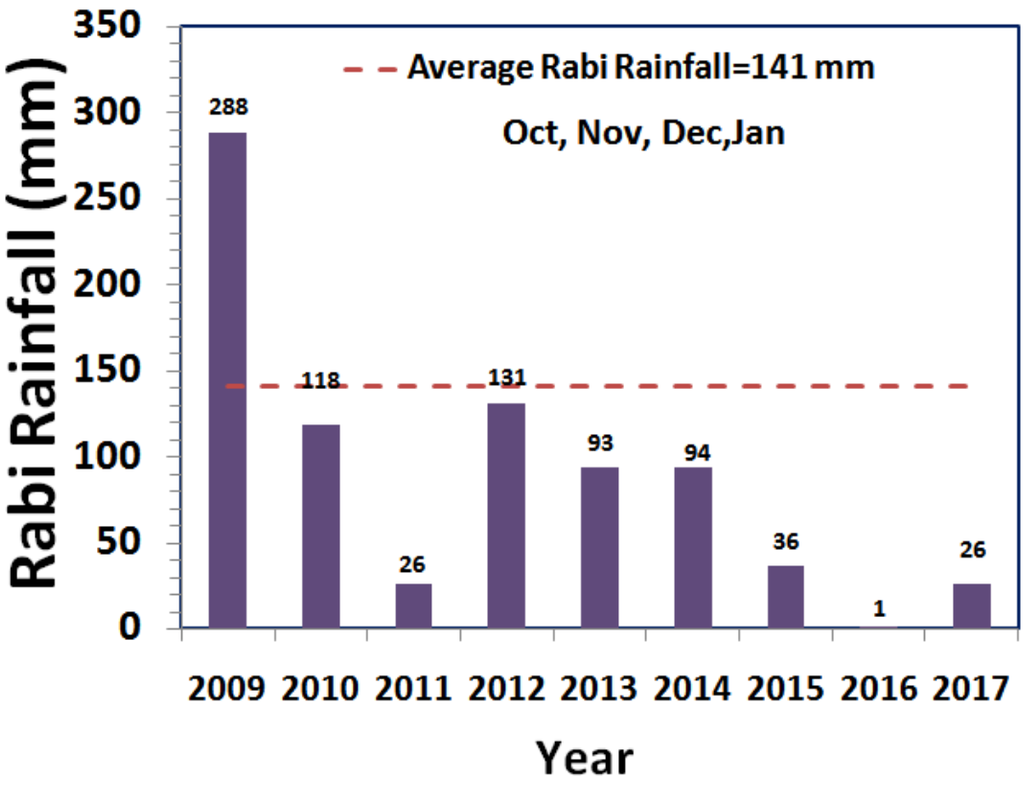


The average annual rainfall (1960-2014) recorded at the Yadgir station in Yadgir taluk of Yadgir district is 887 mm. The annual rainfall at Balichakra station (Hobli H.Q.) is presented. During the years 2009, 2011, 2012, 2013, 2014, 2015 and 2016 the annual rainfall was deficient by 7%, 34%, 27%, 25%, 28%, 25%, 79% and 64% respectively.

The *kharif* rainfall (Jun–Sep) is an average about 80% of the annual rainfall and it typically follows the annual rainfall patterns. During the years 2009, 2011, 2012, 2013, 2014, 2015 and 2016 the annual rainfall was deficient by 27%, 25%, 34%, 79%, 33%, 21%, 73% and 57% respectively.

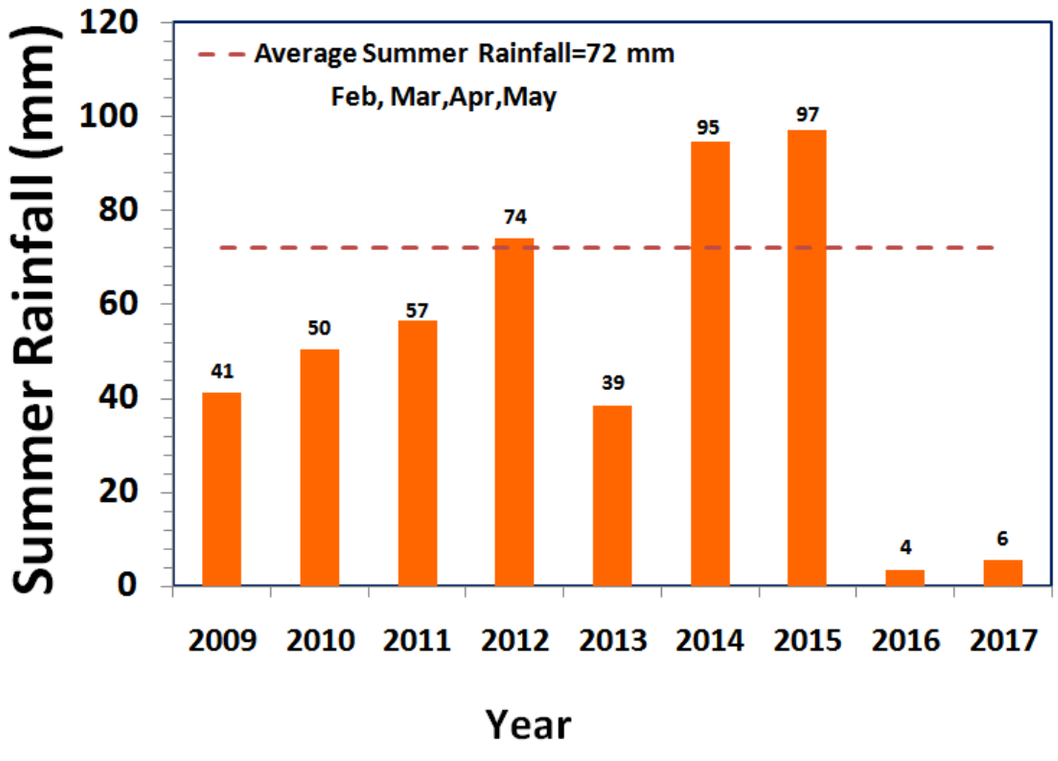


RAINFALL INDEX

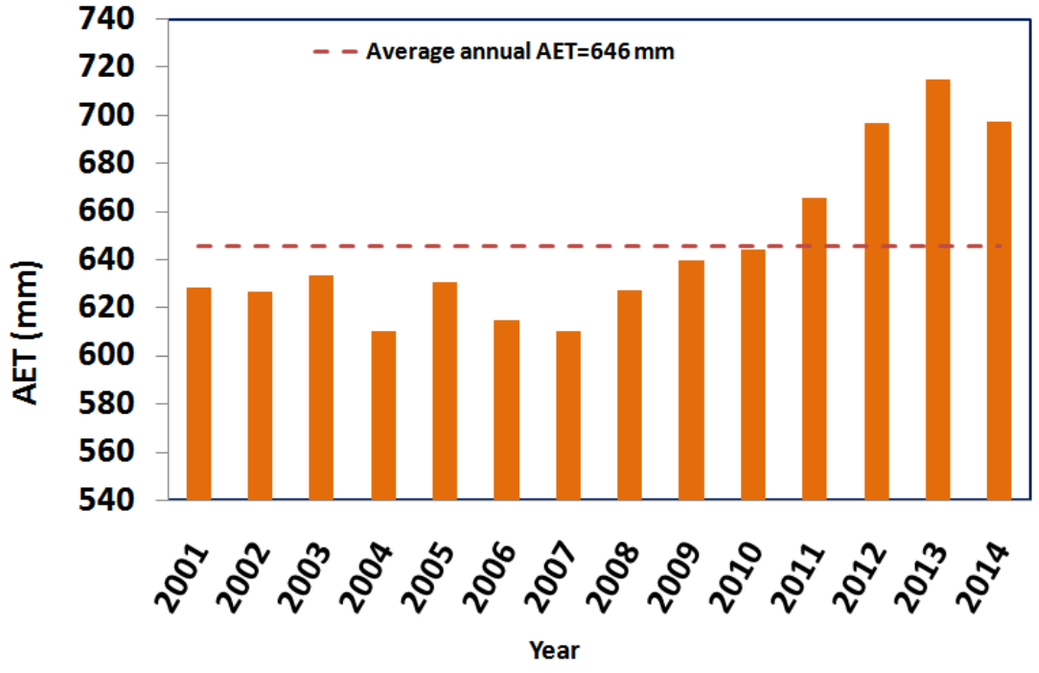


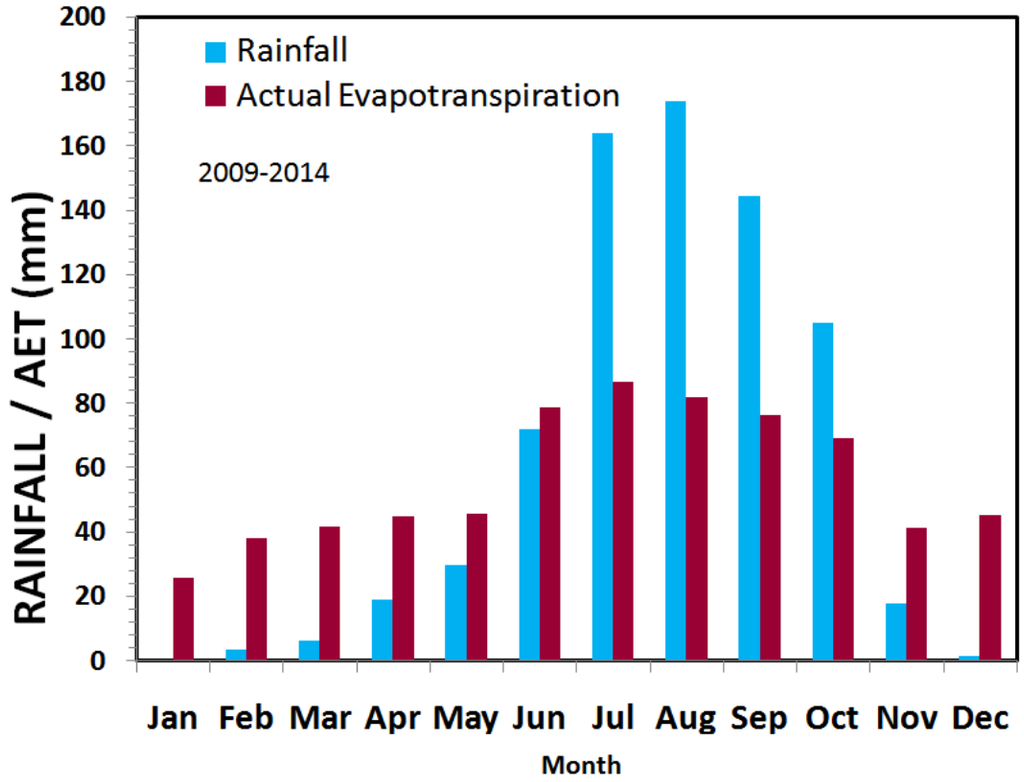
The average *rabi* rainfall (Oct-Jan) is about 13% of the Average annual rainfall. During the years 2010, 2011, 2012, 2013, 2014, 2015 and 2016 the annual rainfall was deficient by 16%, 82%, 7%, 34%, 33%, 74%, 99% and 82% respectively.

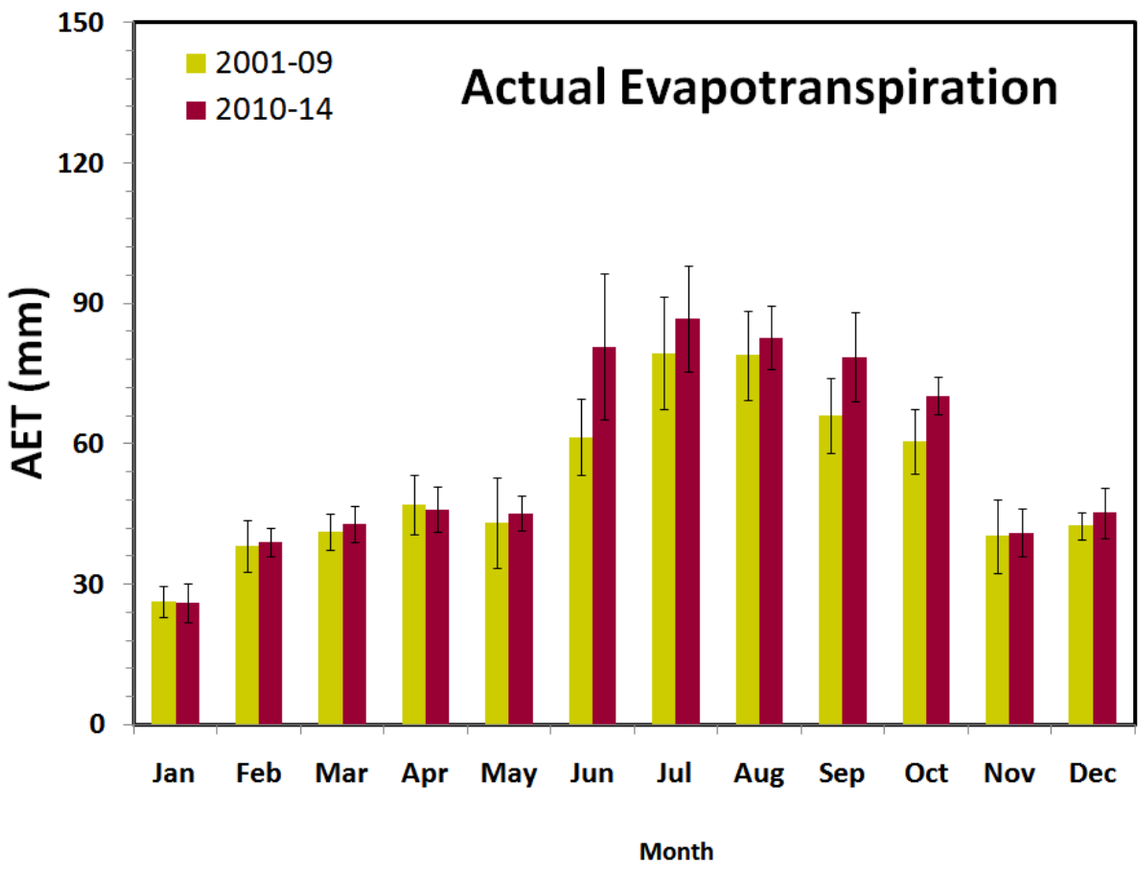
The average summer rainfall (Feb-May) is about 8% of the average annual rainfall.



EVAPOTRANSPIRATION

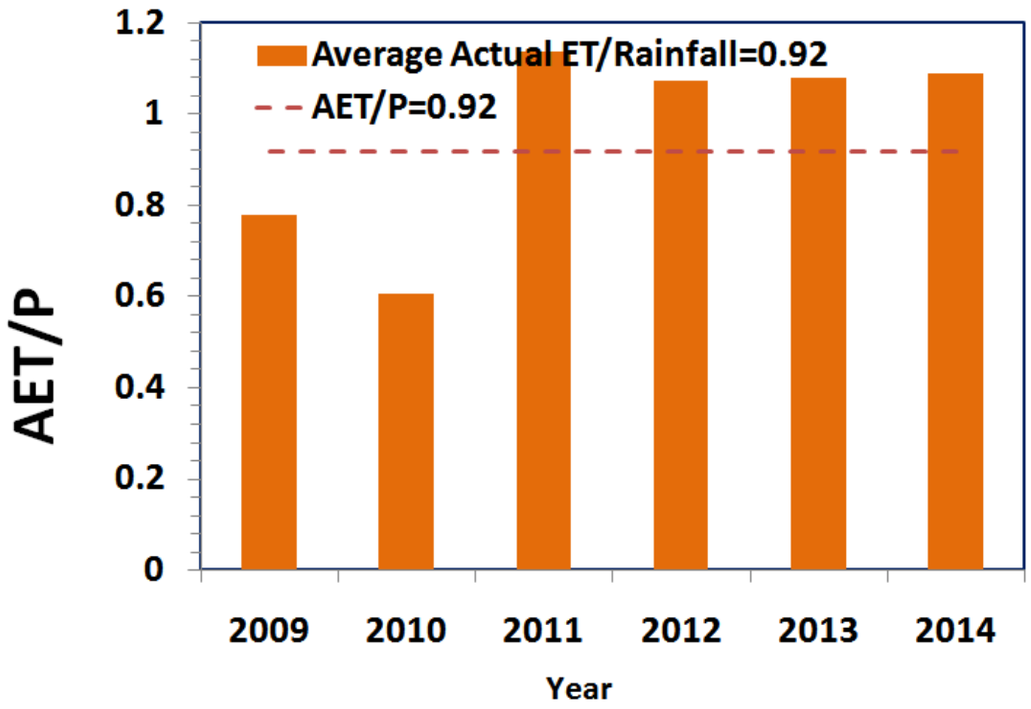


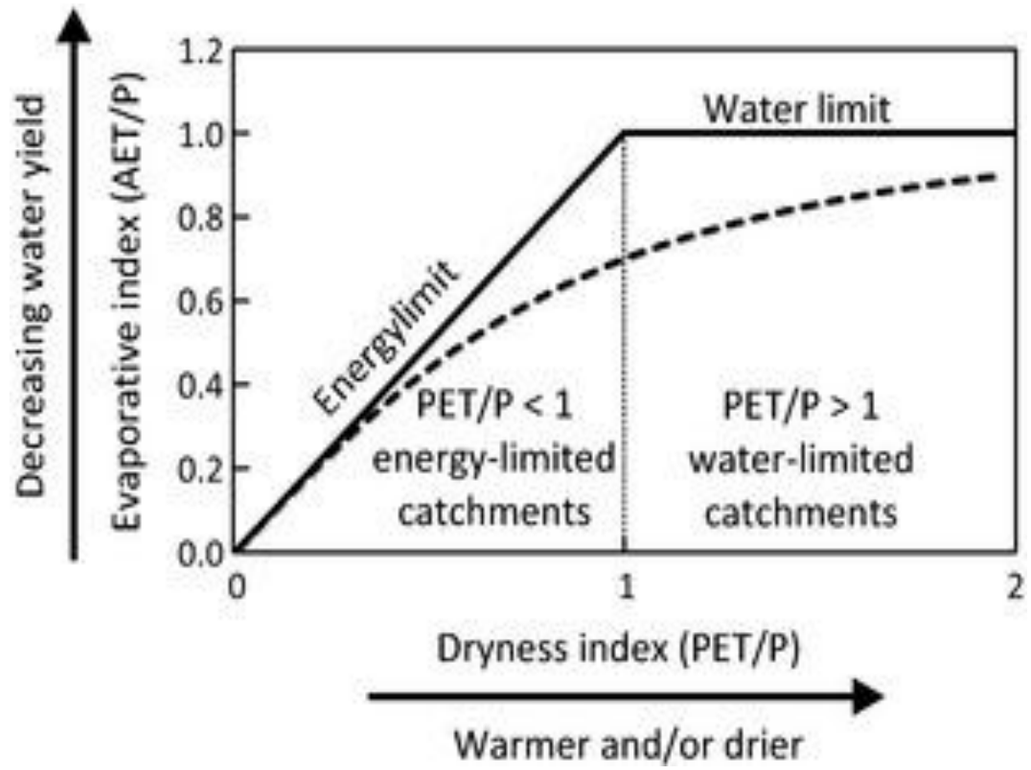




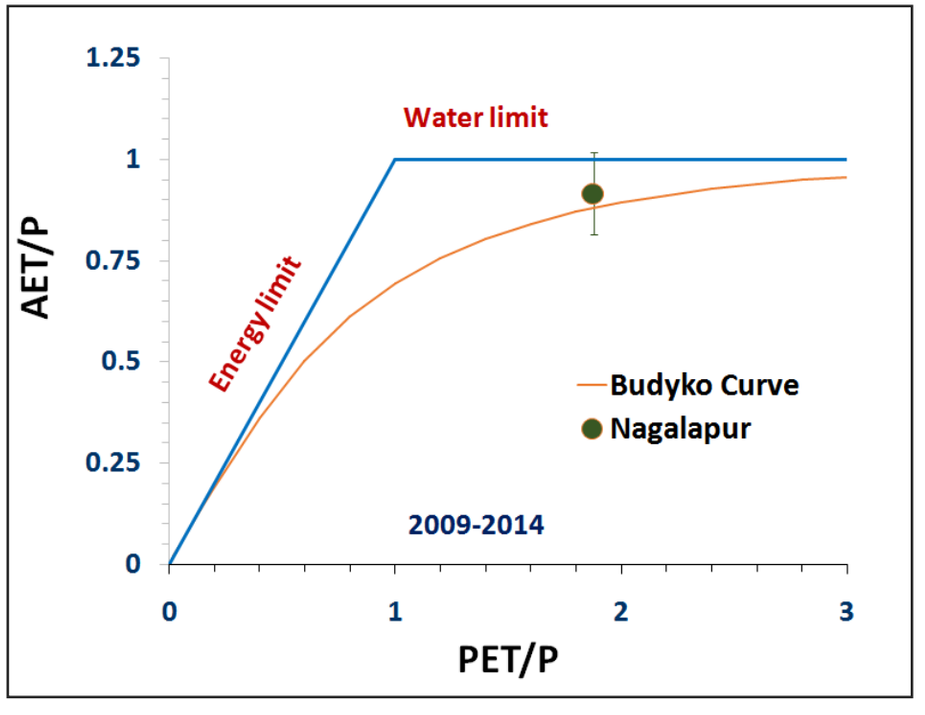
The average annual actual ET is lower than the average rainfall. During *kharif*, average rainfall and AET was found to be 674 mm and 324 mm respectively, whereas in *rabi* it was about 141 mm and 182 mm. The annual ET increased by 9% during 2010-2014 compared to 2001-2009 .

EVAPOTRANSPIRATION INDEX

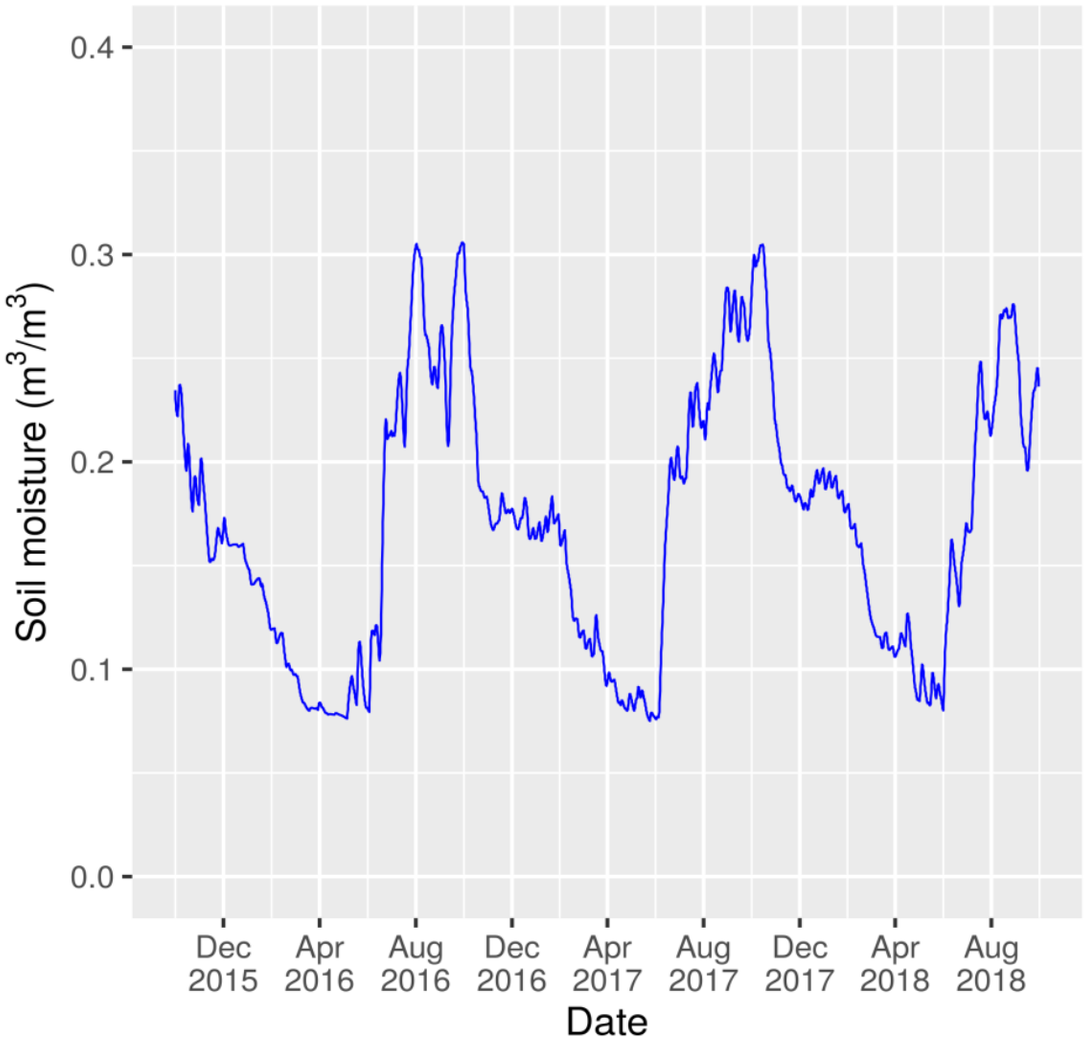




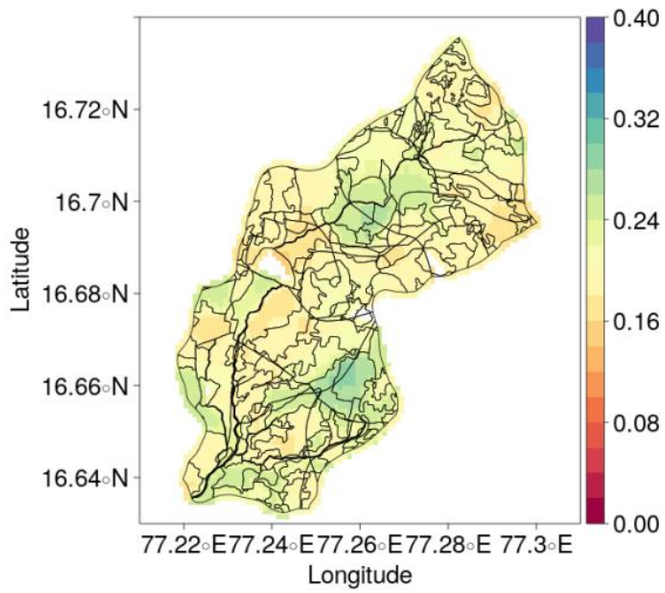
The average AET/P ratio was about 92%, which is slightly higher than the sustainable limit of about 80%. Even during extremely lower rainfall year of 2016, AET was 650 mm. This suggests the presence of water storage and utilization from other sources such as groundwater, which buffered the lower rainfall.



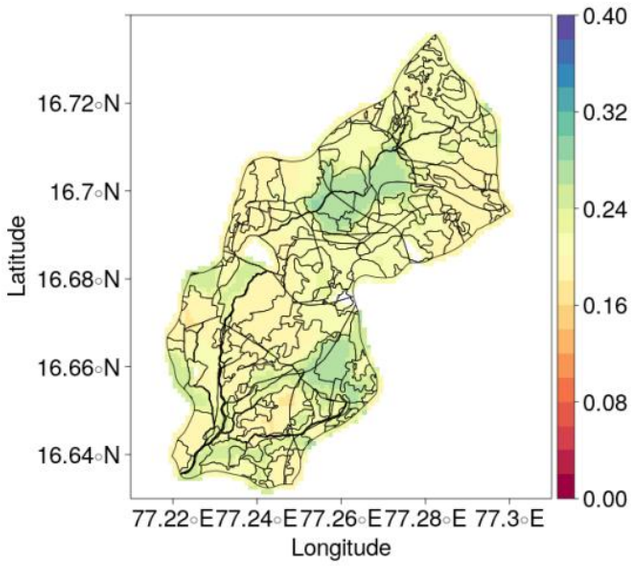
SATELLITE RETRIEVED SOIL MOISTURE



Nagalapur– Rabi Soil Moisture



Nagalapur– Kharif Soil Moisture

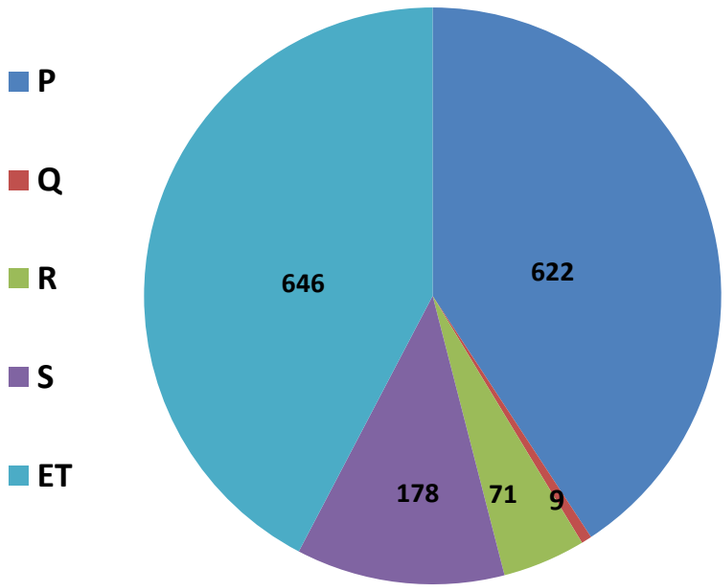


The method developed for retrieving soil moisture from multi-satellite observations allowed to map surface soil moisture behavior in the micro-watershed. The available surface moisture was varied in the range of 12-27 % in *kharif* and 16-31% in *rabi* seasons of 2016 and 7-28% in *Kharif* and 17-30% in *rabi* seasons of 2017.

WATER BALANCE

$$Q = P - E - R - S$$

- Q = Runoff
- P = Precipitation
- E = Evapotranspiration
- R = Groundwater recharge
- S = Soil moisture storage change

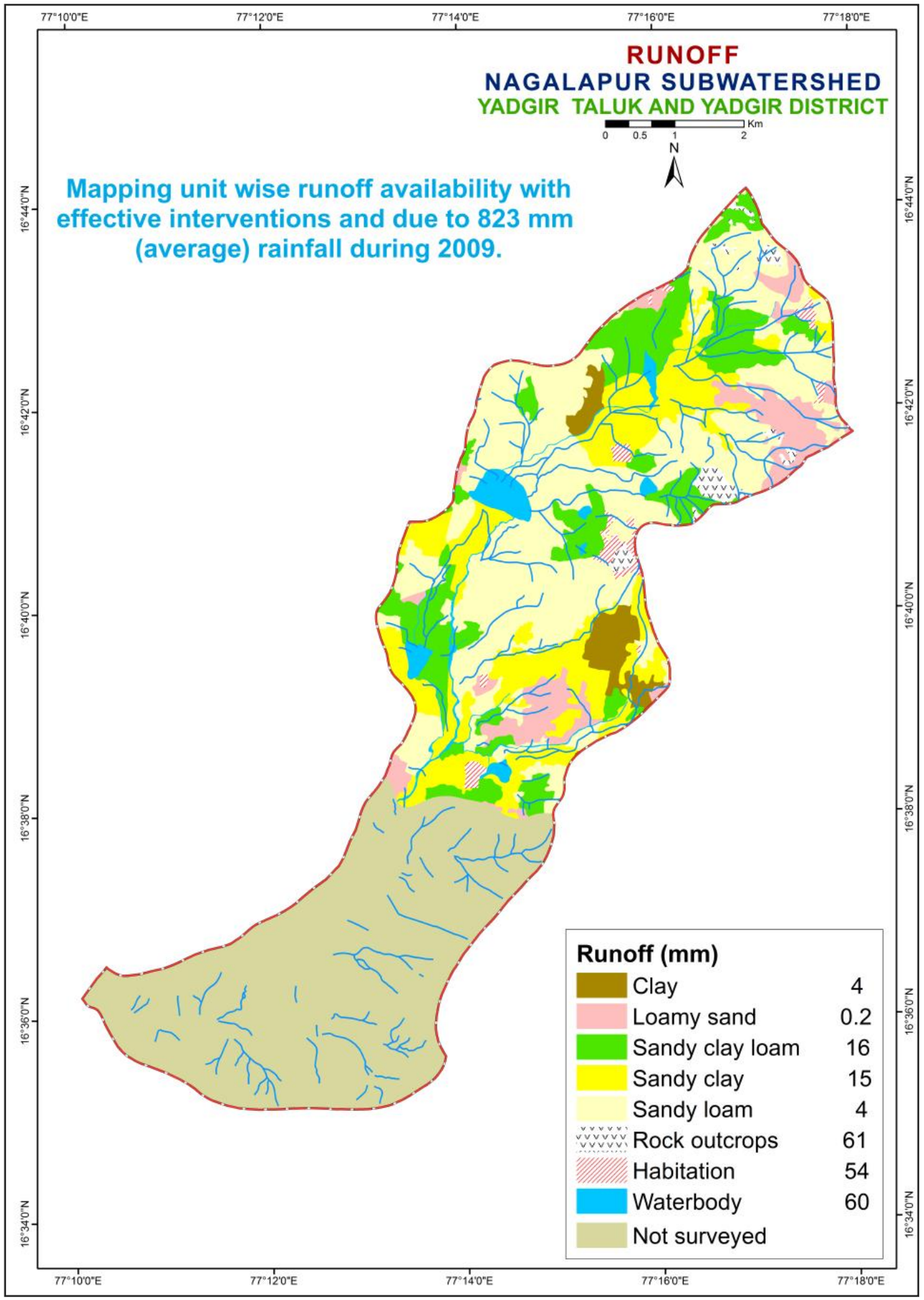


During July-October months, Precipitation is higher than Evapotranspiration, hence Runoff can occur in the watershed.

P = 622 mm (average of 2009-2017) ET = 646 mm R = 71 mm S = 178 mm Q = 9 mm

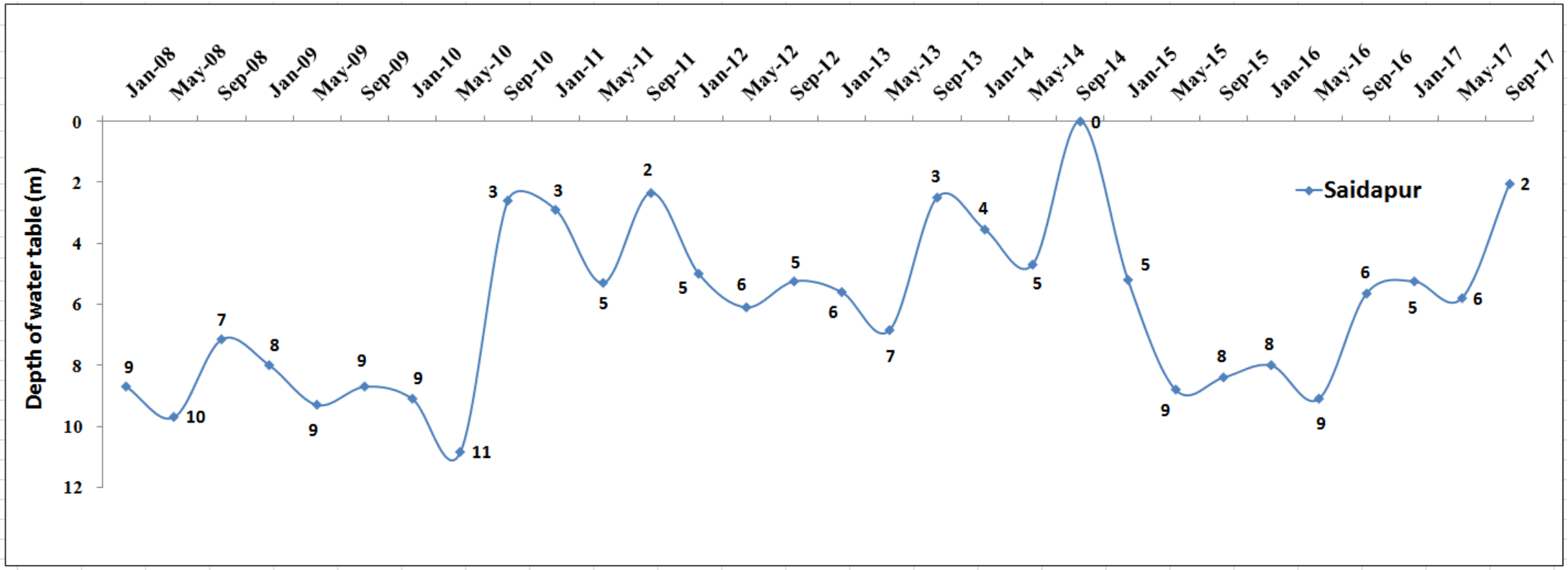
Sl. No.	Parameters	Average_ 2009 (mm)
1.	Rainfall	823
2.	Runoff availability with existing conditions	20
3.	Runoff availability with effective interventions	11
4.	Runoff allowed as environmental flow at the outlet	2
5.	Runoff excess for harvesting by construction of structures	9

RUNOFF


RUNOFF
NAGALAPUR SUBWATERSHED
YADGIR TALUK AND YADGIR DISTRICT
0 0.5 1 2 Km
N
Mapping unit wise runoff availability with effective interventions and due to 823 mm (average) rainfall during 2009.
77°10'0"E
77°12'0"E
77°14'0"E
77°16'0"E
77°18'0"E
16°44'0"N
16°42'0"N
16°40'0"N
16°38'0"N
16°36'0"N
16°34'0"N
Runoff (mm)
Clay 4
Loamy sand 0.2
Sandy clay loam 16
Sandy clay 15
Sandy loam 4
Rock outcrops 61
Habitation 54
Waterbody 60
Not surveyed

GROUND WATER STATUS

SAIDAPUR STATION



The total number of wells present in Nagalapur Sub-watershed as per LRI data is 18 Bore 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.

X

SUMMARY

- The average annual rainfall of 887 mm in the Nagalapur sub-watershed as recorded from the Balichakra station data.

- 80%, 14% and 11% 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 deficit. The cropping & irrigation choices are not appropriate and need to be altered to shift the deficit water balance.

- The estimated runoff available to use is 9 mm for an average annual rainfall of 622 mm (2009-2017). The utilizable groundwater is 49.7 mm (70% of 71 mm recharge estimated). This means the total available water resource combining the soil moisture store for kharif & rabi (178 mm) and utilizable runoff plus recharge is 237 (=178+9+50)

- The average actual evapotranspiration estimated in the watershed based on the current land use and irrigation practices for the kharif and rabi seasons is 506 mm. Hence the amount of water use for kharif and rabi seasons may be estimated as 632 mm (i.e. 125% of AET). This demand for the two seasons is higher by 395 mm, i.e. (632-237). The AET in June-Sept months is only 58% of rainfall. Hence, there is a good opportunity to harvest the excess water through watershed management practices for utilizing during rabi season.

- The total number of wells present in Nagalapur Sub-watershed as per LRI data is 18 Bore 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.