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

CHILKAMUKI (4D4A1R1e) MICRO WATERSHED

Irakallagada Hobli, Koppal Taluk and District, Karnataka

Karnataka Watershed Development Project – II
SUJALA – III
World Bank funded Project

The World Bank

ICAR – NATIONAL BUREAU OF SOIL SURVEY AND LAND USE PLANNING

ICAR - NBSS & LUP

WATERSHED DEVELOPMENT DEPARTMENT
GOVT. OF KARNATAKA, BANGALORE

About ICAR - NBSS&LUP

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

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

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PREFACE

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

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

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

The natural resources (land, water and vegetation) of the state need adequate and constant care and management, backed by site-specific technological interventions and investments particularly by the government. Detailed database pertaining to the nature of

the land resources, their constraints, inherent potentials and suitability for various land based rural enterprises, crops and other uses is a prerequisite for preparing location-specific action plans, which are in tune with the inherent capability of the resources. Any effort to evolve climate resilient technologies has to be based on the baseline scientific database. Then only one can expect effective implementation of climate resilient technologies, monitor the progress, make essential review of the strategy, and finally evaluate the effectiveness of the implemented programs. The information available at present on the land resources of the state are of general nature and useful only for general purpose planning. Since the need of the hour is to have site-specific information suitable for farm level planning and detailed characterization and delineation of the existing land resources of an area into similar management units is the only option.

ICAR-NBSS&LUP, Regional Centre, Bangalore has taken up a project sponsored by the Karnataka Watershed Development Project-II, (Sujala-III), Government of Karnataka funded by the World Bank under Component -1 Land Resource Inventry. This study was taken up to demonstrate the utility of such a database in reviewing, monitoring and evaluating all the land based watershed development programs on a scientific footing. To meet the requirements of various land use planners at grassroots level, the present study on "Land Resource Inventory and Socio-Economic Status of Farm Households for Watershed Planning and Development of for Chilkamuki microwatershed in Koppal Taluk, and District, Karnataka" for integrated development was taken up in collaboration with the State Agricultural 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 micro-watershed. 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 Chilkamuki 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 these physiographic delineations were used as base for mapping soils. The soils were studied in several transects and a soil map was prepared with phases of soil series as mapping units. Random checks were made all over the area outside the transects to confirm and validate the soil map unit boundaries. The soil map shows the geographic distribution and extent, characteristics, classification, behavior and use potentials of the soils in the microwatershed.

The present study covers an area of 659 ha in Koppal taluk and district, Karnataka. The climate is semiarid and categorized as drought - prone with an average annual rainfall of 662 mm, of which about 424 mm is received during south –west monsoon, 161 mm during north-east and the remaining 77 mm during the rest of the year. An area of 99 per cent is covered by soils and one per cent is by water bodies. The salient findings from the land resource inventory are summarized briefly below.

❖ The soils belong to 17 soil series and 35 soil phases (management units) and 8 land use classes.

❖ The length of crop growing period is <90 days and starts from 2nd week of August to 2nd week of November.

❖ From the master soil map, several interpretative and thematic maps like land capability, soil depth, surface soil texture, soil gravelliness, available water capacity, soil slope and soil erosion were generated.

❖ Soil fertility status maps for macro and micronutrients were generated based on the surface soil samples collected at every 320 m grid interval.

❖ Land suitability for growing 28 major agricultural and horticultural crops were assessed and maps showing the degree of suitability along with constraints were generated.

❖ Entire area is suitable for agriculture.

❖ About 29 per cent of the soils are shallow to moderately shallow (25-75 cm), 41 per cent of the soils are moderately deep to deep (75-150 cm) and 16 per cent soils are very deep (>150 cm).

❖ About 14 per cent area has sandy soils, 48 per cent area has loamy soils and 24 per cent area has clay soils.

❖ About 34 per cent area has non-gravelly (<15% gravel) soils and 52 per cent has gravelly to very gravelly (15-60%) soils).

❖ About 60 per cent area is very low to low (<50-100 mm/m), 9 per cent area has medium (101-150 mm/m) and 17 per cent area is high to very high (151- >200 mm/m) in available water capacity.

❖ About 12 per cent area has nearly level (0-1%) lands and 74 per cent area has very gently to gently sloping (1-5%) lands.

❖ About 19 per cent area is slight eroded (e1) and 67 per cent area is moderately eroded (e2) lands.

- ❖ *About 52 per cent area is strongly to slightly acid (pH 5.0-6.5), 17 per cent is neutral (pH 6.5-7.3) and 17 per cent area is slightly alkaline (pH 7.3-7.8) to very strongly alkaline (pH >9.0) in soil reaction.*
- ❖ *Entire area is non saline (<2 dsm^{-1}) in electrical conductivity (EC).*
- ❖ *Organic carbon is medium (0.5-0.75%) in 11 per cent area and high (>0.75%) in 75 per cent area.*
- ❖ *About 19 per cent area is medium (23-57 kg/ha) and 67 per cent area is high (>57 kg/ha) in available phosphorus.*
- ❖ *About 33 per cent area is low (<145 kg/ha), medium (145-337 kg/ha) in 36 per cent area and 17 per cent area is high (>337 kg/ha) in available potassium.*
- ❖ *About 40 per cent area is low (<10 ppm), 46 per cent medium (10-20 ppm) and 1 per cent high (>20 ppm) in available sulphur.*
- ❖ *Available boron is low (<0.5 ppm) in about 66 per cent are and medium (0.5-1.0 ppm) in 20 per cent area.*
- ❖ *Available iron is deficient (<4.5 ppm) in 19 per cent area and sufficient (>4.5 ppm) in 67 per cent area.*
- ❖ *Available zinc is deficient (<0.6 ppm) in 16 per cent area and sufficient (>0.6 ppm) in 70 per cent area.*
- ❖ *Available copper and manganese are sufficient in all the soils.*
- ❖ *The land suitability for 28 major crops grown in the microwatershed were assessed and the areas that are highly suitable (S1) and moderately suitable (S2) are given below. It is however to be noted that a given soil may be suitable for various crops but what specific crop to be grown may be decided by the farmer looking to his capacity to invest on various inputs, marketing infrastructure, market price and finally the demand and supply position.*

Land suitability for various crops in the microwatershed

Crop	Suitability Area in ha (%)		Crop	Suitability Area in ha (%)	
	Highly suitable (S1)	Moderately suitable (S2)		Highly suitable (S1)	Moderately suitable (S2)
Sorghum	30 (5)	193(29)	Pomegranate	40 (6)	220 (33)
Maize	27(4)	232 (35)	Guava	40 (6)	124 (19)
Bajra	50 (8)	384 (58)	Jackfruit	40 (6)	124 (19)
Groundnut	63 (10)	262 (40)	Jamun	-	237 (36)
Sunflower	30 (5)	130 (20)	Musambi	43 (7)	217 (33)
Cotton	3 (<1)	219 (33)	Lime	43 (7)	217 (33)
Red gram	27 (4)	109 (17)	Cashew	40 (6)	140 (21)
Bengalgram	72 (11)	214 (32)	Custard apple	67 (10)	409 (62)
Chilli	27 (4)	100 (15)	Amla	64 (10)	412 (63)
Tomato	27 (4)	100 (15)	Tamarind	-	113 (17)
Drumstick	41 (6)	181 (27)	Marigold	27 (4)	196 (30)
Mulberry	42 (6)	298 (45)	Chrysanthemum	27 (4)	196 (30)
Mango	-	41 (6)	Jasmine	27 (4)	100 (15)
Sapota	40 (6)	124 (19)	Crossandra	27 (4)	127 (19)

Apart from the individual crop suitability, a proposed crop plan has been prepared for the 8 identified LMUs by considering only the highly and moderately suitable lands for different crops and cropping systems with food, fodder, fibre and other horticulture crops.

❖ Maintaining soil-health is vital for 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 for these problematic soils like saline/alkali, highly eroded, sandy soils etc.,

❖ Soil and water conservation treatment plan has been prepared that would help in identifying the sites to be treated and also the type of structures required.

❖ As part of the greening programme, several tree species have been suggested to be planted in marginal and submarginal lands, field bunds and also in the hillocks, mounds and ridges. That would help in supplementing the farm income, provide fodder and fuel, and generate lot of biomass which inturn would help in maintaining the ecological balance and contribute to mitigating the climate change.

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 uncultivated areas are facing various degrees of degradation, particularly soil erosion; salinity and alkalinity has emerged as a major problem in more than 3.5 lakh ha in the irrigated areas of the State. Nutrient depletion and declining factor productivity is common in both rainfed and irrigated areas. The degradation is continuing at an alarming rate and there appears to be no systematic effort among the stakeholders to contain this process. In recent times, an aberration of weather due to climate change phenomenon has added another dimension leading to unpredictable situations to be tackled by the farmers. In this critical juncture, the challenge before us is not only to increase the productivity per unit area which is steadily declining and showing a fatigue syndrome, but also to prevent or at least reduce the severity of degradation. If the situation is not reversed at the earliest, then the sustainability of the already fragile crop production system and the overall ecosystem will be badly affected in the state.

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

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

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

GEOGRAPHICAL SETTING

2.1 Location and Extent

The Chilkamuki Microwatershed is located in the central part of northern Karnataka in Koppal Taluk, Koppal District, Karnataka State (Fig.2.1). It comprises parts of Chilakamukki, Chamalapura, Kodadhala, Hiresoolikeri, Gosaladoddi, Irakallagada and Jinnapura villages. It lies between $15^0 28'$ – $15^0 31'$ North latitudes and $76^0 13'$ – $76^0 15'$ East longitudes and covers an area of 659 ha. It is about 35 km southwest of Koppal town and is surrounded by Chilakamukki village on the northeast and northwest, Gosaladoddi village on the east, Jinnapura on the southaest and Kodadhala on the west and Chamalapura and Irakallagada on the southern side of the microwatershed.
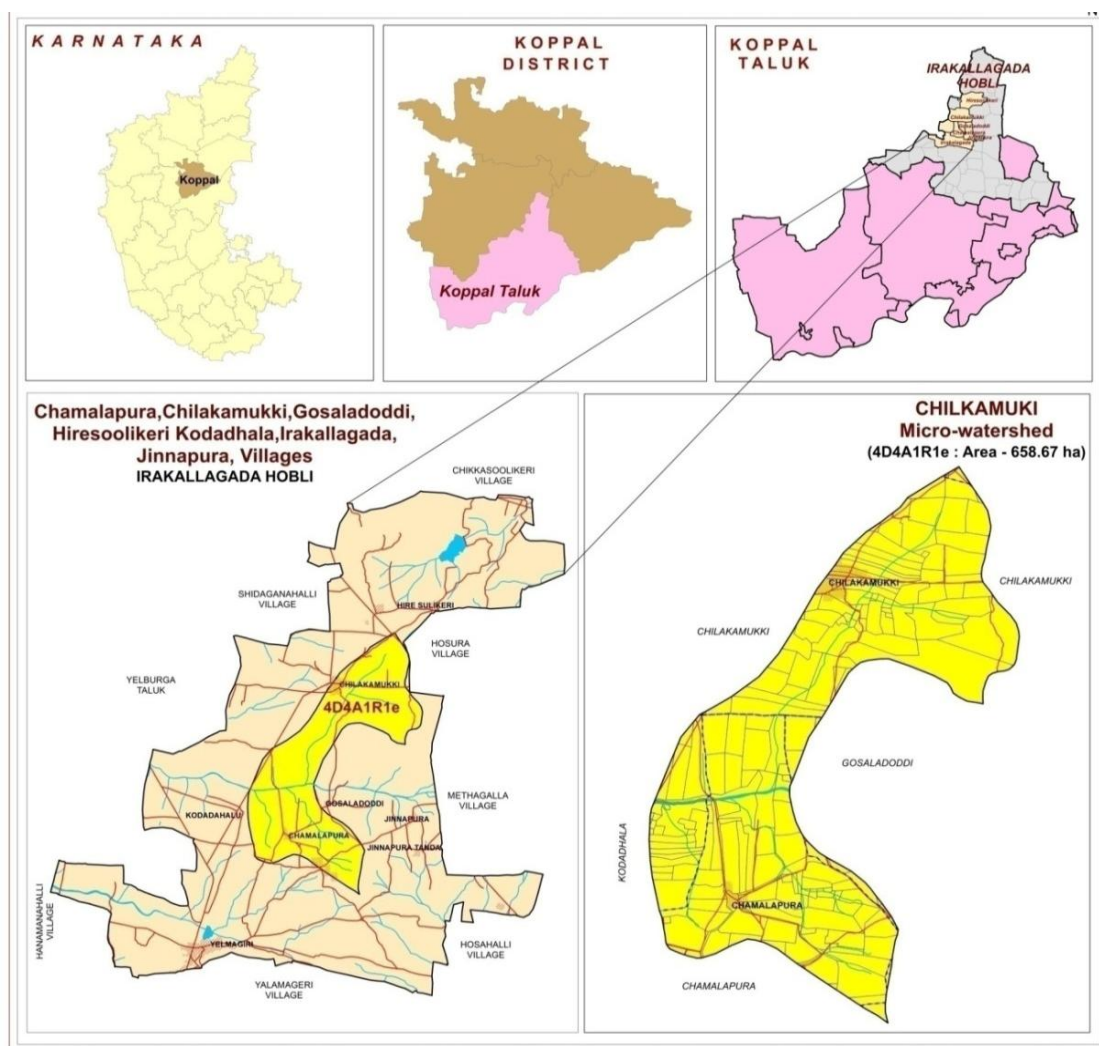
Fig.2.1 Location map of Chilkamuki Microwatershed

2.2 Geology

Major rock formations observed in the microwatershed are granite gneiss and alluvium (Figs.2.2a and b). Granite gneisses are essentially pink to gray and are coarse to

medium grained. They consist primarily of quartz, feldspar, biotite and hornblende. The gray granite gneisses are highly weathered, fractured and fissured upto a depth of about 10 m. Dolerite dykes and quartz veins are common with variable width and found to occur in Chilkamuki village. The soil thickness of the alluvium generally is limited to less than a meter, except in river valleys where it is very deep extending to tens of meters. Such soils are transported and represent palaeo black soils originally formed at higher elevation, but now occupying river valleys.

Fig.2.2 Granite and granite gneiss rocks

Fig.2.2 b Alluvium

2.3 Physiography

Physiographically, the area has been identified as Granite gneiss and Alluvial landscapes based on geology. The microwatershed area has been further divided into mounds/ridges, summits, side slopes and very gently sloping uplands and nearly level

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plains based on slope and its relief features. The elevation ranges from 593 to 629 m in the gently sloping uplands. The mounds and ridges are mostly covered by rock outcrops.

2.4 Drainage

The area is drained by several small seasonal streams that join Hire *halla* and Chenna *halla* along its course. Though, the streams are not perennial, during rainy season they carry large quantities of rain water. The microwatershed has only few small tanks which are not able to store the water flowing 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 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 of the state and is categorized as drought - prone with total annual rainfall of 662 mm (Table 2.1) Of this, a maximum of 424 mm precipitation takes place during south–west monsoon period from June to September, north-east monsoon contributes about 161 mm and prevails from October to early December and the remaining 77 mm received during the rest of the year. The winter season is from December to February. During April and May, the temperatures reach up to 45°C and in December and January, the temperatures will go down to 16°C. Rainfall distribution is shown in Figure 2.3. The average Potential Evapo Transpiration (PET) is 145 mm and varies from a low of 101 mm in December and 193 mm in the months of May. The PET is always higher than precipitation in all the months except in the month of September. Generally, the Length of crop Growing Period (LGP) is <90 days and starts from 2nd week of August to 2nd week of November.

Table 2.1 Mean Monthly Rainfall, PET, 1/2 PET at Koppal Taluk and District

Sl. No.	Months	Rainfall	PET	1/2 PET
1	January	1.60	116.70	58.35
2	February	1.50	129.20	64.60
3	March	14.10	169.80	84.90
4	April	18.10	180.60	90.30
5	May	41.60	193.50	96.75
6	June	85.80	167.90	83.95
7	July	72.10	156.20	78.10
8	August	110.50	152.50	76.25
9	September	155.60	138.50	69.25
10	October	116.30	122.30	61.15
11	November	36.00	106.40	53.20
12	December	9.10	101.00	50.50
	TOTAL	**662.30**	**144.55**	
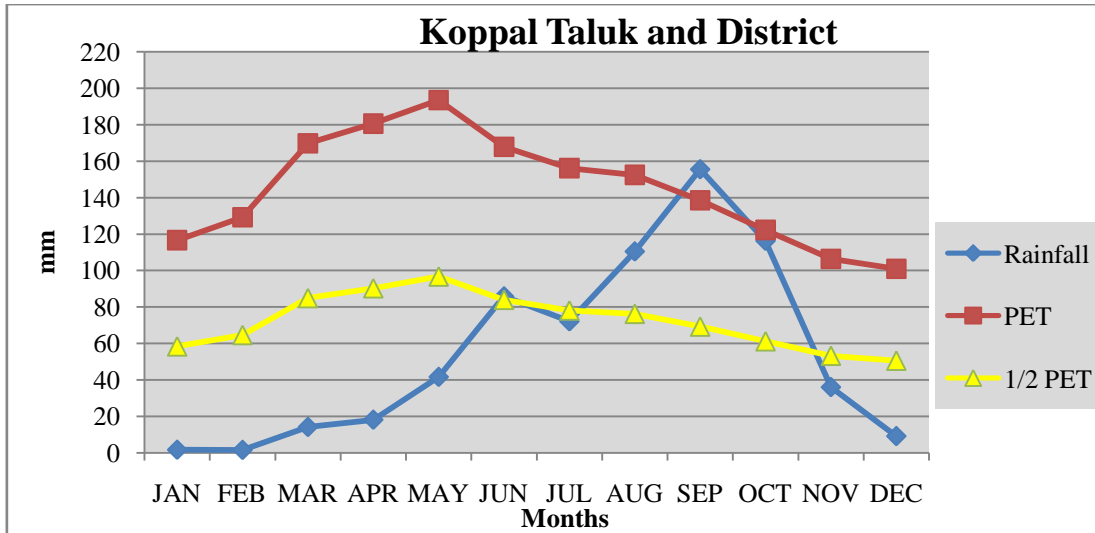
Fig. 2.3 Rainfall distribution in Koppal Taluk and District

2.6 Natural Vegetation

The natural vegetation is sparse comprising few tree species, shrubs and herbs. The mounds, ridges and boulders occupy 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 2.4).

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

Fig 2.4 Natural vegetation of Chilkamuki microwatershed

2.7 Land Utilization

About 91 per cent area (Table 2.2) in Koppal district is cultivated at present and about 17 per cent of the area is sown more than once. An area of about 3 per cent is currently barren. Forests occupy a small area of about 5 per cent and the tree cover is in a very poor state. Most of the mounds, ridges and bouldery areas have very poor vegetative cover. Major crops grown in the area are Maize, bajra, cotton, safflower, sunflower, red gram, horse gram, onion, mulberry, pomegranate, sugarcane, bengalgram, marigold and groundnut (Fig 2.5). While carrying out land resource inventory, the land use/land cover particulars are collected from all the survey numbers and a current land use map of the microwatershed is prepared. The current land use map prepared shows the arable and non-arable lands, other land uses and different types of crops grown in the area. The current land use map of Chilkamuki Microwatershed is presented in Fig.2.6. Simultaneously, enumeration of existing wells (bore wells and open wells) and other soil and water conservation structures in the microwatershed is made and their location in different survey numbers is marked on the cadastral map. Map showing the location of wells and conservation structures in Chilkamuki Microwatershed is given Fig.2.7.

Table 2.2 Land Utilization in Koppal District

Sl. No.	Agricultural land use	Area (ha)	Per cent
1	Total geographical area	552495	
2	Total cultivated area	500542	90.6
3	Area sown more than once	92696	16.8
4	Trees and groves	210	0.04
5	Cropping intensity	-	118
6	Forest	29451	5.33
7	Cultivable wasteland	2568	0.46
8	Permanent Pasture land	14675	2.66
9	Barren land	16627	3.01
10	Non agricultural land	40591	7.35
11	Current fallow	19660	3.56
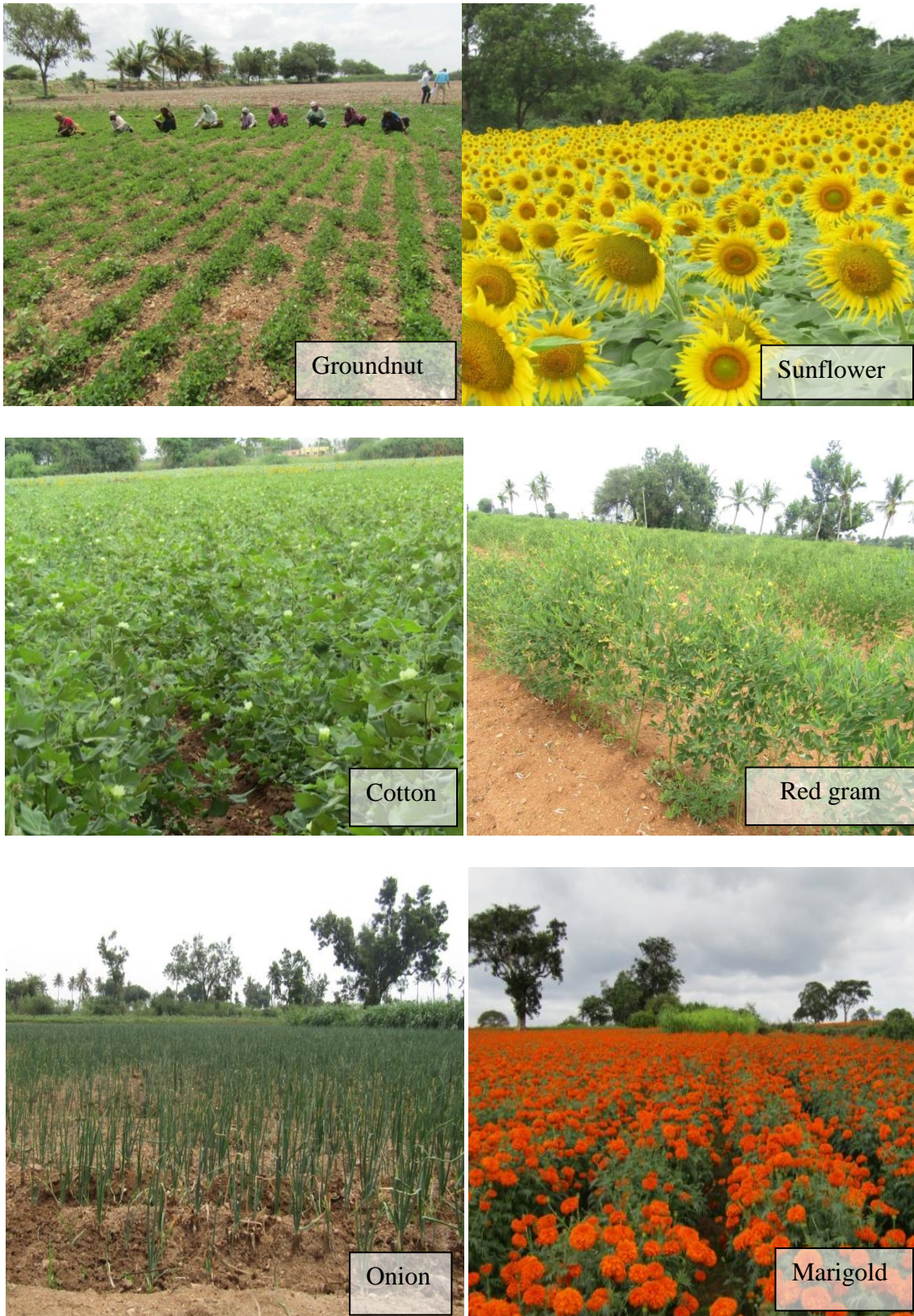
Fig.2.5 Different crops and cropping systems in Chilkamuki Microwatershed
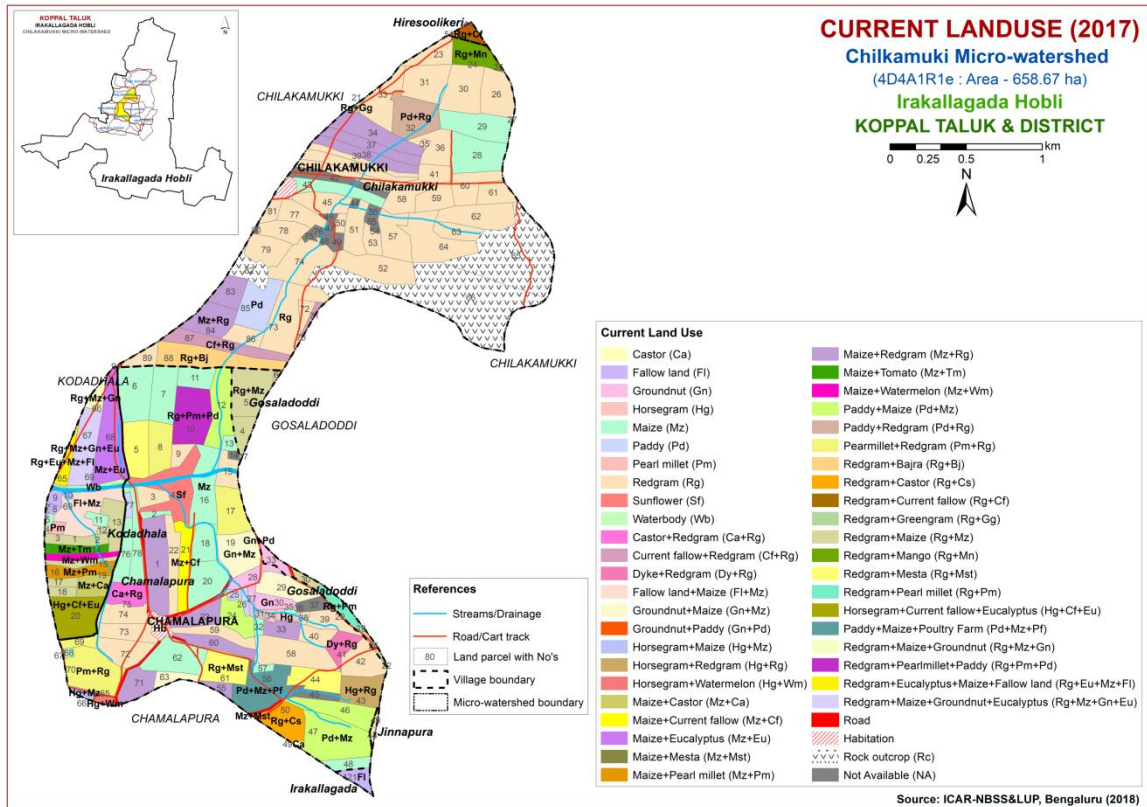
Fig.2.6 Current Land Use – Chilkamuki Microwatershed
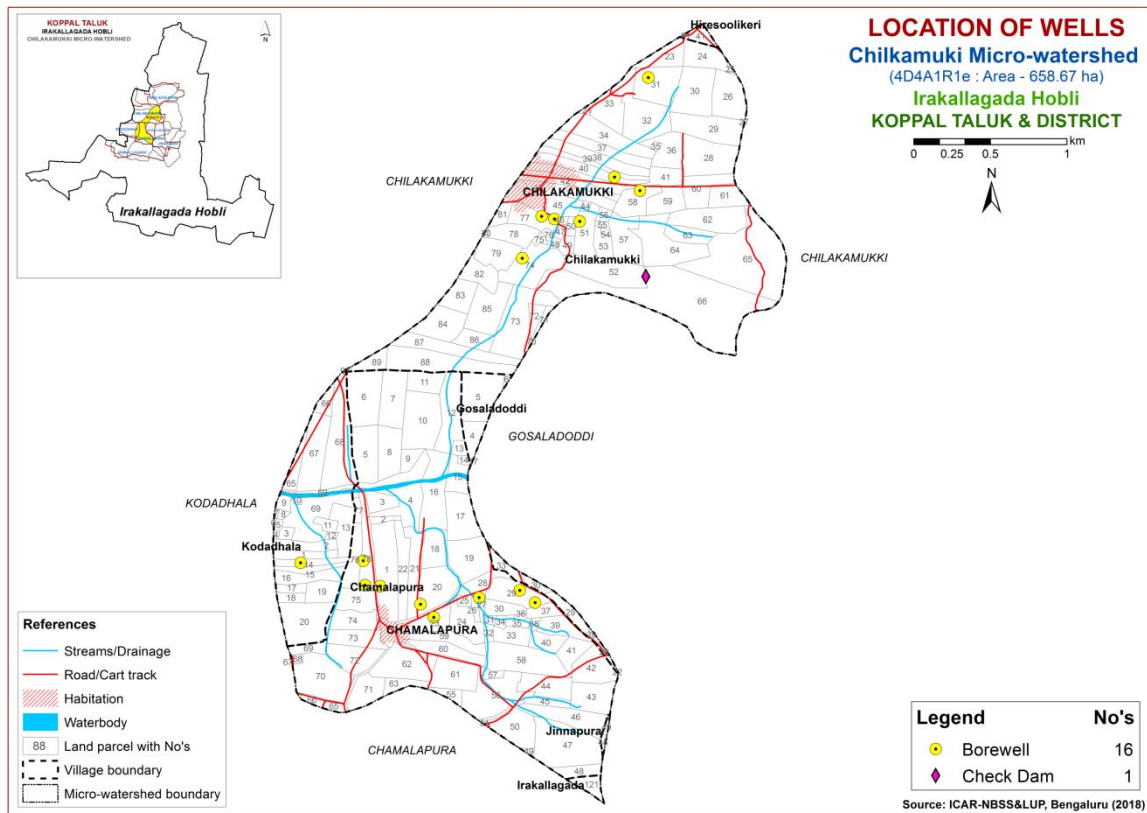
Fig.2.7 Location of wells and conservation structures– Chilkamuki Microwatershed

9

SURVEY METHODOLOGY

The purpose of land resource inventory is to delineate similar areas (soil series and phases), which respond or expected to respond similarly for a given level of management. This was achieved in Chilkamuki 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, erosion, drainage, occurrence of rock fragments etc.) 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 659 ha area. 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 and satellite imagery as base supplied by the KSRSAC. 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 geology, 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 used for initial traversing, identification of geology, landscapes 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 (FCC) of Cartosat-I and LISS-IV merged satellite data covering the microwatershed area was visually interpreted using image interpretation elements and all the available collateral data with local knowledge. The delineated physiographic boundaries were transferred on to a cadastral map overlaid on satellite imagery. Physiographically, the area has been identified as granite gneiss and alluvial landscapes and is divided into landforms such as uplands, summits and very gently sloping based on slope. They were further subdivided into physiographic/ image

interpretation units based on image characteristics. The image interpretation legend for Physiography is given below.

Image Interpretation Legend for Physiography
G- Granite gneiss landscape

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

DSe Alluvial landscape
DSe 1 Summit
DSe 11 Nearly level Summit with dark grey tone
DSe 12 Nearly level Summit with medium grey tone
DSe 13 Nearly level Summit with whitish grey tone
DSe 14 Nearly level Summit with whitish tone (Calcareousness)
DSe 15 Nearly level Summit with pinkish grey tone
DSe 16　Nearly level Summit with medium pink tone
DSe 17　Nearly level Summit with bluish white tone
DSe 18 Nearly level Summit with greenish grey tone
DSe 2 Very gently sloping
DSe 21 Very gently sloping, whitish tone
DSe 22 Very gently sloping, greyish pink tone
DSe 23 Very gently sloping, whitish grey tone
DSe 24 Very gently sloping, medium grey tone
DSe 25 Very gently sloping, medium pink tone
DSe 26 Very gently sloping, dark grey tone
DSe 27 Very gently sloping, bluish grey tone
DSe 28 Very gently sloping, greenish grey tone
DSe 29 Very gently sloping, Pinkish grey
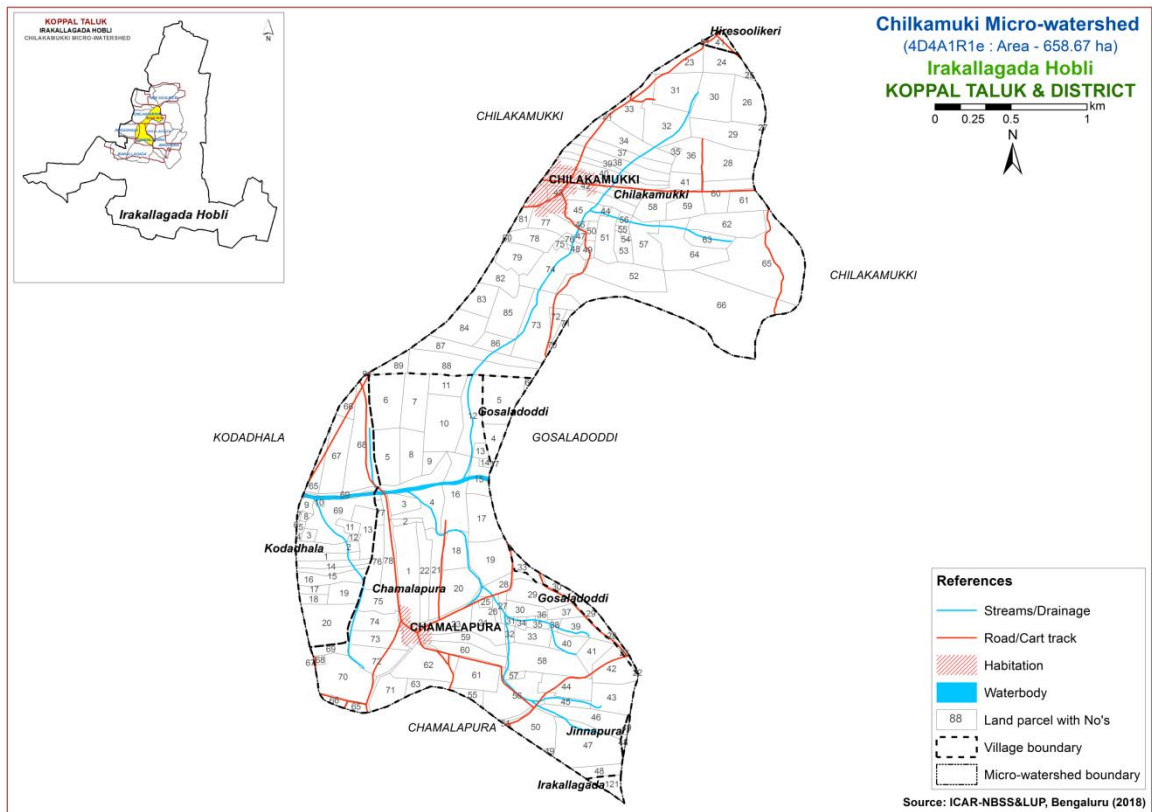
Fig 3.1 Scanned and Digitized Cadastral map of Chilkamuki Microwatershed
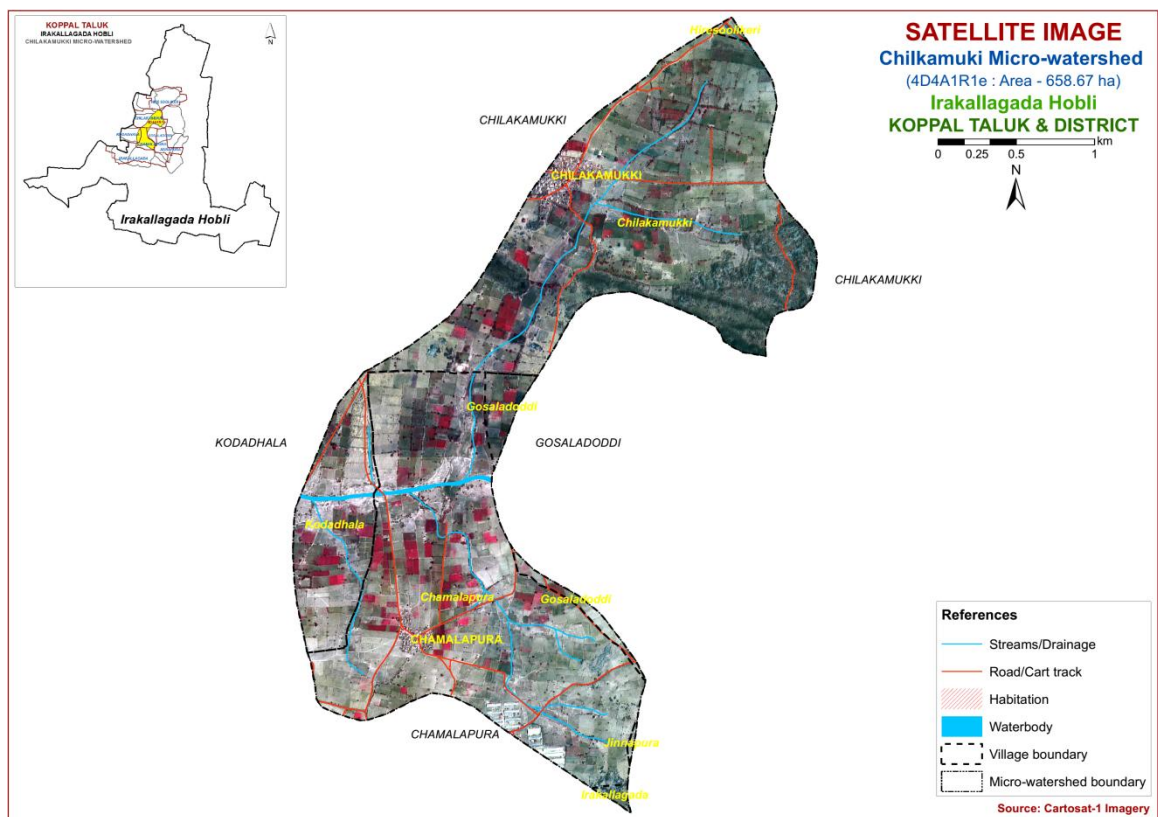
Fig.3.2 Satellite Image of Chilkamuki Microwatershed
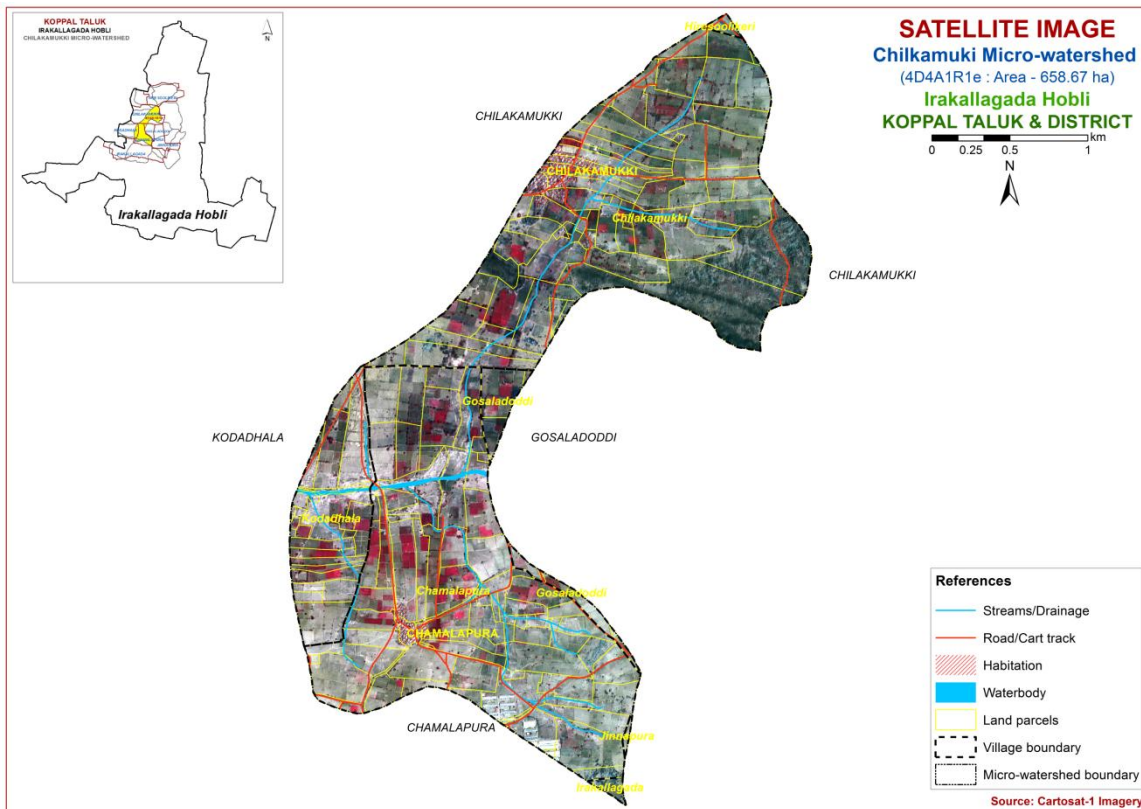
Fig.3.3 Cadastral map overlaid on IRS PAN+LISS IV merged imagery of Chilkamuki Microwatershed

3.3 Field Investigation

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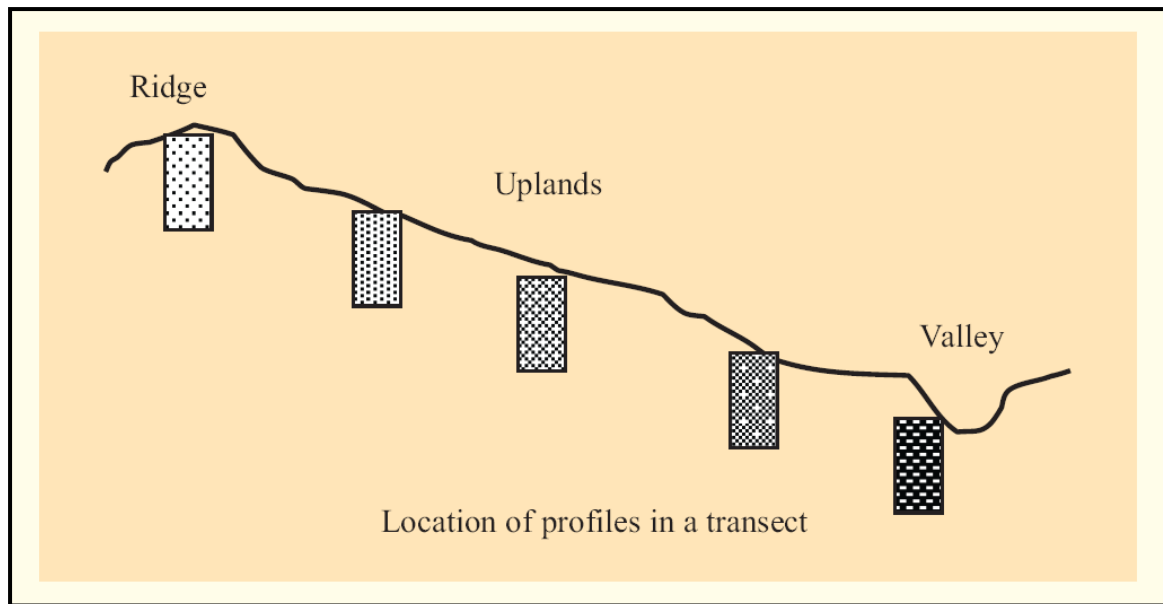
Fig: 3.4. Location of profiles in a transect

In the selected transect, soil profiles (Fig.3.4) 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 to validate the soil map unit boundariers.

Based on the soil characteristics, the soils were grouped into different soil series. Soil series is the most homogeneous unit having similar horizons and properties and behaves similarly for a given level of management. Soil depth, texture, colour, kind of horizon and horizon sequence, amount and nature of gravel present, calcareousness, nature of substratum etc, were used as the major differentiating characteristics for identifying soil series occurring in the area. The differentiating characteristics used for identifying the soil series are given in Table 3.1. Based on the above characteristics, 17 soil series were identified in Chilkamuki Microwatershed.

Table 3.1 Differentiating Characteristics used for identifying Soil Series

(Characteristics are of Series Control Section)

Sl.No	Soil Series	Depth (cm)	Colour (moist)	Texture	Gravel (%)	Horizon sequence	Calcareousness
Soils of granite gneiss Landscape							
1	Harve (HRV)	25-50	2.5YR3/4,3/6 5YR3/3,4/4,3/4	gscl	>35	Ap-Bt-Cr-	
2	Chikkasavanur (CSR)	25-50	7.5YR3/2,3/3,3/4	scl	<15	Ap-Bw-Cr	-
3	Abbigeri (ABR)	25-50	2.5YR 3/3, 3/4	gsc	>35	Ap-Bt-Cr	
4	Lakkur (LKR)	50-75	2.5YR 2.5/3, 2.5/4, 3/4, 3/6	gsc	40-60	Ap-Bt-Bc-Cr	
5	Mukhadahalli (MKH)	50-75	5YR3/3,3/4,4/3, 5/4,6/6 2.5YR3/4	gsc	>35	Ap-Bt-Cr	
6	Hatti (HTI)	50-75	5 YR 3/3, 3/4,	gsc	15-35	Ap-Bt-Cr	
7	Hooradhahalli (HDH)	75-100	2.5YR2.5/4,3/4, 3/6	gsc-gc	>35	Ap-Bt-Cr	
8	Gollarahatti (GHT)	75-100	2.5YR3/4,3/6, 4/4,4/6	gscl	15-35	Ap-Bt-Cr	
9	Bidanagere (BDG)	75-100	5YR3/3,3/4,4/3,5/4 2.5YR3/4	gc	35-60	Ap-Bt-Cr	
10	Mornal (MNL)	100-150	5YR 3/4, 2.5 YR 3/4, 4/6	gsc	15-35	Ap-Bt-Cr	
11	Balapur (BPR)	100-150	2.5YR2.5/4,3/4	gsc-gc	>35	Ap-Bt-Cr	
12	Vaddarahalli (VDH)	100-150	7.5YR3/2,3/3,3/4	sc-c	-	Ap-Bt-Cr	
13	Nagalapur (NGP)	100-150	5YR2.5/2,3/2, 2.5YR3/6,4/6	gsc	>35	Ap-Bt-Cr	
14	Thondigere (TDG)	>150	7.5YR3/3,3/4,4/6 10YR3/3,4/3, 4/4,4/6	scl	-	Ap-Bw-C	
15	Thimmasandra (TSD)	>150	10YR2/12/2,3/1, 3/2,4/1, 4/2,4/3	c	-	Ap-Bw	
Soils of Alluvial Landscape							
16	Dambarahalli (DRL)	75-100	10YR 2/1, 3/1, 4/3	c	<15	Ap-Bss-Ck	e-es
17	Handrala (HDL)	100-150	10 YR 2/1, 3/1,4/1,	c	-	Ap-Bss-Ck	es

3.4 Soil Mapping

The area under each soil series was further separated into 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.3.5) in the form of symbols. During the survey many soil profile pits, few minipits and a few auger bores

representing different landforms occurring in the microwatershed were studied. In addition to the profile study, spot observations in the form of minipits, road cuts, terrace cuts etc., were studied to validate the soil boundaries on the soil map. The soil map shows the geographic distribution and area extent of 35 mapping units representing 17 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 35 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 have to be treated accordingly.

3.5 Laboratory Characterization

Soil samples for each series were collected from representative master profiles for laboratory characterization by following the methods outlined in the Laboratory Manual (Sarma *et al*, 1987). Surface soil samples collected in the year 2017 from Chilkamuki farmer's fields (62 samples) for fertility status (major and micronutrients) at 320 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 using Kriging method for the microwatershed.

3.6 Land management units (LMUs)

The 35 soil phases identified and mapped in the microwatershed were regrouped into 8 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 (LMU's) based on the management needs. One or more than one soil site characteristic having influence on the management have been choosen for identification and delineation of LMUs. For Chilkamuki 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.
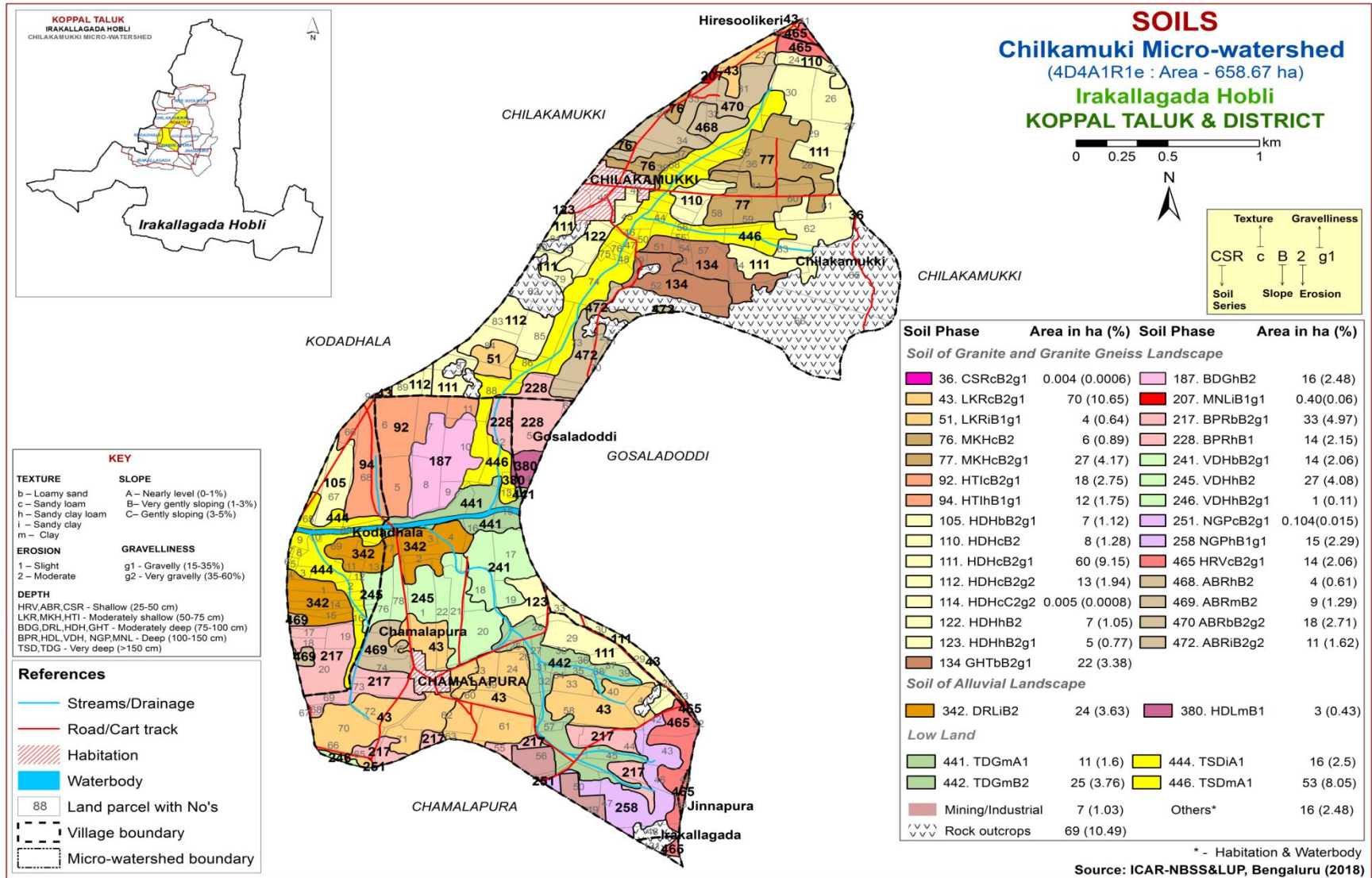
Fig 3.5 Soil Phase or Management Units-Chilkamuki Microwatershed

Table 3.2 Soil map unit description of Chilkamuki Microwatershed

Soil map unit No*	Soil Series	Soil Phase Symbol	Mapping Unit Description	Area in ha (%)
Soils of Granite and Granite gneiss
	HRV		Harve soils are shallow (25-50 cm), well drained, dark red to dark reddish brown, red gravelly loamy soils occurring on nearly level to gently sloping uplands under cultivation	**14 (2.06)**
465		HRVcB2g1	Sandy loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)	14 (2.06)
	CSR		Chikkasavanur soils are shallow (25-50 cm), well drained, have dark brown to light yellowish brown, red sandy clay loam soils occurring on nearly level to very gently sloping uplands under cultivation	**0.004 (0.0)**
36		CSRcB2g1	Sandy loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)	0.004 (0.0)
	ABR		Abbigere soils are shallow (25-50 cm), well drained, have dark reddish brown red gravelly sandy clay soils occurring on very gently sloping uplands under cultivation.	**42 (6.23)**
468		ABRhB2	Sandy clay loam surface, slope 1-3%, moderate erosion	4 (0.61)
469		ABRmB2	Clay surface, slope1-3%, moderate erosion	9 (1.29)
470		ABRbB2g2	Loamy sand surface, slope 1-3%, moderate erosion, very gravelly (35-60%)	18 (2.71)
472		ABRiB2g2	Sandy clay surface, slope 1-3%, moderate erosion, very gravelly (35-60%)	11 (1.62)
	LKR		Lakkur soils are moderately shallow (50-75 cm), well drained, have dark reddish brown to dark red, gravelly sandy clay soils occurring on very gently to moderately sloping uplands under cultivation	**74 (11.2)**
43		LKRcB2g1	Sandy loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)	70 (10.65)
51		LKRiB1g1	Sandy clay surface, slope 1-3%, slight erosion, gravelly (15-35%)	4 (0.64)
	MKH		Mukhadahalli soils are moderately shallow (50-75 cm), well drained, have dark brown to reddish brown gravelly red sandy clay soils occurring on very gently to gently sloping uplands under cultivation	**33 (5.06)**
76		MKHcB2	Sandy loam surface, slope 1-3%, moderate erosion	6 (0.89)
77		MKHcB2g1	Sandy loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)	27 (4.17)
	HTI		Hatti soils are moderately shallow (50-75 cm), well drained, have dark reddish brown gravelly red sandy clay soils occurring on nearly level to very gently sloping uplands under cultivation	**30 (4.5)**
92		HTIcB2g1	Sandy loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)	18 (2.75)
94		HTIhB1g1	Sandy clay loam surface, slope 1-3%, slight erosion, gravelly (15-35%)	12 (1.75)

Soil map unit No*	Soil Series	Soil Phase Symbol	Mapping Unit Description	Area in ha (%)
	HDH		Hooradhahalli soils are moderately deep (75-100 cm), well drained, dark red to dark reddish brown, red gravelly sandy clay to clay soils occurring on nearly level to moderately sloping uplands under cultivation	**80.01 (15.31)**
105		HDHbB2g1	Loamy sand surface, slope 1-3%, moderate erosion, gravelly (15-35%)	7 (1.12)
110		HDHcB2	Sandy loam surface, slope 1-3%, moderate erosion	8 (1.28)
111		HDHcB2g1	Sandy loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)	60 (9.15)
112		HDHcB2g2	Sandy loam surface, slope 1-3%, moderate erosion, very gravelly (35-60%)	13 (1.94)
114		HDHcC2g2	Sandy loam surface, slope 3-5%, moderate erosion, very gravelly (35-60%)	0.01 (0.0)
122		HDHhB2	Sandy clay loam surface, slope 1-3%, moderate erosion	7 (1.05)
123		HDHhB2g1	Sandy clay loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)	5 (0.77)
	GHT		Gollarahatti soils are moderately deep (75-100 cm), well drained, have dark reddish brown to dark red gravelly sandy clay loam soils occurring on nearly level very gently sloping uplands under cultivation	**22 (3.38)**
134		GHTbB2g1	Loamy sand surface, slope 1-3%, moderate erosion, gravelly (15-35%)	22 (3.38)
	BDG		Bidanagere soils are moderately deep (75-100 cm), well drained, have dark reddish brown red gravelly clay soils occurring on nearly level to gently sloping uplands under cultivation	**16 (2.48)**
187		BDGhB2	Sandy clay loam surface, slope 1-3%, moderate erosion	16 (2.48)
	MNL		Mornal soils are deep (100-150 cm), well drained, have dark reddish brown to red gravelly sandy clay soils occurring on very gently sloping uplands under cultivation	**0.41 (0.06)**
207		MNLiB1g1	Sandy clay surface, slope 1-3%, slight erosion, gravelly (15-35%)	0.41 (0.06)
	BPR		Balapur soils are deep (100-150 cm), well drained, have dark reddish brown to dark red gravelly sandy clay to clay soils occurring on nearly level to gently sloping uplands under cultivation	**47 (7.12)**
217		BPRbB2g1	Loamy sand surface, slope 1-3%, moderate erosion, gravelly (15-35%)	33 (4.97)
228		BPRhB1	Sandy clay loam surface, slope 1-3%, slight erosion	14 (2.15)
	VDH		Vaddarahalli soils are deep (100-150 cm), moderately well drained, have dark brown sandy clay to clay soils occurring on nearly level to very gently sloping uplands under cultivation	**42 (6.25)**

Soil map unit No*	Soil Series	Soil Phase Symbol	Mapping Unit Description	Area in ha (%)
241		VDHbB2g1	Loamy sand surface, slope 1-3%, moderate erosion, gravelly (15-35%)	14 (2.06)
245		VDHhB2	Sandy clay loam surface, slope 1-3%, moderate erosion	27 (4.08)
246		VDHhB2g1	Sandy clay loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)	1 (0.11)
	NGP		Nagalapur soils are deep (100-150 cm), well drained, have dark reddish brown to dark red gravelly sandy clay soils occurring on nearly level to gently sloping uplands under cultivation	**15.1 (2.31)**
251		NGPcB2g1	Sandy loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)	0.1 (0.02)
258		NGPhB1g1	Sandy clay loam surface, slope 1-3%, slight erosion, gravelly (15-35%)	15 (2.29)
	TDG		Thondigere soils are very deep (>150 cm), well drained, have dark brown to dark yellowish brown, sandy clay loam soils occurring on nearly level to very gently sloping lowlands under cultivation	**36 (5.36)**
441		TDGmA1	Clay surface, slope 0-1%, slight erosion	11 (1.6)
442		TDGmB2	Clay surface, slope1-3%, moderate erosion	25 (3.76)
	TSD		Thimmasandra soils are very deep (>150 cm), moderately well drained, have very dark brown to very dark grayish brown, clay soils occurring on nearly level to very gently sloping lowlands under cultivation	**69 (10.55)**
444		TSDiA1	Sandy clay surface, slope 0-1%, slight erosion	16 (2.5)
446		TSDmA1	Clay surface, slope 0-1%, slight erosion	53 (8.05)
Soils of Alluvial Landscape				
	DRL		Dambarahalli soils are moderately deep (75-100 cm), moderately well drained, have dark brown to very dark gray, black calcareous cracking clay soils occurring on nearly level to very gently sloping plains under cultivation	**24 (3.63)**
342		DRLiB2	Sandy clay surface, slope 1-3%, moderate erosion	24 (3.63)
	HDL		Handrala soils are deep (100-150 cm), moderately well drained, have dark gray to very dark gray, black calcareous cracking clay soils occurring on very gently sloping plains under cultivation	**3 (0.43)**
380		HDLmB1	Clay surface, slope 1-3%, slight erosion	3 (0.43)
994		Mining/Industrial	Mining and Industrial area	**7 (1.03)**
999		Rock outcrops	Rock lands, both massive & bouldery with little or no soil	**69 (10.49)**
1000		Other	Habitation	**16 (2.48)**

*Soil map unit numbers are continuous for the taluk, not for the microwatersheds

22

THE SOILS

Detailed information pertaining to the nature, extent and distribution of different kinds of soils occurring in Chilkamuki Microwatershed is provided in this chapter. The microwatershed area has been identified as granite gneiss and alluvial landscapes based on geology. In all, 17 soil series are identified. Soil formation is the result of the combined effect of environmental and terrain factors that are reflected in soil morphology. The soil formation is dominantly influenced by the parent material, climate, time and relief.

A brief description of each of the 17 soil series identified followed by 35 soil phases (management units) mapped (Fig. 3.5) are furnished below. The physical and chemical characteristics of soil series identified in Chilkamuki microwatershed is given in Table 4.1 along with soil classification. The soils in any one map unit differ from place to place in their depth, texture, slope, gravelliness, erosion or any other site characteristic 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, 15 soil series were identified and mapped. Of these, Hooradhahalli (HDH) 80 ha, Lakkur (LKR) 74 ha, Thimmasandra (TSD) 69 ha, Balapur (BPR) 47 ha and other series occur in a small area. The brief description of series along with the soil phases identified and mapped is given below.

4.1.1 Harve (HRV) Series: Harve soils are shallow (25-50 cm), well drained, have reddish brown to dark red garvelly sandy clay loam soils. They have developed from granite gneiss and occur on very gently to moderately sloping uplands. The Harve series has been classified as a member of the loamy-skeletal, mixed isohyperthermic family of (Paralithic) Rhodustalfs.

The thickness of the solum ranges from 28 to 48 cm. The thickness of A-horizon ranges from 12 to 17 cm. Its colour is in 5YR and 2.5 YR hue with value 3 to 4 and chroma 4 to 6. The texture varies from loamy sand to sandy loam with 20 to 60 per cent gravel. The thickness of B-horizon ranges from 16 to 32 cm. Its colour is in 2.5 YR and 5 YR hue with value 3 to 4 and chroma 4 to 6. Its texture is sandy clay loam with gravel content of more than 35 per cent. The available water capacity is very low (<50mm/m). Only one soil phase was identified and mapped.

Landscape and soil profile characteristics of Harve (HRV) Series

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

The thickness of the solum ranges from 32 to 49 cm. The thickness of A horizon ranges from 12 to 23 cm. Its colour is in 7.5 YR and 10 YR hue with value 2.5 to 4 and chroma 3 to 6. The texture varies from sandy loam to clay with 10 to 20 per cent gravel. The thickness of B horizon ranges from 16 to 32 cm. Its colour is in 7.5 YR and 5 YR hue with value 3 and chroma 2 to 4. Its texture is sandy clay loam with gravel content of < 15 per cent. The available water capacity is low (50-100 mm/m). Only one soil phase was identified and mapped.

Landscape and soil profile characteristics of Chikkasavanur (CSR) Series

4.1.3 Abbigere series (ABR): Abbigere soils are shallow (25-50 cm), well drained, have dark reddish brown red gravelly sandy clay soils. They have developed from weathered granite gneiss and occur on very gently sloping uplands under cultivation. Abbigere series has been classified as a member of the clayey- skeletal, mixed, isohyperthermic family of (Paralithic) Rhodustalfs.

The thickness of the solum ranges from 28 to 48 cm. The thickness of A-horizon ranges from 12 to 17 cm. Its colour is in 5YR and 2.5 YR hue with value 3 to 4 and chroma 3 to 4. The texture is sandy clay with 20 to 35 per cent gravel. The thickness of B-horizon ranges from 16 to 32 cm. Its colour is in 2.5 YR and 5 YR hue with value 2.5 to 4 and chroma 2 to 3. Its texture is sandy clay to clay with gravel content of more than 35 per cent. The available water capacity is very low (<50 mm/m). Four soil phases were identified and mapped.

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

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

Landscape and soil profile characteristics of Lakkur (LKR) Series

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

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

Landscape and soil profile characteristics of Mukhadahalli (MKH) Series

4.1.6 Hatti (HTI) Series: Hatti soils are moderately shallow (50-75cm), well drained, have dark reddish brown red gravelly sandy clay soils. They are developed from weathered granite gneiss and occur on very gently sloping uplands under cultivation. The Hatti series has been classified as a member of the fine mixed, isohyperthermic, family of Typic Paleustalfs.

The thickness of the solum ranges from 57 to 74 cm. The thickness of A horizon ranges from 16 to 20 cm. Its colour is in 5 YR hue with value and chroma 3 to 4. The texture varies from sandy loam to sandy clay loam and sandy clay with 15 to 60 per cent gravel. The thickness of B horizon ranges from 45 to 56 cm. Its colour is in 5 YR hue with value 3 and chroma 3 to 4. Texture is sandy clay with 15 to 35 per cent gravel. The available water capacity is low (50-100 mm/m). Two soil phases were identified and mapped.

Landscape and soil profile characteristics of Hatti (HTI) Series

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

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

Landscape and soil profile characteristics of Hooradhahalli (HDH) Series

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

The thickness of the solum ranges from 78 to 98 cm. The thickness of A-horizon ranges from   12 to 18cm. Its colour is in 5 YR and 2.5 YR hue with value 3 to 4 and chroma 4 to 6. Texture varies from loamy sand to sandy clay with 15 to 35 per cent gravel. The thickness of B horizon ranges from 66 to 81cm. Its colour is in 2.5 YR hue with value 3 to 4 and chroma 4 to 6. Texture is sandy clay loam with 15 to 35 per cent gravel. The available water capacity is medium (100-150 mm/m). Only one soil phase was identified and mapped.

Landscape and soil profile characteristics of Gollarahatti (GHT) Series

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

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

Landscape Soil Profile Characteristics of Bidanagere (BDG) Series

4.1.10 Mornal (MNL) Series: Mornal soils are deep (100-150 cm), well drained, have dark reddish brown to dark red gravelly sandy clay soils. They are developed from weathered granite gneiss and occur on very gently sloping uplands under cultivation. The Mornal soil series has been classified as a member of the fine mixed, isohyperthermic family of Rhodic Rhodustalfs.

The thickness of the solum ranges from 112 to 149 cm. The thickness of A-horizon ranges from 15 to 25 cm. Its colour is in 5 YR, 10 YR hue with value 3 to 4 and chroma 2 to 4. The texture is sandy clay loam, sandy clay and clay with 15 to 30 per cent gravel. The thickness of B-horizon ranges from 103 to 131 cm. Its colour is in 2.5 YR and 5 YR hue with value 2.5 to 4 and chroma 3 to 6. Texture is sandy clay loam to sandy clay with 15 to 35 per cent gravel. The available water capacity is medium (101-150 mm/m). Only one soil phase was identified and mapped.

Landscape and soil profile characteristics of Mornal (MNL) Series

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

The thickness of the solum ranges from 102 to 147 cm. The thickness of A horizon ranges from 12 to 17cm. Its colour is in 5 YR and 2.5 YR hue with value and chroma 3 to 4. The texture ranges from loamy sand to sandy clay with 15 to 50 per cent gravel. The thickness of B horizon ranges from 90 to 132 cm. Its colour is in 2.5 YR hue with value 2.5 to 3 and chroma 4 to 6. Texture is sandy clay to clay with 35 to 50 per cent gravel. The available water capacity is medium (100-150 mm/m). Two soil phases were identified and mapped.

Landscape and soil profile characteristics of Balapur (BPR) Series

4.1.12 Vaddarahalli (VDH) Series: Vaddarahalli soils are deep (100-150 cm), well drained, have dark reddish brown to dark brown sandy clay to clay soils. They have developed from weathered granite gneiss and occur on nearly level to very gently sloping uplands. The Vaddarahalli series has been classified as a member of the fine, mixed, isohyperthermic family of Typic Haplustalfs.

The thickness of the solum ranges from 106 to 148 cm. The thickness of A horizon ranges from 13 to 23 cm. Its colour is in 7.5 YR and 10 YR hue with value 3 and chroma 3 to 4. The texture varies from sandy loam to clay. The thickness of B horizon ranges from 95 to 132 cm. Its colour is in 7.5 YR and 5 YR hue with value 3 to 4 and chroma 2 to 4. Its texture is sandy clay to clay. The available water capacity is high (150-200 mm/m). Three soil phases were identified and mapped

Landscape and soil profile characteristics of Vaddarahalli (VDH) Series

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

The thickness of the solum ranges from 105 to 145 cm. The thickness of A-horizon ranges from 14 to 20 cm. Its colour is in 7.5 YR hue with value and chroma 3 to 4. The texture ranges from sandy loam to sandy clay with 10 to 50 per cent gravel. The thickness of B horizon ranges from 90 to 128 cm. Its colour is in 2.5 YR, 5 YR and 7.5 YR hue with value 3 to 5 and chroma 3 to 6. Texture is sandy clay to clay with 35 to 80 per cent gravel. The available water capacity is low (51-100 mm/m). Two soil phases were identified and mapped

Landscape Soil Profile Characteristics of Nagalapur (NGP) Series

4.1.14 Thondigere (TDG) Series: Thondigere soils are very deep (>150 cm), well drained, have dark brown to dark yellowish brown, sandy clay loam soils. They have developed from alluvio- colluvium and occur on nearly level to very gently sloping lowlands under cultivation. The Thondigere series has been classified as a member of the fine -loamy, mixed, isohyperthermic family of Fluventic Haplustepts.

The thickness of the solum is more than 150 cm. The thickness of A-horizon ranges from 12 to 19 cm. Its colour is in 10 YR, 5 YR and 7.5 YR hue with value 3 to 4 and chroma 4. The texture is sandy clay loam. The thickness of B horizon is more than 150 cm. Its colour is in 10 YR and 7.5 YR hue with value 3 to 4 and chroma 3 to 6. Its texture is sandy loam, sandy clay loam and sandy clay. The available water capacity is medium (101-150 mm/m). Two soil phases were identified and mapped.

Landscape and soil profile characteristics of Thondigere (TDG) Series

4.1.15 Thimmasandra (TSD) Series: Thimmasandra soils are very deep (>150 cm), moderately well drained, have very dark brown to very dark grayish brown clay soils. They have developed from weathered granite gneiss and occur on nearly level to very gently sloping lowlands under cultivation. The Thimmasandra series has been classified as a member of the fine, mixed, isohyperthermic family of Typic Haplustepts.

The thickness of the solum is more than 150 cm. The thickness of A horizon ranges from 11 to 17 cm. Its colour is in 10 YR hue with value 3 and chroma 3. The texture is sandy clay. 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 3. Its texture is sandy clay to clay. The available water capacity is very high (>200 mm/m). Two soil phases were identified and mapped.

Landscape and soil profile characteristics of Thimmasandra (TSD) Series

4.2 Soils of Alluvial landscape

In this landscape, 2 soil series are identified and mapped. The brief description of each soil series along with the soil phases identified and mapped is given below.

4.2.1 Dambarahalli (DRL) Series: Dambarahalli soils are moderately deep (75-100 cm), moderately well drained, have black and very dark gray to dark brown, calcareous cracking clay soils. They have developed from alluvium and occur on very gently to gently sloping uplands under cultivation. The Dombarahalli series has been classified as a member of the Very fine, smectitic isohyperthermic (calc) family of Typic Haplusterts.

The thickness of the solum ranges from 75 to 99 cm. The thickness of A horizon ranges from 13 to 24 cm. Its colour is in 10 YR hue with value 3 to 4 and chroma 1 to 2. The texture is clay. The thickness of B horizon ranges from 54 to 85 cm. Its colour is in 10 YR hue with value 2 to 4 and chroma 1 to 3. Its texture is clay and are calcareous. The available water capacity is high (151-200 mm/m). Only one soil phase was identified and mapped.

Landscape and soil profile characteristics of Dambarahalli (DRL) Series

4.2.2 Handrala (HDL) Series: Handrala soils are deep (100-150 cm), moderately well drained, have black to very dark brown and dark gray calcareous cracking clay soils. They are developed from alluvium and occur on very gently to gently sloping uplands. Handrala series has been classified as a member of the very fine, smectitic, isohyperthermic (Calc) family of Typic Haplusterts.

The thickness of the solum ranges from 102 to 149 cm. The thickness of A horizon ranges from 14 to 26 cm. Its colour is in 10 YR hue with value 3 and chroma 1. The texture is clay. The thickness of B horizon ranges from 103 to 127 cm. Its colour is in 10 YR hue with value 2 to 4 and chroma 1 to 2. Texture is dominantly clay. The available water capacity is very high (>200 mm/m). Only one soil phase was identified and mapped.

Landscape and soil profile characteristics of Handrala (HDL) Series

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Table: 4.1 Physical and Chemical Characteristics of Soil Series identified in Chilkamuki Microwatershed

Series Name: Harve (HRV)   **Pedon:**R-10
Location: $15^0 25'11.63''$N, $76^0 22'03.65''$E Jabbaragudda village, Koppal Taluk and District
Analysis at: NBSS&LUP, Regional Centre, Bangalore.   **Classification:** Loamy-skeletal, mixed, isohyperthermic (Paralithic) Rhodustalfs

| Depth (cm) | Horizon | Size class and particle diameter (mm) | | | | | | | | Coarse fragments w/w (%) | Texture Class (USDA) | % Moisture | |
| | | Total | | | Sand | | | | | | | | |
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-15	Ap	65.64	9.07	25.28	29.04	12.99	9.00	3.48	11.15	50	scl	12.87	4.81
15-29	Bt1	56.13	7.75	36.12	27.81	11.43	7.21	1.44	8.24	60	sc	15.69	6.24
29-47	Bt2	63.42	6.53	30.05	32.38	13.93	7.48	5.74	3.89	60	scl	15.41	9.29

| Depth (cm) | pH (1:2.5) | | | E.C. (1:2.5) | O.C. | CaCO₃ | Exchangeable bases | | | | | CEC | CEC/ Clay | Base satura tion | ESP |
	Water	CaCl₂	M KCl	dS m^{-1}	%	%	Ca	Mg	K	Na	Total			%	%
							cmol kg^{-1}								
0-15	6.05	-	-	0.21	0.93	-	8.89	1.96	0.50	0.08	11.43	11.24	0.44	100.00	0.73
15-29	5.99	-	-	0.15	0.29	-	9.72	2.75	0.51	0.09	13.07	12.71	0.35	100.00	0.74
29-47	6.07	-	-	0.11	0.38	-	9.35	2.47	0.49	0.06	12.36	12.71	0.42	97.29	0.44

Contd...

Series Name: Abbigeri (ABR), **Pedon:** R-11
Location: 15⁰26'14.0"N, 76⁰16'39.0"E Abbigeri village, Koppal Taluk and District
Analysis at: NBSS&LUP, Regional Centre, Bangalore.   **Classification:** Clayey- skeletal, mixed, isohyperthermic (Paralithic) Rhodustalfs

Depth (cm)	Horizon	Total			Sand					Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-10	Ap	81.18	8.29	10.53	24.31	11.90	19.33	16.07	9.56	20	ls	7.13	3.91
10-25	Bt1	54.32	7.39	38.29	26.64	11.34	5.83	6.24	4.27	40	sc	14.71	11.30
25-40	Bt2	53.84	7.99	38.17	22.10	14.32	6.43	6.85	4.15	50	sc	16.45	12.00

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	CaCO₃	Exchangeable bases					CEC	CEC/ Clay	Base satura tion	ESP
							Ca	Mg	K	Na	Total				
	Water	CaCl₂	M KCl	dS m⁻¹	%	%	cmol kg⁻¹							%	%
0-10	6.13	-	-	0.02	0.81	-	1.56	0.50	0.04	0.01	2.12	3.60	0.34	58.76	0.36
10.-25	6.32	-	-	0.03	0.79	-	5.63	2.41	0.12	0.01	8.17	10.60	0.28	77.07	0.10
25-40	6.27	-	-	0.03	0.64	-	5.41	2.24	0.08	0.01	7.74	12.40	0.32	62.44	0.09

Contd...

Soil Series: Lakkur (LKR), **Pedon:** RM-8.
Location: $15^0$04'26.3"N, $75^0$37'84.1"E, (4D4A3I1f), Belhatti village, Shirahatti taluk, Gadag distrtict
Analysis at: NBSS&LUP, Regional Centre, Bengaluru   **Classification:** Clayey-skeletal, mixed, isohyperthermic Typic Rhodustalfs

| Depth (cm) | Horizon | Size class and particle diameter (mm) | | | | | | | | Coarse fragments w/w (%) | Texture Class (USDA) | % Moisture | |
| | | Total | | | Sand | | | | | | | | |
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-21	Ap	74.00	8.34	17.66	9.62	11.57	15.76	23.13	13.92	20	sl	-	-
21-35	Bt	54.37	10.48	35.14	16.33	8.64	9.69	11.59	8.11	40	sc	-	-
35-56	Bc	48.37	13.46	38.17	10.96	7.69	9.17	11.28	9.27	60	sc	-	-

| Depth (cm) | pH (1:2.5) | | | E.C. (1:2.5) | O.C. | CaCO$_3$ | Exchangeable bases | | | | | CEC | CEC/ Clay | Base satura tion | ESP |
	Water	CaCl$_2$	M KCl	dS m^{-1}	%	%	Ca	Mg	K	Na	Total			%	%
							cmol kg^{-1}								
0-21	8.18	-	-	0.30	0.56	0.94	-	-	0.31	0.55	0.86	12.19	0.69	100.00	4.51
21-35	8.17	-	-	0.30	0.52	1.29	-	-	0.19	0.84	1.03	22.18	0.63	100.00	3.79
35-56	7.95	-	-	0.46	0.48	1.99	-	-	0.24	0.58	0.82	22.94	0.60	100.00	2.53

Contd...

Series Name: Mukahadahalli (MKH), **Pedon:** R-11
Location: $15^022'05.4"$N, $76^004'10.3"$E, Halageri village, Koppal Taluk and District
Analysis at: NBSS&LUP, Regional Centre, Bangalore.   **Classification:** Clayey-skeletal, mixed, isohyperthermic Typic Haplustalfs

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

| Depth (cm) | pH (1:2.5) | | | E.C. (1:2.5) | O.C. | CaCO₃ | Exchangeable bases | | | | | CEC | CEC/ Clay | Base saturation | ESP |
	Water	CaCl₂	M KCl	dS m⁻¹	%	%	Ca	Mg	K	Na	Total			%	%
							\<-------- cmol kg⁻¹ --------\>								
0-19	7.38	-	-	0.09	0.2	0.00	8.97	4.32	0.26	0.22	13.77	14.84	0.58	93	1.49
19-32	7.5	-	-	0.106	0.41	0.00	15.98	3.27	0.16	0.50	19.91	20.88	0.63	95	2.38
32-58	7.46	-	-	0.173	0.49	0.00	19.71	4.53	0.23	1.32	25.79	25.76	0.62	100	5.11

Contd...

Series Name: Hatti (HTI), **Pedon:** R-20
Location: $15^0 21'45''$N, $76^0 03'06''$ E Lakshmapura village Koppal Taluk and District
Analysis at: NBSS&LUP, Regional Centre, Bangalore.   **Classification:** Fine, mixed, isohyperthermic Typic Paleustalfs

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-16	Ap	65.33	12.19	22.48	13.79	11.32	13.37	18.31	8.54	15-20	scl	16.83	5.49
16-41	Bt1	41.54	14.04	44.42	6.47	6.26	9.50	13.36	5.95	15-20	c	27.26	16.64
41-64	Bt2	48.71	8.48	42.81	26.06	7.55	5.38	6.31	3.41	55-60	sc	27.22	12.63

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	CaCO₃	Exchangeable bases					CEC	CEC/ Clay	Base satura tion	ESP
							Ca	Mg	K	Na	Total				
	Water	CaCl₂	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-16	7.11	-	-	0.109	0.92	-	21.06	8.23	0.39	0.06	29.74	20.19	0.89	100	0.30
16-41	7.54	-	-	0.220	0.92	-	21.93	8.47	0.23	0.27	30.90	31.31	0.70	99	0.85
41-64	7.82	-	-	0.168	0.55	-	19.43	7.09	0.31	0.47	27.30	26.57	0.62	100	1.77

Soil Series: Hooradhahalli (HDH), **Pedon:** RM-69
Location: $13^0 24'31''$N, $76^0 33'41''$E, (4D3D8G2d), Hesarahalli village, Chikkanayakanahalli taluk, Tumukura district
Analysis at: NBSS&LUP, Regional Centre, Bengaluru   **Classification:** Clayey-skeletal, mixed, isohyperthermic Rhodic Paleustalfs

| Depth (cm) | Horizon | Size class and particle diameter (mm) | | | | | | | | Coarse fragments w/w (%) | Texture Class (USDA) | % Moisture | |
| | | Total | | | Sand | | | | | | | | |
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-18	Ap	72.56	15.17	12.27	4.57	8.33	17.38	23.88	18.39	35	sl	-	-
18-33	Bt1	56.29	10.75	32.96	7.88	10.24	13.41	14.43	10.34	55	scl	-	-
33-58	Bt2	46.66	10.79	42.55	10.79	9.87	8.43	9.04	8.53	55	sc	-	-
58-90	Bt3	43.09	13.63	43.27	9.90	8.25	7.32	8.76	8.87	45	c	-	-

| Depth (cm) | pH (1:2.5) | | | E.C. (1:2.5) | O.C. | CaCO₃ | Exchangeable bases | | | | | CEC | CEC/ Clay | Base saturation | ESP |
	Water	CaCl₂	M KCl	dS m⁻¹	%	%	Ca	Mg	K	Na	Total			%	%
							cmol kg⁻¹								
0-18	6.54	-	-	0.07	0.60	0.00	2.68	1.38	0.44	0.42	4.91	5.84	0.48	84.07	7.11
18-33	5.90	-	-	0.07	0.52	0.00	3.99	1.27	0.09	0.37	5.71	8.61	0.26	66.32	4.29
33-58	6.16	-	-	0.07	0.44	0.00	4.92	1.67	0.08	0.55	7.22	10.00	0.24	72.23	5.50
58-90	6.39	-	-	0.06	0.40	0.00	4.30	2.02	0.08	0.46	6.87	9.21	0.21	74.61	5.05

Contd...

Soil Series: Gollarahatti (GHT), **Pedon:** RM-2
Location: 50⁰04'88.8"N, 75⁰37'65.2"E, (4D4A3I1f), Belhatti village, Shirahatti taluk, Gadag district.
Analysis at: NBSS&LUP, Regional Centre, Bengaluru   **Classification:** Fine loamy, mixed, isohyperthermic Typic Rhodustalfs

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-26	Ap	83.22	5.74	11.05	9.71	11.73	16.68	27.10	16.58	30	ls	-	-
26-63	Bt1	55.91	13.36	30.73	13.05	9.66	11.10	14.29	7.81	20	scl	-	-
63-84	Bt2	57.17	11.38	31.45	10.53	10.11	12.28	13.83	10.42	20	scl	-	-

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	CaCO₃	Exchangeable bases					CEC	CEC/Clay	Base saturation	ESP
	Water	CaCl₂	M KCl	dS m⁻¹	%	%	Ca	Mg	K	Na	Total			%	%
							cmol kg⁻¹								
0-26	5.70	-	-	0.06	0.20	0.00	1.50	0.60	0.09	0.13	2.32	3.17	0.29	73.00	4.10
26-63	6.26	-	-	0.04	0.24	0.00	7.35	1.55	0.09	0.17	9.15	9.89	0.32	93.00	1.72
63-84	6.50	-	-	0.05	0.20	0.47	-	-	0.09	0.21	0.30	10.18	0.32	100.00	2.06

Contd...

Series: Bidanagere (BDG), **Pedon**: RM-3
Location: $13^0 22'11''N$, $76^0 38'03''E$, (4D3D8G1a), Tharabenahalli village, Chikkanayakanahalli Taluk, Tumakuru District.
Analysis at: NBSS&LUP, Regional Centre, Bengaluru   **Classification:** Clayey-skeletal, mixed, isohyperthermic Rhodic, Paleustalfs

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

| Depth (cm) | pH (1:2.5) | | | E.C. (1:2.5) | O.C. | CaCO$_3$ | Exchangeable bases | | | | | CEC | CEC/ Clay | Base saturation | ESP |
| | Water | CaCl$_2$ | M KCl | dS m^{-1} | % | % | Ca | Mg | K | Na | Total | | | % | % |
							cmol kg^{-1}								
0-20	6.24	-	-	0.06	0.60	0.00	1.61	0.26	0.10	0.01	1.98	3.76	0.50	52.56	0.35
20-35	5.99	-	-	0.02	0.40	0.00	4.25	0.46	0.08	0.28	5.07	8.02	0.26	63.18	3.46
35-92	6.70	-	-	0.03	0.20	0.00	5.45	0.31	0.10	0.22	6.09	9.90	0.21	61.48	2.24

Contd...

Series Name: Mornal (MNL), **Pedon:** R-12
Location: 15^{0}22'75"N, 76^{0}05'16.1" Halageri village, Koppal Taluk and District
Analysis at: NBSS&LUP, Regional Centre, Bangalore.   **Classification:** Fine mixed, isohyperthermic Rhodic Paleustalfs

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-17	Ap	81.48	5.14	13.39	14.07	12.15	17.00	27.53	10.73	70	sl	9.64	4.93
17-31	Bt1	51.43	10.24	38.33	6.67	7.72	9.52	19.26	8.25	30	sc	23.97	11.70
31-56	Bt2	45.62	8.77	45.62	17.85	7.31	8.14	8.87	3.44	30	sc	25.94	12.45
56-104	Bt3	53.10	10.62	36.28	21.87	10.30	8.10	7.99	4.84	<30	sc	20.95	10.16
104-126	Bc	54.21	12.88	32.91	12.28	8.84	15.92	10.20	6.97	<30	scl	19.96	10.21

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	CaCO$_3$	Exchangeable bases					CEC	CEC/ Clay	Base satura tion	ESP
	Water	CaCl$_2$	M KCl	dS m^{-1}	%	%	Ca	Mg	K	Na	Total			%	%
							cmol kg^{-1}								
0-17	7.89	-	-	0.137	0.33	0.00	4.92	3.35	0.35	0.45	9.07	9.01	0.67	100	5.04
17-31	8.19	-	-	0.31	0.45	0.00	7.24	5.16	0.16	0.15	12.70	13.57	0.35	94	1.12
31-56	8.2	-	-	0.414	0.53	0.00	6.49	5.32	0.11	0.13	12.05	18.55	0.41	65	0.71
56-104	8.64	-	-	0.422	0.37	0.00	6.21	4.64	0.16	0.14	11.15	15.16	0.42	74	0.95
104-126	8.71	-	-	0.436	0.2	0.00	7.06	6.31	0.09	0.33	13.79	14.52	0.44	95	2.31

Contd...

Soil Series: Balapur (BPR), **Pedon**: RM-78
Location: 13^{0}26'39"N, 76^{0}35'03"E, (4D3D8G2c), Kasaba, Chikkanayakanahalli taluk, Tumakuru district
Analysis at: NBSS&LUP, Regional Centre, Bengaluru   **Classification:** Clayey-skeletal, mixed, isohyperthermic, Typic Rhodustalfs

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

| Depth (cm) | pH (1:2.5) | | | E.C. (1:2.5) | O.C. | CaCO$_3$ | Exchangeable bases | | | | | CEC | CEC/ Clay | Base satura tion | ESP |
| | Water | CaCl$_2$ | M KCl | dS m^{-1} | % | % | Ca | Mg | K | Na | Total | | | % | % |
							cmol kg^{-1}								
0-12	6.64	-	-	0.03	0.56	0.00	1.90	1.32	0.21	0.03	3.46	5.45	0.35	63.48	0.51
12-34	6.99	-	-	0.02	0.48	0.00	3.66	1.90	0.07	0.08	5.70	7.82	0.29	72.93	0.96
34-60	7.29	-	-	0.02	0.40	0.00	5.13	2.08	0.11	0.20	7.52	11.19	0.30	67.18	1.75
60-84	7.50	-	-	0.02	0.32	0.00	5.83	6.36	0.13	0.23	12.55	12.38	0.28	101.43	1.83
84-112	7.54	-	-	0.02	0.24	0.00	6.02	6.59	0.11	0.25	12.96	12.77	0.33	101.49	1.97
112-127	7.90	-	-	0.02	0.20	0.00	8.04	3.62	0.07	0.32	12.04	12.47	0.51	96.56	2.55

Contd...

Series Name: Nagalapur (NGP)   **Pedon :** R-10
Location: 15^{0}26'38.0"N, 76^{0}10'27.0" E Budashettynala village, Koppal Taluk and District
Analysis at: NBSS&LUP, Regional Centre, Bangalore.   **Classification:** Clayey- skeletal, mixed isohyperthermic Typic Paleustalfs

| Depth (cm) | Horizon | Size class and particle diameter (mm) | | | | | | | | Coarse fragments w/w   (%) | Texture Class (USDA) | % Moisture | |
| | | Total | | | Sand | | | | | | | | |
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-16	Ap	78.43	6.36	15.21	25.23	18.82	14.04	13.22	7.12	30	sl	9.32	5.56
16-38	Bt1	46.97	8.53	44.51	14.33	12.34	7.43	6.80	6.07	30	sc	18.70	13.79
38-58	Bt2	51.92	7.48	40.60	20.98	10.07	7.37	7.48	6.02	40	sc	17.93	13.75
58-81	Bt3	54.05	7.18	38.77	27.07	10.58	5.91	5.81	4.67	50	sc	17.92	11.87
81-104	Bt4	59.03	8.93	32.04	21.88	13.11	8.88	8.05	7.12	50	scl	16.63	10.55
104-126	BC	62.35	9.26	28.40	21.19	14.51	9.88	8.13	8.64	60	scl	15.03	10.06

| Depth (cm) | pH (1:2.5) | | | E.C. (1:2.5) | O.C. | CaCO$_3$ | Exchangeable bases | | | | | CEC | CEC/ Clay | Base satura tion | ESP |
| | Water | CaCl$_2$ | M KCl | dS m^{-1} | % | % | Ca | Mg | K | Na | Total | | | % | % |
							cmol kg^{-1}								
0-16	6.77	-	-	0.09	0.82	-	3.52	2.14	0.18	0.03	5.87	7.10	0.47	82.70	0.46
16-38	6.89	-	-	0.06	0.57	-	9.35	3.85	0.10	0.21	13.50	14.70	0.33	91.87	1.40
38-58	6.80	-	-	0.06	0.52	-	8.76	3.42	0.10	0.26	12.55	14.20	0.35	88.35	1.85
58-81	6.84	-	-	0.06	0.32	-	7.67	2.77	0.10	0.58	11.12	12.90	0.33	86.18	4.48
81-104	6.86	-	-	0.05	0.20	-	6.97	2.07	0.09	0.95	10.07	11.90	0.37	84.59	7.95
104-126	6.70	-	-	0.07	0.10	-	5.53	1.77	0.07	0.73	8.09	9.40	0.33	86.09	7.77

Contd...

Soil Series: Thondigere (TDG), **Pedon:** RM-24
Location: 13⁰28'21"N, 76⁰52'50"E, (4B3D3N1b), Sanabanahalli village, Gubbi taluk, Tumakuru district
Analysis at: NBSS&LUP, Regional Centre, Bengaluru   **Classification:** Fine loamy, mixed, isohyperthermic Fluventic Haplustepts

| Depth (cm) | Horizon | Total | | | Sand | | | | | Coarse fragments w/w (%) | Texture Class (USDA) | % Moisture | |
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-17	Ap	73.83	10.36	15.81	11.20	16.19	15.99	18.84	11.61	-	sl	-	-
17-30	A2	77.02	9.01	13.97	10.12	18.83	18.72	19.43	9.92	-	sl	-	-
30-39	A3	76.42	8.45	15.13	7.49	13.36	15.59	26.01	13.97	-	sl	-	-
39-50	Bw1	63.75	9.90	26.35	5.80	9.27	10.49	18.53	19.65	-	scl	-	-
50-71	Bw2	53.49	15.81	30.70	1.44	4.72	10.57	22.28	14.48	-	scl	-	-
71-95	Bw3	36.35	22.32	41.33	1.46	5.83	16.25	6.25	6.56	-	c	-	-
95-114	Bc1	57.96	13.88	28.16	4.39	12.35	14.18	16.94	10.10	-	scl	-	-
114 - >150	Bc2	50.16	16.94	32.91	3.64	12.90	11.34	13.11	9.16	-	scl	-	-

| Depth (cm) | pH (1:2.5) | | | E.C. (1:2.5) | O.C. | CaCO₃ | Exchangeable bases | | | | | CEC | CEC/Clay | Base saturation | ESP |
| | Water | CaCl₂ | M KCl | dS m⁻¹ | % | % | Ca | Mg | K | Na | Total | | | % | % |
							cmol kg⁻¹								
0-17	7.02	-	-	0.05	0.62	0.00	4.33	1.14	0.28	0.08	5.83	5.77	0.36	100.00	1.44
17-30	7.80	-	-	0.07	0.37	0.00	4.64	0.44	0.06	0.01	5.15	5.15	0.37	100.02	0.24
30-39	7.55	-	-	0.04	0.29	0.00	4.27	0.33	0.05	0.03	4.69	4.64	0.31	100.00	0.75
39-50	7.69	-	-	0.05	0.25	0.00	7.03	0.49	0.07	0.07	7.66	8.45	0.32	90.66	0.82
50-71	8.09	-	-	0.04	0.12	0.00	9.09	1.43	0.13	0.38	11.02	12.26	0.40	89.94	3.10
71-95	7.97	-	-	0.08	0.29	0.00	11.84	1.27	0.11	0.46	13.68	14.42	0.35	94.85	3.21
95-114	8.32	-	-	0.05	0.29	0.00	9.28	1.23	0.15	0.31	10.97	11.74	0.42	93.44	2.65
114 - >150	8.34	-	-	0.07	0.25	0.00	13.90	1.71	0.13	0.83	16.57	17.61	0.54	94.07	4.70

Contd...

Soil Series: Thimmasandra (TSD), **Pedon:** R-14
Location: 11°55'64.2"N, 76°51'82.9" E, (4B3A5K3b), Somanapura village, Chamarajanagara taluk and district
Analysis at: NBSS&LUP, Regional Centre, Bengaluru   **Classification**: Fine, mixed, isohyperthermic Typic Haplustepts

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-19	Ap	12.27	25.92	61.81	0.98	0.98	1.52	3.91	4.89	-	c	-	-
19-33	Bw1	32.98	26.29	40.72	2.75	4.44	4.97	8.35	12.47	-	c	-	-
33-58	Bw2	10.21	27.99	61.81	0.98	1.30	1.19	2.17	4.56	-	c	-	-
58-83	Bw3	9.83	27.40	62.77	1.09	0.98	0.98	1.86	4.91	-	c	-	-
83-95	Bw4	6.17	26.07	67.76	0.99	0.77	0.55	0.99	2.86	-	c	-	-
95-116	Bw5	7.52	28.87	63.61	0.77	1.00	1.11	1.88	2.77	-	c	-	-

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	CaCO$_3$	Exchangeable bases					CEC	CEC/ Clay	Base satura tion	ESP
							Ca	Mg	K	Na	Total				
	Water	CaCl$_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-19	8.46	-	-	0.175	1.01	4.45	-	-	1.91	0.18		36.61	0.59	100	0.19
19-33	8.65	-	-	0.16	0.81	6.41	-	-	0.77	0.39		23.98	0.59	100	0.64
33-58	8.94	-	-	0.26	0.56	6.90	-	-	0.82	2.24		33.59	0.54	100	2.67
58-83	9.13	-	-	0.335	0.4	8.01	-	-	0.30	1.01		36.72	0.58	100	1.10
83-95	9.05	-	-	0.412	0.36	4.58	-	-	0.76	4.17		38.88	0.57	100	4.30
95-116	8.96	-	-	0.4	0.28	4.21	-	-	0.96	4.02		43.63	0.69	100	3.68

Series Name: Dombarahalli (DRL), **Pedon:** R-8
Location: 15°13'96.2"N, 75°57'48.6" E   Ragunathanahalli village, Koppal Taluk and District
Analysis at: NBSS&LUP, Regional Centre, Bangalore.   **Classification:** Very fine, smectitic, isohyperthermic (calc) Typic Haplusterts

| Depth (cm) | Horizon | Size class and particle diameter (mm) | | | | | | | | Coarse fragments w/w (%) | Texture Class (USDA) | % Moisture | |
| | | Total | | | Sand | | | | | | | | |
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-15	Ap	28.25	19.48	52.27	4.76	4.44	4.87	8.23	5.95	-	c	39.86	27.20
15-27	BA1	21.55	20.00	58.45	3.76	2.76	3.43	6.30	5.30	-	c	46.35	34.84
27-45	Bss1	14.86	20.89	64.25	2.46	2.23	2.23	3.91	4.02	-	c	57.99	41.06
45-80	Bss2	10.42	19.04	70.54	1.74	1.97	1.27	2.78	2.66	-	c	66.36	36.24

| Depth (cm) | pH (1:2.5) | | | E.C. (1:2.5) | O.C. | CaCO₃ | Exchangeable bases | | | | | CEC | CEC/ Clay | Base satura tion | ESP |
	Water	CaCl₂	M KCl	dS m⁻¹	%	%	Ca	Mg	K	Na	Total			%	%
							cmol kg⁻¹								
0-15	8.78	-	-	0.42	0.32	12.35	-	-	0.59	4.25	-	49.70	0.95	100.00	5.62
15-27	9.03	-	-	0.61	0.30	12.48	-	-	0.30	8.96	-	57.23	0.98	100.00	10.07
27-45	9.10	-	-	0.67	0.34	11.70	-	-	0.25	11.85	-	60.71	0.95	100.00	14.05
45-80	9.18	-	-	0.86	0.32	13.39	-	-	0.27	15.40	-	63.33	0.90	100.00	18.45

Contd...

Series Name: Handrala (HDL), **Pedon:** A2/RM-1
Location: $15^0 19'69.8''$N, $75^0 58'00''$E, Kavalura village, Koppal Taluk and District
Analysis at: NBSS&LUP, Regional Centre, Bangalore.   **Classification:** Very fine, smectitic, isohyperthermic (Calc) Typic Haplusterts

| Depth (cm) | Horizon | Size class and particle diameter (mm) | | | | | | | | Coarse fragments w/w (%) | Texture Class (USDA) | % Moisture | |
| | | Total | | | Sand | | | | | | | | |
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-25	Ap	21.68	16.62	61.70	4.42	3.98	3.43	5.64	4.20	10	c	41.36	31.27
25-50	Bss1	14.93	15.76	69.32	2.64	2.53	2.99	3.33	3.44	05	c	48.92	39.19
50-82	Bss2	23.11	16.60	60.29	4.51	3.61	6.31	4.74	3.95	05	c	42.46	33.85
82-117	Bss3	10.50	18.38	71.12	1.98	1.98	1.63	2.57	2.33	05	c	52.95	42.82

| Depth (cm) | pH (1:2.5) | | | E.C. (1:2.5) | O.C. | CaCO$_3$ | Exchangeable bases | | | | | CEC | CEC/ Clay | Base satura tion | ESP |
	Water	CaCl$_2$	M KCl	dS m^{-1}	%	%	Ca	Mg	K	Na	Total			%	%
							cmol kg^{-1}								
0-25	9.06	-	-	0.371	0.16	4.80	-	-	0.80	7.93	-	62.33	1.01	-	5.09
25-50	9.09	-	-	0.719	0.2	7.20	-	-	0.42	14.94	-	67.10	0.97	-	8.90
50-82	9.28	-	-	0.47	0.19	9.36	-	-	0.47	11.59	-	60.21	1.00	-	7.70
82-117	8.76	-	-	1.55	0.36	8.64	-	-	0.11	2.28	-	25.33	0.36	-	3.61

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, land irrigability, 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 thematic maps generated are described below.

5.1 Land Capability Classification

Land capability classification is an interpretative grouping of soil map units (soil phases) mainly based on inherent soil characteristics, external land features and environmental factors that limit the use of land for agriculture, pasture, forestry or other uses on a sustained basis (IARI, 1971). The land and soil characteristics used to group the land resources in an area into various land capability classes, subclasses and units are
Soil characteristics: Soil depth, soil texture, coarse fragments, soil reaction, available water capacity, calcareousness, salinity/alkali *etc*.
Land characteristics: Slope, erosion, drainage, rock outcrops.
Climate: Total rainfall and its distribution, and length of crop growing period.

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

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

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

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

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

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

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

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

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

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

The land capability subclasses have been further subdivided into land capability units based on the kinds of limitations present in each subclass. Ten land capability units are identified 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 up to land capability subclass level.

The 35 soil map units identified in the Chilkamuki microwatershed are grouped under 2 Land capability classes and 6 land capability subclasses (Fig. 5.1). Entire area is suitable for agriculture. Major area of about 396 ha (60%) has good lands (Class II) with moderate problems of soil, wetness and erosion and about 170 ha (26%) has moderately good lands (Class III) with severe limitations of soil and erosion, 69 ha (10%) area is under rock outcrops 7 ha (1%) is under mining and industrial area and an area of 16 ha (2%) is under habitation and water bodies.
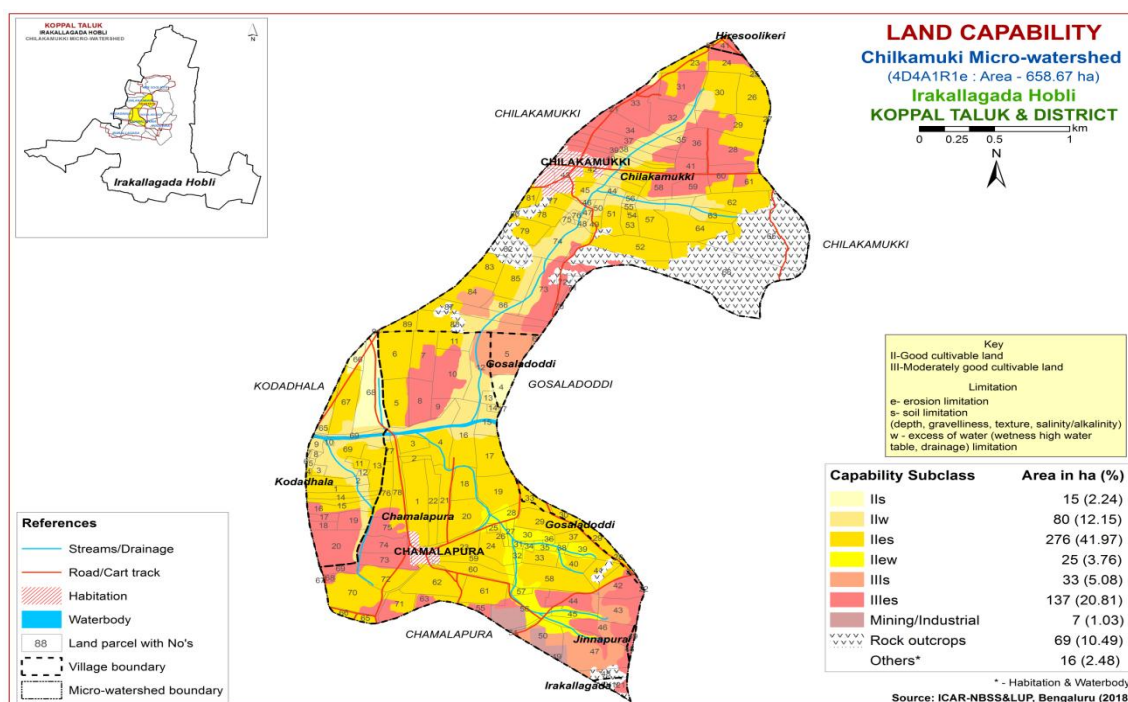
Fig. 5.1 Land Capability map of Chilkamuki Microwatershed

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 (Fig. 5.2).

An area of about 192 ha (29%) is under shallow to moderately shallow (25-75 cm) soils and are distributed in the northern and southern part of the microwatershed. Moderately deep (75-100 cm) and deep (100-150 cm) soils occupy a major area of about 269 ha (41%) and occur in the major part of the microwatershed and very deep (>150 cm) soils occupy an area of 105 ha (16%) and occur in the northern, central and southern part of the microwatershed. The most productive lands cover about 105 ha (16%) where all climatically adopted long duration crops be grown. The problem soils cover about 55 ha (8%) area where only short duration crops can be grown and the probability of crop failure is high.
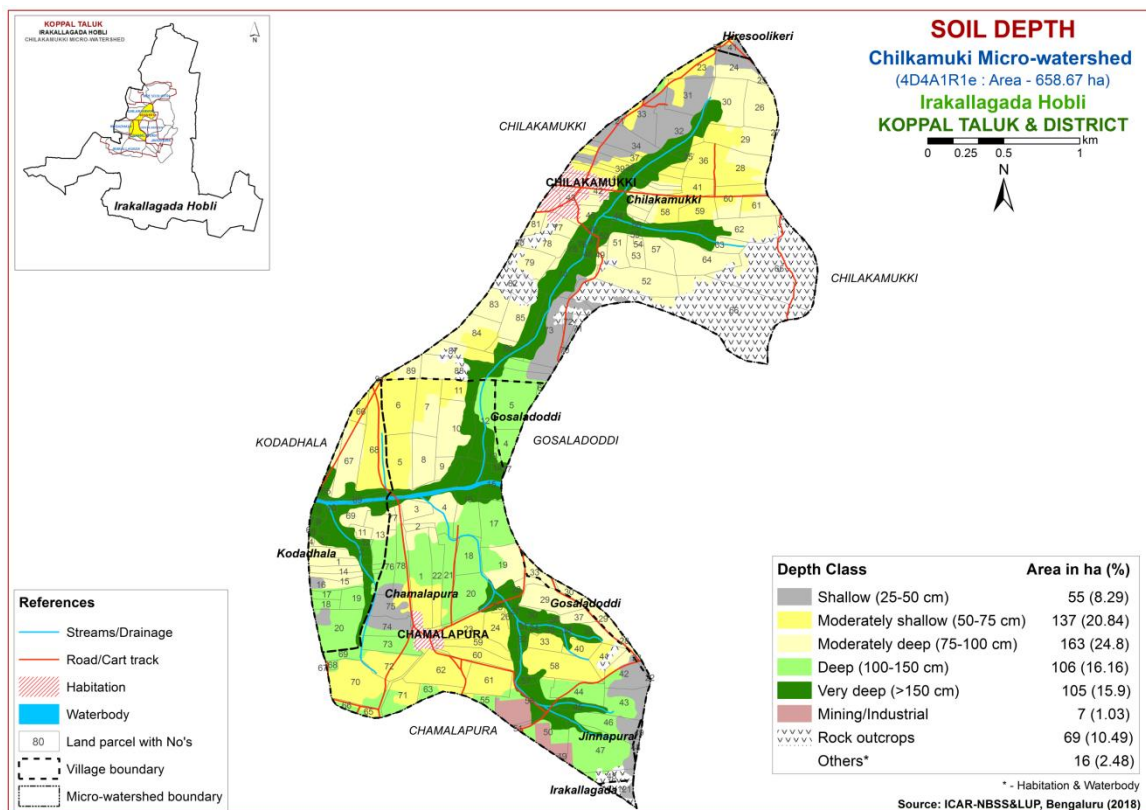
Fig. 5.2 Soil Depth map of Chilkamuki Microwatershed

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 showing sandy, loamy and clayey at the surface was generated. The area extent and their geographical distribution in the microwatershed is shown in Fig.5.3.

About 94 ha (14%) area has sandy soils and occur in the southern and northern part, about 318 ha (48%) has loamy texture and occur in the central part and about 156 ha (24%) area has clayey texture at the surface and occur in the central, southern and northern part of the microwatershed.

About 474 ha (72%) soils are productive lands (Fig. 5.3) 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 in clayey soils. About 94 ha (14%) area has sandy soils which are having problems of low soil-water retention and availability.
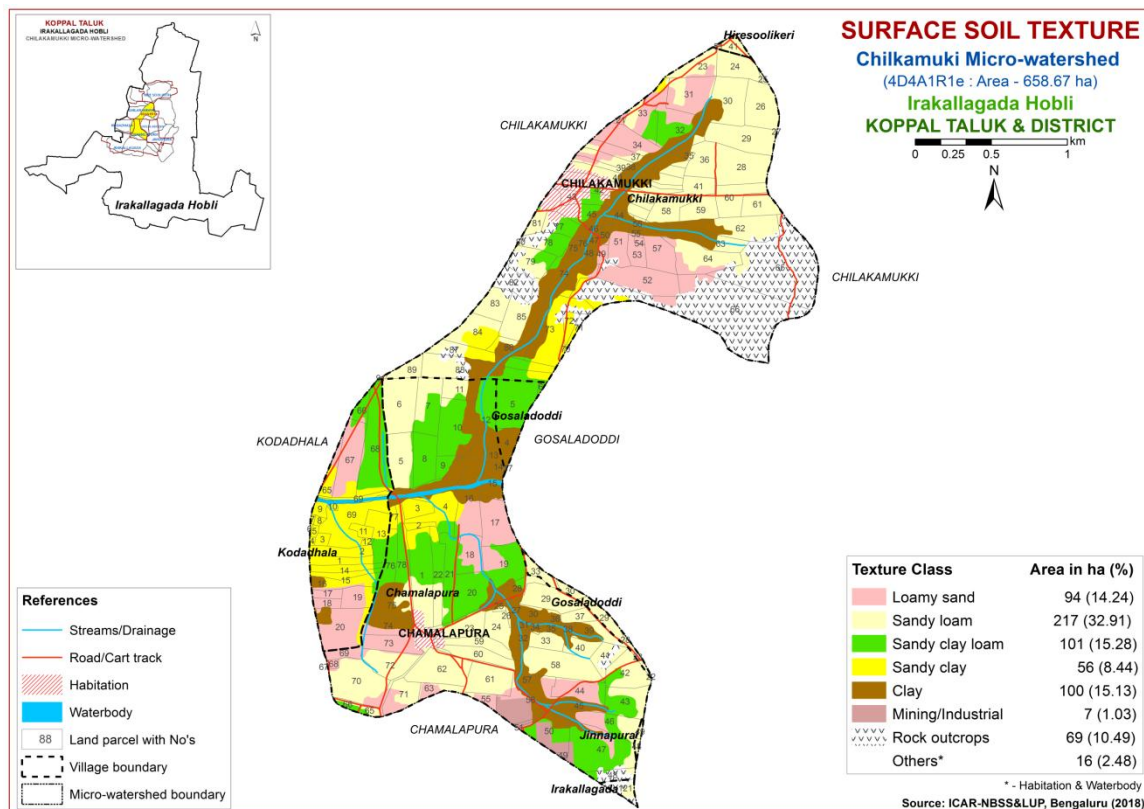
Fig. 5.3 Surface Soil Texture map of Chilkamuki Microwatershed

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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 spatial distribution in the microwatershed is shown in Fig.5.4.

An area of about 223 ha (34%) has non gravelly (<15%) soils and occur in the northern and southern part and major area of about 344 ha (52%) has gravelly to very gravelly (15-60%) soils and occur in all parts of the microwatershed.

An area of about 223 ha (34%) are most productive lands with respect to gravelliness. They are non-gravelly with less than 15 per cent gravel and have potential for growing both annual and perennial crops. The problem lands cover about 41 ha (6%) that are very gravelly where only medium or short duration crops can be grown.
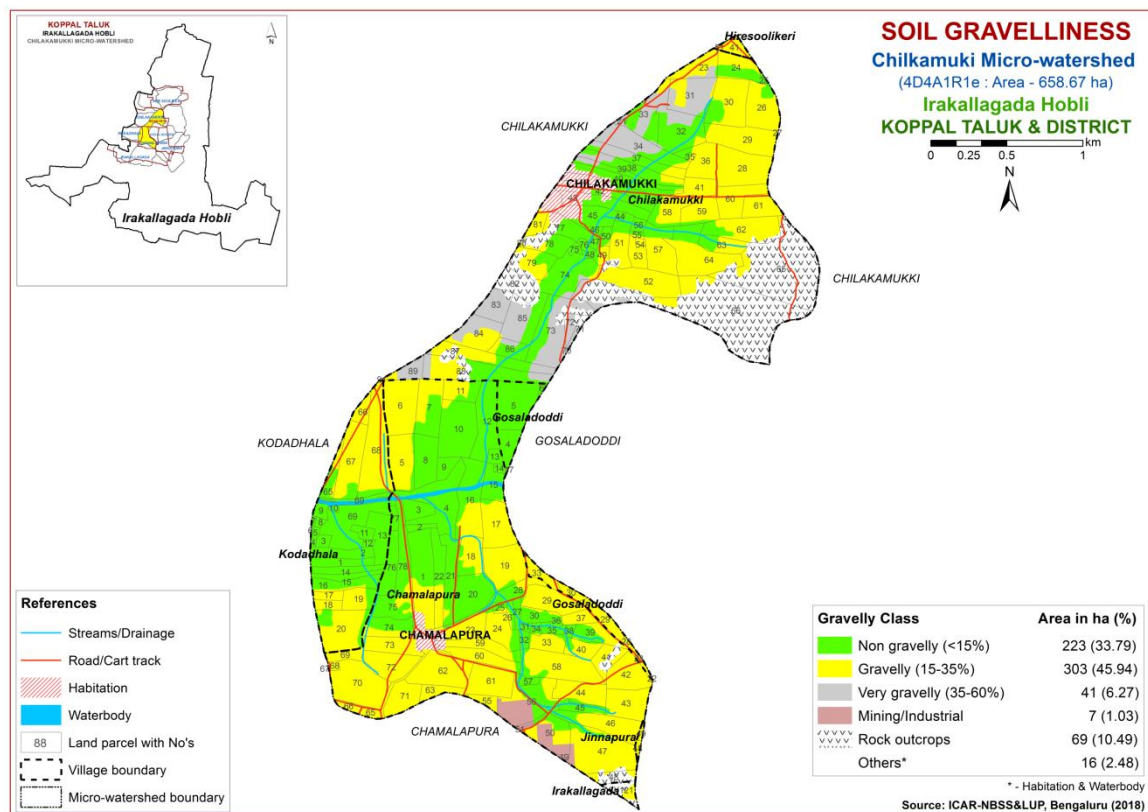
Fig. 5.4 Soil Gravelliness map of Chilkamuki Microwatershed

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 (Fig. 5.5).

An area of about 393 ha (60%) is very low to low (<50-100 mm) and occur in major part of the microwatershed. An area of about 60 ha (9%) is medium (101-150 mm/m) in available water capacity and occur in the central part of the microwatershed and an area of about 113 ha (17%) is high to very high (151- >200 mm/m) in available water capacity.

An area of about 393 ha (60%) in the microwatershed has soils that are problematic with regard to available water capacity. Here, only short duration crops can be grown and the probability of crop failure is very high. These areas are best put to other alternative uses. An area of about 72 ha (11%) has soils that have very high potential (>200 mm/m) with regard to available water capacity where all climatically adapted long duration crops can be grown successfully.
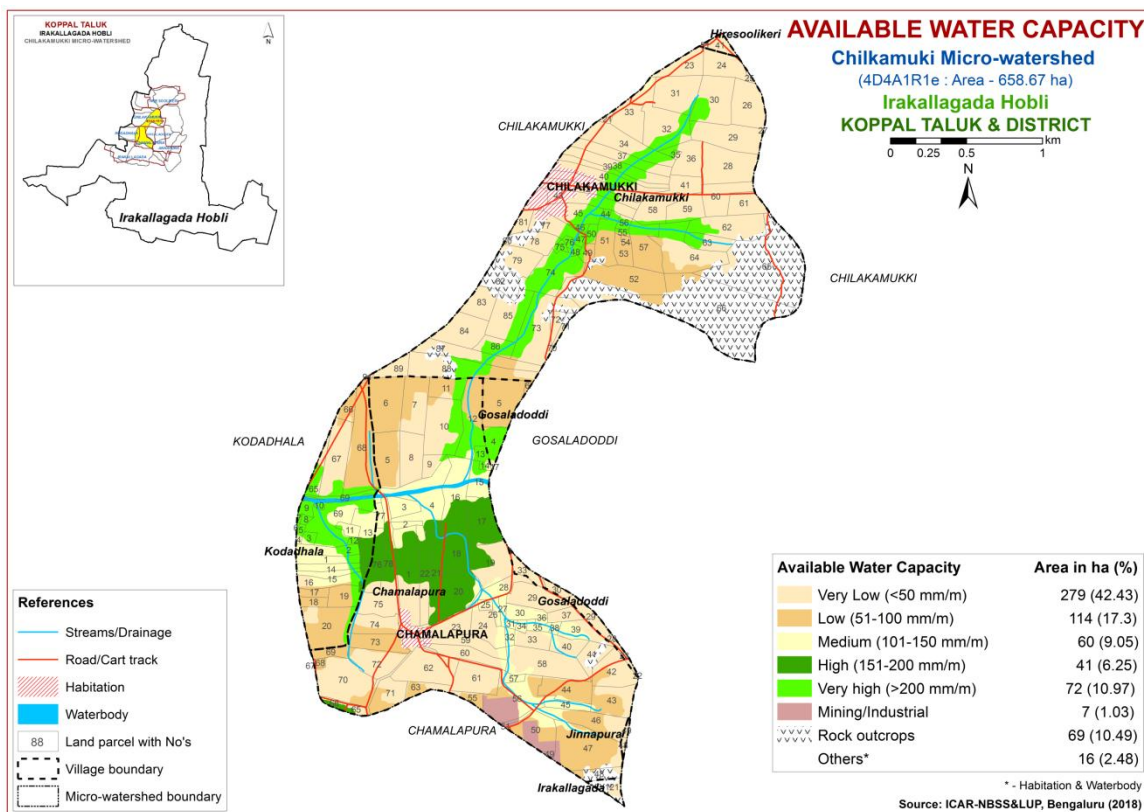
Fig. 5.5 Soil Available Water Capacity map of Chilkamuki Microwatershed

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 of different slope classes in the microwatershed (Fig. 5.6).

About 80 ha (12%) area is under nearly level (0-1%) lands and occur in the central and northern part of the microwatershed and major area of 486 ha (74%) falls under very gently sloping (1-3% slope) lands. In all these areas, all climatically adapted annual and perennial crops can be grown without much soil and water conservation and other land development measures and gently sloping (3-5%) lands occur in very minor area.
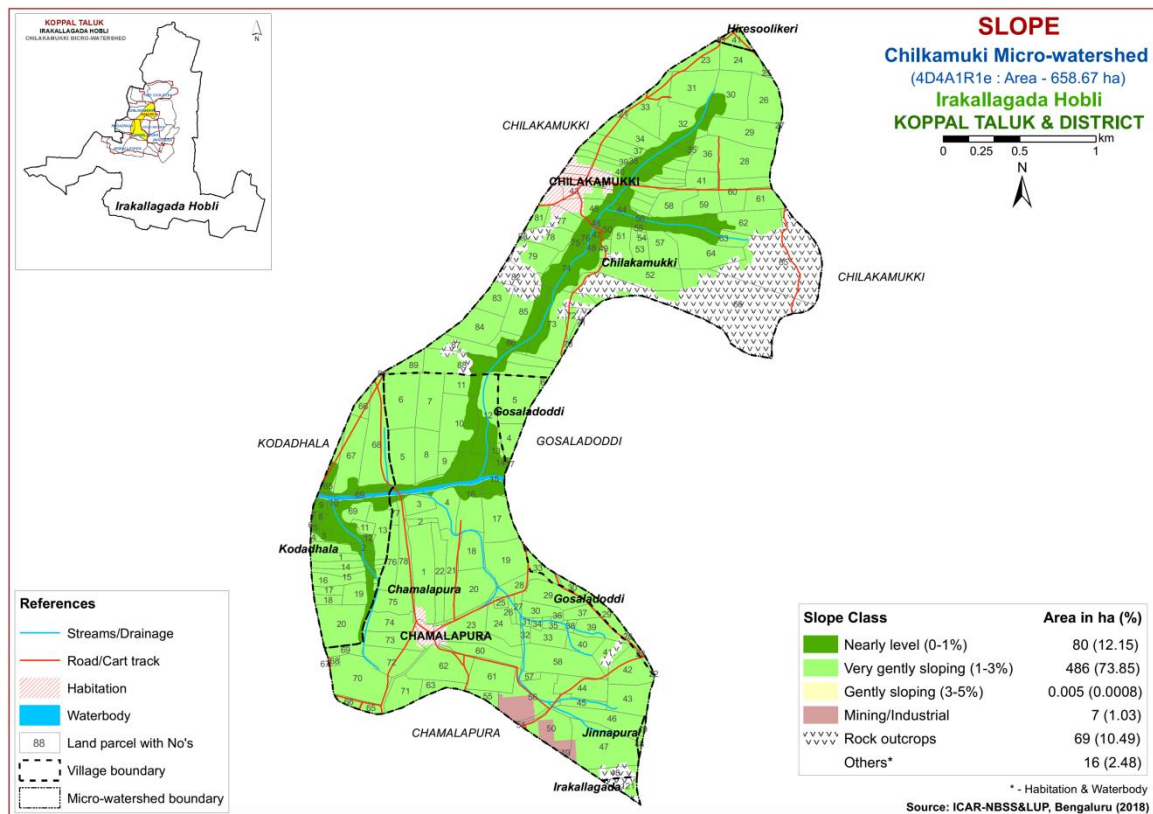
Fig. 5.6 Soil Slope map of Chilkamuki Microwatershed

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.

About 128 ha (19%) area is slightly eroded (e1 class) and occur in the central part of the microwatershed and major area of about 438 ha (67%) has soils that are moderately eroded (e2 class) and are problematic and need appropriate soil and water conservation and other land development measures.
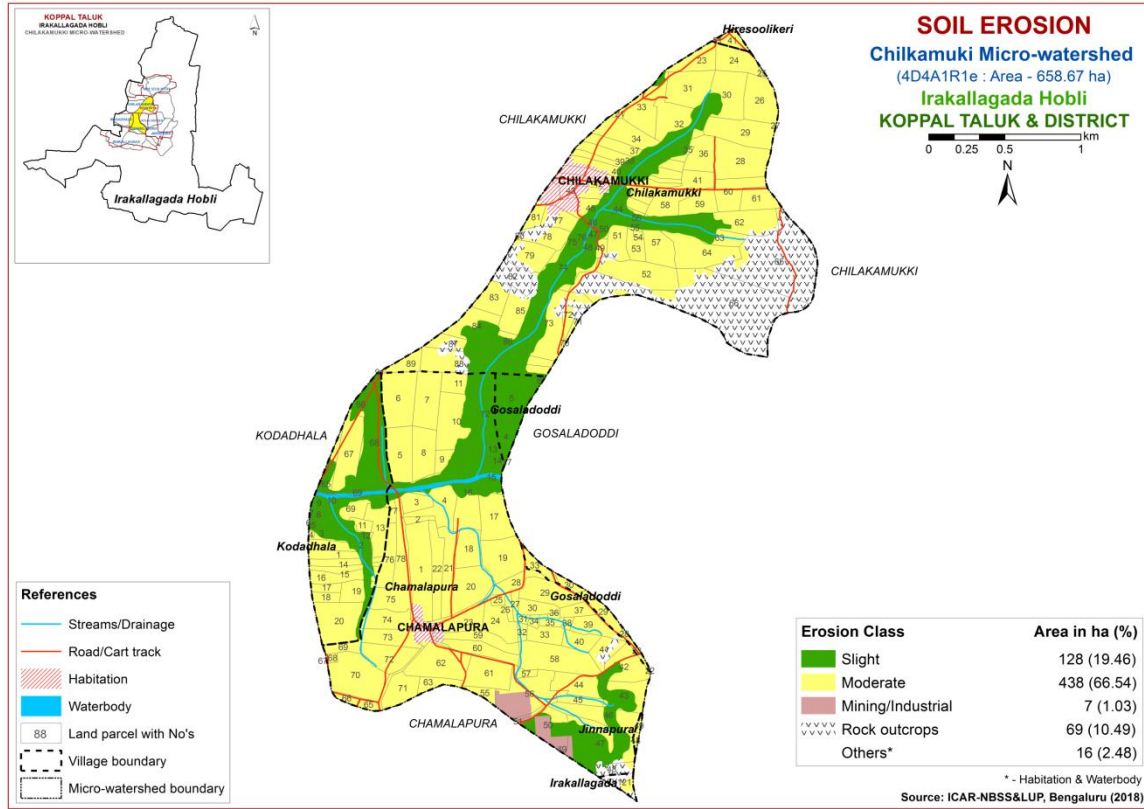
Fig. 5.7 Soil Erosion map of Chilkamuki Microwatershed

FERTILITY STATUS

Soil fertility plays an important role in increasing crop yield. The adoption of high yielding varieties that require high amounts of nutrients has resulted in deficiency symptoms in crops and plants due to imbalanced fertilization and poor inherent fertility status, as these areas are characterised by low rainfall and high temperatures. Hence, it is necessary to know the fertility (macro and micro nutrients) status of the soils of the watersheds for assessing the kind and amount of fertilizers required for each of the crop intended to be grown. For this purpose, the surface soil samples collected from the grid points (one soil sample at every 320 m grid interval) all over the microwatershed through land resource inventory in the year 2017 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 the 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 Chilkamuki microwatershed for soil reaction (pH) showed that major area of about 341 ha (52%) is slightly to strongly acid (pH 5.0-6.5), about 113 ha (17%) area is under neutral (pH 6.5-7.3) and occur in the northern and southern part of the microwatershed. About 113 ha (17%) area is slightly to very strongly alkaline (pH 7.3- >9.0) and occur in the southern part of the microwatershed (Fig.6.1).

6.2 Electrical Conductivity (EC)

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

6.3 Organic Carbon

The soil organic carbon content (an index of available Nitrogen) of the microwatershed is medium (0.5-0.75%) in an area of 74 ha (11%) and occur in the northern part of the microwatershed and major area of about 492 ha (75%) is high (>0.75%) in organic carbon and is distributed in all parts of the microwatershed. (Fig.6.3).

6.4 Available Phosphorus

An area of about 127 ha (19%) is medium (23-57 kg/ha) and occur in the northern part and high (57 kg/ha) in major area of 439 ha (67%) in the microwatershed (Fig 6.4).

6.5 Available Potassium

An area of 220 ha (33%) is low (<145 kg/ha) in available potassium and occur in the northern, southern and central part, medium (145-337 kg/ha) in major area of 235 ha

(36%) and occur in the northern, central and southern part and High (>337 kg/ha) in an area of 111 ha (17%) and occur in the central part of the microwatershed (Fig.6.5).
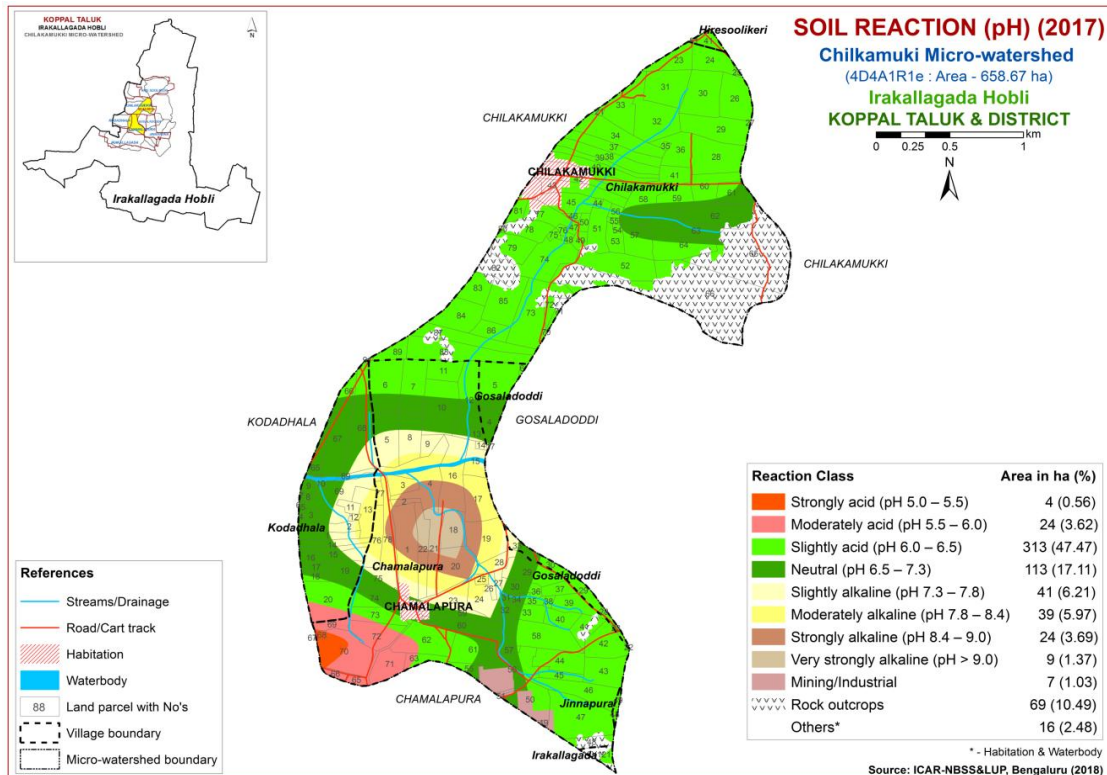
Fig.6.1 Soil Reaction (pH) map of Chilkamuki Microwatershed
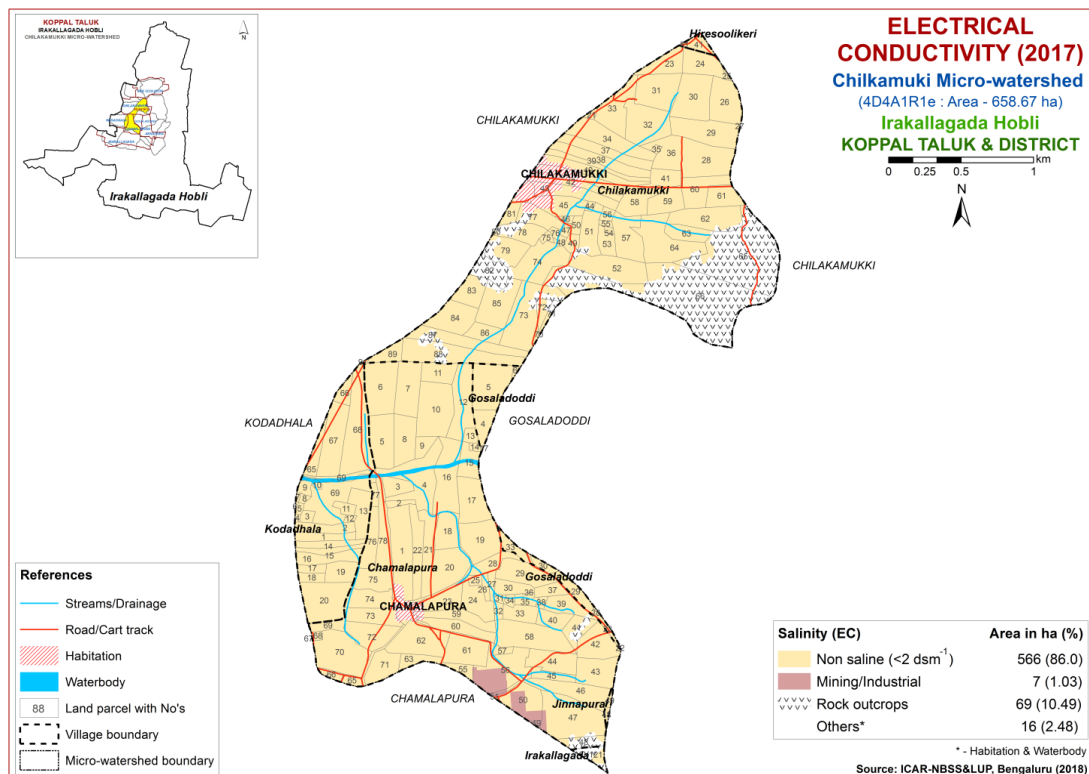
Fig.6.2 Electrical Conductivity (EC) map of Chilkamuki Microwatershed
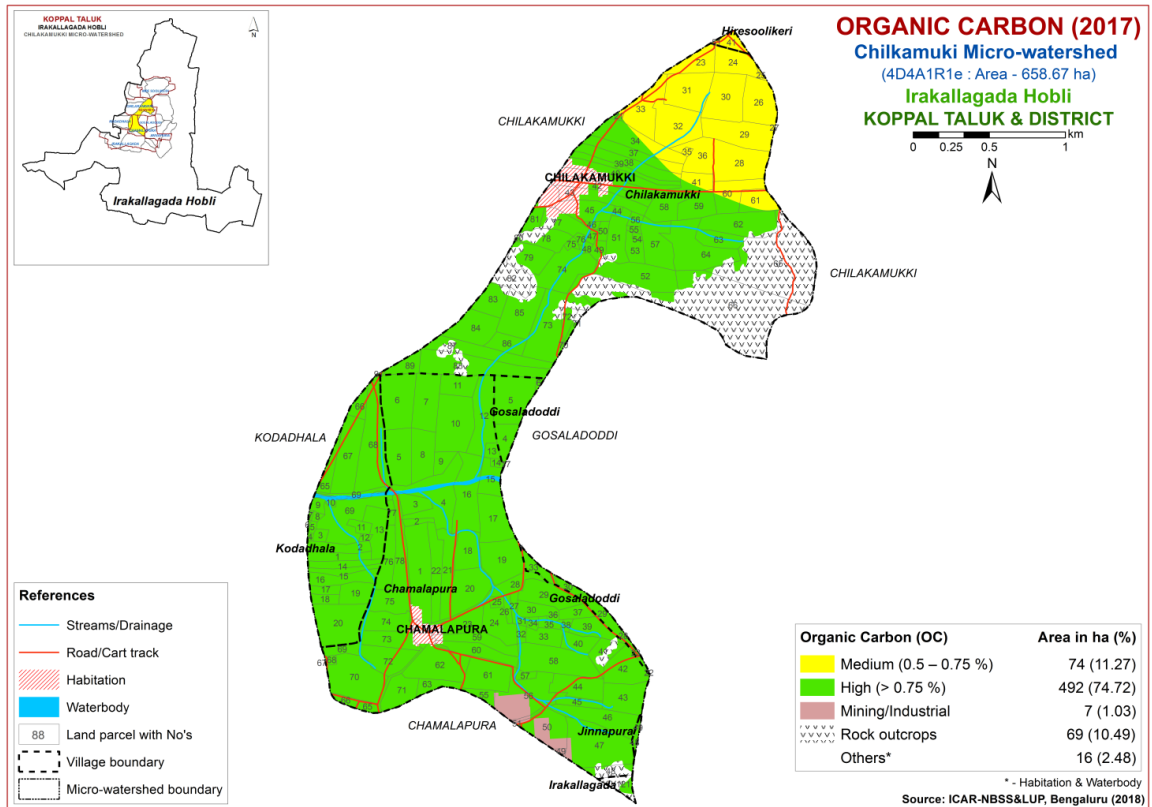
Fig.6.3 Soil Organic Carbon map ofChilkamukiMicrowatershed
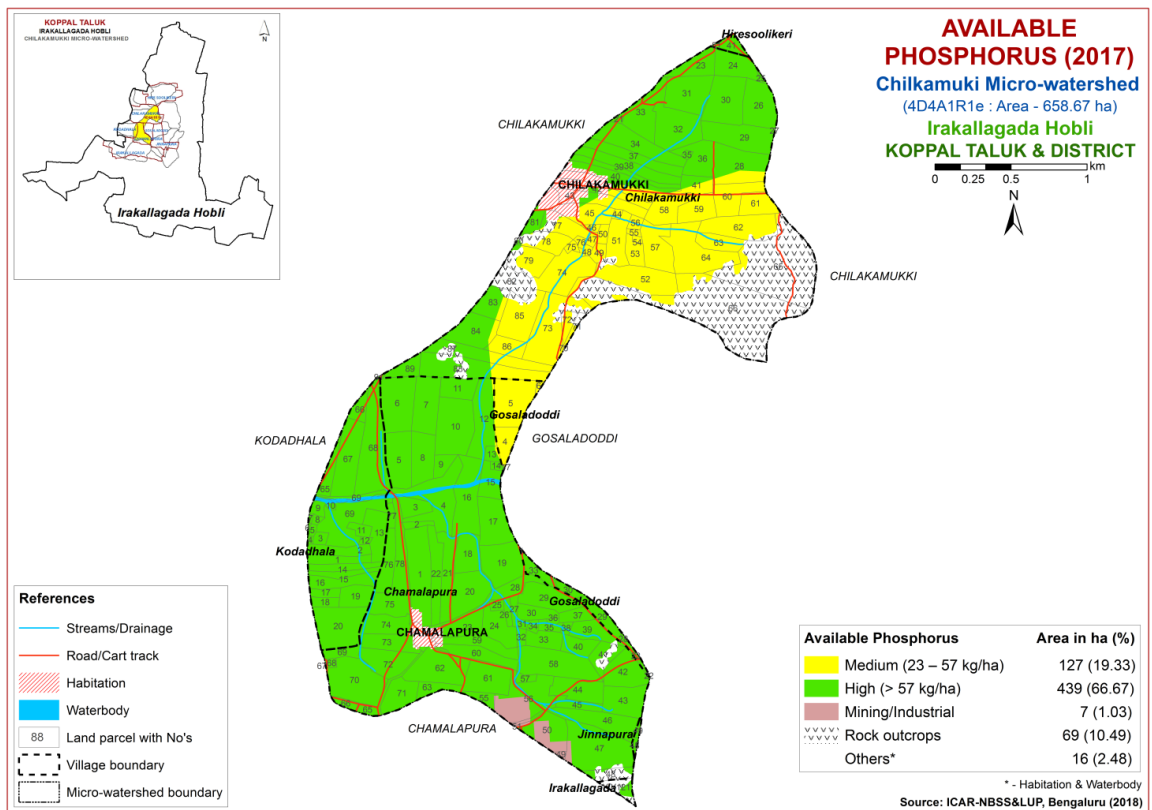
Fig.6.4 Soil Available Phosphors map of Chilkamuki Microwatershed
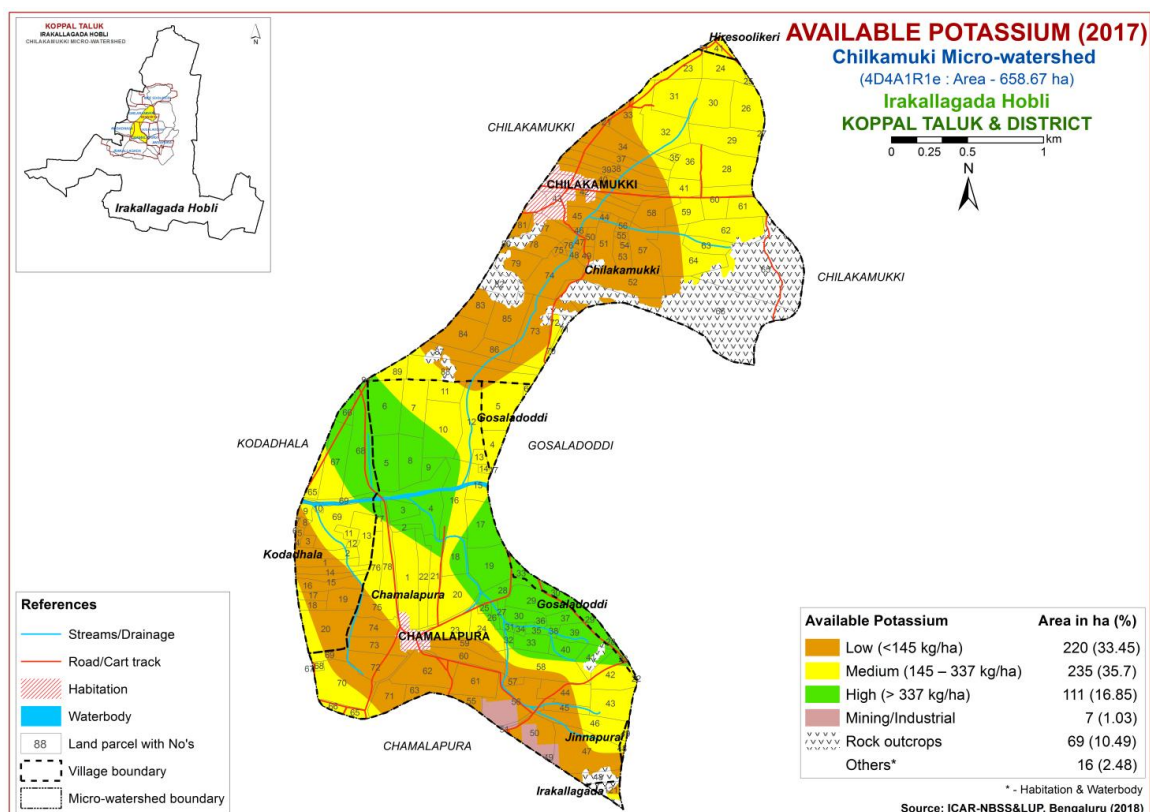
Fig.6.5 Soil Available Potassium map of Chilkamuki Microwatershed

6.6 Available Sulphur

Available sulphur is low (<10 ppm) in 265 ha (40%) area and occur in the southern part, medium (10-20 ppm) in major area of about 300 ha (46%) and occur in the northern and central part and high (>20 ppm) in 1 ha area and occur in the northern part of the microwatershed (Fig.6.6).

6.7 Available Boron

Available boron content is low (<0.5 ppm) in major area of 431 ha (66%) in the microwatershed and is distributed in major part of the microwatershed and an area of about 135 ha (20%) is medium (0.5-1.0 ppm) in available boron and is distributed in the central part of the microwatershed (Fig.6.7). These areas need to be applied with sodium borate @ 10kg/ha as soil application or 0.2% borax as foliar spray to correct the deficiency.

6.8 Available Iron

Available iron content is deficient (<4.5 ppm) in an area of 124 ha (19%) and occur in the southwestern part and sufficient (>4.5 ppm) in major area of 442 ha (67%) and occur in all parts of the microwatershed (Fig 6.8).
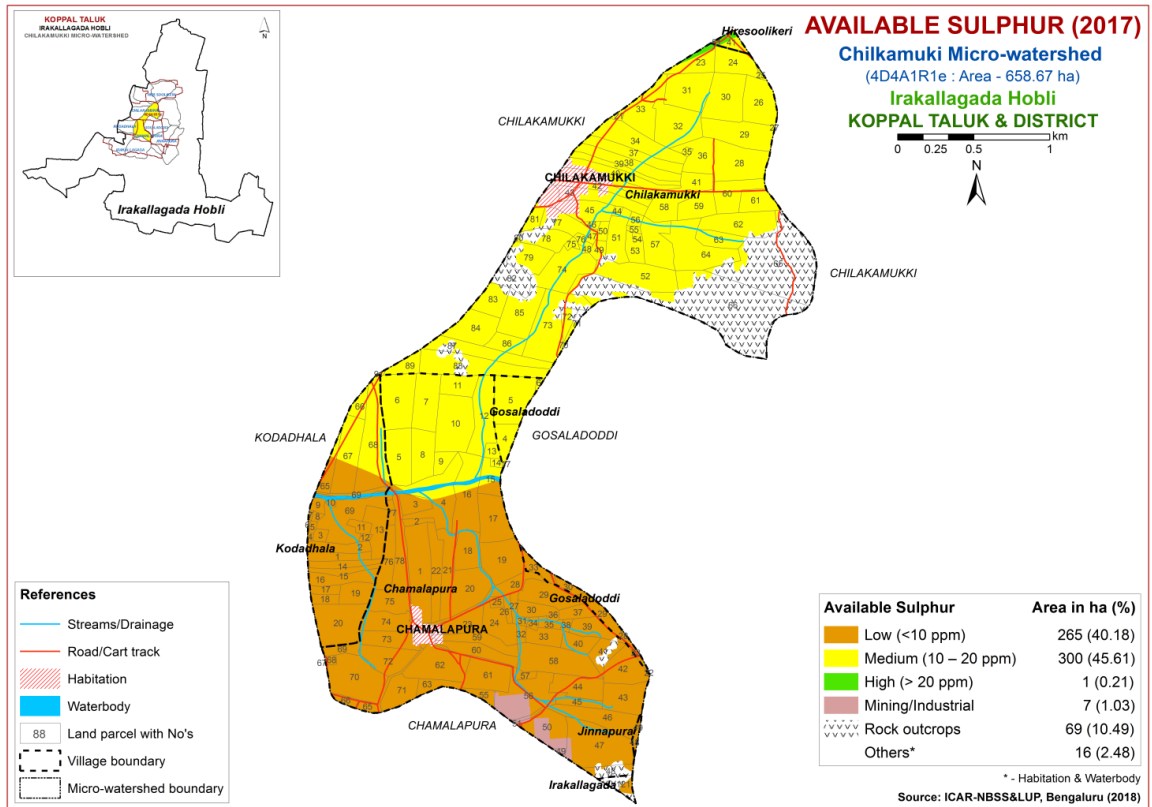
Fig.6.6 Soil Available Sulphur map of Chilkamuki Microwatershed
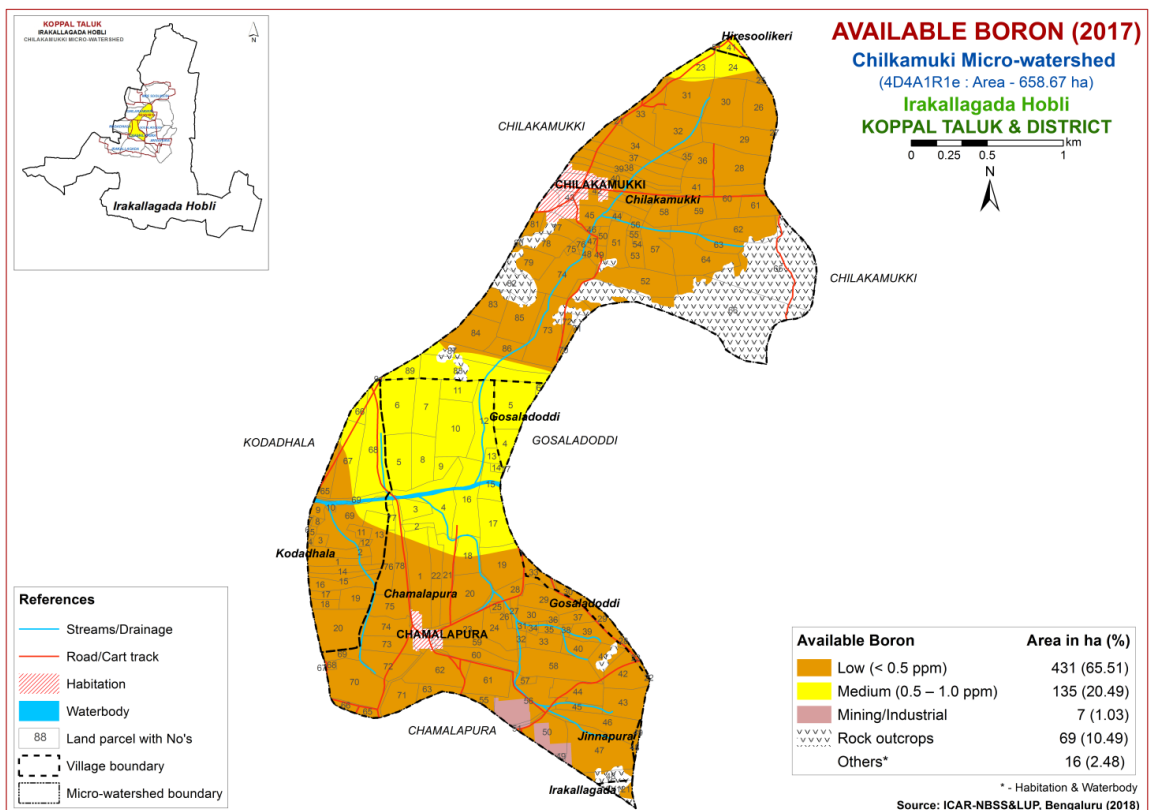
Fig.6.7 Soil Available Boron map of Chilkamuki Microwatershed

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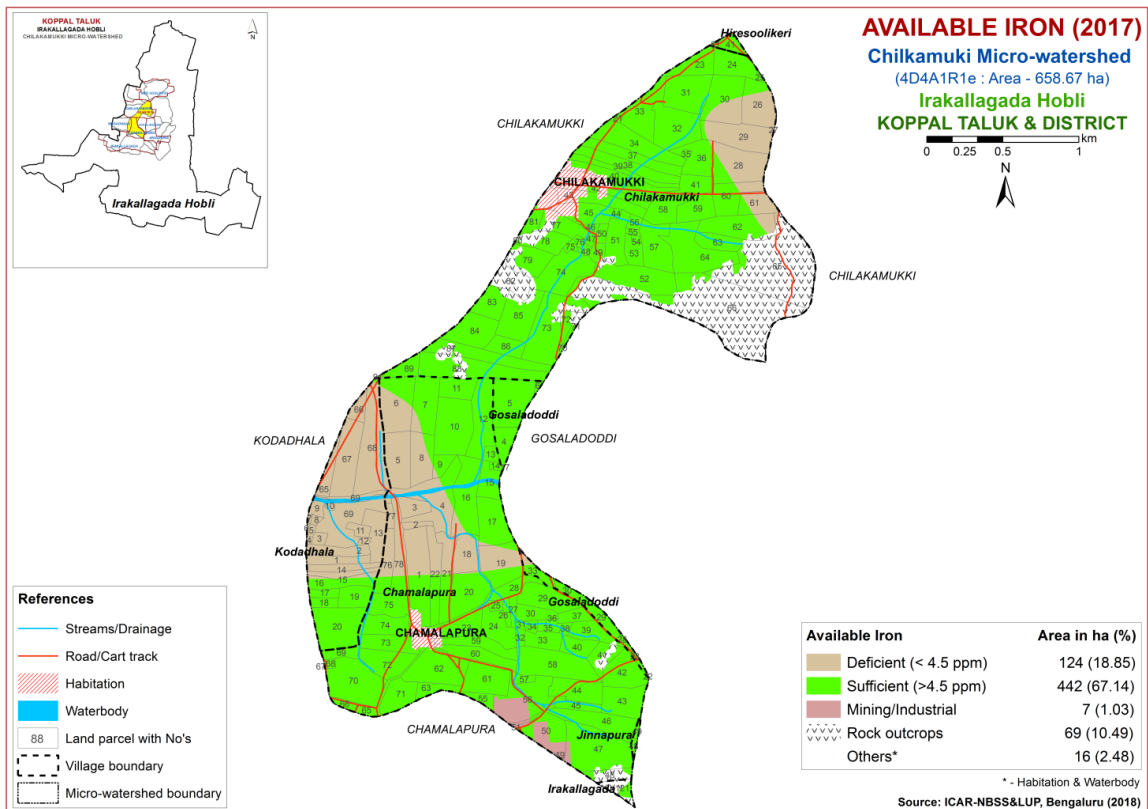
Fig.6.8 Soil Available Iron map of Chilkamuki Microwatershed

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 the northern area of 104 ha (16%) and sufficient (>0.6 ppm) in major area of 462 ha (70%) and occur in all parts of the microwatershed Fig 6.11).
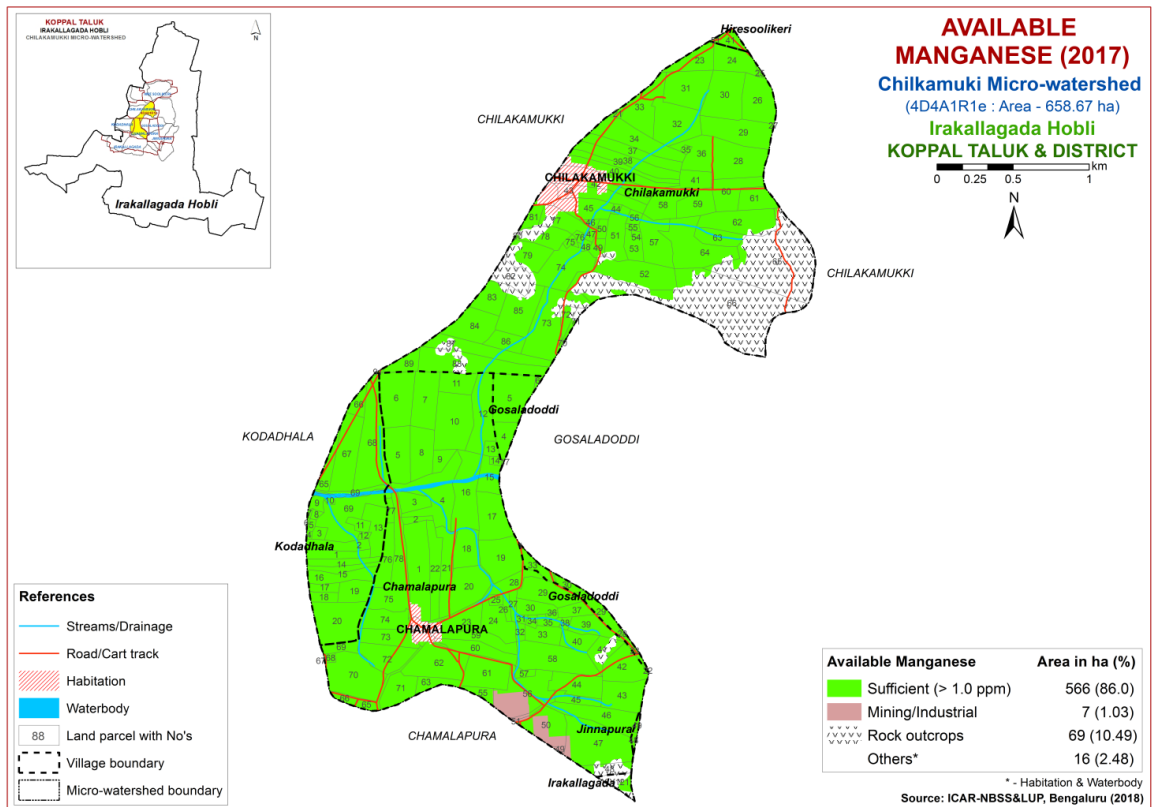
Fig.6.9 Soil Available Manganese map of Chilkamuki Microwatershed
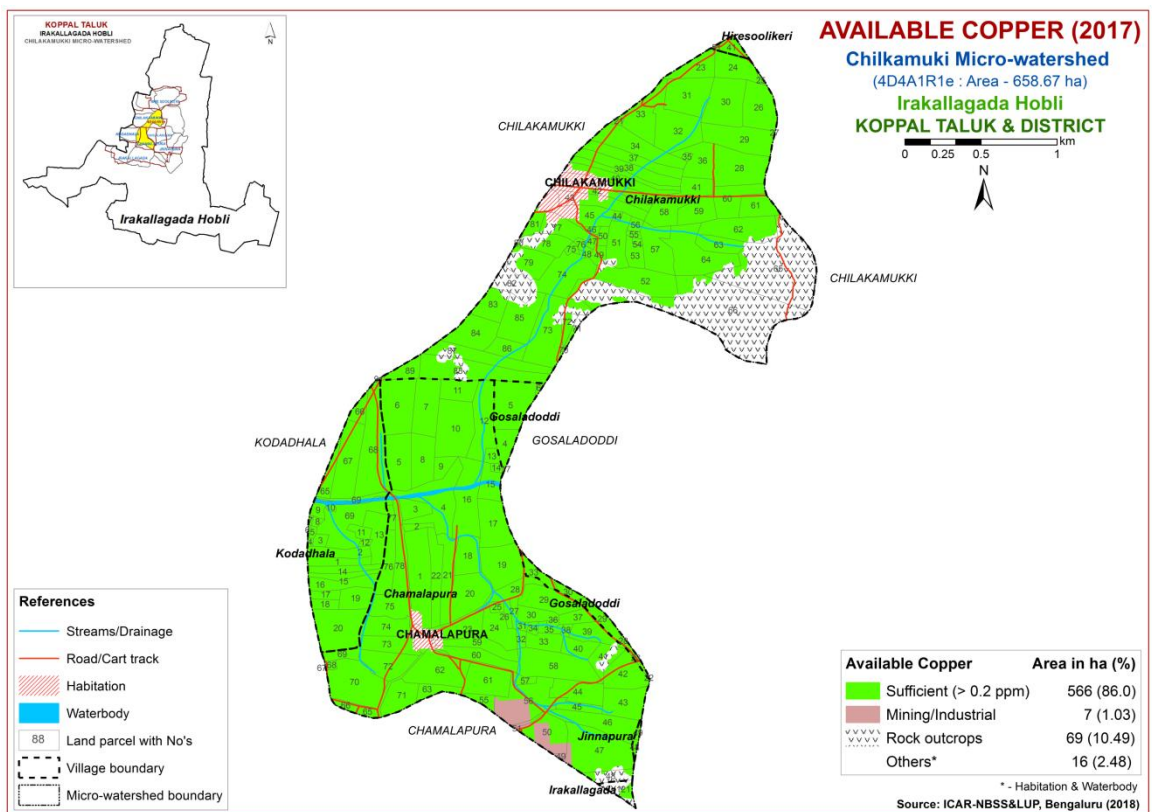
Fig.6.10 Soil Available Copper map of Chilkamuki Microwatershed
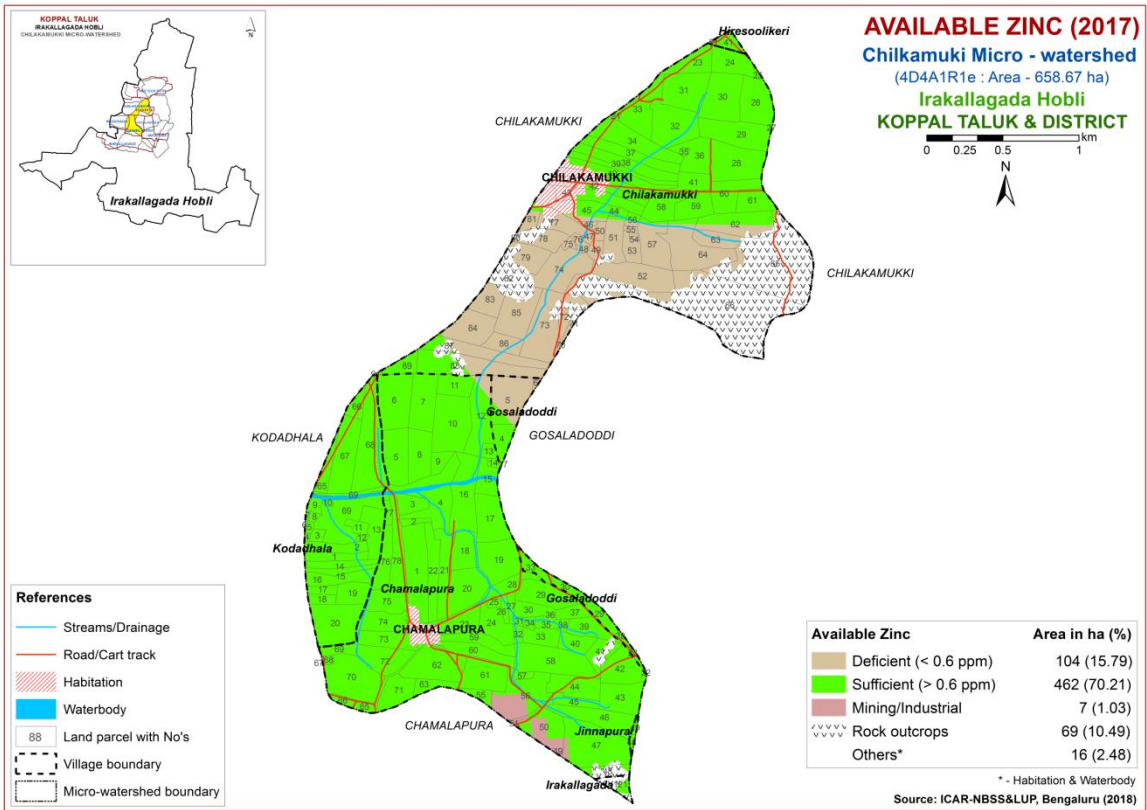
Fig.6.11 Soil Available Zinc map of Chilkamuki Microwatershed

LAND SUITABILITY FOR MAJOR CROPS

The soil and land resource units (soil phases) of Chilkamuki   Microwatershed were assessed for their suitability for growing food, fodder, fibre and other horticulture crops by following the procedure as outlined in FAO, 1976 and 1983. Crop requirements were developed for each of the crop from the available research data and also by referring to Naidu *et. al.* (2006) and Natarajan *et. al* (2015). The soil and land characteristics (Table 7.1) were matched with the crop requirements (Tables 7.2 to 7.29) to arrive at the crop suitability. The soil and land characteristics table and crop requirements tables are given at the end. In FAO land suitability classification, two orders are recognized. Order S- Suitable and Order N- Not suitable. The orders have Classes, subclasses and units. Order-S has three classes, Class S1- Highly Suitable, Class S2- Moderately Suitable and Class S3- Marginally Suitable. Order N has two classes, N1- Currently not Suitable and N2- Permanently not Suitable. There are no subclasses within the Class S1 as they will have very minor or no limitations for crop growth. Classes S2, S3, N1 and N2 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, 'z' for calcareousness and 'w' for drainage. These limitations are indicated as lower case letters to the class symbol. For example, moderately suitable lands with the limitations of soil depth and erosion are designated as S2re. For the microwatershed, the soil mapping units were evaluated and classified up to subclass level.

Using the above criteria, the soil map units of the microwatershed were evaluated and land suitability maps for 28 major agricultural and horticultural crops were generated. The detailed information on the kind of suitability of each of the soil phase for the crops assessed are given village/ survey number wise for the microwatershed in Appendix-III

7.1 Land Suitability for Sorghum (*Sorghum bicolor*)

Sorghum is one of the major food crop grown in Karnataka in an area of 10.47 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 a land a suitability map for growing sorghum was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure. 7.1.

An area of 30 ha (5%) is highly suitable (Class S1) for growing sorghum and occur in the northern part of the microwatershed. An area of about 193 ha (29%) is

moderately suitable (Class S2) for growing sorghum and are distributed in the northern and central part of the microwatershed. They have minor limitations of calcareousness, gravelliness, wetness, sodicity and rooting depth. Major area of about 343 ha (52%) is marginally suitable (Class S3). They have severe limitations of rooting depth, texture and gravelliness and occur in the all parts of the microwatershed.
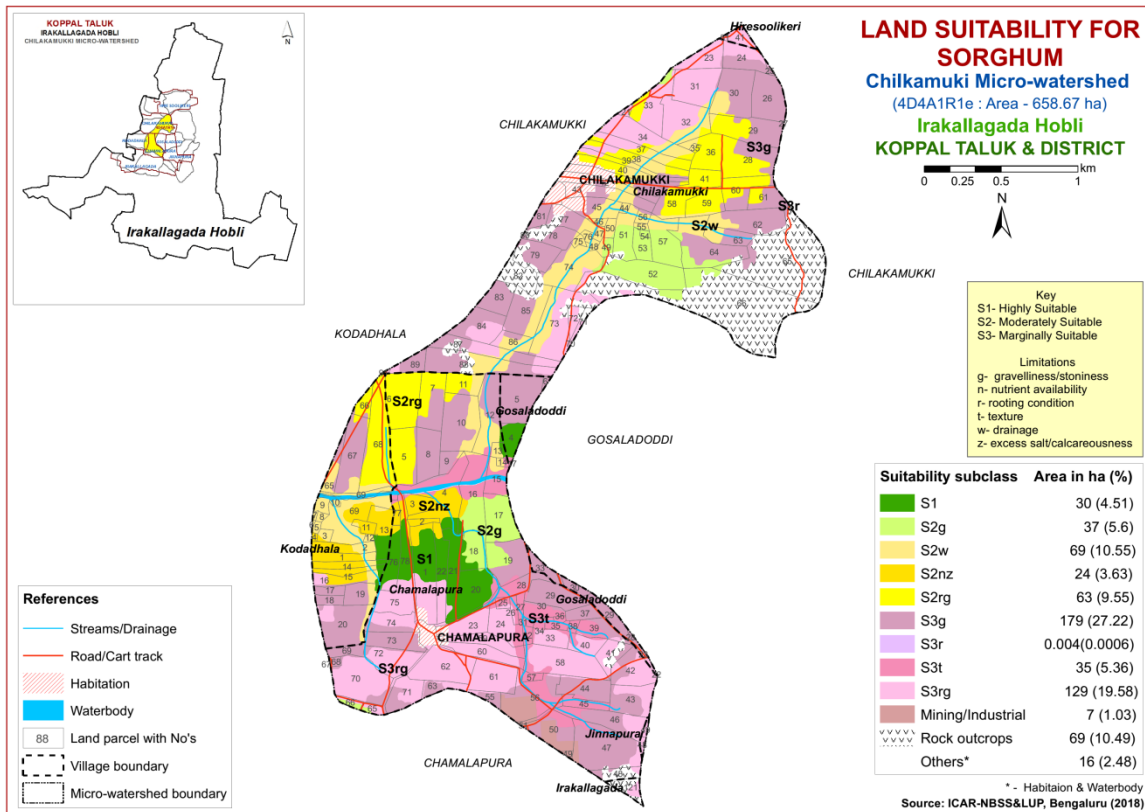
Fig. 7.1 Land Suitability map of Sorghum

7.2 Land Suitability for Maize (*Zea mays*)

Maize is one of the most important food crop grown in an area of 13.37 lakh ha in almost all the districts of the State. The crop requirements for growing maize (Table 7.3) 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.

Small area of about 27 ha (4%) is highly suitable (Class S1) for growing Maize and occur in the southern part of the microwatershed. An area of about 232 ha (35%) is moderately suitable (Class S2) for growing maize and are distributed in the northern and southern part of the microwatershed. They have minor limitations of calcareousness, gravelliness, texture and rooting depth. Major area of about 308 ha (47%) is marginally suitable (Class S3). They have severe limitations of rooting depth and gravelliness and occur in all parts of the microwatershed.
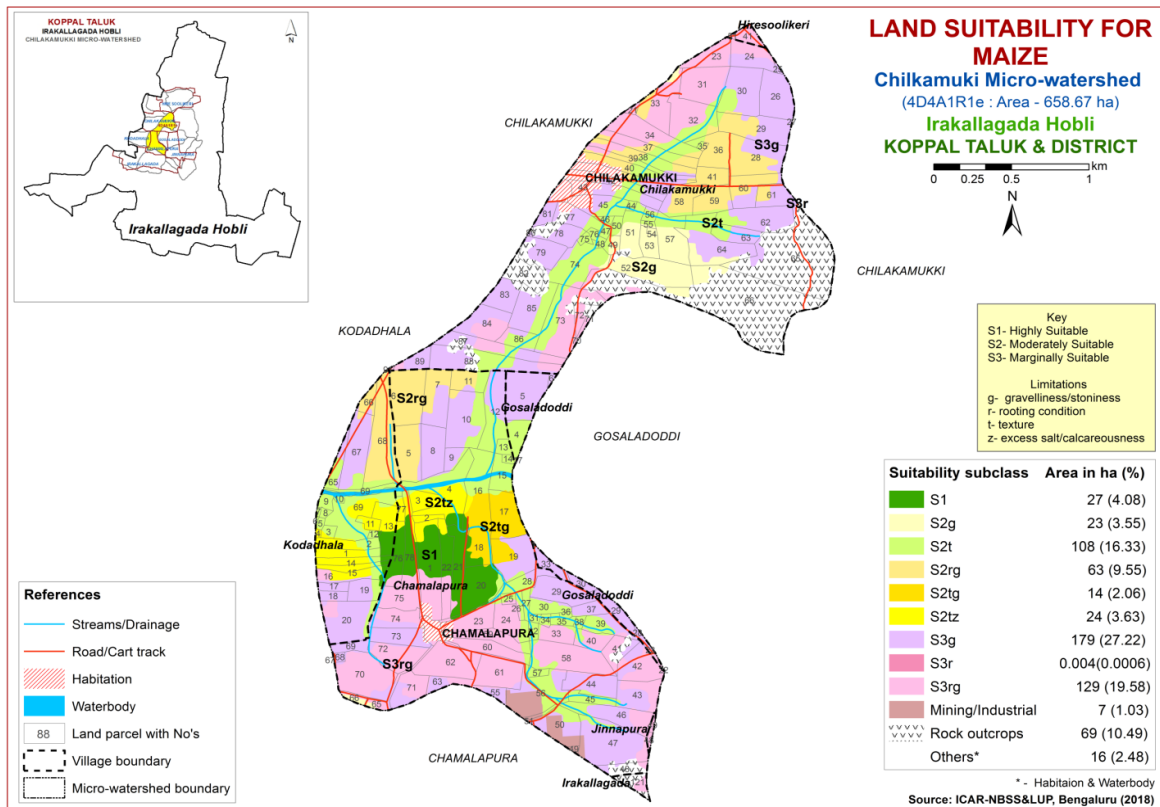
Fig. 7.2 Land Suitability map of Maize

7.3 Land Suitability for Bajra (*Pennisetum glaucum)*

Bajra is one of the major food crop grown in an area of 2.34 lakh ha in Karnataka in the northern districts. The crop requirements (Table 7.4) for growing bajra were matched with the soil-site characteristics (Table 7.1) of the soils of the microwatershed and land suitability map for growing bajra was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.3.

About 50 ha (8%) area is highly suitable (Class S1) for growing bajra and occur in the northern and southern part. Major area of 384 ha (58%) is moderately suitable (Class S2) with minor limitations of texture, rooting depth, gravelliness and calcareousness and occur in all parts of the microwatershed. An area of 133 ha (20%) is marginally suitable (Class S3) for growing bajra with moderate limitations of rooting depth and gravelliness and occur in the northern, central and southern part of the microwatershed.
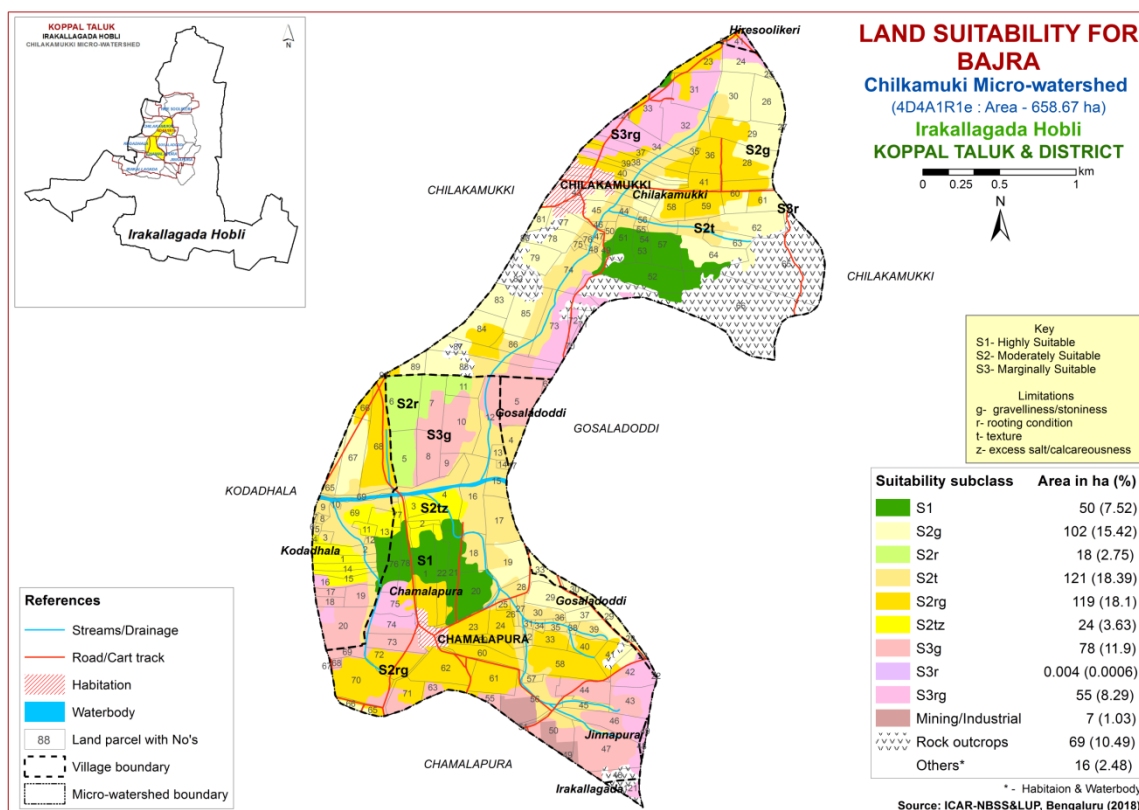
Fig. 7.3 Land Suitability map of Bajra

7.4 Land Suitability for Groundnut (*Arachis hypogaea*)

Groundnut is one of the major oilseed crop grown in an area of 6.54 lakh ha in Karnataka in most of the districts either as rainfed or irrigated crop. The crop requirements for growing groundnut (Table 7.5) were matched with the soil-site characteristics (Table 7.1) of the soils of the microwatershed and a land suitability map for growing groundnut was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.4.

About 63 ha (10%) area is highly suitable (Class S1) for growing groundnut and occur in the northern and southern part, Major area of 262 ha (40%) is moderately suitable (Class S2) with minor limitations of texture, rooting depth and gravelliness occur in major part of the microwatershed. An area of 241 ha (37%) is marginally suitable (Class S3) for growing groundnut with moderate limitations of rooting depth, wetness, calcareousness and gravelliness and occur in the northern, central and southern part of the microwatershed.
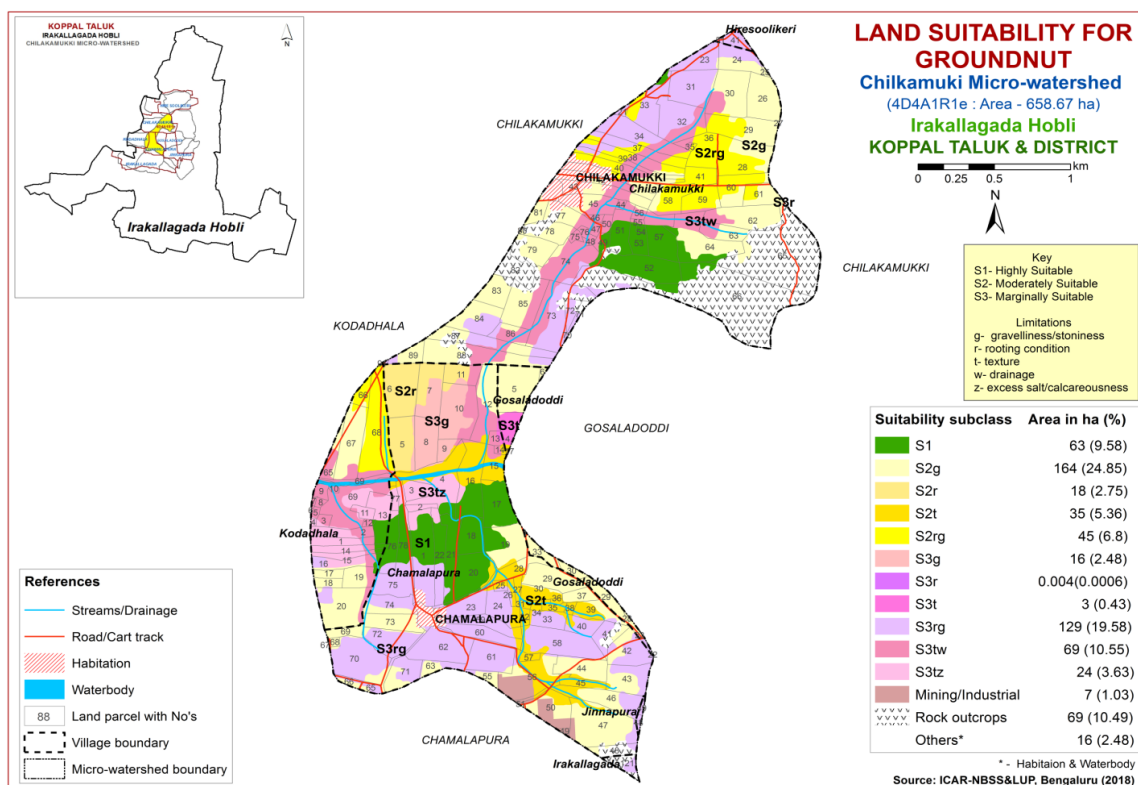
Fig. 7.4 Land Suitability map of Groundnut

7.5 Land Suitability for Sunflower (*Helianthus annus*)

Sunflower is one of the most important oilseed crop grown in an area of 3.56 lakh ha in the State in all the districts. The crop requirements for growing sunflower (Table 7.6) 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 7.5.

Small area of 30 ha (5%) is highly suitable (Class S1) for growing sunflower and are distributed in the southern part. An area of about 130 ha (20%) is moderately suitable (Class S2) and is distributed in the central, northern and southern part of the microwatershed with minor limitations of gravelliness, rooting depth, wetness and calcareousness. Major area of about 352 ha (53%) is marginally suitable (Class S3) for growing sunflower and occur in major part of the microwatershed with moderate limitations of gravelliness, texture and rooting depth and an area of about 55 ha (8%) is currently not suitable (Class N1) for growing sunflower with severe limitations of rooting depth and gravelliness and occur in the northern and southern part of the microwatershed.
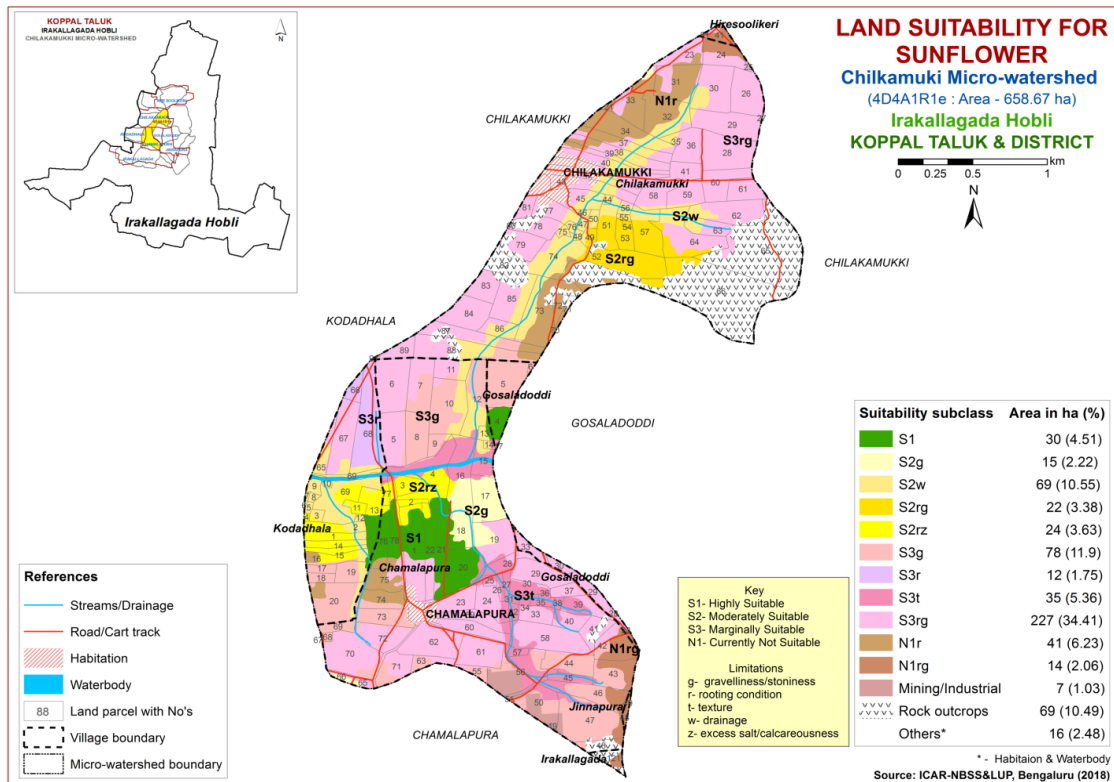
Fig. 7.5 Land Suitability map of Sunflower

7.6 Land Suitability for Cotton (*Gossypium hirsutum*)

Cotton is one of the most important fibre crop grown in the state in about 8.75 lakh ha area in Raichur, Dharwad, Belgaum, Kalaburgi, Bijapur, Bidar, Bellary, Chitradurga and Chamarajnagar districts. The crop requirements for growing cotton (Table 7.7) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing cotton was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.7.

Very minor area of about 3 ha (<1%) is highly (Class S1) suitable for growing cotton and occur in the eastern part of the microwatershed. An area of about 219 ha (33%) is moderately suitable (Class S2) for growing cotton and are distributed in the central and northern part of the microwatershed with minor limitations of gravelliness, texture, wetness, calcareousness and rooting depth. An area of 309 ha (47%) is marginally suitable (Class S3) for cotton with moderate limitations of rooting depth, texture and gravelliness occur in major part of the microwatershed and small area of 35 ha (5%) is currently not suitable (Class N1) with severe limitations of texture and occur in the southern part of the microwatershed.
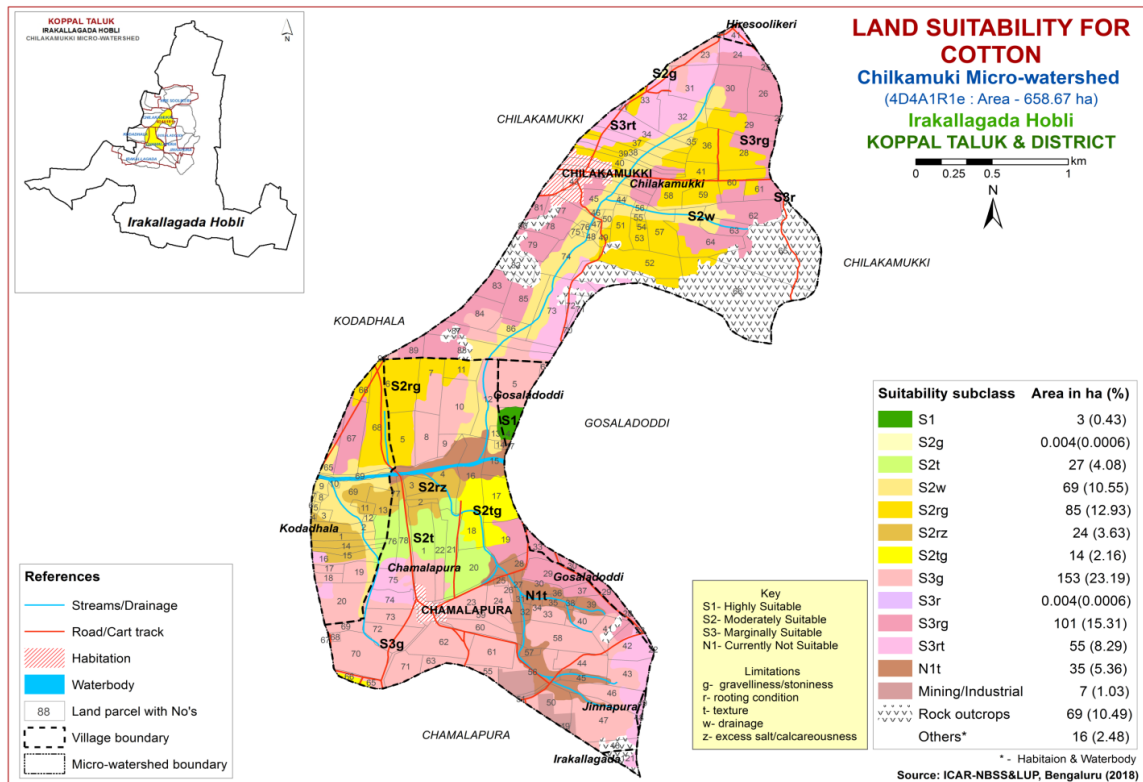
Fig. 7.6 Land Suitability map of Cotton

7.7 Land Suitability for Red gram (*Cajanus cajan*)

Red gram is one of the major pulse crop grown in an area of 7.28 lakh ha mainly in northern Karnataka in Bijapur, Kalaburgi, Raichur, Bidar, Belgaum, Dharwad and Bellary districts. The crop requirements for growing red gram (Table 7.7) were matched with the soil-site characteristics (Table 7.1) of the soils of the microwatershed and a land suitability map for growing red gram was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed is given in Figure 7.7.

Minor area of about 27 ha (4%) is highly suitable (Class S1) for growing red gram and occur in the southern part of the microwatershed. About 109 ha (17%) area is moderately suitable (Class S2) for growing red gram. They have minor limitations of texture, rooting depth, wetness and gravelliness and occur in the northern part of the microwatershed. Major area of about 376 ha (57%) is marginally suitable (Class S3) for growing red gram with moderate limitations of texture, gravelliness, rooting depth and calcareousness and are distributed in major part of the microwatershed. An area of about 55 ha (8%) is currently not suitable (Class N1) for growing red gram with severe limitations of rooting depth and gravelliness and occur in the northern and southern part of the microwatershed.

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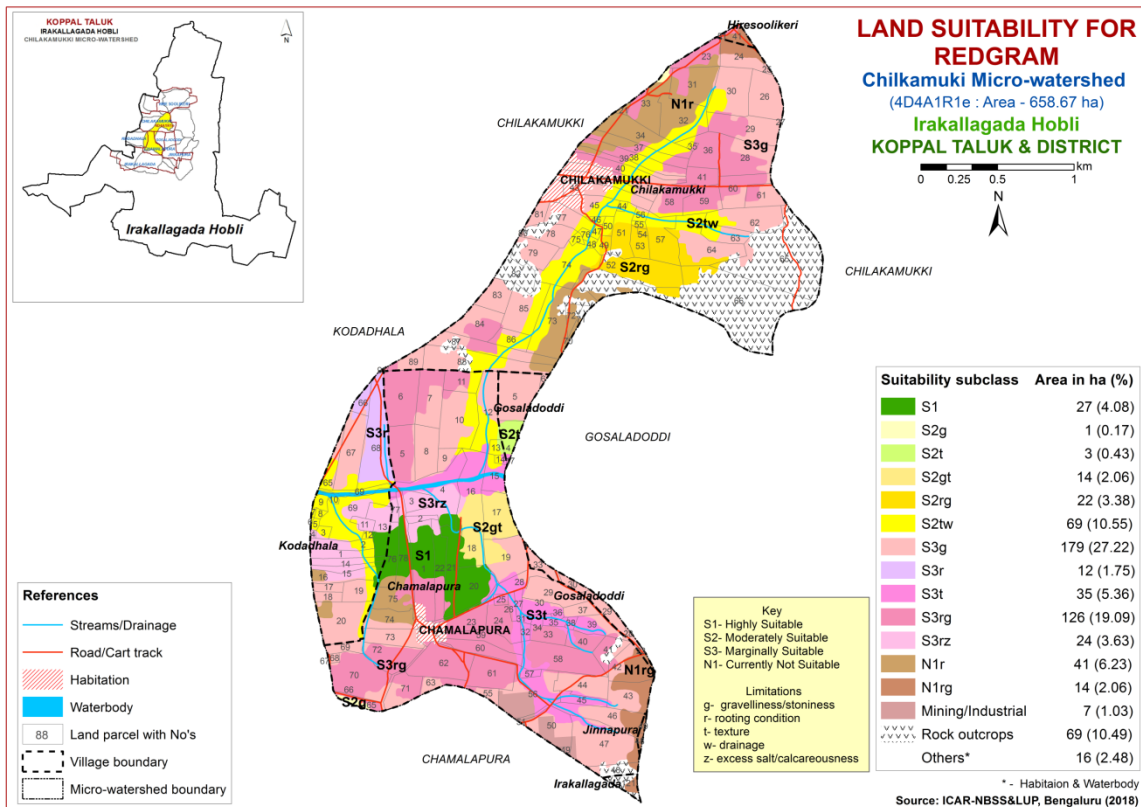
Fig. 7.7 Land Suitability map of Red gram

7.8 Land Suitability for Bengal gram (*Cicer aerativum*)

Bengal gram is one of the most important pulse crop grown in about 9.39 lakh ha area in Bijapur, Raichur, Kalaburgi, Dharwad, Belgaum and Bellary districts. The crop requirements for growing Bengal gram (Table 7.9) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing Bengal gram was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.8.

An area of about 72 ha (11%) is highly suitable (Class S1) for growing Bengal gram and are distributed in the northern and central part of the microwatershed. Major area of about 214 ha (32%) is moderately suitable (Class S2) for growing Bengal gram and are distributed in the southern and northern part of the microwatershed. They have minor limitations of rooting depth, gravelliness, texture and calcareousness. Major area of about 246 ha (37%) is marginally suitable (Class S3) for growing Bengal gram with moderate limitations of rooting depth, gravelliness and texture and occur in all parts of the microwatershed and small area of 35 ha (5%) is currently not suitable (Class N1) for growing Bengal gram with severe limitation of texture and occur in the southern part of the microwatershed.
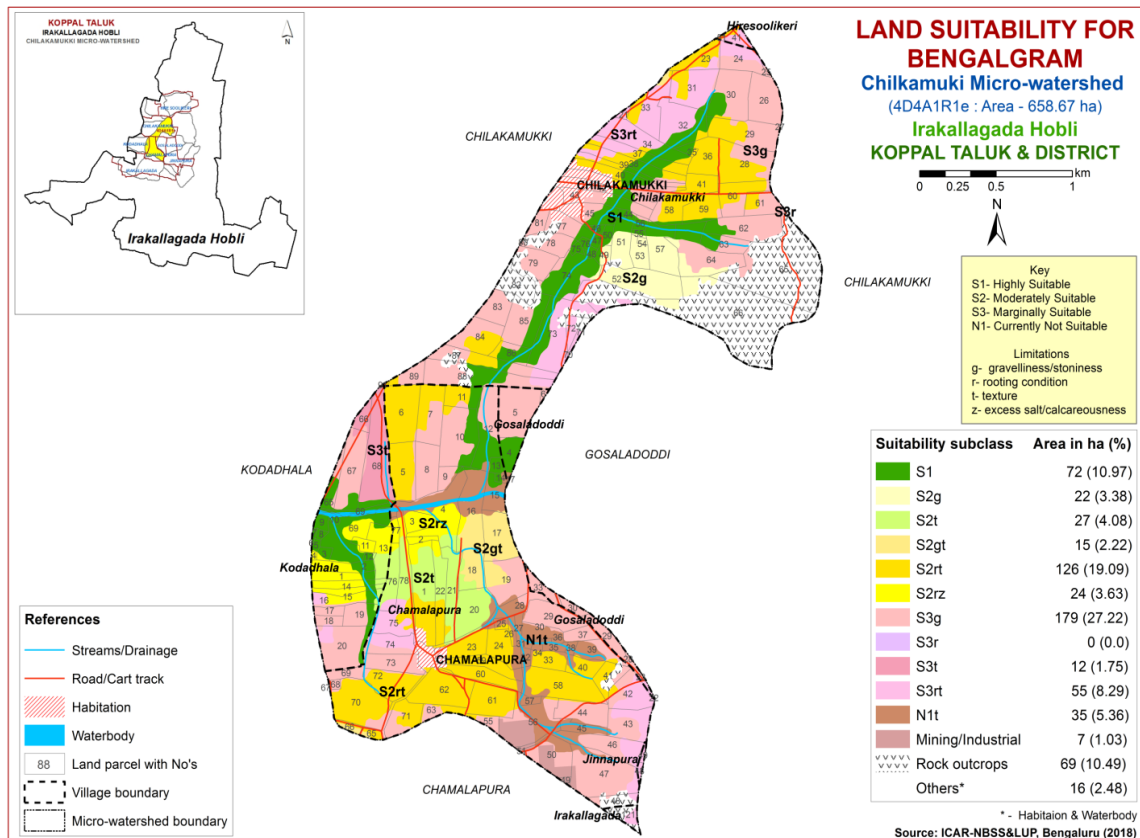
Fig. 7.8 Land Suitability map of Bengal gram

7.9 Land Suitability for Chilli (*Capsicum annuum L*)

Chilli is one of the major vegetable and spice crop grown in an area of 0.42 lakh ha in Karnataka State. The crop requirements for growing chilli (Table 7.10) were matched with the soil-site characteristics (Table 7.1) of the soils of the microwatershed and a land suitability map for growing chilli was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.9.

Small area of about 27 ha (4%) is highly suitable (Class S1) for growing Chilli and are distributed in the southern part of the microwatershed. An area of about 100 ha (15%) is moderately suitable (Class S2) for growing Chilli and are distributed in the southern and northern part of the microwatershed. They have minor limitations of rooting depth, gravelliness and wetness. Major area of about 440 ha (67%) is marginally suitable (Class S3) for growing Chilli with moderate limitations of rooting depth, wetness, gravelliness, calcareousness and texture and occur in all parts of the microwatershed.
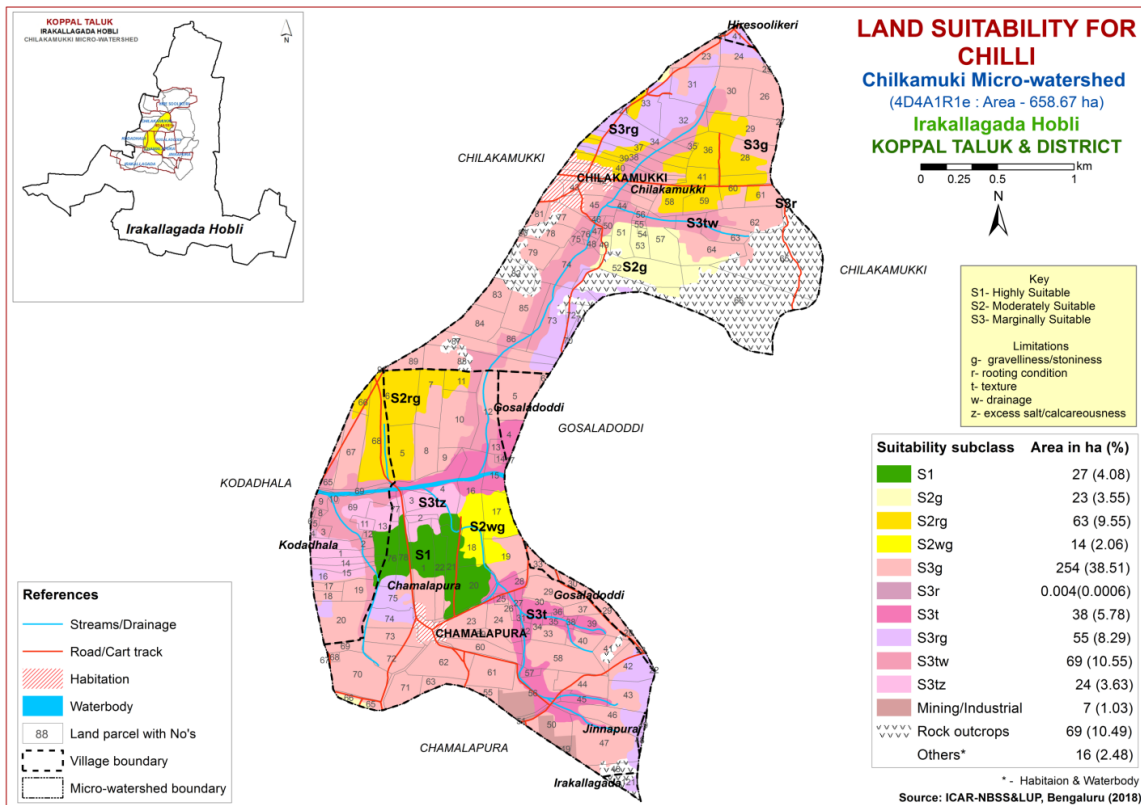
Fig. 7.9 Land Suitability map of Chilli

7.10 Land Suitability for Tomato (*Solanum lycopersicum*)

Tomato is one of the most important vegetable crop grown in an area of 0.65 lakh ha in almost all the districts of the State. The crop requirements (Table 7.11) for growing tomato were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing tomato was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.10.

Small area of about 27 ha (4%) is highly suitable (Class S1) for growing tomato and are distributed in the southern part of the microwatershed. An area of about 100 ha (15%) is moderately suitable (Class S2) for growing tomato and are distributed in the southern and northern part of the microwatershed. They have minor limitations of rooting depth, gravelliness and wetness. Major area of about 440 ha (67%) is marginally suitable (Class S3) for growing tomato with moderate limitations of rooting depth, wetness, gravelliness, calcareousness and texture and occur in all parts of the microwatershed.
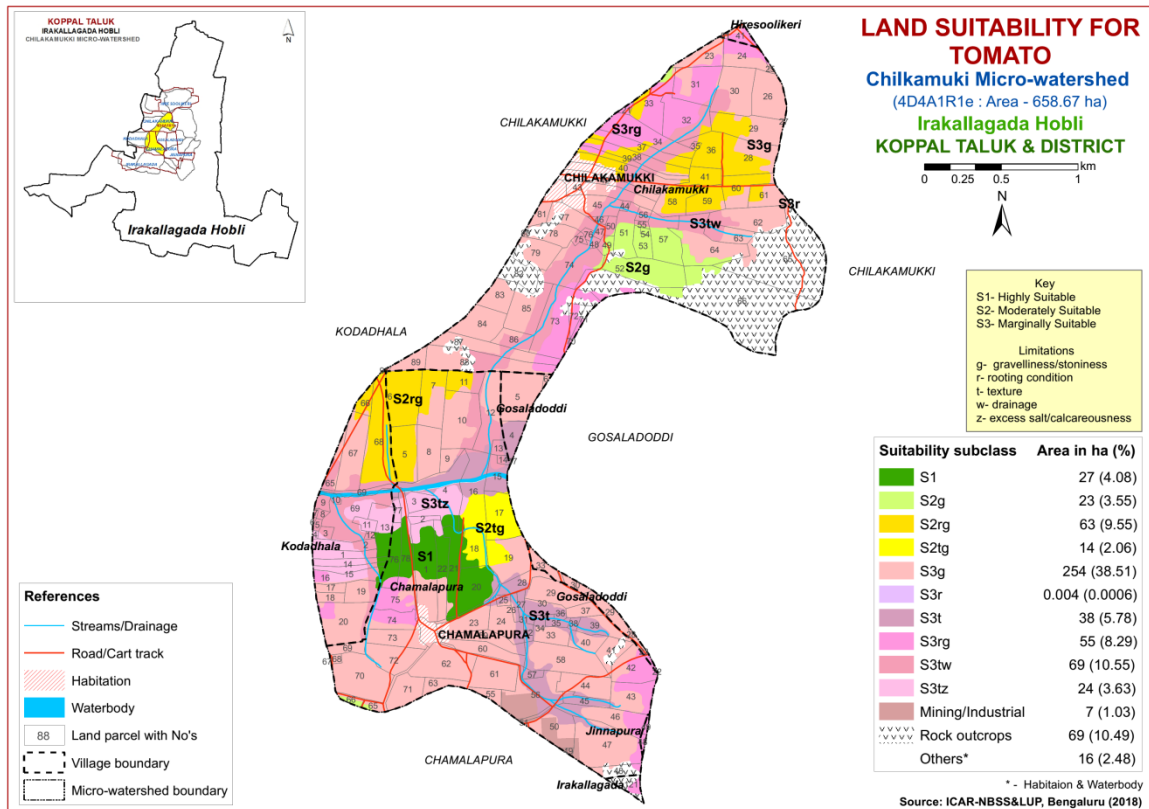
Fig. 7.10 Land Suitability map of Tomato

7.11 Land Suitability for Drumstick (*Moringa oleifera)*

Drumstick is one of the most important vegetable crop grown in 2403 ha area in the state. The crop requirements for growing drumstick (Table 7.12) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing drumstick was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.11.

About 41 ha (6%) area has highly (Class S1) suitable lands for growing drumstick and occur in the southern part of the microwatershed. An area of 181 ha (27%) is moderately (Class S2) suitable for growing drumstick with minor limitations of texture, rooting depth, gravelliness, wetness and calcareousness and distributed in the northern, central and southern part of the microwatershed. Major area of about 290 ha (44%) is marginally suitable (Class S3) for growing drumstick with moderate limitations of rooting depth, gravelliness and texture and occur in major part of the microwatershed. An area of about 55 ha (8%) is currently not suitable (Class N1) for growing drumstick with severe limitations of rooting depth and gravelliness and occur in the southern and northern part of the microwatershed.
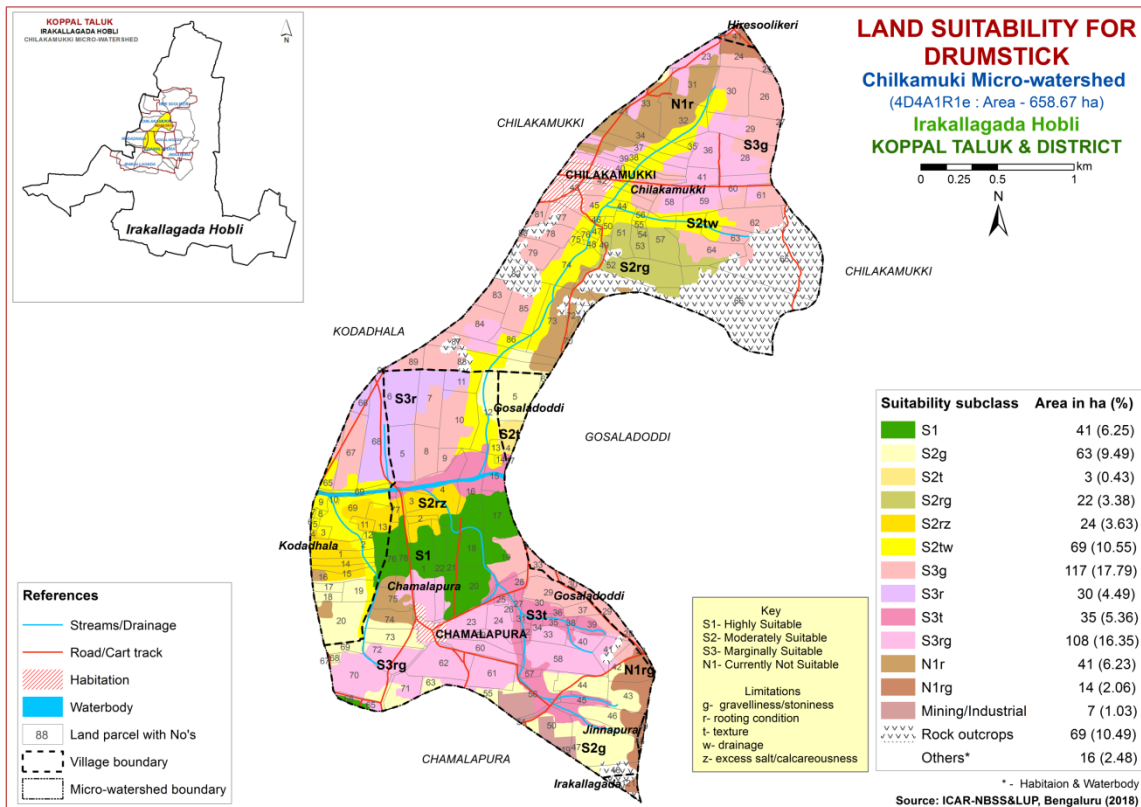
Fig. 7.11 Land Suitability map of Drumstick

7.12 Land Suitability for Mulberry (*Morus nigra*)

Mulberry is the most important leaf crop grown for rearing silkworms in about 1.66 lakh ha in all the districts of the state. The crop requirements for growing mulberry (Table 7.13) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing mulberry was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.12.

Small area of 42 ha (6%) is highly suitable for growing mulberry and occur in the southern part. Major area of 298 ha (45%) is moderately (Class S2) suitable for growing mulberry with minor limitations of texture, rooting depth, gravelliness, wetness and calcareousness and distributed in major part of the microwatershed. An area of about 173 ha (26%) is marginally suitable (Class S3) for growing mulberry with moderate limitations of rooting depth, gravelliness and texture and occur in the southern and central part of the microwatershed and an area of about 55 ha (8%) is currently not suitable (Class N1) for growing mulberry with severe limitations of rooting depth and gravelliness and occur in the southern and northern part of the microwatershed.

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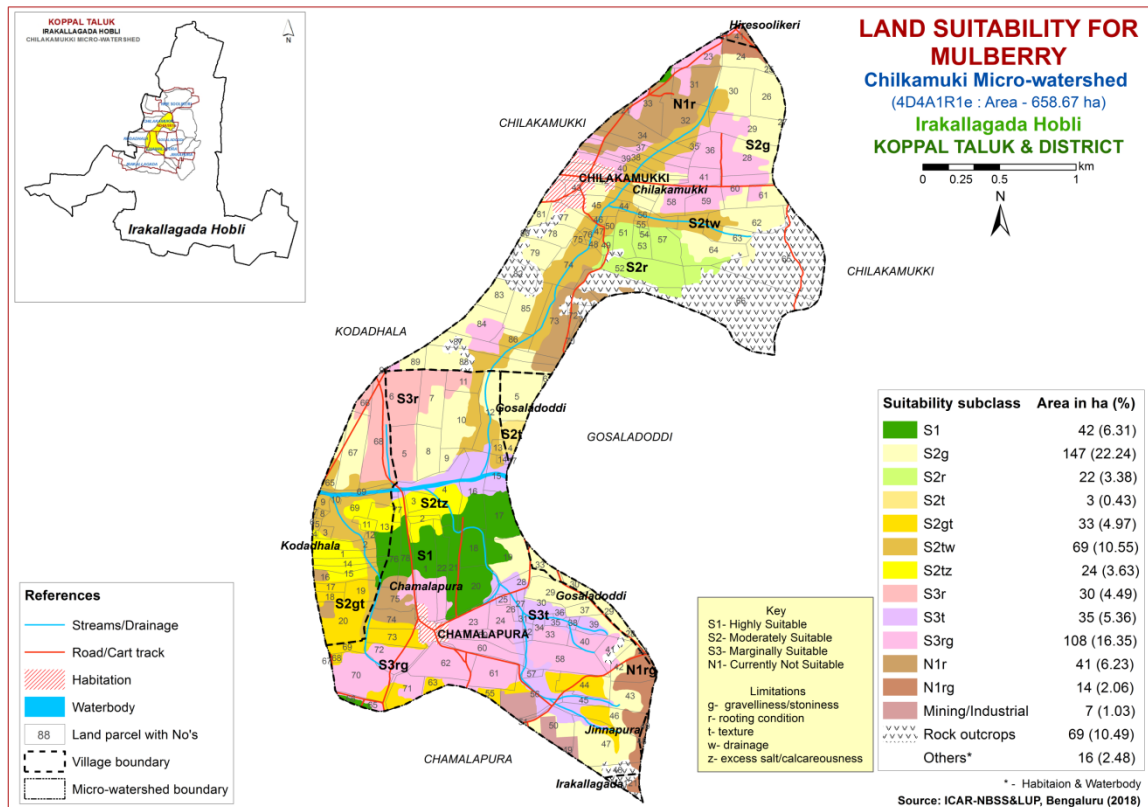
Fig. 7.12 Land Suitability map of Mulberry

7.13 Land Suitability for Mango (*Mangifera indica*)

Mango is one of the most important fruit crop grown in about 1.73 lakh ha in almost all the districts of the State. The crop requirements (Table 7.14) for growing mango were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing mango was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.13.

There are no highly (Class S1) suitable lands. About 41 ha (6%) area is moderately suitable (Class S2) for growing mango with minor limitations of rooting depth and gravelliness and occur in the southern part of the microwatershed. Marginally suitable (Class S3) lands cover a major area of about 332 ha (51%) and occur in the major part of the microwatershed. They have moderate limitations of texture, gravelliness, rooting depth, wetness and calcareousness and an area of about 192 ha (29%) is currently not suitable (Class N1) for growing mango and occur in the northern and southern part of the microwatershed with severe limitations of gravelliness and rooting depth.
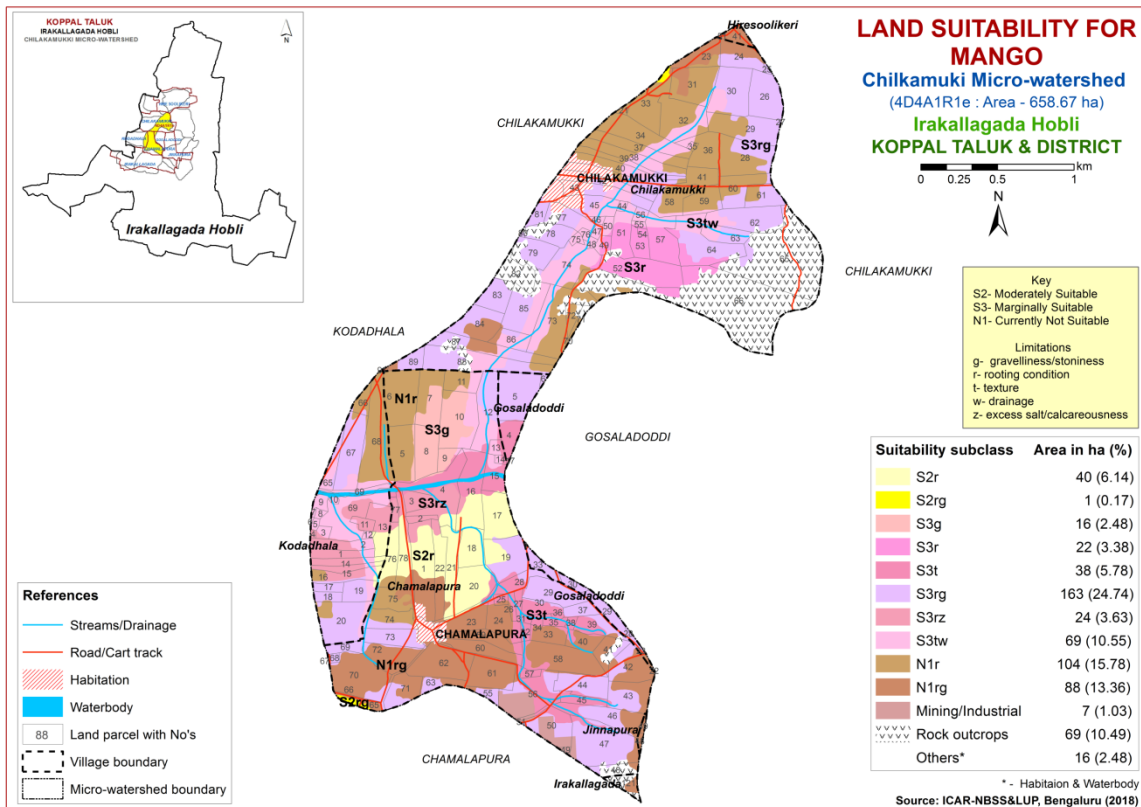
Fig. 7.13 Land Suitability map of Mango

7.14 Land Suitability for Sapota (*Manilkara zapota*)

Sapota is one of the most important fruit crop grown in an area of about 29373 ha in almost all the districts of the state. The crop requirements (Table 7.15) 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 geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.14

About 40 ha (6%) area has highly (Class S1) suitable and occur in the southern part. About 124 ha (19%) area is moderately suitable (Class S2) for growing sapota with minor limitations of rooting depth and gravelliness and occur in the southern and northern part of the microwatershed. Marginally suitable (Class S3) lands cover a major area of about 347 ha (53%) and occur in the major part of the microwatershed. They have moderate limitations of texture, gravelliness, rooting depth, wetness and calcareousness and an area of about 55 ha (8%) is currently not suitable (Class N1) for growing sapota and occur in the northern and southern part of the microwatershed with severe limitations of gravelliness and rooting depth.
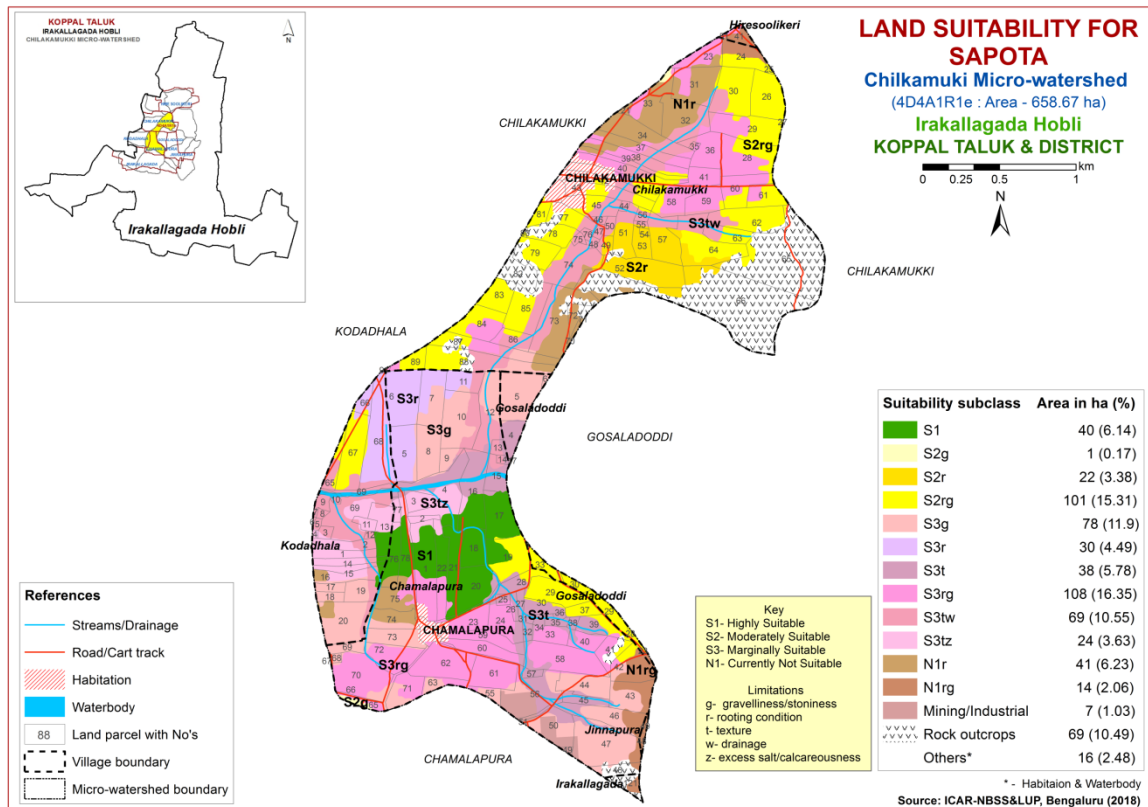
Fig. 7.14 Land Suitability map of Sapota

7.15 Land Suitability for Pomegranate (*Punica granatum*)

Pomegranate is one of the commercially grown fruit crop in about 18488 ha in Karnataka mainly in Bijapur, Bagalkot, Koppal, Gadag and Chitradurga districts. The crop requirements for growing pomegranate (Table 7.16) were matched with the soil-site characteristics (Table 7.1) of the soils of the microwatershed and a land suitability map for growing pomegranate was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.15.

About 40 ha (6%) area has highly (Class S1) suitable lands and occur in the southern part. About 220 ha (33%) area is moderately suitable (Class S2) for growing pomegranate with minor limitations of rooting depth, texture, wetness and gravelliness and occur in the southern and northern part of the microwatershed. Marginally suitable (Class S3) lands cover a major area of about 251 ha (38%) and occur in the major part of the microwatershed. They have moderate limitations of texture, gravelliness, rooting depth and wetness. An area of about 55 ha (8%) is currently not suitable (Class N1) for growing pomegranate and occur in the northern and southern part of the microwatershed with severe limitations of gravelliness and rooting depth.
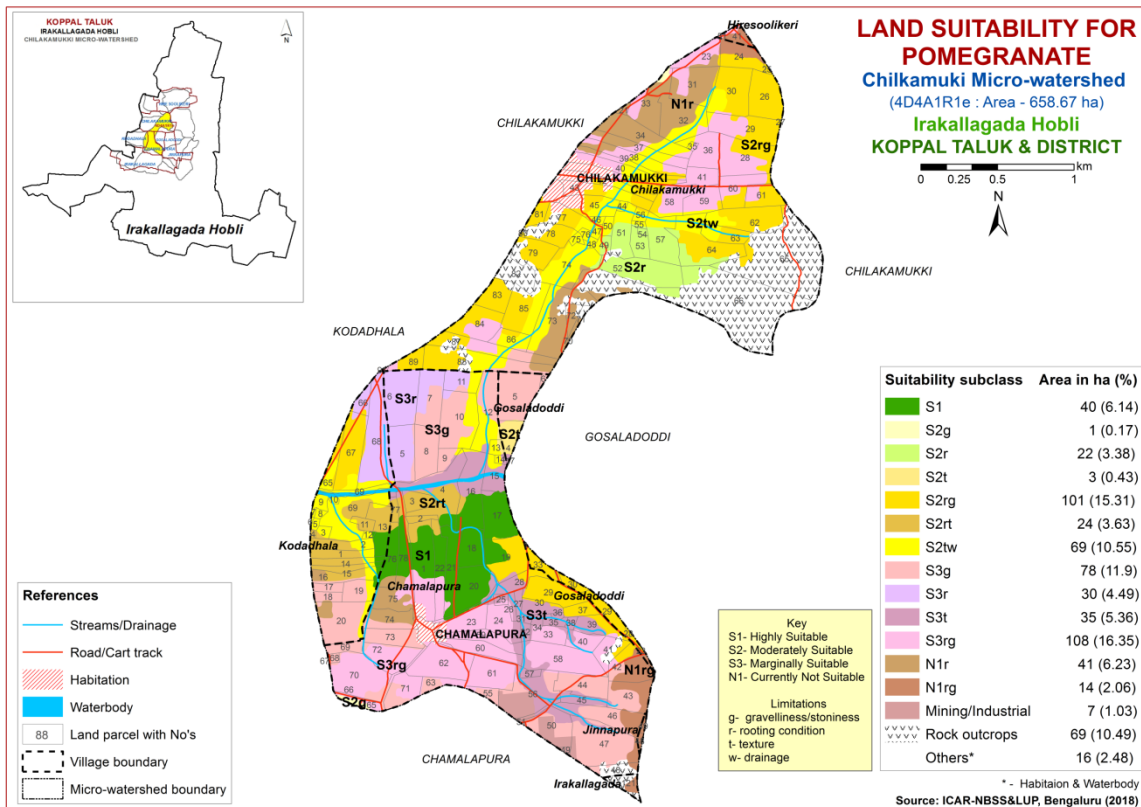
Fig. 7.15 Land Suitability map of Pomegranate

7.16 Land Suitability for Guava (*Psidium guajava*)

Guava is one of the most important fruit crop grown in an area of about 6558 ha in almost all the districts of the state. The crop requirements (Table 7.17) for growing guava were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing guava was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.16.

A small area of about 40 ha (6%) is highly suitable (Class S1) for guava and occur in the southern part of the microwatershed. An area of 124 ha (19%) is moderately suitable (Class S2) with minor limitations of gravelliness and rooting depth. Major area of 347 ha (53%) is marginally (Class S3) suitable for growing guava with moderate limitations of texture, rooting depth, wetness and calcareousness and occur in the major part of the microwatershed and an area of about 55 ha (8%) is currently not suitable (Class N1) for growing guava with severe limitations of rooting depth and gravelliness and occur in the southern and northern part of the microwatershed.

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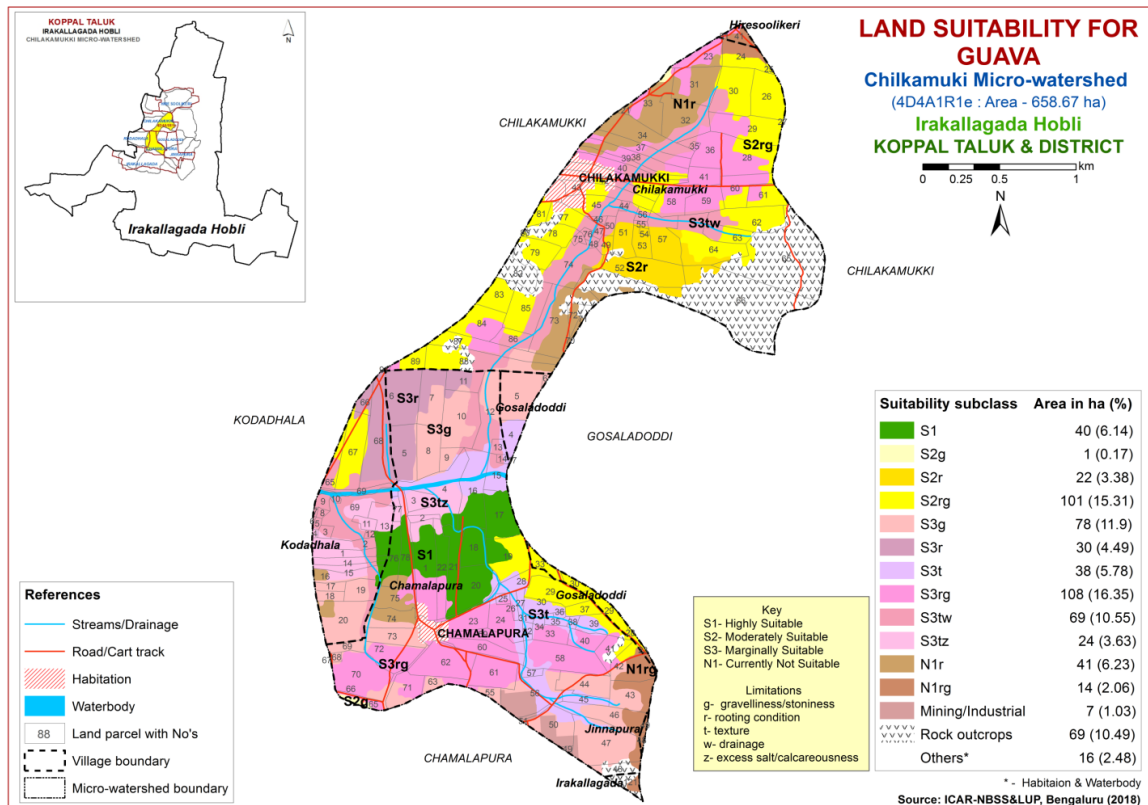
Fig. 7.16 Land Suitability map of Guava

7.17 Land Suitability for Jackfruit (*Artocarpus heterophyllus*)

Jackfruit is one of the most important fruit crop grown in 5368 ha in all the districts of the state. The crop requirements (Table 7.18) for growing jackfruit were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing jackfruit was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in figure 7.17.

A small area of about 40 ha (6%) is highly suitable (Class S1) for jackfruit and occur in southern part of the microwatershed. An area of 124 ha (19%) is moderately suitable (Class S2) with minor limitations of gravelliness and rooting depth. Major area of 347 ha (53%) is marginally (Class S3) suitable for growing jackfruit with moderate limitations of rooting depth texture, wetness, gravelliness and calcareousness and occur in all parts of the microwatershed and an area of about 55 ha (8%) is currently not suitable (Class N1) for growing jackfruit with severe limitations of rooting depth and gravelliness and occur in the southern part of the microwatershed.
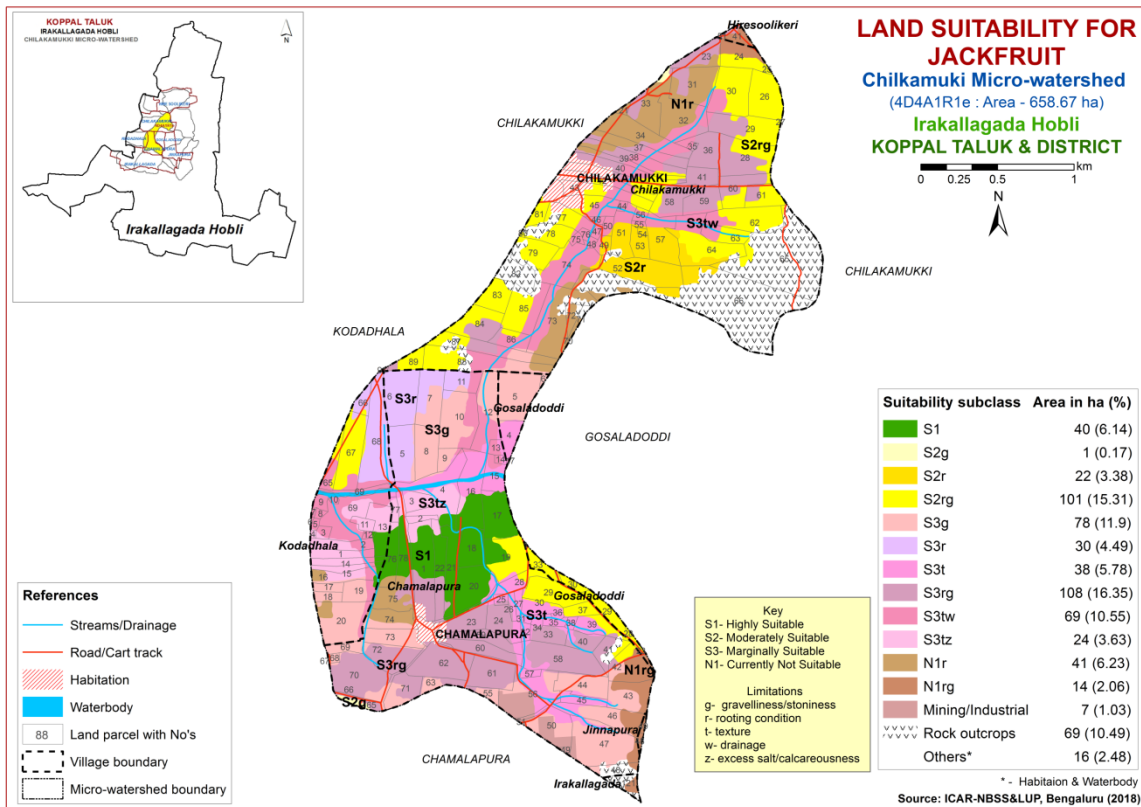
Fig. 7.17 Land Suitability map of Jackfruit

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 (Table 7.19) for growing jamun were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing jamun was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.18.

An area of 237 ha (36%) is moderately suitable (Class S2) for growing jamun with minor limitations of texture, rooting depth, wetness and gravelliness and occur in the major part of the microwatershed. Marginally suitable (Class S3) lands cover a major area of about 275 ha (42%) and occur in the southern and central part of the microwatershed. They have moderate limitations of rooting depth, texture, gravelliness and calcareousness and an area of about 55 ha (8%) is currently not suitable (Class N1) for growing jamun with severe limitations of rooting depth and gravelliness occur and in the southern and northern part of the microwatershed.
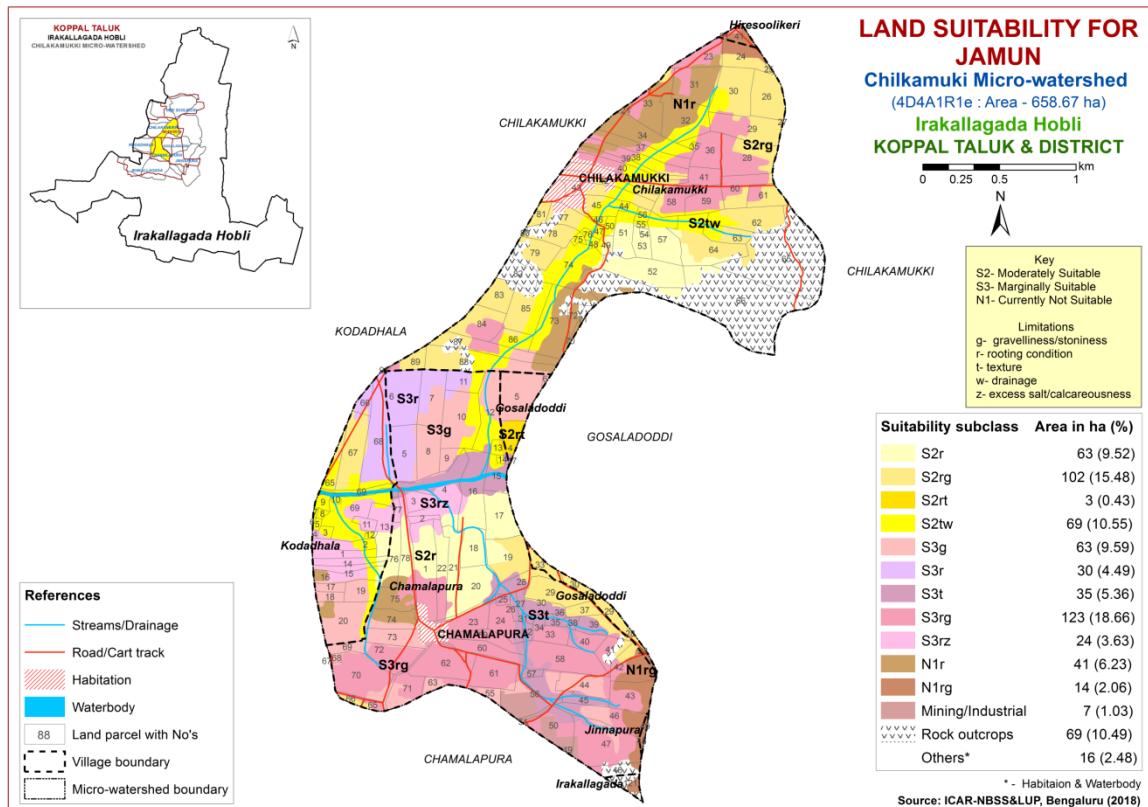
Fig. 7.18 Land Suitability map of Jamun

7.19 Land Suitability for Musambi (*Citrus limetta*)

Musambi is one of the most important fruit crop grown in an area of 5446 ha in almost all the districts of the state. The crop requirements (Table 7.20) for growing musambi were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing musambi was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.16.

Small area of about 43 ha (7%) is highly suitable (Class S1) for growing musambi and occur in the southern part of the microwatershed. About 217 ha (33%) is moderately suitable (Class S2) for growing musambi with minor limitations of gravelliness, rooting depth, wetness and calcareousness and occur in the southern and central part of the microwatershed. Marginally suitable (Class S3) lands cover a major area of about 251 ha (38%) and occur in the northern and southern part of the microwatershed. They have moderate limitations of rooting depth, texture and gravelliness and an area of about 55 ha (8%) is currently not suitable (Class N1) for growing musambi with severe limitations of rooting depth and gravelliness and occur in the southern and northern part of the microwatershed.

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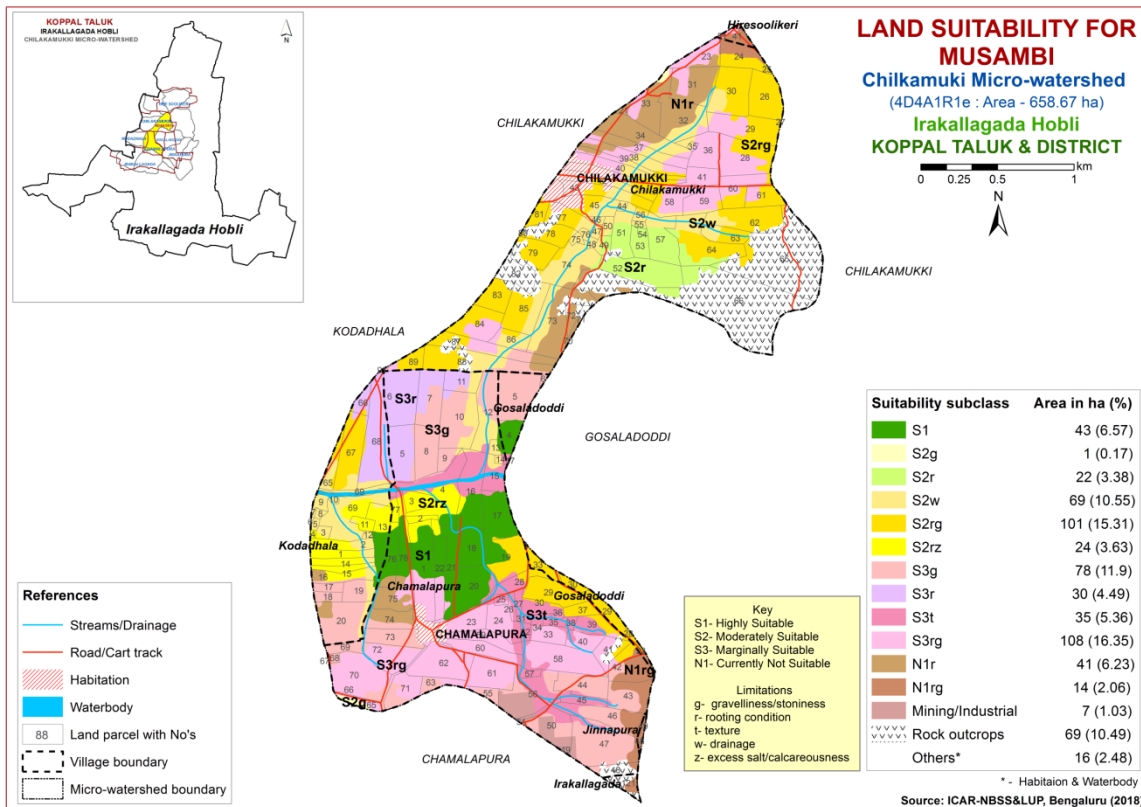
Fig. 7.19 Land Suitability map of Musambi

7.20 Land Suitability for Lime (*Citrus sp*)

Lime is one of the most important fruit crop grown in an area of 11752 ha in almost all the districts of the State. The crop requirements (Table 7.21) for growing lime (Table 7.15) 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 geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.17.

Small area of about 43 ha (7%) is highly suitable (Class S1) for growing lime and occur in the southern part of the microwatershed. About 217 ha (33%) is moderately suitable (Class S2) for growing lime with minor limitations of gravelliness, rooting depth, wetness and calcareousness and occur in the southern and central part of the microwatershed. Marginally suitable (Class S3) lands cover a major area of about 251 ha (38%) and occur in the northern and southern part of the microwatershed. They have moderate limitations of rooting depth, texture and gravelliness and an area of about 55 ha (8%) is currently not suitable (Class N1) for growing lime with severe limitations of rooting depth and gravelliness and occur in the southern and northern part of the microwatershed

LAND SUITABILITY FOR LIME
Chilkamuki Micro-watershed
(4D4A1R1e : Area - 658.67 ha)
Irakallagada Hobli
KOPPAL TALUK & DISTRICT

Suitability subclass	Area in ha (%)
S1	43 (6.57)
S2g	1 (0.17)
S2r	22 (3.38)
S2w	69 (10.55)
S2rg	101 (15.31)
S2rz	24 (3.63)
S3g	78 (11.9)
S3r	30 (4.49)
S3t	35 (5.36)
S3rg	108 (16.35)
N1r	41 (6.23)
N1rg	14 (2.06)
Mining/Industrial	7 (1.03)
Rock outcrops	69 (10.49)
Others*	16 (2.48)

* - Habitaion & Waterbody
Source: ICAR-NBSS&LUP, Bengaluru (2018)

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

References
Streams/Drainage
Road/Cart track
Habitation
Waterbody
88   Land parcel with No's
Village boundary
Micro-watershed boundary

Fig. 7.20 Land Suitability map of Lime

7.21 Land Suitability for Cashew (*Anacardium occidentale)*

Cashew is one of the most important nut crop grown in an area of 7052 ha in almost all the districts of the State. The crop requirements (Table 7.22) for growing cashew were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing cashew was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.21.

Small area of about 40 ha (6%) is highly suitable (Class S1) for growing cashew and occur in the southern part of the microwatershed. About 140 ha (21%) is moderately suitable (Class S2) for growing cashew with minor limitations of gravelliness and rooting depth and occur in the northern part of the microwatershed. Marginally suitable (Class S3) lands cover a major area of about 200 ha (30%) and occur in the northern and southern part of the microwatershed. They have moderate limitations of rooting depth and gravelliness and an area of about 186 ha (28%) is currently not suitable (Class N1) for growing cashew with severe limitations of rooting depth, texture, calcareousness, wetness and gravelliness and occur in the southern and northern part of the microwatershed
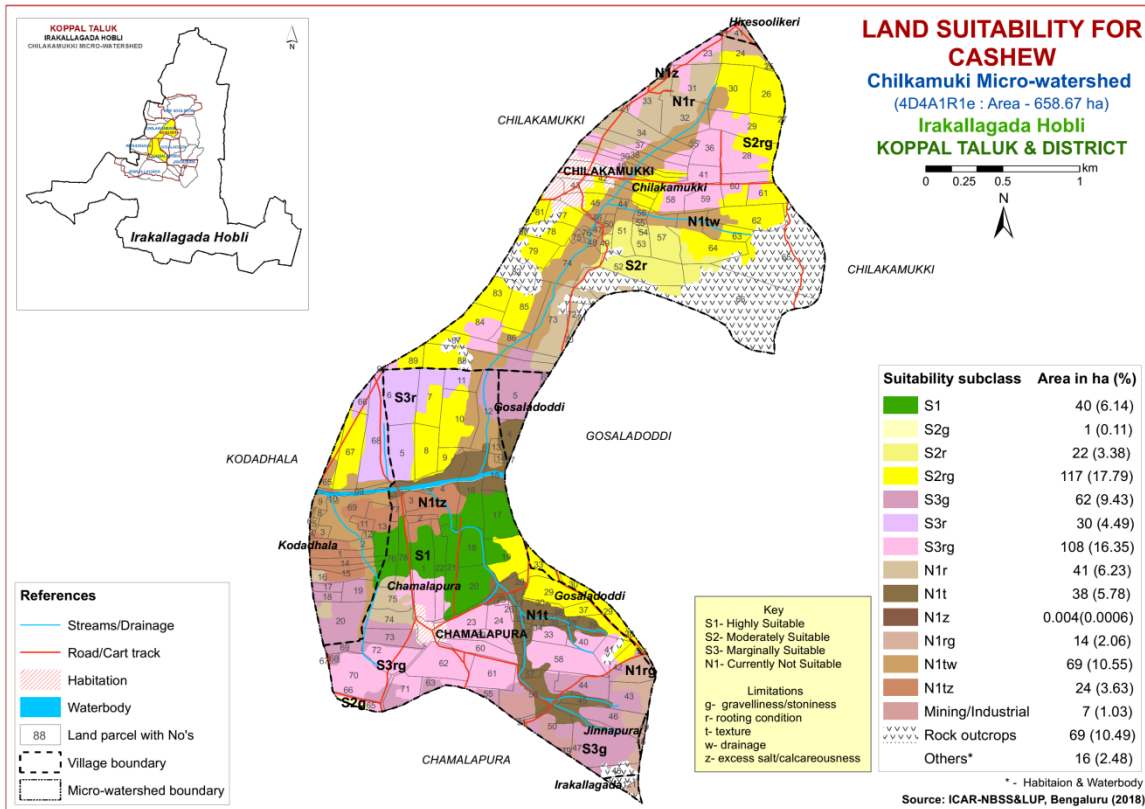
Fig. 7.21 Land Suitability map of Cashew

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

Custard apple is one of the most important fruit crop grown in 1426 ha in almost all the districts of the State. The crop requirements (Table 7.23) for growing custard apple were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing custard apple was generated .The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.22.

An area of about 67 ha (10%) area is highly suitable (Class S1) for growing custard apple and occur in the northern part of the microwatershed. Major area of about 409 ha (62%) is moderately suitable (Class S2) for growing custard apple with minor limitations of rooting depth, gravelliness, wetness and calcareousness and occur in all parts of the microwatershed and an area of 90 ha (14%) is marginally suitable (Class S3) for custard apple with moderate limitations of calcareousness, texture and gravelliness and occur in the southern and northern part of the microwatershed.
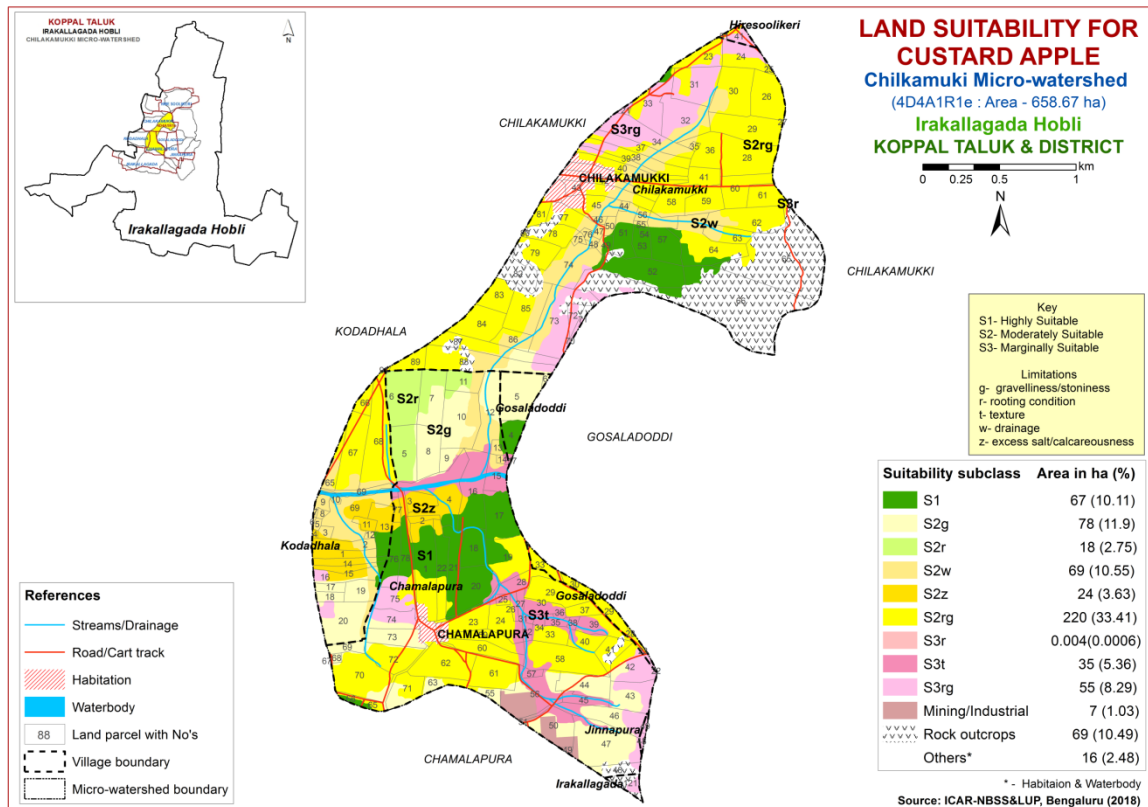
Fig. 7.22 Land Suitability map of Custard Apple

7.23 Land Suitability for Amla (*Phyllanthus emblica*)

Amla is one of the most important fruit and medicinal crop grown in an area of 151 ha and distributed in almost all the districts of the state. The crop requirements for (Table 7.24) growing amla were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing amla was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.23.

An area of 64 ha (10%) is highly suitable for growing amla and occur in northern part. Major area of about 412 ha (63%) is moderately suitable (Class S2) for growing amla with minor limitations of texture, calcareousness, gravelliness, wetness and rooting depth and occur in all parts of the microwatershed and an area of 90 ha (14%) is marginally suitable (Class S3) for amla with moderate limitations of rooting depth, gravelliness and texture and occur in the southern and northern part of the microwatershed.

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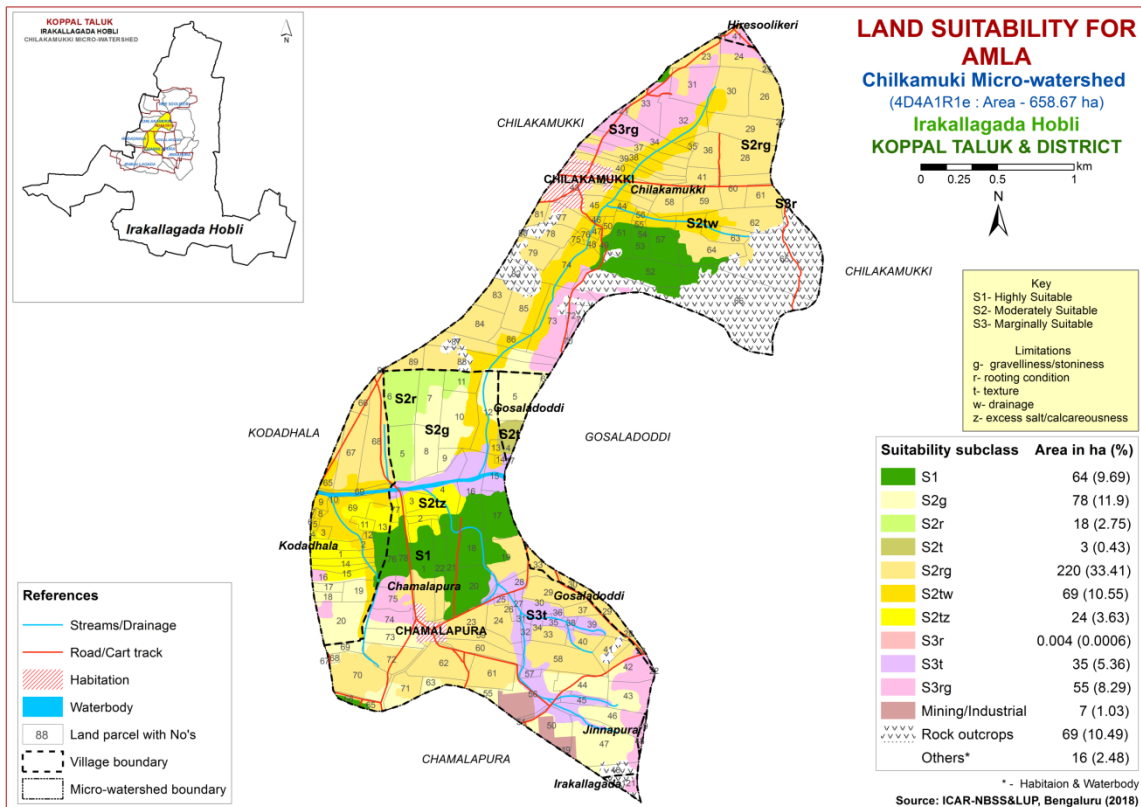
Fig. 7.23 Land Suitability map of Amla

7.24 Land Suitability for Tamarind (*Tamarindus indica*)

Tamarind is one of the most important spice crop grown in 14897 ha in all the districts of the state. The crop requirements (Table 7.25) for growing tamarind were matched with the soil-site characteristics (Table 7.1) 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 Figure 7.24.

Major area of about 113 ha (17%) is moderately suitable (Class S2) for growing tamarind with minor limitations of rooting depth, gravelliness and texture and occur in the northern, central and southern part of the microwatershed. Marginally suitable (Class S3) lands cover a small area of 261 ha (40%) and occur in all parts of the microwatershed. They have moderate limitations of rooting depth, gravelliness and calcareousness and an area of about 192 ha (29%) is currently not suitable (Class N1) for growing tamarind and are distributed in the northern and southern part of the microwatershed. They have severe limitations of rooting depth and gravelliness.
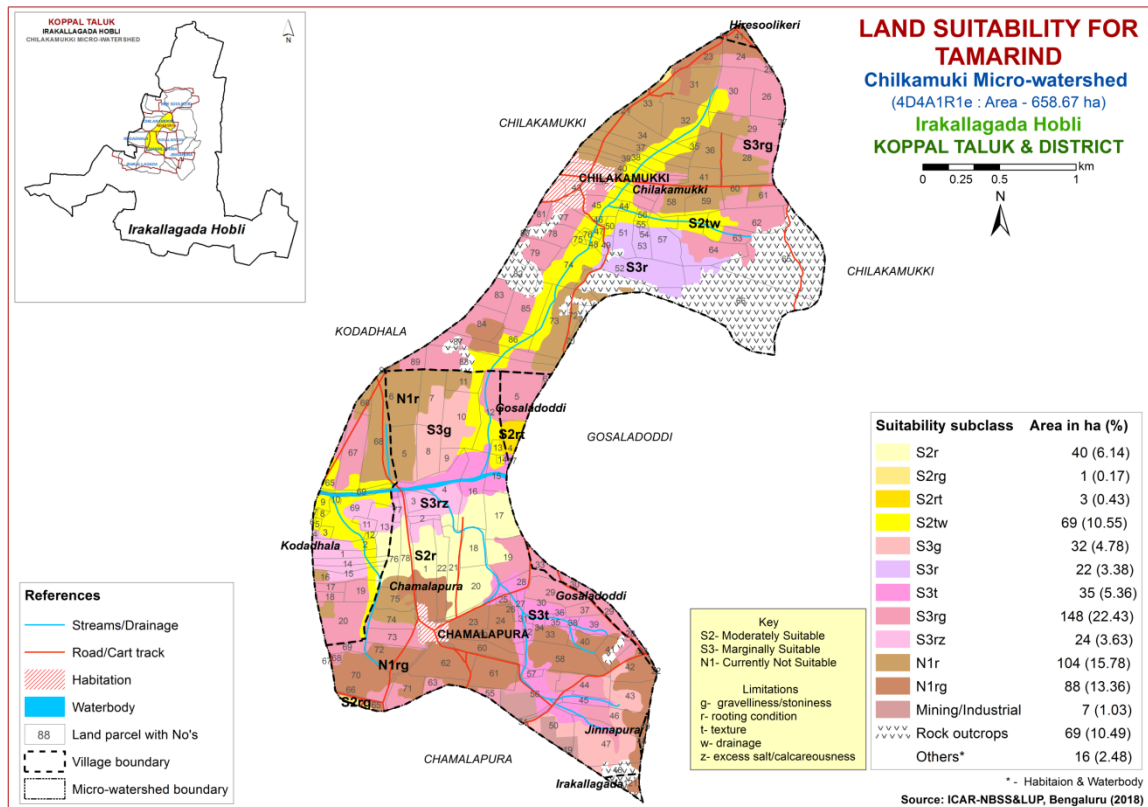
Fig. 7.24 Land Suitability map of Tamarind

7.25 Land Suitability for Marigold (*Tagetes erecta*)

Marigold is one of the most important flower crop grown in an area of 9108 ha in almost all the districts of the state. The crop requirements (Table 7.26) 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 is given in Figure 7.25.

Small area of about 27 ha (4%) is highly suitable (Class S1) for growing marigold and occur in the southern part. An area of about 196 ha (30%) is moderately suitable (Class S2) for growing marigold with minor limitations of rooting depth, gravelliness, texture, wetness and calcareousness and occur in the northern and central part of the microwatershed and major area of 344 ha (52%) is marginally suitable (Class S3) for marigold with moderate limitations of texture, gravelliness and rooting depth and occur in all parts of the microwatershed.
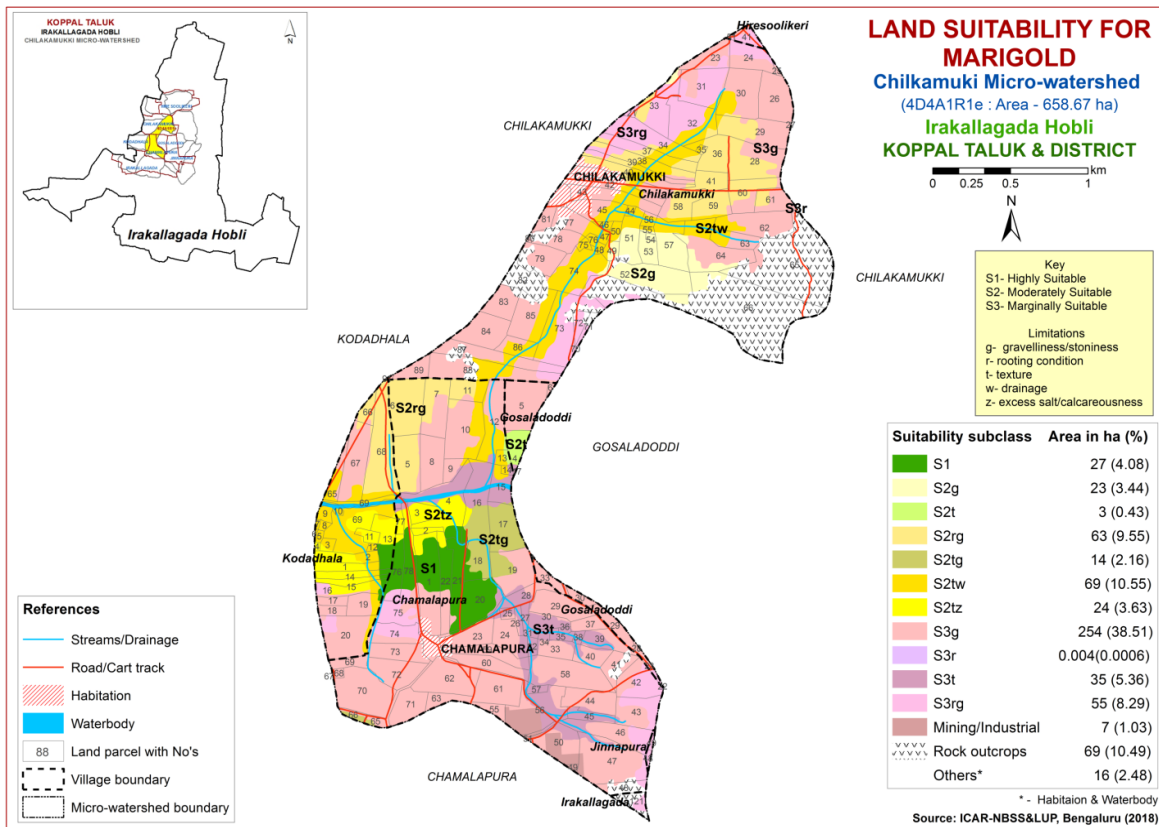
Fig. 7.25 Land Suitability map of Marigold

7.26 Land Suitability for Chrysanthemum (*Chrysanthemum indicum*)

Chrysanthemum is one of the most important flower crop grown in an area of 4978 ha in almost all the districts of the State. The crop requirements (Table 7.27) for growing chrysanthemum were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing chrysanthemum was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed is given in Figure 7.26.

Small area of about 27 ha (4%) is highly suitable (Class S1) for growing chrysanthemum and occur in the southern part. An area of about 196 ha (30%) is moderately suitable (Class S2) for growing chrysanthemum with minor limitations of rooting depth, gravelliness, texture, wetness and calcareousness and occur in the northern and central part of the microwatershed and major area of 344 ha (52%) is marginally suitable (Class S3) for chrysanthemum with moderate limitations of texture, gravelliness and rooting depth and occur in all parts of the microwatershed.
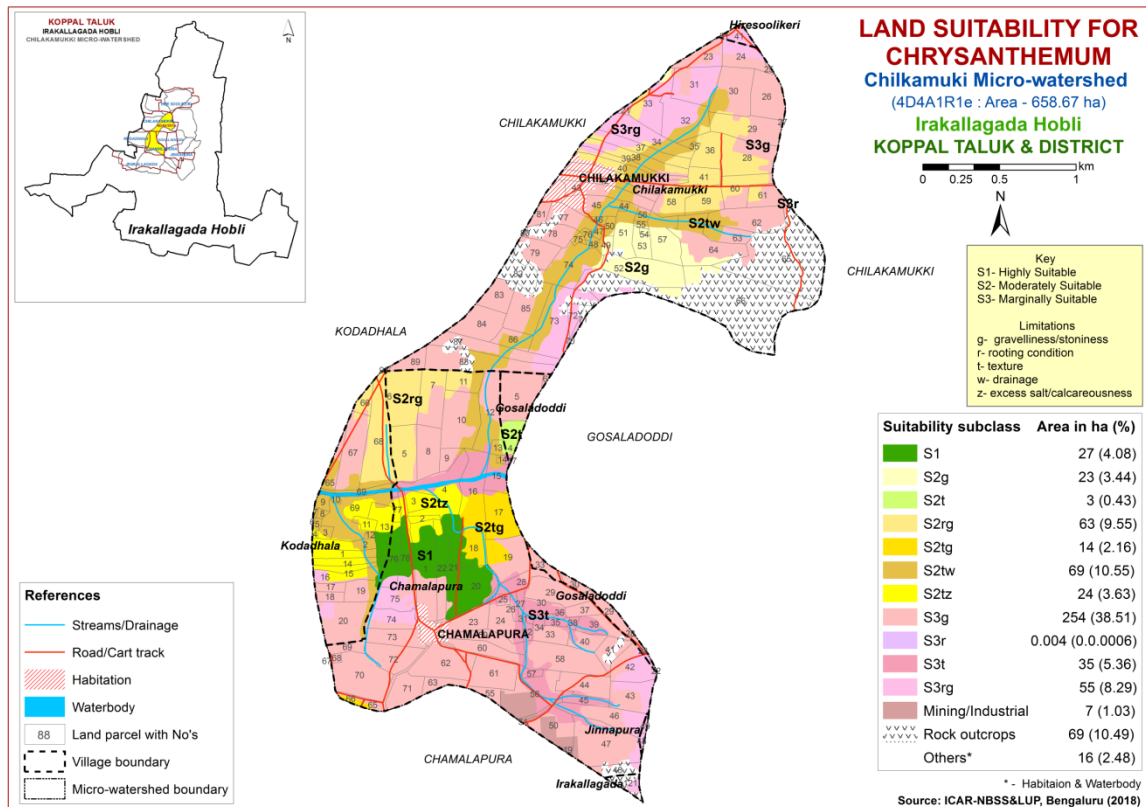
Fig. 7.26 Land Suitability map of Chrysanthemum

7. 27 Land Suitability for Jasmine *(Jasminum sp.)*

Jasmine is one of the most important flower crop grown in an area of 803 ha in almost all the districts of the State. The crop requirements (Table 7.28) for growing jasmine were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing jasmine was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.27.

Small area of about 27 ha (4%) is highly suitable (Class S1) for growing jasmine and occur in the southern part. An area of about 100 ha (15%) is moderately suitable (Class S2) for growing jasmine with minor limitations of rooting depth, gravelliness and texture and occur in the northern and central part of the microwatershed and major area of 440 ha (67%) is marginally suitable (Class S3) for jasmine with moderate limitations of texture, gravelliness, wetness, calcareousness and rooting depth and occur in all parts of the microwatershed.
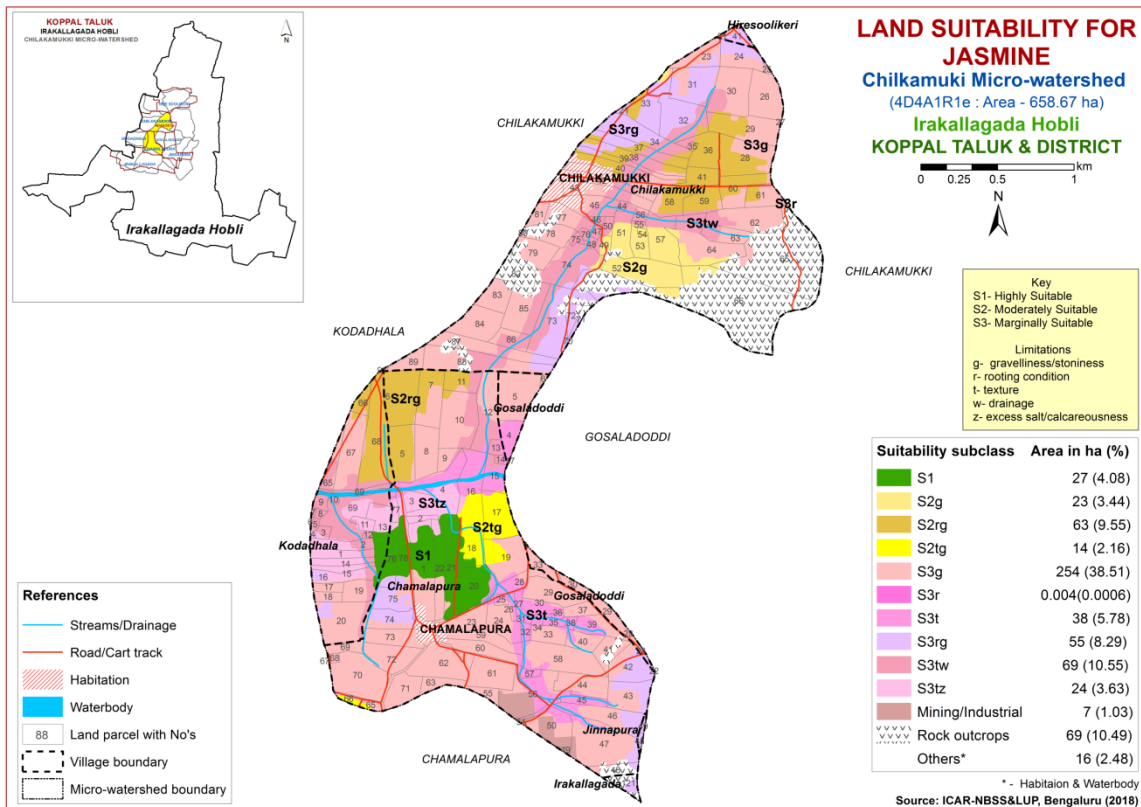
Fig. 7.27 Land Suitability map of Jasmine

7. 28 Land Suitability for Crossandra *(Crossandra infundibuliformis.)*

Crossandra is one of the most important flower crop grown in an all the districts of the state. The crop requirements (Table 7.29) for growing crossandra were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing crossandra was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.27.

Small area of about 27 ha (4%) is highly suitable (Class S1) for growing crossandra and occur in the southern part. An area of about 127 ha (19%) is moderately suitable (Class S2) for growing crossandra with minor limitations of rooting depth, gravelliness and texture and occur in the northern and central part of the microwatershed and major area of 413 ha (63%) is marginally suitable (Class S3) for crossandra with moderate limitations of texture, gravelliness, wetness and rooting depth and occur in all parts of the microwatershed
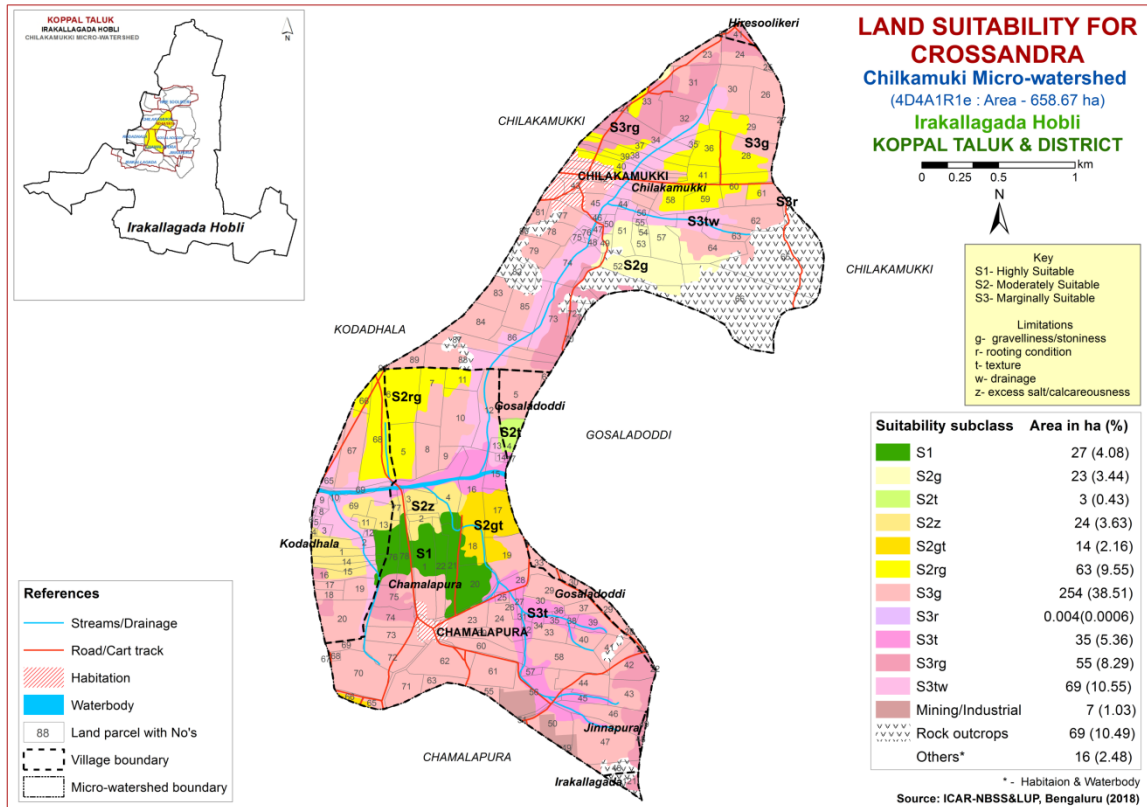
Fig. 7.28 Land Suitability map of Crossandra

Table 7.1 Soil-Site Characteristics of Chilkamuki Microwatershed

Soil Map Units	Climate (P) (mm)	Growing period (Days)	Drainage Class	Soil depth (cm)	Soil texture Surface	Soil texture Sub-surface	Gravelliness Surface	Gravelliness Sub-surface	AWC (mm/m)	Slope (%)	Erosion	pH	EC	ESP	CEC [Cmol (p+)kg-1]	BS (%)
HRVcB2g1	662	<90	WD	25-50	sl	scl	15-35	>35	<50	1-3	moderate	6.05	0.21	0.73	11.24	100.0
CSRcB2g1	662	<90	WD	25-50	sl	scl	15-35	<15	<50	1-3	slight	-	-	-	-	-
ABRhB2	662	<90	WD	25-50	scl	sc	-	>35	<50	1-3	moderate	6.13	0.02	0.36	3.60	58.76
ABRmB2	662	<90	WD	25-50	c	sc	-	>35	<50	1-3	moderate	6.13	0.02	0.36	3.60	58.76
ABRbB2g2	662	<90	WD	25-50	ls	sc	35-60	>35	<50	1-3	moderate	6.13	0.02	0.36	3.60	58.76
ABRiB2g2	662	<90	WD	25-50	sc	sc	35-60	>35	<50	1-3	moderate	6.13	0.02	0.36	3.60	58.76
LKRcB2g1	662	<90	WD	50-75	sl	sc	15-35	>35	<50	1-3	moderate	8.18	0.30	4.51	12.19	100
LKRiB1g1	662	<90	WD	50-75	sc	sc	15-35	>35	<50	1-3	slight	8.18	0.30	4.51	12.19	100
MKHcB2	662	<90	WD	50-75	sl	scl	-	>35	<50	1-3	moderate	7.38	0.09	1.49	14.89	93
MKHcB2g1	662	<90	WD	50-75	sl	scl	15-35	>35	<50	1-3	moderate	7.38	0.09	1.49	14.89	93
HTIcB2g1	662	<90	WD	50-75	sl	sc	15-35	15-35	51-100	1-3	moderate	7.11	0.109	0.30	20.19	100
HTIhB1g1	662	<90	WD	50-75	scl	sc	15-35	15-35	51-100	1-3	slight	7.11	0.109	0.30	20.19	100
HDHbB2g1	662	<90	WD	75-100	ls	Sc-c	15-35	>35	51-100	1-3	moderate	6.54	0.07	7.11	3.84	84.7
HDHcB2	662	<90	WD	75-100	sl	Sc-c	-	>35	51-100	1-3	moderate	6.54	0.07	7.11	3.84	84.7
HDHcB2g1	662	<90	WD	75-100	sl	Sc-c	15-35	>35	51-100	1-3	moderate	6.54	0.07	7.11	3.84	84.7
HDHcB2g2	662	<90	WD	75-100	sl	Sc-c	35-60	>35	51-100	1-3	moderate	6.54	0.07	7.11	3.84	84.7
HDHcC2g2	662	<90	WD	75-100	sl	Sc-c	35-60	>35	51-100	3-5	moderate	6.54	0.07	7.11	3.84	84.7
HDHhB2	662	<90	WD	75-100	scl	Sc-c	-	>35	51-100	1-3	moderate	6.54	0.07	7.11	3.84	84.7
HDHhB2g1	662	<90	WD	75-100	scl	Sc-c	15-35	>35	51-100	1-3	moderate	6.54	0.07	7.11	3.84	84.7
GHTbB2g1	662	<90	WD	75-100	ls	scl	15-35	15-35	51-100	1-3	moderate	5.70	0.06	4.10	3.17	73.00
BDGhB2	662	<90	WD	75-100	scl	c	-	>35	51-100	1-3	moderate	6.24	0.06	0.35	3.76	52.56

Soil Map Units	Climate (P) (mm)	Growing period (Days)	Drainage Class	Soil depth (cm)	Soil texture		Gravelliness		AWC (mm/m)	Slope (%)	Erosion	pH	EC	ESP	CEC [Cmol (p+)kg-1]	BS (%)
					Surf-ace	Sub-surface	Sur-face	Sub-surface								
MNLiB1g1	662	<90	WD	100-150	sc	sc	15-35	15-35	101-150	1-3	slight	7.89	0.13	5.04	9.01	100
BPRbB2g1	662	<90	WD	100-150	ls	Sc-c	15-35	>35	51-100	1-3	moderate	6.64	0.03	0.51	5.45	63.48
BPRhB1	662	<90	WD	100-150	scl	Sc-c	-	>35	51-100	1-3	slight	6.64	0.03	0.51	5.45	63.48
VDHbB2g1	662	<90	MWD	100-150	ls	Sc-c	15-35	-	151-200	1-3	moderate	-	-	-	-	-
VDHhB2	662	<90	MWD	100-150	scl	Sc-c	-	-	151-200	1-3	moderate	-	-	-	-	-
VDHhB2g1	662	<90	MWD	100-150	scl	Sc-c	15-35	-	151-200	1-3	moderate	-	-	-	-	-
NGPcB2g1	662	<90	WD	100-150	sc	sc	15-35	>35	51-100	1-3	moderate	6.77	0.09	1.40	7.10	82.70
NGPhB1g1	662	<90	WD	100-150	Scl	sc	15-35	>35	51-100	1-3	slight	6.77	0.09	1.40	7.10	82.70
DRLiB2	662	<90	MWD	75-100	sc	c	-	<15	151-200	1-3	moderate	8.78	0.42	5.62	49.70	100.0
HDLmB1	662	<90	MWD	100-150	c	c	-	-	>200	1-3	slight	9.06	0.37	12.72	62.33	-
TDGmA1	662	<90	WD	>150	c	scl	-	-	>200	0-1	slight	7.02	0.05	1.44	5.77	100
TDGmB2	662	<90	WD	>150	c	scl	-	-	>200	1-3	moderate	7.02	0.05	1.44	5.77	100
TSDiA1	662	<90	MWD	>150	sc	c	-	-	>200	0-1	slight	8.46	0.17	0.19	36.61	100
TSDmA1	662	<90	MWD	>150	c	c	-	-	>200	0-1	slight	8.46	0.17	0.19	36.61	100

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

Table 7.2 Land suitability criteria for Sorghum

Land use requirement			Rating			
Soil –site characteristics		Unit	**Highly suitable (S1)**	**Moderately suitable (S2)**	**Marginally suitable (S3)**	**Not suitable (N1)**
Climatic regime	Mean temperature in growing season	°C	26–30	30–34; 24–26	34–40; 20–24	>40; <20
	Mean max. temp. in growing season	°C				
	Mean min. tempt. in growing season	°C				
	Mean RH in growing season	%				
	Total rainfall	mm				
	Rainfall in growing season	mm				
Land quality	Soil-site characteristics					
Moisture availability	Length of growing period for short duration	Days				
	Length of growing period for long duration					
	AWC	mm/m				
Oxygen availability to roots	Soil drainage	Class	Well drained	Moderately well drained	Poorly drained	V.poorly drained
	Water logging in growing season	Days				
Nutrient availability	Texture	Class	sc, c (red), c (black)	scl, cl	ls, sl	-
	pH	1:2.5	5.5-7.8	5.0-5.5 7.8-9.0	>9.0	-
	CEC	C mol (p+)/Kg				
	BS	%				
	CaCO3 in root zone	%		<5	5-10	10-15
	OC	%				
Rooting conditions	Effective soil depth	cm	>75	50-75	25-50	<25
	Stoniness	%				
	Coarse fragments	Vol %	<15	15-35	35-60	60-80
Soil toxicity	Salinity (EC saturation extract)	dS/m	<2	2-4	4-8	>8
	Sodicity (ESP)	%	5-10	10-15	>15	
Erosion hazard	Slope	%	0-3	3-5	5-10	>10

Table 7.3 Land suitability criteria for Maize

Land use requirement			Rating			
Soil –site characteristics		**Unit**	**Highly suitable (S1)**	**Moderately suitable (S2)**	**Marginally suitable (S3)**	**Not suitable (N1)**
Climatic regime	Mean temperature in growing season	°C	30-34	35-38 26-30	38-40 26-20	
	Mean max. temp. in growing season	°C				
	Mean min. tempt. in growing season	°C				
	Mean RH in growing season	%				
	Total rainfall	mm				
	Rainfall in growing season	mm				
Land quality	Soil-site characteristic					
Moisture availability	Length of growing period for short duration	Days				
	Length of growing period for long duration					
	AWC	mm/m				
Oxygen availability to roots	Soil drainage	Class	Well drained	Moderately well drained	Poorly drained	Very poorly drained
	Water logging in growing season	Days				
Nutrient availability	Texture	Class	scl, cl, sc	c (red), c (black)	ls, sl	-
	pH	1:2.5	5.5-7.8	5.0-5.5 7.8-9.0	>9.0	-
	CEC	C mol (p+)/Kg				
	BS	%				
	CaCO3 in root zone	%		<5	5-10	>10
	OC	%				
Rooting conditions	Effective soil depth	cm	>75	50-75	25-50	<25
	Stoniness	%				
	Coarse fragments	Vol %	<15	15-35	35-60	60-80
Soil toxicity	Salinity (EC saturation extract)	ds/m	<2	2-4	4-8	>8
	Sodicity (ESP)	%	5-10	10-15	>15	-
Erosion hazard	Slope	%	0-3	3-5	5-10	>10

Table 7.4 Land suitability criteria for Bajra

Land use requirement			Rating			
Soil –site characteristics		**Unit**	**Highly suitable (S1)**	**Moderately suitable (S2)**	**Marginally suitable (S3)**	**Not suitable (N1)**
Climatic regime	Mean temperature in growing season	°C	28-32	33-38 24-27	39-40 20-23	<20
	Mean max. temp. in growing season	°C				
	Mean min. tempt. in growing season	°C				
	Mean RH in growing season	%				
	Total rainfall	mm	500-750	400-500	200-400	<200
	Rainfall in growing season	mm				
Land quality	Soil-site characteristic					
Moisture availability	Length of growing period for short duration	Days				
	Length of growing period for long duration					
	AWC	mm/m				
Oxygen availability to roots	Soil drainage	Class	Well drained	Moderately well drained	Poorly drained	Very poorly drained
	Water logging in growing season	Days				
Nutrient availability	Texture	Class	Sl, scl, cl,sc,c (red)	C (black)	ls	-
	pH	1:2.5	6.0-7.8	5.0-5.5 7.8-9.0	5.5-6.0 >9.0	
	CEC	C mol (p+)/ Kg				
	BS	%				
	CaCO3 in root zone	%		<5	5-10	>10
	OC	%				
Rooting conditions	Effective soil depth	cm	>75	50-75	25-50	<25
	Stoniness	%				
	Coarse fragments	Vol %	15-35	35-60	>60	
Soil toxicity	Salinity (EC saturation extract)	dS/m	<2	2-4	4-8	>8
	Sodicity (ESP)	%	5-10	10-15	>15	
Erosion hazard	Slope	%	1-3	3-5	5-10	>10

Table 7.5 Land suitability criteria for Groundnut

Land use requirement			Rating			
Soil –site characteristics		**Unit**	**Highly suitable (S1)**	**Moderately suitable (S2)**	**Marginally suitable (S3)**	**Not suitable (N1)**
Climatic regime	Mean temperature in growing season	°C	24–33	22–24; 33–35	20–22; 35–40	<20; >40
	Mean max. temp. in growing season	°C				
	Mean min. tempt. in growing season	°C				
	Mean RH in growing season	%				
	Total rainfall	mm				
	Rainfall in growing season	mm				
Land quality	Soil-site characteristic					
Moisture availability	Length of growing period for short duration	Days				
	Length of growing period for long duration					
	AWC	mm/m				
Oxygen availability to roots	Soil drainage	Class	Well drained	Mod. Well drained	Poorly drained	Very Poorly drained
	Water logging in growing season	Days				
Nutrient availability	Texture	Class	scl	sl,cl, sc	c (red), c (black), ls	-
	pH	1:2.5	6.0-7.8	5.5-6.0 7.8-8.4	5.0-5.5 8.4-9.0	>9.0
	CEC	C mol (p+)/ Kg				
	BS	%				
	CaCO3 in root zone	%		<5	5-10	>10
	OC	%				
Rooting conditions	Effective soil depth	cm	>75	50-75	25-50	<25
	Stoniness	%				
	Coarse fragments	Vol %	<35	35-60	>60	
Soil toxicity	Salinity (EC saturation extract)	dS/m	<2	2-4	4-8	>8
	Sodicity (ESP)	%	<5	5-10	10-15	>15
Erosion hazard	Slope	%	<3	3-5	5-10	>10

Table 7.6 Land suitability criteria for Sunflower

Land use requirement			Rating			
Soil –site characteristics		Unit	Highly suitable (S1)	Moderately suitable (S2)	Marginally suitable (S3)	Not suitable (N1)
Climatic regime	Mean temperature in growing season	°C	24–30	30–34; 20–24	34–38; 16–20	>38; <16
	Mean max. temp. in growing season	°C				
	Mean min. tempt. in growing season	°C				
	Mean RH in growing season	%				
	Total rainfall	mm				
	Rainfall in growing season	mm				
Land quality	Soil-site characteristic					
Moisture availability	Length of growing period for short duration	Days				
	Length of growing period for long duration					
	AWC	mm/m				
Oxygen availability to roots	Soil drainage	Class	Well drained	mod. Well drained	-	Poorly to very drained
	Water logging in growing season	Days				
Nutrient availability	Texture	Class	cl, sc,c (red), c (black)	scl	ls, sl	-
	pH	1:2.5	6.5-7.8	7.8-8.4 5.5-6.5	8.4-9.0; 5.0-5.5	>9.0
	CEC	C mol (p+)/Kg				
	BS	%				
	CaCO3 in root zone	%		<5	5-10	>10
	OC	%				
Rooting conditions	Effective soil depth	cm	>100	75-100	50-75	<50
	Stoniness	%				
	Coarse fragments	Vol %	<15	15-35	35-60	60-80
Soil toxicity	Salinity (EC saturation extract)	dS/m	<2	2-4	4-8	>8
	Sodicity (ESP)	%	<5	5-10	10-15	>15
Erosion hazard	Slope	%	<3	3-5	5-10	>10

Table 7.7 Land suitability criteria for Cotton

Land use requirement			Rating			
Soil –site characteristics		**Unit**	**Highly suitable (S1)**	**Moderately suitable (S2)**	**Marginally suitable (S3)**	**Not suitable (N1)**
Climatic regime	Mean temperature in growing season	°C	22-32	>32	<19	-
	Mean max. temp. in growing season	°C				
	Mean min. tempt. in growing season	°C				
	Mean RH in growing season	%				
	Total rainfall	mm				
	Rainfall in growing season	mm				
Land quality	Soil-site characteristic					
Moisture availability	Length of growing period for short duration	Days				
	Length of growing period for long duration					
	AWC	mm/m				
Oxygen availability to roots	Soil drainage	Class	Well to moderately well	Poorly drained/Some what excessively drained	-	very poorly/ex cessively drained
	Water logging in growing season	Days				
Nutrient availability	Texture	Class	sc, c (red,black)	cl	scl	ls, sl
	pH	1:2.5	6.5-7.8	7.8-8.4	5.5-6.5 8.4->9.0	<5.5
	CEC	C mol (p+)Kg				
	BS	%				
	CaCO3 in root zone	%		<5	5-10	>10
	OC	%				
Rooting conditions	Effective soil depth	cm	>100	50-100	25-50	<25
	Stoniness	%				
	Coarse fragments	Vol %	<15	15-35	35-60	60-80
Soil toxicity	Salinity (EC saturation extract)	dS/m	<2	2-4	4-8	>8
	Sodicity (ESP)	%	5-10	10-15	>15	
Erosion hazard	Slope	%	<3	3-5	-	>5

Table 7.8 Land suitability criteria for Red gram

Land use requirement			Rating			
Soil –site characteristics		**Unit**	**Highly suitable (S1)**	**Moderately suitable (S2)**	**Marginally suitable (S3)**	**Not suitable (N1)**
Climatic regime	Mean temperature in growing season	°C	30-35(G) 20-25(AV) 15-18 (F&PS) 35-40(M)	25-30(G) 20-25 (AV) 12-15 (F&PS) 30-35(M)	20-25(G) 15-20(AV) 10-12 (F&PS) 25-30(M)	< 20 <15 <10 <25
	Mean max. temp. in growing season	°C				
	Mean min. tempt. in growing season	°C				
	Mean RH in growing season	%				
	Total rainfall	mm				
	Rainfall in growing season	mm				
Land quality	Soil-site characteristic					
Moisture availability	Length of growing period for short duration	Days				
	Length of growing period for long duration					
	AWC	mm/m				
Oxygen availability to roots	Soil drainage	Class	Well drained	Mod. Well drained	Poorly drained	Very Poorly drained
	Water logging in growing season	Days				
Nutrient availability	Texture	Class	sc, c (red)	c (black),sl, scl, cl	ls	-
	pH	1:2.5	6.0-7.8	5.5-6.0 7.8-9.0	5.0-5.5 >9.0	-
	CEC	C mol (p+)/ Kg				
	BS	%				
	CaCO3 in root zone	%		<5	5-10	>10
	OC	%				
Rooting conditions	Effective soil depth	cm	>100	75-100	50-75	<50
	Stoniness	%				
	Coarse fragments	Vol %	<15	15-35	35-50	60-80
Soil toxicity	Salinity (EC saturation extract)	dS/m	<1.0	1.0-2.0	>2.0	
	Sodicity (ESP)	%	5-10	10-15	>15	
Erosion hazard	Slope	%	<3	3-5	5-10	>10

Table 7.9 Land suitability criteria for Bengal gram

Land use requirement			Rating			
Soil –site characteristics		Unit	Highly suitable (S1)	Moderately suitable (S2)	Marginally suitable (S3)	Not suitable (N1)
Climatic regime	Mean temperature in growing season	°C	20–25	25–30; 15–20	30–35; 10–15	>35; <10
	Mean max. temp. in growing season	°C				
	Mean min. tempt. in growing season	°C				
	Mean RH in growing season	%				
	Total rainfall	mm				
	Rainfall in growing season	mm				
Land quality	Soil-site characteristic					
Moisture availability	Length of growing period for short duration	Days				
	Length of growing period for long duration					
	AWC	mm/m				
Oxygen availability to roots	Soil drainage	Class	Well drained	Mod. Well drained	Poorly drained	Very Poorly drained
	Water logging in growing season	Days				
Nutrient availability	Texture	Class	C (black)	-	c (red), scl, cl, sc	ls, sl
	pH	1:2.5	6.0-7.8	5.0-6.0 7.8-9.0	>9.0	-
	CEC	C mol (p+)/Kg				
	BS	%				
	CaCO3 in root zone	%		<5	5-10	>10
	OC	%				
Rooting conditions	Effective soil depth	cm	>75	50-75	25-50	<25
	Stoniness	%				
	Coarse fragments	Vol %	<15	15-35	35-60	60-80
Soil toxicity	Salinity (EC saturation extract)	dS/m	<2	2-4	4-8	>8
	Sodicity (ESP)	%	5-10	10-15	>15	-
Erosion hazard	Slope	%	<3	3-5	5-10	>10

Table 7.10 Land suitability criteria for Chilli

Land use requirement			Rating			
Soil –site characteristics		**Unit**	**Highly suitable (S1)**	**Moderately suitable (S2)**	**Marginally suitable (S3)**	**Not suitable (N1)**
Climatic regime	Mean temperature in growing season	°C	25-32	33-35 20-25	35-38 <20	>38
	Mean max. temp. in growing season	°C				
	Mean min. tempt. in growing season	°C				
	Mean RH in growing season	%				
	Total rainfall	mm				
	Rainfall in growing season	mm				
Land quality	Soil-site characteristic					
Moisture availability	Length of growing period for short duration	Days				
	Length of growing period for long duration					
	AWC	mm/m				
Oxygen availability to roots	Soil drainage	Class	Well drained	Moderately well drained	Poorly drained	Very poorly drained
	Water logging in growing season	Days				
Nutrient availability	Texture	Class	scl, cl, sc	c (black), sl	ls	-
	pH	1:2.5	6.0-7.3	5.0-6.0 7.3-8.4	8.4-9.0	>9.0
	CEC	C mol (p+)/ Kg				
	BS	%				
	CaCO3 in root zone	%		<5	5-10	>10
	OC	%				
Rooting conditions	Effective soil depth	cm	>75	50-75	25-50	<25
	Stoniness	%				
	Coarse fragments	Vol %	<15	15-35	35-60	60-80
Soil toxicity	Salinity (EC saturation extract)	dS/m	<2	2-4	4-8	>8
	Sodicity (ESP)	%	<5	5-10	10-15	>15
Erosion hazard	Slope	%	<3	3-5	5-10	>10

Table 7.11 Land suitability criteria for Tomato

Land use requirement			Rating			
Soil –site characteristics		**Unit**	**Highly suitable (S1)**	**Moderately suitable (S2)**	**Marginally suitable (S3)**	**Not suitable (N1)**
Climatic regime	Mean temperature in growing season	°C	25-28	29-32 20-24	15-19 33-36	<15 >36
	Mean max. temp. in growing season	°C				
	Mean min. tempt. in growing season	°C				
	Mean RH in growing season	%				
	Total rainfall	mm				
	Rainfall in growing season	mm				
Land quality	Soil-site characteristic					
Moisture availability	Length of growing period for short duration	Days				
	Length of growing period for long duration					
	AWC	mm/m				
Oxygen availability to roots	Soil drainage	Class	Well drained	Moderately well drained	Poorly drained	V.poorly drained
	Water logging in growing season	Days				
Nutrient availability	Texture	Class	sl, scl, cl, sc, c (red)	-	ls, c(black)	-
	pH	1:2.5	6.0-7.3	5.0-6.0 7.3-8.4	8.4-9.0	>9.0
	CEC	C mol (p+)/Kg				
	BS	%				
	CaCO3 in root zone	%		<5	5-10	>10
	OC	%				
Rooting conditions	Effective soil depth	cm	>75	50-75	25-50	<25
	Stoniness	%				
	Coarse fragments	Vol %	<15	15-35	35-60	60-80
Soil toxicity	Salinity (EC saturation extract)	dS/m	<2.0	2-4	4-8	>8.0
	Sodicity (ESP)	%	<5	5-10	10-15	>15
Erosion hazard	Slope	%	<3	3-5	5-10	>10

Table 7.12 Land suitability criteria for Drumstick

Land use requirement			Rating			
Soil –site characteristics		Unit	**Highly suitable (S1)**	**Moderately suitable (S2)**	**Marginally suitable (S3)**	**Not suitable (N1)**
Climatic regime	Mean temperature in growing season	°C				
	Mean max. temp. in growing season	°C				
	Mean min. tempt. in growing season	°C				
	Mean RH in growing season	%				
	Total rainfall	mm				
	Rainfall in growing season	mm				
Land quality	Soil-site characteristic					
Moisture availability	Length of growing period for short duration	Days				
	Length of growing period for long duration					
	AWC	mm/m				
Oxygen availability to roots	Soil drainage	Class	Well drained	Moderately well drained	Poorly drained	V.Poorly drained
	Water logging in growing season	Days				
Nutrient availability	Texture	Class	sc, scl, cl, c (red)	sl, c (black)	ls	s
	pH	1:2.5	6.0-7.3	5.0-5.5 7.3-7.8	5.5-6.0 7.8-8.4	>8.4
	CEC	C mol (p+)/Kg				
	BS	%				
	CaCO3 in root zone	%		<5	5-10	>10
	OC	%				
Rooting conditions	Effective soil depth	cm	>100	75-100	50-75	<50
	Stoniness	%				
	Coarse fragments	Vol %	<35	35-60	60-80	>80
Soil toxicity	Salinity (EC saturation extract)	dS/m				
	Sodicity (ESP)	%	<5	5-10	10-15	>15
Erosion hazard	Slope	%	<3	3-10	-	>10

Table 7.13 Land suitability criteria for Mulberry

Land use requirement			Rating			
Soil –site characteristics		**Unit**	**Highly suitable (S1)**	**Moderately suitable (S2)**	**Marginally suitable (S3)**	**Not suitable (N1)**
Climatic regime	Mean temperature in growing season	°C	24–28	22–24; 28–32	32–38; 22–18	>38; <18
	Mean max. temp. in growing season	°C				
	Mean min. tempt. in growing season	°C				
	Mean RH in growing season	%				
	Total rainfall	mm				
	Rainfall in growing season	mm				
Land quality	Soil-site characteristic					
Moisture availability	Length of growing period for short duration	Days				
	Length of growing period for long duration					
	AWC	mm/m				
Oxygen availability to roots	Soil drainage	Class	Well drained	Moderately well drained	Poorly drained	V. Poorly drained
	Water logging in growing season	Days				
Nutrient availability	Texture	Class	sc, cl, scl	c (red)	c (black), sl, ls	-
	pH	1:2.5	5.5-7.3	5.0-5.5 7.8-8.4	7.3-8.4	>8.4
	CEC	C mol (p+)/Kg				
	BS	%				
	CaCO3 in root zone	%		<5	5-10	>10
	OC	%				
Rooting conditions	Effective soil depth	cm	>100	75-100	50-75	<50
	Stoniness	%				
	Coarse fragments	Vol %	0-35	35-60	60-80	>80
Soil toxicity	Salinity (EC saturation extract)	dS/m	<2	2-4	4-8	>8
	Sodicity (ESP)	%	<5	5-10	10-15	>15
Erosion hazard	Slope	%	0-3	3-5	5-10	>10

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

Table 7.14 Land suitability criteria for Mango

Land use requirement			Rating			
Soil –site characteristics		**Unit**	**Highly suitable (S1)**	**Moderately suitable (S2)**	**Marginally suitable (S3)**	**Not suitable (N1)**
Climatic regime	Mean temperature in growing season	°C	28-32	24-27 33-35	36-40	20-24
	Min temp. before flowering	^{0}C	10-15	15-22	>22	-
	Mean max. temp. in growing season	°C				
	Mean min. tempt. in growing season	°C				
	Mean RH in growing season	%				
	Total rainfall	mm				
	Rainfall in growing season	mm				
Land quality	Soil-site characteristic					
Moisture availability	Length of growing period for short duration	Days				
	Length of growing period for long duration	Days				
	AWC	mm/m				
Oxygen availability to roots	Soil drainage	Class	Well drained	Moderately well drained	Poorly drained	V.Poorly drained
	Water logging in growing season	Days				
Nutrient availability	Texture	Class	scl, cl, sc, c (red)	-	ls, sl, c (black)	-
	pH	1:2.5	5.5-7.3	5.0-5.5 7.3-8.4	8.4-9.0	>9.0
	CEC	C mol (p+)/Kg				
	BS	%				
	CaCO3 in root zone	%		<5	5-10	>10
	OC	%				
Rooting conditions	Effective soil depth	cm	>150	100-150	75-100	<75
	Stoniness	%				
	Coarse fragments	Vol %	<15	15-35	35-60	60-80
Soil toxicity	Salinity (EC saturation extract)	dS/m	<2.0	2-4	4-8	>8.0
	Sodicity (ESP)	%	<5	5-10	10-15	>15
Erosion hazard	Slope	%	<3	3-5	5-10	>10

Table 7.15 Land suitability criteria for Sapota

Land use requirement			Rating			
Soil –site characteristics		**Unit**	**Highly suitable (S1)**	**Moderately suitable (S2)**	**Marginally suitable (S3)**	**Not suitable (N1)**
Climatic regime	Mean temperature in growing season	°C	28-32	33-36 24-27	37-42 20-23	>42 <18
	Mean max. temp. in growing season	°C				
	Mean min. tempt. in growing season	°C				
	Mean RH in growing season	%				
	Total rainfall	mm				
	Rainfall in growing season	mm				
Land quality	Soil-site characteristic					
Moisture availability	Length of growing period for short duration	Days				
	Length of growing period for long duration					
	AWC	mm/m				
Oxygen availability to roots	Soil drainage	Class	Well drained	Moderately well drained	-	Poorly to very drained
	Water logging in growing season	Days				
Nutrient availability	Texture	Class	scl, cl, sc, c (red)	sl	ls, c (black)	-
	pH	1:2.5	6.0-7.3	5.0-6.0 7.3-8.4	8.4-9.0	>9.0
	CEC	C mol (p+)/ Kg				
	BS	%				
	CaCO3 in root zone	%		<5	5-10	>10
	OC	%				
Rooting conditions	Effective soil depth	cm	>100	75-100	50-75	<50
	Stoniness	%				
	Coarse fragments	Vol %	<15	15-35	35-60	60-80
Soil toxicity	Salinity (EC saturation extract)	dS/m	<2.0	2-4	4-8	>8.0
	Sodicity (ESP)	%	<5	5-10	10-15	>15
Erosion hazard	Slope	%	<3	3-5	5-10	>10

Table 7.16 Land suitability criteria for Pomegranate

Land use requirement			Rating			
Soil –site characteristics		Unit	**Highly suitable (S1)**	**Moderately suitable (S2)**	**Marginally suitable (S3)**	**Not suitable (N1)**
Climatic regime	Mean temperature in growing season	°C	30-34	35-38 25-29	39-40 15-24	
	Mean max. temp. in growing season	°C				
	Mean min. tempt. in growing season	°C				
	Mean RH in growing season	%				
	Total rainfall	mm				
	Rainfall in growing season	mm				
Land quality	Soil-site characteristic					
Moisture availability	Length of growing period for short duration	Days				
	Length of growing period for long duration					
	AWC	mm/m				
Oxygen availability to roots	Soil drainage	Class	Well drained	Moderately well drained	Poorly drained	V.Poorly drained
	Water logging in growing season	Days				
Nutrient availability	Texture	Class	scl,cl, sc, c (red)	c (black),sl	ls	-
	pH	1:2.5	5.5-7.8	7.8-8.4	5.0-5.5 8.4-9.0	>9.0
	CEC	C mol (p+)/ Kg				
	BS	%				
	CaCO3 in root zone	%		<5	5-10	>10
	OC	%				
Rooting conditions	Effective soil depth	cm	>100	75-100	50-75	<50
	Stoniness	%				
	Coarse fragments	Vol %	<15	15-35	35-60	60-80
Soil toxicity	Salinity (EC saturation extract)	dS/m	<2.0	2-4	4-8	>8.0
	Sodicity (ESP)	%	<5	5-10	10-15	>15
Erosion hazard	Slope	%	<3	3-5	5-10	>10

Table 7.17 Land suitability criteria for Guava

Land use requirement			Rating			
Soil –site characteristics		**Unit**	**Highly suitable (S1)**	**Moderately suitable (S2)**	**Marginally suitable (S3)**	**Not suitable (N1)**
Climatic regime	Mean temperature in growing season	°C	28-32	33-36 24-27	37-42 20-23	
	Mean max. temp. in growing season	°C				
	Mean min. tempt. in growing season	°C				
	Mean RH in growing season	%				
	Total rainfall	mm				
	Rainfall in growing season	mm				
Land quality	Soil-site characteristic					
Moisture availability	Length of growing period for short duration	Days				
	Length of growing period for long duration					
	AWC	mm/m				
Oxygen availability to roots	Soil drainage	Class	Well drained	Moderately well drained	Poorly drained	V.Poorly drained
	Water logging in growing season	Days				
Nutrient availability	Texture	Class	scl, cl, sc, c (red)	sl	c (black), ls	-
	pH	1:2.5	6.0-7.8	5.0-6.0	7.8-8.4	>8.4
	CEC	C mol (p+)/ Kg				
	BS	%				
	CaCO3 in root zone	%		<5	5-10	>10
	OC	%				
Rooting conditions	Effective soil depth	cm	>100	75-100	50-75	<50
	Stoniness	%				
	Coarse fragments	Vol %	<15	15-35	35-60	60-80
Soil toxicity	Salinity (EC saturation extract)	dS/m	<2.0	2-4	4-8	>8.0
	Sodicity (ESP)	%	<5	5-10	10-15	>15
Erosion hazard	Slope	%	<3	3-5	5-10	>10

Table 7.18 Land suitability criteria for Jackfruit

Land use requirement			Rating			
Soil –site characteristics		**Unit**	**Highly suitable (S1)**	**Moderately suitable (S2)**	**Marginally suitable (S3)**	**Not suitable (N1)**
Climatic regime	Mean temperature in growing season	°C				
	Mean max. temp. in growing season	°C				
	Mean min. tempt. in growing season	°C				
	Mean RH in growing season	%				
	Total rainfall	mm				
	Rainfall in growing season	mm				
Land quality	Soil-site characteristic					
Moisture availability	Length of growing period for short duration	Days				
	Length of growing period for long duration					
	AWC	mm/m				
Oxygen availability to roots	Soil drainage	Class	Well drained	Mod. well	Poorly	V. Poorly
	Water logging in growing season	Days				
Nutrient availability	Texture	Class	scl, cl, sc, c (red)	-	sl, ls, c (black)	-
	pH	1:2.5	5.5-7.3	5.0-5.5 7.3-7.8	7.8-8.4	>8.4
	CEC	C mol (p+)/ Kg				
	BS	%				
	CaCO3 in root zone	%		<5	5-10	>10
	OC	%				
Rooting conditions	Effective soil depth	cm	>100	75-100	50-75	<50
	Stoniness	%				
	Coarse fragments	Vol %	<15	15-35	35-60	>60
Soil toxicity	Salinity (EC saturation extract)	dS/m	<2.0	2-4	4-8	>8.0
	Sodicity (ESP)	%	<5	5-10	10-15	>15
Erosion hazard	Slope	%	0-3	3-5	5-10	>10-

Table 7.19 Land suitability criteria for Jamun

Land use requirement			Rating			
Soil –site characteristics		**Unit**	**Highly suitable (S1)**	**Moderately suitable (S2)**	**Marginally suitable (S3)**	**Not suitable (N1)**
Climatic regime	Mean temperature in growing season	°C				
	Mean max. temp. in growing season	°C				
	Mean min. tempt. in growing season	°C				
	Mean RH in growing season	%				
	Total rainfall	mm				
	Rainfall in growing season	mm				
Land quality	Soil-site characteristic					
Moisture availability	Length of growing period for short duration	Days				
	Length of growing period for long duration					
	AWC	mm/m				
Oxygen availability to roots	Soil drainage	Class	Well	Mod. well	Poorly	V.Poorly
	Water logging in growing season	Days				
Nutrient availability	Texture	Class	scl, cl, sc, c(red)	sl, c (black)	ls	-
	pH	1:2.5	6.0-7.8	5.0-6.0	7.8-8.4	>8.4
	CEC	C mol (p+)/ Kg				
	BS	%				
	CaCO3 in root zone	%		<5	5-10	>10
	OC	%				
Rooting conditions	Effective soil depth	cm	>150	100-150	50-100	<50
	Stoniness	%				
	Coarse fragments	Vol %	<15	15-35	35-60	>60
Soil toxicity	Salinity (EC saturation extract)	dS/m	<2.0	2-4	4-8	>8.0
	Sodicity (ESP)	%	<5	5-10	10-15	>15
Erosion hazard	Slope	%	0-3	3-5	5-10	>10

Table 7.20 Land suitability criteria for Musambi

Land use requirement			Rating			
Soil –site characteristics		**Unit**	**Highly suitable (S1)**	**Moderately suitable (S2)**	**Marginally suitable (S3)**	**Not suitable (N1)**
Climatic regime	Mean temperature in growing season	°C	28-30	31-35 24-27	36-40 20-23	>40 <20
	Mean max. temp. in growing season	°C				
	Mean min. tempt. in growing season	°C				
	Mean RH in growing season	%				
	Total rainfall	mm				
	Rainfall in growing season	mm				
Land quality	Soil-site characteristic					
Moisture availability	Length of growing period for short duration	Days				
	Length of growing period for long duration					
	AWC	mm/m				
Oxygen availability to roots	Soil drainage	Class	Well drained	Moderately drained	poorly	Very poorly
	Water logging in growing season	Days				
Nutrient availability	Texture	Class	scl, cl, sc, c	sl	ls	-
	pH	1:2.5	6.0-7.8	5.5-6.0 7.8-8.4	5.0-5.5 8.4-9.0	>9.0
	CEC	C mol (p+)/ Kg				
	BS	%				
	CaCO3 in root zone	%		<5	5-10	>10
	OC	%				
Rooting conditions	Effective soil depth	cm	>100	75-100	50-75	<50
	Stoniness	%				
	Coarse fragments	Vol %	<15	15-35	35-60	60-80
Soil toxicity	Salinity (EC saturation extract)	dS/m	<2.0	2-4	4-8	>8.0
	Sodicity (ESP)	%	<5	5-10	10-15	>15
Erosion hazard	Slope	%	<3	3-5	5-10	>10

Table 7.21 Land suitability criteria for Lime

Land use requirement			Rating			
Soil –site characteristics		Unit	**Highly suitable (S1)**	**Moderately suitable (S2)**	**Marginally suitable (S3)**	**Not suitable (N1)**
Climatic regime	Mean temperature in growing season	°C	28-30	31-35 24-27	36-40 20-23	>40 <20
	Mean max. temp. in growing season	°C				
	Mean min. tempt. in growing season	°C				
	Mean RH in growing season	%				
	Total rainfall	mm				
	Rainfall in growing season	mm				
Land quality	Soil-site characteristic					
Moisture availability	Length of growing period for short duration	Days				
	Length of growing period for long duration					
	AWC	mm/m				
Oxygen availability to roots	Soil drainage	Class	Well drained	Moderately drained	poorly	Very poorly
	Water logging in growing season	Days				
Nutrient availability	Texture	Class	scl, cl, sc, c	sl	ls	-
	pH	1:2.5	6.0-7.8	5.5-6.0 7.8-8.4	5.0-5.5 8.4-9.0	>9.0
	CEC	C mol (p+)/ Kg				
	BS	%				
	CaCO3 in root zone	%		<5	5-10	>10
	OC	%				
Rooting conditions	Effective soil depth	cm	>100	75-100	50-75	<50
	Stoniness	%				
	Coarse fragments	Vol %	<15	15-35	35-60	60-80
Soil toxicity	Salinity (EC saturation extract)	dS/m	<2.0	2-4	4-8	>8.0
	Sodicity (ESP)	%	<5	5-10	10-15	>15
Erosion hazard	Slope	%	<3	3-5	5-10	>10

Table 7.22 Land suitability criteria for Cashew

Land use requirement			Rating			
Soil –site characteristics		Unit	**Highly suitable (S1)**	**Moderately suitable (S2)**	**Marginally suitable (S3)**	**Not suitable (N1)**
Climatic regime	Mean temperature in growing season	°C	32 to 34	28 to 32; 34 to 38	24 to 28; 38 to 40	<20; >40
	Mean max. temp. in growing season	°C				
	Mean min. tempt. in growing season	°C				
	Mean RH in growing season	%				
	Total rainfall	mm				
	Rainfall in growing season	mm				
Land quality	Soil-site characteristic					
Moisture availability	Length of growing period for short duration	Days				
	Length of growing period for long duration					
	AWC	mm/m				
Oxygen availability to roots	Soil drainage	Class	Well drained	moderately well drained	Poorly drained	Very poorly drained
	Water logging in growing season	Days				
Nutrient availability	Texture	Class	scl, cl, sc, c (red)	-	sl, ls	c (black)
	pH	1:2.5	5.5-6.5	5.0-5.5 6.5-7.3	7.3-7.8	>7.8
	CEC	C mol (p+)/ Kg				
	BS	%				
	CaCO3 in root zone	%		<5	5-10	>10
	OC	%				
Rooting conditions	Effective soil depth	cm	>100	75-100	50-75	<50
	Stoniness	%				
	Coarse fragments	Vol %	<15	15-35	35-60	60-80
Soil toxicity	Salinity (EC saturation extract)	dS/m	<2	2-4	4-8	>8
	Sodicity (ESP)	%	<5	5-10	10-15	>15
Erosion hazard	Slope	%	<3	3-10	>10	-

Table 7.23 Land suitability criteria for Custard apple

Land use requirement			Rating			
Soil –site characteristics		**Unit**	**Highly suitable (S1)**	**Moderately suitable (S2)**	**Marginally suitable (S3)**	**Not suitable (N1)**
Climatic regime	Mean temperature in growing season	°C				
	Mean max. temp. in growing season	°C				
	Mean min. tempt. in growing season	°C				
	Mean RH in growing season	%				
	Total rainfall	mm				
	Rainfall in growing season	mm				
Land quality	Soil-site characteristic					
Moisture availability	Length of growing period for short duration	Days				
	Length of growing period for long duration					
	AWC	mm/m				
Oxygen availability to roots	Soil drainage	Class	Well drained	Mod. well drained	Poorly drained	V.Poorly drained
	Water logging in growing season	Days				
Nutrient availability	Texture	Class	Scl, cl, sc, c (red), c (black)	-	Sl, ls	-
	pH	1:2.5	6.0-7.3	5.5-6.0 7.3-8.4	5.0-5.5 8.4-9.0	>9.0
	CEC	C mol (p+)/Kg				
	BS	%				
	CaCO3 in root zone	%		<5	5-10	>10
	OC	%				
Rooting conditions	Effective soil depth	cm	>75	50-75	25-50	<25
	Stoniness	%				
	Coarse fragments	Vol %	<15-35	35-60	60-80	-
Soil toxicity	Salinity (EC saturation extract)	dS/m	<2.0	2-4	4-8	>8.0
	Sodicity (ESP)	%	<5	5-10	10-15	>15
Erosion hazard	Slope	%	0-3	3-5	>5	-

Table 7.24 Land suitability criteria for Amla

Land use requirement			Rating			
Soil –site characteristics		**Unit**	**Highly suitable (S1)**	**Moderately suitable (S2)**	**Marginally suitable (S3)**	**Not suitable (N1)**
Climatic regime	Mean temperature in growing season	°C				
	Mean max. temp. in growing season	°C				
	Mean min. tempt. in growing season	°C				
	Mean RH in growing season	%				
	Total rainfall	mm				
	Rainfall in growing season	mm				
Land quality	Soil-site characteristic					
Moisture availability	Length of growing period for short duration	Days				
	Length of growing period for long duration					
	AWC	mm/m				
Oxygen availability to roots	Soil drainage	Class	Well drained	Mod.well drained	Poorly drained	V. Poorly drained
	Water logging in growing season	Days				
Nutrient availability	Texture	Class	scl, cl, sc, c (red)	c (black)	ls, sl	-
	pH	1:2.5	5.5-7.3	5.0-5.5 7.3-7.8	7.8-8.4	>8.4
	CEC	C mol (p+)/Kg				
	BS	%				
	CaCO3 in root zone	%		<5	5-10	>10
	OC	%				
Rooting conditions	Effective soil depth	cm	>75	50-75	25-50	<25
	Stoniness	%				
	Coarse fragments	Vol %	<15-35	35-60	60-80	-
Soil toxicity	Salinity (EC saturation extract)	dS/m	<2.0	2-4	4-8	>8.0
	Sodicity (ESP)	%	<5	5-10	10-15	>15
Erosion hazard	Slope	%	0-3	3-5	5-10	>10

Table 7.25 Land suitability criteria for Tamarind

Land use requirement			Rating			
Soil –site characteristics		Unit	**Highly suitable (S1)**	**Moderately suitable (S2)**	**Marginally suitable (S3)**	**Not suitable (N1)**
Climatic regime	Mean temperature in growing season	°C				
	Mean max. temp. in growing season	°C				
	Mean min. tempt. in growing season	°C				
	Mean RH in growing season	%				
	Total rainfall	mm				
	Rainfall in growing season	mm				
Land quality	Soil-site characteristic					
Moisture availability	Length of growing period for short duration	Days				
	Length of growing period for long duration					
	AWC	mm/m				
Oxygen availability to roots	Soil drainage	Class	Well drained	Mod.well drained	Poorly drained	V.Poorly drained
	Water logging in growing season	Days				
Nutrient availability	Texture	Class	scl, cl,sc, c (red)	sl, c (black)	ls	-
	pH	1:2.5	6.0-7.3	5.0-6.0 7.3-7.8	7.8-8.4	>8.4
	CEC	C mol (p+)/ Kg				
	BS	%				
	CaCO3 in root zone	%		<5	5-10	>10
	OC	%				
Rooting conditions	Effective soil depth	cm	>150	100-150	75-100	<75
	Stoniness	%				
	Coarse fragments	Vol %	<15	15-35	35-60	60-80
Soil toxicity	Salinity (EC saturation extract)	dS/m	<2	2-4	4-8	>8
	Sodicity (ESP)	%	<5	5-10	10-15	>15
Erosion hazard	Slope	%	0-3	3-5	5-10	>10

Table 7.26 Land suitability criteria for Marigold

Land use requirement			Rating			
Soil –site characteristics		**Unit**	**Highly suitable (S1)**	**Moderately suitable (S2)**	**Marginally suitable (S3)**	**Not suitable (N1)**
Climatic regime	Mean temperature in growing season	°C	18-23	17-15 24-35	35-40 10-14	>40 <10
	Mean max. temp. in growing season	°C				
	Mean min. tempt. in growing season	°C				
	Mean RH in growing season	%				
	Total rainfall	mm				
	Rainfall in growing season	mm				
Land quality	Soil-site characteristic					
Moisture availability	Length of growing period for short duration	Days				
	Length of growing period for long duration					
	AWC	mm/m				
Oxygen availability to roots	Soil drainage	Class	Well drained	Moderately well drained	Poorly drained	V.Poorly drained
	Water logging in growing season	Days				
Nutrient availability	Texture	Class	sl,scl, cl, sc, c (red)	c (black)	ls	-
	pH	1:2.5	6.0-7.3	5.0-6.0 7.3-8.4	8.4-9.0	>9.0
	CEC	C mol (p+)/Kg				
	BS	%				
	CaCO3 in root zone	%		<5	5-10	>10
	OC	%				
Rooting conditions	Effective soil depth	cm	>75	50-75	25-50	<25
	Stoniness	%				
	Coarse fragments	Vol %	<15	15-35	35-60	60-80
Soil toxicity	Salinity (EC saturation extract)	dS/m	<2.0	2-4	4-8	>8.0
	Sodicity (ESP)	%				
Erosion hazard	Slope	%	<3	3-5	5-10	>10

Table 7.27 Land suitability criteria for Chrysanthemum

Land use requirement			Rating			
Soil –site characteristics		**Unit**	**Highly suitable (S1)**	**Moderately suitable (S2)**	**Marginally suitable (S3)**	**Not suitable (N1)**
Climatic regime	Mean temperature in growing season	°C	18-23	17-15 24-35	35-40 10-14	>40 <10
	Mean max. temp. in growing season	°C				
	Mean min. tempt. in growing season	°C				
	Mean RH in growing season	%				
	Total rainfall	mm				
	Rainfall in growing season	mm				
Land quality	Soil-site characteristic					
Moisture availability	Length of growing period for short duration	Days				
	Length of growing period for long duration					
	AWC	mm/m				
Oxygen availability to roots	Soil drainage	Class	Well drained	Moderately well drained	Poorly drained	V.Poorly drained
	Water logging in growing season	Days				
Nutrient availability	Texture	Class	sl,scl, cl, sc, c (red)	c (black)	ls	-
	pH	1:2.5	6.0-7.3	5.0-6.0 7.3-8.4	8.4-9.0	>9.0
	CEC	C mol (p+)/Kg				
	BS	%				
	CaCO3 in root zone	%		<5	5-10	>10
	OC	%				
Rooting conditions	Effective soil depth	cm	>75	50-75	25-50	<25
	Stoniness	%				
	Coarse fragments	Vol %	<15	15-35	35-60	60-80
Soil toxicity	Salinity (EC saturation extract)	dS/m	<2.0	2-4	4-8	>8.0
	Sodicity (ESP)	%				
Erosion hazard	Slope	%	<3	3-5	5-10	>10

Table 7.28 Land suitability criteria for Jasmine (irrigated)

Land use requirement			Rating			
Soil –site characteristics		**Unit**	**Highly suitable (S1)**	**Moderately suitable (S2)**	**Marginally suitable (S3)**	**Not suitable (N1)**
Climatic regime	Mean temperature in growing season	°C	18-23	17-15 24-35	35-40 10-14	-
	Mean max. temp. in growing season	°C				
	Mean min. tempt. in growing season	°C				
	Mean RH in growing season	%				
	Total rainfall	mm				
	Rainfall in growing season	mm				
Land quality	Soil-site characteristic					
Moisture availability	Length of growing period for short duration	Days				
	Length of growing period for long duration					
	AWC	mm/m				
Oxygen availability to roots	Soil drainage	Class	Well drained	Moderately well drained	Poorly drained	V.Poorly drained
	Water logging in growing season	Days				
Nutrient availability	Texture	Class	scl, cl, sc, c (red)	sl	ls, c (black)	-
	pH	1:2.5	6.0-7.3	5.0-6.0 7.3-8.4	8.4-9.0	>9.0
	CEC	C mol (p+)/Kg				
	BS	%				
	CaCO3 in root zone	%		<5	5-10	>10
	OC	%				
Rooting conditions	Effective soil depth	cm	>75	50-75	25-50	<25
	Stoniness	%				
	Coarse fragments	Vol %	<15	15-35	35-60	60-80
Soil toxicity	Salinity (EC saturation extract)	dS/m	<2.0	2-4	4-8	>8.0
	Sodicity (ESP)	%				
Erosion hazard	Slope	%	<3	3-5	5-10	>10

7.29 Land suitability criteria for Crossandra

Land use requirement			Rating			
Soil –site characteristics		**Unit**	**Highly suitable (S1)**	**Moderately suitable (S2)**	**Marginally suitable (S3)**	**Not suitable (N1)**
Climatic regime	Mean temperature in growing season	°C				
	Mean max. temp. in growing season	°C				
	Mean min. tempt. in growing season	°C				
	Mean RH in growing season	%				
	Total rainfall	mm				
	Rainfall in growing season	mm				
Land quality	Soil-site characteristic					
Moisture availability	Length of growing period for short duration	Days				
	Length of growing period for long duration					
	AWC	mm/m				
Oxygen availability to roots	Soil drainage	Class	Well drained	Moderately well drained	-	Poorly to very poorly drained
	Water logging in growing season	Days				
Nutrient availability	Texture	Class	scl, cl, sc, c(red)	sl,	c (black),ls	-
	pH	1:2.5	6.0-7.3	5.0-6.0 7.3-8.4	8.4-9.0	>9.0
	CEC	C mol (p+)/Kg				
	BS	%				
	CaCO3 in root zone	%		<5	5-10	>10
	OC	%				
Rooting conditions	Effective soil depth	cm	>75	50-75	25-50	<25
	Stoniness	%				
	Coarse fragments	Vol %	<15	15-35	35-60	60-80
Soil toxicity	Salinity (EC saturation extract)	dS/m	<2.0	2-4	4-8	>8.0
	Sodicity (ESP)	%				
Erosion hazard	Slope	%	<3	3-5	5-10	>10

7.29 Land management Units (LMUs)

      The 35 soil map units identified in Chilkamuki microwatershed have been grouped into 8 Land management Units (LMUs) for the purpose of preparing a 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 unit map (Fig.7.29) 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 Eight Land management Units along with brief description of soil and site characteristics are given below.

LMUs	Mapping unit	Soil and site characteristics
1	444.TSDiA1 , 446.TSDmA1	Very deep, lowland clay soils with slopes of 0-1%, slight erosion
2	441.TDGmA1 ,442.TDGmB2	Very deep, lowland sandy clay loam soils with slopes of 0-3%, slight to moderate erosion
3	342.DRLiB2 ,380.HDLmB1	Moderately deep to deep, black calcareous clay soils with slopes of 1-3%, slight to moderate erosion
4	105.HDHbB2g1 ,110.HDHcB2 111.HDHcB2g1,112.HDHcB2g2 114.HDHcC2g2 ,122.HDHhB2 123.HDHhB2g1 187.BDGhB2 217.BPRbB2g1 ,228.BPRhB1 251.NGPcB2g1,258.NGPhB1g1	Moderately deep to deep, red gravelly sandy clay to clay soils with slopes of 1-5%, slight to moderate erosion, gravelly to very gravelly (15-60%)
5	134.GHTbB2g1,207.MNLiB1g1 241.VDHbB2g1 ,245.VDHhB2 246.VDHhB2g1	Moderately deep to deep, red sandy clay to sandy clay loam soils with slopes of 1-3%, slight to moderate erosion, gravelly (15-35%)
6	92.HTIcB2g1 ,94.HTIhB1g1	Moderately shallow, red sandy clay soils with slopes of 1-3%, slight to moderate erosion, gravelly (15-35%)
7	43.LKRcB2g1 ,51.LKRiB1g1 76.MKHcB2 ,77.MKHcB2g1	Moderately shallow, red gravelly sandy clay to sandy clay loam soils with slopes of 1-3%, slight to moderate erosion, gravelly (15-35%)
8	36.CSRcB2g1 ,465.HRVcB2g1 468.ABRhB2 ,469.ABRmB2 470.ABRbB2g2,472.ABRiB2g2	Shallow, red gravelly sandy clay to sandy clay loam soils with slopes of 1-3%, moderate erosion, gravelly to very gravelly (15-60%)
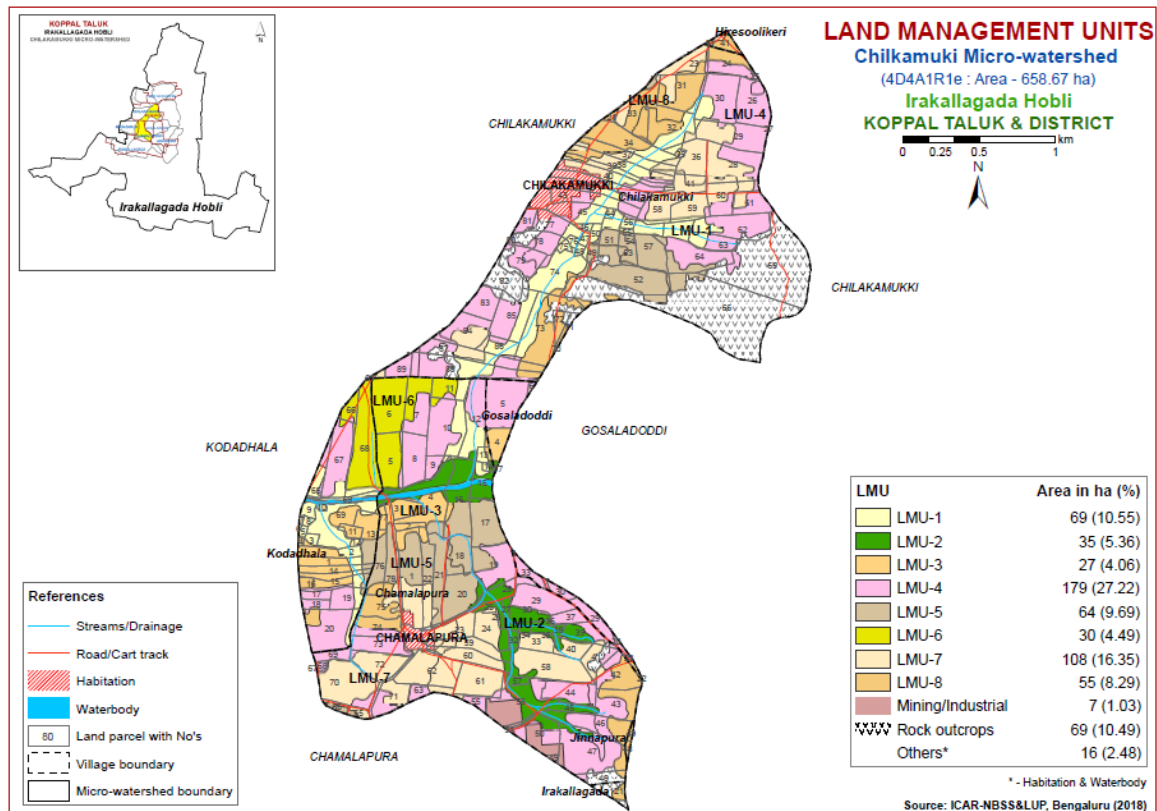
Fig 7.29 Land management Unit map of Chilkamuki microwatershed

7.30 Proposed Crop Plan for Chilkamuki Microwatershed

After assessing the land suitability for the 28 crops, the proposed crop plan has been prepared for the 8 identified LMUs by considering only the highly (Class S1) and moderately (Class S2) suitable lands for each of the 28 crops. The resultant proposed crop plan is presented in Table 7.30

Table 7.30 Proposed Crop Plan for Chilkamuki Microwatershed

LMU	Soil Map Units	Survey Number	Field Crops	Horticulture Crops	Suitable Interventions
1	444.TSDiA1 446.TSDmA1 (Very deep, lowland clay soils)	**Chamalapura:**13,14 **Chilakamukki:**38,44, 45,46,47,48,50,55,56,7 4,75,76,86 **Kodadhala:**3,5,6,7,8,9 ,10,12,65,69	Paddy, Maize, Sugarcane, cotton	**Fruit crops:** Custard Apple, Amla **Vegetable crops:** Brinjal, Tomato, Chillies, Drumstick, Bhendi, Coriander, leafy vegetables **Flower crops:** Marigold, Chrysanthemum, Jasmine	Providing proper drainage, addition of organic manures, green leaf manuring, suitable conservation practises
2	441.TDGmA1 442.TDGmB2 (Very deep, lowland sandy clay loam soils)	**Chamalapura:**15,16,2 5,26,27,28,30,31,32,34 ,35,36,38,39,45,56,57 **Gosaladoddi :**17	Sorghum, Groundnut, Bajra	**Vegetable crops:** Brinjal, Tomato, Carrot, Beetroot **Flower crops:** Marigold, Chrysanthemum, Jasmine	Providing proper drainage, addition of organic manures, green leaf manuring, suitable conservation practises
3	342.DRLiB2 380.HDLmB1 (Moderately deep to deep, blackcalcareous clay soils)	**Chamalapura:**2,3,4,7 7 **Gosaladoddi :** 4 **Kodadhala:**1,2,4,11,1 3,14,15,16	Maize, Sorghum, Sunflower, Cotton, Bengal gram, Safflower, Linseed, Bajra	**Fruit crops:** Sapota, Pomegranate, Jamun, Lime, Musambi, Tamarind, Amla, Custard apple **Vegetables:** Drumstick, Chilli, Coriander, Tomato, Bhendi **Flowers:** Marigold, Chrysanthemum	Application of FYM, Biofertilizers and micronutrients, drip irrigation, mulching, suitable soil and water conservation practises
4	105.HDHbB2g1 110.HDHcB2 111.HDHcB2g1 112.HDHcB2g2 114.HDHcC2g2 122.HDHhB2 123.HDHhB2g1 187.BDGhB2 217.BPRbB2g1 228.BPRhB1 251.NGPcB2g1 258.NGPhB1g1 (Moderately deep to	**Chamalapura:**7,8,9,1 0,12,19,29,37,43,44,47 ,55,63,67,68,69,73 **Chilakamukki:**24,25, 26,27,29,30,61,62,63,6 4,77,78,79,80,81,83,84 ,85,88,89 **Gosaladoddi:**1,5,6,23, 28,29,30,33 **Kodadhala:**17,18,19,2 0,67	Sorghum,Groundn ut Red gram, Bajra, Horse gram, Castor	**Fruit crops:** Musambi, Lime, Jamun, Jackfruit Amla, Custard apple, Tamarind **Vegetable crops:** Drumstick, Curry leaves	Drip irrigation, mulching, suitable soil and water conservation practises (Crescent Bunding with Catch Pit *etc*)

LMU	Soil Map Units	Survey Number	Field Crops	Horticulture Crops	Suitable Interventions
	deep, red gravelly sandy clay to clay soils)				
5	134.GHTbB2g1 207.MNLiB1g1 241.VDHbB2g1 245.VDHhB2 246.VDHhB2g1 (Moderately deep to deep, red sandy clay to sandy clay loam soils)	**Chamalapura:**1,17,18,20,21,22,66,76,78 **Chilakamukki:**49,51,52,53,54,57	Maize, Sorghum, Sunflower, Bajra, Finger millet, Groundnut, Red gram, Cowpea, Field bean, Castor	**Fruit crops:** Pomegranate, Guava, Sapota, Jackfruit, Tamarind, Lime, Musambi, Amla, Custard apple **Vegetable crops:** Drumstick, Tomato, Chilli, Brinjal, Onion, Curry leaves **Flower crops:** Marigold, Chrysanthemum, Jasmine	Drip irrigation, mulching, suitable soil and water conservation practises (Crescent Bunding with Catch Pit etc)
6	92.HTIcB2g1 94.HTIhB1g1 (Moderately shallow, red sandy clay soils)	**Chamalapura:** 5,6,11 **Kodadhala:** 66,68	Sorghum, Groundnut, Bajra, Green gram, Black gram, Cowpea, Horse gram, Castor,	**Fruit crops:** Lime, Musambi, Amla, Custard apple, Cashew **Flower crops:** Marigold, Chrysanthemum	Drip irrigation, Mulching, suitable soil and water conservation practices (Crescent Bunding with Catch Pit etc)
7	43.LKRcB2g1 51.LKRiB1g1 76.MKHcB2 77.MKHcB2g1 (Moderately shallow, red gravelly sandy clay to sandy clay loam soils)	**Chamalapura:**23,24,33,40,41,58,59,60,61,62,65,70,71,72 **Chilakamukki:**23,28,35,36,39,40,41,58,59,60,87,91 **Hiresoolikeri:** 51	Sorghum,Groundnut, Bajra, Castor	**Fruit crops:** Lime, Musambi, Amla, Cashew, Custard apple,	Drip irrigation, mulching, suitable soil and water conservation practises (Crescent Bunding with Catch Pit etc)
8	36.CSRcB2g1 465.HRVcB2g1 468.ABRhB2 469.ABRmB2 470.ABRbB2g2 472.ABRiB2g2 (Shallow, red gravelly sandy clay to sandy clay loam soils)	**Chamalapura:**42,46,74,75 **Chilakamukki:**21,31,32,33,34,37,70,72,73 **Gosaladoddi :** 22 **Hiresoolikeri :** 41 **Jinnapura:** 48,49	Green gram, Black gram, Horse gram	**Agri-Silvi-Pasture:** Custard apple, Amla, Hybrid Napier, *Styloxanthes hamata,* Glyricidia, *Styloxanthes scabra*	Use of short duration varieties, sowing across the slope and split application of nitrogen fertilizers

SOIL HEALTH MANAGEMENT

8.1 Soil Health

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

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

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

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

Characteristics of Chilkamuki Microwatershed
❖ The soil phases with sizeable area identified in the microwatershed belonged to the soil series of Hooradhahalli (HDH) 80 ha (15%), Lakkur (LKR) 74 ha (11%), Thimmasandra (TSD) 69 ha (10%) and other series in a small area.
❖ As per land capability classification, 396 ha (60%) area in the microwatershed falls under arable land category (Class II) with moderate limitations of soil, wetness and erosion, 170 ha (26%) area is under moderately good lands (Class III) with severe limitations of soil and erosion.

❖ On the basis of soil reaction, 341 ha (52%) area has slightly (pH 6.0-6.5) to strongly acid (pH 5.0-5.5) soils, 113 ha (17%) area has neutral and 113 ha (17%) area is slightly (pH 7.3-7.8) to very strongly alkaline (pH >9.0) in reaction.

Soil Health Management

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

Acid soils

Slightly to strongly acid soils cover about 341 ha area in the microwatershed.

1. Growing of crops suitable for a particular soil pH.
2. Amelioration of soils through the application of amendments (liming materials).

Liming materials:

1. $CaCO_3$ (Calcium Carbonate).
2. Dolomite [Ca Mg $(Co_3)_2$]
3. Quick lime (Cao)
4. Slaked lime [Ca $(OH)_2$]

For normal pH and pH 4.8 (35 t/ha) and pH 6 .0-7.0 (4 t/ha) lime is required.

Neutral soils

Neutral soils cover about 113 ha area in the microwatershed.

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.

Alkaline soils

(Slightly alkaline to very strongly alkaline soils cover about 113 ha area in the microwatershed.

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 ZnSO4 – 12.5 kg/ha (once in three years).
5. Application of Boron – 5 kg/ha (once in three years).

Soil Degradation

Soil erosion is one of the major factor affecting the soil health in the microwatershed. About 438 ha (67%) area 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.

Dissemination of Information and Communication of Benefits

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

Inputs for Net Planning (Saturation Plan) and Interventions needed

Net planning in IWMP is focusing on preparation of

1. Soil and Water Conservation Treatment 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 Chilkamuki Microwatershed.

- ❖ **Organic Carbon:** The OC content is medium (0.5-0.75%) in an area of about 74 ha (11%). These areas needs to be further improved by applying farmyard manure and rotating crops with cereals and legumes or mixed cropping and high (>0.75%) in 492 ha (75%) area.

- ❖ **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 74 ha (11%) where OC is medium (0.5-0.75%). 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**: About 127 ha (19%) area is medium (23-57 kg/ha) in available phosphorus. Hence for all crops, 25% additional P-needs to be applied high (>57 kg/ha) in 439 ha (67%) area.

- ❖ **Available Potassium:** Available potassium is low (<145 kg/ha) in 220 ha (33%), medium (145-337 kg/ha) in 235 ha (36%) area and high (>337 kg/ha) in 111 ha (17%) area of the microwatershed.

- ❖ **Available Sulphur:** Available sulphur is a very critical nutrient for oilseed crops. Available sulphur is low (<10 ppm) in 265 ha (40%) area and medium in an area of about 300 ha (46%) in the microwatershed. These areas need to be applied with magnesium sulphate or gypsum or Factomphos (p) fertilizer (13% sulphur) for 2-3 years for the deficiency to be corrected. High (>20 ppm) in 1 ha area.

- ❖ **Available Boron:** An area of about 431 ha (66%) is low (<0.5 ppm) in available boron and an area of 135 ha (20%) is medium (05 -1.0 ppm) in available boron content. These areas need to be applied with sodium borate @ 10kg/ha as soil application or 0.2% borax as foliar spray to correct the deficiency.

- ❖ **Available Iron:** It is deficient (<4.5 ppm) in 124 ha (19%) area. For deficient areas, iron sulphate @ 25 kg/ha needs to be applied for 2-3 years to correct the deficiency and sufficient (>4.5 ppm) in 442 ha (67%).

- ❖ Available manganese and copper are sufficient in the entire area of the microwatershed.

❖ **Available Zinc:** It is deficient (<0.6 ppm) in 104 ha (16%) area. For these areas, application of zinc sulphate @ 25kg/ha is to be recommended. Sufficient (>0.6 ppm) in 462 ha (70%) area.

❖ **Soil Alkalinity:** About 113 ha (17%) area in the microwatershed has soils that are strongly alkaline to very 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 and not 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.

SOIL AND WATER CONSERVATION TREATMENT PLAN

For preparing soil and water conservation treatment plan for Chilkamuki 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
- Available water capacity
- Soil slope
- Soil gravelliness
- Land capability
- Present land use and land cover
- Crop suitability maps
- Rainfall map
- 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 needs to be collected.
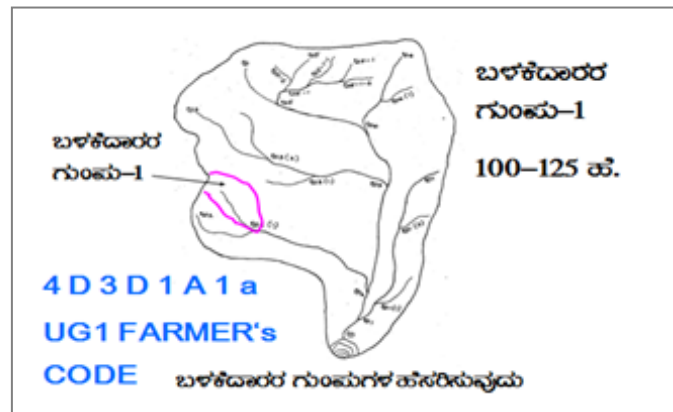
Steps for Survey and Preparation of Treatment Plan

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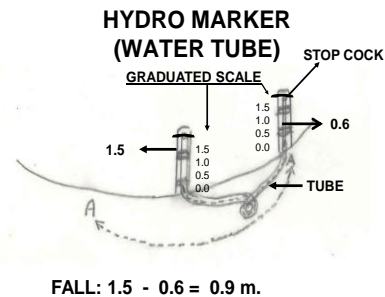
Vertical and Horizontal intervals between bunds as recommended by the Watershed Development Department.

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 (bg0 ....b= loamy sand, g0 = <15% gravel). The recommended sections for different soils are given below.

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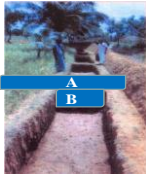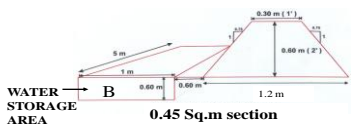
Top width (m)	Base width (m)	Height (m)	Side slope (Z:1;H:V)	Cross section (sq m)	Soil Texture	Remarks
0.3	0.9	0.3	01:01	0.18	Sandy loam	Vegetative bund
0.3	1.2	0.3	1.5:1	0.225	Sandy clay	
0.3	1.2	0.5	0.9:1	0.375	Red gravelly soils	
0.3	1.2	0.6	0.75:1	0.45		
0.3	1.5	0.6	01:01	0.54	Red sandy loam	
0.3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

Formation of Trench cum Bund

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

Details of Borrow Pit dimensions are given below
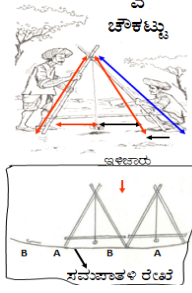
Size of Borrow Pits/ Trench recommended for Trench cum Bund (by machinery)

Bund section	Bund length	Earth quantity	Pit				Berm (pit to pit)	Soil depth Class
m2	m	m3	L(m)	W(m)	D(m)	Quantity (m3)	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 Bund.

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 (Fig 9.1)

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 Leveling Survey using Dumpy Level / Total Station has to be carried out to arrive at the site-specific designs as shown in the Manual.

f) The location of ground water recharge structures are decided by examining the lineaments and fracture zones from geological maps.

g) Rainfall intensity data of the nearest Rain Gauge Station is considered for Hydrologic Designs.

h) Silt load to the Storage/Recharge Structures is reduced by providing vegetative, boulder and earthen checks in the natural water course. Location and design details are given in the Manual.

9.2 Recommended Soil and Water Conservation Measures

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

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

A map (Fig. 9.2) showing soil and water conservation plan with different kinds of structures recommended has been prepared which shows the spatial distribution and extent of area. About 51 ha (8%) area needs graded bunding, 435 ha (66%) area needs trench cum bunding and 80 ha (12%) area needs strengthening of existing bunds/bunding. The conservation plan prepared may be presented to all the stakeholders including farmers and after considering their suggestions, the conservation plan for the microwatershed may be finalised in a participatory approach.
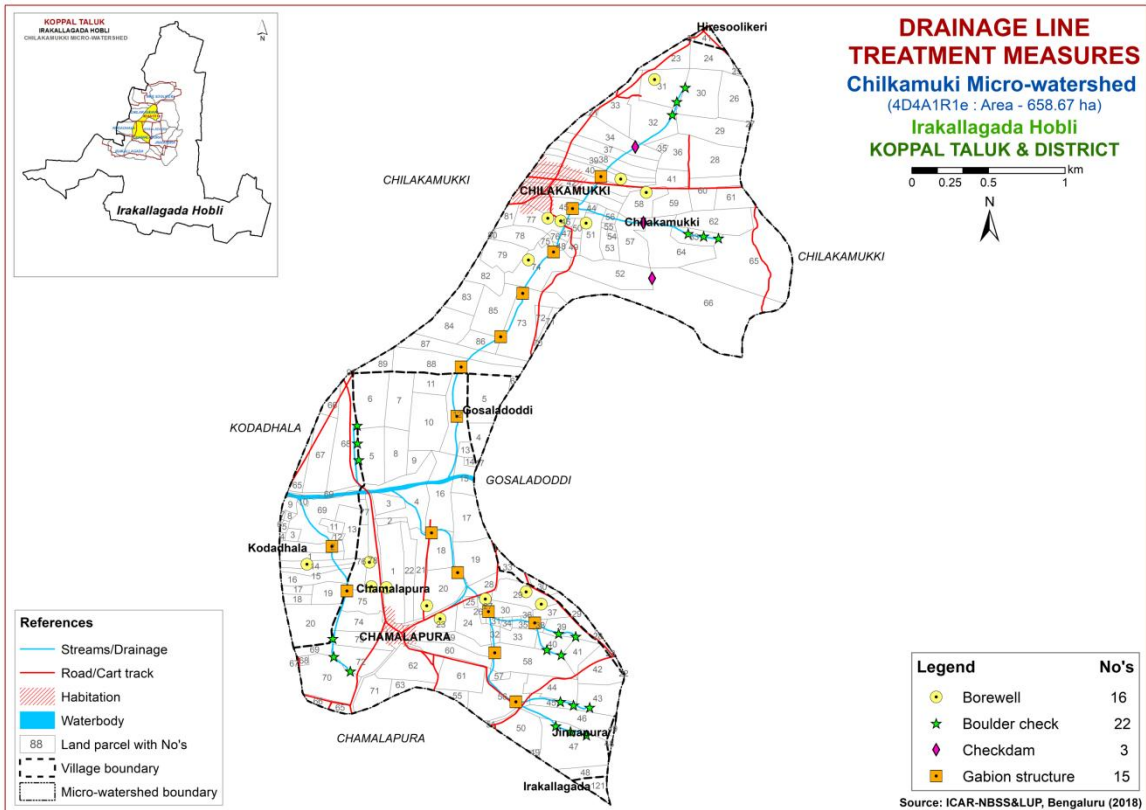
Fig. 9.1 Drainage Line Treatment map of Chilkamuki Microwatershed
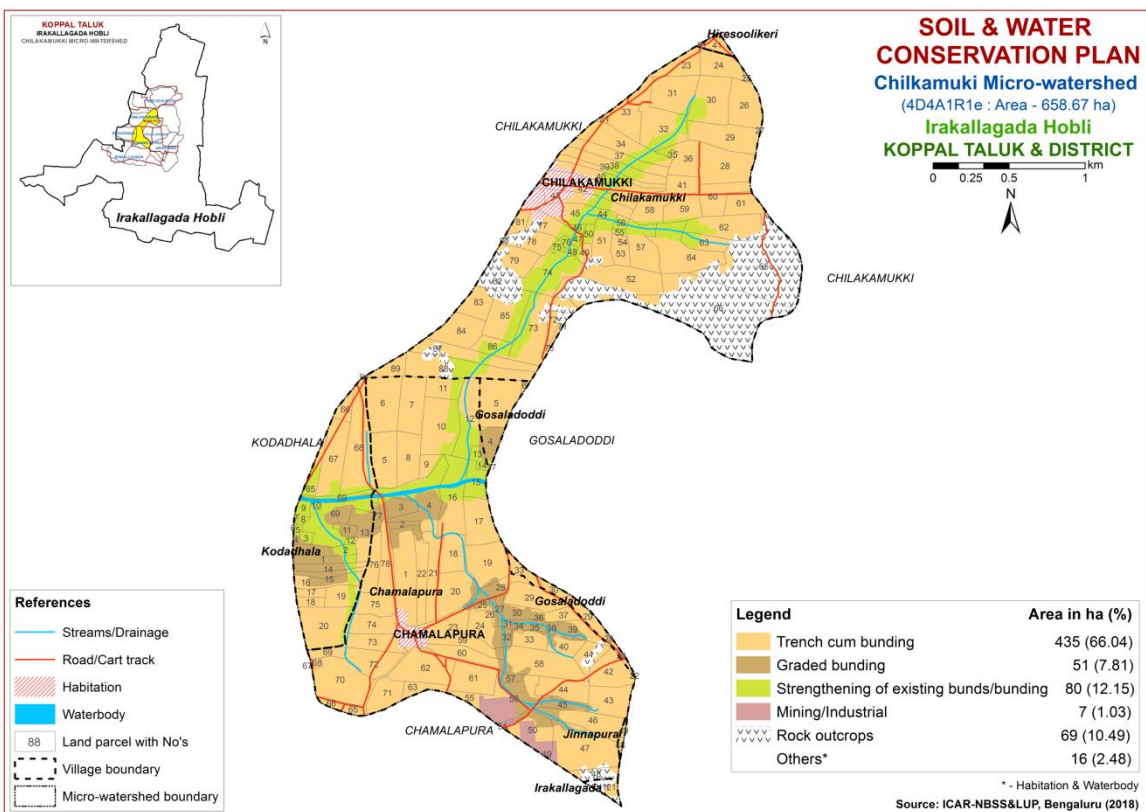
Fig. 9.2 Soil and Water Conservation Plan map of Chilkamuki Microwatershed

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 VII and VIII) 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 the pits during the 1st week of March along the contour and heap the dug out 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		Temp (°C)	Rainfall (mm)
15.	Teak	*Tectona grandis*	20 - 50	500-5000
16.	Nandi	*Legarstroemia lanceolata*	20 - 40	500 - 4000
17.	Honne	*Pterocarpus marsupium*	20 - 40	500 - 3000
18.	Mathi	*Terminalia alata*	20 -50	500 - 2000
19.	Shivane	*Gmelina arboria*	20 -50	500 -2000
20.	Kindal	*T.Paniculata*	20 - 40	500 - 1500
21.	Beete	*Dalbargia latifolia*	20 - 40	500 - 1500
22.	Tare	*T. belerica*	20 - 40	500 - 2000
23.	Bamboo	*Bambusa arundinasia*	20 - 40	500 - 2500
24.	Bamboo	*Dendrocalamus strictus*	20 – 40	500 – 2500
25.	Muthuga	*Butea monosperma*	20 - 40	400 - 1500
26.	Hippe	*Madhuca latifolia*	20 - 40	500 - 2000
27.	Sandal	*Santalum album*	20 - 50	400 - 1000
28.	Nelli	*Emblica officinalis*	20 - 40	500 - 2000
29.	Nerale	*Sizyzium cumini*	20 - 40	500 - 2000
30.	Dhaman	*Grevia tilifolia*	20 - 40	500 - 2000
31.	Kaval	*Careya arborea*	20 - 40	500 - 2000
32.	Harada	*Terminalia chebula*	20 - 40	500 - 2000

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Appendix-I

Village	Survey No	Area (ha)	Soil Phase	LMU	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	Wells	Land Capability	Conservation Plan
Chamalapura	1	9.14	VDHhB2	LMU-5	Deep (100-150 cm)	Sandy clay loam	Non gravelly (<15%)	High (151-200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Redgram (Mz+Rg)	1 Borewell	IIes	TCB
Chamalapura	2	0.74	DRLiB2	LMU-3	Moderately deep (75-100 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Graded bunding
Chamalapura	3	2.22	DRLiB2	LMU-3	Moderately deep (75-100 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Chamalapura	4	9.23	DRLiB2	LMU-3	Moderately deep (75-100 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower (Sf)	Not Available	IIes	Graded bunding
Chamalapura	5	5.95	HTIcB2g1	LMU-6	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram+Mesta (Rg+Mst)	Not Available	IIes	TCB
Chamalapura	6	7.66	HTIcB2g1	LMU-6	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	TCB
Chamalapura	7	6.05	BDGhB2	LMU-4	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIIes	TCB
Chamalapura	8	4.98	BDGhB2	LMU-4	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Pearlmillet+Redgram (Pm+Rg)	Not Available	IIIes	TCB
Chamalapura	9	1.58	BDGhB2	LMU-4	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIIes	TCB
Chamalapura	10	8.7	BDGhB2	LMU-4	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram+Pearlmillet+Paddy (Rg+Pm+Pd)	Not Available	IIIes	TCB
Chamalapura	11	3.16	HTIcB2g1	LMU-6	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	TCB
Chamalapura	12	6.91	BPRhB1	LMU-4	Deep (100-150 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Paddy+Maize (Pd+Mz)	Not Available	IIIs	TCB
Chamalapura	13	0.92	TSDmA1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Nearly level (0-1%)	Slight	Maize (Mz)	Not Available	IIw	Graded bunding
Chamalapura	14	0.42	TSDmA1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Nearly level (0-1%)	Slight	Not Available (NA)	Not Available	IIw	Graded bunding
Chamalapura	15	2.91	TDGmA1	LMU-2	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Redgram (Rg)	Not Available	IIw	Graded bunding
Chamalapura	16	7.96	TDGmA1	LMU-2	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Maize (Mz)	Not Available	IIw	Graded bunding
Chamalapura	17	5.81	VDHbB2g1	LMU-5	Deep (100-150 cm)	Loamy sand	Gravelly (15-35%)	High (151-200 mm/m)	Very gently sloping (1-3%)	Moderate	Pearlmillet+Redgram (Pm+Rg)	Not Available	IIes	TCB
Chamalapura	18	4.03	VDHbB2g1	LMU-5	Deep (100-150 cm)	Loamy sand	Gravelly (15-35%)	High (151-200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	TCB
Chamalapura	19	6.73	HDHhB2g1	LMU-4	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut+Maize (Gn+Mz)	Not Available	IIes	TCB
Chamalapura	20	6.29	VDHhB2	LMU-5	Deep (100-150 cm)	Sandy clay loam	Non gravelly (<15%)	High (151-200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	1 Borewell	IIes	TCB
Chamalapura	21	4.67	VDHhB2	LMU-5	Deep (100-150 cm)	Sandy clay loam	Non gravelly (<15%)	High (151-200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Current fallow (Mz+Cf)	Not Available	IIes	TCB
Chamalapura	22	4.39	VDHhB2	LMU-5	Deep (100-150 cm)	Sandy clay loam	Non gravelly (<15%)	High (151-200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	TCB

Village	Survey No	Area (ha)	Soil Phase	LMU	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	Wells	Land Capability	Conservation Plan
Chamalapura	23	3.84	LKRcB2g1	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Redgram (Mz+Rg)	1 Borewell	IIes	TCB
Chamalapura	24	4.18	LKRcB2g1	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy+Maize (Pd+Mz)	Not Available	IIes	TCB
Chamalapura	25	0.66	TDGmB2	LMU-2	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIew	Graded bunding
Chamalapura	26	0.77	TDGmB2	LMU-2	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIew	Graded bunding
Chamalapura	27	0.83	TDGmB2	LMU-2	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut (Gn)	1 Borewell	IIew	Graded bunding
Chamalapura	28	2.57	TDGmB2	LMU-2	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut (Gn)	Not Available	IIew	Graded bunding
Chamalapura	29	5.21	HDHcB2g1	LMU-4	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut+Maize (Gn+Mz)	2 Borewell	IIes	TCB
Chamalapura	30	2.23	TDGmB2	LMU-2	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut (Gn)	Not Available	IIew	Graded bunding
Chamalapura	31	0.41	TDGmB2	LMU-2	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Horsegram (Hg)	Not Available	IIew	Graded bunding
Chamalapura	32	0.72	TDGmB2	LMU-2	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIew	Graded bunding
Chamalapura	33	2.58	LKRcB2g1	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Redgram (Mz+Rg)	Not Available	IIes	TCB
Chamalapura	34	0.54	TDGmB2	LMU-2	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Horsegram (Hg)	Not Available	IIew	Graded bunding
Chamalapura	35	0.94	TDGmB2	LMU-2	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Horsegram (Hg)	Not Available	IIew	Graded bunding
Chamalapura	36	0.3	TDGmB2	LMU-2	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIew	Graded bunding
Chamalapura	37	1.77	HDHcB2g1	LMU-4	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Chamalapura	38	0.49	TDGmB2	LMU-2	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIew	Graded bunding
Chamalapura	39	3.27	TDGmB2	LMU-2	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIew	Graded bunding
Chamalapura	40	2.45	LKRcB2g1	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	TCB
Chamalapura	41	2.87	LKRcB2g1	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Dyke+Redgram (Dy+Rg)	Not Available	IIes	TCB
Chamalapura	42	5.19	HRVcB2g1	LMU-8	Shallow (25-50 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIIes	TCB
Chamalapura	43	5.21	NGPhB1g1	LMU-4	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Horsegram+Redgram (Hg+Rg)	Not Available	IIIs	TCB
Chamalapura	44	4.73	BPRbB2g1	LMU-4	Deep (100-150 cm)	Loamy sand	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram+Mesta (Rg+Mst)	Not Available	IIIes	TCB
Chamalapura	45	1.84	TDGmB2	LMU-2	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIew	Graded bunding
Chamalapura	46	5.98	HRVcB2g1	LMU-8	Shallow (25-50 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy+Maize (Pd+Mz)	Not Available	IIIes	TCB

II

Village	Survey No	Area (ha)	Soil Phase	LMU	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	Wells	Land Capability	Conservation Plan
Chamalapura	47	11.13	NGPhB1g1	LMU-4	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Paddy+Maize (Pd+Mz)	Not Available	IIIs	TCB
Chamalapura	48	2.17	RO	RO	RO	RO	RO	RO	RO	RO	RO	Not Available	RO	RO
Chamalapura	49	0.26	MI	MI	MI	MI	MI	MI	MI	MI	Castor (Ca)	Not Available	MI	MI
Chamalapura	50	5.55	MI	MI	MI	MI	MI	MI	MI	MI	Redgram+Castor (Rg+Cs)	Not Available	MI	MI
Chamalapura	51	0.06	MI	MI	MI	MI	MI	MI	MI	MI	Maize+Mesta (Mz+Mst)	Not Available	MI	MI
Chamalapura	55	1.26	BPRbB2g1	LMU-4	Deep (100-150 cm)	Loamy sand	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Redgram (Mz+Rg)	Not Available	IIIes	TCB
Chamalapura	56	8.7	TDGmB2	LMU-2	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy+Maize+Poultry Farm (Pd+Mz+Pf)	Not Available	IIew	Graded bunding
Chamalapura	57	0.71	TDGmB2	LMU-2	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIew	Graded bunding
Chamalapura	58	8.66	LKRcB2g1	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	TCB
Chamalapura	59	3.57	LKRcB2g1	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	TCB
Chamalapura	60	3.76	LKRcB2g1	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Redgram (Mz+Rg)	Not Available	IIes	TCB
Chamalapura	61	5.83	LKRcB2g1	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram+Mesta (Rg+Mst)	Not Available	IIes	TCB
Chamalapura	62	7.46	LKRcB2g1	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	TCB
Chamalapura	63	1.92	BPRbB2g1	LMU-4	Deep (100-150 cm)	Loamy sand	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut+Maize (Gn+Mz)	Not Available	IIIes	TCB
Chamalapura	65	0.91	LKRcB2g1	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Horsegram+Watermelon (Hg+Wm)	Not Available	IIes	TCB
Chamalapura	66	0.85	VDHhB2g1	LMU-5	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	High (151-200 mm/m)	Very gently sloping (1-3%)	Moderate	Horsegram+Maize (Hg+Mz)	Not Available	IIes	TCB
Chamalapura	67	0.1	BPRbB2g1	LMU-4	Deep (100-150 cm)	Loamy sand	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Horsegram (Hg)	Not Available	IIIes	TCB
Chamalapura	68	0.37	BPRbB2g1	LMU-4	Deep (100-150 cm)	Loamy sand	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIIes	TCB
Chamalapura	69	1.58	BPRbB2g1	LMU-4	Deep (100-150 cm)	Loamy sand	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Pearmillet+Redgram (Pm+Rg)	Not Available	IIIes	TCB
Chamalapura	70	9.03	LKRcB2g1	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Pearmillet+Redgram (Pm+Rg)	Not Available	IIes	TCB
Chamalapura	71	3.99	LKRcB2g1	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Redgram (Mz+Rg)	Not Available	IIes	TCB
Chamalapura	72	4.99	LKRcB2g1	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	TCB
Chamalapura	73	3.99	BPRbB2g1	LMU-4	Deep (100-150 cm)	Loamy sand	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIIes	TCB
Chamalapura	74	4.03	ABRmB2	LMU-8	Shallow (25-50 cm)	Clay	Non gravelly (<15%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIIes	TCB

III

Village	Survey No	Area (ha)	Soil Phase	LMU	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	Wells	Land Capability	Conservation Plan
Chamalapura	75	3.73	ABRmB2	LMU-8	Shallow (25-50 cm)	Clay	Non gravelly (<15%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Castor+Redgram (Ca+Rg)	Not Available	IIIes	TCB
Chamalapura	76	3.56	VDHhB2	LMU-5	Deep (100-150 cm)	Sandy clay loam	Non gravelly (<15%)	High (151-200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	TCB
Chamalapura	77	0.77	DRLiB2	LMU-3	Moderately deep (75-100 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIes	Graded bunding
Chamalapura	78	3.88	VDHhB2	LMU-5	Deep (100-150 cm)	Sandy clay loam	Non gravelly (<15%)	High (151-200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	2 Borewell	IIes	TCB
Chilakamukki	21	0.4	ABRbB2g2	LMU-8	Shallow (25-50 cm)	Loamy sand	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram+Greengram (Rg+Gg)	Not Available	IIIes	TCB
Chilakamukki	23	3.67	LKRcB2g1	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	TCB
Chilakamukki	24	4.26	HDHcB2	LMU-4	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram+Mango (Rg+Mn)	Not Available	IIes	TCB
Chilakamukki	25	0.21	HDHcB2	LMU-4	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram+Mango (Rg+Mn)	Not Available	IIes	TCB
Chilakamukki	26	6.02	HDHcB2g1	LMU-4	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	TCB
Chilakamukki	27	0.02	HDHcB2g1	LMU-4	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	TCB
Chilakamukki	28	7.92	MKHcB2g1	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIIes	TCB
Chilakamukki	29	7.17	HDHcB2g1	LMU-4	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	TCB
Chilakamukki	30	7.4	HDHcB2g1	LMU-4	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	TCB
Chilakamukki	31	6.63	ABRbB2g2	LMU-8	Shallow (25-50 cm)	Loamy sand	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	1 Borewell	IIIes	TCB
Chilakamukki	32	7.49	ABRhB2	LMU-8	Shallow (25-50 cm)	Sandy clay loam	Non gravelly (<15%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy+Redgram (Pd+Rg)	Not Available	IIIes	TCB
Chilakamukki	33	5.88	ABRbB2g2	LMU-8	Shallow (25-50 cm)	Loamy sand	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIIes	TCB
Chilakamukki	34	6.63	ABRbB2g2	LMU-8	Shallow (25-50 cm)	Loamy sand	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Redgram (Mz+Rg)	Not Available	IIIes	TCB
Chilakamukki	35	0.29	MKHcB2g1	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIIes	TCB
Chilakamukki	36	4.36	MKHcB2g1	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIIes	TCB
Chilakamukki	37	4.34	ABRbB2g2	LMU-8	Shallow (25-50 cm)	Loamy sand	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Redgram (Mz+Rg)	Not Available	IIIes	TCB
Chilakamukki	38	4.57	TSDmA1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Nearly level (0-1%)	Slight	Maize+Redgram (Mz+Rg)	Not Available	IIw	Graded bunding
Chilakamukki	39	2.37	MKHcB2	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIIes	TCB
Chilakamukki	40	4.36	MKHcB2	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	1 Borewell	IIIes	TCB
Chilakamukki	41	6.36	MKHcB2g1	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIIes	TCB

IV

Village	Survey No	Area (ha)	Soil Phase	LMU	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	Wells	Land Capability	Conservation Plan
Chilakamukki	42	3.56	Habitation	Others	Others	Others	Others	Others	Others	Others	Not Available (NA)	Not Available	Others	Others
Chilakamukki	43	4.55	Habitation	Others	Others	Others	Others	Others	Others	Others	Maize (Mz)	Not Available	Others	Others
Chilakamukki	44	0.35	TSDmA1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Nearly level (0-1%)	Slight	Not Available (NA)	Not Available	IIw	Graded bunding
Chilakamukki	45	4.3	TSDmA1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Nearly level (0-1%)	Slight	Redgram (Rg)	Not Available	IIw	Graded bunding
Chilakamukki	46	0.46	TSDmA1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Nearly level (0-1%)	Slight	Not Available (NA)	1 Borewell	IIw	Graded bunding
Chilakamukki	47	0.51	TSDmA1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Nearly level (0-1%)	Slight	Not Available (NA)	Not Available	IIw	Graded bunding
Chilakamukki	48	0.38	TSDmA1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Nearly level (0-1%)	Slight	Not Available (NA)	Not Available	IIw	Graded bunding
Chilakamukki	49	1.12	GHTbB2g1	LMU-5	Moderately deep (75-100 cm)	Loamy sand	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Chilakamukki	50	0.84	TSDmA1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Nearly level (0-1%)	Slight	Redgram (Rg)	Not Available	IIw	Graded bunding
Chilakamukki	51	4.13	GHTbB2g1	LMU-5	Moderately deep (75-100 cm)	Loamy sand	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	1 Borewell	IIes	TCB
Chilakamukki	52	7.95	GHTbB2g1	LMU-5	Moderately deep (75-100 cm)	Loamy sand	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	TCB
Chilakamukki	53	1.99	GHTbB2g1	LMU-5	Moderately deep (75-100 cm)	Loamy sand	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	TCB
Chilakamukki	54	0.27	GHTbB2g1	LMU-5	Moderately deep (75-100 cm)	Loamy sand	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Chilakamukki	55	0.37	TSDmA1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Nearly level (0-1%)	Slight	Not Available (NA)	Not Available	IIw	Graded bunding
Chilakamukki	56	0.75	TSDmA1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Nearly level (0-1%)	Slight	Not Available (NA)	Not Available	IIw	Graded bunding
Chilakamukki	57	5.67	GHTbB2g1	LMU-5	Moderately deep (75-100 cm)	Loamy sand	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	TCB
Chilakamukki	58	4.08	MKHcB2g1	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	1 Borewell	IIIes	TCB
Chilakamukki	59	3.76	MKHcB2g1	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIIes	TCB
Chilakamukki	60	4.72	MKHcB2g1	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIIes	TCB
Chilakamukki	61	3.24	HDHcB2g1	LMU-4	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	TCB
Chilakamukki	62	7.04	HDHcB2g1	LMU-4	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	TCB
Chilakamukki	63	3	HDHcB2g1	LMU-4	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	TCB
Chilakamukki	64	9.22	HDHcB2g1	LMU-4	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	TCB
Chilakamukki	65	22.07	RO	RO	RO	RO	RO	RO	RO	RO	Rock outcrop (Rc)	Not Available	RO	RO

v

Village	Survey No	Area (ha)	Soil Phase	LMU	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	Wells	Land Capability	Conservation Plan
Chilakamukki	66	33.9	RO	RO	RO	RO	RO	RO	RO	RO	Rock outcrop (Rc)	1 Check Dam	RO	RO
Chilakamukki	70	0.04	ABRiB2g2	LMU-8	Shallow (25-50 cm)	Sandy clay	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIIes	TCB
Chilakamukki	71	0.72	RO	RO	RO	RO	RO	RO	RO	RO	Currentfallow+Redgram (Cf+Rg)	Not Available	RO	RO
Chilakamukki	72	1.38	ABRiB2g2	LMU-8	Shallow (25-50 cm)	Sandy clay	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIIes	TCB
Chilakamukki	73	10.33	ABRiB2g2	LMU-8	Shallow (25-50 cm)	Sandy clay	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIIes	TCB
Chilakamukki	74	7.65	TSDmA1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Nearly level (0-1%)	Slight	Redgram (Rg)	1 Borewell	IIw	Graded bunding
Chilakamukki	75	0.52	TSDmA1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Nearly level (0-1%)	Slight	Not Available (NA)	Not Available	IIw	Graded bunding
Chilakamukki	76	0.47	TSDmA1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Nearly level (0-1%)	Slight	Not Available (NA)	Not Available	IIw	Graded bunding
Chilakamukki	77	3.55	HDHhB2	LMU-4	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	1 Borewell	IIes	TCB
Chilakamukki	78	3.59	HDHhB2	LMU-4	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	TCB
Chilakamukki	79	4.57	HDHcB2g1	LMU-4	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	TCB
Chilakamukki	80	0.15	HDHcB2g1	LMU-4	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Chilakamukki	81	1.42	HDHcB2g1	LMU-4	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	TCB
Chilakamukki	82	3.58	RO	RO	RO	RO	RO	RO	RO	RO	Rock outcrop (Rc)	Not Available	RO	RO
Chilakamukki	83	3.61	HDHcB2g2	LMU-4	Moderately deep (75-100 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Redgram (Mz+Rg)	Not Available	IIes	TCB
Chilakamukki	84	5.52	HDHcB2g2	LMU-4	Moderately deep (75-100 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Redgram (Mz+Rg)	Not Available	IIes	TCB
Chilakamukki	85	6.83	HDHcB2g2	LMU-4	Moderately deep (75-100 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIes	TCB
Chilakamukki	86	2.63	TSDmA1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Nearly level (0-1%)	Slight	Redgram (Rg)	Not Available	IIw	Graded bunding
Chilakamukki	87	6.05	LKRiB1g1	LMU-7	Moderately shallow (50-75 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Currentfallow+Redgram (Cf+Rg)	Not Available	IIIs	TCB
Chilakamukki	88	9.45	HDHcB2g1	LMU-4	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram+Bajra (Rg+Bj)	Not Available	IIes	TCB
Chilakamukki	89	2.13	HDHcB2g2	LMU-4	Moderately deep (75-100 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	TCB
Chilakamukki	91	0.02	LKRcB2g1	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Horsegram (Hg)	Not Available	IIes	TCB
Gosaladoddi	1	0.04	HDHcB2g1	LMU-4	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut+Paddy (Gn+Pd)	Not Available	IIes	TCB
Gosaladoddi	4	2.51	HDLmB1	LMU-3	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Redgram+Maize (Rg+Mz)	Not Available	IIs	Graded bunding

VI

Village	Survey No	Area (ha)	Soil Phase	LMU	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	Wells	Land Capability	Conservation Plan
Gosaladoddi	5	7.39	BPRhB1	LMU-4	Deep (100-150 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Redgram+Maize (Rg+Mz)	Not Available	IIIs	TCB
Gosaladoddi	6	0.28	BPRhB1	LMU-4	Deep (100-150 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Redgram+Maize (Rg+Mz)	Not Available	IIIs	TCB
Gosaladoddi	17	0.06	TDGmA1	LMU-2	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Paddy (Pd)	Not Available	IIw	Graded bunding
Gosaladoddi	22	0.01	HRVcB2g1	LMU-8	Shallow (25-50 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIIes	TCB
Gosaladoddi	23	0.7	HDHcB2g1	LMU-4	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram+Maize (Rg+Mz)	Not Available	IIes	TCB
Gosaladoddi	28	0.16	HDHcB2g1	LMU-4	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	TCB
Gosaladoddi	29	2.38	HDHcB2g1	LMU-4	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram+Pearl millet (Rg+Pm)	Not Available	IIes	TCB
Gosaladoddi	30	0.95	HDHcB2g1	LMU-4	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram+Maize (Rg+Mz)	Not Available	IIes	TCB
Gosaladoddi	33	1.57	HDHcB2g1	LMU-4	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut (Gn)	Not Available	IIes	TCB
Hiresoolikeri	41	1.53	HRVcB2g1	LMU-8	Shallow (25-50 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram+Current fallow (Rg+Cf)	Not Available	IIIes	TCB
Hiresoolikeri	51	0.15	LKRcB2g1	LMU-7	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	TCB
Irakallagada	121	2	RO	RO	RO	RO	RO	RO	RO	RO	Fallow land (Fl)	Not Available	RO	RO
Jinnapura	48	0.33	HRVcB2g1	LMU-8	Shallow (25-50 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIIes	TCB
Jinnapura	49	0.31	HRVcB2g1	LMU-8	Shallow (25-50 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIIes	TCB
Kodadhala	1	2.32	DRLiB2	LMU-3	Moderately deep (75-100 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Tomato (Mz+Tm)	Not Available	IIes	Graded bunding
Kodadhala	2	2.72	DRLiB2	LMU-3	Moderately deep (75-100 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram+Maize (Rg+Mz)	Not Available	IIes	Graded bunding
Kodadhala	3	0.73	TSDiA1	LMU-1	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Nearly level (0-1%)	Slight	Pearl millet (Pm)	Not Available	IIw	Graded bunding
Kodadhala	4	0.2	DRLiB2	LMU-3	Moderately deep (75-100 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Kodadhala	5	0.36	TSDiA1	LMU-1	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Nearly level (0-1%)	Slight	Maize (Mz)	Not Available	IIw	Graded bunding
Kodadhala	6	0.06	TSDiA1	LMU-1	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Nearly level (0-1%)	Slight	Fallow land (Fl)	Not Available	IIw	Graded bunding
Kodadhala	7	0.16	TSDiA1	LMU-1	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Nearly level (0-1%)	Slight	Fallow land (Fl)	Not Available	IIw	Graded bunding
Kodadhala	8	0.36	TSDiA1	LMU-1	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Nearly level (0-1%)	Slight	Fallow land (Fl)	Not Available	IIw	Graded bunding
Kodadhala	9	0.87	TSDiA1	LMU-1	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Nearly level (0-1%)	Slight	Fallow land (Fl)	Not Available	IIw	Graded bunding
Kodadhala	10	0.3	TSDiA1	LMU-1	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Nearly level (0-1%)	Slight	Fallow land (Fl)	Not Available	IIw	Graded bunding

VII

Village	Survey No	Area (ha)	Soil Phase	LMU	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	Wells	Land Capability	Conservation Plan
Kodadhala	11	1.02	DRLiB2	LMU-3	Moderately deep (75-100 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Graded bunding
Kodadhala	12	0.35	TSDiA1	LMU-1	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Nearly level (0-1%)	Slight	Redgram+Maize (Rg+Mz)	Not Available	IIw	Graded bunding
Kodadhala	13	3.81	DRLiB2	LMU-3	Moderately deep (75-100 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram+Maize (Rg+Mz)	Not Available	IIes	Graded bunding
Kodadhala	14	2.1	DRLiB2	LMU-3	Moderately deep (75-100 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Watermelon (Mz+Wm)	1 Borewell	IIes	Graded bunding
Kodadhala	15	1.65	DRLiB2	LMU-3	Moderately deep (75-100 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram+Maize (Rg+Mz)	Not Available	IIes	Graded bunding
Kodadhala	16	3.4	DRLiB2	LMU-3	Moderately deep (75-100 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Pearl millet (Mz+Pm)	Not Available	IIes	Graded bunding
Kodadhala	17	1.13	BPRbB2g1	LMU-4	Deep (100-150 cm)	Loamy sand	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram+Maize (Rg+Mz)	Not Available	IIIes	TCB
Kodadhala	18	1.19	BPRbB2g1	LMU-4	Deep (100-150 cm)	Loamy sand	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram+Maize (Rg+Mz)	Not Available	IIIes	TCB
Kodadhala	19	2.98	BPRbB2g1	LMU-4	Deep (100-150 cm)	Loamy sand	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Castor (Mz+Ca)	Not Available	IIIes	TCB
Kodadhala	20	8	BPRbB2g1	LMU-4	Deep (100-150 cm)	Loamy sand	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Horsegram+Current fallow+Eucalyptus (Hg+Cf+Eu)	Not Available	IIIes	TCB
Kodadhala	65	2.14	TSDiA1	LMU-1	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Nearly level (0-1%)	Slight	Redgram+Eucalyptus +Maize+Fallow land (Rg+Eu+Mz+Fl)	Not Available	IIw	Graded bunding
Kodadhala	66	1.56	HTIhB1g1	LMU-6	Moderately shallow (50-75 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Redgram+Maize+Gro undnut (Rg+Mz+Gn)	Not Available	IIs	TCB
Kodadhala	67	7.32	HDHbB2g1	LMU-4	Moderately deep (75-100 cm)	Loamy sand	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram+Maize+Gro undnut+Eucalyptus (Rg+Mz+Gn+Eu)	Not Available	IIes	TCB
Kodadhala	68	10.8	HTIhB1g1	LMU-6	Moderately shallow (50-75 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize+Eucalyptus (Mz+Eu)	Not Available	IIs	TCB
Kodadhala	69	9.21	TSDiA1	LMU-1	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Nearly level (0-1%)	Slight	Fallow land+Maize (Fl+Mz)	Not Available	IIw	Graded bunding

TCB-Trench cum bunding, Ro-Ro

Appendix II

Village	Survey No	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Chamalapura	1	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	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 (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	2	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	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 (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	3	Moderately alkaline (pH 7.8 - 8.4)	Non saline (<2 dsm)	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 (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	4	Moderately alkaline (pH 7.8 - 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 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 (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	5	Slightly alkaline (pH 7.3 - 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 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 (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	6	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 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 (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	7	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	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 (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	8	Slightly alkaline (pH 7.3 - 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 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 (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	9	Slightly alkaline (pH 7.3 - 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 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 (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	10	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	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 (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	11	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	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 (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	12	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	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 (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	13	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	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 (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	14	Slightly alkaline (pH 7.3 - 7.8)	Non saline (<2 dsm)	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 (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	15	Slightly alkaline (pH 7.3 - 7.8)	Non saline (<2 dsm)	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 (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	16	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 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 (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	17	Moderately alkaline (pH 7.8 - 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	18	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	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 (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	19	Moderately alkaline (pH 7.8 - 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	20	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	21	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	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 (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	22	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	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 (> 0.2 ppm)	Sufficient (> 0.6 ppm)

Village	Survey No	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Chamalapura	23	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	24	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	25	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	26	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	27	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	28	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	29	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	30	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	31	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	32	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	33	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	34	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	35	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	36	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	37	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	38	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	39	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	40	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	41	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	42	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	43	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	44	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	45	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	46	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)

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Village	Survey No	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Chamalapura	47	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	48	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro
Chamalapura	49	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI
Chamalapura	50	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI
Chamalapura	51	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI
Chamalapura	55	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	56	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	57	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	58	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	59	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	60	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	61	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	62	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	63	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	65	Moderately acid (pH 5.5 – 6.0)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	66	Moderately acid (pH 5.5 – 6.0)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	67	Strongly acid (pH 5.0 – 5.5)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	68	Strongly acid (pH 5.0 – 5.5)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	69	Moderately acid (pH 5.5 – 6.0)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	70	Moderately acid (pH 5.5 – 6.0)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	71	Moderately acid (pH 5.5 – 6.0)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	72	Moderately acid (pH 5.5 – 6.0)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	73	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	74	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	75	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)

Village	Survey No	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Chamalapura	76	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	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 (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	77	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 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 (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chamalapura	78	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	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 (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chilakamukki	21	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chilakamukki	23	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chilakamukki	24	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chilakamukki	25	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chilakamukki	26	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chilakamukki	27	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chilakamukki	28	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chilakamukki	29	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chilakamukki	30	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chilakamukki	31	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chilakamukki	32	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chilakamukki	33	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chilakamukki	34	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chilakamukki	35	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chilakamukki	36	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chilakamukki	37	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chilakamukki	38	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chilakamukki	39	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chilakamukki	40	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chilakamukki	41	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chilakamukki	42	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Chilakamukki	43	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others

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Village	Survey No	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Chilakamukki	44	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chilakamukki	45	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chilakamukki	46	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Chilakamukki	47	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Chilakamukki	48	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Chilakamukki	49	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Chilakamukki	50	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Chilakamukki	51	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Chilakamukki	52	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Chilakamukki	53	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Chilakamukki	54	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Chilakamukki	55	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Chilakamukki	56	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chilakamukki	57	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Chilakamukki	58	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chilakamukki	59	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chilakamukki	60	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chilakamukki	61	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chilakamukki	62	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chilakamukki	63	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Chilakamukki	64	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Chilakamukki	65	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro
Chilakamukki	66	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro
Chilakamukki	70	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Chilakamukki	71	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro

Village	Survey No	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Chilakamukki	72	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Chilakamukki	73	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Chilakamukki	74	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Chilakamukki	75	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Chilakamukki	76	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Chilakamukki	77	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Chilakamukki	78	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Chilakamukki	79	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Chilakamukki	80	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Chilakamukki	81	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Chilakamukki	82	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro
Chilakamukki	83	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Chilakamukki	84	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Chilakamukki	85	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Chilakamukki	86	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Chilakamukki	87	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Chilakamukki	88	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	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 (> 0.2 ppm)	Deficient (< 0.6 ppm)
Chilakamukki	89	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	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 (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Chilakamukki	91	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 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 (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Gosaladoddi	1	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Gosaladoddi	4	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Gosaladoddi	5	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Gosaladoddi	6	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Gosaladoddi	17	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	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 (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Gosaladoddi	22	Slightly acid (pH 6.0	Non saline	High (> 0.75	High (> 57	Medium (145	Low (<10	Low (< 0.5	Sufficient	Sufficient (>	Sufficient (>	Sufficient (>

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Village	Survey No	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
		– 6.5)	(<2 dsm)	%)	kg/ha)	– 337 kg/ha)	ppm)	ppm)	(>4.5 ppm)	1.0 ppm)	0.2 ppm)	0.6 ppm)
Gosaladoddi	23	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Gosaladoddi	28	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Gosaladoddi	29	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Gosaladoddi	30	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Gosaladoddi	33	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Hiresoolikeri	41	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Hiresoolikeri	51	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Irakallagada	121	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro
Jinnapura	48	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Jinnapura	49	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kodadhala	1	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kodadhala	2	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kodadhala	3	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kodadhala	4	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kodadhala	5	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kodadhala	6	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kodadhala	7	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kodadhala	8	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kodadhala	9	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	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 (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kodadhala	10	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	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 (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kodadhala	11	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	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 (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kodadhala	12	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	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 (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kodadhala	13	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	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 (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kodadhala	14	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)

Village	Survey No	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Kodadhala	15	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kodadhala	16	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kodadhala	17	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kodadhala	18	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kodadhala	19	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kodadhala	20	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kodadhala	65	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	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 (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kodadhala	66	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 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 (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kodadhala	67	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 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 (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kodadhala	68	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 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 (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kodadhala	69	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	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 (> 0.2 ppm)	Sufficient (> 0.6 ppm)

Appendix III
Chilkamuki (1R1e) Microwatershed
Soil Suitability Information

Village	Survey No	Mango	Maize	Sapota	Sorghum	Guava	Cotton	Tamarind	Lime	Bengal gram	Sunflower	Red gram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Jasmine	Bhendi	Brinjal	Crossandra	Drumstick	Mulberry	Onion
Chamala pura	1	S2r	S1	S1	S1	S1	S2t	S2r	S1	S2t	S1	S1	S1	S1	S1	S1	S2r	S1	S1	S1	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S2t
Chamala pura	2	S3rz	S2tz	S3tz	S2nz	S3tz	S2rz	S3rz	S2rz	S2rz	S2rz	S3rz	S2tz	S3tz	S2z	N1tz	S3rz	S2rz	S3tz	S3tz	S3tz	S2tz	S2tz	S2rt	S2tz	S3tz	S2tz	S2tz	S2z	S2rz	S2tz	S3tz
Chamala pura	3	S3rz	S2tz	S3tz	S2nz	S3tz	S2rz	S3rz	S2rz	S2rz	S2rz	S3rz	S2tz	S3tz	S2z	N1tz	S3rz	S2rz	S3tz	S3tz	S3tz	S2tz	S2tz	S2rt	S2tz	S3tz	S2tz	S2tz	S2z	S2rz	S2tz	S3tz
Chamala pura	4	S3rz	S2tz	S3tz	S2nz	S3tz	S2rz	S3rz	S2rz	S2rz	S2rz	S3rz	S2tz	S3tz	S2z	N1tz	S3rz	S2rz	S3tz	S3tz	S3tz	S2tz	S2tz	S2rt	S2tz	S3tz	S2tz	S2tz	S2z	S2rz	S2tz	S3tz
Chamala pura	5	N1r	S2rg	S3r	S2rg	S3r	S2rg	N1r	S3r	S2rt	S3rg	S3rg	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2rg	S2rg	S2rg	S2rg	S3r	S2r	S2rg	S2rt	S2r	S2rg	S3r	S3r	S2rt
Chamala pura	6	N1r	S2rg	S3r	S2rg	S3r	S2rg	N1r	S3r	S2rt	S3rg	S3rg	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2rg	S2rg	S2rg	S2rg	S3r	S2r	S2rg	S2rt	S2r	S2rg	S3r	S3r	S2rt
Chamala pura	7	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S2rg	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2tg	S2tg	S3g	S2g	S2tg
Chamala pura	8	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S2rg	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2tg	S2tg	S3g	S2g	S2tg
Chamala pura	9	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S2rg	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2tg	S2tg	S3g	S2g	S2tg
Chamala pura	10	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S2rg	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2tg	S2tg	S3g	S2g	S2tg
Chamala pura	11	N1r	S2rg	S3r	S2rg	S3r	S2rg	N1r	S3r	S2rt	S3rg	S3rg	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2rg	S2rg	S2rg	S2rg	S3r	S2r	S2rg	S2rt	S2r	S2rg	S3r	S3r	S2rt
Chamala pura	12	S3rg	S3g	S3g	S3g	S3g	S3g	S3rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g
Chamala pura	13	S3tw	S2t	S3tw	S2w	S3tw	S2w	S2tw	S2w	S1	S2w	S2tw	S2tw	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S3tw	S3tw	S2tw	S2tw	S2tw	S2t	S3tw	S2tw	S2tw	S3tw	S2tw	S3tw	S2tw
Chamala pura	14	S3tw	S2t	S3tw	S2w	S3tw	S2w	S2tw	S2w	S1	S2w	S2tw	S2tw	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S3tw	S3tw	S2tw	S2tw	S2tw	S2t	S3tw	S2tw	S2tw	S3tw	S2tw	S3tw	S2tw
Chamala pura	15	S3t	S2t	S3t	S3t	S3t	N1t	S3t	S3t	N1t	S3t	S3t	S3t	S3t	S3t	N1t	S3t	S3t	S2t	S3t	S3t	S3t	S3t	S3t	S2t	S3t	S2w	S2w	S3t	S3t	S3t	S2w
Chamala pura	16	S3t	S2t	S3t	S3t	S3t	N1t	S3t	S3t	N1t	S3t	S3t	S3t	S3t	S3t	N1t	S3t	S3t	S2t	S3t	S3t	S3t	S3t	S3t	S2t	S3t	S2w	S2w	S3t	S3t	S3t	S2w
Chamala pura	17	S2r	S2tg	S1	S2g	S1	S2tg	S2r	S1	S2gt	S2g	S2gt	S1	S1	S1	S1	S2r	S1	S1	S2wg	S2tg	S2tg	S2tg	S1	S2t	S2tg	S2t	S1	S2gt	S1	S1	S2t
Chamala pura	18	S2r	S2tg	S1	S2g	S1	S2tg	S2r	S1	S2gt	S2g	S2gt	S1	S1	S1	S1	S2r	S1	S1	S2wg	S2tg	S2tg	S2tg	S1	S2t	S2tg	S2t	S1	S2gt	S1	S1	S2t
Chamala pura	19	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g

Village	Survey No	Mango	Maize	Sapota	Sorghum	Guava	Cotton	Tamarind	Lime	Bengal gram	Sunflower	Red gram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Jasmine	Bhendi	Brinjal	Crossandra	Drumstick	Mulberry	Onion
Chamala pura	20	S2r	S1	S1	S1	S1	S2t	S2r	S1	S2t	S1	S1	S1	S1	S1	S1	S2r	S1	S1	S1	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S2t
Chamala pura	21	S2r	S1	S1	S1	S1	S2t	S2r	S1	S2t	S1	S1	S1	S1	S1	S1	S2r	S1	S1	S1	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S2t
Chamala pura	22	S2r	S1	S1	S1	S1	S2t	S2r	S1	S2t	S1	S1	S1	S1	S1	S1	S2r	S1	S1	S1	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S2t
Chamala pura	23	N1rg	S3rg	S3rg	S3rg	S3rg	S3g	N1rg	S3rg	S2rt	S3rg	S3rg	S2rg	S3rg	S2rg	S3rg	S3rg	S3rg	S3rg	S3g	S3g	S3g	S3g	S3rg	S2rg	S3g	S3g	S3g	S3g	S3rg	S3rg	S3g
Chamala pura	24	N1rg	S3rg	S3rg	S3rg	S3rg	S3g	N1rg	S3rg	S2rt	S3rg	S3rg	S2rg	S3rg	S2rg	S3rg	S3rg	S3rg	S3rg	S3g	S3g	S3g	S3g	S3rg	S2rg	S3g	S3g	S3g	S3g	S3rg	S3rg	S3g
Chamala pura	25	S3t	S2t	S3t	S3t	S3t	N1t	S3t	S3t	N1t	S3t	S3t	S3t	S3t	S3t	N1t	S3t	S3t	S2t	S3t	S3t	S3t	S3t	S3t	S2t	S3t	S2w	S2w	S3t	S3t	S3t	S2w
Chamala pura	26	S3t	S2t	S3t	S3t	S3t	N1t	S3t	S3t	N1t	S3t	S3t	S3t	S3t	S3t	N1t	S3t	S3t	S2t	S3t	S3t	S3t	S3t	S3t	S2t	S3t	S2w	S2w	S3t	S3t	S3t	S2w
Chamala pura	27	S3t	S2t	S3t	S3t	S3t	N1t	S3t	S3t	N1t	S3t	S3t	S3t	S3t	S3t	N1t	S3t	S3t	S2t	S3t	S3t	S3t	S3t	S3t	S2t	S3t	S2w	S2w	S3t	S3t	S3t	S2w
Chamala pura	28	S3t	S2t	S3t	S3t	S3t	N1t	S3t	S3t	N1t	S3t	S3t	S3t	S3t	S3t	N1t	S3t	S3t	S2t	S3t	S3t	S3t	S3t	S3t	S2t	S3t	S2w	S2w	S3t	S3t	S3t	S2w
Chamala pura	29	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S3g	S3g	S2g	S3g
Chamala pura	30	S3t	S2t	S3t	S3t	S3t	N1t	S3t	S3t	N1t	S3t	S3t	S3t	S3t	S3t	N1t	S3t	S3t	S2t	S3t	S3t	S3t	S3t	S3t	S2t	S3t	S2w	S2w	S3t	S3t	S3t	S2w
Chamala pura	31	S3t	S2t	S3t	S3t	S3t	N1t	S3t	S3t	N1t	S3t	S3t	S3t	S3t	S3t	N1t	S3t	S3t	S2t	S3t	S3t	S3t	S3t	S3t	S2t	S3t	S2w	S2w	S3t	S3t	S3t	S2w
Chamala pura	32	S3t	S2t	S3t	S3t	S3t	N1t	S3t	S3t	N1t	S3t	S3t	S3t	S3t	S3t	N1t	S3t	S3t	S2t	S3t	S3t	S3t	S3t	S3t	S2t	S3t	S2w	S2w	S3t	S3t	S3t	S2w
Chamala pura	33	N1rg	S3rg	S3rg	S3rg	S3rg	S3g	N1rg	S3rg	S2rt	S3rg	S3rg	S2rg	S3rg	S2rg	S3rg	S3rg	S3rg	S3rg	S3g	S3g	S3g	S3g	S3rg	S2rg	S3g	S3g	S3g	S3g	S3g	S3rg	S3g
Chamala pura	34	S3t	S2t	S3t	S3t	S3t	N1t	S3t	S3t	N1t	S3t	S3t	S3t	S3t	S3t	N1t	S3t	S3t	S2t	S3t	S3t	S3t	S3t	S3t	S2t	S3t	S2w	S2w	S3t	S3t	S3t	S2w
Chamala pura	35	S3t	S2t	S3t	S3t	S3t	N1t	S3t	S3t	N1t	S3t	S3t	S3t	S3t	S3t	N1t	S3t	S3t	S2t	S3t	S3t	S3t	S3t	S3t	S2t	S3t	S2w	S2w	S3t	S3t	S3t	S2w
Chamala pura	36	S3t	S2t	S3t	S3t	S3t	N1t	S3t	S3t	N1t	S3t	S3t	S3t	S3t	S3t	N1t	S3t	S3t	S2t	S3t	S3t	S3t	S3t	S3t	S2t	S3t	S2w	S2w	S3t	S3t	S3t	S2w
Chamala pura	37	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S3g	S3g	S2g	S3g
Chamala pura	38	S3t	S2t	S3t	S3t	S3t	N1t	S3t	S3t	N1t	S3t	S3t	S3t	S3t	S3t	N1t	S3t	S3t	S2t	S3t	S3t	S3t	S3t	S3t	S2t	S3t	S2w	S2w	S3t	S3t	S3t	S2w
Chamala pura	39	S3t	S2t	S3t	S3t	S3t	N1t	S3t	S3t	N1t	S3t	S3t	S3t	S3t	S3t	N1t	S3t	S3t	S2t	S3t	S3t	S3t	S3t	S3t	S2t	S3t	S2w	S2w	S3t	S3t	S3t	S2w
Chamala pura	40	N1rg	S3rg	S3rg	S3rg	S3rg	S3g	N1rg	S3rg	S2rt	S3rg	S3rg	S2rg	S3rg	S2rg	S3rg	S3rg	S3rg	S3rg	S3g	S3g	S3g	S3g	S3rg	S2rg	S3g	S3g	S3g	S3g	S3g	S3rg	S3g

Village	Survey No	Mango	Maize	Sapota	Sorghum	Guava	Cotton	Tamarind	Lime	Bengal gram	Sunflower	Red gram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Jasmine	Bhendi	Brinjal	Crossandra	Drumstick	Mulberry	Onion
Chamalapura	41	N1rg	S3rg	S3rg	S3rg	S3rg	S3g	N1rg	S3rg	S2rt	S3rg	S3rg	S2rg	S3rg	S2rg	S3rg	S3rg	S3rg	S3rg	S3g	S3g	S3g	S3g	S3rg	S2rg	S3g	S3g	S3g	S3g	S3rg	S3rg	S3g
Chamalapura	42	N1rg	S3rg	N1rg	S3rg	N1rg	S3rt	N1rg	N1rg	S3rt	N1rg	N1rg	S3rg	N1rg	S3rg	N1rg	N1rg	N1rg	S3rg	S3rg	S3rg	S3rg	S3rg	N1rg	S3rg	S3rg	S3r	S3r	S3rg	N1rg	N1rg	S3r
Chamalapura	43	S3rg	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3rg	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Chamalapura	44	S3rg	S3g	S3g	S3g	S3g	S3g	S3rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2gt	S2g
Chamalapura	45	S3t	S2t	S3t	S3t	S3t	N1t	S3t	S3t	N1t	S3t	S3t	S3t	S3t	S3t	N1t	S3t	S3t	S2t	S3t	S3t	S3t	S3t	S3t	S2t	S3t	S2w	S2w	S3t	S3t	S3t	S2w
Chamalapura	46	N1rg	S3rg	N1rg	S3rg	N1rg	S3rt	N1rg	N1rg	S3rt	N1rg	N1rg	S3rg	N1rg	S3rg	N1rg	N1rg	N1rg	S3rg	S3rg	S3rg	S3rg	S3rg	N1rg	S3rg	S3rg	S3r	S3r	S3rg	N1rg	N1rg	S3r
Chamalapura	47	S3rg	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3rg	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S2g
Chamalapura	48	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro
Chamalapura	49	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI
Chamalapura	50	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI
Chamalapura	51	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI	MI
Chamalapura	55	S3rg	S3g	S3g	S3g	S3g	S3g	S3rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2gt	S2g
Chamalapura	56	S3t	S2t	S3t	S3t	S3t	N1t	S3t	S3t	N1t	S3t	S3t	S3t	S3t	S3t	N1t	S3t	S3t	S2t	S3t	S3t	S3t	S3t	S3t	S2t	S3t	S2w	S2w	S3t	S3t	S3t	S2w
Chamalapura	57	S3t	S2t	S3t	S3t	S3t	N1t	S3t	S3t	N1t	S3t	S3t	S3t	S3t	S3t	N1t	S3t	S3t	S2t	S3t	S3t	S3t	S3t	S3t	S2t	S3t	S2w	S2w	S3t	S3t	S3t	S2w
Chamalapura	58	N1rg	S3rg	S3rg	S3rg	S3rg	S3g	N1rg	S3rg	S2rt	S3rg	S3rg	S2rg	S3rg	S2rg	S3rg	S3rg	S3rg	S3rg	S3g	S3g	S3g	S3g	S3rg	S2rg	S3g	S3g	S3g	S3g	S3rg	S3rg	S3g
Chamalapura	59	N1rg	S3rg	S3rg	S3rg	S3rg	S3g	N1rg	S3rg	S2rt	S3rg	S3rg	S2rg	S3rg	S2rg	S3rg	S3rg	S3rg	S3rg	S3g	S3g	S3g	S3g	S3rg	S2rg	S3g	S3g	S3g	S3g	S3rg	S3rg	S3g
Chamalapura	60	N1rg	S3rg	S3rg	S3rg	S3rg	S3g	N1rg	S3rg	S2rt	S3rg	S3rg	S2rg	S3rg	S2rg	S3rg	S3rg	S3rg	S3rg	S3g	S3g	S3g	S3g	S3rg	S2rg	S3g	S3g	S3g	S3g	S3rg	S3rg	S3g
Chamalapura	61	N1rg	S3rg	S3rg	S3rg	S3rg	S3g	N1rg	S3rg	S2rt	S3rg	S3rg	S2rg	S3rg	S2rg	S3rg	S3rg	S3rg	S3rg	S3g	S3g	S3g	S3g	S3rg	S2rg	S3g	S3g	S3g	S3g	S3rg	S3rg	S3g
Chamalapura	62	N1rg	S3rg	S3rg	S3rg	S3rg	S3g	N1rg	S3rg	S2rt	S3rg	S3rg	S2rg	S3rg	S2rg	S3rg	S3rg	S3rg	S3rg	S3g	S3g	S3g	S3g	S3rg	S2rg	S3g	S3g	S3g	S3g	S3rg	S3rg	S3g
Chamalapura	63	S3rg	S3g	S3g	S3g	S3g	S3g	S3rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S2gt	S2g
Chamalapura	65	N1rg	S3rg	S3rg	S3rg	S3rg	S3g	N1rg	S3rg	S2rt	S3rg	S3rg	S2rg	S3rg	S2rg	S3rg	S3rg	S3rg	S3rg	S3g	S3g	S3g	S3g	S3rg	S2rg	S3g	S3g	S3g	S3g	S3rg	S3rg	S3g

Village	Survey No	Mango	Maize	Sapota	Sorghum	Guava	Cotton	Tamarind	Lime	Bengal gram	Sunflower	Red gram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Jasmine	Bhendi	Brinjal	Crossandra	Drumstick	Mulberry	Onion
Chamala pura	66	S2rg	S2g	S2g	S2g	S2g	S2tg	S2rg	S2g	S2gt	S2g	S2g	S1	S2g	S1	S2g	S2rg	S2g	S2g	S2g	S2g	S2tg	S2tg	S2g	S2g	S2tg	S2t	S1	S2gt	S1	S1	S2t
Chamala pura	67	S3rg	S3g	S3g	S3g	S3g	S3g	S3rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g
Chamala pura	68	S3rg	S3g	S3g	S3g	S3g	S3g	S3rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g
Chamala pura	69	S3rg	S3g	S3g	S3g	S3g	S3g	S3rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g
Chamala pura	70	N1rg	S3rg	S3rg	S3rg	S3rg	S3g	N1rg	S3rg	S2rt	S3rg	S3rg	S2rg	S3rg	S2rg	S3rg	S3rg	S3rg	S3rg	S3g	S3g	S3g	S3g	S3rg	S2rg	S3g	S3g	S3g	S3rg	S3rg	S3rg	S3g
Chamala pura	71	N1rg	S3rg	S3rg	S3rg	S3rg	S3g	N1rg	S3rg	S2rt	S3rg	S3rg	S2rg	S3rg	S2rg	S3rg	S3rg	S3rg	S3rg	S3g	S3g	S3g	S3g	S3rg	S2rg	S3g	S3g	S3g	S3rg	S3rg	S3rg	S3g
Chamala pura	72	N1rg	S3rg	S3rg	S3rg	S3rg	S3g	N1rg	S3rg	S2rt	S3rg	S3rg	S2rg	S3rg	S2rg	S3rg	S3rg	S3rg	S3rg	S3g	S3g	S3g	S3g	S3rg	S2rg	S3g	S3g	S3g	S3rg	S3rg	S3rg	S3g
Chamala pura	73	S3rg	S3g	S3g	S3g	S3g	S3g	S3rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g
Chamala pura	74	N1r	S3rg	N1r	S3rg	N1r	S3rt	N1r	N1r	S3rt	N1r	N1r	S3rg	N1r	S3rg	N1r	N1r	N1r	S3rg	S3rg	S3rg	S3rg	S3rg	N1r	S3rg	S3rg	S3rg	S3rg	S3rg	N1r	N1r	S3rg
Chamala pura	75	N1r	S3rg	N1r	S3rg	N1r	S3rt	N1r	N1r	S3rt	N1r	N1r	S3rg	N1r	S3rg	N1r	N1r	N1r	S3rg	S3rg	S3rg	S3rg	S3rg	N1r	S3rg	S3rg	S3rg	S3rg	S3rg	N1r	N1r	S3rg
Chamala pura	76	S2r	S1	S1	S1	S1	S2t	S2r	S1	S2t	S1	S1	S1	S1	S1	S1	S2r	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S2t
Chamala pura	77	S3rz	S2tz	S3tz	S2nz	S3tz	S2rz	S3rz	S2rz	S2rz	S2rz	S3rz	S2tz	S3tz	S2z	N1tz	S3rz	S2rz	S3tz	S3tz	S3tz	S2tz	S2tz	S2rt	S2tz	S3tz	S2tz	S2tz	S2z	S2rz	S2tz	S3tz
Chamala pura	78	S2r	S1	S1	S1	S1	S2t	S2r	S1	S2t	S1	S1	S1	S1	S1	S1	S2r	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S2t
Chilaka mukki	21	N1r	S3rg	N1r	S3rg	N1r	S3rt	N1r	N1r	S3rt	N1r	N1r	S3rg	N1r	S3rg	N1r	N1r	N1r	S3rg	S3rg	S3rg	S3rg	S3rg	N1r	S3rg	S3rg	S3rg	S3rg	S3rg	N1r	N1r	S3rg
Chilaka mukki	23	N1rg	S3rg	S3rg	S3rg	S3rg	S3g	N1rg	S3rg	S2rt	S3rg	S3rg	S2rg	S3rg	S2rg	S3rg	S3rg	S3rg	S3rg	S3g	S3g	S3g	S3g	S3rg	S2rg	S3g	S3g	S3g	S3g	S3rg	S3rg	S3g
Chilaka mukki	24	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S3g	S2g	S2g	S2g	S3g
Chilaka mukki	25	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S3g	S2g	S2g	S2g	S3g
Chilaka mukki	26	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S3g	S2g	S2g	S2g	S3g
Chilaka mukki	27	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S3g	S2g	S2g	S2g	S3g
Chilaka mukki	28	N1r	S2rg	S3rg	S2rg	S3rg	S2rg	N1r	S3rg	S2rt	S3rg	S3rg	S2rg	S3rg	S2rg	S3rg	S3rg	S3rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S3g	S3g	S2rg	S3rg	S3rg	S3g
Chilaka mukki	29	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g

Village	Survey No	Mango	Maize	Sapota	Sorghum	Guava	Cotton	Tamarind	Lime	Bengal gram	Sunflower	Red gram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Jasmine	Bhendi	Brinjal	Crossandra	Drumstick	Mulberry	Onion
Chilaka mukki	30	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S3g	S3g	S2g	S3g
Chilaka mukki	31	N1r	S3rg	N1r	S3rg	N1r	S3rt	N1r	N1r	S3rt	N1r	N1r	S3rg	N1r	S3rg	N1r	N1r	N1r	S3rg	S3rg	S3rg	S3rg	S3rg	N1r	S3rg	S3rg	S3rg	S3rg	S3rg	N1r	N1r	S3rg
Chilaka mukki	32	N1r	S3rg	N1r	S3rg	N1r	S3rt	N1r	N1r	S3rt	N1r	N1r	S3rg	N1r	S3rg	N1r	N1r	N1r	S3rg	S3rg	S3rg	S3rg	S3rg	N1r	S3rg	S3rg	S3r	S3r	S3rg	N1r	N1r	S3r
Chilaka mukki	33	N1r	S3rg	N1r	S3rg	N1r	S3rt	N1r	N1r	S3rt	N1r	N1r	S3rg	N1r	N1r	N1r	N1r	N1r	S3rg	S3rg	S3rg	S3rg	N1r	S3rg	S3rg	S3rg	N1r	S3rg	S3rg	S3rg	N1r	N1r	S3rg
Chilaka mukki	34	N1r	S3rg	N1r	S3rg	N1r	S3rt	N1r	N1r	S3rt	N1r	N1r	S3rg	N1r	S3rg	N1r	N1r	N1r	S3rg	S3rg	S3rg	S3rg	S3rg	N1r	S3rg	S3rg	S3rg	S3rg	S3rg	N1r	N1r	S3rg
Chilaka mukki	35	N1r	S2rg	S3rg	S2rg	S3rg	S2rg	N1r	S3rg	S2rt	S3rg	S3rg	S2rg	S3rg	S2rg	S3rg	S3rg	S3rg	S2rg	S2rg	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S3g	S3g	S2rg	S3rg	S3rg	S3g
Chilaka mukki	36	N1r	S2rg	S3rg	S2rg	S3rg	S2rg	N1r	S3rg	S2rt	S3rg	S3rg	S2rg	S3rg	S2rg	S3rg	S3rg	S3rg	S2rg	S2rg	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S3g	S3g	S2rg	S3rg	S3rg	S3g
Chilaka mukki	37	N1r	S3rg	N1r	S3rg	N1r	S3rt	N1r	N1r	S3rt	N1r	N1r	S3rg	N1r	S3rg	N1r	N1r	N1r	S3rg	S3rg	S3rg	S3rg	S3rg	N1r	S3rg	S3rg	S3rg	S3rg	S3rg	N1r	N1r	S3rg
Chilaka mukki	38	S3tw	S2t	S3tw	S2w	S3tw	S2w	S2tw	S2w	S1	S2w	S2tw	S2tw	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S3tw	S3tw	S2tw	S2tw	S2tw	S2t	S3tw	S2tw	S2tw	S3tw	S2tw	S2tw	S2tw
Chilaka mukki	39	N1r	S2rg	S3rg	S2rg	S3rg	S2rg	N1r	S3rg	S2rt	S3rg	S3rg	S2rg	S3rg	S2rg	S3rg	S3rg	S3rg	S2rg	S2rg	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S3g	S3g	S2rg	S3rg	S3rg	S3g
Chilaka mukki	40	N1r	S2rg	S3rg	S2rg	S3rg	S2rg	N1r	S3rg	S2rt	S3rg	S3rg	S2rg	S3rg	S2rg	S3rg	S3rg	S3rg	S2rg	S2rg	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S3g	S3g	S2rg	S3rg	S3rg	S3g
Chilaka mukki	41	N1r	S2rg	S3rg	S2rg	S3rg	S2rg	N1r	S3rg	S2rt	S3rg	S3rg	S2rg	S3rg	S2rg	S3rg	S3rg	S3rg	S2rg	S2rg	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S3g	S3g	S2rg	S3rg	S3rg	S3g
Chilaka mukki	42	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Chilaka mukki	43	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Chilaka mukki	44	S3tw	S2t	S3tw	S2w	S3tw	S2w	S2tw	S2w	S1	S2w	S2tw	S2tw	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S3tw	S3tw	S2tw	S2tw	S2tw	S2t	S3tw	S2tw	S2tw	S3tw	S2tw	S2tw	S2tw
Chilaka mukki	45	S3tw	S2t	S3tw	S2w	S3tw	S2w	S2tw	S2w	S1	S2w	S2tw	S2tw	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S3tw	S3tw	S2tw	S2tw	S2tw	S2t	S3tw	S2tw	S2tw	S3tw	S2tw	S2tw	S2tw
Chilaka mukki	46	S3tw	S2t	S3tw	S2w	S3tw	S2w	S2tw	S2w	S1	S2w	S2tw	S2tw	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S3tw	S3tw	S2tw	S2tw	S2tw	S2t	S3tw	S2tw	S2tw	S3tw	S2tw	S2tw	S2tw
Chilaka mukki	47	S3tw	S2t	S3tw	S2w	S3tw	S2w	S2tw	S2w	S1	S2w	S2tw	S2tw	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S3tw	S3tw	S2tw	S2tw	S2tw	S2t	S3tw	S2tw	S2tw	S3tw	S2tw	S2tw	S2tw
Chilaka mukki	48	S3tw	S2t	S3tw	S2w	S3tw	S2w	S2tw	S2w	S1	S2w	S2tw	S2tw	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S3tw	S3tw	S2tw	S2tw	S2tw	S2t	S3tw	S2tw	S2tw	S3tw	S2tw	S2tw	S2tw
Chilaka mukki	49	S3r	S2g	S2r	S2g	S2r	S2rg	S3r	S2r	S2g	S2rg	S2rg	S1	S2r	S1	S2r	S2r	S2r	S1	S2g	S2g	S2g	S2g	S2r	S1	S2g	S1	S1	S2g	S2rg	S2r	S1
Chilaka mukki	50	S3tw	S2t	S3tw	S2w	S3tw	S2w	S2tw	S2w	S1	S2w	S2tw	S2tw	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S3tw	S3tw	S2tw	S2tw	S2tw	S2t	S3tw	S2tw	S2tw	S3tw	S2tw	S2tw	S2tw

Village	Survey No	Mango	Maize	Sapota	Sorghum	Guava	Cotton	Tamarind	Lime	Bengal gram	Sunflower	Red gram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Jasmine	Bhendi	Brinjal	Crossandra	Drumstick	Mulberry	Onion
Chilaka mukki	51	S3r	S2g	S2r	S2g	S2r	S2rg	S3r	S2r	S2g	S2rg	S2rg	S1	S2r	S1	S2r	S2r	S2r	S1	S2g	S2g	S2g	S2g	S2r	S1	S2g	S1	S1	S2g	S2rg	S2r	S1
Chilaka mukki	52	S3r	S2g	S2r	S2g	S2r	S2rg	S3r	S2r	S2g	S2rg	S2rg	S1	S2r	S1	S2r	S2r	S2r	S1	S2g	S2g	S2g	S2g	S2r	S1	S2g	S1	S1	S2g	S2rg	S2r	S1
Chilaka mukki	53	S3r	S2g	S2r	S2g	S2r	S2rg	S3r	S2r	S2g	S2rg	S2rg	S1	S2r	S1	S2r	S2r	S2r	S1	S2g	S2g	S2g	S2g	S2r	S1	S2g	S1	S1	S2g	S2rg	S2r	S1
Chilaka mukki	54	S3r	S2g	S2r	S2g	S2r	S2rg	S3r	S2r	S2g	S2rg	S2rg	S1	S2r	S1	S2r	S2r	S2r	S1	S2g	S2g	S2g	S2g	S2r	S1	S2g	S1	S1	S2g	S2rg	S2r	S1
Chilaka mukki	55	S3tw	S2t	S3tw	S2w	S3tw	S2w	S2tw	S2w	S1	S2w	S2tw	S2tw	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S3tw	S3tw	S2tw	S2tw	S2tw	S2t	S3tw	S2tw	S2tw	S3tw	S2tw	S2tw	S2tw
Chilaka mukki	56	S3tw	S2t	S3tw	S2w	S3tw	S2w	S2tw	S2w	S1	S2w	S2tw	S2tw	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S3tw	S3tw	S2tw	S2tw	S2tw	S2t	S3tw	S2tw	S2tw	S3tw	S2tw	S2tw	S2tw
Chilaka mukki	57	S3r	S2g	S2r	S2g	S2r	S2rg	S3r	S2r	S2g	S2rg	S2rg	S1	S2r	S1	S2r	S2r	S2r	S1	S2g	S2g	S2g	S2g	S2r	S1	S2g	S1	S1	S2g	S2rg	S2r	S1
Chilaka mukki	58	N1r	S2rg	S3rg	S2rg	S3rg	S2rg	N1r	S3rg	S2rt	S3rg	S3rg	S2rg	S3rg	S2rg	S3rg	S3rg	S3rg	S2rg	S2rg	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S3g	S3g	S2rg	S3rg	S3rg	S3g
Chilaka mukki	59	N1r	S2rg	S3rg	S2rg	S3rg	S2rg	N1r	S3rg	S2rt	S3rg	S3rg	S2rg	S3rg	S2rg	S3rg	S3rg	S3rg	S2rg	S2rg	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S3g	S3g	S2rg	S3rg	S3rg	S3g
Chilaka mukki	60	N1r	S2rg	S3rg	S2rg	S3rg	S2rg	N1r	S3rg	S2rt	S3rg	S3rg	S2rg	S3rg	S2rg	S3rg	S3rg	S3rg	S2rg	S2rg	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S3g	S3g	S2rg	S3rg	S3rg	S3g
Chilaka mukki	61	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g
Chilaka mukki	62	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3g	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g
Chilaka mukki	63	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g
Chilaka mukki	64	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g
Chilaka mukki	65	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro
Chilaka mukki	66	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro
Chilaka mukki	70	N1r	S3rg	N1r	S3rg	N1r	S3rt	N1r	N1r	S3rt	N1r	N1r	S3rg	N1r	S3rg	N1r	N1r	N1r	S3rg	S3rg	S3rg	S3rg	S3rg	N1r	S3rg	S3rg	S3rg	S3rg	S3rg	N1r	N1r	S3rg
Chilaka mukki	71	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro
Chilaka mukki	72	N1r	S3rg	N1r	S3rg	N1r	S3rt	N1r	N1r	S3rt	N1r	N1r	S3rg	N1r	S3rg	N1r	N1r	N1r	S3rg	S3rg	S3rg	S3rg	S3rg	N1r	S3rg	S3rg	S3rg	S3rg	S3rg	N1r	N1r	S3rg
Chilaka mukki	73	N1r	S3rg	N1r	S3rg	N1r	S3rt	N1r	N1r	S3rt	N1r	N1r	S3rg	N1r	S3rg	N1r	N1r	N1r	S3rg	S3rg	S3rg	S3rg	S3rg	N1r	S3rg	S3rg	S3rg	S3rg	S3rg	N1r	N1r	S3rg
Chilaka mukki	74	S3tw	S2t	S3tw	S2w	S3tw	S2w	S2tw	S2w	S1	S2w	S2tw	S2tw	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S3tw	S3tw	S2tw	S2tw	S2tw	S2t	S3tw	S2tw	S2tw	S3tw	S2tw	S2tw	S2tw

Village	Survey No	Mango	Maize	Sapota	Sorghum	Guava	Cotton	Tamarind	Lime	Bengal gram	Sunflower	Red gram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Jasmine	Bhendi	Brinjal	Crossandra	Drumstick	Mulberry	Onion
Chilaka mukki	75	S3tw	S2t	S3tw	S2w	S3tw	S2w	S2tw	S2w	S1	S2w	S2tw	S2tw	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S3tw	S3tw	S2tw	S2tw	S2tw	S2t	S3tw	S2tw	S2tw	S3tw	S2tw	S2tw	S2tw
Chilaka mukki	76	S3tw	S2t	S3tw	S2w	S3tw	S2w	S2tw	S2w	S1	S2w	S2tw	S2tw	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S3tw	S3tw	S2tw	S2tw	S2tw	S2t	S3tw	S2tw	S2tw	S3tw	S2tw	S2tw	S2tw
Chilaka mukki	77	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S3g	S3g	S2g	S3g
Chilaka mukki	78	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S3g	S3g	S2g	S3g
Chilaka mukki	79	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S3g	S3g	S2g	S3g
Chilaka mukki	80	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S3g	S3g	S2g	S3g
Chilaka mukki	81	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S3g	S3g	S2g	S3g
Chilaka mukki	82	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro
Chilaka mukki	83	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S3g	S3g	S2g	S3g
Chilaka mukki	84	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S3g	S3g	S2g	S3g
Chilaka mukki	85	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S3g	S3g	S2g	S3g
Chilaka mukki	86	S3tw	S2t	S3tw	S2w	S3tw	S2w	S2tw	S2w	S1	S2w	S2tw	S2tw	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S3tw	S3tw	S2tw	S2tw	S2tw	S2t	S3tw	S2tw	S2tw	S3tw	S2tw	S2tw	S2tw
Chilaka mukki	87	N1rg	S3rg	S3rg	S3rg	S3rg	S3g	N1rg	S3rg	S2rt	S3rg	S3rg	S2rg	S3rg	S2rg	S3rg	S3rg	S3rg	S3rg	S3g	S3g	S3g	S3g	S2rg	S2rg	S3g	S3g	S3g	S3g	S3rg	S3rg	S3g
Chilaka mukki	88	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S3g	S3g	S2g	S3g
Chilaka mukki	89	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S3g	S3g	S2g	S3g
Chilaka mukki	91	N1rg	S3rg	S3rg	S3rg	S3rg	S3g	N1rg	S3rg	S2rt	S3rg	S3rg	S2rg	S3rg	S2rg	S3rg	S3rg	S3rg	S3rg	S3g	S3g	S3g	S3g	S3rg	S2rg	S3g	S3g	S3g	S3g	S3rg	S3rg	S3g
Gosalad oddi	1	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S3g	S3g	S2g	S3g
Gosalad oddi	4	S3t	S2t	S3t	S1	S3t	S1	S2rt	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2rt	S1	S3t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S2tz	S2tz	S2t	S2t	S2t	S3tz
Gosalad oddi	5	S3rg	S3g	S3g	S3g	S3g	S3g	S3rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Gosalad oddi	6	S3rg	S3g	S3g	S3g	S3g	S3g	S3rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Gosalad oddi	17	S3t	S2t	S3t	S3t	S3t	N1t	S3t	S3t	N1t	S3t	S3t	S3t	S3t	S3t	N1t	S3t	S3t	S2t	S3t	S3t	S3t	S3t	S3t	S2t	S3t	S2w	S2w	S3t	S3t	S3t	S2w

Village	Survey No	Mango	Maize	Sapota	Sorghum	Guava	Cotton	Tamarind	Lime	Bengal gram	Sunflower	Red gram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Jasmine	Bhendi	Brinjal	Crossandra	Drumstick	Mulberry	Onion
Gosaladoddi	22	N1rg	S3rg	N1rg	S3rg	N1rg	S3rt	N1rg	N1rg	S3rt	N1rg	N1rg	S3rg	N1rg	S3rg	N1rg	N1rg	N1rg	S3rg	S3rg	S3rg	S3rg	S3rg	N1rg	S3rg	S3rg	S3r	S3r	S3rg	N1rg	N1rg	S3r
Gosaladoddi	23	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S3g	S3g	S2g	S3g
Gosaladoddi	28	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S3g	S3g	S2g	S3g
Gosaladoddi	29	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S3g	S3g	S2g	S3g
Gosaladoddi	30	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S3g	S3g	S2g	S3g
Gosaladoddi	33	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S3g	S3g	S2g	S3g
Hiresoolikeri	41	N1rg	S3rg	N1rg	S3rg	N1rg	S3rt	N1rg	N1rg	S3rt	N1rg	N1rg	S3rg	N1rg	S3rg	N1rg	N1rg	N1rg	S3rg	S3rg	S3rg	S3rg	S3rg	N1rg	S3rg	S3rg	S3r	S3r	S3rg	N1rg	N1rg	S3r
Hiresoolikeri	51	N1rg	S3rg	S3rg	S3rg	S3rg	S3g	N1rg	S3rg	S2rt	S3rg	S3rg	S2rg	S3rg	S2rg	S3rg	S3rg	S3rg	S3rg	S3g	S3g	S3g	S3g	S3rg	S2rg	S3g	S3g	S3g	S3g	S3g	S3rg	S3g
Irakallagada	121	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro
Jinnapura	48	N1rg	S3rg	N1rg	S3rg	N1rg	S3rt	N1rg	N1rg	S3rt	N1rg	N1rg	S3rg	N1rg	S3rg	N1rg	N1rg	N1rg	S3rg	S3rg	S3rg	S3rg	S3rg	N1rg	S3rg	S3rg	S3r	S3r	S3rg	N1rg	N1rg	S3r
Jinnapura	49	N1rg	S3rg	N1rg	S3rg	N1rg	S3rt	N1rg	N1rg	S3rt	N1rg	N1rg	S3rg	N1rg	S3rg	N1rg	N1rg	N1rg	S3rg	S3rg	S3rg	S3rg	S3rg	N1rg	S3rg	S3rg	S3r	S3r	S3rg	N1rg	N1rg	S3r
Kodadhala	1	S3rz	S2tz	S3tz	S2nz	S3tz	S2rz	S3rz	S2rz	S2rz	S2rz	S3rz	S2tz	S3tz	S2z	N1tz	S3rz	S2rz	S3tz	S3tz	S3tz	S2tz	S2tz	S2rt	S2tz	S3tz	S2tz	S2z	S2rz	S2tz	S2rz	S2tz
Kodadhala	2	S3rz	S2tz	S3tz	S2nz	S3tz	S2rz	S3rz	S2rz	S2rz	S2rz	S3rz	S2tz	S3tz	S2z	N1tz	S3rz	S2rz	S3tz	S3tz	S3tz	S2tz	S2tz	S2rt	S2tz	S3tz	S2tz	S2tz	S2z	S2rz	S2tz	S3tz
Kodadhala	3	S3tw	S2t	S3tw	S2w	S3tw	S2w	S2tw	S2w	S1	S2w	S2tw	S2tw	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S3tw	S3tw	S2tw	S2tw	S2tw	S2t	S3tw	S2tw	S2tw	S3tw	S2tw	S2tw	S2tw
Kodadhala	4	S3rz	S2tz	S3tz	S2nz	S3tz	S2rz	S3rz	S2rz	S2rz	S2rz	S3rz	S2tz	S3tz	S2z	N1tz	S3rz	S2rz	S3tz	S3tz	S3tz	S2tz	S2tz	S2rt	S2tz	S3tz	S2tz	S2z	S2rz	S2tz	S2rz	S3tz
Kodadhala	5	S3tw	S2t	S3tw	S2w	S3tw	S2w	S2tw	S2w	S1	S2w	S2tw	S2tw	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S3tw	S3tw	S2tw	S2tw	S2tw	S2t	S3tw	S2tw	S2tw	S3tw	S2tw	S2tw	S2tw
Kodadhala	6	S3tw	S2t	S3tw	S2w	S3tw	S2w	S2tw	S2w	S1	S2w	S2tw	S2tw	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S3tw	S3tw	S2tw	S2tw	S2tw	S2t	S3tw	S2tw	S2tw	S3tw	S2tw	S2tw	S2tw
Kodadhala	7	S3tw	S2t	S3tw	S2w	S3tw	S2w	S2tw	S2w	S1	S2w	S2tw	S2tw	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S3tw	S3tw	S2tw	S2tw	S2tw	S2t	S3tw	S2tw	S2tw	S3tw	S2tw	S2tw	S2tw
Kodadhala	8	S3tw	S2t	S3tw	S2w	S3tw	S2w	S2tw	S2w	S1	S2w	S2tw	S2tw	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S3tw	S3tw	S2tw	S2tw	S2tw	S2t	S3tw	S2tw	S2tw	S3tw	S2tw	S2tw	S2tw
Kodadhala	9	S3tw	S2t	S3tw	S2w	S3tw	S2w	S2tw	S2w	S1	S2w	S2tw	S2tw	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S3tw	S3tw	S2tw	S2tw	S2tw	S2t	S3tw	S2tw	S2tw	S3tw	S2tw	S2tw	S2tw
Kodadhala	10	S3tw	S2t	S3tw	S2w	S3tw	S2w	S2tw	S2w	S1	S2w	S2tw	S2tw	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S3tw	S3tw	S2tw	S2tw	S2tw	S2t	S3tw	S2tw	S2tw	S3tw	S2tw	S2tw	S2tw

Village	Survey No	Mango	Maize	Sapota	Sorghum	Guava	Cotton	Tamarind	Lime	Bengal gram	Sunflower	Red gram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Jasmine	Bhendi	Brinjal	Crossandra	Drumstick	Mulberry	Onion
Kodadhala	11	S3rz	S2tz	S3tz	S2nz	S3tz	S2rz	S3rz	S2rz	S2rz	S2rz	S3rz	S2tz	S3tz	S2z	N1tz	S3rz	S2rz	S3tz	S3tz	S3tz	S2tz	S2tz	S2rt	S2tz	S3tz	S2tz	S2tz	S2z	S2rz	S2tz	S3tz
Kodadhala	12	S3tw	S2t	S3tw	S2w	S3tw	S2w	S2tw	S2w	S1	S2w	S2tw	S2tw	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S3tw	S3tw	S2tw	S2tw	S2tw	S2t	S3tw	S2tw	S2tw	S3tw	S2tw	S2tw	S2tw
Kodadhala	13	S3rz	S2tz	S3tz	S2nz	S3tz	S2rz	S3rz	S2rz	S2rz	S2rz	S3rz	S2tz	S3tz	S2z	N1tz	S3rz	S2rz	S3tz	S3tz	S3tz	S2tz	S2tz	S2rt	S2tz	S3tz	S2tz	S2tz	S2z	S2rz	S2tz	S3tz
Kodadhala	14	S3rz	S2tz	S3tz	S2nz	S3tz	S2rz	S3rz	S2rz	S2rz	S2rz	S3rz	S2tz	S3tz	S2z	N1tz	S3rz	S2rz	S3tz	S3tz	S3tz	S2tz	S2tz	S2rt	S2tz	S3tz	S2tz	S2tz	S2z	S2rz	S2tz	S3tz
Kodadhala	15	S3rz	S2tz	S3tz	S2nz	S3tz	S2rz	S3rz	S2rz	S2rz	S2rz	S3rz	S2tz	S3tz	S2z	N1tz	S3rz	S2rz	S3tz	S3tz	S3tz	S2tz	S2tz	S2rt	S2tz	S3tz	S2tz	S2tz	S2z	S2rz	S2tz	S3tz
Kodadhala	16	S3rz	S2tz	S3tz	S2nz	S3tz	S2rz	S3rz	S2rz	S2rz	S2rz	S3rz	S2tz	S3tz	S2z	N1tz	S3rz	S2rz	S3tz	S3tz	S3tz	S2tz	S2tz	S2rt	S2tz	S3tz	S2tz	S2tz	S2z	S2rz	S2tz	S3tz
Kodadhala	17	S3rg	S3g	S3g	S3g	S3g	S3g	S3rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2gt	S2g
Kodadhala	18	S3rg	S3g	S3g	S3g	S3g	S3g	S3rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2gt	S2g
Kodadhala	19	S3rg	S3g	S3g	S3g	S3g	S3g	S3rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2gt	S2g
Kodadhala	20	S3rg	S3g	S3g	S3g	S3g	S3g	S3rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2gt	S2g
Kodadhala	65	S3tw	S2t	S3tw	S2w	S3tw	S2w	S2tw	S2w	S1	S2w	S2tw	S2tw	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S3tw	S3tw	S2tw	S2tw	S2tw	S2t	S3tw	S2tw	S2tw	S3tw	S2tw	S2tw	S2tw
Kodadhala	66	N1r	S2rg	S3r	S2rg	S3r	S2rg	N1r	S3r	S3t	S3r	S3r	S2rg	S3r	S2rg	S3r	S3r	S3r	S2rg	S2rg	S2rg	S2rg	S2rg	S3r	S2rg	S2rg	S2rt	S2r	S2rg	S3r	S3r	S2rt
Kodadhala	67	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S3g	S3g	S2g	S3g
Kodadhala	68	N1r	S2rg	S3r	S2rg	S3r	S2rg	N1r	S3r	S3t	S3r	S3r	S2rg	S3r	S2rg	S3r	S3r	S3r	S2rg	S2rg	S2rg	S2rg	S2rg	S3r	S2rg	S2rg	S2rt	S2r	S2rg	S3r	S3r	S2rt
Kodadhala	69	S3tw	S2t	S3tw	S2w	S3tw	S2w	S2tw	S2w	S1	S2w	S2tw	S2tw	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S3tw	S3tw	S2tw	S2tw	S2tw	S2t	S3tw	S2tw	S2tw	S3tw	S2tw	S2tw	S2tw

Ro-Rock outcrops

PART-B

SOCIO-ECONOMIC STATUS OF FARM HOUSEHOLDS

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LIST OF TABLES

SALIENT FINDINGS OF THE STUDY

❖ *Results indicated that 35 farmers were sampled in Chilkamuki micro watershed among them 15 (42.86%) were marginal farmers, 14 (40 %) were small farmers, 1(2.86 %) were semi medium farmers and 5 (14.29 %) landless farmers were also interviewed for the survey.*

❖ *The data indicated that there were 148 population households were there in the studied micro watershed. Among them 80 (54.05%) men and 68 (45.95 %) were women. The average family size of landless was 3, marginal farmers and medium farmers were 4, small farmer was 6 and semi medium farmer was 5. On an average the family size was 4.*

❖ *The data indicated that 18(12.16%) people were in 0-15 years of age, 72 (48.65 %) were in 16-35 years of age, 42 (23.38 %) were in 36-60 years of age and 16 (10.81%) were above 61 years of age.*

❖ *The results indicated that the Chilkamuki had 38.51 per cent illiterates, 20.95 per cent of them had primary school education, 12.84 per cent of them had both middle school, 18.24 per cent them had high school education, 6.76 per cent of them had PUC education, 0.68 per cent them had ITI education, 1.35 per cent of them had degree education and 0.68 per cent them had others.*

❖ *The results indicated that, 82.86 per cent of households practicing agriculture, 5.71 per cent of the household heads were agricultural labour 8.57 per cent of the household heads were general labour.*

❖ *The results indicated that agriculture was the major occupation for 72.30 per cent of the household members, 4.05 per cent were agricultural labourers, 6.76 per cent were general labours and 14.86 per cent of them were students. In case of landless households 31.25 per cent were agriculture labour, 56.25 per cent were general labourers and 12.50 per cent were students. In case of marginal farmers 89.83 per cent were agriculturist and 10.17 per cent were students. In case of small farmers 75 per cent of them were agriculturist and 17.65 per cent of them were students. In case of semi medium farmers 60 per cent of the family members were agriculturist and 40 per cent of them were students.*

❖ *The results showed that 1.35 per cent of them participated in self help groups and 98.65 per cent of them have not participated in any local institutions.*

❖ *The results indicated that 82.86 per cent of the households possess Katcha house and 8.57 per cent of the households possess Pucca house and Thatched house respectively.*

❖ *The results showed that, 77.14 per cent of the households possess TV and Mixer grinder, 80 per cent of the households possess bicycle, 11.43 per cent of the households possess motor cycle and 85.71 per cent of the households possess mobile.*

❖ *The results showed that the average value of television was Rs. 3000, mixer grinder was Rs.1018, bicycle was Rs.1089, motor cycle was Rs.26000 and mobile phone was Rs.772.*

❖ *Data showed that 11.43 per cent of the households possess bullock cart, 37.14 per cent of them possess plough, 20 per cent of the households possess sprayer, 85.71 per cent of the households possess weeder and 22.86 per cent of the households possess chaff cutter.*

❖ *The results showed that the average value of bullock cart was Rs.20000; the average value of plough was Rs. 591, the average value of sprayer was Rs. 3571, the average value of weeder was Rs. 31 and the average value of chaff cutter was Rs. 2500.*

❖ *The results indicated that, 37.14 per cent of the households possess bullocks and 2.86 per cent of the households possess crossbred cow. In case of marginal farmers, 26.67 per cent of the households possess bullock. In case of small farmers, 64.29 per cent of households possess bullock and 7.14 per cent possess crossbred cow.*

❖ *The results indicated that, average own labour men available in the micro watershed was 11.23 average own labour (women) available was 10.97, average hired labour (men) available was 1.57 and average hired labour (women) available was 1.83. In case of marginal farmers, average own labour men available was 8.33, average own labour (women) was also 8.53, average hired labour (men) was 1.53 and average hired labour (women) available was 1.87. In case of small farmers, average own labour men available was 14.64, average own labour (women) was 13.79, average hired labour (men) was 1.57 and average hired labour (women) available was 1.86. In case of semi medium farmers, average own labour men available was 7, average own labour (women) was 8, average hired labour (men) was 2 and average hired labour (women) available was 1.*

❖ *The results indicated that, 94.29 per cent of the household opined that hired labour was adequate.*

❖ *The results indicated that, households of the Chilkamuki micro watershed possess 30.97 ha (96.23 %) of dry land and 1.21 ha (3.77%) of irrigated land. Marginal farmers possess 11.02 ha (100%) of dry land. Small farmers possess 19.95 ha (100 %) of dry land. Semi medium farmers possess 1.21 ha (100%) of irrigated land.*

❖ *The results indicated that, the average value of dry land was Rs. 293,701.82 and average value of irrigated was Rs. 411,666.67. In case of marginal famers, the average land value was Rs. 389,904.55 for dry land. In case of small famers, the average land value was Rs. 240,535.60 for dry land. In case of semi medium famers, the average land value was Rs. 411,666.67 for irrigated land.*

❖ *The results indicated that, there were 1 functioning bore wells in the micro watershed.*

❖ *The results indicated that, bore well was the major irrigation source for 2.86 per cent of the farmers.*

❖ *The results indicated that on an average the depth of the bore well was 2.44 meters.*

❖ *The results indicated that, in case of semi medium farmers there was 0.81 ha of irrigated land.*

❖ *The results indicated that, farmers have grown groundnut (9.66 ha), Navane (0.81 ha), paddy (0.81 ha), Red gram (1.62 ha), sunflower (4.98 ha) and maize (1.62 ha). Marginal farmers have grown groundnut, navane and sunflower. Small farmers have grown groundnut, redgram, sunflower and maize. Semi medium farmers have grown paddy.*

❖ *The results indicated that, the cropping intensity in Chilkamuki micro watershed was found to be 100 per cent. In case of marginal farmers it was 103per cent, in small farmers it was 100 and in semi medium farmers it was 66.67.*

❖ *The results indicated that, 91.43 per cent of the households have bank account including 40 per cent of the landless and 100 per cent of the marginal, small and semi medium farmers respectively.*

❖ *The results indicated that, 40 per cent of the landless, 86.67 per cent of marginal, 100 per cent of small and semi medium farmers have borrowed credit from different sources.*

❖ *The results indicated that, 11.76 per cent have availed loan in commercial bank and friends/ relatives correspondingly, 52.94 per cent have availed loan from Grameena bank, 23.52 per cent have availed loan from money lender and 29.41 per cent have availed loan from SHGs/CBOs.*

❖ *The results indicated that, marginal, small and semi medium have availed Rs.10000, Rs. 11923.08 and Rs. 16428.57 respectively. Overall average credit amount availed by households in the micro watershed is 13500.*

❖ *The results indicated that, 100 per cent of the households have borrowed loan institutional credit for agriculture production.*

❖ *The results indicated that, about 80 percent of private credit was taken for agriculture production and 20 per cent of the loan taken for household consumption.*

❖ *Results indicated that 100 percent of the households have unpaid their institutional loan.*

❖ *Results indicated that 82.82 per cent of the households have repaid their private credit partially, 9.09 percent of the households have unpaid their loan and 9.09 per cent of them fully paid their loan.*

❖ *The results indicated that 100 per cent of the households were opined that they were helped to perform timely agricultural operations.*

❖ *The results indicated that, the total cost of cultivation for maize was Rs. 24649.75. The gross income realized by the farmers was Rs. 22656.01. The net income from*

maize cultivation was Rs. -1993.74. Thus the benefit cost ratio was found to be 1:0.92.

❖ *The results indicated that, the total cost of cultivation for paddy was Rs. 35697.58. The gross income realized by the farmers was Rs. 109359.25. The net income from paddy cultivation was Rs. 73661.67. Thus the benefit cost ratio was found to be 1:3.06.*

❖ *The results indicated that, the total cost of cultivation for groundnut was Rs. 43389.06. The gross income realized by the farmers was Rs. 56396.58. The net income from groundnut cultivation was Rs. 13007.52. Thus the benefit cost ratio was found to be 1:1.3.*

❖ *The results indicated that, the total cost of cultivation for Sunflower was Rs. 26654.19. The gross income realized by the farmers was Rs. 45506.01. The net income from Sunflower cultivation was Rs. 18851.82. Thus the benefit cost ratio was found to be 1:1.71.*

❖ *The results indicated that, the total cost of cultivation for Red gram was Rs. 16982.11. The gross income realized by the farmers was Rs. 148200. The net income from Red gram cultivation was Rs. 131217.89. Thus the benefit cost ratio was found to be 1:8.73.*

❖ *The results indicated that, the total cost of cultivation for Navane was Rs. 17558.19. The gross income realized by the farmers was Rs. 23341.50. The net income from Navane cultivation was Rs. 5783.31. Thus the benefit cost ratio was found to be 1:1.33.*

❖ *The results indicated that, 31.43 per cent of the households opined that dry fodder was adequate.*

❖ *The table indicated that, in landless farmers, the average income from wage was Rs. 51000. In marginal farmers the average income from service/salary was Rs.5333.33, wage was Rs.41000 and agriculture Rs.28654. In case of small farmers the average income from service/salary was Rs.6785.71, wage was Rs.28928.57, agriculture was Rs.57380 and dairy farm was Rs.964.29. In case of semi medium farmers, the average income from wage was Rs.10000 and agriculture Rs.110000.*

❖ *The results indicated that, in landless farmer, the average expenditure from wage was Rs. 1250.In marginal farmers; the average expenditure from agriculture was Rs.15866.67. In small farmers the average expenditure from agriculture was Rs.35071.43 and dairy farm was Rs.8000. In semi medium farmers the average expenditure from agriculture was Rs.65000.*

❖ *The results indicated that, sampled households have grown 9 coconut trees and 6 mango tree in their field.*

❖ *The results indicated that, households have planted 1 teak trees, 69 neem trees, 5 tamarind tress and 2 banyan trees in their field.*

❖ *The results indicate that, households have an average investment capacity of Rs. 1428.57 for land development, Rs. 571.43 for improved crop production and Rs.2571.43 for improved livestock management. Marginal households have an average investment capacity of Rs. 6000 for improved livestock management. Small farmers have an average investment capacity of Rs. 3571.43 for land development and Rs.1428.57 for improved crop production.*

❖ *The results indicated that for 2.86 per cent of the households were dependent on loan from the bank for land development and irrigation facility and improved crop production respectively. 5.71 per cent of the households were dependent on loan from the bank for improved livestock management.*

❖ *The results indicated that, maize, navane, paddy, red gram and sunflower crops were sold to the extent of 100 per cent. Bajra and groundnut were sold to the extent of 98.78 per cent and 90.65 per cent respectively.*

❖ *The results indicated that, 25.71 percent of the households have sold their produce to local/village merchant and 68.57 percent of the households sold their produce in regulated markets.*

❖ *The results indicated that 62.86 per cent of the households have used tractor as a mode of transport, and 31.43 per cent have used truck.*

❖ *The results indicated that, 22.86 per cent of the households have experienced the soil and water erosion problems i.e. 26.67 percent of marginal farmers and 28.57 per cent of small farmers.*

❖ *The results indicated that, 91.43 per cent of the households have shown interest in soil testing.*

❖ *The results indicated that, 94.29 percent used fire wood as a source of fuel and 8.57 percent of the households used LPG.*

❖ *The results indicated that, piped supply was the source of drinking water for 97.14 per cent and 2.86 per cent of them were using bore well for drinking water.*

❖ *The results indicated that, electricity was the major source of light for 100 per cent of the households.*

❖ *The results indicated that, 57.14 per cent of the households possess sanitary toilet i.e. 40 per cent of landless, 100 per cent of marginal, 14.29 per cent of small and 100 per cent of semi medium farmers had sanitary toilet facility.*

❖ *The results indicated that, 100 per cent of the sampled households possessed BPL card.*

❖ *The results indicated that, 62.86 per cent of the households participated in NREGA programme which included 100 per cent of the landless, marginal and semi medium and 7.14 percent of the small farmers respectively.*

❖ *The results indicated that, cereals, pulses, oilseeds, vegetables, fruits , milk and egg were adequate for 100 per cent, 94.29 per cent, 2.86 per cent, 45.71 per cent, 14.29 per cent, 74.29 per cent and 8.57 per cent of the households respectively.*

❖ *The results indicated that, pulses, oilseeds, vegetables, fruits, milk, egg and meat were inadequate for 5.71 per cent,65.71 per cent, 54.29 per cent,88.57 per cent, 25.71 per cent, 85.71 and 97.14 per cent of the households respectively.*

❖ *The results indicated that, Lower fertility status of the soil was the constraint experienced by 51.43 per cent of the households, wild animal menace on farm field (74.29%), frequent incidence of pest and diseases (71.43%), inadequacy of irrigation water (25.71%), high cost of Fertilizers and plant protection chemicals (62.86%), high rate of interest on credit (25.71%), low price for the agricultural commodities (65.71%), lack of marketing facilities in the area (60%), inadequate extension services (28.57%), lack of transport for safe transport of the agricultural produce to the market (71.43%), less rainfall (14.29%) and Source of Agri-technology information(Newspaper/TV/Mobile (2.86%).*

INTRODUCTION

Soil and water are the two precious natural resources which are essential for crop production and existence of life on earth. Rainfed agriculture is under severe stress due to various constraints related to agriculture like uneven and erratic distribution of rainfall, indiscriminate use of fertilizers, chemicals and pesticides, adoption of improper land management practices, soil erosion, decline in soil fertility, decline in ground water resources leading to low crop productivity. The area under rainfed agriculture has to be managed effectively using the best available practices to enhance the production of food, fodder and fuel. This is possible if the land resources are characterized at each parcel of land through detailed land resource inventory using the best available techniques of remote sensing, GPS and GIS. The watershed development programs are aimed at the sustainable distribution of its resources and the process of creating and implementing plans, programs, and projects to sustain and enhance watershed functions that affect the plant, animal and human communities within a watershed boundary.

World Bank funded KWDP II, SUJALA III project was implemented in with Broad objective of demonstrating more effective watershed management through greater integration of programmes related to rain-fed agriculture, innovative and science based approaches and strengthen institutional capacities and If successful, it is expected that the systems and tools could be mainstreamed into the overall IWMP in the State of Karnataka and in time, throughout other IWMP operations in India. With this background the socio-economic survey has been carried out with following specific objectives:

1. To understand the demographic features of the households in the micro-watershed
2. To understand the extent of family labour available and additional employment opportunities available within the village.
3. To know the status of assets of households in the micro-watershed for suggesting possible improvements.
4. To study the cropping pattern, cropped area and productivity levels of different households in micro-watershed.
5. To determine the type and extent of livestock owned by different categories of HHs
6. Availability of fodder and level of livestock management.

Scope and importance of survey

Survey helps in identification of different socio-economic and resource use-patterns of farmers at the Micro watershed. Household survey provides demographic features, labour force, and levels of education; land ownership and asset position (including livestock and other household assets) of surveyed households; and cropping patterns, input intensities, and average crop yields from farmers' fields. It also discusses crop utilization and the degree of commercialization of production in the areas; farmers' access to and utilization of credit from formal and informal sources; and the level of adoption and use of soil, water,and pest management technologies.

METHODOLOGY

The description of the methods, components selected for the survey and procedures followed in conducting the baseline survey are furnished under the following heads.

Description of the study area

Koppal district is an administrative district in the state of Karnataka in India. In the past Koppal was referred to as 'Kopana Nagara'. Koppal, now a district headquarters is ancient Kopana a major holy place of the Jains. The district occupies an area of 7,190 km² and has a population of 1,196,089, which 16.58% were urban as of 2001. The Koppal district was formed after split of Raichur district. It consists of four taluks namely Koppal, Gangavathi, Kushtagi and Yelburga. The undulating topography with black cotton soil shrips, cut across by numerous nalas or streams is the major characteristic feature of the study region. The Koppal district is having partly red sandy and black soil suitable for agriculture and horticulture crops. Majority of Gangavathi taluk is having black soil. The taluk is also having very few hills with xerophilous vegetation. The partly red sandy soil and black soil of mixed geographical origin are found in the Yelburga taluk.

Three physiographic divisions have made considering the local conditions of landforms and crops grown in the district. On the basis of physiographic, Koppal district can be divided into three major divisions. They are (a) Koppal & Yelburga plateau, (b) Maidan division, (c) Tungabhadra valley. The district is part of Krishna basin the main streams draining the area are Maskinala, Ilkal-nadi and Hirenala. These are Ephemeral in nature, these come under Tungabhadra sub-basin. The drainage exhibit dendritic to subdendritic with drainage density varies from 1.4 to7.0kms/sq.km.

According to the 2011 census Koppal district has a population of 1,391,292, roughly equal to the nation of Swaziland or the US state of Hawaii. This gives it a ranking of 350th in India (out of a total of 640). The district has a population density of 250 inhabitants per square kilometre (650/sq mi). Its population growth rate over the decade 2001-2011 was 16.32%. Koppal has a sex ratio of 983 females for every 1000 males, and a literacy rate of 67.28%.

Description of the micro-watershed

Chilkamuki micro-watershed (Irakallaguda sub-watershed, Koppal Taluk and District) is located at North latitude $15^0 31'23.774''$ to $15^0 28'39.571''$ and East longitude $76^0 15'40.026''$ to $76^0 13'40.911''$ covering an area of 658.88 ha and spread across Chilakamukki, Hosura, Kodadhala, Gasaladoddi and Chambalpura villages.

Methodology followed in assessing socio-economic status of households

In order to assess the socio-economic condition of the farmers in the watershed a comprehensive questionnaire was prepared. Major components such as demographic conditions, migration details, food consumption and family expenditure pattern, material possession, land holding, land use management, cropping pattern, cost of cultivation of crops, livestock management. The statistical components such as frequency and percentage were used to analyze the data. About 35 households located in the micro-watershed were interviewed for the survey.

SALIENT FEATURES OF THE SURVEY

Households sampled for socio-economic survey: The data on households sampled for socio economic survey in Chilkamuki micro watershed is presented in Table 1 and it indicated that 35 farmers were sampled in Chilkamuki micro watershed among them 15 (42.86%) were marginal farmers, 14 (40 %) were small farmers, 1(2.86 %) were semi medium farmers and 5 (14.29 %) landless farmers were also interviewed for the survey.

Table 1: Households sampled for socio economic survey in Chilkamuki micro watershed

Sl.No.	Particulars	LL (5)		MF (15)		SF (14)		SMF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Farmers	5	14.29	15	42.86	14	40.00	1	2.86	35	100.00

Population characteristics: The population characteristics of households sampled for socio-economic survey in Chilkamuki micro watershed is presented in Table 2. The data indicated that there were 148 population households were there in the studied micro watershed. Among them 80 (54.05%) men and 68 (45.95 %) were women. The average family size of landless was 3, marginal farmers and medium farmers were 4, small farmer was 6 and semi medium farmer was 5. On an average the family size was 4.

Table 2: Population characteristics of Chilkamuki micro-watershed

Sl.No.	Particulars	LL (16)		MF (59)		SF (68)		SMF (5)		All (148)	
		N	%	N	%	N	%	N	%	N	%
1	Male	10	62.50	31	52.54	36	52.94	3	60.00	80	54.05
2	Female	6	37.50	28	47.46	32	47.06	2	40.00	68	45.95
	Total	16	100.00	59	100.00	68	100.00	5	100.00	148	100.00
	Average	3		4		6		5		4	

Age wise classification of population: The age wise classification of household members in Chilkamuki micro watershed is presented in Table 3. The data indicated that 18(12.16%) people were in 0-15 years of age, 72 (48.65 %) were in 16-35 years of age, 42 (23.38 %) were in 36-60 years of age and 16 (10.81%) were above 61 years of age.

Table 3: Age wise classification of household members in Chilkamuki micro watershed

Sl.No.	Particulars	LL (16)		MF (59)		SF (68)		SMF (5)		All (148)	
		N	%	N	%	N	%	N	%	N	%
1	0-15 years	1	6.25	4	6.78	11	16.18	2	40.00	18	12.16
2	16-35 years	6	37.50	32	54.24	32	47.06	2	40.00	72	48.65
3	36-60 years	6	37.50	17	28.81	19	27.94	0	0.00	42	28.38
4	> 61 years	3	18.75	6	10.17	6	8.82	1	20.00	16	10.81
	Total	16	100.00	59	100.00	68	100.00	5	100.00	148	100.00

Education level of household members: Education level of household members in Chilkamuki micro watershed is presented in Table 4. The results indicated that the Chilkamuki had 38.51 per cent illiterates, 20.95 per cent of them had primary school

education, 12.84 per cent of them had both middle school, 18.24 per cent them had high school education, 6.76 per cent of them had PUC education, 0.68 per cent them had ITI education, 1.35 per cent of them had degree education and 0.68 per cent them had others.

Table 4: Education level of household members in Chilkamuki micro watershed

Sl.No.	Particulars	LL (16)		MF (59)		SF (68)		SMF (5)		All (148)	
		N	%	N	%	N	%	N	%	N	%
1	Illiterate	9	56.25	25	42.37	21	30.88	2	40	57	38.51
2	Primary School	2	12.50	11	18.64	17	25.00	1	20	31	20.95
3	Middle School	1	6.25	7	11.86	9	13.24	2	40	19	12.84
4	High School	3	18.75	9	15.25	15	22.06	0	0	27	18.24
5	PUC	0	0.00	7	11.86	3	4.41	0	0	10	6.76
6	ITI	0	0.00	0	0.00	1	1.47	0	0	1	0.68
7	Degree	1	6.25	0	0.00	1	1.47	0	0	2	1.35
8	Others	0	0.00	0	0.00	1	1.47	0	0	1	0.68
	Total	16	100.00	59	100.00	68	100.00	5	10	148	100.00

Occupation of household heads: The data regarding the occupation of the household heads in Chilkamuki micro watershed is presented in Table 5. The results indicated that, 82.86 per cent of households practicing agriculture, 5.71 per cent of the household heads were agricultural labour 8.57 per cent of the household heads were general labour.

Table 5: Occupation of household heads in Chilkamuki micro watershed

Sl. No.	Particulars	LL (5)		MF (15)		SF (14)		SMF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Agriculture	0	0.00	15	100.00	13	92.86	1	100.00	29	82.86
2	Agricultural Labour	2	40.00	0	0.00	0	0.00	0	0.00	2	5.71
3	General Labour	3	60.00	0	0.00	0	0.00	0	0.00	3	8.57
4	Others	0	0.00	0	0.00	1	7.14	0	0.00	1	2.86
	Total	5	100.00	15	100.00	14	100.00	1	100.00	35	100.00

Table 6: Occupation of family members in Chilkamuki micro watershed

Sl. No.	Particulars	LL (16)		MF (59)		SF (68)		SMF (5)		All (148)	
		N	%	N	%	N	%	N	%	N	%
1	Agriculture	0	0.00	53	89.83	51	75.00	3	60	107	72.30
2	Agricultural Labour	5	31.25	0	0.00	1	1.47	0	0	6	4.05
3	General Labour	9	56.25	0	0.00	1	1.47	0	0	10	6.76
4	Student	2	12.50	6	10.17	12	17.65	2	40	22	14.86
5	Others	0	0.00	0	0.00	2	2.94	0	0	2	1.35
6	Children	0	0.00	0	0.00	1	1.47	0	0	1	0.68
	Total	16	100.00	59	100.00	68	100.00	5	100	148	100.00

Occupation of the household members: The data regarding the occupation of the household members in Chilkamuki micro watershed is presented in Table 6. The results indicated that agriculture was the major occupation for 72.30 per cent of the household members, 4.05 per cent were agricultural labourers, 6.76 per cent were general labours and 14.86 per cent of them were students. In case of landless households 31.25 per cent were agriculture labour, 56.25 per cent were general labourers and 12.50 per cent were

students. In case of marginal farmers 89.83 per cent were agriculturist and 10.17 per cent were students. In case of small farmers 75 per cent of them were agriculturist and 17.65 per cent of them were students. In case of semi medium farmers 60 per cent of the family members were agriculturist and 40 per cent of them were students.

Institutional participation of the household members: The data regarding the institutional participation of the household members in Chilkamuki micro-watershed is presented in Table 7. The results showed that 1.35 per cent of them participated in self help groups and 98.65 per cent of them have not participated in any local institutions.

Table 7: Institutional Participation of household members in Chilkamuki micro watershed

Sl.No.	Particulars	LL (16)		MF (59)		SF (68)		SMF (5)		All (148)	
		N	%	N	%	N	%	N	%	N	%
1	Self Help Group	0	0.00	1	1.69	1	1.47	0	0.00	2	1.35
2	No Participation	16	100.00	58	98.31	67	98.53	5	100.00	146	98.65
	Total	16	100.00	59	100.00	68	100.00	5	100.00	148	100.0

Type of house owned: The data regarding the type of house owned by the households in Chilkamuki micro watershed is presented in Table 8. The results indicated that 82.86 per cent of the households possess Katcha house and 8.57 per cent of the households possess Pucca house and Thatched house respectively.

Table 8: Type of house owned by households in Chilkamuki micro watershed

Sl.No.	Particulars	LL (5)		MF (15)		SF (14)		SMF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Thatched	2	40.00	1	6.67	0	0.00	0	0.00	3	8.57
2	Katcha	3	60.00	14	93.33	11	78.57	1	100.00	29	82.86
3	Pucca/RCC	0	0.00	0	0.00	3	21.43	0	0.00	3	8.57
	Total	5	100.00	15	100.00	14	100.00	1	100.00	35	100.00

Durable Assets owned by the households: The data regarding the Durable Assets owned by the households in Chilkamuki micro watershed is presented in Table 9. The results showed that, 77.14 per cent of the households possess TV and Mixer grinder, 80 per cent of the households possess bicycle, 11.43 per cent of the households possess motor cycle and 85.71 per cent of the households possess mobile.

Table 9: Durable Assets owned by households in Chilkamuki micro watershed

Sl.No.	Particulars	LL (5)		MF (15)		SF (14)		SMF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Television	2	40.00	11	73.33	13	92.86	1	100.00	27	77.14
2	Mixer/Grinder	2	40.00	11	73.33	13	92.86	1	100.00	27	77.14
3	Bicycle	3	60.00	10	66.67	14	100.00	1	100.00	28	80.00
4	Motor Cycle	0	0.00	0	0.00	4	28.57	0	0.00	4	11.43
5	Mobile Phone	3	60.00	13	86.67	13	92.86	1	100.00	30	85.71
6	Blank	2	40.00	1	6.67	0	0.00	0	0.00	3	8.57

Average value of durable assets: The data regarding the average value of durable assets owned by the households in Chilkamuki micro watershed is presented in Table 10. The results showed that the average value of television was Rs. 3000, mixer grinder was Rs.1018, bicycle was Rs.1089, motor cycle was Rs.26000 and mobile phone was Rs.772.

Table 10: Average value of durable assets owned by households in Chilkamuki micro watershed

Sl.No.	Particulars	LL (5)	MF (15)	SF (14)	SMF (1)	All (35)
1	Television	2,000.00	4,000.00	2,384.00	2,000.00	3,000.00
2	Mixer/Grinder	1,000.00	954.00	1,076.00	1,000.00	1,018.00
3	Bicycle	1,333.00	1,000.00	1,107.00	1,000.00	1,089.00
4	Motor Cycle	0.00	0.00	26,000.00	0.00	26,000.00
5	Mobile Phone	1,400.00	766.00	676.00	1,000.00	772.00

Farm Implements owned: The data regarding the farm implements owned by the households in Chilkamuki micro watershed is presented in Table 11. About 11.43 per cent of the households possess bullock cart, 37.14 per cent of them possess plough, 20 per cent of the households possess sprayer, 85.71 per cent of the households possess weeder and 22.86 per cent of the households possess chaff cutter.

Table 11: Farm Implements owned by households in Chilkamuki micro watershed

Sl.No.	Particulars	LL (5)		MF (15)		SF (14)		SMF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Bullock Cart	0	0.00	2	13.33	2	14.29	0	0.00	4	11.43
2	Plough	0	0.00	4	26.67	9	64.29	0	0.00	13	37.14
3	Sprayer	0	0.00	1	6.67	6	42.86	0	0.00	7	20.00
4	Weeder	3	60.00	13	86.67	13	92.86	1	100.00	30	85.71
5	Chaff Cutter	0	0.00	3	20.00	5	35.71	0	0.00	8	22.86
6	Blank	2	40.00	2	13.33	1	7.14	0	0.00	5	14.29

Average value of farm implements: The data regarding the average value of farm Implements owned by the households in Chilkamuki micro watershed is presented in Table 12. The results showed that the average value of bullock cart was Rs.20000; the average value of plough was Rs. 591, the average value of sprayer was Rs. 3571, the average value of weeder was Rs. 31 and the average value of chaff cutter was Rs. 2500.

Table 12: Average value (Rs) of farm implements owned by households in Chilkamuki micro watershed

Sl.No.	Particulars	LL (5)	MF (15)	SF (14)	SMF (1)	All (35)
1	Bullock Cart	0.00	20,000.00	20,000.00	0.00	20,000.00
2	Plough	0.00	609.00	584.00	0.00	591.00
3	Sprayer	0.00	3,000.00	3,666.00	0.00	3,571.00
4	Weeder	50.00	32.00	26.00	50.00	31.00
5	Chaff Cutter	0.00	2,666.00	2,400.00	0.00	2,500.00

Livestock possession by the households: The data regarding the Livestock possession by the households in Chilkamuki micro watershed is presented in Table 13. The results

indicated that, 37.14 per cent of the households possess bullocks and 2.86 per cent of the households possess crossbred cow. In case of marginal farmers, 26.67 per cent of the households possess bullock. In case of small farmers, 64.29 per cent of households possess bullock and 7.14 per cent possess crossbred cow.

Table 13: Livestock possession by households in Chilkamuki micro watershed

Sl.No.	Particulars	MF (15)		SF (14)		All (35)	
		N	%	N	%	N	%
1	Bullock	4	26.67	9	64.29	13	37.14
2	Crossbred cow	0	0.00	1	7.14	1	2.86

Average Labour availability: The data regarding the average labour availability in Chilkamuki micro watershed is presented in Table 14. The results indicated that, average own labour men available in the micro watershed was 11.23 average own labour (women) available was 10.97, average hired labour (men) available was 1.57 and average hired labour (women) available was 1.83. In case of marginal farmers, average own labour men available was 8.33, average own labour (women) was also 8.53, average hired labour (men) was 1.53 and average hired labour (women) available was 1.87. In case of small farmers, average own labour men available was 14.64, average own labour (women) was 13.79, average hired labour (men) was 1.57 and average hired labour (women) available was 1.86. In case of semi medium farmers, average own labour men available was 7, average own labour (women) was 8, average hired labour (men) was 2 and average hired labour (women) available was 1.

Table 14: Average Labour availability in Chilkamuki micro watershed

Sl.No.	Particulars	MF (15)	SF (14)	SMF (1)	All (35)
		N	N	N	N
1	Hired labour Female	8.33	14.64	7.00	11.23
2	Hired labour Male	8.53	13.79	8.00	10.97
3	Own Labour Female	1.53	1.57	2.00	1.57
4	Own labour Male	1.87	1.86	1.00	1.83

Adequacy of Hired Labour: The data regarding the adequacy of hired labour in Chilkamuki micro watershed is presented in Table 15. The results indicated that, 94.29 per cent of the household opined that hired labour was adequate.

Table 15: Adequacy of Hired Labour in Chilkamuki micro watershed

Sl.No.	Particulars	MF (15)		SF (14)		SMF (1)		All (35)	
		N	%	N	%	N	%	N	%
1	Adequate	15	100	14	100	1	100.00	33	94.29

Distribution of land (ha): The data regarding the distribution of land (ha) in Chilkamuki micro watershed is presented in Table 16. The results indicated that, households of the Chilkamuki micro watershed possess 30.97 ha (96.23 %) of dry land and 1.21 ha (3.77%) of irrigated land. Marginal farmers possess 11.02 ha (100%) of dry land. Small farmers

possess 19.95 ha (100 %) of dry land. Semi medium farmers possess 1.21 ha (100%) of irrigated land.

Table 16: Distribution of land (Ha) in Chilkamuki micro watershed

Sl.No.	Particulars	MF (15)		SF (14)		SMF (1)		All (35)	
		ha	%	ha	%	ha	%	ha	%
1	Dry	11.02	100.00	19.95	100.00	0.00	0.00	30.97	96.23
2	Irrigated	0.00	0.00	0.00	0.00	1.21	100.00	1.21	3.77
	Total	11.02	100.00	19.95	100.00	1.21	100.00	32.19	100.00

Average land value (Rs./ha): The data regarding the average land value (Rs./ha) in Chilkamuki micro watershed is presented in Table 17. The results indicated that, the average value of dry land was Rs. 293,701.82 and average value of irrigated was Rs. 411,666.67. In case of marginal famers, the average land value was Rs. 389,904.55 for dry land. In case of small famers, the average land value was Rs. 240,535.60 for dry land. In case of semi medium famers, the average land value was Rs. 411,666.67 for irrigated land.

Table 17: Average land value (Rs. /ha) in Chilkamuki micro watershed

Sl.No.	Particulars	MF (15)	SF (14)	SMF (1)	All (35)
		N	N	N	N
1	Dry	389,904.55	240,535.60	0.00	293,701.82
2	Irrigated	0.00	0.00	411,666.67	411,666.67

Status of bore wells: The data regarding the status of bore wells in Chilkamuki micro watershed is presented in Table 18. The results indicated that, there were 1 functioning bore wells in the micro watershed.

Table 18: Status of bore wells in Chilkamuki micro watershed

Sl.No.	Particulars	SF (14)	SMF (1)	All (35)
		N	N	N
1	Functioning	0	1	1

Source of irrigation: The data regarding the source of irrigation in Chilkamuki micro watershed is presented in Table 19. The results indicated that, bore well was the major irrigation source for 2.86 per cent of the farmers.

Table 19: Source of irrigation in Chilkamuki micro watershed

Sl.No.	Particulars	SMF (1)		All (35)	
		N	%	N	%
1	Bore Well	1	100.00	1	2.86

Depth of water: The data regarding the depth of water in Chilkamuki micro watershed is presented in Table 20. The results indicated that on an average the depth of the bore well was 2.44 meters.

Table 20: Depth of water in Chilkamuki micro watershed

Sl.No.	Particulars	SMF (1)	All (35)
		N	N
1	Bore Well	85.34	2.44

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Irrigated Area (ha): The data regarding the irrigated area (ha) in Chilkamuki micro watershed is presented in Table 21. The results indicated that, in case of semi medium farmers there was 0.81 ha of irrigated land.

Table 21: Irrigated Area in Chilkamuki micro watershed

Sl.No.	Particulars	SMF (1)	All (35)
1	Kharif	0.81	0.81
	Total	0.81	0.81

Cropping pattern: The data regarding the cropping pattern in Chilkamuki micro watershed is presented in Table 22. The results indicated that, farmers have grown groundnut (9.66 ha), Navane (0.81 ha), paddy (0.81 ha), Red gram (1.62 ha), sunflower (4.98 ha) and maize (1.62 ha). Marginal farmers have grown groundnut, navane and sunflower. Small farmers have grown groundnut, redgram, sunflower and maize. Semi medium farmers have grown paddy.

Table 22: Cropping pattern in Chilkamuki micro watershed   Area (ha)

Sl.No.	Particulars	MF (15)	SF (14)	SMF (1)	All (35)
1	Kharif - Groundnut	3.40	6.26	0.00	9.66
2	Kharif - Navane (Fox Millet)	0.81	0.00	0.00	0.81
3	Kharif - Paddy	0.00	0.00	0.81	0.81
4	Kharif - Red gram (togari)	0.00	1.62	0.00	1.62
5	Kharif - Sunflower	3.77	1.21	0.00	4.98
6	Rabi - Maize	0.00	1.62	0.00	1.62
Total		11.43	21.15	0.81	33.40

Cropping intensity: The data regarding the cropping intensity in Chilkamuki micro watershed is presented in Table 23. The results indicated that, the cropping intensity in Chilkamuki micro watershed was found to be 100 per cent. In case of marginal farmers it was 103per cent, in small farmers it was 100 and in semi medium farmers it was 66.67.

Table 23: Cropping intensity (%) in Chilkamuki micro watershed

Sl.No.	Particulars	MF (15)	SF (14)	SMF (1)	All (35)
1	Cropping Intensity	103.67	100.00	66.67	100.00

Possession of Bank account: The data regarding the possession of Bank account and savings in Chilkamuki micro watershed is presented in Table 24. The results indicated that, 91.43 per cent of the households have bank account including 40 per cent of the landless and 100 per cent of the marginal, small and semi medium farmers respectively.

Table 24: Possession of Bank account and savings in Chilkamuki micro watershed

Sl.No.	Particulars	LL (5)		MF (15)		SF (14)		SMF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Account	2	40.00	15	100.00	14	100.00	1	100.00	32	91.43

Borrowing status: The data regarding the possession of borrowing status in Chilkamuki micro watershed is presented in Table 25. The results indicated that, 40 per cent of the

landless, 86.67 per cent of marginal, 100 per cent of small and semi medium farmers have borrowed credit from different sources.

Table 25: Borrowing status in Chilkamuki micro watershed

Sl.No.	Particulars	LL (5)		MF (15)		SF (14)		SMF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Credit Availed	2	40.00	13	86.67	14	100.00	1	100.00	30	85.71

Source of credit: The data regarding the source of credit availed by households in Chilkamuki micro watershed is presented in Table 26. The results indicated that, 11.76 per cent have availed loan in commercial bank and friends/ relatives correspondingly, 52.94 per cent have availed loan from Grameena bank, 23.52 per cent have availed loan from money lender and 29.41 per cent have availed loan from SHGs/CBOs.

Table 26: Source of credit availed by households in Chilkamuki micro watershed

Sl.No.	Particulars	LL (2)		MF (13)		SF (14)		All (30)	
		N	%	N	%	N	%	N	%
1	Friends/Relatives	1	50.00	0	0.00	0	0.00	1	3.33
2	Grameena Bank	0	0.00	1	7.69	2	14.29	3	10.00
3	Input Dealers/ Suppliers	0	0.00	1	7.69	0	0.00	1	3.33
4	Money Lender	0	0.00	1	7.69	2	14.29	3	10.00
5	SHGs/CBOs	1	50.00	2	15.38	3	21.43	6	20.00

Average credit amount: The data regarding the average credit amount availed by households in Chilkamuki micro watershed is presented in Table 27. The results indicated that, marginal, small and semi medium have availed Rs.10000, Rs. 11923.08 and Rs. 16428.57 respectively. Overall average credit amount availed by households in the micro watershed is 13500.

Table 27: Average Credit amount availed by households in Chilkamuki micro watershed

Sl.No.	Particulars	LL (2)	MF (13)	SF (14)	All (30)
		N	N	N	N
1	Average Credit	10,000.00	11,923.08	16,428.57	13,500.00

Purpose of credit borrowed (institutional Source): The data regarding the purpose of credit borrowed from institutional sources by households in Chilkamuki micro watershed is presented in Table 28. The results indicated that, 100 per cent of the households have borrowed loan institutional credit for agriculture production.

Table 28: Purpose of credit borrowed (institutional Source) by households in Chilkamuki micro watershed

Sl.No.	Particulars	MF (1)		SF (2)		LF (0)		All (3)	
		N	%	N	%	N	%	N	%
1	Agriculture production	1	100.00	2	100.00	0	0.00	3	100.00

Purpose of credit borrowed (Private Credit): The data regarding the purpose of credit borrowed from private sources by households in Chilkamuki micro watershed is

presented in Table 29. The results indicated that, about 80 percent of private credit was taken for agriculture production and 20 per cent of the loan taken for household consumption.

Table 29: Purpose of credit borrowed (Private Credit) by households in Chilkamuki micro watershed

Sl.No.	Particulars	LL (2)		MF (4)		SF (4)		All (10)	
		N	%	N	%	N	%	N	%
1	Agriculture production	0	0.00	4	100.00	4	100.00	8	80.00
2	Household consumption	2	100.00	0	0.00	0	0.00	2	20.00

Repayment status of households (Institutional): The data regarding the repayment status of credit borrowed from institutional sources by households in Chilkamuki micro watershed is presented in Table 30. Results indicated that 100 percent of the households have unpaid their institutional loan.

Table 30: Repayment status of households (Institutional) **in Chilkamuki micro watershed**

Sl.No.	Particulars	LL (0)		MF (1)		SF (2)		All (3)	
		N	%	N	%	N	%	N	%
1	Un paid	0	0.00	1	100.00	2	100.00	3	100.00

Repayment status of households (Private): The data regarding the repayment status of credit borrowed from private sources by households in Chilkamuki micro watershed is presented in Table 31. Results indicated that 82.82 per cent of the households have repaid their private credit partially, 9.09 percent of the households have unpaid their loan and 9.09 per cent of them fully paid their loan.

Table 31: Repayment status of households (Private) in Chilkamuki micro watershed

Sl.No.	Particulars	LL (2)		MF (4)		SF (5)		All (11)	
		N	%	N	%	N	%	N	%
1	Partially paid	1	50.00	4	100.00	4	80.00	9	81.82
2	Un paid	1	50.00	0	0.00	0	0.00	1	9.09
3	Fully paid	0	0.00	0	0.00	1	20.00	1	9.09

Opinion on institutional sources of credit: The data regarding opinion on institutional sources of credit by households in Chilkamuki micro watershed is presented in Table 32. The results indicated that 100 per cent of the households were opined that they were helped to perform timely agricultural operations.

Table 32: Opinion on institutional sources of credit in Chilkamuki micro watershed

Sl.No.	Particulars	MF (1)		SF (2)		All (3)	
		N	%	N	%	N	%
1	Helped to perform timely agricultural operations	1	100	2	100	3	100

Cost of Cultivation of Maize: The data regarding the cost of cultivation of maize in Chilkamuki micro watershed is presented in Table 33. The results indicated that, the total cost of cultivation for maize was Rs. 24649.75. The gross income realized by the farmers was Rs. 22656.01. The net income from maize cultivation was Rs. -1993.74. Thus the benefit cost ratio was found to be 1:0.92.

Table 33: Cost of Cultivation of Maize in Chilkamuki micro watershed

Sl. No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	28.31	5297.80	21.49
2	Bullock		Pairs/day	0.63	351.92	1.43
3	Tractor		Hours	2.60	1634.32	6.63
4	Machinery		Hours	0.00	0.00	0.00
6	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	20.88	4021.73	16.32
7	FYM		Quintal	19.59	2350.24	9.53
8	Fertilizer + micronutrients		Quintal	2.85	2311.54	9.38
9	Pesticides (PPC)		Kgs / liters	0.68	682.99	2.77
10	Irrigation		Number	0.62	0.00	0.00
11	Depreciation charges			0.00	49.12	0.20
12	Land revenue and Taxes			0.00	4.32	0.02
II	**Cost B1**					
13	Interest on working capital				1123.98	4.56
14	**Cost B1 = (Cost A1 + sum of 15 and 16)**				17827.97	72.33
III	**Cost B2**					
15	Rental Value of Land				500.00	2.03
16	**Cost B2 = (Cost B1 + Rental value)**				18327.97	74.35
IV	**Cost C1**					
17	Family Human Labour			13.86	4080.90	16.56
18	**Cost C1 = (Cost B2 + Family Labour)**				22408.86	90.91
V	**Cost C2**					
19	Risk Premium				0.00	0.00
20	**Cost C2 = (Cost C1 + Risk Premium)**				22408.86	90.91
VI	**Cost C3**					
20	Managerial Cost				2240.89	9.09
21	**Cost C3 = (Cost C2 + Managerial Cost)**				24649.75	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		15.11	21623.93	
		b) Main Crop Sales Price (Rs.)			1431.25	
	By Product	e) Main Product (q)		18.03	1032.08	
		f) Main Crop Sales Price (Rs.)			57.25	
b.	Gross Income (Rs.)				22656.01	
c.	Net Income (Rs.)				-1993.74	
d.	Cost per Quintal (Rs./q.)				1631.52	
e.	Benefit Cost Ratio (BC Ratio)				1:0.92	

Cost of Cultivation of Paddy: The data regarding the cost of cultivation of paddy in Chilkamuki micro watershed is presented in Table 34. The results indicated that, the total cost of cultivation for paddy was Rs. 35697.58. The gross income realized by the farmers was Rs. 109359.25. The net income from paddy cultivation was Rs. 73661.67. Thus the benefit cost ratio was found to be 1:3.06.

Table 34: Cost of Cultivation of Paddy in Chilkamuki micro watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	Cost A1					
1	Hired Human Labour		Man days	53.11	8459.75	23.70
2	Bullock		Pairs/day	11.12	5557.50	15.57
3	Tractor		Hours	2.47	1482.00	4.15
4	Machinery		Hours	0.00	0.00	0.00
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	86.45	5187.00	14.53
6	FYM		Quintal	0.00	0.00	0.00
7	Fertilizer + micronutrients		Quintal	4.94	4322.50	12.11
8	Pesticides (PPC)		Kgs / liters	1.24	1235.00	3.46
9	Irrigation		Number	24.70	0.00	0.00
10	Depreciation charges			0.00	2.47	0.01
11	Land revenue and Taxes			0.00	4.12	0.01
II	Cost B1					
12	Interest on working capital				1289.34	3.61
13	**Cost B1 = (Cost A1 + sum of 15 and 16)**				27539.68	77.15
III	Cost B2					
14	Rental Value of Land				466.67	1.31
15	**Cost B2 = (Cost B1 + Rental value)**				28006.34	78.45
IV	Cost C1					
16	Family Human Labour			22.23	4446.00	12.45
17	**Cost C1 = (Cost B2 + Family Labour)**				32452.34	90.91
V	Cost C2					
18	Risk Premium				0.00	0.00
19	**Cost C2 = (Cost C1 + Risk Premium)**				32452.34	90.91
VI	Cost C3					
20	Managerial Cost				3245.23	9.09
21	**Cost C3 = (Cost C2 + Managerial Cost)**				35697.58	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		80.28	108371.25	
		b) Main Crop Sales Price (Rs.)			1350.00	
	By Product	e) Main Product (q)		12.35	988.00	
		f) Main Crop Sales Price (Rs.)			80.00	
b.	Gross Income (Rs.)				109359.25	
c.	Net Income (Rs.)				73661.67	
d.	Cost per Quintal (Rs./q.)				444.69	
e.	Benefit Cost Ratio (BC Ratio)				1:3.06	

Cost of Cultivation of Groundnut: The data regarding the cost of cultivation of groundnut in Chilkamuki micro watershed is presented in Table 35. The results indicated that, the total cost of cultivation for groundnut was Rs. 43389.06. The gross income realized by the farmers was Rs. 56396.58. The net income from groundnut cultivation was Rs. 13007.52. Thus the benefit cost ratio was found to be 1:1.3.

Table 35: Cost of Cultivation of Groundnut in Chilkamuki micro watershed

Sl.No	Particulars	Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**				
1	Hired Human Labour	Man days	35.20	5988.20	13.80
2	Bullock	Pairs/day	1.02	599.13	1.38
3	Tractor	Hours	3.05	2053.58	4.73
4	Machinery	Hours	0.00	0.00	0.00
5	Seed Main Crop (Establishment and Maintenance)	Kgs (Rs.)	116.01	15639.63	36.05
6	FYM	Quintal	20.83	2499.19	5.76
7	Fertilizer + micronutrients	Quintal	3.75	3064.90	7.06
8	Pesticides (PPC)	Kgs / liters	1.28	1309.29	3.02
9	Irrigation	Number	0.00	0.00	0.00
10	Depreciation charges		0.00	116.89	0.27
11	Land revenue and Taxes		0.00	5.10	0.01
II	**Cost B1**				
12	Interest on working capital			2701.56	6.23
13	**Cost B1 = (Cost A1 + sum of 15 and 16)**			33977.47	78.31
III	**Cost B2**				
14	Rental Value of Land			480.00	1.11
15	**Cost B2 = (Cost B1 + Rental value)**			34457.47	79.42
IV	**Cost C1**				
16	Family Human Labour		23.51	4987.13	11.49
17	**Cost C1 = (Cost B2 + Family Labour)**			39444.60	90.91
V	**Cost C2**				
18	Risk Premium			0.00	0.00
19	**Cost C2 = (Cost C1 + Risk Premium)**			39444.60	90.91
VI	**Cost C3**				
20	Managerial Cost			3944.46	9.09
21	**Cost C3 = (Cost C2 + Managerial Cost)**			43389.06	100.00
VII	**Economics of the Crop**				
a.	Main Product	a) Main Product (q)	10.95	56393.43	
		b) Main Crop Sales Price (Rs.)		5150.00	
	By Product	e) Main Product (q)	0.52	3.14	
		f) Main Crop Sales Price (Rs.)		6.00	
b.	Gross Income (Rs.)			56396.58	
c.	Net Income (Rs.)			13007.52	
d.	Cost per Quintal (Rs./q.)			3962.41	
e.	Benefit Cost Ratio (BC Ratio)			1:1.3	

Cost of Cultivation of Sunflower: The data regarding the cost of cultivation of Sunflower in Chilkamuki micro watershed is presented in Table 36. The results indicated that, the total cost of cultivation for Sunflower was Rs. 26654.19. The gross income realized by the farmers was Rs. 45506.01. The net income from Sunflower cultivation was Rs. 18851.82. Thus the benefit cost ratio was found to be 1:1.71.

Table 36: Cost of Cultivation of Sunflower in Chilkamuki micro watershed

Sl.No	Particulars	Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**				
1	Hired Human Labour	Man days	29.96	4893.82	18.36
2	Bullock	Pairs/day	0.82	452.83	1.70
3	Tractor	Hours	3.01	1887.33	7.08
4	Machinery	Hours	0.00	0.00	0.00
5	Seed Main Crop (Establishment and Maintenance)	Kgs (Rs.)	4.11	1921.85	7.21
6	FYM	Quintal	26.39	3166.67	11.88
7	Fertilizer + micronutrients	Quintal	3.17	2633.35	9.88
8	Pesticides (PPC)	Kgs / liters	1.28	1277.22	4.79
9	Irrigation	Number	0.00	0.00	0.00
10	Depreciation charges		0.00	194.65	0.73
11	Land revenue and Taxes		0.00	5.08	0.02
II	**Cost B1**				
12	Interest on working capital			1079.89	4.05
13	**Cost B1 = (Cost A1 + sum of 15 and 16)**			17512.70	65.70
III	**Cost B2**				
14	Rental Value of Land			333.33	1.25
15	**Cost B2 = (Cost B1 + Rental value)**			17846.03	66.95
IV	**Cost C1**				
16	Family Human Labour		29.03	6385.06	23.96
17	**Cost C1 = (Cost B2 + Family Labour)**			24231.09	90.91
V	**Cost C2**				
18	Risk Premium			0.00	0.00
19	**Cost C2 = (Cost C1 + Risk Premium)**			24231.09	90.91
VI	**Cost C3**				
20	Managerial Cost			2423.11	9.09
21	**Cost C3 = (Cost C2 + Managerial Cost)**			26654.19	100.00
VII	**Economics of the Crop**				
a.	Main Product	a) Main Product (q)	9.87	45506.01	
		b) Main Crop Sales Price (Rs.)		4608.33	
b.	Gross Income (Rs.)			45506.01	
c.	Net Income (Rs.)			18851.82	
d.	Cost per Quintal (Rs./q.)			2699.23	
e.	Benefit Cost Ratio (BC Ratio)			1:1.71	

Cost of Cultivation of Red gram: The data regarding the cost of cultivation of Red gram in Chilkamuki micro watershed is presented in Table 37. The results indicated that, the total cost of cultivation for Red gram was Rs. 16982.11. The gross income realized by the farmers was Rs. 148200. The net income from Red gram cultivation was Rs. 131217.89. Thus the benefit cost ratio was found to be 1:8.73.

Table 37: Cost of Cultivation of Red gram in Chilkamuki micro watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	17.29	3519.75	20.73
2	Bullock		Pairs/day	0.00	0.00	0.00
3	Tractor		Hours	3.71	2593.50	15.27
4	Machinery		Hours	0.00	0.00	0.00
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	37.05	4446.00	26.18
6	FYM		Quintal	7.41	889.20	5.24
7	Fertilizer + micronutrients		Quintal	0.00	0.00	0.00
8	Pesticides (PPC)		Kgs / liters	0.62	617.50	3.64
9	Irrigation		Number	0.00	0.00	0.00
10	Depreciation charges			0.00	0.01	0.00
11	Land revenue and Taxes			0.00	4.12	0.02
II	**Cost B1**					
12	Interest on working capital				714.32	4.21
13	**Cost B1 = (Cost A1 + sum of 15 and 16)**				12784.40	75.28
III	**Cost B2**					
14	Rental Value of Land				400.00	2.36
15	**Cost B2 = (Cost B1 + Rental value)**				13184.40	77.64
IV	**Cost C1**					
16	Family Human Labour			10.50	2253.88	13.27
17	**Cost C1 = (Cost B2 + Family Labour)**				15438.28	90.91
V	**Cost C2**					
18	Risk Premium				0.00	0.00
19	**Cost C2 = (Cost C1 + Risk Premium)**				15438.28	90.91
VI	**Cost C3**					
20	Managerial Cost				1543.83	9.09
21	**Cost C3 = (Cost C2 + Managerial Cost)**				16982.11	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		37.05	148200.00	
		b) Main Crop Sales Price (Rs.)			4000.00	
b.	Gross Income (Rs.)				148200.00	
c.	Net Income (Rs.)				131217.89	
d.	Cost per Quintal (Rs./q.)				458.36	
e.	Benefit Cost Ratio (BC Ratio)				1:8.73	

Cost of Cultivation of Navane: The data regarding the cost of cultivation of Navane in Chilkamuki micro watershed is presented in Table 38. The results indicated that, the total cost of cultivation for Navane was Rs. 17558.19. The gross income realized by the farmers was Rs. 23341.50. The net income from Navane cultivation was Rs. 5783.31. Thus the benefit cost ratio was found to be 1:1.33.

Table 38: Cost of Cultivation of Navane in Chilkamuki micro watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	24.70	5125.25	29.19
2	Bullock		Pairs/day	1.24	617.50	3.52
3	Tractor		Hours	2.47	1482.00	8.44
4	Machinery		Hours	0.00	0.00	0.00
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	4.94	2766.40	15.76
6	FYM		Quintal	0.00	0.00	0.00
7	Fertilizer + micronutrients		Quintal	2.47	1914.25	10.90
8	Pesticides (PPC)		Kgs / liters	0.00	0.00	0.00
9	Irrigation		Number	0.00	0.00	0.00
10	Depreciation charges			0.00	2.47	0.01
11	Land revenue and Taxes			0.00	4.94	0.03
II	**Cost B1**					
12	Interest on working capital				561.68	3.20
13	**Cost B1 = (Cost A1 + sum of 15 and 16)**				12474.49	71.05
III	**Cost B2**					
14	Rental Value of Land				400.00	2.28
15	**Cost B2 = (Cost B1 + Rental value)**				12874.49	73.32
IV	**Cost C1**					
16	Family Human Labour			13.59	3087.50	17.58
17	**Cost C1 = (Cost B2 + Family Labour)**				15961.99	90.91
V	**Cost C2**					
18	Risk Premium				0.00	0.00
19	**Cost C2 = (Cost C1 + Risk Premium)**				15961.99	90.91
VI	**Cost C3**					
20	Managerial Cost				1596.20	9.09
21	**Cost C3 = (Cost C2 + Managerial Cost)**				17558.19	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		11.12	23341.50	
		b) Main Crop Sales Price (Rs.)			2100.00	
b.	Gross Income (Rs.)				23341.50	
c.	Net Income (Rs.)				5783.31	
d.	Cost per Quintal (Rs./q.)				1579.68	
e.	Benefit Cost Ratio (BC Ratio)				1:1.33	

Adequacy of fodder: The data regarding the adequacy of fodder in Chilkamuki micro watershed is presented in Table 39. The results indicated that, 31.43 per cent of the households opined that dry fodder was adequate.

Table 39: Adequacy of fodder in Chilkamuki micro watershed

Sl.No.	Particulars	MF (15)		SF (14)		SMF (1)		All (35)	
		N	%	N	%	N	%	N	%
1	Adequate-Dry Fodder	3	20.00	7	50.00	1	100.00	11	31.43

Average Annual gross income of households: The results of the average annual gross income of the household in Chilkamuki is presented in table 40. The table indicated that, in landless farmers, the average income from wage was Rs. 51000. In marginal farmers the average income from service/salary was Rs.5333.33, wage was Rs.41000 and agriculture Rs.28654. In case of small farmers the average income from service/salary was Rs.6785.71, wage was Rs.28928.57, agriculture was Rs.57380 and dairy farm was Rs.964.29. In case of semi medium farmers, the average income from wage was Rs.10000 and agriculture Rs.110000.

Table 40: Average Annual gross income (Rs.) of households in Chilkamuki micro watershed

Sl.No.	Particulars	LL (5)	MF (15)	SF (14)	SMF (1)	All (35)
1	Service/salary	0.00	5,333.33	6,785.71	0.00	5,000.00
2	Wage	51,000.00	41,000.00	28,928.57	10,000.00	36,714.29
3	Agriculture	0.00	28,654.00	57,380.00	110,000.00	38,375.14
4	Dairy Farm	0.00	0.00	964.29	0.00	385.71
	Income(Rs.)	51,000.00	74,987.33	94,058.57	120,000.00	80,475.14

Average Annual expenditure of household: The results of the overall average annual expenditure of the household in Chilkamuki were presented in Table 41. The results indicated that, in landless farmer, the average expenditure from wage was Rs. 1250.In marginal farmers; the average expenditure from agriculture was Rs.15866.67. In small farmers the average expenditure from agriculture was Rs.35071.43 and dairy farm was Rs.8000. In semi medium farmers the average expenditure from agriculture was Rs.65000.

Table 41: Average Annual expenditure of households in Chilkamuki micro watershed

Sl.No.	Particulars	LL (5)	MF (15)	SF (14)	SMF (1)	All (35)
		Rs.	Rs.	Rs.	Rs.	Rs.
1	Wage	1,250.00	0.00	0.00	0.00	142.86
2	Agriculture	0.00	15,866.67	35,071.43	65,000.00	22,685.71
3	Dairy Farm	0.00	0.00	8,000.00	0.00	228.57
	Total	1,250.00	15,866.67	43,071.43	65,000.00	125,188.10
	Average	250.00	1,057.78	3,076.53	65,000.00	3,576.80

Horticulture species grown: The data regarding horticulture species grown in Chilkamuki micro watershed is presented in Table 42. The results indicated that, sampled households have grown 9 coconut trees and 6 mango tree in their field.

Table 42: Horticulture species grown in Chilkamuki micro watershed

Sl.No.	Particulars	MF (15)		SF (14)		All (35)	
		Field	Backyard	Field	Backyard	Field	Backyard
1	Coconut	4	0	5	0	9	0
2	Mango	0	0	6	0	6	0

Forest species grown: The data regarding forest species grown in Chilkamuki micro watershed is presented in Table 43. The results indicated that, households have planted 1 teak trees, 69 neem trees, 5 tamarind tress and 2 banyan trees in their field.

Table 43: Forest species grown in Chilkamuki micro watershed

S.N.	Particulars	MF (15)		SF (14)		SMF (1)		All (35)	
		F	B	F	B	F	B	F	B
1	Teak	0	0	0	0	1	0	1	0
2	Neem	30	0	37	0	2	0	69	0
3	Tamarind	5	0	0	0	0	0	5	0
4	Banyan	1	0	1	0	0	0	2	0

Average additional investment capacity: The data regarding average additional investment capacity in Chilkamuki microwatershed is presented in Table 44. The results indicate that, households have an average investment capacity of Rs. 1428.57 for land development, Rs. 571.43 for improved crop production and Rs.2571.43 for improved livestock management. Marginal households have an average investment capacity of Rs. 6000 for improved livestock management. Small farmers have an average investment capacity of Rs. 3571.43 for land development and Rs.1428.57 for improved crop production.

Table 44: Average additional investment (Rs.) capacity of households in Chilkamuki microwatershed

Sl.No.	Particulars	MF (15)	SF (14)	All (35)
1	Land development	0.00	3,571.43	1,428.57
2	Improved crop production	0.00	1,428.57	571.43
3	Improved livestock management	6,000.00	0.00	2,571.43

Source of funds for additional investment: The data regarding source of funds for additional investment in Chilkamuki micro watershed is presented in Table 45. The results indicated that for 2.86 per cent of the households were dependent on loan from the bank for land development and irrigation facility and improved crop production respectively. 5.71 per cent of the households were dependent on loan from the bank for improved livestock management.

Table 45: Source of funds for additional investment capacity in Chilkamuki micro watershed

Sl.No	Item	Land development		Improved crop production		Improved livestock management	
		N	%	N	%	N	%
1	Loan from bank	1	2.86	1	2.86	2	5.71

Marketing of the agricultural produce: The data regarding marketing of the agricultural produce in Chilkamuki micro watershed is presented in Table 46. The results indicated that, maize, navane, paddy, red gram and sunflower crops were sold to the extent of 100 per cent. Bajra and groundnut were sold to the extent of 98.78 per cent and 90.65 per cent respectively.

Table 46: Marketing of the agricultural produce in Chilkamuki micro watershed

Sl.No	Crops	Output obtained (q)	Output retained (q)	Output sold (q)	Output sold (%)	Avg. Price obtained (Rs/q)
1	Bajra	82.0	1.0	81.0	98.78	1625.0
2	Groundnut	107.0	10.0	97.0	90.65	5150.0
3	Maize	152.0	0.0	152.0	100.0	1431.25
4	Navane	9.0	0.0	9.0	100.0	2100.0
5	Paddy	65.0	0.0	65.0	100.0	1350.0
6	Redgram	60.0	0.0	60.0	100.0	4000.0
7	Sunflower	49.0	0.0	49	100	3456.25

Marketing Channels used for sale of agricultural produce: The data regarding marketing channels used for sale of agricultural produce in Chilkamuki micro watershed is presented in Table 47. The results indicated that, 25.71 percent of the households have sold their produce to local/village merchant and 68.57 percent of the households sold their produce in regulated markets.

Table 47: Marketing Channels used for sale of agricultural produce in Chilkamuki micro watershed

Sl.No.	Particulars	MF (15)		SF (14)		SMF (1)		All (35)	
		N	%	N	%	N	%	N	%
1	Local/village Merchant	4	26.67	5	35.71	0	0.00	9	25.71
2	Regulated Market	13	86.67	10	71.43	1	100.00	24	68.57

Mode of transport of agricultural produce: The data regarding mode of transport of agricultural produce in Chilkamuki micro watershed is presented in Table 48. The results indicated that 62.86 per cent of the households have used tractor as a mode of transport, and 31.43 per cent have used truck.

Table 48: Mode of transport of agricultural produce in Chilkamuki micro watershed

Sl.No.	Particulars	MF (15)		SF (14)		SMF (1)		All (35)	
		N	%	N	%	N	%	N	%
1	Tractor	12	80.00	10	71.43	0	0.00	22	62.86
2	Truck	5	33.33	5	35.71	1	100.00	11	31.43

Incidence of soil and water erosion problems: The data regarding incidence of soil and water erosion problems in Chilkamuki microwatershed is presented in Table 49. The results indicated that, 22.86 per cent of the households have experienced the soil and water erosion problems i.e. 26.67 percent of marginal farmers and 28.57 per cent of small farmers.

Table 49: Incidence of soil and water erosion problems in Chilkamuki microwatershed

Sl.No.	Particulars	MF (15)		SF (14)		All (35)	
		N	%	N	%	N	%
1	Soil and water erosion problems in the farm	4	26.67	4	28.57	8	22.86

Interest towards soil testing: The data regarding interest shown towards soil testing in Chilkamuki micro watershed is presented in Table 50. The results indicated that, 91.43 per cent of the households have shown interest in soil testing.

Table 50: Interest shown towards soil testing in Chilkamuki micro watershed

Sl.No.	Particulars	MF (15)		SF (14)		SMF (1)		All (35)	
		N	%	N	%	N	%	N	%
1	Interest in soil test	17	113.33	14	100.00	1	100.00	32	91.43

Usage pattern of fuel for domestic use: The data regarding usage pattern of fuel for domestic use in Chilkamuki micro watershed is presented in Table 51. The results indicated that, 94.29 percent used fire wood as a source of fuel and 8.57 percent of the households used LPG.

Table 51: Usage pattern of fuel for domestic use in Chilkamuki micro watershed

Sl.No.	Particulars	LL (5)		MF (15)		SF (14)		SMF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Fire Wood	5	100.00	15	100.00	12	85.71	1	100.00	33	94.29
2	LPG	0	0.00	1	6.67	2	14.29	0	0.00	3	8.57

Source of drinking water: The data regarding source of drinking water in Chilkamuki micro watershed is presented in Table 52. The results indicated that, piped supply was the source of drinking water for 97.14 per cent and 2.86 per cent of them were using bore well for drinking water.

Table 52: Source of drinking water in Chilkamuki micro watershed

Sl.No.	Particulars	LL (5)		MF (15)		SF (14)		SMF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Piped supply	5	100.00	15	100.00	13	92.86	1	100.00	34	97.14
2	Bore Well	0	0.00	0	0.00	1	7.14	0	0.00	1	2.86

Source of light: The data regarding source of light in Chilkamuki micro watershed is presented in Table 53. The results indicated that, electricity was the major source of light for 100 per cent of the households.

Table 53: Source of light in Chilkamuki micro watershed

Sl.No.	Particulars	LL (5)		MF (15)		SF (14)		SMF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Electricity	5	100.00	15	100.00	14	100.00	1	100.00	35	100.00

Existence of Sanitary toilet facility: The data regarding existence of sanitary toilet facility in Chilkamuki micro watershed is presented in Table 54. The results indicated that, 57.14 per cent of the households possess sanitary toilet i.e. 40 per cent of landless, 100 per cent of marginal, 14.29 per cent of small and 100 per cent of semi medium farmers had sanitary toilet facility.

Table 54: Existence of Sanitary toilet facility in Chilkamuki micro watershed

Sl.No.	Particulars	LL (5)		MF (15)		SF (14)		SMF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Sanitary toilet facility	2	40.00	15	100.00	2	14.29	1	100.00	20	57.14

Possession of PDS card: The data regarding possession of PDS card in Chilkamuki micro watershed is presented in Table 55. The results indicated that, 100 per cent of the sampled households possessed BPL card.

Table 55: Possession of PDS card in Chilkamuki micro watershed

Sl.No.	Particulars	LL (5)		MF (15)		SF (14)		SMF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	BPL	5	100.00	15	100.00	14	100.00	1	100.00	35	100.00

Participation in NREGA programme: The data regarding participation in NREGA programme in Chilkamuki micro watershed is presented in Table 56. The results indicated that, 62.86 per cent of the households participated in NREGA programme which included 100 per cent of the landless, marginal and semi medium and 7.14 percent of the small farmers respectively.

Table 56: Participation in NREGA programme in Chilkamuki micro watershed

Sl.No.	Particulars	LL (5)		MF (15)		SF (14)		SMF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Participation in NREGA programme	5	100	15	100	1	7.14	1	100	22	62.86

Adequacy of food items: The data regarding adequacy of food items in Chilkamuki micro watershed is presented in Table 57. The results indicated that, cereals, pulses, oilseeds, vegetables, fruits , milk and egg were adequate for 100 per cent, 94.29 per cent, 2.86 per cent, 45.71 per cent, 14.29 per cent, 74.29 per cent and 8.57 per cent of the households respectively.

Table 57: Adequacy of food items in Chilkamuki micro watershed

Sl.No.	Particulars	LL (5)		MF (15)		SF (14)		SMF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Cereals	5	100.00	15	100.00	14	100.00	1	100.00	35	100.00
2	Pulses	4	80.00	15	100.00	13	92.86	1	100.00	33	94.29
3	Oilseed	0	0.00	0	0.00	1	7.14	0	0.00	1	2.86
4	Vegetables	1	20.00	6	40.00	8	57.14	1	100.00	16	45.71
5	Fruits	1	20.00	1	6.67	3	21.43	0	0.00	5	14.29
6	Milk	2	40.00	11	73.33	12	85.71	1	100.00	26	74.29
7	Egg	0	0.00	3	20.00	0	0.00	0	0.00	3	8.57

Response on Inadequacy of food items: The data regarding inadequacy of food items in Chilkamuki micro watershed is presented in Table 58. The results indicated that, pulses, oilseeds, vegetables, fruits, milk, egg and meat were inadequate for 5.71 per cent,65.71 per cent, 54.29 per cent,88.57 per cent, 25.71 per cent, 85.71 and 97.14 per cent of the households respectively.

Table 58: Response on Inadequacy of food items in Chilkamuki micro watershed

Sl.No.	Particulars	LL (5)		MF (15)		SF (14)		SMF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Pulses	1	20.00	0	0.00	1	7.14	0	0.00	2	5.71
2	Oilseed	5	100.00	10	66.67	8	57.14	0	0.00	23	65.71
3	Vegetables	4	80.00	9	60.00	6	42.86	0	0.00	19	54.29
4	Fruits	4	80.00	16	106.67	10	71.43	1	100.00	31	88.57
5	Milk	3	60.00	4	26.67	2	14.29	0	0.00	9	25.71
6	Egg	4	80.00	12	80.00	13	92.86	1	100.00	30	85.71
7	Meat	4	80.00	15	100.00	14	100.00	1	100.00	34	97.14

Farming constraints: The data regarding farming constraints experienced by households in Chilkamuki micro watershed is presented in Table 59. The results indicated that, Lower fertility status of the soil was the constraint experienced by 51.43 per cent of the households, wild animal menace on farm field (74.29%), frequent incidence of pest and diseases (71.43%), inadequacy of irrigation water (25.71%), high cost of Fertilizers and plant protection chemicals (62.86%), high rate of interest on credit (25.71%), low price for the agricultural commodities (65.71%), lack of marketing facilities in the area (60%), inadequate extension services (28.57%), lack of transport for safe transport of the agricultural produce to the market (71.43%), less rainfall (14.29%) and Source of Agri-technology information(Newspaper/TV/Mobile (2.86%).

Table 59: Farming constraints Experienced in Chilkamuki micro watershed

Sl. No.	Particulars	MF (15)		SF (14)		SMF(1)		All (35)	
		N	%	N	%	N	%	N	%
1	Lower fertility status of the soil	11	73.33	7	50.00	0	0	18	51.43
2	Wild animal menace on farm field	13	86.67	12	85.71	1	100	26	74.29
3	Frequent incidence of pest and diseases	11	73.33	13	92.86	1	100	25	71.43
4	Inadequacy of irrigation water	4	26.67	5	35.71	0	0	9	25.71
5	High cost of Fertilizers and plant protection chemicals	13	86.67	8	57.14	1	100	22	62.86
6	High rate of interest on credit	3	20	6	42.86	0	0	9	25.71
7	Low price for the agricultural commodities	12	80	11	78.57	0	0	23	65.71
8	Lack of marketing facilities in the area	9	60	11	78.57	1	100	21	60.00
9	Inadequate extension services	4	26.67	6	42.86	0	0	10	28.57
10	Lack of transport for safe transport of the Agril produce to the market.	13	86.67	11	78.57	1	100	25	71.43
11	Less rainfall	2	13.33	2	14.29	1	100	5	14.29
12	Source of Agri-technology information(Newspaper/TV/Mobile)	1	6.67	0	0.00	0	0	1	2.86

SUMMARY

In order to assess the socio-economic condition of the farmers in the watershed a comprehensive questionnaire was prepared. Major components such as demographic conditions, migration details, food consumption and family expenditure pattern, material possession, land holding, land use management, cropping pattern, cost of cultivation of crops, livestock management. The statistical components such as frequency and percentage were used to analyze the data. About 35 households located in the micro watershed were interviewed for the survey.

Results indicated that 35 farmers were sampled in Chilkamuki micro watershed among them 15 (42.86%) were marginal farmers, 14 (40 %) were small farmers, 1(2.86 %) were semi medium farmers and 5 (14.29 %) landless farmers were also interviewed for the survey. The data indicated that there were 148 population households were there in the studied micro watershed. Among them 80 (54.05%) men and 68 (45.95 %) were women. The average family size of landless was 3, marginal farmers and medium farmers were 4, small farmer was 6 and semi medium farmer was 5. On an average the family size was 4. The data indicated that 18(12.16%) people were in 0-15 years of age, 72 (48.65 %) were in 16-35 years of age, 42 (23.38 %) were in 36-60 years of age and 16 (10.81%) were above 61 years of age.

The results indicated that the Chilkamuki had 38.51 per cent illiterates, 20.95 per cent of them had primary school education, 12.84 per cent of them had both middle school, 18.24 per cent them had high school education, 6.76 per cent of them had PUC education, 0.68 per cent them had ITI education, 1.35 per cent of them had degree education and 0.68 per cent them had others. The results indicated that, 82.86 per cent of households practicing agriculture, 5.71 per cent of the household heads were agricultural labour 8.57 per cent of the household heads were general labour.

The results indicated that agriculture was the major occupation for 72.30 per cent of the household members, 4.05 per cent were agricultural labourers, 6.76 per cent were general labours and 14.86 per cent of them were students. In case of landless households 31.25 per cent were agriculture labour, 56.25 per cent were general labourers and 12.50 per cent were students. In case of marginal farmers 89.83 per cent were agriculturist and 10.17 per cent were students. In case of small farmers 75 per cent of them were agriculturist and 17.65 per cent of them were students. In case of semi medium farmers 60 per cent of the family members were agriculturist and 40 per cent of them were students.

The results showed that 1.35 per cent of them participated in self help groups and 98.65 per cent of them have not participated in any local institutions. The results indicated that 82.86 per cent of the households possess Katcha house and 8.57 per cent of

the households possess Pucca house and Thatched house respectively. The results showed that, 77.14 per cent of the households possess TV and Mixer grinder, 80 per cent of the households possess bicycle, 11.43 per cent of the households possess motor cycle and 85.71 per cent of the households possess mobile. The results showed that the average value of television was Rs. 3000, mixer grinder was Rs.1018, bicycle was Rs.1089, motor cycle was Rs.26000 and mobile phone was Rs.772. Data showed that 11.43 per cent of the households possess bullock cart, 37.14 per cent of them possess plough, 20 per cent of the households possess sprayer, 85.71 per cent of the households possess weeder and 22.86 per cent of the households possess chaff cutter. The results showed that the average value of bullock cart was Rs.20000; the average value of plough was Rs. 591, the average value of sprayer was Rs. 3571, the average value of weeder was Rs. 31 and the average value of chaff cutter was Rs. 2500.

The results indicated that, 37.14 per cent of the households possess bullocks and 2.86 per cent of the households possess crossbred cow. In case of marginal farmers, 26.67 per cent of the households possess bullock. In case of small farmers, 64.29 per cent of households possess bullock and 7.14 per cent possess crossbred cow.

The results indicated that, average own labour men available in the micro watershed was 11.23 average own labour (women) available was 10.97, average hired labour (men) available was 1.57 and average hired labour (women) available was 1.83. In case of marginal farmers, average own labour men available was 8.33, average own labour (women) was also 8.53, average hired labour (men) was 1.53 and average hired labour (women) available was 1.87. In case of small farmers, average own labour men available was 14.64, average own labour (women) was 13.79, average hired labour (men) was 1.57 and average hired labour (women) available was 1.86. In case of semi medium farmers, average own labour men available was 7, average own labour (women) was 8, average hired labour (men) was 2 and average hired labour (women) available was 1. The results indicated that, 94.29 per cent of the household opined that hired labour was adequate.

The results indicated that, households of the Chilkamuki micro watershed possess 30.97 ha (96.23 %) of dry land and 1.21 ha (3.77%) of irrigated land. Marginal farmers possess 11.02 ha (100%) of dry land. Small farmers possess 19.95 ha (100 %) of dry land. Semi medium farmers possess 1.21 ha (100%) of irrigated land. The results indicated that, the average value of dry land was Rs. 293,701.82 and average value of irrigated was Rs. 411,666.67. In case of marginal famers, the average land value was Rs. 389,904.55 for dry land. In case of small famers, the average land value was Rs. 240,535.60 for dry land. In case of semi medium famers, the average land value was Rs. 411,666.67 for irrigated land.

The results indicated that, there were 1 functioning bore wells in the micro watershed. The results indicated that, bore well was the major irrigation source for 2.86 per cent of the farmers. The results indicated that on an average the depth of the bore well was 2.44 meters. The results indicated that, in case of semi medium farmers there was 0.81 ha of irrigated land. The results indicated that, farmers have grown groundnut (9.66 ha), Navane (0.81 ha), paddy (0.81 ha), Red gram (1.62 ha), sunflower (4.98 ha) and maize (1.62 ha). Marginal farmers have grown groundnut, navane and sunflower. Small farmers have grown groundnut, redgram, sunflower and maize. Semi medium farmers have grown paddy. The results indicated that, the cropping intensity in Chilkamuki micro watershed was found to be 100 per cent. In case of marginal farmers it was 103per cent, in small farmers it was 100 and in semi medium farmers it was 66.67.

The results indicated that, 91.43 per cent of the households have bank account including 40 per cent of the landless and 100 per cent of the marginal, small and semi medium farmers respectively. The results indicated that, 40 per cent of the landless, 86.67 per cent of marginal, 100 per cent of small and semi medium farmers have borrowed credit from different sources. The results indicated that, 11.76 per cent have availed loan in commercial bank and friends/ relatives correspondingly, 52.94 per cent have availed loan from Grameena bank, 23.52 per cent have availed loan from money lender and 29.41 per cent have availed loan from SHGs/CBOs. The results indicated that, marginal, small and semi medium have availed Rs.10000, Rs. 11923.08 and Rs. 16428.57 respectively. Overall average credit amount availed by households in the micro watershed is 13500. The results indicated that, 100 per cent of the households have borrowed loan institutional credit for agriculture production. The results indicated that, about 80 percent of private credit was taken for agriculture production and 20 per cent of the loan taken for household consumption. Results indicated that 100 percent of the households have unpaid their institutional loan. Results indicated that 82.82 per cent of the households have repaid their private credit partially, 9.09 percent of the households have unpaid their loan and 9.09 per cent of them fully paid their loan. The results indicated that 100 per cent of the households were opined that they were helped to perform timely agricultural operations.

The results indicated that, the total cost of cultivation for maize was Rs. 24649.75. The gross income realized by the farmers was Rs. 22656.01. The net income from maize cultivation was Rs. -1993.74. Thus the benefit cost ratio was found to be 1:0.92. The results indicated that, the total cost of cultivation for paddy was Rs. 35697.58. The gross income realized by the farmers was Rs. 109359.25. The net income from paddy cultivation was Rs. 73661.67. Thus the benefit cost ratio was found to be 1:3.06. The results indicated that, the total cost of cultivation for groundnut was Rs. 43389.06. The gross income realized by the farmers was Rs. 56396.58. The net income from groundnut cultivation was Rs. 13007.52. Thus the benefit cost ratio was found to be 1:1.3. The results indicated that, the total cost of cultivation for Sunflower was Rs. 26654.19. The

gross income realized by the farmers was Rs. 45506.01. The net income from Sunflower cultivation was Rs. 18851.82. Thus the benefit cost ratio was found to be 1:1.71. The results indicated that, the total cost of cultivation for Red gram was Rs. 16982.11. The gross income realized by the farmers was Rs. 148200. The net income from Red gram cultivation was Rs. 131217.89. Thus the benefit cost ratio was found to be 1:8.73. The results indicated that, the total cost of cultivation for Navane was Rs. 17558.19. The gross income realized by the farmers was Rs. 23341.50. The net income from Navane cultivation was Rs. 5783.31. Thus the benefit cost ratio was found to be 1:1.33.

The results indicated that, 31.43 per cent of the households opined that dry fodder was adequate. The table indicated that, in landless farmers, the average income from wage was Rs. 51000. In marginal farmers the average income from service/salary was Rs.5333.33, wage was Rs.41000 and agriculture Rs.28654. In case of small farmers the average income from service/salary was Rs.6785.71, wage was Rs.28928.57, agriculture was Rs.57380 and dairy farm was Rs.964.29. In case of semi medium farmers, the average income from wage was Rs.10000 and agriculture Rs.110000. The results indicated that, in landless farmer, the average expenditure from wage was Rs. 1250.In marginal farmers; the average expenditure from agriculture was Rs.15866.67. In small farmers the average expenditure from agriculture was Rs.35071.43 and dairy farm was Rs.8000. In semi medium farmers the average expenditure from agriculture was Rs.65000.

The results indicated that, sampled households have grown 9 coconut trees and 6 mango tree in their field. The results indicated that, households have planted 1 teak trees, 69 neem trees, 5 tamarind tress and 2 banyan trees in their field. The results indicate that, households have an average investment capacity of Rs. 1428.57 for land development, Rs. 571.43 for improved crop production and Rs.2571.43 for improved livestock management. Marginal households have an average investment capacity of Rs. 6000 for improved livestock management. Small farmers have an average investment capacity of Rs. 3571.43 for land development and Rs.1428.57 for improved crop production. The results indicated that for 2.86 per cent of the households were dependent on loan from the bank for land development and irrigation facility and improved crop production respectively. 5.71 per cent of the households were dependent on loan from the bank for improved livestock management.

The results indicated that, maize, navane, paddy, red gram and sunflower crops were sold to the extent of 100 per cent. Bajra and groundnut were sold to the extent of 98.78 per cent and 90.65 per cent respectively. The results indicated that, 25.71 percent of the households have sold their produce to local/village merchant and 68.57 percent of the households sold their produce in regulated markets. The results indicated that 62.86 per cent of the households have used tractor as a mode of transport, and 31.43 per cent have used truck. The results indicated that, 22.86 per cent of the households have experienced

the soil and water erosion problems i.e. 26.67 percent of marginal farmers and 28.57 per cent of small farmers.

The results indicated that, 91.43 per cent of the households have shown interest in soil testing. The results indicated that, 94.29 percent used fire wood as a source of fuel and 8.57 percent of the households used LPG. The results indicated that, piped supply was the source of drinking water for 97.14 per cent and 2.86 per cent of them were using bore well for drinking water. The results indicated that, electricity was the major source of light for 100 per cent of the households. The results indicated that, 57.14 per cent of the households possess sanitary toilet i.e. 40 per cent of landless, 100 per cent of marginal, 14.29 per cent of small and 100 per cent of semi medium farmers had sanitary toilet facility. The results indicated that, 100 per cent of the sampled households possessed BPL card. The results indicated that, 62.86 per cent of the households participated in NREGA programme which included 100 per cent of the landless, marginal and semi medium and 7.14 percent of the small farmers respectively.

The results indicated that, cereals, pulses, oilseeds, vegetables, fruits , milk and egg were adequate for 100 per cent, 94.29 per cent, 2.86 per cent, 45.71 per cent, 14.29 per cent, 74.29 per cent and 8.57 per cent of the households respectively. The results indicated that, pulses, oilseeds, vegetables, fruits, milk, egg and meat were inadequate for 5.71 per cent,65.71 per cent, 54.29 per cent,88.57 per cent, 25.71 per cent, 85.71 and 97.14 per cent of the households respectively.

The results indicated that, Lower fertility status of the soil was the constraint experienced by 51.43 per cent of the households, wild animal menace on farm field (74.29%), frequent incidence of pest and diseases (71.43%), inadequacy of irrigation water (25.71%), high cost of Fertilizers and plant protection chemicals (62.86%), high rate of interest on credit (25.71%), low price for the agricultural commodities (65.71%), lack of marketing facilities in the area (60%), inadequate extension services (28.57%), lack of transport for safe transport of the agricultural produce to the market (71.43%), less rainfall (14.29%) and Source of Agri-technology information(Newspaper/TV/Mobile (2.86%).