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LAND RESOURCE INVENTORY AND SOCIO-ECONOMIC STATUS OF FARM HOUSEHOLDS FOR WATERSHED PLANNING AND DEVELOPMENT

KADENHALLI (4D3D8G1a) MICROWATERSHED

Chikkanayakanahalli Taluk, Tumkur District, Karnataka

Karnataka Watershed Development Project – II

SUJALA – III

World Bank funded Project

The World Bank

ICAR – NATIONAL BUREAU OF SOIL SURVEY AND LAND USE PLANNING

ICAR - NBSS & LUP

WATERSHED DEVELOPMENT DEPARTMENT
GOVT. OF KARNATAKA, BANGALORE

About ICAR - NBSS&LUP

The ICAR-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 optimising 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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PREFACE

In Karnataka, as in other Indian States, the livelihoods of rural people are intertwined with farming pursuits. Thechallenges in agriculture are seriously threatening the livelihood of a large number of farmers as they have been practicing farming in contextual factors beyond their control. Climatic factors are the most important ones and have become much more significant in recent times due to rapid climate changes induced by intensive anthropogenic activities affecting our ecosystem in multiple ways. Climate change has become the reality, it is happening and efforts to evolve and demonstrate climate resilient technologies have become essential. Due to the already over stressed scenario of agrarian sector, the climate change is resulting in manifold increase in the complexities, pushing the rural mass to face more and more unpredictable situations. The rising temperatures and unpredictable rainfall patterns are going to test seriously the informed decisions farmers have to make in order to survive in farming and sustain their livelihood.

It is generally recognized that impacts of climate change shall not be uniform across the globe. It is said that impact of climate change is more severe in South Asia. Based on the analysis of meteorological data, it is predicted that in India, there will be upward trend in mean temperature, downward trend in relative humidity, annual rainfall and number of wet days in a year. Also, in general, phenomena like erratic monsoon, spread of tropical diseases, rise in sea levels, changes in availability of fresh water, frequent floods, droughts, heat waves, storms and hurricanes are predicted. Each one of these adverse situations are already being experienced in various parts of India and also at the global level. Decline in agricultural productivity of small and marginal farmers becoming more vulnerable is already witnessed.

In Karnataka, more than 60 per cent of the population live in rural areas and depend on agriculture and allied activities for their livelihood. Though the state has achieved significant progress in increasing the yield of many crops, there is tremendous pressure on the land resources due to the growing and competing demands of various land uses. This is reflected in the alarming rate of land degradation observed. Already more than 50 per cent of the area is affected by various forms of degradation. If this trend continues, the sustainability of the fragile ecosystem will be badly affected. The adverse effects of change in the climatic factors are putting additional stress on the land resources and the farmers dependent on this.

The natural resources (land, water and vegetation) of the state need adequate and constant care and management, backed by site-specific technological interventions and investments particularly by the government. Detailed database pertaining to the nature of the land resources, their constraints, inherent potentials and suitability for various land based rural enterprises, crops and other uses is a prerequisite for preparing location-specific action plans, which are in tune with the inherent capability of the resources. Any effort to evolve climate resilient technologies has to be based on the baseline scientific database. Then only

one can expect effective implementation of climate resilient technologies, monitor the progress, make essential review of the strategy, and finally evaluate the effectiveness of the implemented programs. The information available at present on the land resources of the state are of general nature and useful only for general purpose planning. Since the need of the hour is to have site-specific information suitable for farm level planning and detailed characterization and delineation of the existing land resources of an area into similar management units is the only option.

ICAR-NBSS&LUP, Regional Centre, Bangalore has taken up a project sponsored by the Karnataka Watershed Development Project-II, (Sujala-III), Government of Karnataka funded by the World Bank under Component -1 Land Resource Inventry. This study was taken up to demonstrate the utility of such a database in reviewing, monitoring and evaluating all the land based watershed development programs on a scientific footing. To meet the requirements of various land use planners at grassroots level, the present study on "Land Resource Inventory and Socio-Economic Status of Farm Households for Watershed Planning and Development of Kadenhalli Microwatershed, Chikkanayakanahalli Taluk and Tumakur District, Karnataka" for integrated development was taken up in collaboration with the State Agricutural Universities, IISC, KSRSAC, KSNDMC as Consortia partners. The project provides detailed land resource information at cadastral level (1:7920 scale) for all the plots and socio-economic status of farm households covering thirty per cent farmers randomely selected representing landed and landless class of farmers in the micowatershed. The project report with the accompanying maps for the Microwatershed will provide required detailed database for evolving effective land use plan, alternative land use options and conservation plans for the planners, administrators, agricutural extention personnel, KVK officials, developmental departments and other land users to manage the land resources in a sustainable manner.

It is hoped that this database will be useful to the planners, administrators and developmental agencies working in the area in not only for formulating location specific developmental schemes but also for their effective monitoring at the village/watershed level.

Nagpur
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PART-A

LAND RESOURCE INVENTORY

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EXECUTIVE SUMMARY

The land resource inventory of Kadenhalli Microwatershed was conducted using village cadastral maps and IRS satellite imagery on 1:7920 scale. The false color composites of IRS imagery were interpreted for Physiography and the physiographic delineations were used as base for mapping soils. The soils were studied in several transects and a soil map was prepared with phases of soil series as mapping units. Random checks were made all over the area outside the transects to confirm and validate the soil map unit boundaries. The soil map shows the geographic distribution and extent, characteristics, classification, behavior and use potentials of the soils in the microwatershed.

The present study covers an area of 476 ha in Chikkanayakanahalli taluk of Tumkur district, Karnataka. The climate is semiarid and categorized as drought-prone with an average annual rainfall of 700 mm, of which about 378 mm is received during south –west monsoon, 179 mm during north-east and the remaining 143 mm during the rest of the year. An area of about 96 per cent is covered by soils and 4 per cent by others. The salient findings from the land resource inventory are summarized briefly below.

- *The soils belong to 15 soil series and 31 soil phases (management units) and six land use classes.*
- *The length of crop growing period is about 120-150 days starting from 2nd week of July to 3rd week of November.*
- *From the master soil map, several interpretative and thematic maps like land capability, soil depth, surface soil texture, soil gravelliness, available water capacity, soil slope and soil erosion were generated.*
- *Soil fertility status maps for macro and micronutrients were generated based on the surface soil samples collected at every 250 m grid interval.*
- *Land suitability for growing 34 major agricultural and horticultural crops were assessed and maps showing the degree of suitability along with constraints were generated.*
- *An area of about 94 per cent in the microwatershed is suitable for agriculture and two per cent not suitable for agriculture.*
- *About 15 per cent of the soils are deep (100-150 cm) to very deep (>150 cm), 24 per cent moderately deep (75-100cm) and 54 per cent moderately shallow to shallow (25-75%) soils.*
- *About 2 per cent of the area has clayey soils, 2 % sandy soils and 92 per cent loamy soils at the surface.*
- *About 52 per cent of the area has non-gravelly soils, 22 per cent gravelly (15-35%) and 21 per cent very gravelly to extremely gravelly (35-80%) soils.*
- *About 83 per cent has soils that are very low (<50mm/m) to low (51-100 mm/m) and 11 per cent medium (101-150 mm/m) in available water capacity.*
- *About 77 per cent of the area has nearly level (0-1%) to very gently sloping (1-3% slope) and 17 per cent gently sloping to moderately sloping (3-10%) lands.*
- *An area of about 62 per cent has soils that are slightly eroded (e1) and 32 per cent moderately eroded (e2).*

- *An area of about 47 per cent has soils that are slightly acid (pH 5.0-6.5) to moderately acid and 49 per cent neutral (pH 6.5-7.3) in soil reaction.*
- *The Electrical Conductivity (EC) of the soils are dominantly <2 dsm^{-1} indicating that the soils are non-saline.*
- *About 95 per cent of the soils are medium (0.5-0.75%) in organic carbon.*
- *About 80 per cent area is medium (23-57 kg/ha) and 15 per cent high (>57 kg/ha) in available phosphorus.*
- *About 8 per cent of the soils are low (<145 kg/ha) and 87 per cent of the soils are high (145-337 kg/ha) in available potassium.*
- *Available sulphur is high (>10 ppm) in about 36 per cent area, low (<10ppm) in less than one per cent and medium (10-20 ppm) in about 59 per cent area.*
- *Available boron is low (0.5 ppm) in about 72 per cent area and medium (0.5-1.0 ppm) in 23 per cent area.*
- *Available iron, manganese and copper are sufficient in all the soils of the microwatershed.*
- *Available zinc is sufficient (>0.6 ppm) in about 92 per cent area and deficient (<0.6 ppm) in 3 per cent area.*
- *The land suitability for 34 major crops grown in the microwatershed were assessed and the areas that are highly suitable (S1) and moderately suitable (S2) are given below. It is however to be noted that a given soil may be suitable for various crops but what specific crop to be grown may be decided by the farmer looking to his capacity to invest on various inputs, marketing infrastructure, market price and finally the demand and supply position.*

Land suitability for various crops in the Kadenhalli Microwatershed

Crop	Suitability Area in ha (%)		Crop	Suitability Area in ha (%)	
	Highly suitable (S1)	Moderately suitable (S2)		Highly suitable (S1)	Moderately suitable (S2)
Sorghum	*59 (1)*	*294 (62)*	*Guava*	*25 (5)*	*91 (19)*
Fodder Sorghum	*59 (12)*	*303 (64)*	*Pomegranate*	*54 (11)*	*46 (10)*
Maize	*30 (6)*	*262 (55)*	*Banana*	*54 (11)*	*46 (10)*
Upland paddy	*59 (12)*	*303 (64)*	*Jackfruit*	*54 (11)*	*107 (23)*
Finger millet	*59 (12)*	*320 (67)*	*Jamun*	*54 (11)*	-
Redgram	*59 (1)*	*294 (62)*	*Musambi*	*54 (11)*	*107 (23)*
Horse gram	*109 (23)*	*269 (57)*	*Lime*	*54 (11)*	*107 (23)*
Field bean	*59 (1)*	*294 (62)*	*Cashew*	*25 (5)*	*152 (32)*
Cowpea	*59 (1)*	*294 (62)*	*Custard apple*	*59 (12)*	*319 (67)*
Groundnut	*30 (6)*	*257 (54)*	*Amla*	*59 (12)*	*382 (67)*
Sunflower	*54 (11)*	*107 (23)*	*Tamarind*	*54 (11)*	-
Onion	*59 (1)*	*233 (49)*	*Marigold*	*59 (1)*	*294 (62)*
Chilli	*59 (1)*	*294 (62)*	*Chrysanthemum*	*59 (1)*	*294 (62)*
Brinjal	*59 (1)*	*294 (62)*	*Jasmine*	*59 (1)*	*294 (62)*
Tomato	*59 (1)*	*294 (62)*	*Coconut*	*25 (5)*	*75 (16)*
Mango	*54 (11)*	-	*Arecanut*	*25 (5)*	*75 (16)*
Sapota	*54 (11)*	*107 (23)*	*Mulberry*	*25 (5)*	*75 16)*

Apart from the individual crop suitability, a proposed crop plan has been prepared for the 6 identified LUCs by considering only the highly and moderately suitable lands for different crops and cropping systems with food, fodder, fibre and horticulture crops that helps in maintaining productivity and ecological balance in the microwatershed.

- *Maintaining soil-health is vital to crop production and conserve soil and land resource base for maintaining ecological balance and to mitigate climate change. For this, several ameliorative measures have been suggested to these problematic soils like saline/alkali, highly eroded, sandy soils etc.*
- *Soil and water conservation treatment plan has been prepared that would help in identifying the sites to be treated and also the type of structures required.*
- *As part of the greening programme, several tree species have been suggested to be planted in marginal and sub-marginal lands and also in the hillocks, mounds and ridges that would help in supplementing the farm income, provide fodder, fuel and generate lot of biomass. This helps in maintaining ecological balance and contributes to mitigating the climate change.*

Chapter 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 the land in a rational and judicious manner. But what is happening in many areas of the state is a cause for concern to everyone involved in the management of land resources at the grassroots level. The area available for agriculture is about 51 per cent of the total geographical area and more than 60 per cent of the people are still dependant 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 significant diversion of farm lands and water resources for non-agricultural purposes. Apart from this, due to lack of interest in farmers for farming, large tracts of cultivable lands are turning into fallows in many areas and this trend is continuing at an alarming rate.

Further, land degradation has emerged as a serious problem which has already affected about 38 lakh ha of cultivated area in the state. Soil erosion alone has degraded about 35 lakh ha. Almost all the uncultivated areas are facing various degrees of degradation, particularly soil erosion. Salinity and alkalinity has emerged as a major problem in more than 3.5 lakh ha in the irrigated areas of the state. Nutrient depletion and declining factor productivity is common in both rainfed and irrigated areas. The degradation is continuing at an alarming rate and there appears to be no systematic effort among the stakeholders to contain this process. In recent times, an aberration of weather due to climate change phenomenon has added another dimension leading to unpredictable situations to be tackled by the farmers.

In this critical juncture, the challenge before us is not only to increase the productivity per unit area which is steadily declining and showing a fatigue syndrome, but also to prevent or at least reduce the severity of degradation. If the situation is not reversed at the earliest, then the sustainability of the already fragile crop production system and the overall ecosystem will be badly affected in the state. The continued neglect and unscientific use of the resources for a long time has led to the situation observed at present in the state. It is a known fact and established beyond doubt by many studies in the past that the cause for all kinds of degradation is the neglect and irrational use of the land resources. Hence, there is an urgent need to generate a detailed site-specific farm level database on various land resources for all the villages/watersheds in a time bound manner that would help to protect the valuable soil and land resources and also to stabilize the farm production.

Therefore, the land resource inventory required for farm level planning is the one which investigates not only the surface but also consider the other parameters which are critical for productivity *viz.,* soils, climate, water, minerals and rocks, topography, geology, hydrology, vegetation, crops, land use pattern, animal population, socio-

economic conditions, infrastructure, marketing facilities and various schemes and developmental works of the government etc. 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.

The Land Resource Inventory is basically done for identifying the potential and problem areas, developing sustainable land use plans, estimation of surface run off and water harvesting potential, preparation of soil and water conservation plans, land degradation/desertification etc. The Bureau is presently engaged in developing an LRI methodology using high resolution satellite remote sensing data and Digital Elevation Model (DEM) data to prepare Landscape Ecological Units (LEU) map representing agro-ecosystem as a whole. The LEU is preferred over landform as the base map for LRI. LEU is the assemblage of landform, slope and land use. An attempt was made to upscale the soil resource information from 1:250000 and 1:50000 scale to the LEU map in Goa and other states.

The land resource inventory aims to provide site specific database for Kadenhalli microwatershed in Chikkanayakanahalli Taluk, Tumkur District, Karnataka State for the Karnataka Watershed Development Department. The database was generated by using cadastral map of the village as a base along with high resolution IRS LISS IV and Cartosat-1 merged satellite imagery. Later, an attempt will be made to uplink this LRI data generated at 1:7920 scale under Sujala-III Project to the proposed Landscape Ecological Units (LEUs) map.

The study was organized and executed by the ICAR- National Bureau of Soil Survey and Land Use Planning, Regional Centre, Bangalore under Generation of Land Resource Inventory Data Base Component-1 of the Sujala-III Project funded by the World Bank.

Chapter 2

GEOGRAPHICAL SETTING

2.1 Location and Extent

Tumkur District popularly known as *Kalpataru Nadu* (for production of Coconuts) is located 71 kms away from the capital city of Karnataka state. The study area of Kadenhalli microwatershed (Anekatte sub-watershed) is located in the southeastern part of Karnataka in Chikkanayakanahalli taluk, Tumkur district, Karnataka State (Fig. 2.1). It lies between $13^0$21' and $13^0$23' North latitudes and $76^0$36'and $76^0$39' East longitudes and covers an area of 476 ha. It comprises parts of Kadenahalli, Dabbegatta, Tharabenahalli, Jayachamarajapura and Bairaganahalli villages. It is about 10 km from Chikkanayakanahalli town and is surrounded by Kadenahalli on the northwest and northeast, Dabbegatta on the north, Tharabenahalli on the southwest and east, Jayachamarajapura on the southwest and Bairaganahalli village on the southeast.

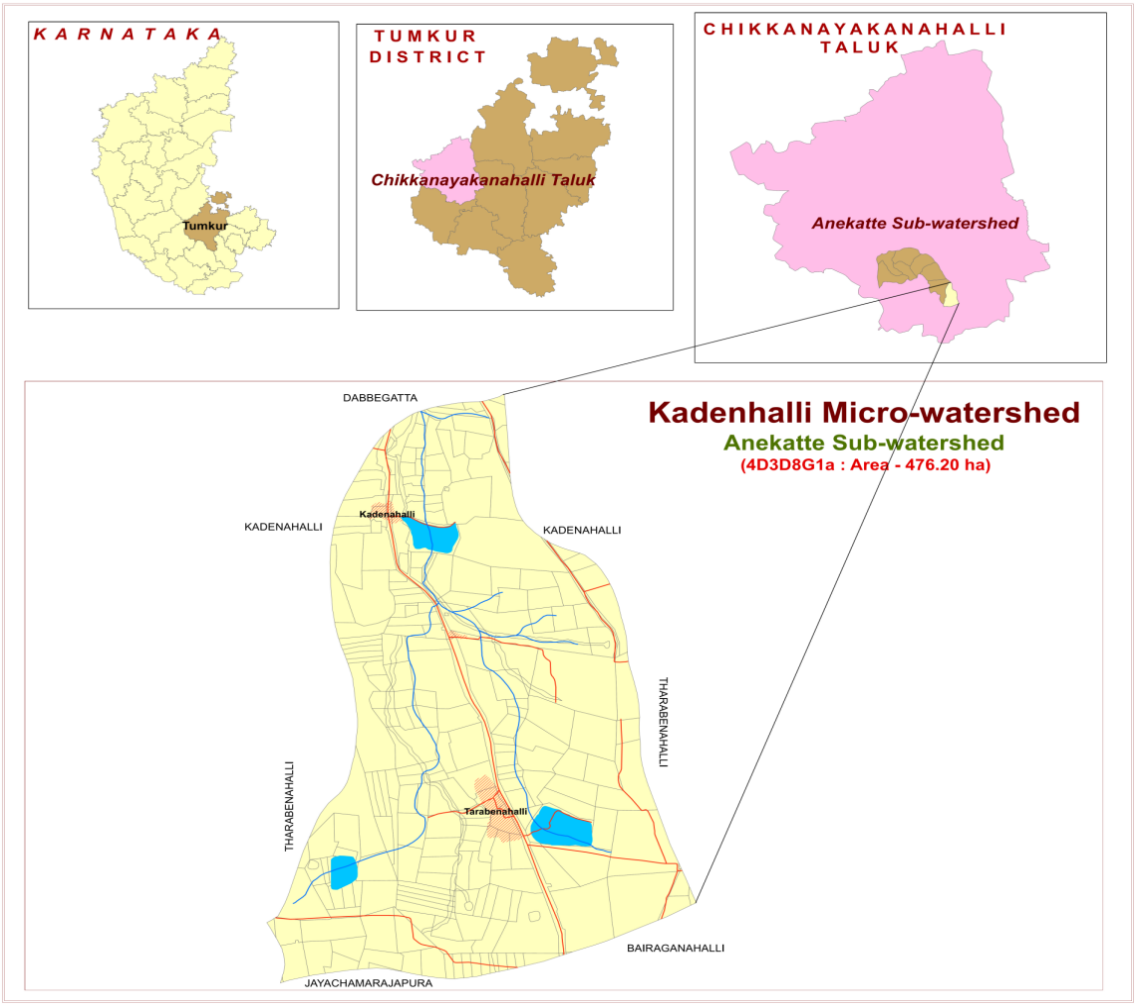


Fig.2.1 Location map of Kadenhalli Microwatershed

2.2 Geology

Major rock formations observed in the microwatershed are granite gneiss and alluvium (Figs.2.2 and 2.3). Granite and granite gneiss are essentially pink to gray and are coarse to medium grained. They consist primarily of quartz, feldspar, biotite and hornblende. The gray granite gneisses are highly weathered, fractured and fissured upto a depth of about 10 m. The most widespread and characteristic development of alluvium in the watershed region lying in the Suvarnamukhi river basin is a wide belt, the underlying formation is gneiss and alluvial soils occur over gneiss. Limestone and shale are far more extensive and homogeneous than those found on the Deccan Trap country lying to the river Suvarnamukhi. The soil thickness of the alluvium generally is limited to less than a meter, except in river valleys where it is very deep extending to tens of meters. Such soils are transported and represent paleo black soils originally formed at higher elevation, but now occupying river valleys.

Fig.2.2 Granite and granite gneiss rocks

Fig. 2.3 Alluvium

2.3 Physiography

Physiographically, the area has been identified as granite gneiss and alluvial landscapes based on geology. It has been further divided into three landforms *viz*; mounds/ ridges, uplands and lowlands based on slope and other relief features. They have been further subdivided into four physiographic units, *viz;* summits, side slopes, very

gently sloping uplands and lowlands/valleys. The elevation ranges from 824 to 838 m. The mounds and ridges are mostly covered by rock outcrops.

2.4 Drainage

There are no perennial rivers flowing in Chikkanayakanahalli taluk. However, the area is drained by several small seasonal streams like Tore *Halla* which joins Kare Tore and further drains to Suvarnamuki river along its course. Though, they are not perennial, during rainy season, they carry large quantities of rain water. The microwatershed area has only few small tanks which are not capable of storing water that flows during the rainy season. Due to this, the ground water recharge is very much affected in the villages. This is reflected in the failure of many bore wells in the villages. If the available rain water is properly harnessed by constructing new tanks and recharge structures at appropriate places in the villages, then the drinking and irrigation needs of the area can be met. The drainage network is dendritic to subparallel.

2.5 Climate

The district falls under semiarid tract and is categorized as drought - prone with average annual rainfall of 700 mm (Table 2.1). Of the total rainfall, a maximum of 378 mm is received during south-west monsoon period from June to September, north-east monsoon from October to early December contributes about 179 mm and the remaining 143 mm is received during the rest of the year. The winter season is from December to February. During April and May, the temperatures reach up to 35 °C and in December and January, the temperatures will go down to 20 °C. Rainfall distribution is shown in Figure 2.4. The average Potential Evapo-Transpiration (PET) is 110 mm and varies from a low of 73 mm in December to 152 mm in the month of April. The PET is always higher than precipitation in all the months except in the months of September and October. Generally, the Length of crop Growing Period (LGP) is 120-150 days and starts from July 2nd week to 3rd week of November.

Table 2.1 Mean Monthly Rainfall, PET, 1/2 PET in Chikkanayakanahalli Taluk, Tumkur District

Sl. No.	Months	Rainfall (mm)	PET	1/2 PET
1	January	3.6	78.3	39.15
2	February	6.0	102.7	51.35
3	March	17.1	142.6	71.3
4	April	40.0	151.6	75.8
5	May	76.6	149.7	74.85
6	June	75.2	121.1	60.55
7	July	73.2	107.6	53.8
8	August	87.4	105.8	52.9
9	September	142.3	101.2	50.6
10	October	126.4	100.2	50.1
11	November	42.4	85.0	42.5
12	December	10.3	73.0	36.5
Total		**700.5**		

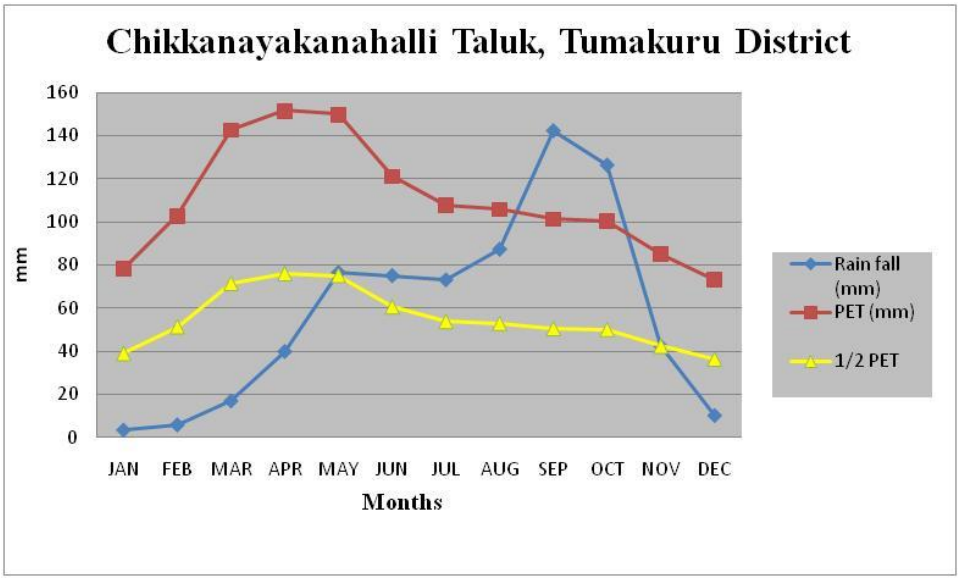


Fig 2.4 Rainfall distribution in Chikkanayakanahalli Taluk, Tumkur District

2.6 Natural Vegetation

The natural vegetation is sparse comprising few tree species, shrubs and herbs. The mounds, ridges and boulders occupy very sizeable area which is under thin to moderately thick forest vegetation. Still, there are some remnants of the past forest cover which can be seen in patches in some ridges and hillocks in the microwatershed (Fig. 2.5).

Apart from the continuing deforestation, the presence of large population of goats, sheep and other cattle in the microwatershed is causing vegetative degradation of whatever little vegetation left in the area. The uncontrolled grazing has left no time for the regeneration of the vegetative cover. This leads to the accelerated rate of erosion on the hill slopes resulting in the formation of deep gullies in the foot slopes that eventually result in the heavy siltation of tanks and reservoirs in the microwatershed.

Fig. 2.5 Natural vegetation of Kadenhalli Microwatershed

2.7 Land Utilization

About 55 per cent area (Table 2.2) in Chikkanayakanahalli taluk is cultivated at present. An area of about 7 per cent is currently barren. Forests occupy an area of about 7

per cent. Most of the mounds, ridges and bouldery areas have very poor vegetative cover. Major crops grown in the area are Ragi, Groundnut, Maize, Sorghum, Sunflower, Redgram, Horsegram, Field bean, Cowpea, Mango, Banana, Mulberry and plantation crops like Coconut and Arecanut. While carrying out land resource inventory, the land use/land cover particulars are collected from all the survey numbers and a current land use map of the Kadenhalli microwatershed is prepared. The current land use map generated shows the arable and non-arable lands, other land uses and different types of crops grown in the area (Fig 2.6). The different crops and cropping systems adopted in the microwatershed is presented in Figures 2.6.a &b. Simultaneously, enumeration of wells (bore wells and open wells) and existing conservation structures in the microwatershed are made and their location in different survey numbers is marked on the cadastral map. Map showing the location of wells and other water bodies in Kadenhalli microwatershed is given in Fig. 2.7.

Table 2.2 Land Utilization in Chikkanayakanahalli Taluk

Sl. No.	Agricultural land use	Area (ha)	Per cent
1.	Total geographical area	112998	-
2.	Total cultivated area	61718	54.61
3.	Area sown more than once	8231	7.28
4.	Cropping intensity	-	113.33
5.	Trees and grooves	2715	2.40
6.	Forest	8235	7.28
7.	Cultivable wasteland	18164	16.07
8.	Permanent Pasture land	4500	3.98
9.	Barren land	7773	6.87
10.	Non- Agriculture land	6771	5.99

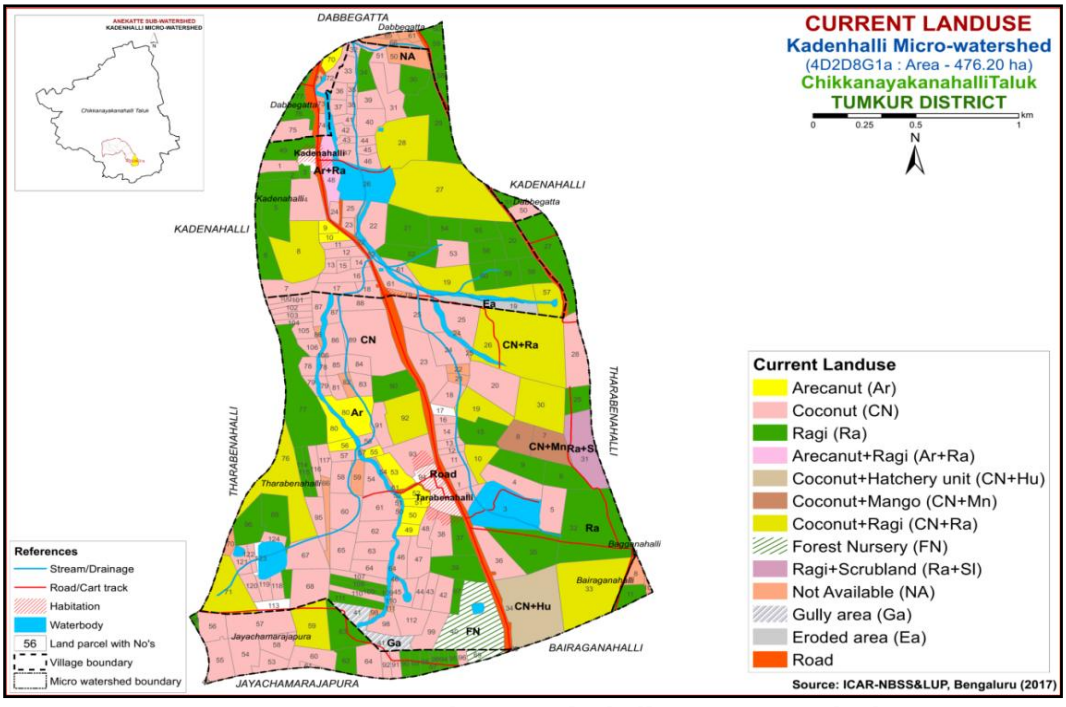


Fig.2.6 Current Land Use Kadenhalli Microwatershed

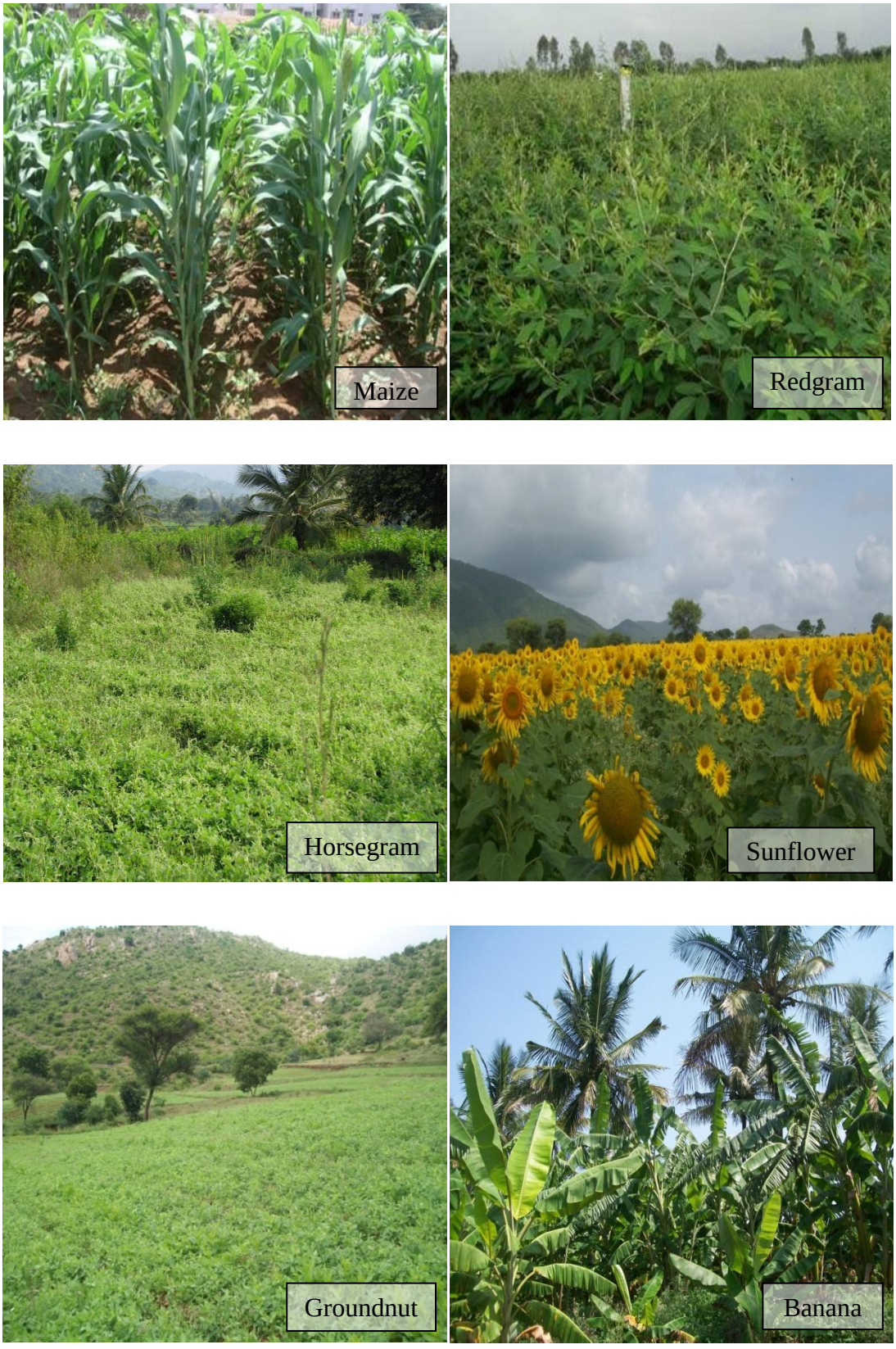


Fig.2.6a Different crops and cropping systems in Kadehalli Microwatershed

Fig.2.6.b Different crops and cropping systems in Kadehalli Microwatershed

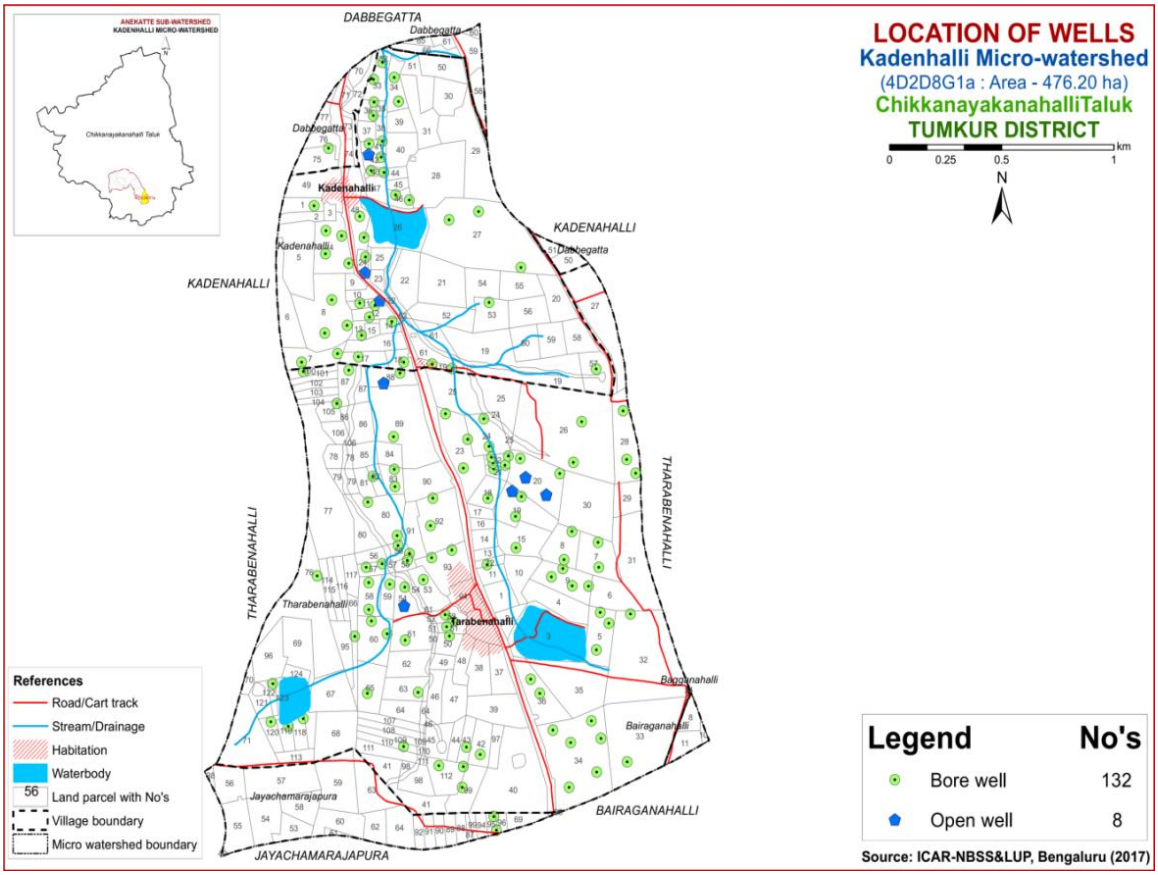


Fig.2.7 Location of wells in Kadenhalli Microwatershed

Chapter 3

SURVEY METHODOLOGY

The purpose of land resource inventory is to delineate similar areas (soil series and phases), which respond or expected to respond similarly to a given level of management. This was achieved in Kadenhalli microwatershed by the detailed study of all the soil characteristics (depth, texture, colour, structure, consistence, coarse fragments, porosity, soil reaction, soil horizons etc.) and site characteristics (slope of the land, erosion, drainage, occurrence of rock fragments etc.) and followed by grouping of similar areas based on soil-site characteristics into homogeneous (management units) units, and showing area extent and their geographic distribution on the microwatershed cadastral map. The detailed survey at 1:7920 scale was carried out in an area of 544 ha. The methodology followed for carrying out land resource inventory was as per the guidelines given in Soil Survey Manual (IARI, 1971; Soil Survey Staff, 2006; Natarajan *et al.,* 2015) which is briefly described below.

3.1 Base Maps

The detailed survey of the land resources occurring in the microwatershed was carried out by using digitized cadastral map as a base. The cadastral map shows field boundaries with their survey numbers, location of tanks, streams and other permanent features of the area (Fig. 3.1). Apart from the cadastral map, remote sensing data products from Cartosat-1 and LISS IV merged at the scale of 1:7920 were used in conjunction with the cadastral map to identify the landscapes, landforms and other surface features. The imagery helped in the identification and delineation of boundaries between hills, uplands and lowlands, water bodies, forest and vegetated areas, roads, habitations and other cultural features of the area (Fig.3.2).The cadastral map was overlaid on the satellite imagery (Fig.3.3) that helps to identify the parcel boundaries and other permanent features. Apart from cadastral maps and images, toposheets of the area (1:50,000 scale) were also used for initial traversing, identification of geology and landforms, drainage features, present land use and also for selection of transects in the microwatershed.

3.2 Image Interpretation for Physiography

False Colour Composites (FCCs) of Cartosat-I and LISS-IV merged satellite data covering the microwatershed area was visually interpreted using image interpretation elements along with the geology map and all the available collateral data with local knowledge. The delineated physiographic boundaries were transferred on to a cadastral map overlaid on satellite imagery. Physiographically, the area has been identified as granite gneiss and alluvial landscapes and is divided into landforms such as ridges, mounds, uplands and valleys based on slope and other relief features. They were further subdivided into physiographic/ image interpretation units based on image characteristics. The image interpretation legend for physiography is given below.

Image Interpretation Legend for Physiography

G- Granite gneiss landscape

- G1 Hills/ Ridges/ Mounds
  - G11 Summits
  - G12 Side slopes
    - G121 Side slopes with dark grey tones
- G2 Uplands
  - G21 Summits
  - G22 Gently sloping uplands
    - G221 Gently sloping uplands, yellowish green (eroded)
    - G222 Gently sloping uplands, yellowish white (severely eroded)
  - G23 Very gently sloping uplands
    - G231 Very gently sloping uplands, yellowish green
    - G232 Very gently sloping uplands, medium green and pink
    - G233 Very gently sloping uplands, pink and green (scrub land)
    - G234 Very gently sloping uplands, medium greenish grey
    - G235 Very gently sloping uplands, yellowish white (eroded)
    - G236 Very gently sloping uplands, dark green
    - G237 Very gently sloping uplands, medium pink (coconut garden)
    - G238 Very gently sloping uplands, pink and bluish white (eroded)
  - G24 Valleys/ lowlands
    - G241 Valleys, pink tones
    - G242 Valleys gray mixed with pink tones

DSe – Alluvial landscape

DSe 1 – Summit

DSe 11 –

DSe 12 –

DSe 2 – Very genetly sloping

DSe 21 – Very gently sloping, dark gray tone

DSe 22 – Very gently sloping, medium gray tone

DSe 23 – Very gently sloping, yellowish grey tone

DSe 24 – Very gently sloping, whitish grey tone

DSe 25 – Very gently sloping, whitish/ eroded/ calcareous tone

DSe 26- Very gently sloping, medium pink

DSe 3 – Valley/ Lowland

DSe 31 – Whitish gray/Calcareous

DSe 32 – Gray with pink patches

DSe 33 – Medium gray tone

DSe 34 – Lightish gray tone

DSe 35 – Dark gray tone

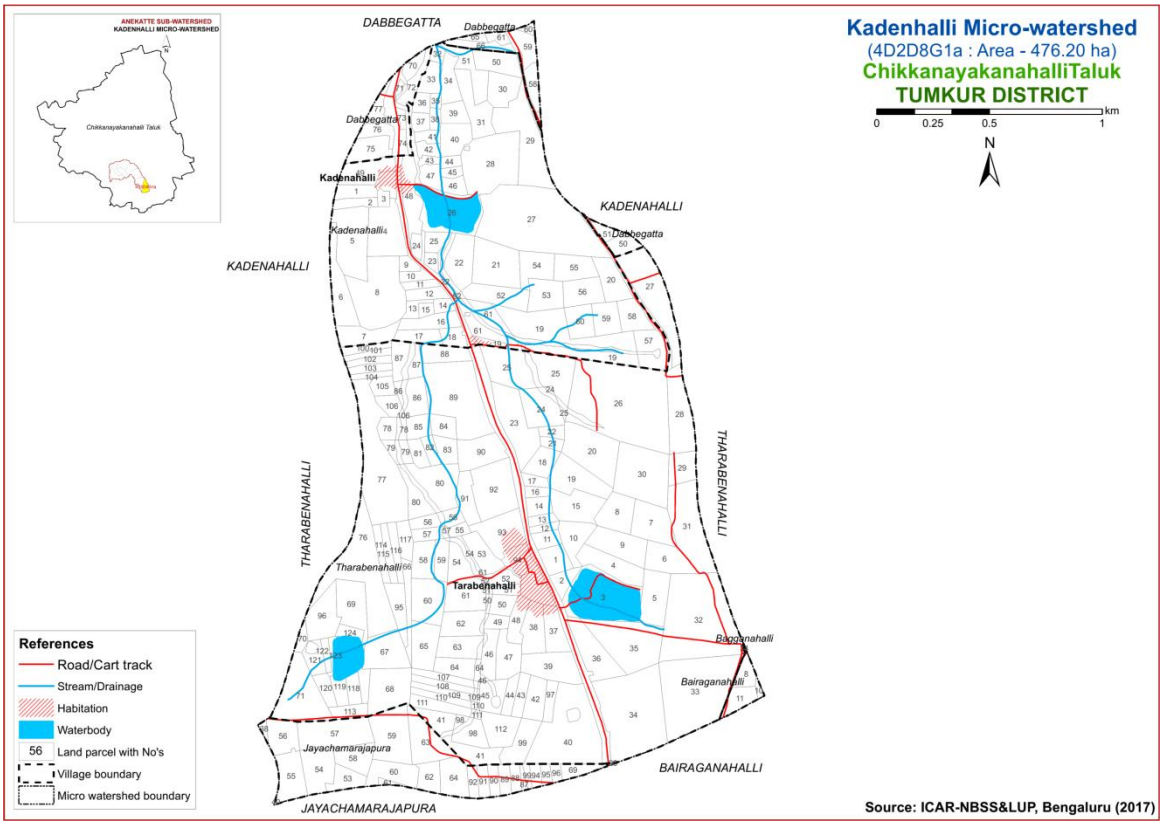


Fig 3.1 Scanned and Digitized Cadastral map of Kadenhalli Microwatershed

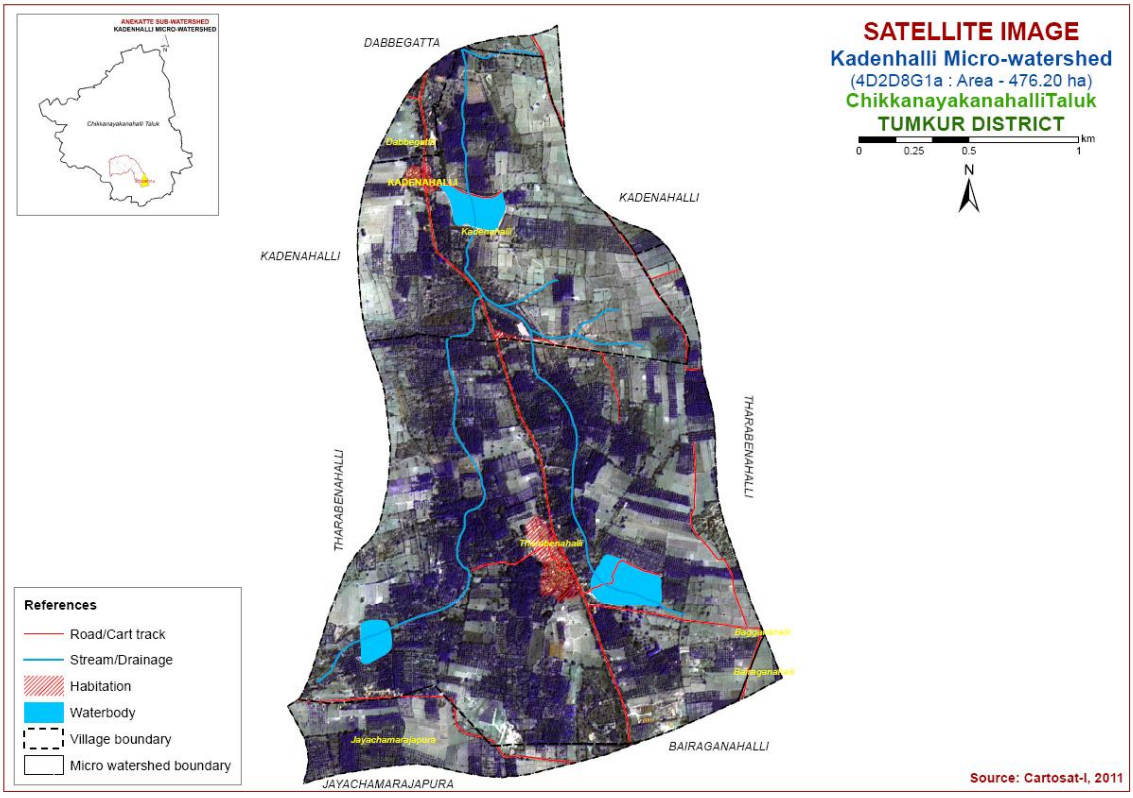


Fig.3.2 Satellite Image of Kadenhalli Microwatershed

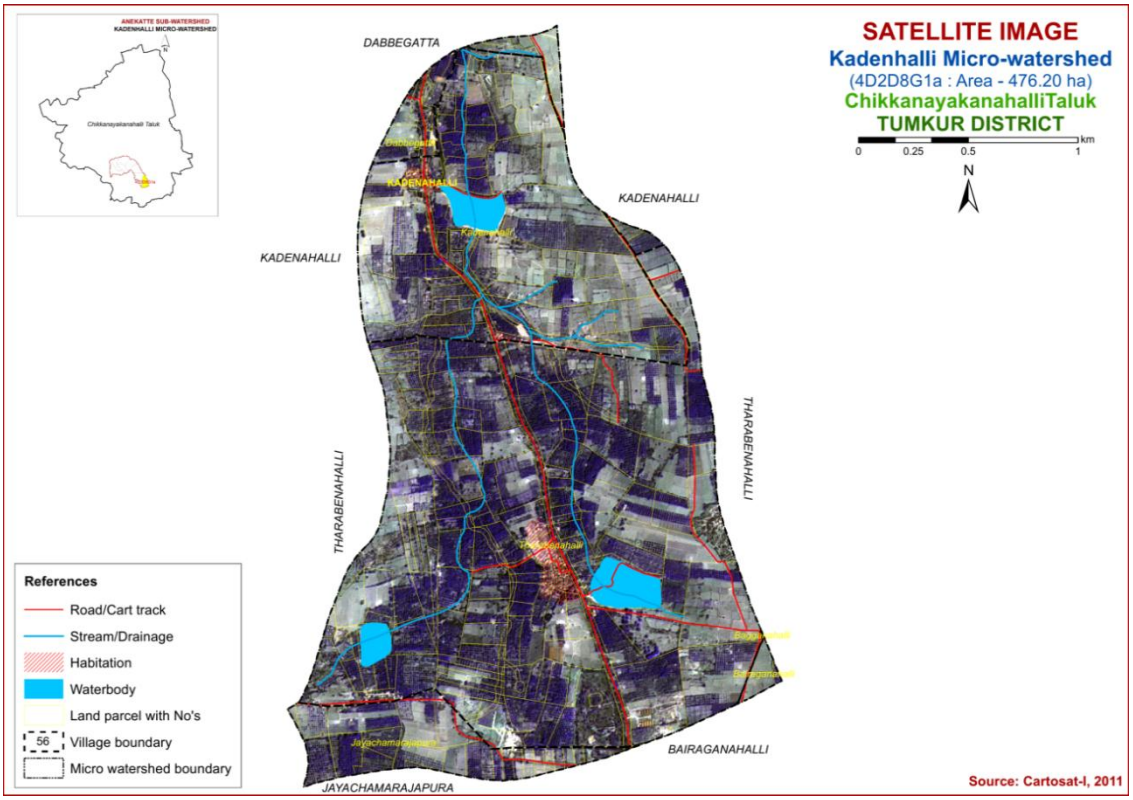


Fig.3.3 Cadastral map overlaid on IRS PAN+LISS IV merged imagery of Kadenhalli Microwatershed

3.3 Field Investigation

The field boundaries and survey numbers given on the cadastral sheet were located on the ground by following permanent features like roads, cart tracks, *nallas*, streams, tanks etc., and wherever changes were noticed, they were incorporated on the microwatershed cadastral map. Preliminary traverse of the microwatershed was carried out with the help of cadastral map, imagery and toposheets. While traversing, landforms and physiographic units identified were checked and preliminary soil legend was prepared by studying soils at few selected places. Then, intensive traversing of each physiographic unit like hills, ridges, uplands and valleys was carried out. Based on the variability observed on the surface, transects (Fig. 3.4) were selected across the slope covering all the landform units in the microwatershed (Natarajan and Dipak Sarkar, 2010).

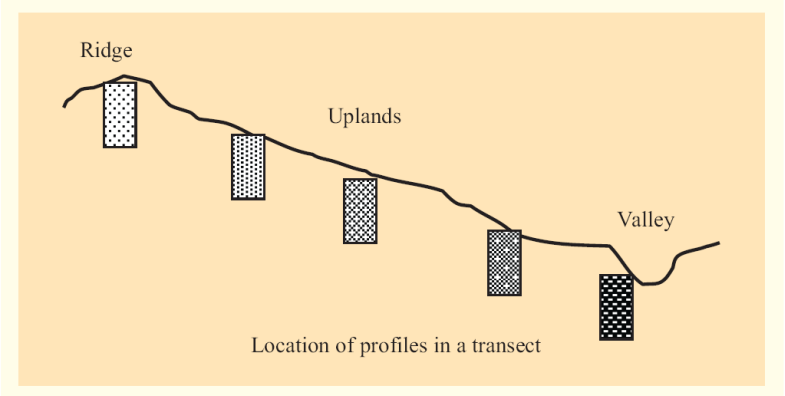


Fig: 3.4. Location of profiles in a transect

In the selected transect, soil profiles were located (Fig. 3.4) at closely spaced intervals to take care of any change in the land features like break in slope, erosion, gravel, stones etc. In the selected sites, soil profiles (vertical cut showing the soil layers from surface to the rock) were opened upto 200 cm or to the depth limited by rock or hard substratum and studied in detail for all their morphological and physical characteristics. The soil and site characteristics were recorded for all profile sites on a standard proforma as per the guidelines given in USDA Soil Survey Manual (Soil Survey Staff, 2012). Apart from the transect study, profiles were also studied at random, almost like in a grid pattern, outside the transect areas.

Based on the soil characteristics, the soils were grouped into different soil series. Soil series is the most homogeneous unit having similar horizons and properties and behaves similarly for a given level of management. Soil depth, texture, colour, kind of horizon and horizon sequence, amount and nature of gravel present, calcareousness nature of substratum etc, were used as the major differentiating characteristics for identifying soil series occurring in the area. The differentiating characteristics used for identifying the soil series are given in Table 3.1. Based on the above characteristics, 10 soil series were identified in the Kadenhalli microwatershed.

Table 3.1 Differentiating Characteristics used for identifying Soil Series (Characteristics are of Series Control Section)

Soils of Granite gneiss landscape							
Sl.No	**Soil Series**	**Depth (cm)**	**Colour (moist)**	**Texture (control section)**	**Gravel (%) (control section)**	**Horizon sequence**	**Calcare-ousness**
1	Chikkasavanur(CSR)	25-50	7.5YR3/2,3/3,3/4	scl	<15	Ap-Bw-Cr	-
2	Lakkur(LKR)	50-75	2.5YR3/4,3/6,	sc	>35	Ap-Bt-Bc-Cr	-
3	Thammadahalli(TDH)	50-75	2.5YR2.5/4,3/6,	sc-c	-	Ap-Bt-Cr	-
4	Kutegoudana-hundi (KGH)	50-75	7.5YR3/42,3/33/4,	scl	15-35	Ap-Bt-Cr	-
5	Kethanapura(KTP)	50-75	2.5YR3/4,3/6	scl	15-35	Ap-Bt-Cr	-
6	Mukhadahalli (MKH)	50-75	5YR3/3,3/4,4/3,5/4,6/6 2.5YR3/4	scl	>35	Ap-Bt-Cr	-
7	Hooradhahalli(HDH)	75-100	2.5YR2.5/4,3/4,3/6	sc-c	>35	Ap-Bt-Cr	-
8	Gollarahatti (GHT)	75-100	2.5YR3/4,4/6	scl	15-35	Ap-Bt-Cr	-
9	Bhimanakunte(BMK)	75-100	5YR3/3,4/6	sc-c	15-35	Ap-Bt-Cr	-
10	Bidanagere (BDG)	75-100	5YR3/3,3/4,4/3,5/4, 2.5YR3/4	sc	35-60	Ap-Bt-Cr	-
11	Balapur(BPR)	100-150	2.5YR2.5/4,3/4	sc-c	>35	Ap-Bt-Cr	
12	Jedigere (JDG)	100-150	5YR4/6,3/4, 7.5YR3/4,4/6	sc-c	<15	Ap-Bt-BC-Cr	-
13	Ranathur (RTR)	>150	2.5YR2.5/3,2.5/4, 3/3,4/6	c	-	Ap-Bt	
Soils of Alluvial landscape							
14	Kyasalapura (KSP)	50-75	5YR3/2, 3/3,3/4	scl-sc	15-35	Ap-Bt-Ck	e-ev
15	Bedwatti(BWT)	75-100	10YR3/1,4/1,4/3	sc-c	>35	Ap-Bw-Ck	e-ev

3.4 Soil Mapping

The area under each soil series was further separated into 31 soil phases and their boundaries delineated on the cadastral map based on the variations observed in the texture of the surface soil, slope, erosion, presence of gravel, stoniness etc. A soil phase is a subdivision of soil series based mostly on surface features that affect its use and management. The soil mapping units are shown on the soil map (Fig. 3.5) in the form of symbols. During the survey about 21 profile pits, few minipits and a few auger bores representing different landforms occurring in the microwatershed were studied. In addition to the profile study, spot observations in the form of minipits, road cuts, terrace cuts etc., were studied to validate the soil boundaries on the soil map.

The soil map shows the geographic distribution of 31 mapping units representing 15 soil series occurring in the microwatershed. The soil map unit (soil legend) description is presented in Table 3.2. The soil phase map (management units) shows the distribution of 31 soil phases mapped in the microwatershed. Each mapping unit (soil phase) delineated on the map has similar soil and site characteristics. In other words, all the farms or survey numbers included in one soil phase will have similar management needs and have to be treated accordingly.

3.5 Laboratory Characterization

Soil samples were collected from representative master profiles for laboratory characterization by following the methods outlined in the Laboratory Manual (Sarma *et al*, 1987). Surface soil samples collected in the year 2016 from farmer's fields (83 samples) for fertility status (major and micronutrients) at 250 m grid interval were analyzed in the laboratory (Katyal and Rattan, 2003). By linking the soil fertility data to the survey numbers through GIS using Kriging method, soil fertility maps for the 11 elements including pH and EC were generated for the microwatershed.

3.6 Land Use Classes

The 31 soil phases identified and mapped in the microwatershed were grouped into six Land Use Classes (LUC's) for the purpose of preparing a Proposed Crop Plan for sustained development of the microwatershed. The database (soil phases) generated under LRI was utilized for identifying Land Use Classes (LUC's) based on the management needs. One or more than one soil site characteristic having influence on the management have been choosen for identification and delineation of LUCs. For Kadenhalli microwatershed, five soil and site characteristics, namely soil depth, soil texture, slope, erosion and gravel content have been considered for defining LUCs. The land use classes are expected to behave similarly for a given level of management.

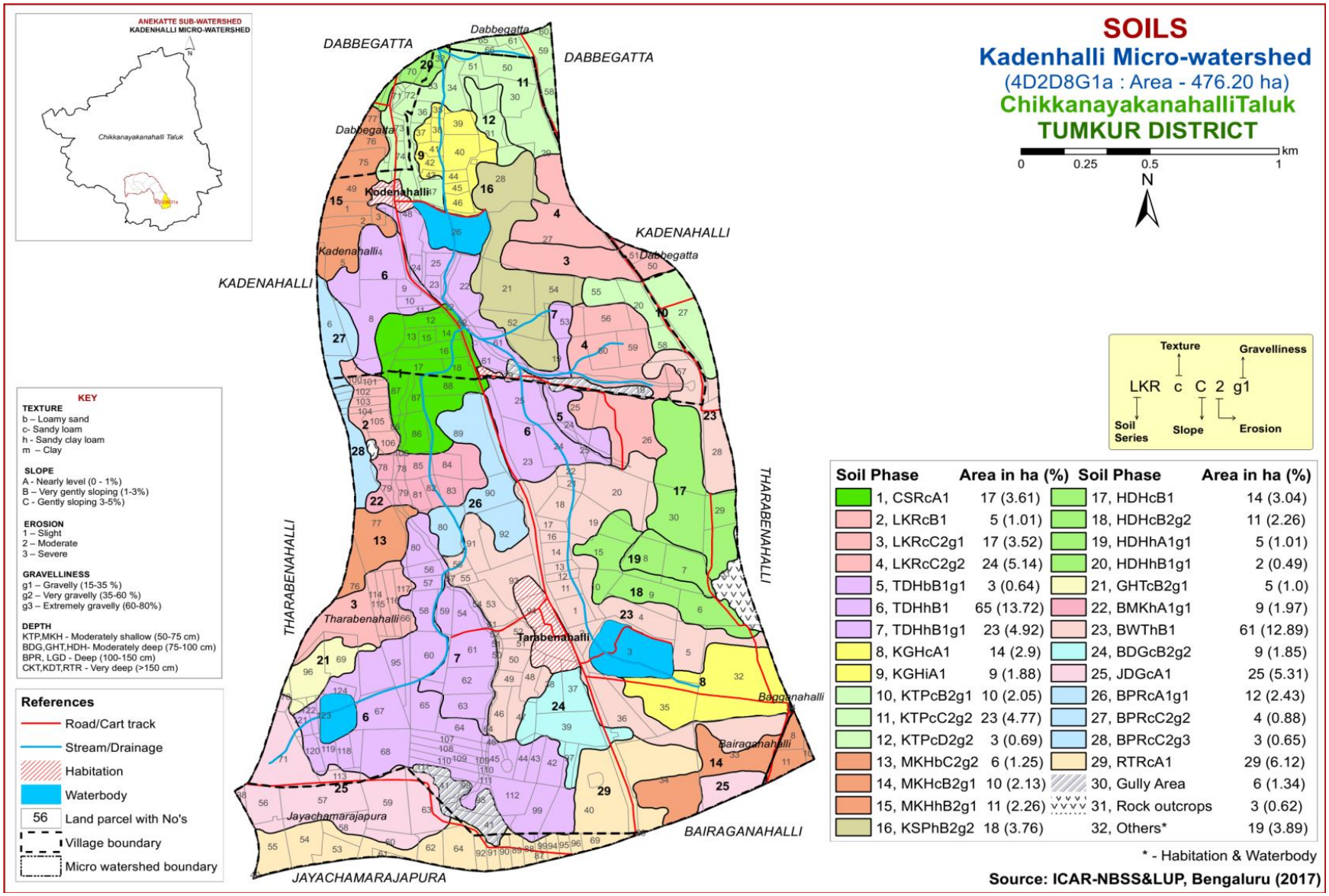


Fig 3.5 Soil Phase or Management Units - Kadenhalli Microwatershed

Table 3.2 Soil map unit description of Kadenhalli Microwatershed

SoilMap unit No	Soil Series	Soil Phase	Mapping Unit Description	Area in ha (%)
SOILS OF GRANITE GNEISS LANDSCAPE				
	CSR	Chikkasavanur soils are shallow (25-50 cm), well drained, have dark brown to light yellowish brown sandy clay loam soils occurring on nearly level uplands under cultivation		**17 (3.61)**
1		CSRcA1	Sandy loam surface, slope 0-1%, slight erosion	17 (3.61)
	LKR	Lakkur soils are moderately shallow (50-75 cm), well drained, have reddish brown to dark red gravelly sandy clay soils occurring on very gently to gently sloping uplands under cultivation		**46 (9.67)**
2		LKRcB1	Sandy loam surface, slope 1-3%, slight erosion	5 (1.01)
3		LKRcC2g1	Sandy loam surface, slope 3-5%, moderate erosion, gravelly (15-35%)	17 (3.52)
4		LKRcC2g2	Sandy loam surface, slope 3-5%, moderate erosion, very gravelly (35-60%)	24 (5.14)
	TDH	Thammadahalli soils are moderately shallow (50-75cm), well drained, have dark red to dark reddish brown sandy clay to clay soils occurring on very gently sloping uplands under cultivation		**91 (19.28)**
5		TDHbB1g1	Loamy sand surface, slope 1-3%, slight erosion, gravelly (15-35%)	3 (0.64)
6		TDHhB1	Sandy clay loam surface, slope 1-3%, slight erosion	65(13.72)
7		TDHhB1g1	Sandy clay loam surface, slope 1-3%, slight erosion, gravelly (15-35%)	23 (4.92)
	KGH	Kutegoudanahundi soils are moderately shallow (50-75 cm), well drained, have brown to dark brown gravelly sandy clay loam soils occurring on nearly level uplands under cultivation		**23 (4.78)**
8		KGHcA1	Sandy loam surface, slope 0-1%, slight erosion	14 (2.90)
9		KGHiA1	Sandy clay surface, slope 0-1%, slight erosion	9 (1.88)
	KTP	Kethanapura soils are moderately shallow (50-75 cm), well drained, have dark reddish brown gravelly sandy clay loam soils occurring on very gently sloping to moderately sloping uplands under cultivation		**36 (7.51)**
10		KTPcB2g1	Sandy loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)	10 (2.05)
11		KTPcC2g2	Sandy loam surface, slope 3-5%, moderate erosion, very gravelly (35-60%)	23 (4.77)
12		KTPcD2g2	Sandy loam surface, slope 5-10%, moderate erosion, very gravelly (35-60%)	3 (0.69)
	MKH	Mukhadahalli soils are moderately shallow (50-75cm), well drained, have dark brown to reddish brown gravelly sandy clay loam soils occurring on very gently sloping to gently sloping uplands under cultivation		**27 (5.64)**
13		MKHbC2g2	Loamy sand surface, slope 3-5%, moderate erosion, very gravelly (35-60%)	6 (1.25)
14		MKHcB2g1	Sandy loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)	10 (2.13)

15		MKHhB2g1	Sandy clay loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)	11 (2.26)
	HDH	Hooradhahalli soils are moderately deep (75-100 cm), well drained, have red to dark red and reddish brown gravelly sandy clay to clay soils occurring on near level to very gently sloping uplands under cultivation		**32 (6.8)**
17		HDHcB1	Sandy loam surface, slope 1-3%, slight erosion	14 (3.04)
18		HDHcB2g2	Sandy loam surface, slope 1-3%, moderate erosion, very gravelly (35-60%)	11 (2.26)
19		HDHhA1g1	Sandy clay loam surface, slope 0-1%, slight erosion, gravelly (15-35%)	5 (1.01)
20		HDHhB1g1	Sandy clay loam surface, slope 1-3%, slight erosion, gravelly (15-35%)	2 (0.49)
	GHT	Gollarahatti soils are moderately deep (75-100 cm), well drained, have dark reddish brown to dark red gravelly sandy clay loam soils occurring on very gently sloping uplands under cultivation		**5 (1.00)**
21		GHTcB2g1	Sandy loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)	5 (1.00)
	BMK	Bhimanakunte soils are moderately deep (75-100 cm), well drained, have yellowish red to dark reddish brown gravelly sandy clay to clay soils occurring on nearly level uplands under cultivation		**9 (1.97)**
22		BMKhA1g1	Sandy clay loam surface, slope 0-1%, slight erosion, gravelly (15-35%)	9 (1.97)
	BDG	Bidanagere soils are moderately deep (75-100 cm), well drained, have dark reddish brown gravelly sandy clay soils occurring on very gently sloping uplands under cultivation		**9 (1.85)**
24		BDGcB2g2	Sandy loam surface, slope 1-3%, moderate erosion, very gravelly (35-60%)	9 (1.85)
	JDG	Jedigere soils are deep (100-150 cm), well drained, have dark brown to dark reddish brown sandy clay to clay soils occurring on nearly level uplands under cultivation		**25 (5.31)**
25		JDGcA1	Sandy loam surface, slope 0-1%, slight erosion	25 (5.31)
	BPR	Balapur soils are deep (100-150 cm), well drained, have dark reddish brown to dark red gravelly sandy clay to clay soils occurring on nearly level to gently sloping uplands under cultivation		**19 (3.96)**
26		BPRcA1g1	Sandy loam surface, slope 0-1%, slight erosion, gravelly (15-35%)	12 (2.43)
27		BPRcC2g2	Sandy loam surface, slope 3-5%, moderate erosion, very gravelly (35-60%)	4 (0.88)
28		BPRcC2g3	Sandy loam surface, slope 3-5%, moderate erosion, extremely gravelly (60-80%)	3 (0.65)
	RTR	Ranatur soils are very deep (>150 cm), well drained, have dark reddish brown to dark red clay soils occurring on very gently sloping uplands under cultivation		**29 (6.12)**
29		RTRhcA1	Sandy loam surface, slope 0-1%, slight erosion	29 (6.12)

SOILS OF ALLUVIAL LANDSCAPE				
	KSP	Kyasalapura soils are moderately shallow (50-75cm), well drained, have dark reddish brown calcareous gravelly sandy clay loam to sandy clay soils occurring on very gently sloping uplands under cultivation		**18 (3.76)**
16		KSPhB2g2	Sandy clay loam surface, slope 1-3%, moderate erosion, very gravelly (35-60%)	18 (3.76)
	BWT	Bedwatti soils are moderately deep (75-100 cm), well drained, have dark gray to very dark gray calcareous gravelly sandy clay to clay soils occurring on very gently sloping uplands under cultivation		**61 (12.89)**
23		BWThB1	Sandy clay loam surface, slope 1-3%, slight erosion	61(12.89)
30		Gullied Area	Cut up shallow and deep gullied land	**6(1.34)**
31		Rock outcrops	Rocky lands, both massive and bouldery	**3 (0.62)**
32		Others		**19 (3.89)**

Chapter 4

THE SOILS

Detailed information pertaining to the nature, extent and their distribution of different kinds of soils occurring in Kadenhalli microwatershed is provided in this chapter. The microwatershed area has been identified as granite gneiss and alluvial landscapes based on geology. In all, 15 soil series are identified. Soil formation is the result of the combined effect of environmental and terrain factors that are reflected in soil morphology. In the granite gneiss and alluvial landscapes, it is by parent material, relief and climate. A brief description of each of the 15 soil series identified and mapped as soil phases is furnished below. The soil phases identified and mapped under each soil series are described and given in Table 3.2. The soils in any one map unit differ from place to place in their depth, texture, slope, gravelliness, erosion or any other site characteristics that affect management. The soil phase map can be used for identifying the suitability of areas for growing specific crops or for other alternative uses and also for deciding the type of conservation structures needed. The detailed information on soil and site-characteristics like soil depth, surface soil texture, slope, erosion, gravelliness, AWC, LCC etc, with respect to each of the soil phase identified is given village/survey number wise for the microwatershed in Appendix-I.

4.1 Soils of granite gneiss landscape

In this landscape, 13 soil series are identified and mapped as soil phases. Thammadahalli series occupies maximum area of about 91 ha (19%) followed by Lakkur 49 ha (10%). Brief description of each series identified and mapped is given below.

4.1.1 Chikkasavanur (CSR) Series: Chikkasavanur soils are shallow (25-50 cm), well drained, have dark brown to light yellowish brown sandy clay loam soils. They have developed from granite gneiss and occur on nearly level uplands. The Chikkasavanur series has been tentatively classified as a member of the fine-loamy, mixed, isohyperthermic family of Typic Haplustepts.

The thickness of the solum ranges from 32 to 49 cm. The thickness of A horizon ranges from 12 to 23 cm. Its colour is in 7.5 YR and 10 YR hue with value 2.5 to 4 and chroma 3 to 6. The texture varies from sandy loam to clay with 10 to 20 per cent gravel. The thickness of B horizon ranges from 16 to 32 cm. Its colour is in 7.5 YR and 5 YR hue with value 3 and chroma 2 to 4. Its texture is sandy clay loam with gravel content of < 15 per cent. The available water capacity is low (51-100 mm/m). Only one phase is identified and mapped.

Landscape and soil profile characteristics of Chikkasavanur (CSR) Series

4.1.2 Lakkur (LKR) Series: Lakkur soils are moderately shallow (50-75cm), well drained, have reddish brown to dark red gravelly sandy clay red soils. They have developed from granite gneiss and occur on very gently to gently sloping uplands. The Lakkur series has been classified as a member of the clayey-skeletal, mixed, isohyperthermic family of Typic Rhodustalfs.

The thickness of the solum ranges from 51 to 74 cm. The thickness of A horizon ranges from 12 to 18 cm. Its colour is in 5YR and 2.5 YR hue with value 3 to 4 and chroma 4 to 6. The texture varies from loamy sand to sandy clay loam with 15 to 50 per cent gravel. The thickness of B horizon ranges from 39 to 58 cm. Its colour is in 2.5 YR hue with value 3 to 4 and chroma 4 to 6. Texture varies from sandy clay loam to sandy clay with 40 to 60 per cent gravel. The available water capacity is low (51-100 mm/m). Three phases were identified and mapped.


Landscape and soil profile characteristics of Lakkur (LKR) Series

4.1.3 Thammadahalli (TDH) Series: Thammadahalli soils are moderately shallow (50-75cm), well drained, have brown to very dark brown and dark reddish brown sandy clay to clay soils. They have developed from granite gneiss and occur on very gently sloping

uplands. The Thammadahalli series has been classified as a member of the fine, mixed, isohyperthermic family of Rhodic Paleustalfs.

The thickness of the solum ranges from 54 to 75 cm. The thickness of A horizon ranges from 11 to 19 cm. Its colour is in 7.5 YR, 5YR and 2.5 YR hue with value 2.5 to 4 and chroma 2 to 6. The texture varies from sandy clay loam to clay with 10 to 20 per cent gravel. The thickness of B horizon ranges from 43 to 60 cm. Its colour is in 2.5 YR hue with value 3 and chroma 4 to 6. Its texture is sandy clay to clay. The available water capacity is medium (101-150 mm/m). Three phases were identified and mapped.

Landscape and soil profile characteristics of Thammadahalli (TDH) Series

4.1.4 Kutegoudanahalli (KGH) Series: Kutegoudanahundi soils are moderatly shallow (50-75 cm), well drained, have brown to dark brown loamy sand to sandy clay loam soils. They have developed from granite gneiss and occur on nearly level uplands. The Kutegoudanahundi series has been tentatively classified as a member of the fine-loamy, mixed, isohyperthermic family of Typic Haplustalfs.

Landscape and soil profile characteristics of Kutegoudanahundi (KGH) Series

The thickness of the solum ranges from 50 to 74 cm. The thickness of A horizon ranges from 12 to 22 cm. Its colour is in 7.5 YR and 10 YR hue with value and chroma 3 to 4. The texture varies from loamy sand to sandy loam with 15 to 30 per cent gravel. The thickness of B horizon ranges from 40 to 62 cm. Its colour is in 7.5 YR hue with value

and chroma 3 to 4. Its texture is sandy clay loam with gravel content of 15 to 35 per cent. The available water capacity is medium (101-150 mm/m). Two phases were identified and mapped.

4.1.5 Kethanapura (KTP) Series: Kethanapura soils are moderately shallow (50-75cm), well drained, have dark reddish brown gravelly sandy clay loam soils. They are developed from weathered granite gneiss and occur on gently sloping uplands. The Kethanapura series has been tentatively classified as a member of the fine-loamy, mixed, isohyperthermic family of Typic Rhodustalfs.

The thickness of the solum ranges from 53 to 72 cm. The thickness of A-horizon ranges from 11 to 16 cm. Its colour is in 5YR and 2.5 YR hue with value 3 to 4 and chroma 3 to 6. The texture varies from loamy sand to sandy clay loam with 15 to 40 per cent gravel. The thickness of B-horizon varies from 41 to 56 cm. Its colour is in 2.5 YR hue with value 3 to 4 and chroma 4 to 6. Texture is dominantly sandy clay loam with 15 to 35 per cent gravel. The available water capacity is medium (101-150 mm/m). Three phases were identified and mapped.

Landscape and soil profile characteristics of Kethanapura (KTP) Series

4.1.6 Mukhadahalli (MKH) Series: Mukhadahalli soils are moderately shallow (50-75 cm), well drained, have dark brown to reddish brown gravelly sandy clay loam soils. They are developed from weathered granite gneiss and occur on gently sloping uplands. The Mukhadahalli series has been tentatively classified as a member of the loamy-skeletal, mixed, isohyperthermic family of Typic Haplustalfs.

The thickness of the solum ranges from 51 to 72 cm. The thickness of A horizon ranges from 12 to 17 cm. Its colour is in 5 YR and 7.5 YR hue with value 3 to 4 and chroma 2 to 4. The texture varies from loamy sand to sandy loam with 20 to 45 per cent gravel. The thickness of B horizon ranges from 40 to 68 cm. Its colour is in 2.5 YR and 5 YR hue with value and chroma 3 to 6. Texture is sandy clay loam with 35 to 50 per cent gravel. The available water capacity is low (51-100 mm/m). Three phases were identified and mapped.

Landscape and soil profile characteristics of Mukhadahalli (MKH) Series

4.1.7 Hooradhahalli (HDH) Series: Hooradhahalli soils are moderately deep (75-100 cm), well drained, have red to dark red and reddish brown gravelly sandy clay to clay soils. They are developed from weathered granite gneiss and occur on very gently sloping uplands.The Hooradhahalli series has been tentatively classified as a member of the loamy-skeletal, mixed, isohyperthermic family of Typic Rhodustalfs.

The thickness of the solum ranges from 76 to 100 cm. The thickness of A horizon ranges from 11 to 19 cm. Its colour is in 5 YR and 2.5 YR hue with value 3 to 4 and chroma 3 to 6. The texture varies from loamy sand to sandy clay with 15 to 50 per cent gravel. The thickness of B horizon varies from 65 to 83 cm. Its colour is in 2.5 YR hue with value 2.5 to 3 and chroma 4 to 6. Texture is sandy clay loam to clay with 35 to 50 per cent gravel. The available water capacity is low (51-100mm/m). Four phases were identified and mapped.

Landscape and soil profile characteristics of Hooradhahalli (HDH) Series

4.1.8 Gollarahatti (GHT) Series: Gollarahatti soils are moderately deep (75-100 cm), well drained, have dark reddish brown to dark red sandy clay loam soils. They are developed from weathered granite gneiss and occur on very gently sloping uplands. The Gollarahatti series has been tentatively classified as a member of the fine-loamy, mixed, isohyperthermic family of Typic Haplustalfs.

The thickness of the solum ranges from 78 to 98 cm. The thickness of A-horizon ranges from 12 to 18 cm. Its colour is in 5 YR and 2.5 YR hue with value 3 to 4 and chroma 4 to 6. Texture varies from loamy sand to sandy clay with 15 to 35 per cent gravel. The thickness of B horizon ranges from 66 to 81cm. Its colour is in 2.5 YR hue with value 3 to 4 and chroma 4 to 6. Texture is sandy clay loam with 15 to 35 per cent gravel. The available water capacity is medium (101-150 mm/m). Only one phase was identified and mapped.

Landscape and soil profile characteristics of Gollarahatti (GHT) Series

4.1.9 Bhimanakunte (BMK) Series: Bhimanakunte soils are moderately deep (75-100 cm), well drained, have very dark reddish brown to yellowish red gravelly sandy clay to clay soils. They have developed from weathered granite gneiss and occur on nearly level uplands under cultivation.

The thickness of the solum ranges from 75 to 99 cm. The thickness of A-horizon ranges from 15 to 18 cm. Its colour is in 5 YR hue with value 3 to 4 and chroma 2 to 4. The texture is sandy clay loam to clay. The thickness of B-horizon ranges from 57 to 82 cm. Its colour is in 2.5 YR, 5 YR and 7.5 YR hue with value and chroma ranging from 3 to 4. Its texture is sandy clay to clay soil with 15 to 35 per cent gravel. The available water capacity is low (51-100 mm/m). Only one phase was identified and mapped.

Landscape and soil profile characteristics of Bhimanakunte (BMK) Series.

4.1.10 Bidanagere (BDG) Series: Bidanagere soils are moderately deep (75-100 cm), well drained, have dark reddish brown gravelly sandy clay soils. They have developed from weathered granite gneiss and occur on very gently sloping uplands. The Bidanagere series has been classified as member of the clayey-skeletal, mixed, isohyperthermic family of Rhodic Paleustalfs.

The thickness of the solum ranges from 78 to 99 cm. The thickness of A-horizon ranges from 12 to 19 cm. Its colour is in 2.5 YR and 5 YR hue with value 2 to 3 and chroma 3 to 4. The texture varies from sandy clay loam to sandy clay with 10 to 20 per cent gravel. The thickness of B-horizon ranges from 68 to 85 cm. Its colour is in 2.5 YR hue with value 3 to 5 and chroma 3 to 4. Its texture is gravelly sandy clay with gravel content of 35-60 per cent. The available water capacity is very low (<50 mm/m). Only one phase was identified and mapped.

Landscape Soil Profile Characteristics of Bidanagere (BDG) Series

4.1.11 Jedigere (JDG) Series: Jedigere soils are deep (100-150 cm) well drained, have yellowish red to strong brown soils. They have developed from granite gneiss and occur on nearly level uplands under cultivation.

The thickness of the solum ranges from 117 to 145 cm. The thickness of A horizon ranges from 13 to 21 cm. Its colour is in hue 5 YR and 7.5 YR with value 2 to 4 and chroma 2 to 6. Its texture is dominantly sandy clay and sand clay loam. The thickness of B horizon ranges from 104 to 124 cm. Its colour is in hue 10 YR and 7.5 YR with value 2 to 4 and chroma 3 to 6. Its texture varies from sandy clay to clay. The available water capacity is very high (>200mm/m). Only one phase was identified and mapped.

Landscape and Soil Profile Characteristics of Jedigere (JDG) Series

4.1.12 Balapur (BPR) Series: Balapur soils are deep (100-150 cm), well drained, have dark reddish brown to dark red gravelly sandy clay to clay soils. They are developed from weathered granite gneiss and occur on very gently sloping uplands. Balapur series has been tentatively classified as a member of the clayey-skeletal, mixed, isohyperthermic family of Typic Rhodustalfs.

The thickness of the solum ranges from 102 to 147 cm. The thickness of A horizon ranges from 12 to 17 cm. Its colour is in 5 YR and 2.5 YR hue with value and chroma 3 to 4. The texture ranges from loamy sand to sandy clay with 15 to 50 per cent gravel. The thickness of B horizon ranges from 90 to 132 cm. Its colour is in 2.5 YR hue with value 2.5 to 3 and chroma 4 to 6. Texture is sandy clay to clay with 35 to 50 per cent gravel. The available water capacity is low (51-100 mm/m). Three phases were identified and mapped.

Landscape Soil Profile Characteristics of Balapur (BPR) Series

4.1.13 Ranatur (RTR) Series: Ranatur soils are very deep (> 150 cm), well drained, have dark reddish brown to dark red clayey soils. They have developed from granite

gneiss and occur on very gently sloping uplands. The Ranatur series has been tentatively classified as a member of the fine, mixed, isohyperthermic family of Rhodic Paleustalfs.

The thickness of the solum is more than 150 cm. The thickness of A horizon ranges from 8 to 14 cm. Its colour is in 5 YR and 2.5 YR hue with value 2.5 to 4 and chroma 3 to 6. The texture varies from sandy loam to sand clay. The thickness of B horizon is more than 150 cm. Its colour is in 2.5 YR hue with value 2.5 to 3 and chroma 3 to 6. Its texture is clay. The available water capacity is high (150-200 mm/m). Only one phase was identified and mapped.

Landscape and soil profile characteristics of Ranatur (RTR) Series

4.2 Soils of Alluvial Landscape

In this landscape, two soil series was identified and mapped. Bedwatti series occupies maximum area of about 61 ha (13%) followed by Kyasalapura 18 ha (4%). The brief description of soil series along with the soil phases identified and mapped is given below.

4.2.1 Kyasalapura (KSP) Series: Kyasalapura soils are moderately shallow (50-75cm), well drained, have dark reddish brown gravelly calcareous sandy clay loam to sandy clay soils. They are developed from weathered granite gneiss and occur on very gently sloping uplands under cultivation.

The thickness of the solum ranges from 53 to 75 cm. The thickness of A-horizon ranges from 17 to 23 cm. Its colour is in 2.5YR, 5 YR and 7.5 YR hue with value 3 to 5 and chroma 2 to 4. The texture varies from sandy clay loam to sand clay with 15 to 30 per cent gravel. The thickness of B-horizon varies from 33 to 55 cm. Its colour is in 2.5 YR and 5 YR hue with value 3 and chroma 2 to 4. Texture is sandy clay loam to sandy clay with 15 to 35 per cent gravel. The available water capacity is very low (<50mm/m). Only one phase was identified and mapped.

Landscape and soil profile characteristics of Kyasalapura (KSP) Series.

4.2.2 Bedwatti (BWT) Series: Bedwatti soils are moderately deep (75-100 cm), moderately well drained, have very dark gray to dark brown gravelly, calcareous sandy clay to clay soils. They have developed from weathered granite gneiss and occur on very gently sloping uplands under cultivation.

The thickness of the solum ranges from 75 to 96 cm. The thickness of A-horizon ranges from 11 to 20 cm. Its colour is in 7.5 YR and 10 YR hue with value 3 to 4 and chroma 1 to 3. The texture is sandy clay loam to clay. The thickness of B-horizon ranges from 56 to 76 cm. Its colour is in 7.5 YR and 10 YR hue with value and chroma ranging from 3 to 4. Its texture is sandy clay to clay soil with 50 to 60 per cent gravel. The available water capacity is low (51-100 mm/m). Only one phase was identified and mapped.

Landscape and soil profile characteristics of Bedwatti (BWT) Series.

Table 4.1 Physical and chemical characteristics of soil series identified in Kadenhalli microwatershed

Soil Series: Lakkur (LKR), Pedon: RM-8.

Location: $15^0$04'26.3"N, $75^0$37'84.1"E, (4D4A3I1f), Belhatti village, Shirahatti taluk, Gadag distrtict

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Clayey-skeletal, mixed, isohyperthermic Typic Rhodustalfs

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-21	Ap	74.00	8.34	17.66	9.62	11.57	15.76	23.13	13.92	-	sl	-	-
21-35	Bt	54.37	10.48	35.14	16.33	8.64	9.69	11.59	8.11	-	sc	-	-
35-56	Bc	48.37	13.46	38.17	10.96	7.69	9.17	11.28	9.27	-	sc	-	-

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-21	8.18	-	-	0.30	0.56	0.94	-	-	0.31	0.55	0.86	12.19	0.69	100.00	4.51
21-35	8.17	-	-	0.30	0.52	1.29	-	-	0.19	0.84	1.03	22.18	0.63	100.00	3.79
35-56	7.95	-	-	0.46	0.48	1.99	-	-	0.24	0.58	0.82	22.94	0.60	100.00	2.53

Contd...

Soil Series: Thammadahalli (TDH), Pedon-TR_1/1

Location: $15^0$03'41.7"N, $75^0$36'65.2"E, (4D4A3G2d), Nilogal village, Shirahatti taluk, Gadag district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Fine, Mixed, isohyperthermic Rhodic Paleustalfs

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-25	Ap	85.71	7.34	6.94	14.79	13.28	16.10	24.75	16.80	-	ls	-	-
25-65	Bt	47.76	7.96	44.28	15.30	9.78	6.24	7.91	8.53	-	sc	-	-

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-25	9.19	-	-	0.18	0.35	1.29	-	-	0.08	0.52	0.60	3.57	0.51	100.00	14.57
25-65	8.00	-	-	0.17	0.35	0.58	-	-	0.15	1.31	1.46	13.87	0.31	100.00	9.44

Contd...

Series Name: Mukahadahalli (MKH), Pedon: R-11

Location: $15^0$22'05.4"N, $76^0$04'10.3"E, Halageri village, Chikkanayakanahalli taluk and Tumkur district

Analysis at: NBSS&LUP, Regional Centre, Bangalore. **Classification:** Clayey-skeletal, mixed, isohyperthermic Typic Haplustalfs

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-19	Ap	65.71	8.83	25.46	9.27	9.06	14.42	21.52	11.43	70	scl	16.54	8.60
19-32	Bt	55.89	11.13	32.98	6.47	9.18	11.89	19.19	9.18	50	scl	19.24	12.78
32-58	Bt	47.95	10.41	41.63	17.52	3.78	9.13	9.55	7.97	50	sc	24.03	16.02

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-19	7.38	-	-	0.09	0.2	-	8.97	4.32	0.26	0.22	13.77	14.84	0.58	93	1.49
19-32	7.5	-	-	0.106	0.41	-	15.98	3.27	0.16	0.50	19.91	20.88	0.63	95	2.38
32-58	7.46	-	-	0.173	0.49	-	19.71	4.53	0.23	1.32	25.79	25.76	0.62	100	5.11

Contd...

Series Name: Hooradhahalli (HDH), Pedon: RM-10

Location: $15^0$22'13"N, $76^0$18'36"E, Kerehalli village, Chikkanayakanahalli taluk and Tumkur district

Analysis at: NBSS&LUP, Regional Centre, Bangalore. **Classification:** Clayey-skeletal, mixed, isohyperthermic Rhodic Paleustalfs

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-20	Ap	78.62	6.53	14.85	16.63	19.11	15.91	16.74	10.23	10	sl	8.95	5.15
20-30	Bt1	41.23	6.49	52.27	16.88	7.58	5.74	6.06	4.98	30	c	21.79	17.23
30-50	Bt2	39.62	8.61	51.77	17.90	7.84	4.98	4.98	3.92	50	c	23.49	17.84
50-80	Bt3	47.38	8.02	44.60	24.95	8.60	5.24	4.72	3.88	50	sc	22.13	15.62

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-20	7.55	-	-	0.152	0.97	2.52	4.64	3.02	0.20	0.03	7.90	7.59	0.51	104	0.44
20-30	8.59	-	-	0.219	0.54	3.24	12.47	5.21	0.14	1.36	19.18	17.93	0.34	107	7.57
30-50	8.47	-	-	0.309	0.62	3.48	12.14	4.90	0.16	1.77	18.96	20.90	0.40	91	8.46
50-80	8.4	-	-	0.322	0.38	3.12	10.22	3.97	0.15	1.82	16.16	16.50	0.37	98	11.06

Contd...

Soil Series: Gollarahatti (GHT), Pedon: RM-2

Location: $50^0$04'88.8"N, $75^0$37'65.2"E, (4D4A3I1f), Belhatti village, Chikkanayakanahalli taluk and Tumkur district.

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Fine-loamy, mixed, isohyperthermic Typic Rhodustalfs

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-26	Ap	83.22	5.74	11.05	9.71	11.73	16.68	27.10	16.58	-	ls	-	-
26-63	Bt1	55.91	13.36	30.73	13.05	9.66	11.10	14.29	7.81	-	scl	-	-
63-84	Bt2	57.17	11.38	31.45	10.53	10.11	12.28	13.83	10.42	-	scl	-	-

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-26	5.70	-	-	0.06	0.20	0.00	1.50	0.60	0.09	0.13	2.32	3.17	0.29	73.00	4.10
26-63	6.26	-	-	0.04	0.24	0.00	7.35	1.55	0.09	0.17	9.15	9.89	0.32	93.00	1.72
63-84	6.50	-	-	0.05	0.20	0.47	-	-	0.09	0.21	0.30	10.18	0.32	100.00	2.06

Contd...

Series: Bidanagere (BDG), Pedon: RM-3

Location: $13^0$22'11"N, $76^0$38'03"E, (4D3D8G1a), Tharabenahalli village, Chikkanayakanahalli taluk, Tumkur district.

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Clayey-skeletal, mixed, isohyperthermic Rhodic, Paleustalfs

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-20	Ap	81.19	11.25	7.56	12.54	15.07	17.90	21.94	13.75	50	ls	-	-
20-35	Bt1	57.45	11.45	31.10	12.76	11.02	10.92	12.45	10.31	50	scl	-	-
35-92	Bt2	44.63	7.85	47.52	12.40	9.61	8.37	7.75	6.51	60	c	-	-

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-20	6.24	-	-	0.06	0.60	0.00	1.61	0.26	0.10	0.01	1.98	3.76	0.50	52.56	0.35
20-35	5.99	-	-	0.02	0.40	0.00	4.25	0.46	0.08	0.28	5.07	8.02	0.26	63.18	3.46
35-92	6.70	-	-	0.03	0.20	0.00	5.45	0.31	0.10	0.22	6.09	9.90	0.21	61.48	2.24

Contd...

Soil Series: Balapur (BPR), Pedon: RM-78

Location: $13^0$26'39"N, $76^0$35'03"E, (4D3D8G2c), Kasaba, Chikkanayakanahalli taluk and Tumkur district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Clayey-skeletal, mixed, isohyperthermic, Typic Rhodustalfs

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-12	Ap	65.66	18.66	15.68	4.14	6.16	13.33	21.82	20.20	-	sl	-	-
12-34	Bt1	61.91	11.52	26.57	2.36	6.78	12.53	21.36	18.89	-	scl	-	-
34-60	Bt2	51.81	11.24	36.94	4.66	5.70	12.23	15.96	13.26	30	sc	-	-
60-84	Bt3	46.61	9.02	44.37	14.70	6.88	7.51	8.97	8.55	55	sc	-	-
84-112	Bt4	48.75	12.92	38.33	15.73	8.13	6.87	8.23	9.79	60	sc	-	-
112-127	Bc	50.98	24.74	24.28	5.25	4.63	5.15	10.92	25.03	50	scl	-	-

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-12	6.64	-	-	0.03	0.56	0.00	1.90	1.32	0.21	0.03	3.46	5.45	0.35	63.48	0.51
12-34	6.99	-	-	0.02	0.48	0.00	3.66	1.90	0.07	0.08	5.70	7.82	0.29	72.93	0.96
34-60	7.29	-	-	0.02	0.40	0.00	5.13	2.08	0.11	0.20	7.52	11.19	0.30	67.18	1.75
60-84	7.50	-	-	0.02	0.32	0.00	5.83	6.36	0.13	0.23	12.55	12.38	0.28	101.43	1.83
84-112	7.54	-	-	0.02	0.24	0.00	6.02	6.59	0.11	0.25	12.96	12.77	0.33	101.49	1.97
112-127	7.90	-	-	0.02	0.20	0.00	8.04	3.62	0.07	0.32	12.04	12.47	0.51	96.56	2.55

Contd...

Soil Series: Ranatur (RTR), Pedon: RM-87

Location: $13^0$21'49.0"N, $76^0$38'06"E, (4B3D4L2a), J C Pura village, Chikkanayakanahalli taluk, Tumkur district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Fine, mixed, isohyperthermic Rhodic Paleustalfs

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-17	Ap	84.16	9.46	6.38	2.22	18.57	26.14	24.32	12.92	-	ls	-	-
17-47	Bt1	51.14	8.30	40.56	1.66	13.49	14.52	13.59	7.88	-	sc	-	-
47-89	Bt2	51.99	11.01	37.00	1.94	13.99	15.32	13.18	7.56	-	sc	-	-
89-123	Bt3	51.58	9.07	39.35	3.47	14.50	14.61	11.64	7.35	-	sc	-	-
123-152	Bt4	47.89	8.88	43.23	2.27	12.36	14.21	11.12	7.93	-	sc	-	-
152-198	Bt5	43.37	13.17	43.45	2.48	9.83	13.25	10.87	6.94	-	c	-	-

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-17	5.08	-	-	0.03	0.52	0.00	3.68	0.72	0.06	0.19	4.65	9.21	1.44	50.50	2.06
17-47	6.28	-	-	0.03	0.48	0.00	3.93	0.72	0.08	0.07	4.80	7.92	0.20	60.59	0.94
47-89	6.42	-	-	0.03	0.40	0.00	4.40	0.74	0.08	0.06	5.28	7.52	0.20	70.15	0.79
89-123	6.50	-	-	0.02	0.32	0.00	4.44	0.76	0.09	0.07	5.36	7.82	0.20	68.58	0.93
123-152	6.52	-	-	0.02	0.28	0.00	4.40	0.71	0.09	0.07	5.26	8.22	0.19	64.00	0.81
152-198	7.09	-	-	0.02	0.24	0.00	6.10	0.98	0.10	0.20	7.38	9.60	0.22	76.89	2.09

Chapter 5

INTERPRETATION FOR LAND RESOURCE MANAGEMENT

The most important soil and site characteristics that affect the land use and conservation needs of an area are land capability, soil depth, soil texture, coarse fragments, available water capacity, soil slope, soil erosion, soil reaction etc. These are interpreted from the data base generated through land resource inventory and several interpretative and thematic maps are generated. These would help in identifying the areas suitable for growing crops and, soil and water conservation measures and structures needed thus helping to maintain good soil health for sustained crop production. The various interpretative and thematic maps generated are described below.

5.1 Land Capability Classification

Land capability classification is an interpretative grouping of soil map units (soil phases) mainly based on inherent soil characteristics, external land features and environmental factors that limit the use of land for agriculture, pasture, forestry, or other uses on a sustained basis (IARI, 1971). The land and soil characteristics used to group the land resources in an area into various land capability classes, subclasses and units are

Soil characteristics: Depth, texture, gravel content, calcareousness

Land characteristics: Slope, erosion, drainage, rock outcrops.

Climate: Total rainfall and its distribution, and length of crop growing period.

The Land capability classification system is divided into land capability classes, subclasses and units based on the level of information available. Eight land capability classes are recognized. They are

Class I: They are very good lands that have no limitations or very few limitations that restrict their use.

Class II: They are good lands that have minor limitations and require moderate conservation practices.

Class III: They are moderately good lands that have moderate limitations that reduce the choice of crops or that require special conservation practices.

Class IV: They are fairly good lands that have very severe limitations that reduce the choice of crops or that require very careful management.

Class V: Soils in these lands are not likely to erode, but have other limitations like wetness that are impractical to remove and as such not suitable for agriculture, but suitable for pasture or forestry with minor limitations.

Class VI: The lands have severe limitations that make them generally unsuitable for cultivation, but suitable for pasture or forestry with moderate limitations.

Class VII: The lands have very severe limitations that make them unsuitable for cultivation, but suitable for pasture or forestry with major limitations.

Class VIII: Soil and other miscellaneous areas (rock lands) that have very severe limitations that nearly preclude their use for any crop production, but suitable for wildlife, recreation and installation of wind mills.

The land capability subclasses are recognised based on the dominant limitations observed within a given land capability class. The subclasses are designated by adding a lower case letter like 'e', 'w', 's', or 'c' to the class numeral. The subclass "e" indicates that the main hazard is risk of erosion, "w" indicates drainage or wetness as a limitation for plant growth, "s" indicates shallow soil depth, coarse or heavy textures, calcareousness, salinity/alkali or gravelliness and "c" indicates limitation due to climate.

The land capability subclasses have been further subdivided into land capability units based on the kinds of limitations present in each subclass. Ten land capability units are used in grouping the soil map units. They are stony or rocky (0), erosion hazard (slope, erosion) (1), coarse texture (sand, loamy sand, sandy loam) (2), fine texture (cracking clay, silty clay) (3), slowly permeable subsoil (4), coarse underlying material (5), salinity/alkali (6), stagnation, overflow, high ground water table (7), soil depth (8) and fertility problems (9). The capability units thus identified have similar soil and land characteristics that respond similarly to a given level of management. The soils of the microwatershed have been classified upto land capability subclass level.

The 31 soil map units identified in the Kadenhalli microwatershed are grouped under 5 land capability classes and 7 subclasses. About 94 per cent area in the microwatershed is suitable for agriculture and 2 per cent is not suitable for agriculture (Fig. 5.1).

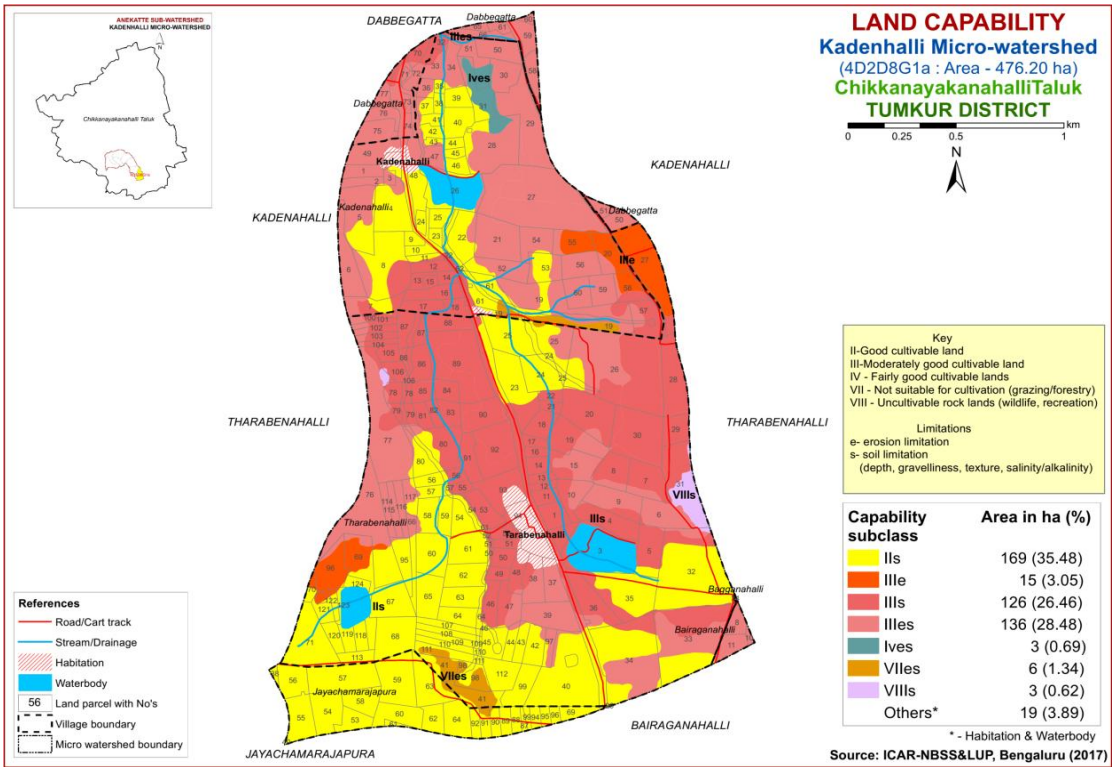


Fig. 5.1 Land Capability map of Kadenhalli Microwatershed

Good cultivable lands (Class II) cover an area of about 35 per cent and are distributed in the southern, southwestern, central, southeastern and northern part of the microwatershed with minor problems of soil. Moderately good cultivable lands (Class III) cover an area of about 58 per cent and are distributed in all parts of the microwatershed with moderate problems of soil and erosion. Fairly good cultivable lands (Class IV) cover an area of about 1 per cent and are distributed in the northern part of the microwatershed with moderate problems of soil and erosion. Lands not suitable for agriculture (Class VII and VIII) cover an area of about 2 per cent and are distributed in the southern and southeastern part of the microwatershed with severe limitations of soil and erosion.

5.2 Soil Depth

Soil depth refers to the depth of the soil occurring above the parent material or hard rock. The depth of the soil determines the effective rooting depth for plants and in accordance with soil texture, mineralogy and gravel content, the capacity of the soil column to hold water and nutrient availability. Soil depth is one of the most important soil characteristic that is used in differentiating soils into different soil series. The soil depth classes used in identifying soils in the field are very shallow (<25 cm), shallow (25-50 cm), moderately shallow (50-75 cm), moderately deep (75-100 cm), deep (100-150 cm) and very deep (>150 cm). They were used to classify the soils into different depth classes and a soil depth map was generated. The area extent and their geographical distribution in the microwatershed is given in Fig. 5.2.

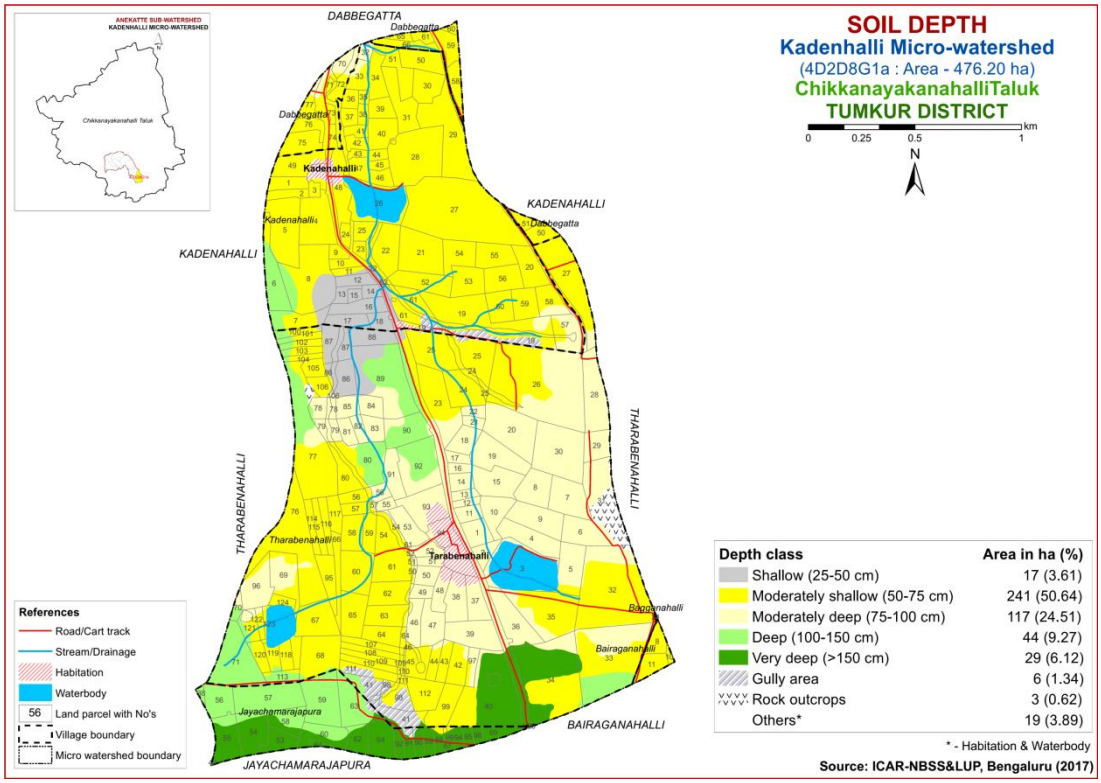


Fig. 5.2 Soil Depth map of Kadenhalli Microwatershed

Moderately deep (75-100 cm) soils occupy an area of about 117 ha (24%) and are distributed in the central, eastern, western and southeastern part of the microwatershed. Deep (100-150 cm) soils occupy an area of 44 ha (9%) and are distributed in the southwestern, central, western and southeastern part of the microwatershed. Very deep (>150 cm) soils cover an area of 29 ha (6%) and are distributed in the southern and southwestern part of the microwatershed. Moderately shallow (50-75 cm) soils occupy a major area of about 241 ha (51%) and are distributed in all parts of the microwatershed. Shallow (25-50 cm) soils occupy a small area of about 17 ha (4%) and are distributed in the central part of the microwatershed.

The most productive lands 73 ha (15%) with respect to soil rooting depth where all climatically adapted annual and perennial crops can be grown are very deep (>150 cm depth) and deep (100-150 cm) soils occurring in the major part of the microwatershed. The problem soils cover about 17 ha (4%), where only short duration crops can be grown are shallow (25-50 cm) and probability of crop failure is high.

5.3 Surface Soil Texture

Texture is an expression to indicate the coarseness or fineness of the soil as determined by the relative proportion of primary particles of sand, silt and clay. It has a direct bearing on the structure, porosity, adhesion and consistence. The surface layer of a soil to a depth of about 25 cm is the layer that is most used by crops and plants. The surface soil textural class provides a guide to understanding soil-water retention and availability, nutrient holding capacity, infiltration, workability, drainage, physical and chemical behaviour, microbial activity and crop suitability. The textural classes used for LRI were used to classify and a surface soil texture map was generated. The area extent and their geographical distribution in the microwatershed is shown in Figure 5.3.

Maximum area of about 430 ha (90%) has soils that are loamy at the surface. They are distributed in all parts of the microwatershed. An area of 9 ha (2 %) has soils that are clayey at the surface and occur in the northern part of the microwatershed. An area of about 9 ha (2%) has soils that are sandy at the surface and are distributed in the western and central part of the Microwatershed (Fig. 5.3).

The most productive lands (2%) with respect to surface soil texture are the clayey soils that have high potential for soil-water retention and availability, and nutrient retention and availability, but have problems of drainage, infiltration, workability and other physical problems. The other productive lands (90 %) are loamy soils which also have high potential for soil-water retention and nutrient availability but have no drainage or other physical problems. The problematic lands are sandy soils that have less run-off and soil moisture conservation, less capillary rise, less evaporation losses poor in fertility but are amendable to good soil tilth and are ideal for root crops.

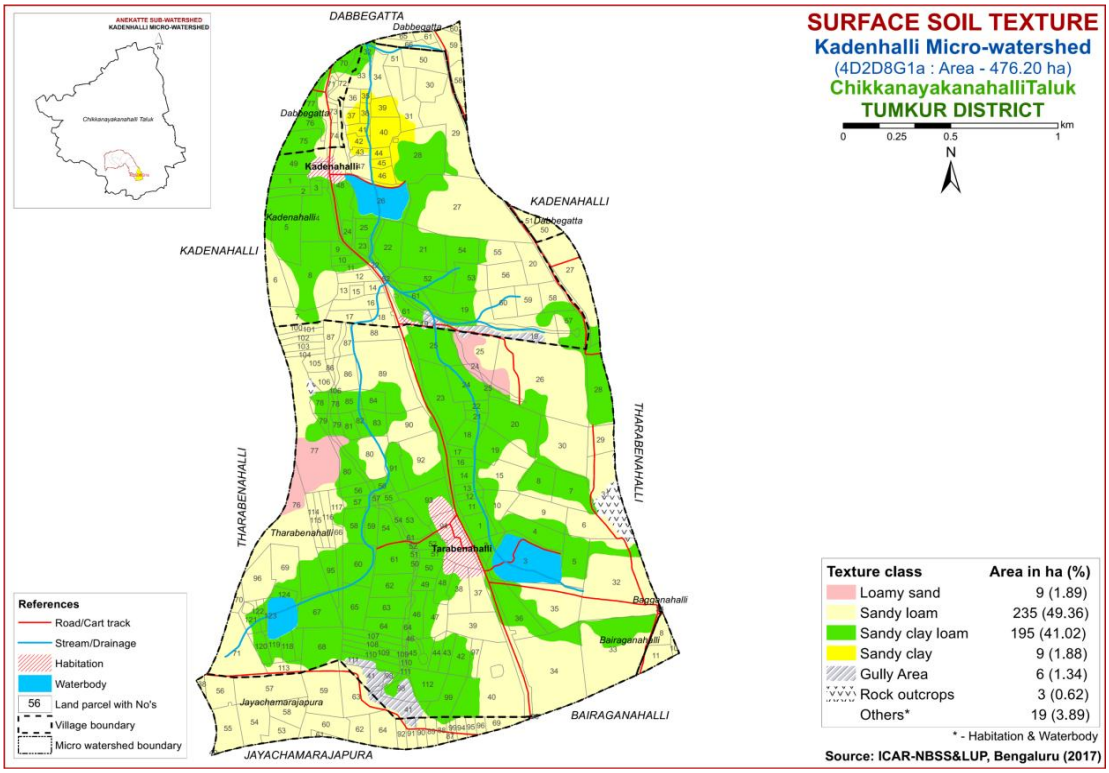


Fig. 5.3 Surface Soil Texture map of Kadenhalli Microwatershed

5.4 Soil Gravelliness

Gravel is the term used for describing coarse fragments between 2 mm and 7.5 cm diameter and stones for those between 7.5 cm and 25 cm. The presence of gravel and stones in soil reduces the volume of soil responsible for moisture and nutrient storage, drainage, infiltration and runoff, and hinders plant growth by impeding root growth and seedling emergence, intercultural operations and farm mechanization. The gravelliness classes used in LRI were used to classify the soils and using these classes a gravelliness map was generated. The area extent and their geographic distribution in the microwatershed is shown in Figure 5.4.

Maximum area of about 247 ha (52%) is non gravelly (<15%) and are distributed in all parts of the microwatershed. The soils that are gravelly (15-35%) covering about 107 ha (22%) are distributed in the central, southeastern, western, northeastern and northwestern part of the microwatershed. An area has soils that are very gravelly (35-60%) covering about 98 ha (21%) and are distributed in the western, northern, northeastern, central and southeastern part followed by soils that are extremely gravelly (60-80%) covering a small area of about 3 ha (1 %) and are distributed in the western part of the microwatershed (Fig 5.4).

The most productive soils with respect to gravelliness are found to be 74 per cent. They are non gravelly (<15%) and gravelly (15-35%) and have potential for growing both agricultural and horticultural crops. The problem soils that are very gravelly to extremely gravelly (35-80%) are found to cover about 21 per cent area, where only short duration crops can be grown, if rainfall is normal and equally distributed.

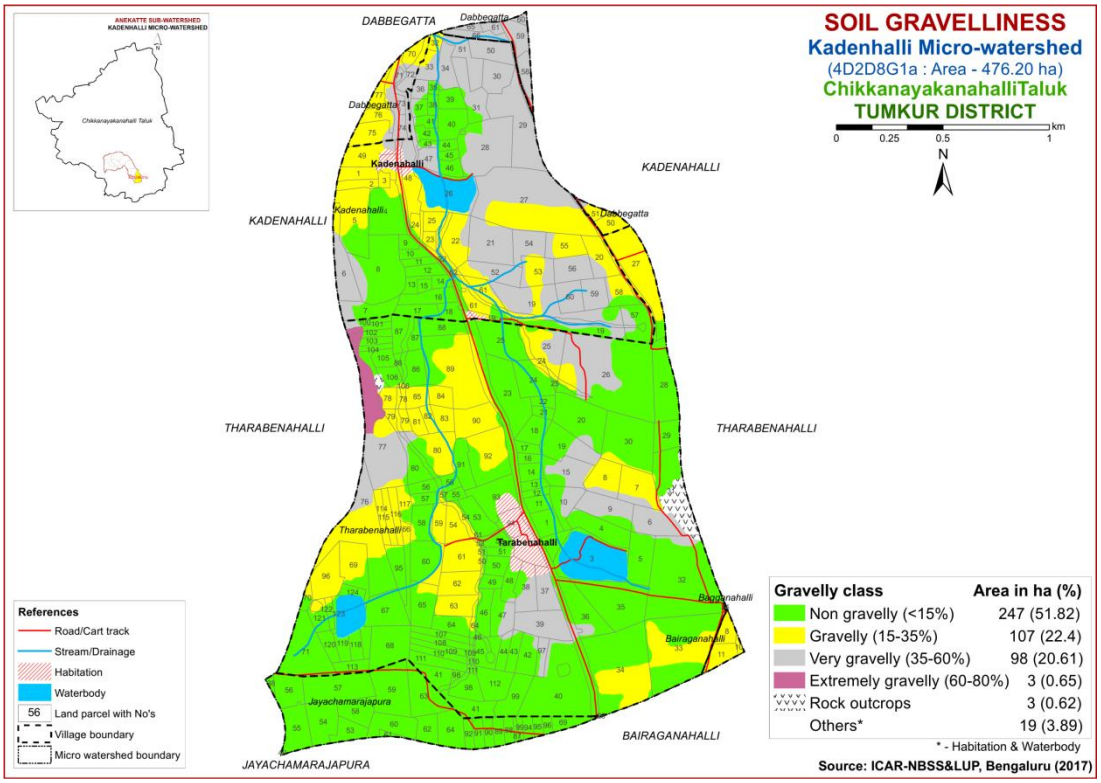


Fig. 5.4 Soil Gravelliness map of Kadenhalli Microwatershed

5.5 Available Water Capacity

The soil available water capacity (AWC) is estimated based on the ability of the soil column to retain water between the tensions of 0.33 and 15 bar in a depth of 100 cm or the entire solum if the soil is shallower. The AWC of the soils (soil series) as estimated by considering the soil texture, mineralogy, soil depth and gravel content (Sehgal *et al.*, 1990) and accordingly the soil map units were grouped into five AWC classes *viz*, very low (<50 mm/m), low (50-100 mm/m), medium (100-150 mm/m), high (150-200 mm/m) and very high (>200 mm/m) and using these values, an AWC map was generated. The area extent and their geographic distribution of different AWC classes in the microwatershed is given in Figure 5.5.

An area of about 159 ha (33%) in the microwatershed has soils that are very low (<50 mm/m) in available water capacity and are distributed in the western, eastern, central, northeastern and northwestern part of the microwatershed. An area of about 235 ha (49%) that are low (51-100 mm/m) in available water capacity are distributed in all parts of the microwatershed. An area of about 54 ha (11%) is medium (101-150 mm/m) in available water capacity and are distributed in the southern, southwestern and southeastern part of the microwatershed.

About 394 ha (83%) area in the microwatershed has soils that are problematic with regard to available water capacity. Here, only short duration crops can be grown and the probability of crop failure is very high. These areas are best put to other alternative uses.

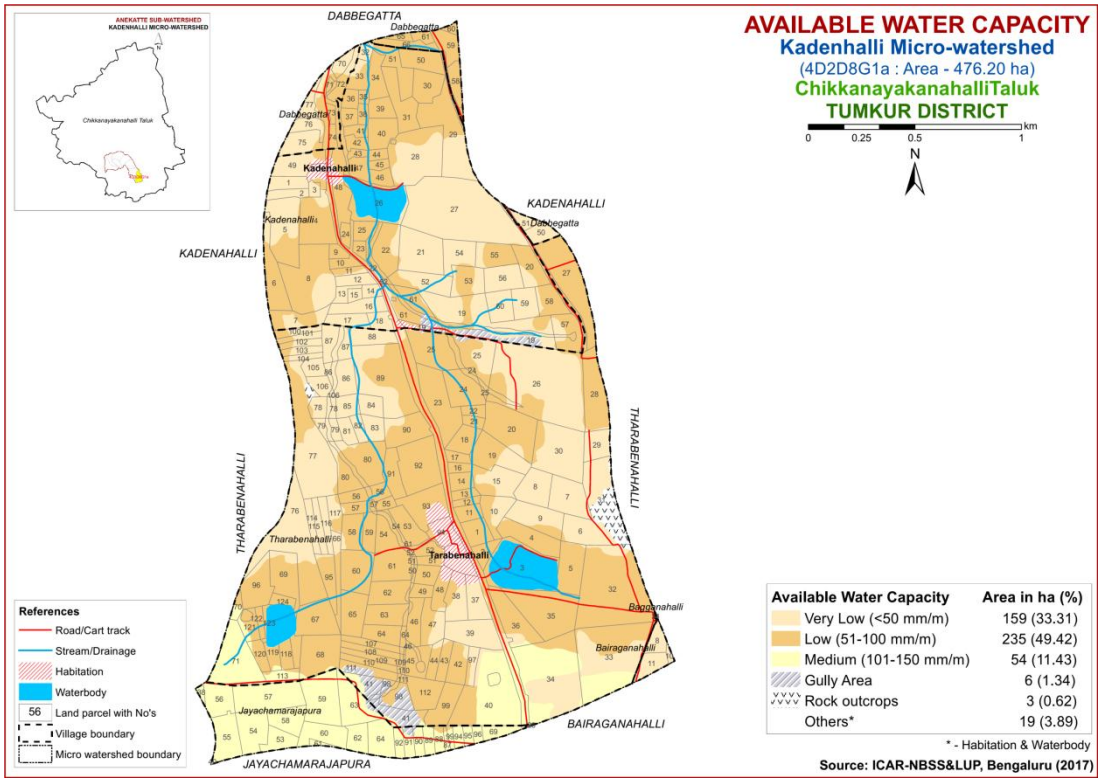


Fig. 5.5 Soil Available Water Capacity map of Kadenhalli Microwatershed

5.6 Soil Slope

Soil slope refers to the inclination of the surface of the land. It is defined by gradient, shape and length, and is an integral feature of any soil as a natural body. Slope is considered important in soil genesis, land use and land development. The length and gradient of slope influences the rate of runoff, infiltration, erosion and deposition. The soil map units were grouped into four slope classes and a slope map was generated showing the area extent and their geographic distribution in the microwatershed (Fig. 5.6).

Maximum area of about 248 ha (52%) falls under very gently sloping (1-3%) lands and is distributed in all parts of the microwatershed. An area of about 120 ha (25%) is under nearly level (0-1%) lands and are distributed in the southern, southwestern, southeastern, central and northern part of the microwatershed. An area of about 77 ha (16%) is under gently sloping (3-5%) lands and are distributed in the western, northern and northeastern part of the microwatershed. A small area of about 3 ha (1%) is under moderately sloping (5-10%) lands and are distributed in the northern part of the microwatershed.

An area of about 368 (77%) in the microwatershed has soils that have high potential in respect of soil slopes. In these areas, all climatically adapted annual and perennial crops can be grown without much soil and water conservation and other land development measures.

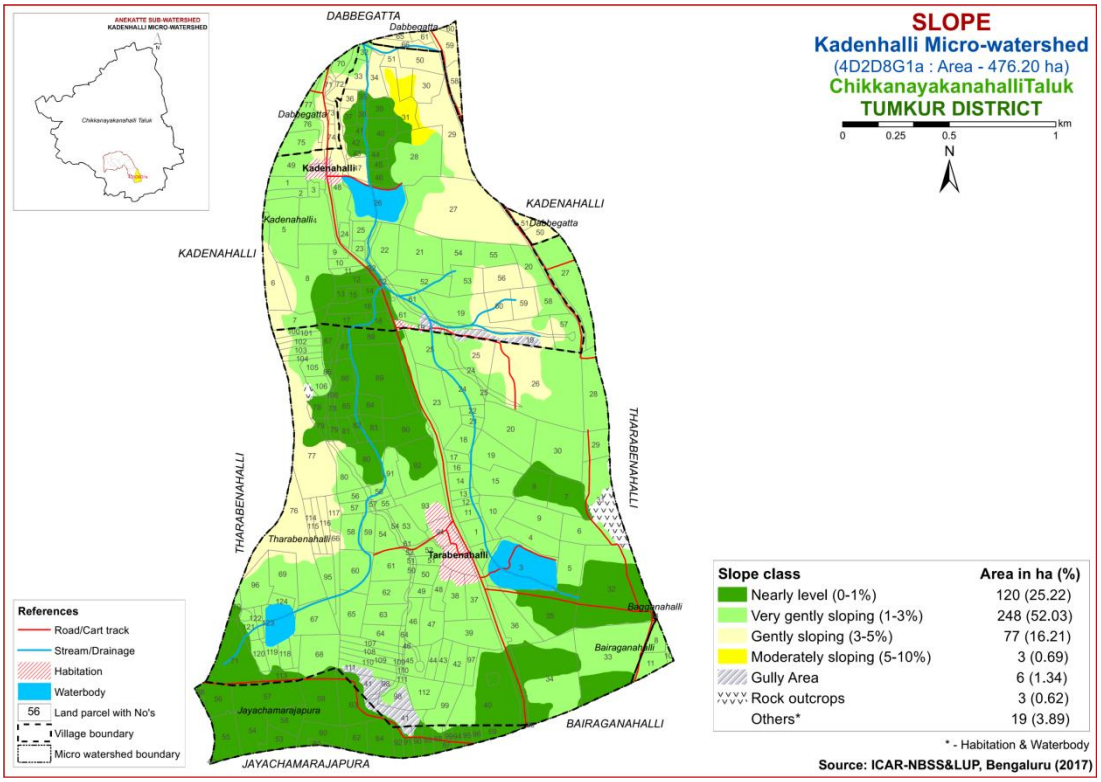


Fig. 5.6 Soil Slope map of Kadenhalli Microwatershed

5.7 Soil Erosion

Soil erosion refers to the wearing away of the earth's surface by the forces of water, wind and ice involving detachment and transport of soil by raindrop impact. It is used for accelerated soil erosion resulting from disturbance of the natural landscape by burning, excessive grazing and indiscriminate felling of forest trees and tillage, all usually by man. The erosion classes showing an estimate of the current erosion status as judged from field observations in the form of rills, gullies or a carpet of gravel on the surface are recorded. Four erosion classes, viz, slight erosion (e1), moderate erosion (e2), severe erosion (e3) and very severe erosion (e4) are recognized. The soil map units were grouped into different erosion classes and a soil erosion map generated. The area extent and their spatial distribution in the microwatershed is given in Figure 5.7.

Soils that are moderately eroded (e2 class) cover an area of about 153 ha (32%) in the microwatershed. They are distributed in all parts of the microwatershed. Slightly eroded (e1 class) soils cover an area of about 295 ha (62%) and are distributed in the southeastern, western, northern, northeastern, northwestern and central part of the microwatershed. Soils that are nil in erosion (e0 class) cover a very small area of about 6 ha (1%) in the microwatershed. They are distributed in the central part of the microwatershed.

An area of about 153 ha (32%) in the microwatershed is problematic because of moderate erosion. For these areas, taking up soil and water conservation and other land development measures is needed.

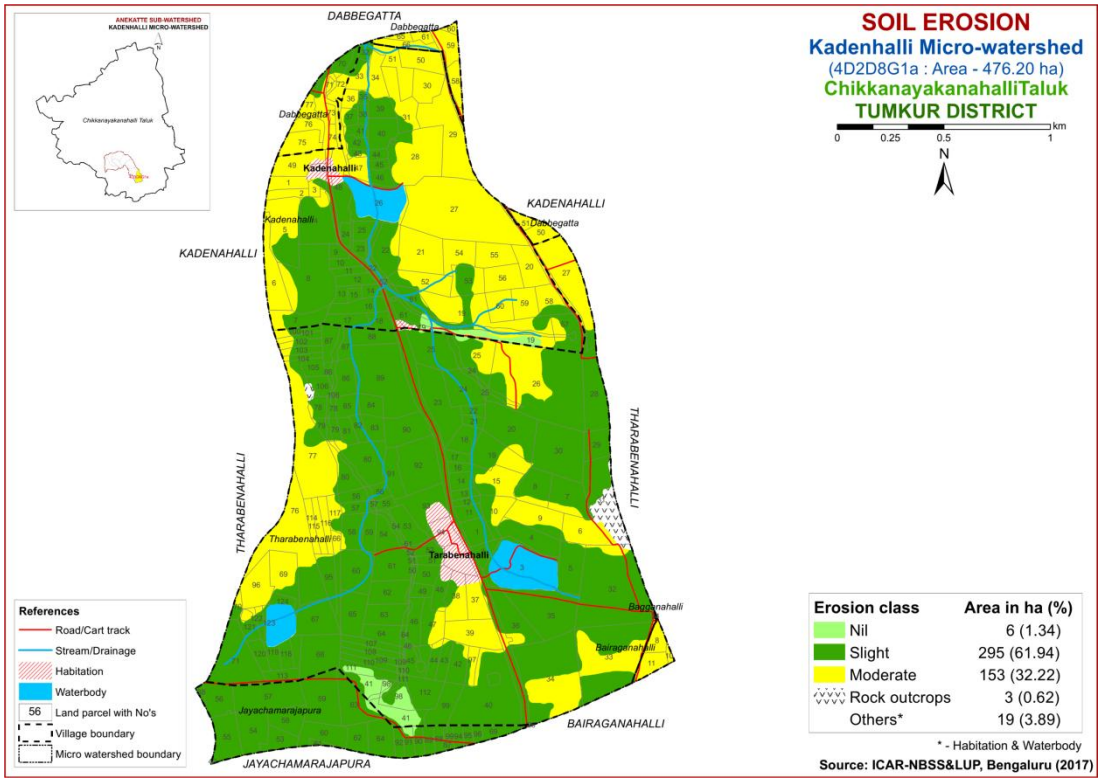


Fig. 5.7 Soil Erosion map of Kadenhalli Microwatershed

Chapter 6

FERTILITY STATUS

Soil fertility plays an important role in increasing crop yield. The adoption of high yielding varieties that require high amounts of nutrients has resulted in deficiency symptoms in crops and plants due to imbalanced fertilization and poor inherent fertility status as these areas are characterised by low rainfall and high temperatures. Hence, it is necessary to know the fertility (macro and micro nutrients) status of the soils of the watersheds for assessing the kind and amount of fertilizers required for each of the crop intended to be grown. For this purpose, the surface soil samples collected from the grid points (one soil sample at every 250 m interval) all over the microwatershed through land resource inventory in the year 2016 were analysed for pH, EC, organic carbon, available phosphorus and potassium, and for micronutrients like zinc, boron, copper, iron and manganese, and secondary nutrient sulphur.

Soil fertility data generated has been assessed and individual maps for all the nutrients for the microwatershed have been generated using kriging method under GIS. The village/survey number wise fertility data for the microwatershed is given in Appendix-II.

6.1 Soil Reaction (pH)

The soil analysis of the Kadenhalli microwatershed for soil reaction (pH) showed that a small area of about 26 ha (5%) is moderately acid (pH 5.5-6.0) and are distributed in the southern, eastern and northwestern part of the microwatershed. An area of 197 ha (41%) is slightly acid (pH 6.0-6.5) and are distributed in the southern, southwestern, southeastern, northwestern and northeastern part of the microwatershed. Maximum area of 231 ha (48%) is neutral (pH 6.5-7.3) and are distributed in the central, western, eastern, northern, northeastern and northwestern part of the microwatershed (Fig. 6.1). In all, 223 ha (46%) area of soils are acidic in nature and 231 ha (48%) are neutral in reaction.

6.2 Electrical Conductivity (EC)

The Electrical Conductivity of the soils of the entire microwatershed area is <2 dS m^{-1} (Fig 6.2) and as such the soils are non-saline.

6.3 Organic Carbon

The soil organic carbon content of the microwatershed is medium (0.5-0.75%) covering an entire area of about 455 ha (95%) and are distributed in all parts of the microwatershed. (Fig 6.3).

6.4 Available Phosphorus

Available phosphorus content is medium (23-57 kg/ha) covering a maximum area of about 381 ha (80%) and occur in all parts of the microwatershed. There is an urgent need to increase the dose of phosphorus for all the crops by 25 per cent over the recommended dose to realize better crop performance. High (>57 kg/ha) in an area of

about 73 ha (15%) and are distributed in the eastern, western, northwestern and northern part of the microwatershed (Fig 6.4).

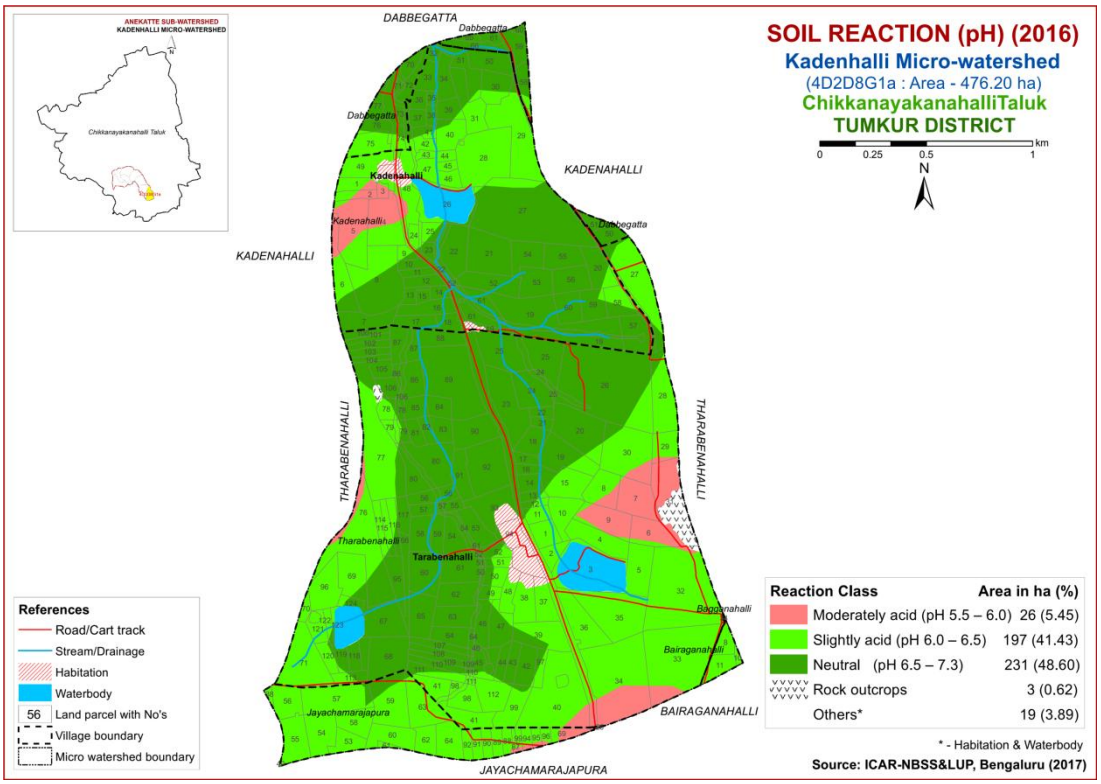


Fig.6.1 Soil Reaction (pH) map of Kadenhalli Microwatershed

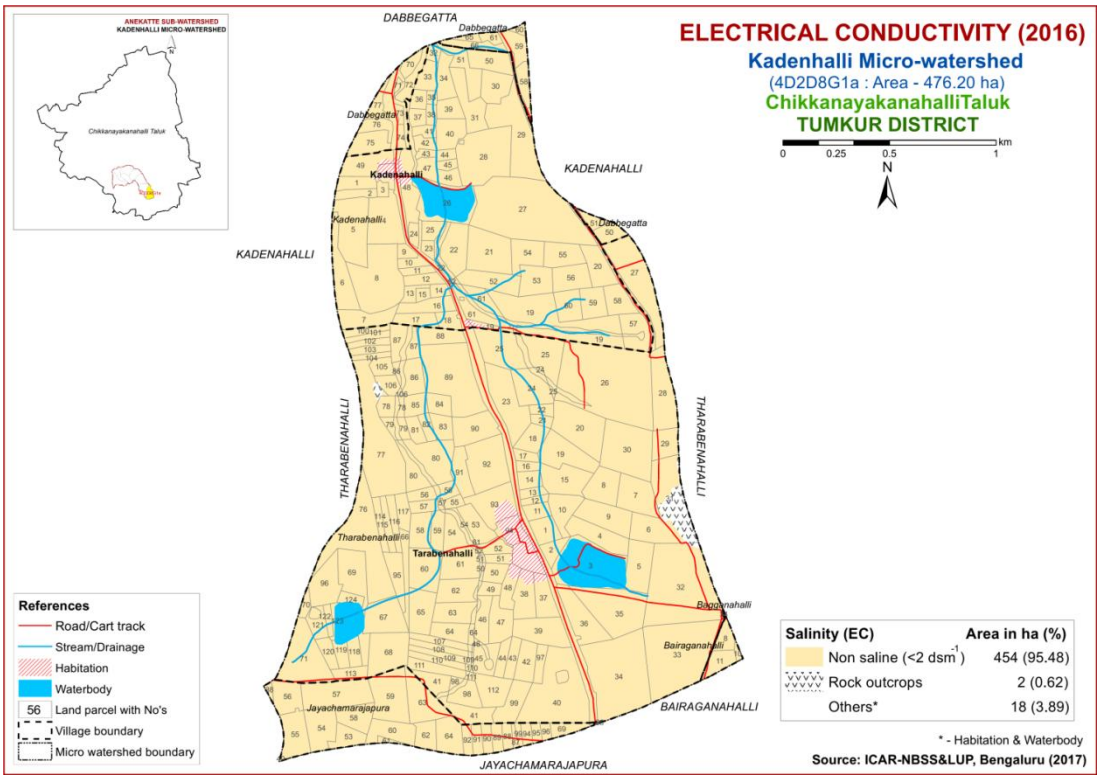


Fig.6.2 Electrical Conductivity (EC) map of Kadenhalli Microwatershed

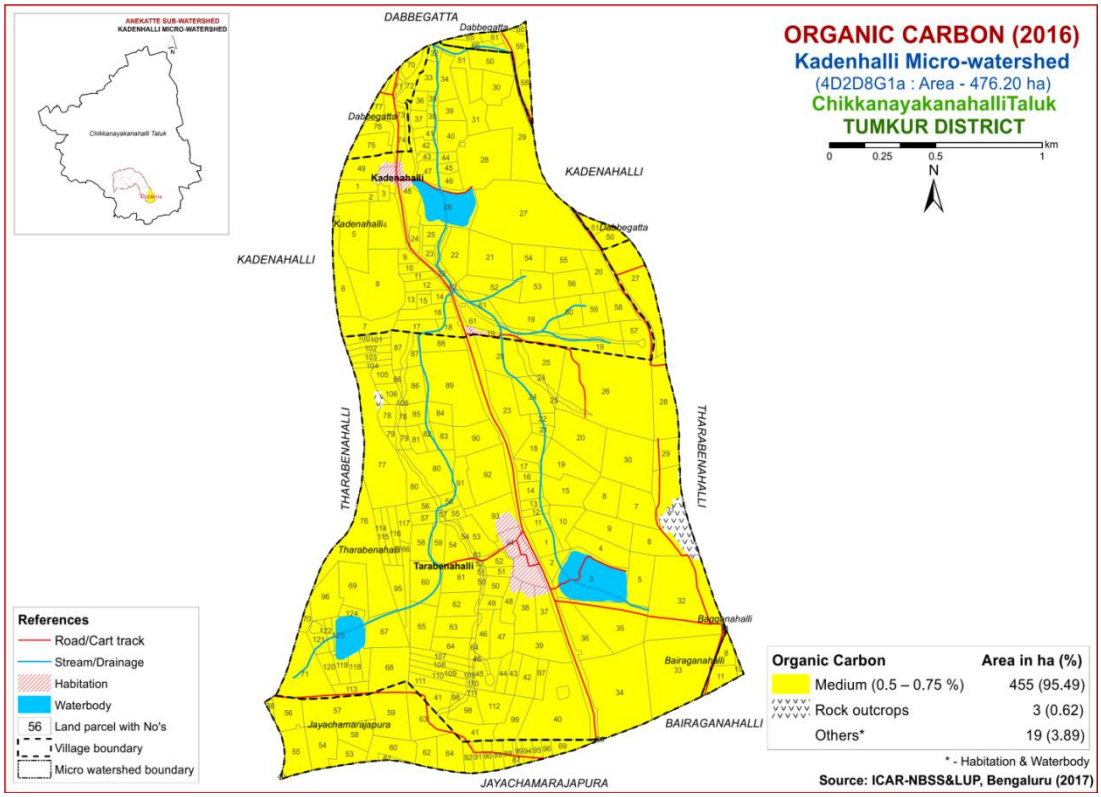


Fig.6.3 Soil Organic Carbon map of Kadenhalli Microwatershed

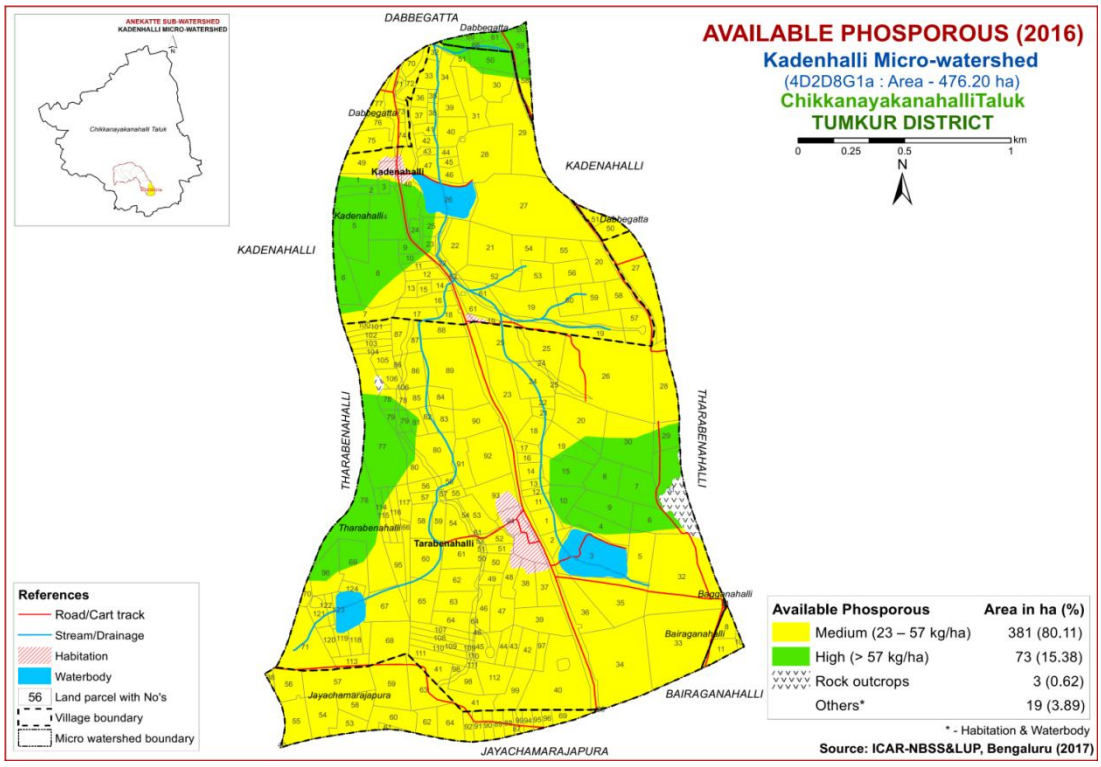


Fig.6.4 Soil Available Phosphorus map of Kadenhalli Microwatershed

6.5 Available Potassium

Available potassium content is medium (145-337 kg/ha) in maximum area of about 416 ha (87%) and is distributed in all parts of the microwatershed (Fig. 6.5). It is low in an area of 39 ha (8%) and are distributed in the northeastern and northwestern part of the microwatershed.

6.6 Available Sulphur

Major area of about 282 ha (59%) is medium (10-20 ppm) in available sulphur and are distributed in all parts of the microwatershed, high (>20 ppm) in an area of 172 ha (36%) and are distributed in the southwestern, southeastern, central, eastern, northern and northeastern part of the microwatershed and low (<10 ppm) in a very minute area of 1 ha in the microwatershed (Fig. 6.6).

6.7 Available Boron

Available boron content is medium (0.5-1.0 ppm) in an area of 110 ha (23%) and are distributed in the southeastern, northeastern, central and northern part of the microwatershed. Maximum area of about 345 ha (72%) is low (<0.5 ppm) in available boron and are distributed in all parts of the microwatershed. (Fig 6.7).

6.8 Available Iron

Available iron content is sufficient (>4.5 ppm) in the entire microwatershed area (Fig 6.8).

6.9 Available Manganese

Available manganese content is sufficient (>1.0 ppm) in the entire microwatershed area (Fig 6.9).

6.10 Available Copper

Available copper content is sufficient (>0.2 ppm) in the entire microwatershed area (Fig 6.10).

6.11 Available Zinc

Available zinc content is sufficient (>0.6 ppm) in maximum area of about 438 (92%) and is distributed in all parts of the microwatershed. It is deficient (<0.6 ppm) in a small area of about 17 ha (3%) and is distributed in the southwestern part of the microwatershed (Fig 6.11).

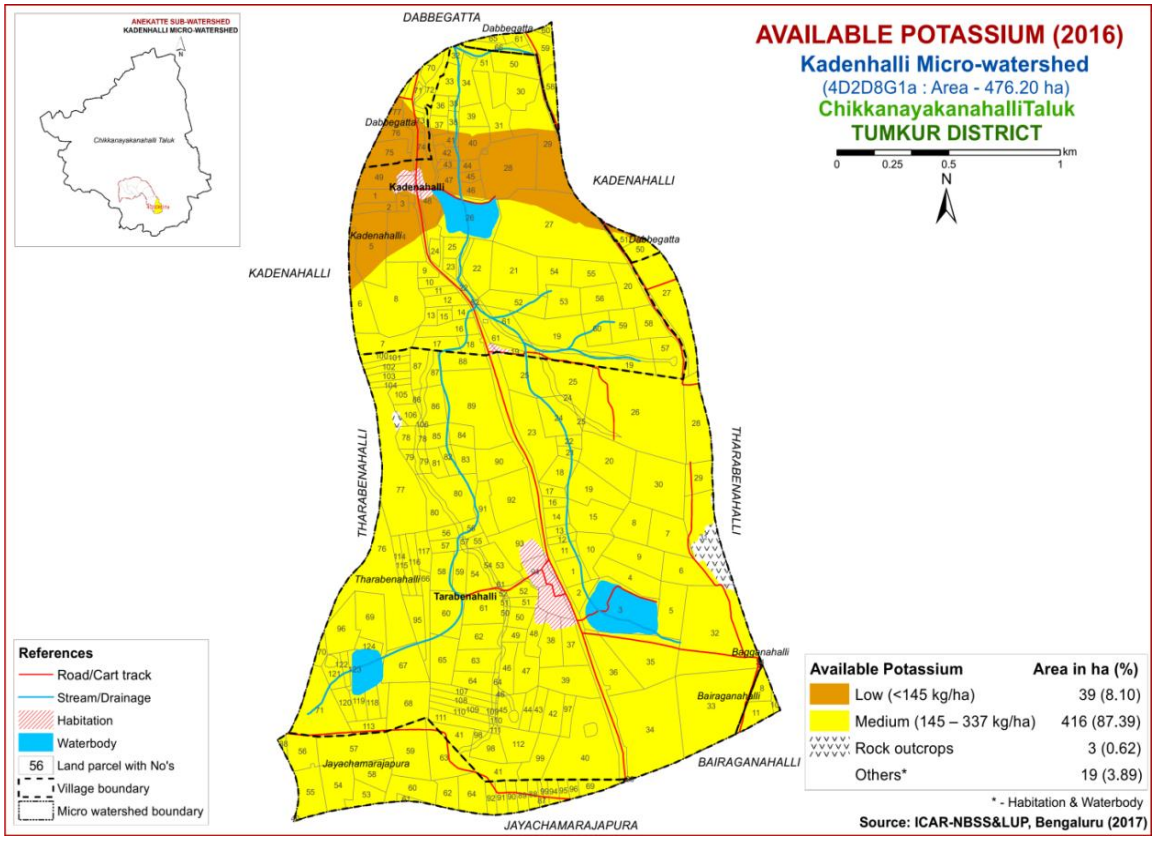


Fig.6.5 Soil Available Potassium map of Kadenhalli Microwatershed

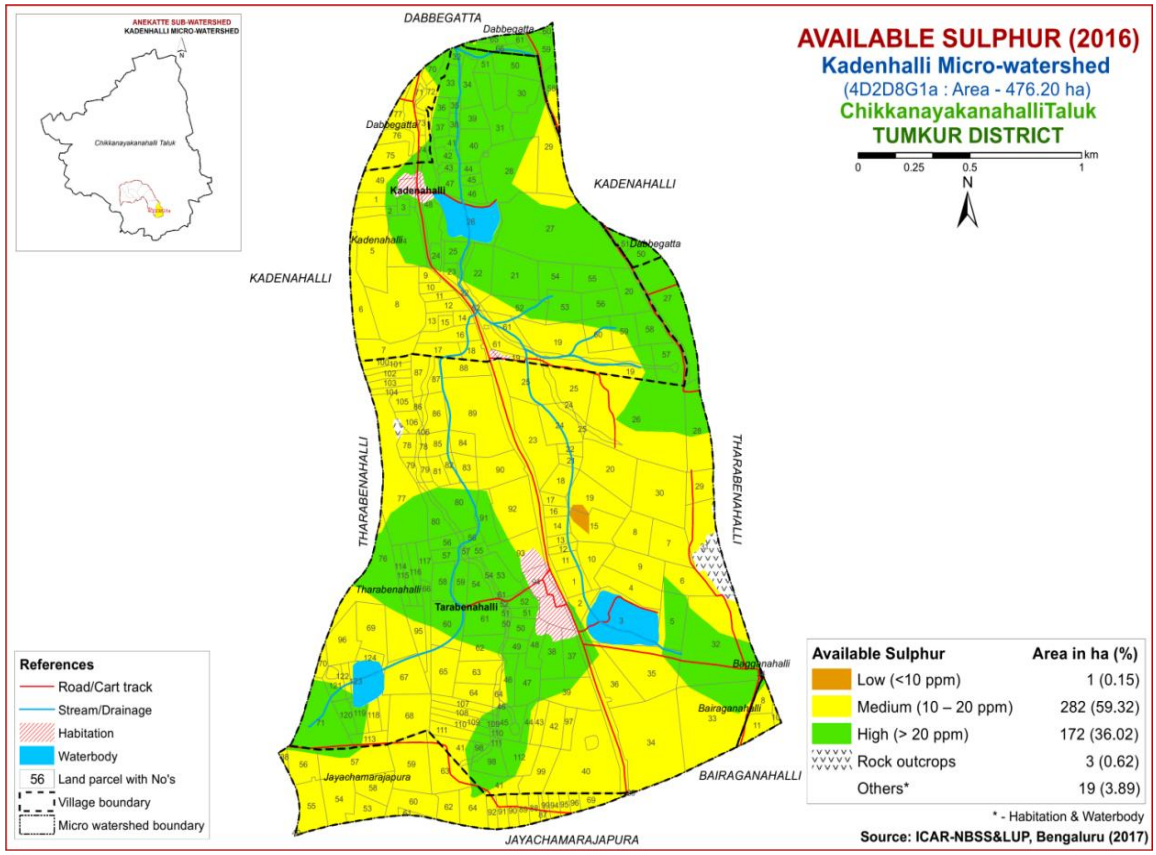


Fig.6.6 Soil Available Sulphur map of Kadenhalli Microwatershed

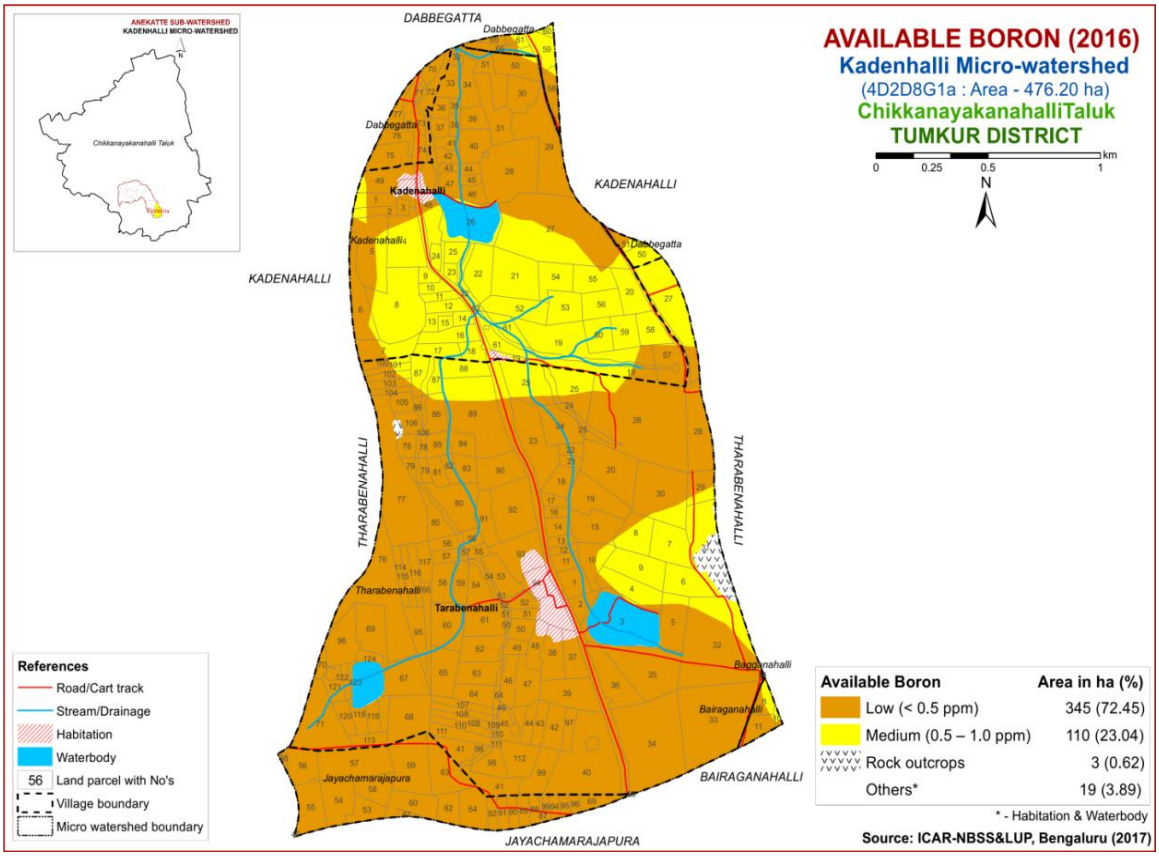


Fig.6.7 Soil Available Boron map of Kadenhalli Microwatershed

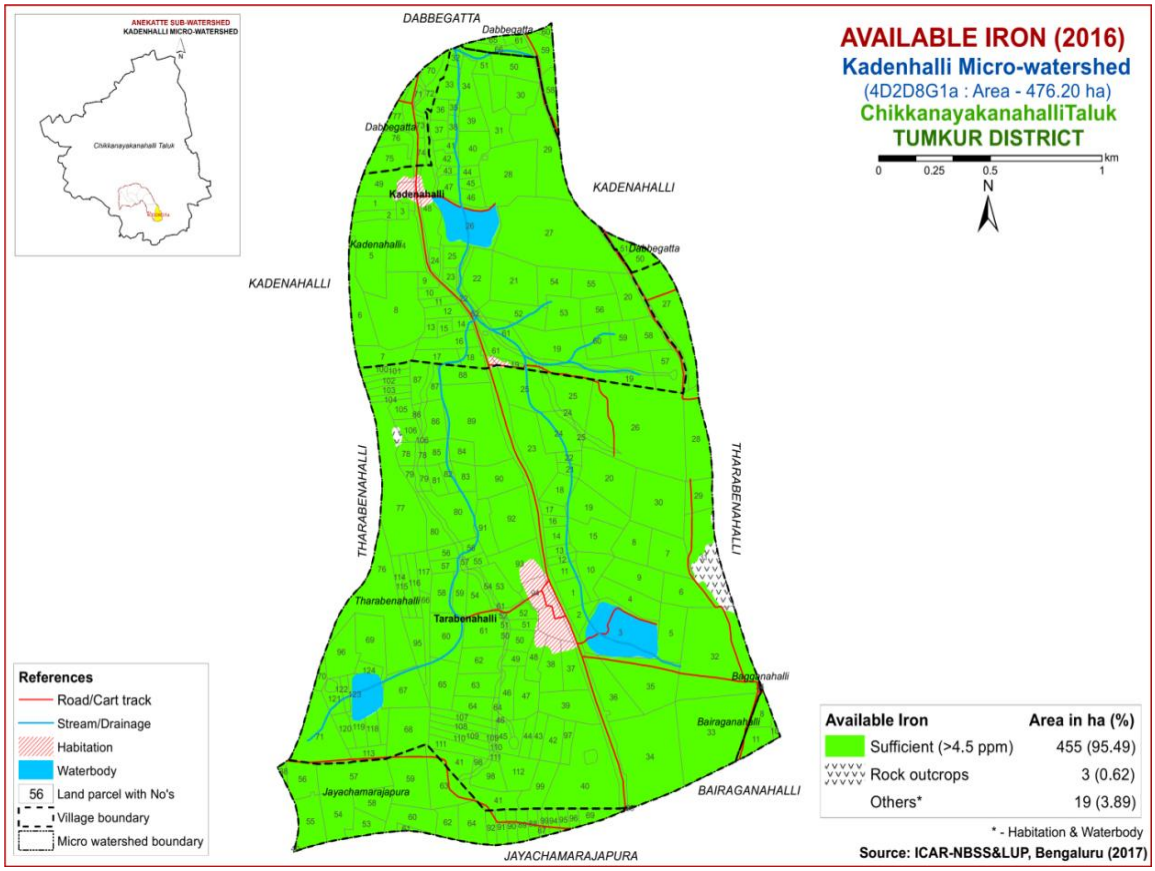


Fig.6.8 Soil Available Iron map of Kadenhalli Microwatershed

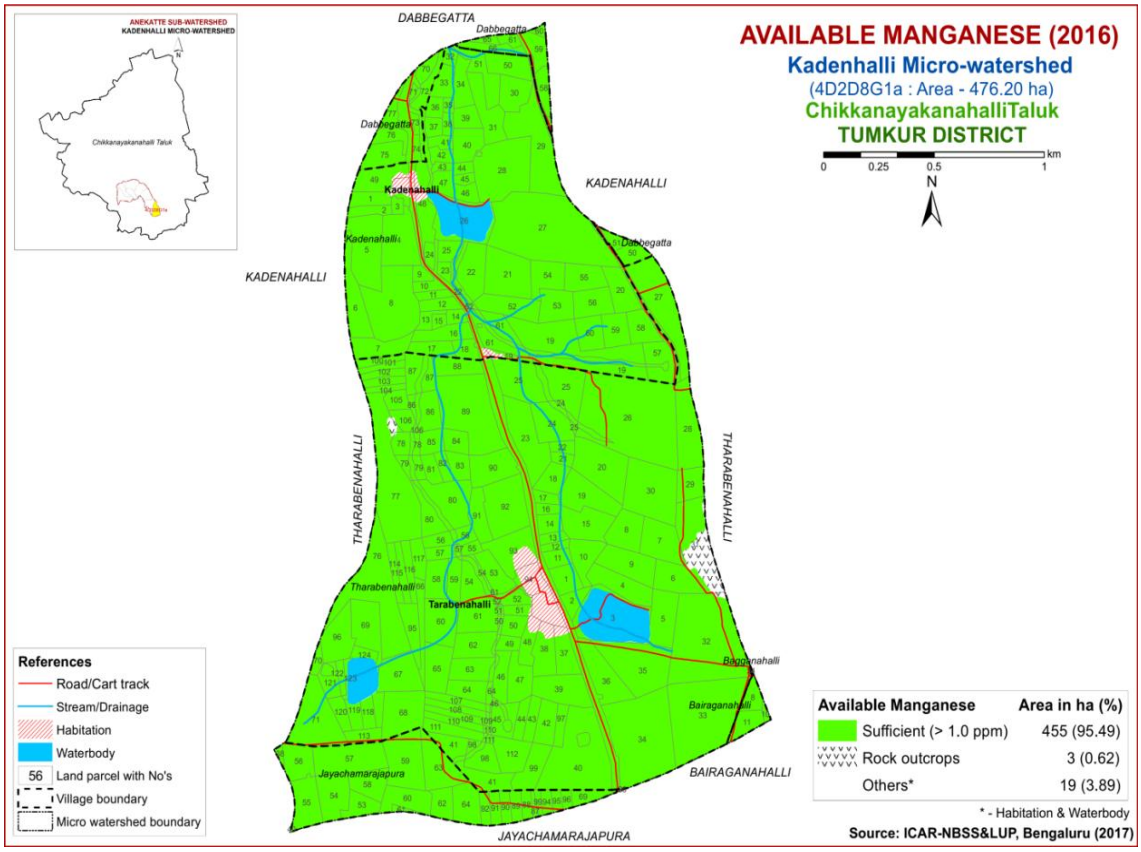


Fig.6.9 Soil Available Manganese map of Kadenhalli Microwatershed

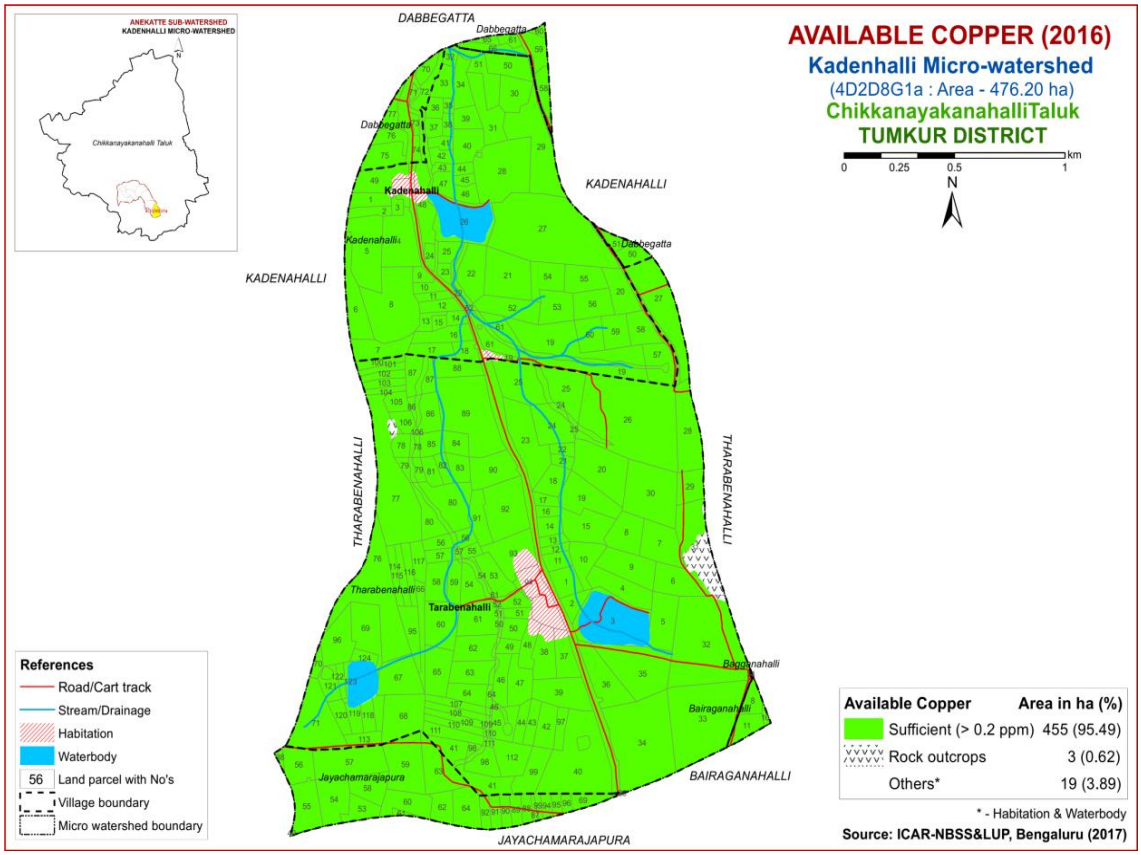


Fig.6.10 Soil Available Copper map of Kadenhalli Microwatershed

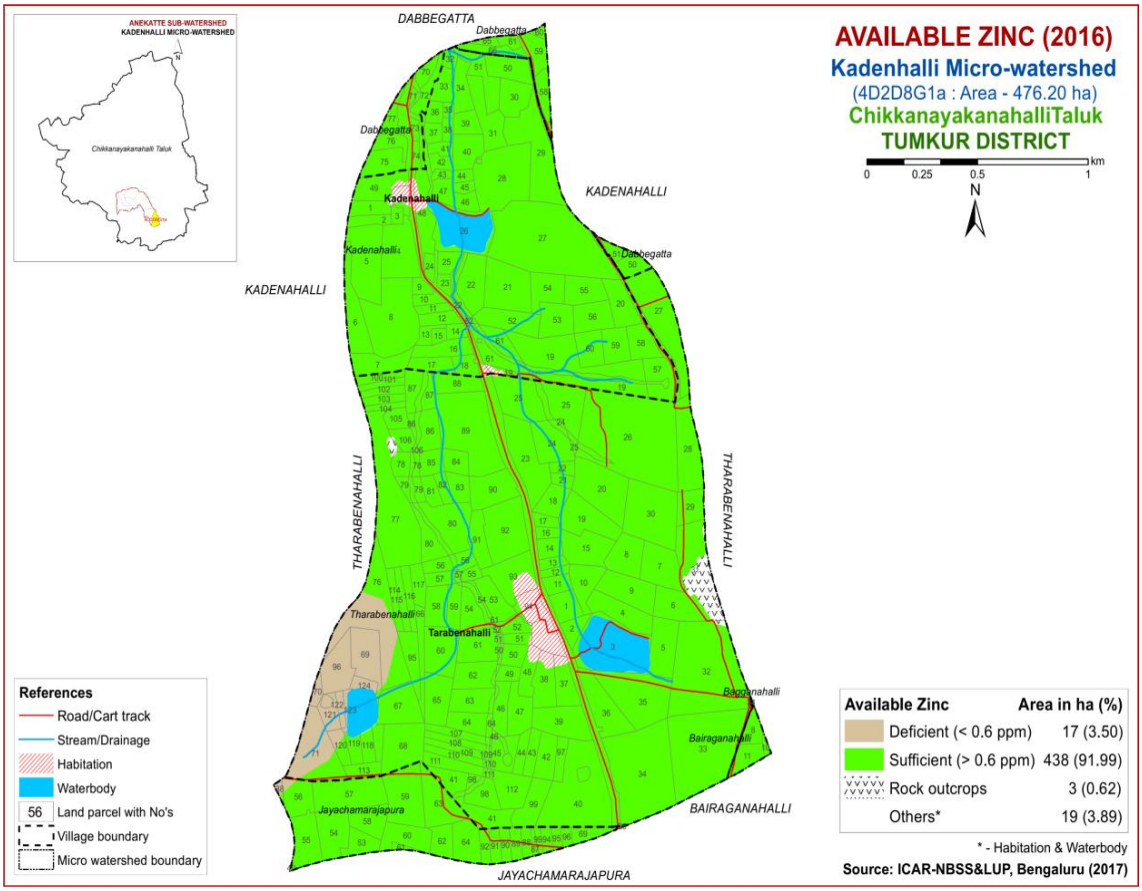


Fig.6.11 Soil Available Zinc map of Kadenhalli Microwatershed

Chapter 7

LAND SUITABILITY FOR MAJOR CROPS

The soil and land resource units (soil phases) of Kadenhalli microwatershed were assessed for their suitability for growing food, fodder, fibre and other horticulture crops by following the procedure as outlined in FAO, 1976 and 1983. Crop requirements were developed for each of the crop from the available research data and also by referring to Naidu *et. al.* (2006) and Natarajan *et. al* (2015). The soil and land characteristics (Table 7.1) were matched with the crop requirement to arrive at the crop suitability. In FAO land suitability classification, two orders are recognized. Order S-Suitable and Order N-Not suitable. The orders have classes, subclasses and units. Order-S has three Classes, Class S1-Highly Suitable, Class S2-Moderately Suitable and Class S3- Marginally Suitable. Order N has two classes, N1- Currently not Suitable and N2- Permanently not Suitable. There are no subclasses within the Class S1 as they will have very minor or no limitations for crop growth. Classes S2, S3 and N1 are divided into subclasses based on the kinds of limitations encountered. The limitations that affect crop production are 'c' for erratic rainfall and its distribution and length of growing period (LGP), 'e' for erosion hazard, 'r' for rooting condition, 't' for lighter or heavy texture, 'g' for gravelliness or stoniness, 'n' for nutrient availability, 'l' for topography, 'm' for moisture availability and 'w' for drainage and 'z' for calcareousness. These limitations are indicated as lower case letters to the class symbol. For example, moderately suitable lands with the limitations of soil depth and erosion are designated as S2re. For the microwatershed, the soil mapping units were evaluated and classified up to subclass level.

Using the above criteria, the soil map units of the microwatershed were evaluated and land suitability maps for 34 major agricultural and horticultural crops were generated. The detailed information on the kind of suitability of each of the soil phase for the crops assessed are given village/ survey number wise for the microwatershed in Appendix-III.

7.1 Land Suitability for Sorghum (*Sorghum bicolor*)

Sorghum is one of the major crops grown in Karnataka in an area of 10.47 lakh ha in Bijapur, Gulbarga, Raichur, Bidar, Belgaum, Dharwad, Bellary, Chitradurga, Mysore and Tumakuru districts. The crop requirements for growing sorghum (Table 7.2) were matched with the soil-site characteristics (Table 7.1) of the soils of the microwatershed and a land suitability map for growing sorghum was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.1.

An area of about 59 ha (12%) is highly suitable (Class S1) for growing sorghum and are distributed in the southern and southwestern part of the microwatershed. A major area of about 294 ha (62%) is moderately suitable (Class S2) for growing sorghum and are distributed in all parts of the microwatershed. They have minor limitations of rooting depth, excess salt and gravelliness.

Table 7.1 Soil-Site Characteristics of Kadenhalli Microwatershed

Soil Map Units	Climate (P)(mm)	Growing period (Days)	Drai-nage Class	Soil depth (cm)	Soil texture		Gravelliness		AWC (mm/m)	Slope (%)	Erosion	pH	EC (dSm^{-1})	ESP (%)	CEC [Cmol (p^{+})kg^{-1}]	BS (%)
					Surf-ace	Sub-surface	Surface (%)	Subsurface (%)								
CSRcA1	700	150	WD	25-50	sl	scl	-	<15	51-100	0.1	Slight	-	-	-	-	-
LKRcB1	700	150	WD	50-75	sl	scl-sc	-	>35	51-100	1-3	Slight	8.18	0.30	4.51	12.2	100
LKRcC2g1	700	150	WD	50-75	sl	scl-sc	15-35	>35	51-100	3-5	Moderate	8.18	0.30	4.51	12.2	100
LKRcC2g2	700	150	WD	50-75	sl	scl-sc	35-60	>35	51-100	3-5	Moderate	8.18	0.30	4.51	12.2	100
TDHbB1g1	700	150	WD	50-75	ls	sc-sc	15-35	-	101-150	1-3	Slight	9.19	0.18	14.6	3.57	100
TDHhB1	700	150	WD	50-75	scl	sc-sc	-	-	101-150	1-3	Slight	9.19	0.18	14.6	3.57	100
TDHhB1g1	700	150	WD	50-75	scl	sc-sc	15-35	-	101-150	1-3	Slight	9.19	0.18	14.6	3.57	100
KGHcA1	700	150	WD	50-75	sl	scl	-	15-35	101-150	0-1	Slight	-	-	-	-	-
KGHiA1	700	150	WD	50-75	sc	scl	-	15-35	101-150	0-1	Slight	-	-	-	-	-
KTPcB2g1	700	150	WD	50-75	sl	scl	15-35	15-35	101-150	1-3	Moderate	-	-	-	-	-
KTPcC2g2	700	150	WD	50-75	sl	scl	35-60	15-35	101-150	3-5	Moderate	-	-	-	-	-
KTPcD2g2	700	150	WD	50-75	sl	scl	35-60	15-35	101-150	5-10	Moderate	-	-	-	-	-
MKHbC2g2	700	150	WD	50-75	ls	scl	35-60	>35	51-100	3-5	Moderate	7.38	0.09	1.49	14.8	93
MKHcB2g1	700	150	WD	50-75	sl	scl	15-35	>35	51-100	1-3	Moderate	7.38	0.09	1.49	14.8	93
MKHhB2g1	700	150	WD	50-75	scl	scl	15-35	>35	51-100	1-3	Moderate	7.38	0.09	1.49	14.8	93
KSPhB2g2	700	150	WD	50-75	scl	scl-sc	35-60	15-35	<50	1-3	Moderate	-	-	-	-	-
HDHcB1	700	150	MWD	75-100	sl	scl-sc	-	>35	51-100	1-3	Slight	7.55	0.15	0.44	7.59	104
HDHcB2g2	700	150	WD	75-100	sl	scl-sc	35-60	>35	51-100	1-3	Moderate	7.55	0.15	0.44	7.59	104
HDHhA1g1	700	150	WD	75-100	scl	scl-sc	15-35	>35	51-100	0-1	Slight	7.55	0.15	0.44	7.59	104
HDHhB1g1	700	150	WD	75-100	scl	scl-sc	15-35	>35	51-100	1-3	Slight	7.55	0.15	0.44	7.59	104
GHTcB2g1	700	150	WD	75-100	sl	scl	15-35	15-35	101-150	1-3	Moderate	5.70	0.06	4.10	3.17	73
BMKhA1g1	700	150	WD	75-100	scl	sc-sc	15-35	15-35	51-100	0-1	Slight	-	-	-	-	-
BWThB1	700	150	WD	75-100	scl	sc-sc	-	>35	51-100	1-3	Slight	-	-	-	-	-
BDGcB2g2	700	150	WD	75-100	sl	scl-sc	35-60	>35	<50	1-3	Moderate	6.24	0.06	0.35	3.76	52
JDGcA1	700	150	WD	100-150	sl	sc-sc	-	<15	>200	0-1	Slight	-	-	-	-	-
BPRcA1g1	700	150	WD	100-150	sl	sc-sc	15-35	>35	51-100	0-1	Slight	6.64	0.03	0.51	5.45	63
BPRcC2g2	700	150	WD	100-150	sl	sc-sc	35-60	>35	51-100	3-5	Moderate	6.64	0.03	0.51	5.45	63
BPRcC2g3	700	150	WD	100-150	scl	sc-sc	60-80	>35	51-100	3-5	Moderate	6.64	0.03	0.51	5.45	63
RTRhB1	700	150	WD	>150	scl	c	-	-	151-200	1-3	Slight	5.08	0.03	2.06	9.21	50

*Symbols and abbreviations are according to Field Guide for LRI under Sujala-III Project, Karnataka

Marginally suitable lands (Class S3) occupy an area of about 88 ha (18%) and occur in the southwestern, central, western and northeastern part of the microwatershed. They have moderate limitations of gravelliness and rooting depth. A small area of about 12 ha (3%) is not suitable (Class N) for growing sorghum and are distributed in the southern, western and northern part of the microwatershed. They have severe limitations of gravelliness, soil problem, erosion and topography.

Table 7.2 Crop suitability criteria for Sorghum

Crop requirement		Rating			
Soil –site characteristics	**Unit**	**Highly suitable (S1)**	**Moderately suitable(S2)**	**Marginally suitable (S3)**	**Not suitable(N)**
Slope	%	2-3	3-8	8-15	>15
LGP	Days	120-150	120-90	<90	
Soil drainage	Class	Well to mod. Well drained	imperfect	Poorly/excessively	V.poorly
Soil reaction	pH	6.0-8.0	5.5-5.9,8.1-8.5	<5.5,8.6-9.0	>9.0
Surface soil texture	Class	c, cl, sicl, sc	l, sil, sic	sl, ls	s, fragmental skeletal
Soil depth	Cm	100-75	50-75	30-50	<30
Gravel content	% vol.	5-15	15-30	30-60	>60
Salinity (EC)	dS m^{-1}	2-4	4-8	8-10	>10
Sodicity (ESP)	%	5-8	8-10	10-15	>15

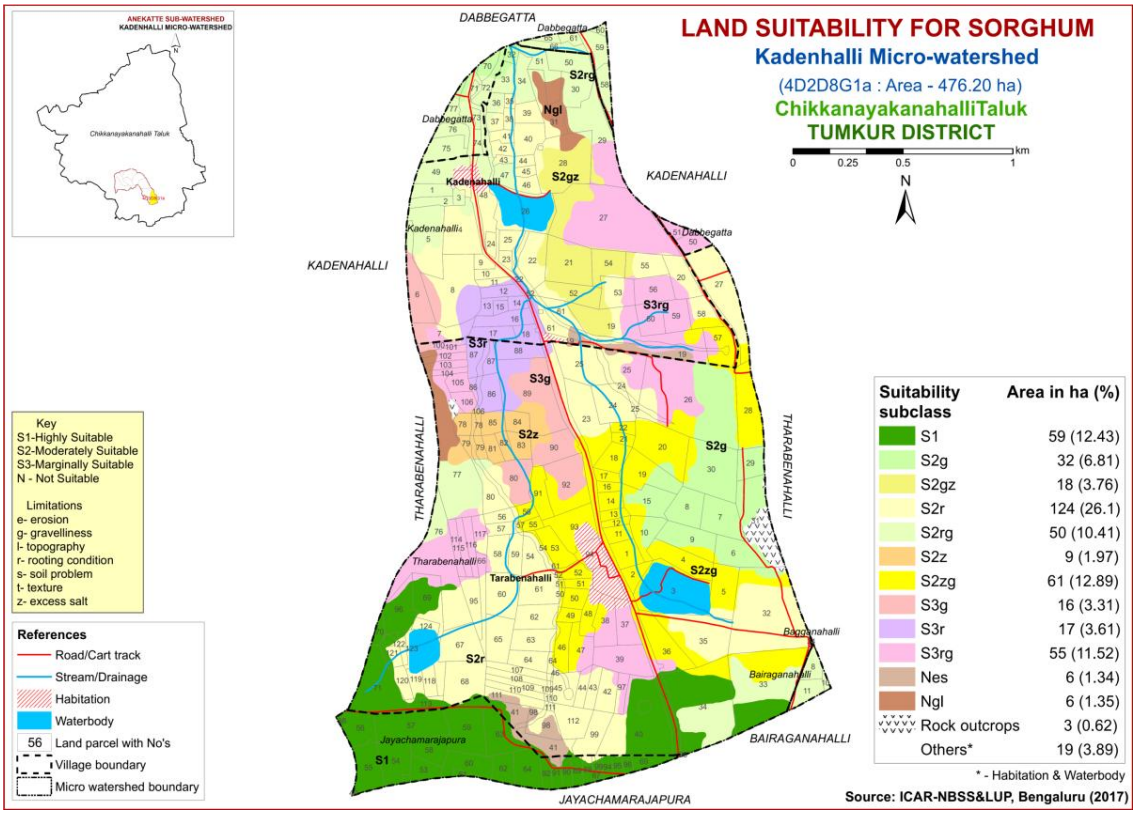


Fig. 7.1 Land Suitability map of Sorghum

7.2 Land Suitability for Fodder Sorghum (*Sorghum bicolor*)

Fodder Sorghum is one of the major fodder crops grown in South Karnataka in Tumakuru, Chikkaballapur, Mysore, Mandya, Bengaluru Rural and Kolar districts. The crop requirements for growing fodder sorghum (Table 7.3) were matched with the soil-site characteristics (Table 7.1) of the soils of the microwatershed and a land suitability map for growing sorghum was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.2.

Table 7.3 Crop suitability criteria for Fodder Sorghum

Crop requirement		Rating			
Soil –site characteristics	**Unit**	**Highly suitable(S1)**	**Moderately suitable(S2)**	**Marginally suitable (S3)**	**Not suitable(N)**
Slope	%	2-3	3-8	8-15	>15
LGP	Days	120-150	120-90	<90	
Soil drainage	Class	Well to mod. Well drained	imperfect	Poorly/excessively	V. poorly
Soil reaction	pH	6.0-8.0	5.5-5.9,8.1-8.5	<5.5,8.6-9.0	>9.0
Surface soil texture	Class	c, cl, sicl, sc	l, sil, sic	sl, ls	s,fragmental skeletal
Soil depth	Cm	100-75	50-75	30-50	<30
Gravel content	% vol.	5-15	15-30	30-60	>60
Salinity (EC)	dS m^{-1}	2-4	4-8	8-10	>10
Sodicity (ESP)	%	5-8	8-10	10-15	>15

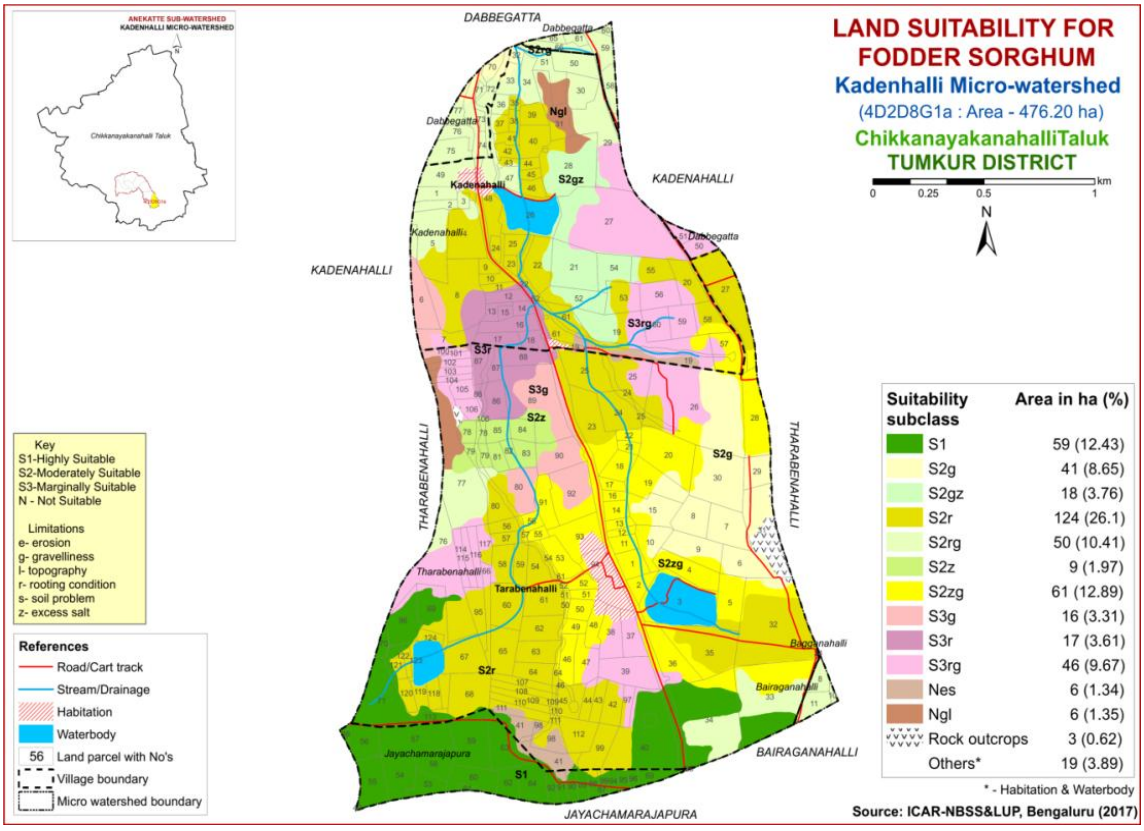


Fig. 7.2 Land Suitability map of Fodder Sorghum

An area of about 59 ha (12%) is highly suitable (Class S1) for growing fodder sorghum and are distributed in the southern and southwestern part of the microwatershed. A major area of about 303 ha (64%) is moderately suitable (Class S2) for growing fodder sorghum and are distributed in all parts the microwatershed. They have minor limitations of rooting depth, excess salt and gravelliness. Marginally suitable lands (Class S3) occupy an area of about 79 ha (17%) and occur in the western, southwestern, central and northeastern part of the microwatershed. They have moderate limitations of gravelliness and rooting depth. A small area of about 12 ha (3%) is not suitable (Class N) for growing fodder sorghum and are distributed in the western, northern and southern part of the microwatershed. They have severe limitations of gravelliness, soil problem, erosion and topography.

7.3 Land Suitability for Maize (*Zea mays*)

Maize is one of the most important food crop grown in an area of 13.37 lakh ha in almost all the districts of the State. The crop requirements for growing maize (Table 7.4) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing maize was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.3.

An area of about 30 ha (6%) is highly suitable (Class S1) for growing maize and are distributed in the southeastern and southwestern part of the microwatershed. Moderately suitable (Class S2) lands cover a maximum area of about 262 ha (55%) and occur in all parts of the microwatershed. They have minor limitations rooting depth, excess salt, texture and gravelliness.

Table 7.4 Crop suitability criteria for Maize

Crop requirement		Rating			
Soil–site characteristics	**Unit**	**Highly suitable(S1)**	**Moderately suitable(S2)**	**Marginally suitable (S3)**	**Not suitable(N)**
Slope	%	<3	3.5	5-8	
LGP	Days	>100	100-80	60-80	
Soil drainage	Class	Well drained	Mod. to imperfectly	Poorly/excessively	V.poorly
Soil reaction	pH	5.5-7.5	7.6-8.5	8.6-9.0	
Surface soil texture	Class	l, cl, scl, sil	sl, sicl, sic	c(s-s), ls	s,fragmental
Soil depth	Cm	>75	50-75	25-50	<25
Gravel content	% vol.	<15	15-35	35-50	>50
Salinity (EC)	dS m^{-1}	<1.0	1.0-2.0	2.0-4.0	
Sodicity (ESP)	%	<10	10-15	>15	

Marginally suitable lands (Class S3) for growing maize occupy an area of about 149 ha (31%) and occur in the central, western, eastern, southeastern and northeastern part of the microwatershed. They have moderate limitations of gravelliness, texture, rooting depth and excess salt. A small area of about 12 ha (3%) is not suitable (Class N)

for growing maize and are distributed in the southern, western and northern part of the microwatershed. They have severe limitations of gravelliness, erosion, soil problem and topography.

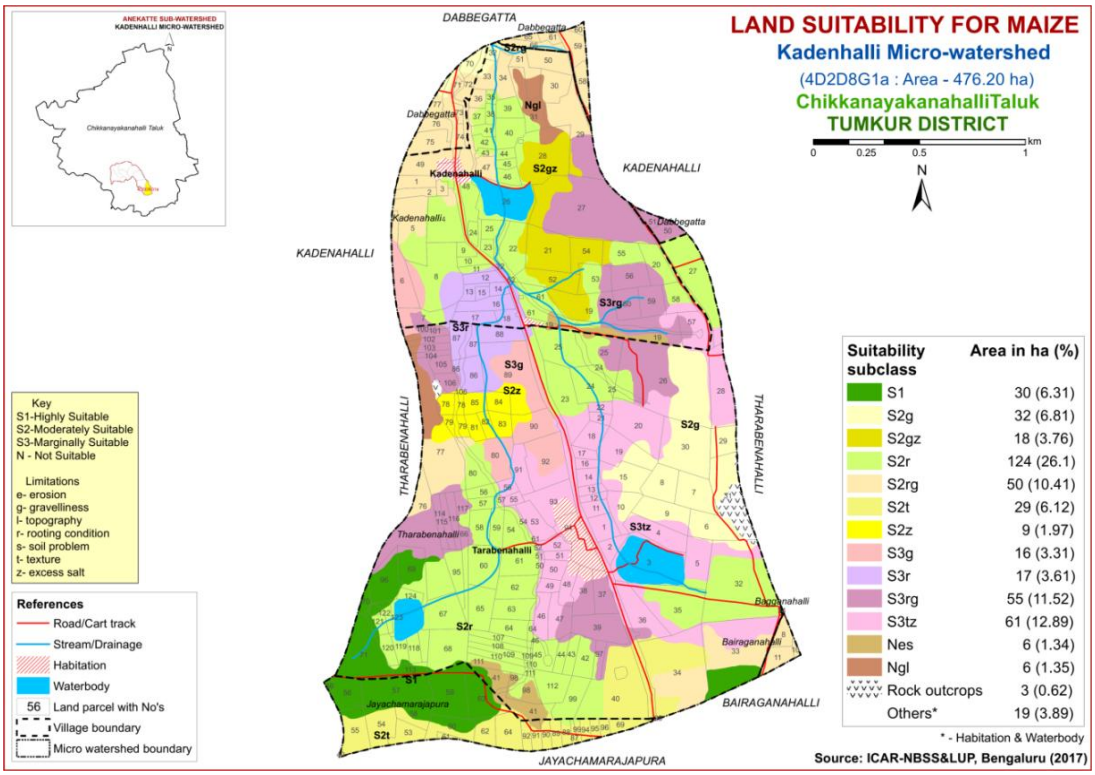


Fig. 7.3 Land Suitability map of Maize

7.4 Land Suitability for Upland Paddy (*Oryaza sativa*)

Upland paddy is one of the most important food crop grown in some parts of the districts in the State under rainfed condition. The crop requirements for growing Upland paddy (Table 7.5) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing Upland paddy was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.4.

Table 7.5 Land suitability criteria for Upland paddy

Crop requirement		Rating			
Soil –site characteristics	**Unit**	**Highly suitable (S1)**	**Moderately suitable(S2)**	**Marginally suitable(S3)**	**Not suitable(N)**
Slope	%	1-3	1-3	3-5	>5
Soil drainage	class	Well to mod.	poorly	Very poorly	
Soil reaction	pH	5.5-6.5	6.5-7.3,4.5-5.4	7.3-8.4	>8.4
Surface soil texture	Class	c,sic,cl,sicl,sc	scl, sil, l	sl, ls	s
Soil depth	Cm	>75	50-75	25-50	<25
Gravel content	% vol.	<15	15-35	35-60	60-80

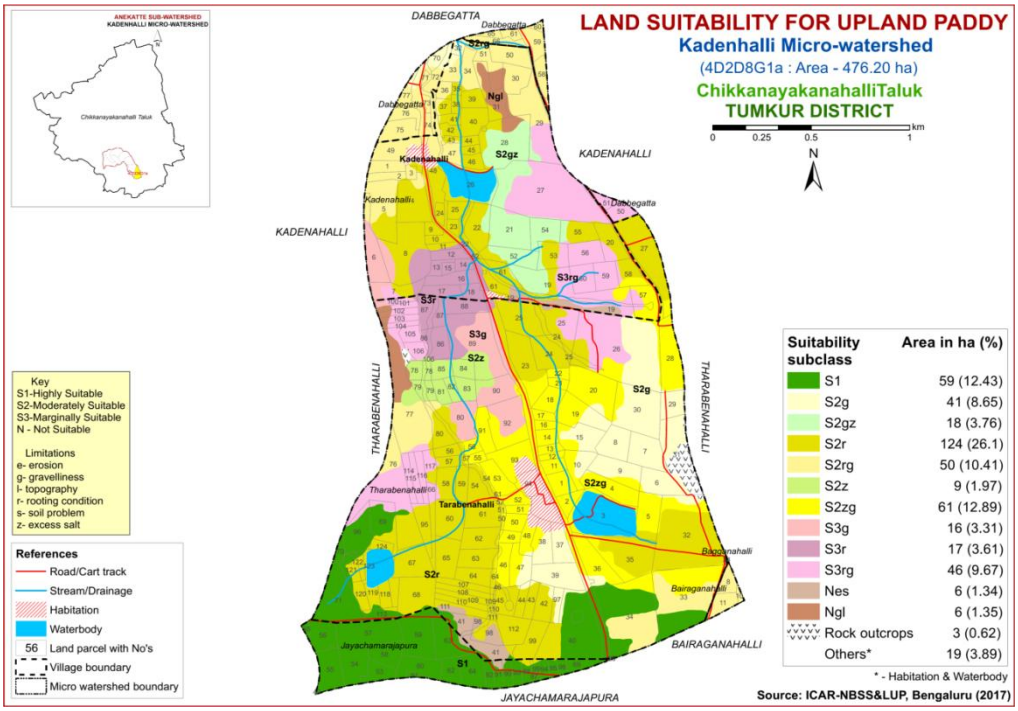


Fig. 7.4 Land Suitability map of Upland paddy

An area of about 59 ha (12%) is highly suitable (Class S1) for growing upland paddy and are distributed in the southern and southwestern part of the microwatershed. A major area of about 303 ha (64%) is moderately suitable (Class S2) for growing upland paddy and are distributed in all parts of the microwatershed. They have minor limitations of rooting depth, excess salt and gravelliness. Marginally suitable lands (Class S3) occupy an area of about 79 ha (17%) and occur in the western, southwestern, central and northeastern part of the microwatershed. They have moderate limitations of gravelliness and rooting depth. A small area of about 12 ha (3%) is not suitable (Class N) for growing upland paddy and are distributed in the western, northern and southern part of the microwatershed. They have severe limitations of gravelliness, soil problem, erosion and topography.

7.5 Land Suitability for Finger millet (*Eleusine coracana*)

Finger millet is one of the most important food crop grown in an area of 7.08 lakh ha in almost all the districts of south Karnataka. The crop requirements for growing Finger millet (Table 7.6) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing Finger millet was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.5.

An area of about 59 ha (12%) is highly suitable (Class S1) for growing Finger millet and are distributed in the southern and southwestern part of the microwatershed. A major area of about 320 ha (67%) is moderately suitable (Class S2) for growing Finger millet and are distributed in all parts of the microwatershed. They have minor limitations of rooting depth, excess salt and gravelliness. Marginally suitable lands (Class S3) for

growing finger millet occupy an area of about 62 ha (13%) and occur in the central, western, southwestern and northeastern part of the microwatershed. They have moderate limitations of gravelliness and rooting depth. An area of about 12 ha (3%) is not suitable (Class N) for growing finger millet and are distributed in the southern, western and northern part of the microwatershed. They have severe limitations of gravelliness, erosion, soil problem and topography.

Table 7.6 Land suitability criteria for Finger millet

Crop requirement		Rating			
Soil –site characteristics	**Unit**	**Highly suitable(S1)**	**Moderately suitable(S2)**	**Marginally suitable (S3)**	**Not suitable(N)**
Slope	%	<3	3-5	5-10	>10
LGP	Days	>110	90-110	60-90	<60
Soil drainage	class	Well to mod. drained	Imperfectly drained	Poorly/excessively	V.poorly
Soil reaction	pH	5.5-7.3	7.3-8.4	8.4-9.0	>9.0
Surface soil texture	Class	l, sil, sl, cl, sicl, scl	sic, c, sc	ls, s,c >60%	
Soil depth	Cm	>75	50-75	25-50	<25
Gravel content	% vol.	<15	15-35	35-60	>60
Salinity (ECe)	dS m^{-1}	<1.0	1.0-2.0	2.0-4.0	
Sodicity (ESP)	%	<10	10-15	15-25	>25

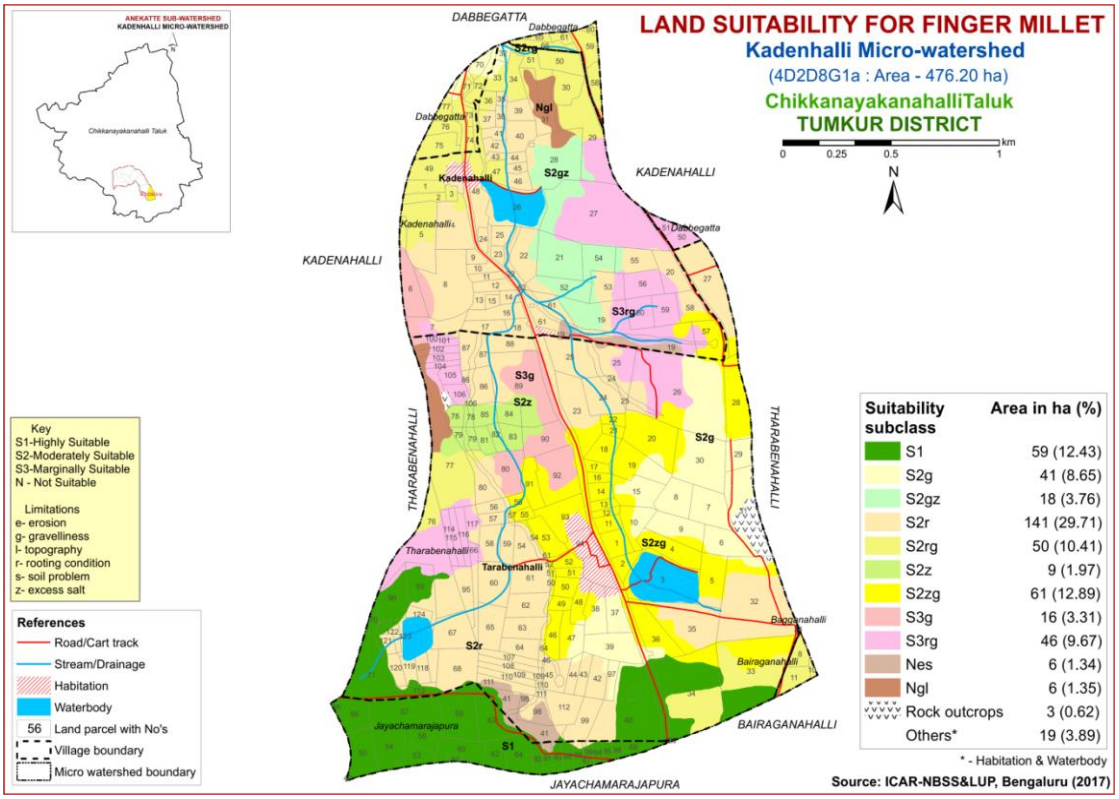


Fig. 7.5 Land Suitability map of Finger millet

7.6 Land suitability criteria for Red gram (*Cajanus cajan)*

Redgram is one of the most important pulse crop grown in an area of 7.28 lakh ha in almost all the districts of the State. The crop requirements for growing red gram (Table 7.7) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing redgram was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.6.

Table 7.7 Land suitability criteria for Red gram

Crop requirement		Rating			
Soil –site characteristics	**Unit**	**Highly suitable(S1)**	**Moderately suitable (S2)**	**Marginally suitable(S3)**	**Not suitable(N)**
Slope	%	<3	3-5	5-10	>10
LGP	Days	>210	180-210	150-180	<150
Soil drainage	Class	Well drained	Mod. well drained	Imperfectly drained	Poorly drained
Soil reaction	pH	6.5-7.5	5.0-6.5, 7.6-8.0	8.0-9.0	>9.0
Sub Surface soil texture	Class	l, scl, sil, cl, sl	sicl, sic, c(m)	ls	
Soil depth	Cm	>100	75-100	50-75	<50
Gravel content	% vol.	<15	15-35	3-60	>60
Salinity (EC)	ds m^{-1}	<1.0	1.0-2.0	>2.0	
Sodicity (ESP)	%	<10	10-15	>15	

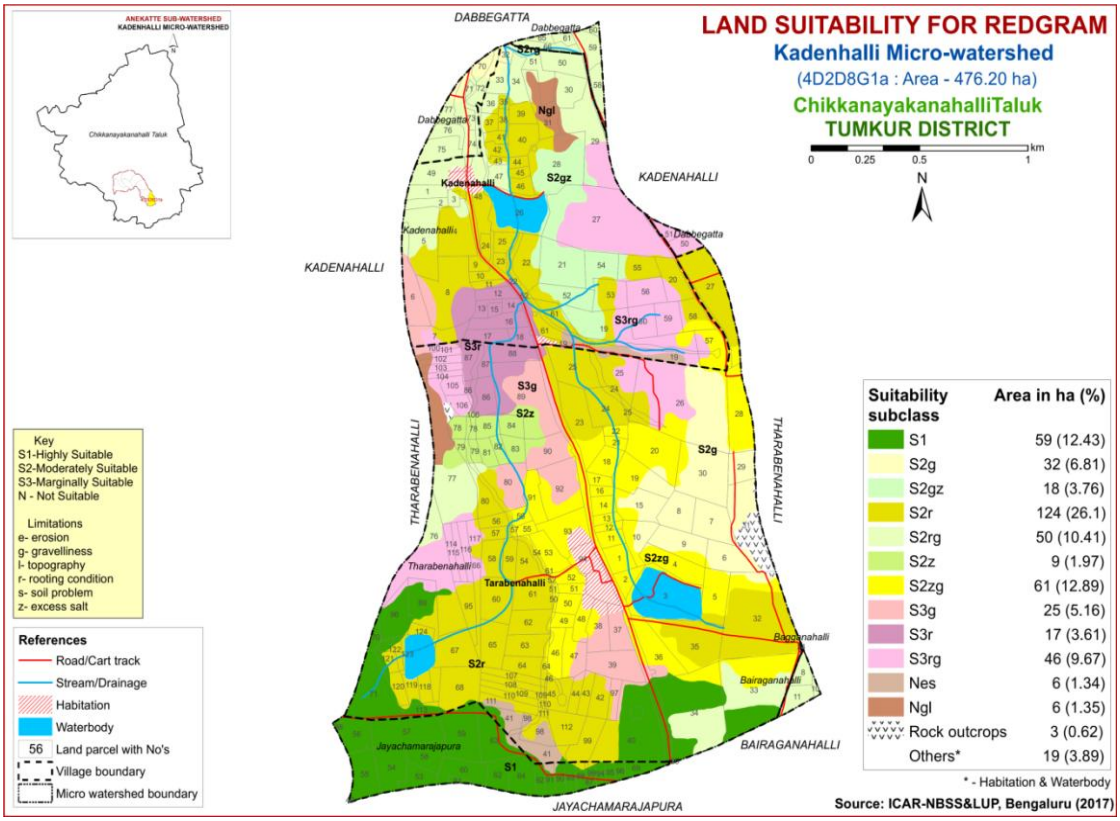


Fig. 7.6 Land Suitability map of Redgram

An area of about 59 ha (12%) is highly suitable (Class S1) for growing redgram and are distributed in the southern and southwestern part of the microwatershed. A major area of about 294 ha (62%) is moderately suitable (Class S2) for growing redgram and are distributed in all parts of the microwatershed. They have minor limitations of rooting depth, excess salt and gravelliness. Marginally suitable lands (Class S3) occupy an area of about 88 ha (18%) and occur in the southwestern, central, western and northeastern part of the microwatershed. They have moderate limitations of gravelliness and rooting depth. A small area of about 12 ha (3%) is not suitable (Class N) for growing redgram and are distributed in the southern, western and northern part of the microwatershed. They have severe limitations of gravelliness, soil problem, erosion and topography.

7.7 Land suitability for Horsegram (*Macrotyloma uniflorum*)

Horsegram is one of the most important pulse crop grown in an area of 1.81 lakh ha in almost all the districts of the State. The crop requirements for growing horsegram were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing horsegram (Table 7.8) was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.7.

Table 7.8 Land suitability criteria for Horse gram

Crop requirement		Rating			
Soil –site characteristics	**Unit**	**Highly suitable (S1)**	**Moderately Suitable (S2)**	**Marginally suitable(S3)**	**Not suitable(N)**
Slope	%	<3	3-5	5-10	>10
LGP	Days				
Soil drainage	Class	Well drained/ mod.well drained	imperfectly drained	Poorly drained	Very Poorly drained
Soil reaction	pH	6.0-8.5	8.5-9.0,5.5-5.9	9.1-9.5,5.0-5.4	>9.5
Surface soil texture	Class	l, sl, scl, cl, sc	Ls, sic, sicl, c, ls	Heavy clays (>60%)	-
Soil depth	Cm	50-75	25-50	<25	-
$CaCO_3$ in root zone	% vol.	<15	15-25	25-30	>30
Salinity (ECe)	ds m^{-1}	<1.0	1.0-2.0	>2.0	
Sodicity (ESP)	%	<10	10-15	>15	-

An area of about 109 ha (23%) is highly suitable (Class S1) for growing horsegram and are distributed in the southern, southeastern, southwestern, western and northern part of the microwatershed. Maximum area of about 269 ha (57%) is moderately suitable (Class S2) for growing horsegram and are distributed in all parts of the microwatershed. They have minor limitations of gravelliness, rooting depth and excess salt. Marginally suitable lands (Class S3) occupy an area of about 63 ha (13%) and occur in the western, central and northeastern part of the microwatershed. They have moderate limitations of gravelliness and rooting depth. A small area of about 12 ha (3%) is not suitable (Class N) for growing horsegram and are distributed in the southern, western and northern part of the microwatershed. They have severe limitations of gravelliness, soil problem, erosion and topography.

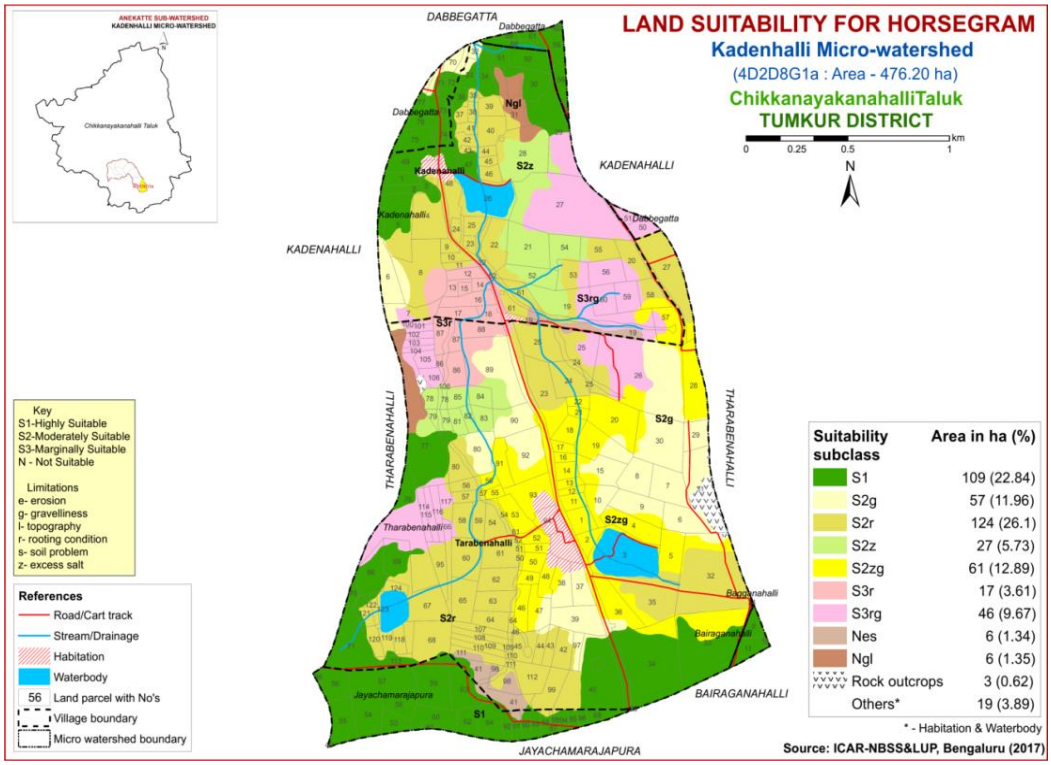


Fig. 7.7 Land Suitability map of Horsegram

7.8 Land suitability for Field Bean (*Dolichos lablab*)

Field Bean is one of the most important pulse crop grown in an area of 0.68 lakh ha in almost all the districts of the State. The crop requirements (Table 7.9) for growing field bean were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing field bean was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Fig. 7.8.

Table 7.9 Land suitability criteria for Field Bean

Crop requirement		**Rating**			
Soil-site characteristics	**Unit**	**Highly suitable (S1)**	**Moderately suitable (S2)**	**Marginally suitable (S3)**	**Not suitable(N)**
Slope	%	<3	3-5	5-10	>10
LGP	Days	>120	90-120	70-90	<70
Soil drainage	Class	Well drained/ mod.welldrained	imperfectly drained	Poorly drained	Very Poorly drained
Soil reaction	pH	6.0-8.5	8.5-9.0,5.5-5.9	9.1-9.5,5.0-5.4	>9.5
Sub Surface soil texture	Class	l, sl, scl, cl, sc	sic, sicl, c	Heavy clays (>60%), ls	s
Soil depth	Cm	>75	50-75	25-50	<25
$CaCO_3$ in root zone	%vol.	<15	15-35	35-50	>50
Salinity (EC)	ds m^{-1}	<1.0	1.0-2.0	>2.0	
Sodicity (ESP)	%	<10	10-15	15-20	>20

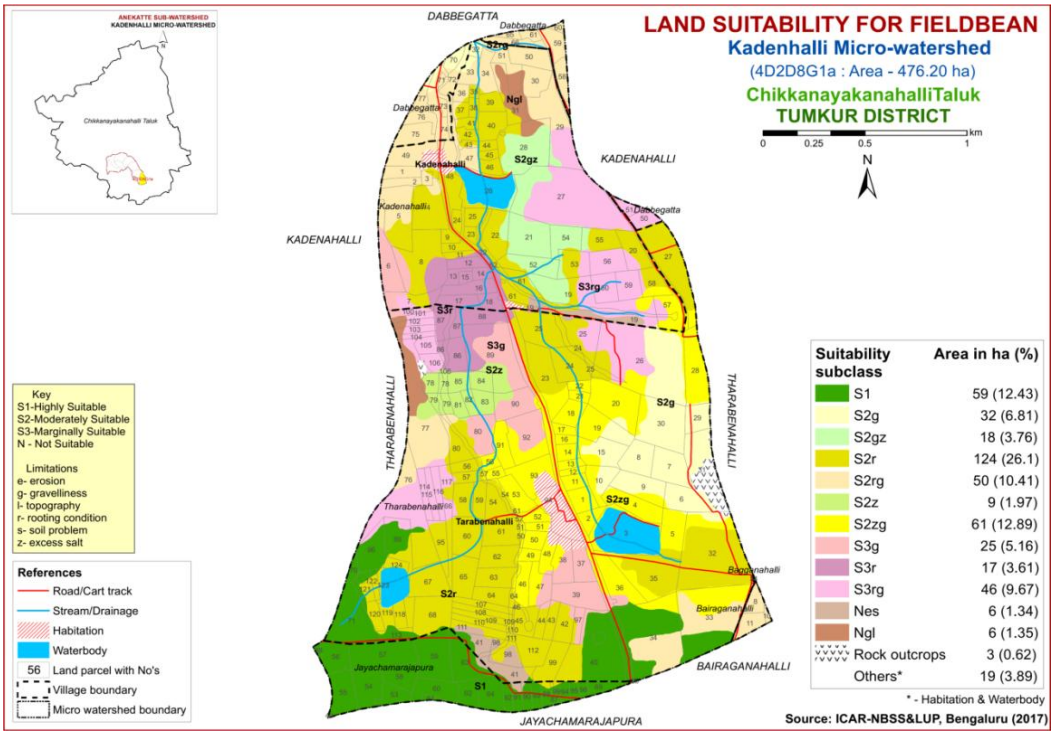


Fig. 7.8 Land Suitability map of Field bean

7. 9 Land Suitability for Cowpea (*Vigna radiata*)

Cowpea is one of the most important pulse crop grown in an area of 0.80 lakh ha in almost all the districts of the State. The crop requirements for growing cowpea were matched with the soil-site characteristics and a land suitability map for growing cowpea was generated.

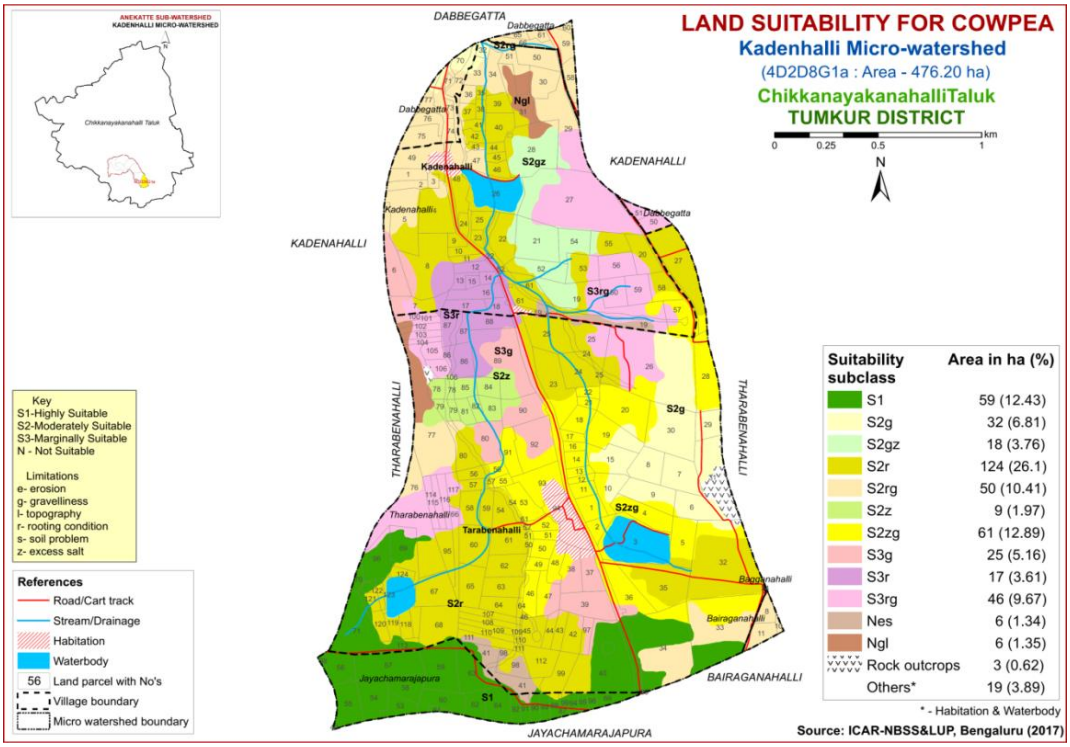


Fig. 7.9 Land Suitability map of Cowpea

The area extent and their geographical distribution of different suitability subclasses in the microwatersheds is given in Figure 7.9.

An area of about 59 ha (12%) is highly suitable (Class S1) for growing cowpea and are distributed in the southern and southwestern part of the microwatershed. A major area of about 294 ha (62%) is moderately suitable (Class S2) for growing cowpea and are distributed in all parts of the microwatershed. They have minor limitations of rooting depth, excess salt and gravelliness. Marginally suitable lands (Class S3) occupy an area of about 88 ha (18%) and occur in the southwestern, central, western and northeastern part of the microwatershed. They have moderate limitations of gravelliness and rooting depth. A small area of about 12 ha (3%) is not suitable (Class N) for growing cowpea and are distributed in the southern, western and northern part of the microwatershed. They have severe limitations of gravelliness, soil problem, erosion and topography.

7.10 Land Suitability for Groundnut (*Arachis hypogaea*)

Groundnut is one of the major oilseed crop grown in an area of 6.54 lakh ha in Karnataka in most of the districts either as rainfed or irrigated crop. The crop requirements for growing groundnut (Table 7.10) were matched with the soil-site characteristics (Table 7.1) of the soils of the microwatershed and a land suitability map for growing groundnut was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.10.

An area of about 30 ha (6%) is highly suitable (Class S1) for growing groundnut and are distributed in the southeastern and southwestern part of the microwatershed. Moderately suitable (Class S2) lands cover a maximum area of about 257 ha (54%) and occur in all parts of the microwatershed.

Table 7.10 Crop suitability criteria for Groundnut

Crop requirement		Rating			
Soil–site characteristics	**Unit**	**Highly suitable(S1)**	**Moderately suitable (S2)**	**Marginally suitable(S3)**	**Not suitable(N)**
Slope	%	<3	3-5	5-10	>10
LGP	Days	100-125	90-105	75-90	
Soil drainage	Class	Well drained	Mod. Well drained	Imperfectly drained	Poorly drained
Soil reaction	pH	6.0-8.0	8.1-8.5,5.5-5.9	>8.5,<5.5	
Surface soil texture	Class	l, cl, sil, sc, sicl	sc, sic, c,	s, ls, sl c (>60%)	s, fragmental
Soil depth	Cm	>75	50-75	25-50	<25
Gravel content	% vol.	<35	35-50	>50	
$CaCO_3$ in root zone	%	high	Medium	low	
Salinity (EC)	dS m^{-1}	<2.0	2.0-4.0	4.0-8.0	
Sodicity (ESP)	%	<5	5-10	>10	

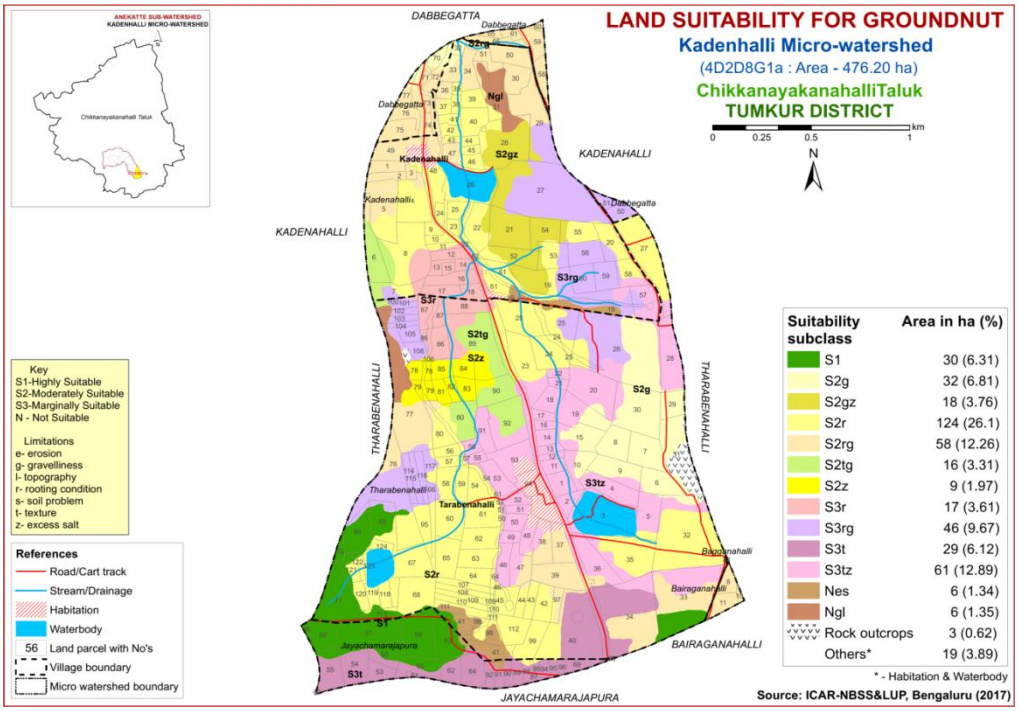


Fig. 7.10 Land Suitability map of Groundnut

They have minor limitations rooting depth, excess salt, texture and gravelliness. Marginally suitable lands (Class S3) for growing groundnut occupy an area of about 153 ha (32%) and occur in the central, western, eastern, southeastern, southern and northeastern part of the microwatershed. They have moderate limitations of gravelliness, texture, rooting depth and excess salt. A small area of about 12 ha (3%) is not suitable (Class N) for growing groundnut and are distributed in the southern, southwestern and northern part of the microwatershed. They have severe limitations of gravelliness, erosion, soil problem and topography.

7.11 Land Suitability for Sunflower (*Helianthus annus*)

Sunflower is one of the most important oilseed crop grown in an area of 3.56 lakh ha in the State in all the districts. The crop requirements for growing sunflower (Table 7.11) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing sunflower was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.11.

An area of about 54 ha (11%) is highly suitable (Class S1) for growing sunflower and are distributed in the southern, southwestern and southeastern part of the microwatershed. An area of about 107 ha (23%) is moderately suitable (Class S2) for growing sunflower and are distributed in the central, eastern and southeastern part of the microwatershed. They have minor limitations of rooting depth, excess salt and gravelliness. Marginally suitable lands (Class S3) for growing sunflower occupy major area of about 262 ha (52%) and occur in all parts of the microwatershed. They have moderate limitations of gravelliness, rooting depth and excess salt. A small area of about

29 ha (6%) is not suitable (Class N) for growing sunflower and are distributed in the central and western part of the microwatershed. They have severe limitations of gravelliness, rooting depth, erosion, soil problem and topography.

Table 7.11 Crop suitability criteria for Sunflower

Crop requirement		Rating			
Soil–site characteristics	**Unit**	**Highly suitable(S1)**	**Moderately suitable (S2)**	**Marginally suitable(S3)**	**Not suitable(N)**
Slope	%	<3	3-5	5-10	>10
LGP	Days	>90	80-90	70-80	<70
Soil drainage	Class	Well drained	Mod. well rained	Imperfectly drained	Poorly drained
Soil reaction	pH	6.5-8.0	8.1-8.55.5-6.4	8.6-9.0;4.5-5.4	>9.0<4.5
Surface soil texture	Class	l, cl, sil, sc	scl, sic, c,	c (>60%), sl	ls, s
Soil depth	Cm	>100	75-100	50-75	<50
Gravel content	% vol.	<15	15-35	35-60	>60
Salinity (EC)	dSm^{-1}	<1.0	1.0-2.0	>2.0	
Sodicity (ESP)	%	<10	10-15	>15	

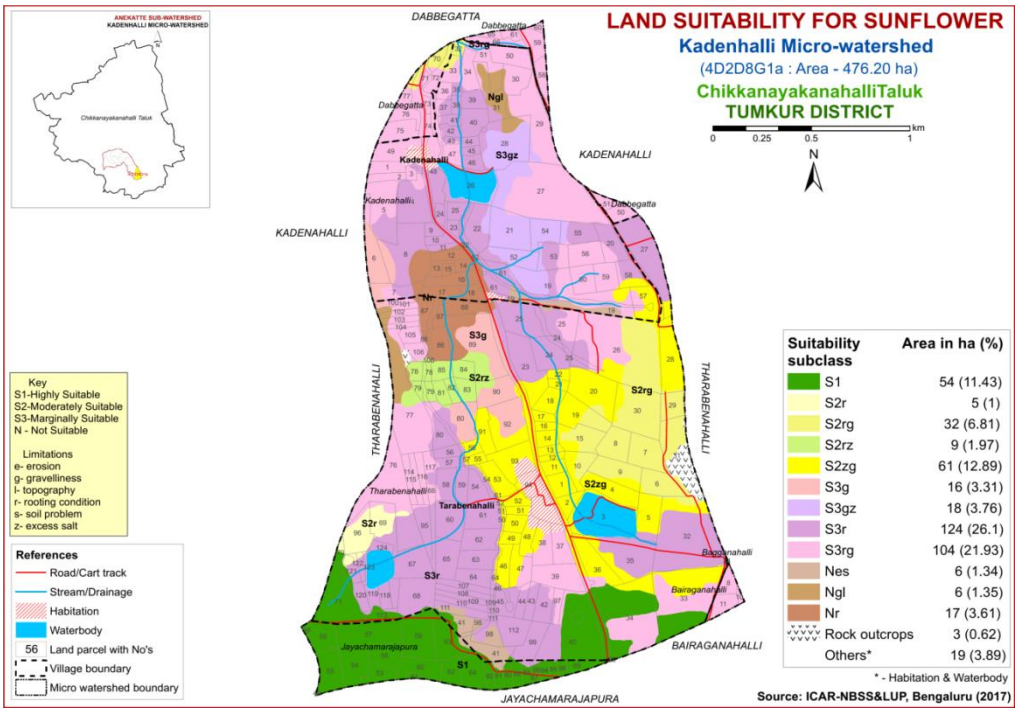


Fig. 7.11 Land Suitability map of Sunflower

7.12 Land Suitability for Onion (*Allium cepa*)

Onion is one of the most important vegetable crop grown in Raichur, Dharwad, Belgaum, Gulbarga, Bijapur, Bidar, Bellary, Chitradurga and Tumakuru districts. The crop requirements for growing onion (Table 7.12) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing Onion was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.12.

Table 7.12 Land suitability criteria for Onion

Crop requirement		Rating			
Soil –site characteristics	**Unit**	**Highly suitable (S1)**	**Moderately suitable (S2)**	**Marginally suitable (S3)**	**Not suitable(N)**
Mean temperature in growing season	^{0}c	20-30	30-35	35-40	>40
Slope	%	<3	3-5	5-10	>10
Soil drainage	Class	Well drained	Moderately /imperfectly	Poor drained	Very poorly drained
Soil reaction	pH	6.5-7.3	7.3-7.8, 5.0-5.4	7.8-8.4,<5.0	>8.4
Surface soil texture	Class	scl, sil, sl	sc,sicl,c(red soil)	sc,c(black soil)	ls
Soil depth	Cm	>75	50-75	25-50	<25
Gravel content	% vol.	<15	15-35	35-60	60-80
Salinity (ECe)	ds m^{-1}	<1.0	1.0-2.0	2.0-4.0	<4
Sodicity (ESP)	%	<5	5-10	10-15	>15

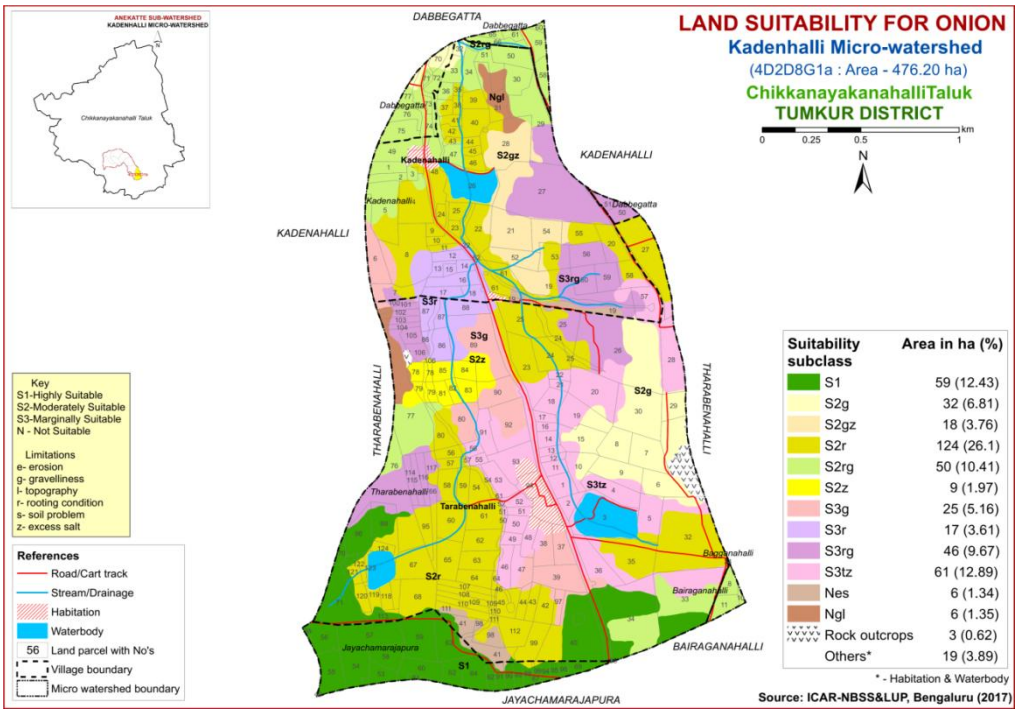


Fig. 7.12 Land Suitability map of Onion

An area of about 59 ha (12%) is highly suitable (Class S1) for growing onion and are distributed in the southwestern and southern part of the microwatershed. Moderately suitable (Class S2) lands cover a maximum area of about 233 ha (49%) and occur in all parts of the microwatershed. They have minor limitations rooting depth, excess salt and gravelliness. Marginally suitable lands (Class S3) for growing onion occupy an area of about 149 ha (31%) and occur in the central, western, eastern, southeastern and northeastern part of the microwatershed. They have moderate limitations of gravelliness, texture, rooting depth and excess salt. A small area of about 12 ha (3%) is not suitable (Class N) for growing onion and are distributed in the southern, western and northern part

of the microwatershed. They have severe limitations of gravelliness, erosion, soil problem and topography.

7.13 Land Suitability for Chilli (*Capscicum annuum L.*)

Chilli is one of the most important commercial spice crop grown in 0.78 lakh ha area in all the districts of the State. The crop requirements for growing Chilli (Table 7.13) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing Chilli was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.13.

Table 7.13 Land suitability criteria for chilli

Crop requirement		Rating			
Soil –site characteristics	**Unit**	**Highly suitable(S1)**	**Moderately suitable(S2)**	**Marginally suitable (S3)**	**Not suitable(N)**
Slope	%	<3	3-5	5-10	
LGP	Days	>150	120-150	90-120	<90
Soil drainage	class	Well drained	Mod.to imperf.drained	Poor drained/ excessively	Very poorly drained
Soil reaction	pH	6.0-7.0	7.1-8.0	8.1-9.0,5.0-5.9	>9.0
Surface soil texture	Class	L, scl, cl, sil	sl,sc,sic,c(m/k)	c(ss), ls, s	
Soil depth	Cm	>75	50-75	25-50	<25
Gravel content	%vol.	<15	15-35	>35	
Salinity (ECe)	ds m^{-1}	<1.0	1.0-2.0	2.0-4.0	<4
Sodicity (ESP)	%	<5	5-10	10-15	

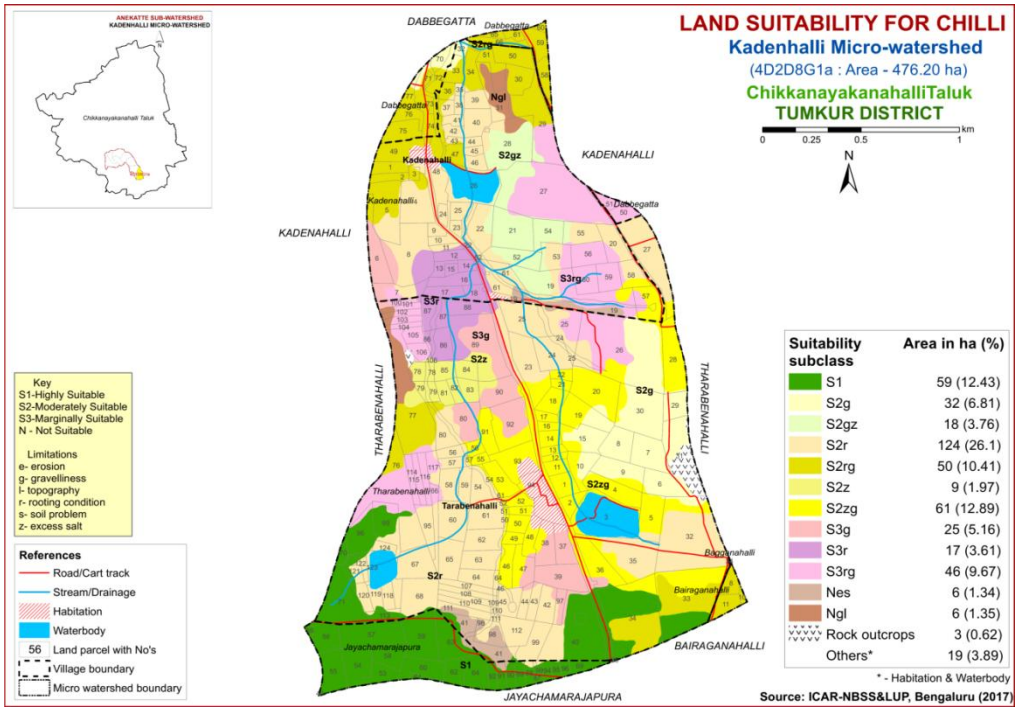


Fig. 7.13 Land Suitability map of Chilli

An area of about 59 ha (12%) is highly suitable (Class S1) for growing chilli and are distributed in the southern and southwestern part of the microwatershed. A major area

of about 294 ha (62%) is moderately suitable (Class S2) for growing chilli and are distributed in all parts of the microwatershed. They have minor limitations of rooting depth, excess salt and gravelliness. Marginally suitable lands (Class S3) occupy an area of about 88 ha (18%) and occur in the southwestern, central, western and northeastern part of the microwatershed. They have moderate limitations of gravelliness and rooting depth. A small area of about 12 ha (3%) is not suitable (Class N) for growing chilli and are distributed in the southern, western and northern part of the microwatershed. They have severe limitations of gravelliness, soil problem, erosion and topography.

7.14 Land suitability for Brinjal (*Solanum melongena*)

Brinjal is one of the most important vegetable crop grown in all the districts. The crop requirements for growing Brinjal (Table 7.14) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing Brinjal was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.14.

Table 7.14 Land suitability criteria for Brinjal

Crop requirement			Rating			
Soil –site characteristics		Unit	Highly suitable(S1)	Moderately suitable (S2)	Marginally suitable(S3)	Not suitable(N)
Soil aeration	Soil drainage	Class	Well drained	Moderately well drained	Poorly drained	V. Poorly drained
Nutrient availability	Texture	Class	sl, scl, cl, sc	c (red)	Ls, c (black)	-
	pH	1:2.5	6.0-7.3	7.3-8.4,5.5-6.0	8.4-9.0	>9.0
Rooting conditions	Soil depth	Cm	>75	50-75	25-50	<25
	Gravel content	% vol.	<15	15-35	35-60	>60
Erosion	Slope	%	0-3	3-5	5-10	>10

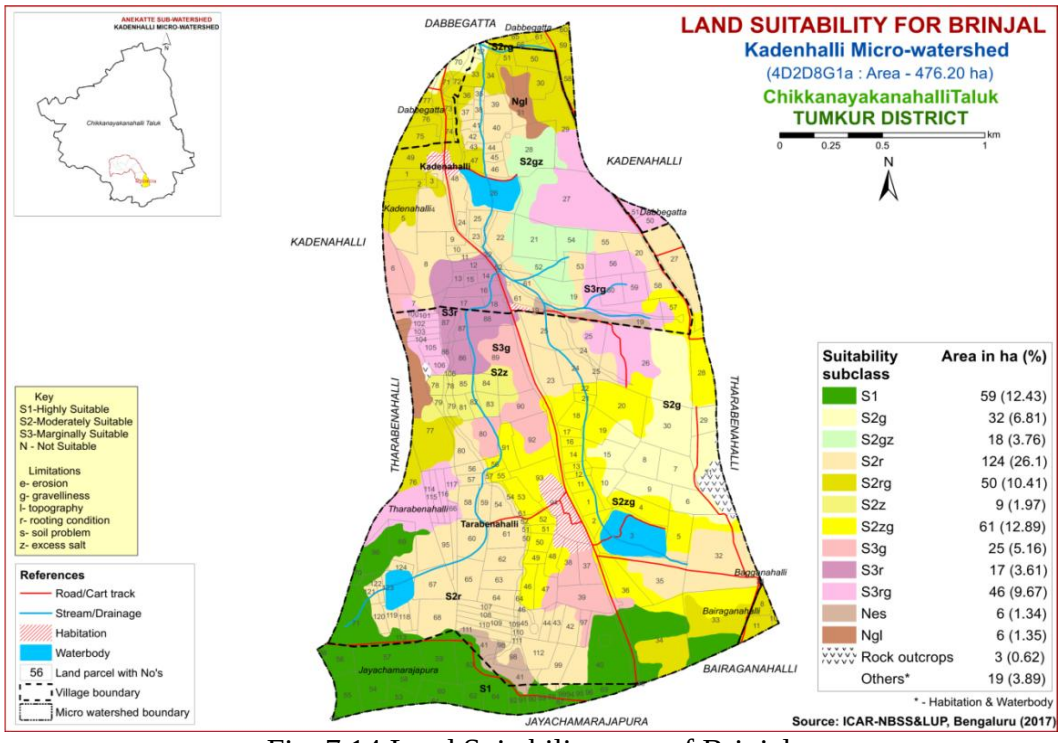


Fig. 7.14 Land Suitability map of Brinjal

An area of about 59 ha (12%) is highly suitable (Class S1) for growing brinjal and are distributed in the southern and southwestern part of the microwatershed. A major area of about 294 ha (62%) is moderately suitable (Class S2) for growing brimjal and are distributed in all parts of the microwatershed. They have minor limitations of rooting depth, excess salt and gravelliness.

Marginally suitable lands (Class S3) occupy an area of about 88 ha (18%) and occur in the southwestern, central, western and northeastern part of the microwatershed. They have moderate limitations of gravelliness and rooting depth. A small area of about 12 ha (3%) is not suitable (Class N) for growing brinjal and are distributed in the southern, western and northern part of the microwatershed. They have severe limitations of gravelliness, soil problem, erosion and topography.

7. 15 Land suitability for Tomato (*Lycopersicon esculentum*)

Tomato is one of the most important vegetable crop grown in all the districts. The crop requirements for growing Tomato (Table 7.15) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing Tomato was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.15.

Table 7.15 Land suitability criteria for Tomato

Crop requirement			**Rating**			
Soil –site characteristics		**Unit**	**Highly suitable(S1)**	**Moderately suitable(S2)**	**Marginally suitable(S3)**	**Not suitable(N)**
climate	Temperature in growing season	^{0}c	25-28	29-32 20-24	15-19 33-36	<15 >36
Soil moisture	Growing period	Days	>150	120-150	90-120	
Soil aeration	Soil drainage	class	Well drained	Moderately well drained	Poorly drained	V. poorly drained
Nutrient availability	Texture	Class	l, sl, cl, scl	sic,sicl,sc,c(m/k)	c (ss), ls	s
	pH	1:2.5	6.0-7.3	5.5-6.0,7.3-8.4	8.4-9.0	>9.0
	$CaCO_3$ in root zone	%	Non calcareous	Slightly calcareous	Strongly calcareous	
Rooting conditions	Soil depth	Cm	>75	50-75	25-50	<25
	Gravel content	%vol	<15	15-35	>35	
Soil toxicity	Salinity	ds/m	Non saline	slight	strongly	
	Sodicity(ESP)	%	<10	10-15	>15	-
Erosion	Slope	%	1-3	3-5	5-10	>10

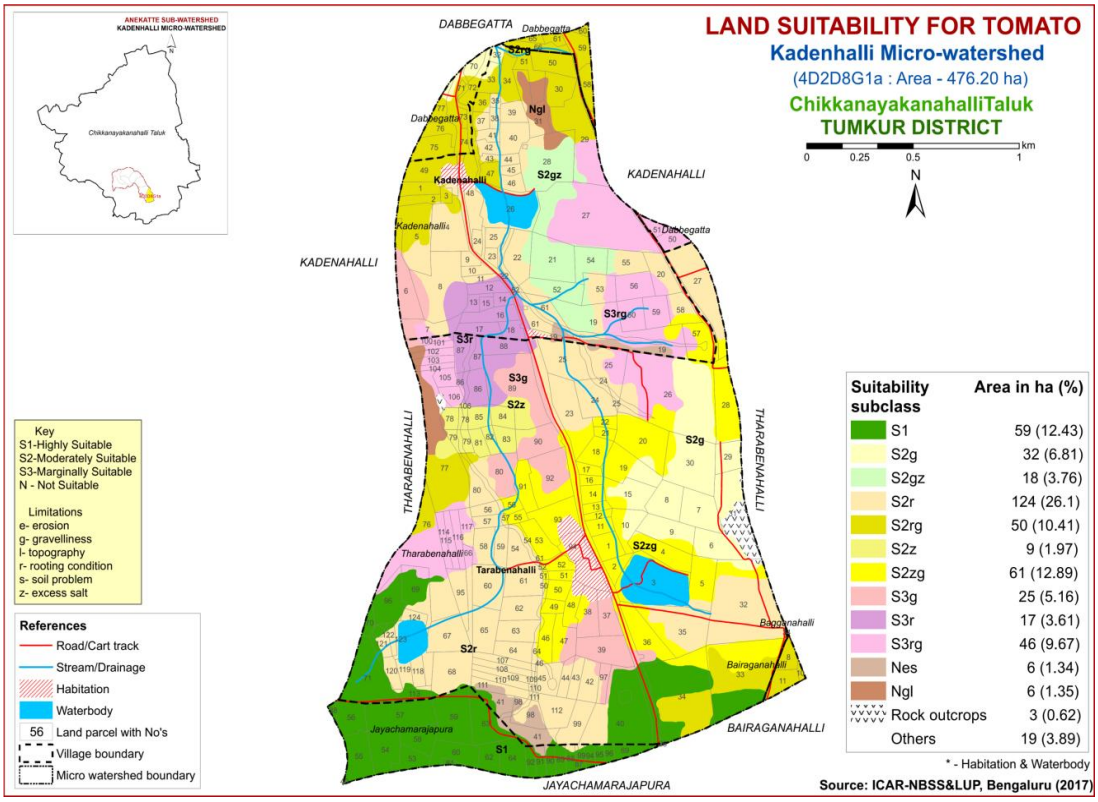


Fig. 7.15 Land Suitability map of Tomato

An area of about 59 ha (12%) is highly suitable (Class S1) for growing tomato and are distributed in the southern and southwestern part of the microwatershed. A major area of about 294 ha (62%) is moderately suitable (Class S2) for growing tomato and are distributed in all parts of the microwatershed. They have minor limitations of rooting depth, excess salt and gravelliness. Marginally suitable lands (Class S3) occupy an area of about 88 ha (18%) and occur in the southwestern, central, western and northeastern part of the microwatershed. They have moderate limitations of gravelliness and rooting depth. A small area of about 12 ha (3%) is not suitable (Class N) for growing tomato and are distributed in the southern, western and northern part of the microwatershed. They have severe limitations of gravelliness, soil problem, erosion and topography.

7.16 Land suitability for Mango (*Mangifera indica*)

Mango is one of the most important fruit crop grown in an area of 18.53 lakh ha in almost all the districts of the State. The crop requirements (Table 7.16) for growing mango were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing mango was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed is given in Figure 7.16.

An area of about 54 ha (11%) is highly suitable (Class S1) for growing mango and are distributed in the southern and southwestern part of the microwatershed. Marginally suitable lands (Class S3) for growing mango occupy an area of about 132 ha (28%) and occur in central, eastern, western and southwestern part of the microwatershed. They have moderate limitations of gravelliness, excess salt and rooting depth. Major area of

about 267 ha (56%) is not suitable (Class N) for growing mango and are distributed in all parts of the microwatershed. They have severe limitations of gravelliness, erosion, soil problem, rooting depth and topography.

Table 7.16 Crop suitability criteria for Mango

Crop requirement			Rating			
Soil-site characteristics		**Unit**	**Highly suitable(S1)**	**Moderately suitable(S2)**	**Marginally suitable(S3)**	**Not suitable(N)**
Climate	Temp. in growingseason	^{0}C	28-32	24-27 33-35	36-40	20-24
	Min.temp.before flowering	^{0}C	10-15	15-22	>22	
Soil moisture	Growing period	Days	>180	150-180	120-150	<120
Soil aeration	Soil drainage	Class	Well drained	Mod. To imperf.drained	Poor drained	Very poorly drained
	Water table	M	>3	2.50-3.0	2.5-1.5	<1.5
Nutrient availability	Texture	Class	sc, l, sil, cl	sl,sc,sic,l,c	c (<60%)	c (>60%),
	pH	1:2.5	5.5-7.5	7.6-8.5,5.0-5.4	8.6-9.0,4.0-4.9	>9.0<4.0
	OC	%	High	medium	low	
	$CaCO_3$ in root zone	%	Non calcareous	<5	5-10	>10
Rooting conditions	Soil depth	cm	>200	125-200	75-125	<75
	Gravel content	%vol	Non-gravelly	<15	15-35	>35
Soil toxicity	Salinity	dS/m	Non saline	<2.0	2.0-3.0	>3.0
	Sodicity	%	Non sodic	<10	10-15	>15
Erosion	Slope	%	<3	3-5	5-10	

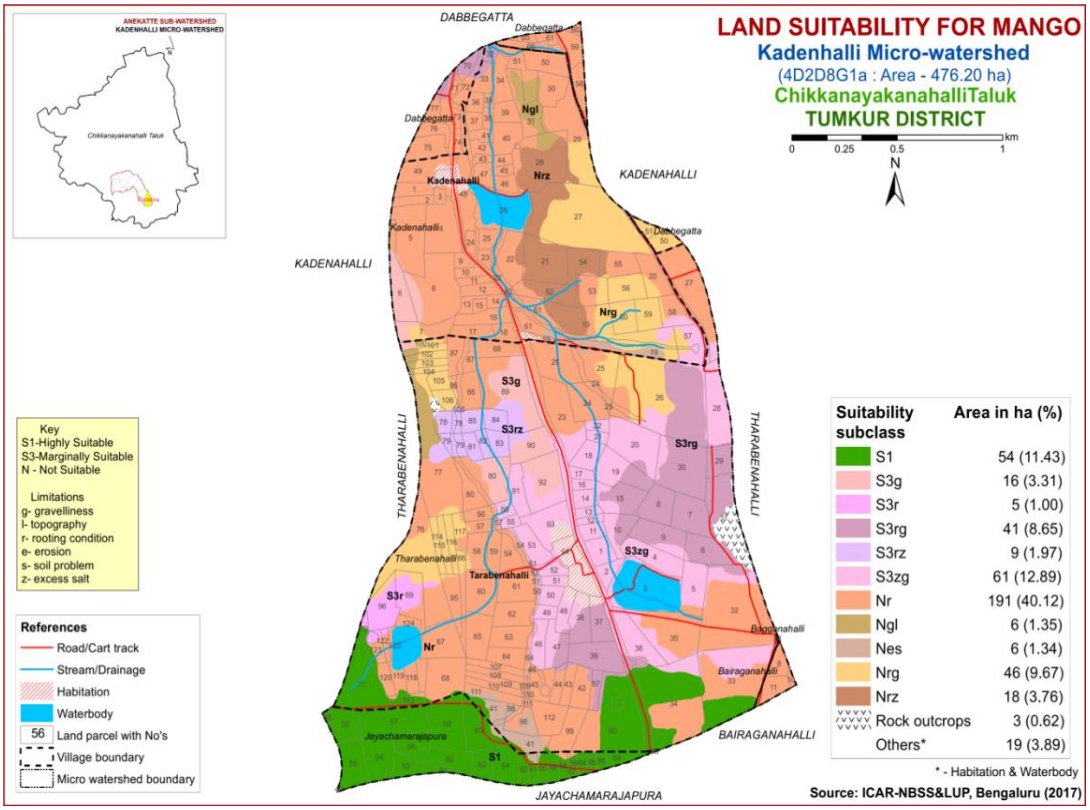


Fig. 7.16 Land Suitability map of Mango

7.17 Land suitability for Sapota (*Manilkara zapota*)

Sapota is one of the most important fruit crop grown in an area of 29373 ha in almost all the districts of the State. The crop requirements (Table 7.17) for growing sapota were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing sapota was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.17.

Table 7.17 Crop suitability criteria for Sapota

Crop requirement			Rating			
Soil –site characteristics		**Unit**	**Highly suitable(S1)**	**Moderately suitable(S2)**	**Marginally suitable(S3)**	**Not suitable(N)**
Climate	Temperature in growing season	^{0} C	28-32	33-36 24-27	37-42 20-23	>42 <18
Soil moisture	Growing period	Days	>150	120-150	90-120	<120
Soil aeration	Soil drainage	Class	Well drained	Moderately well drained	Imperfectly drained	Poorly drained
Nutrient availability	Texture	Class	scl, l, cl, sil	sl, sicl, sc	c (<60%)	ls,s,c(>60%)
	pH	1:2.5	6.0-7.5	7.6-8.0,5.0-5.9	8.1-9.0,4.5-4.9	>9.0,<4.5
	$CaCO_3$ in root zone	%	Non calcareous	<10	10-15	>15
Rooting conditions	Soil depth	Cm	>150	75-150	50-75	<50
	Gravel content	% vol.	Non gravelly	<15	15-35	<35
Soil toxicity	Salinity	dS/m	Non saline	Up to 1.0	1.0-2.0	2.0-4.0
	Sodicity	%	Non sodic	10-15	15-25	>25
Erosion	Slope	%	<3	3-5	5-10	>10

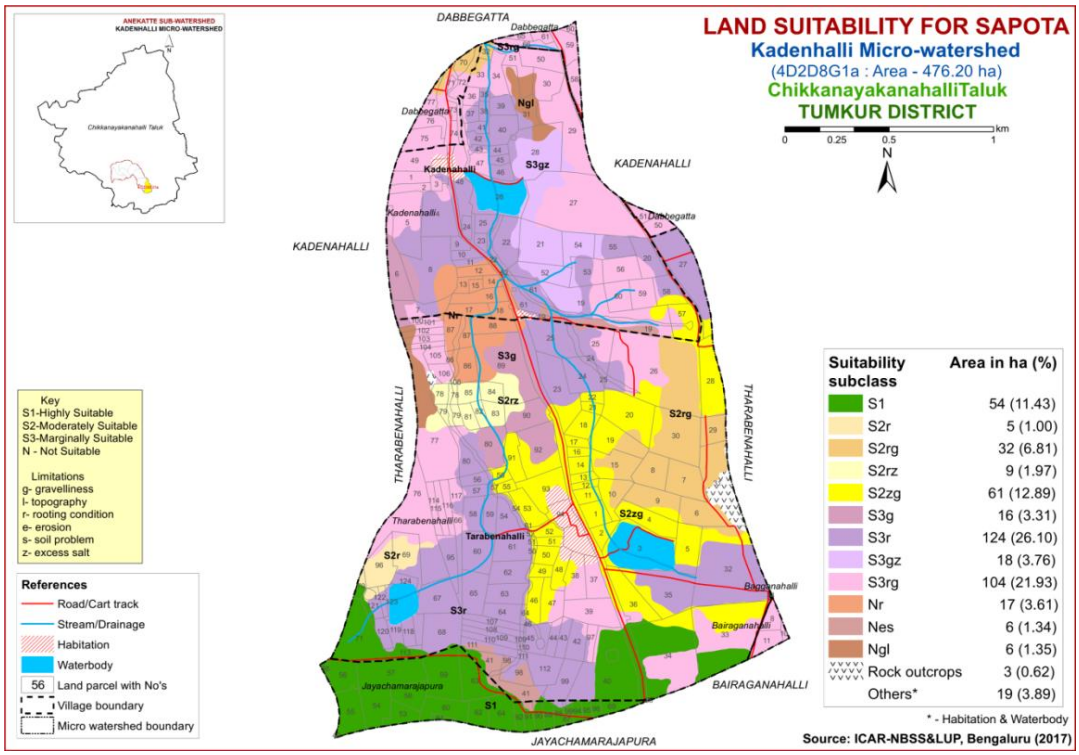


Fig. 7.18 Land Suitability map of Sapota

An area of about 54 ha (11%) is highly suitable (Class S1) for growing sapota and are distributed in the southern, southwestern and southeastern part of the microwatershed. An area of about 107 ha (23%) is moderately suitable (Class S2) for growing sapota and are distributed in the central, eastern and southeastern part of the microwatershed. They have minor limitations of rooting depth, excess salt and gravelliness. Marginally suitable lands (Class S3) for growing sapota occupy major area of about 262 ha (52%) and occur in all parts of the microwatershed. They have moderate limitations of gravelliness, rooting depth and excess salt. A small area of about 29 ha (6%) is not suitable (Class N) for growing sapota and are distributed in the central and western part of the microwatershed. They have severe limitations of gravelliness, rooting depth, erosion, soil problem and topography.

7.18 Land suitability for Guava (*Psidium guajava*)

Guava is one of the most important fruit crop grown in an area of 0.64 lakh ha in almost all the districts of the State. The crop requirements (Table 7.18) for growing guava were matched with the soil-site characteristics (7.1) and a land suitability map for growing guava was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.18.

Table 7.18 Crop suitability criteria for Guava

Crop requirement			Rating			
Soil –site characteristics		Unit	Highly suitable(S1)	Moderately Suitable(S2)	Marginally suitable(S3)	Not suitable(N)
Climate	Temperature in growing season	^{0}C	28-32	33-36 24-27	37-42 20-23	
Soil moisture	Growing period	Days	>150	120-150	90-120	<90
Soil aeration	Soil drainage	Class	Well drained	Mod. to imperfectly	poor	Very poor
Nutrient availability	Texture	Class	scl, l, cl,sil	sl,sicl,sic.,sc,c	c (<60%)	c (>60%)
	pH	1:2.5	6.0-7.5	7.6-8.0:5.0-5.9	8.1-8.5:4.5-4.9	>8.5:<4.5
	$CaCO_3$ in root zone	%	Non calcareous	<10	10-15	>15
Rooting conditions	Soil depth	Cm	>100	75-100	50-75	<50
	Gravel content	% vol.	<15	15-35	>35	
Soil toxicity	Salinity	dS/m	<2.0	2.0-4.0	4.0-6.0	
	Sodicity	%	Non sodic	10-15	15-25	>25
Erosion	Slope	%	<3	3-5	5-10	>10

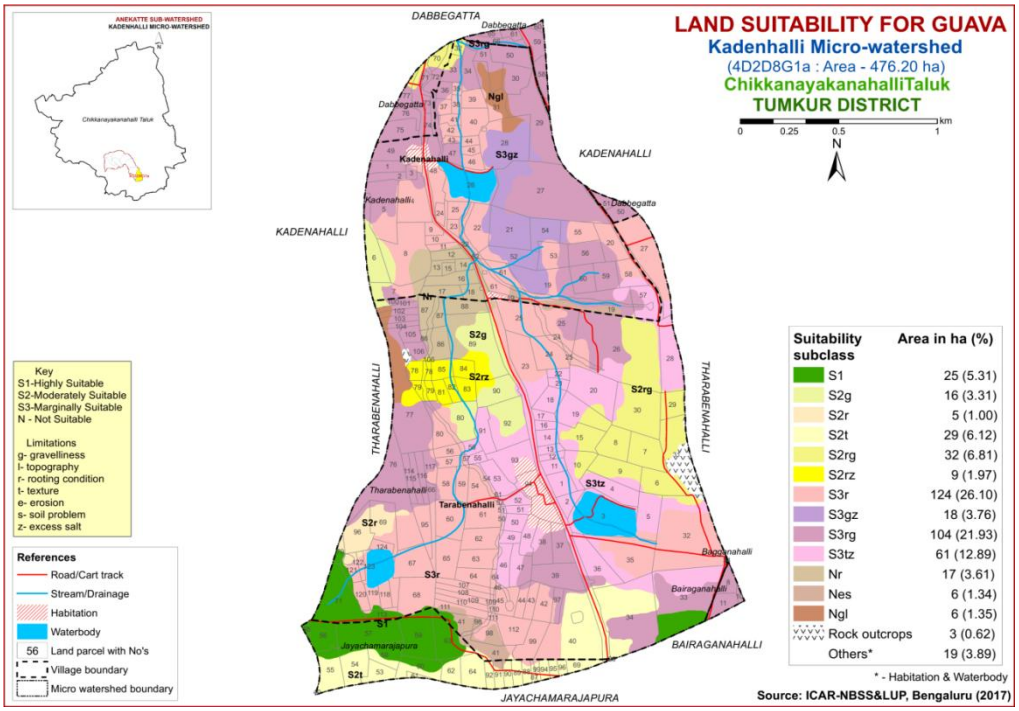


Fig. 7.18 Land Suitability map of Guava

An area of about 25 ha (5%) is highly suitable (Class S1) for growing guava and are distributed in the southern and southwestern part of the microwatershed. An area of about 91 ha (19%) is moderately suitable (Class S2) for growing guava and are distributed in the central, eastern, southern and southwestern part of the microwatershed. They have minor limitations of rooting depth, topography and gravelliness. Marginally suitable lands (Class S3) for growing guava occupy major area of about 307 ha (65%) and occur in all parts of the microwatershed. They have moderate limitations of gravelliness, rooting depth, texture and excess salt. A small area of about 29 ha (6%) is not suitable (Class N) for growing guava and are distributed in the central, northern and western part of the microwatershed. They have severe limitations of gravelliness, rooting depth, erosion, soil problem and topography.

7.19 Land Suitability for Pomegranate (*Punica granatum*)

Pomegranate is one of the commercially grown fruit crop in Karnataka in an area of 0.16 lakh ha mainly in Bijapur, Bagalkot, Koppal, Gadag and Chitradurga districts. The crop requirements for growing pomegranate (Table 7.19) were matched with the soil-site characteristics (Table 7.1) of the soils of the microwatershed and a land suitability map for growing pomegranate was generated.

The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.19.

Table 7.19 Crop suitability criteria for Pomegranate

Crop requirement			Rating			
Soil –site characteristics		**Unit**	**Highly suitable(S1)**	**Moderately suitable(S2)**	**Marginally suitable(S3)**	**Not suitable(N)**
Climate	Temperature in growing season	^{0}C	30-34	35-38 25-29	39-40 15-24	
Soil moisture	Growing period	Days	>150	120-150	90-120	<90
Soil aeration	Soil drainage	class	Well drained	imperfectly drained		
Nutrient availability	Texture	Class	sl, scl, l, cl	c, sic, sicl	cl, s, ls	s, fragmental
Rooting conditions	pH	1:2.5	5.5-7.5	7.6-8.5	8.6-9.0	
	Soil depth	Cm	>100	75-100	50-75	<50
	Gravel content	%vol.	nil	15-35	35-60	>60
Soil toxicity	Salinity	dS/m	Nil	<9	>9	<50
	Sodicity	%	nil			
Erosion	Slope	%	<3	3-5	5-10	

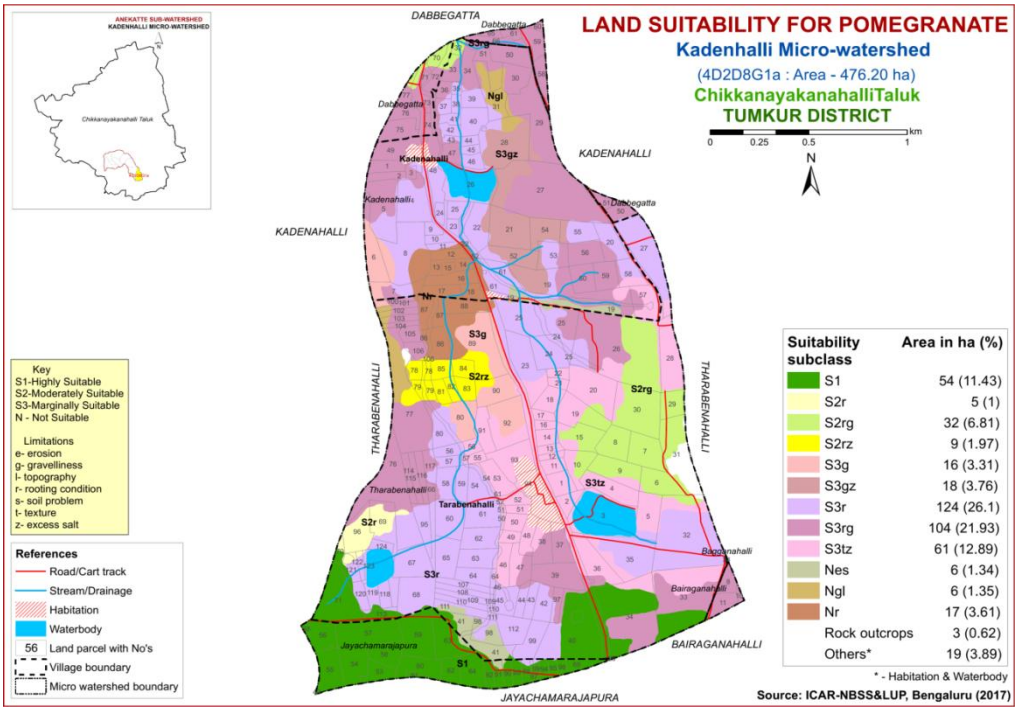


Fig. 7.19 Land Suitability map of Pomegranate

An area of about 54 ha (11%) in the microwatershed is highly suitable (Class S1) for growing pomegranate and are distributed in the southwestern and southeastern part of the microwatershed. An area of about 46 ha (10%) is moderately suitable (Class S2) for growing pomegranate and are distributed in the central, eastern and northern part of the microwatershed and have minor limitations of rooting depth, excess salt and gravelliness. The marginally suitable (Class S3) lands cover a major area of about 323 ha (68%) and are distributed in all parts of the microwatershed. They have moderate limitations of rooting depth, excess salt, texture and gravelliness. A small area of about 29 ha (6%) is

not suitable (Class N) for growing pomegranate and are distributed in the central, northern and western part of the microwatershed. They have severe limitations of gravelliness, rooting depth, erosion, soil problem and topography.

7.20 Land Suitability for Banana (*Musa paradisiaca*)

Banana is one of the major fruit crop grown in an area of 1.02 lakh ha in Karnataka State. The crop requirements for growing banana (Table 7.20) were matched with the soil-site characteristics (Table 7.1) of the soils of the microwatershed and a land suitability map for growing banana was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.20.

An area of about 54 ha (11%) in the microwatershed is highly suitable (Class S1) for growing banana and are distributed in the southwestern and southeastern part of the microwatershed. An area of about 46 ha (10%) is moderately suitable (Class S2) for growing banana and are distributed in the central, eastern and northern part of the microwatershed and have minor limitations of rooting depth, excess salt and gravelliness. The marginally suitable (Class S3) lands cover a major area of about 323 ha (68%) and are distributed in all parts of the microwatershed. They have moderate limitations of rooting depth, excess salt, texture and gravelliness. A small area of about 29 ha (6%) is not suitable (Class N) for growing banana and are distributed in the central, northern and western part of the microwatershed. They have severe limitations of gravelliness, rooting depth, erosion, soil problem and topography.

Table 7.20 Crop suitability criteria for Banana

Crop requirement			Rating			
Soil –site characteristics		**Unit**	**Highly suitable(S1)**	**Moderately Suitable(S2)**	**Marginally suitable(S3)**	**Not suitable(N)**
Climate	Temperature in growing season	^{0}C	26-33	34-36 24-25	37-38	>38
Soil aeration	Soil drainage	Class	Well drained	Moderately to imperf.drained	Poorly drained	Very poorly drained
Nutrient availability	Texture	Class	l,cl, scl,sil	sicl,sc,c(<45%)	c(>45%),sic,sl	ls, s
	pH	1:2.5	6.5-7.0	7.1-8.5,5.5-6.4	>8.5,<5.5	
Rooting conditions	Soil depth	Cm	>125	76-125	50-75	<50
	Stoniness	%	<10	10-15	15-35	>35
Soil toxicity	Salinity	dS/m	<1.0	1-2	>2	
	Sodicity	%	<5	5-10	10-15	>15
Erosion	Slope	%	<3	3-5	5-15	>15

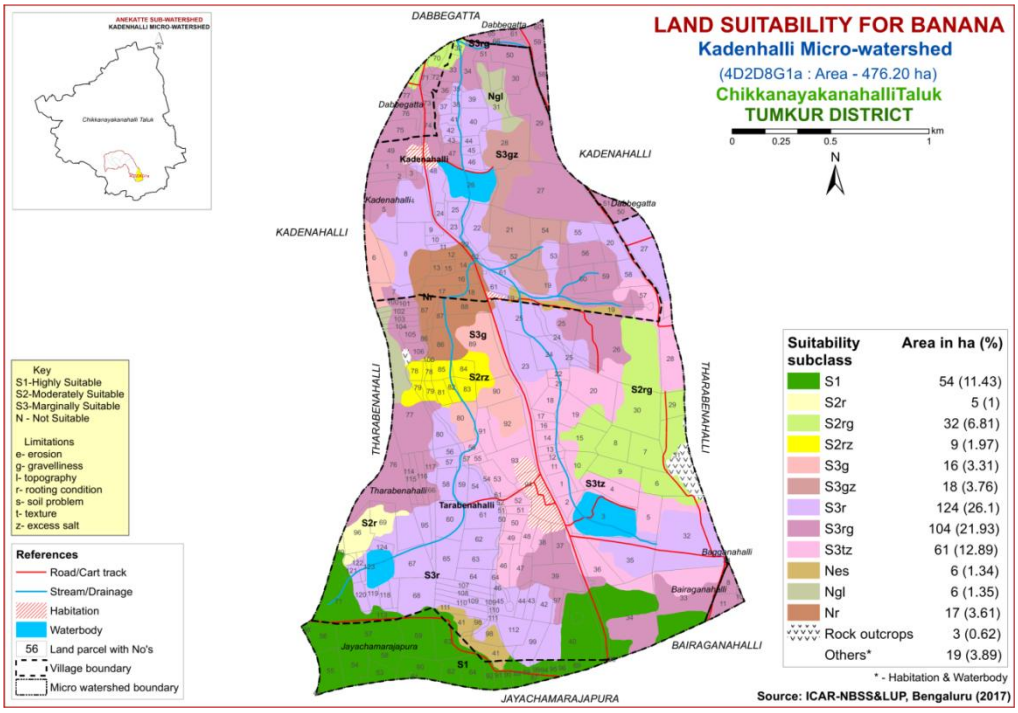


Fig. 7.20 Land Suitability map of Banana

7.21 Land Suitability for Jackfruit (*Artocarpus heterophyllus*)

Jackfruit is one of the most important fruit crop grown in almost all the districts of the State. The crop requirements for growing jackfruit were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing jackfruit (Table 7.21) was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.21.

Table 7.21 Land suitability criteria for Jackfruit

Crop requirement			Rating			
Soil –site characteristics		Unit	Highly suitable(S1)	Moderately suitable(S2)	Marginally suitable(S3)	Not suitable(N)
Soil aeration	Soil drainage	class	well	Mod. well	Poorly	V. Poorly
Nutrient availability	Texture	Class	scl,cl,sc,c(red)	-	sl,ls,c(black)	-
	pH	1:2.5	5.5-7.3	5.0-5.5, 7.3-7.8	7.8-8.4	>8.4
Rooting conditions	Soil depth	Cm	>100	75-100	50-75	<50
	Gravel content	% vol.	<15	15-35	35-60	>60
Erosion	Slope	%	0-3	3-5	>5	-

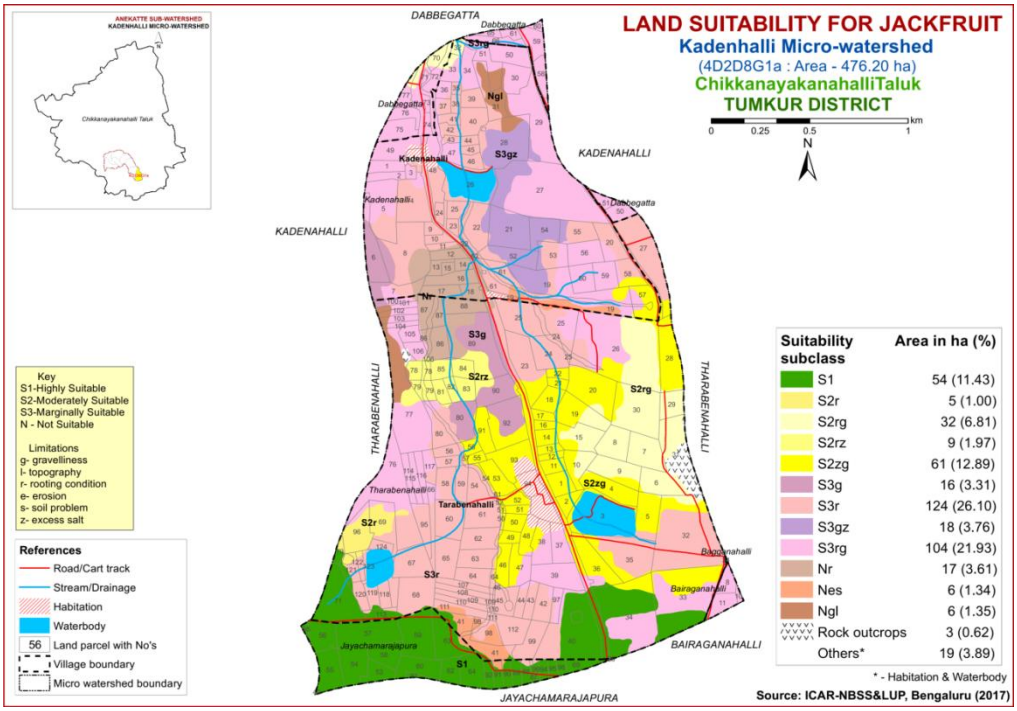


Fig. 7.21 Land Suitability map of Jackfruit

An area of about 54 ha (11%) is highly suitable (Class S1) for growing jackfruit and are distributed in the southern, southwestern and southeastern part of the microwatershed. An area of about 107 ha (23%) is moderately suitable (Class S2) for growing jackfruit and are distributed in the central, eastern and southeastern part of the microwatershed. They have minor limitations of rooting depth, excess salt and gravelliness. Marginally suitable lands (Class S3) for growing jackfruit occupy major area of about 262 ha (52%) and occur in all parts of the microwatershed. They have moderate limitations of gravelliness, rooting depth and excess salt. A small area of about 29 ha (6%) is not suitable (Class N) for growing jackfruit and are distributed in the central and western part of the microwatershed. They have severe limitations of gravelliness, rooting depth, erosion, soil problem and topography.

7.22 Land Suitability for Jamun (*Syzygium cumini*)

Jamun is an important fruit crop grown in almost all the districts of the State. The crop requirements for growing jamun were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing jamun (Table 7.22) was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.22.

An area of about 54 ha (11%) in the microwatershed is highly suitable (Class S1) for growing jamun and are distributed in the southern and southwestern part of the microwatershed. The marginally suitable (Class S3) lands cover a major area of about 370 ha (78%) and are distributed in all parts of the microwatershed. They have moderate limitations of rooting depth, excess salt and gravelliness. An area of about 29 ha (6%) is not suitable (Class N) for growing jamun and are distributed in the southern, western and

northern part of the microwatershed. They have severe limitations of gravelliness, rooting depth, erosion, soil problem and topography.

Table 7.22 Land suitability criteria for Jamun

Crop requirement			Rating			
Soil –site characteristics		**Unit**	**Highly suitable(S1)**	**Moderately suitable(S2)**	**Marginally suitable(S3)**	**Not suitable(N)**
Soil aeration	Soil drainage	Class	Well	Mod. well	Poorly	V.Poorly
Nutrient availability	Texture	Class	scl,cl,sc,c(red)	sl, c (black)	ls	-
	pH	1:2.5	6.0-7.8	5.0-6.0	7.8-8.4	>8.4
Rooting conditions	Soil depth	Cm	>150	100-150	50-100	<50
	Gravel content	% vol.	<15	15-35	35-60	>60
Erosion	Slope	%	0-3	3-5	5-10	>10

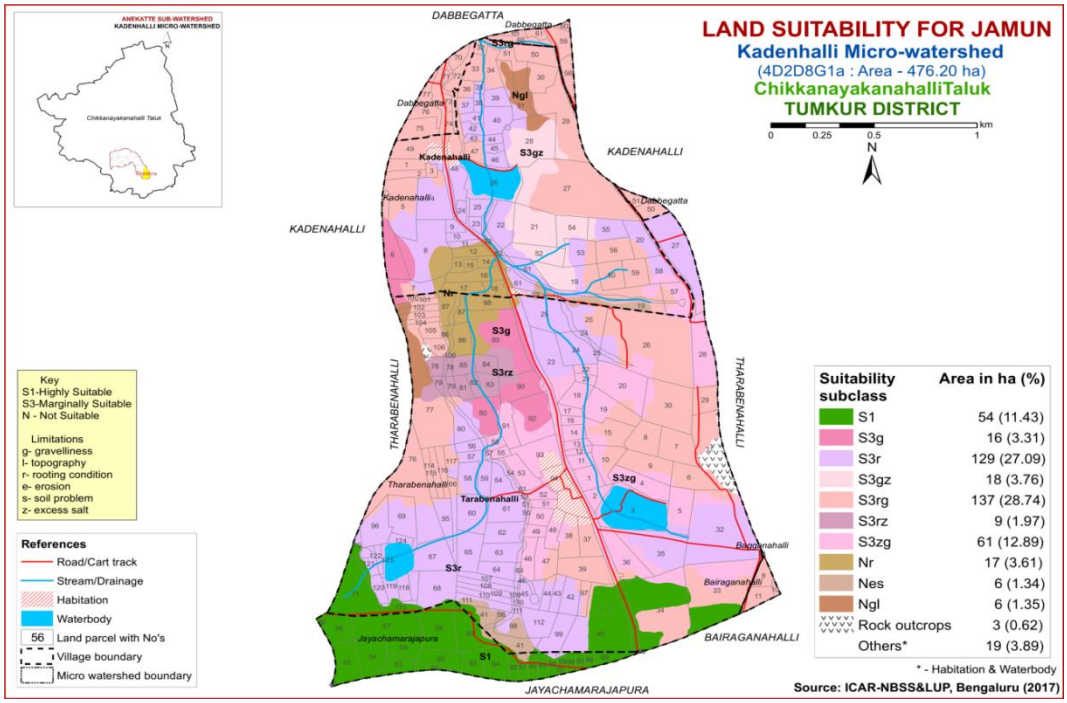


Fig. 7.22 Land Suitability map of Jamun

7.23 Land Suitability for Musambi (*Citrus limetta*)

Musambi is one of the important fruit crop grown in almost all the districts of the State. The crop requirements for growing musambi were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing musambi (Table 7.23) was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.23.

An area of about 54 ha (11%) is highly suitable (Class S1) for growing musambi and are distributed in the southern, southwestern and southeastern part of the microwatershed. An area of about 107 ha (23%) is moderately suitable (Class S2) for growing musambi and are distributed in the central, eastern and southeastern part of the microwatershed. They have minor limitations of rooting depth, excess salt and gravelliness. Marginally suitable lands (Class S3) for growing musambi occupy major area of about 262 ha (52%) and occur in all parts of the microwatershed. They have

moderate limitations of gravelliness, rooting depth and excess salt. A small area of about 29 ha (6%) is not suitable (Class N) for growing musambi and are distributed in the central and western part of the microwatershed. They have severe limitations of gravelliness, rooting depth, erosion, soil problem and topography.

Table 7.23 Crop suitability criteria for Musambi

Crop requirement			Rating			
Soil –site characteristics		Unit	Highly suitable(S1)	Moderately suitable(S2)	Marginally suitable(S3)	Not suitable(N)
Soil aeration	Soil drainage	Class	Well drained	Mod. to imperf drained	poorly	Very poorly
Nutrient availability	Texture	Class	scl,l,sicl,cl,s	sc, sc, c	c(>70%)	s, ls
	pH	1:2.5	6.0-7.5	5.5-6.4,7.6-8.0	4.0-5.4,8.1-8.5	<4.0,>8.5
Rooting conditions	Soil depth	Cm	>150	100-150	50-100	<50
	Gravel content	% vol.	Non gravelly	15-35	35-55	>55
Erosion	Slope	%	<3	3-5	5-10	

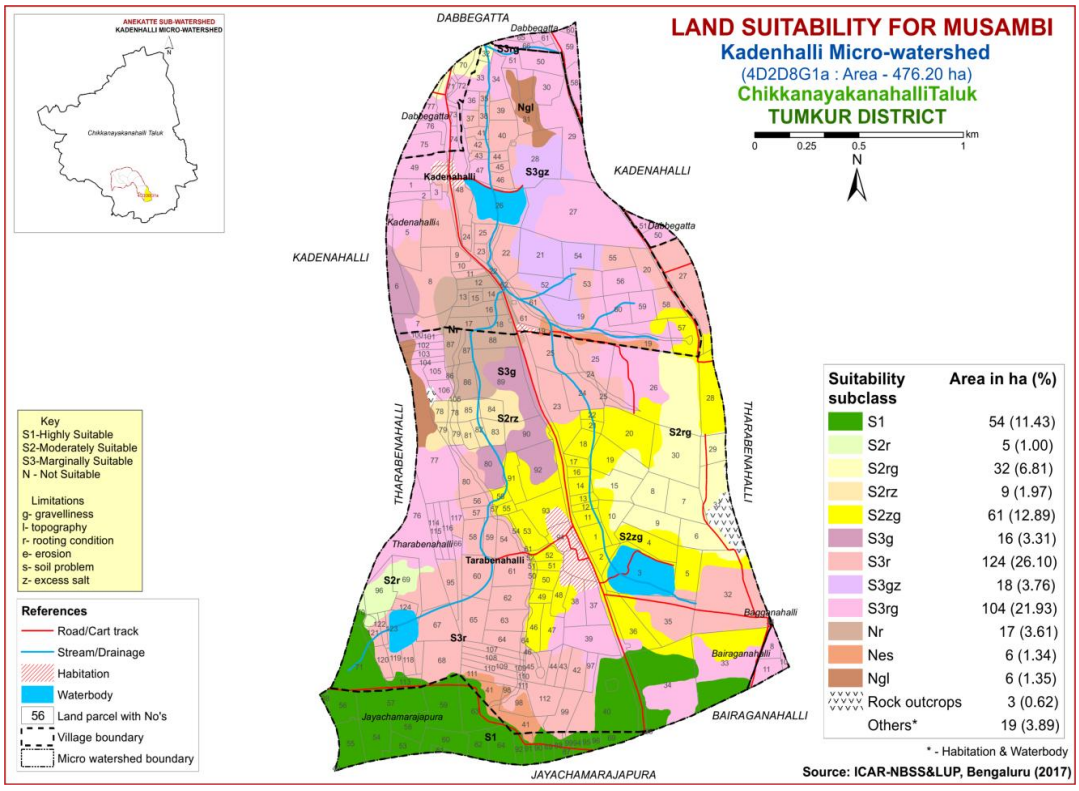


Fig. 7.23 Land Suitability map of Musambi

7.24 Land Suitability for Lime (*Citrus sp*)

Lime is one of the most important fruit crop grown in an area of 0.11 lakh ha in almost all the districts of the State. The crop requirements for growing lime (Table 7.24) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing lime was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7. 24.

Table 7.24 Crop suitability criteria for Lime

Crop requirement			Rating			
Soil –site characteristics		**Unit**	**Highly suitable (S1)**	**Moderately suitable(S2)**	**Marginally suitable(S3)**	**Not suitable(N)**
Climate	Temperature in growing season	^{0}C	28-30	31-35 24-27	36-40 20-23	>40 <20
Soil moisture	Growing period	Days	240-265	180-240	150-180	<150
Soil aeration	Soil drainage	Class	Well drained	Mod. to imperf.drained	poorly	Very poorly
Nutrient availability	Texture	Class	scl,l,sicl,cl, s	sc, sc, c	c(>70%)	s, ls
	pH	1:2.5	6.0-7.5	5.5-6.4,7.6-8.0	4.0-5.4,8.1-8.5	<4.0,>8.5
	$CaCO_3$ in root zone	%	Non 34calcareous	Upto 5	5-10	>10
Rooting conditions	Soil depth	Cm	>150	100-150	50-100	<50
	Gravel content	% vol.	Non gravelly	15-35	35-55	>55
Soil toxicity	Salinity	dS/m	Non saline	Upto 1.0	1.0-2.5	>2.5
	Sodicity	%	Non sodic	5-10	10-15	>15
Erosion	Slope	%	<3	3-5	5-10	

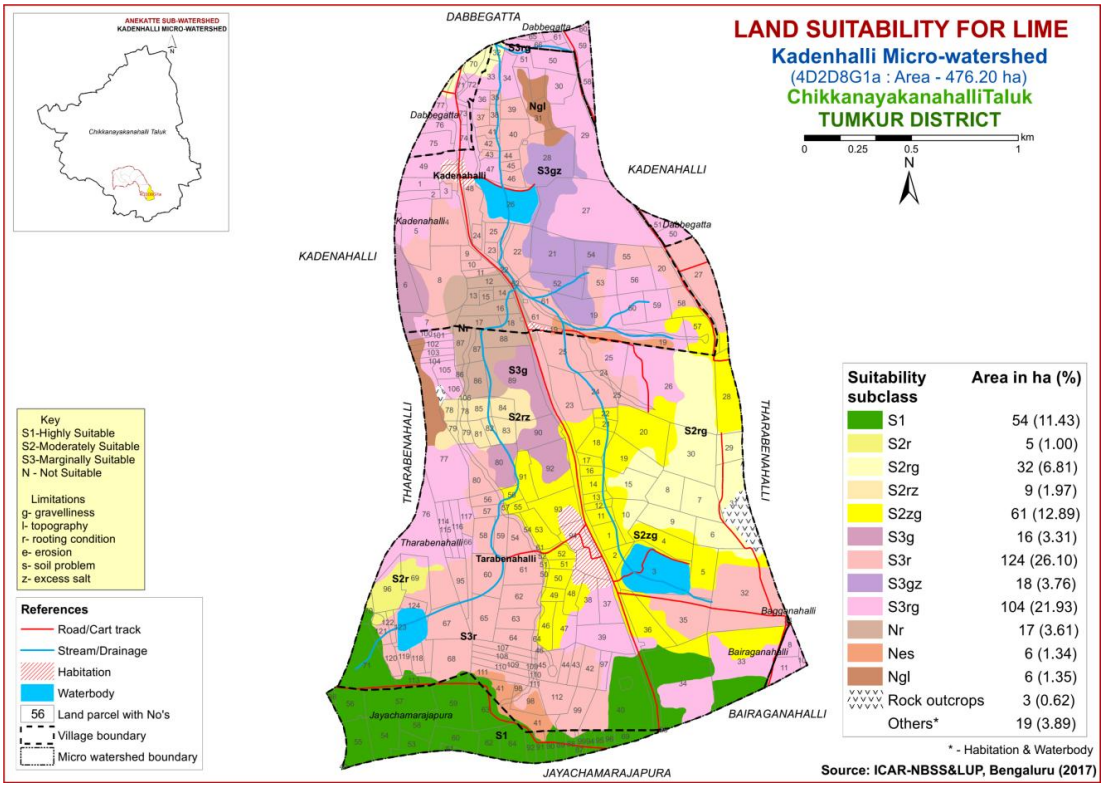


Fig. 7.24 Land Suitability map of Lime

An area of about 54 ha (11%) is highly suitable (Class S1) for growing lime and are distributed in the southern, southwestern and southeastern part of the microwatershed. An area of about 107 ha (23%) is moderately suitable (Class S2) for growing lime and are distributed in the central, eastern and southeastern part of the microwatershed. They have minor limitations of rooting depth, excess salt and gravelliness. Marginally suitable lands

(Class S3) for growing lime occupy major area of about 262 ha (52%) and occur in all parts of the microwatershed. They have moderate limitations of gravelliness, rooting depth and excess salt. A small area of about 29 ha (6%) is not suitable (Class N) for growing lime and are distributed in the central and western part of the microwatershed. They have severe limitations of gravelliness, rooting depth, erosion, soil problem and topography.

7.25 Land Suitability for Cashew (*Anacardium occidentale)*

Cashew is one of the most important nut and plantation crop grown in an area of 1.24 lakh ha in almost all the districts of the State. The crop requirements for growing cashew were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing cashew (Table 7.25) was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.25.

Table 7.25 Land suitability criteria for Cashew

Crop requirement			**Rating**			
Soil –site characteristics		**Unit**	**Highly suitable(S1)**	**Moderately suitable(S2)**	**Marginally suitable(S3)**	**Not suitable(N)**
Soil aeration	Soil drainage	Class	Well drained	Mod. well drained	Poorly drained	V.Poorly drainage
Nutrient availability	Texture	Class				
	pH	1:2.5	5.5-6.5	5.0-5.5,6.5-7.3	7.3-7.8	>7.8
Rooting conditions	Soil depth	Cm	>100	75-100	50-75	<50
	Gravel content	% vol.	<15	15-35	35-60	>60
Erosion	Slope	%	0-3	3-10	>10	

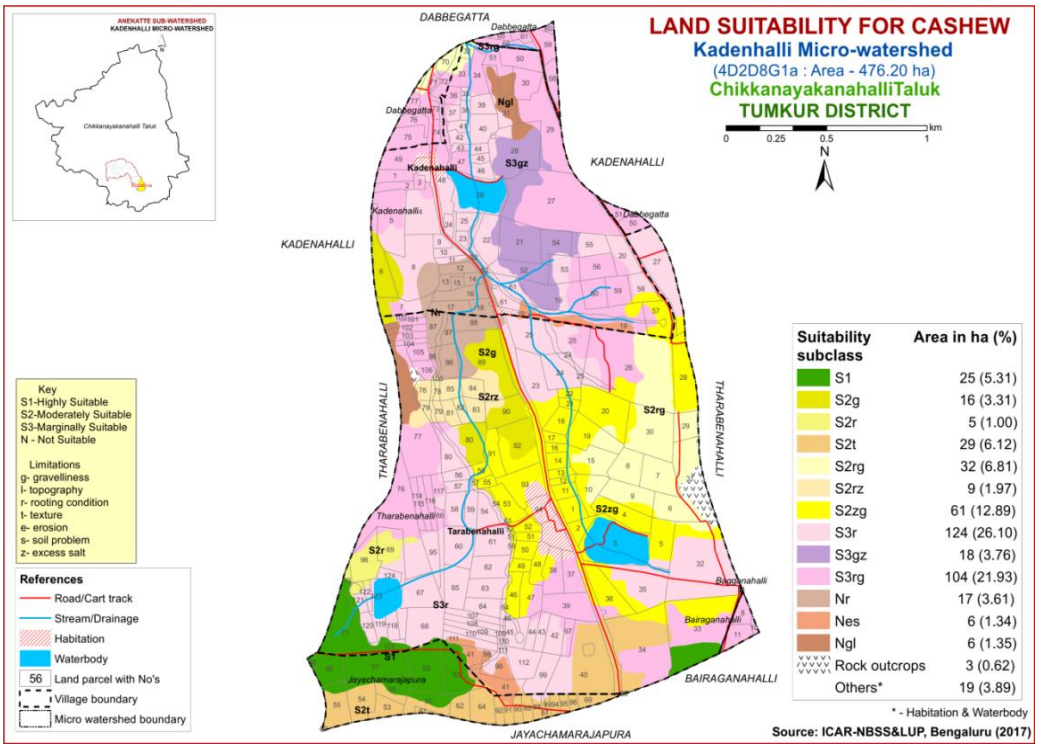


Fig. 7.25 Land Suitability map of Cashew

An area of about 25 ha (5%) in the microwatershed is highly suitable (Class S1) for growing cashew and are distributed in the southwestern and southeastern part of the microwatershed. An area of about 152 ha (32%) is moderately suitable (Class S2) for growing cashew and are distributed in the eastern, central and southeastern part of the microwatershed and have minor limitations of texture, gravelliness, excess salt and rooting depth. The marginally suitable (Class S3) lands cover a major area of about 246 ha (52%) and are distributed in all parts of the microwatershed. They have moderate limitations of rooting depth, excess salt and gravelliness. An area of about 29 ha (6%) is not suitable (Class N) for growing cashew and are distributed in the southern, western and northern part of the microwatershed. They have severe limitations of gravelliness, rooting depth, texture, soil problem and topography.

7.26 Land Suitability for Custard Apple (*Annona reticulata*)

Custard apple is one of the most important fruit crop grown in almost all the districts of the State. The crop requirements for growing custard apple were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing custard apple (Table 7.26) was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.26.

An area of about 59 ha (12%) in the microwatershed is highly suitable (Class S1) for growing custard apple and are distributed in the southwestern and southeastern part of the microwatershed. A major area of about 319 ha (67%) is moderately suitable (Class S2) for growing custard apple and are distributed in all parts of the microwatershed and have minor limitations of gravelliness, excess salt and rooting depth. The marginally suitable (Class S3) lands cover an area of about 49 ha (10%) and are distributed in the western, southwestern, central and northeastern part of the microwatershed. They have moderate limitations of rooting depth, topography and gravelliness. An area of about 29 ha (6%) is not suitable (Class N) for growing custard apple and are distributed in the southern, western and northern part of the microwatershed. They have severe limitations of gravelliness, rooting depth, topography, erosion and soil problems.

Table 7.26 Land suitability criteria for Custard apple

Crop requirement			**Rating**			
Soil –site characteristics		**Unit**	**Highly suitable(S1)**	**Moderately suitable(S2)**	**Marginally suitable(S3)**	**Not suitable(N)**
Soil aeration	Soil drainage	Class	Well drained	Mod. well drained	Poorly drained	V. Poorly drained
Nutrient availability	Texture	Class	scl, cl, sc, c (red), c (black)	-	sl, ls	-
	pH	1:2.5	6.0-7.3	7.3-8.4	5.0-5.5,8.4-9.0	>9.0
Rooting conditions	Soil depth	Cm	>75	50-75	25-50	<25
	Gravelcontent	% vol.	<15-35	35-60	60-80	-
Erosion	Slope	%	0-3	3-5	>5	

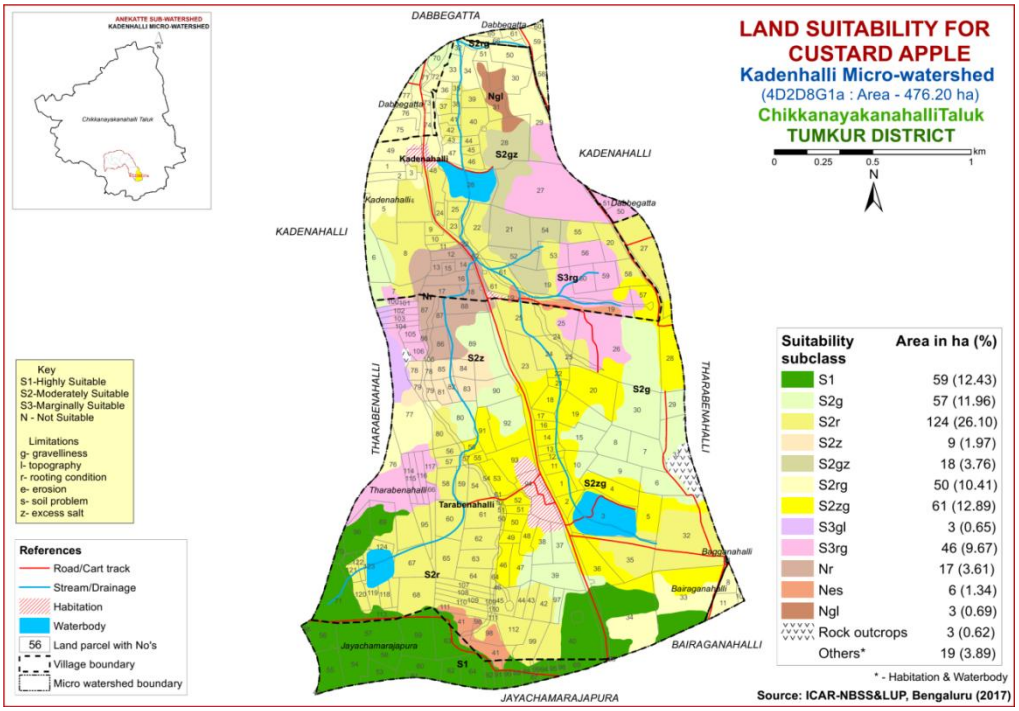


Fig. 7.26 Land Suitability map of Custard Apple

7.27 Land Suitability for Amla (*Phyllanthus emblica*)

Amla is one of the medicinal fruit crop grown in almost all the districts of the State. The crop requirements for growing amla were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing amla (Table 7.27) was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.27.

Table 7.27 Land suitability criteria for Amla

Crop requirement			Rating			
Soil –site characteristics		**Unit**	**Highly suitable(S1)**	**Moderately Suitable(S2)**	**Marginally suitable(S3)**	**Not suitable(N)**
Soil aeration	Soil drainage	Class	Well drained	Mod.well drained	Poorly drained	V. Poorly drained
Nutrient availability	Texture	Class	Scl,cl,sc,c(red)	C (black)	ls, sl	-
	pH	1:2.5	5.5-7.3	5.0-5.5	7.8-8.4	>8.4
Rooting conditions	Soil depth	Cm	>75	50-75	25-50	<25
	Gravel content	% vol.	<15-35	35-60	60-80	
Erosion	Slope	%	0-3	3-5	5-10	>10

An area of about 59 ha (12%) in the microwatershed is highly suitable (Class S1) for growing amla and are distributed in the southwestern and southeastern part of the microwatershed. A major area of about 382 ha (67%) is moderately suitable (Class S2) for growing amla and are distributed in all parts of the microwatershed and have minor limitations of gravelliness, excess salt and rooting depth. The marginally suitable (Class S3) lands cover an area of about 63 ha (13%) and are distributed in the central, southwestern and northeastern part of the microwatershed. They have moderate

limitations of rooting depth and gravelliness. An area of about 12 ha (3%) is not suitable (Class N) for growing amla and are distributed in the southern, western and northern part of the microwatershed. They have severe limitations of gravelliness, erosion, soil problems and topography.

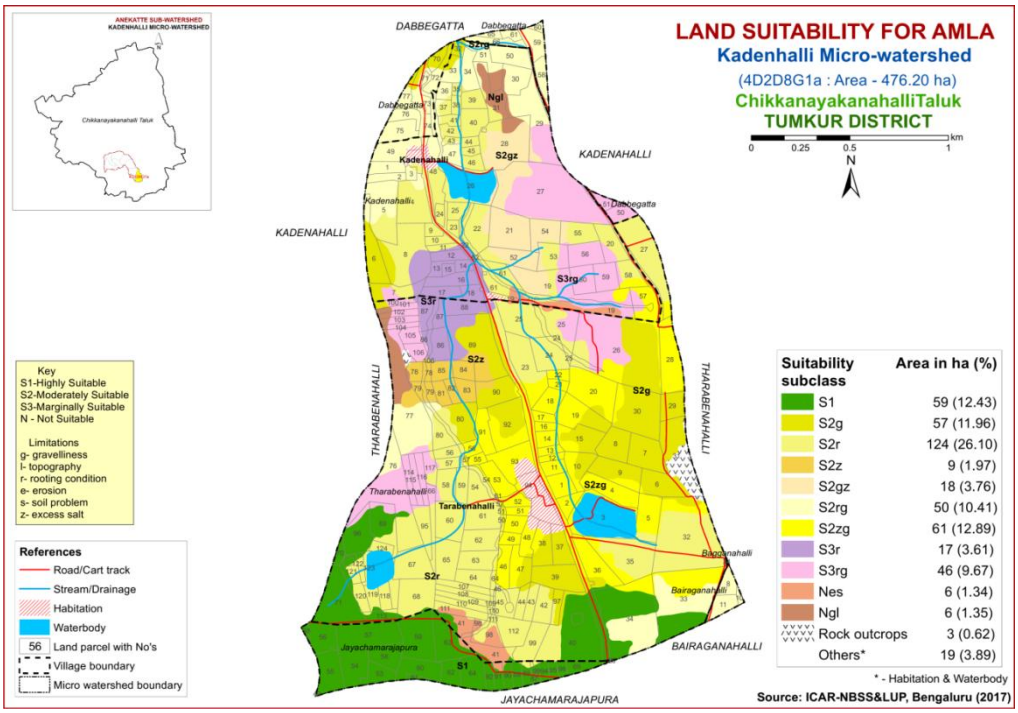


Fig. 7.27 Land Suitability map of Amla

7.28 Land Suitability for Tamarind (*Tamarindus indica*)

Tamarind is one of the most important spice crop grown in almost all the districts of the state. The crop requirements for growing tamarind were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing tamarind (Table 7.28) was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Fig. 7.28.

Table 7.28 Land suitability criteria for Tamarind

Crop requirement			Rating			
Soil –site characteristics		Unit	Highly suitable(S1)	Moderately suitable(S2)	Marginally suitable(S3)	Not suitable(N)
Soil aeration	Soil drainage	Class	Well drained	Mod.well drained	Poorly drained	V.Poorly drained
Nutrient availability	Texture	Class	scl,cl,sc,c(red)	sl,c(black)	ls	-
	pH	1:2.5	6.0-7.3	5.0-6.0,7.3-7.8	7.8-8.4	>8.4
Rooting conditions	Soil depth	Cm	>150	100-150	75-100	<50
	Gravel content	% vol.	<15	15-35	35-60	60-80
Erosion	Slope	%	0-3	3-5	5-10	>10

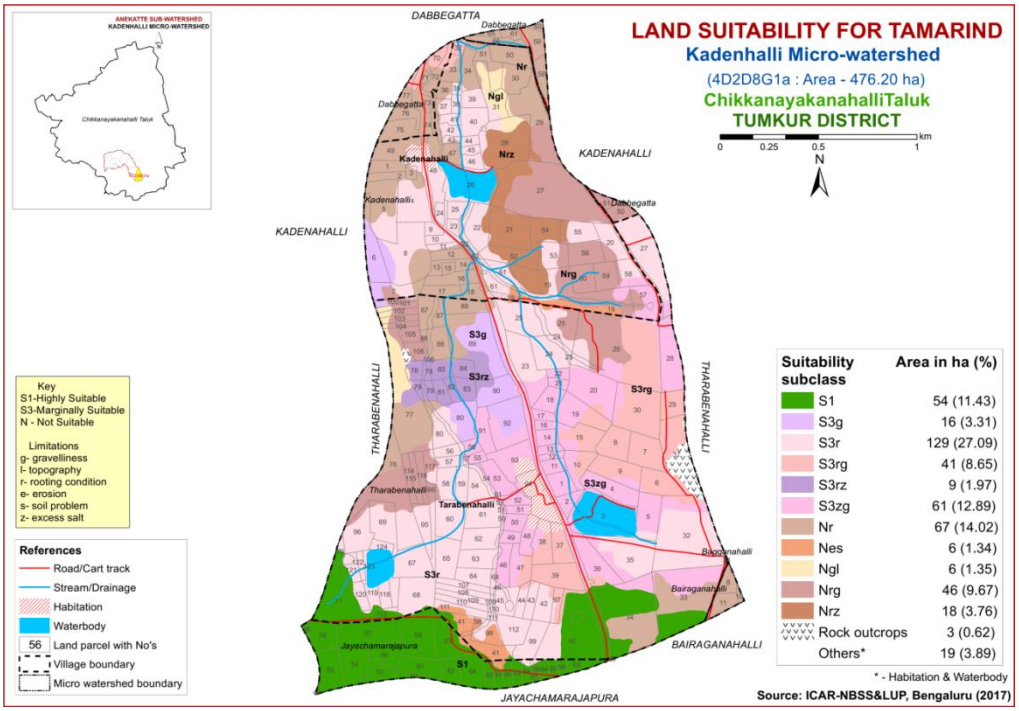


Fig. 7.28 Land Suitability map of Tamarind

An area of about 54 ha (11%) is highly suitable (Class S1) for growing tamarind and are distributed in the southwestern and southeastern part of the microwatershed. Marginally suitable lands (Class S3) occupy a major area of about 256 ha (54%) and occur in all parts of the microwatershed. They have moderate limitations of gravelliness, excess salt and rooting depth. An area of about 143 ha (30%) is not suitable (Class N) for growing tamarind and are distributed in the western, central, northeastern and northwestern part of the microwatershed. They have severe limitations of gravelliness, rooting depth, erosion, soil problems and topography.

7.29 Land suitability for Marigold (*Tagetes sps.*)

Marigold is one of the most important flower crop grown in an area of 1858 ha in almost all the districts of the State. The crop requirements (Table 7.29) for growing marigold were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing marigold was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.29.

An area of about 59 ha (12%) is highly suitable (Class S1) for growing marigold and are distributed in the southern and southwestern part of the microwatershed. A major area of about 294 ha (62%) is moderately suitable (Class S2) for growing marigold and are distributed in all parts of the microwatershed.

They have minor limitations of rooting depth, excess salt and gravelliness. Marginally suitable lands (Class S3) occupy an area of about 88 ha (18%) and occur in the southwestern, central, western and northeastern part of the microwatershed. They have moderate limitations of gravelliness and rooting depth. A small area of about 12 ha

(3%) is not suitable (Class N) for growing marigold and are distributed in the southern, western and northern part of the microwatershed. They have severe limitations of gravelliness, soil problem, erosion and topography.

Table 7.29 Land suitability criteria for Marigold

Crop requirement			Rating			
Soil –site characteristics		Unit	Highly suitable(S1)	Moderately suitable(S2)	Marginally suitable(S3)	Not suitable(N)
Climate	Temperature in growing season		18-23	17-15 24-35	35-40 10-14	>40 <10
Soil aeration	Soil drainage	Class	Well drained	Moderately well drained	Imperfectly drained	Poorly drained
Nutrient availability	Texture	Class	l ,sl,scl,cl,sil	sicl,sc,sic,c	c	ls, s
	pH	1:2.5	7.0-7.5	5.5-5.9,7.6-8.5	<5, >8.5	-
	$CaCO_3$ in root zone	%	Non calcareous	Slightly calcareous	Strongly calcareous	-
Rooting conditions	Soil depth	Cm	>75	50-75	25-50	<25
	Gravel content	% vol.	<15	15-35	>35	-
Soil toxicity	Salinity	ds/m	Non saline	Slightly	Strongly	-
	Sodicity(ESP)	%	<10	10-15	>15	-
Erosion	Slope	%	1-3	3-5	5-10	-

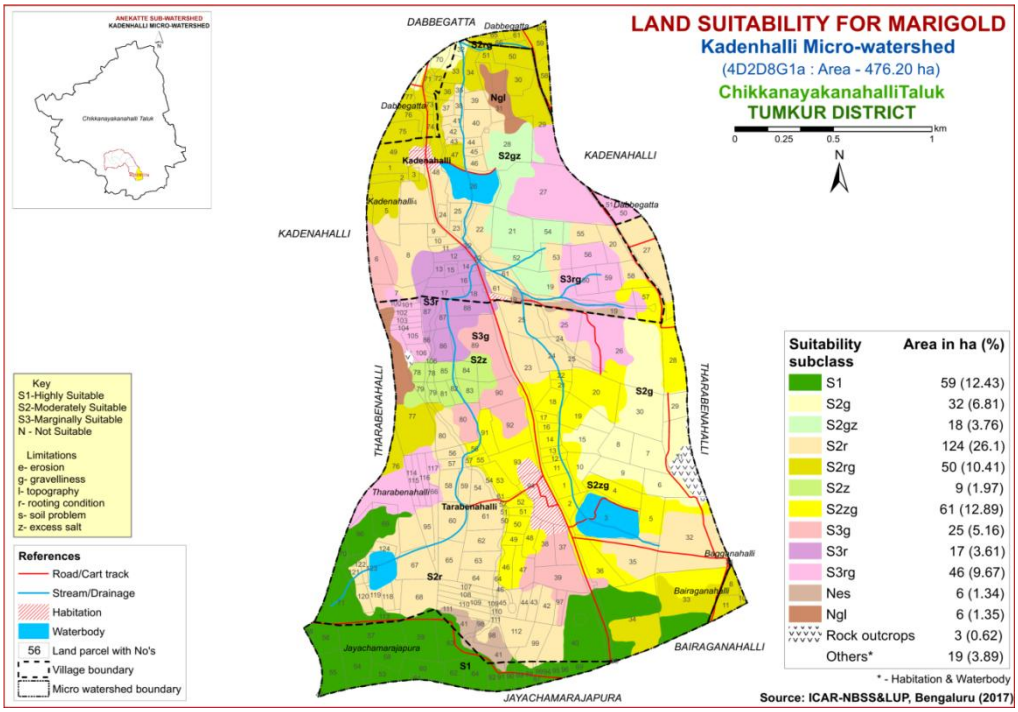


Fig. 7.29 Land Suitability map of Marigold

7.30 Land Suitability for Chrysanthemum (*Dendranthema grandiflora*)

Chrysanthemum is one of the most important flower crop grown in an area of 803 ha in almost all the districts of the State. The crop requirements (Table 7.30) for growing chrysanthemum were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing chrysanthemum was generated. The area extent and their

geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.30.

Table 7.30 Land suitability criteria for Chrysanthemum

Crop requirement			Rating			
Soil –site characteristics		**Unit**	**Highly suitable(S1)**	**Moderately suitable(S2)**	**Marginally suitable(S3)**	**Not suitable(N)**
Climate	Temperature in growing season		18-23	17-15 24-35	35-40 10-14	>40 <10
Soil aeration	Soil drainage	Class	Well drained	Moderately well drained	Imperfectly drained	Poorly drained
Nutrient availability	Texture	Class	l,sl,scl,cl,sil	sicl,sc,sic,c	c	ls, s
	pH	1:2.5	7.0-7.5	5.5-5.9,7.6-8.5	<5,>8.5	
	$CaCO_3$ in root zone	%	Non calcareous	Slightly calcareous	Strongly calcareous	
Rooting conditions	Soil depth	Cm	>75	50-75	25-50	<25
	Gravel content	%vol.	<15	15-35	>35	
Soil toxicity	Salinity	ds/m	Non saline	slightly	strongly	
	Sodicity(ESP)	%	<10	10-15	>15	-
Erosion	Slope	%	1-3	3-5	5-10	

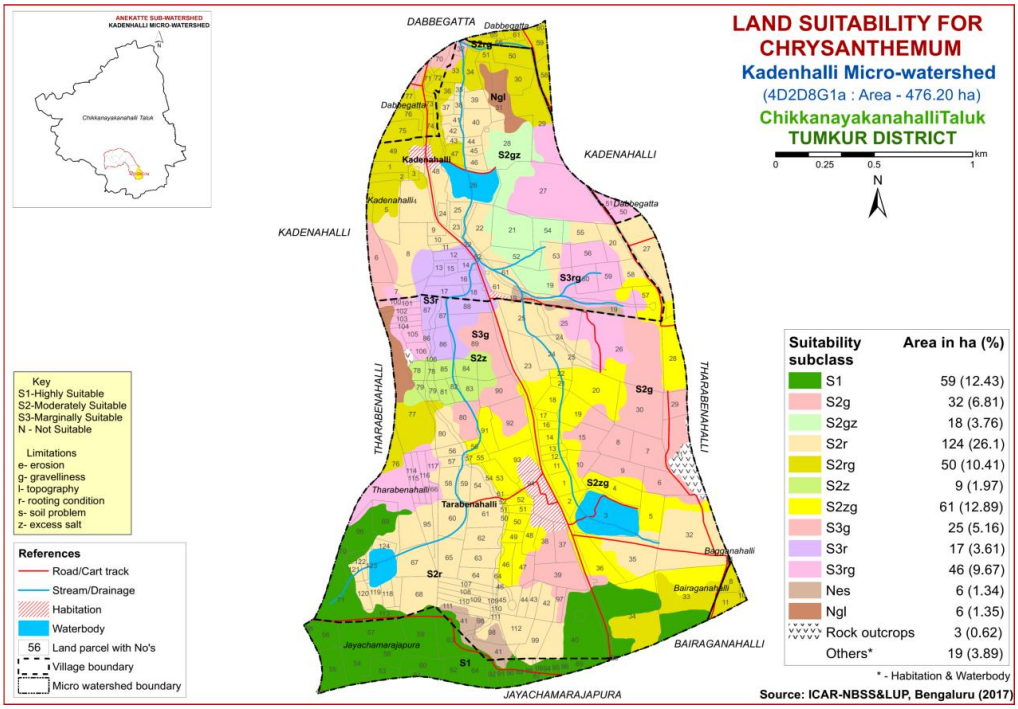


Fig. 7.30 Land Suitability map of Chrysanthemum

An area of about 59 ha (12%) is highly suitable (Class S1) for growing chrysanthemum and are distributed in the southern and southwestern part of the microwatershed. A major area of about 294 ha (62%) is moderately suitable (Class S2) for growing chrysanthemum and are distributed in all parts of the microwatershed. They have minor limitations of rooting depth, excess salt and gravelliness. Marginally suitable lands (Class S3) occupy an area of about 88 ha (18%) and occur in the southwestern, central, western and northeastern part of the microwatershed. They have moderate

limitations of gravelliness and rooting depth. A small area of about 12 ha (3%) is not suitable (Class N) for growing chrysanthemum and are distributed in the southern, western and northern part of the microwatershed. They have severe limitations of gravelliness, soil problem, erosion and topography.

7. 31 Land Suitability for Jasmine *(Jasminum sp.)*

Jasmine is one of the most important flower crop grown in an area of 803 ha in almost all the districts of the State. The crop requirements (Table 7.31) for growing chrysanthemum were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing chrysanthemum was generated.

Table 7.31 Land suitability criteria for jasmine (irrigated)

Crop requirement			Rating			
Soil –site characteristics		**Unit**	**Highly suitable(S1)**	**Moderately suitable(S2)**	**Marginally suitable(S3)**	**Not suitable(N)**
Climate	Temperature in growing season		18-23	17-15 24-35	35-40 10-14	
Soil aeration	Soil drainage	Class	Well drained	Moderately drained	Imperfectly drained	Poorly drained
Nutrient availability	Texture	Class	scl,l,scl,cl,sil	sicl,sc,sic,c(m/k)	c(ss),	ls, s
	pH	1:2.5	6.0-7.5	5.5-5.9,7.6-8.5	<5,>8.5	
	$CaCO_3$ in root zone	%	Non calcareous	Slightly calcareous	Strong calcareous	
Rooting conditions	Soil depth	Cm	>75	50-75	25-50	<25
	Gravel content	%vol.	<15	15-35	>35	
Soil toxicity	Salinity	ds/m	Non saline	Slight	Strongly	
	Sodicity	%	Non sodic	Slight	Strongly	
Erosion	Slope	%	1-3	3-5	5-10	

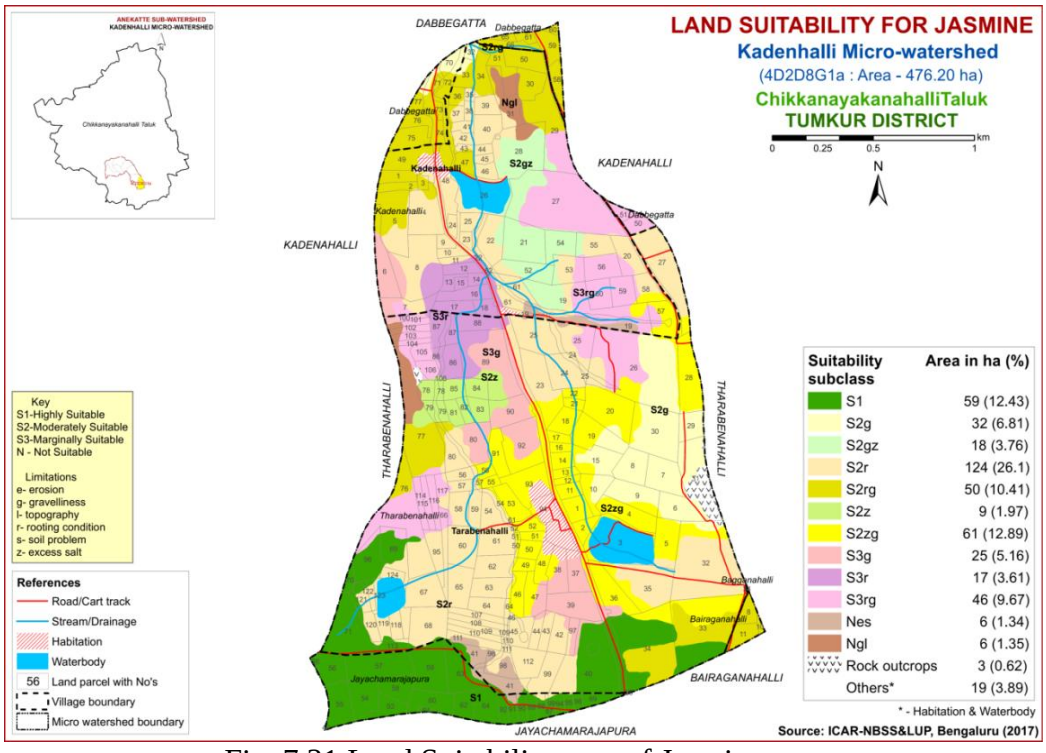


Fig. 7.31 Land Suitability map of Jasmine

The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.31.

An area of about 59 ha (12%) is highly suitable (Class S1) for growing jasmine and are distributed in the southern and southwestern part of the microwatershed. A major area of about 294 ha (62%) is moderately suitable (Class S2) for growing jasmine and are distributed in all parts of the microwatershed. They have minor limitations of rooting depth, excess salt and gravelliness. Marginally suitable lands (Class S3) occupy an area of about 88 ha (18%) and occur in the southwestern, central, western and northeastern part of the microwatershed. They have moderate limitations of gravelliness and rooting depth. A small area of about 12 ha (3%) is not suitable (Class N) for growing jasmine and are distributed in the southern, western and northern part of the microwatershed. They have severe limitations of gravelliness, soil problem, erosion and topography.

7.32 Land Suitability for Coconut (*Cocos nucifera*)

Coconut is one of the most important nut crop grown in almost all the districts of the State. The crop requirements (Table 7.32) for growing Coconut were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing Coconut was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.32.

An area of about 25 ha (5%) is highly suitable (Class S1) for growing coconut and are distributed in the southwestern and southeastern part of the microwatershed. An area of about 75 ha (16%) is moderately suitable (Class S2) for growing coconut and are distributed in the southern, southwestern, eastern, central and northern part of the microwatershed. They have minor limitations of rooting depth, texture, excess salt and gravelliness. Marginally suitable lands (Class S3) occupy a major area of about 324 ha (68%) and occur in all parts of the microwatershed. They have moderate limitations of gravelliness, rooting depth, excess salt and texture. An area of about 29 ha (6%) is not suitable (Class N) for growing coconut and are distributed in the southern, western and northern part of the microwatershed. They have severe limitations of gravelliness, rooting depth, erosion, soil problems and topography.

Table 7.32 Land suitability criteria for Coconut

Crop requirement		Rating			
Soil –site characteristics	**Unit**	**Highly suitable(S1)**	**Moderately suitable(S2)**	**Marginally suitable(S3)**	**Not suitable(N)**
Slope	%	0-3	3-5	5-10	>10
Soil drainage	class	Well drained	Mod. drained	Poorly	Very poorly
Soil reaction	pH	5.1-6.5	6.6-7.5	7.6-8.5	-
Surface soil texture	Class	sc, cl, scl	c (red), sl	c (black), ls	-
Soil depth	Cm	>100	75-100	50-75	<50
Gravel content	% vol.	<15	15-35	35-60	>60

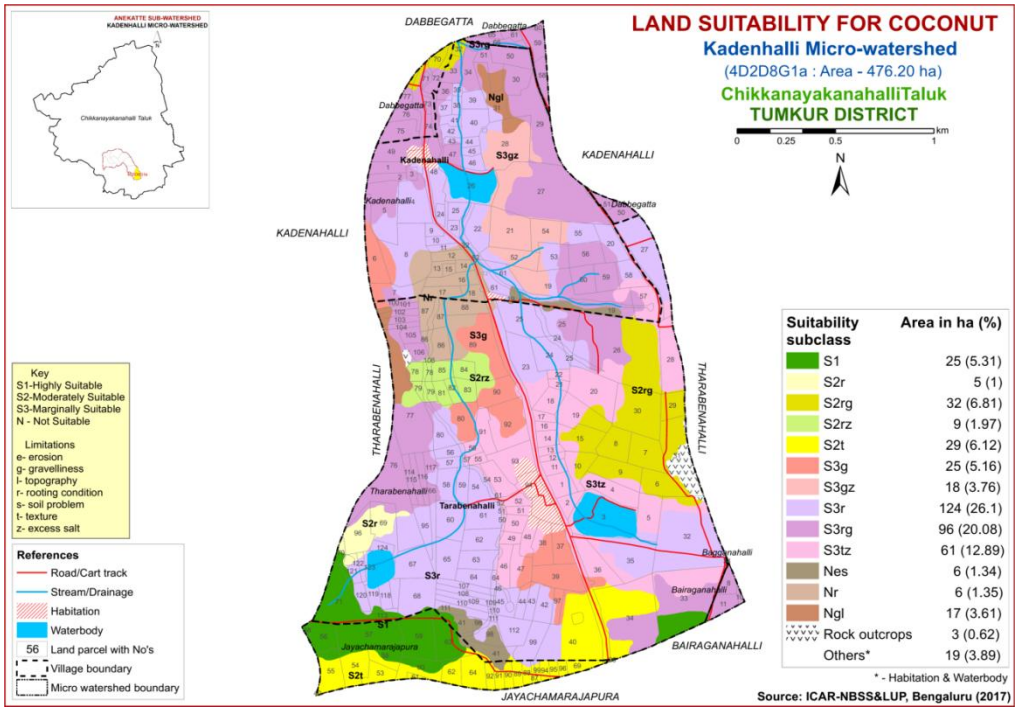


Fig. 7.32 Land Suitability map of Coconut

7.33 Land Suitability for Arecanut (*Areca catechu*)

Arecanut (Beatlenut) is one of the most important nut crop grown in almost all the districts of the State. The crop requirements (Table 7.33) for growing Arecanut were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing Arecanut was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.33.

An area of about 25 ha (5%) is highly suitable (Class S1) for growing arecanut and are distributed in the southwestern and southeastern part of the microwatershed. An area of about 75 ha (16%) is moderately suitable (Class S2) for growing arecanut and are distributed in the southern, southwestern, eastern, central and northern part of the microwatershed. They have minor limitations of rooting depth, texture, excess salt and gravelliness. Marginally suitable lands (Class S3) occupy a major area of about 324 ha (68%) and occur in all parts of the microwatershed. They have moderate limitations of gravelliness, rooting depth, excess salt and textures. An area of about 29 ha (6%) is not suitable (Class N) for growing arecanut and are distributed in the southern, western and northern part of the microwatershed. They have severe limitations of gravelliness, rooting depth, erosion, soil problems and topography.

Table 7.33 Land suitability criteria for Arecanut

Crop requirement		Rating			
Soil –site characteristics	**Unit**	**Highly suitable (S1)**	**Moderately suitable (S2)**	**Marginally suitable(S3)**	**Not suitable(N)**
Slope	%	0-3	3-5	5-10	>10
Soil drainage	class	Well drained	Mod. to poorly drained	-	Very poorly
Soil reaction	pH	5.0-6.5	6.6-7.5	7.6-8.5	
Surface soil texture	Class	sc, cl, scl	c (red), sl	c (black),ls	-
Soil depth	Cm	>100	75-100	50-75	<50
Gravel content	% vol.	<15	15-35	35-60	>60

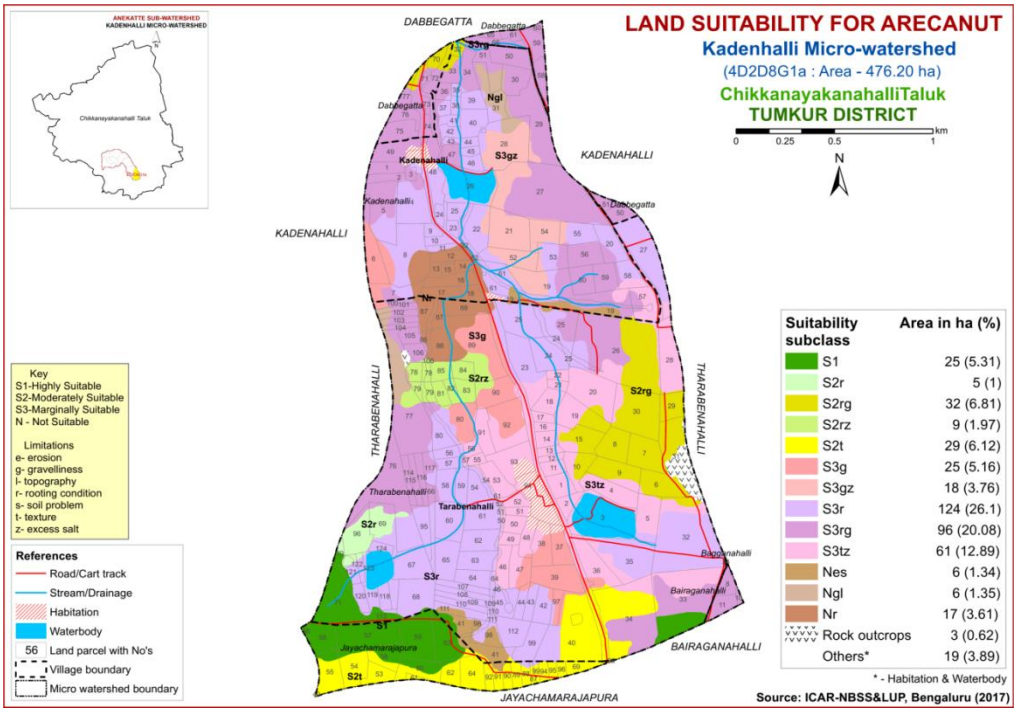


Fig. 7.33 Land Suitability map of Arecanut

7.34 Land Suitability for Mulberry (*Morus nigra*)

Mulberry is the most important leaf crop grown for feeding silk worm in about 1.66 lakh ha in all districts of the State. The crop requirements for growing mulberry (Table 7.34) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing mulberry was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.34.

Table 7.34 Land suitability criteria for Mulberry

Crop requirement			**Rating**			
Soil –site characteristics		**Unit**	**Highly suitable(S1)**	**Moderately suitable (S2)**	**Marginally suitable (S3)**	**Not suitable(N)**
Soil aeration	Soil drainage	Class	Well drained	Moderately well drained	Poorly drained	V. Poorly drained
Nutrient availability	Texture	Class	sc, cl, scl	c (red)	c (black), sl, ls	-
	pH	1:2.5				
Rooting conditions	Soil depth	Cm	>100	75-100	50-75	<50
	Gravel content	% vol.	0-35	35-60	60-80	>80
Erosion	Slope	%	0-3	3-5	5-10	>10

Note: Suitability evaluation only for Mulberry leaf not for Silk worm rearing

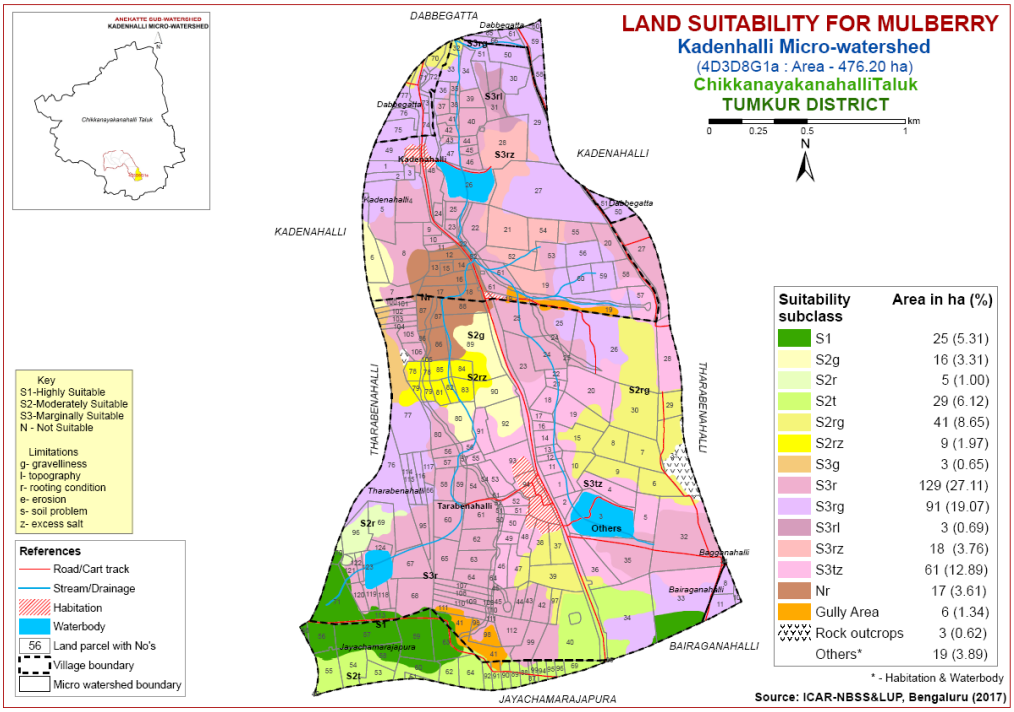


Fig. 7.34 Land Suitability map of Mulberry

An area of about 25 ha (5%) is highly suitable (Class S1) for growing mulberry and are distributed in the southwestern and southeastern part of the microwatershed. An area of about 75 ha (16%) is moderately suitable (Class S2) for growing mulberry and are distributed in the southern, southwestern, eastern, central and northern part of the microwatershed. They have minor limitations of rooting depth, texture, excess salt and gravelliness. Marginally suitable lands (Class S3) occupy a major area of about 324 ha (68%) and occur in all parts of the microwatershed. They have moderate limitations of gravelliness, rooting depth, excess salt and texture. An area of about 29 ha (6%) is not suitable (Class N) for growing mulberry and are distributed in the southern, western and northern part of the microwatershed. They have severe limitations of gravelliness, rooting depth, erosion, soil problems and topography.

7.35 Land Use Classes (LUCs)

The 31 soil map units identified in Kadenhalli microwatershed have been grouped into six Land Use Classes (LUC's) for the purpose of preparing a Proposed Crop Plan. Land Use Classes are grouped based on the similarities in respect of the type of soil, the depth of the soil, the surface soil texture, gravel content, AWC, slope, erosion etc. and a Land Use Classes map (Fig.7.35) has been generated. These Land Use Classes are expected to behave similarly for a given level of management.

The map units that have been grouped into six Land Use Classes along with brief description of soil and site characteristics are given below.

LUC NO.	Soil Map Unit number	Soil Map Units	Soil and site characteristics
1	23	RTRhB1	Very deep, red clayey soils with 1-3% slopes and slight erosion
2	24,26,28,29, 16	BMKhA1g1, BDGcB2g2 BPRcA1g1, BPRcC2g2 BPRcC2g3	Moderately deep to deep, gravelly red clay to clay loam soils with 0-5% slopes, gravelly to extremely gravelly (15-80%) and slight to moderate erosion
3	22,27	GHTcB2g1 JDGcA1	Moderately deep to deep, red clay to loamy soils with 0-3% slopes, gravelly (15-35%) and slight to moderate erosion
4	25	BWThB1	Moderately deep, gravelly clay black soils with 1-3% slope and slight erosion
5	2,3,4,13,14, 15,18,19,20, 21	LKRcB1, LKRcC2g1 LKRcC2g2, MKHbC2g2 MKHcB2g1, MKHhB2g1 HDHcB1, HDHcB2g2 HDHhA1g1, HDHhB1g1	Moderately shallow, gravelly red loamy soils with 0-5% slopes, gravelly to very gravelly (15-60%) and slight to moderate erosion
6	1,5,6,7,8,9,1 0, 11,12,17	CSRcA1, TDHbB1g1 TDHhB1, TDHhB1g1 KGHcA1, KGHiA1 KTPcB2g1, KTPcC2g2 KTPcD2g2, KSPhB2g2	Shallow to moderately shallow, red loamy soils with 0-10% slopes, gravelly to very gravelly (15-60%) and slight to moderate erosion

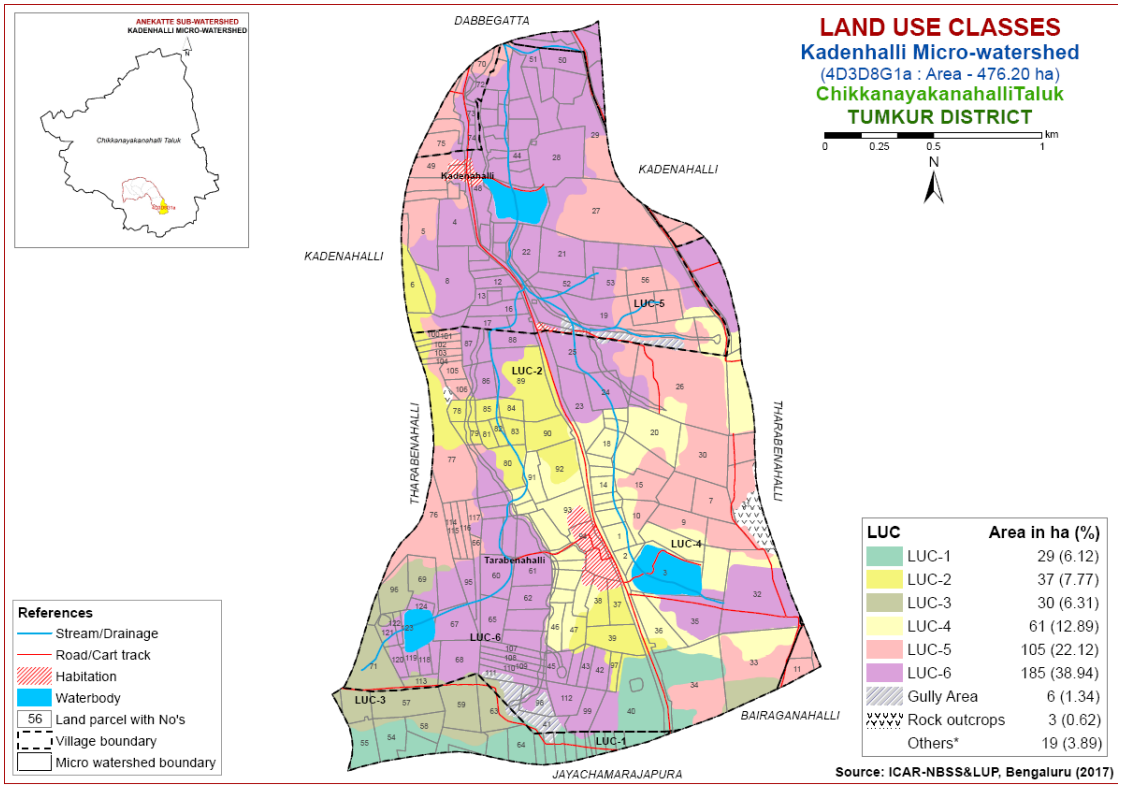


Fig. 7.35 Land Use Classes Map – Kadenhalli Microwatershed

7.36 Proposed Crop Plan for Kadenhalli Microwatershed

After assessing the land suitability for the 34 crops, the proposed crop plan has been prepared for the six identified LUCs by considering only the highly (Class S1) and moderately (Class S2) suitable lands for each of the 34 crops. The resultant proposed crop plan is presented below in Table 7.35.

Table 7.35 Proposed Crop Plan for Kadenhalli Microwatershed

LUC No	Mapping Units	Survey Number	Field Crops	Forestry/ Grasses	Horticulture Crops with suitable interventions	Suitable Interventions
LUC1	29 Very deep (>150 cm), red clayey soils	**Bairaganahalli:** 26 Jayachamarajapura:40,53,54,55, 60,61,62,64,69,87,88,89,90,91,9 2,94,95,96,99 **Tharabanahalli:** 34,40	**Sole Crop:** Ragi, Upland paddy, Maize, Sorghum, Fodder sorghum, Sunflower, Groundnut, Redgram, Fieldbean, Cowpea **Intercropping:** Redgram+Foddersorghum Ragi+Cowpea Ragi+Redgram Ragi+Fieldbean	Neem, Silver Oak **Grasses** *Styloxanthes hamata*, *Styloxanthes Scabra*, Hybrid Napier, Sesbania,	**Vegetables**: Onion, Tomato, Brinjal, Chillies, Coriander, Drumstick **Flower crops:** Crossandra, Chrysanthemum, Jasmine, China aster, Marigold, **Fruit crops/ Plantation crops:** Mango, Sapota, Guava, Cashew, Pomegranate, Jackfruit, Musambi, Arecanut, Coconut	Drip irrigation, Mulching, suitable conservation practices (Crescent Bunding with Catch Pit etc)
LUC 2	22,24,26,27,28 Moderately deep to deep (75-150 cm), gravelly red clay to clay loam soils	**Kadenanahalli:**6,7 **Tharabanahalli:**37,38,39,78,79 ,80,81,82,83,84,85,89,90,92,97	**Sole crop**: Upland paddy, Ragi, Maize, Sorghum, Groundnut, Fieldbean, Cowpea, Fodder sorghum, Horsegram	Glyricidia, **Grasses:** *Styloxanthes hamata*, *Styloxanthes scabra*, Hybrid Napier	**Vegetables:** Tomato, Brinjal, Chillies, Drumstick, Curry leaf **Flower crops:** Crossandra, Chrysanthemum, Marigold, **Fruit crops:** Tamarind, Custard Apple, Amla, Lime, Musambi	Drip irrigation, Mulching, suitable conservation practices (Crescent Bunding with Catch Pit etc)
LUC3	21,25 Moderately deep to deep (75-150 cm), red clay to loamy soils	**Jayachamarajapura:**38,56,57, 58,59,63 **Tharabanahalli:**69,70,71,96,11 3	**Sole crop**: Upland paddy, Ragi, Maize, Sorghum, Groundnut, Sunflower, Fieldbean, Cowpea, Fodder sorghum **Intercropping:** Redgram+Fodder sorghum Ragi+Cowpea	Glyricidia, Subabul, Hebbevu **Grasses:** *Styloxanthes hamata*, *Styloxanthes scabra*, Hybrid napier	**Vegetables:** Onion, Tomato, Chillies Brinjal, Cucurbits **Flower crops:** Chrysanthemum, Jasmine, Crossandra, China aster **Fruit crops/ Plantation crops:** Musambi, Sapota, Pomegranate, Banana, Amla, Lime, Arecanut, Coconut	Drip irrigation, Mulching, suitable conservation practices (Crescent Bunding with Catch Pit etc)

			Ragi+Redgram			
LUC 4	23 Moderately deep (75-100 cm), gravelly calcareous clay black soils	**Kadenanahalli:** 57 **Tharabanahalli:**1,2,4,5,11,12,13,14,16,17,18,19,20,21,22,28,36,46,47,48,49,50,51,52,53,55,91, 93	**Sole crop**: Sorghum, Sunflower, Fodder sorghum, Redgram, Field bean, Horse gram **Intercropping:** Redgram+Fodder sorghum	Hebbevu, Silveroak **Grasses:** *Styloxanthes hamata, Styloxanthes scabra*, Hybrid napier	**Vegetables:** Tomato, Chillies, Curry leaf, Drumstick **Flower crops:** Marigold, Chrysanthemum **Fruit crops:** Pomegranate, Tamarind, Custard Apple, Amla, Lime, Musambi	Application of gypsum, FYM and micronutrients, drip irrigation, Mulching, suitable conservation practises
LUC 5	2,3,4,13,14,15, 17,18,19,20 Moderately shallow (50-75 cm), gravelly red loamy soils	**Bairaganahalli:** 8,10,11 **Dabbegatta:**50,51,70,75,76,77 **Kadenanahalli:**1,2,3,5,19,27,32,49,56,59,60 **Tharabanahalli:**6,7,8,9,10,15,26,29,30,33,76,77,100,101,102,103,104,105,106,114,115,116,117	**Sole crops:** Ragi, Fodder sorghum, Cowpea, Horsegram	Glyricidia, **Grasses** *Styloxanthes hamata, Styloxanthes scabra*	**Vegetables:** Tomato, Chillies, Curryleaf, **Fruit crops:** Custard apple, Amla, Bael	Use of medium duration varieties, and deep rooted crops, sowing across the slope, drip irrigation and mulching is recommended
LUC 6	1,5,6,7,8,9,10, 11,12,16 Shallow to moderately shallow (25-75 cm), red loamy soils	**Bagganahalli:** 34 **Dabbegatta:**58,59,60,61,65,66, 71,72,73, 74 **Kadenanahalli:**4,8,9,10,11,12, 13,14,15,16,17,18,20,21,22,23,24,25,28,29,30,31,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47, 48,50,51,52,53,54,55,58,61 **Tharabanahalli:**23,24,25,27,32,35,42,43,44,45,54,56,57,58,59, 60,61,62,63,64,65,66,67,68,86,87,88,95,99,107,108,109,110,111,12,118,119,120,121,122, 124	**Sole crops:** Fodder sorghum, Cowpea, Horsegram	Glyricidia, **Grasses** *Styloxanthes hamata, Styloxanthes scabra*	**Fruit crops:** Custard apple, Amla, Bael	Use of medium duration varieties, and deep rooted crops, sowing across the slope, drip irrigation and mulching is recommended
Gullied area	30	**Jayachamarajapura:**63,91,90, 92 **Kadenahalli:** 61,19 Tharabanahalli:25,26,111,41,112,98,41	-	-	-	Gully plugging with live hedges, earth boulders, levelling, sowing across the slope, contour bunding

Chapter 8

SOIL HEALTH MANAGEMENT

8.1 Soil Health

Soil is fundamental to crop production. Without soil, no food could be produced nor would livestock be fed on a large scale. Because it is finite and fragile, soil is a precious resource that requires special care from its users.

Soil health or the capacity of the soil to function is critical to human survival. Soil health has been defined as: "the capacity of the soil to function as a living system without adverse effect on the ecosystem". Healthy soils maintain a diverse community of soil organisms that help to form beneficial symbiotic associations with plant roots, recycle essential plant nutrients, improve soil structure with positive repercussions for soil, water and nutrient holding capacity and ultimately improve crop production and also contribute to mitigating climate change by maintaining or increasing its carbon content.

Functional interactions of soil biota with organic and inorganic components, air and water determine a soil's potential to store and release nutrients and water to plants and to promote and sustain plant growth. Thus, maintaining soil health is vital to crop production and conserve soil resource base for sustaining agriculture.

The most important characterististics of a healthy soil are

- Good soil tilth
- Sufficient soil depth
- Good water storage and good drainage
- Adequate supply, but not excess of nutrients
- Large population of beneficial organisms
- Small proportion of plant pathogens and insect pests
- Low weed pressure
- Free of chemicals and toxins that may harm the crop
- Resistance to degradation
- Resilience when unfavorable conditions occur

Characteristics of Kadenhalli Microwatershed

- The soil phases identified in the microwatershed belonged to the soil series of TDH 91 ha (19%), BWT 61 ha (13%), LKR 49 ha (10%), KTP 36 ha (7%), HDH 32 ha (7%), RTR 29 ha (6%), MKH 27 ha (6%), JDG 25 ha (5%), KGH 23 ha (5%), BPR 19 ha (4%), KSP 18 ha (4%), CSR 17 ha (4%), BMK 12 ha (2%), BDG 9 ha (2%) and GHT 5 ha (1%).
- As per land capability Classification, 94 per cent area in the microwatershed falls under arable land category (Class II, III & IV). The major limitations identified in the arable lands were soil and erosion. About 2 per cent area is not suitable for

agriculture' but, well suited for forestry, pasture, recreation and installation of wind mills.

- On the basis of soil reaction, an area of about 231 ha (49%) is neutral (pH 6.5 -7.3) and about 223 ha (47%) is under moderately to slightly acid (pH 5.5-6.5).

Soil Health Management

The following actions are required to improve the current land husbandry practices that provide a sound basis for the successful adoption of sustainable crop production system.

Acid soils

(Slightly acid to strongly acid soils)

1. Application of lime in the form of calcium carbonate or lime stone ($CaCO_3$)
2. Regular addition of organic manure, green manuring, green leaf manuring, crop residue incorporation and mulching needs to be taken up to improve the soil organic matter status.
3. Use of rock phosphate (30-50 % of CaO, which helps in improving soil pH).
4. Application of basic fertilizers (Sodium nitrate, basic slag etc, reduces acidity in acid soils)

Besides the above recommendations, the best transfer of technology options are also to be adopted.

Alkaline soils

(Slightly alkaline to moderately alkaline soils)

1. Regular addition of organic manure, green manuring, green leaf manuring, crop residue incorporation and mulching needs to be taken up to improve the soil organic matter status.
2. Application of biofertilizers (Azospirullum, Azatobacter, Rhizobium).
3. Application of 25% extra N and P (125 % RDN&P).
4. Application of $ZnSO_4$ – 12.5 kg/ha (once in three years).
5. Application of Boron – 5kg/ha (once in three years).

Neutral soils

1. Regular addition of organic manure, green manuring, green leaf manuring, crop residue incorporation and mulching needs to be taken up to improve the soil organic matter status.
2. Application of biofertilizers, (Azospirullum, Azotobacter, Rhizobium).
3. Application of 100 per cent RDF.
4. Need based micronutrient applications.

Besides the above recommendations, the best transfer of technology options are also to be adopted.

Soil Degradation

Soil erosion is one of the major factors affecting the soil health in the microwatershed. Out of total 476 ha area in the microwatershed, an area of 153 ha is suffering from moderate erosion. These areas need soil and water conservation and other land husbandry practices for restoring soil health.

Dissemination of Information and Communication of Benefits

Any large scale implementation of soil health management requires that supporting information is made available widely, particularly through channels familiar to farmers and extension workers. Given the very high priority attached to soil-health especially by the Central Government on issuing Soil-Health Cards to all the farmers, media outlets like Regional, State and National Newspapers, Radio and Dooradarshan programs in local languages but also modern information and communication technologies such as Cellular phones and the Internet, which can be much more effective in reaching the younger farmers.

Inputs for Net Planning (Saturation Plan) and Interventions needed

Net planning (Saturation Plan) in IWMP is focusing on preparation of

1. Soil and Water Conservation Plans for each plot or farm.
2. Productivity enhancement measures/ interventions for existing crops/livestock/other farm enterprises.
3. Diversification of farming mainly with perennial horticultural crops and livestock.
4. Improving livelihood opportunities and income generating activities.

In this connection, how various outputs of Sujala-III are of use in addressing these objectives of Net Planning (Saturation Plan) are briefly presented below.

- **Soil Depth:** The depth of a soil decides the amount of moisture and nutrients it can hold, what crops can be taken up or not, depending on the rooting depth and the length of growing period available for raising any crop. Deeper the soil, better for a wide variety of crops. If sufficient depth is not available for growing deep rooted crops, either choose medium or short duration crops or deeper planting pits need to be opened and additional good quality soil brought from outside has to be filled into the planting pits.
- **Surface soil texture:** Lighter soil texture in the top soil means, better rain water infiltration, less run-off and soil moisture conservation, less capillary rise and less evaporation losses. Lighter surface textured soils are amenable to good soil tilth and are highly suitable for crops like groundnut, root vegetables (carrot, raddish, potato etc) but not ideal for crops that need stagnant water like lowland paddy. Heavy textured soils are poor in water infiltration and percolation. They are prone for sheet erosion; such soils can

be improved by sand mulching. The technology that is developed by the AICRP-Dryland Agriculture, Vijayapura, Karnataka can be adopted.

- **Gravelliness:** More gravel content is favorable for run-off harvesting but poor in soil moisture storage and nutrient availability. It is a significant parameter that decides the kind of crop to be raised.
- **Land Capability Classification:** The land capability map shows the areas suitable and not suitable for agriculture and the major constraints in each of the plot/survey number. Hence, one can decide what kind of enterprise is possible in each of these units. In general, erosion and soil are the major constraints in Kadenhalli microwatershed.
- **Organic Carbon:** In about 455 ha (95%) area, the OC content is medium (0.5-0.75%). The areas that are low and medium in OC needs to be further improved by applying farmyard manure and rotating crops with cereals and legumes or mixed cropping.
- **Promoting green manuring:** Growing of green manuring crops cost Rs. 1250/ha (green manuring seeds) and about Rs. 2000/ha towards cultivation that totals to Rs. 3250/- per ha. On the other hand, application of organic manure @ 10 tons/ha costs Rs. 5000/ha. The practice needs to be continued for 2-3 years or more. Nitrogen fertilizer needs to be supplemented by 25% in addition to the recommended level in 455 ha area where OC is medium. For example, for rainfed maize, recommended level is 50 kg N per ha and an additional 12 kg /ha needs to be applied for all the crops grown in these plots.
- **Available Phosphorus**: In 381 ha (80%) area, the available phosphorus is medium and about 73 ha (15%) area it is high in available phosphorus in the microwatershed. Hence for all the crops, 25% additional P-needs to be applied in those areas where available phosphorus is medium.
- **Available Potassium:** Available potassium is medium in 416 ha (87%) area of the microwatershed, low in 39 ha (8%) area of the microwatershed Hence, in all these plots, for all crops, an additional 25 % potassium may be applied.
- **Available Sulphur:** Available sulphur is a very critical nutrient for oilseed crops. It is low in 1 ha (<1%) area of the microwatershed and medium in 282 ha (59%).These areas need to be applied with magnesium sulphate or gypsum or Factamphos (p) fertitilizer (13% sulphur) for 2-3 years for the deficiency to be corrected. About 172 ha (36%) area has soils that are high in available sulphur.
- **Available Boron:** It is low in maximum area of 345 ha and medium in an area of 110 ha. For all these areas, sodium borate @ 10 kg/ha as soil application or 0.2% borax as foliar application to correct the boron deficiency.
- **Available iron:** Available iron content is sufficient in the entire microwatershed.
- **Available Zinc:** It is deficient in 17 ha (3%) area of the microwatershed. Application of zinc sulphate @25kg/ha is to be applied. It is sufficient in 438 ha (92%) area in the microwatershed.
- **Soil acidity:** The microwatershed has 223 ha area with soils that are acidic. These areas need application of lime ($CaCO_3$) and wherever acidity is in excess, rock phosphate and

basic slag can be recommended. Management practices like soil management, water management *etc.* increase the efficiency of nitrogen and potassic fertilizers and growing of acid tolerant crops like Rice, Potato, Tomato, Barley, Wheat *etc*., are recommended.

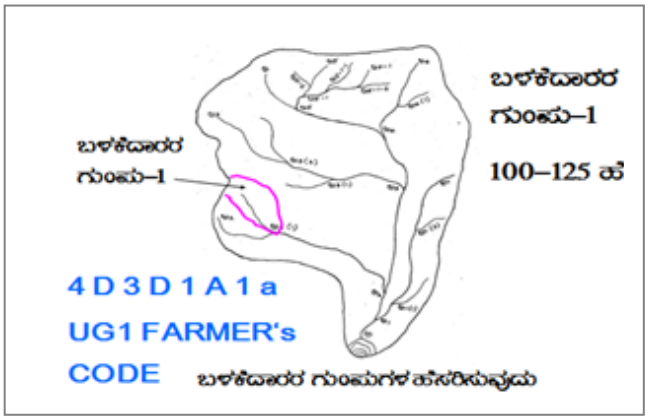
- **Land Suitability for various crops:** Areas that are highly, moderately and marginally suitable for growing various crops are indicated. Along with the suitability, various constraints that are limiting the productivity are also indicated. For example, in case of cotton, gravel content and rooting depth are the major constraints in various plots. With suitable management interventions, the productivity can be enhanced. In order to increase water holding capacity of light textured soils, growing of green manure crops and application of organic manure is recommended.

Chapter 9

SOIL AND WATER CONSERVATION TREATMENT PLAN

For preparing soil and water conservation treatment plan for Kadenhalli microwatershed, the land resource inventory database generated under Sujala-III project has been transformed as information through series of interpretative (thematic) maps using soil phase map as a base. The various thematic maps (1:7920 scale) generated were

- Soil depth
- Surface soil texture
- Soil gravelliness
- Available water capacity
- Soil slope
- Soil erosion
- Land capability
- Present land use and land cover
- Crop suitability
- Rainfall
- Hydrology
- Water Resources
- Socio-economic data
- Contour plan with existing features- network of waterways, pothissa boundaries, cut up/ minor terraces etc.
- Cadastral map (1:7920 scale)
- Satellite imagery (1:7920 scale)



Apart from these, Hand Level/ Hydro Marker/ Dumpy Level/ Total Station and Kathedars' List to be collected.

Steps for Survey and Preparation of Treatment Plan

The boundaries of Land User Groups' and Survey No. boundaries are traced in the field.

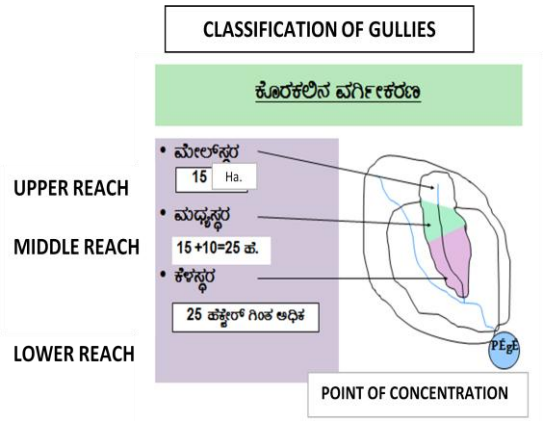
- Naming of user groups and farmers
- Identification of arable and non arable lands
- Identification of drainage lines and gullies
- Identification of non treatable areas
- Identification of priority areas in the arable lands
- Treatment plan for arable lands
- Location of water harvesting and recharge structures

9.1 Treatment Plan

The treatment plan recommended for arable lands is briefly described below.

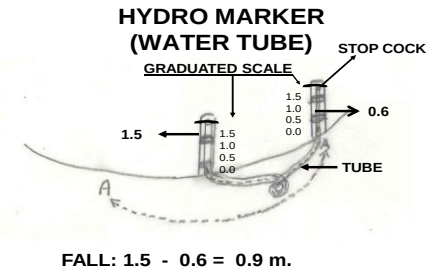
9.1.1 Arable Land Treatment

A. BUNDING

Steps for Survey and Preparation of Treatment Plan		USER GROUP-1
Cadastral map (1:7920 scale) is enlarged to a scale of 1:2500 scale Existing network of waterways, pothissa boundaries, grass belts, natural drainage lines/ watercourse, cut ups/ terraces are marked on the cadastral map to the scale Drainage lines are demarcated into		
Small gullies	(up to 5 ha catchment)	
Medium gullies	(5-15 ha catchment)	
Ravines	(15-25 ha catchment) and	
Halla/Nala	(more than 25ha catchment)	

Measurement of Land Slope

Land slope is estimated or determined by the study and interpretation of contours or by measurement in the field using simple instruments like Hand Level or Hydromarker.



Vertical and Horizontal intervals between bunds as recommended by the Watershed Development Department.

Slope percentage	Vertical interval (m)	Corresponding Horizontal Distance (m)
2 - 3%	0.6	24
3 - 4%	0.9	21
4 - 5%	0.9	21
5 - 6%	1.2	21
6 - 7%	1.2	21

Note: i) The above intervals are maximum.

(ii) Considering the slope class and erosion status (A1… A= 0-1% slope, 1= slight erosion.) the intervals have to be decided.

Bund length recording: Considering the contour plan and the existing grass belts/partitions, the bunds are aligned and lengths are measured.

Section of the Bund

Bund section is decided considering the soil texture class and gravelliness class (bg_0 …b = loamy sand, g_0 = <15% gravel). The recommended Sections for different soils are given below.

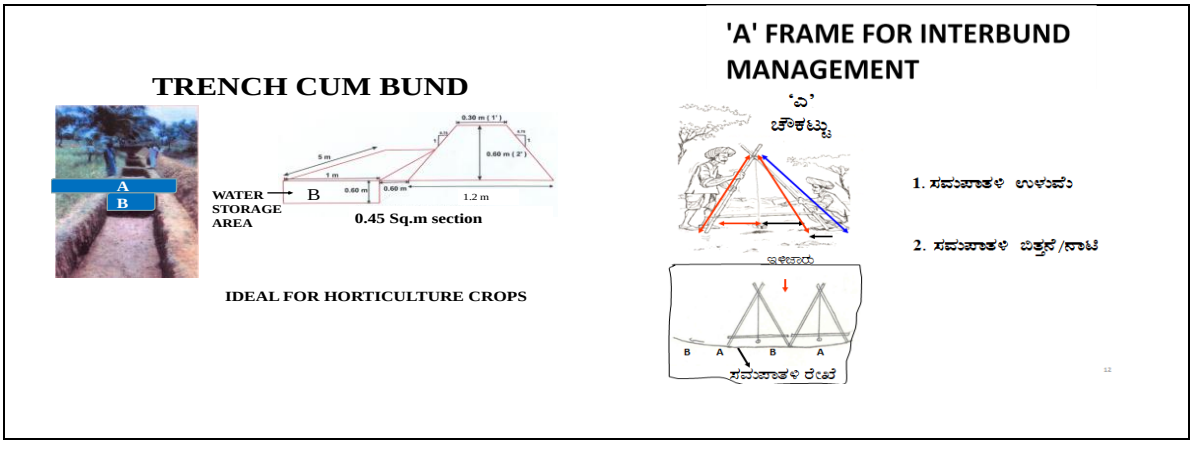
Recommended Bund Section

Top width (m)	Base width (m)	Height (m)	Side slope (Z:1;H:V)	Cross section (sq m)	Soil Texture	Remarks
0.3	0.9	0.3	01:01	0.18	Sandy loam	Vegetative bund
0.3	1.2	0.3	1.5:1	0.225	Sandy clay	
0.3	1.2	0.5	0.9:1	0.375	Red gravelly soils	
0.3	1.2	0.6	0.75:1	0.45		
0.3	1.5	0.6	01:01	0.54	Red sandy loam	
0.3	2.1	0.6	1.5:1	0.72	Very shallow black clayey soils	
0.45	2	0.75	01:01	0.92		
0.45	2.4	0.75	1.3:1	1.07	Shallow black clayey soils	
0.6	3.1	0.7	1.78:1	1.29	Medium black clayey soils	
0.5	3	0.85	1.47:1	1.49		

Formation of Trench cum Bund

Dimensions of the Borrow Pits/ Trenches to be excavated (machinery are decided considering the Bund Section).

Details of Borrow Pit dimensions are given below



Size of Borrow Pit/ Trench recommended for Trench cum Bund (by machinery)

Bund section	Bund length	Earth quantity	Pit				Berm (pit to pit)	Soil depth Class
m^2	m	m^3	L(m)	W(m)	D(m)	QUANTITY (m^3)	m	
0.375	6	2.25	5.85	0.85	0.45	2.24	0.15	Shallow
0.45	6	2.7	5.4	1.2	0.43	2.79	0.6	Shallow
0.45	6	2.7	5	0.85	0.65	2.76	1	Moderately Shallow
0.54	5.6	3.02	5.5	0.85	0.7	3.27	0.1	Moderately shallow
0.54	5.5	2.97	5	1.2	0.5	3	0.5	Shallow
0.72	6.2	4.46	6	1.2	0.7	5.04	0.2	Moderately shallow
0.72	5.2	3.74	5.1	0.85	0.9	3.9	0.1	Moderately deep

B. Waterways

1. Existing waterways are marked on the cadastral map (1:7920 scale) and their dimensions are recorded.
2. Considering the contour plan of the MWS, additional waterways/ modernization of the existing ones can be thought of.
3. The design details are given in the Manual.

C. Farm Ponds

Waterways and the catchment area will give an indication on the size of the Farm Pond. Location of the pond can be decided based on the contour plan/ field condition and farmers' need/desire.

D. Diversion channel

Existing EPT/ CPT are marked on the cadastral map. Looking to the need, these can be modernized or fresh diversion channel can be proposed and runoff from this can be stored in Gokatte/ Recharge ponds.

9.1.2 Non-Arable Land Treatment

Depending on the gravelliness and crops preferred by the farmers, the concerned authorities can decide appropriate treatment plan. The recommended treatments may be Contour Trench, Staggered Trench, Crescent Bund, Boulder Bund or Pebble Bund is formed in the field.

9.1.3 Treatment of Natural Water Course/ Drainage Lines

a) The cadastral map has to be updated as regards the network of drainge lines (gullies/ *nalas/ hallas*) and existing structures are marked to the scale and storage capacity of the existing water bodies are documented.
b) The drainage line will be demarcated into Upper Reach, Middle Reach and Lower Reach.
c) Considering the Catchment, *Nala* bed and bank conditions, suitable structures are decided.
d) Number of storage structures (Check dam/ *Nala* bund/ Percolation tank) will be decided considering the commitments and available runoff from the water budgeting and quality of water in the wells and site suitability.
e) Detailed Leveling Survey using Dumpy Level / Total Station has to be carried out to arrive at the site-specific designs as shown in the Manual.
f) The location of ground water recharge structures are decided by examining the lineaments and fracture zones from the available geological maps.
g) Rainfall intensity data of the nearest Rain Gauge Station is considered for Hydrologic Designs.
h) Silt load to the Storage/Recharge Structures is reduced by providing vegetative, boulder and earthen checks in the natural water course. Location and design details are given in the Manual.

9.2 Recommended Soil and Water Conservation Measures

The appropriate conservation structures best suited for each of the land parcel/ survey number (Appendix-I) are selected based on the slope per cent, severity of erosion, amount of rainfall, land use and soil type. The different kinds of conservation structures recommended are

1. Graded / Strengthening of Bunds
2. Trench cum Bunds (TCB)
3. Trench cum Bunds / Strengthening
4. Crescent Bunds

A map (Fig. 9.1) showing soil and water conservation plan with different kinds of structures recommended has been generated, which shows the spatial distribution and extent of area. A maximum area of about 273 ha (57%) requires Trench cum Bunding, about 61 ha (13%) requires Graded Bunding, about 111 ha (23%) area requires Bunding/ Strengthening of existing field bunds and about 3 ha (1%) area requires Terracing. The conservation plan generated may be presented to all the stakeholders including the farmers and after considering their suggestions, the conservation plan for the microwatershed may be finalised in a participatory approach.

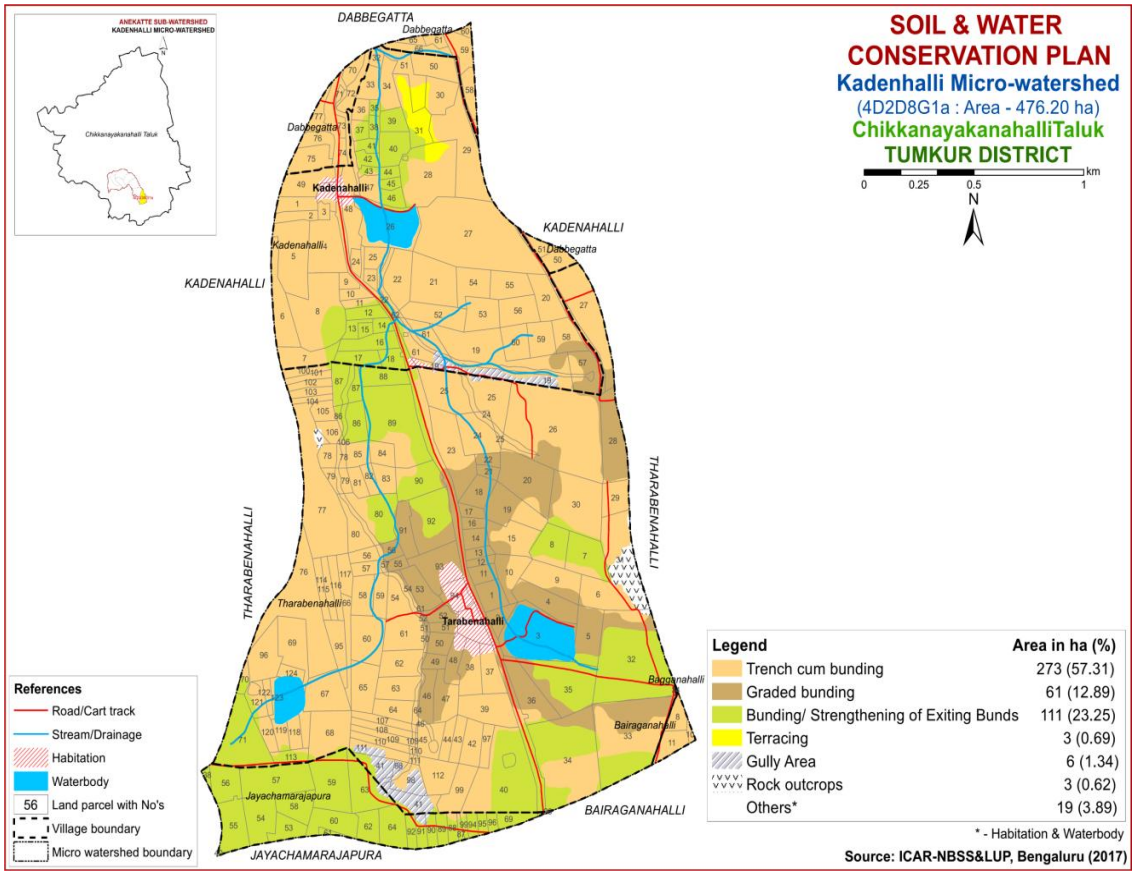


Fig. 7.36 Soil and Water Conservation Plan map of Kadenhalli Microwatershed

9.3 Greening of Microwatershed

As part of the greening programme in the watersheds, it is envisaged to plant a variety of horticultural and other tree plants that are edible, economical and produce lot of biomass which helps to restore the ecological balance in the watersheds. The lands that are suitable for greening programme are non-arable lands (land capability classes V, VI and VII) and also the lands that are not suitable or marginally suitable for growing annual and perennial crops. The method of planting these trees is given below.

It is recommended to open pits during the 1st week of March along the contour and heap the dugout soil on the lower side of the slope in order to harness the flowing water and facilitate weathering of soil in the pit. Exposure of soil in the pit also prevents spread of pests and diseases due to scorching sun rays. The pits should be filled with mixture of soil and organic manure during the second week of April and keep ready with sufficiently tall seedlings produced either in poly bags or in root trainer nurseries so that planting can be done during the 2nd or 3rd week of April depending on the rainfall.

The tree species suitable for the area considering rainfall, temperature and adaptability is listed below; waterlogged areas are recommended to be planted with species like Nerale (*Sizyzium cumini*) and Bamboo. Dry areas are to be planted with species like Honge, Bevu, Seetaphal *etc*.

Dry Deciduous Species			Temp (°C)	Rainfall(mm)
1.	Bevu	*Azadiracta indica*	21–32	400 –1,200
2.	Tapasi	*Holoptelia integrifolia*	20-30	500 - 1000
3.	Seetaphal	*Anona Squamosa*	20-40	400 - 1000
4.	Honge	*Pongamia pinnata*	20 -50	500–2,500
5.	Kamara	*Hardwikia binata*	25 -35	400 - 1000
6.	Bage	*Albezzia lebbek*	20 - 45	500 - 1000
7.	Ficus	*Ficus bengalensis*	20 - 50	500–2,500
8.	Sisso	*Dalbargia Sissoo*	20 - 50	500 -2000
9.	Ailanthus	*Ailanthus excelsa*	20 - 50	500 - 1000
10.	Hale	*Wrightia tinctoria*	25 - 45	500 - 1000
11.	Uded	*Steriospermum chelanoides*	25 - 45	500 -2000
12.	Dhupa	*Boswella Serrata*	20 - 40	500 - 2000
13.	Nelli	*Emblica Officinalis*	20 - 50	500 -1500
14.	Honne	*Pterocarpus marsupium*	20 - 40	500 - 2000
Moist Deciduous Species			**Temp (°C)**	**Rainfall(mm)**
15.	Teak	*Tectona grandis*	20 - 50	500-5000
16.	Nandi	*Legarstroemia lanceolata*	20 - 40	500 - 4000
17.	Honne	*Pterocarpus marsupium*	20 - 40	500 - 3000
18.	Mathi	*Terminalia alata*	20 -50	500 - 2000
19.	Shivane	*Gmelina arboria*	20 -50	500 -2000
20.	Kindal	*T.Paniculata*	20 - 40	500 - 1500
21.	Beete	*Dalbargia latifolia*	20 - 40	500 - 1500
22.	Tare	*T. belerica*	20 - 40	500 - 2000
23.	Bamboo	*Bambusa arundinasia*	20 - 40	500 - 2500
24.	Bamboo	*Dendrocalamus strictus*	20 – 40	500 – 2500
25.	Muthuga	*Butea monosperma*	20 - 40	400 - 1500
26.	Hippe	*Madhuca latifolia*	20 - 40	500 - 2000
27.	Sandal	*Santalum album*	20 - 50	400 - 1000
28.	Nelli	*Emblica officinalis*	20 - 40	500 - 2000
29.	Nerale	*Sizyzium cumini*	20 - 40	500 - 2000
30.	Dhaman	*Grevia tilifolia*	20 - 40	500 - 2000
31.	Kaval	*Careya arborea*	20 - 40	500 - 2000
32.	Harada	*Terminalia chebula*	20 - 40	500 - 2000

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Appendix I

Kadenhalli Microwatershed

Soil Phase Information

Village	Survey No.	Total Area(ha)	Soil Phase	LUC	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	WELLS	Land Capability	Conservation Plan
Bagganahalli	34	0.02	KGHcA1	LUC-6	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Not Available (NA)	Not Available	IIs	Bunding/ Field bunds
Bairaganahalli	8	1	MKHcB2g1	LUC-5	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIIes	Trench cum bunding
Bairaganahalli	10	0.2	MKHcB2g1	LUC-5	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIIes	Trench cum bunding
Bairaganahalli	11	1.29	MKHcB2g1	LUC-5	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Ragi (Ra)	Not Available	IIIes	Trench cum bunding
Bairaganahalli	26	0.01	RTRcA1	LUC-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Not Available (NA)	Not Available	IIs	Bunding/ Field bunds
Dabbegatta	50	1.03	LKRcC2g1	LUC-5	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Gently sloping (3-5%)	Moderate	Coconut (CN)	Not Available	IIIes	Trench cum bunding
Dabbegatta	51	0.61	LKRcC2g1	LUC-5	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Gently sloping (3-5%)	Moderate	Ragi (Ra)	Not Available	IIIes	Trench cum bunding
Dabbegatta	58	0.98	KTPcC2g2	LUC-6	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Low (51-100 mm/m)	Gently sloping (3-5%)	Moderate	Ragi (Ra)	Not Available	IIIes	Trench cum bunding
Dabbegatta	59	1.26	KTPcC2g2	LUC-6	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Low (51-100 mm/m)	Gently sloping (3-5%)	Moderate	Ragi (Ra)	Not Available	IIIes	Trench cum bunding
Dabbegatta	60	0.26	KTPcC2g2	LUC-6	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Low (51-100 mm/m)	Gently sloping (3-5%)	Moderate	Ragi (Ra)	Not Available	IIIes	Trench cum bunding
Dabbegatta	61	0.48	KTPcC2g2	LUC-6	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Low (51-100 mm/m)	Gently sloping (3-5%)	Moderate	Not Available (NA)	Not Available	IIIes	Trench cum bunding
Dabbegatta	65	0.34	KTPcC2g2	LUC-6	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Low (51-100 mm/m)	Gently sloping (3-5%)	Moderate	Not Available (NA)	Not Available	IIIes	Trench cum bunding
Dabbegatta	66	1.06	KTPcC2g2	LUC-6	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Low (51-100 mm/m)	Gently sloping (3-5%)	Moderate	Not Available (NA)	Not Available	IIIes	Trench cum bunding
Dabbegatta	70	0.7	HDHhB1g1	LUC-5	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Arecanut (Ar)	Not Available	IIIs	Trench cum bunding
Dabbegatta	71	0.16	KTPcC2g2	LUC-6	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Low (51-100 mm/m)	Gently sloping (3-5%)	Moderate	Not Available (NA)	Not Available	IIIes	Trench cum bunding
Dabbegatta	72	1.06	KTPcC2g2	LUC-6	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Low (51-100 mm/m)	Gently sloping (3-5%)	Moderate	Coconut (CN)	Not Available	IIIes	Trench cum bunding
Dabbegatta	73	0.31	KTPcC2g2	LUC-6	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Low (51-100 mm/m)	Gently sloping (3-5%)	Moderate	Not Available (NA)	Not Available	IIIes	Trench cum bunding
Dabbegatta	74	0.43	KTPcC2g2	LUC-6	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Low (51-100 mm/m)	Gently sloping (3-5%)	Moderate	Coconut (CN)	Not Available	IIIes	Trench cum bunding
Dabbegatta	75	1.81	MKHhB2g1	LUC-5	Moderately shallow (50-75 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Coconut (CN)	1 Bore well	IIIes	Trench cum bunding
Dabbegatta	76	0.97	MKHhB2g1	LUC-5	Moderately shallow (50-75 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Ragi (Ra)	Not Available	IIIes	Trench cum bunding
Dabbegatta	77	0.95	MKHhB2g1	LUC-5	Moderately shallow (50-75 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Ragi (Ra)	Not Available	IIIes	Trench cum bunding
Jayachamaraja pura	38	0.22	JDGcA1	LUC-3	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Ragi (Ra)	Not Available	IIs	Bunding/ Field bunds

Village	Survey No.	Total Area(ha)	Soil Phase	LUC	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	WELLS	Land Capability	Conservation Plan
Jayachamaraja pura	40	0.02	RTRcA1	LUC-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Not Available (NA)	Not Available	IIs	Bunding/ Field bunds
Jayachamaraja pura	53	1.32	RTRcA1	LUC-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Coconut (CN)	Not Available	IIs	Bunding/ Field bunds
Jayachamaraja pura	54	2.52	RTRcA1	LUC-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Coconut (CN)	Not Available	IIs	Bunding/ Field bunds
Jayachamaraja pura	55	2.49	RTRcA1	LUC-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Coconut (CN)	Not Available	IIs	Bunding/ Field bunds
Jayachamaraja pura	56	1.95	JDGcA1	LUC-3	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Coconut (CN)	Not Available	IIs	Bunding/ Field bunds
Jayachamaraja pura	57	4	JDGcA1	LUC-3	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Coconut (CN)	Not Available	IIs	Bunding/ Field bunds
Jayachamaraja pura	58	1.83	JDGcA1	LUC-3	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Coconut (CN)	Not Available	IIs	Bunding/ Field bunds
Jayachamaraja pura	59	3.87	JDGcA1	LUC-3	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Coconut+Ragi (CN+Ra)	Not Available	IIs	Bunding/ Field bunds
Jayachamaraja pura	60	2.1	RTRcA1	LUC-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Coconut (CN)	Not Available	IIs	Bunding/ Field bunds
Jayachamaraja pura	61	0.23	RTRcA1	LUC-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Coconut (CN)	Not Available	IIs	Bunding/ Field bunds
Jayachamaraja pura	62	1.29	RTRcA1	LUC-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Ragi (Ra)	Not Available	IIs	Bunding/ Field bunds
Jayachamaraja pura	63	2.93	JDGcA1	LUC-3	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Ragi (Ra)	Not Available	IIs	Bunding/ Field bunds
Jayachamaraja pura	64	2.02	RTRcA1	LUC-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Coconut (CN)	Not Available	IIs	Bunding/ Field bunds
Jayachamaraja pura	69	0.89	RTRcA1	LUC-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Forest Nursery (FN)	Not Available	IIs	Bunding/ Field bunds
Jayachamaraja pura	87	0.24	RTRcA1	LUC-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Ragi (Ra)	Not Available	IIs	Bunding/ Field bunds
Jayachamaraja pura	88	0.58	RTRcA1	LUC-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Ragi (Ra)	Not Available	IIs	Bunding/ Field bunds
Jayachamaraja pura	89	0.68	RTRcA1	LUC-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Ragi (Ra)	Not Available	IIs	Bunding/ Field bunds
Jayachamaraja pura	90	0.65	RTRcA1	LUC-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Ragi (Ra)	Not Available	IIs	Bunding/ Field bunds
Jayachamaraja pura	91	0.7	RTRcA1	LUC-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Coconut (CN)	Not Available	IIs	Bunding/ Field bunds
Jayachamaraja pura	92	0.63	RTRcA1	LUC-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Coconut (CN)	Not Available	IIs	Bunding/ Field bunds
Jayachamaraja pura	94	0.49	RTRcA1	LUC-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Ragi (Ra)	Not Available	IIs	Bunding/ Field bunds
Jayachamaraja pura	95	0.41	RTRcA1	LUC-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Ragi (Ra)	2 Bore well	IIs	Bunding/ Field bunds
Jayachamaraja pura	96	0.37	RTRcA1	LUC-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Coconut (CN)	Not Available	IIs	Bunding/ Field bunds
Jayachamaraja pura	99	0.27	RTRcA1	LUC-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Ragi (Ra)	Not Available	IIs	Bunding/ Field bunds

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Kadenahalli	1	1.09	MKHhB2g1	LUC-5	Moderately shallow (50-75 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Coconut (CN)	1 Bore well	IIIes	Trench cum bunding
Kadenahalli	2	0.82	MKHhB2g1	LUC-5	Moderately shallow (50-75 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Ragi (Ra)	Not Available	IIIes	Trench cum bunding
Kadenahalli	3	0.39	MKHhB2g1	LUC-5	Moderately shallow (50-75 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Ragi (Ra)	Not Available	IIIes	Trench cum bunding
Kadenahalli	4	3.51	TDHhB1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	4 Bore well	IIs	Trench cum bunding
Kadenahalli	5	4.28	MKHhB2g1	LUC-5	Moderately shallow (50-75 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Ragi (Ra)	Not Available	IIIes	Trench cum bunding
Kadenahalli	6	2.77	BPRcC2g2	LUC-2	Deep (100-150 cm)	Sandy loam	Very gravelly (35-60%)	Low (51-100 mm/m)	Gently sloping (3-5%)	Moderate	Ragi (Ra)	Not Available	IIIes	Trench cum bunding
Kadenahalli	7	2.03	BPRcC2g2	LUC-2	Deep (100-150 cm)	Sandy loam	Very gravelly (35-60%)	Low (51-100 mm/m)	Gently sloping (3-5%)	Moderate	Coconut (CN)	2 Bore well	IIIes	Trench cum bunding
Kadenahalli	8	6.2	TDHhB1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut+Ragi (CN+Ra)	3 Bore well	IIs	Trench cum bunding
Kadenahalli	9	0.52	TDHhB1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Arecanut (Ar)	Not Available	IIs	Trench cum bunding
Kadenahalli	10	0.62	TDHhB1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Arecanut (Ar)	Not Available	IIs	Trench cum bunding
Kadenahalli	11	0.57	TDHhB1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	2Borewel l,1 Open well	IIs	Trench cum bunding
Kadenahalli	12	0.92	CSRcA1	LUC-6	Shallow (25-50 cm)	Sandy loam	Non gravelly (<15%)	Very Low (<50 mm/m)	Nearly level (0-1%)	Slight	Coconut (CN)	1 Bore well	IIIs	Bunding/ Field bunds
Kadenahalli	13	0.58	CSRcA1	LUC-6	Shallow (25-50 cm)	Sandy loam	Non gravelly (<15%)	Very Low (<50 mm/m)	Nearly level (0-1%)	Slight	Coconut (CN)	1 Bore well	IIIs	Bunding/ Field bunds
Kadenahalli	14	0.53	CSRcA1	LUC-6	Shallow (25-50 cm)	Sandy loam	Non gravelly (<15%)	Very Low (<50 mm/m)	Nearly level (0-1%)	Slight	Coconut (CN)	1 Bore well	IIIs	Bunding/ Field bunds
Kadenahalli	15	0.39	CSRcA1	LUC-6	Shallow (25-50 cm)	Sandy loam	Non gravelly (<15%)	Very Low (<50 mm/m)	Nearly level (0-1%)	Slight	Coconut (CN)	Not Available	IIIs	Bunding/ Field bunds
Kadenahalli	16	1.62	CSRcA1	LUC-6	Shallow (25-50 cm)	Sandy loam	Non gravelly (<15%)	Very Low (<50 mm/m)	Nearly level (0-1%)	Slight	Coconut (CN)	Not Available	IIIs	Bunding/ Field bunds
Kadenahalli	17	1.22	CSRcA1	LUC-6	Shallow (25-50 cm)	Sandy loam	Non gravelly (<15%)	Very Low (<50 mm/m)	Nearly level (0-1%)	Slight	Coconut (CN)	1 Bore well	IIIs	Bunding/ Field bunds
Kadenahalli	18	0.88	CSRcA1	LUC-6	Shallow (25-50 cm)	Sandy loam	Non gravelly (<15%)	Very Low (<50 mm/m)	Nearly level (0-1%)	Slight	Coconut (CN)	1 Bore well	IIIs	Bunding/ Field bunds
Kadenahalli	19	8.08	LKRcC2g2	LUC-5	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Gently sloping (3-5%)	Moderate	Coconut+Ragi (CN+Ra)	2 Bore well	IIIes	Trench cum bunding
Kadenahalli	20	2.02	KTPcB2g1	LUC-6	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Ragi (Ra)	Not Available	IIIe	Trench cum bunding
Kadenahalli	21	3.92	KSPhB2g2	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Ragi (Ra)	Not Available	IIIes	Trench cum bunding
Kadenahalli	22	2.93	TDHhB1g1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	Not Available	IIs	Trench cum bunding
Kadenahalli	23	0.44	TDHhB1g1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	Not Available	IIs	Trench cum bunding
Kadenahalli	24	0.49	TDHhB1g1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	1 OW, 1 BW	IIs	Trench cum bunding

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Kadenahalli	25	0.8	TDHhB1g1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	Not Available	IIs	Trench cum bunding
Kadenahalli	26	4.88	Waterbody	Others	Others	Others	Others	Others	Others	Others	Waterbody	Not Available	Others	Others
Kadenahalli	27	12.82	LKRcC2g1	LUC-5	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Gently sloping (3-5%)	Moderate	Coconut+Ragi (CN+Ra)	3 Bore well	IIIes	Trench cum bunding
Kadenahalli	28	5.87	KSPhB2g2	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Coconut+Ragi (CN+Ra)	Not Available	IIIes	Trench cum bunding
Kadenahalli	29	5.51	KTPcC2g2	LUC-6	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Low (51-100 mm/m)	Gently sloping (3-5%)	Moderate	Ragi (Ra)	Not Available	IIIes	Trench cum bunding
Kadenahalli	30	1.87	KTPcC2g2	LUC-6	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Low (51-100 mm/m)	Gently sloping (3-5%)	Moderate	Ragi (Ra)	Not Available	IIIes	Trench cum bunding
Kadenahalli	31	2.48	KTPcD2g2	LUC-6	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Low (51-100 mm/m)	Moderately sloping (5-10%)	Moderate	Coconut (CN)	Not Available	Ives	Terracing
Kadenahalli	32	0.45	HDHhB1g1	LUC-5	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	1 Bore well	IIIs	Trench cum bunding
Kadenahalli	33	1.18	KTPcC2g2	LUC-6	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Low (51-100 mm/m)	Gently sloping (3-5%)	Moderate	Coconut (CN)	1 Bore well	IIIes	Trench cum bunding
Kadenahalli	34	1.51	KTPcC2g2	LUC-6	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Low (51-100 mm/m)	Gently sloping (3-5%)	Moderate	Ragi (Ra)	3 Bore well	IIIes	Trench cum bunding
Kadenahalli	35	0.32	KGHiA1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Coconut (CN)	Not Available	IIs	Bunding/ Field bunds
Kadenahalli	36	0.66	KTPcC2g2	LUC-6	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Low (51-100 mm/m)	Gently sloping (3-5%)	Moderate	Coconut (CN)	2 Bore well	IIIes	Trench cum bunding
Kadenahalli	37	0.64	KGHiA1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Coconut (CN)	Not Available	IIs	Bunding/ Field bunds
Kadenahalli	38	0.48	KGHiA1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Coconut (CN)	Not Available	IIs	Bunding/ Field bunds
Kadenahalli	39	1.09	KGHiA1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Coconut (CN)	Not Available	IIs	Bunding/ Field bunds
Kadenahalli	40	1.79	KGHiA1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Coconut (CN)	Not Available	IIs	Bunding/ Field bunds
Kadenahalli	41	0.59	KGHiA1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Coconut (CN)	2 Bore well	IIs	Bunding/ Field bunds
Kadenahalli	42	0.64	KGHiA1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Coconut (CN)	1 B w, 1 Ow	IIs	Bunding/ Field bunds
Kadenahalli	43	0.35	KGHiA1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Coconut (CN)	2 Bore well	IIs	Bunding/ Field bunds
Kadenahalli	44	0.46	KGHiA1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Coconut (CN)	Not Available	IIs	Bunding/ Field bunds
Kadenahalli	45	0.43	KGHiA1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Coconut (CN)	Not Available	IIs	Bunding/ Field bunds
Kadenahalli	46	0.8	KGHiA1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Coconut (CN)	2 Bore well	IIs	Bunding/ Field bunds
Kadenahalli	47	0.95	KTPcC2g2	LUC-6	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Low (51-100 mm/m)	Gently sloping (3-5%)	Moderate	Coconut (CN)	Not Available	IIIes	Trench cum bunding
Kadenahalli	48	2.33	TDHhB1g1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Arecanut+Ragi (Ar+Ra)	2 Bore well	IIs	Trench cum bunding

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Kadenahalli	49	2.15	MKHhB2g1	LUC-5	Moderately shallow (50-75 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Ragi (Ra)	Not Available	IIIes	Trench cum bunding
Kadenahalli	50	1.91	KTPcC2g2	LUC-6	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Low (51-100 mm/m)	Gently sloping (3-5%)	Moderate	Not Available (NA)	Not Available	IIIes	Trench cum bunding
Kadenahalli	51	1.98	KTPcC2g2	LUC-6	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Low (51-100 mm/m)	Gently sloping (3-5%)	Moderate	Coconut (CN)	Not Available	IIIes	Trench cum bunding
Kadenahalli	52	2.4	KSPhB2g2	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Ragi (Ra)	Not Available	IIIes	Trench cum bunding
Kadenahalli	53	2.04	TDHhB1g1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	1 Bore well	IIs	Trench cum bunding
Kadenahalli	54	2.01	KSPhB2g2	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Ragi (Ra)	Not Available	IIIes	Trench cum bunding
Kadenahalli	55	1.97	KTPcB2g1	LUC-6	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Ragi (Ra)	Not Available	IIIe	Trench cum bunding
Kadenahalli	56	2.01	LKRcC2g2	LUC-5	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Gently sloping (3-5%)	Moderate	Ragi (Ra)	Not Available	IIIes	Trench cum bunding
Kadenahalli	57	1.99	BWThB1	LUC-4	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut+Ragi (CN+Ra)	1 Bore well	IIIs	Graded bunding
Kadenahalli	58	1.62	KTPcB2g1	LUC-6	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Ragi (Ra)	Not Available	IIIe	Trench cum bunding
Kadenahalli	59	1.67	LKRcC2g2	LUC-5	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Gently sloping (3-5%)	Moderate	Ragi (Ra)	Not Available	IIIes	Trench cum bunding
Kadenahalli	60	1.69	LKRcC2g2	LUC-5	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Gently sloping (3-5%)	Moderate	Ragi (Ra)	Not Available	IIIes	Trench cum bunding
Kadenahalli	61	2.46	TDHhB1g1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	Not Available	IIs	Trench cum bunding
Tharabenahalli	1	1.38	BWThB1	LUC-4	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	Not Available	IIIs	Graded bunding
Tharabenahalli	2	0.92	BWThB1	LUC-4	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	Not Available	IIIs	Graded bunding
Tharabenahalli	3	6.44	Waterbody	Others	Others	Others	Others	Others	Others	Others	Waterbody	Not Available	Others	Others
Tharabenahalli	4	2.58	BWThB1	LUC-4	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	Not Available	IIIs	Graded bunding
Tharabenahalli	5	2.76	BWThB1	LUC-4	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	3 Bore well	IIIs	Graded bunding
Tharabenahalli	6	2.33	HDHcB2g2	LUC-5	Moderately deep (75-100 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Ragi (Ra)	Not Available	IIIes	Trench cum bunding
Tharabenahalli	7	2.85	HDHhA1g1	LUC-5	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Nearly level (0-1%)	Slight	Coconut+Mango (CN+Mn)	2 Bore well	IIIs	Bunding/ Field bunds
Tharabenahalli	8	2.3	HDHhA1g1	LUC-5	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Nearly level (0-1%)	Slight	Coconut+Mango (CN+Mn)	2 Bore well	IIIs	Bunding/ Field bunds
Tharabenahalli	9	2.87	HDHcB2g2	LUC-5	Moderately deep (75-100 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Ragi (Ra)	4 Bore well	IIIes	Trench cum bunding
Tharabenahalli	10	1.9	HDHcB2g2	LUC-5	Moderately deep (75-100 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Coconut+Ragi (CN+Ra)	Not Available	IIIes	Trench cum bunding
Tharabenahalli	11	0.86	BWThB1	LUC-4	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	Not Available	IIIs	Graded bunding

Village	Survey No.	Total Area(ha)	Soil Phase	LUC	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	WELLS	Land Capability	Conservation Plan
Tharabenahalli	12	0.44	BWThB1	LUC-4	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	1 Bore well	IIIs	Graded bunding
Tharabenahalli	13	0.53	BWThB1	LUC-4	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	Not Available	IIIs	Graded bunding
Tharabenahalli	14	0.89	BWThB1	LUC-4	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	Not Available	IIIs	Graded bunding
Tharabenahalli	15	2.74	HDHcB2g2	LUC-5	Moderately deep (75-100 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Ragi (Ra)	1 Bore well	IIIes	Trench cum bunding
Tharabenahalli	16	0.49	BWThB1	LUC-4	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	Not Available	IIIs	Graded bunding
Tharabenahalli	17	0.56	BWThB1	LUC-4	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Habitation	Not Available	IIIs	Graded bunding
Tharabenahalli	18	1.43	BWThB1	LUC-4	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	1 Bore well	IIIs	Graded bunding
Tharabenahalli	19	3.06	BWThB1	LUC-4	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut+Ragi (CN+Ra)	2 Bw, 1 Ow	IIIs	Graded bunding
Tharabenahalli	20	4.41	BWThB1	LUC-4	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	2 O.well, 2 B.well	IIIs	Graded bunding
Tharabenahalli	21	0.51	BWThB1	LUC-4	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Not Available (NA)	1 Bore well	IIIs	Graded bunding
Tharabenahalli	22	0.59	BWThB1	LUC-4	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Not Available (NA)	4 Bore well	IIIs	Graded bunding
Tharabenahalli	23	4.06	TDHhB1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	3 Bore well	IIs	Trench cum bunding
Tharabenahalli	24	2.57	TDHhB1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	2 Bore well	IIs	Trench cum bunding
Tharabenahalli	25	6.16	TDHhB1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	Not Available	IIs	Trench cum bunding
Tharabenahalli	26	14.04	HDHcB1	LUC-5	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Coconut+Ragi (CN+Ra)	2 Bore well	IIIs	Trench cum bunding
Tharabenahalli	27	5.16	KTPcB2g1	LUC-6	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Ragi (Ra)	Not Available	IIIe	Trench cum bunding
Tharabenahalli	28	3.65	BWThB1	LUC-4	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	3 Bore well	IIIs	Graded bunding
Tharabenahalli	29	1.62	HDHcB1	LUC-5	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Ragi (Ra)	Not Available	IIIs	Trench cum bunding
Tharabenahalli	30	5.45	HDHcB1	LUC-5	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Coconut+Ragi (CN+Ra)	Not Available	IIIs	Trench cum bunding
Tharabenahalli	31	5.14	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Ragi+Scrubland (Ra+Sl)	Not Available	VIIIs	Rock outcrops
Tharabenahalli	32	11.12	KGHcA1	LUC-6	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Ragi (Ra)	1 Bore well	IIs	Bunding/ Field bunds
Tharabenahalli	33	9.62	MKHcB2g1	LUC-5	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Coconut+Ragi (CN+Ra)	1 Bore well	IIIes	Trench cum bunding
Tharabenahalli	34	9.85	RTRcA1	LUC-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Coconut+Hatchery unit (CN+Hu)	6 Bore well	IIs	Bunding/ Field bunds
Tharabenahalli	35	5.48	KGHcA1	LUC-6	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Ragi (Ra)	Not Available	IIs	Bunding/ Field bunds

Village	Survey No.	Total Area(ha)	Soil Phase	LUC	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	WELLS	Land Capability	Conservation Plan
Tharabenahalli	36	3.1	BWThB1	LUC-4	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	2 Bore well	IIIs	Graded bunding
Tharabenahalli	37	1.74	BDGcB2g2	LUC-2	Moderately deep (75-100 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Ragi (Ra)	Not Available	IIIes	Trench cum bunding
Tharabenahalli	38	2.1	BDGcB2g2	LUC-2	Moderately deep (75-100 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Coconut (CN)	Not Available	IIIes	Trench cum bunding
Tharabenahalli	39	2.97	BDGcB2g2	LUC-2	Moderately deep (75-100 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Ragi (Ra)	Not Available	IIIes	Trench cum bunding
Tharabenahalli	40	7.94	RTRcA1	LUC-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Forest Nursery (FN)	Not Available	IIs	Bunding/ Field bunds
Tharabenahalli	41	3.04	Gully Area	Gully Area	-	Gully Area	Non gravelly (<15%)	Gully Area	Gully Area	Nil	Gully area (Ga)	Not Available	VIIes	Gully Area
Tharabenahalli	42	1.6	TDHhB1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	1 Bore well	IIs	Trench cum bunding
Tharabenahalli	43	0.94	TDHhB1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	1 Bore well	IIs	Trench cum bunding
Tharabenahalli	44	0.84	TDHhB1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	Not Available	IIs	Trench cum bunding
Tharabenahalli	45	1.28	TDHhB1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	Not Available	IIs	Trench cum bunding
Tharabenahalli	46	1.37	BWThB1	LUC-4	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	Not Available	IIIs	Graded bunding
Tharabenahalli	47	1.92	BWThB1	LUC-4	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	Not Available	IIIs	Graded bunding
Tharabenahalli	48	1.29	BWThB1	LUC-4	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	Not Available	IIIs	Graded bunding
Tharabenahalli	49	0.63	BWThB1	LUC-4	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Arecanut (Ar)	Not Available	IIIs	Graded bunding
Tharabenahalli	50	1.02	BWThB1	LUC-4	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Arecanut (Ar)	1 Bore well	IIIs	Graded bunding
Tharabenahalli	51	0.61	BWThB1	LUC-4	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Arecanut (Ar)	1 Bore well	IIIs	Graded bunding
Tharabenahalli	52	0.72	BWThB1	LUC-4	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Arecanut (Ar)	2 Bore well	IIIs	Graded bunding
Tharabenahalli	53	1.68	BWThB1	LUC-4	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Arecanut (Ar)	1 Bore well	IIIs	Graded bunding
Tharabenahalli	54	1.59	TDHhB1g1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	1 O. well, 1 B. well	IIs	Trench cum bunding
Tharabenahalli	55	0.46	BWThB1	LUC-4	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Arecanut (Ar)	1 Bore well	IIIs	Graded bunding
Tharabenahalli	56	1.34	TDHhB1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Arecanut (Ar)	2 Bore well	IIs	Trench cum bunding
Tharabenahalli	57	0.78	TDHhB1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	2 Bore well	IIs	Trench cum bunding
Tharabenahalli	58	1.65	TDHhB1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	2 Bore well	IIs	Trench cum bunding
Tharabenahalli	59	1.13	TDHhB1g1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Not Available (NA)	1 Bore well	IIs	Trench cum bunding

Village	Survey No.	Total Area(ha)	Soil Phase	LUC	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	WELLS	Land Capability	Conservation Plan
Tharabenahalli	60	2.88	TDHhB1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	2 Bore well	IIs	Trench cum bunding
Tharabenahalli	61	2.51	TDHhB1g1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	1 Bore well	IIs	Trench cum bunding
Tharabenahalli	62	2	TDHhB1g1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	Not Available	IIs	Trench cum bunding
Tharabenahalli	63	1.8	TDHhB1g1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	1 Bore well	IIs	Trench cum bunding
Tharabenahalli	64	1.46	TDHhB1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	Not Available	IIs	Trench cum bunding
Tharabenahalli	65	2.35	TDHhB1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	1 Bore well	IIs	Trench cum bunding
Tharabenahalli	66	1.19	TDHhB1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Not Available (NA)	1 Bore well	IIs	Trench cum bunding
Tharabenahalli	67	2.84	TDHhB1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	Not Available	IIs	Trench cum bunding
Tharabenahalli	68	3.37	TDHhB1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	Not Available	IIs	Trench cum bunding
Tharabenahalli	69	4.28	GHTcB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Ragi (Ra)	Not Available	IIIe	Trench cum bunding
Tharabenahalli	70	0.49	JDGcA1	LUC-3	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Not Available (NA)	Not Available	IIs	Bunding/ Field bunds
Tharabenahalli	71	4.69	JDGcA1	LUC-3	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Coconut+Ragi (CN+Ra)	Not Available	IIs	Bunding/ Field bunds
Tharabenahalli	76	7.62	LKRcC2g1	LUC-5	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Gently sloping (3-5%)	Moderate	Coconut+Ragi (CN+Ra)	1 Bore well	IIIes	Trench cum bunding
Tharabenahalli	77	8.3	MKHbC2g2	LUC-5	Moderately shallow (50-75 cm)	Loamy sand	Very gravelly (35-60%)	Very Low (<50 mm/m)	Gently sloping (3-5%)	Moderate	Ragi (Ra)	Not Available	IIIes	Trench cum bunding
Tharabenahalli	78	1.05	BMKhA1g1	LUC-2	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Nearly level (0-1%)	Slight	Coconut (CN)	Not Available	IIIs	Trench cum bunding
Tharabenahalli	79	0.82	BMKhA1g1	LUC-2	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Nearly level (0-1%)	Slight	Coconut (CN)	Not Available	IIIs	Trench cum bunding
Tharabenahalli	80	4.5	BPRcA1g1	LUC-2	Deep (100-150 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Arecanut (Ar)	2 Bore well	IIIs	Bunding/ Field bunds
Tharabenahalli	81	0.83	BMKhA1g1	LUC-2	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Nearly level (0-1%)	Slight	Coconut (CN)	Not Available	IIIs	Trench cum bunding
Tharabenahalli	82	0.67	BMKhA1g1	LUC-2	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Nearly level (0-1%)	Slight	Not Available (NA)	1 Bore well	IIIs	Trench cum bunding
Tharabenahalli	83	1.08	BMKhA1g1	LUC-2	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Nearly level (0-1%)	Slight	Coconut (CN)	2 Bore well	IIIs	Trench cum bunding
Tharabenahalli	84	1.07	BMKhA1g1	LUC-2	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Nearly level (0-1%)	Slight	Coconut (CN)	Not Available	IIIs	Trench cum bunding
Tharabenahalli	85	1.07	BMKhA1g1	LUC-2	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Nearly level (0-1%)	Slight	Coconut (CN)	Not Available	IIIs	Trench cum bunding
Tharabenahalli	86	1.75	CSRcA1	LUC-6	Shallow (25-50 cm)	Sandy loam	Non gravelly (<15%)	Very Low (<50 mm/m)	Nearly level (0-1%)	Slight	Coconut (CN)	Not Available	IIIs	Bunding/ Field bunds
Tharabenahalli	87	1.76	CSRcA1	LUC-6	Shallow (25-50 cm)	Sandy loam	Non gravelly (<15%)	Very Low (<50 mm/m)	Nearly level (0-1%)	Slight	Coconut (CN)	1 Bore well	IIIs	Bunding/ Field bunds

Village	Survey No.	Total Area(ha)	Soil Phase	LUC	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	WELLS	Land Capability	Conservation Plan
Tharabenahalli	88	1.61	CSRcA1	LUC-6	Shallow (25-50 cm)	Sandy loam	Non gravelly (<15%)	Very Low (<50 mm/m)	Nearly level (0-1%)	Slight	Coconut (CN)	1 O.well, 1 B.well	IIIs	Bunding/ Field bunds
Tharabenahalli	89	7.14	BPRcA1g1	LUC-2	Deep (100-150 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Coconut (CN)	1 Bore well	IIIs	Bunding/ Field bunds
Tharabenahalli	90	2.65	BPRcA1g1	LUC-2	Deep (100-150 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Ragi (Ra)	Not Available	IIIs	Bunding/ Field bunds
Tharabenahalli	91	1.64	BWThB1	LUC-4	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	Not Available	IIIs	Graded bunding
Tharabenahalli	92	4.23	BPRcA1g1	LUC-2	Deep (100-150 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Coconut+Ragi (CN+Ra)	2 Bore well	IIIs	Bunding/ Field bunds
Tharabenahalli	93	3.1	BWThB1	LUC-4	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	2 Bore well	IIIs	Graded bunding
Tharabenahalli	94	1.37	Habitation	Others	Others	Others	Others	Others	Others	Others	Habitation	Not Available	Others	Others
Tharabenahalli	95	1.57	TDHhB1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	Not Available	IIs	Trench cum bunding
Tharabenahalli	96	2.62	GHTcB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Ragi (Ra)	Not Available	IIIe	Trench cum bunding
Tharabenahalli	97	0.82	BDGcB2g2	LUC-2	Moderately deep (75-100 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Ragi (Ra)	Not Available	IIIes	Trench cum bunding
Tharabenahalli	98	1.55	Gully Area	Gully Area	-	Gully Area	Non gravelly (<15%)	Gully Area	Gully Area	Nil	Coconut (CN)	Not Available	VIIes	Gully Area
Tharabenahalli	99	1.99	TDHhB1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	1 Bore well	IIs	Trench cum bunding
Tharabenahalli	100	0.71	LKRcB1	LUC-5	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	1 Bore well	IIIs	Trench cum bunding
Tharabenahalli	101	0.58	LKRcB1	LUC-5	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	Not Available	IIIs	Trench cum bunding
Tharabenahalli	102	0.64	LKRcB1	LUC-5	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	Not Available	IIIs	Trench cum bunding
Tharabenahalli	103	0.68	LKRcB1	LUC-5	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	Not Available	IIIs	Trench cum bunding
Tharabenahalli	104	0.47	LKRcB1	LUC-5	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	Not Available	IIIs	Trench cum bunding
Tharabenahalli	105	0.85	LKRcB1	LUC-5	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	1 Bore well	IIIs	Trench cum bunding
Tharabenahalli	106	0.84	LKRcB1	LUC-5	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	Not Available	IIIs	Trench cum bunding
Tharabenahalli	107	0.91	TDHhB1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	Not Available	IIs	Trench cum bunding
Tharabenahalli	108	0.87	TDHhB1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Ragi (Ra)	Not Available	IIs	Trench cum bunding
Tharabenahalli	109	0.82	TDHhB1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Ragi (Ra)	Not Available	IIs	Trench cum bunding
Tharabenahalli	110	0.88	TDHhB1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	1 Bore well	IIs	Trench cum bunding
Tharabenahalli	111	1.39	TDHhB1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Ragi (Ra)	Not Available	IIs	Trench cum bunding

Village	Survey No.	Total Area(ha)	Soil Phase	LUC	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	WELLS	Land Capability	Conservation Plan
Tharabenahalli	112	2.08	TDHhB1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	2 Bore well	IIs	Trench cum bunding
Tharabenahalli	113	0.94	JDGcA1	LUC-3	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Habitation	Not Available	IIs	Bunding/ Field bunds
Tharabenahalli	114	0.85	LKRcC2g1	LUC-5	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Gently sloping (3-5%)	Moderate	Ragi (Ra)	Not Available	IIIes	Trench cum bunding
Tharabenahalli	115	0.89	LKRcC2g1	LUC-5	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Gently sloping (3-5%)	Moderate	Ragi (Ra)	Not Available	IIIes	Trench cum bunding
Tharabenahalli	116	0.93	LKRcC2g1	LUC-5	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Gently sloping (3-5%)	Moderate	Coconut (CN)	Not Available	IIIes	Trench cum bunding
Tharabenahalli	117	1.01	LKRcC2g1	LUC-5	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Gently sloping (3-5%)	Moderate	Coconut (CN)	Not Available	IIIes	Trench cum bunding
Tharabenahalli	118	0.83	TDHhB1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	1 Bore well	IIs	Trench cum bunding
Tharabenahalli	119	0.86	TDHhB1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	1 Bore well	IIs	Trench cum bunding
Tharabenahalli	120	0.88	TDHhB1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	1 Bore well	IIs	Trench cum bunding
Tharabenahalli	121	0.94	TDHhB1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	Not Available	IIs	Trench cum bunding
Tharabenahalli	122	0.44	TDHhB1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	1 Bore well	IIs	Trench cum bunding
Tharabenahalli	123	0.87	Waterbody	Others	Others	Others	Others	Others	Others	Others	Waterbody	Not Available	Others	Others
Tharabenahalli	124	0.65	TDHhB1	LUC-6	Moderately shallow (50-75 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Coconut (CN)	Not Available	IIs	Trench cum bunding

Appendix II

Kadenhalli Microwatershed

Soil Fertility Information

Village	Survey No.	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Bagganahalli	34	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Bairaganahalli	8	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Bairaganahalli	10	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Bairaganahalli	11	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Bairaganahalli	26	Moderately acid (pH 5.5 – 6.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Dabbegatta	50	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Dabbegatta	51	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Dabbegatta	58	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Dabbegatta	59	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Dabbegatta	60	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Dabbegatta	61	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Dabbegatta	65	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Dabbegatta	66	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Dabbegatta	70	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Dabbegatta	71	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Dabbegatta	72	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Dabbegatta	73	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Dabbegatta	74	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Dabbegatta	75	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Dabbegatta	76	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Dabbegatta	77	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Jayachamarajapura	38	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)

Village	Survey No.	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Jayachamarajapura	40	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Jayachamarajapura	53	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Jayachamarajapura	54	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Jayachamarajapura	55	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Jayachamarajapura	56	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Jayachamarajapura	57	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Jayachamarajapura	58	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Jayachamarajapura	59	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Jayachamarajapura	60	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Jayachamarajapura	61	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Jayachamarajapura	62	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Jayachamarajapura	63	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Jayachamarajapura	64	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Jayachamarajapura	69	Moderately acid (pH 5.5 – 6.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Jayachamarajapura	87	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Jayachamarajapura	88	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Jayachamarajapura	89	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Jayachamarajapura	90	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Jayachamarajapura	91	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Jayachamarajapura	92	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Jayachamarajapura	94	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Jayachamarajapura	95	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Jayachamarajapura	96	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Jayachamarajapura	99	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)

Village	Survey No.	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Kadenahalli	1	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	2	Moderately acid (pH 5.5 – 6.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	3	Moderately acid (pH 5.5 – 6.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	4	Moderately acid (pH 5.5 – 6.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	5	Moderately acid (pH 5.5 – 6.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	6	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	7	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	8	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	9	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	10	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	11	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	12	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	13	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	14	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	15	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	16	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	17	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	18	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	19	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	20	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	21	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	22	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	23	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	24	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)

Village	Survey No.	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Kadenahalli	25	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	26	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Kadenahalli	27	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	28	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	29	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	30	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	31	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	32	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	33	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	34	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	35	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	36	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	37	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	38	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	39	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	40	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	41	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	42	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	43	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	44	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	45	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	46	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	47	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	48	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)

Village	Survey No.	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Kadenahalli	49	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	50	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	51	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	52	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	53	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	54	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	55	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	56	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	57	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	58	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	59	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	60	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kadenahalli	61	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	1	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	2	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	3	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Tharabenahalli	4	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	5	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	6	Moderately acid (pH 5.5 – 6.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	7	Moderately acid (pH 5.5 – 6.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	8	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	9	Moderately acid (pH 5.5 – 6.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	10	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	11	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)

Village	Survey No.	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Tharabenahalli	12	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	13	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	14	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	15	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	16	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	17	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	18	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	19	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	20	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	21	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	22	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	23	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	24	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	25	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	26	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	27	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	28	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	29	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	30	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	31	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops
Tharabenahalli	32	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	33	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	34	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	35	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)

Village	Survey No.	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Tharabenahalli	36	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	37	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	38	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	39	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	40	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	41	Gully Area	Gully Area	Gully Area	Gully Area	Gully Area	Gully Area	Gully Area	Gully Area	Gully Area	Gully Area	Gully Area
Tharabenahalli	42	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	43	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	44	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	45	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	46	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	47	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	48	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	49	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	50	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	51	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	52	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	53	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	54	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	55	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	56	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	57	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	58	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	59	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)

Village	Survey No.	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Tharabenahalli	60	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	61	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	62	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	63	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	64	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	65	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	66	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	67	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	68	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	69	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Tharabenahalli	70	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Tharabenahalli	71	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Tharabenahalli	76	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Tharabenahalli	77	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	78	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	79	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	80	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	81	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	82	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	83	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	84	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	85	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	86	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	87	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)

Village	Survey No.	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Tharabenahalli	88	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	89	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	90	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	91	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	92	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	93	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	94	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Tharabenahalli	95	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	96	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Tharabenahalli	97	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	98	Gully Area	Gully Area	Gully Area	Gully Area	Gully Area	Gully Area	Gully Area	Gully Area	Gully Area	Gully Area	Gully Area
Tharabenahalli	99	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	100	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	101	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	102	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	103	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	104	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	105	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	106	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	107	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	108	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	109	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	110	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	111	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	112	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)

Village	Survey No.	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Tharabenahalli	113	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	114	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	115	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	116	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	117	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	118	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	119	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	120	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Tharabenahalli	121	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Tharabenahalli	122	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Tharabenahalli	123	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Tharabenahalli	124	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)

Appendix III

Kadenhalli Microwatershed

Soil Suitability Information

Village	Sy. No.	Sorgham	Fodder Sorghum	Maize	Upland-Paddy	Finger Millet	Redgram	Horsegram	Field-bean	Cowpea	Ground nut	Sunflower	Onion	Chilly	Brinjal	Tomato	Mango	Sapota	Guava	Pomegranate	Banana	Jackfruit	Jamun	Musambi	Lime	Cashew	Custard apple	Amla	Tamarind	Marigold	Chrysanthemum	Jasmine	Coconut	Arecanut	Mulberry
Bagganahalli	34	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Bairaganahalli	8	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S1	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S2rg	S2rg	Nr	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S2rg	S2rg	Nr	S2rg	S2rg	S2rg	S3rg	S3rg	S3rg
Bairaganahalli	10	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S1	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S2rg	S2rg	Nr	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S2rg	S2rg	Nr	S2rg	S2rg	S2rg	S3rg	S3rg	S3rg
Bairaganahalli	11	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S1	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S2rg	S2rg	Nr	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S2rg	S2rg	Nr	S2rg	S2rg	S2rg	S3rg	S3rg	S3rg
Bairaganahalli	26	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S3t	S1	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S2t	S2t
Dabbegatta	50	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	Nrg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	Nrg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg
Dabbegatta	51	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	Nrg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	Nrg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg
Dabbegatta	58	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S1	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S2rg	S2rg	Nr	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S2rg	S2rg	Nr	S2rg	S2rg	S2rg	S3rg	S3rg	S3rg
Dabbegatta	59	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S1	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S2rg	S2rg	Nr	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S2rg	S2rg	Nr	S2rg	S2rg	S2rg	S3rg	S3rg	S3rg
Dabbegatta	60	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S1	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S2rg	S2rg	Nr	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S2rg	S2rg	Nr	S2rg	S2rg	S2rg	S3rg	S3rg	S3rg
Dabbegatta	61	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S1	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S2rg	S2rg	Nr	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S2rg	S2rg	Nr	S2rg	S2rg	S2rg	S3rg	S3rg	S3rg
Dabbegatta	65	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S1	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S2rg	S2rg	Nr	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S2rg	S2rg	Nr	S2rg	S2rg	S2rg	S3rg	S3rg	S3rg
Dabbegatta	66	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S1	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S2rg	S2rg	Nr	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S2rg	S2rg	Nr	S2rg	S2rg	S2rg	S3rg	S3rg	S3rg
Dabbegatta	70	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2rg	S2g	S2g	S2g	S2g	S3rg	S2rg	S2rg	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S2rg	S2g	S2g	S3rg	S2g	S2g	S2g	S2rg	S2rg	S2rg
Dabbegatta	71	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S1	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S2rg	S2rg	Nr	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S2rg	S2rg	Nr	S2rg	S2rg	S2rg	S3rg	S3rg	S3rg
Dabbegatta	72	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S1	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S2rg	S2rg	Nr	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S2rg	S2rg	Nr	S2rg	S2rg	S2rg	S3rg	S3rg	S3rg
Dabbegatta	73	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S1	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S2rg	S2rg	Nr	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S2rg	S2rg	Nr	S2rg	S2rg	S2rg	S3rg	S3rg	S3rg
Dabbegatta	74	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S1	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S2rg	S2rg	Nr	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S2rg	S2rg	Nr	S2rg	S2rg	S2rg	S3rg	S3rg	S3rg
Dabbegatta	75	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S1	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S2rg	S2rg	Nr	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S2rg	S2rg	Nr	S2rg	S2rg	S2rg	S3rg	S3rg	S3rg
Dabbegatta	76	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S1	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S2rg	S2rg	Nr	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S2rg	S2rg	Nr	S2rg	S2rg	S2rg	S3rg	S3rg	S3rg
Dabbegatta	77	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S1	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S2rg	S2rg	Nr	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S2rg	S2rg	Nr	S2rg	S2rg	S2rg	S3rg	S3rg	S3rg
Jayachamarajapura	38	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Jayachamarajapura	40	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S3t	S1	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S2t	S2t
Jayachamarajapura	53	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S3t	S1	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S2t	S2t
Jayachamarajapura	54	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S3t	S1	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S2t	S2t

Village	Sy. No.	Sorgham	Fodder Sorghum	Maize	Upland-Paddy	Finger Millet	Red gram	Horse gram	Field-bean	Cow pea	Ground nut	Sunflower	Onion	Chilly	Brinjal	Tomato	Mango	Sapota	Guava	Pomegranate	Banana	Jackfruit	Jamun	Musambi	Lime	Cashew	Custard apple	Amla	Tamarind	Marigold	Chrysanthemum	Jasmine	Coconut	Arecanut	Mulberry
Jayachamarajapura	55	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S3t	S1	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S2t	S2t
Jayachama rajapura	56	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Jayachama rajapura	57	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Jayachama rajapura	58	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Jayachama arajapura	59	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Jayachama arajapura	60	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S3t	S1	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S2t	S2t
Jayachama arajapura	61	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S3t	S1	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S2t	S2t
Jayachama arajapura	62	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S3t	S1	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S2t	S2t
Jayachama arajapura	63	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Jayachama arajapura	64	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S3t	S1	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S2t	S2t
Jayachama arajapura	69	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S3t	S1	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S2t	S2t
Jayachama arajapura	87	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S3t	S1	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S2t	S2t
Jayachama arajapura	88	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S3t	S1	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S2t	S2t
Jayachama arajapura	89	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S3t	S1	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S2t	S2t
Jayachama arajapura	90	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S3t	S1	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S2t	S2t
Jayachama arajapura	91	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S3t	S1	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S2t	S2t
Jayachama arajapura	92	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S3t	S1	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S2t	S2t
Jayachama arajapura	94	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S3t	S1	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S2t	S2t
Jayachama arajapura	95	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S3t	S1	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S2t	S2t
Jayachama arajapura	96	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S3t	S1	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S2t	S2t
Jayachama arajapura	99	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S3t	S1	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S2t	S2t
Kadenahalli	1	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S1	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S2rg	S2rg	Nr	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S2rg	S2rg	Nr	S2rg	S2rg	S2rg	S3rg	S3rg	S3rg
Kadenahalli	2	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S1	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S2rg	S2rg	Nr	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S2rg	S2rg	Nr	S2rg	S2rg	S2rg	S3rg	S3rg	S3rg
Kadenahalli	3	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S1	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S2rg	S2rg	Nr	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S2rg	S2rg	Nr	S2rg	S2rg	S2rg	S3rg	S3rg	S3rg

Village	Sy. No.	Sorgham	Fodder Sorghum	Maize	Upland-Paddy	Finger Millet	Red gram	Horse gram	Field-bean	Cow pea	Ground nut	Sunflower	Onion	Chilly	Brinjal	Tomato	Mango	Sapota	Guava	Pomegranate	Banana	Jackfruit	Jamun	Musambi	Lime	Cashew	Custard apple	Amla	Tamarind	Marigold	Chrysanthemum	Jasmine	Coconut	Arecanut	Mulberry
Kadenahalli	4	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Kadenahalli	5	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S1	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S2rg	S2rg	Nr	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S2rg	S2rg	Nr	S2rg	S2rg	S2rg	S3rg	S3rg	S3rg
Kadenahalli	6	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3g	S2tg	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S2g
Kadenahalli	7	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3g	S2tg	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S2g
Kadenahalli	8	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Kadenahalli	9	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Kadenahalli	10	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Kadenahalli	11	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Kadenahalli	12	S3r	S3r	S3r	S3r	S2r	S3r	S3r	S3r	S3r	S3r	Nr	S3r	S3r	S3r	S3r	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	S3r	Nr	S3r	S3r	S3r	Nr	Nr	Nr
Kadenahalli	13	S3r	S3r	S3r	S3r	S2r	S3r	S3r	S3r	S3r	S3r	Nr	S3r	S3r	S3r	S3r	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	S3r	Nr	S3r	S3r	S3r	Nr	Nr	Nr
Kadenahalli	14	S3r	S3r	S3r	S3r	S2r	S3r	S3r	S3r	S3r	S3r	Nr	S3r	S3r	S3r	S3r	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	S3r	Nr	S3r	S3r	S3r	Nr	Nr	Nr
Kadenahalli	15	S3r	S3r	S3r	S3r	S2r	S3r	S3r	S3r	S3r	S3r	Nr	S3r	S3r	S3r	S3r	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	S3r	Nr	S3r	S3r	S3r	Nr	Nr	Nr
Kadenahalli	16	S3r	S3r	S3r	S3r	S2r	S3r	S3r	S3r	S3r	S3r	Nr	S3r	S3r	S3r	S3r	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	S3r	Nr	S3r	S3r	S3r	Nr	Nr	Nr
Kadenahalli	17	S3r	S3r	S3r	S3r	S2r	S3r	S3r	S3r	S3r	S3r	Nr	S3r	S3r	S3r	S3r	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	S3r	Nr	S3r	S3r	S3r	Nr	Nr	Nr
Kadenahalli	18	S3r	S3r	S3r	S3r	S2r	S3r	S3r	S3r	S3r	S3r	Nr	S3r	S3r	S3r	S3r	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	S3r	Nr	S3r	S3r	S3r	Nr	Nr	Nr
Kadenahalli	19	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	Nrg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	Nrg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg
Kadenahalli	20	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Kadenahalli	21	S2gz	S2gz	S2gz	S2gz	S2gz	S2gz	S2z	S2gz	S2gz	S2gz	S3gz	S2gz	S2gz	S2gz	S2gz	Nrz	S3gz	S3gz	S3gz	S3gz	S3gz	S3gz	S3gz	S3gz	S3gz	S2gz	S2gz	Nrz	S2gz	S2gz	S2gz	S3gz	S3gz	S3rz
Kadenahalli	22	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Kadenahalli	23	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Kadenahalli	24	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Kadenahalli	25	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Kadenahalli	26	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Kadenahalli	27	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	Nrg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	Nrg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg
Kadenahalli	28	S2gz	S2gz	S2gz	S2gz	S2gz	S2gz	S2z	S2gz	S2gz	S2gz	S3gz	S2gz	S2gz	S2gz	S2gz	Nrz	S3gz	S3gz	S3gz	S3gz	S3gz	S3gz	S3gz	S3gz	S3gz	S2gz	S2gz	Nrz	S2gz	S2gz	S2gz	S3gz	S3gz	S3rz
Kadenahalli	29	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S1	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S2rg	S2rg	Nr	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S2rg	S2rg	Nr	S2rg	S2rg	S2rg	S3rg	S3rg	S3rg
Kadenahalli	30	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S1	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S2rg	S2rg	Nr	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S2rg	S2rg	Nr	S2rg	S2rg	S2rg	S3rg	S3rg	S3rg
Kadenahalli	31	Ngl	Ngl	Ngl	Ngl	Ngl	Ngl	Ngl	Ngl	Ngl	Ngl	Ngl	Ngl	Ngl	Ngl	Ngl	Ngl	Ngl	Ngl	Ngl	Ngl	Ngl	Ngl	Ngl	Ngl	Ngl	Ngl	Ngl	Ngl	Ngl	Ngl	Ngl	Ngl	Ngl	S3rl
Kadenahalli	32	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2rg	S2g	S2g	S2g	S2g	S3rg	S2rg	S2rg	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S2rg	S2g	S2g	S3rg	S2g	S2g	S2g	S2rg	S2rg	S2rg

Village	Sy. No.	Sorgham	Fodder Sorghum	Maize	Upland-Paddy	Finger Millet	Red gram	Horse gram	Field-bean	Cow pea	Ground nut	Sunflower	Onion	Chilly	Brinjal	Tomato	Mango	Sapota	Guava	Pomegranate	Banana	Jackfruit	Jamun	Musambi	Lime	Cashew	Custard apple	Amla	Tamarind	Marigold	Chrysanthemum	Jasmine	Coconut	Arecanut	Mulberry
Kadenahalli	33	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S1	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S2rg	S2rg	Nr	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S2rg	S2rg	Nr	S2rg	S2rg	S2rg	S3rg	S3rg	S3rg
Kadenahalli	34	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S1	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S2rg	S2rg	Nr	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S2rg	S2rg	Nr	S2rg	S2rg	S2rg	S3rg	S3rg	S3rg
Kadenahalli	35	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Kadenahalli	36	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S1	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S2rg	S2rg	Nr	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S2rg	S2rg	Nr	S2rg	S2rg	S2rg	S3rg	S3rg	S3rg
Kadenahalli	37	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Kadenahalli	38	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Kadenahalli	39	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Kadenahalli	40	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Kadenahalli	41	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Kadenahalli	42	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Kadenahalli	43	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Kadenahalli	44	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Kadenahalli	45	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Kadenahalli	46	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Kadenahalli	47	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S1	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S2rg	S2rg	Nr	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S2rg	S2rg	Nr	S2rg	S2rg	S2rg	S3rg	S3rg	S3rg
Kadenahalli	48	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Kadenahalli	49	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S1	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S2rg	S2rg	Nr	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S2rg	S2rg	Nr	S2rg	S2rg	S2rg	S3rg	S3rg	S3rg
Kadenahalli	50	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S1	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S2rg	S2rg	Nr	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S2rg	S2rg	Nr	S2rg	S2rg	S2rg	S3rg	S3rg	S3rg
Kadenahalli	51	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S1	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S2rg	S2rg	Nr	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S2rg	S2rg	Nr	S2rg	S2rg	S2rg	S3rg	S3rg	S3rg
Kadenahalli	52	S2gz	S2gz	S2gz	S2gz	S2gz	S2gz	S2z	S2gz	S2gz	S2gz	S3gz	S2gz	S2gz	S2gz	S2gz	Nrz	S3gz	S3gz	S3gz	S3gz	S3gz	S3gz	S3gz	S3gz	S3gz	S2gz	S2gz	Nrz	S2gz	S2gz	S2gz	S3gz	S3gz	S3rz
Kadenahalli	53	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Kadenahalli	54	S2gz	S2gz	S2gz	S2gz	S2gz	S2gz	S2z	S2gz	S2gz	S2gz	S3gz	S2gz	S2gz	S2gz	S2gz	Nrz	S3gz	S3gz	S3gz	S3gz	S3gz	S3gz	S3gz	S3gz	S3gz	S2gz	S2gz	Nrz	S2gz	S2gz	S2gz	S3gz	S3gz	S3rz
Kadenahalli	55	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Kadenahalli	56	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	Nrg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	Nrg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg
Kadenahalli	57	S2zg	S2zg	S3tz	S2zg	S2zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3tz	S2zg	S3tz	S2zg	S2zg	S2zg	S3zg	S2zg	S3tz	S3tz	S3tz	S2zg	S3zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3zg	S2zg	S2zg	S2zg	S3tz	S3tz	S3tz
Kadenahalli	58	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Kadenahalli	59	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	Nrg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	Nrg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg
Kadenahalli	60	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	Nrg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	Nrg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg
Kadenahalli	61	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r

Village	Sy. No.	Sorgham	Fodder Sorghum	Maize	Upland-Paddy	Finger Millet	Red gram	Horse gram	Field-bean	Cow pea	Ground nut	Sunflower	Onion	Chilly	Brinjal	Tomato	Mango	Sapota	Guava	Pomegranate	Banana	Jackfruit	Jamun	Musambi	Lime	Cashew	Custard apple	Amla	Tamarind	Marigold	Chrysanthemum	Jasmine	Coconut	Arecanut	Mulberry
Tharabenahalli	1	S2zg	S2zg	S3tz	S2zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3tz	S2zg	S3tz	S2zg	S2zg	S2zg	S3zg	S2zg	S3tz	S3tz	S3tz	S2zg	S3zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3zg	S2zg	S2zg	S2zg	S3tz	S3tz	S3tz
Tharabenahalli	2	S2zg	S2zg	S3tz	S2zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3tz	S2zg	S3tz	S2zg	S2zg	S2zg	S3zg	S2zg	S3tz	S3tz	S3tz	S2zg	S3zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3zg	S2zg	S2zg	S2zg	S3tz	S3tz	S3tz
Tharabenahalli	3	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Tharabenahalli	4	S2zg	S2zg	S3tz	S2zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3tz	S2zg	S3tz	S2zg	S2zg	S2zg	S3zg	S2zg	S3tz	S3tz	S3tz	S2zg	S3zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3zg	S2zg	S2zg	S2zg	S3tz	S3tz	S3tz
Tharabenahalli	5	S2zg	S2zg	S3tz	S2zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3tz	S2zg	S3tz	S2zg	S2zg	S2zg	S3zg	S2zg	S3tz	S3tz	S3tz	S2zg	S3zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3zg	S2zg	S2zg	S2zg	S3tz	S3tz	S3tz
Tharabenahalli	6	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2rg	S2g	S2g	S2g	S2g	S3rg	S2rg	S2rg	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S2rg	S2g	S2g	S3rg	S2g	S2g	S2g	S2rg	S2rg	S2rg
Tharabenahalli	7	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2rg	S2g	S2g	S2g	S2g	S3rg	S2rg	S2rg	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S2rg	S2g	S2g	S3rg	S2g	S2g	S2g	S2rg	S2rg	S2rg
Tharabenahalli	8	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2rg	S2g	S2g	S2g	S2g	S3rg	S2rg	S2rg	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S2rg	S2g	S2g	S3rg	S2g	S2g	S2g	S2rg	S2rg	S2rg
Tharabenahalli	9	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2rg	S2g	S2g	S2g	S2g	S3rg	S2rg	S2rg	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S2rg	S2g	S2g	S3rg	S2g	S2g	S2g	S2rg	S2rg	S2rg
Tharabenahalli	10	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2rg	S2g	S2g	S2g	S2g	S3rg	S2rg	S2rg	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S2rg	S2g	S2g	S3rg	S2g	S2g	S2g	S2rg	S2rg	S2rg
Tharabenahalli	11	S2zg	S2zg	S3tz	S2zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3tz	S2zg	S3tz	S2zg	S2zg	S2zg	S3zg	S2zg	S3tz	S3tz	S3tz	S2zg	S3zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3zg	S2zg	S2zg	S2zg	S3tz	S3tz	S3tz
Tharabenahalli	12	S2zg	S2zg	S3tz	S2zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3tz	S2zg	S3tz	S2zg	S2zg	S2zg	S3zg	S2zg	S3tz	S3tz	S3tz	S2zg	S3zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3zg	S2zg	S2zg	S2zg	S3tz	S3tz	S3tz
Tharabenahalli	13	S2zg	S2zg	S3tz	S2zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3tz	S2zg	S3tz	S2zg	S2zg	S2zg	S3zg	S2zg	S3tz	S3tz	S3tz	S2zg	S3zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3zg	S2zg	S2zg	S2zg	S3tz	S3tz	S3tz
Tharabenahalli	14	S2zg	S2zg	S3tz	S2zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3tz	S2zg	S3tz	S2zg	S2zg	S2zg	S3zg	S2zg	S3tz	S3tz	S3tz	S2zg	S3zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3zg	S2zg	S2zg	S2zg	S3tz	S3tz	S3tz
Tharabenahalli	15	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2rg	S2g	S2g	S2g	S2g	S3rg	S2rg	S2rg	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S2rg	S2g	S2g	S3rg	S2g	S2g	S2g	S2rg	S2rg	S2rg
Tharabenahalli	16	S2zg	S2zg	S3tz	S2zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3tz	S2zg	S3tz	S2zg	S2zg	S2zg	S3zg	S2zg	S3tz	S3tz	S3tz	S2zg	S3zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3zg	S2zg	S2zg	S2zg	S3tz	S3tz	S3tz
Tharabenahalli	17	S2zg	S2zg	S3tz	S2zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3tz	S2zg	S3tz	S2zg	S2zg	S2zg	S3zg	S2zg	S3tz	S3tz	S3tz	S2zg	S3zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3zg	S2zg	S2zg	S2zg	S3tz	S3tz	S3tz
Tharabenahalli	18	S2zg	S2zg	S3tz	S2zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3tz	S2zg	S3tz	S2zg	S2zg	S2zg	S3zg	S2zg	S3tz	S3tz	S3tz	S2zg	S3zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3zg	S2zg	S2zg	S2zg	S3tz	S3tz	S3tz
Tharabenahalli	19	S2zg	S2zg	S3tz	S2zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3tz	S2zg	S3tz	S2zg	S2zg	S2zg	S3zg	S2zg	S3tz	S3tz	S3tz	S2zg	S3zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3zg	S2zg	S2zg	S2zg	S3tz	S3tz	S3tz
Tharabenahalli	20	S2zg	S2zg	S3tz	S2zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3tz	S2zg	S3tz	S2zg	S2zg	S2zg	S3zg	S2zg	S3tz	S3tz	S3tz	S2zg	S3zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3zg	S2zg	S2zg	S2zg	S3tz	S3tz	S3tz
Tharabenahalli	21	S2zg	S2zg	S3tz	S2zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3tz	S2zg	S3tz	S2zg	S2zg	S2zg	S3zg	S2zg	S3tz	S3tz	S3tz	S2zg	S3zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3zg	S2zg	S2zg	S2zg	S3tz	S3tz	S3tz
Tharabenahalli	22	S2zg	S2zg	S3tz	S2zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3tz	S2zg	S3tz	S2zg	S2zg	S2zg	S3zg	S2zg	S3tz	S3tz	S3tz	S2zg	S3zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3zg	S2zg	S2zg	S2zg	S3tz	S3tz	S3tz
Tharabenahalli	23	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r

Village	Sy. No.	Sorghum	Fodder Sorghum	Maize	Upland-Paddy	Finger Millet	Red gram	Horse gram	Field-bean	Cowpea	Groundnut	Sunflower	Onion	Chilly	Brinjal	Tomato	Mango	Sapota	Guava	Pomegranate	Banana	Jack fruit	Jamun	Musambi	Lime	Cashew	Custard apple	Amla	Tamarind	Marigold	Chrysanthemum	Jasmine	Coconut	Arecanut	Mulberry
Tharabenahalli	24	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Tharabenahalli	25	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Tharabenahalli	26	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2rg	S2g	S2g	S2g	S2g	S3rg	S2rg	S2rg	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S2rg	S2g	S2g	S3rg	S2g	S2g	S2g	S2rg	S2rg	S2rg
Tharabenahalli	27	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Tharabenahalli	28	S2zg	S2zg	S3tz	S2zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3tz	S2zg	S3tz	S2zg	S2zg	S2zg	S3zg	S2zg	S3tz	S3tz	S3tz	S2zg	S3zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3zg	S2zg	S2zg	S2zg	S3tz	S3tz	S3tz
Tharabenahalli	29	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2rg	S2g	S2g	S2g	S2g	S3rg	S2rg	S2rg	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S2rg	S2g	S2g	S3rg	S2g	S2g	S2g	S2rg	S2rg	S2rg
Tharabenahalli	30	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2rg	S2g	S2g	S2g	S2g	S3rg	S2rg	S2rg	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S2rg	S2g	S2g	S3rg	S2g	S2g	S2g	S2rg	S2rg	S2rg
Tharabenahalli	31	Rock Out crops	Rock Out crops	Rock Out crops	Rock Outcrops	Rock Outcrops	Rock Outcrops	Rock Outcrops	Rock Outcrops	Rock Outcrops	Rock Outcrops	Rock Outcrops	Rock Outcrops	Rock Outcrops	Rock Outcrops	Rock Outcrops	Rock Outcrops	Rock Outcrops	Rock Outcrops	Rock Outcrops	Rock Outcrops	Rock Outcrops	Rock Outcrops	Rock Outcrops	Rock Outcrops	Rock Outcrops	Rock Outcrops	Rock Outcrops	Rock Outcrops	Rock Outcrops	Rock Outcrops	Rock Outcrops	Rock Outcrops	Rock Outcrops	Rock Out crops
Tharabenahalli	32	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Tharabenahalli	33	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S1	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S2rg	S2rg	Nr	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S2rg	S2rg	Nr	S2rg	S2rg	S2rg	S3rg	S3rg	S3rg
Tharabenahalli	34	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S3t	S1	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S2t	S2t
Tharabenahalli	35	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Tharabenahalli	36	S2zg	S2zg	S3tz	S2zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3tz	S2zg	S3tz	S2zg	S2zg	S2zg	S3zg	S2zg	S3tz	S3tz	S3tz	S2zg	S3zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3zg	S2zg	S2zg	S2zg	S3tz	S3tz	S3tz
Tharabenahalli	37	S3rg	S3rg	S3rg	S2g	S2g	S3g	S2g	S3g	S3g	S2rg	S3rg	S3g	S3g	S3g	S3g	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S2g	S2g	S3rg	S3g	S3g	S3g	S3g	S3g	S2rg
Tharabenahalli	38	S3rg	S3rg	S3rg	S2g	S2g	S3g	S2g	S3g	S3g	S2rg	S3rg	S3g	S3g	S3g	S3g	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S2g	S2g	S3rg	S3g	S3g	S3g	S3g	S3g	S2rg
Tharabenahalli	39	S3rg	S3rg	S3rg	S2g	S2g	S3g	S2g	S3g	S3g	S2rg	S3rg	S3g	S3g	S3g	S3g	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S2g	S2g	S3rg	S3g	S3g	S3g	S3g	S3g	S2rg
Tharabenahalli	40	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S3t	S1	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S2t	S2t
Tharabenahalli	41	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Gully Area
Tharabenahalli	42	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Tharabenahalli	43	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Tharabenahalli	44	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Tharabenahalli	45	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Tharabenahalli	46	S2zg	S2zg	S3tz	S2zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3tz	S2zg	S3tz	S2zg	S2zg	S2zg	S3zg	S2zg	S3tz	S3tz	S3tz	S2zg	S3zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3zg	S2zg	S2zg	S2zg	S3tz	S3tz	S3tz

Village	Sy. No.	Sorgham	Fodder Sorghum	Maize	Upland-Paddy	Finger Millet	Red gram	Horse gram	Field-bean	Cow pea	Ground nut	Sunflower	Onion	Chilly	Brinjal	Tomato	Mango	Sapota	Guava	Pomegranate	Banana	Jackfruit	Jamun	Musambi	Lime	Cashew	Custard apple	Amla	Tamarind	Marigold	Chrysanthemum	Jasmine	Coconut	Arecanut	Mulberry
Tharabenahalli	47	S2zg	S2zg	S3tz	S2zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3tz	S2zg	S3tz	S2zg	S2zg	S2zg	S3zg	S2zg	S3tz	S3tz	S3tz	S2zg	S3zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3zg	S2zg	S2zg	S2zg	S3tz	S3tz	S3tz
Tharabenahalli	48	S2zg	S2zg	S3tz	S2zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3tz	S2zg	S3tz	S2zg	S2zg	S2zg	S3zg	S2zg	S3tz	S3tz	S3tz	S2zg	S3zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3zg	S2zg	S2zg	S2zg	S3tz	S3tz	S3tz
Tharabenahalli	49	S2zg	S2zg	S3tz	S2zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3tz	S2zg	S3tz	S2zg	S2zg	S2zg	S3zg	S2zg	S3tz	S3tz	S3tz	S2zg	S3zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3zg	S2zg	S2zg	S2zg	S3tz	S3tz	S3tz
Tharabenahalli	50	S2zg	S2zg	S3tz	S2zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3tz	S2zg	S3tz	S2zg	S2zg	S2zg	S3zg	S2zg	S3tz	S3tz	S3tz	S2zg	S3zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3zg	S2zg	S2zg	S2zg	S3tz	S3tz	S3tz
Tharabenahalli	51	S2zg	S2zg	S3tz	S2zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3tz	S2zg	S3tz	S2zg	S2zg	S2zg	S3zg	S2zg	S3tz	S3tz	S3tz	S2zg	S3zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3zg	S2zg	S2zg	S2zg	S3tz	S3tz	S3tz
Tharabenahalli	52	S2zg	S2zg	S3tz	S2zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3tz	S2zg	S3tz	S2zg	S2zg	S2zg	S3zg	S2zg	S3tz	S3tz	S3tz	S2zg	S3zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3zg	S2zg	S2zg	S2zg	S3tz	S3tz	S3tz
Tharabenahalli	53	S2zg	S2zg	S3tz	S2zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3tz	S2zg	S3tz	S2zg	S2zg	S2zg	S3zg	S2zg	S3tz	S3tz	S3tz	S2zg	S3zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3zg	S2zg	S2zg	S2zg	S3tz	S3tz	S3tz
Tharabenahalli	54	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Tharabenahalli	55	S2zg	S2zg	S3tz	S2zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3tz	S2zg	S3tz	S2zg	S2zg	S2zg	S3zg	S2zg	S3tz	S3tz	S3tz	S2zg	S3zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3zg	S2zg	S2zg	S2zg	S3tz	S3tz	S3tz
Tharabenahalli	56	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Tharabenahalli	57	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Tharabenahalli	58	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Tharabenahalli	59	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Tharabenahalli	60	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Tharabenahalli	61	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Tharabenahalli	62	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Tharabenahalli	63	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Tharabenahalli	64	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Tharabenahalli	65	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Tharabenahalli	66	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Tharabenahalli	67	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Tharabenahalli	68	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Tharabenahalli	69	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S2r	S1	S1	S1	S1	S3r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S1	S1	S3r	S1	S1	S1	S2r	S2r	S2r

Village	Sy. No.	Sorgham	Fodder Sorghum	Maize	Upland-Paddy	Finger Millet	Red gram	Horse gram	Field-bean	Cow pea	Ground nut	Sunflower	Onion	Chilly	Brinjal	Tomato	Mango	Sapota	Guava	Pomegranate	Banana	Jackfruit	Jamun	Musambi	Lime	Cashew	Custard apple	Amla	Tamarind	Marigold	Chrysanthemum	Jasmine	Coconut	Arecanut	Mulberry
Tharabenahalli	70	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Tharabenahalli	71	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Tharabenahalli	76	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	Nrg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	Nrg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg
Tharabenahalli	77	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S1	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S2rg	S2rg	Nr	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S2rg	S2rg	Nr	S2rg	S2rg	S2rg	S3rg	S3rg	S3rg
Tharabenahalli	78	S2z	S2z	S2z	S2z	S2z	S2z	S2z	S2z	S2z	S2z	S2rz	S2z	S2z	S2z	S2z	S3rz	S2rz	S2rz	S2rz	S2rz	S2rz	S3rz	S2rz	S2rz	S2rz	S2z	S2z	S3rz	S2z	S2z	S2z	S2rz	S2rz	S2rz
Tharabenahalli	79	S2z	S2z	S2z	S2z	S2z	S2z	S2z	S2z	S2z	S2z	S2rz	S2z	S2z	S2z	S2z	S3rz	S2rz	S2rz	S2rz	S2rz	S2rz	S3rz	S2rz	S2rz	S2rz	S2z	S2z	S3rz	S2z	S2z	S2z	S2rz	S2rz	S2rz
Tharabenahalli	80	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3g	S2tg	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S2g
Tharabenahalli	81	S2z	S2z	S2z	S2z	S2z	S2z	S2z	S2z	S2z	S2z	S2rz	S2z	S2z	S2z	S2z	S3rz	S2rz	S2rz	S2rz	S2rz	S2rz	S3rz	S2rz	S2rz	S2rz	S2z	S2z	S3rz	S2z	S2z	S2z	S2rz	S2rz	S2rz
Tharabenahalli	82	S2z	S2z	S2z	S2z	S2z	S2z	S2z	S2z	S2z	S2z	S2rz	S2z	S2z	S2z	S2z	S3rz	S2rz	S2rz	S2rz	S2rz	S2rz	S3rz	S2rz	S2rz	S2rz	S2z	S2z	S3rz	S2z	S2z	S2z	S2rz	S2rz	S2rz
Tharabenahalli	83	S2z	S2z	S2z	S2z	S2z	S2z	S2z	S2z	S2z	S2z	S2rz	S2z	S2z	S2z	S2z	S3rz	S2rz	S2rz	S2rz	S2rz	S2rz	S3rz	S2rz	S2rz	S2rz	S2z	S2z	S3rz	S2z	S2z	S2z	S2rz	S2rz	S2rz
Tharabenahalli	84	S2z	S2z	S2z	S2z	S2z	S2z	S2z	S2z	S2z	S2z	S2rz	S2z	S2z	S2z	S2z	S3rz	S2rz	S2rz	S2rz	S2rz	S2rz	S3rz	S2rz	S2rz	S2rz	S2z	S2z	S3rz	S2z	S2z	S2z	S2rz	S2rz	S2rz
Tharabenahalli	85	S2z	S2z	S2z	S2z	S2z	S2z	S2z	S2z	S2z	S2z	S2rz	S2z	S2z	S2z	S2z	S3rz	S2rz	S2rz	S2rz	S2rz	S2rz	S3rz	S2rz	S2rz	S2rz	S2z	S2z	S3rz	S2z	S2z	S2z	S2rz	S2rz	S2rz
Tharabenahalli	86	S3r	S3r	S3r	S3r	S2r	S3r	S3r	S3r	S3r	S3r	Nr	S3r	S3r	S3r	S3r	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	S3r	Nr	S3r	S3r	S3r	Nr	Nr	Nr
Tharabenahalli	87	S3r	S3r	S3r	S3r	S2r	S3r	S3r	S3r	S3r	S3r	Nr	S3r	S3r	S3r	S3r	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	S3r	Nr	S3r	S3r	S3r	Nr	Nr	Nr
Tharabenahalli	88	S3r	S3r	S3r	S3r	S2r	S3r	S3r	S3r	S3r	S3r	Nr	S3r	S3r	S3r	S3r	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	Nr	S3r	Nr	S3r	S3r	S3r	Nr	Nr	Nr
Tharabenahalli	89	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3g	S2tg	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S2g
Tharabenahalli	90	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3g	S2tg	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S2g
Tharabenahalli	91	S2zg	S2zg	S3tz	S2zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3tz	S2zg	S3tz	S2zg	S2zg	S2zg	S3zg	S2zg	S3tz	S3tz	S3tz	S2zg	S3zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3zg	S2zg	S2zg	S2zg	S3tz	S3tz	S3tz
Tharabenahalli	92	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3g	S2tg	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S2g
Tharabenahalli	93	S2zg	S2zg	S3tz	S2zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3tz	S2zg	S3tz	S2zg	S2zg	S2zg	S3zg	S2zg	S3tz	S3tz	S3tz	S2zg	S3zg	S2zg	S2zg	S2zg	S2zg	S2zg	S3zg	S2zg	S2zg	S2zg	S3tz	S3tz	S3tz
Tharabenahalli	94	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Tharabenahalli	95	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Tharabenahalli	96	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S2r	S1	S1	S1	S1	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S1	S1	S3r	S1	S1	S1	S2r	S2r	S2r

Village	Sy. No.	Sorgham	Fodder Sorghum	Maize	Upland-Paddy	Finger Millet	Redgram	Horsegram	Field-bean	Cowpea	Ground nut	Sunflower	Onion	Chilly	Brinjal	Tomato	Mango	Sapota	Guava	Pomegranate	Banana	Jackfruit	Jamun	Musambi	Lime	Cashew	Custard apple	Amla	Tamarind	Marigold	Chrysanthemum	Jasmine	Coconut	Arecanut	Mulberry
Tharabenahalli	97	S3rg	S3rg	S3rg	S2g	S2g	S3g	S2g	S3g	S3g	S2rg	S3rg	S3g	S3g	S3g	S3g	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S2g	S2g	S3rg	S3g	S3g	S3g	S3g	S3g	S3g	S2rg
Tharabenahalli	98	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Nes	Gully Area
Tharabenahalli	99	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Tharabenahalli	100	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	Nrg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	Nrg	S3rg	S3rg	S3rg	S3rg	S3rg	S3r
Tharabenahalli	101	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	Nrg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	Nrg	S3rg	S3rg	S3rg	S3rg	S3rg	S3r
Tharabenahalli	102	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	Nrg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	Nrg	S3rg	S3rg	S3rg	S3rg	S3rg	S3r
Tharabenahalli	103	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	Nrg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	Nrg	S3rg	S3rg	S3rg	S3rg	S3rg	S3r
Tharabenahalli	104	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	Nrg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	Nrg	S3rg	S3rg	S3rg	S3rg	S3rg	S3r
Tharabenahalli	105	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	Nrg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	Nrg	S3rg	S3rg	S3rg	S3rg	S3rg	S3r
Tharabenahalli	106	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	Nrg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	Nrg	S3rg	S3rg	S3rg	S3rg	S3rg	S3r
Tharabenahalli	107	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Tharabenahalli	108	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Tharabenahalli	109	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Tharabenahalli	110	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Tharabenahalli	111	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Tharabenahalli	112	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Tharabenahalli	113	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Tharabenahalli	114	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	Nrg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	Nrg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg
Tharabenahalli	115	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	Nrg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	Nrg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg
Tharabenahalli	116	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	Nrg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	Nrg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg
Tharabenahalli	117	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	Nrg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg	Nrg	S3rg	S3rg	S3rg	S3rg	S3rg	S3rg
Tharabenahalli	118	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Tharabenahalli	119	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r

Village	Sy. No.	Sorgham	Fodder Sorghum	Maize	Upland-Paddy	Finger Millet	Red gram	Horse gram	Field-bean	Cow pea	Ground nut	Sunflower	Onion	Chilly	Brinjal	Tomato	Mango	Sapota	Guava	Pomegranate	Banana	Jackfruit	Jamun	Musambi	Lime	Cashew	Custard apple	Amla	Tamarind	Marigold	Chrysanthemum	Jasmine	Coconut	Arecanut	Mulberry
Tharabenahalli	120	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Tharabenahalli	121	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Tharabenahalli	122	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r
Tharabenahalli	123	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Tharabenahalli	124	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r	S3r

PART-B

SOCIO-ECONOMIC STATUS OF FARM HOUSEHOLDS

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Chapter 1

EXECUTIVE SUMMARY

Baseline socioeconomic characterisation is prerequisite to prepare action plan for program implementation and to assess the project performance before making any changes in the watershed development program. The baseline provides appropriate policy direction for enhancing productivity and sustainability in agriculture.

Methodology: *Kadenahalli micro-watershed (Anekatte sub-watershed, Chikkanayakanahalli taluk, Tumkur district) is located in between $13^0 21'$ – $13^0 23'$ North latitudes and $76^0 36'$ – $76^0 39'$ East longitudes, covering an area of about 476.20 ha, bounded by Kadenahalli, Dabbegatta, Tharabenahalli, Jayachamarajapura and Bairaganahalli villages length of growing period (LGP) 120-150 days.We used soil resource map as basis for sampling farm households to test the hypothesis that soil quality influence crop selection, and conservation investment of farm households. The level of technology adoption and productivity gaps and livelihood patterns were analyses. The cost of soil degradation and ecosystem services were quantified.*

Results: *The socio-economic outputs for the Kadenahalli Microwatershed (Anekatte sub-watershed, Chikkanayakanahalli taluk, Tumkur district) are presented here.*

Social Indicators;

- *Male and female ratio is 53.7 to 46.3 per cent to the total sample population.*
- *Younger age 18 to 50 years group of population is around 51.2 per cent to the total population.*
- *Literacy population is around 92.7 per cent.*
- *Social groups belong to general caste among the all sample households.*
- *Liquefied petroleum gas is the source of energy for a cooking among 95.2 per cent.*
- *About 61.9 per cent of households have a yashaswini health card.*
- *About 10.0 per cent of farm households are having MGNREGA card for rural employment.*
- *Dependence on ration cards for food grain through public distribution system is around 70.0 per cent.*
- *Swach bharath program providing closed toilet facilities having among all the sample households.*
- *Institutional participation is only 24.4 per cent of sample households.*
- *Rural migration to unban centre for employment is prevalent among 7.3 per cent of farm households.*
- *Women participation in decisions making for agriculture production among all sample households.*

Economic Indicators;

- *The average land holding is 0.4 ha indicates that majority of farm households are belonging to marginal farmers. The dry land of 81.4 per cent and irrigated land 18.6 % of total cultivated land area among the sample farmers.*
- *Agriculture is the main occupation among 52.8 per cent and agriculture is the main and agriculture labour is subsidiary occupation for 19.4 per cent of sample households.*
- *The average value of domestic assets is around Rs.10282 per household. Mobile and television are popular media mass communication.*
- *The average value of farm assets is around Rs.78671 per household, about 70.0 per cent of sample farmers having plough and sprayer*
- *The average value of livestock is around Rs.19550 per household; about 86.0 per cent of household are having livestock.*
- *The average per capita food consumption is around 605 grams (1504 kilo calories) against national institute of nutrition (NIN) recommendation at 827 gram. Around 90.0 per cent of sample households are consuming less than the NIN recommendation.*
- *The annual average income is around Rs.92308 per household. About 40 per cent of farm households are below poverty line.*
- *The per capita average monthly expenditure is around Rs.801.*

Environmental Indicators-Ecosystem Services;

- *The value of ecosystem service helps to support investment to decision on soil and water conservation and in promoting sustainable land use.*
- *The onsite cost of different soil nutrients lost due to soil erosion is around Rs. 591 per ha/year. The total cost of annual soil nutrients is around Rs. 264732 per year for the total area of 476.20 ha.*
- *The average value of ecosystem service for food grain production is around Rs. 18704/ ha/year. Per hectare food grain production services is maximum in areca nut (Rs. 92098), coconut (Rs. 25904), ragi (Rs. 17996), red gram (Rs. 9462), black gram (Rs. 6711), green gram (Rs. 3540) and sorghum is negative return.*
- *The average value of ecosystem service for fodder production is around Rs. 4254/ ha/year. Per hectare fodder production services is maximum in sorghum (Rs. 10725) Followed by ragi (Rs. 3075), greengram (Rs. 1790) and horse gram (Rs. 1425).*
- *The data on water requirement for producing one quintal of grain is considered for estimating the total value of water required for crop production. The per hectare value of water used and value of water was maximum in coconut(Rs.*

481866), black gram (Rs. 272925), sorghum (Rs.167301), red gram (Rs. 90506) horse gram (Rs.65792), green gram (Rs.54717), ragi (Rs. 33117) and areca nut (Rs. 6128).

Economic Land Evaluation;

- *The major cropping pattern is coconut (28.0 %) followed by ragi (27.2 %), greengram (18.1 %), sorghum (9.1 %), areca nut (8.0 %), horse gram (7.7 %) and black gram (1.9 %).*
- *In Kadenahalli micro-watershed, major soil is of Bidanagere (BDG) series is having moderately deep soil depth cover around 1.9 % of area. On this soil farmers are presently growing green gram. Bhimanakunte (BMK) is also having moderately deep soil depth cover 2.0 % of area, the crops are black gram (56.2 %) and ragi (43.8%). Balapur (BPR) soil series having deep soil depth cover around 3.9 % of areas, crops are greengram (50.0 %) and ragi (50.0 %). Bedwatti (BWT) soil series having moderately deep soil depth cover around 12.9 % of area, main crop is sorghum. Dambarahalli (CSR) soil series are having shallow soil depth cover around 3.6 % of area, respectively. The major crops grown are areca nut (84.9%) and coconut (15.1 %). Gollarahatti (GHT) soil series are having moderately deep soil depth covers around 1.0 % of area; the major crop grown is horsegram (50.0 %) and redgram. Hooradhahalli (HDH) soil series having moderately deep soil depth cover 6.8 % of areas respectively; crops are cotton (50.0 %) and ragi (50.0 %). Ranatur (RTR) soil series having very deep soil depth cover 6.1% of areas; main crops are coconut and Thammadahalli (TDH) soil series having moderately shallow soil depth cover 19.3 % of areas main crop is coconut.*
- *The total cost of cultivation and benefit cost ratio (BCR) in study area for coconut ranges between Rs.160451/ha in TDH soil (with BCR of 1.17) and Rs.27147/ha in HDH soil (with BCR of 2.61).*
- *In green gram the cost of cultivation range between Rs. 32058/ha in BDG soil (with BCR of 1.03) and Rs.24399/ha in BPR (with BCR of 1.53).*
- *In ragi the cost of cultivation range between Rs. 58521/ha in BMK soil and Rs.15002/ha in BPR soil (with BCR of 2.91).*
- *In red gram the cost of cultivation in GHT soil is Rs.41600/ha (with BCR of 1.20).*
- *In black gram the cost of cultivation in BMK soil is Rs. 49275/ha (with BCR of 1.14) and sorghum the cost of cultivation in BWT soil is Rs.36792/ha (with BCR of 1.03).*
- *The land management practices reported by the farmers are crop rotation, tillage practices, fertilizer application and use of farm yard manure (FYM). Due to higher wages farmer are following labour saving strategies is not prating soil*

and water conservation measures. Less ownership of livestock limiting application of FYM.

- *It was observed soil quality influences on the type and intensity of land use. More fertilizer applications in deeper soil to maximize returns.*

Suggestions;

- *Involving farmers is watershed planning helps in strengthing institutional participation.*
- *The per capita food consumption and monthly income is very low. Diversifying income generation activities from crop and livestock production in order to reduce risk related to drought and market prices.*
- *Majority of farmers reported that they are not getting timely support/extension services from the concerned development departments.*
- *By strengthing agricultural extension for providing timely advice improved technology there is scope to increase in net income of farm households.*
- *By adopting recommended package of practices by following the soil test fertiliser recommendation, there is scope to increase yield in areca nut (22.8 %), coconut (43.5 to 52.6 %), ragi (42.2 to 60.9 %), redgram (2.7 %), horse gram (27.0 %) and greengram (13.2 to 30.1 %).*

Chapter 2

INTRODUCTION

Watershed Development program aim to restore degraded watersheds in rainfed regions to increase their capacity to capture and store rain water, reduce soil erosion, and improved soil nutrients and carbon contents so they can produce greater agricultural yields and other benefits. As majority of rural poor live in these regions and dependent on natural resources for their livelihood and sustenance, improvements in agricultural yields improve human welfare and simultaneously improve national food security.

Sujala–III watershed development project conceptualised and implemented by the Watershed Development Department of Government of Karnataka with tripartite cost-sharing arrangements. The World Bank through International Development Association provided major portion of plan outlay as a loan to Government of India and in turn loan to Government of Karnataka.

The objectives of Sujala-III is to demonstrate more effective watershed management through greater integration of programs related to rain fed agriculture, innovative and science based approaches and strengthened institutions and capacities. The project is implemented in 11 districts of Bidar, Vijayapura, Gulbarga, Yadgir, Koppal, Gadag, Raichur, Davanagere, Tumkur, Chikkamangalur and Chamarajanagar which have been identified by the Watershed Development Department based on rainfall and socio-economic conditions. The project will be implemented over six years and linked with the centrally financed integrated watershed management programme.

Economic evaluations can better guide in watershed planning and implementation, as well as raise awareness of benefits of ecosystem restoration for food security and poverty alleviation program. The present study aims to characterize socio-economic status of farm households, assess the land and water use status, evaluate the economic viability of land use, prioritize farming constraints and suggest the measures for soil and water conservation for sustainable agriculture.

Objectives of the study

1. To characterize socio-economic status of farm households
2. To evaluate the economic viability of land use and land related constraints
3. To estimate the ecosystem service provided by the watershed and
4. To suggest alternatives for sustainable agriculture production.

Chapter 3

Methodology

Study area

Kadenahalli Microwatershed is located in Central Dry Zone of Karnataka (Figure 1): The zone covers the entire Chitradurga district, parts of Tumkur (6 taluks) and one taluk each in Chikkamangalur and Hassan districts. The zone has an area of 1.98 M ha with 0.93 M ha under cultivation of which 0.18 M ha enjoys irrigation facilities. The major soil type is red loam with sporadic occurrence of shallow to deep black soils in Chitradurga district. The elevation ranges from 450 to 900 m MSL with most parts lying at an elevation of 800-900 m MSL. This is the driest zone in the state with annual average rainfall ranging from 450 to 715 mm. More than 55 per cent of the rains in this zone are received during pre-monsoon period and southwest monsoon making it a predominantly kharif area. Ragi, sorghum, rice, oilseeds and pulses are the major crops cultivated in the zone. It's represented Agro Ecological Sub Region (AESR) 8.2 having LGP 120-150 days.

Kadenahalli Microwatershed (Anekatte sub-watershed, Chikkanayakanahalli taluk, Tumkur district) is located in between $13^0$21' – $13^0$23' North latitudes and $76^0$36' – $76^0$39' East longitudes, covering an area of about 476.20 ha, bounded by Kadenahalli, Dabbegatta, Tharabenahalli, Jayachamarajapura and Bairaganahalli villages.

Sampling Procedure:

In this study we have followed soil variability as criterion for sampling the farm households. In each micro-watershed the survey numbers and associated soil series are listed. Minimum three farm households for each soil series were taken and summed up to arrive at total sample for analysis.

Sources of data and analysis:

For evaluating the specific objectives of the study, primary data was collected from the sample respondents by personal interview method with the help of pre-tested questionnaire. The data on socio-economic characteristics of respondents such as family size and composition, land holdings, asset position, occupational pattern and education level was collected. The present cropping pattern and the level of input use and yields collected during survry. The data collected from the representative farm households were analysed using Automated Land Potential Evalution System (Figure 2).

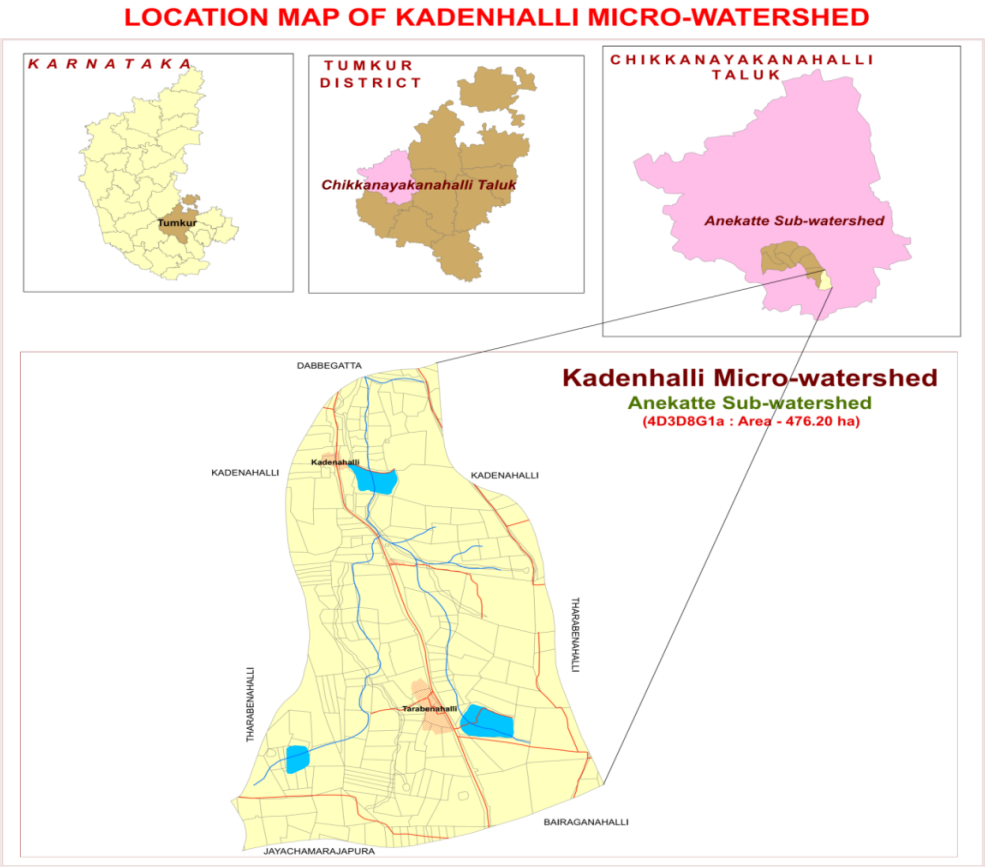


Figure 1: Location of study area

Steps followed in socio-economic assessment

1. •After the completion of soil profile study link the cadastral number to the soil profile in the micro watershed.
2. • Download the names of the farmers who are owning the land for each cadastral number in the Karnataka BHOOMI Website.
3. • Compiling the names of the farmers representing for all the soil profiles studied in the micro watershed for socio-economic Survey.
4. • Conducting the socioeconomic survey of selected farm households in the micro watershed.
5. • Farm households database created using the Automated Land Potential Evaluation System (ALPES) for analysis of socio economic status for each micro watershed.
6. • Synthesis of tables and preparation of report for each micro watershed.

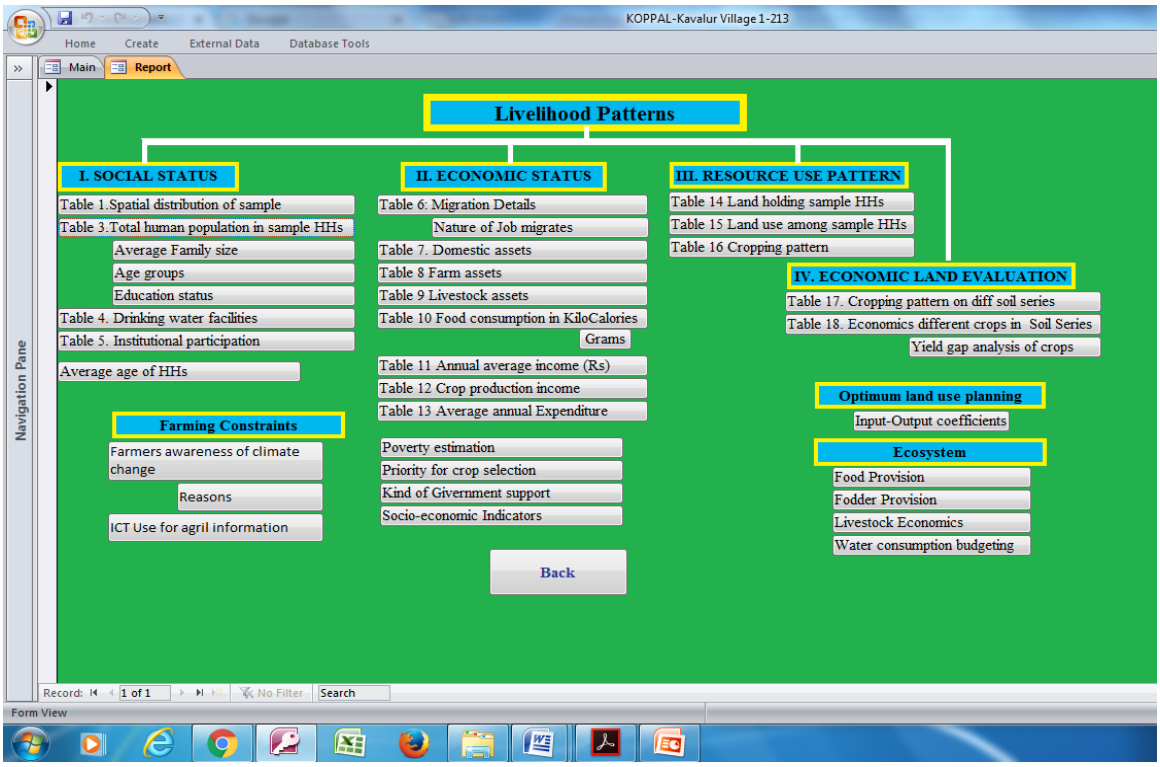


Figure 2: ALPES FRAMEWORK

The sample farmers were post classified in to marginal and small (0.0 to <=2 ha), medium and semi medium (>2 to <=10 ha) and large (>10 ha). The steps involved in estimation of soil potential involve estimation of total cost of cultivation, the yield/gross returns and net income per hectare. The cost of inputs such seed, manure and fertilizer, plant protection chemicals, payment towards human and bullock labour and interest on working capita are included under operational costs. In the case of perennial crops, the cost of establishment was estimated by using actual physical requirements and prevailing market prices. Estimation cost included maintenance cost up to bearing period. The value of main product and by product from the crop enterprise at the market rates were the gross returns of the crop. Net returns were worked out by deducting establishment and maintained cost from gross returns.

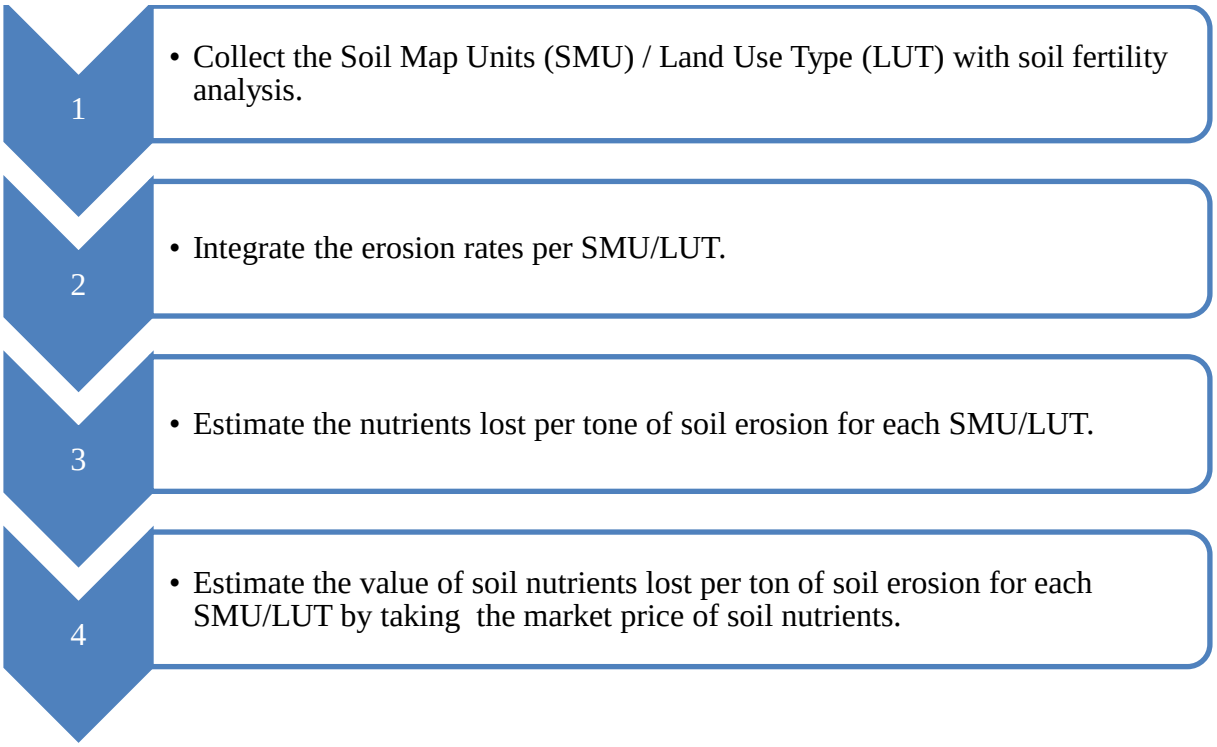
Operational Cost = cost of seeds, fertilizers, pesticides. Cost of human and bullock labour, cost of machinery, cost of irrigation water + interest on working capital.
Gross returns = Yield (Quintals/hectare)*Price (Rs/Quintal)
Net returns = Gross returns-Operational cost.
Benefit Cost Ratio = Net returns/Total cost.

Economic suitability classes: once each land use –land area combination has been assigned an economic value by the land evaluation, the question arises as to its 'suitability', that is, the degree to which it satisfies the land user. The FAO framework defines two suitability orders: 'S'(suitable if benefit cost ratio (BCR)>1) and 'N'(not suitable if (BCR<1), which are dived into five economic suitability classes:'S1'(highly suitable if BCR>3), 'S2'(suitable if BCR>2 and <3),'S3'(Marginally suitable if BCR >1 and <2), 'N1'(Not suitable for economic reasons but physically suitable) and 'N2'(not suitable for physical reasons). The limit between 'S3' and 'N1'must be at least at the point of financial feasibility (i.e. net returns, NPV, or IRR>0 and BCR>1). The other limits depend on social factors such as farm size, family size, alternative employment or investment possibilities and wealth expectations; these need to be specified for the Soil series.

Economic Valuation of Soil ecosystem services:

The replacement cost approach was followed for estimating the onsite cost of soil erosion, Market price method was followed for estimating the value of food and fodder production. Value transfer menthods was followed for estimating the value of water demand by different crops in the micro watershed.

Steps followed in Replacement cost methods for estimation of onsite cost of soil erosion



Chapter 4

RESULTS AND DISCUSSIONS

The demographic information shows that the household population dynamics encompasses the socioeconomic status of the farmer. For a rural family, the household size should be optimal to earn a comfortable livelihood through farm and non-farm wage earning. The total number of population in watershed area was 41, out of which 53.7 per cent were males and 46.3 per cent females. Average family size of the households is 4.1. Age is an important factor, which affects the potential employment and mobility status of respondents. The data on age wise distribution of farmers in the sample households indicated that majority of the farmers are coming under the age group of more than 50 years (41.5 %) followed by 30 to 50 years (31.7 %), 18 to 30 years (19.5 %) and 0 to18 years (7.3 %). Hence, in the study area in general, the respondents were of young and middle age, indicating thereby that the households had almost settled with whatever livelihood options they were practicing and sample respondents were young by age who could venture into various options of livelihood sources. Data on literacy indicated that. 7.3 per cent of respondents were illiterate and 92.7 per cent literate (Table 1).

Table 1: Human population among sample households in Kadenahalli Microwatershed

Particulars	**Units**	**Value**
Total human population in sample HHs	Number	41
Male	% to total Population	53.7
Female	% to total Population	46.3
Average family size	Number	4.1
Age group		
0 to 18 years	% to total Population	7.3
18 to 30 years	% to total Population	19.5
30 to 50 years	% to total Population	31.7
>50 years	% to total Population	41.5
Average age	Age in years	37.5
Education Status		
Illiterates	% to total Population	7.3
Literates	% to total Population	92.7
Primary School (<5 class)	% to total Population	36.6
Middle School (6- 8 class)	% to total Population	7.3
High School (9- 10 class)	% to total Population	9.8
Others	% to total Population	39.0

The ethnic groups among the all sample farm households belonging to general castes (Table 2 and Figure 3). All the sample households are using liquefied petroleum

gas as source of fuel for cooking. All the sample farmers are having electricity connection. About 70 per cent are sample households having health cards. Only 10.0 percent of households are having MNREGA job cards for employment generation. About 70 per cent of farm households are having ration cards for taking food grains from public distribution system. All the farm households are having toilet facilities.

Table 2: Basic needs of sample households in Kadenahalli Microwatershed

Particulars	Units	Value
Social groups		
General	% of Households	100.0
Types of fuel use for cooking		
Gas	% of Households	100.0
Energy supply for home		
Electricity	% of Households	100.0
Number of households having Health card		
Yes	% of Households	70.0
No	% of Households	30.0
MGNREGA Card		
Yes	% of Households	10.0
No	% of Households	90.0
Ration Card		
Yes	% of Households	70.0
No	% of Households	30.0
Households with toilet		
Yes	% of Households	100.0
No	% of Households	00.0
Drinking water facilities		
Tube Well	% of Households	70.00
Tank	% of Households	20.00
Pond	% of Households	10.00

The data collected on the source of drinking water in the study area is presented in Table 2. Majority of the sample respondents are having tube well (70.0%) source for water supply for domestic purpose fallowed by tank (20.0%) and around 10.0 percent of pond.

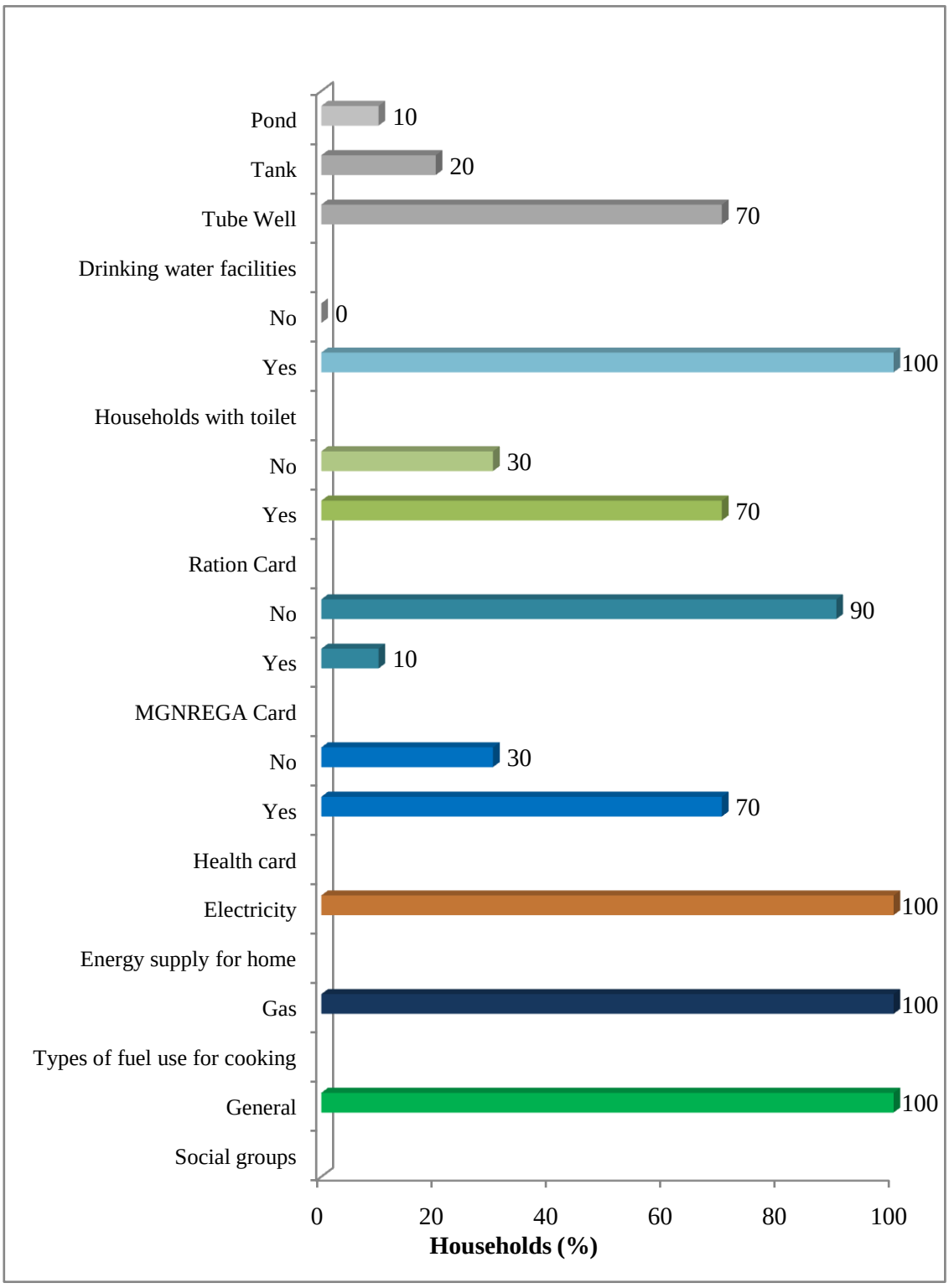


Figure 3: Basic needs of sample households in Kadenahalli Microwatershed

Only 24.4 per cent of the farmers are participating in community based organizations (Table 3). Among them majority were participating in diary co-operatives societies (19.5 %) and self help group organization (4.9%) like Sri Dharmasthala Swasahaya Sangha, Stri Shakhti Sangha.

Table 3: Institutional participation among the sample population in Kadenahalli Microwatershed

Particulars	Units	Value
No. of people participating	% of total	**24.4**
Self help groups(SHG's)	% of total	4.9
Co operative society -dairy	% of total	19.5
No. of people not participating	% of total	**75.6**

The data on migration in Kadenahalli Microwatershed is given in Table 4. It indicated that around 7.3 per cent of samples households were migrated. The average distance travelled for seeking employment is 75 km.

Table 4: Migration details among the sample households in Kadenahalli Microwatershed

Particulars	**Value**
% of households showing migration	7.3
% of persons migrating	30.0
No. of months migrated in a year	9.3
Average Distance of migration(Km)	75.0
Nature of job (%)	
Job/wage/work	100.0

The occupational pattern (Table 5) among sample households shows that agriculture is the main occupation around 52.8 per cent of farmers followed by agriculture is the main and subsidiary occupations like agricultural labour (19.4 %), private service (13.9 %), non agriculture labour (8.3 %) and government service is agriculture is the main occupation among of 5.6 per cent among sample household.

Table 5: Occupational pattern in sample Population in Kadenahalli Microwatershed

Occupation		**% of Total**
Main	**Subsidiary**	
Agriculture	Agriculture	52.8
	Agriculture labour	19.4
	Non Agriculture Labour	8.3
	Private service	13.9
Govt. service		5.6
Family labour Availability		**Man days/Month**
Male		39
Female		26
Total		65

The important assets especially with reference to domestic assets were analyzed and are given in Table 6 and Figure 4. The important domestic assets possessed by all categories of farmers are mobile phones (90 %) followed by television (100 %), bicycle (10 %), mixer/grinder (50 %), motorcycle (50 %), computer/laptop (10 %) and refrigerator (20 %). The average value of domestic assets is around Rs.10282 per household.

Table 6: Domestic assets among the sample households in Kadenahalli Microwatershed

Particulars	% of households	Average value in Rs
Bicycle	10	600
Computer/laptop	10	12100
Mixer/grinder	50	1220
Mobile Phone	90	1767
Motorcycle	50	42000
Refrigerator	20	12000
Television	100	2290
Average Value	10282	

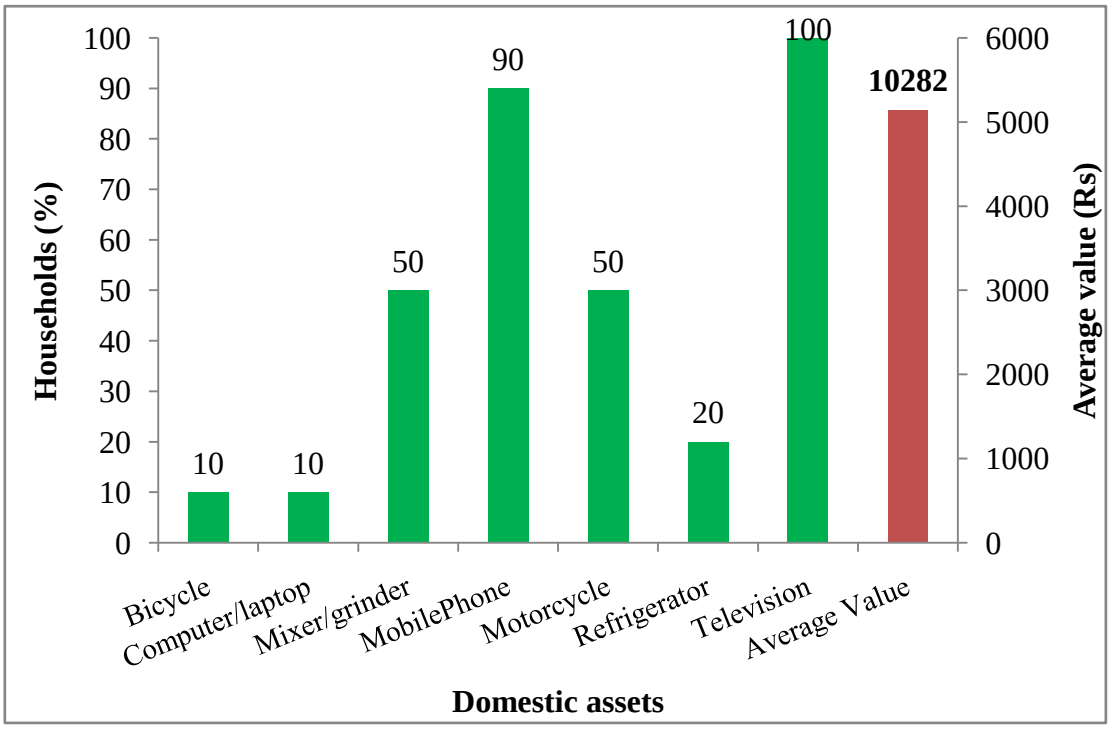


Figure 4: Domestic assets among the sample households in Kadenahalli Microwatershed

The most popularly owned farm equipments were sickles, plough, cattle shed; pump sets, chaff cutter, bullock cart, sprayer and thresher. Plough and sickle were commonly present in all the sampled farmers; these were primary implements in agriculture. The per cent of households owned plough (70 %), bullock cart (20 %),

sprayer (30 %), chaff cutter (20 %), weeder (20 %), tractor (20%), earth remover (20 %) and power tiller (10%) was found highest among the sample farmers. The average value of farm assets is around Rs 78671 per households (Table 7 and Figure 5).

Table 7: Farm assets among samples households in Kadenahalli Microwatershed

Particulars	% of households	Average value in Rs
Bullock cart	20.0	14000
Chaff Cutter	20.0	3000
Earth Remover	20.0	23000
Plough	70.0	2060
Power Tiller	10.0	35000
Sprayer	30.0	2250
Tractor	20.0	550000
Weeder	20.0	60
Average Value	78671	

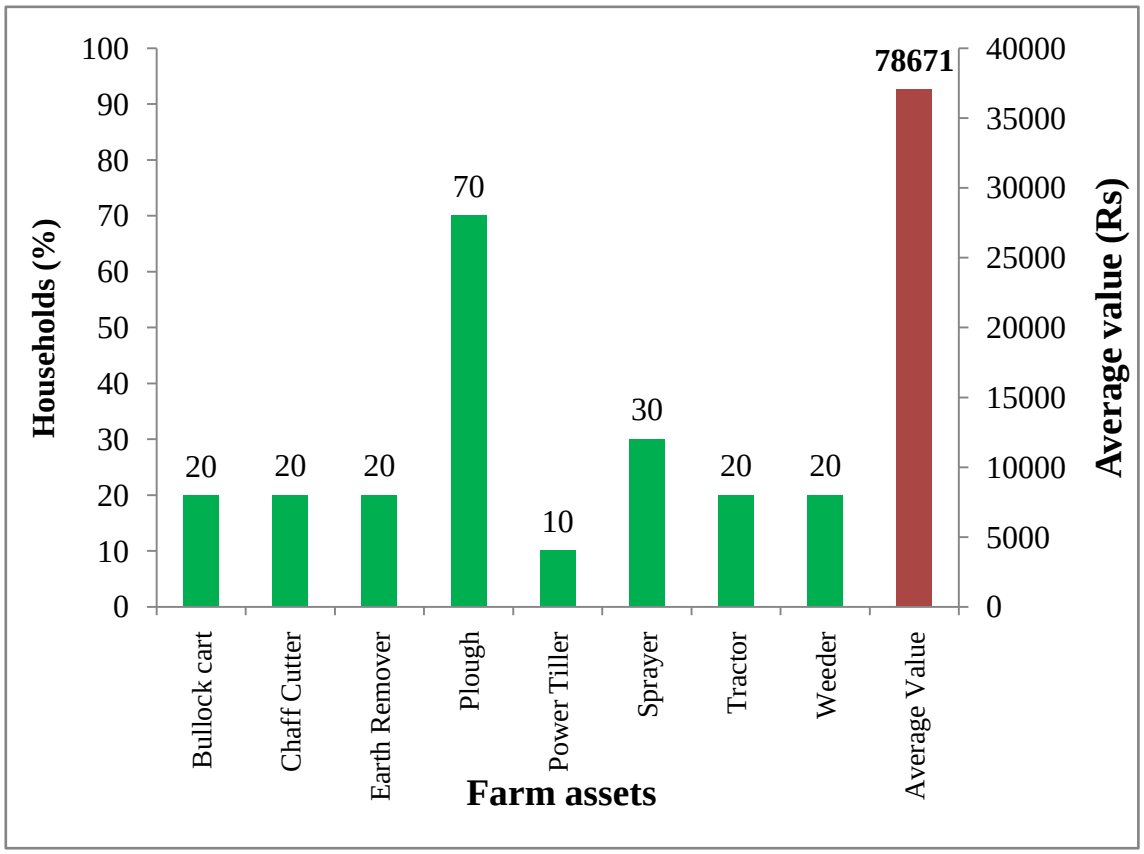


Figure5: Farm assets among samples households in Kadenahalli Microwatershed

Livestock is an integral component of the conventional farming systems (Table 8 and Figure 6). The highest livestock population is local dry cow (41.7 %) followed by local milching cow (25 %), cross breed dry cow (8.3 %) and cross breed milching cow (25 %).The average livestock value was Rs.19550 per household.

Table 8: Livestock assets among sample households in Kadenahalli Microwatershed

Particulars	% of livestock population	Average value in Rs
Local Dry Cow	41.7	4200
Local Milching Cow	25	25000
Crossbred Dry Cow	8.3	8000
Crossbred Milching Cow	25	41000
Average value	100	19550

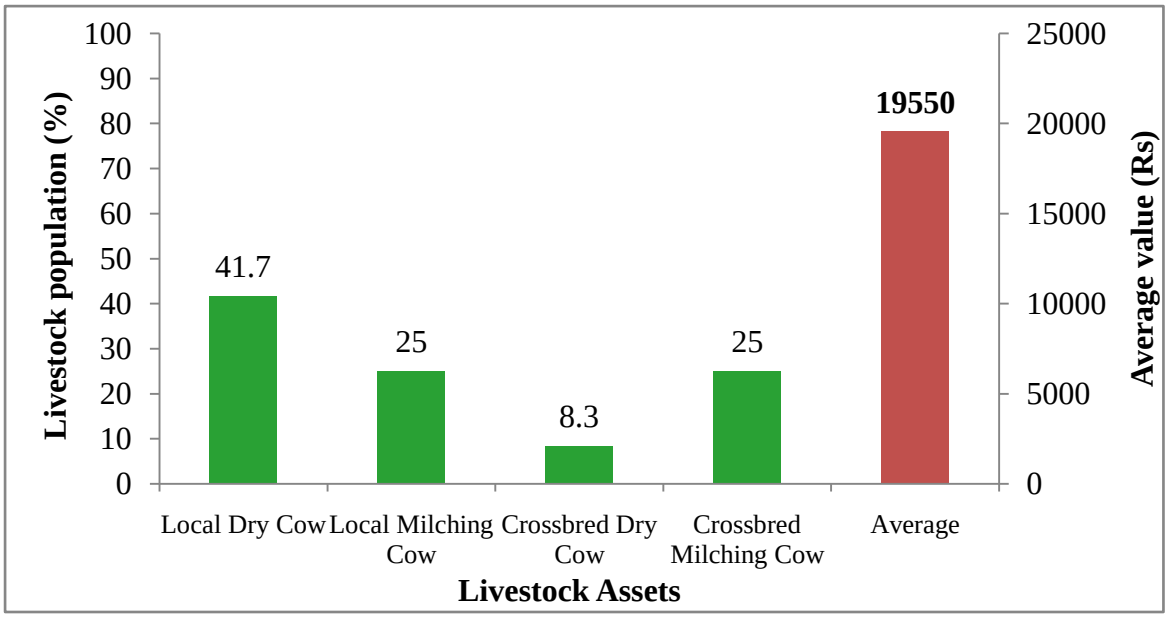


Figure 6: Livestock assets among sample households in Kadenahalli Microwatershed

Table 9: Milk produced and fodder availability of sample households in Kadenahalli Microwatershed

Particulars	
Name of the Livestock	**Ltr./Lactation/animal**
Crossbred Milching Cow	3540
Local Milching Cow	2220
Average Milk Produced	2880
Fodder produces	**Fodder yield (kg/ha.)**
Sorghum	8146
Coconut	8385
Horse gram	1667
Ragi	5882
Average fodder availability	6020
Livestock having households (%)	86
Livestock population (Numbers)	19

Average milk produced in sample households is 2880 litters/ annum. Among the farm households, sorghum, ragi, coconut and horse gram are the main crops for domestic food and fodder for animals. About 6020 kg/ha of average fodder is available per season for the livestock feeding (Table 9).

A woman participation in decision making is in this micro-watershed is presented in Table 10. About 9.2 per cent of women participation in local organisation activates, about 40 per cent women earning for her family requirement and among all women taking decision in her family and agriculture related activities.

Table 10: Women empowerment of sample households in Kadenahalli Microwatershed % to Grand Total

Particulars	**Yes**	**No**
Women participation in local organization activities	9.2	90.8
Women elected as panchayat member	0.0	100
Women earning for her family requirement	40.0	60.0
Women taking decision in her family and agriculture related activities	100	0.00

The food intake in terms of kilo calorie (kcal) per person per day was calculated and presented in the Table 11 and Figure 7. More quantity of cereals is consumed by sample farmers which accounted for 1059.1 kcal per person. The other important food items consumed was followed by cooking oil 198.9 kcal, pulses 123.8 kcal, milk 109.3 kcal, vegetables 13.1 kcal In the sampled households, farmers were consuming less (1504 kcal) than NIN- recommended food requirement (2250 kcal).

Table 11: Per capita daily consumption of food among the sample households in Kadenahalli Microwatershed

Particulars	**NIN recommendation (gram/ per day/ person)**	**Present level of consumption (gram/ per day/ person)**	**Kilo Calories /day/person**
Cereals	396	311.5	1059.1
Pulses	43	36.1	123.8
Milk	200	168.1	109.3
Vegetables	143	54.8	13.1
Cooking Oil	31	34.9	198.9
Egg	0.5	0.0	0.00
Meat	14.2	0.0	0.00
Total	**827.7**	**605**	**1504**
Threshold of NIN recommendation		827 gram*	2250 Kcal*
% Below NIN		90.0	90.0
% Above NIN		10.0	10.0

Note: * day/person

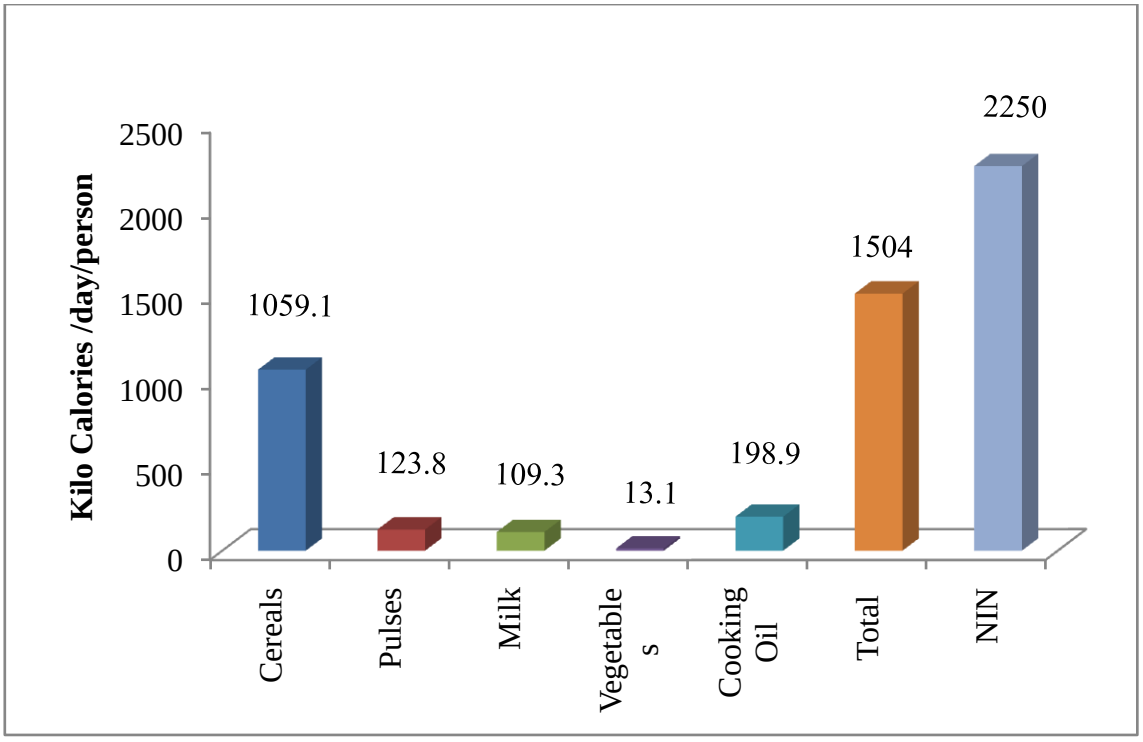


Figure 7: Per capita daily consumption of food among the sample households in Kadenahalli Microwatershed

Annual income of the sample HHs: The average annual household income is around Rs 92308. Major source of income to the farmers in the study area is from livestock (Rs. 71477) followed by crop production (Rs 18629) The income from Non farm income was very low at Rs 2203. The monthly per capita income is Rs.1876, which is less than the threshold monthly income of Rs 975 for considering above poverty line. Due to the fact that erratic rainfall and shortage of water, farmers are diverting from crop production activities to enable the household for a comfortable livelihood. The incomes from the other aforesaid sources are very meagre (Table 12).

Table 12: Annual average income of HHs from various sources in Kadenahalli Microwatershed

Particulars	Income *
Nonfarm income (Rs)	2203 (30)
Livestock income (Rs)	71477(60)
Crop Production (Rs)	18629 (100)
Total Annual Income (Rs)	***92308***
Average monthly per capita income (Rs)	1876
Threshold for Poverty level (Rs 975 per month/person)	
% of households below poverty line	40.0
% of households above poverty line	60.0

* Figure in the parenthesis indicates % of Households

The average annual expenditure of farm households indicated that farmers in the study area spend highest on food (Rs. 21960) followed by education, clothing, social function and health. Now a day's education is most important among all of us. In today's competitive world, education is a necessity for man after food, clothing, and shelter. It is the only fundamental way by which a desired change in the society can happen. The average per capita monthly expenditure is around Rs 801 and about 40.0 per cent of farm households are below poverty line and 60.0 per of farm households are above poverty line (Table 13 and Figure 8).

Table 13: Average annual expenditure of sample HHs in Kadenahalli Microwatershed

Particulars	Value in Rupees	Per cent
Food	21960	55.7
Education	3800	9.6
Clothing	3750	9.5
Social functions	4550	11.5
Health	5350	13.6
Total Expenditure (Rs/year)	39410	100.0
Monthly per capita expenditure (Rs)	801	

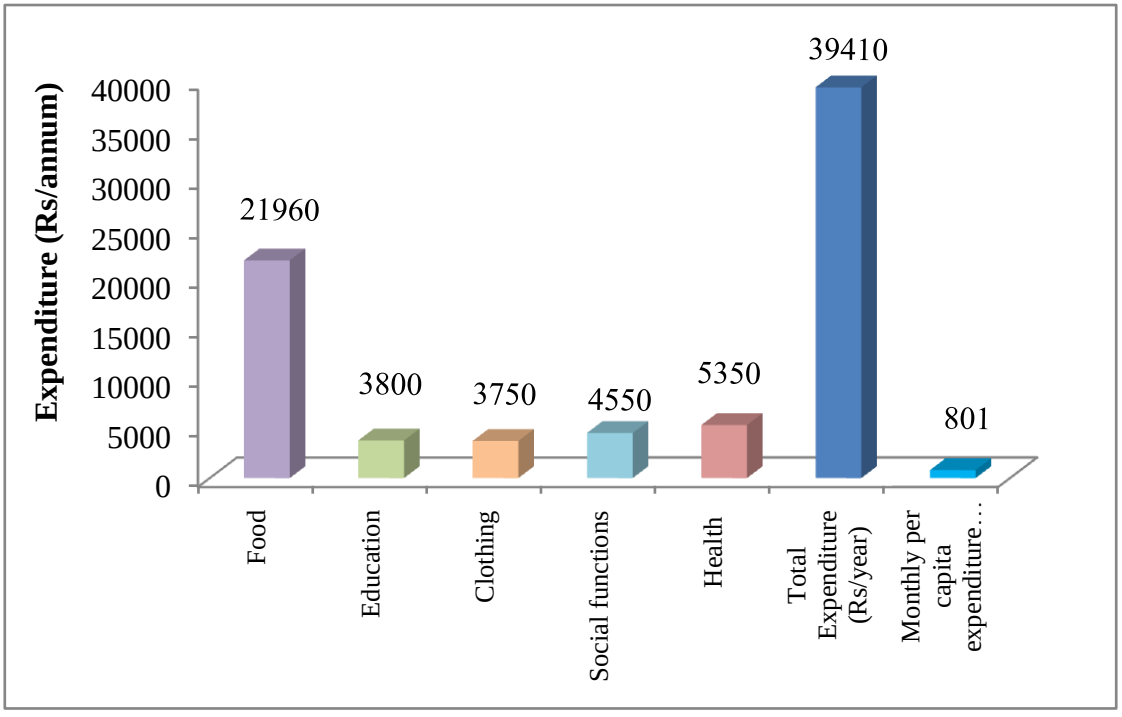


Figure 8: Average annual expenditure of sample HHs in Kadenahalli Microwatershed

Land use: The total land holding in the Kadenahalli Microwatershed is. 4.1 ha (Table 14). Of which 3.3 ha is rain fed land and 0.8 ha is irrigated land. The average land holding per household is worked out to be 0.41 ha.

Table 14: Land use among samples households in Kadenahalli Microwatershed

Particulars	Per cent	Area in ha
Irrigated land	18.6	0.8
Rainfed Land	81.4	3.3
Fallow Land	0.0	0.0
Total land holding	100.0	4.1
Average land holding	0.41	

In the micro-watershed, the prevalent present land uses under perennial plants are neem trees (40.5%) followed by acacia trees (35.7%), coconut trees (14.3%), mango trees (7.1%) and lime trees (2.4%) (Table 15)

Table 15: Number of trees/plants covered in sample farm households in Kadenahalli Microwatershed

Particulars	Number of Plants/trees	Per cent
Coconut	6	14.3
Lime	1	2.4
Mango	3	7.1
Neem trees	17	40.5
Acacia	15	35.7
Grand Total	**42**	**100.0**

The land use decisions are usually based on experience of farmers, tradition, expected profit, personal preferences, resources and social requirements.

The present dominant crops grown in dry lands in the study area were by coconut (28.0%), ragi (26.0%), sorghum (9.1%), areca nut (8.0%), black gram (1.9%) and green gram (1.2 %) which are taken during Kharif and horse gram (7.7%), green gram (16.9%) and ragi (1.2%) during Rabi season respectively. The cropping intensity was 134 per cent (Table 16 and Figure 9).

Table 16: Present cropping pattern and cropping intensity in Kadenahalli Microwatershed % to Grand Total

Crops	Kharif	Rabi	Grand Total
Areca nut	8.0	0.00	8.0
Black gram	1.9	0.0	1.9
Coconut	28.0	0.0	28.0
Greengram	1.2	16.9	18.1
Horsegram	0.0	7.7	7.7
Ragi	26.0	1.2	27.2
Sorghum	9.1	0.0	9.1
Grand Total	74.2	25.8	100.0
Crop intensity (%)	134		

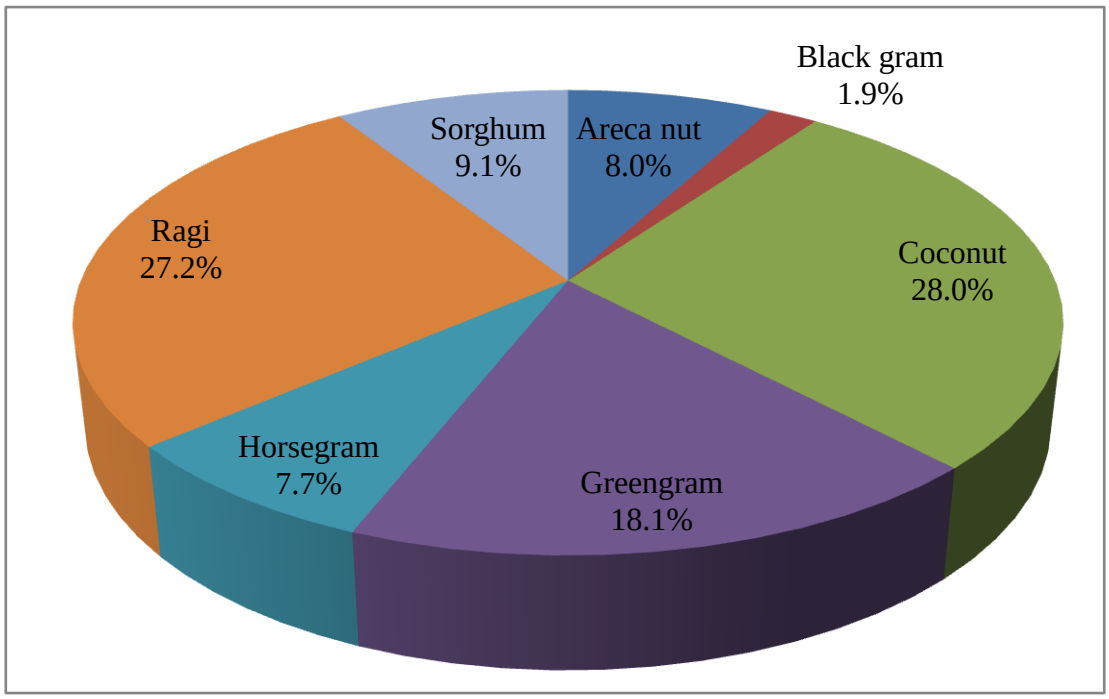


Figure 9: Present cropping pattern in Kadenahalli Microwatershed

Economic land evaluation

The main purpose to characterise the socio-economic systems in the watershed is to identify the existing production constraints and propose the potential/alternate options for agro-technology transfer and for bridging the adoption and yield gap.

In Kadenahalli Microwatershed, 15 soil series are identified and mapped (Table 17). The distribution of major soil series are Chikkasavanur covering an area around 17 ha (3.6 %) followed by Lakkur 46 ha (9.7 %), Tammadahalli 91 ha (19.3 %), Kutegoudanahundi 23 ha (4.8 %), Kethanapura 36 ha (7.5 %), Mukhadahalli 27 ha (5.6 %), Kyasalapura18 ha (3.7 %), Hooradhahalli 32 ha (6.8 %), Gollarahatti 5 ha (1.0 %), Bhimanakunte 9 ha (2%), Bedwatti 61ha (12.9 %), Bidanagere 9 ha (1.9%), Jedigere 25ha (5.3%), Balapur19 (3.9%) and Ranatur 29ha (6.1%).

Table 17: Distribution of soil series in Kadenahalli Microwatershed

Sl. No	Soil Series	Mapping Unit Description	Area in ha (%)
1	CSR	Chikkasavanur soils are shallow (25-50 cm), well drained, have dark brown to light yellowish brown sandy clay loam soils occurring on very gently sloping uplands under cultivation	17 (3.6)
2	LKR	Lakkur soils are moderately shallow (50-75 cm), well drained, have reddish brown to dark red gravelly sandy clay loam to sandy clay soils occurring on very gently and gently sloping uplands under cultivation	46 (9.7)
3	TDH	Thammadahalli soils are moderately shallow (50-75cm), well	91

		drained, have dark red to dark reddish brown sandy clay to clay soils occurring on very gently sloping uplands under cultivation	(19.3)
4	KGH	Kutegoudanahundi soils are moderately shallow (50-75 cm), well drained, have brown to dark brown gravelly sandy clay loam soils occurring on very gently to gently sloping uplands under cultivation	23 (4.8)
5	KTP	Kethanapura soils are moderately shallow (50-75 cm), well drained, have dark reddish brown gravelly sandy clay loam soils occurring on gently sloping uplands under cultivation	36 (7.5)
6	MKH	Mukhadahalli soils are moderately shallow (50-75cm), well drained, have dark brown to reddish brown gravelly sandy clay loam soils occurring on gently sloping uplands under cultivation	27 (5.6)
7	KSP	Kyasalapura soils are moderately shallow (50-75cm), well drained, have dark reddish brown calcareous gravelly sandy clay loam soils occurring on very gently sloping uplands under cultivation	18 (3.7)
8	HDH	Hooradhahalli soils are moderately deep (75-100 cm), well drained, have red to dark red and reddish brown gravelly sandy clay loam to sandy clay soils occurring on near level to very gently sloping uplands under cultivation	32 (6.8)
9	GHT	Gollarahatti soils are moderately deep (75-100 cm), well drained, have dark reddish brown to dark red gravelly sandy clay loam soils occurring on very gently sloping uplands under cultivation	5 (1.0)
10	BMK	Bhimanakunte soils are moderately deep (75-100 cm), well drained, have yellowish red to dark reddish brown calcareous gravelly sandy clay loam soils occurring on nearly level to very gently sloping uplands under cultivation	9 (2.0)
11	BWT	Bedwatti soils are moderately deep (75-100 cm), well drained, have dark gray to very dark gray calcareous gravelly sandy clay to clay soils occurring on very gently sloping uplands under cultivation	61(12.9)
12	BDG	Bidanagere soils are moderately deep (75-100 cm), well drained, have dark reddish brown gravelly sandy clay loam to sandy clay soils occurring on very gently sloping uplands under cultivation	9 (1.9)
13	JDG	Jedigere soils are deep (100-150 cm), well drained, have dark brown to dark reddish brown sandy clay to clay soils occurring on very gently sloping uplands under cultivation	25 (5.3)
14	BPR	Balapur soils are deep (100-150 cm), well drained, have dark reddish brown to dark red gravelly sandy clay to clay soils occurring on very gently to gently sloping uplands under cultivation	19 (3.9)
15	RTR	Ranatur soils are very deep (>150 cm), well drained, have dark reddish brown to dark red clay soils occurring on very gently sloping uplands under cultivation	29 (6.1)

Present cropping pattern on different soil series are given in Table 18. Crops grown on Bidanagere soils are green gram. Bajra, black gram and ragi on Bhimanakunte soils is grown. Green gram and ragi on Balapura soils. Sorghum on Bedwatti soils are grows. Areca nut and coconut on Chikkasavanur soils are grow. Horse gram and red gram

on Gollarahatti soils is grow. Coconut ragi on Hooradhahalli soils is grow, coconut on Ranatur soil is grow and coconut on Tammadahalli soils can grow.

Table 18: Cropping pattern on major soil series in Kadenahalli Microwatershed

(Area in per cent)

Soil series	Soil depth	crops	Dry		Irrigated	Grand Total
			Kharif	Rabi	Kharif	
CSR	Shallow (25-50 cm)	Areca nut	0.0	0.0	84.9	84.9
		Coconut	15.1	0.0	0.0	15.1
TDH	Moderately shallow (50-75 cm)	Coconut	0.0	0.0	100.0	100.0
BMK	Moderately deep (75-100 cm)	Black gram	56.2	0.0	0.0	56.2
		Ragi	0.0	43.8	0.0	43.8
BDG	Moderately deep(75-100 cm)	Greengram	100.0	0.0	0.0	100.0
GHT	Moderately deep (75-100 cm)	Horsegram	0.0	50.0	0.0	50.0
		Redgram	50.0	0.0	0.0	50.0
BWT	Moderately deep (75-100 cm)	Sorghum	100.0	0.0	0.0	100.0
HDH	Moderately deep (75-100 cm)	Coconut	50.0	0.0	0.0	50.0
		Ragi	41.0	9.0	0.0	50.0
BPR	Deep (100-150 cm)	Greengram	50.0	0.0	0.0	50.0
		Ragi	0.0	50.0	0.0	50.0
RTR	Very deep (>150 cm)	Coconut	0.0	0.0	100.0	100.0

Land is used for agricultural use for growing cereals, pulse, oilseeds and commercial crops. The soil/ land potential are measures in terms of physical yield and net income. The alternative land use options for each micro-watershed are given below (Table 19).

Table 19: Alternative land use options for different size group of farmers (Benefit Cost Ratio) in Kadenahalli Microwatershed.

Soil Series	Small Farmers
BDG	Greengram (1.0)
BMK	Black gram (1.1) & Ragi (1.3)
BPR	Greengram (1.5)& Ragi (2.9)
BWT	Sorghum (1.0)
CSR	Areca nut (4.3) & Coconut (1.1)
GHT	Horsegram (1.2) & Horsegram (1.2)
HDH	Redgram (2.6),Coconut & Ragi (1.8)
RTR	Coconut (1.6)
TDH	Coconut (1.2)

The productivity of different crops grown in Kadenahalli Microwatershed under potential yield of the crops is given in Table 20.

Table 20: Economic land evaluation and bridging yield gap for different crops in Kadenahalli Microwatershed

Particulars	CSR (25-50 cm)		TDH (50-75 cm)	BWT (75-100 cm)	BDG (75-100cm)	BMK (75-100 cm)		GHT (75-100 cm)		HDH (75-100 cm)		BPR (100-150 cm)		RTR (>150 cm)
	Areca nut	Coco nut	Coconut	Sorg hum	Green gram	Black gram	Ragi	Horse gram	Red gram	Coco nut	Ragi	Green gram	Ragi	Coco nut
Total cost (Rs/ha)	27971	151288	160451	36792	32058	49275	58521	24015	41600	28147	32047	24399	15002	49444
Gross Return (Rs/ha)	120069	164023	187720	38025	32975	55987	74806	28856	51063	73483	52246	37289	43672	77188
Net returns (Rs/ha)	92098	12736	27269	1233	916	6711	16284	4841	9462	45336	20199	12890	28670	27743
BCR	4.29	1.08	1.17	1.03	1.03	1.14	1.28	1.20	1.23	2.61	1.76	1.53	2.91	1.56
Farmers Practices (FP)														
FYM (t/ha)	4.2	15.6	20.0	6.6	2.5	5.6	0.0	0.0	4.8	1.3	0.7	2.4	0.0	4.2
Nitrogen (kg/ha)	0.0	0.0	0.0	0.0	22.5	57.1	57.1	21.6	21.6	25.6	45.7	21.1	21.1	0.0
Phosphorus (kg/ha)	0.0	0.0	0.0	0.0	57.5	146.0	146.0	55.3	55.3	28.8	104.5	49.5	49.5	0.0
Potash (kg/ha)	0.0	0.0	0.0	0.0	75.0	83.3	83.3	36.1	36.1	0.0	0.0	18.1	18.1	0.0
Grain (Qtl/ha)	34.7	195.3	200.0	13.2	7.5	11.1	17.9	7.2	12.0	87.5	13.2	6.0	12.1	104.2
Price of Yield (Rs/Qtl)	3500	850	950	2100	4450	5100	4000	3850	4300	850	3767	5050	3600	750
Soil test based fertilizer Recommendation (STBR)														
FYM (t/ha)	6.8	10.0	10.0	7.4	7.4	7.4	8.6	0.0	7.4	10.0	8.6	7.4	8.6	10.0
Nitrogen (kg/ha)	100.0	102.5	102.5	81.5	18.5	18.5	74.1	24.7	24.7	102.5	74.1	18.5	74.1	102.5
Phosphorus (kg/ha)	75.0	65.0	65.0	56.8	37.1	37.1	43.2	27.8	37.1	48.8	32.4	37.1	43.2	65.0
Potash (kg/ha)	40.0	245.0	245.0	39.5	37.1	24.7	44.5	24.7	24.7	245.0	44.5	37.1	44.5	245.0
Grain (Qtl/ha)	45.0	184.5	184.5	28.4	8.6	9.9	30.9	9.9	12.4	184.5	30.9	8.6	30.9	184.5
% of Adoption/yield gap (STBR-FP) / (STBR)														
FYM (%)	38.3	-56.3	-100.0	11.2	66.3	25.0	100.0	0.0	35.1	87.5	91.8	67.4	100.0	58.3
Nitrogen (%)	100.0	100.0	100.0	100.0	-21.5	-208.5	22.9	12.4	12.4	75.0	38.4	-14.1	71.5	100.0
Phosphorus (%)	100.0	100.0	100.0	100.0	-55.2	-294.1	-237.8	-99.0	-49.2	41.0	-222.3	-33.6	-14.6	100.0
Potash (%)	100.0	100.0	100.0	100.0	-102.4	-237.4	-87.4	-46.0	0.0	100.0	100.0	51.1	0.0	100.0
Grain (%)	22.8	-5.9	-8.4	53.7	13.2	-12.5	42.2	27.0	2.7	52.6	57.3	30.1	60.9	43.5
Value of yield and Fertilizer (Rs)														
Additional Cost (Rs/ha)	7883	3365	-1010	5099	3204	-4577	3548	-1400	1609	15453	5998	4793	9531	14823
Additional Benefits(Rs/ha)	35972	-9191	-14725	32019	5095	-6279	52071	10274	1422	82450	66590	13162	67672	60250
Net change Income(Rs/ha)	28089	-12556	-13715	26920	1892	-1702	48524	11674	-187	66998	60592	8369	58141	45427

The data on cost of cultivation and benefit cost ratio (BCR) of different crops is given in Table 20. The total cost of cultivation in study area for coconut ranges between Rs.160451/ha in TDH soil (with BCR of 1.17) and Rs.27147/ha in HDH soil (with BCR of 2.61), green gram range between Rs 32058/ha in BDG soil (with BCR of 1.03) and Rs.24399/ha in BPR (with BCR of 1.53), ragi range between Rs. 58521/ha in BMK soil and Rs.15002/ha in BPR soil (with BCR of 2.91), redgram in GHT soil is Rs.41600/ha (With BCR of 1.20), black gram cost of cultivation in BMK soil is Rs 49275/ha (with BCR of 1.14) and sorghum cost of cultivation in BWT soil is Rs. 36792/ha (with BCR of 1.03).

The data on FYM, Nitrogen, Phosphorus and Potash application by the farmers to different crops and recommended FYM for different crops is given in Table 20. There is a huge gap between FYM application by farmers and recommended FYM in all the crops across the soils. There is a larger yield gap in crops grown across different soil series. Adequate knowledge about recommended package of practices is the pre-requisite for their use in cultivation of crops. It is a fact that, recommended practices are major contributing factors to yield. Inadequate knowledge about recommended practices leads to their improper adoption. Strengthening of extension services by concerned agency is required to increase adoption of recommended cultivation practices and ultimately reducing the gap. By adopting soil-test fertiliser recommendation, there is scope to increase yield and income to a maximum of Rs. 66998 in coconut and a minimum of Rs. 1892 in greengram cultivation.

Economic valuation of Ecosystem Services (ES) was aimed at combining use and non-use values to determine Total Economic Value (TEV) of ES. Ecosystem Services (ES) were valued based on their annual flow or utilization in common monetary units, Rs/year. The valuation of ES was based on market price in 2017 or market cost approaches whichever is applicable, and in other cases on value or benefit transfer from previous valuation studies.

Table 21: Estimation of onsite cost of soil erosion in Kadenahalli Microwatershed

Particulars	Quantity(kg)		Value (Rs)	
	Per ha	Total	Per ha	Total
Organic matter	77.27	34617	486.79	218084
Phosphorous	0.17	78	7.63	3417
Potash	0.70	314	14.00	6272
Iron	0.13	58	6.20	2778
Manganese	0.23	105	64.24	28781
Cupper	0.01	4	5.24	2346
Zinc	0.01	2	0.22	100
Sulphur	0.16	72	6.44	2886
Boron	0.00	2	0.15	69
Total	78.68	35251	590.92	264732

The onsite cost of different soil nutrients lost due to soil erosion is given in Table 21 and Figure 10. The average value of soil nutrient loss is around Rs 590.9 per ha/year. The total cost of annual soil nutrients is around Rs 264732 per year for the total area of 123.7 ha.

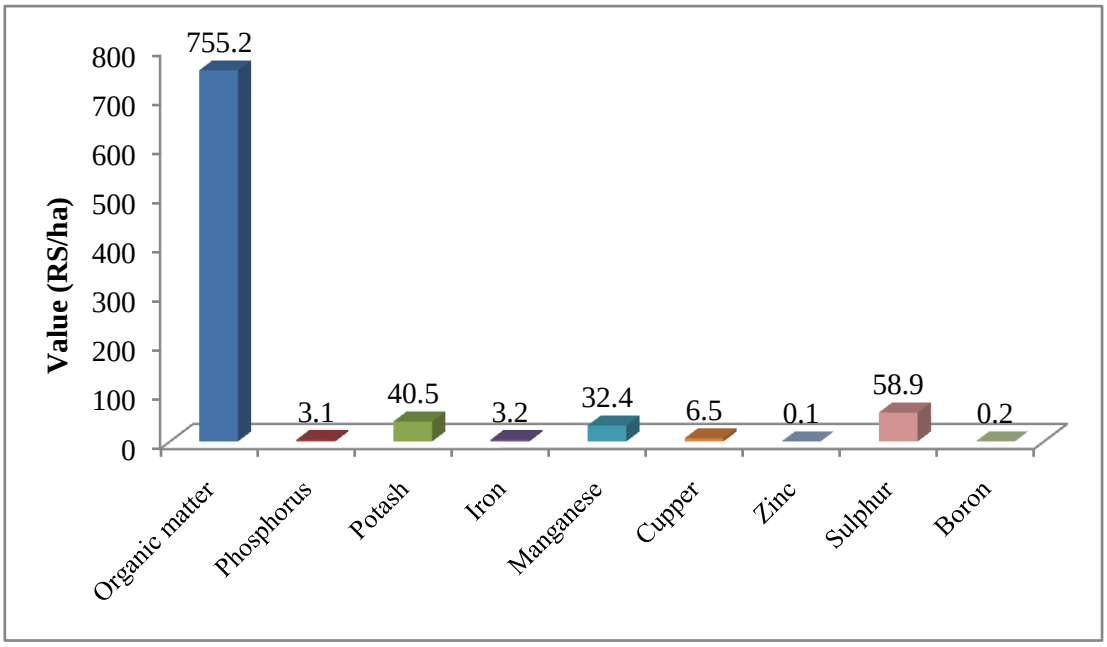


Figure 10: Estimation of onsite cost of soil erosion in Kadenahalli Microwatershed

The average value of ecosystem service for food grain production is around Rs. 18704 / ha/year (Table 22 and Figure 11). Per hectare food grain production services is maximum in Areca nut (Rs. 92098), coconut (Rs. 25904), ragi (Rs.17996), redgram (Rs. 9462), black gram (Rs. 6711), green gram (Rs. 3540) and sorghum is negative return.

Table 22: Ecosystem services of food grain production in Kadenahalli Microwatershed

Production items	Crops	Area in ha	Yield (Qtl/ha)	Price (Rs/Qtl)	Gross Returns (Rs/ha)	Cost of Cultivation (Rs/ha)	Net Returns (Rs/ha)
Cereals	Ragi	1.8	14	3780	51929	33933	17996
	Sorghum	0.2	13	2100	27300	36792	-9492
Pulses	Black gram	0.2	11	5100	55987	49275	6711
	Greengram	1.2	7	4750	31768	28229	3540
	Horsegram	0.4	7	3850	27431	24015	3416
	Redgram	0.4	12	4300	51063	41600	9462
Oil seeds	Coconut	1.5	145	850	123236	97332	25904
Commercial Crops	Areca nut	0.7	34	3500	120069	27971	92098
Average value		6.5	30	3529	61098	42393	18704

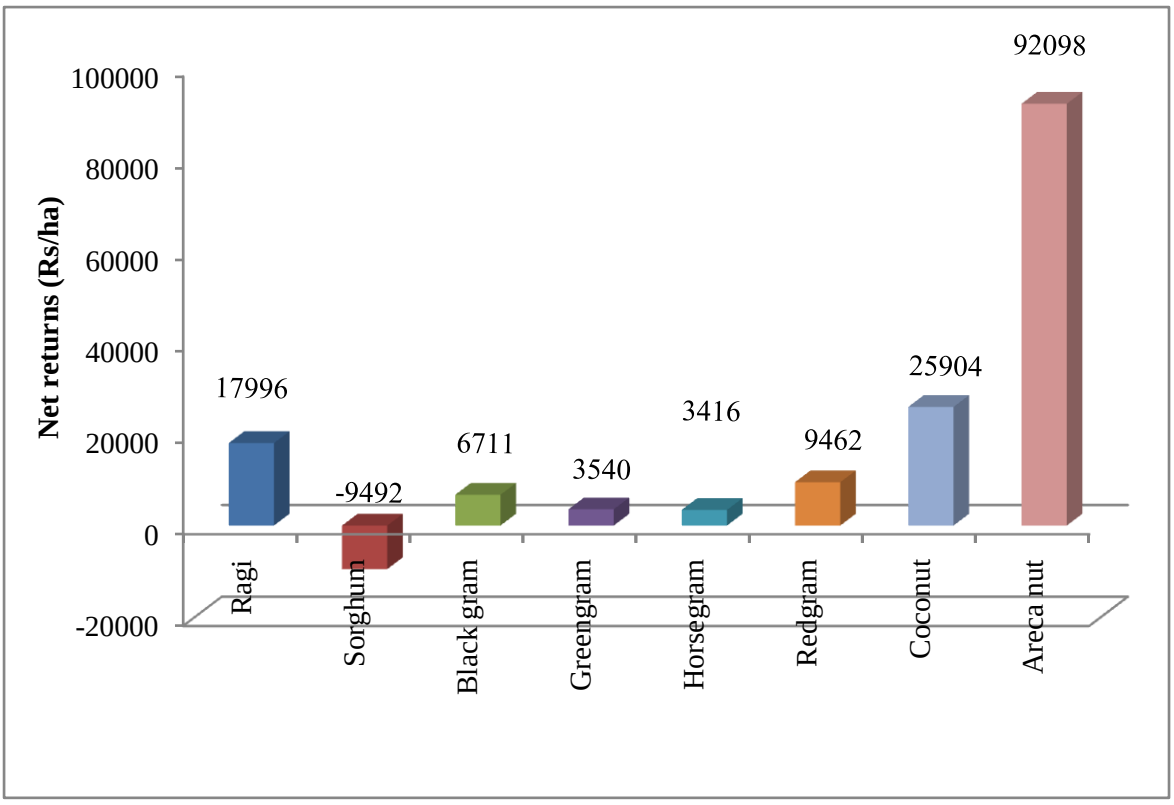


Figure 11: Ecosystem services of food grain production in Kadenahalli Microwatershed

The average value of ecosystem service for fodder production is around Rs 4254/ ha/year (Table 23). Per hectare fodder production services is maximum in sorghum (Rs. 10725) Followed by ragi (Rs. 3075), greengram (Rs. 1790) and horse gram (Rs. 1425).

Table 23: Ecosystem services of fodder production in Kadenahalli Microwatershed

Production items	Crops	Area in ha	Yield (Qtl/ha)	Price (Rs/Qtl)	Net Returns(Rs/ha)
Cereals	Ragi	1.8	3.4	900	3075
	Sorghum	0.2	6.5	1650	10725
Pulses	Greengram	1.2	1.2	1500	1790
	Horsegram	0.4	2.4	600	1425
Average value		3.6	3.4	1162	4254

The water demand for production of different crops was worked out in arriving at the ecosystem services of water support to crop growth. The data on water requirement for producing one quintal of grain is considered for estimating the total value of water required for crop production. The per hectare value of water used and value of water was maximum (Table 24 and Figure 12) in coconut (Rs. 481866), black gram (Rs. 272925), sorghum (Rs. 167301), red gram (Rs. 90506), horse gram (Rs. 65792), green gram (Rs. 54717), ragi (Rs. 33117) and areca nut (Rs. 6128).

Table 24: Ecosystem services of water supply in Kadenahalli Microwatershed

Crops	Yield (Qtl/ha)	Virtual water (cubic meter)perha	Value of Water (Rs/ha)	Water consumption (Cubic meters/Qtl)
Areca nut	5.5	612.8	6128	112
Black gram	39.5	27292.5	272925	691
Coconut	179.3	48186.6	481866	269
Green gram	7.9	5471.7	54717	691
Horse gram	21.4	6579.2	65792	308
Ragi	27.1	3311.8	33118	122
Red gram	16.6	9050.7	90506	544
Sorghum	54.9	16730.1	167301	305
Average value	352.2	14654.4	146544	380

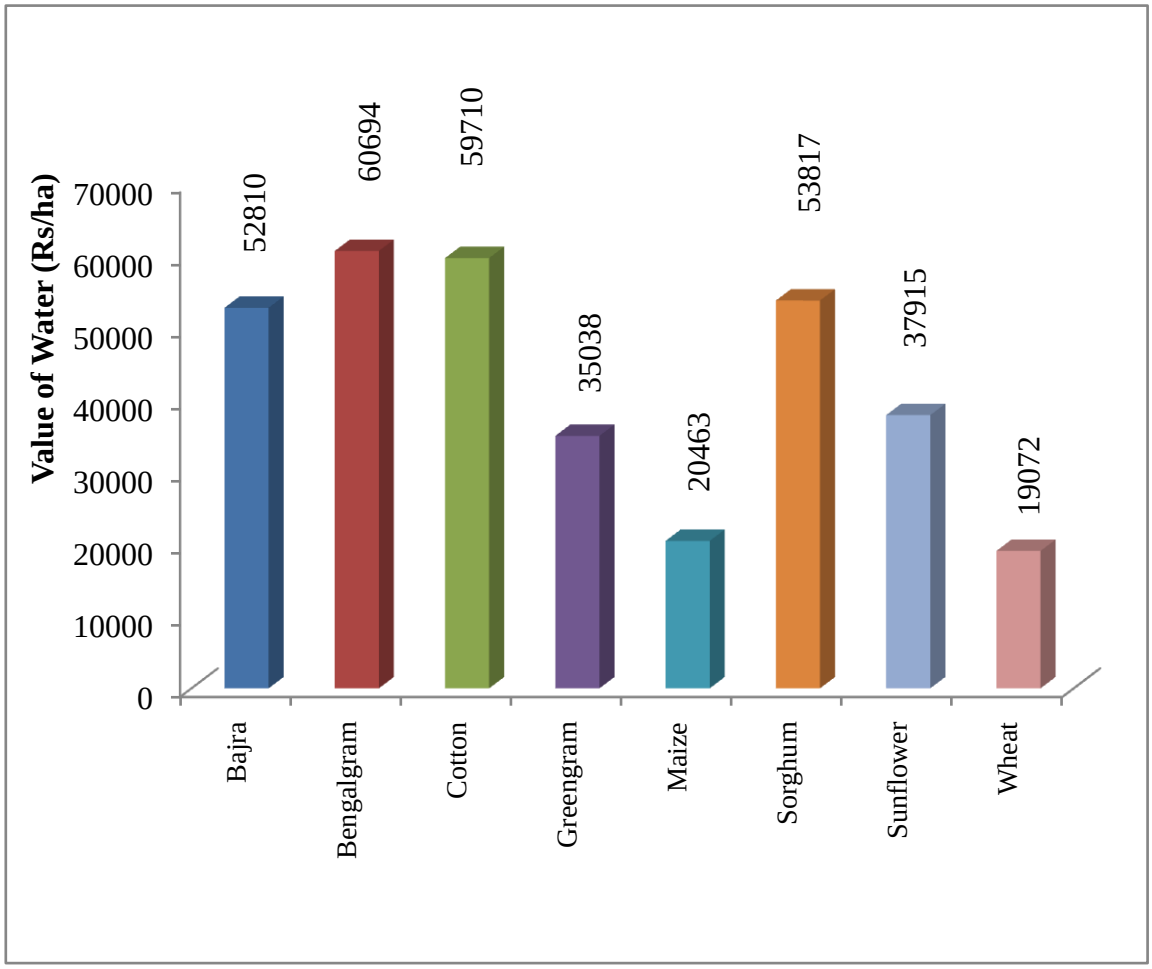


Figure 12: Ecosystem services of water supply in Kadenahalli Microwatershed

The main farming constraints in Kadenahalli Microwatershed to be found are less rainfall, lack of good quality seeds, non availability fertilizers, high crop pests & diseases, animal pests & diseases, lack of transportation, lack of storage, damage of crops by wild

animals and non availability of plant protection chemicals. Majority of farmers depend up on bank and money lender of the sources of loan for purpose of crop production. Farmers to sell the agriculture produce through village market, regulated and the farmers getting the agriculture related information on newspaper and television. Farmers reported that they are not getting timely support/extension services from the concerned development department (Table 25).

Table 25: Farming constraints related land resources of sample households in Kadenahalli Microwatershed

Sl.No	Particulars	Per cent
1	Less Rainfall	80.0
2	Lack of good quality seeds	60.0
3	Non availability Fertilizers	20.0
4	High Crop Pests & Diseases	20.0
5	Animal Pests & Diseases	10.0
6	Lack of transportation	10.0
7	Lack of storage	50.0
8	Damage of crops by Wild Animals	80.0
9	Non availability of Plant Protection Chemicals	100.0
10	**Source of loan**	
	Bank	10.0
11	**Money Leander**	90.0
	Market for selling	
	Village market	100.0
12	**Sources of Agri-Technology information**	
	Newspaper	100.0

The findings of the study would be very much useful to the planners and policy makers of the study area to identify the irrationality in the existing production pattern and to suggest appropriate production plans for efficient utilization of their scarce resources resulting in increased net farm incomes and employment. The study also throws light on future potentialities of increasing net farm income and employment under different situations viz., with existing and recommended technology.