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

KANIVAIHUNDI (4B3E2G2e) MICRO WATERSHED

Gundlupet Taluk, Chamarajanagara District, Karnataka

Karnataka Watershed Development Project – II

SUJALA – III

World Bank funded Project

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 Kanivaihundi Microwatershed, Gundlupet Taluk and Chamarajanagar 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.

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PART-A

LAND RESOURCE INVENTORY

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EXECUTIVE SUMMARY

The land resource inventory of Kanivaihundi Microwatershed was conducted using village cadastral maps and IRS satellite imagery on 1:7920 scale. The false colour 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 boundries. The soil map shows the geographic distribution and extent, characterstics, classification and use potentials of the soils in the microwartershed.

The present study covers an area of 501 ha in Gundlupet taluk of Chamarajanagar district, Karnataka. The climate is semiarid and categorized as drought- prone with an average annual rainfall of 734 mm, of which about 254 mm is received during south –west monsoon, 268 mm during north-east and the remaining 212 mm during the rest of the year. An area of about 96 per cent is covered by soils, three per cent by others and less than one per cent is under forest. The salient findings from the land resource inventory are summarized briefly below.

- *The soils belong to 12 soil series, 28 soil phases (management units) and 9 land management units.*
- *The length of crop growing period is about 150 days starting from the 3rd week of June to 1st week of October.*
- *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 major agricultural and horticultural crops were assessed and maps showing the degree of suitability along with constraints were generated.*
- *About 96 per cent area is suitable for agriculture, <1 per cent area is not suitable for agriculture and very negligible area is under forest.*
- *About 82 per cent of the soils are moderately deep (75-100 cm) to very deep (>150 cm) and 41 per cent are shallow to moderately shallow (25-75 cm).*
- *About 56 per cent of the area has clayey soils at the surface, 40 per cent loamy soils and <1 per cent sandy soils.*
- *About 61 per cent of the area has non-gravelly soils, 24 per cent gravelly soils (15-35 % gravel) and 11 per cent very gravelly (35- 60% gravel) soils.*
- *About 62 per cent has soils that are very low (<50mm/m) to low (51-100 mm/m) in available water capacity an 35 per cent has very high (>200 mm/m) available water capacity.*

- *About 96 per cent of the area has nearly level (0-1%) to very gently sloping (1-3% slope) lands.*
- *An area of about 65 per cent has soils that are slightly eroded (e1) and 31 per cent moderately eroded (e2).*
- *An area of about 5 per cent has soils that are moderately acidic to slightly acidic (pH 5.5- 6.5); 7 per cent neutral (pH 6.5-7.3) and maximum area of about 84 per cent has soils that are slightly alkaline (pH 7.3 to 7.8) to strongly alkaline (pH 8.4 to 9.0).*
- *The Electrical Conductivity (EC) of the soils are dominantly <2 dsm^{-1} indicating that the soils are non-saline.*
- *About 27 per cent of the soils are low (<0.5%), <1 per cent medium (0.5-0.75%) and 69 per cent high (>0.75%) in organic carbon.*
- *About two per cent of the soils are low (<23 kg/ha), in 81 per cent medium (23-57 kg/ha) and 13 per cent high (>57 kg/ha) in available phosphorus.*
- *About 5 per cent of the soils are low (<145 kg/ha), 21 per cent medium (145-337 kg/ha) area and 70 per cent high (>337 kg/ha) in available potassium.*
- *Available sulphur is low (<10 ppm) in about 79 per cent area, medium (10-20 ppm) in about 16 per centf and high (>20ppm) in about one per cent area.*
- *Available boron is low (0.5 ppm) in about 16 per cent area, medium (0.5-1.0 ppm) in 69 per cent and high (>1.0 ppm) in 11 per cent area.*
- *Available iron is deficient in about 77 per cent area and sufficient in 19 per cent area.*
- *Available manganese and copper are sufficient in all the soils of the microwatershed.*
- *Available zinc is deficient (<0.6 ppm) in about 71 per cent and sufficient (>0.6 ppm) in about 25 per cent area of the microwatershed.*
- *The land suitability for 27 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, price and finally the demand and supply position.*

Land suitability for various crops in the Microwatershed

Crop	Suitability Area in ha (%)			Crop	Suitability Area in ha (%)	
	Highly suitable (S1)	Moderately suitable (S2)			Highly suitable (S1)	Moderately suitable (S2)
Sorghum	*83 (17)*	*244 (49)*		*Sapota*	*191 (38)*	*59 (12)*
Maize	*230 (46)*	*85 (17)*		*Guava*	*203 (41)*	*50 (10)*
Redgram	*230 (46)*	*148 (29)*		*Banana*	*173 (35)*	*81 (16)*
Horsegram	*230 (46)*	*183 (37)*		*Jackfruit*	*173(35)*	*30 (6)*
Field bean	*173 (35)*	*170 (34)*		*Jamun*	*177 (36)*	*30 (6)*
Groundnut	*46 (9)*	*277 (55)*		*Musambi*	*177 (36)*	*30 (6)*
Sunflower	*21 (4)*	*221 (44)*		*Lime*	*177 (36)*	*30 (6)*
Cotton	*26 (5)*	*149 (30)*		*Cashew*	*193 (39)*	*106 (21)*
Onion	*173 (35)*	*154 (30)*		*Custard apple*	*208 (41)*	*205 (41)*
Potato	*173 (35)*	*149 (30)*		*Amla*	*208 (41)*	*205 (45)*
Beans	*173 (35)*	*154 (30)*		*Tamarind*	*177 (35)*	*75 (15)*
Beetroot	*173 (35)*	*149 (30)*		*Marigold*	*230 (46)*	*97 (19)*
Turmeric	*173 (35)*	*149 (30)*		*Chrysanthemum*	*173 (35)*	*170 (34)*
Mango	*173 (35)*	*75 (15)*				

Apart from the individual crop suitability, a proposed crop plan has been prepared for the 9 identified LMUs by considering only the highly and moderately suitable lands for different crops and cropping systems with food, fibre and horticulture crops.

- *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 the 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 submarginal lands and also in the hillocks, mounds and ridges.*

Chapter 1

INTRODUCTION

Soil is a finite natural resource that is central to sustainable agriculture and food security. Over the years, this precious resource is faced with the problems of erosion, salinity, alkalinity, degradation, depletion of nutrients and even decline in availability of land for agriculture. It is a known fact, that it takes thousands of years to form a few centimetres of soil, thus, soil is a precious gift of nature. 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. However, the capacity of a soil to produce is limited and the limits to the production are set by its intrinsic characteristics, agroclimatic setting, and use and management. There is, therefore, tremendous pressure on land and water resources, which is causing decline in soil-health and stagnation in productivity. As much as 121 m ha of land is reportedly degraded which leads to impaired soil quality. It is imperative that steps are urgently taken to check and reverse land degradation without any further loss of time. The improvements in productivity will have to come from sustainable intensification measures that make the most effective use of land and water resources. Soil erosion alone has degraded about 35 lakh ha. Almost all the areas are facing various degrees of degradation, particularly soil erosion; salinity and alkalinity has emerged as a major problem (>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. Added to this, every year there is a significant diversion of farm lands and water resources for non-agricultural purposes. Thus, developing strategies to slow down the degradation process or reclaim the soils to normal condition and ensure sustainability of production system are the major issues today. This demands a systematic appraisal of our soil and land resources with respect to their extent, geographic distribution, characteristics, behaviour and uses potential, which is very important for developing an effective land use and cropping systems for augmenting agricultural production on a sustainable basis.

The soil and land resource inventories made so far in Karnataka had limited utility because the surveys were of different types, scales and intensities carried out at different times with specific objectives. Hence, there is an urgent need to generate 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 all the parameters which are critical for productivity *viz.,* soils, site characteristics like slope, erosion, gravelliness and stoniness, climate, water, 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. An attempt was made later to uplink the LRI data generated under Sujala-III Project to the Landscape Ecological Units (LEUs) map for Hosur-1 micro watershed, Gadag district, Karnataka.

The land resource inventory aims to provide site specific database for Kanivaihundi micro watershed in Gundlupet Taluk, Chamarajanagar 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 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

The Kanivaihundi microwatershed (Hangala subwatershed) is located in the southern part of Karnataka in Gundlupet Taluk, Chamarajanagar District, Karnataka State (Fig.2.1). It comprises parts of Siddaihanapura, Hungalapura, Karle, Pasaianapura, Kaligaudanahalli and Hangala villages. It lies between $11^0$42' to 11^0 44' North latitudes and $76^0$38' to $76^0$40' East longitudes and covers an area of 501 ha. It is about 20 km south of Chamarajanagar and is surrounded by Hangalapura on north, Hangala on northwest, Karle on northeast and Pasainapura on east and Kaligaudanahalli on south.

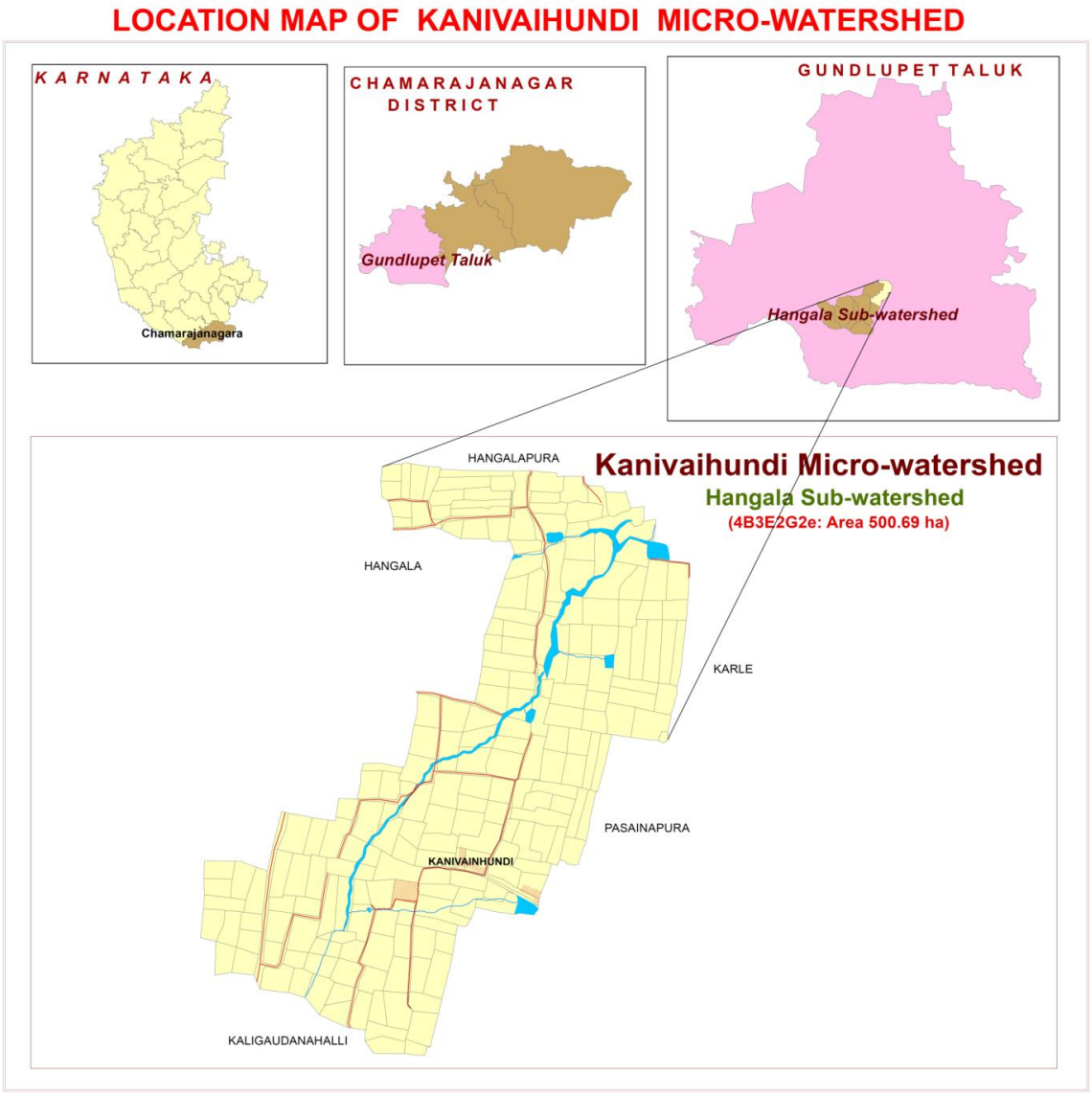


Fig.2.1 Location map of Kanivaihundi Microwatershed

2.2 Geology

Major rock formations observed in the microwatershed are of Archaean age and comprise of (Figs.2.2 and 2.3) granite and gneiss. They are essentially pink to gray granite gneisses. The rocks 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. Dolerite dykes and quartz veins are common with variable width and found to occur in Shivapura village.

Fig.2.2 Granite and granite gneiss rocks

Fig. 2.3 Granite rocks

2.3 Physiography

Physiographically, the area has been identified as granite gneiss landscape 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 823 to 917 m. The mounds and ridges are mostly covered by rock outcrops.

2.4 Drainage

There are no perennial rivers flowing in Gundlupet taluk. However, the area is drained by several small seasonal streams like Gundlu hole along its course. Though, they are not perennial, during rainy season, it carries 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 easily met. The drainage network is dendritic to sub parallel.

2.5 Climate

The district falls under semiarid tract and is categorized as drought-prone with average annual rainfall of 734 mm (Table 2.1). Of the total rainfall, a maximum of 254 mm is received during south–west monsoon period from June to September, north-east monsoon from October to early December contributes about 268 mm and the remaining 212 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 42°C and in December and January, the temperatures will go down to 16°C. Rainfall distribution is shown in Figure 2.4. The average Potential Evapo-Transpiration (PET) is 128 mm and varies from a low of 106 mm in November to 165 mm in the month of March. The PET is always higher than precipitation in all the months except in the last week of September to first week of November. Generally, the Length of crop Growing Period (LGP) is 150 days and starts from 3rd week of June to third week of November.

Table 2.1 Mean Monthly Rainfall, PET, 1/2 PET in Gundlupet Taluk, Chamarajanagara District

Sl. no.	Months	Rainfall	PET	1/2 PET
1	JAN	0.80	129.10	64.55
2	FEB	6.80	133.80	66.90
3	MAR	26.90	164.90	82.45
4	APR	73.60	153.80	76.90
5	MAY	103.90	147.20	73.60
6	JUN	56.00	124.60	62.30
7	JUL	50.40	116.40	58.20
8	AUG	55.80	117.10	58.55
9	SEP	92.00	116.80	58.40
10	OCT	164.10	111.10	55.55
11	NOV	80.50	106.20	53.10
12	DEC	23.50	109.90	54.95
Total		734.30	127.57	

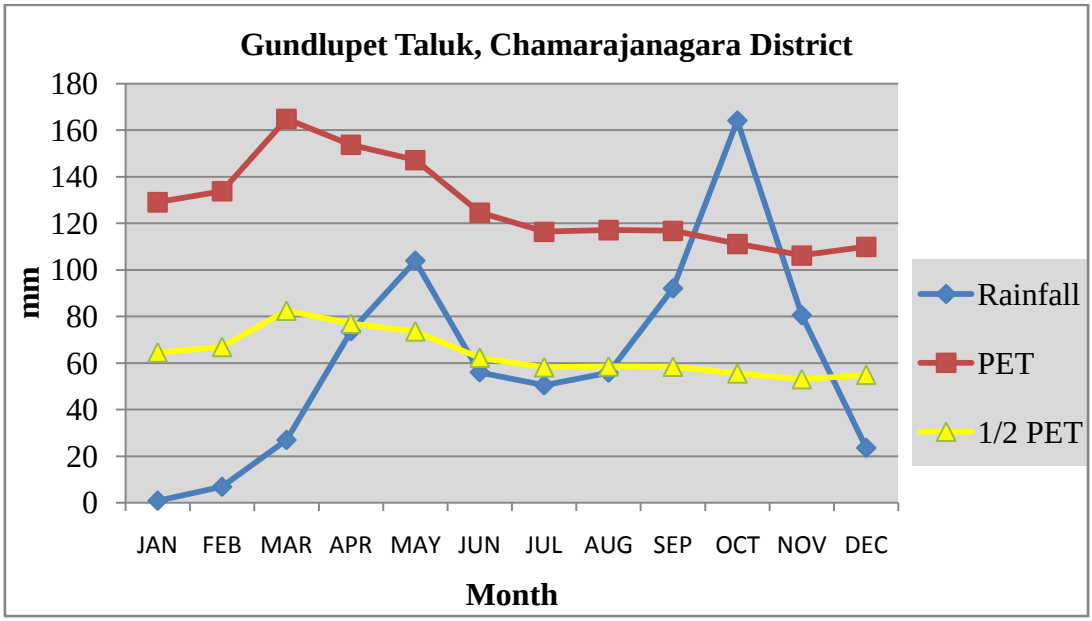


Fig 2.4 Rainfall distribution in Gundlupet Taluk, Chamarajanagara District

2.6 Natural Vegetation

Forests occupy about 32 per cent area in Gundlupet taluk. The major area of these forests is found in Bandipur National Park and Himavad Gopalaswamy Betta. The rest of the area in the taluk has sparse natural vegetation comprising few tree species, shrubs and herbs. The mounds, ridges and boulders occupy very sizeable areas which are 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 Natural vegetation of Kanivaihundi Microwatershed

2.7 Land Utilization

About 48 per cent area (Table 2.2) in Gundlupet taluk is cultivated at present. An area of about 6 per cent is currently barren. Forests occupy an area of about 32 per cent and the tree cover is in a very poor state except in Bandipura National Park and Gopalaswamy Betta. Most of the mounds, ridges and bouldery areas have very poor vegetative cover. Major crops grown in the area are sorghum, maize, cotton, mulberry, onion, safflower, tobacco, groundnut, Sunflower, red gram, horse gram banana, tobacco, cotton, marigold and sapota. 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 Kanivaihundi 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 and 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 located on the cadastral map. Map showing the location of wells and other water bodies in the Kanivaihundi microwatershed is given in Fig.2.7.

Table 2.2 Land Utilization in Gundlupet Taluk

Sl. No.	Agricultural land use	Area (ha)	Per cent
1	Total geographical area	140607	
2	Total cultivated area	67339	47.84
3	Area sown more than once	13532	
4	Cropping intensity	-	120.09
5	Trees and grooves	3485	2.47
6	Forest	44859	31.98
7	Cultivable wasteland	3265	2.32
8	Permanent Pasture land	10287	7.31
9	Barren land	7988	5.68
10	Non- Agriculture land	3384	2.40

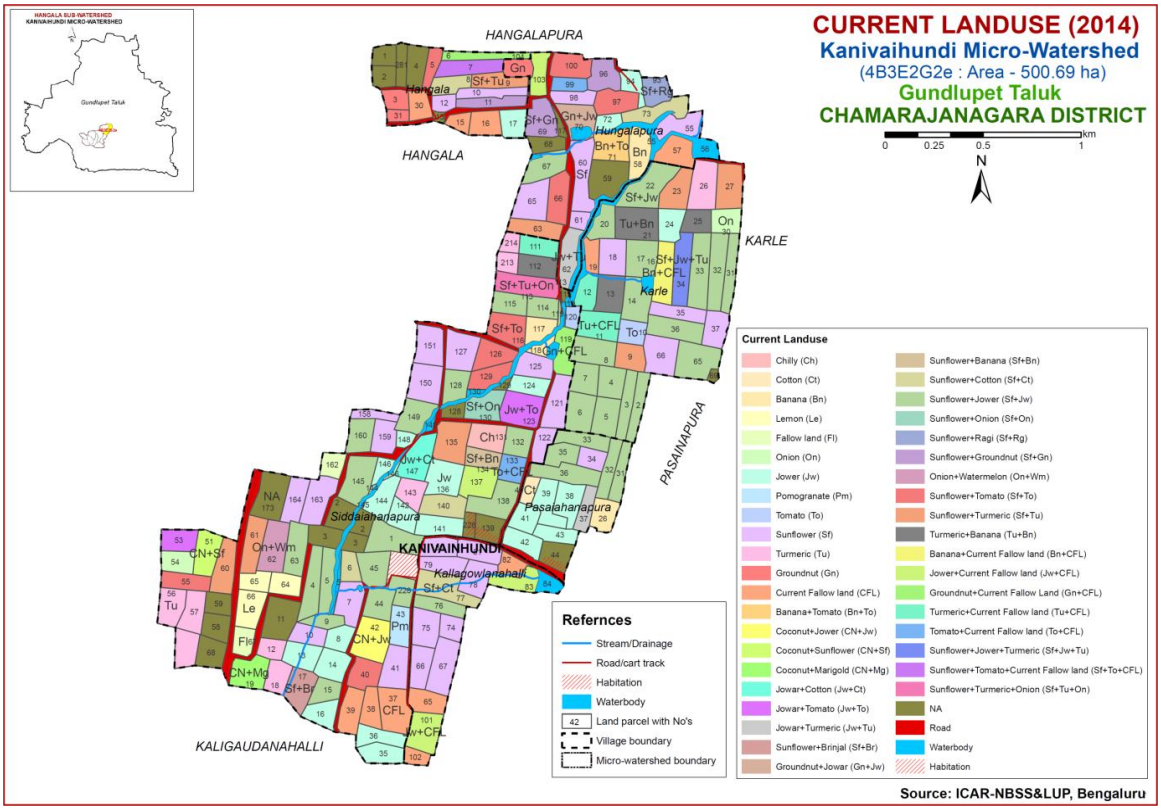


Fig.2.6 Current Land Use – Kanivaihundi Microwatershed

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

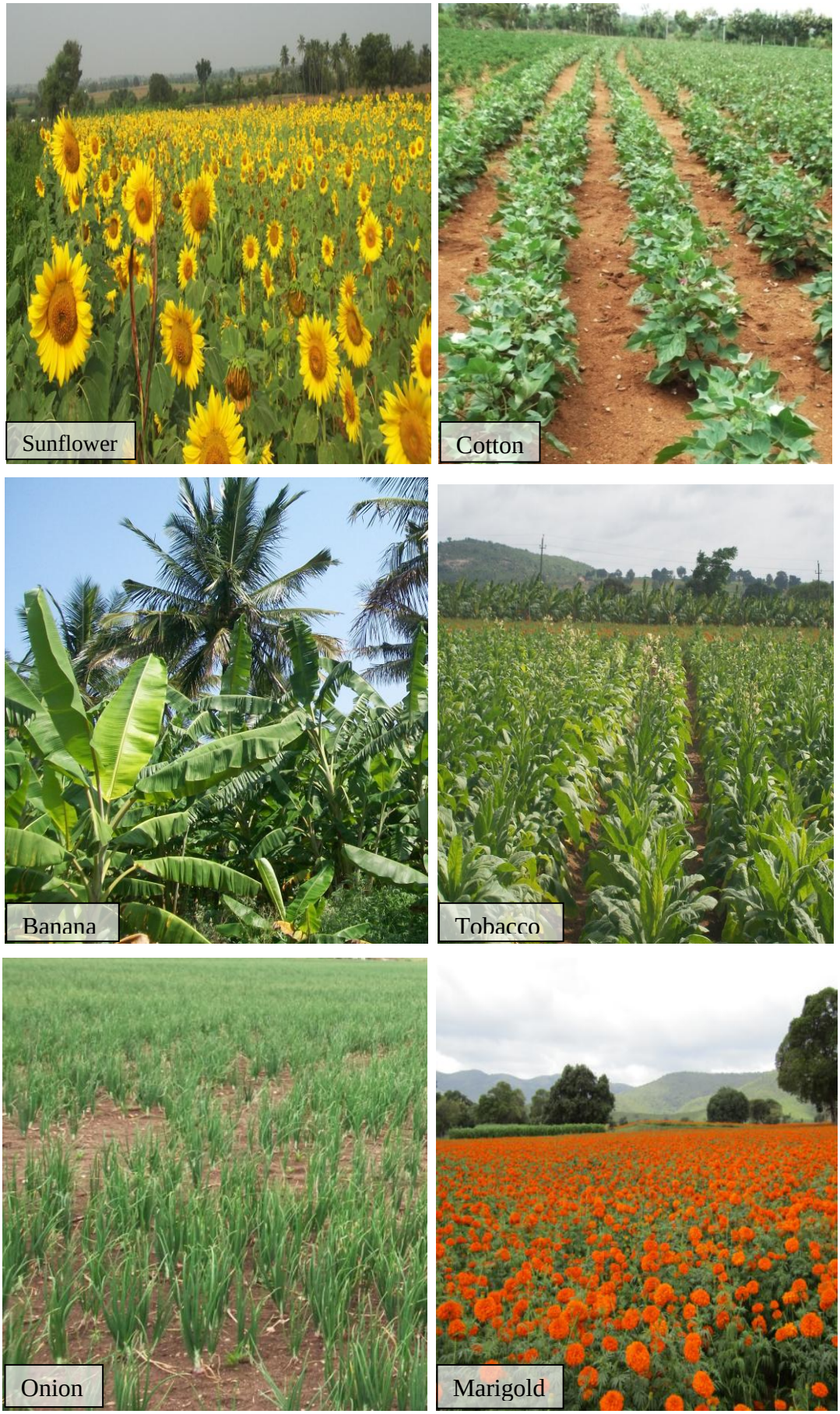


Fig.2.6.b. Different crops and cropping systems in Kanivaihundi Microwatershed

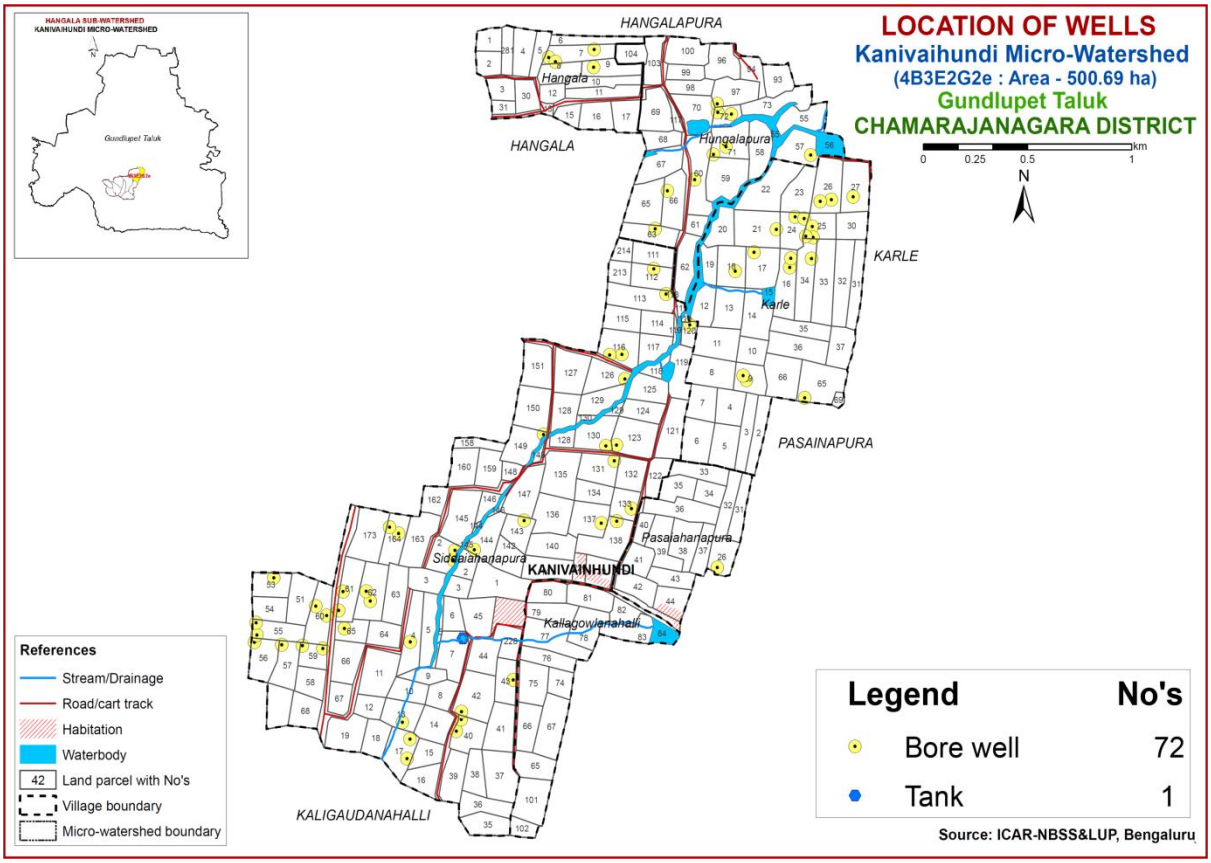


Fig.2.7 Location of Wells - Kanivaihundi Microwatershed

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 Kanivaihundi 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 their extent and geographic distribution on the microwatershed cadastral map. The detailed soil survey at 1:7920 scale was carried out in an area of 501 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 landscape 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 landform

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

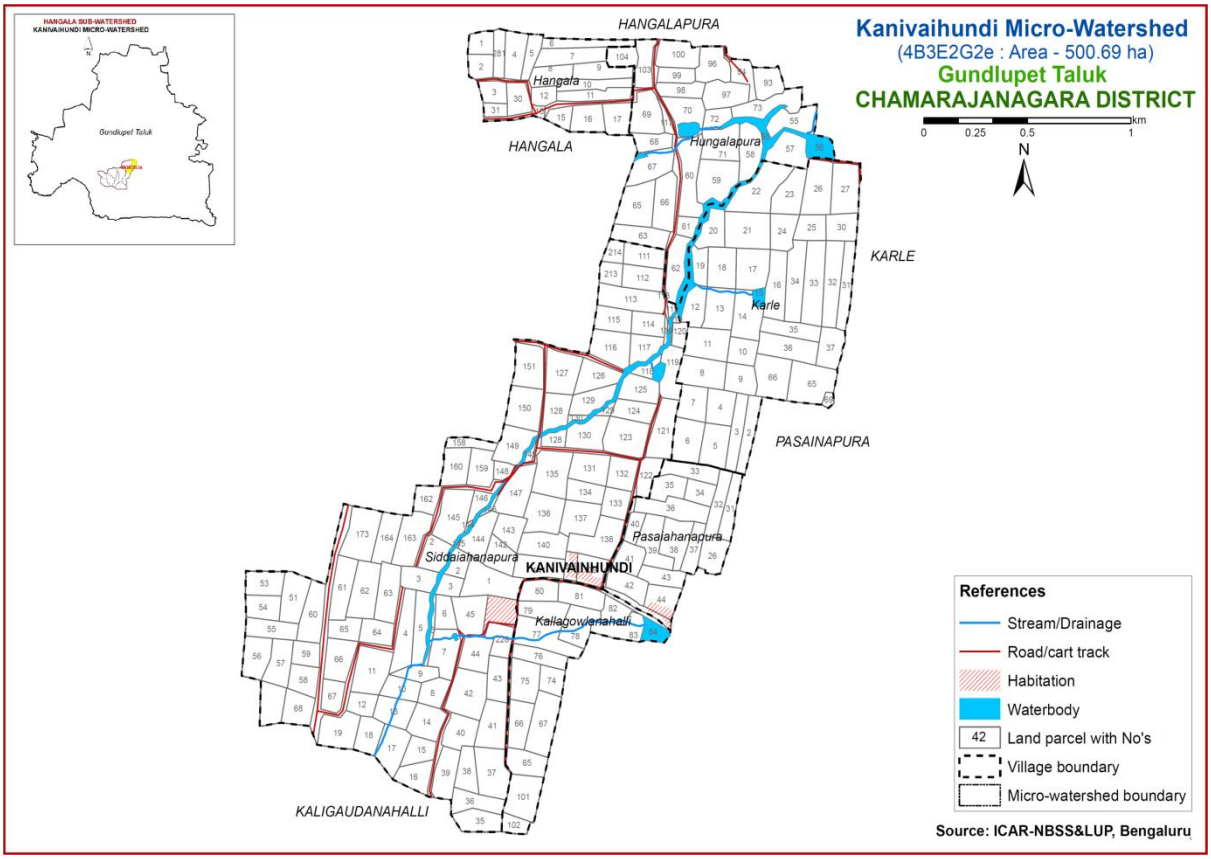


Fig 3.1 Scanned and Digitized Cadastral map of Kanivaihundi Microwatershed

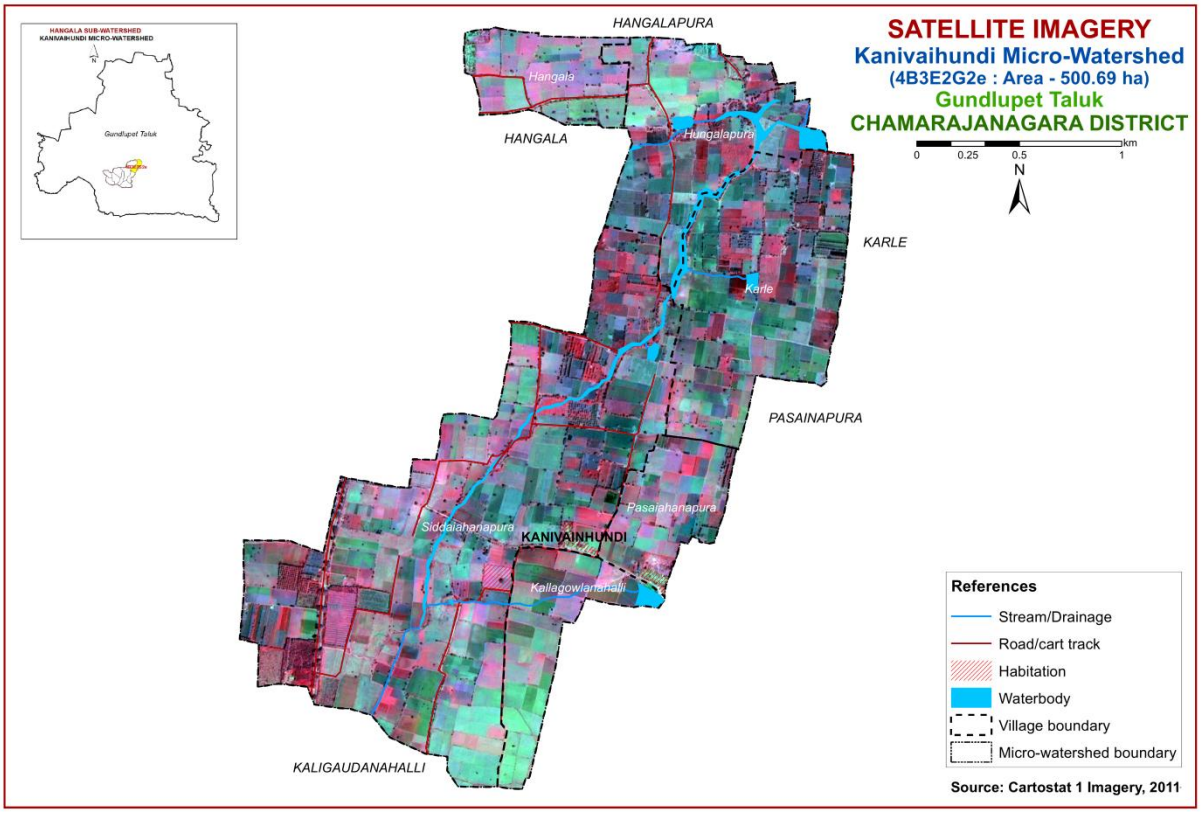


Fig.3.2 Satellite Image of Kanivaihundi Microwatershed

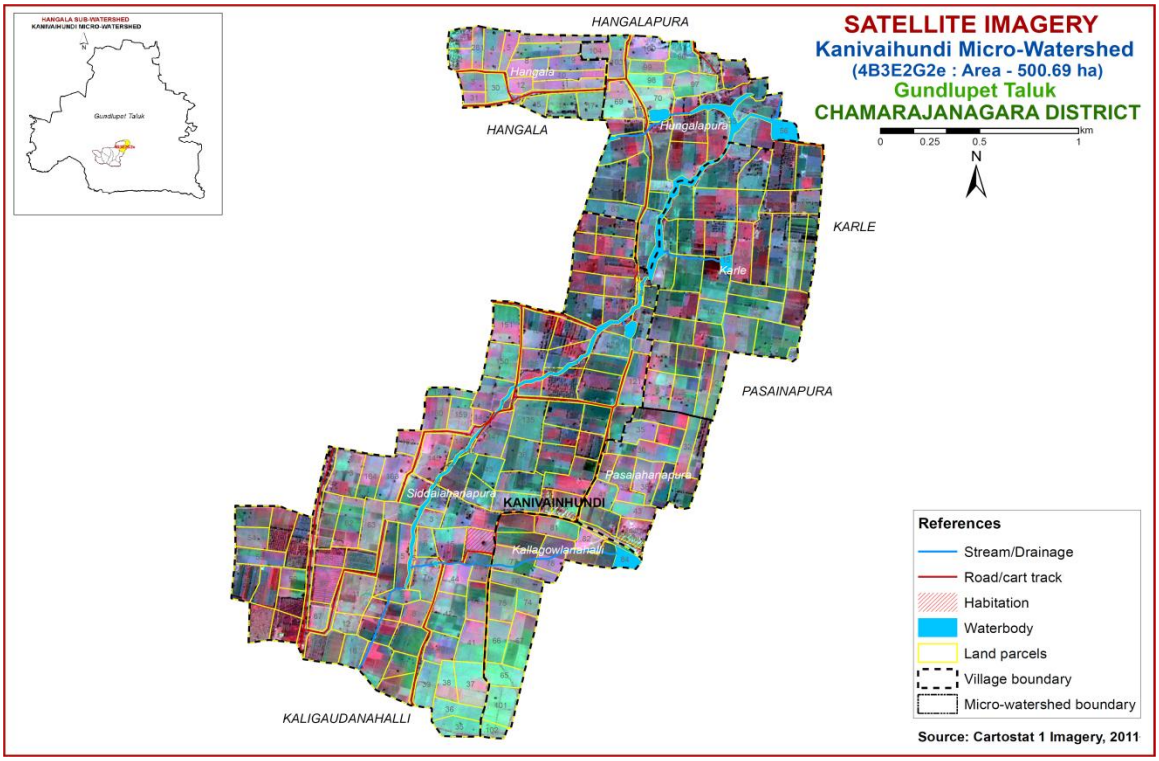


Fig.3.3 Cadastral map overlaid on IRS PAN+LISS IV merged imagery of Kanivaihundi Microwatershed

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 generated 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 were selected across the slope covering all the landform units in the microwatershed (Natarajan and Dipak Sarkar, 2010).

In the selected transect, soil profiles were located 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, profiles (vertical cut showing the soil layers from surface to the rock) were opened up to 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, 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, 12 soil series were identified in the Kanivaihundi 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**	**Calcareousness**
1	ARK (Annurkeri)	>150	2.5YR 2.5/2,3/2, 2.5/3,3/3,2.5/4, 3/4	sc-c	<15	Ap-Bt	-
2	BMB (Beemanabeedu)	>150	10YR 2/1,2/2,3/1, 3/2,4/1	c	-	Ap-Bw	-
3	DRH (Devarahalli)	50-75	2.5YR 2.5/4, 3/2, 3/6	scl-sc	15-35	Ap-Bt-Cr-	-
4	GPR (Gopalapura)	75-100	2.5YR 3/2, 3/3	Scl-sc			
5	HDR(Hundipura)	25-50	2.5YR 2.5/4, 5 YR 3/2	scl-sc	<15	Ap-Bt-Cr	-
6	(HGH) (Honnegaudanahalli)	>150	7.5YR 2.5/2,2.5/3, 3/3,2.5/4,3/4	scl	<15	Ap-Bw	-
7	HPR (Hullipura)	50-75	7.5YR	sc-c	15-35	Ap-Bw-Ck	-
8	KLP (Kallipura)	100-150	2.5YR 2.5/3,2.5/4, 3/4	scl-sc	15-35	Ap-Bt-Cr	
9	(KNG) (Kannigala)	75-100	2.5YR 2.5/4,3/4,3/6	scl-sc	>35	AP-Bt-Cr	-
10	MDH (Maddinahundi)	100-150	2.5YR 2.5/4,3/4	sc	>35	Ap-Bt-Cr	
11	MGH (Magoonahalli)	50-75	2.5YR 2.5/4, 3/4	scl	>35	Ap-Bt-Cr	-
12	SPR (Shivapura)	25-50	2.5YR 2.5/4, 3/4	scl-sc	>35	Ap-Bt-Cr	-

3.4 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 from farmer's fields (93 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, soil fertility maps were generated for the microwatershed.

3.5 Finalization of Soil Map

The area under each soil series was further separated and mapped as 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 map (Fig.3.4) in the form of symbols. During the survey about 24 profile pits, few minipits and a few auger bores representing different landforms occurring in the microwatershed were studied. All the profile locations are indicated on the village cadastral map in the form of a triangle. 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 28 mapping units representing 12 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 28 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 phase will have similar management needs and they have to be treated accordingly.

The 28 soil phases identified and mapped in the microwatershed were regrouped into 9 Land Management Units (LMU'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 Management Units (LMUs) 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 LMUs. For Kanivaihundi microwatershed, five soil and site characteristics, namely soil depth, soil texture, slope, erosion and gravel content have been considered for defining LMUs. The land management units are expected to behave similarly for a given level of management.

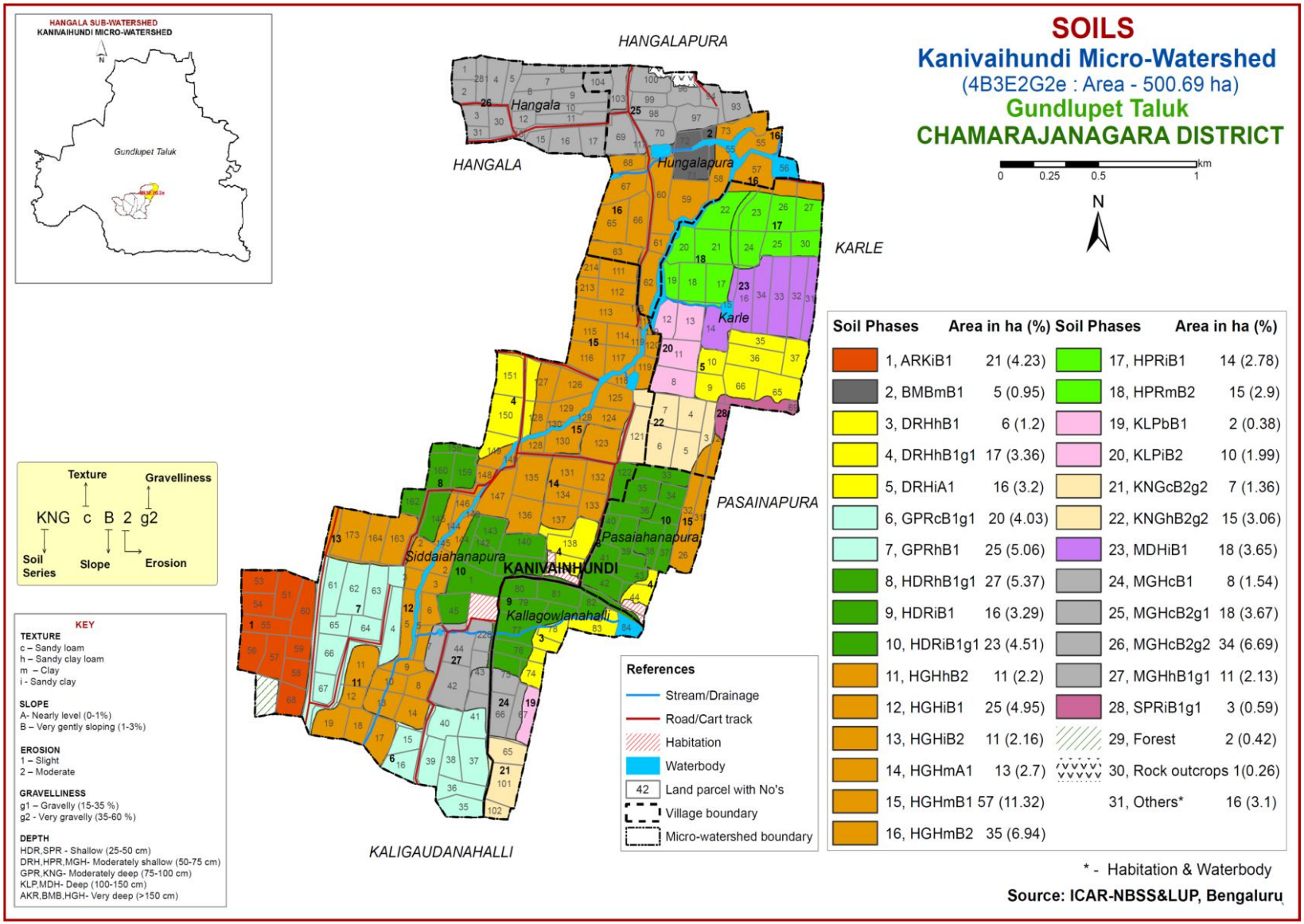


Fig 3.4 Soil Phase or Management Units Map of Kanivaihundi Microwatershed

Table 3.2 Soil map unit description of Kanivaihundi Microwatershed

Soil map unit No	Soil Series	Soil Phase Symbol	Mapping Unit Description	Area in ha (%)
Soils of Granite gneiss Landscape				
	ARK	Annurkeri soils are very deep (>150 cm), well drained, have dark reddish brown to very dusky red sandy clay to clay soils occurring on very gently sloping uplands under cultivation.		**21.16 (4.23)**
1		ARKiB1	Sandy clay surface, slope 1-3%, slight erosion	21.16 (4.23)
	BMB	Beemanabeedu soils are very deep (>150 cm), moderately well drained, have very dark greyish brown to dark grey and very dark brown clayey soils occurring on nearly level to very gently sloping lowlands under cultivation		**4.74 (0.95)**
2		BMBmB1	Clay surface, slope 1-3%, slight erosion	4.74 (0.95)
	DRH	Devarahalli soils are moderately shallow (50-75 cm), well drained, have dark red to reddish brown and dusky red gravelly sandy clay loam to sandy clay soils occurring on very gently to gently sloping uplands under cultivation		**38.86 (7.76)**
3		DRHhB1	Sandy clay loam surface, slope 1-3%, slight erosion	6.02 (1.20)
4		DRHhB1g1	Sandy clay loam surface, slope 1-3%, slight erosion, gravelly (15-35%)	16.82 (3.36)
5		DRHiA1	Sandy clay surface, slope 0-1%, slight erosion	16.02 (3.20)
	GPR	Gopalapura soils are moderately deep (75-100 cm), well drained, have dark brown to dark reddish brown and reddish brown gravelly sandy clay loam to sandy clay soils occurring on very gently to gently sloping uplands under cultivation		**45.51 (9.09)**
6		GPRcB1g1	Sandy loam surface, slope 1-3%, slight erosion, gravelly (15-35%)	20.16 (4.03)
7		GPRhB1	Sandy clay loam surface, slope 1-3%, slight erosion	25.35 (5.06)
	HDR	Hundipura soils are shallow (25-50 cm), well drained, have dark reddish brown to dusky red sandy clay loam to sandy clay soils occurring on very gently sloping uplands and moderately sloping mounds and ridges		**65.93 (13.17)**
8		HDRhB1g1	Sandy clay loam surface, slope 1-3 %, slight erosion, gravelly (15-35%)	26.89 (5.37)
9		HDRiB1	Sandy clay surface, slope 1-3%, slight erosion	16.48 (3.29)
10		HDRiB1g1	Sandy clay surface, slope 1-3 %, slight erosion, gravelly (15-35%)	22.56 (4.51)
	HGH	Honnegaudanahalli soils are very deep (>150 cm), well drained, have very dark brown to brown and dark reddish brown sandy clay loam soils occurring on very gently		**151.57 (30.27)**

		sloping uplands under cultivation.		
11		HGHhB2	Sandy clay loam surface, slope 1-3%, moderate erosion	11.00 (2.20)
12		HGHiB1	Sandy clay surface, slope 1-3%, slight erosion	24.80 (4.95)
13		HGHiB2	Sandy clay surface, slope 1-3%, moderate erosion	10.81 (2.16)
14		HGHmA1	Clay surface, slope 0-1%, slight erosion	13.50 (2.70)
15		HGHmB1	Clay surface, slope 1-3%, slight erosion	56.70 (11.32)
16		HGHmB2	Clay surface, slope 1-3%, moderate erosion	34.76 (6.94)
	HPR	Hullipura soils are moderately shallow (50-75 cm), well drained, have dark brown to very dark brown gravelly sandy clay to clay soils occurring on very gently to gently sloping uplands under cultivation		**28.45 (5.68)**
17		HPRiB1	Sandy clay surface, slope 1-3%, slight erosion	13.94 (2.78)
18		HPRmB2	Clay surface, slope 1-3%, moderate erosion	14.51 (2.90)
	KLP	Kallipura soils are deep (100-150 cm), well drained, have dark reddish brown to dark red gravelly sandy clay loam to sandy clay soils occurring on very gently sloping uplands under cultivation.		**11.85 (2.37)**
19		KLPbB1	Loamy sand surface, slope 1-3%, slight erosion	1.91 (0.38)
20		KLPiB2	Sandy clay surface, slope 1-3%, moderate erosion	9.94 (1.99)
	KNG	Kannigala soils are moderately deep (75-100 cm), well drained, have dark reddish brown to dark red gravelly sandy clay loam to sandy clay soils occurring on very gently sloping uplands and strongly sloping mounds and ridges.		**22.14 (16.71)**
21		KNGcB2g2	Sandy loam surface, slope 1-3%, moderate erosion, very gravelly (35-60%)	6.79 (1.36)
22		KNGhB2g2	Sandy clay loam surface, slope 1-3%, moderate erosion, very gravely (35-60%)	15.35 (3.06)
	MDH	Maddinahundi soils are deep (100-150 cm), well drained, have dark reddish brown gravelly sandy clay soils occurring on very gently to gently sloping uplands under cultivation.		**18.26 (3.65)**
23		MDHiB1	Sandy clay surface, slope 1-3%, slight erosion	18.26 (3.65)
	MGH	Magoonahalli soils are moderately shallow (50-75 cm), well drained, have very dark brown to dark brown gravelly sandy clay loam soils occurring on very gently sloping uplands and moderatly sloping mounds and ridges		**70.31 (14.03)**

24		MGHcB1	Sandy loam surface, slope 1-3%, slight erosion	7.70 (1.54)
25		MGHcB2g1	Sandy loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)	18.40 (3.67)
26		MGHcB2g2	Sandy loam surface, slope 1-3%, moderate erosion, very gravelly (35-60%)	33.52 (6.69)
27		MGHhB1g1	Sandy clay loam surface, slope 1-3%, slight erosion, gravelly (15-35%)	10.69 (2.13)
	SPR	Shivapura soils are shallow (25-50 cm), well drained, have dark reddish brown gravelly sandy clay loam to sandy clay soils occurring on very gently sloping uplands and very strongly sloping hills, mounds and ridges.		**2.98 (0.59)**
28		SPRiB1g1	Sandy clay surface, slope 1-3%, slight erosion, gravelly (15-35%)	2.98 (0.59)
29		Forest		2.12 (0.42)
30		Rock outcrops		1.28 (0.26)
31		Others	Habitation & Waterbody	15.53 (3.10)

Chapter 4

THE SOILS

Detailed information pertaining to the nature, extent and their distribution of different kinds of soils occurring in Kanivaihundi microwatershed is provided in this chapter. The microwatershed area has been identified as granite gneiss landscape based on geology. In all, 12 soil series are identified. Soil formation is the result of the combined effect of environmental and terrain factors that are reflected in soil morphology. Soil formation in the granite gneiss landscape is dominantly influenced by the parent material, climate and relief.

A brief description of each of the 12 soil series identified followed by 28 soil phases (management units) mapped under each series (Fig. 3.4) are furnished below. 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, 12 soil series are identified and mapped. Brief description of each series and their phases identified are given below. Of these, Honnegaudanahalli (HGH) soil series occupies maximum area of about 151.57 ha (30.27 %) followed by Magoonahalli (MGH) 70 ha (14%), Hundipura (HDR) 66 ha (14%), Gopalapura (GPR) 46 ha (9%), Devarahalli (DRH) 38 ha (8%) and other series occupy minor area in the microwatershed.

4.1.1 Annurkeri (ARK) Series: Annurkeri soils are very deep (>150 cm), well drained, have dark reddish brown to very dusky red sandy clay to clay soils. They are developed from weathered granite gneiss and occur on very gently sloping uplands.

The thickness of the solum ranges from 150 to 200 cm. The thickness of A horizon ranges from 11 to 18 cm. Its colour is in 5YR and 2.5 YR hue with value 3 and chroma 3 to 4. The texture varies from sandy clay to clay with 10 to 15 per cent gravel. 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 2 to 4. Texture is dominantly sandy clay to clay with less than 15 per cent gravel. The available water capacity is very high (>200 mm/m).

Only one phase was identified:

ARKiB1	Sandy clay surface, slope 1-3%, slight erosion

Landscape and Soil Profile characteristics of Annurkeri (ARK) Series

4.1.2 Beemanabeedu (BMB) Series: Beemanabeedu soils are very deep (>150 cm), moderately well drained, have very dark greyish brown to dark grey and very dark brown clayey soils. They are developed from weathered granite gneiss and occur on very gently sloping lowlands.

The thickness of the solum ranges from 150 to 200 cm. The thickness of A horizon ranges from 12 to 17 cm. Its colour is in 10 YR and 7.5 YR hue with value 2.5 to 4 and chroma 2 to 4. The texture varies from sandy clay to clay with 10 to 15 per cent gravel. The thickness of B horizon is more than 150 cm. Its colour is in 10 YR hue with value 2 to 4 and chroma 1 to 2. Texture is clay and are nongravelly. The available water capacity is very high (>200 mm/m).

Only one phase was identified:

BMBmB1	Clay surface, slope 1-3%, slight erosion

Landscape and Soil Profile characteristics of Beemanabeedu (BMB) Series

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

The thickness of the solum ranges from 52 to 73 cm. The thickness of A horizon ranges from 7 to 15 cm. Its colour is in 7.5 YR and 5YR hue with value 3 to 4 and chroma 2 to 6. The texture varies from loamy sand to sandy clay with 10 to 25 per cent gravel. The thickness of B horizon ranges from 45 to 58 cm. Its colour is in 2.5 YR hue with value 2.5 to 3 and chroma 4 to 6. Its texture is gravelly sandy clay loam to gravelly sandy clay with gravel content of 15 to 35 per cent. The available water capacity is low (51-100 mm/m).

Three phases were identified:

DRHhB1	Sandy clay loam surface, slope 1-3%, slight erosion
DRHhB1g1	Sandy clay loam surface, slope 1-3%, slight erosion, gravelly (15-35%)
DRHiA1	Sandy clay surface, slope 0-1%, slight erosion

Landscape and Soil Profile characteristics of Devarahalli (DRH) Series

4.1.4 Gopalapura (GPR) Series: Gopalapura soils are moderately deep (75-100 cm), well drained, have dark brown to dark reddish brown and reddish brown sandy clay loam to sandy clay soils.They have developed from granite gneiss and occur on very gently to gently sloping uplands.

The thickness of the solum ranges from 73 to 97 cm. The thickness of A horizon ranges from 12 to 18 cm. Its colour is in 2.5 YR and 7.5 YR hue with value 3 and chroma 2. The texture varies from gravelly sandy clay to sandy clay loam with 10-25 per cent gravel. The thickness of B horizon ranges from 66 to79 cm. Its colour is in 2.5 YR and 5 YR hue with value 3 to 4 and chroma 2 to 3. Its texture is gravelly sandy clay loam to gravelly sandy clay with gravel content of 15-35 per cent. The available water capacity is low (75 mm/m).

Two phases were identified:

GPRcB1g1	Sandy loam surface, slope 1-3%, slight erosion, gravelly (15-35%)
GPRhB1	Sandy clay loam surface, slope 1-3%, slight erosion

Landscape and Soil Profile characteristics of Gopalapura (GPR) Series

4.1.5 Hundipura (HDR) Series: Hundipura soils are shallow (25-50 cm), well drained, have dark reddish brown to dusky red sandy clay loam to sandy clay soils. They have developed from granite gneiss and occur on very gently to moderately sloping uplands.

The thickness of the solum ranges from 35 to 46 cm. The thickness of A horizon ranges from 7 to 18 cm. Its colour is in 7.5 YR and 5 YR hue with value 3 and chroma 3 to 4. The texture varies from loamy sand to sandy clay loam with 10 to 20 per cent gravel. The thickness of B horizon ranges from 19 to 31 cm. Its colour is in 2.5 YR and 5 YR hue with value 2.5 to 3 and chroma 2 to 4. Its texture is sandy clay loam to sandy clay with gravel content of < 15 per cent. The available water capacity is very low (<50 mm/m).

Three phases were identified :

HDRhB1g1	Sandy clay loam surface, slope 1-3 %, slight erosion, gravelly (15-35%)
HDRiB1	Sandy clay surface, slope 1-3%, slight erosion
HDRiB1g1	Sandy clay surface, slope 1-3 %, slight erosion, gravelly (15-35%)

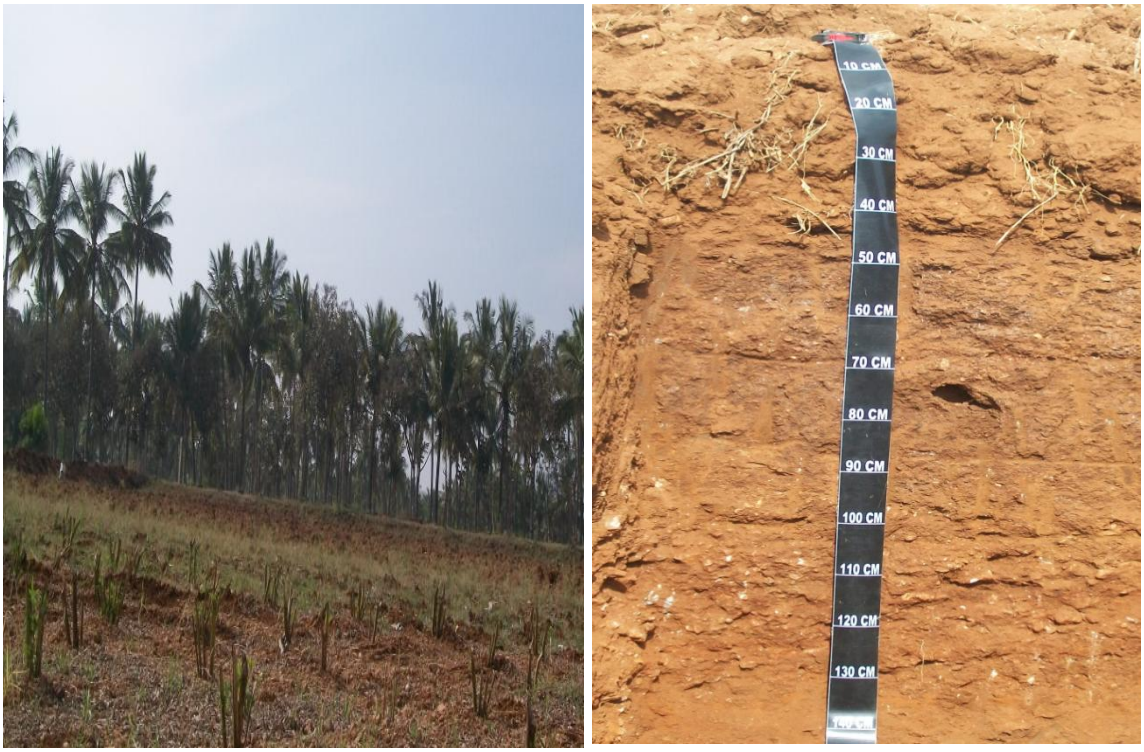
Landscape and Soil Profile characteristics of Hundipura (HDR) Series

4.1.6 Honnegaudanahalli (HGH) Series: Honnegaudanahalli soils are very deep (>150 cm), well drained, have very dark brown to brown and dark reddish brown sandy clay loam soils. They are developed from weathered granite gneiss and occur on very gently sloping uplands under cultivation.

The thickness of the solum ranges from 150-200 cm. The thickness of A horizon ranges from 14 to 19 cm. Its colour is in 7.5 YR hue with value 2.5 to 4 and chroma 2 to 6. The texture varies from sandy loam to clay with 10 to 15 per cent gravel. The thickness of B horizon is more than 150 cm. Its colour is in 7.5 YR hue with value 2.5 to 3 and chroma 2 to 4. Texture is sandy clay loam with <15 per cent gravel. The available water capacity is very high (>200mm/m).

Six phases were identified:

HGHhB2	Sandy clay loam surface, slope 1-3%, moderate erosion
HGHiB1	Sandy clay surface, slope 1-3%, slight erosion
HGHiB2	Sandy clay surface, slope 1-3%, moderate erosion
HGHmA1	Clay surface, slope 0-1%, slight erosion
HGHmB1	Clay surface, slope 1-3%, slight erosion
HGHmB2	Clay surface, slope 1-3%, moderate erosion



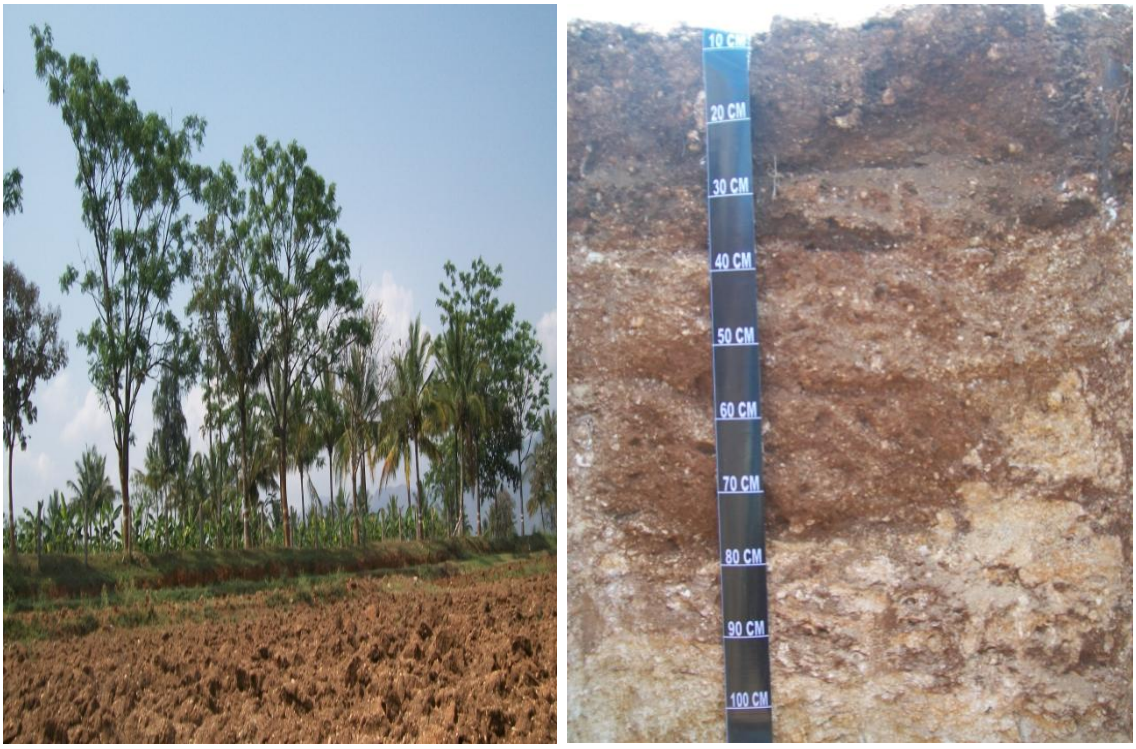
Landscape and Soil Profile characteristics of Honnegaudanahalli (HGH) Series

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

The thickness of the solum ranges from 51 to 71 cm. The thickness of A horizon ranges from 13 to 18 cm. Its colour is in 7.5YR and 10 YR hue with value 2.5 to 3 and chroma 2 to 4. The texture varies from gravelly sandy loam to gravelly clay with 15 to 25 per cent gravel. The thickness of B horizon ranges from 38 to 52 cm. Its colour is in 2.5 YR and 7.5 YR hue with value 2.5 to 3 and chroma 2. Its texture is gravelly sandy clay loam to gravelly sandy clay with gravel content of 15 to 35 per cent. The available water capacity is low (51-100 mm/m).

Two phases were identified:

HPRiB1	Sandy clay surface, slope 1-3%, slight erosion
HPRmB2	Clay surface, slope 1-3%, moderate erosion



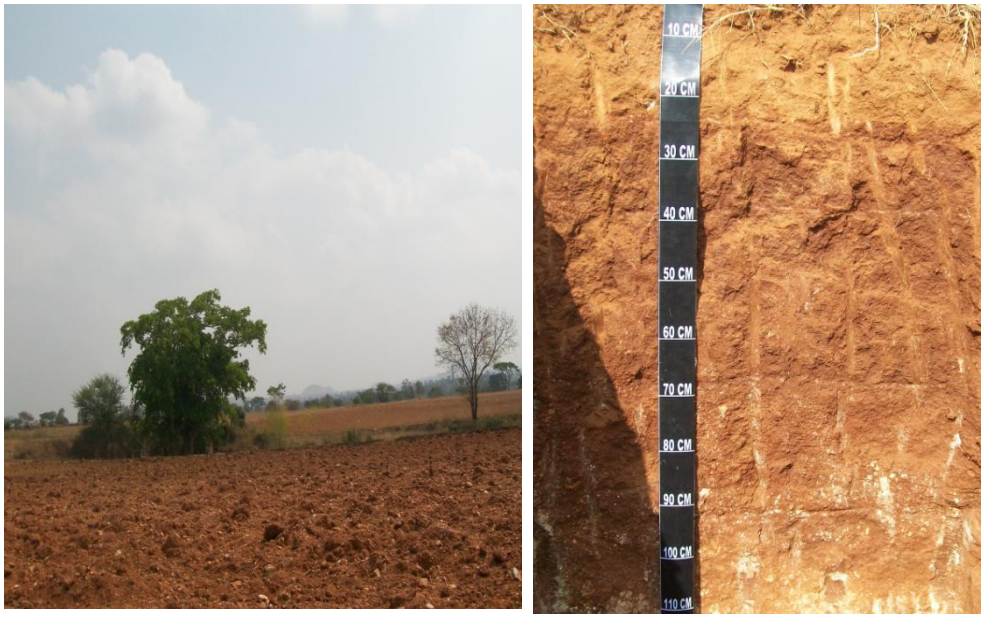
Landscape and Soil Profile characteristics of Hullipura (HPR) Series

4.1.8 Kallipura (KLP) Series: Kallipura soils are moderately shallow (50 to 75 cm), well drained, have brown to very dark brown and dark reddish brown sandy loam to clay loam soils. They have developed from granite gneiss and occur on nearly level to gently sloping uplands.

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 gravelly sandy loam to gravelly clay loam 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 gravelly sandy clay loam to gravelly sandy clay with gravel content of 15 to 35 per cent. The available water capacity is medium (100 mm/m).

Two phases were identified:

KLPbB1	Loamy sand surface, slope 1-3%, slight erosion
KLPiB2	Sandy clay surface, slope 1-3%, moderate erosion



Landscape and Soil Profile characteristics of Kallipura (KLP) Series

4.1.9 Kannigala (KNG) Series: Kannigala soils are moderately deep (75-100 cm), well drained, have dark reddish brown to dark red sandy clay loam to sandy clay soils. They have developed from granite gneiss and occur on very gently to strongly sloping uplands.

The thickness of the solum ranges from 78 to 94 cm. The thickness of A horizon ranges from 12 to 15 cm. Its colour is in 5YR, 2.5 YR and 7.5 YR hue with value 3 and chroma 3 to 4. The texture varies from gravelly loamy sand to clay with 15 to 25 per cent gravel. The thickness of B horizon ranges from 69 to 80 cm. Its colour is in 2.5 YR hue with value 2.5 to 3 and chroma 4 to 6. Texture varies from gravelly sandy clay loam to gravelly sandy clay with >35 per cent gravel. The available water capacity is very low (<50 mm/m).

Two phases were identified:

KNGcB2g2	Sandy loam surface, slope 1-3%, moderate erosion, very gravelly (35-60%)
KNGhB2g2	Sandy clay loam surface, slope 1-3%, moderate erosion, very gravely (35-60%)

4.1.10 Maddinahundi (MDH) Series: Maddinahundi soils are deep (100-150 cm), well drained, have dark reddish brown sandy clay soils. They have developed from granite gneiss and occur on very gently to gently sloping uplands.

The thickness of the solum ranges from 102 to 150 cm. The thickness of A horizon ranges from 12 to 25 cm. Its colour is in 7.5 YR, 5 YR and 2.5 YR hue with value 3 and chroma 2 to 6. The texture varies from gravelly sandy loam to gravelly sandy clay with 15 to 30 per cent gravel. The thickness of B horizon ranges from 90 to 148 cm. Its colour is in 2.5 YR hue with value 2.5 to 3 and chroma 4. Its texture is gravelly sandy clay with gravel content of >35 per cent. The available water capacity is medium (100 mm/m).

Only one phase was identified:

MDHiB1	Sandy clay surface, slope 1-3%, slight erosion

Landscape and Soil Profile characteristics of Maddinahundi (MDH) Series

4.1.11 Magoonahalli (MGH) Series: Magoonahalli soils are moderately shallow (50-75 cm), well drained, have very dark brown to dark brown sandy clay loam soils. They have developed from granite gneiss and occur on very gently to moderately sloping uplands.

The thickness of the solum ranges from 53 to 74 cm. The thickness of A horizon ranges from 15 to 18 cm. Its colour is in 7.5 YR and 5 YR hue with value 3 to 4 and chroma 2 to 6. The texture varies from gravelly sandy loam to gravelly clay with 15 to 25 per cent gravel. The thickness of B horizon ranges from 44 to 52 cm. Its colour is in 2.5 YR hue with value 2.5 to 3 and chroma 4. Its texture is gravelly sandy clay loam with gravel content of >35 per cent. The available water capacity is very low (<50 mm/m).

Four phases were identified:

MGHcB1	Sandy loam surface, slope 1-3%, slight erosion
MGHcB2g1	Sandy loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)
MGHcB2g2	Sandy loam surface, slope 1-3%, moderate erosion, very gravelly (35-60%)
MGHhB1g1	Sandy clay loam surface, slope 1-3%, slight erosion, gravelly (15-35%)

Landscape and Soil Profile characteristics of Magoonahalli (MGH) Series

4.1.12 Shivapura (SPR) Series: Shivapura soils are shallow (25-50 cm), well drained, have dark reddish brown sandy clay loam to sandy clay soils. They have developed from granite gneiss and occur on very gently to very strongly sloping uplands.

The thickness of the solum ranges from 26 to 46 cm. The thickness of A horizon ranges from 7 to 9 cm. Its colour is in 7.5 YR and 2.5 YR hue with value 3 to 4 and chroma 3 to 6. The texture varies from gravelly sandy loam to gravelly clay with 15 to 25 per cent gravel. The thickness of B horizon ranges from 18 to 30 cm. Its colour is in 2.5 YR hue with value 2.5 to 3 and chroma 4. Its texture is gravelly sandy clay loam to gravelly sandy clay with gravel content of >35 per cent. The available water capacity is very low (<50 mm/m).

Only one phase was identified:

SPRiB1g1	Sandy clay surface, slope 1-3%, slight erosion, gravelly (15-35%)

Landscape and Soil Profile characteristics of Shivapura (SPR) Series

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 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

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

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

The Land capability classification system 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 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/alkalinity 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 28 soil map units identified in the Kanivaihundi microwatershed are grouped under 4 land capability classes and 6 land capability subclasses. About (482 ha) 96% area in the microwatershed is suitable for agriculture and less than one per cent is not suitable for agriculture but well suited for forestry, pasture, recreation, as habitat for wild life and for installation of wind mills (Fig. 5.1).

Good cultivable lands (Class II) cover a maximum area of about 82 per cent and are distributed in the major part of the micowatershed with minor problems of soil and erosion. Moderately good cultivable lands (Class III) cover a small area of about 13 per cent and are distributed in the eastern, western and southern part of the microwatershed with moderate problems of soil. The fairly good cultivable lands (class IV) cover a very small area of about <1 per cent. They have severe limitations of soil and are distributed in the eastern part of the microwatershed and a very small area of <1 per cent is not suitable for agriculture (Class VIII).

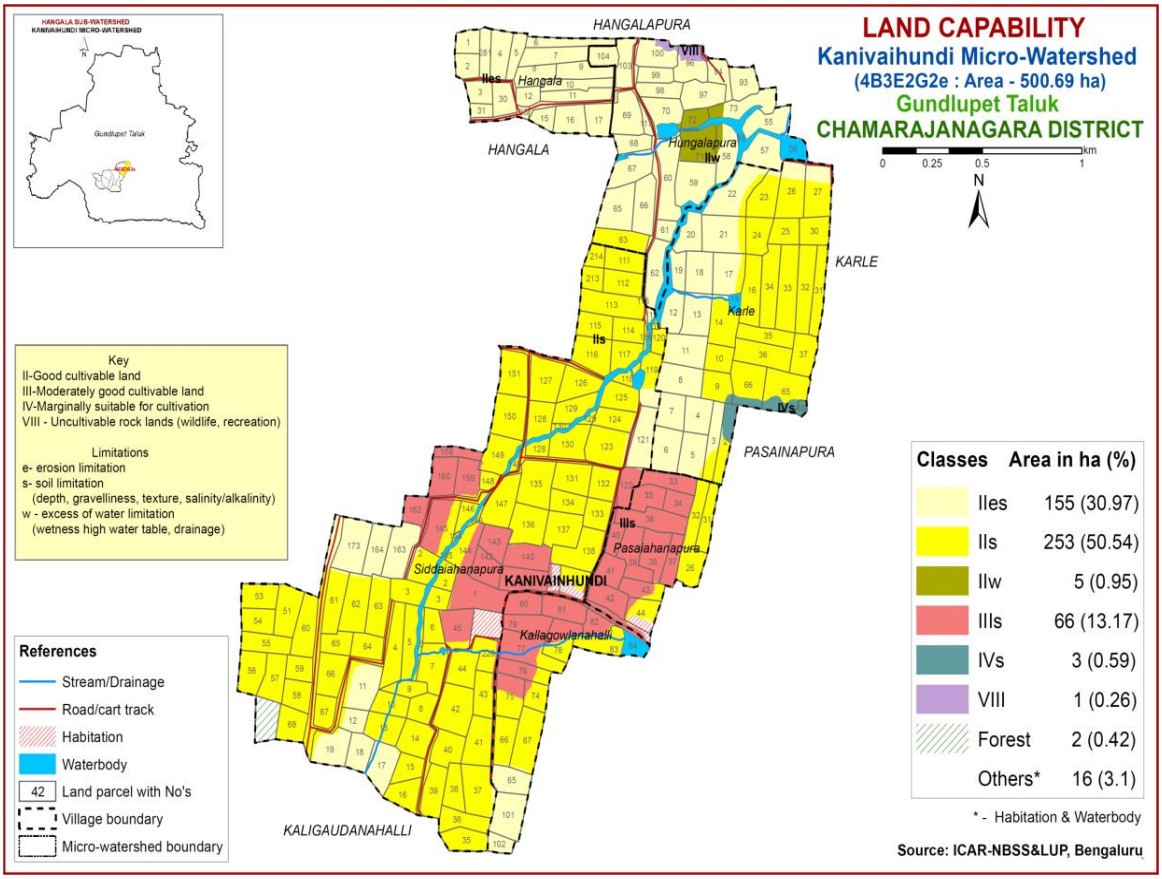


Fig. 5.1 Land Capability map of Kanivaihundi Microwatershed

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 mcrowatershed is shown in Figure 5.2.

Shallow soils (25-50 cm) cover an area of about 69 ha (14%) and occur in the southern part of the microwatershed. Moderately shallow (50-75 cm) soils covers about 138 ha (27%) area and are distributed in the northern, northeastern, central and southern part of the microwatershed. Moderately deep (75-100 cm) soils occupy an area of about 68 ha (14%) and are distributed in the southern and eastern part of the microwatershed. Deep (100-150- cm) soils cover about a small area of 30 ha (6%) and are distributed in the northern and northeastern part of the microwatershed. Very deep (>150 cm) soils

cover a maximum area of 177 ha (35%) and are distributed in the northwestern and southwestern part of the microwatershed.

The most productive lands 207 ha (41%) 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 northern, central and southern part of the microwatershed.

The most problem lands with a small area of about 69 ha (14%) having shallow (25-50 cm) rooting depth occur in the southern part of the microwatershed. They are not suitable for growing agricultural crops but well suited for pasture, forestry or other recreational purposes. Occasionally, short duration crops may be grown if rainfall is normal.

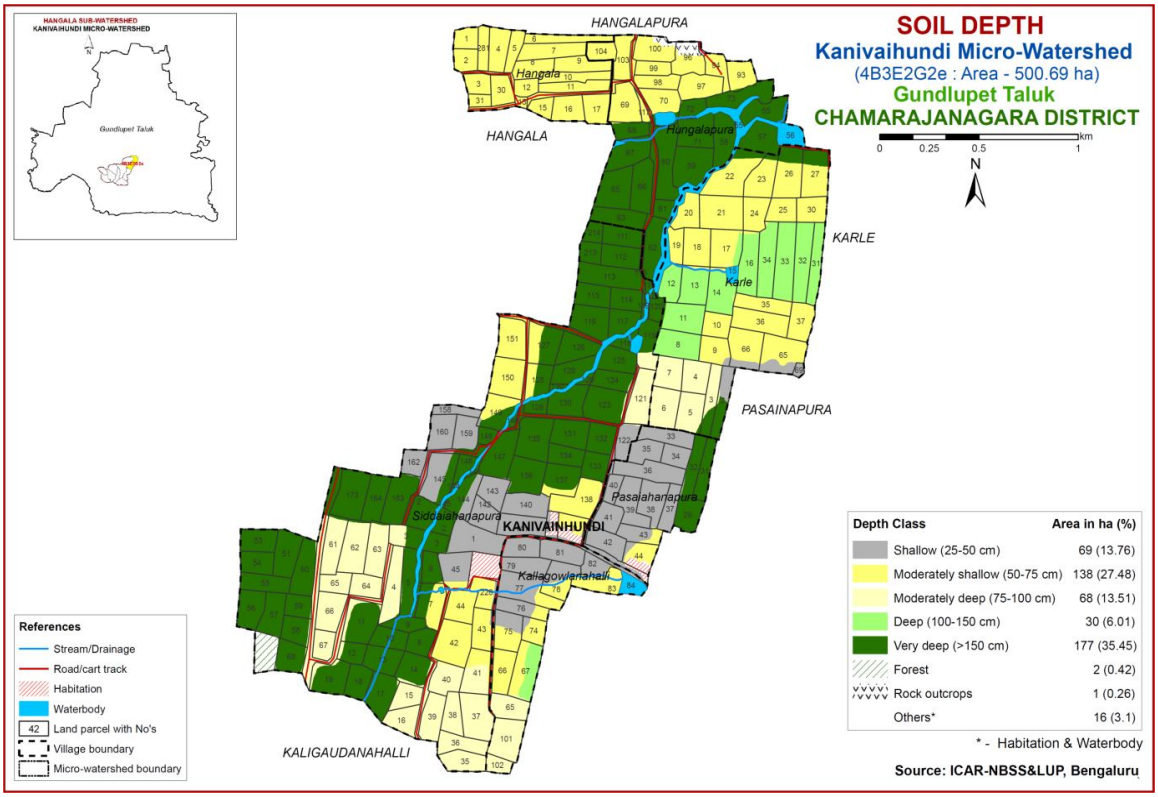


Fig. 5.2 Soil Depth map of Kanivaihundi Microwatershed

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.

An area of about 199 ha (40%) has soils that are loamy soils. They are distributed in the northern and southern part of the microwatershed. Maximum area of 281 ha (56%) has soils that are clayey at the surface and are distributed in the northern, southern and eastern part of the microwatershed and a very small area of about 2 ha (<1%) has soils that are sandy soils and are distributed in the southern part of the microwatershed (Fig. 5.3).

The most productive lands (56%) 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 most productive lands (40%) are loamy soils which also have high potential for AWC, nutrient availability but have no drainage or other physical problems.

The most problem soils (<1%) with respect to surface soil texture are the sandy soils that have poor soil-water retention and availability and nutrient retention and availability, but have better rain water infiltration, less runoff and soil moisture conservation, less capillary rise and less evaporation losses. Here only short duration crops can be grown if the rainfall is normal and distributed well during crop growing period.

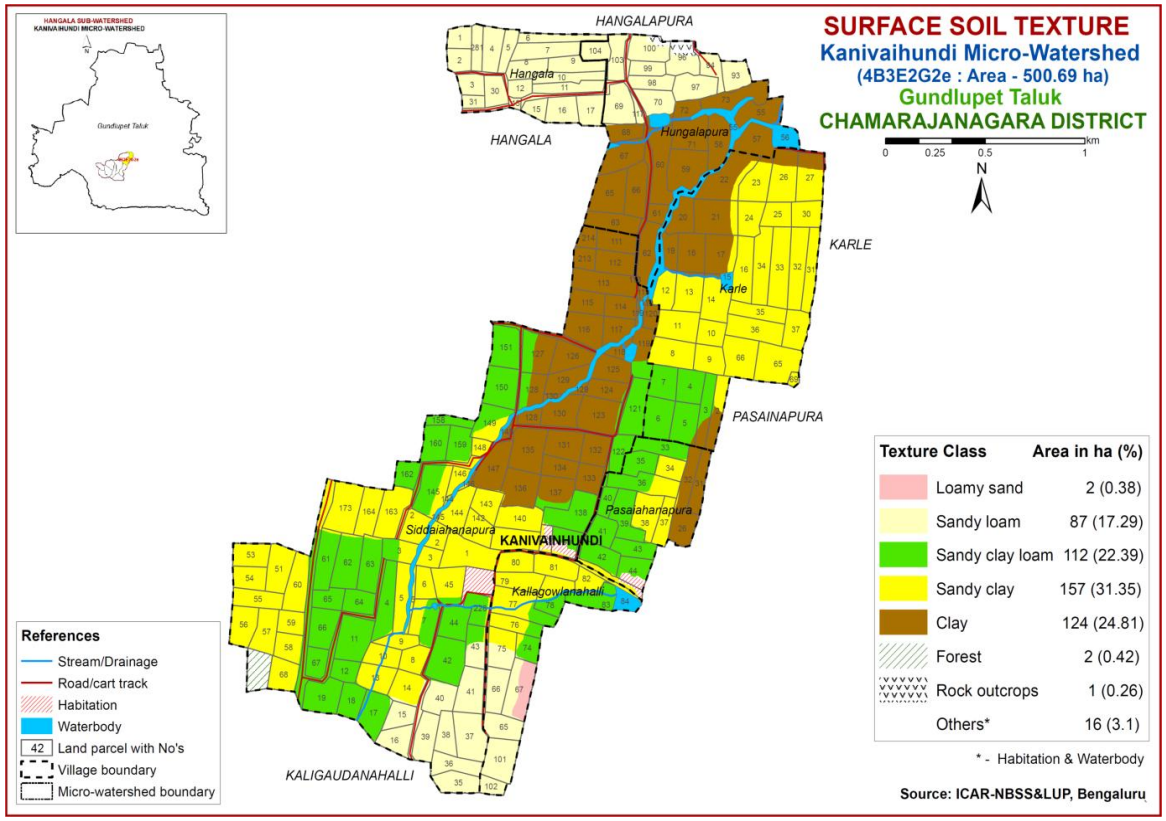


Fig. 5.3 Surface Soil Texture map of Kanivaihundi Microwatershed

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.

A small area in the microwatershed has soils that are very gravelly (35-60%) covering about 56 ha (11%) and are distributed in the northern and central part of the microwatershed, about 118 ha (24%) area of soils that are gravelly (15-35%) are distributed in the northern, southern, eastern and western part of the microwatershed. The soils that are non-gravelly (<15%) cover a maximum area of about 308 ha (61%) and are distributed in the major part of the microwatershed (Fig. 5.4)

The most productive lands with respect to gravelliness are found to be 61%. They are non-gravelly with less than 15 per cent gravel and have potential for growing both annual and perennial crops. The problem soils (11%) that are very gravelly (35-60%) where only short duration crops can be grown.

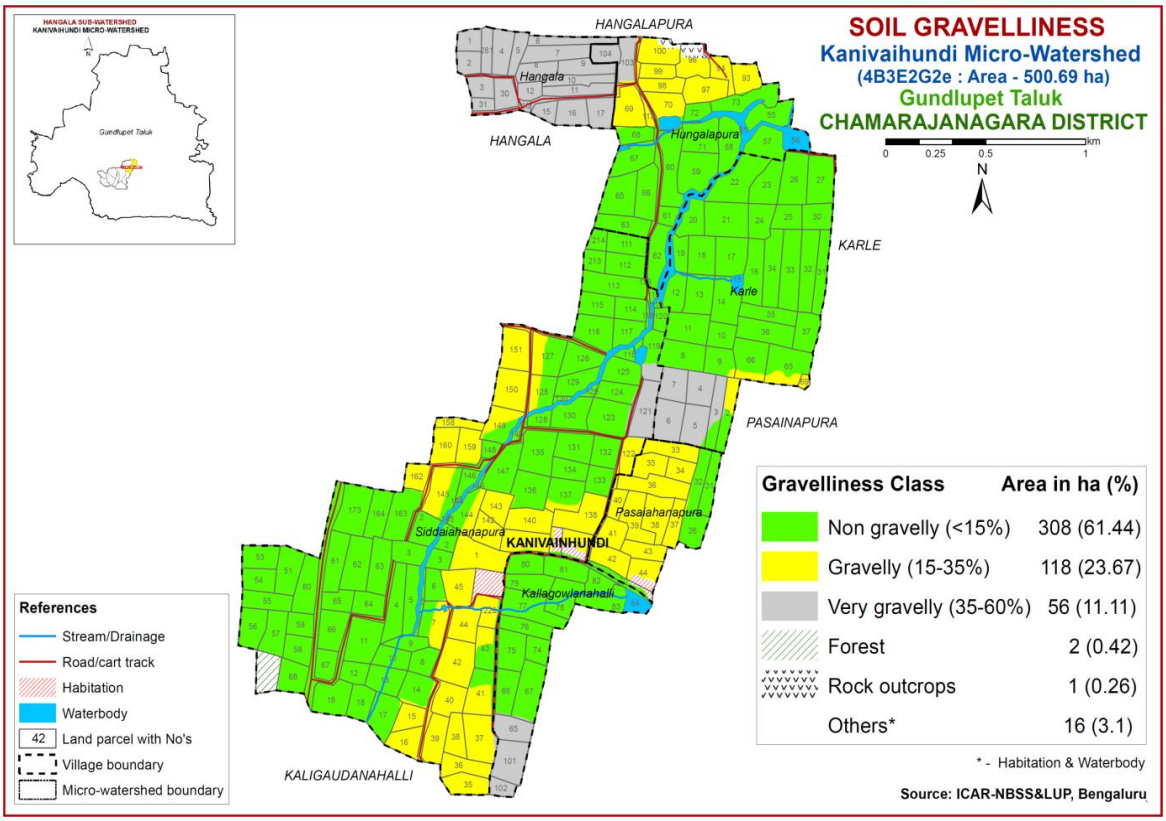


Fig. 5.4 Soil Gravelliness map of Kanivaihundi Microwatershed

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 161 ha (32%) in the microwatershed has soils that are very low (<50 mm/m) in available water capacity and are distributed in the northern, central and southern part of the microwatershed followed by an area of about 143 ha (29%) that has soils that are low (51-100 mm/m) in available water capacity and are distributed in the central, eastern and southern part of the microwatershed. Maximum area of about 177 ha (35%) is very high (>200 mm/m) in available water capacity and are distributed in the northern and northeastern part of the microwateshed.

About 161 ha (32%) area in the microwatershed has soils that are problematic with regard to available water capacity. Here, only short or medium duration crops can be grown and the probability of crop failure is very high. These areas are best put to other alternative uses. An area of about 177 ha (35%) has soils that have high potential (>200 mm/m) with regard to available water capacity where all climatically adapted long duration crops can be grown successfully.

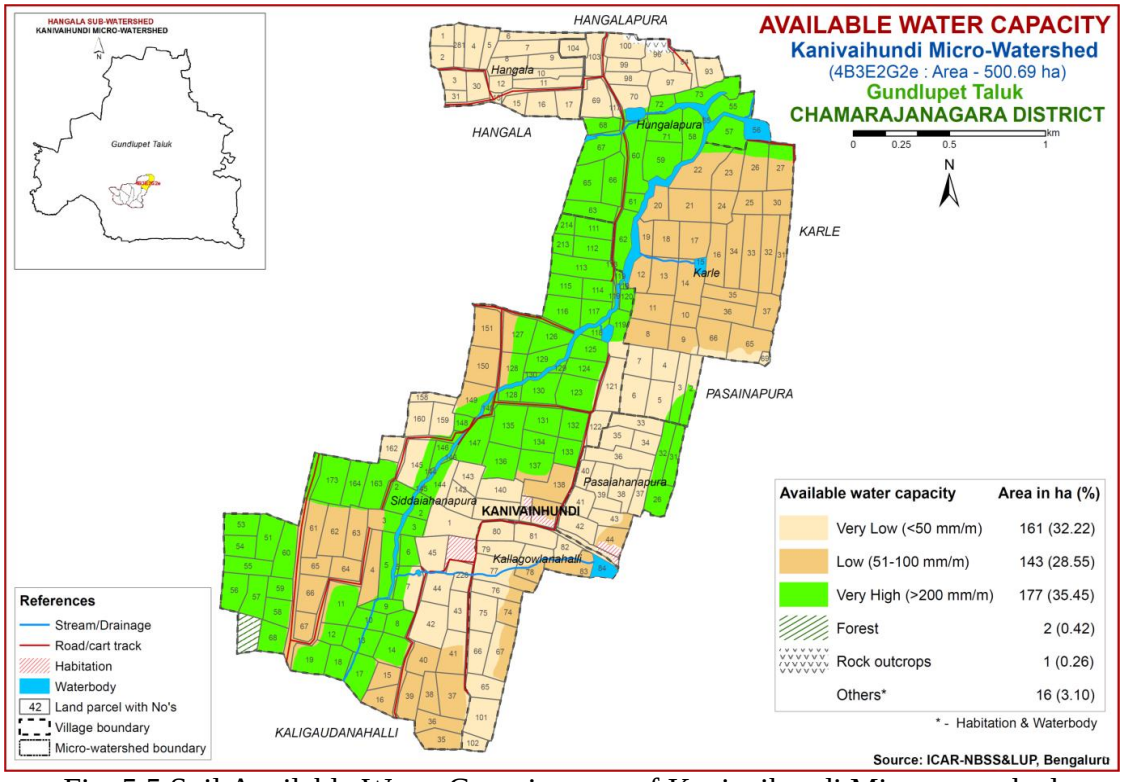


Fig. 5.5 Soil Available Water Capacity map of Kanivaihundi Microwatershed

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).

Major area of about 452 ha (90%) falls under very gently sloping (1-3% slope) lands and is distributed in all parts of the microwatershed. Nearly level (0-1% slope) lands cover a small area of about 30 ha (6%) and is distributed in the central and eastern part of the microwatershed.

Major area of about 452 ha (90%) 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.

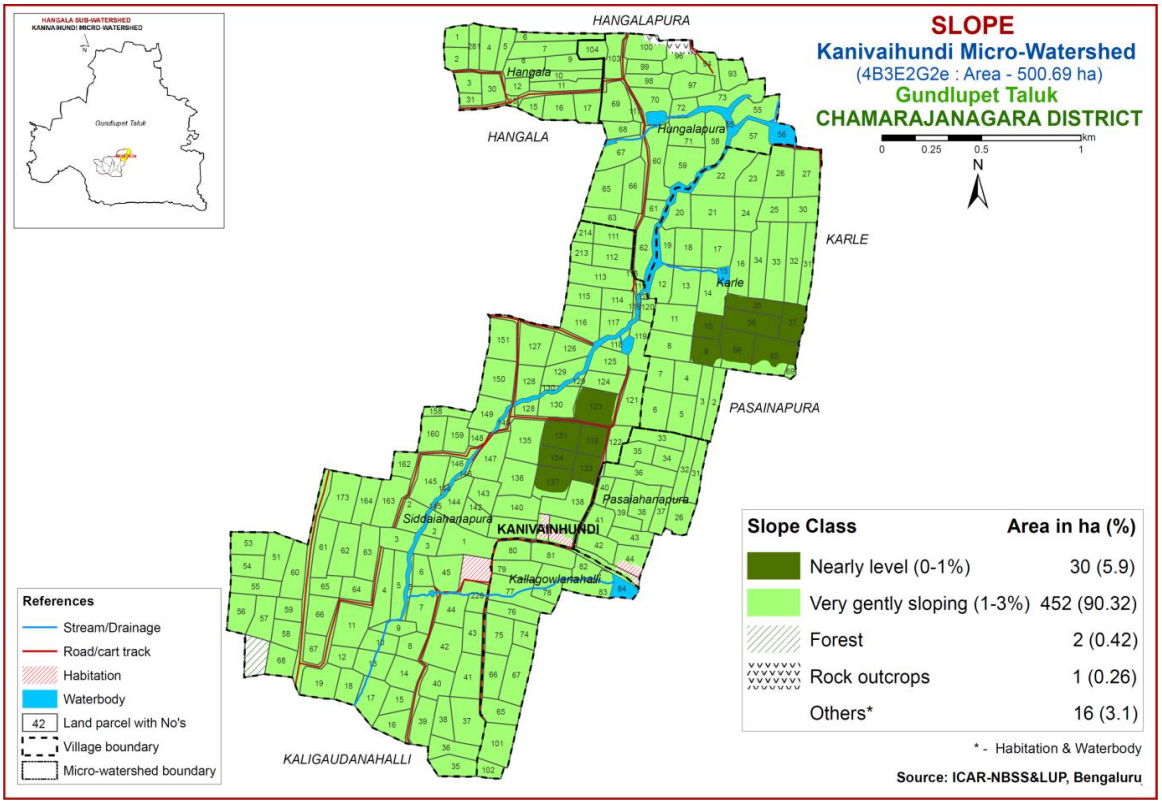


Fig. 5.6 Soil Slope map of Kanivaihundi Microwatershed

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 155 ha (31%) in the microwatershed. They are distributed in the southern, northern and central part of the microwatershed. Slightly eroded (e1 class) soils cover a maximum area of about 327 ha (65%) and are distributed in all parts of the microwatershed.

An area of about 155 ha (31%) in the microwatershed is problematic because of moderate erosion. These areas need soil and water conservation and other land development measures.

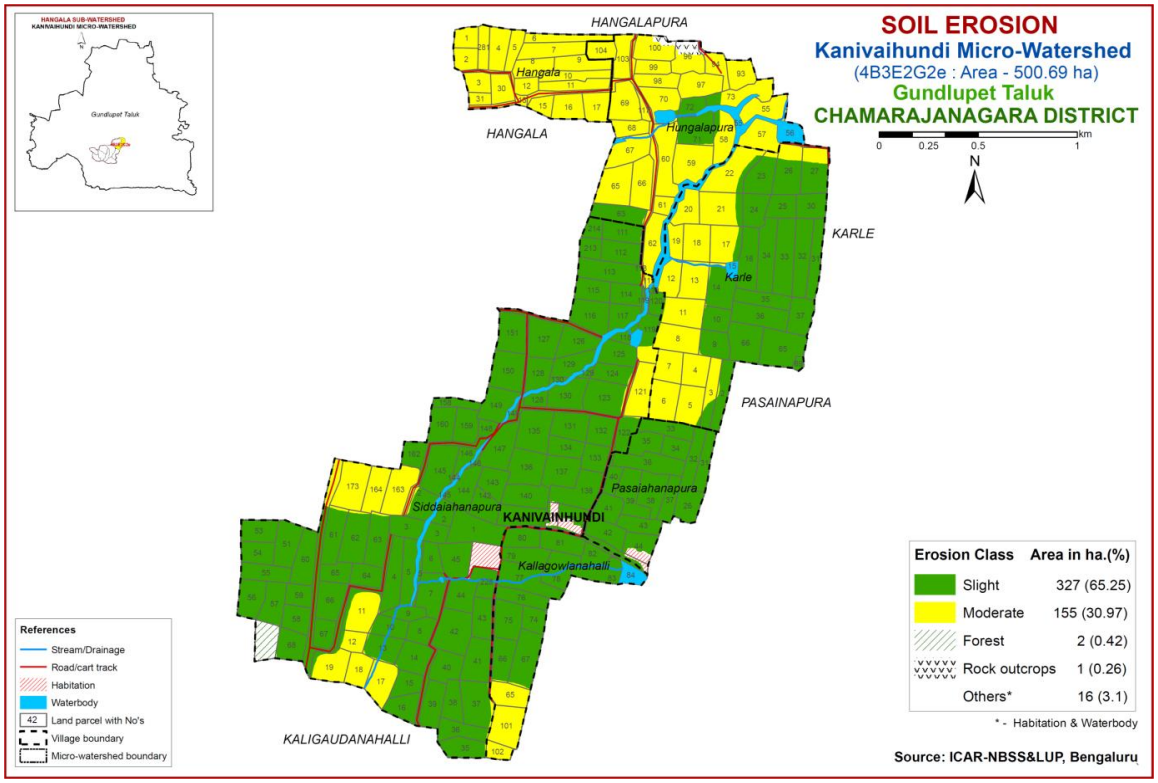


Fig. 5.7 Soil Erosion map of Kanivaihundi Microwatershed

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. 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 (84 samples) from the grid points (one soil sample at every 250 m interval) all over the microwatershed through land resource inventory in the year 2014 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 Kanivaihundi microwatershed for soil reaction (pH) showed that an area of about 41 ha (3%) is slightly alkaline (pH 7.3-7.8) and an area of about 186 ha (37%) is moderately alkaline (pH 7.8-8.4) and is distributed in the northern, southern and central part of the microwatershed. Maximum area of about 195 ha (39%) is strongly alkaline (pH 8.4-9.0) and are distributed in the northern, central and southern part of the microwatershed. A very minor area of 12 ha (2%) is moderately acid (pH 5.5-6.0) and is distributed in the southern part of the microwatershed. A very minor area of about 14 ha (3%) is slightly acid (pH 6.0-6.5) and are distributed in the northern and southern part of the microwatershed. A small area of about 35 ha (7%) is neutral (pH 6.5-7.3) and is distributed in the northern and southern part of the microwatershed.

6.2 Electrical Conductivity (EC)

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

6.3 Organic Carbon

The soil organic carbon content in the soils of the microwatershed is medium (0.5-0.75%) in a very minor area of about 3 ha (<1%) and is distributed in the northern part of the microwatershed. A maximum area of about 346 ha (69%) is high (>0.75%) in organic carbon content and is distributed in all parts of the microwatershed followed by low (<0.5%) organic carbon content in 133 ha (27%) area and are distributed in the northern and southern part of the microwatershed (Fig.6.3).

6.4 Available Phosphorus

Available phosphorus content is low (<23 kg/ha) in a very minor area about 11 ha (2%) and is distributed in the southern and western part microwatershed. Maximum area of about 404 ha (81%) is medium (23-57 kg/ha) in available phosphorus and is distributed in all parts of the microwatershed and a small area of 67 ha (13%) is high (>57 kg/ha) in available phosphorus (Fig. 6.4).

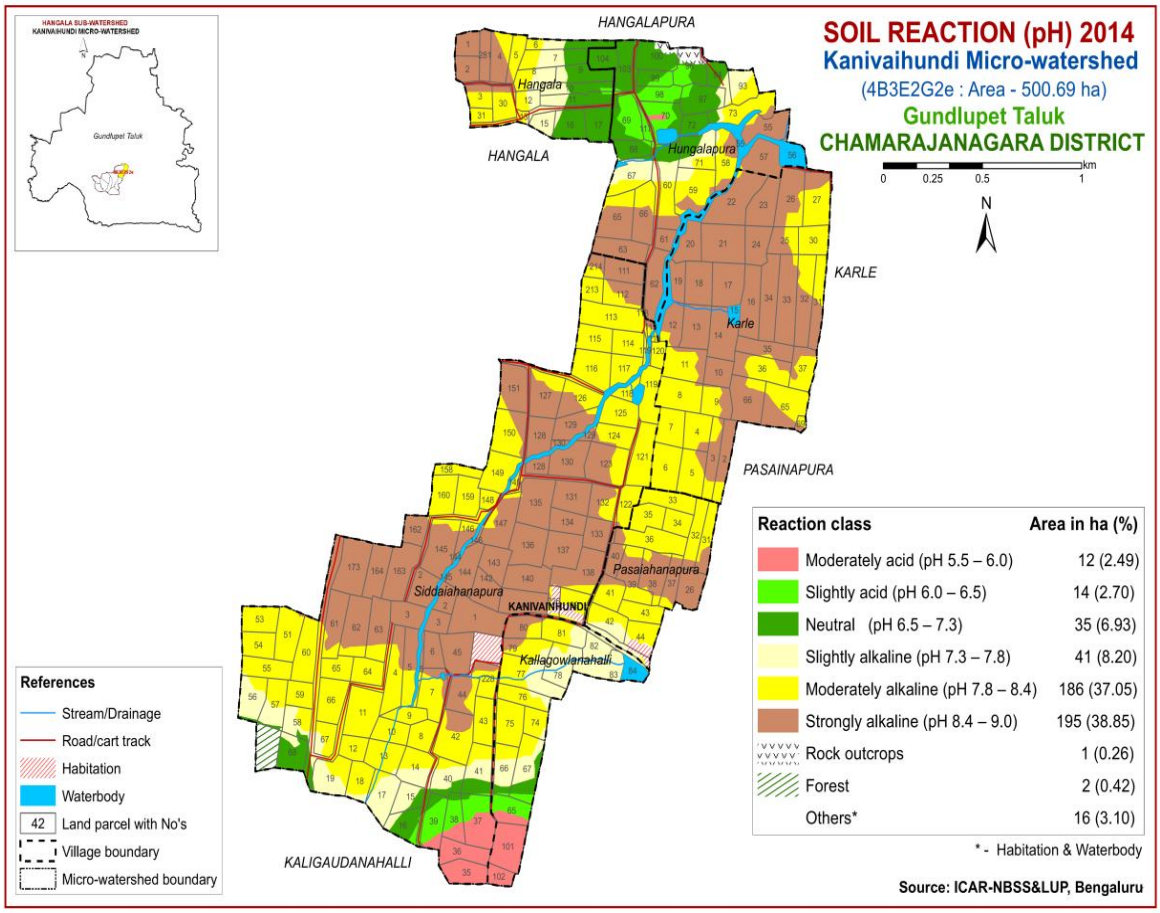


Fig.6.1 Soil Reaction (pH) map of Kanivaihundi Microwatershed

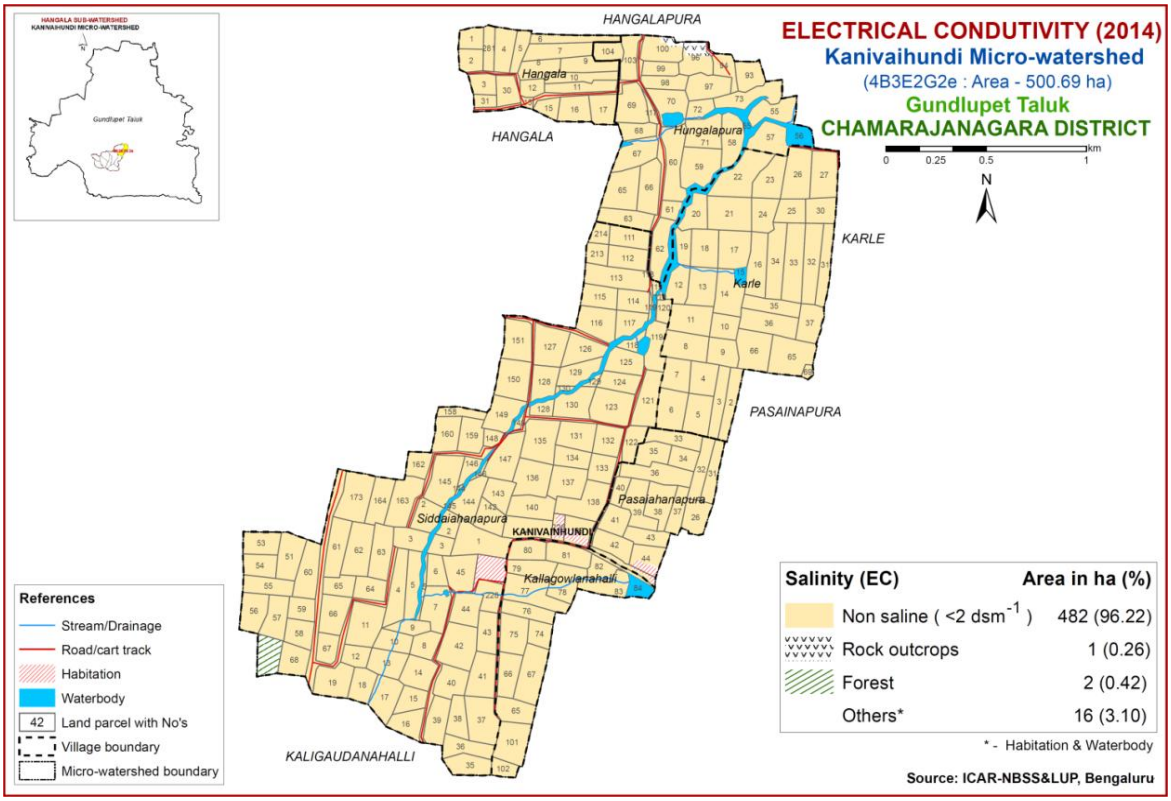


Fig.6.2 Electrical Conductivity (EC) map of Kanivaihundi Microwatershed

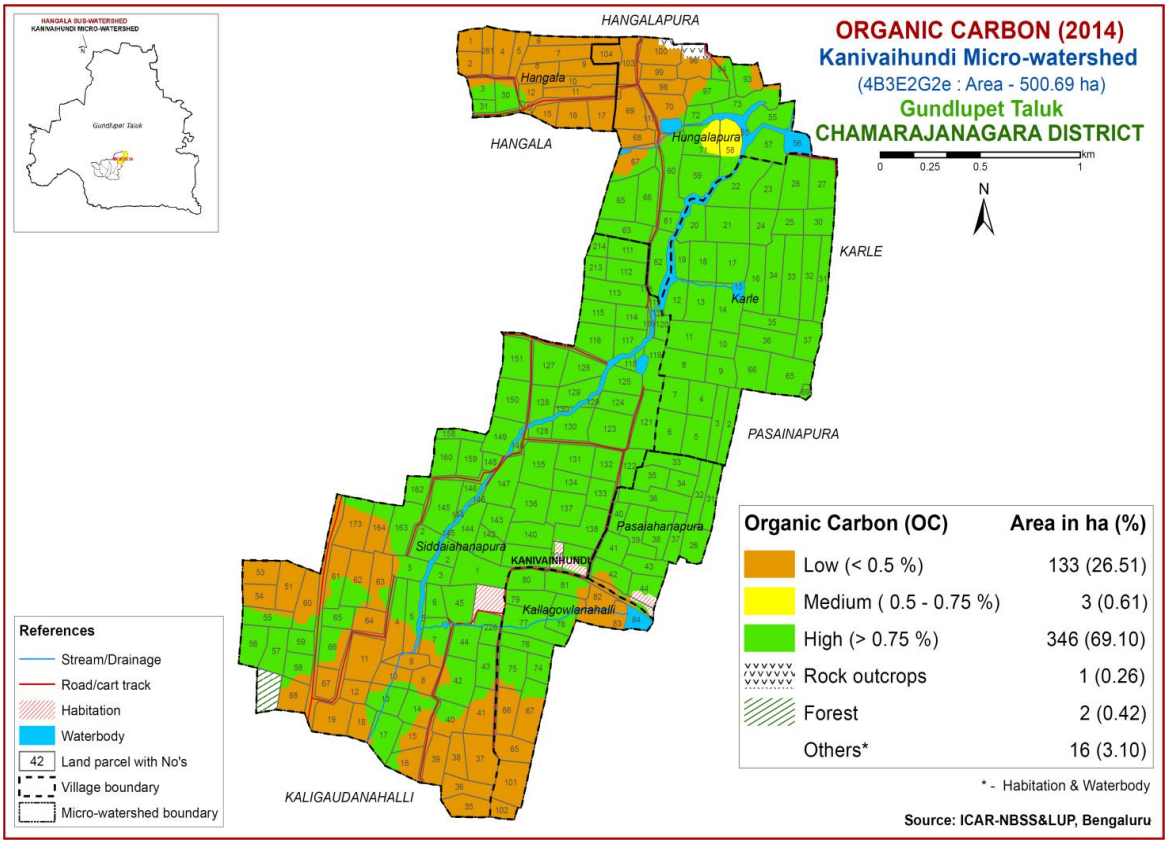


Fig.6.3 Soil Organic Carbon map of Kanivaihundi Microwatershed

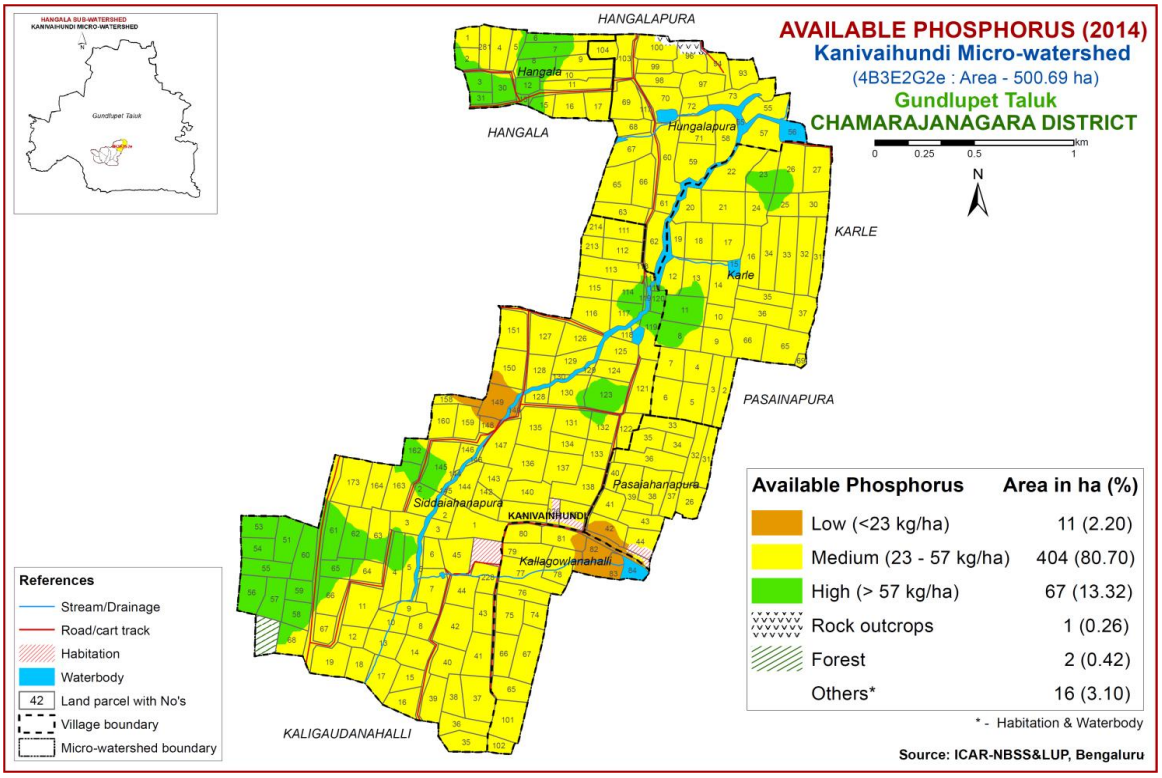


Fig.6.4 Soil Available Phosphorus map of Kanivaihundi Microwatershed

6.5 Available Potassium

Available potassium content is medium (145-337 kg/ha) in an area of about 105 ha (21%) and is distributed in the southern and northern part of the microwatershed. (Fig.6.5) It is high in available potassium (>337 kg/ ha) in an area of 352 ha (70%) and is distributed in all parts of the microwatershed and available potassium is low in a small area of 24 ha (5%) and is distributed in the northern and southern part of the microwatershed.

6.6 Available Sulphur

Available sulphur content is low (<10 ppm) in major area of 396 ha (79%) and is distributed in all parts of the microwatershed. A small area of about 81 ha (16%) is medium (10-20 ppm) in available sulphur and is distributed in the southern and northern part of the microwatershed and high in a very small area of 5 ha (1%) (Fig.6.6).

6.7 Available Boron

Available boron content is medium (0.5-1.0 ppm) in major area of 345 ha (69%) and is distributed in all parts of the microwatershed. An area of about 80 ha (16%) is low (<0.5 ppm) in available boron and is distributed in the northern and southern part of the microwatershed (Fig.6.7). Available boron is high (>1.0 ppm) in a small area of about 56 ha (11%) and is distributed in the central, northeastern and southern part of the microwatershed.

6.8 Available Iron

Available iron content is sufficient (>4.5 ppm) in an area of 96 ha (19%) and is distributed in the northern and southern part of the microwatershed. Major area of about 385 ha (77%) is deficient (<4.5 ppm) in available iron content and is distributed in all parts of the microwatershed (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 deficient (<0.6 ppm) in major area of 356 ha (71%) and are distributed in all parts of the microwatershed and 125 ha (25%) is sufficient (>0.6 ppm) in available zinc and are distributed in the northern, eastern and southern part of the microwatershed (Fig 6.11).

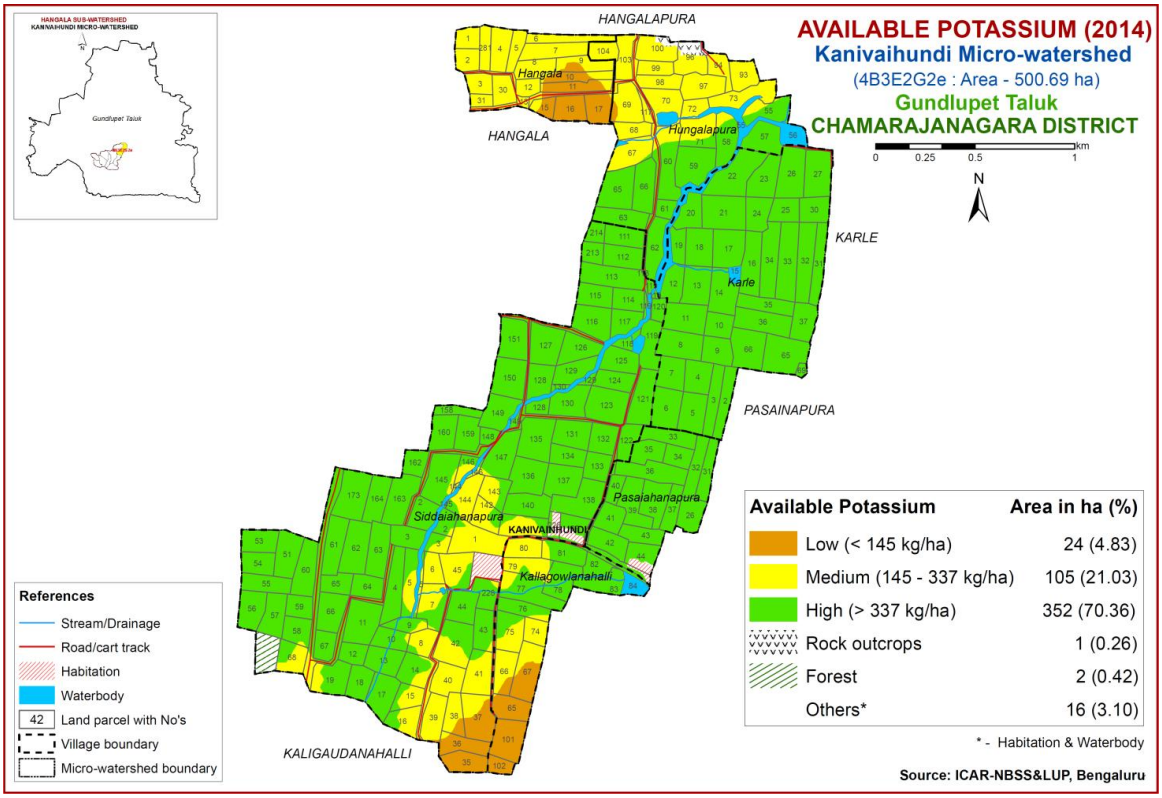


Fig.6.5 Soil Available Potassium map of Kanivaihundi Microwatershed

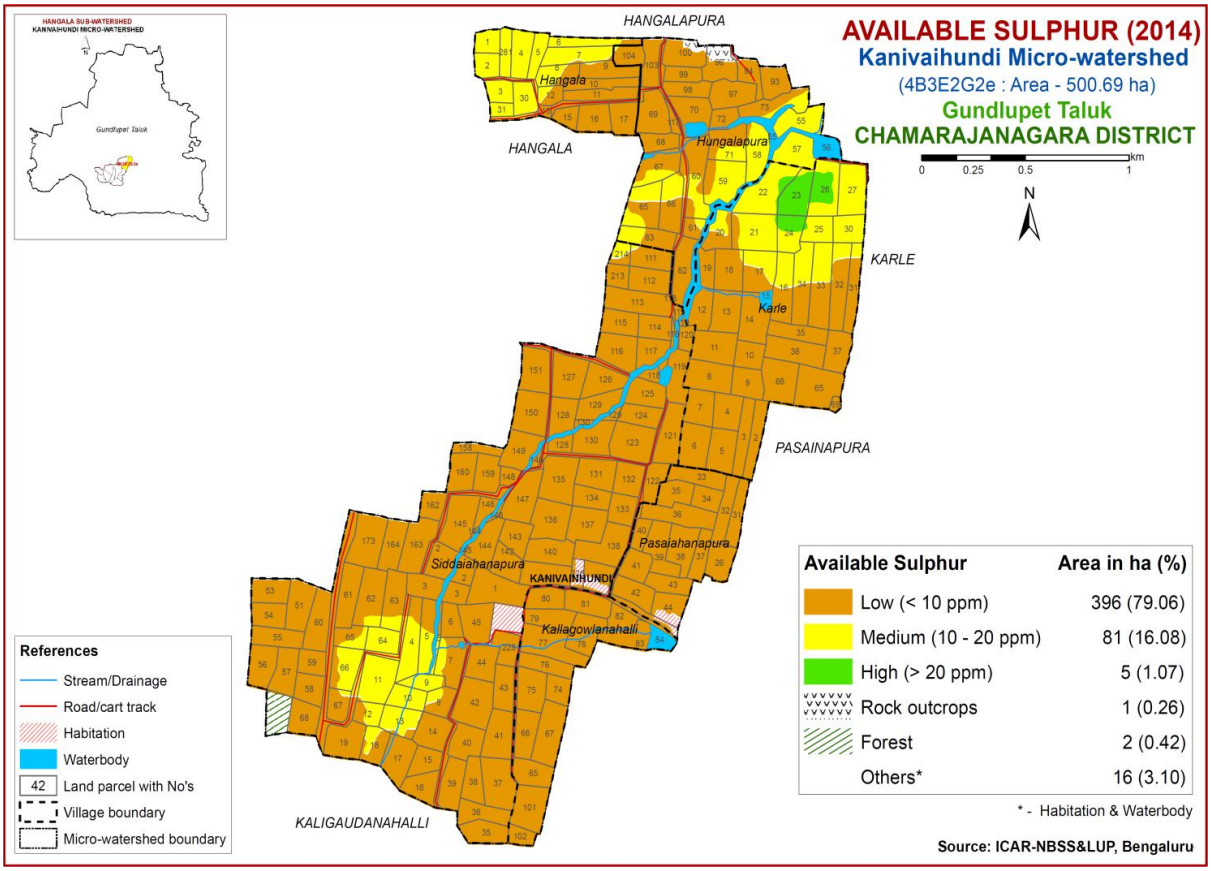


Fig.6.6 Soil Available Sulphur map of Kanivaihundi Microwatershed

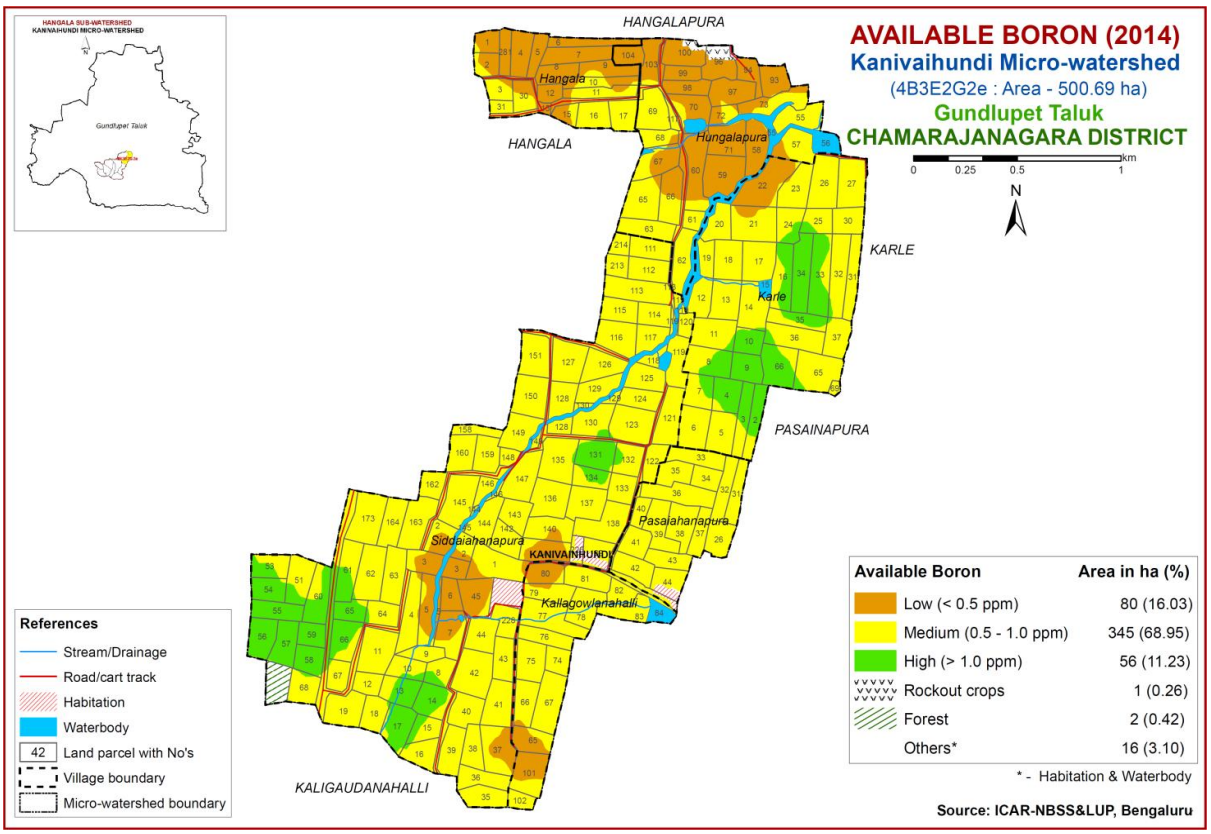


Fig.6.7 Soil Available Boron map of Kanivaihundi Microwatershed

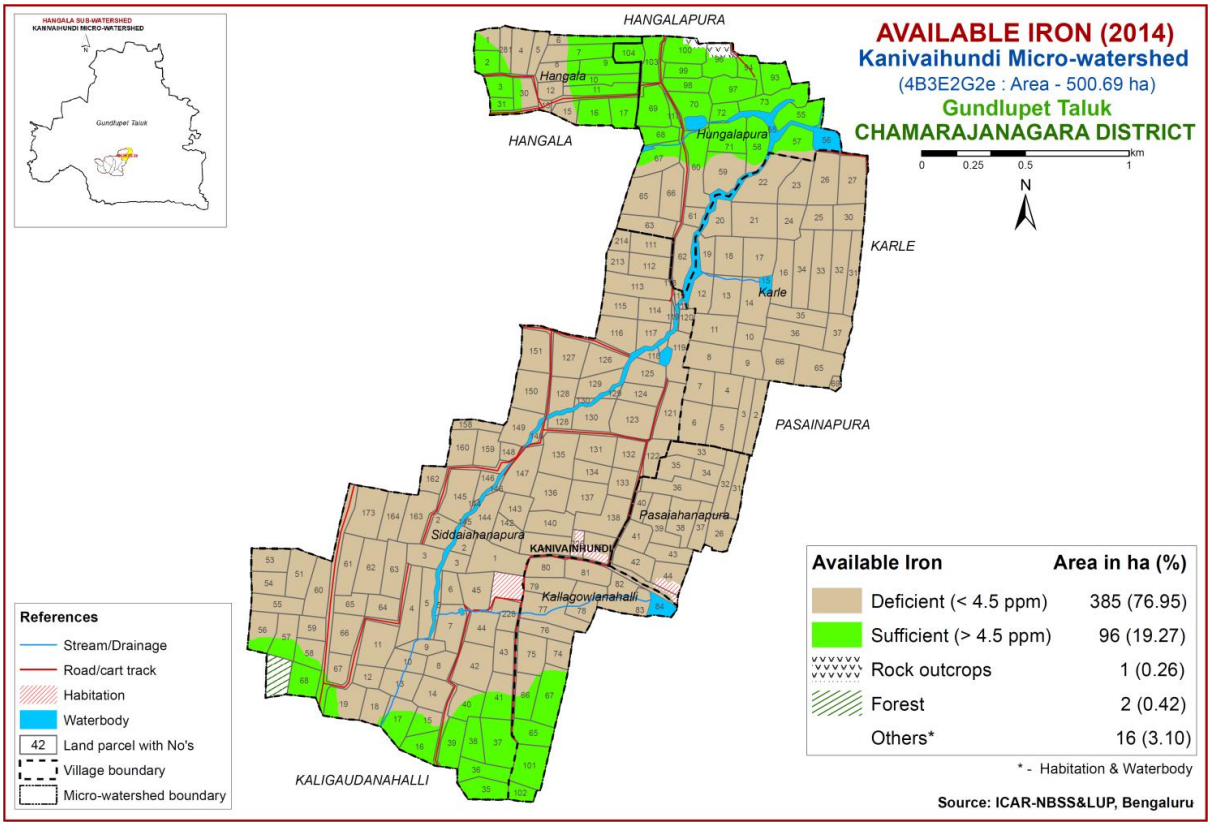


Fig.6.8 Soil Available Iron map of Kanivaihundi Microwatershed

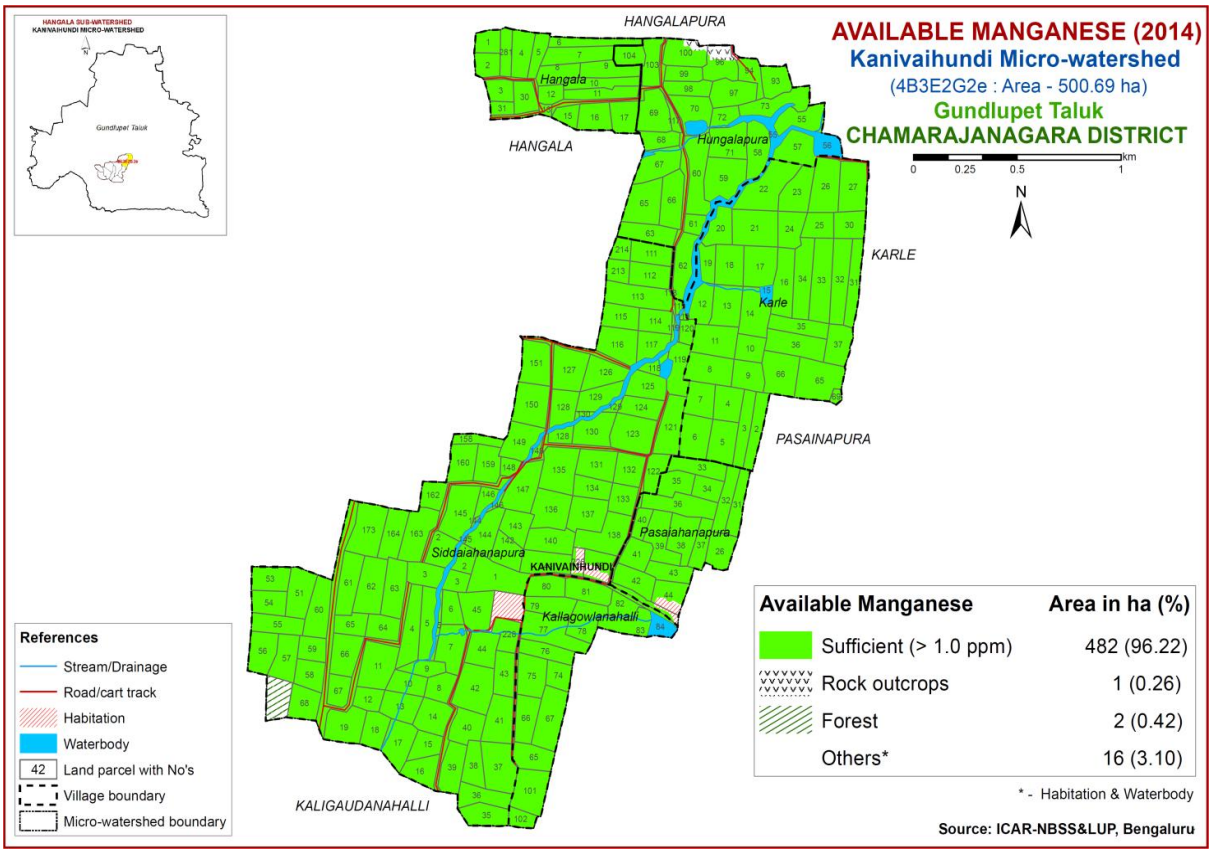


Fig.6.9 Soil Available Manganese map of Kanivaihundi Microwatershed

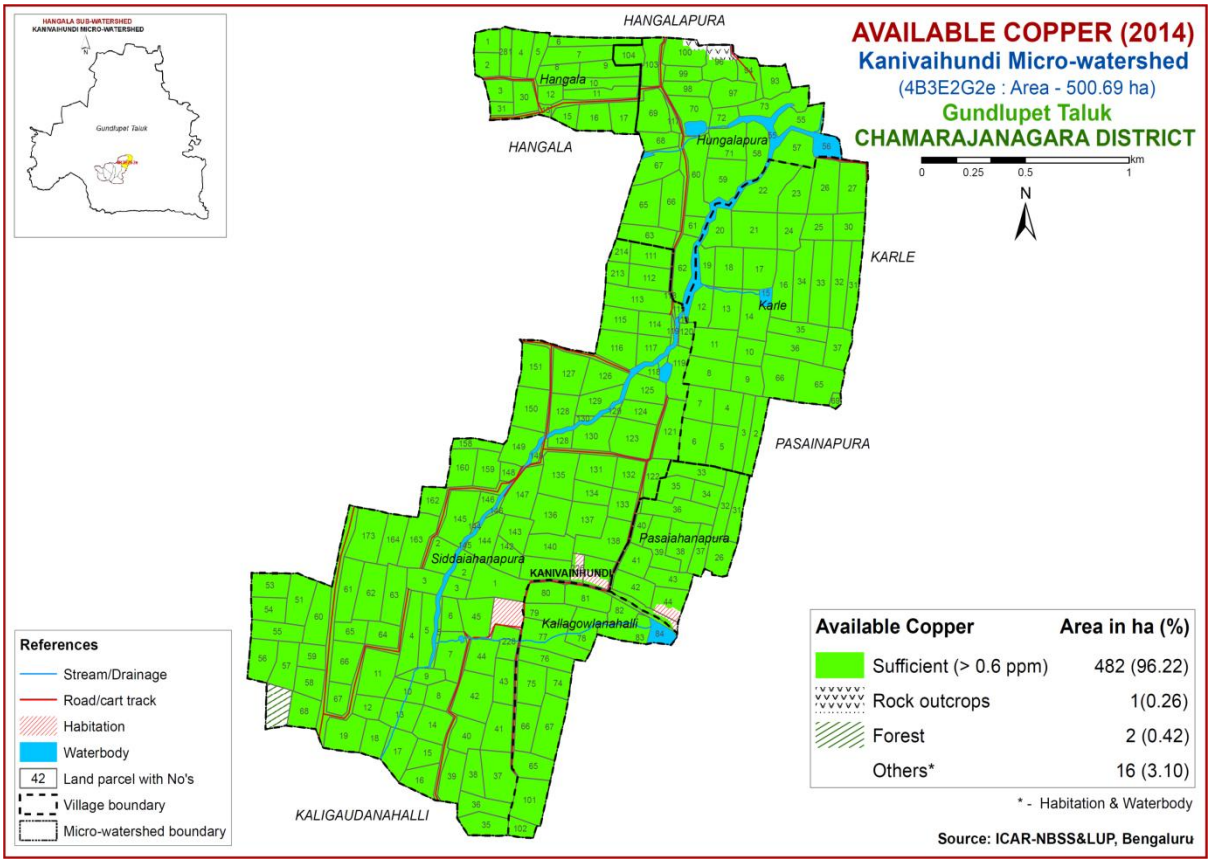


Fig.6.10 Soil Available Copper map of Kanivaihundi Microwatershed

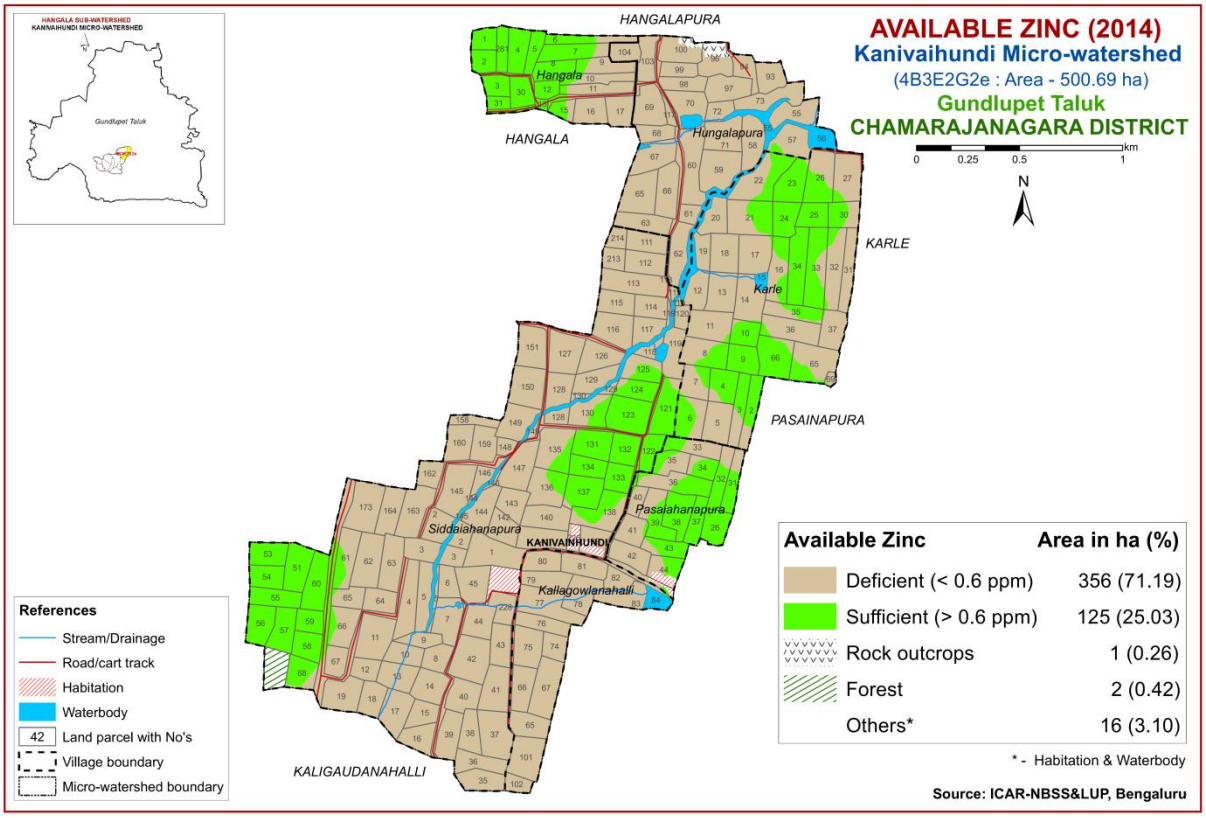


Fig.6.11 Soil Available Zinc map of Kanivaihundi Microwatershed

Chapter 7

LAND SUITABILITY FOR MAJOR CROPS

The soil and land resource units (soil phases) of Kanivaihundi 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 crop requirements were matched with the soil and land characteristics (Table 7.1) 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 and S3 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 land with the limitations of soil depth and erosion is 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 27 major annual and perennial 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 11.02 lakh ha in Bijapur, Gulbarga, Raichur, Bidar, Belgaum, Dharwad, Bellary, Chitradurga, Mysore and Chamarajnagar 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 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.

A very small area of about 83 ha (17%) is highly suitable (Class S1) for growing sorghum and are distributed in the eastern, southern, central and northern part the microwatershed. Major area of about 244 ha (49%) is moderately suitable (Class S2) for growing sorghum and are distributed in the central, northwestern, northeastern and southern part the microwatershed.

Table 7.1 Soil-Site Characteristics of Kanivaihundi Microwatershed

Soil Map Units	Climate (P) (mm)	Growing period (Days)	Drai-nage class	Soil depth (cm)	Soil texture		Gravelliness		AWC (mm/m)	Slope (%)	Erosion	p H	E C	E S P	CEC [Cmol (p^+)kg^{-1}]	BS (%)
					Surf-ace	Sub-surface	Surface (%)	Subsurface (%)								
ARKiB1	734	150	WD	>150	sc	sc-c	-	<15	100-150	1-3	Slight					
BMBmB1	734	150	MWD	>150	c	c	-	-	>200	1-3	Slight					
DRHhB1	734	150	WD	50-75	scl	scl-sc	-	15-35	51-100	1-3	Slight					
DRHhB1g1	734	150	WD	50-75	scl	scl-sc	15-35	15-35	51-100	1-3	Slight					
DRHiA1	734	150	WD	50-75	sc	scl-sc	-	15-35	51-100	0-1	Slight					
GPRcB1g1	734	150	WD	75-100	sl	scl-sc	15-35	15-35	51-100	1-3	Slight					
GPRhB1	734	150	WD	75-100	scl	scl-sc	-	15-35	51-100	1-3	Slight					
HDRhB1g1	734	150	WD	25-50	scl	scl-sc	15-35	<15	<50	1-3	Slight					
HDRiB1	734	150	WD	25-50	sc	scl-sc	-	<15	<50	1-3	Slight					
HDRiB1g1	734	150	WD	25-50	sc	scl-sc	15-35	<15	<50	1-3	Slight					
HGHhB2	734	150	WD	>150	scl	scl	-	<15	101-150	1-3	moderate					
HGHiB1	734	150	WD	>150	sc	scl	-	<15	101-150	1-3	Slight					
HGHiB2	734	150	WD	>150	sc	scl	-	<15	101-150	1-3	moderate					
HGHmA1	734	150	WD	>150	c	scl	-	<15	101-150	0-1	Slight					
HGHmB1	734	150	WD	>150	c	scl	-	<15	101-150	1-3	Slight					
HGHmB2	734	150	WD	>150	c	scl	-	<15	101-150	1-3	modearte					
HPRiB1	734	150	WD	50-75	sc	scl-sc	-	15-35	51-100	1-3	Slight					
HPRmB2	734	150	WD	50-75	c	scl-sc	-	15-35	51-100	1-3	moderate					
KLPbB1	734	150	WD	100-150	ls	scl-sc	-	15-35	101-150	1-3	Slight					
KLPiB2	734	150	WD	100-150	sc	scl-sc	-	15-35	101-150	1-3	moderate					
KNGcB2g2	734	150	WD	75-100	sl	scl-sc	35-60	>35	<50	1-3	moderate					
KNGhB2g2	734	150	WD	75-100	scl	scl-sc	35-60	>35	<50	1-3	moderate					
MDHiB1	734	150	WD	100-150	sc	sc	-	>35	51-100	1-3	slight					
MGHcB1	734	150	WD	50-75	sl	scl	-	>35	<50	1-3	slight					
MGHcB2g1	734	150	WD	50-75	sl	scl	15-35	>35	<50	1-3	slight					
MGHcB2g2	734	150	WD	50-75	sl	scl	35-60	>35	<50	1-3	moderate					
MGHhB1g1	734	150	WD	50-75	scl	scl	15-35	>35	<50	1-3	slight					
SPRiB1g1	734	150	WD	25-50	sc	scl-sc	15-35	>35	>35	1-3	slight					

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

They have minor limitations of gravelliness, texture and rooting depth. Marginally suitable lands (Class S3) for growing sorghum occupy an area of about 155 ha (31%) and occur in the northern and southern part of the microwatershed. They have moderate limitations of rooting depth and gravelliness.

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/excessive ly	V.poorly
Soil reaction	pH	6.0-8.0	5.5-5.98.1-8.5	<5.58.6-9.0	>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)	dSm^{-}_{1}	2-4	4-8	8-10	>10
Sodicity (ESP)	%	5-8	8-10	10-15	>15

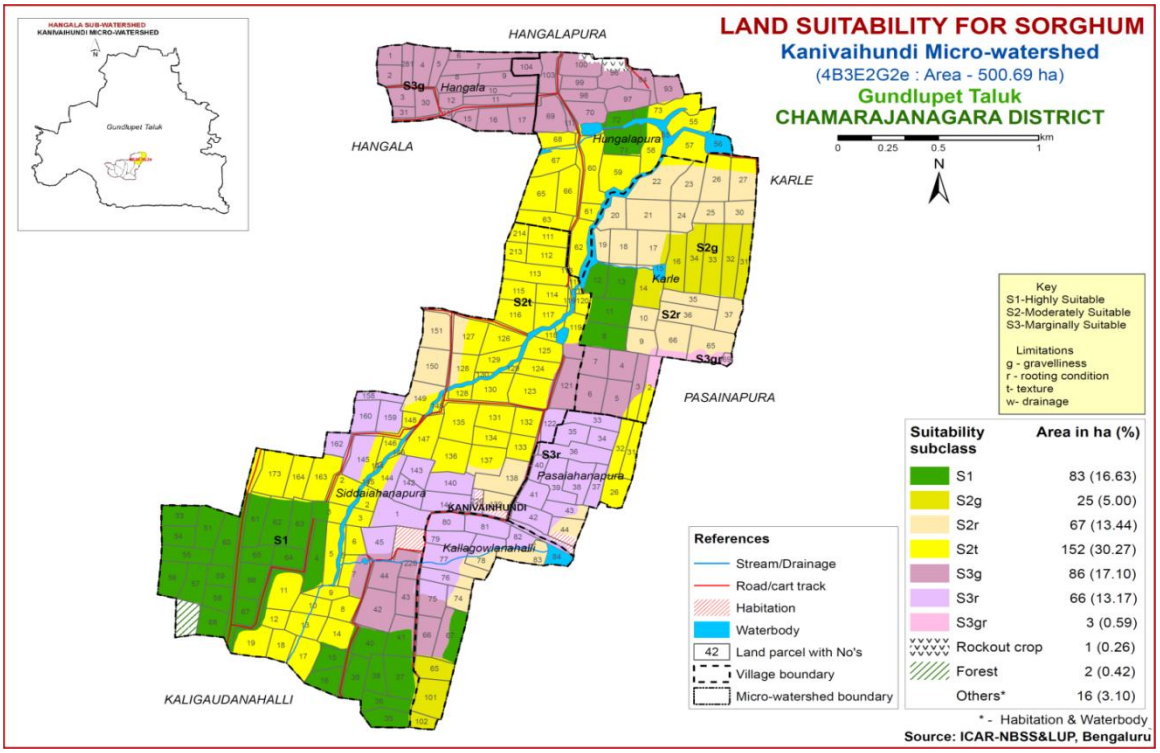


Fig. 7.1 Land Suitability map of Sorghum

7.2 Land Suitability for Maize (*Zea mays*)

Maize is the most important food crop grown in an area of 13.73 lakh ha in almost all the districts of the State. The crop requirements for growing maize (Table 7.3) 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 7.2.

Major area of about 230 ha (46%) is highly suitable (Class S1) for growing maize and are distributed in the northwestern, central and southern part of the microwatershed. A small area of about 85 ha (17%) is moderately suitable (Class S2) for growing maize and are distributed in the northeastern, southeastern and central part of the microwatershed. They have minor limitations of gravelliness and rooting depth. Marginally suitable lands (Class S3) for growing maize occupy an area of about 166 ha (33%) and occur in the northern and southeastern part of the microwatershed. They have moderate limitations of rooting depth, wetness, slope and gravelliness.

Table 7.3 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)	dSm^{-1}	<1.0	1.0-2.0	2.0-4.0	
Sodicity (ESP)	%	<10	10-15	>15	

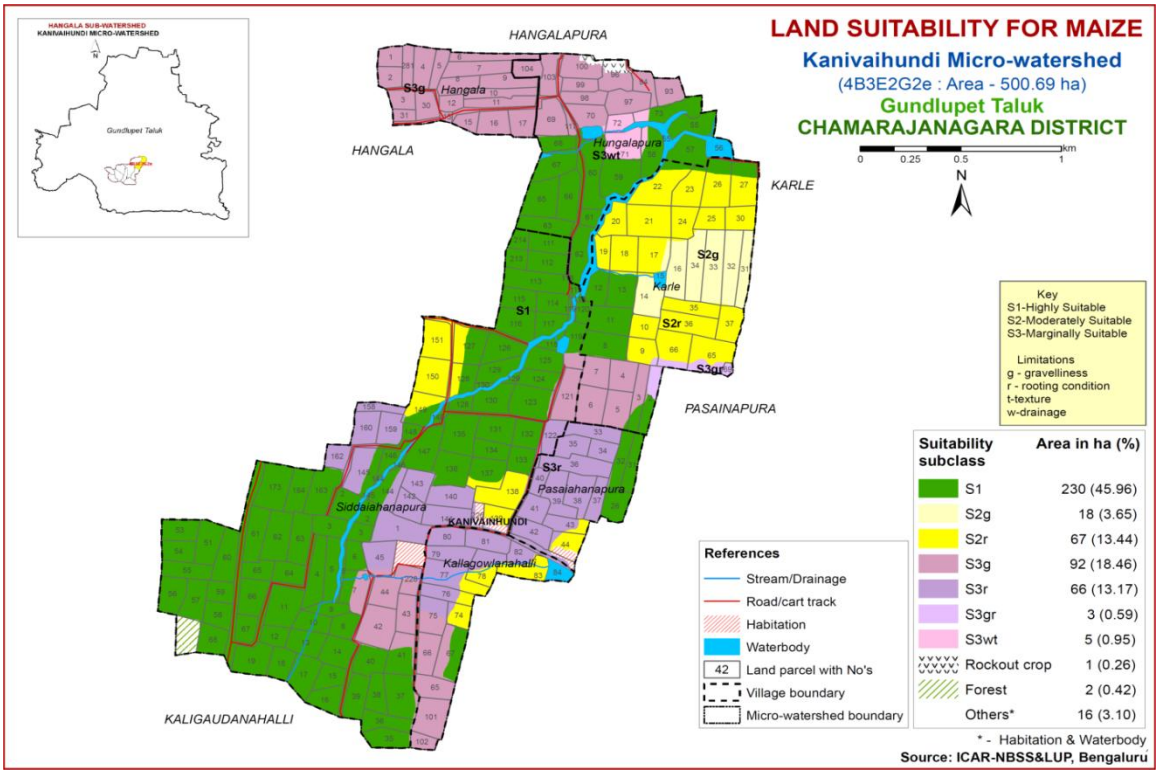


Fig. 7.2 Land Suitability map of Maize

7.3 Land Suitability for Redgram (*Cajanus cajan)*

Redgram is the most important pulse crop grown in an area of 8.23 lakh ha in almost all the districts of the State. The crop requirements for growing redgram (Table 7.4) 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 7.3.

Major area of about 230 ha (46%) is highly suitable (Class S1) for growing redgram and are distributed in the northern, southern and northwestern part of the microwatershed. An area of about 148 ha (29%) is moderately suitable (Class S2) for growing redgram and are distributed in the northern and central part the microwatershed. They have minor limitations of gravelliness and wetness. Marginally suitable lands (Class S3) for growing redgram occupy a small area of about 35 ha (7%) and occur in the northeastern and southern part of the microwatershed. They have moderate limitations of rooting depth and gravelliness. An area of about 69 ha (14%) is not suitable for growing redgram and occur in the southern part of the microwatershed. They have severe limitations of rooting depth and gravelliness.

Table 7.4 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)	dsm^{-1}	<1.0	1.0-2.0	>2.0	
Sodicity (ESP)	%	<10	10-15	>15	

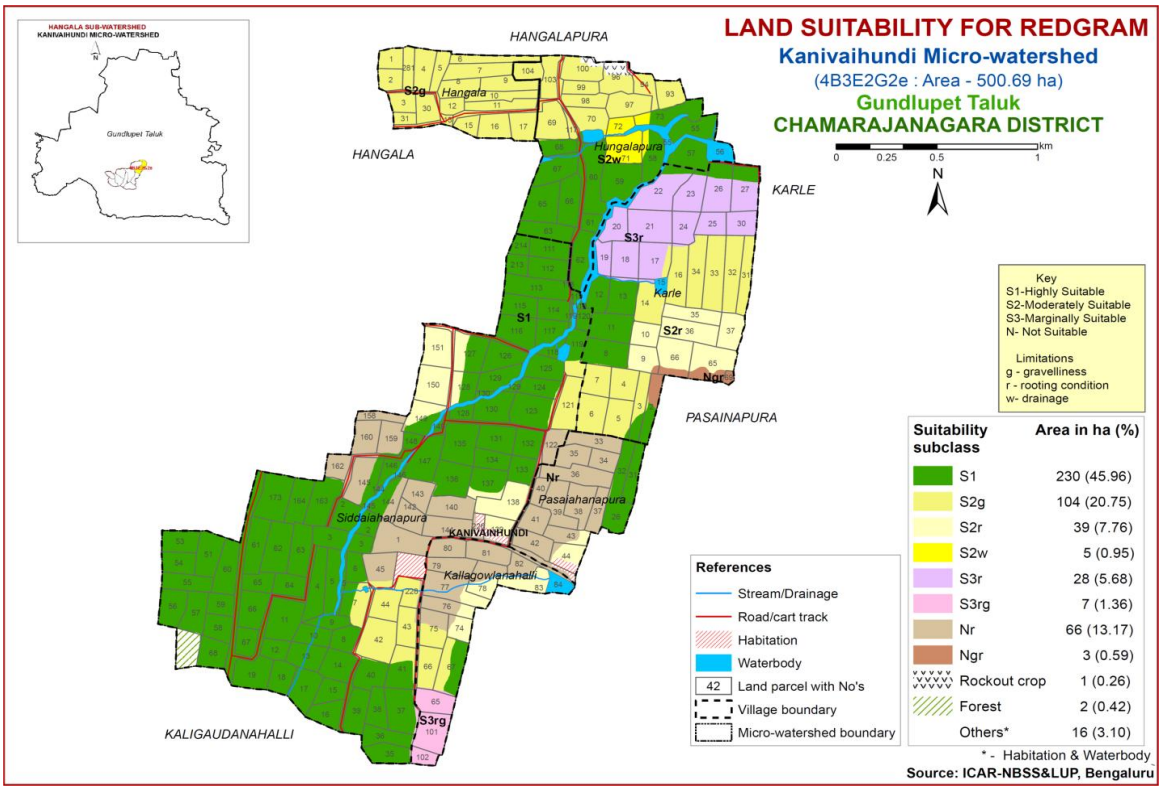


Fig. 7.3 Land Suitability map of Redgram

7.4 Land suitability for Horsegram (*Macrotyloma uniflorum*)

Horsegram is the most important pulse crop grown in an area of 1.8 lakh ha in almost all the districts of the State. The crop requirements for growing horsegram (Table 7.5) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing horsegram was generated and the area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.4.

Major area of about 230 ha (46%) is highly suitable (Class S1) for growing horsegram and are distributed in the northwestern, central and southern part of the microwatershed. An area of about 183 ha (37%) is moderately suitable (Class S2) for growing horsegram and are distributed in the northern, eastern and southern part of the microwatershed. They have minor limitations of gravelliness, rooting depth and wetness. Marginally suitable lands (Class S3) for growing horsegram occupy small area of about 69 ha (14%) and occur in the southern part of the microwatershed. They have moderate limitations of rooting depth and gravelliness.

Table 7.5 Land suitability criteria for Horsegram

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)	dsm^{-1}	<1.0	1.0-2.0	>2.0	
Sodicity (ESP)	%	<10	10-15	>15	-

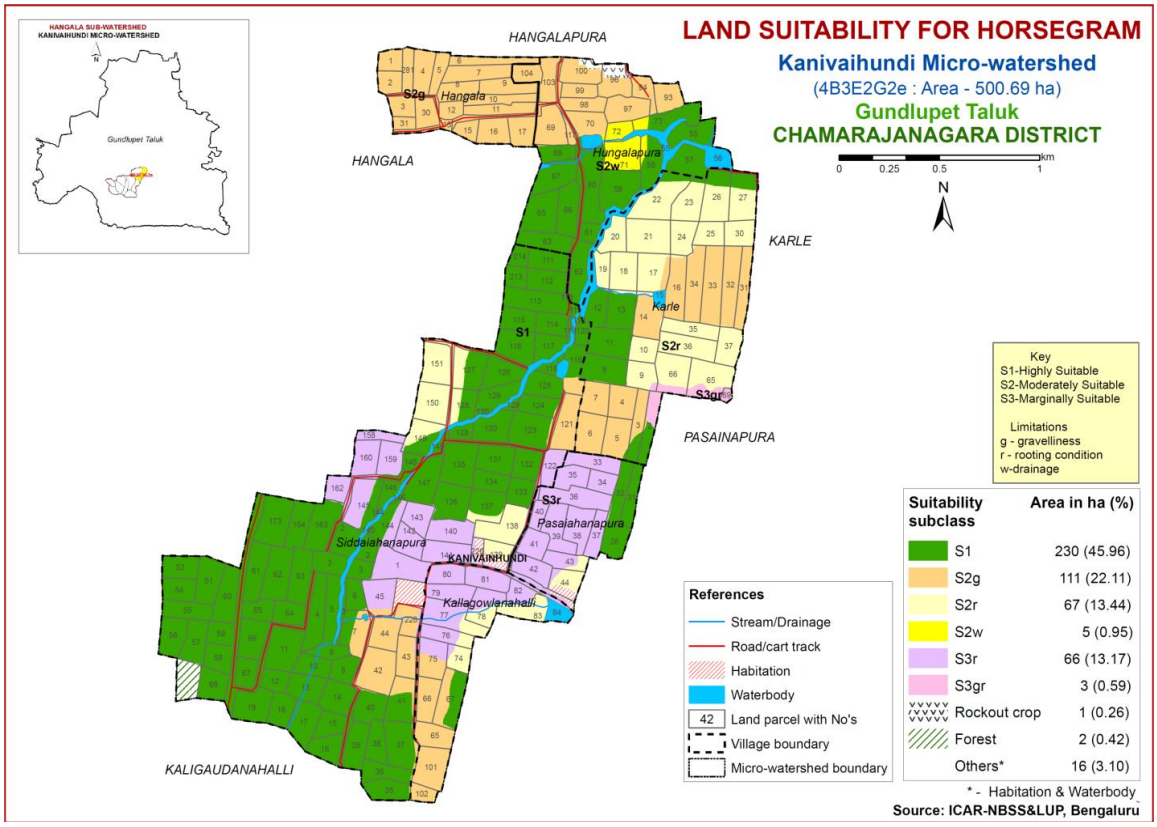


Fig. 7.4 Land Suitability map of Horsegram

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

Field Bean is 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 7.6) 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 Figure 7.5.

Maximum area of about 173 ha (35%) is highly suitable (Class S1) for growing field bean and are distributed in the northwestern, central and southern part the microwatershed followed by an area of about 170 ha (34%) is moderately suitable (Class S2) for growing field bean and are distributed in the northeastern, southern and central part of the microwatershed. They have minor limitations of gravelliness, rooting depth and wetness. Marginally suitable lands (Class S3) for growing field bean occupy an area of about 139 ha (28%) and occur in the northern and southern part of the microwatershed. They have moderate limitations of rooting depth and gravelliness.

Table 7.6 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. 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
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)	dsm^{-1}	<1.0	1.0-2.0	>2.0	
Sodicity (ESP)	%	<10	10-15	15-20	>20

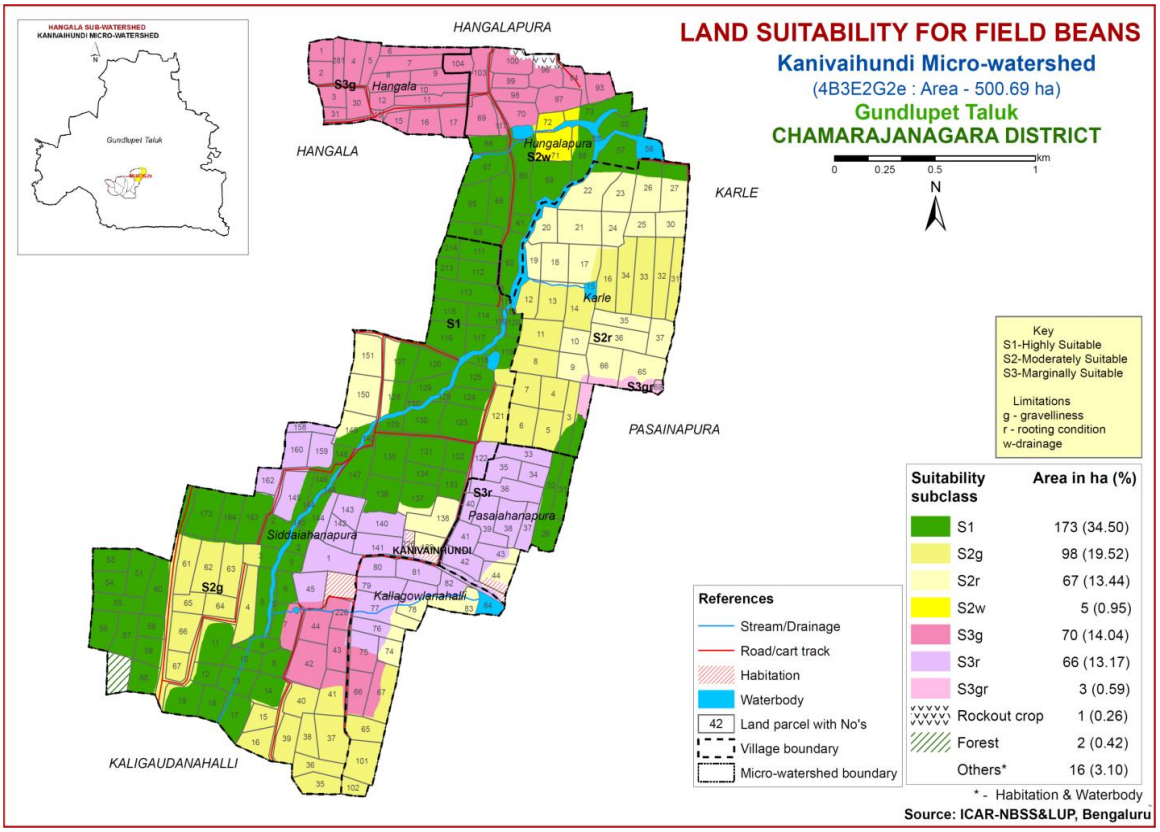


Fig. 7.5 Land Suitability map of Field bean

7.6 Land Suitability for Groundnut (*Arachis hypogaea*)

Groundnut is one of the major oilseed crop grown in an area of 6.5 lakh ha in Karnataka in most of the districts either as rainfed or irrigated crop. The crop requirements for growing groundnut (Table 7.7) were matched with the soil-site characteristics (Table 7.1) of the soils of the microwatershed and 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 7.6.

A small area of 46 ha (9%) is highly suitable (Class S1) for growing groundnut and are distributed in the southern part of the microwatershed. maximum area of about 277 ha (55%) is moderately suitable (Class S2) for groundnut and are distributed in the northwestern, northeastern, central and southern part of the microwatershed. They have minor limitations of rooting depth, gravelliness and texture. Marginally suitable lands (Class S3) for growing groundnut occupy an area of about 160 ha (32%) and are distributed in the northern, southern and eastern part of the microwatershed. They have moderate limitations of rooting depth, gravelliness, wetness and texture.

Table 7.7 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)	dSm^{-1}	<2.0	2.0-4.0	4.0-8.0	
Sodicity (ESP)	%	<5	5-10	>10	

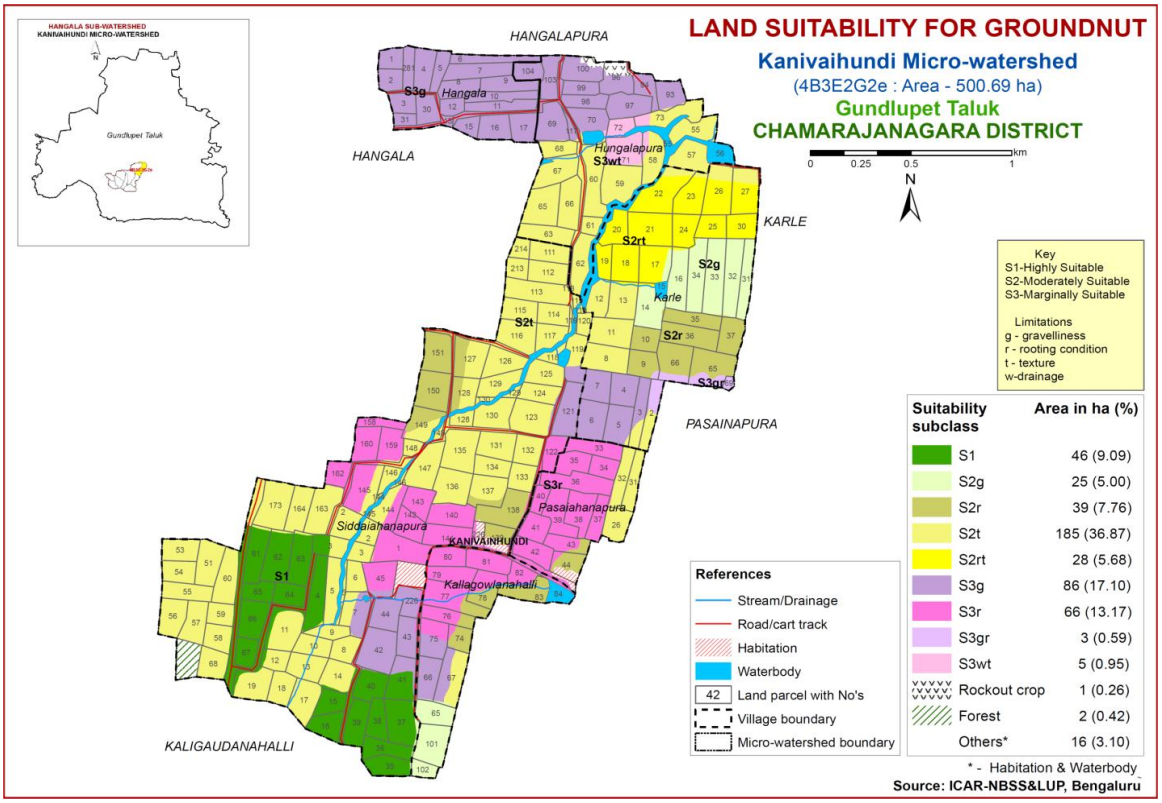


Fig. 7.6 Land Suitability map of Groundnut

7.7 Land Suitability for Sunflower (*Helianthus annus*)

Sunflower is the most important oilseed crop grown in an area of 4.1 lakh ha in the State in all the districts. The crop requirements for growing sunflower (Table 7.8) 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 7.7.

A very small area of about 21 ha (4%) is highly suitable (Class S1) for growing sunflower and are distributed in the southern part of the microwatershed. Moderately suitable (Class S2) lands for growing sunflower are found to occur in a maximum area of about 221 ha (44%). They have minor limitations of texture, gravelliness and wetness and are distributed in the northwestern, central and southern part of the microwatershed. The marginally suitable (Class S3) lands cover an area of about 171 ha (34%) and occur in the northern, northeastern and southern part of the microwatershed. They have moderate limitations of gravelliness and rooting depth. An area of about 69 ha (14%) is not suitable for growing sunflower and occur in the southern part of the microwatershed. They have very severe limitations of gravelliness and rooting depth.

Table 7.8 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	

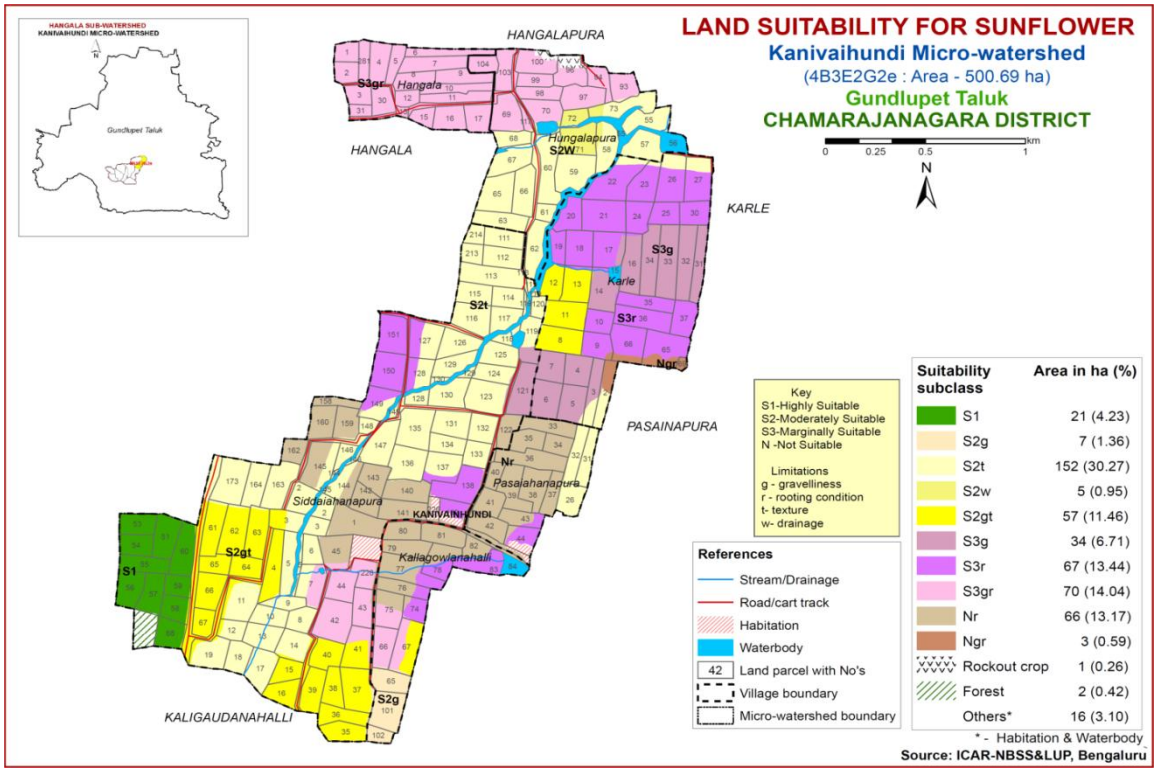


Fig. 7.7 Land Suitability map of Sunflower

7.8 Land Suitability for Cotton (*Gossypium hirsutum*)

Cotton is the most important fibre crop grown in the State in about 6.6 lakh ha area in Raichur, Dharwad, Belgaum, Gulbarga, Bijapur, Bidar, Bellary, Chitradurga and Chamarajnagar districts. The crop requirements for growing cotton (Table 7.9) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing cotton was generated and the area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.8.

A very small area of about 26 ha (5%) has soils that are highly suitable (Class S1) and are distributed in the northern and eastern part of the microwatershed. An area of about 149 ha (30%) has soils that are moderately suitable (Class S2) for growing cotton with minor limitations of gravelliness, texture and rooting depth. They are distributed in the northeastern, central and southern part of the microwatershed. The marginally suitable (Class S3) lands cover a maximum area of about 307 ha (61%) and occur in major part of the microwatershed. They have moderate limitations of gravelliness, texture and rooting depth.

Table 7.9 Crop suitability criteria for Cotton

Crop requirement		Rating			
Soil–site characteristics	**Unit**	**Highly suitable (S1)**	**Moderately Suitable (S2)**	**Marginally suitable (S3)**	**Not suitable (N)**
Slope	%	1-2	2-3	3-5	>5
LGP	Days	180-240	120-180	<120	
Soil drainage	class	Well to moderately well	Imperfectly drained	Poor somewhat excessive	Stagnant/ Excessive
Soil reaction	pH	6.5-7.5	7.6-8.0	8.1-9.0	>9.0>6.5
Surface soil texture	Class	Sic, c	Sicl, cl	Si, sil, sc, scl, l	Sl, s,ls
Soil depth	Cm	100-150	60-100	30-60	<30
Gravel content	% vol.	<5	5-10	10-15	15-35
$CaCO_3$ in root zone	%	<3	3-5	5-10	10-20
Salinity (EC)	dSm^{-1}	2-4	4.0-8.0	8.0-12	>12
Sodicity (ESP)	%	5-10	10-20	20-30	>30

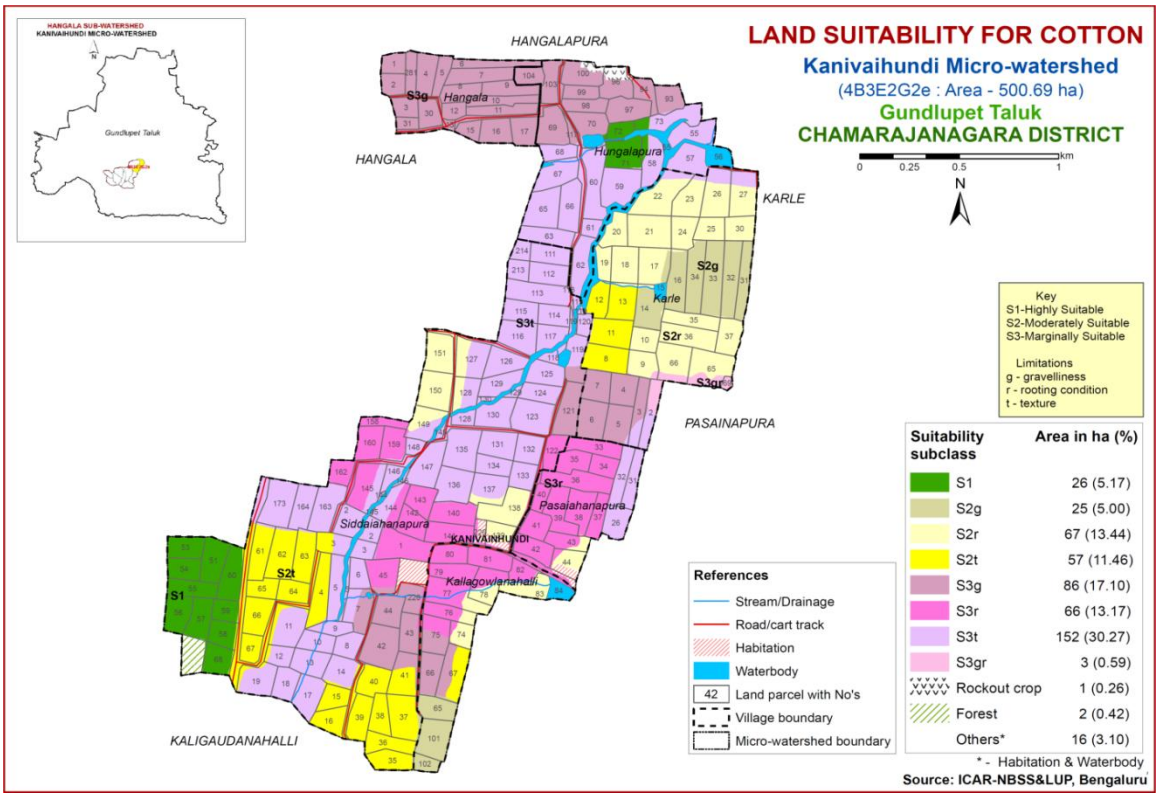


Fig. 7.8 Land Suitability map of Cotton

7.9 Land Suitability for Onion (*Allium cepa*)

Onion is the most important vegetable crop grown in Raichur, Dharwad, Belgaum, Gulbarga, Bijapur, Bidar, Bellary, Chitradurga and Chamarajnagar districts. The crop requirements for growing Onion (Table 7.10) 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 is given in Figure 7.9.

Maximum area of about 173 ha (35%) has soils that are highly suitable (Class S1) and are distributed in the northwestern, central and southern part of the microwatershed. An area of about 154 ha (30%) has soils that are moderately suitable (Class S2) for growing onion with minor limitations of gravelliness, wetness, texture and rooting depth. They are distributed in northeastern, central and southern part of the microwatershed. The marginally suitable (Class S3) lands cover an area of about 157 ha (31%) and occur in the northern and southeastern part of the microwatershed. They have moderate limitations of rooting depth and gravelliness.

Table 7.10 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)	dsm^{-1}	<1.0	1.0-2.0	2.0-4.0	<4
Sodicity (ESP)	%	<5	5-10	10-15	>15

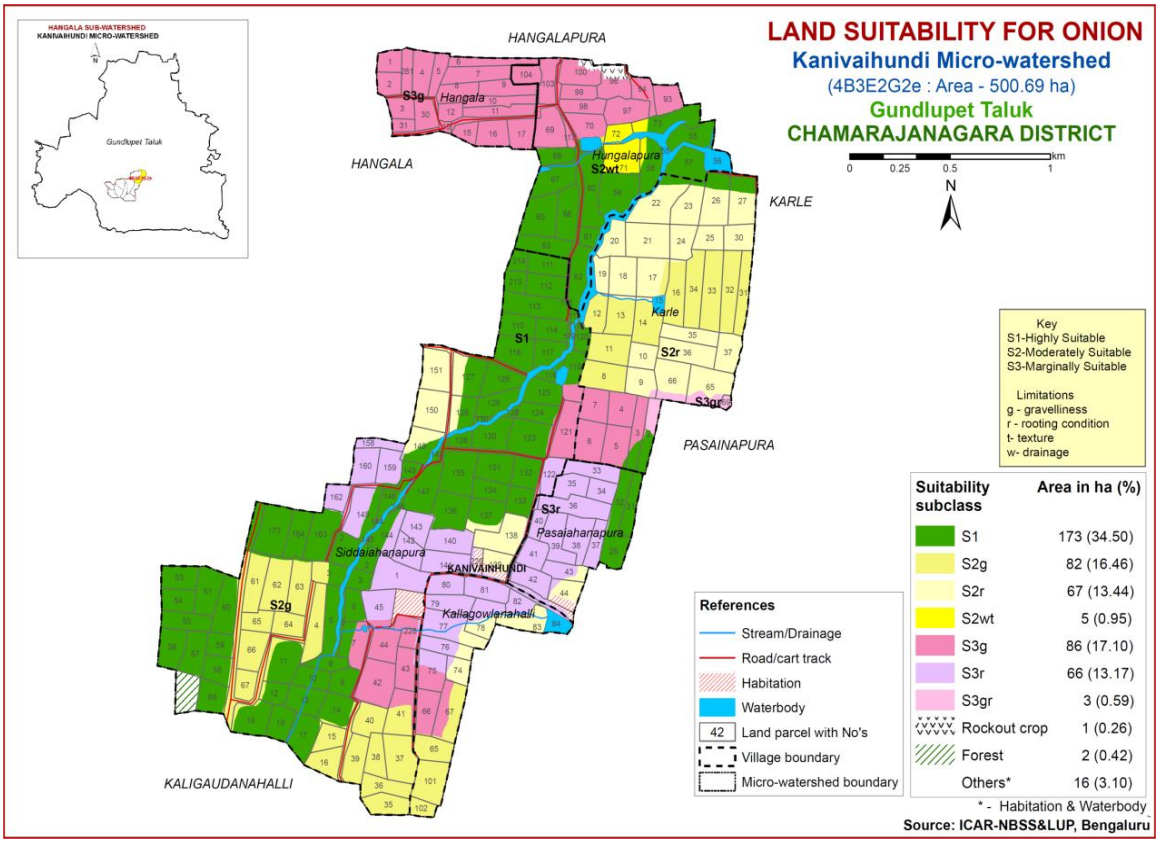


Fig. 7.9 Land Suitability map of Onion

7.10 Land Suitability for Potato (*Solanun tuberosum)*

Potato is the most important vegetable crop grown in Raichur, Dharwad, Belgaum, Gulbarga, Bijapur, Bidar, Bellary, Chitradurga, Chikkaballapura, Kolar and Chamarajnagar districts. The crop requirements for growing potato (Table 7.11) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing potato was generated and the area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.10.

Major area of about 173 ha (35%) has soils that are highly suitable (Class S1) and are distributed in the northeastern, central and southern part of the microwatershed. An area of about 149 ha (30%) has soils that are moderately suitable (Class S2) for growing potato with minor limitations of gravelliness and rooting depth. They are distributed in the northeastern, central and southern part of the microwatershed. The marginally suitable (Class S3) lands cover an area of about 160 ha (32%) and occur in the northern and southeastern part of the microwatershed. They have moderate limitations of rooting depth, texture, wetness and gravelliness.

Table 7.11 Land suitability criteria for Potato

Crop requirement			Rating			
Soil –site characteristics		Unit	Highly suitable (S1)	Moderately Suitable (S2)	Marginally suitable (S3)	Not suitable (N)
Slope	Hills	%	<5	5-10	10-15	>15
	Plains	%	<3	3-5	5-8	>8
Mean temperature in growing season		^{0}c	16-25	26-30 13-15	31-32 10-12	>32 <10
Soil drainage		class	Well drained	Moderately /imperfectly	Poor drained	Very poorly drained
Soil reaction		pH	5.5-6.5	6.6-8.2 5.0-5.4	>8.2 <5.0	-
Surface soil texture		Class	Scl, sil	S, sil	s	
Soil depth		Cm	75-100	50-75	25-50	<25
Stoniness		%	0-10	10-15	15-35	>35
Salinity (ECe)		dsm^{-1}	<1.0	1.0-2.0	2.0-4.0	>4.0
Sodicity (ESP)		%	<10	10-15	>15	-

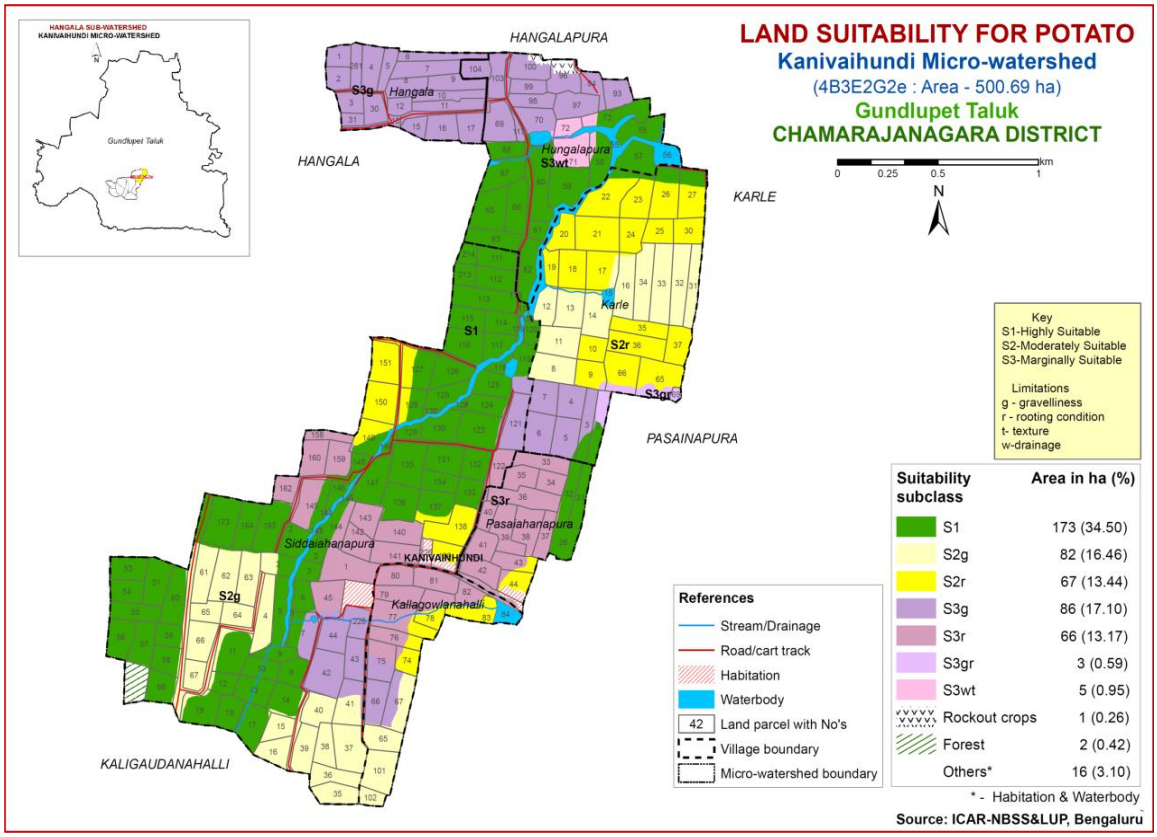


Fig. 7.10 Land Suitability map of Potato

7.11 Land Suitability for Beans (*Phaseolus vulgaris)*

Beans is the most important vegetable crop grown in almost all the districts of Karnataka. The crop requirements for growing beans were matched with the soil- site

characteristics and a land suitability map for growing beans was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.11.

Maximum area of about 173 ha (35%) has soils that are highly suitable (Class S1) and are distributed in the northeastern, central and southern part of the microwatershed. An area of about 154 ha (30%) has soils that are moderately suitable (Class S2) for growing beans with minor limitations of gravelliness, texture, wetness and rooting depth. They are distributed in the northeastern, central and southern part of the microwatershed. The marginally suitable (Class S3) lands cover an area of about 155 ha (31%) and occur in the northern and southeastern part of the microwatershed. They have moderate limitations of rooting depth and gravelliness.

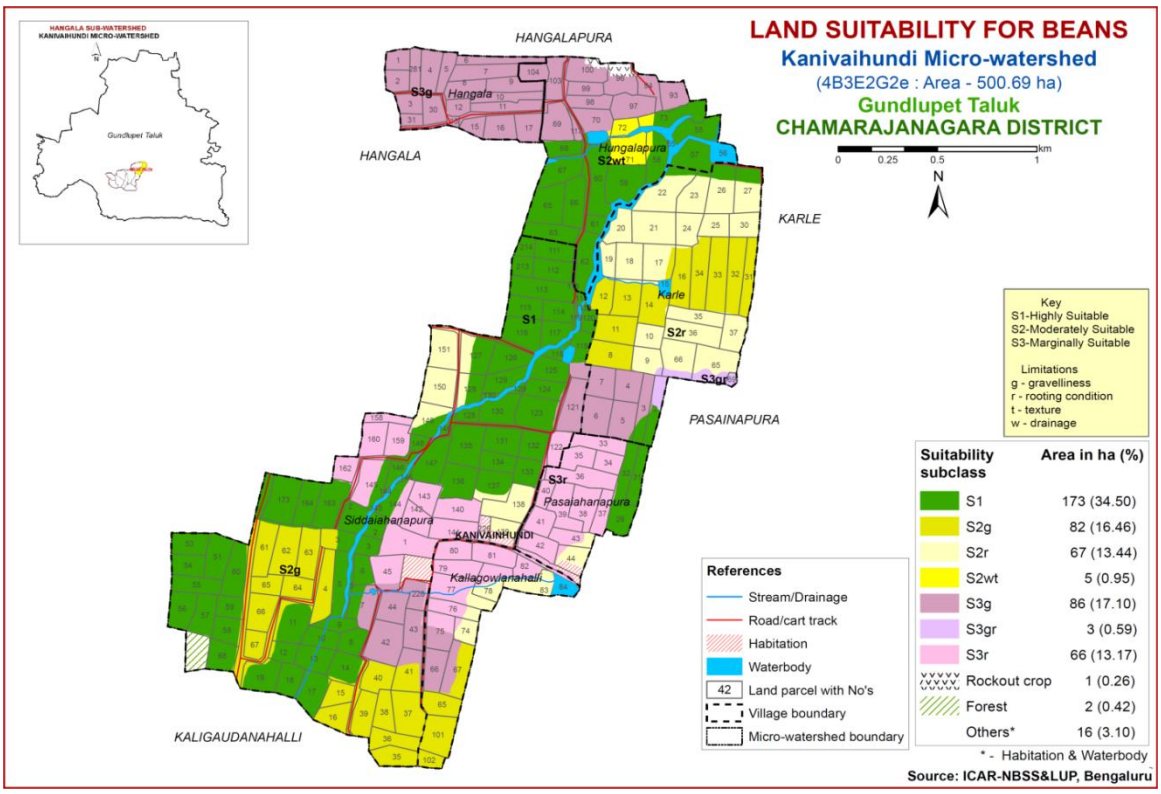


Fig. 7.11 Land Suitability map of Beans

7.12 Land Suitability for Beetroot (*Beta vulgaris)*

Beetroot is the most important vegetable crop grown in almost all the districts of Karnataka. The crop requirements for growing beetroot were matched with the soil- site characteristics and a land suitability map for growing beetroot was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.12.

Maximum area of about 173 ha (35%) has soils that are highly suitable (Class S1) for growing beetroot and are distributed in the northeastern, central and southern part of the microwatershed. An area of about 149 ha (30%) has soils that are moderately suitable

(Class S2) for growing beetroot with minor limitations of gravelliness and rooting depth. They are distributed in the northeastern, central and southern part of the microwatershed. The marginally suitable (Class S3) lands cover an area of about 160 ha (32%) and occur in the northern and southeastern part of the microwatershed. They have moderate limitations of rooting depth, texture, wetness and gravelliness.

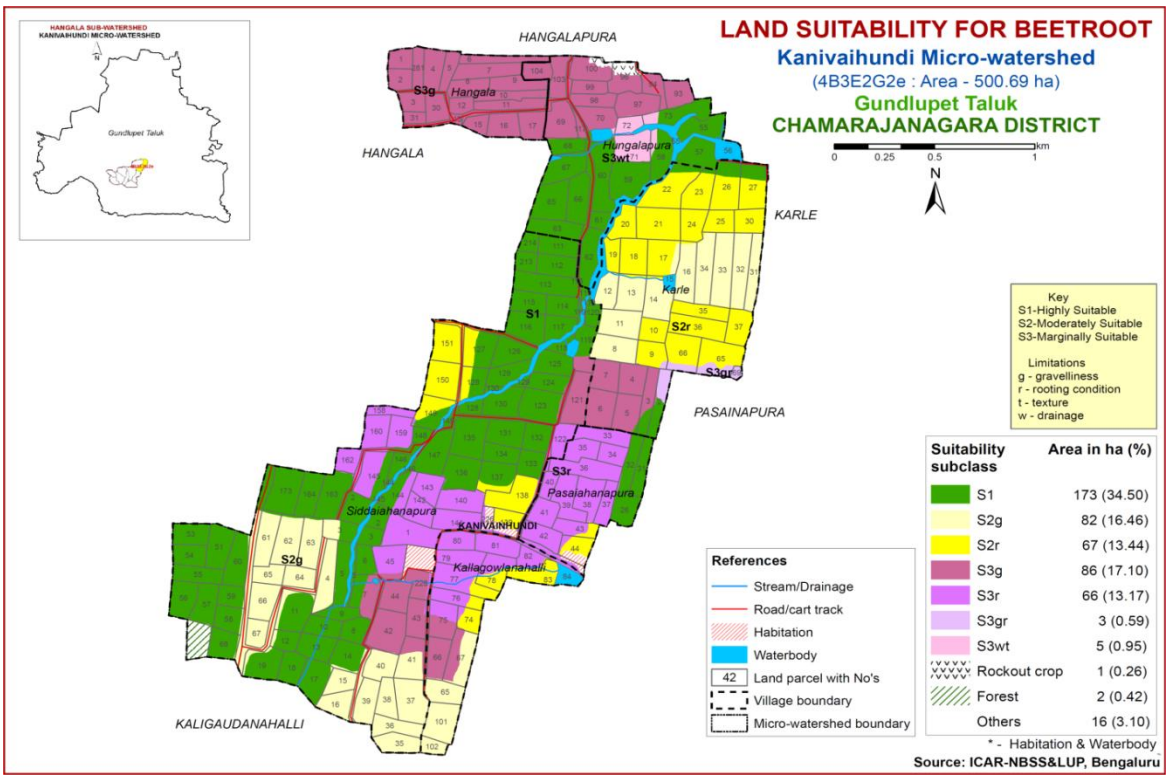


Fig. 7.12 Land Suitability map of Beetroot

7.13 Land suitability for Mango (*Mangifera indica*)

Mango is the most important fruit crop grown in large area in almost all the districts of the State. The crop requirements (Table 7.12) 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 geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.13.

An area of about 173 ha (35%) is highly suitable (Class S1) for growing mango and are distributed in the northwestern, central and southern part of the microwatershed. A small area of 75 ha (15%) is moderately suitable for growing mango and are distributed in the northeastern and southern part of the microwatershed. They have minor limitation of gravelliness and rooting depth. The marginally suitable (Class S3) lands cover a very small area of about 22 ha (4%) and are distributed in the southern and central part of the microwatershed. They have moderate limitations of rooting depth and gravelliness. A maximum area of about 211 ha (42%) is not suitable (Class N) for growing mango and are distributed in major part of the microwatershed.

Table 7.12 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 growing season	^{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 imperfectly 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	7.6-8.55.0-5.4	8.6-9.04.0-4.9	>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	

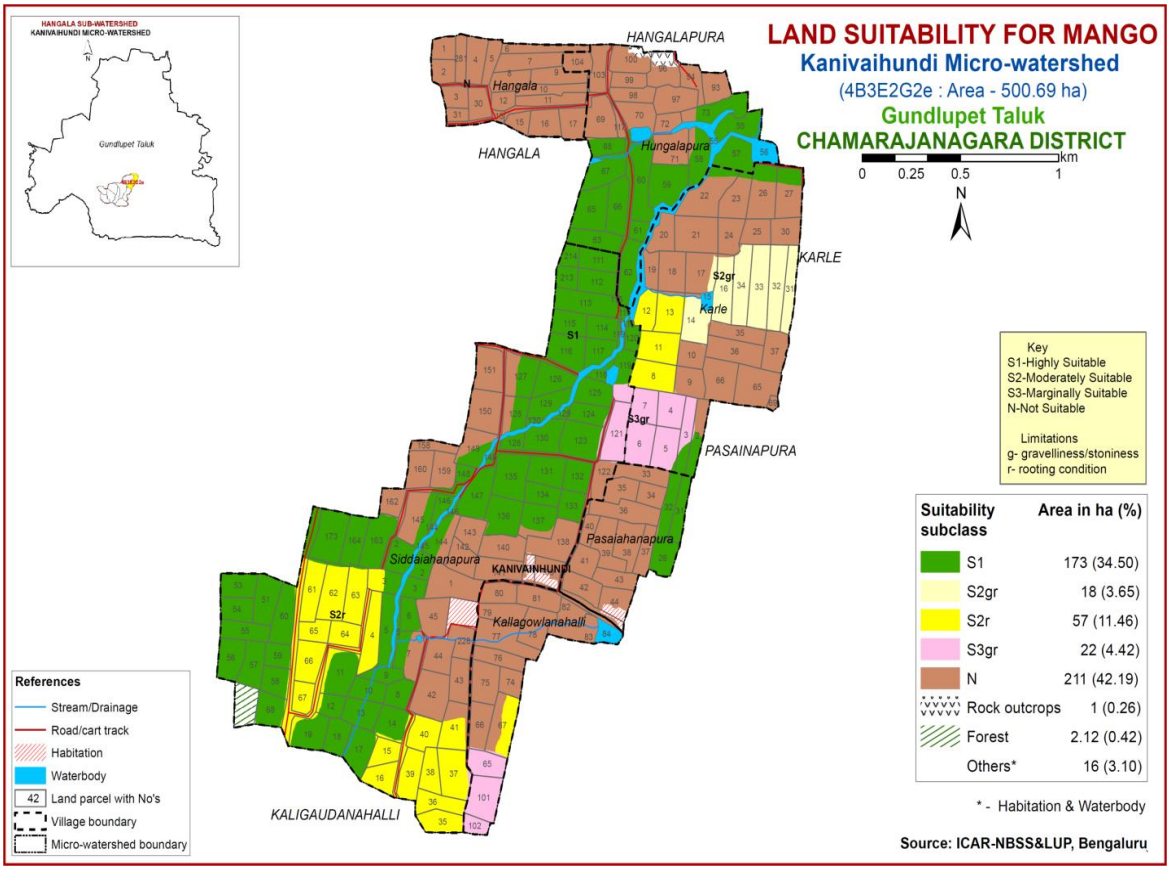


Fig. 7.13 Land Suitability map of Mango

7.14 Land suitability for Sapota (*Manilkara zapota*)

Sapota is the most important fruit crop grown in an area of 3.11 lakh ha in almost all the districts of the State. The crop requirements (Table 7.13) 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 7.14.

Maximum area of about 191 ha (38%) in the microwatershed is highly suitable (Class S1) for growing sapota and are distributed in the northwestern, central, southern and northeastern part of the microwatershed. Small area of about 59 ha (12%) is moderately suitable (Class S2) for growing sapota and are distributed in the central and southern part and they have minor limitations of gravelliness and rooting depth. The marginally suitable (Class S3) lands cover an area of about 163 ha (32%) and are distributed in the northern, northeastern and southern part of the microwatershed. They have moderate limitations of texture, rooting depth, wetness and gravelliness. An area of about 69 ha (14%) is not suitable for growing sapota and are distributed in the northern part of the microwatershed.

Table 7.13 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

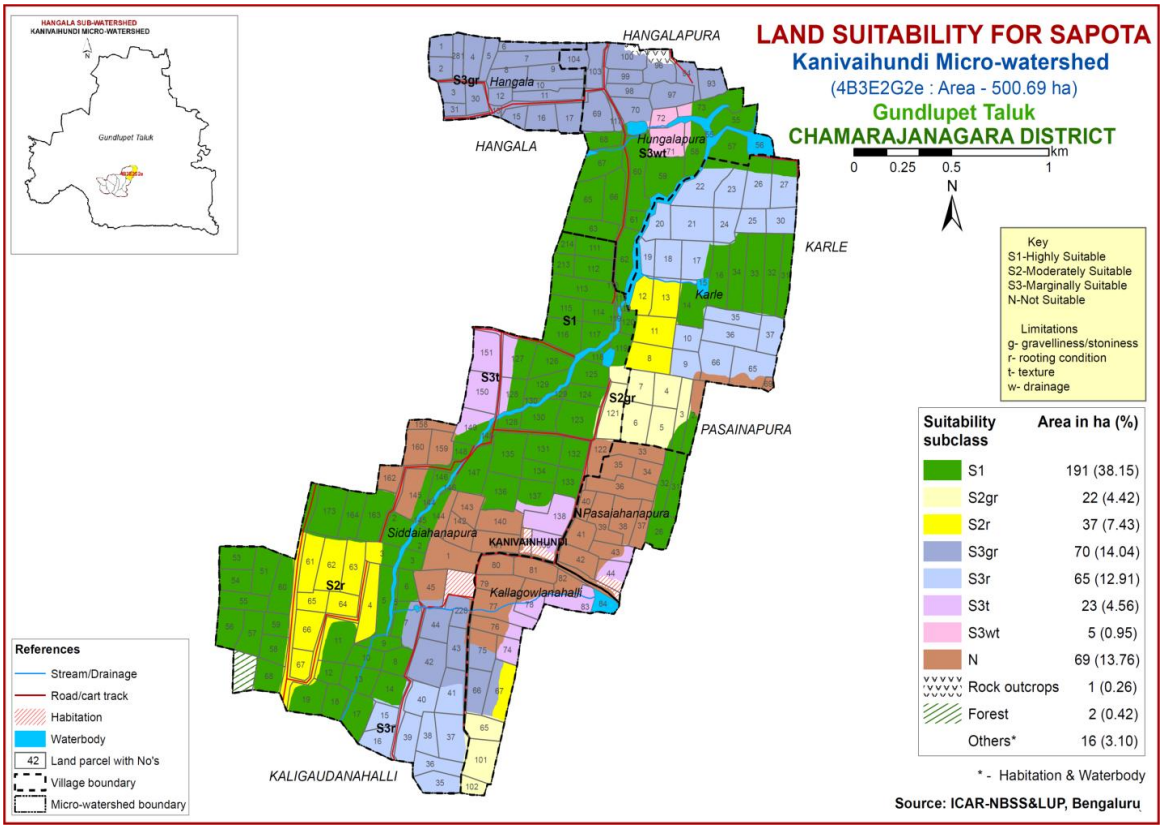


Fig. 7.14 Land Suitability map of Sapota

7.15 Land suitability for Guava (*Psidium guajava*)

Guava is 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 7.14) 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 7.15.

Maximum area of about 203 ha (41%) is highly suitable (Class S1) for growing guava and are distributed in the northwestern, northeastern, central and southwestern part of the microwatershed. A small area of about 50 ha (10%) is moderately suitable (Class S2) and are distributed in the central and northeastern part and they have minor limitations of gravelliness and rooting depth. The marginally suitable (Class S3) lands cover an area of about 155 ha (31%) and are distributed in the central, northern, eastern and southern part of the microwatershed. They have moderate limitations of texture, rooting depth and gravelliness. An area of about 74 ha (15%) is not suitable for growing guava and are distributed in the southern and southeastern part of the microwatershed.

Table 7.14 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

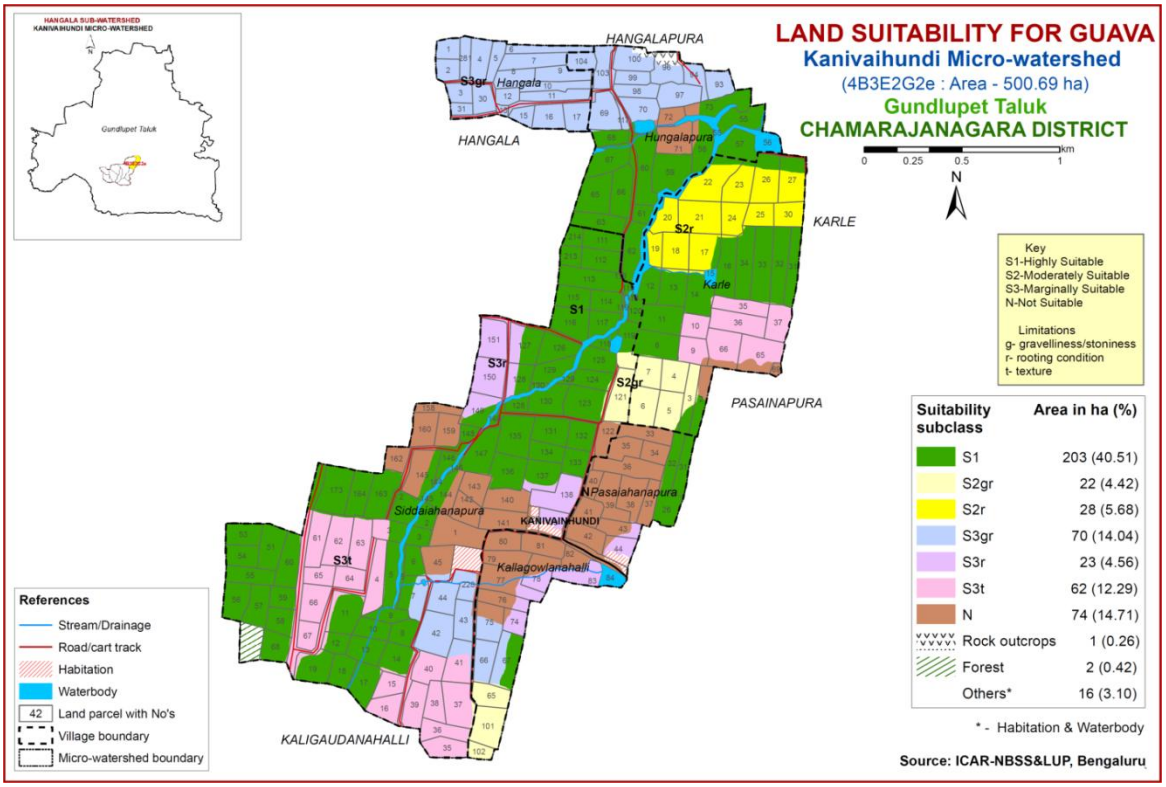


Fig. 7.15 Land Suitability map of Guava

7.16 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 7.15) were matched with the soil-site characteristics (Table 7.1) of the soils of the microwatershed and 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 7.16.

Maximum area of about 173 ha (35%) is highly suitable (Class S1) for growing banana and are distributed in the northwestern, central and southern part of the microwatershed. A small area of about 81 ha (16%) is moderately suitable (Class S2) for growing banana and are distributed in the northern part of the microwatershed. They have minor limitations of wetness, gravelliness and texture. Marginally suitable (Class S3) lands for growing banana occupy an area of about 160 ha (32%) and are distributed in the northern, northeastern and southern part of the microwatershed. They have minor limitations of rooting depth and gravelliness. A small area of about 69 ha (14%) is not suitable for growing banana and occur in the southern and southeastern part of the microwatershed. They have very severe limitations of rooting depth.

Table 7.15 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 imperfectly 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

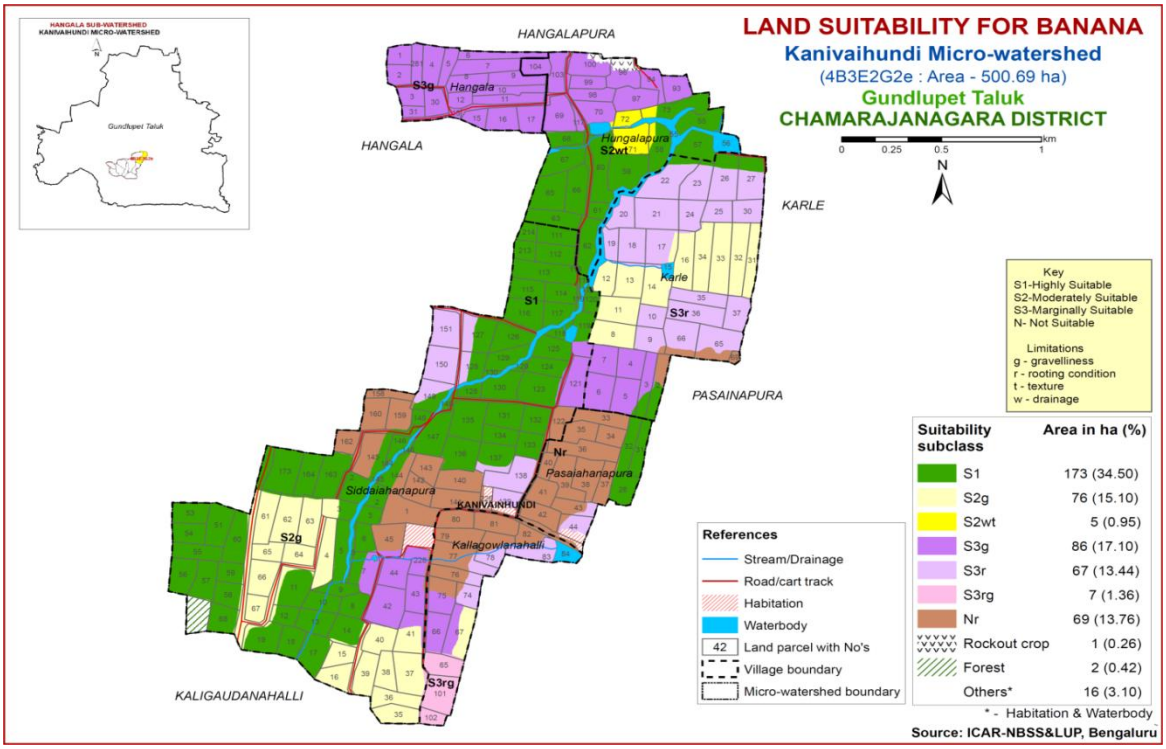


Fig. 7.16 Land Suitability map of Banana

7.17 Land Suitability for Jackfruit (*Artocarpus heterophyllus*)

Jackfruit is 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 and a land suitability map for growing jackfruit was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.17.

An area of about 173 ha (35%) is highly suitable (Class S1) for growing jackfruit and are distributed in the northwestern, central and southern part of the microwatershed. A very small area of 30 ha (6%) is moderately suitable for growing jackfruit and is distributed in the northeastern and small area in southern part of the microwatershed. They have minor limitations of gravelliness and rooting depth. The marginally suitable (Class S3) lands cover a maximum area of about 205 ha (41%) and occur in the northeastern, northern, central and southern part of the microwatershed. They have moderate limitations of gravelliness and rooting depth. A small area of about 74 ha (15%) is not suitable for growing jackfruit and occur in the southern, northern and eastern part of the microwatershed.

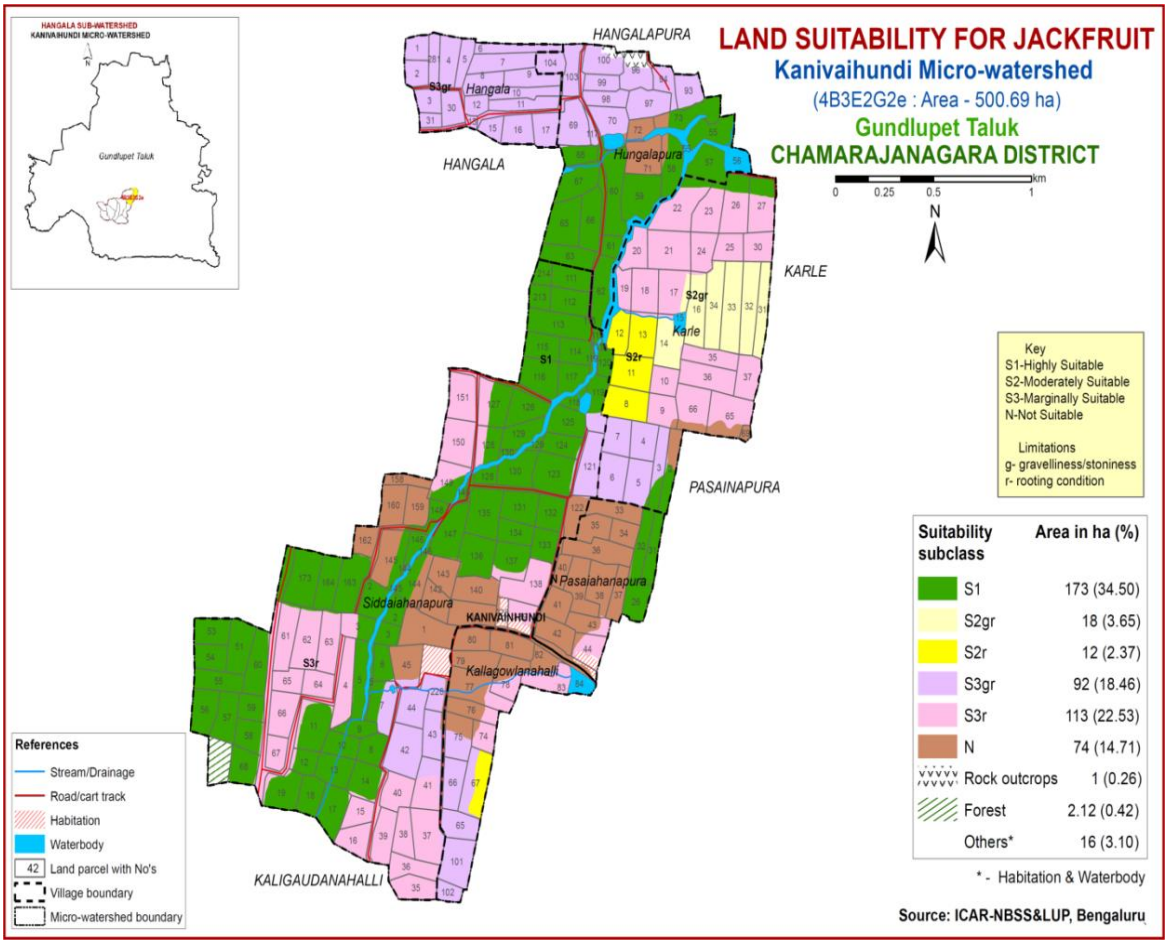


Fig. 7.17 Land Suitability map of Jackfruit

7.18 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 and a land suitability map for growing jamun was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.18.

An area of about 177 ha (36%) is highly suitable (Class S1) for growing jamun and are distributed in the northern part of the microwatershed. A very small area of 30 ha (6%) is moderately suitable (Class S2) for growing jamun and are distributed in the northeastern part of the microwatershed. They have minor limitations of gravelliness and rooting depth. The marginally suitable (Class S3) lands cover a maximum area of about 205 ha (41%) and occur in the northeastern, northern and southern part of the microwatershed. They have moderate limitations of gravelliness and rooting depth. A small area of about 69 ha (14%) is not suitable for growing jamun and occur in the southwestern and southeastern part of the microwatershed.

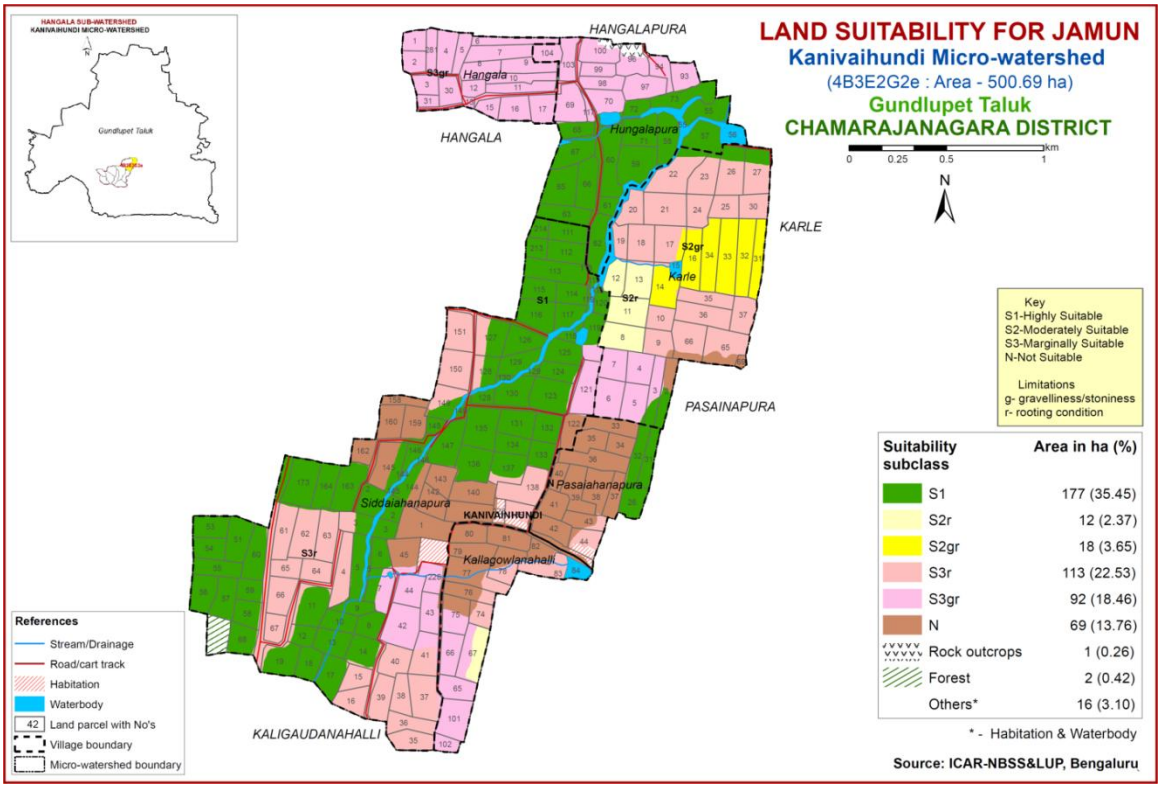


Fig. 7.18 Land Suitability map of Jamun

7.19 Land Suitability for Musambi (*Citrus limetta*)

Musambi is 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 and a land suitability map for growing musambi was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.19.

An area of about 177 ha (36%) is highly suitable (Class S1) for growing musambi and are distributed in the northern part of the microwatershed. A very small area of 30 ha (6%) is moderately suitable for growing musambi and are distributed in the northeastern part of the microwatershed. They have minor limitations of gravelliness and rooting depth. The marginally suitable (Class S3) lands cover a maximum area of about 205 ha (41%) and occur in the northeastern, northern and southern part of the microwatershed. They have moderate limitations of gravelliness and rooting depth. A small area of about 69 ha (14%) is not suitable (Class N) for growing musambi and are occur in the southwestern and southeastern part of the microwatershed.

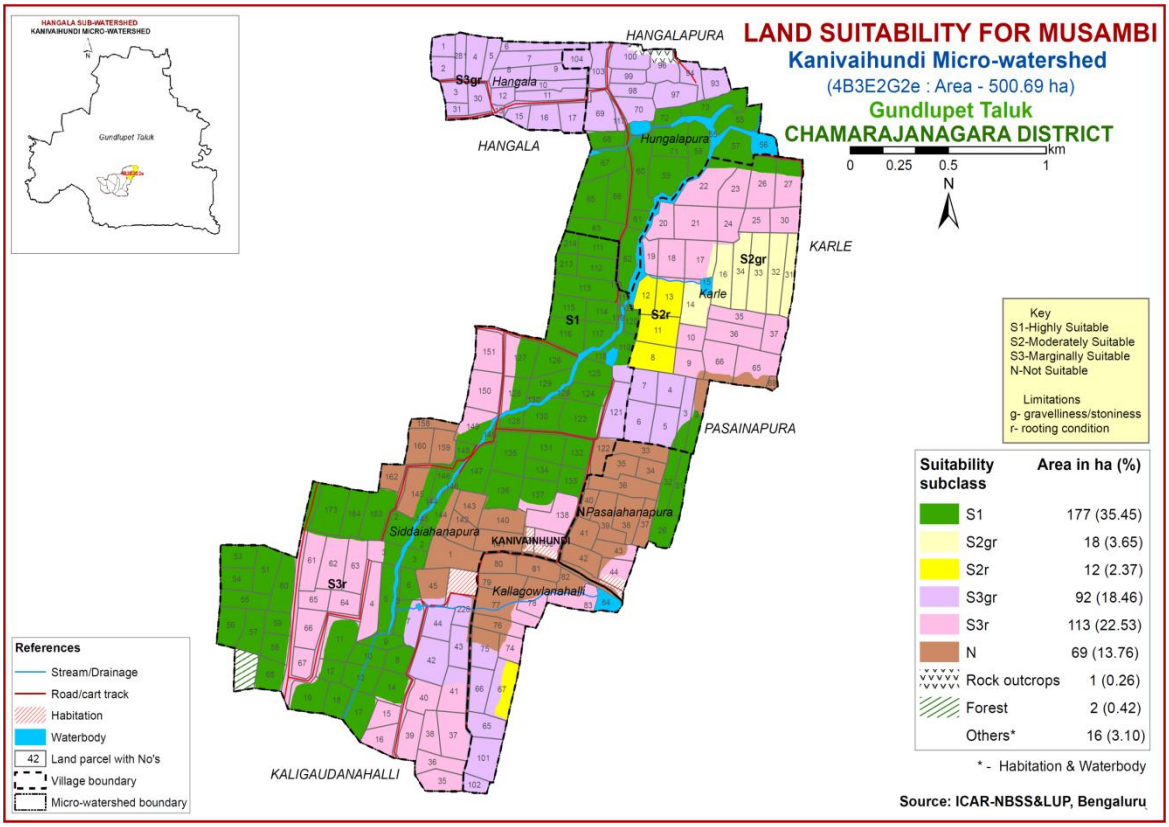


Fig. 7.19 Land Suitability map of Musambi

7.20 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 7.16) 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 are given in Figure 7. 20.

An area of about 177 ha (36%) is highly suitable (Class S1) for growing Lime and are distributed in the northern part of the microwatershed. A very small area of 30 ha (6%) is moderately suitable (Class S2) for growing Lime and are distributed in the northeastern part of the microwatershed. They have minor limitations of gravelliness and rooting depth. The marginally suitable (Class S3) lands cover a maximum area of about 205 ha (41%) and occur in the northeastern, northern and southern part of the microwatershed. They have moderate limitations of gravelliness and rooting depth. A small area of about 69 ha (14%) is not suitable for growing Lime and are occur in the southwestern and southeastern part of the microwatershed.

Table 7.16 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 imperfectly 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	5.5-6.47.6-8.0	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	

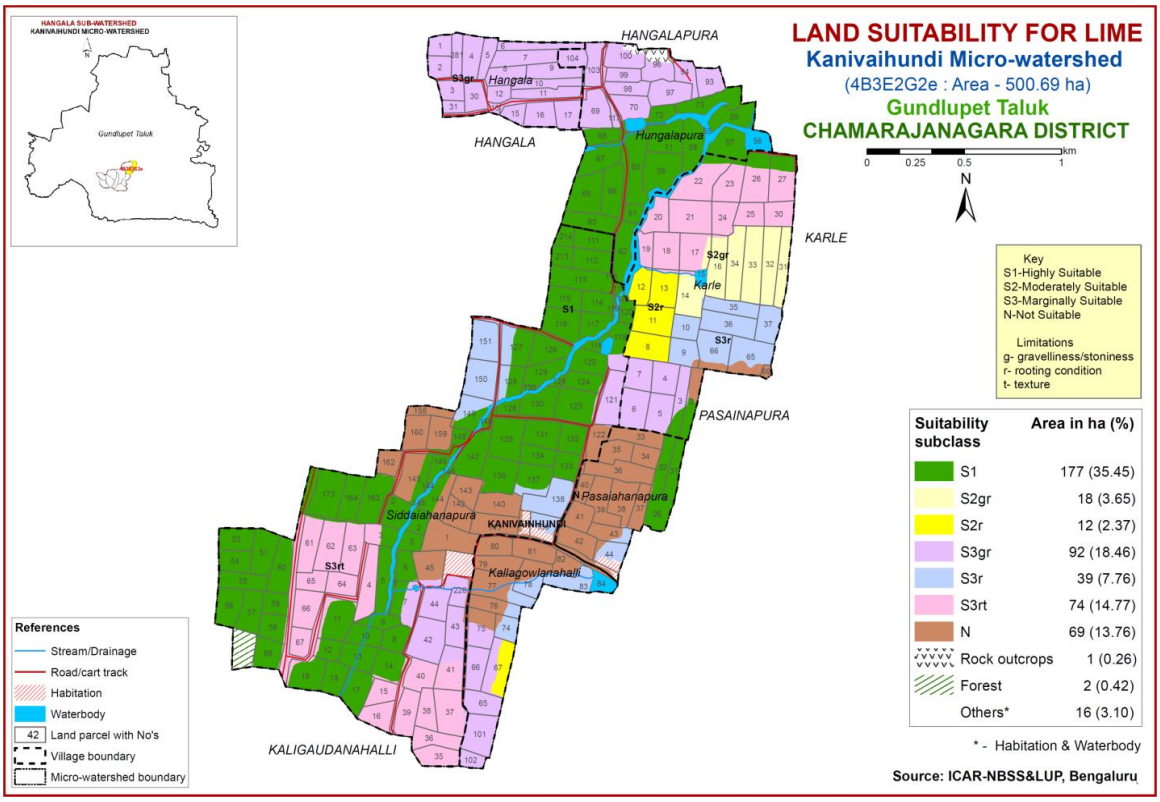


Fig. 7.20 Land Suitability map of Lime

7.21 Land Suitability for Cashew (*Anacardium occidentale)*

Cashew is one of the most important fruit 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 and a land suitability map for growing cashew was genertared. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.21.

Maximum area of about 193 ha (39%) has soils that are highly suitable (class S1) for growing cashew and are distributed in the northern, central and southern part of the microwatershed. An area of about 106 ha (21%) is moderately suitable (class S2) for growing cashew and are distributed in the northeastern and southern part of the microwatershed.

The marginally suitable (class S3) lands cover an area of about 109 ha (22%) and occur in the northern, eastern and southern part of the microwatershed. They have moderate limitations of gravelliness and rooting depth. A small area of about 74 ha (15%) is not suitable for growing cashew and occur in the southern part of the microwatershed.

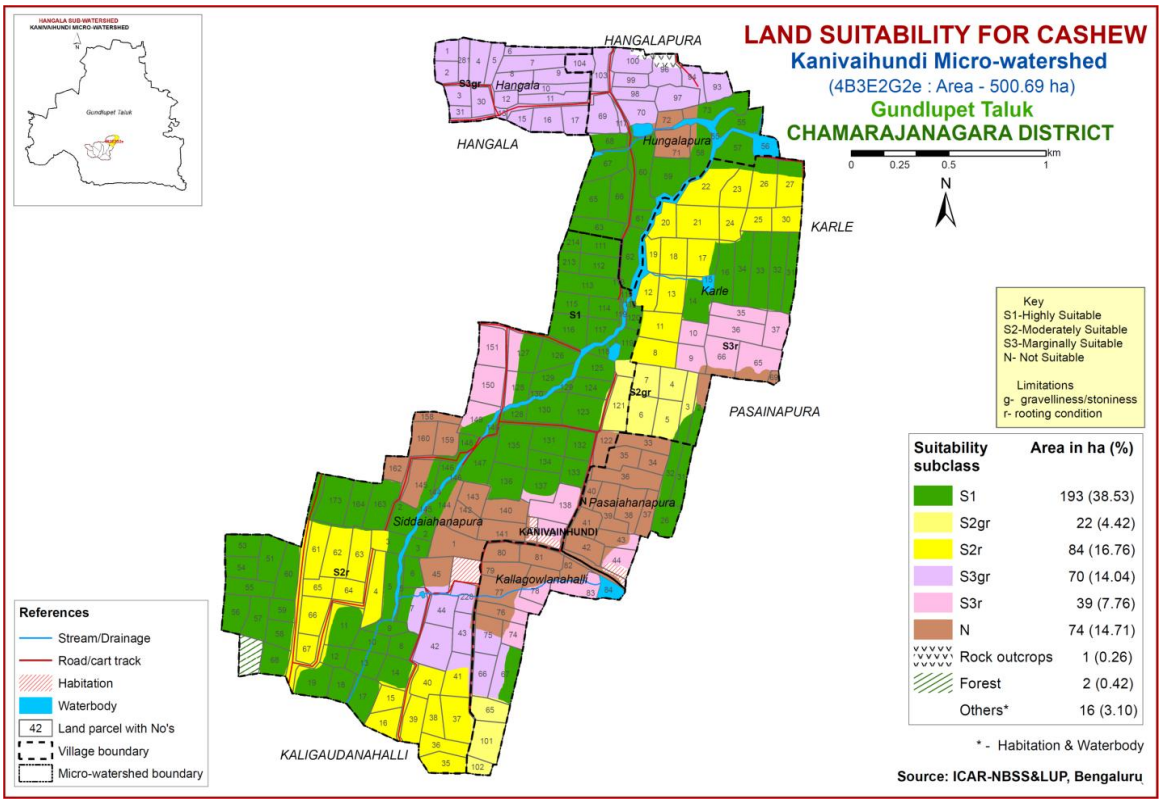


Fig. 7.21 Land Suitability map of Cashew

7.22 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 and a land suitability map for growing custard apple was

generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.22.

Maximum area of 208 ha (41%) is highly suitable (Class S1) for growing custard apple and are distributed in the northern, northwestern and southern part of the microwatershed. An area of about 205 ha (41%) has soils that are moderately suitable (Class S2) for growing custard apple with minor limitations of rooting depth and gravelliness and are distributed in the northern, northeastern and southern part of the microwatershed. The marginally suitable (Class S3) lands cover a small area of about 69 ha (14%) and occur in the southern part of the microwatershed. They have moderate limitations of rooting depth.

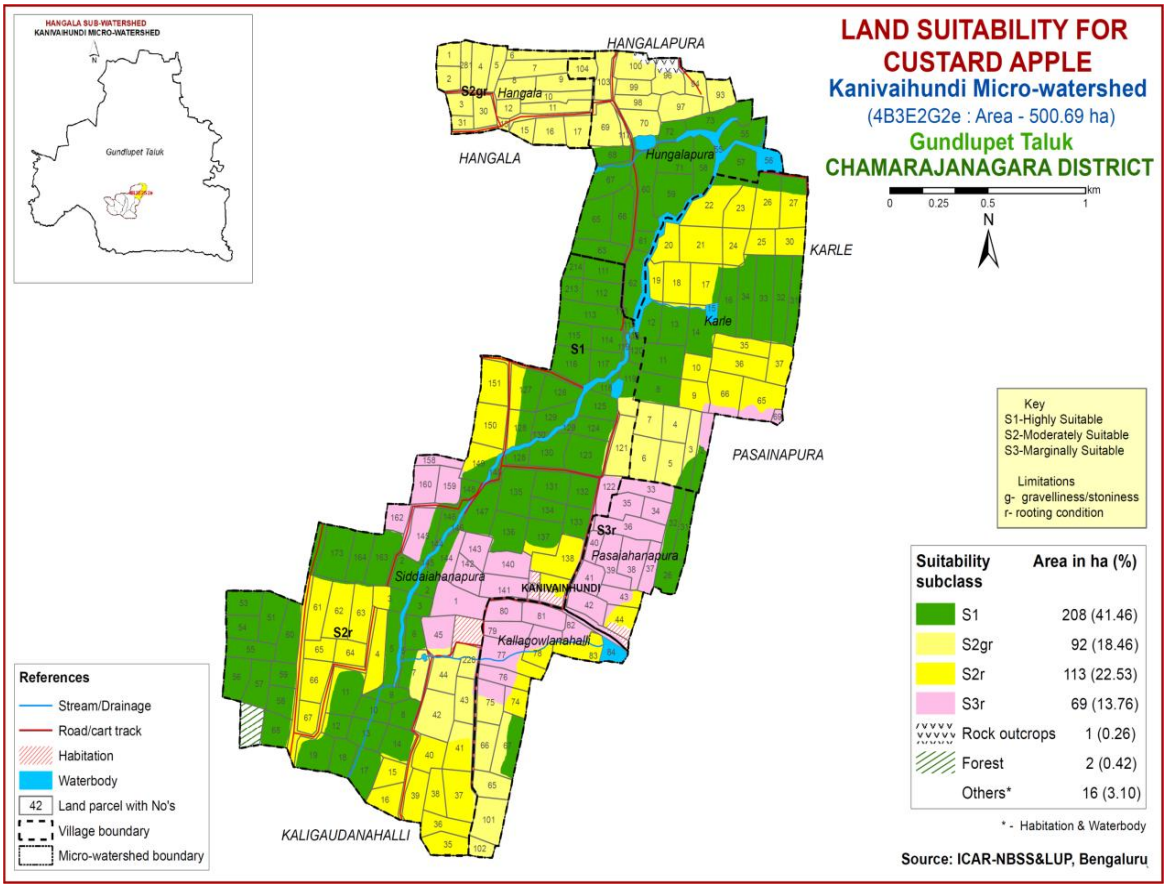


Fig. 7.22 Land Suitability map of Custard Apple

7.23 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 and a land suitability map for growing amla was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.23.

Maximum area of 208 ha (41%) is highly suitable (Class S1) for growing amla and are distributed in the northern, northwestern and southern part of the microwatershed

followed by an area of about 205 ha (41%) has soils that are moderately suitable (Class S2) for growing amla with minor limitations of rooting depth and gravelliness and are distributed in the northern, northeastern and southern part of the microwatershed. The marginally suitable (Class S3) lands cover an area of about 69 ha (14%) and occur in the southern part of the microwatershed. They have moderate limitations of rooting depth.

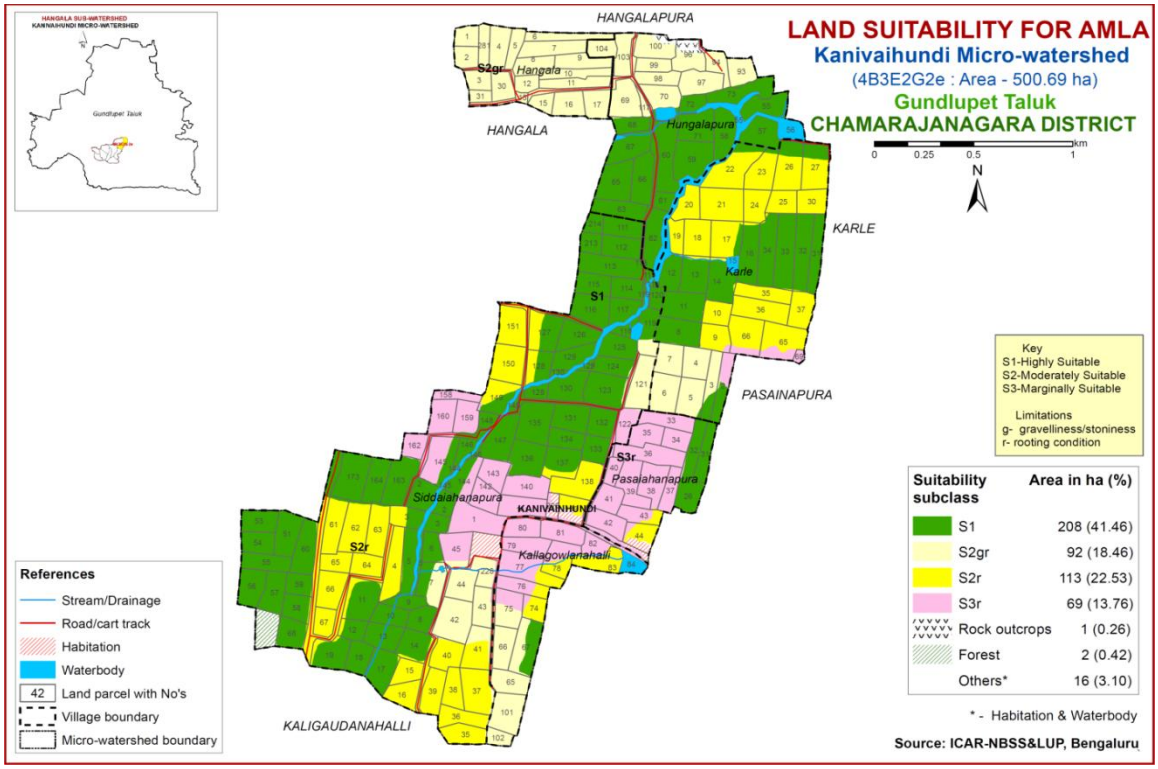


Fig. 7.23 Land Suitability map of Amla

7.24 Land Suitability for Tamarind (*Tamarindus indica*)

Tamarind is 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 and a land suitability map for growing tamarind was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Fig. 7.24.

Maximum area of about 177 ha (35%) has soils that are highly suitable (Class S1) and are distributed in the northwestern and southern part of the microwatershed. Small area of about 75 ha (15%) has soils that are moderately suitable (Class S2) for growing tamarind with minor limitations of gravelliness and rooting depth and are distributed in the northeastern and southern part of the microwatershed. The marginally suitable (Class S3) lands cover an area of about 120 ha (24%) and occur in the northern, northeastern and southern part of the microwatershed. They have moderate limitations of gravelliness and rooting depth. An area of about 108 ha (22%) is not suitable (Class N) for growing Tamarind and are distributed in the southeastern and southwestern part of the microwatershed.

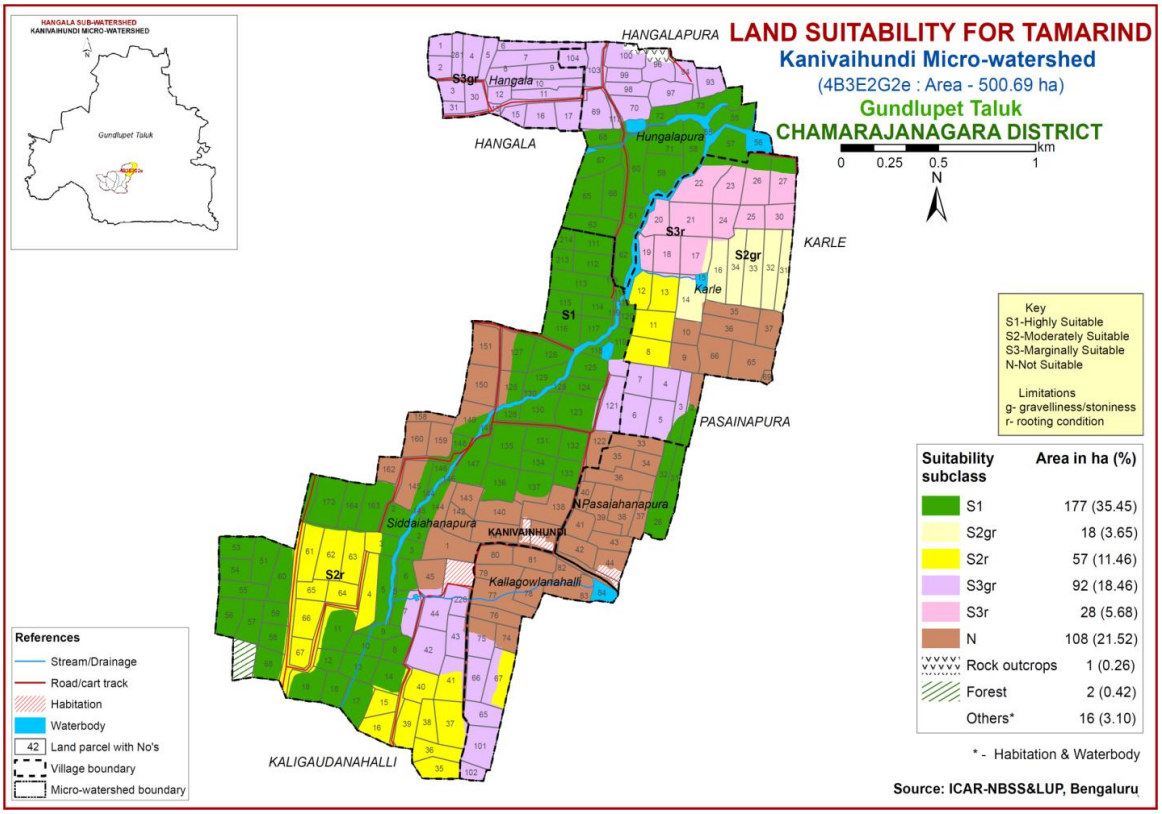


Fig. 7.24 Land Suitability map of Tamarind

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

Marigold is the most important flower crop grown in an area of 1858 ha in almost all the districts of the State. The crop requirements (Table 7.17) 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 7.25.

Maximum area of about 230 ha (46%) is highly suitable (Class S1) for growing marigold and are distributed in the northwestern, central and southern part of the microwatershed. An area of about 97 ha (19%) is moderately suitable (Class S2) for growing marigold and are distributed in the northeastern and southeastern part of the microwatershed. They have minor limitations of gravelliness, wetness, texture and rooting depth. Marginally suitable (Class S3) lands for growing marigold occupy an area of about 155 ha (31%) and are distributed in the northern, southeastern and southern part of the microwatershed. They have moderate limitations of rooting depth and gravelliness.

Table 7.17 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	-

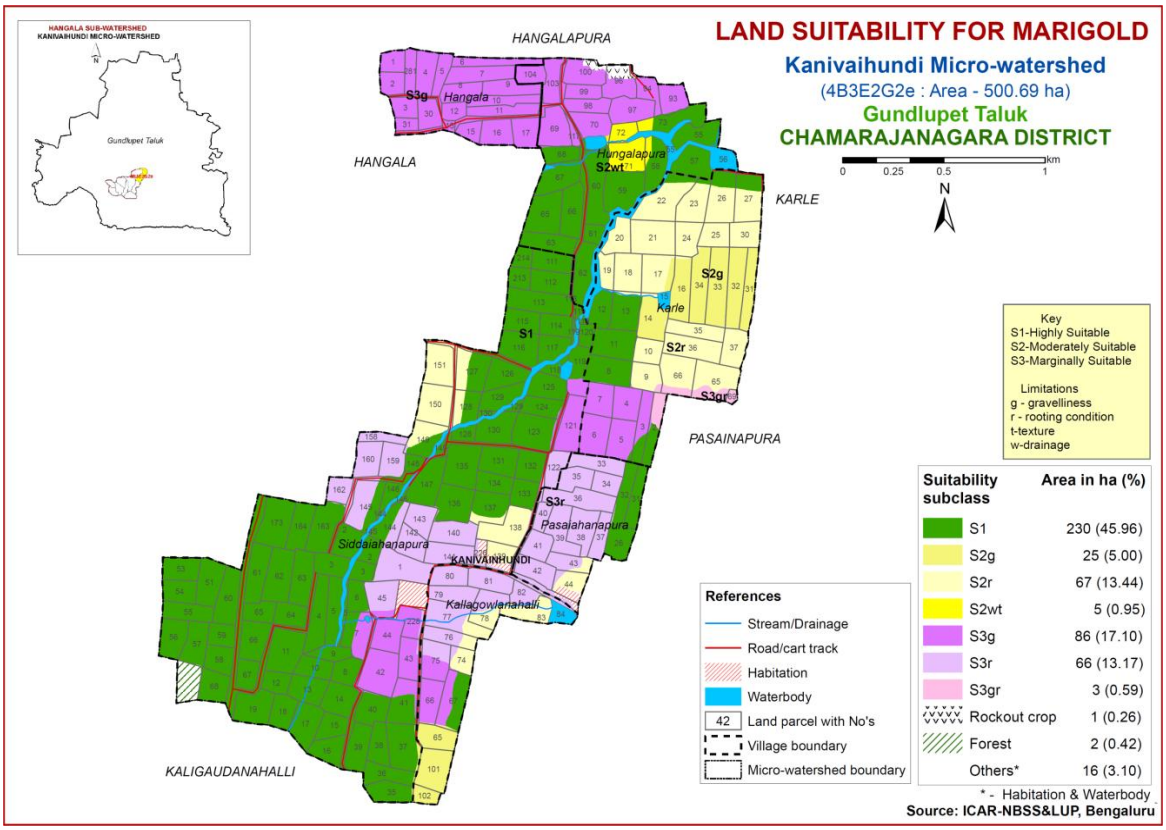


Fig. 7.25 Land Suitability map of Marigold

7.26 Land suitability for Chrysanthemum (*Dendranthema grandiflora*)

Chrysanthemum is the most important flower crop grown in an area of 803 ha in almost all the districts of the State. The crop requirements (7.18) 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 thier geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.26.

Maximum area of about 173 ha (35%) is highly suitable (Class S1) for growing chrysanthemum and are distributed in the northwestern, central and southern part of the microwatershed followed by an area of about 170 ha (34%) is moderately suitable (Class S2) for growing chrysanthemum and are distributed in the northeastern and southern part of the microwatershed. They have minor limitations of gravelliness, wetness, texture and rooting depth. Marginally suitable (Class S3) lands for growing chrysanthemum occupy an area of about 139 ha (28%) and are distributed in the northern and southern part of the microwatershed. They have moderate limitations of rooting depth and gravelliness.

Table 7.18 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	

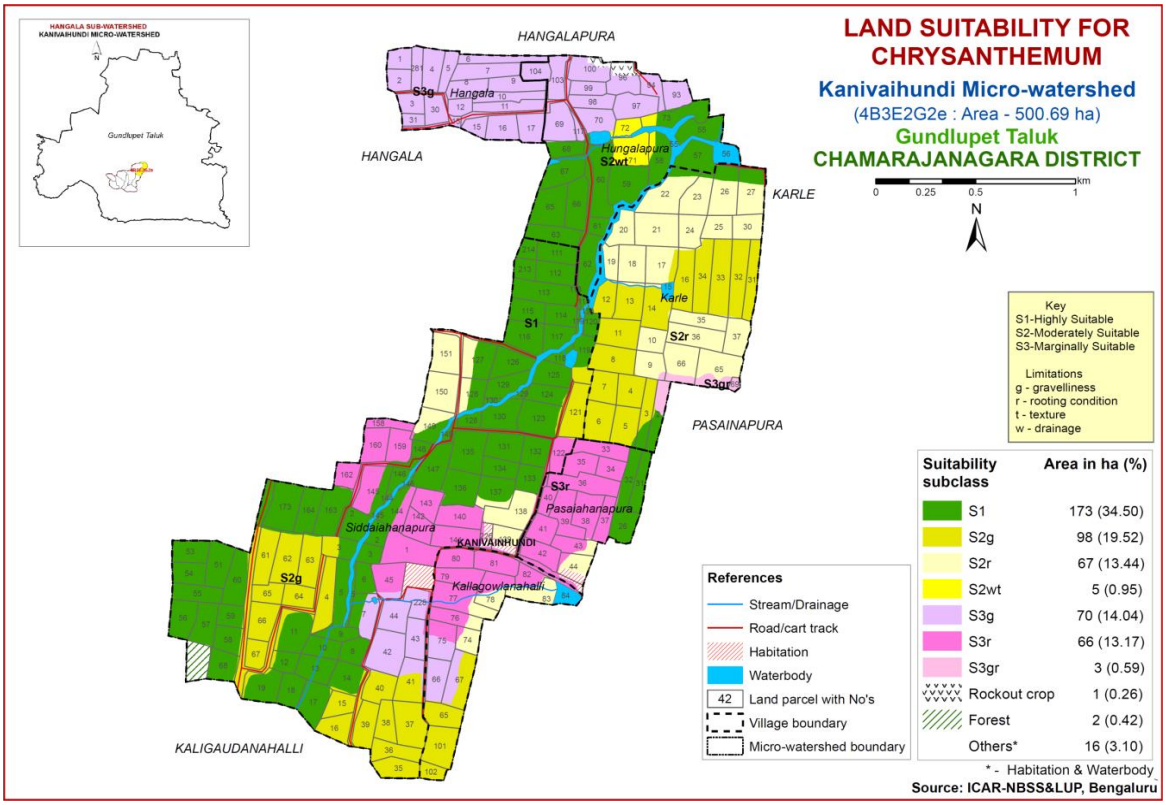


Fig. 7.18 Land Suitability map of Chrysanthemum

7.27 Land Suitability for Turmeric (*Curcuma longa*)

Turmeric is the most important spice crop grown in an area of 1.39 lakh ha in almost all the districts of the State. The crop requirements for growing turmeric (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 turmeric was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.27.

Maximum area of about 173 ha (35%) has soils that are highly suitable (Class S1) for growing turmeric and are distributed in the northeastern, central and southern part of the microwatershed. An area of about 149 ha (30%) has soils that are moderately suitable (Class S2) for growing turmeric with minor limitations of gravelliness and rooting depth. They are distributed in the northeastern, central and southern part of the microwatershed. The marginally suitable (Class S3) lands cover an area of about 160 ha (32%) for growing turmeric and occur in the northern and southeastern part of the microwatershed. They have moderate limitations of rooting depth, texture, wetness and gravelliness.

Table 7.19 Land suitability criteria for Turmeric

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	20-27 33-37	10-19 38-40	<10 >40
Soil aeration	Soil drainage	class	Well drained	Mod. well drained	Imperfectly drained	Poorly drained
Nutrient availability	Texture	Class	l, cl, scl, sl	Sc, sic, sicl	C(40-60%), ls	Stony heavy clay>60%
	pH	1:2.5				
	Available nutrient status (NPK)	Fertility rating class	high	medium	low	
Rooting conditions	Soil depth	Cm	>75	50-75	25-50	<25
Erosion	Slope	%	<3	3-8	8-15	>15mm

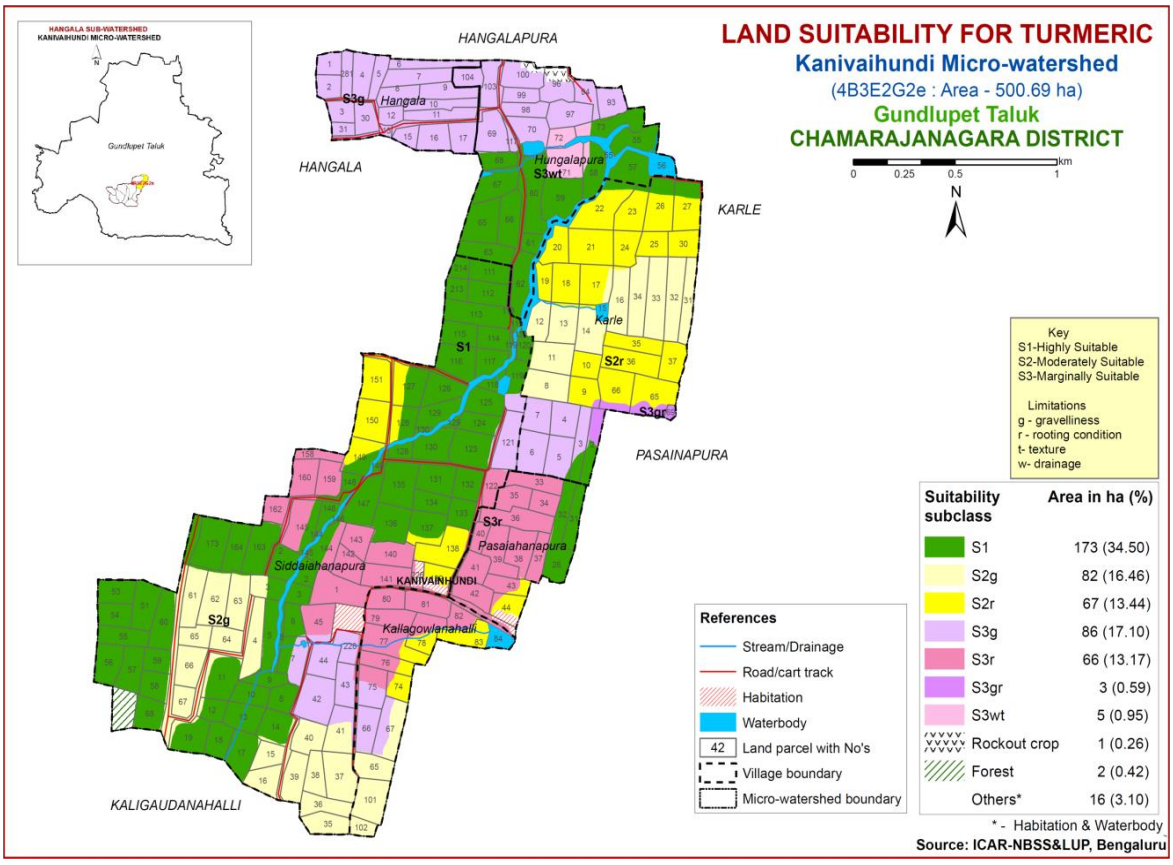


Fig. 7.27 Land Suitability map of Turmeric

7.28 Land Management Units (LMUs)

The 28 soil map units identified in Kanivaihundi microwatershed have been regrouped into 9 Land Management Units (LMU's) for the purpose of preparing Proposed Crop Plan. Land Management Units 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 Management Units map (Fig.7.28) has been generated. These Land Management Units are expected to behave similarly for a given level of management.

The map units that have been grouped into 9 land management units along with brief description of soil and site characteristics are given below.

LMUs	Soil map units	Soil and site characteristics
1	ARKiB1	Very deep, red clayey soils with slopes of 1-3% and slight erosion
2	BMBmB1	Very deep, black clayey soils with slopes of 1-3% and slight erosion
3	HGHhB2,HGHiB1 HGHiB2,HGHmA1 HGHmB1,HGHmB2	Very deep, red loamy soils with slopes of 0-3% and slight to moderate erosion
4	KLPbB1,KLPiB2 MDHiB1	Deep, gravelly red sandy clay to sandy clay loam soils with slopes of 1-3% and slight to moderate erosion
5	KNGcB2g2,KNGhB2g2 GPRcB1g1,GPRhB1	Moderately deep, gravelly red sandy clay to sandy clay loam soils with slopes of 1-3%, gravelly to very gravelly (15-60%) and slight to moderate erosion
6	DRHhB1,DRHhB1g1 DRHiA1 ,HPRiB1 HPRmB2	Moderately shallow, gravelly red sandy clay to sandy clay loam soils with slopes of 0-3%, gravelly (15-35%) and slight to moderate erosion
7	MGHcB1,MGHcB2g1 MGHcB2g2,MGHhB1g1	Moderately shallow, gravelly red loamy soils with slopes of 1-3%, gravelly to very gravelly (15-60%) and slight to moderate erosion
8	HDRhB1g1,HDRiB1 HDRiB1g1	Shallow, red sandy clay to sandy clay loam soils with slopes of 1-3%, gravelly (15-35%) and slight erosion
9	SPRiB1g1	Shallow, gravelly red sandy clay to sandy clay loam soils with slopes of 1-3%, gravelly (15-35%) and slight erosion

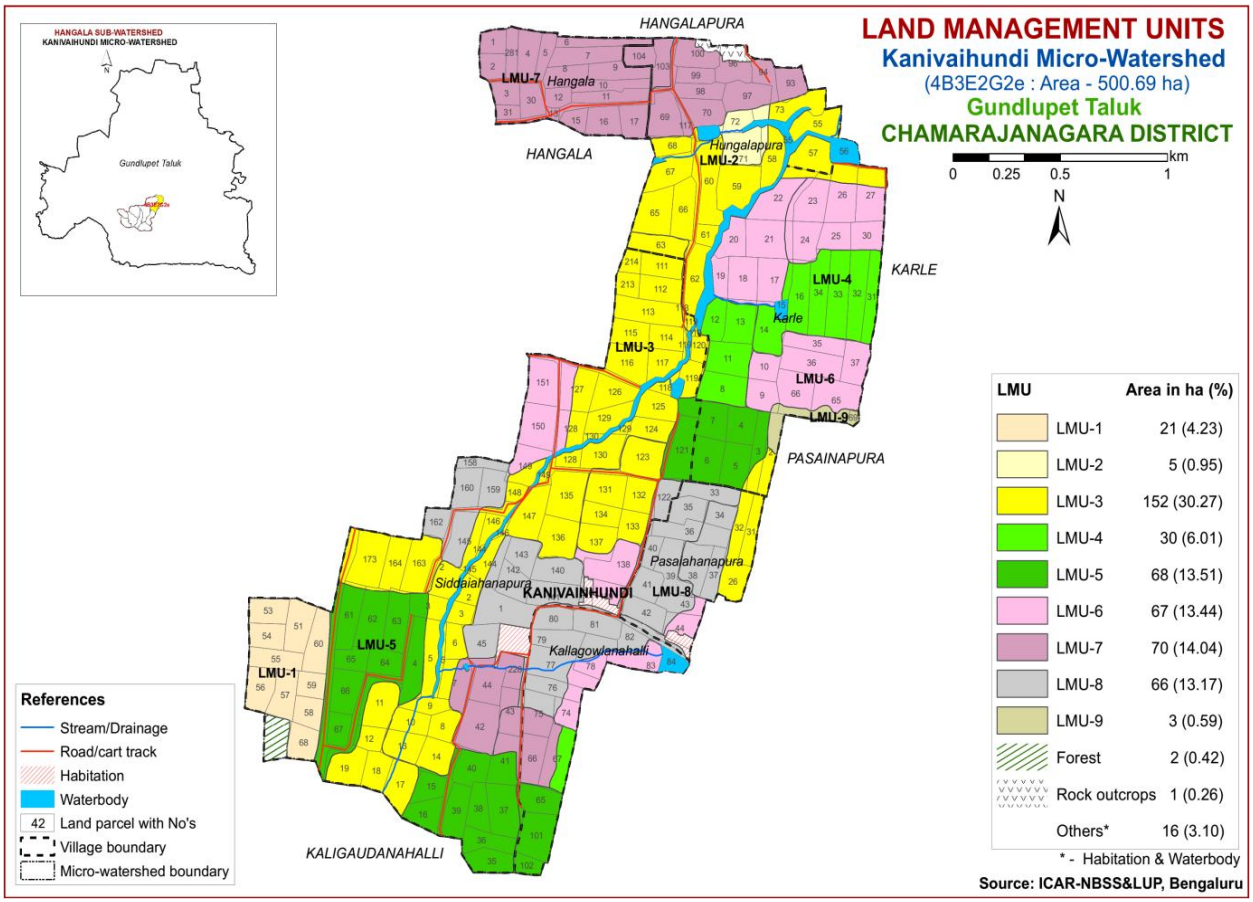


Fig. 7.28 Land Management Units Map- Kanivaihundi Microwatershed

7.29 Proposed Crop Plan for Kanivaihundi Microwatershed

After assessing the land suitability for the 27 crops, the proposed crop plan has been prepared for the 9 identified LMUs by considering only the highly (Class S1) and moderately (Class S2) suitable lands for each of the 27 crops. The resultant proposed crop plan is presented below in Table 7.20

Table 7.20 Proposed Crop Plan for Kanivaihundi Microwatershed

LMU No	Mapping Units	Survey Number	Field Crops/Forestry	Suitable Horticulture Crops under Irrigation	Horticulture Crops with suitable Interventions	Suitable Interventions
LMU1 (21 ha, 4%)	1 (Very deep (>150 cm), red clay soils)	**Siddaiahanapura**: 51,53,54,55,56, 57,58,59,60,68	Maize, Sorghum, Cotton, Sunflower, Sugarcane **Multiple crop rotation:** Redgram+Maize Redgram+Groundnut Pulses+Ragi Pulses+Sorghum	Turmeric, Banana, Lime, Tomato, Beans, Bhendi	**Perennial components:** Mango, Sapota, Lime **Flower crops:** Marigold, Chrysanthemum **Annual vegetables:** Chillies, Bhendi	Drip irrigation, Mulching, crop suitable conservation practices
LMU 2 (5ha, <1%)	2 (Very deep (>150 cm), lowland clayey soils)	**Hungalapura**: 71,72	Maize, Cotton, Sorghum, Sunflower	Beetroot, Banana, Lime, Tomato, Beans, Bhendi , Banana	**Flower crops:** Marigold, Chrysanthemum **Fruit crops:** Sapota, Banana, Pomegranate **Vegetables:** Chillies, Bhendi	Providing proper drainage, addition of organic manures, green leaf manuring, suitable conservation practises
LMU 3 (152 ha, 3 0%)	11, 12, 13, 14, 15, 16 (Very deep (>150 cm), red loamy soils)	**Hungalapura**: 55,57,58,59,60,61,62 ,63,65,66,67,68,73 **Karle**: 2 **Pasaianapura**: 26,31,32	Maize, Sorghum, Sunflower, Redgram, Sugarcane **Multiple crop rotation:** Redgram+Maize Redgram+Groundnut	Turmeric, Banana, Lime, Tomato, Beans, Bhendi	**Perennial components:** Mango, Sapota, Lime **Flower crops:** Marigold, Chrysanthemum **Annual vegetables:**	Drip irrigation, Mulching, crop suitable conservation practices

		Siddaiahanapura: 2,3,5,6,8,9,10,11,12, 13,14,17,18,19,111,1 12,113,114,115,116,1 17,118,119,120,123, 124,125,126,127,128 ,129,130,131,132,13 3,134,135,136,137,1 44,146,147,148,163, 164,173,213, 214	Pulses+Ragi Pulses+Sorghum		Chillies, Bhendi	
LMU 4 (30 ha, 6%)	19, 20, 23 Deep(100-150 cm), gravelly red clay soils	**Kaligaudnahalli**: 67 **Karle**: 8,11,12,13,14,16,31, 32,33,34	Maize, Sorghum, Cotton, Sunflower, Redgram **Multiple crop rotation:** Redgram+Maize Redgram+Groundnut Pulses+Sorghum	Tomato, Beetroot, Potato, Mango, Banana, Beans, Bhendi, Turmeric	**Perennial components:** Mango, Sapota, Lime **Flower crops:** Marigold, Chrysanthemum **Annual vegetables:** Chillies, Bhendi	Drip irrigation, Mulching, crop suitable conservation practices
LMU5 (68 ha, 14%)	6, 7, 21, 22 Moderately deep (75-100 cm), gravelly red clay soils	**Kaligaudanahalli:**6 5,101,102 **Karle**: 3,4,5,6,7 **Siddaiahanapura**: 4,15,16,35,36,37, 38,39,40,41,61,62, 63,64,65,66,67,121	Maize, Sorghum, Cotton, Ragi, Sunflower Pulses+Sorghum	Fieldbean, Tomato, Beetroot, Onion, Banana, Turmeric	**Perennial components:** Sapota, Guava **Flower crops:** Marigold, Chrysanthemum **Annual vegetables:** Chillies, Bhendi	Drip irrigation, Mulching, Crop suitable conservation practices
LMU 6 67 ha, 13%)	3, 4, 5, 17, 18 Moderately shallow (50-75 cm), gravelly red clay soils	**Kaligaudanahalli:**7 4,83 **Karle**: 9,10,17,18,19,20, 21,22,23,24,25, 26,27,30,35,36, 37,65,66 **Pasainapura**: 44	Ragi, Groundnut, Maize, Sorghum, Cotton Pulses+Sorghum	Fieldbean, Tomato, Beetroot, Onion, Banana, Turmeric	Custard apple, Ber, Aonla **Vegetables:** Clusterbean, Bhendi **Flower crops:** Marigold, Chrysanthemum, Gillardia	Drip irrigation, Mulching, Crop suitable conservation practices

		Siddaiahanapura: 138,139,149,150, 151				
LMU 7 (70 ha, 14%)	24, 25, 26, 27 Moderately shallow (50-75 cm), gravelly red loam soils	**Hangala**: 1,2,3,4,5,6,7,8,9,10,11,12,13,15,16,17, 30,31,281 **Hungalapura**: 69,70,93,94,96,97,98,99,100,103,104,117 **Kaligaudanahalii:**66,75 **Siddaiahanapura**: 7,42,43,44,228	Groundnut, Ragi, Horsegram	Custard apple, Amla	Custard apple, Amla, Drumstick, Fig	Drip irrigation, Mulching, Crop suitable conservation practices
LMU 8 (66 ha, 13%)	8, 9, 10 Shallow (25-50 cm), red clay soils	**Kaligaudanahalli:**76,77,78,79,80,81,82 **Pasainapura**: 33,34,35,36,37,38,39, 40,41,42,43 **Siddaiahanapura**: 1,45,122,140,141, 142,143,145,158,159, 160,162	Groundnut, Horsegram, Fieldbean, Ragi	Custard apple, Amla	Custard apple, Ber	Drip irrigation, Mulching, Crop suitable conservation practices
LMU 9 (3 ha, <1%)	28 Shallow (25-50 cm), gravelly, red clay soils (marginal lands)	**Karle**: 69	Groundnut, Horsegram	Custard apple, Amla	Custard apple, Ber	Drip irrigation, Mulching, Crop suitable conservation practices

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 health
- 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 un-favorable conditions occur

Characteristics of Kanivaihundi Microwatershed

The soil phases identified in the microwatershed belonged to the soil series of HGH (151.57 ha), MGH (70.31 ha), HDR (65.93), GPR (45.51 ha), DRH (38.86 ha), HPR (28.45 ha), KNG (22.14 ha), ARK (21.16 ha), MDH (18.26), KLP (11.85), BMB (4.74) and SPR (2.98 ha). As per land capability classification, about 96 per cent area in the microwatershed falls under arable land category (Class II, III and IV) and less than one per cent is under non arable lands (VIII). The major limitations identified in the arable and non arable lands were soil, wetness and erosion.

On the basis of soil reaction, small area of about is 26 ha (5%) moderately acid to slightly acid (pH 5.5-6.5), about 35 ha (7%) is under neutral (pH 6.5-7.3) and maximum area of about 422 ha (84%) is under slightly to strongly alkaline (pH 7.3-9.0).

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.

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 factor affecting the soil health in the microwatershed. Out of total 501 ha area in the microwatershed, an area of about 155 ha is suffering from moderate erosion. These areas need immediate soil and water conservation and, other land development and land husbandry practices for restoring soil health.

Disseminate information and communicate 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 younger farmers.

Inputs for Net Planning and Interventions needed

Net planning 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 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 Kanivaihundi microwatershed.

Organic Carbon: The OC content is medium (0.5-0.75%) in about 3 ha (<1%) area, low (<0.5%) in about 133 ha (27%) and high (>0.5%) in maximum area of about 346 ha (69%). 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 costs 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 501 ha area where OC is medium (0.5-0.75%) and low <0.5%). 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 11 ha (2%) area, the available phosphorus is low (<23 kg/ha), medium (23-57 kg/ha) in maximum area of about 404 ha (81 %) area and high (>57 kg/ha) in 67 ha (13%) area. Hence for all the crops, 25% additional P-needs to be applied, where available phosphorus is low and medium.

Available Potassium: Available potassium is medium in 105 ha (21%) area of the microwatershed, about 24 ha (5%) area is low (<145 kg/ha) in available potassium and maximum area of about 352 ha (70%) is high (>337 kg/ha) in available potassium. Hence, in all these plots, where available potassium is low and medium, for all the crops, additional 25 % potassium may be applied.

Available Sulphur: Available sulphur is a very critical nutrient for oilseed crops. It is low in a maximum area of 396 ha (79%) in the microwatershed and medium in 81 ha (16%) and high (>20 ppm) in small area of 5 ha (1%). These areas that are low and medium in available sulphur 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.

Available iron: It is deficient in a maximum area of 385 ha (77%) in the microwatershed. To manage iron deficiency, iron sulphate @ 25kg /ha needs to be applied for 2-3 years. It is sufficient in the rest of 96 ha (19 %) area in the microwatershed.

Available Zinc: It is deficient (<0.6 ppm) in maximum area of about 356 ha (71%) and sufficient in about 125 ha (25%) in the microwatershed. areas deficient in available zinc need application of zinc sulphate @25kg/ha.

Soil alkalinity: The microwatershed has 422 ha (84%) area with soils that are slightly to strongly alkaline. These areas need application of gypsum and wherever calcium is in excess, iron pyrites and element sulphur can be recommended. Management practices like treating repeatedly with good quality water to drain out the excess salts and provision of subsurface drainage and growing of salt tolerant crops like Casuarina, Acasia, Neem, Ber etc, are recommended.

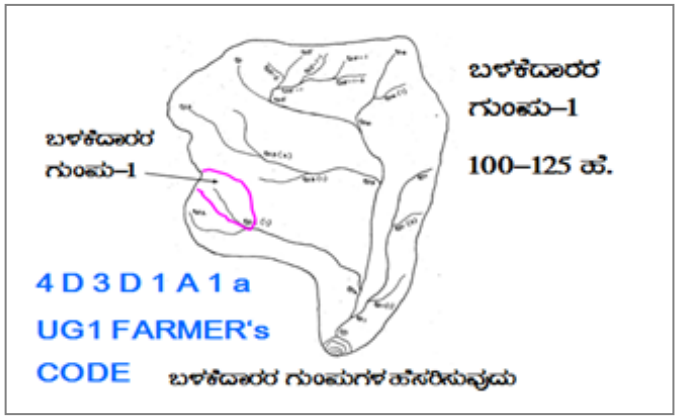
Land Suitability for various crops: Areas that are highly, moderately and marginally suitable for growing various crops are indicated. Along with the suitability, various constraints that are limiting the productivity are also indicated. For example, in case of cotton, gravel content, rooting depth and salinity/alkalinity 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 Kanivaihundi 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 has 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.

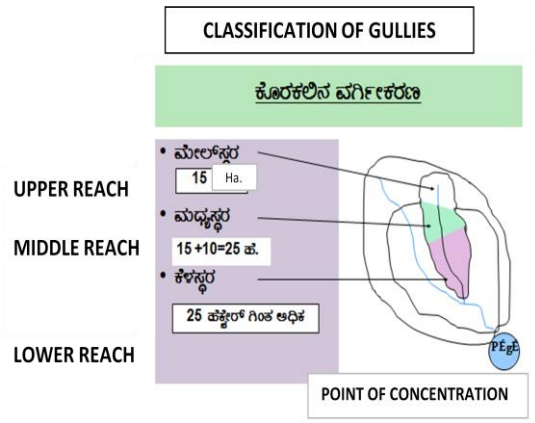
- Naming of user groups and farmers
- Identification of arable and non arable lands
- Identification of drainage lines and gullies
- Identification of non treatable areas
- Identification of priority areas in the arable lands
- Treatment plan for arable lands
- Location of water harvesting and recharge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

9.1 Treatment Plan

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

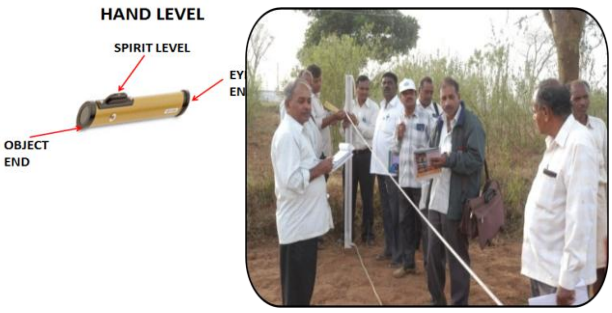
9.1.1 Arable Land Treatment

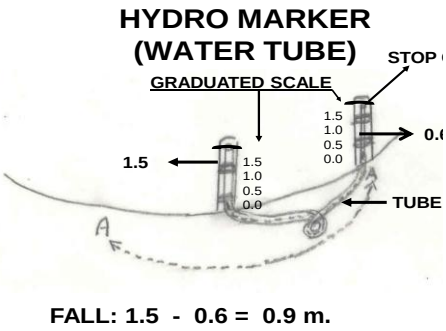
A. BUNDING

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.





FALL: 1.5 - 0.6 = 0.9 m.

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.

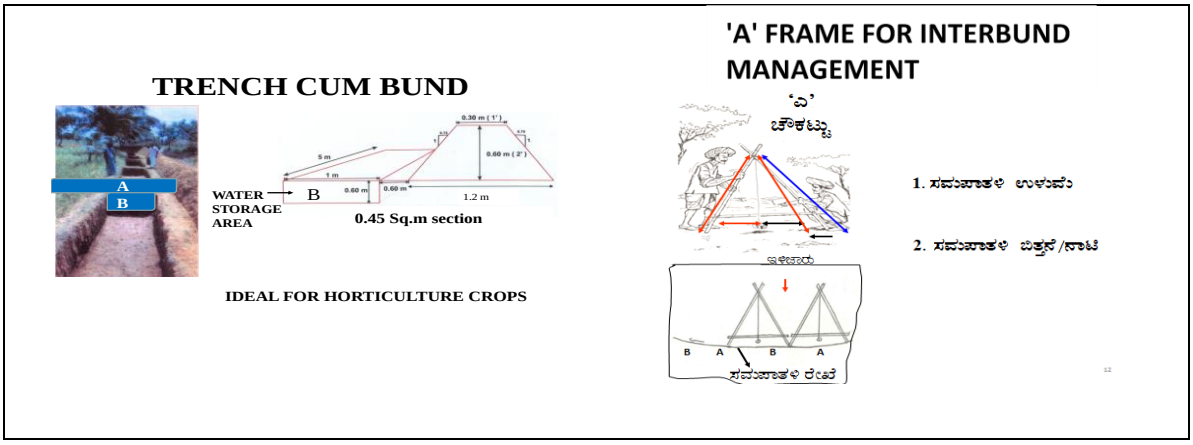
Recommended Bund Section

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 soils	
0.45	2	0.75	01:01	0.92		
0.45	2.4	0.75	1.3:1	1.07	Shallow black soils	
0.6	3.1	0.7	1.78:1	1.29	Medium black 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 Pits/ 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

a) Existing waterways are marked on the cadastral map (1:7920 scale) and their dimensions are recorded.

b) Considering the contour plan of the MWS, additional waterways/ modernization of the existing ones can be thought of.

c) 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 Bunds are 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 in water budgeting and quality of water in the wells and site suitability.
e) Detailed Levelling 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 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 earthern 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 461 ha (92%) requires trench cum bunding and a small area of about 21 ha (4%) needs graded bunds or strengthening of existing bunds. The conservation plan generated may be presented to all the stakeholders including farmers and after including their suggestions, the conservation plan for the microwatershed may be finalised in a participatory approach.

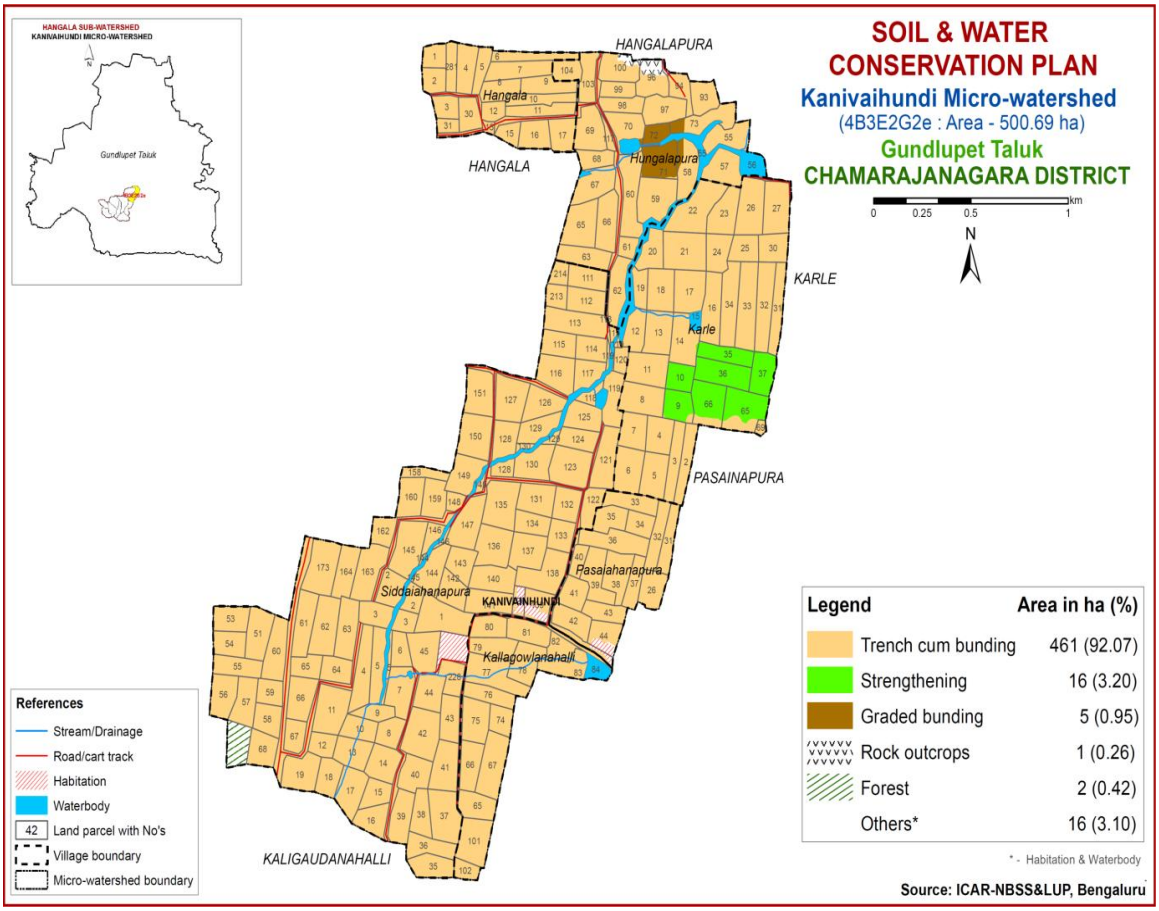


Fig. 9.1 Soil and Water Conservation Plan map of Kanivaihundi Microwatershed

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 Neral (*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				
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

Kanivaihundi Microsoft

Soil Phase Information

Village	Survey No.	Total Area (ha)	Soils phase	Land Management Unit	Soil Depth	Surface Soil Texture	Soil Gravelliness	AWC	Slope	Soil Erosion	CLU code	Land Capability	Conservation Plan
Hangala	1	1.25	MGHcB2g2	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	NA	IIes	Trench cum bunding
Hangala	2	1.34	MGHcB2g2	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	NA	IIes	Trench cum bunding
Hangala	3	1.3	MGHcB2g2	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut (Gn)	IIes	Trench cum bunding
Hangala	4	2.1	MGHcB2g2	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	NA	IIes	Trench cum bunding
Hangala	5	1.27	MGHcB2g2	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower+Tomato (Sf+To)	IIes	Trench cum bunding
Hangala	6	1.76	MGHcB2g2	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut+Current Fallow Land (Gn+CFL)	IIes	Trench cum bunding
Hangala	7	2.52	MGHcB2g2	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower+Tomato+Current Fallow land (Sf+To+CFL)	IIes	Trench cum bunding
Hangala	8	1.72	MGHcB2g2	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower+Cotton (Sf+Ct)	IIes	Trench cum bunding
Hangala	9	1.96	MGHcB2g2	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower+Turmeric (Sf+Tu)	IIes	Trench cum bunding
Hangala	10	1.72	MGHcB2g2	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower (Sf)	IIes	Trench cum bunding
Hangala	11	1.87	MGHcB2g2	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower+Groundnut (Sf+Gn)	IIes	Trench cum bunding
Hangala	12	1.02	MGHcB2g2	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower (Sf)	IIes	Trench cum bunding
Hangala	13	0.33	MGHcB2g2	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	NA	IIes	Trench cum bunding
Hangala	15	1.02	MGHcB2g2	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Current Fallow land (CFL)	IIes	Trench cum bunding
Hangala	16	1.98	MGHcB2g2	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Current Fallow land (CFL)	IIes	Trench cum bunding
Hangala	17	1.89	MGHcB2g2	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Jower (Jw)	IIes	Trench cum bunding
Hangala	30	1.58	MGHcB2g2	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Current Fallow land (CFL)	IIes	Trench cum bunding
Hangala	31	0.71	MGHcB2g2	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut (Gn)	IIes	Trench cum bunding
Hangala	281	1.23	MGHcB2g2	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	NA	IIes	Trench cum bunding
Hungalapura	55	2.37	HGHmB2	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower (Sf)	IIes	Trench cum bunding
Hungalapura	56_TANK	1.32	Waterbody	Others	Others	Others	Others	Others	Others	Others	Waterbody	Others	Others
Hungalapura	57	2.54	HGHmB2	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Current Fallow land (CFL)	IIes	Trench cum bunding

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Hungalapura	58	2.56	HGHmB2	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Banana (Bn)	IIes	Trench cum bunding
Hungalapura	59	3.45	HGHmB2	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Moderate	NA	IIes	Trench cum bunding
Hungalapura	60	3.55	HGHmB2	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower (Sf)	IIes	Trench cum bunding
Hungalapura	61	0.86	HGHmB2	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower (Sf)	IIes	Trench cum bunding
Hungalapura	62	2.39	HGHmB2	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar+Turmeric (Jw+Tu)	IIes	Trench cum bunding
Hungalapura	63	2.27	HGHmB1	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+Turmeric (Sf+Tu)	IIs	Trench cum bunding
Hungalapura	65	3.2	HGHmB2	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower (Sf)	IIes	Trench cum bunding
Hungalapura	66	2.67	HGHmB2	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower+Tomato (Sf+To)	IIes	Trench cum bunding
Hungalapura	67	2.61	HGHmB2	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower+Jower (Sf+Jw)	IIes	Trench cum bunding
Hungalapura	68	1.42	HGHmB2	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Moderate	NA	IIes	Trench cum bunding
Hungalapura	69	2.73	MGHcB2g1	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower+Groundnut (Sf+Gn)	IIes	Trench cum bunding
Hungalapura	70	2.28	MGHcB2g1	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut+Jowar (Gn+Jw)	IIes	Trench cum bunding
Hungalapura	71	2.72	BMBmB1	LMU-2	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Banana+Tomato (Bn+To)	IIw	Graded bunding
Hungalapura	72	1.15	BMBmB1	LMU-2	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Jower (Jw)	IIw	Graded bunding
Hungalapura	73	2.64	HGHmB2	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower+Cotton (Sf+Ct)	IIes	Trench cum bunding
Hungalapura	93	1.86	MGHcB2g1	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower+Ragi (Sf+Rg)	IIes	Trench cum bunding
Hungalapura	94	1.42	MGHcB2g1	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Jower (Jw)	IIes	Trench cum bunding
Hungalapura	96	2.34	MGHcB2g1	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower+Groundnut (Sf+Gn)	IIes	Trench cum bunding
Hungalapura	97	2.52	MGHcB2g1	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower+Tomato (Sf+To)	IIes	Trench cum bunding

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Hungalapura	98	1.54	MGHcB2g1	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower (Sf)	IIes	Trench cum bunding
Hungalapura	99	1.26	MGHcB2g1	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Tomato+Current Fallow land (To+CFL)	IIes	Trench cum bunding
Hungalapura	100	2.44	MGHcB2g1	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower+Tomato (Sf+To)	IIes	Trench cum bunding
Hungalapura	103	1.82	MGHcB2g2	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Jower+Current Fallow land (Jw+CFL)	IIes	Trench cum bunding
Hungalapura	104	1.36	MGHcB2g2	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut (Gn)	IIes	Trench cum bunding
Hungalapura	117	0.44	MGHcB2g1	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	NA	IIes	Trench cum bunding
Hungalapura	STREAM	3	Waterbody	Others	Others	Others	Others	Others	Others	Others	Waterbody	Others	Others
Hungalapura	TANK	0.58	Waterbody	Others	Others	Others	Others	Others	Others	Others	Waterbody	Others	Others
Kallagowlanahalli	65	2.1	KNGcB2g2	LMU-5	Moderately deep (75-100 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Current Fallow land (CFL)	IIes	Trench cum bunding
Kallagowlanahalli	66	2.21	MGHcB1	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower (Sf)	IIs	Trench cum bunding
Kallagowlanahalli	67	3.45	KLPbB1	LMU-4	Deep (100-150 cm)	Loamy sand	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower (Sf)	IIs	Trench cum bunding
Kallagowlanahalli	74	1.43	DRHhB1	LMU-6	Moderately shallow (50-75 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower (Sf)	IIs	Trench cum bunding
Kallagowlanahalli	75	2.56	MGHcB1	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower (Sf)	IIs	Trench cum bunding
Kallagowlanahalli	76	1.86	HDRiB1	LMU-8	Shallow (25-50 cm)	Sandy clay	Non gravelly (<15%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+Jower (Sf+Jw)	IIIs	Trench cum bunding
Kallagowlanahalli	77	3.57	HDRiB1	LMU-8	Shallow (25-50 cm)	Sandy clay	Non gravelly (<15%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+Cotton (Sf+Ct)	IIIs	Trench cum bunding
Kallagowlanahalli	78	2.55	HDRiB1	LMU-8	Shallow (25-50 cm)	Sandy clay	Non gravelly (<15%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower (Sf)	IIIs	Trench cum bunding
Kallagowlanahalli	79	2.02	HDRiB1	LMU-8	Shallow (25-50 cm)	Sandy clay	Non gravelly (<15%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower (Sf)	IIIs	Trench cum bunding
Kallagowlanahalli	80	1.78	HDRiB1	LMU-8	Shallow (25-50 cm)	Sandy clay	Non gravelly (<15%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower (Sf)	IIIs	Trench cum bunding
Kallagowlanahalli	81	2.13	HDRiB1	LMU-8	Shallow (25-50 cm)	Sandy clay	Non gravelly (<15%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower (Sf)	IIIs	Trench cum bunding
Kallagowlanahalli	82	1.33	HDRiB1	LMU-8	Shallow (25-50 cm)	Sandy clay	Non gravelly (<15%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Current Fallow land (CFL)	IIIs	Trench cum bunding
Kallagowlanahalli	83	2.12	DRHhB1	LMU-6	Moderately shallow (50-75 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Jower+Current Fallow land (Jw+CFL)	IIs	Trench cum bunding
Kallagowlanahalli	84_TANK	1.03	Waterbody	Others	Others	Others	Others	Others	Others	Others	Waterbody	Others	Others
Kallagowlanahalli	101	3.1	KNGcB2g2	LMU-5	Moderately deep (75-100 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Jower+Current Fallow land (Jw+CFL)	IIes	Trench cum bunding
Kallagowlanahalli	102	1	KNGcB2g2	LMU-5	Moderately deep (75-100 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Current Fallow land (CFL)	IIes	Trench cum bunding

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Karle	2	2.06	HGHmB1	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+Jower (Sf+Jw)	IIs	Trench cum bunding
Karle	3	2.11	KNGhB2g2	LMU-5	Moderately deep (75-100 cm)	Sandy clay loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower+Jower (Sf+Jw)	IIes	Trench cum bunding
Karle	4	2.13	KNGhB2g2	LMU-5	Moderately deep (75-100 cm)	Sandy clay loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower+Jower (Sf+Jw)	IIes	Trench cum bunding
Karle	5	2.53	KNGhB2g2	LMU-5	Moderately deep (75-100 cm)	Sandy clay loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower+Jower (Sf+Jw)	IIes	Trench cum bunding
Karle	6	2.79	KNGhB2g2	LMU-5	Moderately deep (75-100 cm)	Sandy clay loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower+Jower (Sf+Jw)	IIes	Trench cum bunding
Karle	7	2.12	KNGhB2g2	LMU-5	Moderately deep (75-100 cm)	Sandy clay loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower+Jower (Sf+Jw)	IIes	Trench cum bunding
Karle	8	2.96	KLPiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower+Jower (Sf+Jw)	IIes	Trench cum bunding
Karle	9	1.99	DRHiA1	LMU-6	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Sunflower+Turmeric (Sf+Tu)	IIs	Strengthening
Karle	10	1.64	DRHiA1	LMU-6	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Tomato (To)	IIs	Strengthening
Karle	11	2.96	KLPiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Turmeric+Current Fallow land (Tu+CFL)	IIes	Trench cum bunding
Karle	12	1.83	KLPiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Turmeric+Current Fallow land (Tu+CFL)	IIes	Trench cum bunding
Karle	13	2.65	KLPiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Turmeric+Banana (Tu+Bn)	IIes	Trench cum bunding
Karle	14	2.81	MDHiB1	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+Jower (Sf+Jw)	IIs	Trench cum bunding
Karle	15_TANK	0.45	Waterbody	Others	Others	Others	Others	Others	Others	Others	Waterbody	Others	Others
Karle	16	2.95	MDHiB1	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Banana+Current Fallow land (Bn+CFL)	IIs	Trench cum bunding
Karle	17	2.95	HPRmB2	LMU-6	Moderately shallow (50-75 cm)	Clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower+Jower (Sf+Jw)	IIes	Trench cum bunding
Karle	18	2.58	HPRmB2	LMU-6	Moderately shallow (50-75 cm)	Clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower (Sf)	IIes	Trench cum bunding
Karle	19	1.28	HPRmB2	LMU-6	Moderately shallow (50-75 cm)	Clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Current Fallow land (CFL)	IIes	Trench cum bunding
Karle	20	1.92	HPRmB2	LMU-6	Moderately shallow (50-75 cm)	Clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower+Jower (Sf+Jw)	IIes	Trench cum bunding
Karle	21	3.68	HPRmB2	LMU-6	Moderately shallow (50-75 cm)	Clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Turmeric+Banana (Tu+Bn)	IIes	Trench cum bunding
Karle	22	4.08	HPRmB2	LMU-6	Moderately shallow (50-75 cm)	Clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower+Jower (Sf+Jw)	IIes	Trench cum bunding
Karle	23	2.6	HPRiB1	LMU-6	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+Turmeric (Sf+Tu)	IIs	Trench cum bunding
Karle	24	2.02	HPRiB1	LMU-6	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Jower (Jw)	IIs	Trench cum bunding
Karle	25	1.71	HPRiB1	LMU-6	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Turmeric+Banana (Tu+Bn)	IIs	Trench cum bunding

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Karle	26	3.32	HPRiB1	LMU-6	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Turmeric (Tu)	IIs	Trench cum bunding
Karle	27	3.04	HPRiB1	LMU-6	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+Turmeric (Sf+Tu)	IIs	Trench cum bunding
Karle	30	1.89	HPRiB1	LMU-6	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Onion (On)	IIs	Trench cum bunding
Karle	31	2.23	MDHiB1	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+Jower (Sf+Jw)	IIs	Trench cum bunding
Karle	32	3.23	MDHiB1	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+Jower (Sf+Jw)	IIs	Trench cum bunding
Karle	33	3.77	MDHiB1	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+Jower (Sf+Jw)	IIs	Trench cum bunding
Karle	34	3.14	MDHiB1	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+Jower+Turmeric (Sf+Jw+Tu)	IIs	Trench cum bunding
Karle	35	2.02	DRHiA1	LMU-6	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Sunflower (Sf)	IIs	Strengthening
Karle	36	2.98	DRHiA1	LMU-6	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Sunflower+Jower (Sf+Jw)	IIs	Strengthening
Karle	37	2.15	DRHiA1	LMU-6	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Sunflower (Sf)	IIs	Strengthening
Karle	65	3.69	DRHiA1	LMU-6	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Sunflower+Jower (Sf+Jw)	IIs	Strengthening
Karle	66	3.18	DRHiA1	LMU-6	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Sunflower (Sf)	IIs	Strengthening
Karle	69	0.31	SPRiB1g1	LMU-9	Shallow (25-50 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	NA	IVs	Trench cum bunding
Karle	STREAM	1.48	Waterbody	Others	Others	Others	Others	Others	Others	Others	Waterbody	Others	Others
Pasaiahanapura	26	1.98	HGHmB1	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Banana (Bn)	IIs	Trench cum bunding
Pasaiahanapura	31	1.83	HGHmB1	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+Jower (Sf+Jw)	IIs	Trench cum bunding
Pasaiahanapura	32	1.98	HGHmB1	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+Jower (Sf+Jw)	IIs	Trench cum bunding
Pasaiahanapura	33	2.04	HDRhB1g1	LMU-8	Shallow (25-50 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+Jower (Sf+Jw)	IIIs	Trench cum bunding
Pasaiahanapura	34	1.42	HDRiB1g1	LMU-8	Shallow (25-50 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower (Sf)	IIIs	Trench cum bunding
Pasaiahanapura	35	1.79	HDRhB1g1	LMU-8	Shallow (25-50 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+Jower (Sf+Jw)	IIIs	Trench cum bunding
Pasaiahanapura	36	2.99	HDRhB1g1	LMU-8	Shallow (25-50 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+Jower (Sf+Jw)	IIIs	Trench cum bunding
Pasaiahanapura	37	1.6	HDRiB1g1	LMU-8	Shallow (25-50 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Jowar+Turmeric (Jw+Tu)	IIIs	Trench cum bunding
Pasaiahanapura	38	2.56	HDRiB1g1	LMU-8	Shallow (25-50 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Jower (Jw)	IIIs	Trench cum bunding
Pasaiahanapura	39	2.66	HDRhB1g1	LMU-8	Shallow (25-50 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Jower (Jw)	IIIs	Trench cum bunding

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Pasaiahanapura	40	0.99	HDRhB1g1	LMU-8	Shallow (25-50 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Cotton (Ct)	IIIs	Trench cum bunding
Pasaiahanapura	41	1.79	HDRhB1g1	LMU-8	Shallow (25-50 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Jower (Jw)	IIIs	Trench cum bunding
Pasaiahanapura	42	2.03	HDRhB1g1	LMU-8	Shallow (25-50 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Jower (Jw)	IIIs	Trench cum bunding
Pasaiahanapura	43	1.68	HDRhB1g1	LMU-8	Shallow (25-50 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Jower (Jw)	IIIs	Trench cum bunding
Pasaiahanapura	44	2.02	DRHhB1g1	LMU-6	Moderately shallow (50-75 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	NA	IIs	Trench cum bunding
Siddaiahanapura	1	3.61	HDRiB1g1	LMU-8	Shallow (25-50 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+Jower (Sf+Jw)	IIIs	Trench cum bunding
Siddaiahanapura	2	2.95	HGHiB1	LMU-3	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	NA	IIs	Trench cum bunding
Siddaiahanapura	3	2.81	HGHiB1	LMU-3	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	NA	IIs	Trench cum bunding
Siddaiahanapura	4	2.88	GPRhB1	LMU-5	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+Jower (Sf+Jw)	IIs	Trench cum bunding
Siddaiahanapura	5	2.68	HGHiB1	LMU-3	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+Jower (Sf+Jw)	IIs	Trench cum bunding
Siddaiahanapura	6	1.42	HGHiB1	LMU-3	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+Cotton (Sf+Ct)	IIs	Trench cum bunding
Siddaiahanapura	7	2.64	MGHhB1g1	LMU-7	Moderately shallow (50-75 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower (Sf)	IIs	Trench cum bunding
Siddaiahanapura	8	1.59	HGHiB1	LMU-3	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Jower (Jw)	IIs	Trench cum bunding
Siddaiahanapura	9	1.28	HGHiB1	LMU-3	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+Jower (Sf+Jw)	IIs	Trench cum bunding
Siddaiahanapura	10	1.73	HGHiB1	LMU-3	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower (Sf)	IIs	Trench cum bunding
Siddaiahanapura	11	3.35	HGHhB2	LMU-3	Very deep (>150 cm)	Sandy clay loam	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Moderate	NA	IIes	Trench cum bunding
Siddaiahanapura	12	1.36	HGHhB2	LMU-3	Very deep (>150 cm)	Sandy clay loam	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Turmeric (Tu)	IIes	Trench cum bunding
Siddaiahanapura	13	2.27	HGHiB1	LMU-3	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Jower (Jw)	IIs	Trench cum bunding
Siddaiahanapura	14	2.34	HGHiB1	LMU-3	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Jower (Jw)	IIs	Trench cum bunding
Siddaiahanapura	15	1.62	GPRcB1g1	LMU-5	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+Jower (Sf+Jw)	IIs	Trench cum bunding

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Siddaiahanapura	16	1.92	GPRcB1g1	LMU-5	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Jower (Jw)	IIs	Trench cum bunding
Siddaiahanapura	17	2.65	HGHhB2	LMU-3	Very deep (>150 cm)	Sandy clay loam	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower+ Brinjal (Sf+Br)	IIes	Trench cum bunding
Siddaiahanapura	18	1.87	HGHhB2	LMU-3	Very deep (>150 cm)	Sandy clay loam	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Turmeric (Tu)	IIes	Trench cum bunding
Siddaiahanapura	19	2.79	HGHhB2	LMU-3	Very deep (>150 cm)	Sandy clay loam	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Coconut+ Marigold (CN+Mg)	IIes	Trench cum bunding
Siddaiahanapura	35	2.11	GPRcB1g1	LMU-5	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Jower (Jw)	IIs	Trench cum bunding
Siddaiahanapura	36	2.07	GPRcB1g1	LMU-5	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Jower (Jw)	IIs	Trench cum bunding
Siddaiahanapura	37	3.37	GPRcB1g1	LMU-5	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Current Fallow land (CFL)	IIs	Trench cum bunding
Siddaiahanapura	38	1.84	GPRcB1g1	LMU-5	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Current Fallow land (CFL)	IIs	Trench cum bunding
Siddaiahanapura	39	2.38	GPRcB1g1	LMU-5	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Current Fallow land (CFL)	IIs	Trench cum bunding
Siddaiahanapura	40	2.24	GPRcB1g1	LMU-5	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+ Tomato (Sf+To)	IIs	Trench cum bunding
Siddaiahanapura	41	2.82	GPRcB1g1	LMU-5	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower (Sf)	IIs	Trench cum bunding
Siddaiahanapura	42	3.65	MGHhB1g1	LMU-7	Moderately shallow (50-75 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Coconut+ Jower (CN+Jw)	IIs	Trench cum bunding
Siddaiahanapura	43	2	MGHcB1	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Pomogrant (Pm)	IIs	Trench cum bunding
Siddaiahanapura	44	2.19	MGHhB1g1	LMU-7	Moderately shallow (50-75 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+ Jower (Sf+Jw)	IIs	Trench cum bunding
Siddaiahanapura	45	2.65	HDRiB1g1	LMU-8	Shallow (25-50 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+ Jower (Sf+Jw)	IIIs	Trench cum bunding
Siddaiahanapura	51	2.65	ARKiB1	LMU-1	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Coconut+ Sunflower (CN+Sf)	IIs	Trench cum bunding
Siddaiahanapura	53	2.03	ARKiB1	LMU-1	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Jowar+ Tomato (Jw+To)	IIs	Trench cum bunding
Siddaiahanapura	54	1.82	ARKiB1	LMU-1	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Onion (On)	IIs	Trench cum bunding
Siddaiahanapura	55	2.09	ARKiB1	LMU-1	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+ Tomato (Sf+To)	IIs	Trench cum bunding
Siddaiahanapura	56	4.52	ARKiB1	LMU-1	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Turmeric (Tu)	IIs	Trench cum bunding
Siddaiahanapura	57	2.33	ARKiB1	LMU-1	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Turmeric (Tu)	IIs	Trench cum bunding

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Siddaiahanapura	58	1.81	ARKiB1	LMU-1	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	NA	IIs	Trench cum bunding
Siddaiahanapura	59	1.46	ARKiB1	LMU-1	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	NA	IIs	Trench cum bunding
Siddaiahanapura	60	2.76	ARKiB1	LMU-1	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+ Turmeric (Sf+Tu)	IIs	Trench cum bunding
Siddaiahanapura	61	2.7	GPRhB1	LMU-5	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+Turmeric (Sf+Tu)	IIs	Trench cum bunding
Siddaiahanapura	62	3.28	GPRhB1	LMU-5	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Onion+Watermelon (On+Wm)	IIs	Trench cum bunding
Siddaiahanapura	63	2.73	GPRhB1	LMU-5	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+ Jower (Sf+Jw)	IIs	Trench cum bunding
Siddaiahanapura	64	1.73	GPRhB1	LMU-5	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Lemon (Le)	IIs	Trench cum bunding
Siddaiahanapura	65	1.52	GPRhB1	LMU-5	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Lemon (Le)	IIs	Trench cum bunding
Siddaiahanapura	66	2.51	GPRhB1	LMU-5	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Lemon (Le)	IIs	Trench cum bunding
Siddaiahanapura	67	1.47	GPRhB1	LMU-5	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Fallow land (Fl)	IIs	Trench cum bunding
Siddaiahanapura	68	2.09	ARKiB1	LMU-1	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	NA	IIs	Trench cum bunding
Siddaiahanapura	111	1.91	HGHmB1	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Turmeric+ Current Fallow land (Tu+CFL)	IIs	Trench cum bunding
Siddaiahanapura	112	2.11	HGHmB1	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Turmeric+ Banana (Tu+Bn)	IIs	Trench cum bunding
Siddaiahanapura	113	3.28	HGHmB1	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+ Turmeric+ Onion (Sf+Tu+On)	IIs	Trench cum bunding
Siddaiahanapura	114	1.7	HGHmB1	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+ Jower (Sf+Jw)	IIs	Trench cum bunding
Siddaiahanapura	115	1.92	HGHmB1	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+ Jower (Sf+Jw)	IIs	Trench cum bunding
Siddaiahanapura	116	2.79	HGHmB1	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+ Tomato (Sf+To)	IIs	Trench cum bunding
Siddaiahanapura	117	1.69	HGHmB1	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Banana (Bn)	IIs	Trench cum bunding
Siddaiahanapura	118	0.66	HGHmB1	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Banana (Bn)	IIs	Trench cum bunding
Siddaiahanapura	119	2.73	HGHmB1	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Groundnut+ Current Fallow Land (Gn+CFL)	IIs	Trench cum bunding
Siddaiahanapura	120	0.81	HGHmB1	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Tomato (To)	IIs	Trench cum bunding

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Siddaiahanapura	121	2.89	KNGhB2g2	LMU-5	Moderately deep (75-100 cm)	Sandy clay loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower (Sf)	IIes	Trench cum bunding
Siddaiahanapura	122	1.61	HDRhB1g1	LMU-8	Shallow (25-50 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower (Sf)	IIIs	Trench cum bunding
Siddaiahanapura	123	3.34	HGHmA1	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Nearly level (0-1%)	Slight	Jowar+ Tomato (Jw+To)	IIs	Trench cum bunding
Siddaiahanapura	124	1.79	HGHmB1	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Jower (Jw)	IIs	Trench cum bunding
Siddaiahanapura	125	2.12	HGHmB1	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower (Sf)	IIs	Trench cum bunding
Siddaiahanapura	126	2.31	HGHmB1	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+ Tomato (Sf+To)	IIs	Trench cum bunding
Siddaiahanapura	127	3.02	HGHmB1	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower (Sf)	IIs	Trench cum bunding
Siddaiahanapura	128	2.8	HGHmB1	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+ Jower (Sf+Jw)	IIs	Trench cum bunding
Siddaiahanapura	129	2.26	HGHmB1	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+ Tomato (Sf+To)	IIs	Trench cum bunding
Siddaiahanapura	130	2.73	HGHmB1	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+ Onion (Sf+On)	IIs	Trench cum bunding
Siddaiahanapura	131	2.46	HGHmA1	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Nearly level (0-1%)	Slight	Chilly (Ch)	IIs	Trench cum bunding
Siddaiahanapura	132	1.95	HGHmA1	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Nearly level (0-1%)	Slight	Sunflower+ Jower (Sf+Jw)	IIs	Trench cum bunding
Siddaiahanapura	133	1.71	HGHmA1	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Nearly level (0-1%)	Slight	Tomato+ Current Fallow land (To+CFL)	IIs	Trench cum bunding
Siddaiahanapura	134	1.69	HGHmA1	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Nearly level (0-1%)	Slight	Sunflower+ Banana (Sf+Bn)	IIs	Trench cum bunding
Siddaiahanapura	135	3.42	HGHmB1	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+ Turmeric (Sf+Tu)	IIs	Trench cum bunding
Siddaiahanapura	136	3.05	HGHmB1	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Jower (Jw)	IIs	Trench cum bunding
Siddaiahanapura	137	2.71	HGHmA1	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Nearly level (0-1%)	Slight	Jower+ Current Fallow land (Jw+CFL)	IIs	Trench cum bunding
Siddaiahanapura	138	3.34	DRHhB1g1	LMU-6	Moderately shallow (50-75 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+ Jower (Sf+Jw)	IIs	Trench cum bunding
Siddaiahanapura	139	1.76	DRHhB1g1	LMU-6	Moderately shallow (50-75 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	NA	IIs	Trench cum bunding
Siddaiahanapura	140	2.52	HDRiB1g1	LMU-8	Shallow (25-50 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+ Cotton (Sf+Ct)	IIIs	Trench cum bunding

Village	Survey No.	Total Area (ha)	Soils phase	Land Management Unit	Soil Depth	Surface Soil Texture	Soil Gravelliness	AWC	Slope	Soil Erosion	CLU code	Land Capability	Conservation Plan
Siddaiahanapura	141	2.39	HDRiB1g1	LMU-8	Shallow (25-50 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Jower (Jw)	IIIs	Trench cum bunding
Siddaiahanapura	142	1.9	HDRiB1g1	LMU-8	Shallow (25-50 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Jower (Jw)	IIIs	Trench cum bunding
Siddaiahanapura	143	1.89	HDRiB1g1	LMU-8	Shallow (25-50 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Turmeric (Tu)	IIIs	Trench cum bunding
Siddaiahanapura	144	2.44	HGHiB1	LMU-3	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Jower (Jw)	IIs	Trench cum bunding
Siddaiahanapura	145	3.43	HDRhB1g1	LMU-8	Shallow (25-50 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+ Jower (Sf+Jw)	IIIs	Trench cum bunding
Siddaiahanapura	146	1.06	HGHiB1	LMU-3	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Jower (Jw)	IIs	Trench cum bunding
Siddaiahanapura	147	3.07	HGHmB1	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Jowar+ Cotton (Jw+Ct)	IIs	Trench cum bunding
Siddaiahanapura	148	0.7	HGHiB1	LMU-3	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Jower (Jw)	IIs	Trench cum bunding
Siddaiahanapura	149	2.71	DRHhB1g1	LMU-6	Moderately shallow (50-75 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+ Jower (Sf+Jw)	IIs	Trench cum bunding
Siddaiahanapura	150	3.11	DRHhB1g1	LMU-6	Moderately shallow (50-75 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower (Sf)	IIs	Trench cum bunding
Siddaiahanapura	151	2.78	DRHhB1g1	LMU-6	Moderately shallow (50-75 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower (Sf)	IIs	Trench cum bunding
Siddaiahanapura	158	1.09	HDRhB1g1	LMU-8	Shallow (25-50 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower (Sf)	IIIs	Trench cum bunding
Siddaiahanapura	159	2	HDRhB1g1	LMU-8	Shallow (25-50 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower (Sf)	IIIs	Trench cum bunding
Siddaiahanapura	160	2.2	HDRhB1g1	LMU-8	Shallow (25-50 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+ Jower (Sf+Jw)	IIIs	Trench cum bunding
Siddaiahanapura	162	1.45	HDRhB1g1	LMU-8	Shallow (25-50 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Fallow land (Fl)	IIIs	Trench cum bunding
Siddaiahanapura	163	3.11	HGHiB2	LMU-3	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower (Sf)	IIes	Trench cum bunding
Siddaiahanapura	164	2.32	HGHiB2	LMU-3	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower (Sf)	IIes	Trench cum bunding
Siddaiahanapura	173	3.54	HGHiB2	LMU-3	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Moderate	NA	IIes	Trench cum bunding
Siddaiahanapura	213	1.14	HGHmB1	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Turmeric (Tu)	IIs	Trench cum bunding
Siddaiahanapura	214	0.92	HGHmB1	LMU-3	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very High (>200 mm/m)	Very gently sloping (1-3%)	Slight	Turmeric (Tu)	IIs	Trench cum bunding
Siddaiahanapura	226	0.78	Habitation	Others	Others	Others	Others	Others	Others	Others	NA	Others	Others
Siddaiahanapura	228	1.62	MGHhB1g1	LMU-7	Moderately shallow (50-75 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+ Jower (Sf+Jw)	IIs	Trench cum bunding

Appendix II

Kanivaihundi Microsoft

Soil Fertility Information

VILLAGE	Survey No.	Soil Reaction (pH)	Salinity (EC)	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Hangala	1	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Hangala	2	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	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 (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Hangala	3	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 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 (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Hangala	4	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Hangala	5	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Hangala	6	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	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 (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Hangala	7	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	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 (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Hangala	8	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Hangala	9	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (< 10 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Hangala	10	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Low (< 145 kg/ha)	Low (< 10 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Hangala	11	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Low (< 145 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Hangala	12	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (< 10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Hangala	13	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (< 10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Hangala	15	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Low (< 145 kg/ha)	Low (< 10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Hangala	16	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Low (< 145 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Hangala	17	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Low (< 145 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Hangala	30	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Hangala	31	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 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 (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Hangala	281	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Hungalapura	55	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Hungalapura	56_TANK	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Hungalapura	57	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Hungalapura	58	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)

VILLAGE	Survey No.	Soil Reaction (pH)	Salinity (EC)	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Hungalapura	59	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Hungalapura	60	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Hungalapura	61	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Hungalapura	62	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Hungalapura	63	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Hungalapura	65	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Hungalapura	66	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Hungalapura	67	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (< 10 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Hungalapura	68	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Hungalapura	69	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Hungalapura	70	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (< 10 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Hungalapura	71	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (< 10 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Hungalapura	72	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (< 10 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Hungalapura	73	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Hungalapura	93	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (< 10 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Hungalapura	94	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (< 10 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Hungalapura	96	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (< 10 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Hungalapura	97	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (< 10 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Hungalapura	98	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (< 10 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Hungalapura	99	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (< 10 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Hungalapura	100	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (< 10 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Hungalapura	103	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (< 10 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Hungalapura	104	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (< 10 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Hungalapura	117	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Kallagowlanahalli	65	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Low (< 145 kg/ha)	Low (< 10 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Kallagowlanahalli	66	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)

VILLAGE	Survey No.	Soil Reaction (pH)	Salinity (EC)	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Kallagowlanahalli	67	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Low (< 145 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Kallagowlanahalli	74	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Kallagowlanahalli	75	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Kallagowlanahalli	76	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Kallagowlanahalli	77	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Kallagowlanahalli	78	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Kallagowlanahalli	79	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Kallagowlanahalli	80	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (< 10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Kallagowlanahalli	81	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Kallagowlanahalli	82	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Low (<23 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Kallagowlanahalli	83	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Low (<23 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Kallagowlanahalli	84_TANK	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Kallagowlanahalli	101	Moderately acid (pH 5.5 – 6.0)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Low (< 145 kg/ha)	Low (< 10 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Kallagowlanahalli	102	Moderately acid (pH 5.5 – 6.0)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Low (< 145 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Karle	2	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	High (> 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Karle	3	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	High (> 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Karle	4	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	High (> 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Karle	5	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Karle	6	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Karle	7	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Karle	8	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	High (> 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Karle	9	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	High (> 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Karle	10	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	High (> 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Karle	11	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Karle	12	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)

VILLAGE	Survey No.	Soil Reaction (pH)	Salinity (EC)	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Karle	13	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Karle	14	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Karle	15_TANK	Others	Non saline (<2 dsm^{-1})	Others	Others	Others	Others	Others	Others	Others	Others	Others
Karle	16	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	High (> 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Karle	17	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Karle	18	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Karle	19	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Karle	20	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Karle	21	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Karle	22	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Karle	23	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Karle	24	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Karle	25	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Karle	26	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Karle	27	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Karle	30	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Karle	31	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Karle	32	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Karle	33	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	High (> 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Karle	34	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	High (> 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Karle	35	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	High (> 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Karle	36	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Karle	37	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Karle	65	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Karle	66	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	High (> 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)

VILLAGE	Survey No.	Soil Reaction (pH)	Salinity (EC)	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Karle	69	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Karle	STREAM	Others	Non saline (<2 dsm^{-1})	Others	Others	Others	Others	Others	Others	Others	Others	Others
Pasaiahanapura	26	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Pasaiahanapura	31	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Pasaiahanapura	32	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Pasaiahanapura	33	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Pasaiahanapura	34	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Pasaiahanapura	35	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Pasaiahanapura	36	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Pasaiahanapura	37	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Pasaiahanapura	38	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Pasaiahanapura	39	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Pasaiahanapura	40	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Pasaiahanapura	41	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Pasaiahanapura	42	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Low (<23 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Pasaiahanapura	43	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Pasaiahanapura	44	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Siddaiahanapura	1	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	2	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	3	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	4	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	5	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	6	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (< 10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	7	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (< 10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	8	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)

VILLAGE	Survey No.	Soil Reaction (pH)	Salinity (EC)	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Siddaiahanapura	9	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	10	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	11	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	12	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	13	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	High (> 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	14	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	High (> 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	15	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	16	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	17	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	High (> 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	18	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	19	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	35	Moderately acid (pH 5.5 – 6.0)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Low (< 145 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	36	Moderately acid (pH 5.5 – 6.0)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Low (< 145 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	37	Moderately acid (pH 5.5 – 6.0)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Low (< 145 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	38	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	39	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	40	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	41	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	42	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	43	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	44	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	45	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (< 10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	51	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Siddaiahanapura	53	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Siddaiahanapura	54	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	High (> 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Siddaiahanapura	55	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	High (> 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)

VILLAGE	Survey No.	Soil Reaction (pH)	Salinity (EC)	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Siddaiahanapura	56	Forest	Non saline (<2 dsm^{-1})	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	High (> 1.0 ppm)	Forest	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Siddaiahanapura	57	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	High (> 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Siddaiahanapura	58	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	High (> 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Siddaiahanapura	59	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	High (> 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Siddaiahanapura	60	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	High (> 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Siddaiahanapura	61	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	62	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	63	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	64	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	65	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	High (> 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	66	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	High (> 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	67	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	68	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Siddaiahanapura	111	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	112	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	113	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	114	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	115	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	116	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	117	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	118	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	119	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	120	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	121	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Siddaiahanapura	122	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Siddaiahanapura	123	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)

VILLAGE	Survey No.	Soil Reaction (pH)	Salinity (EC)	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Siddaiahanapura	124	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Siddaiahanapura	125	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	126	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	127	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	128	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	129	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	130	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	131	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	High (> 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Siddaiahanapura	132	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Siddaiahanapura	133	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Siddaiahanapura	134	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Siddaiahanapura	135	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	136	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	137	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Sufficient (> 0.6 ppm)
Siddaiahanapura	138	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	139	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	140	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	141	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (< 10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	142	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	143	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	144	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	145	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	146	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	147	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	148	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Low (<23 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	149	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Low (<23 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)

VILLAGE	Survey No.	Soil Reaction (pH)	Salinity (EC)	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Siddaiahanapura	150	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	151	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	158	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Low (<23 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	159	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	160	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	162	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	163	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	164	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	173	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	213	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	214	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)
Siddaiahanapura	226	Others	Non saline (<2 dsm^{-1})	Others	Others	Others	Others	Others	Others	Others	Others	Others
Siddaiahanapura	228	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm^{-1})	High (> 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.6 ppm)	Deficient (< 0.6 ppm)

Appendix III

Kanivaihundi Microsoft

Soil Suitability Information

Village	Survey No.	Sorghum	Maize	Redgram	Ground-nut	Sunflower	Cotton	Onion	Turmeric	Beetroot	Potato	Beans	Horsegram	Field bean	Guava	Mango	Sapota	Jackfruit	Jamun	Musambi	Lime	Cashew	Custardapple	Amla	Tamarind	Banana	Mari-gold	Chrysan-themum
Hangala	1	S3g	S3g	S2g	S3g	S3gr	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3gr	N	S3gr	S3gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S3gr	S3g	S3g	S3g
Hangala	2	S3g	S3g	S2g	S3g	S3gr	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3gr	N	S3gr	S3gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S3gr	S3g	S3g	S3g
Hangala	3	S3g	S3g	S2g	S3g	S3gr	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3gr	N	S3gr	S3gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S3gr	S3g	S3g	S3g
Hangala	4	S3g	S3g	S2g	S3g	S3gr	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3gr	N	S3gr	S3gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S3gr	S3g	S3g	S3g
Hangala	5	S3g	S3g	S2g	S3g	S3gr	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3gr	N	S3gr	S3gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S3gr	S3g	S3g	S3g
Hangala	6	S3g	S3g	S2g	S3g	S3gr	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3gr	N	S3gr	S3gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S3gr	S3g	S3g	S3g
Hangala	7	S3g	S3g	S2g	S3g	S3gr	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3gr	N	S3gr	S3gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S3gr	S3g	S3g	S3g
Hangala	8	S3g	S3g	S2g	S3g	S3gr	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3gr	N	S3gr	S3gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S3gr	S3g	S3g	S3g
Hangala	9	S3g	S3g	S2g	S3g	S3gr	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3gr	N	S3gr	S3gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S3gr	S3g	S3g	S3g
Hangala	10	S3g	S3g	S2g	S3g	S3gr	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3gr	N	S3gr	S3gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S3gr	S3g	S3g	S3g
Hangala	11	S3g	S3g	S2g	S3g	S3gr	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3gr	N	S3gr	S3gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S3gr	S3g	S3g	S3g
Hangala	12	S3g	S3g	S2g	S3g	S3gr	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3gr	N	S3gr	S3gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S3gr	S3g	S3g	S3g
Hangala	13	S3g	S3g	S2g	S3g	S3gr	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3gr	N	S3gr	S3gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S3gr	S3g	S3g	S3g
Hangala	15	S3g	S3g	S2g	S3g	S3gr	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3gr	N	S3gr	S3gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S3gr	S3g	S3g	S3g
Hangala	16	S3g	S3g	S2g	S3g	S3gr	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3gr	N	S3gr	S3gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S3gr	S3g	S3g	S3g
Hangala	17	S3g	S3g	S2g	S3g	S3gr	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3gr	N	S3gr	S3gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S3gr	S3g	S3g	S3g
Hangala	30	S3g	S3g	S2g	S3g	S3gr	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3gr	N	S3gr	S3gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S3gr	S3g	S3g	S3g
Hangala	31	S3g	S3g	S2g	S3g	S3gr	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3gr	N	S3gr	S3gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S3gr	S3g	S3g	S3g
Hangala	281	S3g	S3g	S2g	S3g	S3gr	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3gr	N	S3gr	S3gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S3gr	S3g	S3g	S3g
Hungalapura	55	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Hungalapura	56_TANK	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
Hungalapura	57	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Hungalapura	58	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Hungalapura	59	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Hungalapura	60	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Hungalapura	61	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1

Village	Survey No.	Sorghum	Maize	Redgram	Ground-nut	Sunflower	Cotton	Onion	Turmeric	Beetroot	Potato	Beans	Horsegram	Fieldbean	Guava	Mango	Sapota	Jackfruit	Jamun	Musambi	Lime	Cashew	Custardapple	Amla	Tamarind	Banana	Mari-gold	Chrysan-themum
Hungalapura	62	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Hungalapura	63	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Hungalapura	65	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Hungalapura	66	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Hungalapura	67	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Hungalapura	68	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Hungalapura	69	S3g	S3g	S2g	S3g	S3gr	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3gr	N	S3gr	S3gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S3gr	S3g	S3g	S3g
Hungalapura	70	S3g	S3g	S2g	S3g	S3gr	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3gr	N	S3gr	S3gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S3gr	S3g	S3g	S3g
Hungalapura	71	S1	S3wt	S2w	S3wt	S2W	S1	S2wt	S3wt	S3wt	S3wt	S2wt	S2w	S2w	N	N	S3wt	N	S1	S1	S1	N	S1	S1	S1	S2wt	S2wt	S2wt
Hungalapura	72	S1	S3wt	S2w	S3wt	S2W	S1	S2wt	S3wt	S3wt	S3wt	S2wt	S2w	S2w	N	N	S3wt	N	S1	S1	S1	N	S1	S1	S1	S2wt	S2wt	S2wt
Hungalapura	73	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Hungalapura	93	S3g	S3g	S2g	S3g	S3gr	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3gr	N	S3gr	S3gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S3gr	S3g	S3g	S3g
Hungalapura	94	S3g	S3g	S2g	S3g	S3gr	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3gr	N	S3gr	S3gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S3gr	S3g	S3g	S3g
Hungalapura	96	S3g	S3g	S2g	S3g	S3gr	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3gr	N	S3gr	S3gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S3gr	S3g	S3g	S3g
Hungalapura	97	S3g	S3g	S2g	S3g	S3gr	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3gr	N	S3gr	S3gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S3gr	S3g	S3g	S3g
Hungalapura	98	S3g	S3g	S2g	S3g	S3gr	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3gr	N	S3gr	S3gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S3gr	S3g	S3g	S3g
Hungalapura	99	S3g	S3g	S2g	S3g	S3gr	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3gr	N	S3gr	S3gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S3gr	S3g	S3g	S3g
Hungalapura	100	S3g	S3g	S2g	S3g	S3gr	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3gr	N	S3gr	S3gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S3gr	S3g	S3g	S3g
Hungalapura	103	S3g	S3g	S2g	S3g	S3gr	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3gr	N	S3gr	S3gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S3gr	S3g	S3g	S3g
Hungalapura	104	S3g	S3g	S2g	S3g	S3gr	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3gr	N	S3gr	S3gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S3gr	S3g	S3g	S3g
Hungalapura	117	S3g	S3g	S2g	S3g	S3gr	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3gr	N	S3gr	S3gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S3gr	S3g	S3g	S3g
Hungalapura	STREAM	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
Hungalapura	TANK	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
Kallagowlanahalli	65	S2g	S3g	S3rg	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2gr	S3gr	S2gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S2gr	S3gr	S3rg	S2g	S2g

Village	Survey No.	Sorghum	Maize	Redgram	Ground-nut	Sunflower	Cotton	Onion	Turmeric	Beetroot	Potato	Beans	Horsegram	Fieldbean	Guava	Mango	Sapota	Jackfruit	Jamun	Musambi	Lime	Cashew	Custardapple	Amla	Tamarind	Banana	Mari-gold	Chrysan-themum
Kallagowlanahalli	66	S3g	S3g	S2g	S3g	S3gr	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3gr	N	S3gr	S3gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S3gr	S3g	S3g	S3g
Kallagowlanahalli	67	S1	S1	S1	S2t	S2gt	S2t	S2g	S2g	S2g	S2g	S2g	S1	S2g	S1	S2r	S2r	S2r	S2r	S2r	S2r	S1	S1	S1	S2r	S2g	S1	S2g
Kallagowlanahalli	74	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	N	S3t	S3r	S3r	S3r	S3r	S3r	S2r	S2r	N	S3r	S2r	S2r
Kallagowlanahalli	75	S3g	S3g	S2g	S3g	S3gr	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3gr	N	S3gr	S3gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S3gr	S3g	S3g	S3g
Kallagowlanahalli	76	S3r	S3r	Nr	S3r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	N	N	N	N	N	N	N	N	S3r	S3r	N	Nr	S3r	S3r
Kallagowlanahalli	77	S3r	S3r	Nr	S3r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	N	N	N	N	N	N	N	N	S3r	S3r	N	Nr	S3r	S3r
Kallagowlanahalli	78	S3r	S3r	Nr	S3r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	N	N	N	N	N	N	N	N	S3r	S3r	N	Nr	S3r	S3r
Kallagowlanahalli	79	S3r	S3r	Nr	S3r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	N	N	N	N	N	N	N	N	S3r	S3r	N	Nr	S3r	S3r
Kallagowlanahalli	80	S3r	S3r	Nr	S3r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	N	N	N	N	N	N	N	N	S3r	S3r	N	Nr	S3r	S3r
Kallagowlanahalli	81	S3r	S3r	Nr	S3r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	N	N	N	N	N	N	N	N	S3r	S3r	N	Nr	S3r	S3r
Kallagowlanahalli	82	S3r	S3r	Nr	S3r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	N	N	N	N	N	N	N	N	S3r	S3r	N	Nr	S3r	S3r
Kallagowlanahalli	83	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	N	S3t	S3r	S3r	S3r	S3r	S3r	S2r	S2r	N	S3r	S2r	S2r
Kallagowlanahalli	84_TANK	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
Kallagowlanahalli	101	S2g	S3g	S3rg	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2gr	S3gr	S2gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S2gr	S3gr	S3rg	S2g	S2g
Kallagowlanahalli	102	S2g	S3g	S3rg	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2gr	S3gr	S2gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S2gr	S3gr	S3rg	S2g	S2g
Karle	2	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Karle	3	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S2gr	S3gr	S2gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S2gr	S3gr	S3g	S3g	S2g
Karle	4	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S2gr	S3gr	S2gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S2gr	S3gr	S3g	S3g	S2g
Karle	5	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S2gr	S3gr	S2gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S2gr	S3gr	S3g	S3g	S2g
Karle	6	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S2gr	S3gr	S2gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S2gr	S3gr	S3g	S3g	S2g
Karle	7	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S2gr	S3gr	S2gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S2gr	S3gr	S3g	S3g	S2g
Karle	8	S1	S1	S1	S2t	S2gt	S2t	S2g	S2g	S2g	S2g	S2g	S1	S2g	S1	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S1	S1	S2r	S2g	S1	S2g
Karle	9	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3t	N	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	N	S3r	S2r	S2r
Karle	10	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3t	N	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	N	S3r	S2r	S2r
Karle	11	S1	S1	S1	S2t	S2gt	S2t	S2g	S2g	S2g	S2g	S2g	S1	S2g	S1	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S1	S1	S2r	S2g	S1	S2g

Village	Survey No.	Sorghum	Maize	Redgram	Ground-nut	Sunflower	Cotton	Onion	Turmeric	Beetroot	Potato	Beans	Horsegram	Fieldbean	Guava	Mango	Sapota	Jackfruit	Jamun	Musambi	Lime	Cashew	Custardapple	Amla	Tamarind	Banana	Mari-gold	Chrysan-themum
Karle	12	S1	S1	S1	S2t	S2gt	S2t	S2g	S2g	S2g	S2g	S2g	S1	S2g	S1	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S1	S1	S2r	S2g	S1	S2g
Karle	13	S1	S1	S1	S2t	S2gt	S2t	S2g	S2g	S2g	S2g	S2g	S1	S2g	S1	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S1	S1	S2r	S2g	S1	S2g
Karle	14	S2g	S2g	S2g	S2g	S3g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S1	S2gr	S1	S2gr	S2gr	S2gr	S2gr	S1	S1	S1	S2gr	S2g	S2g	S2g
Karle	15_TANK	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
Karle	16	S2g	S2g	S2g	S2g	S3g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S1	S2gr	S1	S2gr	S2gr	S2gr	S2gr	S1	S1	S1	S2gr	S2g	S2g	S2g
Karle	17	S2r	S2r	S3r	S2rt	S3r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	N	S3r	S3r	S3r	S3r	S3rt	S2r	S2r	S2r	S3r	S3r	S2r	S2r
Karle	18	S2r	S2r	S3r	S2rt	S3r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	N	S3r	S3r	S3r	S3r	S3rt	S2r	S2r	S2r	S3r	S3r	S2r	S2r
Karle	19	S2r	S2r	S3r	S2rt	S3r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	N	S3r	S3r	S3r	S3r	S3rt	S2r	S2r	S2r	S3r	S3r	S2r	S2r
Karle	20	S2r	S2r	S3r	S2rt	S3r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	N	S3r	S3r	S3r	S3r	S3rt	S2r	S2r	S2r	S3r	S3r	S2r	S2r
Karle	21	S2r	S2r	S3r	S2rt	S3r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	N	S3r	S3r	S3r	S3r	S3rt	S2r	S2r	S2r	S3r	S3r	S2r	S2r
Karle	22	S2r	S2r	S3r	S2rt	S3r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	N	S3r	S3r	S3r	S3r	S3rt	S2r	S2r	S2r	S3r	S3r	S2r	S2r
Karle	23	S2r	S2r	S3r	S2rt	S3r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	N	S3r	S3r	S3r	S3r	S3rt	S2r	S2r	S2r	S3r	S3r	S2r	S2r
Karle	24	S2r	S2r	S3r	S2rt	S3r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	N	S3r	S3r	S3r	S3r	S3rt	S2r	S2r	S2r	S3r	S3r	S2r	S2r
Karle	25	S2r	S2r	S3r	S2rt	S3r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	N	S3r	S3r	S3r	S3r	S3rt	S2r	S2r	S2r	S3r	S3r	S2r	S2r
Karle	26	S2r	S2r	S3r	S2rt	S3r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	N	S3r	S3r	S3r	S3r	S3rt	S2r	S2r	S2r	S3r	S3r	S2r	S2r
Karle	27	S2r	S2r	S3r	S2rt	S3r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	N	S3r	S3r	S3r	S3r	S3rt	S2r	S2r	S2r	S3r	S3r	S2r	S2r
Karle	30	S2r	S2r	S3r	S2rt	S3r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	N	S3r	S3r	S3r	S3r	S3rt	S2r	S2r	S2r	S3r	S3r	S2r	S2r
Karle	31	S2g	S2g	S2g	S2g	S3g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S1	S2gr	S1	S2gr	S2gr	S2gr	S2gr	S1	S1	S1	S2gr	S2g	S2g	S2g
Karle	32	S2g	S2g	S2g	S2g	S3g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S1	S2gr	S1	S2gr	S2gr	S2gr	S2gr	S1	S1	S1	S2gr	S2g	S2g	S2g
Karle	33	S2g	S2g	S2g	S2g	S3g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S1	S2gr	S1	S2gr	S2gr	S2gr	S2gr	S1	S1	S1	S2gr	S2g	S2g	S2g
Karle	34	S2g	S2g	S2g	S2g	S3g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S2g	S1	S2gr	S1	S2gr	S2gr	S2gr	S2gr	S1	S1	S1	S2gr	S2g	S2g	S2g
Karle	35	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3t	N	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	N	S3r	S2r	S2r
Karle	36	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3t	N	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	N	S3r	S2r	S2r
Karle	37	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3t	N	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	N	S3r	S2r	S2r
Karle	65	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3t	N	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	N	S3r	S2r	S2r
Karle	66	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3t	N	S3r	S3r	S3r	S3r	S3r	S3r	S2r	S2r	N	S3r	S2r	S2r
Karle	69	S3gr	S3gr	Ngr	S3gr	Ngr	S3gr	S3gr	S3gr	S3gr	S3gr	S3gr	S3gr	S3gr	N	N	N	N	N	N	N	N	S3r	S3r	N	Nr	S3gr	S3gr
Pasaiahanapura	26	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1

Village	Survey No.	Sorghum	Maize	Redgram	Ground-nut	Sunflower	Cotton	Onion	Turmeric	Beetroot	Potato	Beans	Horsegram	Fieldbean	Guava	Mango	Sapota	Jackfruit	Jamun	Musambi	Lime	Cashew	Custardapple	Amla	Tamarind	Banana	Mari-gold	Chrysan-themum
Pasaiahanapura	31	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Pasaiahanapura	32	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Pasaiahanapura	33	S3r	S3r	Nr	S3r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	N	N	N	N	N	N	N	N	S3r	S3r	N	Nr	S3r	S3r
Pasaiahanapura	34	S3r	S3r	Nr	S3r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	N	N	N	N	N	N	N	N	S3r	S3r	N	Nr	S3r	S3r
Pasaiahanapura	35	S3r	S3r	Nr	S3r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	N	N	N	N	N	N	N	N	S3r	S3r	N	Nr	S3r	S3r
Pasaiahanapura	36	S3r	S3r	Nr	S3r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	N	N	N	N	N	N	N	N	S3r	S3r	N	Nr	S3r	S3r
Pasaiahanapura	37	S3r	S3r	Nr	S3r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	N	N	N	N	N	N	N	N	S3r	S3r	N	Nr	S3r	S3r
Pasaiahanapura	38	S3r	S3r	Nr	S3r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	N	N	N	N	N	N	N	N	S3r	S3r	N	Nr	S3r	S3r
Pasaiahanapura	39	S3r	S3r	Nr	S3r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	N	N	N	N	N	N	N	N	S3r	S3r	N	Nr	S3r	S3r
Pasaiahanapura	40	S3r	S3r	Nr	S3r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	N	N	N	N	N	N	N	N	S3r	S3r	N	Nr	S3r	S3r
Pasaiahanapura	41	S3r	S3r	Nr	S3r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	N	N	N	N	N	N	N	N	S3r	S3r	N	Nr	S3r	S3r
Pasaiahanapura	42	S3r	S3r	Nr	S3r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	N	N	N	N	N	N	N	N	S3r	S3r	N	Nr	S3r	S3r
Pasaiahanapura	43	S3r	S3r	Nr	S3r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	N	N	N	N	N	N	N	N	S3r	S3r	N	Nr	S3r	S3r
Pasaiahanapura	44	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	N	S3t	S3r	S3r	S3r	S3r	S3r	S2r	S2r	N	S3r	S2r	S2r
Siddaiahanapura	1	S3r	S3r	Nr	S3r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	N	N	N	N	N	N	N	N	S3r	S3r	N	Nr	S3r	S3r
Siddaiahanapura	2	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiahanapura	3	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiahanapura	4	S1	S1	S1	S1	S2gt	S2t	S2g	S2g	S2g	S2g	S2g	S1	S2g	S3t	S2r	S2r	S3r	S3r	S3r	S3rt	S2r	S2r	S2r	S2r	S2g	S1	S2g
Siddaiahanapura	5	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiahanapura	6	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiahanapura	7	S3g	S3g	S2g	S3g	S3gr	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3gr	N	S3gr	S3gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S3gr	S3g	S3g	S3g
Siddaiahanapura	8	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiahanapura	9	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiahanapura	10	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiahanapura	11	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1

Village	Survey No.	Sorghum	Maize	Redgram	Ground-nut	Sunflower	Cotton	Onion	Turmeric	Beetroot	Potato	Beans	Horsegram	Fieldbean	Guava	Mango	Sapota	Jackfruit	Jamun	Musambi	Lime	Cashew	Custardapple	Amla	Tamarind	Banana	Mari-gold	Chrysan-themum
Siddaiah anapura	12	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	13	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	14	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	15	S1	S1	S1	S1	S2gt	S2t	S2g	S2g	S2g	S2g	S2g	S1	S2g	S3t	S2r	S3r	S3r	S3r	S3r	S3rt	S2r	S2r	S2r	S2r	S2g	S1	S2g
Siddaiah anapura	16	S1	S1	S1	S1	S2gt	S2t	S2g	S2g	S2g	S2g	S2g	S1	S2g	S3t	S2r	S3r	S3r	S3r	S3r	S3rt	S2r	S2r	S2r	S2r	S2g	S1	S2g
Siddaiah anapura	17	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	18	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	19	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	35	S1	S1	S1	S1	S2gt	S2t	S2g	S2g	S2g	S2g	S2g	S1	S2g	S3t	S2r	S3r	S3r	S3r	S3r	S3rt	S2r	S2r	S2r	S2r	S2g	S1	S2g
Siddaiah anapura	36	S1	S1	S1	S1	S2gt	S2t	S2g	S2g	S2g	S2g	S2g	S1	S2g	S3t	S2r	S3r	S3r	S3r	S3r	S3rt	S2r	S2r	S2r	S2r	S2g	S1	S2g
Siddaiah anapura	37	S1	S1	S1	S1	S2gt	S2t	S2g	S2g	S2g	S2g	S2g	S1	S2g	S3t	S2r	S3r	S3r	S3r	S3r	S3rt	S2r	S2r	S2r	S2r	S2g	S1	S2g
Siddaiah anapura	38	S1	S1	S1	S1	S2gt	S2t	S2g	S2g	S2g	S2g	S2g	S1	S2g	S3t	S2r	S3r	S3r	S3r	S3r	S3rt	S2r	S2r	S2r	S2r	S2g	S1	S2g
Siddaiah anapura	39	S1	S1	S1	S1	S2gt	S2t	S2g	S2g	S2g	S2g	S2g	S1	S2g	S3t	S2r	S3r	S3r	S3r	S3r	S3rt	S2r	S2r	S2r	S2r	S2g	S1	S2g
Siddaiah anapura	40	S1	S1	S1	S1	S2gt	S2t	S2g	S2g	S2g	S2g	S2g	S1	S2g	S3t	S2r	S3r	S3r	S3r	S3r	S3rt	S2r	S2r	S2r	S2r	S2g	S1	S2g
Siddaiah anapura	41	S1	S1	S1	S1	S2gt	S2t	S2g	S2g	S2g	S2g	S2g	S1	S2g	S3t	S2r	S3r	S3r	S3r	S3r	S3rt	S2r	S2r	S2r	S2r	S2g	S1	S2g
Siddaiah anapura	42	S3g	S3g	S2g	S3g	S3gr	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3gr	N	S3gr	S3gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S3gr	S3g	S3g	S3g
Siddaiah anapura	43	S3g	S3g	S2g	S3g	S3gr	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3gr	N	S3gr	S3gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S3gr	S3g	S3g	S3g
Siddaiah anapura	44	S3g	S3g	S2g	S3g	S3gr	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3gr	N	S3gr	S3gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S3gr	S3g	S3g	S3g
Siddaiah anapura	45	S3r	S3r	Nr	S3r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	N	N	N	N	N	N	N	N	S3r	S3r	N	Nr	S3r	S3r
Siddaiah anapura	51	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	53	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	54	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	55	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	56	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	57	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1

Village	Survey No.	Sorghum	Maize	Redgram	Groundnut	Sunflower	Cotton	Onion	Turmeric	Beetroot	Potato	Beans	Horsegram	Fieldbean	Guava	Mango	Sapota	Jackfruit	Jamun	Musambi	Lime	Cashew	Custardapple	Amla	Tamarind	Banana	Mari-gold	Chrysan-themum
Siddaiah anapura	58	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	59	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	60	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	61	S1	S1	S1	S1	S2gt	S2t	S2g	S2g	S2g	S2g	S2g	S1	S2g	S3t	S2r	S2r	S3r	S3r	S3r	S3rt	S2r	S2r	S2r	S2r	S2g	S1	S2g
Siddaiah anapura	62	S1	S1	S1	S1	S2gt	S2t	S2g	S2g	S2g	S2g	S2g	S1	S2g	S3t	S2r	S2r	S3r	S3r	S3r	S3rt	S2r	S2r	S2r	S2r	S2g	S1	S2g
Siddaiah anapura	63	S1	S1	S1	S1	S2gt	S2t	S2g	S2g	S2g	S2g	S2g	S1	S2g	S3t	S2r	S2r	S3r	S3r	S3r	S3rt	S2r	S2r	S2r	S2r	S2g	S1	S2g
Siddaiah anapura	64	S1	S1	S1	S1	S2gt	S2t	S2g	S2g	S2g	S2g	S2g	S1	S2g	S3t	S2r	S2r	S3r	S3r	S3r	S3rt	S2r	S2r	S2r	S2r	S2g	S1	S2g
Siddaiah anapura	65	S1	S1	S1	S1	S2gt	S2t	S2g	S2g	S2g	S2g	S2g	S1	S2g	S3t	S2r	S2r	S3r	S3r	S3r	S3rt	S2r	S2r	S2r	S2r	S2g	S1	S2g
Siddaiah anapura	66	S1	S1	S1	S1	S2gt	S2t	S2g	S2g	S2g	S2g	S2g	S1	S2g	S3t	S2r	S2r	S3r	S3r	S3r	S3rt	S2r	S2r	S2r	S2r	S2g	S1	S2g
Siddaiah anapura	67	S1	S1	S1	S1	S2gt	S2t	S2g	S2g	S2g	S2g	S2g	S1	S2g	S3t	S2r	S2r	S3r	S3r	S3r	S3rt	S2r	S2r	S2r	S2r	S2g	S1	S2g
Siddaiah anapura	68	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	111	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	112	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	113	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	114	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	115	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	116	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	117	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	118	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	119	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	120	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	121	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S2gr	S3gr	S2gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S2gr	S3gr	S3g	S3g	S2g
Siddaiah anapura	122	S3r	S3r	Nr	S3r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	N	N	N	N	N	N	N	N	S3r	S3r	N	Nr	S3r	S3r
Siddaiah anapura	123	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	124	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1

Village	Survey No.	Sorghum	Maize	Redgram	Ground-nut	Sunflower	Cotton	Onion	Turmeric	Beetroot	Potato	Beans	Horsegram	Fieldbean	Guava	Mango	Sapota	Jackfruit	Jamun	Musambi	Lime	Cashew	Custardapple	Amla	Tamarind	Banana	Mari-gold	Chrysan-themum
Siddaiah anapura	125	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	126	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	127	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	128	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	129	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	130	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	131	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	132	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	133	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	134	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	135	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	136	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	137	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	138	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	N	S3t	S3r	S3r	S3r	S3r	S3r	S2r	S2r	N	S3r	S2r	S2r
Siddaiah anapura	139	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	N	S3t	S3r	S3r	S3r	S3r	S3r	S2r	S2r	N	S3r	S2r	S2r
Siddaiah anapura	140	S3r	S3r	Nr	S3r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	N	N	N	N	N	N	N	N	S3r	S3r	N	Nr	S3r	S3r
Siddaiah anapura	141	S3r	S3r	Nr	S3r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	N	N	N	N	N	N	N	N	S3r	S3r	N	Nr	S3r	S3r
Siddaiah anapura	142	S3r	S3r	Nr	S3r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	N	N	N	N	N	N	N	N	S3r	S3r	N	Nr	S3r	S3r
Siddaiah anapura	143	S3r	S3r	Nr	S3r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	N	N	N	N	N	N	N	N	S3r	S3r	N	Nr	S3r	S3r
Siddaiah anapura	144	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	145	S3r	S3r	Nr	S3r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	N	N	N	N	N	N	N	N	S3r	S3r	N	Nr	S3r	S3r
Siddaiah anapura	146	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	147	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	148	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	149	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	N	S3t	S3r	S3r	S3r	S3r	S3r	S2r	S2r	N	S3r	S2r	S2r

Village	Survey No.	Sorghum	Maize	Redgram	Ground-nut	Sunflower	Cotton	Onion	Turmeric	Beetroot	Potato	Beans	Horsegram	Fieldbean	Guava	Mango	Sapota	Jackfruit	Jamun	Musambi	Lime	Cashew	Custardapple	Amla	Tamarind	Banana	Mari-gold	Chrysan-themum
Siddaiah anapura	150	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	N	S3t	S3r	S3r	S3r	S3r	S3r	S2r	S2r	N	S3r	S2r	S2r
Siddaiah anapura	151	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	N	S3t	S3r	S3r	S3r	S3r	S3r	S2r	S2r	N	S3r	S2r	S2r
Siddaiah anapura	158	S3r	S3r	Nr	S3r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	N	N	N	N	N	N	N	N	S3r	S3r	N	Nr	S3r	S3r
Siddaiah anapura	159	S3r	S3r	Nr	S3r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	N	N	N	N	N	N	N	N	S3r	S3r	N	Nr	S3r	S3r
Siddaiah anapura	160	S3r	S3r	Nr	S3r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	N	N	N	N	N	N	N	N	S3r	S3r	N	Nr	S3r	S3r
Siddaiah anapura	162	S3r	S3r	Nr	S3r	Nr	S3r	S3r	S3r	S3r	S3r	S3r	S3r	S3r	N	N	N	N	N	N	N	N	S3r	S3r	N	Nr	S3r	S3r
Siddaiah anapura	163	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	164	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	173	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	213	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	214	S2t	S1	S1	S2t	S2t	S3t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Siddaiah anapura	226	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
Siddaiah anapura	228	S3g	S3g	S2g	S3g	S3gr	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S3gr	N	S3gr	S3gr	S3gr	S3gr	S3gr	S3gr	S2gr	S2gr	S3gr	S3g	S3g	S3g

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: *Kanivaihundi Microwatershed (Hangala sub-watershed, Gundlupet taluk, Chamarajanagar district) is located in between $11^0 42'$ – $11^0 44'$ North latitudes and $76^0 38'$ – $76^0 40'$ East longitudes, covering an area of about 501 ha, bounded by Hangala, Hangalapura, Karle, Pasainapura and Kaligaudanahalli villages with 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 Kanivaihundi Microwatershed (Hangala sub-watershed, Gundlupet taluk, Chamarajanagar district) are presented here.*

Social Indicators

- *Male and female ratio is 45.4 to 54.6 per cent to the total sample population.*
- *Younger age 18 to 50 years group of population is around 48.5 per cent to the total population.*
- *Literacy population is around 66.5 per cent.*
- *Social groups belong to other backward caste (OBC) is around 75.0 per cent.*
- *Liquefied petroleum gas is the source of energy for a cooking among 79.0 per cent.*
- *About 50.0 per cent of households have a yashaswini health card.*
- *Dependence on ration cards for food grains through public distribution system is around 70.0 per cent.*
- *Swach bharath program providing closed toilet facilities around 62.5 per cent of sample households.*
- *Institutional participation is only 3.0 per cent of sample households.*
- *Women participation in decisions making are around 25 per cent of households were found.*

Economic Indicators

- *The average land holding is 1.85 ha indicates that majority of farm households are belong to small farmers. The dry land account for 34.3 per cent and irrigated land 65.7 per cent of total cultivated land area among the sample farmers.*

- *Agriculture is the main occupation among 59.3 per cent and agriculture is the main and private service is subsidiary occupation for 7.4 per cent of sample households.*
- *The average value of domestic assets is around Rs. 10456 per household. Mobile and television are popular media mass communication.*
- *The average value of farm assets is around Rs. 60532 per household, among all the sample farmers having owen plough.*
- *The average livestock value is around Rs. 29000 per households; about 60 per cent of household are having livestock.*
- *The average per capita food consumption is around 617.2 grams (1408 kilo calories) against national institute of nutrition (NIN) recommendation at 827 gram. Around 87.5 per cent of sample households are consuming less than the NIN recommendation.*
- *The annual average income is around Rs. 35720 per household. About 87.5 per cent of farm households are below poverty line.*
- *The per capita monthly average expenditure is around Rs. 1212.*

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. 570 per ha/year. The total cost of annual soil nutrients is around Rs. 274907 per year for the total area of 500.69 ha.*
- *The average value of ecosystem service for food grain production is around Rs 72273/ ha/year. Per hectare food grain production services is maximum in lemon (Rs. 415454) followed by horse gram (Rs. 9228), sunflower (Rs. 5480), cowpea (Rs. 3575), ragi (Rs. 1356) and sorghum is negative returns.*
- *The average value of ecosystem service for fodder production is around Rs. 1407/ ha/year. Per hectare fodder production services is maximum in sorghum (Rs. 2646) followed by cowpea (Rs. 1203) and horse gram (Rs. 1136).*
- *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 25 and Figure 12) in lemon (Rs. 57663) followed by sorghum (Rs. 37291), sunflower (Rs. 32068), horse gram (Rs. 23235), and cowpea (Rs. 8093).*

Economic Land Evaluation

- *The major cropping pattern is sorghum (25.4 %), horse gram (25.4 %) followed by sunflower (21.7 %), cowpea (17.7 %), ragi (8.9 %) and lemon (0.9 %).*
- *In Kanivaihundi Microwatershed, major soil are soil of Honnegaudanahalli (HGH) series is having very deep 30.3 per cent area On this soil farmers are*

presently growing horse gram (50.0 %), sorghum (25.0 %), sunflower (25.0 %) followed by Hindupur (HDR) series is having shallow 13.2 % per cent of area On this soil farmers are presently growing cowpea (33.3 %), ragi (33.3 %), horse gram (14.8 %) and sorghum (14.8 %). Magoonahalli (MGH) series is havingg moderately shallow 14.0 per cent of areas, on this soil farmer are presently growing horse gram (47.4 %), sorghum (47.4 %). Gopalapur (GPR) series is having Moderately deep 45.5 per cent of area On this soil farmers are presently growing Lemon (100 %), Devarahalli (DRH) series is having moderately shallow 7.8 per cent area On this soil farmers are presently growing horsegram (50.0 %), sorghum(50 %). Kannigala (KNG) series is having moderately deep 16.7 per cent of area, on this soil farmers are presently sunflower and Annurkeri (ARK) series is having shallow soil deep cover around 4.2 per cent of area on this soil farmers are presently growing sorghum and sunflower.

- *The total cost of cultivation and benefit cost ratio (BCR) in study area for horse gram ranges between Rs. 22995/ha in DRH soil (with BCR of 1.26) and Rs. 9018 in MGH soil (with BCR of 2.40).*
- *In sorghum the cost of cultivation range between Rs. 29444/ha in ARK soil (with of 0.05) and Rs. 16470/ha in MGH soil (with BCR of 1.12).*
- *In sun flower the cost of cultivation range between Rs. 27513/ha in ARK soil (with BCR of 1.22) and Rs. 23566/ha in KNG soil (with BCR of 1.31).*
- *In ragi the cost cultivation in HDR soil is Rs. 24418/ha (with BCR of 1.08).*
- *In cowpea the cost of cultivation in HDR soil is Rs 14467/ha (with BCR of 1.33) and lemon cost of cultivation in GPR soil is Rs 33637/ha (with BCR of 13.35).*
- *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 are 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 ragi (71.8 %), lemon (63.2 %), sorghum (65.3 to 45.0 %), cowpea (47.2 %), sunflower (45.8 to 39.3) and horse gram (34.8 to 11.4 %).*

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

Kanivaihundi Microwatershed is located in Southern Dry Zone of Karnataka (Figure 1). It has a total geographical area of 1.56 M ha with 0.74 M ha under cultivation of which 0.22 M ha is irrigated. The mean elevation ranges from 450 to 900 m MSL; most part of the zone is situated at 800-900m. The major soils are red loams with pockets of black soils in Kollegal, Yalandur and T.N. Pura taluks of Mysore district. The average annual rainfall ranges from 670 to 890 mm, of which about 55 to 75 per cent is received during the kharif season. The major crops of the zone are rice, ragi, sugarcane, pulses and minor millets. It's represented Agro Ecological Sub Region (AESR) 8.2 having LGP 120-150 days.

Kanivaihundi Microwatershed (Hangala sub-watershed, Gundlupet taluk, Chamaraja-nagar district) is located in between $11^0$42' – $11^0$44' North latitudes and $76^0$38' – $76^0$40' East longitudes, covering an area of about 501 ha, bounded by Hangala, Hangalapura, Karle, Pasainapura and Kaligaudanahalli villages.

Sampling Procedure

In this study we have followed soil variability as criterion for sampling the farm households. In each Microwatershed 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).

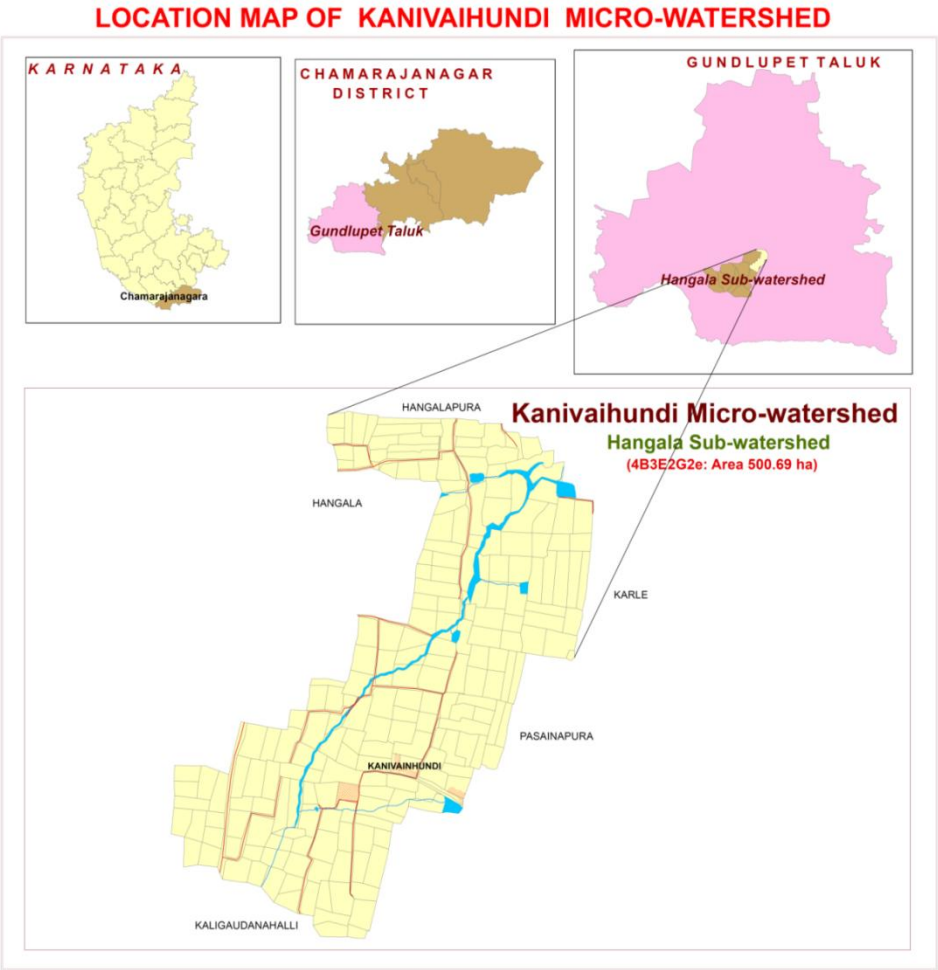


Figure 1: Location of study area

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 .

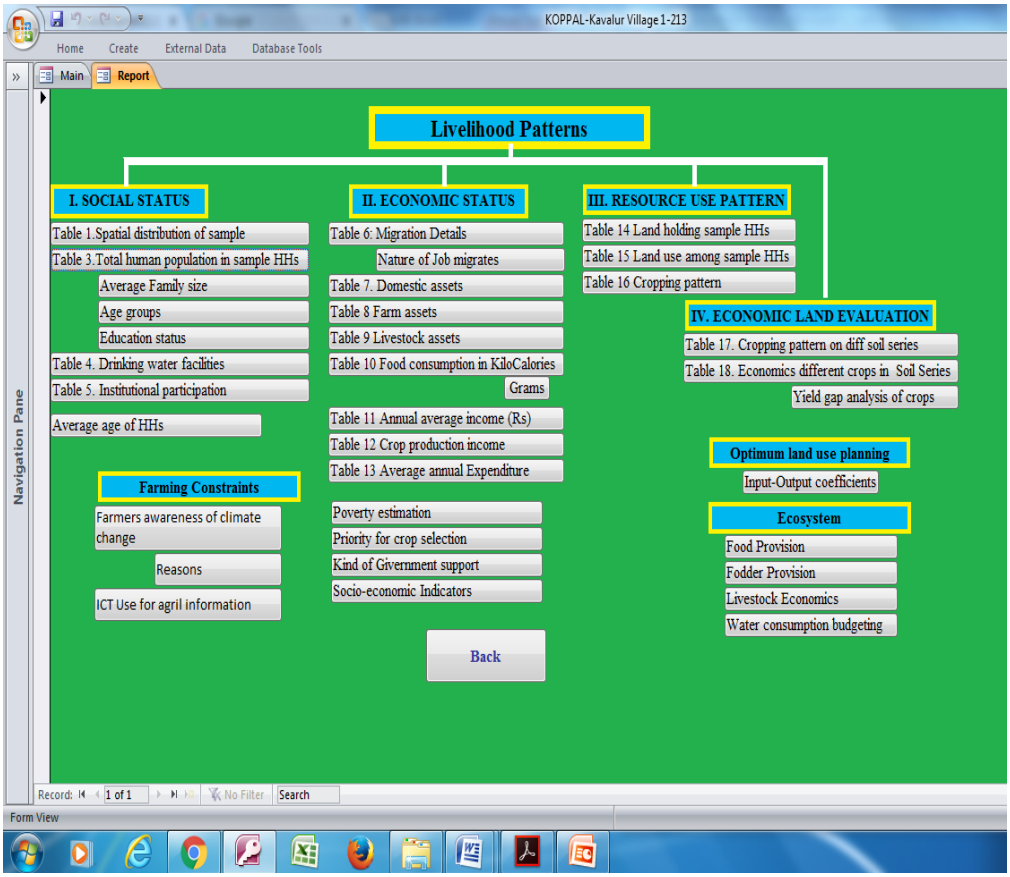


Figure 2: ALPES FRAMEWORK

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.

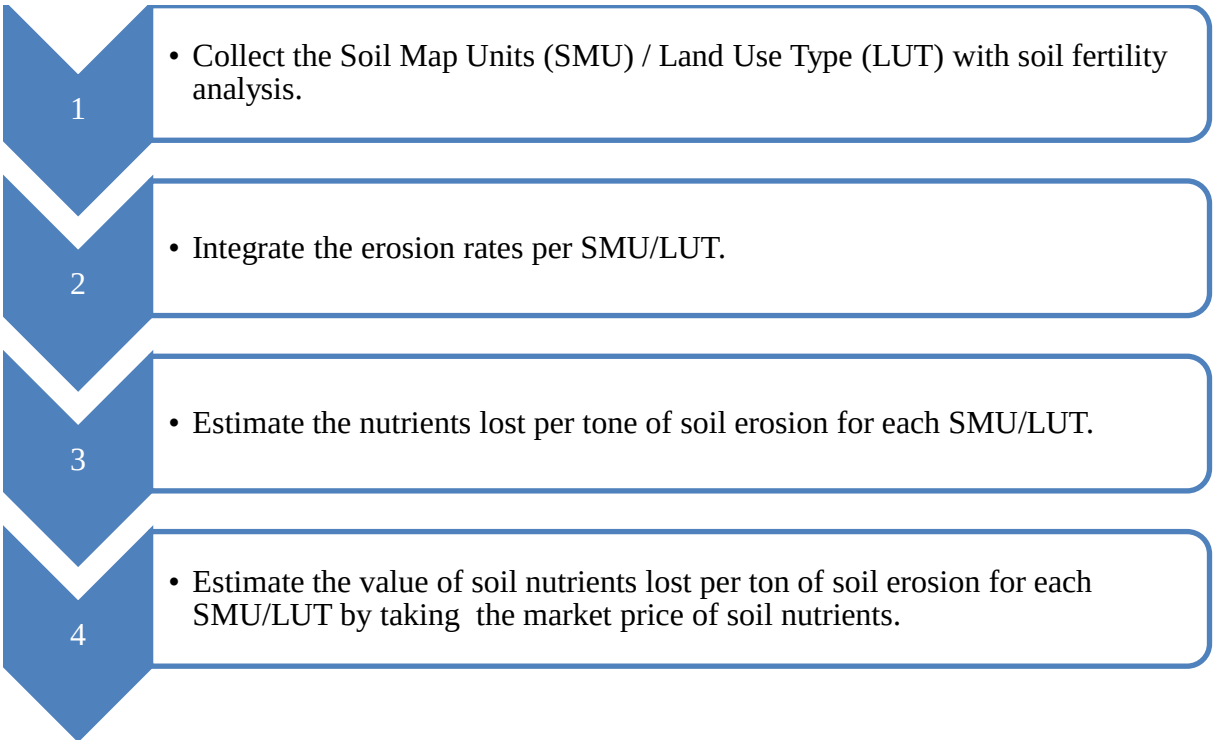
Operational Cost = cost of seeds, fertilizers, pesticides. Cost of human and bullock labour, cost of machinery, cost of irrigation water + interest on working capital.
Gross returns = Yield (Quintals/hectare)*Price (Rs/Quintal)
Net returns = Gross returns-Operational cost.
Benefit Cost Ratio = Net returns/Total 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 33, out of which 45.4 per cent were males and 54.6 per cent female. 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 30 to 50 years (39.4%) followed by more than 50 years (33.4 %), 0 to18 years (18.9 %) and 18 to 30 years (9.1). 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 66.5 per cent of respondents were illiterate and 33.5 per cent literate (Table 1).

Table 1: Human population among sample households in Kanivaihundi Microwatershed

Particulars	**Units**	**Value**
Total human population in sample HHs	Number	33.0
Male	% to total Population	45.4
Female	% to total Population	54.6
Average family size	Number	4.1
Age group		
0 to 18 years	% to total Population	18.9
18 to 30 years	% to total Population	9.1
30 to 50 years	% to total Population	39.4
>50 years	% to total Population	33.4
Average age	Age in years	40.9
Education Status		
Illiterates	% to total Population	33.5
Literates	% to total Population	66.5
Primary School (<5 class)	% to total Population	21.2
Middle School (6- 8 class)	% to total Population	18.9
High School (9- 10 class)	% to total Population	15.2
Others	% to total Population	12.1

The ethnic groups among the sample farm households found to be 75 per cent belonging to other backward castes (OBC) and general caste 25 per cent (Table 2 and Figure 3). About 79 per cent of sample households are using LPG gas as source of fuel

for cooking. All the sample farmers are having electricity connection. About 50 per cent are sample households having health cards. None 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. About 62.5 per cent of farm households are having toilet facilities.

Table 2: Basic needs of sample households in Kanivaihundi Microwatershed

Particulars	Units	Value
Social groups		
OBC	% of Households	75.0
General	% of Households	25.0
Types of fuel use for cooking		
Fire wood	% of Households	21.0
Gas	% of Households	79.0
Energy supply for home		
Electricity	% of Households	100.0
Number of households having Health card		
Yes	% of Households	50.0
No	% of Households	50.0
MGNREGA Card		
Yes	% of Households	0
No	% of Households	100.0
Ration Card		
Yes	% of Households	70.0
No	% of Households	30.0
Households with toilet		
Yes	% of Households	62.5
No	% of Households	37.5
Drinking water facilities		
Tube well	% of Households	100.0

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 dug well source for water supply for domestic purpose (86.8 %) and 13.2 per cent was tube well.

Only 3 per cent of the farmers are participating in community based organizations (Table 3). Among them majority were participating in diary co-operatives societies 3 per cent.

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

Particulars	Units	Value
No. Of people participating	% to total	3.0
Co-operative Societies-Dairy	% to total	3.0
No. Of people not participating	% to total	97.0

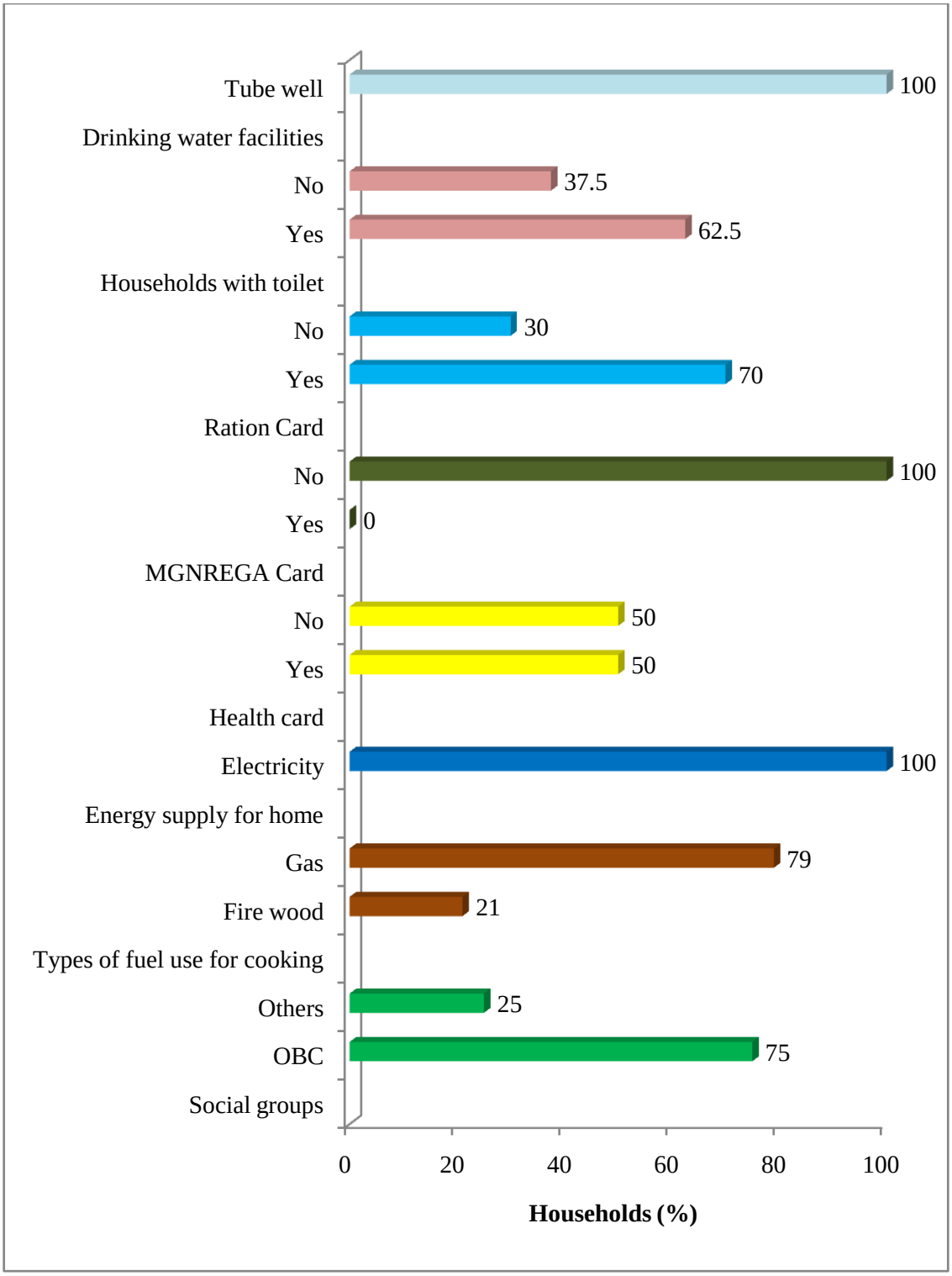


Figure 3: Basic needs of sample households in Kanivaihundi Microwatershed

The occupational pattern (Table 4) among sample households shows that Agriculture is the main occupation around 59.3. Agriculture labour is main occupation and predominant subsidiary occupation is 18.5 per cent and non agriculture labour of 7.4 per cent. The agriculature labour, government services and private service are a main occupation of 3.7 per cent, 3.7 per cent and 7.4 per cent.

Table 4: Occupational pattern in sample population in Kanivaihundi Microwatershed

Occupation		% to total
Main	**Subsidiary**	
Agriculture	Agriculture	59.3
	Agriculture Labour	18.5
	Non Agriculture Labour	7.4
Agriculture labour		3.7
Govt. service		3.7
Private service		7.4
Grand Total		100.0
Family labour availability		**(Man days/Month)**
Male		31.3
Female		28.6
Total		59.8

The important assets especially with reference to domestic assets were analyzed and are given in Table 5 and Figure 4. The important domestic assets possessed by all categories of farmers are mobile phones (87.5 %) followed by television (100 %), mixer/grinder (62.5 %), bicycle (25 %), motorcycle (37.5 %). The average value of domestic assets is around Rs 10456 per households.

Table 5: Domestic assets among the sample households in Kanivaihundi Microwatershed

Particulars	% of households	Average value in Rs
Bicycle	25.0	3300
Dvd/Cvd	12.5	5000
Mixer/grinder	62.5	1080
Mobile Phone	87.5	3857
Motor cycle	37.5	44000
Television	100.0	5500
Average value	10456	

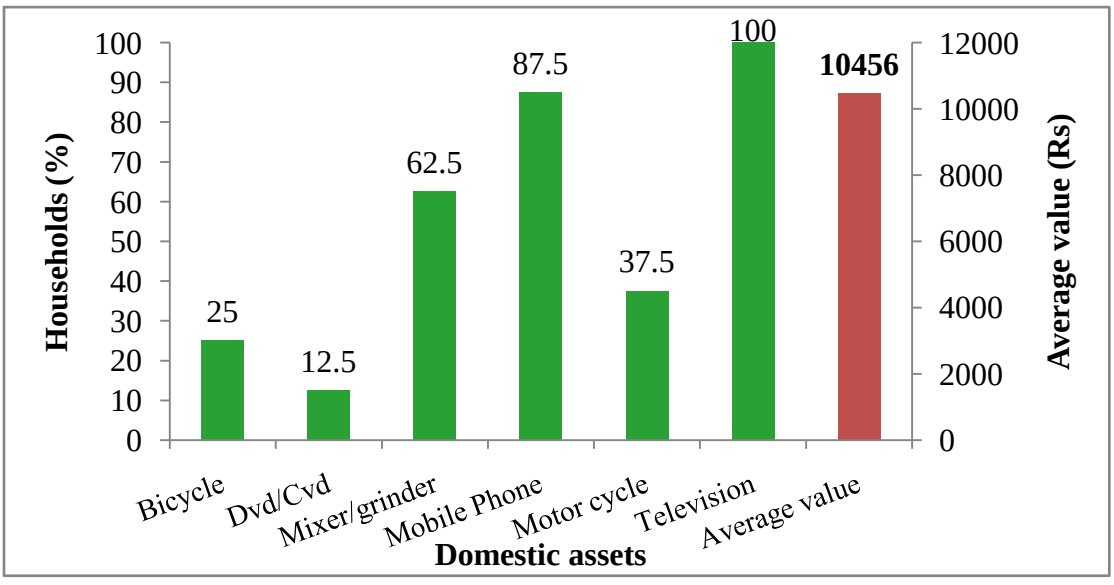


Figure 4: Domestic assets among the sample households in Kanivaihundi Microwatershed

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 (100 %), Weeder (20 %), Bullock cart (10 %), Tractor (10 %) and Drip/sprinkler (30 %), Irrigation Pump (10%) was found highest among the sample farmers. The average value of farm assets is around Rs 60532 per households (Table 6 and Figure 5).

Table 6: Farm assets among samples households in Kanivaihundi Microwatershed

Particulars	% of households	Average value in Rs
Bullock cart	10.0	13000
Drip/sprinkler	30.0	8667
Irrigation Pump	10.0	40000
Plough	100.0	1467
Tractor	10.0	300000
Weeder	20.0	640
Average value	60532	

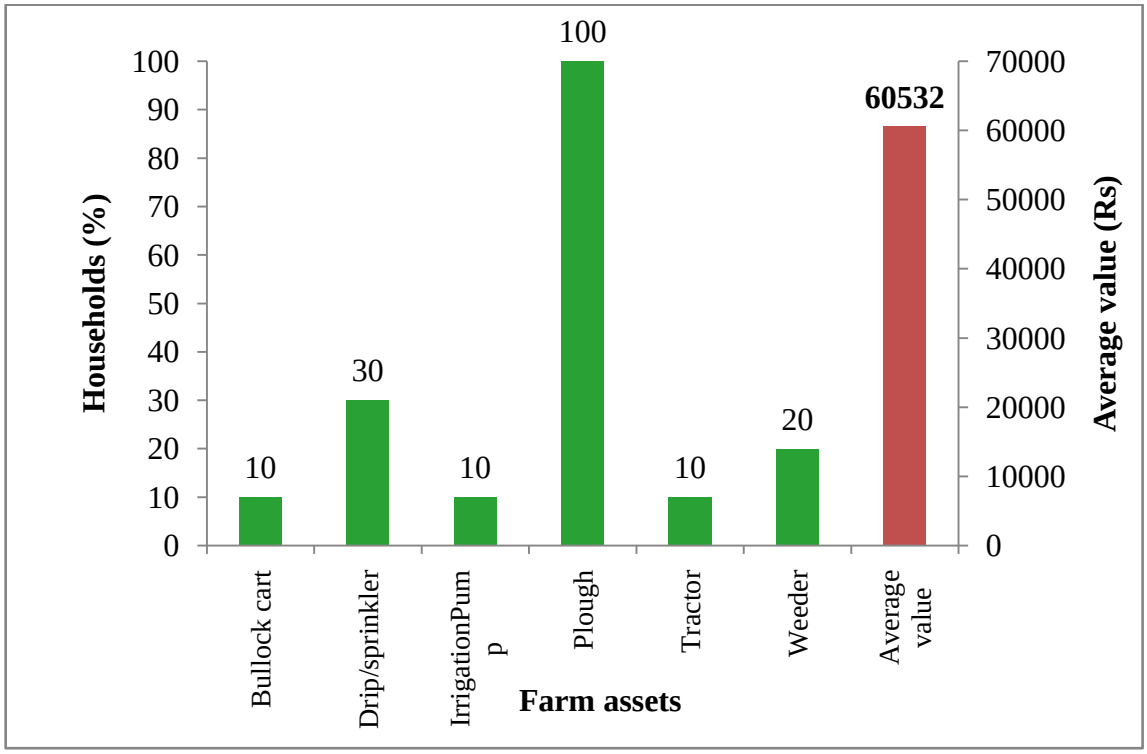


Figure 5: Farm assets among samples households in Kanivaihundi Microwatershed

Livestock is an integral component of the conventional farming systems (Table 7 and Figure 6). The highest livestock population is local dry cow were around 33.3 per cent, crossbred milching cow were around (33.3 %) followed by local milching cow (16.7 %) and crossbred dry cow (16.7 %) The average livestock value was Rs 29000 per livestock.

Table 7: Livestock assets among sample households in Kanivaihundi Microwatershed

Particulars	% of livestock population	Average value in Rs
Local Dry Cow	33.3	18000
Local Milching Cow	16.7	30000
Crossbred Dry Cow	16.7	8000
Crossbred Milching Cow	33.3	60000
Average value	29000	

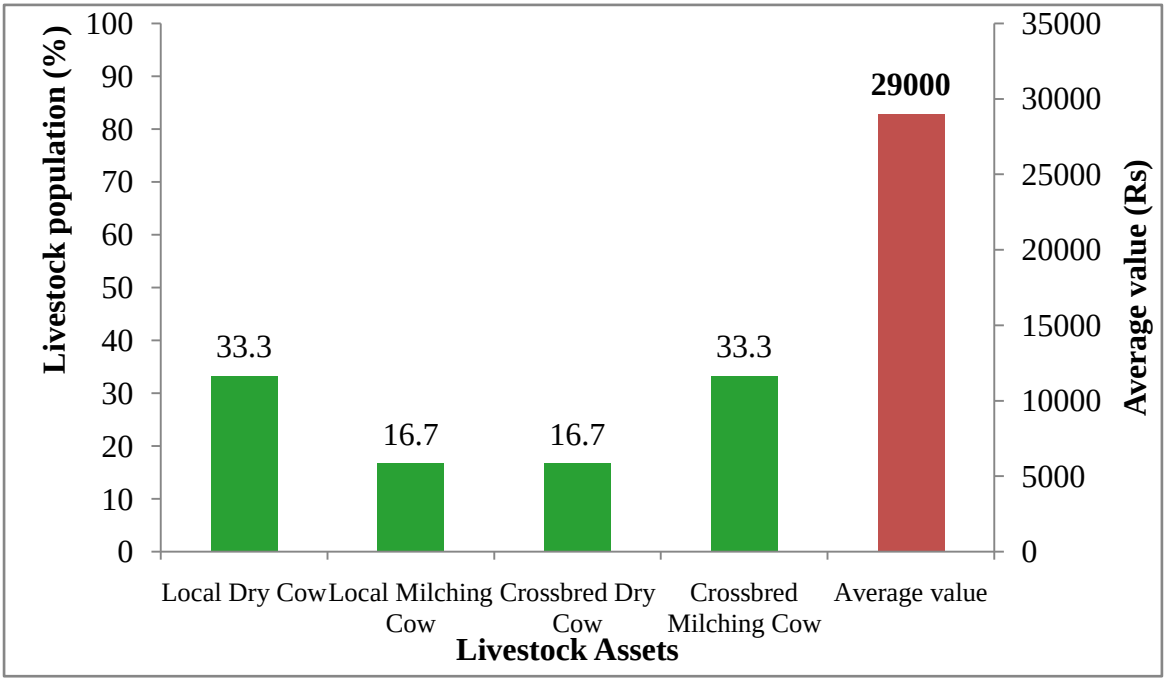


Figure 6: Livestock assets among sample households in Kanivaihundi Microwatershed

Average milk produced in sample households is 1080 litters/ annum. Among the farm households, sorghum, horse gram and ragi are the main crops for domestic food and fodder for animals. About 1890 kg /ha of average fodder is available per season for the livestock feeding (Table 8).

Table 8: Milk produced and fodder availability of sample households in Kanivaihundi Microwatershed

Particulars	
Name of the Livestock	**Ltr./Lactation/animal**
Local Milching Cow	720
Crossbred Milching	1440
Average Milk produced	1080
Fodder produces	**Fodder yield (kg/ha.)**
Sorghum	1831
Horsegram	1666
Ragi	2173
Average fodder availability	1890
Livestock having households (%)	60.0
Livestock population (Numbers)	9

A woman participation in decision making is in this Microwatershed is presented in Table 9. About 25 per cent of women participation in local organisation activates, 12.5 per cent of Women earning for her family requirement and 25 per cent of women taking decision in her family and agriculture related activities.

Table 9: Women empowerment of sample households in Kanivaihundi Microwatershed % to Grand Total

Particulars	Yes	No
Women participation in local organization activities	25.0	75.0
Women elected as panchayat member	0.0	100.0
Women earning for her family requirement	12.5	87.5
Women taking decision in her family and agriculture related activities	25.0	75.0

The food intake in terms of kilo calorie (kcal) per person per day was calculated and presented in the Table 10 and Figure 7. More quantity of cereals is consumed by sample farmers which accounted for 681.3 kcal per person. The other important food items consumed was pulses 88.6 kcal followed by cooking oil 205.0 kcal, milk 82.8 kcal, vegetables 17.4 kcal, egg 119.3 kcal and meat 33.9 kcal. In the sampled households, farmers were consuming less (1408.3 kcal) than NIN- recommended food requirement (2250 kcal).

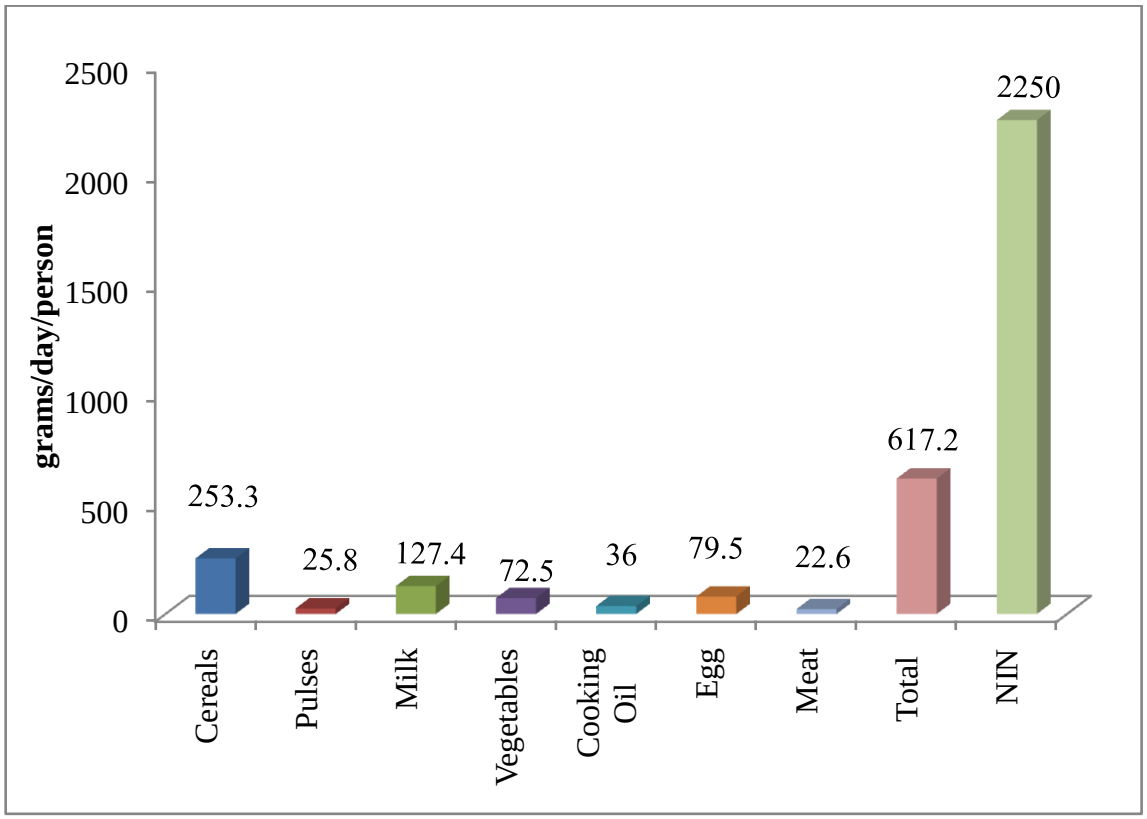


Figure 7: Per capita daily consumption of food among the sample households in Kanivaihundi Microwatershed

Table 10: Per capita daily consumption of food among the sample households in Kanivaihundi Microwatershed

Particulars	NIN recommendation (gram/ per day/ person)	Present level of consumption (gram/ per day/ person)	Kilo Calories /day/person
Cereals	396.0	253.3	861.3
Pulses	43.0	25.8	88.6
Milk	200.0	127.4	82.8
Vegetables	143.0	72.5	17.4
Cooking Oil	31.0	36.0	205.0
Egg	0.5	79.5	119.3
Meat	14.2	22.6	33.9
Total	**827.7**	**617.2**	**1408.3**
Threshold of NIN recommendation		827 gram*	2250 Kcal*
% Below NIN		87.5	87.5
% Above NIN		12.5	12.5

Note: * day/person

Annual income of the sample HHs: The average annual household income is around Rs 35720. Major source of income to the farmers in the study area is from livestock (Rs 20870) followed by crop production (Rs. 11546). The income from Non farm income was very low at Rs 3304. The monthly per capita income is Rs.721 which is greater than the threshold monthly income of Rs 686.36 for considering below 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 11).

Table 11: Annual average income of HHs from various sources in Kanivaihundi Microwatershed

Particulars	**Income ***
Nonfarm income (Rs)	3304(12.5)
Livestock income (Rs)	20870(37.5)
Crop Production (Rs)	11546(100)
Total Annual Income (Rs)	***35720***
Average monthly per capita income (Rs)	721
Threshold for Poverty level (Rs 975 per month/person)	
% of households below poverty line	87.5
% of households above poverty line	12.5

* 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. 30893) 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 1212 and about 87.5 per cent of farm households are below poverty line (Table 12 and Figure 8)

Table 12: Average annual expenditure of sample HHs in Kanivaihundi Microwatershed

Particulars	Value in Rupees	Per cent
Food	30893	51.5
Education	10000	16.7
Clothing	4625	7.8
Social functions	5500	9.0
Health	9000	15.0
Total Expenditure (Rs/year)	60018	100.0
Monthly per capita expenditure (Rs)	1212	

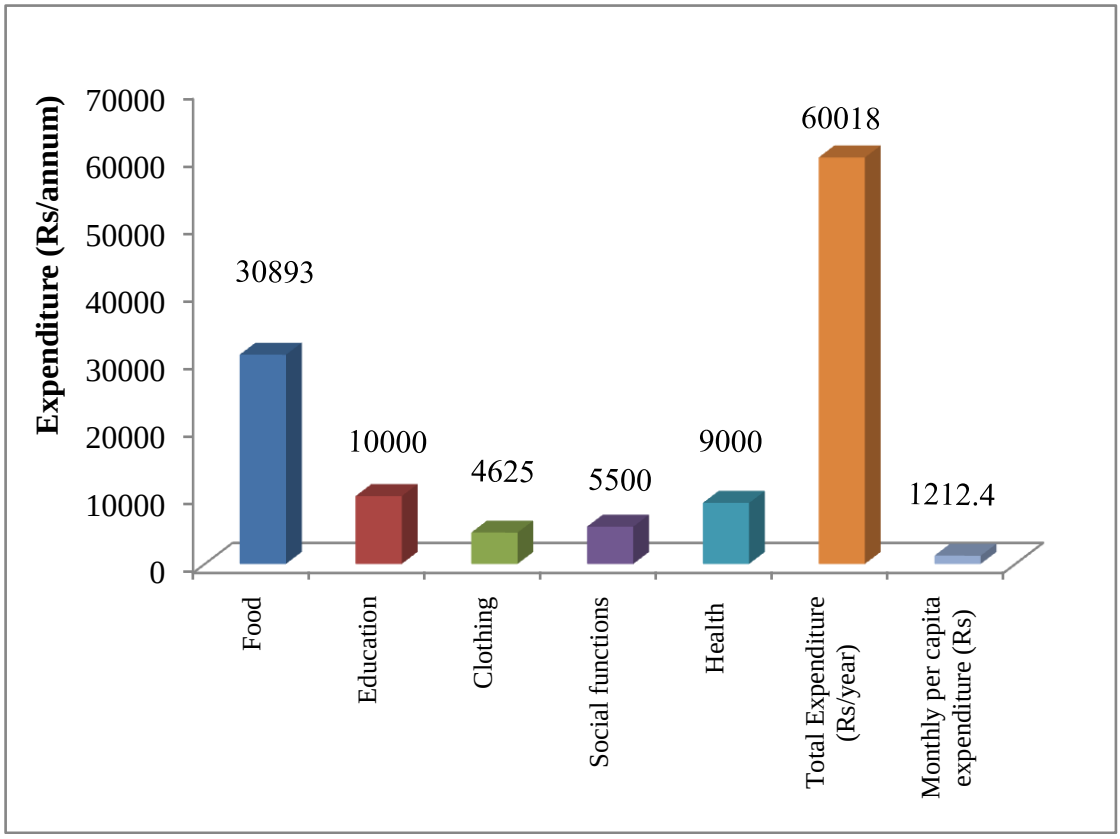


Figure 8: Average annual expenditure of sample HHs in Kanivaihundi Microwatershed

Land holding: Total area cultivated by them is 14.7 ha. The average land holding of sample HHs is 1.8 ha. Large number of sample HHs (87.5%) belong to small size group with an average holding size of 0.84 ha and a large farmer (12.5) with a average land holding size of 8.9 ha (Table 13).

Table 13: Distribution of land holding among the sample households in Kanivaihundi Microwatershed

Particulars	Units	Values
Small farmers		
Total land	ha	5.9
Sample size	Per cent	87.5
Average land holding	ha	0.8
Medium farmers		
Total land	ha	8.9
Sample size	Per cent	12.5
Average land holding	ha	8.9
Large farmers		
Total land	ha	14.8
Sample size	Per cent	100.0
Average land holding	ha	1.8

Land use: The total land holding in the Kanivaihundi Microwatershed is 14.8 ha (Table 14). Of which 5.1 ha is rain fed land and 9.7 ha is irrigated land. The average land holding per household is worked out to be 1.85 ha.

Table 14: Land use among samples households in Kanivaihundi Microwatershed

Particulars	Per cent	Area in ha
Irrigated land	65.7	9.7
Rain fed Land	34.3	5.1
Total land holding	100.0	14.8
Average land holding	1.8	

In the micro-watershed, the prevalent present land uses under perennial plants are coconut (58.3 %) followed by neem tree (16.6 %), teak (25 %) (Table 16).

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

Particulars	Number of Plants/trees	Per cent
Coconut	7	58.3
Neem trees	2	16.6
Teak	3	25.0
Grand Total	12	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 sorghum (25.4 %) followed by sunflower (21.7 %), ragi (8.9 %) and lemon (0.8 %) which are taken during Kharif and horse gram (25.42 %), and cowpea (17.7 %) during Rabi season respectively. The cropping intensity was 175 per cent (Table 16 and Figure 9).

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

Crops	Kharif	Rabi	Grand Total
Horse gram	0.0	25.42	25.4
Sorghum	25.4	0.0	25.4
Sunflower	21.7	0.0	21.7
Cowpea	0.0	17.7	17.7
Ragi	8.9	0.0	8.9
lemon	0.8	0.0	0.8
Grand Total	**56.9**	**43.1**	**100.0**
Cropping intensity (%)	175		

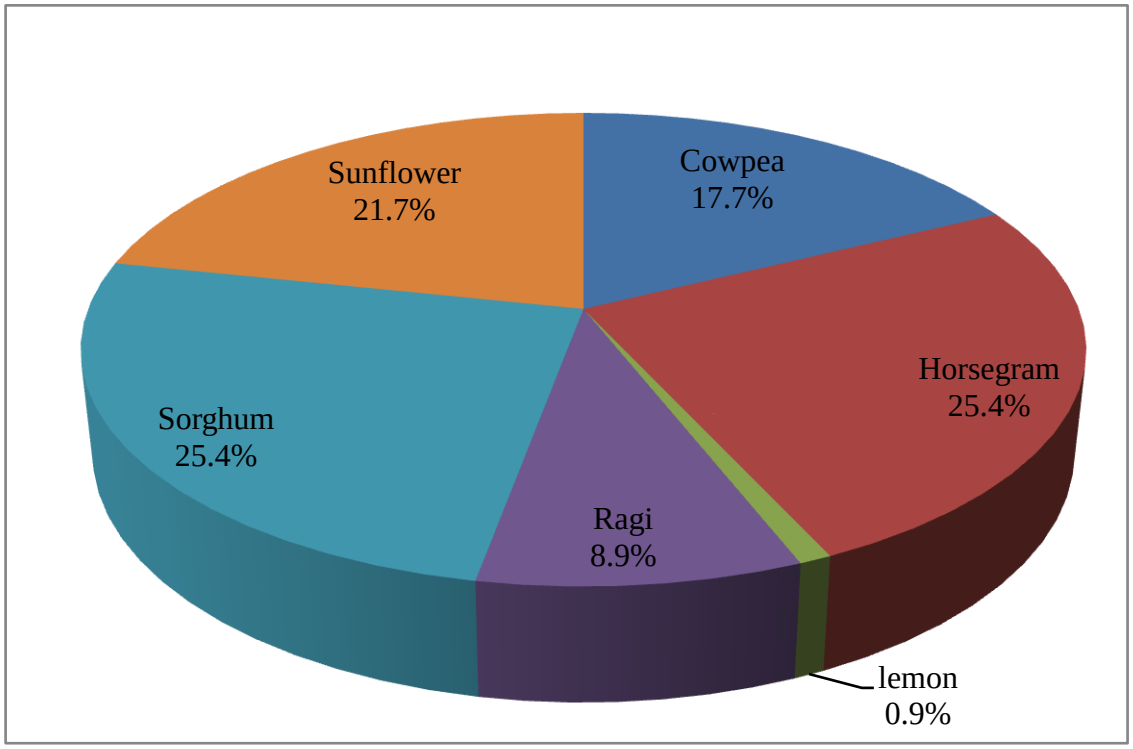


Figure 9: Present cropping pattern in Kanivaihundi Microwatershed

Economic land evaluation

The main purpose of economic land evaluation 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 Kanivaihundi micro-watershed, 12 soil series are identified and mapped (Table 17). The distribution of major soil series are Honnegaudanahalli covering an area around 151.6 ha (30.2 %) followed by Magoonahalli 70.3 ha (14.0 %), Hindupur 65.9 ha (13.2 %), Gopalapura 45.5 ha (9.1 %), Devarahalli 38.9 ha (7.8 %), Hullipura 28.5 ha (5.7 %), Kannigala 22.1 ha (16.7 %), Annurkeri 21.2 ha (4.2 %), Maddinahundi 18.3 ha (3.7 %), Kallipura 11.9 ha (2.4 %), Beemanbeedu 4.7 ha (1.0 %) and Shivapura 3.0 ha (0.6 %).

Table 17: Distribution of soil series in Kanivaihundi Microwatershed

Soil No	Soil Series	Mapping Unit Description	Area in ha (%)
1	ARK	Annurkeri soils are very deep (>150 cm), well drained, have dark reddish brown to very dusky red sandy clay to clay soils occurring on very gently sloping uplands under cultivation.	21.2 (4.2)
2	BMB	Beemanabeedu soils are very deep (>150 cm), moderately well drained, have very dark greyish brown to dark grey and very dark brown clayey soils occurring on nearly level to very gently sloping lowlands under cultivation	4.7 (1.0)
3	DRH	Devarahalli soils are moderately shallow (50-75 cm), well drained, have dark red to reddish brown and dusky red gravelly sandy clay loam to sandy clay soils occurring on very gently to gently sloping uplands under cultivation	38.9 (7.8)
4	GPR	Gopalapura soils are moderately deep (75-100 cm), well drained, have dark brown to dark reddish brown and reddish brown gravelly sandy clay loam to sandy clay soils occurring on very gently to gently sloping uplands under cultivation	45.5 (9.1)
5	HDR	Hindupur soils are shallow (25-50 cm), well drained, have dark reddish brown to dusky red sandy clay loam to sandy clay soils occurring on very gently sloping uplands and moderately sloping mounds and ridges	65.9 (13.2)
6	HGH	Honnegaudanahalli soils are very deep (>150 cm), well drained, have very dark brown to brown and dark reddish brown sandy clay loam soils occurring on very gently sloping uplands under cultivation.	151.6 (30.3)
7	HPR	Hullipura soils are moderately shallow (50-75 cm), well drained, have dark brown to very dark brown gravelly sandy clay loam to sandy clay soils occurring on very gently to gently sloping uplands under cultivation	28.5 (5.7)
8	KLP	Kallipura soils are deep (100-150 cm), well drained, have dark reddish brown to dark red gravelly sandy clay loam to sandy clay soils occurring on very gently sloping uplands under cultivation.	11.9 (2.4)
9	KNG	Kannigala soils are moderately deep (75-100 cm), well drained, have dark reddish brown to dark red gravelly sandy clay loam to sandy clay soils occurring on very gently sloping uplands and strongly sloping mounds and ridges.	22.1 (16.7)
10	MDH	Maddinahundi soils are deep (100-150 cm), well drained, have dark reddish brown gravelly sandy clay soils occurring on very gently to gently sloping uplands under cultivation.	18.3 (3.7)
11	MGH	Magoonahalli soils are moderately shallow (50-75 cm), well drained, have very dark brown to dark brown gravelly sandy clay loam soils occurring on very gently sloping uplands and moderatly sloping mounds and ridges	70.3 (14.0)
12	SPR	Shivapura soils are shallow (25-50 cm), well drained, have dark reddish brown gravelly sandy clay loam to sandy clay soils occurring on very gently sloping uplands and very strongly sloping hills, mounds and ridges.	3.0 (0.6)
13	Forest		2.1(0.4)
14	Rock outcrop		1.3(0.3)
15	Others		15.5(3.1)

Present cropping pattern on different soil series are given in Table 18. Crops grown on Hindupur (HDR) soils are cowpea, sorghum, ragi and horse gram. Sorghum and horse gram on Devarahalli (DRH) soils is grown. Horsegram and sorghum on Magoonahalli (MGH) soils is grow and lemon on Gopalapur (GPR) soils can grow. Sunflower is grown on Kannigala (KGN) soils. Cotton, maize and sunflower on Annurkeri (ARK) soils are grow. Horse gram, sorghum and sunflower on Honnegaudanahalli (HGH) soils are grow.

Table 18: Cropping pattern on major soil series in Kanivaihundi Microwatershed (Area in per cent)

Soil Series	Soil Depth	Crops	Dry		Irrigated	Grand Total
			Kharif	Rabi	Kharif	
HDR	Shallow (25-50 cm)	Cowpea	0.0	33.3	0.0	33.3
		Horsegram	0.0	14.8	0.0	14.8
		Ragi	33.3	0.0	0.0	33.3
		Sorghum	14.8	0.0	0.0	14.8
DRH	Moderately shallow (50-75 cm)	Horsegram	0.0	50.0	0.0	50.0
		Sorghum	50.0	0.0	0.0	50.0
KNG	Moderately deep(75-100)	Sunflower	100.0	0.0	0.0	100.0
GPR	Moderately deep(75-100)	Lemon	0.0	0.0	100.0	100.0
MGH	Moderately shallow (50-75 cm)	Horsegram	0.0	47.4	0.0	47.4
		Sorghum	47.4	0.0	0.0	47.4
ARK	Very deep (>150 cm)	Sorghum	55.6	0.0	0.0	55.6
		Sunflower	44.4	0.0	0.0	44.4
HGH	Very deep(>150 cm)	Horsegram	0.0	50.0	0.0	50.0
		Sorghum	25.0	0.0	0.0	25.0
		Sunflower	25.0	0.0	0.0	25.0

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 Microwatershed are given below (Table 19).

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

Soil Series	Small Farmers	Large Farmers
HDR	Cowpea (1.2), Horsegram (1.3) Ragi (1.1), Sorghum (0.7)	
DRH	Horsegram (1.2), Sorghum (0.9)	
MGH	Horsegram (2.4), Sorghum (1.1)	
GPR		Lemon (12.5)
KNG	Sunflower (1.3)	
ARK	Sorghum (0.9), Sunflower (1.8)	
HGH	Horse gram (2.9),Sorghum (0.7) Sunflower (0.8)	

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

The data on cost of cultivation and benefit cost ratio (BCR) of different crops is given in Tables 20 and 20a. The total cost of cultivation in study area for horse gram ranges between Rs. 22995/ha in DRH soil (with BCR of 1.26) and Rs. 9018/ha in MGH soil (with BCR of 2.40), sorghum range between Rs. 29444/ha in ARK soil (with of 0.05) and Rs. 16470/ha in MGH soil (with BCR of 1.12), sun flower between Rs. 27513/ha in ARK soil (with BCR of 1.22) and Rs. 23566/ha in KNG soil (with BCR of 1.31), ragi cultivation in HDR soil is Rs. 24418/ha (with BCR of 1.08), cowpea cultivation in HDR soil is Rs 14467/ha (with BCR of 1.33) and lemon cultivation in GPR soil is Rs 33637/ha (with BCR of 13.35).

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

Particulars	HDR (25-50 cm)				DRH (50-75 cm)		MGH (50-75 cm)	
	Cow pea	Horse gram	Ragi	Sorg hum	Horse gram	Sor ghum	Horse gram	Sor ghum
Total cost (Rs/ha)	14467	17734	24418	19848	22995	19291	9018	16470
Gross Return (Rs/ha)	19245	22971	26418	20501	28979	20421	21626	18498
Net returns (Rs/ha)	4778	5237	2000	653	5983	1130	12608	2029
BCR	1.33	1.30	1.08	1.03	1.26	1.06	2.40	1.12
Farmers Practices (FP)								
FYM (t/ha)	0.0	0.0	5.4	0.0	0.0	0.0	0.0	2.1
Nitrogen (kg/ha)	47.8	80.0	47.8	80.0	57.6	57.6	25.5	25.5
Phosphorus (kg/ha)	93.5	57.5	93.5	57.5	76.3	76.3	25.5	25.5
Potash (kg/ha)	18.5	0.0	18.5	0.0	8.4	8.4	25.5	25.5
Grain (Qtl/ha)	6.5	7.5	8.7	10.0	7.9	9.8	6.4	13.9
Price of Yield (Rs/Qtl)	2800	3000	3000	1700	3400	1800	3300	1300
Soil test based fertilizer Recommendation (STBR)								
FYM (t/ha)	7.4	0.0	8.6	7.4	0.0	7.4	0.0	7.4
Nitrogen (kg/ha)	18.5	18.5	55.6	61.1	18.5	61.1	30.9	101.9
Phosphorus (kg/ha)	49.4	37.1	43.2	56.8	37.1	56.8	37.1	56.8
Potash (kg/ha)	24.7	18.5	44.5	29.6	24.7	39.5	24.7	39.5
Grain (Qtl/ha)	12.4	9.9	30.9	28.4	9.9	28.4	9.9	28.4
% of Adoption/yield gap (STBR-FP) / (STBR)								
FYM (%)	100.0	0.0	37.1	100.0	0.0	100.0	0.0	71.0
Nitrogen (%)	-158.2	-331.8	13.9	-30.9	-210.8	5.8	17.5	75.0
Phosphorus (%)	-89.2	-55.2	-116.3	-1.2	-105.9	-34.3	31.2	55.1
Potash (%)	25.2	100.0	58.4	100.0	66.1	78.8	-3.2	35.5
Grain (%)	47.2	24.1	71.8	64.8	20.3	65.3	34.8	50.9
Value of yield and Fertilizer (Rs)								
Additional Cost (Rs/ha)	5243	-1267	1612	7746	-1868	7219	558	7840
Additional Benefits (Rs/ha)	16319	7140	66538	31289	6820	33412	11359	18793
Net change Income (Rs/ha)	11076	8407	64926	23542	8688	26193	10801	10953

Table 20a: Economic land evaluation and bridging gap for different crops in Kanivaihundi Microwatershed

Particulars	GPR (75-100 cm)	KNG (75-100 cm)	ARK (>150 cm)		HGH (>150 cm)	
	Lemon	Sun flower	Sor ghum	Sunflower	Horse gram	Sor ghum
Total cost (Rs/ha)	33637	23566	29444	27513	9211	25002
Gross Return (Rs/ha)	449091	30875	30875	33493	26676	26059
Net returns (Rs/ha)	415454	7309	1431	5981	17465	1057
BCR	13.35	1.31	1.05	1.22	2.90	1.04
Farmers Practices (FP)						
FYM (t/ha)	11.4	1.5	3.9	0.0	0.0	2.5
Nitrogen (kg/ha)	0.0	34.2	20.0	20.0	80.4	80.4
Phosphorus (kg/ha)	0.0	44.6	51.2	51.2	65.8	65.8
Potash (kg/ha)	0.0	27.5	66.8	66.8	7.1	7.1
Grain (Qtl/ha)	90.9	8.9	15.6	10.0	8.8	12.5
Price of Yield (Rs/Qtl)	5000	3500	1800	3300	3000	1800
Soil test based fertilizer Recommendation (STBR)						
FYM (t/ha)	4.1	6.6	7.4	6.6	0.0	7.4
Nitrogen (kg/ha)	308.8	69.0	101.9	69.0	18.5	61.1
Phosphorus (kg/ha)	111.2	59.3	56.8	59.3	37.1	56.8
Potash (kg/ha)	185.3	46.3	39.5	37.1	18.5	29.6
Grain (Qtl/ha)	247.0	16.5	28.4	16.5	9.9	28.4
% of Adoption/yield gap (STBR-FP) / (STBR)						
FYM (%)	-180.5	77.4	47.3	100.0	0.0	66.3
Nitrogen (%)	100.0	50.4	80.3	70.9	-334.1	-31.5
Phosphorus (%)	100.0	24.7	9.9	13.6	-77.7	-15.9
Potash (%)	0.0	40.6	-69.0	-80.3	0.0	76.1
Grain (%)	63.2	45.8	45.0	39.3	11.4	56.0
Value of yield and Fertilizer (Rs)						
Additional Cost (Rs/ha)	4988	6535	4187	6934	-1780	4733
Additional Benefits (Rs/ha)	780455	26383	23004	21340	3390	28629
Net change Income (Rs/ha)	775467	19848	18817	14406	5170	23896

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 and 20a. 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 775467 in lemon and a minimum of Rs 5170 in horse gram 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.

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 71.265 per ha/year. The total cost of annual soil nutrients is around Rs 274907per year for the total area of 570 ha.

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

Particulars	Quantity(kg)		Value (Rs)	
	Per ha	Total	Per ha	Total
Organic matter	75.41	36347	475.08	228988
Phosphorus	1.55	745	68.00	32778
Potash	0.16	79	3.26	1573
Iron	0.03	16	1.63	787
Manganese	0.05	25	14.26	6874
Cupper	0.01	4	5.20	2506
Zinc	0.00	2	0.14	70
Sulphur	0.06	31	2.55	1228
Boron	0.01	3	0.21	104
Total	80.98	37252	570.35	274907

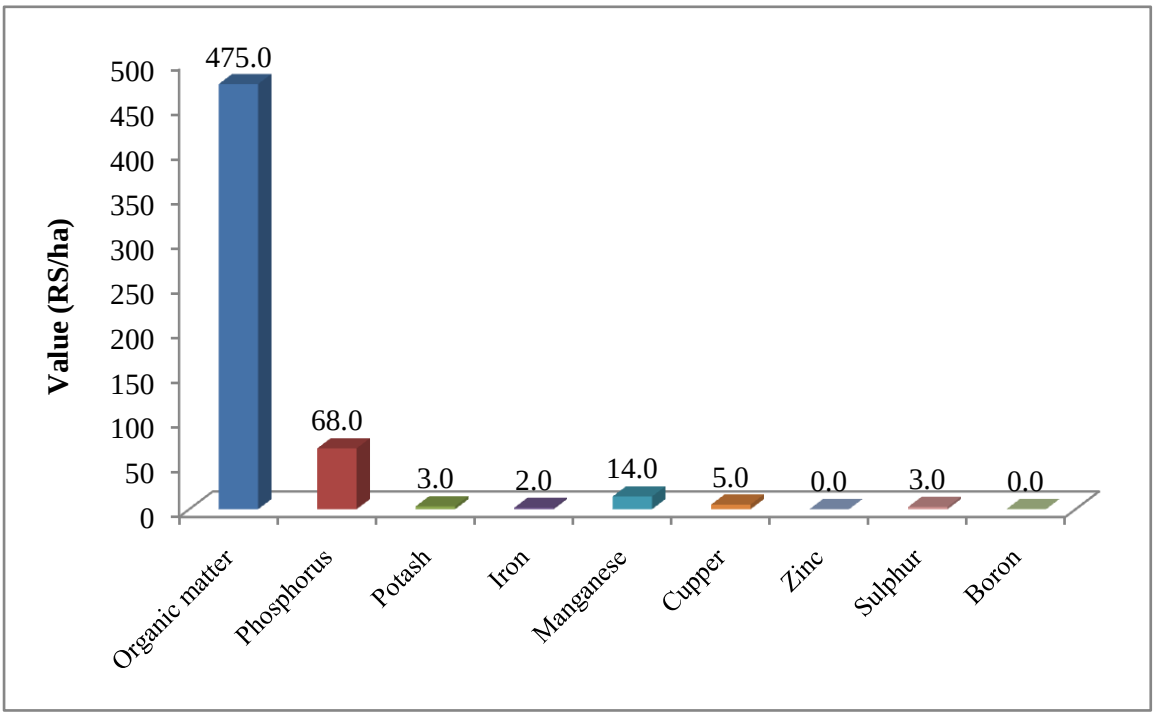


Figure 10: Estimation of onsite cost of soil erosion in Kanivaihundi Microwatershed

The average value of ecosystem service for food grain production is around Rs 72273/ ha/year (Table 22 and Figure 11). Per ha food production services is maximum in lemon (Rs 415454) followed by horse gram (Rs 9228), sunflower (Rs 5480), cowpea (Rs 3575), ragi (Rs 1356/ha) and sorghum is negative returns.

Table 22: Ecosystem services of food grain production in Kanivaihundi 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	0.9	8.6	3000	25774	24418	1356
	Sorghum	2.8	12.2	1680	20554	22011	-1457
Pulses	Cowpea	0.9	6.4	2800	18042	14467	3575
	Horse gram	2.7	7.5	3175	23967	14739	9228
Oil seeds	Sunflower	2.2	9.5	3267	31122	25642	5480
Fruits	Lemon	0.1	89.8	5000	449091	33637	415454
Grand Total		9.6	22.4	3154	94758	22486	72273

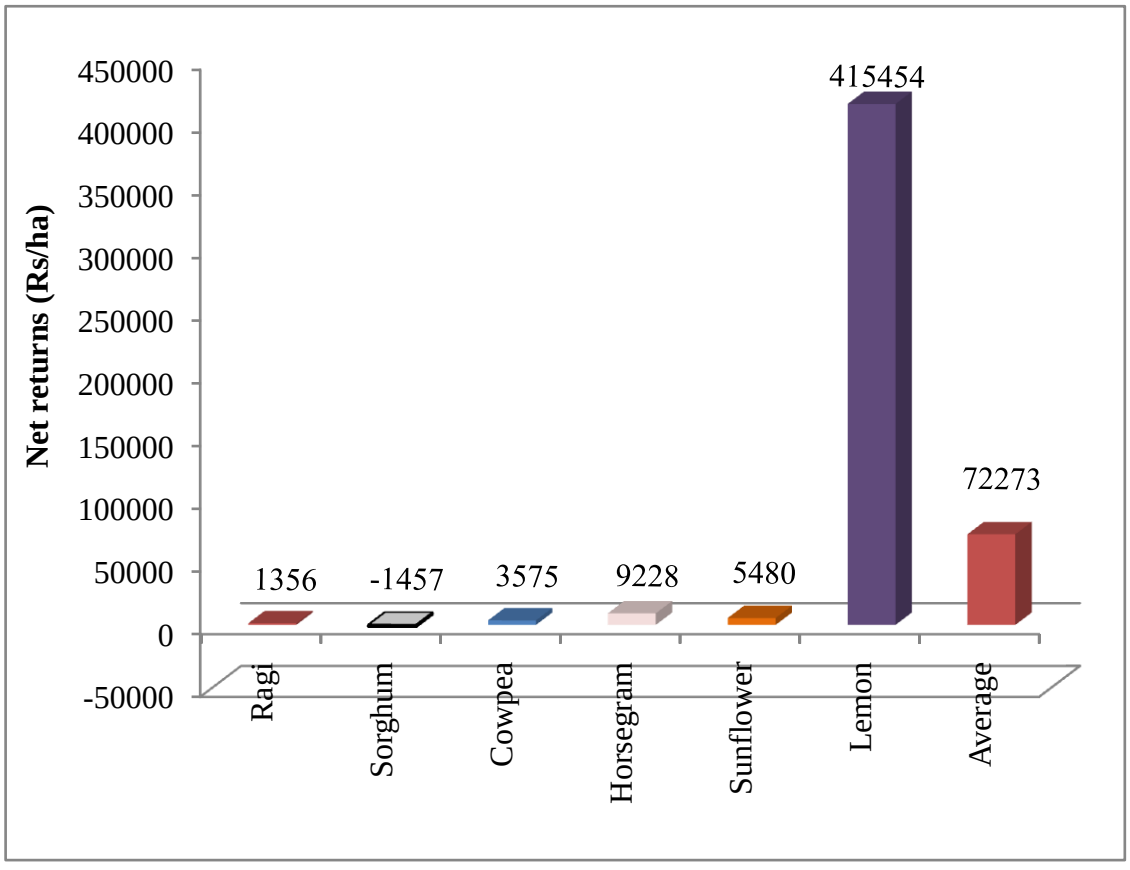


Figure 11: Ecosystem services of food grain production in Kanivaihundi Microwatershed

The average value of ecosystem service for fodder production is around Rs 1407/ ha/year (Table 23). Per ha fodder production services is maximum in sorghum (Rs 2646) followed by cowpea (Rs 1203), bajra (Rs 684), horse gram (Rs 1136), and ragi (Rs 644).

Table 23: Ecosystem services of fodder production in Kanivaihundi Microwatershed

Production items	Crops	Area in ha	Yield (Qtl/ha)	Price (Rs/Qtl)	Net Returns (Rs/ha)
Cereals	Ragi	0.9	1.1	600	644
	Sorghum	2.8	2	1340	2646
Pulses	Cowpea	0.9	1.7	700	1203
	Horse gram	2.7	1.9	613	1136
Average value		7.3	1.68	813	1407

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 lemon (Rs 57663) followed by sorghum (Rs 37291), sunflower (Rs 32068), horse gram (Rs 23235), cowpea (Rs 8093).

Table 24: Ecosystem services of water supply in Kanivaihundi Microwatershed

Crops	Yield (Qtl/ha)	Virtual water (cubic Meter) per ha	Value of Water (Rs/ha)	Water consumption (Cubic meters/Qtl)
Cowpea	6.4	809.3	8093	126
Horsegram	7.5	2323.5	23235	308
Lemon	89.8	5766.3	57663	64
Ragi	8.6	1049.9	10499	122
Sorghum	12.2	3729.1	37291	305
Sunflower	9.5	3206.8	32068	337
Grand Total	15.0	3012.4	30124	201

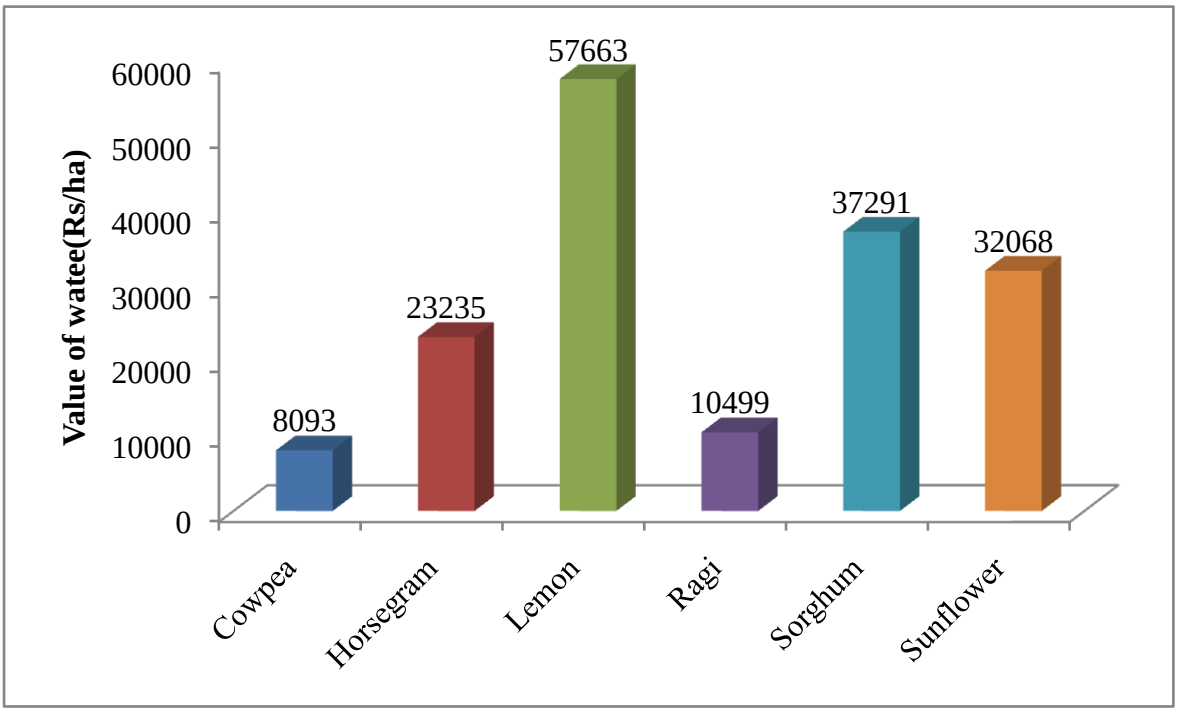


Figure 12: Ecosystem services of water supply in Kanivaihundi Microwatershed

The main farming constraints in Kanivainhundi Microwatershed to be found are less rainfall, lack of good quality seeds, lack of storage, damage of crops by wild animals and non availability of plant protection chemicals. Majority of farmers depend up on money lender of the sources of loan for purpose of crop production. Farmers to sell the agriculture produce through village market and the farmers getting the agriculture related information on newspaper. 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 Kanivaihundi Microwatershed

SI. No	Particulars	Per cent
1	Less Rainfall	100.0
2	Lack of transportation	12.5
3	Lack of storage	25.0
4	Damage of crops by Wild Animals	100.0
5	**Source of loan**	
	Money Leander	100.0
6	**Market for selling**	
	Village market	100.0
7	**Sources of Agri-Technology information**	
	Newspaper	87.5
	Television	12.5

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.