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

BUDIHALU (4D4A1W2e) MICRO WATERSHED

Alavandi 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. The challenges 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 Budihalu microwatershed in Koppal Taluk, Koppal District, Karnataka" for integrated development was taken up in collaboration with the State Agricutural Universities, IISC, KSRSAC, KSNDMC as Consortia partners. The project provides detailed land resource information at cadastral level (1:7920 scale) for all the plots and socio-economic status of farm households covering thirty per cent farmers randomely selected representing landed and landless class of farmers in the 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.

Nagpur
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PART-A

LAND RESOURCE INVENTORY

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EXECUTIVE SUMMARY

The land resource inventory of Budihalu 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 792 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 about 99 per cent is covered by soils and 1 per cent by water bodies, settlements and others. The salient findings from the land resource inventory are summarized briefly below.

- *The soils belong to 21 soil series and 33 soil phases (management units) and 9 land management units.*
- *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 31 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 2 per cent of the soils are shallow (50-75 cm), 25 per cent of the soils are moderately shallow (50-75 cm), 29 per cent of the soils are moderately deep (75-100 cm) and 38 per cent area has deep (100-150 cm) to very deep (>150 cm) soils.*
- *About 58 per cent has clayey soils, 35 per cent has loamy and 2 per cent has sandy soils at the surface.*
- *About 66 per cent of the area has non-gravelly (<15%) soils, 25 per cent gravelly (15-35 % gravel) and 2 per cent has very gravelly (35-60%) soils.*
- *About 9 per cent are very low (<50 mm/m), 45 per cent low (51-100 mm/m), 13 per cent medium (101-150 mm/m) and 27 per cent high (151-200 mm/m) to very high (>200 mm/m) in available water capacity.*

- *About 5 per cent area has nearly level (0-1%) and 88 per cent has very gently sloping (1-3%) lands.*
- *About 58 per cent has soils that are slightly eroded (e1) and 35 per cent moderately eroded (e2) lands.*
- *An area of about 1 per cent are slightly acid (pH 6.0-6.5), 27 per cent are neutral (pH 6.5-7.3), 12 per cent are slightly alkaline (pH 7.3-7.8), 31 per cent are moderately alkaline (pH 7.8-8.4), 18 per cent are strongly alkaline (pH 8.4-9.0) and 5 per cent are very strongly alkaline (pH >9.0) in soil reaction.*
- *The Electrical Conductivity (EC) of the soils is non-saline (<2 dS m^{-1}) in 74 per cent, low (2-4 dS m^{-1}) in 17 per cent and medium (4-8 dS m^{-1}) in about 3 per cent soils.*
- *Organic carbon is low (<0.5%) in about 13 per cent, 48 per cent of the soils are medium (0.5-0.75%) and high (>0.75%) in 33 per cent soils.*
- *Available phosphorus is low (<23 kg/ha) in <1 per cent and medium (23-57 kg/ha) about 93 per cent in the microwatershed.*
- *About <1 per cent of the soils are low (<145 kg/ha), medium (145-337 kg/ha) in 57 per cent soils and 36 per cent soils are high (>337 kg/ha) in available potassium content.*
- *Available sulphur is low (<10 ppm) in <1 per cent, medium (10-20 ppm) in 34 per cent and high (>320 ppm) in about 59 per cent soils.*
- *Available boron is low (0.5 ppm) in about 47 per cent, 47 per cent are medium (0.5-1.0 ppm) and <1 per cent area is high (>1.0 ppm).*
- *Available iron is sufficient (>4.5 ppm) in 74 per cent and deficient (<4.5 ppm) in about 20 per cent area.*
- *Available zinc is deficient (<0.6 ppm) in about 21 per cent and deficient (<0.6 ppm) in 72 per cent soils.*
- *Available manganese and copper are sufficient in all the soils.*
- *The land suitability for 31 major agricultural and horticultural 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	*282 (36)*	*389 (49)*	*Sapota*	*169 (21)*	*180 (23)*
Maize	*87 (11)*	*584 (74)*	*Pomegranate*	*175 (22)*	*334 (42)*
Bajra	*334 (42)*	*362 (46)*	*Musambi*	*271 (34)*	*238 (30)*
Groundnut	*174 (22)*	*313 (39)*	*Lime*	*271 (34)*	*238 (30)*
Sunflower	*271 (34)*	*228 (29)*	*Amla*	*334 (42)*	*395 (50)*
Red gram	*169 (21)*	*286 (36)*	*Cashew*	*109 (14)*	*235 (30)*
Bengalgram	*111 (14)*	*585 (74)*	*Jackfruit*	*169 (21)*	*174 (22)*
Cotton	*237 (30)*	*434 (55)*	*Jamun*	*126 (16)*	*321 (41)*
Chilli	*184 (23)*	*317 (40)*	*Custard apple*	*445 (56)*	*284 (36)*
Tomato	*184 (23)*	*323 (41)*	*Tamarind*	*126 (16)*	*154 (20)*
Brinjal	*208 (26)*	*460 (58)*	*Mulberry*	*149 (19)*	*365 (46)*
Onion	*166 (21)*	*333 (42)*	*Marigold*	*144 (18)*	*527 (66)*
Bhendi	*166 (21)*	*502 (63)*	*Chrysanthemum*	*144 (18)*	*527 (66)*
Drumstick	*175 (22)*	*349 (44)*	*Jasmine*	*144 (18)*	*362 (46)*
Mango	*126 (16)*	*49 (6)*	*Crossandra*	*171 (22)*	*476 (60)*
Guava	*148 (19)*	*195 (25)*			

Apart from the individual crop suitability, a proposed crop plan has been prepared for the 9 identified LMUs by considering only the highly and moderately suitable lands for different crops and cropping systems with food, fodder, fibre and other horticulture crops that helps in maintaining productivity and ecological balance in the microwatershed.

- *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 in turn would help in maintaining the ecological balance and contribute to mitigating the climate change.*

Chapter 1

INTRODUCTION

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

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

In this critical juncture, the challenge before us is not only to increase the productivity per unit area which is steadily declining and showing a fatigue syndrome, but also to prevent or at least reduce the severity of degradation. If the situation is not reversed at the earliest, then the sustainability of the already fragile crop production system and the overall ecosystem will be badly affected in the state.

The continued neglect and unscientific use of the resources for a long time has led to the situation observed at present in the state. It is a known fact and established beyond doubt by many studies in the past that the cause for all kinds of degradation is the neglect and irrational use of the land resources. Hence, there is urgent need to generate a detailed site-specific farm level database on various land resources for all the villages/watersheds in a time bound manner that would help to protect the valuable soil and land resources and also to stabilize the farm production.

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

developmental works of the government etc. From the data collected at farm level, the specific problems and potentials of the area can be identified and highlighted, conservation measures required for the area can be planned on a scientific footing, suitability of the area for various uses can be worked out and finally viable and sustainable land use options suitable for each and every land holding can be prescribed.

The Land Resource Inventory is basically done for identifying 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 Budihalu 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.

Chapter 2

GEOGRAPHICAL SETTING

2.1 Location and Extent

The Budihalu Microwatershed is located in the central part of northern Karnataka in Koppal Taluk and District, Karnataka State (Fig. 2.1). It comprises parts of Budhihala, Hireshindhogi, Dombrahalli, Chikkashindhogi and Bisarahalli Villages. It lies between $15^0$15' – $15^0$18' North latitudes and $76^0$3' – $76^0$6' East longitudes and covers an area of 792 ha. It is about 15 km from Koppal town. It is surrounded by Budhihala and Chikkashindhogi villages on the east, Hireshindhogi and Bisarahalli villages on the west, Dombrahalli village on the southern side.

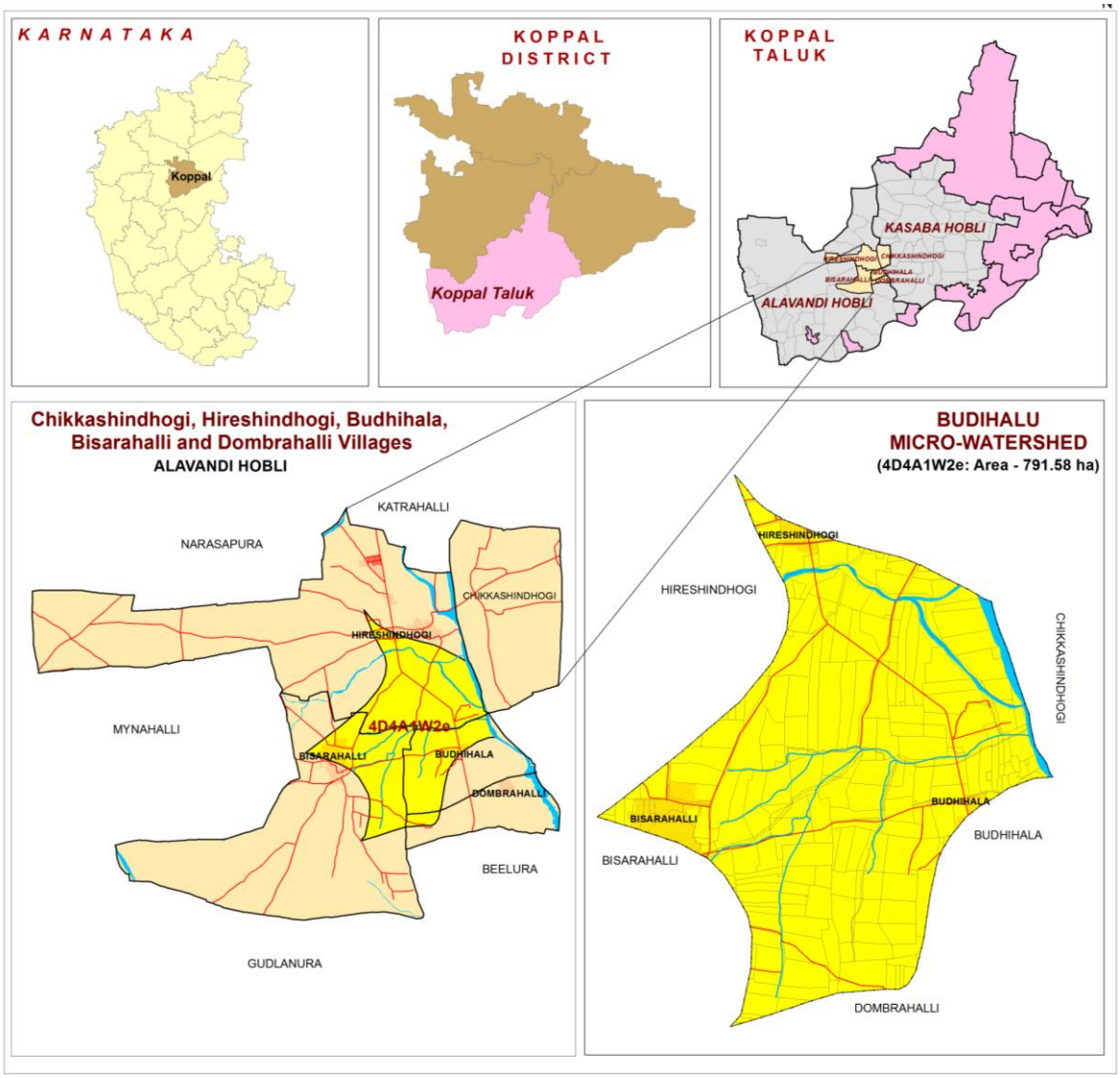


Fig. 2.1 Location map of Budihalu Microwatershed

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 the village. The 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 a 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

summits, very gently sloping uplands and nearly level plains based on slope and its relief features. The elevation ranges from 503 to 528 m in the gently sloping uplands.

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 an average annual rainfall of 662 mm (Table 2.1). Maximum of 424 mm precipitation takes place during the 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 takes place 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 month 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**	

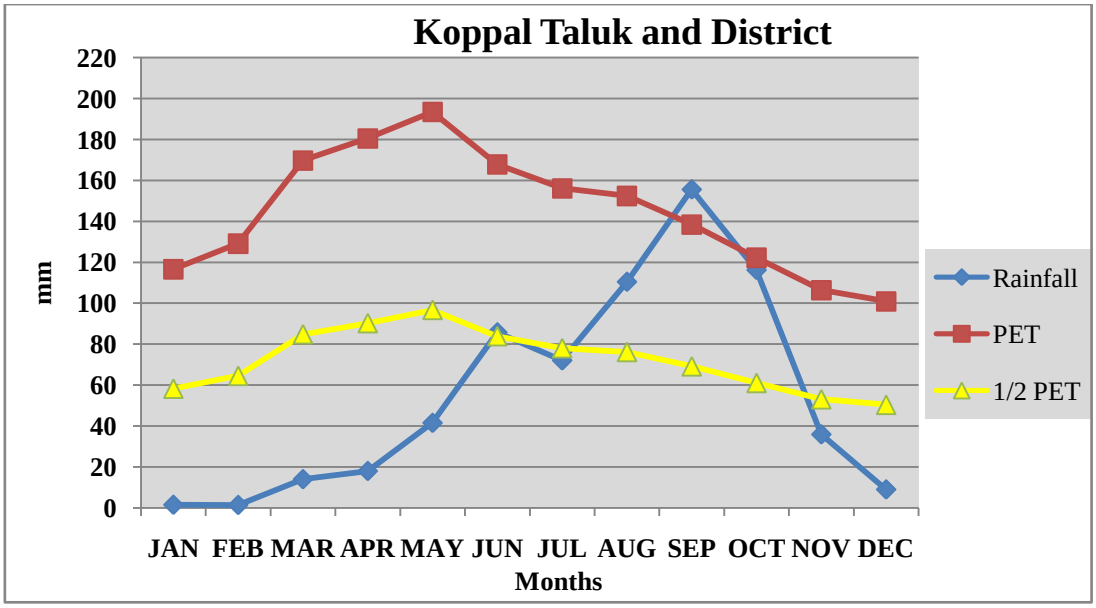


Fig. 2.3 Rainfall distribution in Koppal Taluk and District

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 Budihalu Microwatershed

2.7 Land Utilization

About 91 per cent area (Table 2.2) in Koppal district is cultivated at present and about 16 per cent of the area is sown more than once. The cropping intensity is 118 per cent. 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 sorghum, maize, bajra, cotton, safflower, sunflower, red gram, horse gram, onion, mulberry, pomegranate, sugarcane, bengalgram 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 Budihalu 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 other water bodies and conservation structures in Budihalu 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 (a) Different crops and cropping systems in Budihalu Microwatershed

Fig. 2.5 (b) Different crops and cropping systems in Budihalu Microwatershed

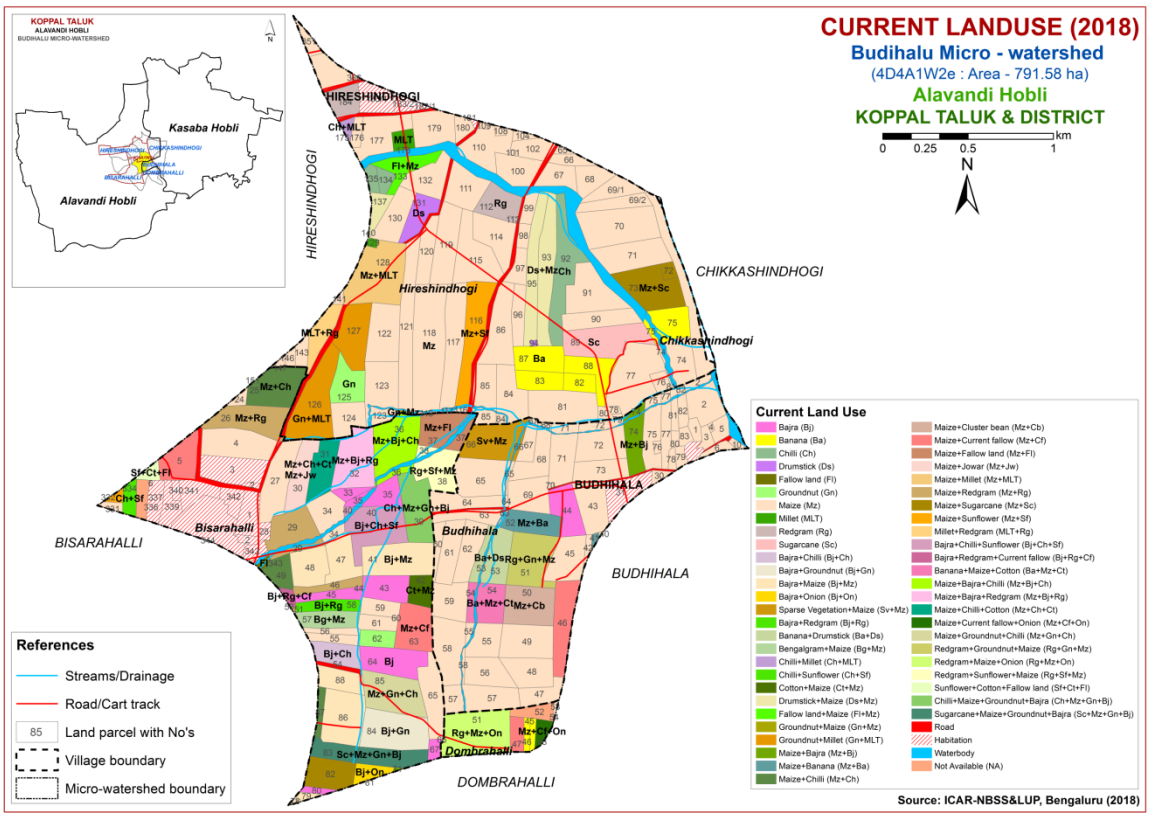


Fig. 2.6 Current Land Use – Budihalu Microwatershed

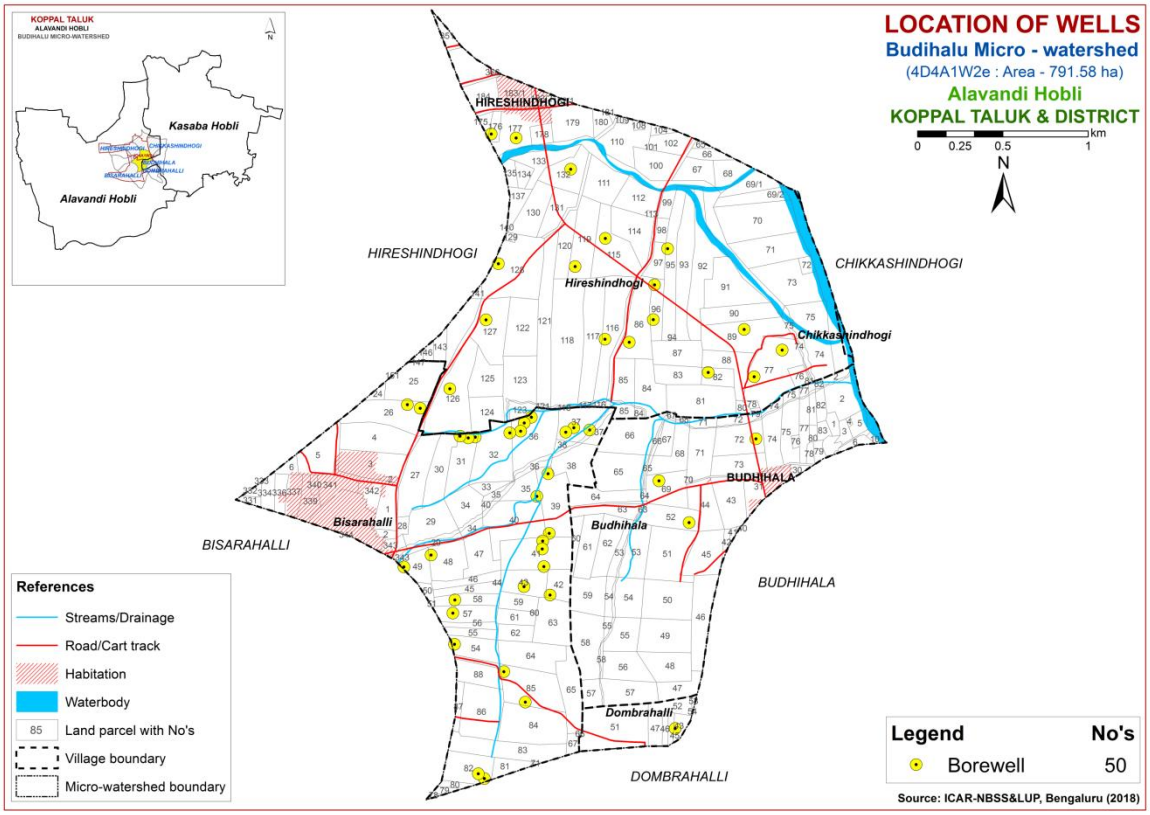


Fig. 2.7 Location of wells and conservation structure-Budihalu Microwatershed

Chapter 3

SURVEY METHODOLOGY

The purpose of land resource inventory is to delineate similar areas (soil series and phases), which respond or expected to respond similarly for a given level of management. This was achieved in Budihalu 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 792 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 ridges, mounds and uplands 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 genetly 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

Dsa 25 – Nearly Level Lands

- Dsa 251- Nearly level, Grayish green tone
- Dsa 252- Nearly level, Bluish grey tone
- Dsa 253- Nearly level, Light green tone
- Dsa 254- Nearly level, Medium green tone
- Dsa 255- Nearly level, Greenish pink tone
- Dsa 256- Nearly level, Whitish green
- Dsa 257- Nearly level, Pink tone
- Dsa 258- Nearly level, Whitish grey tone
- Dsa 259- Nearly level, Grayish Pink

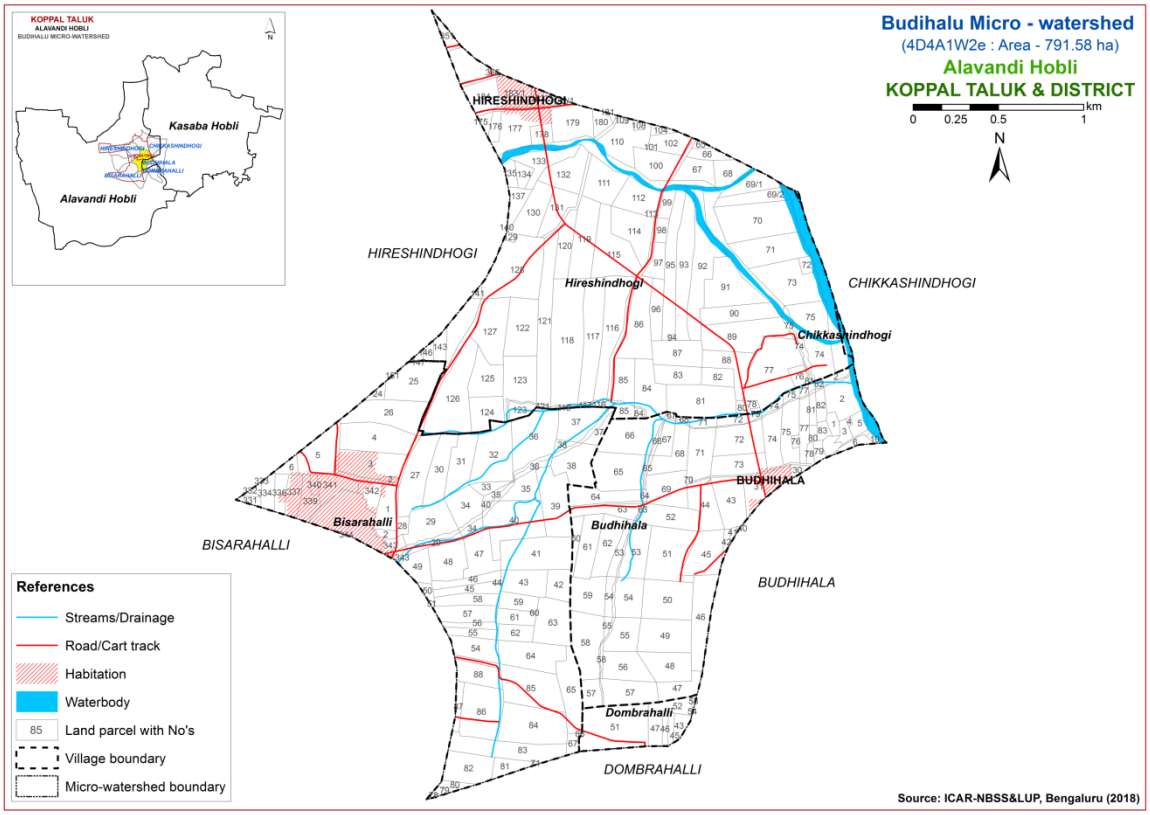


Fig. 3.1 Scanned and Digitized Cadastral map of Budihalu Microwatershed

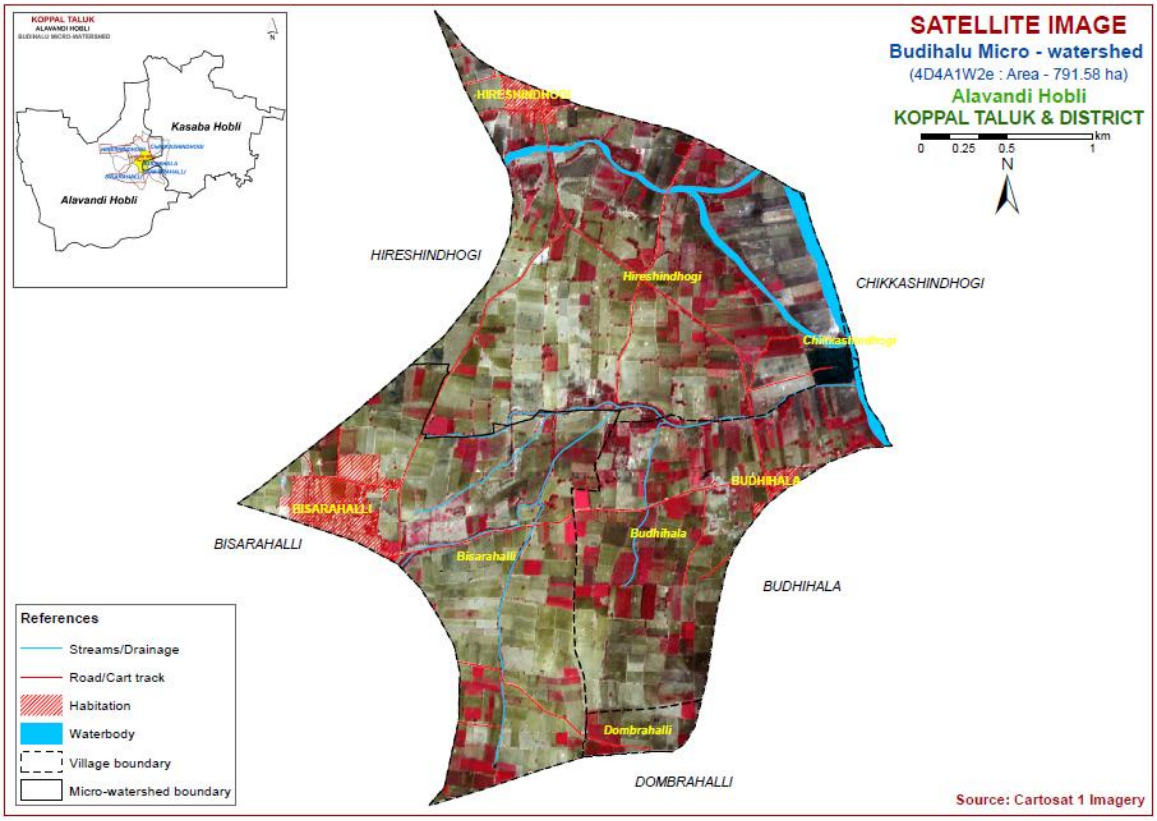


Fig. 3.2 Satellite Image of Budihalu Microwatershed

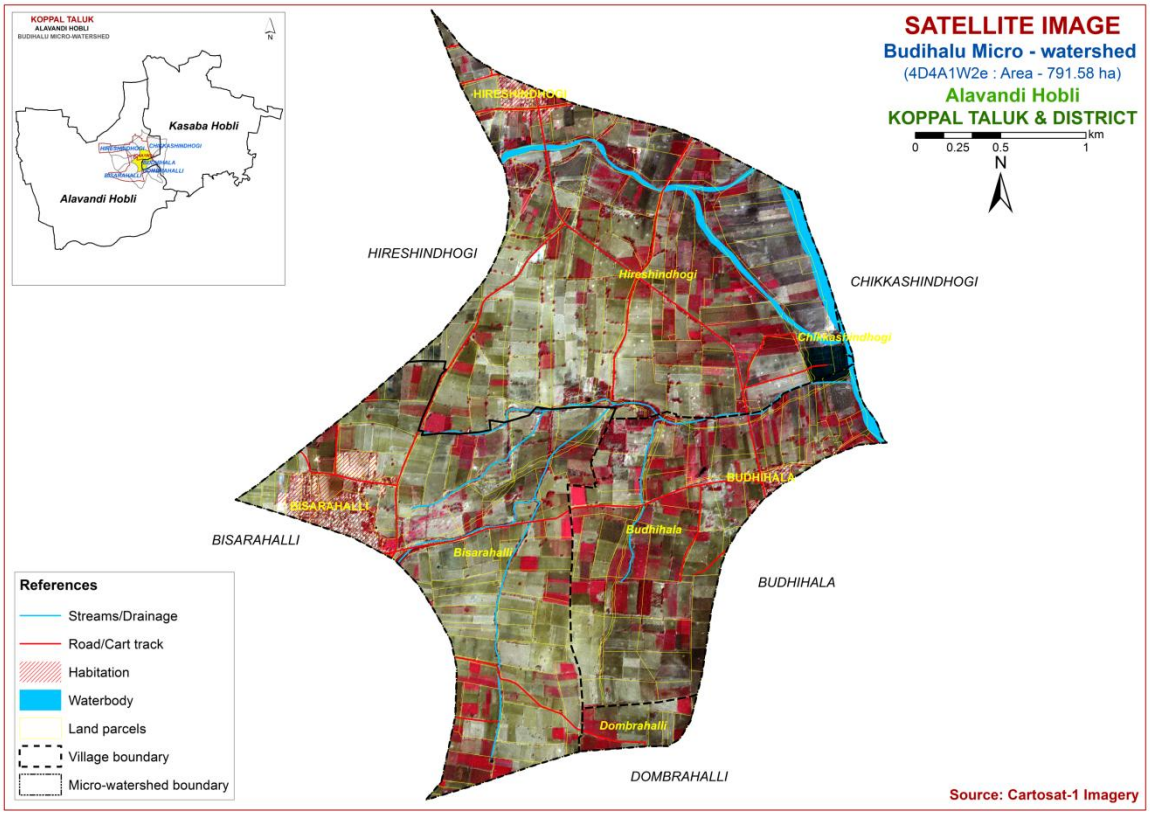


Fig. 3.3 Cadastral map overlaid on IRS PAN+LISS IV merged imagery of Budihalu Microwatershed

3.3 Field Investigation

The field boundaries and survey numbers given on the cadastral sheet were located on the ground by following permanent features like roads, cart tracks, *nallas*, streams, tanks etc., and wherever changes were noticed, they were incorporated on the microwatershed cadastral map. Preliminary traverse of the microwatershed was carried out with the help of cadastral map, imagery and toposheets. While traversing, landforms and physiographic units identified were checked and preliminary soil legend was prepared by studying soils at few selected places. Then, intensive traversing of each physiographic unit like hills, ridges, uplands and 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).

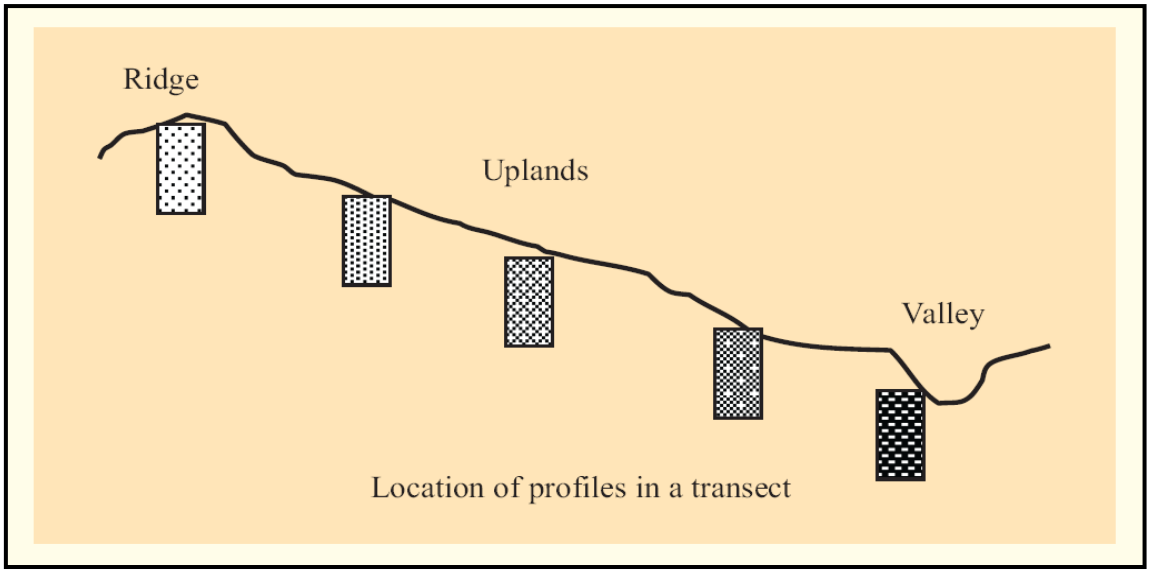


Fig. 3.4 Location of profiles in a transect

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, soil profiles (vertical cut showing the soil layers from surface to the rock) were opened upto 200 cm or to the depth limited by rock or hard substratum and studied in detail for all their morphological and physical characteristics. The soil and site characteristics were recorded for all profile sites on a standard proforma as per the guidelines given in USDA Soil Survey Manual (Soil Survey Staff, 2012). Apart from the transect study, profiles were also studied at random, almost like in a grid pattern, outside the transect areas to validate the soil map unit boundaries.

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, 21 soil series were identified in Budihalu 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	Calcareo-usness
Soils of Granite gneiss Landscape							
1	Chikkasavanur (CSR)	25-50	7.5YR3/2,3/3,3/4	scl	<15	Ap-Bw-Cr	-
2	Abbigere (ABR)	25-50	2.5YR 3/3, 3/4	gsc	>35	Ap-Bt-Cr	
3	Mukhadahalli	50-75	5YR3/3,3/4,4/3,	gsc	>35	Ap-Bt-Cr	

Sl. No	Soil Series	Depth (cm)	Colour (moist)	Texture	Gravel (%)	Horizon sequence	Calcareo-usness
	(MKH)		5/4,6/6 2.5YR3/4				
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	Thammadahalli (TDH)	50-75	2.5YR2.5/4,3/6	sc-c	<15	Ap-Bt-Cr	es
6	Kethanapura (KTP)	50-75	2.5YR3/4, 3/6	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	Bisarahalli (BSR)	75-100	5 YR 3/3, 3/4	gsc	15-35	Ap-Bt-Cr	
10	Giddadapalya (GDP)	100-150	2.5YR3/4, 3/6	gsc-gc	35-60 after 60 m depth	Ap-Bt-Cr	-
11	Balapur (BPR)	100-150	2.5YR2.5/4,3/4	gsc-gc	>35	Ap-Bt-Cr	-
12	Kumchahalli (KMH)	100-150	2.5YR3/4, 3/6	sc	<15	Bt-Cr	
13	Ranatur (RTR)	>150	2.5YR2.5/3,2.5/4, 3/3,4/6	c	-	Ap-Bt	
14	Hallikere (HLK)	>150	5YR3/3,3/4 7.5YR3/3,3/4	c	<15	Ap-Bt	
Soils of Alluvial Landscape							
15	Ravanaki (RNK)	50-75	7.5YR3/2,3/3,5/2,5/3 10YR3/1,3/2,4/1, 4/2, 5/1,6/1	c	<15	Ap-Bw-Cr	e-ev
16	Narasapura (NSP)	75-100	10 YR 3/1, 3/2, 4/2,	c		Ap-Bw-Cr	e-es
17	Dambarahalli (DRL)	75-100	10YR 2/1, 3/1, 4/3	c	<15	Ap-Bss-Ck	e-es
18	Bedwatti (BWT)	75-100	10YR3/1,4/1,4/3	gsc-gc	>35	Ap-Bw-Ck	e-es
19	Lakshmangudda (LGD)	100-150	10YR3/1,3/2,4/1,4/2, 7.5YR3/1,3/2,5/1, 2.5Y5/2,5/3,6/3	c	<15	Ap-Bss-Ck	es
20	Handrala (HDL)	100-150	10 YR 2/1, 3/1,4/1,	c	-	Ap-Bss-Ck	es
21	Bardur (BDR)	>150	10YR 2/1, 3/1, 3/2,	c	<15	Ap-Bss	es

3.4 Soil Mapping

The area under each soil series was further separated into 33 soil phases and their boundaries delineated on the cadastral map based on the variations observed in the texture of the surface soil, slope, erosion, presence of gravel, stoniness etc. A soil phase is a

subdivision of soil series based mostly on surface features that affect its use and management.

The soil mapping units are shown on the soil map (Fig. 3.5) in the form of symbols. During the survey 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 of 33 mapping units representing 21 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 33 soil phases mapped in the microwatershed. Each mapping unit (soil phase) delineated on the map has similar soil and site characteristics. In other words, all the farms or survey numbers included in one phase will have similar management needs and have to be treated accordingly.

3.5 Laboratory Characterization

Soil samples for each soil 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 2018 from Budihalu farmer's fields (74 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.

Table 3.2 Soil map unit description of Budihalu Microwatershed

Soil map unit No*	Soil Series	Soil Phase Symbol	Mapping Unit Description	Area in ha (%)
Soils of Granite and Granite gneiss landscape				
	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		**4 (0.53)**
39		CSRiB2	Sandy clay surface, slope 1-3 % moderate erosion	4 (0.53)
	ABR	Abbigere soils are shallow (25-50 cm), well drained, have dark reddish brown gravelly red sandy clay to clay soils occurring on very gently sloping uplands under cultivation		**9 (1.17)**
470		ABRbB2g2	Loamy sand surface, slope 1-3%, moderate erosion, very gravelly (35-60%)	9 (1.17)
	MKH	Mukhadahalli soils are moderately shallow (50-75 cm), well drained, have dark brown to reddish brown gravelly red sandy clay loam soils occurring on gently very gently to gently sloping uplands under cultivation		34 (4.24)
78		MKHcB2g2	Sandy loam surface, slope 1-3%, moderate erosion, very gravelly (35-60%)	8 (0.99)
85		MKHhB2g1	Sandy clay loam surface, slope 1-3 % moderate	8

Soil map unit No*	Soil Series	Soil Phase Symbol	Mapping Unit Description	Area in ha (%)
			erosion, gravelly (15-35%)	(1.02)
90		MKHiB2g1	Sandy clay surface, slope 1-3 % moderate erosion, gravelly (15-35%)	18 (2.23)
	LKR	Lakkur soils are moderately shallow (50-75 cm), well drained, have dark reddish brown to dark red, red gravelly sandy clay soils occurring on very gently to moderately sloping uplands under cultivation		**17.27 (2.12)**
53		LKRiB2	Sandy clay surface, slope 1-3 % moderate erosion	0.27 (0.03)
54		LKRiB2g1	Sandy clay surface, slope 1-3%, moderate erosion, gravelly (15-35%)	17 (2.09)
	TDH	Thammadahalli soils are moderately shallow (50-75cm), well drained, have dark red to dark reddish brown red sandy clay to clay soils occurring on very gently sloping uplands under cultivation		**80 (10.06)**
55		TDHcB1	Sandy loam surface, slope 1-3%, slight erosion	80 (10.06)
	KTP	Kethanapura soils are moderately shallow (50-75 cm), well drained, have dark reddish brown red sandy clay loam soils occurring on very gently sloping uplands under cultivation		**61 (7.7)**
74		KTPiB1g1	Sandy clay surface, slope 1-3%, slight erosion, gravelly (15-35%)	61 (7.7)
	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		**10 (1.21)**
128		HDHiB2g1	Sandy clay surface, slope 1-3 % moderate erosion, gravelly (15-35%)	10 (1.21)
	GHT	Gollarahatti soils are moderately deep (75-100 cm), well drained, have dark reddish brown to dark red sandy clay loam soils occurring on nearly level very gently sloping uplands under cultivation		**117 (14.73)**
142		GHThB2g1	Sandy clay loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)	41 (5.19)
144		GHTiB1	Sandy clay surface, slope 1-3%, slight erosion	76 (9.54)
	BSR	Bisarahalli soils are moderately deep (75-100 cm), well drained, have dark reddish brown red sandy clay soils occurring on very gently sloping uplands under cultivation		**42 (5.26)**
159		BSRcB1	Sandy loam surface, slope 1-3%, slight erosion	2 (0.2)
165		BSRiB1g1	Sandy clay surface, slope 1-3%, slight erosion, gravelly (15-35%)	40 (5.06)
	GDP	Giddadapalya soils are deep (100-150 cm), well drained, have dark reddish brown to dark red gravelly sandy clay to clay soils occurring on very gently sloping uplands under cultivation		**21 (2.62)**
269		GDPiB2	Sandy clay surface, slope 1-3 % moderate erosion	21 (2.62)
	BPR	Balapur soils are deep (100-150 cm), well drained, have dark		**23**

Soil map unit No*	Soil Series	Soil Phase Symbol	Mapping Unit Description	Area in ha (%)
		reddish brown to dark red gravelly sandy clay to clay soils occurring on nearly level to gently sloping uplands under cultivation		**(2.97)**
228		BPRhB1	Sandy clay loam surface, slope 1-3%, slight erosion	16 (2.07)
239		BPRiB2	Sandy clay surface, slope 1-3 % moderate erosion	7 (0.9)
	KMH	Kumchahalli soils are deep (100-150 cm), well drained, have dark reddish brown to dark red sandy clay red soils occurring on nearly level to very gently sloping uplands under cultivation		**49 (6.3)**
197		KMHcB2	Sandy loam surface, slope 1-3%, moderate erosion	43 (5.48)
202		KMHiB2g1	Sandy clay surface, slope 1-3 % moderate erosion, gravelly (15-35%)	6 (0.82)
	RTR	Ranatur soils are very deep (>150 cm), well drained, have dark reddish brown to dark red clay soils occurring on nearly level to very gently sloping uplands under cultivation		**57 (7.25)**
285		RTRcB2	Sandy loam surface, slope 1-3%, moderate erosion	11 (1.44)
286		RTRhA1	Sandy clay loam surface, slope 0-1%, slight erosion	38 (4.85)
288		RTRiB2	Sandy clay surface, slope 1-3 % moderate erosion	8 (0.96)
	HLK	Hallikere soils are very deep (>150 cm), well drained, have dark brown to dark reddish brown clayey soils occurring on nearly level to very gently sloping uplands under cultivation		**48 (5.99)**
270		HLKhB2	Sandy clay loam surface, slope 1-3%, moderate erosion	27 (3.36)
273		HLKiB1	Sandy clay surface, slope 1-3%, slight erosion	21 (2.63)
Soils of Alluvial Landscape				
	RNK	Ravanaki soils are moderately shallow (50-75 cm), moderately well drained, have dark brown to very dark grayish brown and dark gray, calcareous clay black soils occurring on nearly level to very gently sloping plains under cultivation		**5 (0.62)**
329		RNKiA1	Sandy clay surface, slope 0-1%, slight erosion	3 (0.34)
336		RNKmB2	Clay surface, slope 1-3%, moderate erosion	2 (0.28)
	NSP	Narasapura soils are moderately deep (75-100 cm), moderately well drained, have dark grayish brown to very dark grayish brown and very dark gray, black calcareous cracking clay sodic soils occurring on nearly level to very gently sloping plains under cultivation		**10 (1.23)**
362		NSPmB2	Clay surface, slope 1-3%, moderate erosion	10 (1.23)
	DRL	Dambarahalli soils are moderately deep (75-100 cm),		**44**

Soil map unit No*	Soil Series	Soil Phase Symbol	Mapping Unit Description	Area in ha (%)
		moderately well drained, have dark brown to very dark gray, calcareous black cracking clay soils occurring on nearly level to very gently sloping plains under cultivation		**(5.54)**
348		DRLmB1	Clay surface, slope 1-3%, slight erosion	24 (3.02)
350		DRLmB2	Clay surface, slope 1-3%, moderate erosion	20 (2.52)
	BWT	Bedwatti soils are moderately deep (75-100 cm), moderately well drained, dark brown to dark gray and very dark gray, black calcareous gravelly sandy clay to clay soils occurring on very gently sloping plains under cultivation		**6 (0.77)**
367		BWTmB1	Clay surface, slope 1-3%, slight erosion	6 (0.77)
	LGD	Lakshmangudda soils are deep (100-150 cm), well drained, have light olive brown to very dark gray, clay soils occurring on nearly level uplands under cultivation		**4 (0.46)**
393		LGDmB1	Clay surface, slope 1-3%, slight erosion	4 (0.46)
	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		**93 (11.78)**
380		HDLmB1	Clay surface, slope 1-3%, slight erosion	93 (11.78)
	BDR	Bardur soils are very deep (>150 cm), moderately well drained, have very dark grayish brown to very dark gray, black cracking calcareous clay soils occurring on nearly level to very gently sloping plains under cultivation		**8 (1.07)**
433		BDRmB2	Clay surface, slope 1-3%, moderate erosion	8 (1.07)
1000	Others	Habitations and waterbody		**48 (6.06)**

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

3.6 Land Management Units (LMU's)

The 33 soil phases identified and mapped in the microwatershed were regrouped into 9 Land Management Units (LMU's) for the purpose of preparing a Proposed Crop Plan for sustained development of the microwatershed. The database (soil phases) generated under LRI was utilized for identifying Land Management Units (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 Budihalu Microwatershed, five soil and site characteristics, namely soil depth, soil texture, slope, erosion and gravel content have been considered for defining LMUs. The Land Management Units are expected to behave similarly for a given level of management.

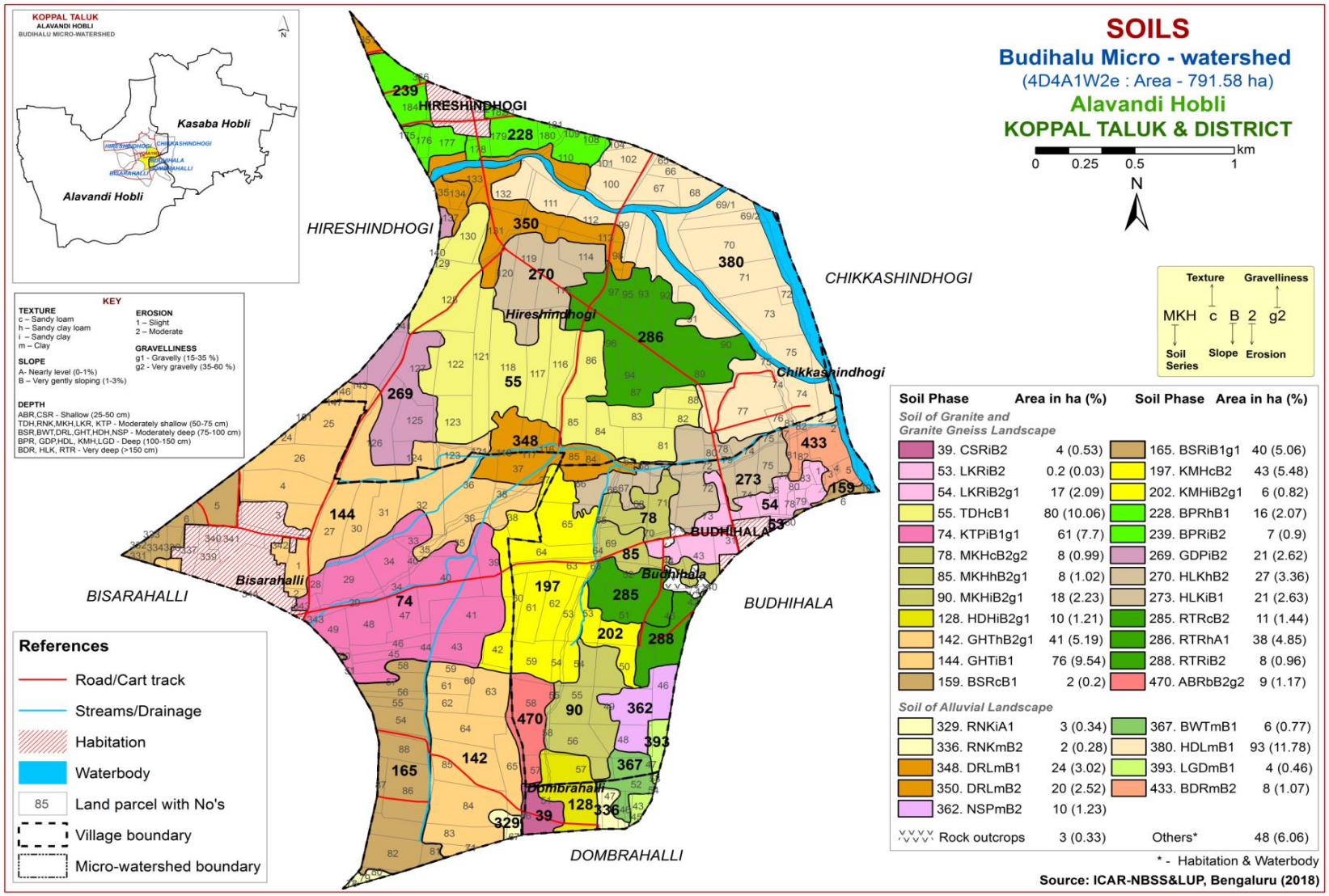


Fig 3.4 Soil Phase or Management Units-Budihalu Microwatershed

Chapter 4

THE SOILS

Detailed information pertaining to the nature, extent and distribution of different kinds of soils occurring in Budihalu Microwatershed is provided in this chapter. The microwatershed area has been identified as granite gneiss and alluvial landscapes based on geology. In all, 21 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 21 soil series identified followed by 33 soil phases (management units) mapped (Fig. 3.4) are furnished below. The physical and chemical characteristics of soil series identified in Budihalu Microwatershed are given in Table 4.1. 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.

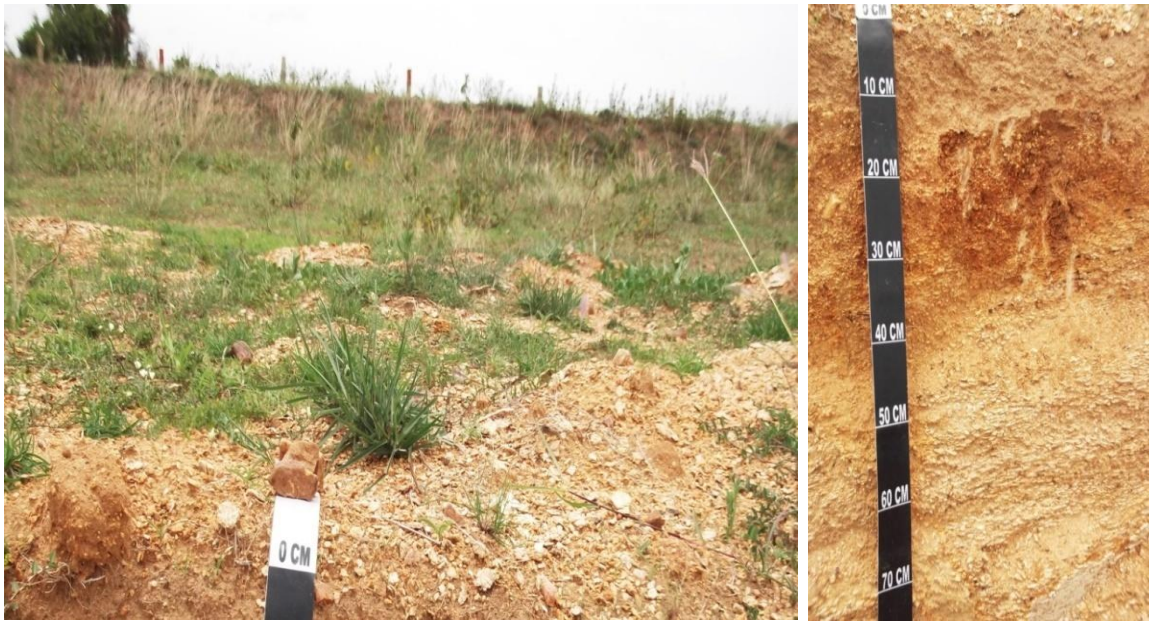
4.1 Soils of granite and granite gneiss landscape

In this landscape, 14 soil series are identified and mapped. Of these, Gollarahatti (GHT) series occupies maximum area of 117 (15%), Thammadahalli (TDH) 80 ha (10%), Kethanapura (KTP) 61 ha (8%), Ranatur (RTR) 57 ha (7%), Kumchahalli (KMH) 49 ha (6%), Hallikere (HLK) 48 ha (6%), Bisarahalli (BSR) 42 ha (5%), Mukhadahalli (MKH) 34 ha (4%), Balapur (BPR) 23 ha (3%), Giddadapalya (GDP) 21 ha (3%), Lakkur (LKR) 17 ha (2%), Hooradhahalli (HDH) 10 ha (2%), Abbigere (ABR) 9 ha (1%) and Chikkasavanur occupy an area of about 4 ha (1%) in the microwatershed. The brief description of each soil series along with the soil phases identified and mapped is given below.

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



Landscape and soil profile characteristics of Chikkasavanur (CSR) Series

4.1.2 Abbigere series (ABR): Abbigere soils are shallow (25-50 cm), well drained, have dark reddish brown gravelly red sandy clay soils. They have developed from weathered granite gneiss and occur on very gently sloping uplands under cultivation. The 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). Only one phase was identified and mapped.

Landscape and soil profile characteristics of Abbigere (ABR) Series

4.1.3 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). Three phases were identified and mapped.

Landscape and soil profile characteristics of Mukhadahalli (MKH) Series

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

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

Landscape and soil profile characteristics of Lakkur (LKR) Series

4.1.5 Thammadahalli (TDH) Series: Thammadahalli soils are moderately shallow (50-75cm), well drained, have brown to very dark brown and dark reddish brown sandy clay to clay soils. They have developed from granite gneiss and occur on nearly level to gently sloping uplands. The Thammadahalli series has been classified as a member of the fine, mixed, isohyperthermic family of Rhodic Paleustalfs.

The thickness of the solum ranges from 54 to 75 cm. The thickness of A horizon ranges from 11 to 19 cm. Its colour is in 7.5 YR, 5YR and 2.5 YR hue with value 2.5 to 4 and chroma 2 to 6. The texture varies from sandy clay loam to clay with 10 to 20 per cent gravel. The thickness of B horizon ranges from 43 to 60 cm. Its colour is in 2.5 YR hue with value 3 and chroma 4 to 6. Its texture is sandy clay to clay. The available water capacity is medium (100-150 mm/m). Only one phase was identified and mapped.

Landscape and soil profile characteristics of Thammadahalli (TDH) Series

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

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

Landscape and soil profile characteristics of Kethanapura (KTP) 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 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 (50-100 mm/m). Only one phase was identified and mapped.

Landscape and soil profile characteristics of Hooradhahalli (HDH) Series

4.1.8 Gollarahatti (GHT) Series: Gollarahatti soils are moderately deep (75-100 cm), well drained, have dark reddish brown to dark red sandy clay loam soils. They are developed from weathered granite gneiss and occur on very gently 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 gravelly sandy clay loam 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). Two phases were identified and mapped.

Landscape and soil profile characteristics of Gollarahatti (GHT) Series

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

The thickness of the solum ranges from 75 to 98 cm. The thickness of A horizon ranges from 17 to 25 cm. Its colour is in 5 YR hue with value 3 to 4 and chroma 3 to 6. The texture ranges from sandy clay loam to sandy clay with 15 to 35 per cent gravel. The thickness of B horizon ranges from 61 to 79 cm. Its colour is in 5 YR hue with value 3 and chroma 3 to 4. Its texture is gravelly sandy clay with gravel content of 15-35 per cent. The available water capacity is low (50-100 mm/m). Two phases were identified and mapped.

Landscape and soil profile characteristics of Bisarahalli (BSR) Series

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

The thickness of the solum ranges from 106 to 145 cm. The thickness of A-horizon ranges from 12 to 13 cm. Its colour is in 5 YR hue with value and chroma 3 to 4. The texture ranges from sandy loam with 10 to 15 per cent gravel. The thickness of B-horizon ranges from 106 to 123 cm. Its colour is in 2.5 YR hue with value 3 to 4 and chroma 3 to 6. Texture is sandy clay to clay with 35 to 75 per cent gravel. The available water capacity is low (51-100 mm/m). Only one phase was identified and mapped.

Landscape and soil profile characteristics of Giddadapalya (GDP) Series.

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

Landscape and soil profile characteristics of Balapur (BPR) Series

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

The thickness of the solum ranges from 102 to 150 cm. The thickness of A horizon ranges from 11 to 23 cm. Its colour is in 5 YR and 2.5 YR hue with value 2.5 to 3 and chroma 3 to 6. The texture is dominantly sandy clay. The thickness of B horizon ranges from 95 to 132 cm. Its colour is in 2.5 YR hue with value 3 and chroma 4 to 6. Its texture is dominantly sandy clay loam to sandy clay. The available water capacity is high (150-200 mm/m). Two phases were identified and mapped.

Landscape and soil profile characteristics of Kumchahalli (KMH) Series

4.1.13 Ranatur (RTR) Series: Ranatur soils are very deep (> 150 cm), well drained, have dark reddish brown to dark red clayey soils. They have developed from granite gneiss and occur on very gently sloping uplands. The Ranatur series has been classified as a member of the fine, mixed, isohyperthermic family of Rhodic Paleustalfs.

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

Landscape and soil profile characteristics of Ranatur (RTR) Series

4.1.14 Hallikere (HLK) Series: Hallikere soils are very deep (>150 cm), well drained, have dark brown and dark reddish brown clayey soils. They have developed from granite gneiss and occur on nearly level to very gently sloping uplands. The Hallikere series has been tentatively classified as a member of the fine, mixed, isohyperthermic family of Typic Paleustalfs.

The thickness of the solum is more than 150 cm. The thickness of A horizon ranges from 11 to 14 cm. Its colour is in 7.5 YR and 5 YR hue with value 3 to 4 and chroma 3 to 4. The texture varies from sandy loam to sandy clay loam. The thickness of B horizon is more than 150 cm. Its colour is in 7.5 YR and 5 YR hue with value and chroma 3 to 4. Its texture is clay. The available water capacity is high (150-200 mm/m). Two phases were identified and mapped.

Landscape and soil Profile Characteristics of Hallikere (HLK) Series

4.2 Soils of Alluvial landscape

In this landscape, seven soil series have been identified and mapped. Of these, Handrala (HDL) series occupies maximum area of 93 ha (12%), Dambarahalli (DRL) 44 ha (6%), Narasapura (NSP) 10 ha (1%), Bardur (BDR) 8 ha (1%), Bedwatti (BWT) 6 ha (1%), Ravanaki (RNK) 5 ha (1%), and Lakshmangudda (LGD) occupy minor area of about 4 ha (<1%) in the microwatershed. The brief description of soil series along with the soil phases identified and mapped is given below.

4.2.1 Ravanaki (RNK) Series: Ravanaki soils are moderately shallow (50-75 cm), well drained, have dark brown to very dark grayish brown, calcareous clay soils. They have developed from alluvium and occur on nearly level to very gently sloping plains. The Ravanaki series has been classified as a member of the very fine, smectitic, isohyperthermic (calc) family of Typic Haplustepts.

The thickness of the solum ranges from 50 to 75 cm. The thickness of A horizon ranges from 15 to 20 cm. Its colour is in 7.5 YR and 10 YR hue with value 2 to 3 and chroma 2.5 to 4. The texture varies from sandy clay to clay with 10 to 15 per cent gravel. The thickness of B horizon ranges from 35 to 60 cm. Its colour is in 10 YR and 7.5 YR hue with value 2 to 6 and chroma 2 to 4. Its texture is sandy clay to clay with gravel content of 10 to 20 per cent. The available water capacity is low (51-100 mm/m). Two soil phases were identified and mapped.

Landscape and soil Profile Characteristics of Ravanaki (RNK) Series

4.2.2 Narsapura (NSP) Series: Narasapura soils are moderately deep (75-100 cm), moderately well drained, have dark grayish brown to very dark grayish brown and very dark gray, black calcareous cracking clay sodic soils They have developed from alluvium and occur on very gently sloping uplands. The Narsapura series has been classified as a member of the very fine, smectitic, isohyperthermic (calc) family of Vertic Haplustepts.

The thickness of the solum is 76 to 98 cm. The thickness of A horizon ranges from 15 to 19 cm. Its colour is in 10 YR hue with value 3 and chroma 1 to 2.The texture is clay with no gravel. The thickness of B horizon ranges from 57 to 83 cm. Its colour is in 10 YR hue with value 3 to 5 and chroma 1 to 3. Its texture is clay and are calacreous. The available water capacity is medium (101-150 mm/m). Only one phase was identified and mapped.

Landscape and soil profile characteristics of Narsapura (NSP) series

4.2.3 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 (calc), isohyperthermic 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). Two phases were identified and mapped.

Landscape and soil profile characteristics of Dambarahalli (DRL) Series

4.2.4 Bedwatti (BWT) Series: Bedwatti soils are moderately deep (75-100 cm), moderately well drained, have very dark gray to dark brown gravelly, calcareous sandy clay to clay soils. They have developed from alluvium and occur on very gently sloping plains under cultivation. The Bedwatti series has been classified as a member of the clayey-skeletal, mixed, (calc), isohyperthermic family of Typic Haplustepts.

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

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

4.2.5 Lakshmangudda (LGD) Series: Lakshmangudda soils are deep (100-150 cm), well drained, have light olive brown to very dark gray clayey soils. They have developed from alluvium and occur on nearly level plains. The Lakshmangudda series has been classified as a member of the fine, smectitic, (calc) isohyperthermic family of Typic Haplusterts.

The thickness of the solum ranges from 108 to 149 cm. The thickness of A horizon ranges from 16 to 20 cm. Its colour is in 7.5 YR and 10 YR hue with value and chroma 3 to 4. The texture varies from sandy clay to clay with 5 to 10 per cent gravel. The thickness of B horizon ranges from 90 to 132 cm. Its colour is in 2.5 Y, 10 YR and 7.5 YR hue with value 3 to 6 and chroma 1 to 3. Its texture is clay. The available water capacity is high (150-200 mm/m). Only one phase was identified and mapped.

Landscape and soil Profile Characteristics of Lakshmangudda (LGD) Series

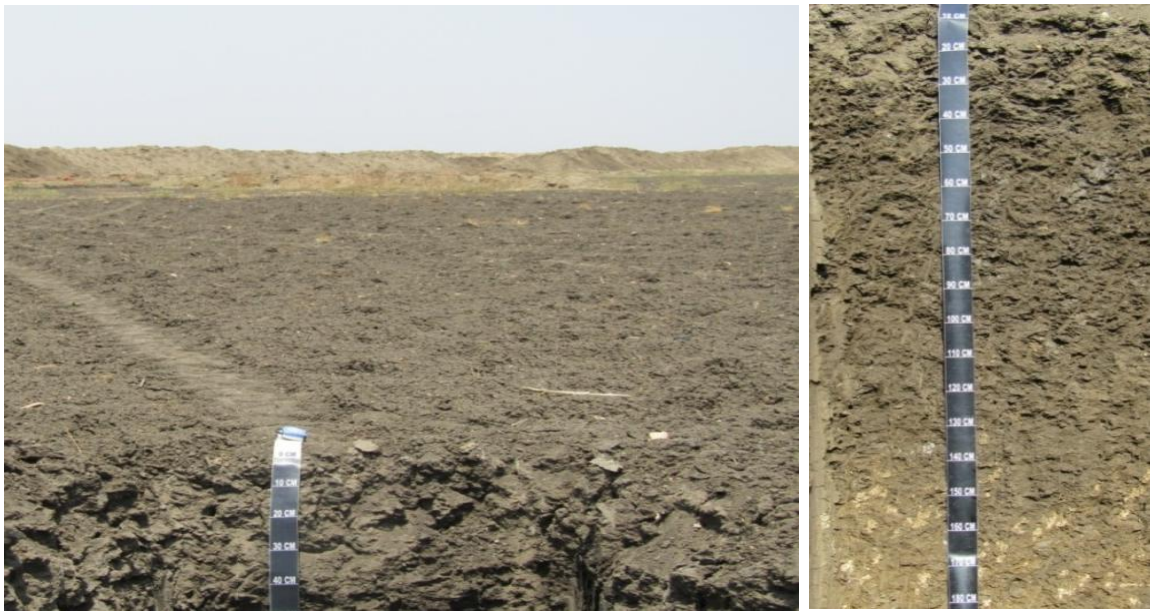
4.2.6 Handrala (HDL) Series: Handrala soils are deep (100-150 cm), moderately well drained, have black to very dark brown and dark gray cracking clay soils. They are developed from alluvium and occur on very gently to gently sloping plains. The Handrala series has been classified as a member of the very fine, smectitic, (calc) isohyperthermic 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 phase was identified and mapped.

Landscape and soil Profile Characteristics of Handrala (HDL) Series

4.2.7 Bardur (BDR) Series: Bardur soils are very deep (>150 cm), moderately well drained, have very dark grayish brown to very dark gray, black calcareous cracking clay soils. They are developed from alluvium and occur on nearly level to very gently sloping plains under cultivation. The Bardur series has been classified as a member of the very fine, smectitic, (calc) isohyperthermic family of Typic Haplusterts.

The thickness of the solum is more than 150 cm. The thickness of A horizon ranges from 15 to 19 cm. Its colour is in 10 YR hue with value 2 and chroma 1 with clay texture. The thickness of B horizon ranges from 146 to 180 cm. Its colour is in 10 YR hue with value 2 to 3 and chroma 1 to 2. Its texture is clay and is calcareous with less than 15 per cent gravel. The available water capacity is very high (>200 mm/m). Only one phase was identified and mapped.



Landscape and soil profile characteristics of Bardur (BDR) Series

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

Series Name: Abbigeri (ABR), **Pedon:**R-11
Location: $15^0$26'14.0"N, $76^0$16'39.0"E Abbigeri village, Koppal Taluk and District
Analysis at: NBSS&LUP, Regional Centre, Bangalore. **Classification:** Clayey- skeletal, mixed, isohyperthermic (Paralithic) Rhodustalfs

Depth (cm)	Horizon	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
0-10	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.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-10	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...

Series Name: Mukahadahalli (MKH), **Pedon:** R-11
Location: $15^0$22'05.4"N, $76^0$04'10.3"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.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-19	7.38	-	-	0.09	0.2	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...

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 saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-21	8.18	-	-	0.30	0.56	0.94	-	-	0.31	0.55	0.86	12.19	0.69	100.00	4.51
21-35	8.17	-	-	0.30	0.52	1.29	-	-	0.19	0.84	1.03	22.18	0.63	100.00	3.79
35-56	7.95	-	-	0.46	0.48	1.99	-	-	0.24	0.58	0.82	22.94	0.60	100.00	2.53

Contd...

Soil Series: Thammadahalli (TDH), **Pedon:** $TR_1/1$
Location: $15^0$03'41.7"N, $75^0$36'65.2"E, (4D4A3G2d), Nilogal village, Shirahatti taluk, Gadag district
Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Fine, mixed, isohyperthermic Rhodic Paleustalfs

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-25	Ap	85.71	7.34	6.94	14.79	13.28	16.10	24.75	16.80	20	ls	-	-
25-65	Bt	47.76	7.96	44.28	15.30	9.78	6.24	7.91	8.53	10	sc	-	-

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-25	9.19	-	-	0.18	0.35	1.29	-	-	0.08	0.52	0.60	3.57	0.51	100.00	5.82
25-65	8.00	-	-	0.17	0.35	0.58	-	-	0.15	1.31	1.46	13.87	0.31	100.00	3.78

Contd...

Series Name: Kethanapura (KTP) **Pedon:** R-9
Location: $15^0$25'28.81"N, $76^0$22'00.76" E Jabbaragudda 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
0-18	Ap	83.64	10.52	5.84	25.61	22.36	15.24	13.52	6.91	10	ls	7.92	2.58
18-38	Bt1	46.06	5.63	48.31	21.58	9.54	3.53	4.15	7.26	30	sc	19.62	14.48
38-73	Bt2	52.31	6.91	40.78	24.56	12.74	5.96	5.55	3.49	30	sc	17.73	11.95

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-18	6.42	-		0.07	1.24	-	2.95	0.93	0.57	0.02	4.48	4.41	0.75	100.00	0.05
18-38	6.63	-	-	0.09	0.70	-	11.71	3.53	0.98	0.08	16.31	16.59	0.34	98.30	0.50
38-73	6.88	-	-	0.15	0.48	-	11.36	3.30	0.72	0.13	15.50	15.75	0.39	98.42	0.80

Contd...

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.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-18	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

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Soil Series: Gollarahatti (GHT), **Pedon:** RM-2
Location: $50^0$04'88.8"N, $75^0$37'65.2"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.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-26	5.70	-	-	0.06	0.20	0.00	1.50	0.60	0.09	0.13	2.32	3.17	0.29	73.00	4.10
26-63	6.26	-	-	0.04	0.24	0.00	7.35	1.55	0.09	0.17	9.15	9.89	0.32	93.00	1.72
63-84	6.50	-	-	0.05	0.20	0.47	-	-	0.09	0.21	0.30	10.18	0.32	100.00	2.06

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Series Name: Bisarahalli (BSR) **Pedon:** R-9
Location: $15^0$25'21.0"N, $76^0$11'42.0"E Hatti 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
0-14	Ap	70.11	9.29	20.60	22.31	15.97	11.98	9.83	10.03	20	scl	13.22	7.81
14-57	Bt1	47.27	7.52	45.20	27.04	8.28	4.61	2.10	5.24	25	sc	16.39	13.31
57-80	Bt2	41.93	8.67	49.40	21.95	6.83	4.76	4.66	3.73	30	c	21.41	15.41
80-99	Bt3	49.02	9.87	41.11	19.90	10.78	6.84	6.42	5.08	40	sc	21.82	14.24

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-14	6.59	-	-	0.12	0.73	-	4.47	1.77	0.06	0.53	6.82	8.80	0.43	77.55	6.00
14-57	7.02	-	-	0.04	0.48	-	5.85	2.31	0.06	0.20	8.43	14.70	0.33	57.32	1.36
57-80	7.00	-	-	0.05	0.28	-	11.74	2.26	0.08	0.22	14.31	15.60	0.32	91.73	1.44
80-99	6.90	-	-	0.06	0.18	-	13.70	2.16	0.08	0.14	16.08	16.50	0.40	97.44	0.83

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Series Name: Giddadapalya (GDP), **Pedon:** R-8
Location: $15^0$25'26"N, $76^0$10'59"E, Kalakeri 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
0-16	Ap	74.95	9.24	15.81	18.43	18.94	13.85	14.97	8.76	-	sl	11.88	5.09
16-43	Bt1	41.69	13.89	44.42	9.84	10.90	7.41	7.62	5.93	-	c	23.13	14.53
43-61	Bt2	47.67	6.13	46.19	21.14	10.15	5.29	6.45	4.65	-	sc	21.60	11.87
61-83	Bt3	52.52	7.10	40.38	24.42	10.59	5.66	7.55	4.30	40	sc	19.51	11.35
83-119	Bt4	43.76	11.59	44.65	20.15	7.56	5.77	5.46	4.83	60	c	20.80	12.06
119-139	Bt5	54.93	9.84	35.23	29.70	10.49	5.50	5.92	3.32	50	sc	15.24	11.97

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-16	7.88	-	-	0.103	0.79	-	5.98	1.35	0.05	0.22	7.60	7.8	0.49	97	2.87
16-43	7.81	-	-	0.117	0.66	-	13.99	1.97	0.08	0.46	16.50	16.9	0.38	98	2.74
43-61	7.74	-	-	0.132	0.51	-	12.70	2.18	0.08	0.69	15.64	15.9	0.34	98	4.36
61-83	7.72	-	-	0.142	0.39	-	11.46	2.22	0.08	0.66	14.41	14.6	0.36	99	4.53
83-119	7.58	-	-	0.115	0.22	-	11.30	2.70	0.09	0.73	14.82	15.3	0.34	97	4.79
119-139	7.50	-	-	0.113	0.22	-	10.03	2.19	0.07	0.65	12.95	13.2	0.37	98	4.89

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

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S**eries Name:** Kumchahalli (KMH), **Pedon:** RM-9
Location: $15^0$20'05"N, $76^0$13'21"E, Basapura village, Koppal Taluk and District
Analysis at: NBSS&LUP, Regional Centre, Bangalore. **Classification:** Fine 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
0-13	Ap	51.76	9.05	39.19	7.99	8.84	13.42	14.38	7.14	-	sc	20.08	13.69
13-27	A21	53.50	8.12	38.38	7.00	11.05	15.21	14.33	5.91	-	sc	17.05	12.32
27-43	A22	63.60	5.01	31.40	3.85	11.56	24.52	18.52	5.14	-	scl	11.76	9.09
43-64	Bt1	48.74	5.91	45.35	8.87	9.31	12.49	12.27	5.81	10	sc	16.68	13.35
64-84	Bt2	45.13	8.90	45.97	9.86	7.12	10.95	10.62	6.57	20	sc	17.45	13.42
84-114	BC	65.04	6.94	28.02	10.49	16.21	17.80	13.88	6.67	40	scl	13.20	9.75

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-13	7.2	-	-	0.193	0.81	3.00	9.69	3.93	1.41	0.08	15.10	15.07	0.38	100	0.54
13-27	7.13	-	-	0.161	0.7	3.00	8.69	3.57	1.29	0.16	13.70	13.75	0.36	100	1.14
27-43	7.31	-	-	0.096	0.89	2.64	5.19	2.36	1.07	0.24	8.86	9.46	0.30	94	2.51
43-64	7.65	-	-	0.089	1.16	2.52	8.25	2.88	0.72	0.35	12.20	12.65	0.28	96	2.79
64-84	7.98	-	-	0.1	0.38	3.12	10.49	2.88	0.26	0.41	14.04	14.63	0.32	96	2.78
84-114	8.23	-	-	0.121	0.58	2.88	8.02	1.87	0.09	0.43	10.41	10.67	0.38	98	4.02

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Soil Series: Ranatur (RTR), **Pedon:** RM-87
Location: $13^0$21'49.0"N, $76^0$38'06"E, (4B3D4L2a), J C Pura village, Chikkanayakanahalli taluk, Tumakuru district
Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Fine, mixed, isohyperthermic Rhodic Paleustalfs

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

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

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Series Name: Ravanaki (RNK), **Pedon:** RM-20
Location: $15^0$14'22.7"N, $75^0$57'45.8"E, Gatareddihalla village, Koppal Taluk and District
Analysis at: NBSS&LUP, Regional Centre, Bangalore. **Classification:** Very fine, smectitic, (calc) 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
0-28	Ap	24.43	17.76	57.81	5.30	3.89	3.78	7.14	4.32	20	c	41.40	29.60
28-55	Bw	18.77	15.59	65.64	2.74	3.73	2.85	4.83	4.61	10	c	46.71	35.18

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-28	8.86	-	-	0.483	0.63	15.48	-	-	0.86	6.27	-	37.00	0.64	-	6.78
28-55	8.61	-	-	1.4	0.23	13.68	-	-	0.68	12.27	-	53.20	0.81	-	9.22

Contd...

Series Name: Narsapura (NSP), **Pedon:** A2/RM-2
Location: $15^0$19'86.9"N, $75^0$57'86.1"E, Kavalura village, Koppal Taluk and District
Analysis at: NBSS&LUP, Regional Centre, Bangalore. **Classification:** Very fine, smectitic, (calc) isohyperthermic Vertic 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
0-29	Ap	31.32	16.52	52.16	5.51	5.40	5.51	9.83	5.08	10	c	38.86	27.64
29-52	Bw1	13.30	22.08	64.62	2.52	2.41	2.41	3.67	2.29	05	c	49.88	40.05
52-77	BW2	13.22	17.39	69.40	3.56	2.41	1.95	2.76	2.53	05	c	51.33	41.55

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-29	9.16	-	-	0.615	0.23	9.36	-	-	0.72	10.98	-	51.09	0.98	-	8.60
29-52	8.69	-	-	2.01	0.5	8.64	-	-	0.55	24.42	-	60.63	0.94	-	16.11
52-77	8.52	-	-	2.68	0.46	7.68	-	-	0.50	25.65	-	60.74	0.88	-	16.90

Contd...

Series Name: Dombarahalli (DRL) **Pedon:** R-8
Location: $15^0$13'96.2"N, $75^0$57'48.6" E Ragunathanahalli village, Koppal Taluk and District
Analysis at: NBSS&LUP, Regional Centre, Bangalore. **Classification:** Very fine, smectitic, (calc) isohyperthermic 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.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-15	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: Lakshmangudda (LGD) **Pedon:** R-2
Location: $15^0$13'08.2"N, $76^0$15'27.3" E Raghunathanahalli village, Koppal Taluk and District
Analysis at: NBSS&LUP, Regional Centre, Bangalore. **Classification:** Fine, smectitic, (calc) isohyperthermic 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
0-17	Ap	50.60	14.29	35.11	4.53	7.86	12.49	5.18	20.54	-	sc	28.99	18.05
17-40	Bss1	40.22	16.89	42.89	3.03	7.03	9.95	13.84	6.38	-	c	34.09	23.60
40-65	Bss2	37.58	17.32	45.10	2.94	6.86	10.24	11.55	5.99	-	c	35.23	24.68
65-92	Bss3	30.69	19.33	49.97	2.09	5.06	8.03	8.25	7.26	-	c	40.92	29.53
92-124	Bss4	29.82	21.09	49.09	2.99	5.76	7.65	3.33	10.09	-	c	44.40	31.52
124-145	Bss5	28.77	22.78	48.44	2.63	5.36	7.44	8.86	4.49	-	c	43.05	30.08

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-17	8.03	-	-	1.93	0.94	8.84	-	-	0.35	5.02	-	32.37	0.92	100.00	1.82
17-40	7.68	-	-	1.85	0.98	8.97	-	-	0.16	4.38	-	42.18	0.98	100.00	1.66
40-65	7.61	-	-	1.75	0.94	9.36	-	-	0.16	3.77	-	42.84	0.95	100.00	1.32
65-92	7.82	-	-	1.65	1.07	9.23	-	-	0.22	5.02	-	47.85	0.96	100.00	2.82
92-124	8.46	-	-	1.10	1.13	10.40	-	-	0.23	6.72	-	47.31	0.96	100.00	7.95
124-145	8.66	-	-	0.94	0.88	14.17	-	-	0.22	6.48	-	44.80	0.92	100.00	8.17

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, (calc) isohyperthermic 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 saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	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

Contd...

Series Name: Bardur (BDR), **Pedon:** R-4

Location: $15^0$14'31.7"N, $76^0$01'19.1"E, Moranali village, Koppal Taluk and District

Analysis at: NBSS&LUP, Regional Centre, Bangalore. **Classification:** Very fine, smectitic, (calc) isohyperthermic 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	21.78	22.78	55.44	2.17	3.68	4.44	6.61	4.88	-	c	36.78	26.95
25-53	BA	18.62	18.56	62.82	2.23	4.24	3.46	5.24	3.46	-	c	41.25	29.87
53-90	Bss1	15.87	18.60	65.53	2.23	1.34	4.25	3.91	4.13	-	c	44.73	33.64
90-126	Bss2	13.66	20.02	66.32	1.68	2.80	2.35	3.70	3.14	-	c	49.24	38.37
126-152	Bss3	11.64	20.79	67.57	1.69	1.81	1.81	3.50	2.82	-	c	53.50	41.90
152-210	Bss4	11.38	22.78	65.42	2.16	2.16	1.93	3.07	2.05	-	c	51.53	39.64

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-25	8.73	-	22.78	0.203	0.24	5.76	-	-	0.65	4.43	-	40.56	0.73	-	4.37
25-53	9.17	-	18.56	0.295	0.45	4.92	-	-	0.32	10.47	-	74.70	1.19	-	5.61
53-90	9.27	-	18.60	0.388	0.66	6.00	-	-	0.24	10.49	-	76.20	1.16	-	5.51
90-126	9.22	-	20.02	0.608	0.57	5.88	-	-	0.21	15.93	-	77.20	1.16	-	8.25
126-152	9.21	-	20.79	0.936	0.33	6.60	-	-	0.37	20.88	-	80.90	1.20	-	10.32
152-210	9.03	-	23.21	1.47	0.33	8.16	-	-	0.24	15.34	-	73.10	1.12	-	8.39

Chapter 5

INTERPRETATION FOR LAND RESOURCE MANAGEMENT

The most important soil and site characteristics that affect the land use and conservation needs of an area are land capability, 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/alkalinity or gravelliness and "c" indicates limitation due to climate.

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

The 33 soil map units identified in the Budihalu Microwatershed are grouped under two land capability classes and five land capability subclasses (Fig. 5.1).

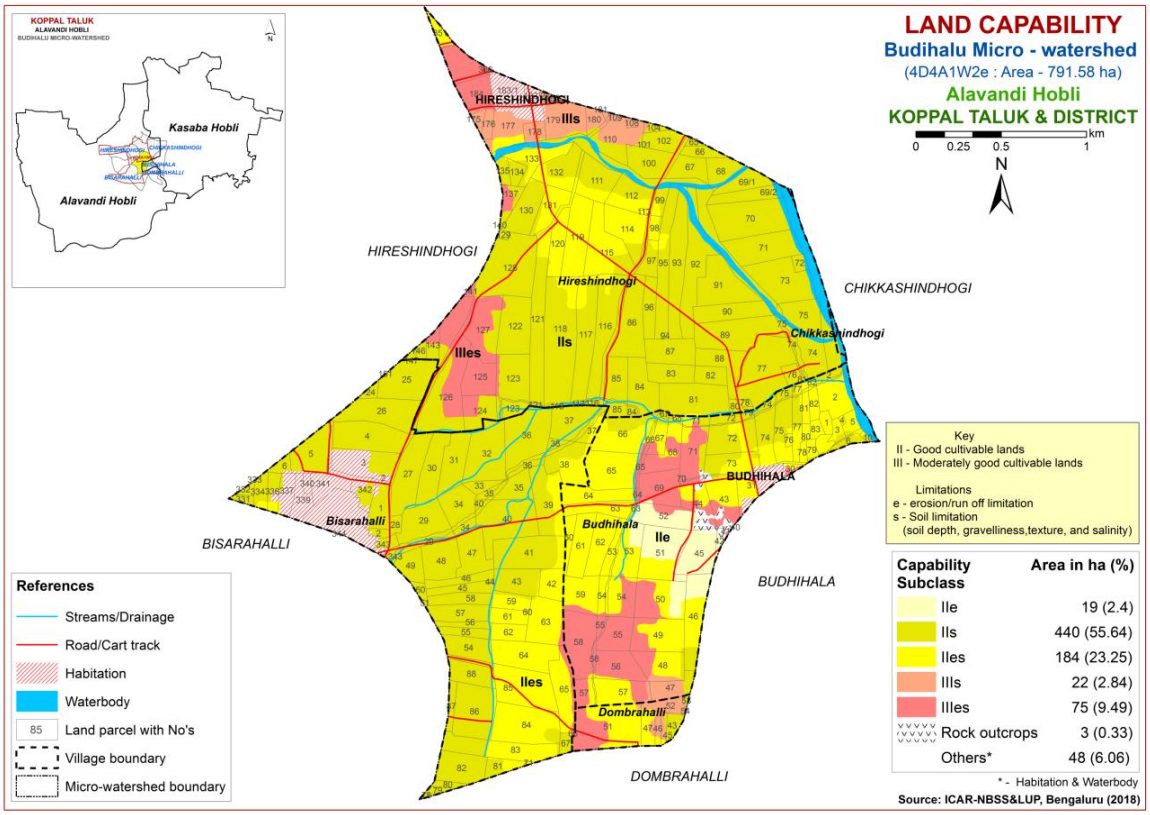


Fig. 5.1 Land Capability map of Budihalu Microwatershed

Entire area of the microwatershed is suitable for agriculture. Maximum area of 643 ha (81%) are good lands (Class II) that have minor limitations and require moderate conservation practices and are distributed in the major part of the microwatershed. Moderately good lands (Class III) cover an area of 97 ha (12%) and are distributed in the southern, northern, western and eastern part of the microwatershed with moderate problems of soil that require special conservation practices.

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).

Shallow (25-50 cm) soils occupy an area of 13 ha (2%) and are distributed in the southern part of the microwatershed. An area of 196 ha (25%) is moderately shallow (50-75 cm) and are distributed in the southern, central, western and northern part of the microwatershed. Moderately deep soils (75-100 cm) occupy an area of 227 ha (29%) and occur in the major part of the microwatershed. Deep (100-150 cm) to very deep (100->150 cm) soils occupy maximum area of 304 ha (38%) and are distributed in the northern, eastern, central and western part of the microwatershed.

The most problem lands with an area of about 13 ha (2%) having shallow (25-50 cm) rooting depth. They are suitable for growing short duration agricultural crops but well suited for pasture, forestry or other recreational purposes. The most productive lands cover a maximum area about 304 ha (38%) where all climatically adapted long duration crops be grown.

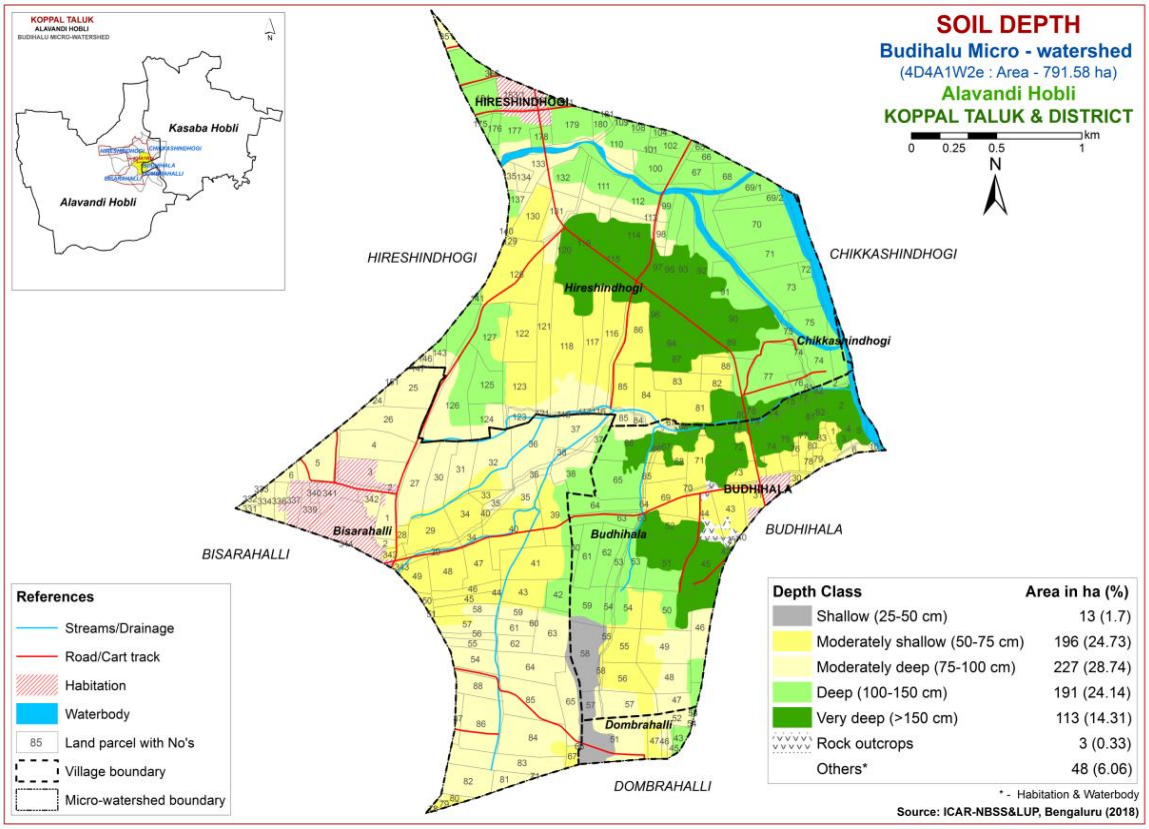


Fig. 5.2 Soil Depth map of Budihalu Microwatershed

5.3 Surface Soil Texture

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

Maximum area of 457 ha (58%) has clayey soils at the surface and are distributed in the major part of the microwatershed. An area of 275 ha (35%) is loamy at the surface and are distributed in the central, northern, eastern and southern part of the microwatershed. An area of 9 ha (1%) is sandy soils at the surface and are distributed in the southern part of the microwatershed (Fig. 5.3).

The most productive lands 457 ha (58%) with respect to surface soil texture are the clayey soils that have high potential for soil-water retention and availability, and nutrient retention and availability, but have more problems of drainage, infiltration, workability and other physical problems. The other most productive lands 275 ha (35%) are loamy soils

which also have high potential for AWC, nutrient availability but have no drainage or other physical problems compared to loamy soils.

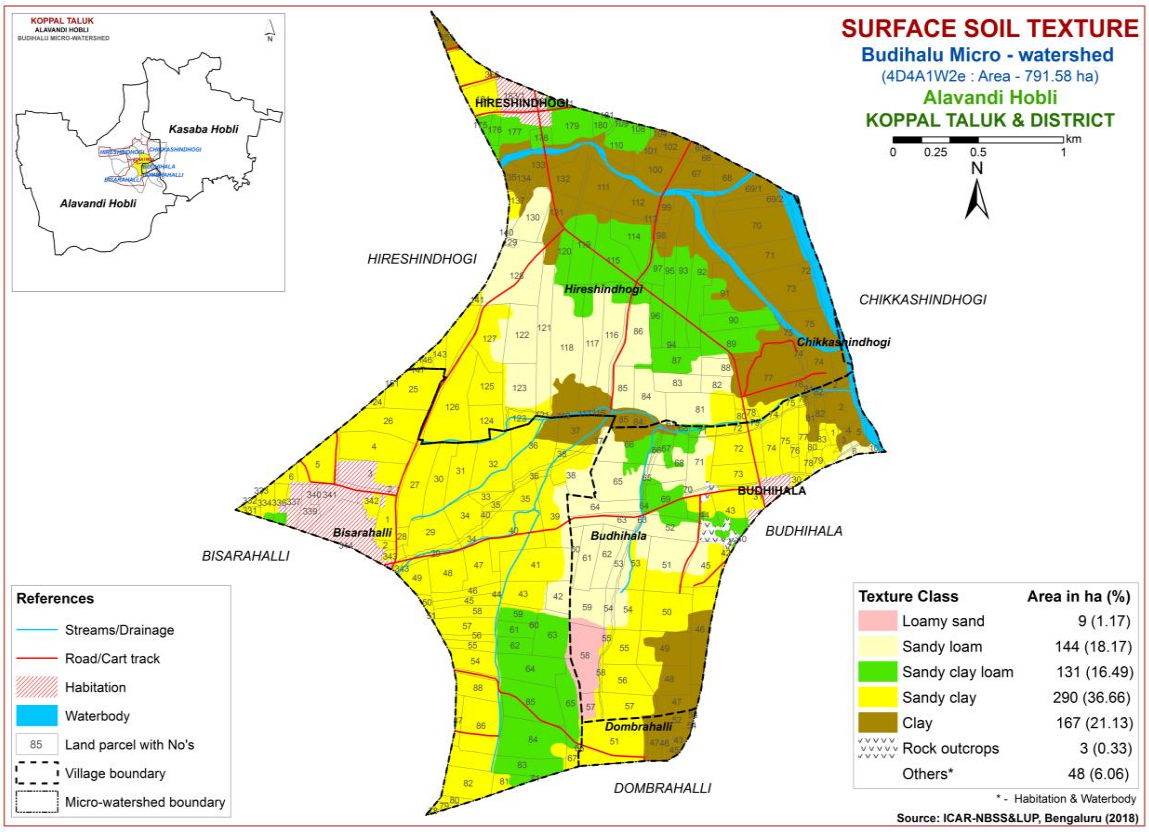


Fig. 5.3 Surface Soil Texture map of Budihalu Microwatershed

5.4 Soil Gravelliness

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

The soils that are non-gravelly (<15% gravel) cover an area of 524 ha (66%) and are distributed in the major part of the microwatershed. An area of 200 ha (25%) is covered by gravelly (15-35% gravel) soils and are distributed in the eastern, southern and western part of the microwatershed (Fig. 5.4).

The most productive lands with respect to gravelliness are found to be 66%. They are non-gravelly with less than 15 per cent gravel and have potential for growing both annual and perennial crops. The problem soils that are gravelly (15-35%) to very gravelly (35-60%) cover 217 ha (27%) where only short or medium duration crops can be grown.

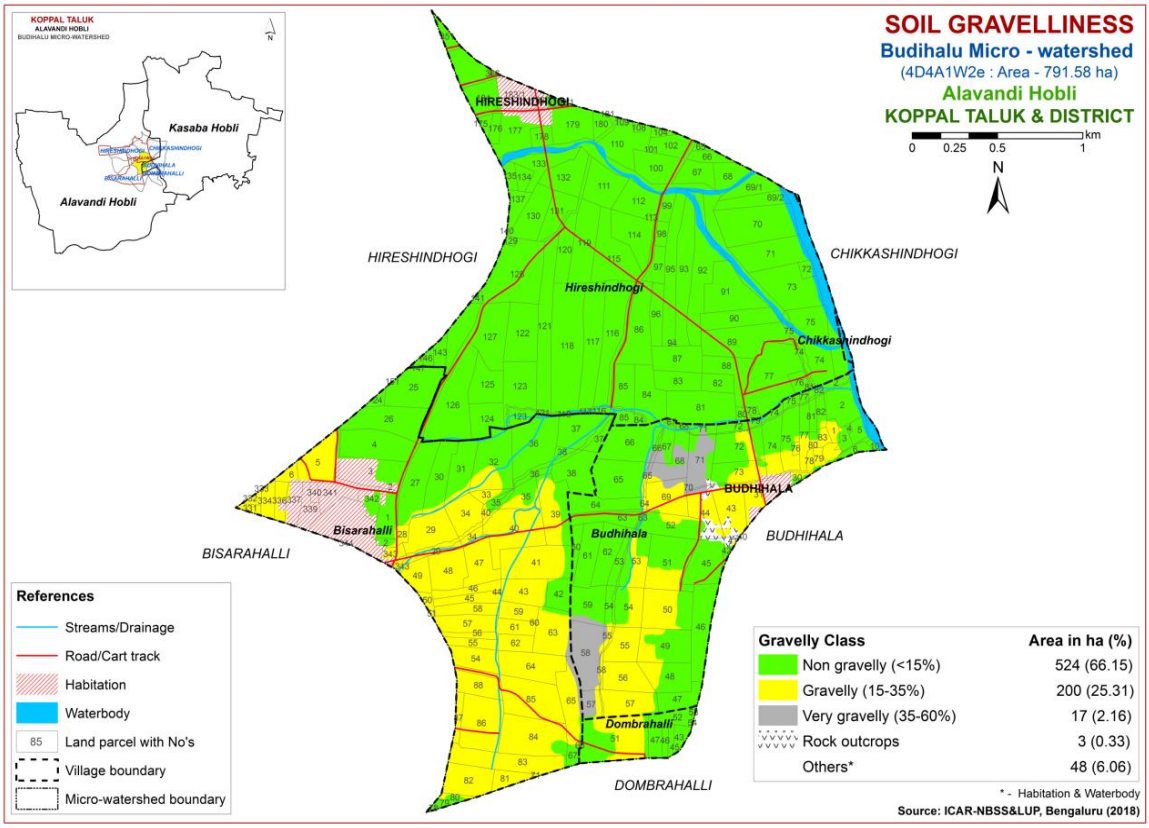


Fig. 5.4 Soil Gravelliness map of Budihalu Microwatershed

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), showing the area extent and their spatial distribution in the microwatershed.

An area of about 73 ha (9%) are very low (<50 mm/m) in available water capacity and are distributed in the eastern part of the microwatershed. Maximum area of about 354 ha (45%) has soils that are low (51-100 mm/m) in available water capacity and are distributed in the major part of the microwatershed. Soils with medium available water capacity (101-150 mm/m) occupy an area of 103 ha (13%) and are distributed in the central and northern part of the microwatershed. An area of about 210 ha (27%) is high (151-200 mm/m) to very high (>200 mm/m) in available water capacity and are distributed in the northern and eastern part of the microwatershed.

An area of about 73 ha (9%) 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. The potential soils with respect to AWC cover about 210 ha (27%) that have high to very high AWC, where all climatically adapted long duration crops can be grown.

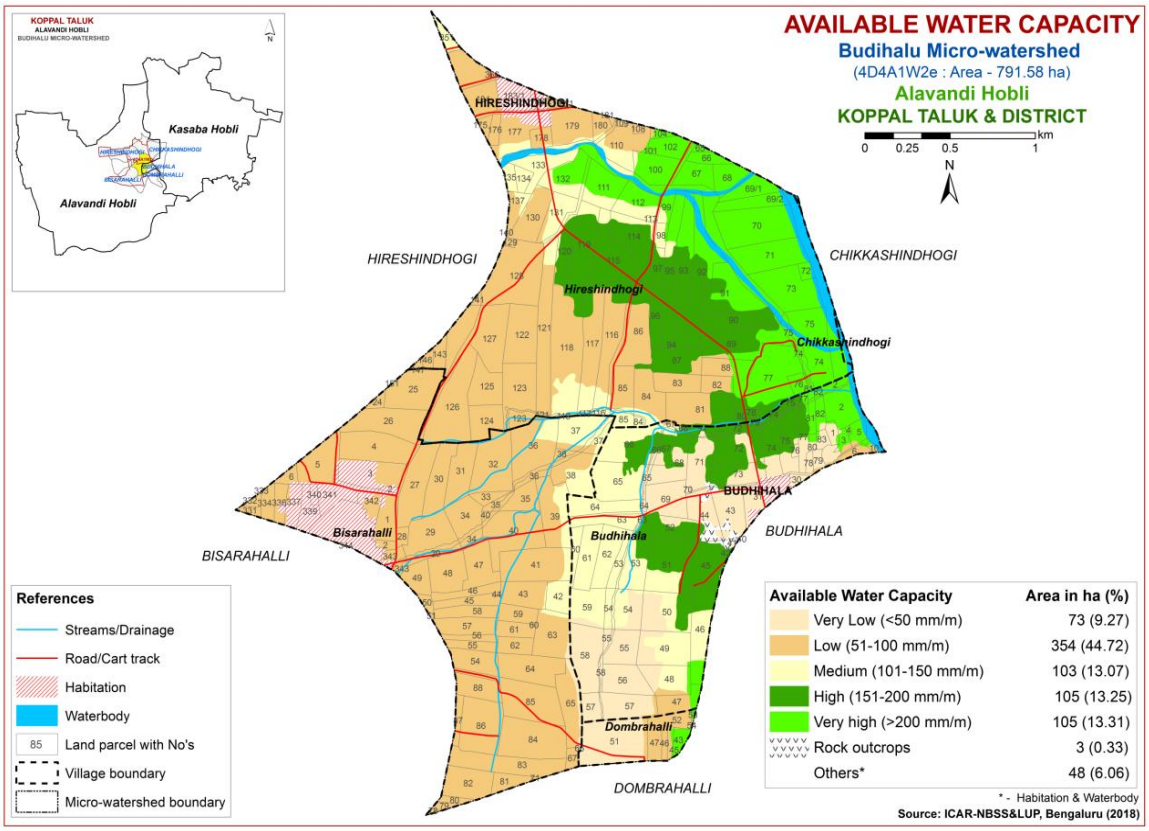


Fig. 5.5 Soil Available Water Capacity map of Budihalu Microwatershed

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).

An area of about 41 ha (5%) falls under nearly level (0-1% slope) and are distributed in the northern and southern part of the microwatershed. Very gently sloping (1-3% slope) lands occupy a entire area of 700 ha (88%) and are distributed in all parts of the microwatershed. In all these lands, all climatically adapted annual and perennial crops can be grown without much soil and water conservation and other land development measures.

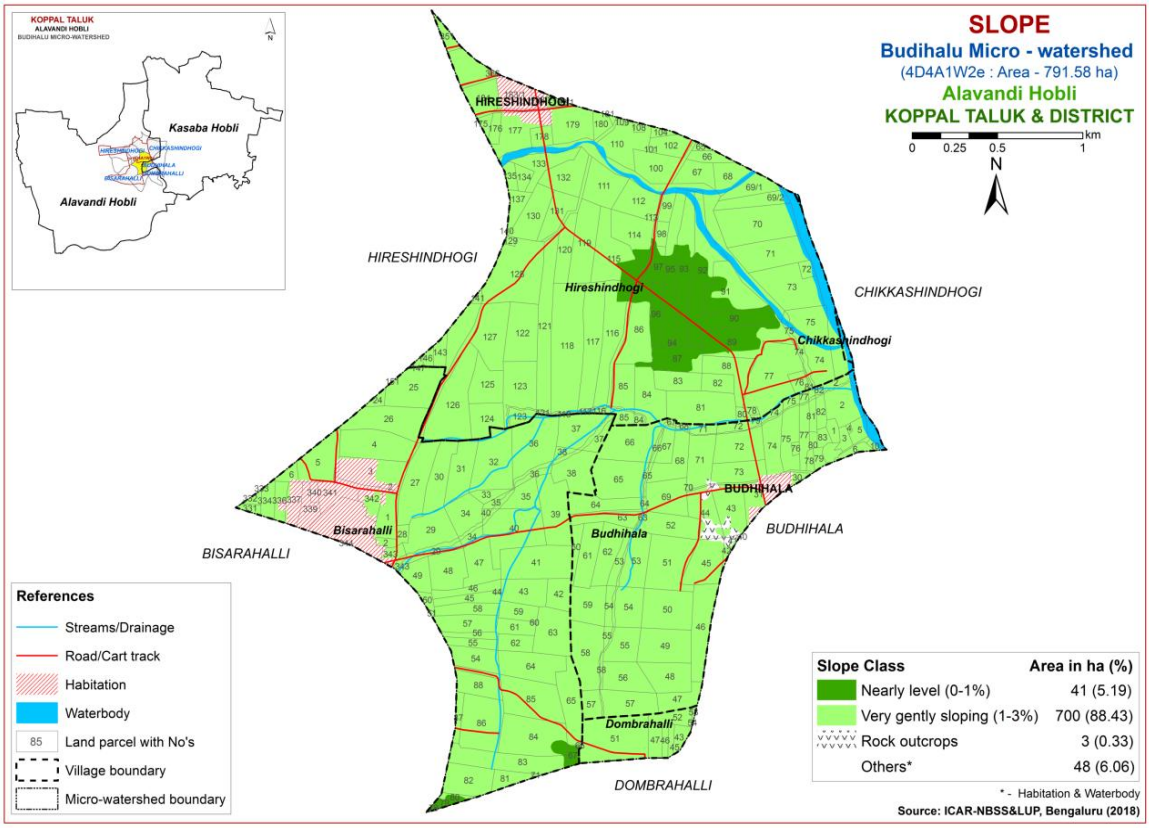


Fig. 5.6 Soil Slope map of Budihalu Microwatershed

5.7 Soil Erosion

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

Soils that are slightly eroded (e1 Class) occupy an area of about 463 ha (58%) and are distributed in the major part of the microwatershed. Moderately eroded (e2 Class) soils cover an area of 278 ha (35%) and are distributed in the northern, western and eastern part of the microwatershed.

An area of about 278 ha (35%) in the microwatershed is problematic because of moderate erosion. These areas need soil and water conservation and other land development measures for restoring the soil health.

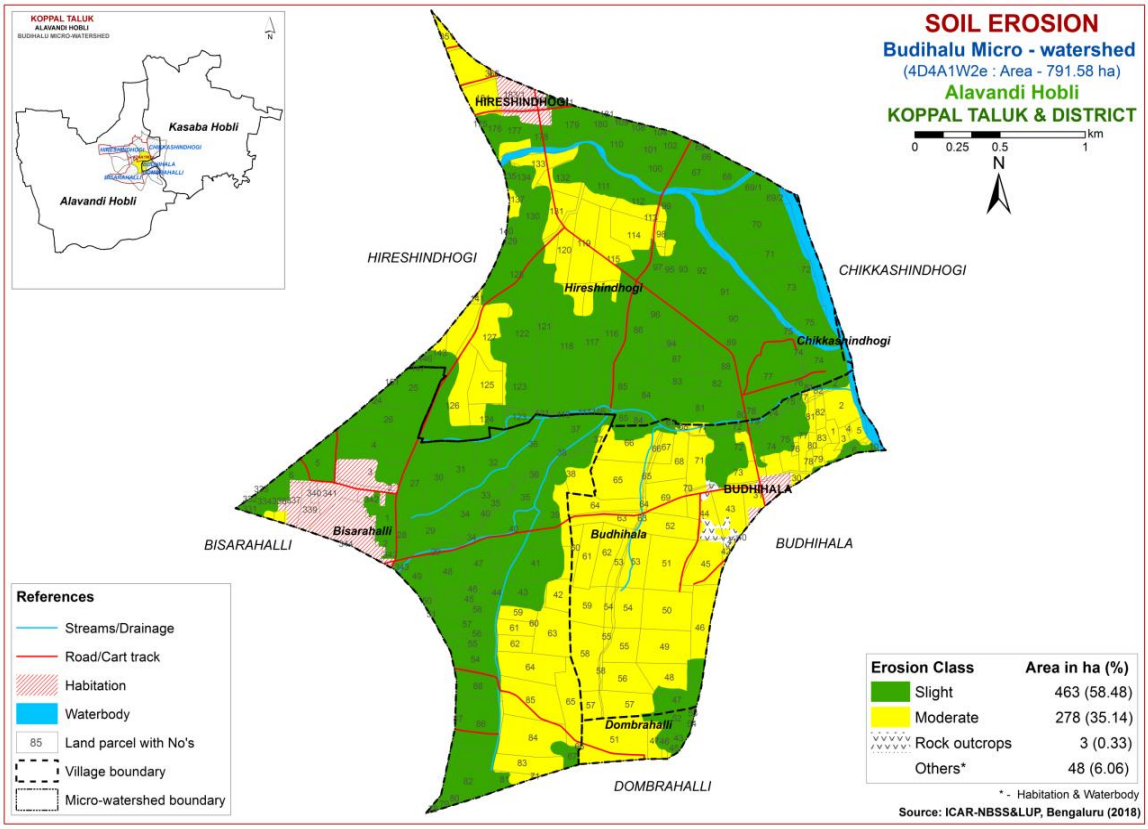


Fig. 5.7 Soil Erosion map of Budihalu Microwatershed

Chapter 6

FERTILITY STATUS

Soil fertility plays an important role in increasing crop yield. The adoption of high yielding varieties that require high amounts of nutrients has resulted in deficiency symptoms in crops and plants due to imbalanced fertilization and poor inherent fertility status, as these areas are characterised by low rainfall and high temperatures. Hence, it is necessary to know the fertility (macro and micro nutrients) status of the soils of the watersheds for assessing the kind and amount of fertilizers required for each of the crop intended to be grown. For this purpose, the surface soil samples collected from the grid points (one soil sample at every 320 m grid interval) all over the microwatershed through land resource inventory in the year 2018 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 by 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 Budihalu Microwatershed for soil reaction (pH) showed that an area of 11 ha (1%) is slightly acid (pH 6.0-6.5) and is distributed in the western part of the microwatershed. An area of 215 ha (27%) is neutral (pH 6.5-7.3) and is distributed in the western part of the microwatershed. Slightly alkaline (pH 7.3-7.8) soil occurs in an area of 95 ha (12%) and is distributed in the central, southern and western part of the microwatershed. Maximum area of 243 ha (31%) is moderately alkaline (pH 7.8-8.4) and are distributed in the northern, central and southern part of the microwaterhsed. An area of 177 ha (22%) is strongly alkaline (pH 8.4-9.0) to very strongly alkaline (pH >9.0) and are distributed in the central and eastern part of the microwatershed. Thus, the soils are acid in 11 ha, neutral in 215 ha and alkaline covering in 515 ha.

6.2 Electrical Conductivity (EC)

The Electrical Conductivity of the soils is nonsaline (<2 dS m^{-1}) in maximum area of 584 ha (74%), low (2-4 dS m^{-1}) in an area of 136 ha (17%) and about 21 ha (3%) is medium (4-8 dS m^{-1}) in the microwatershed. (Fig. 6.2)

6.3 Organic Carbon

The soil organic carbon content (an index of available Nitrogen) in the soils of the microwatershed is low (<0.5%) covering an area of 105 ha (13%) and is distributed in the southwestern part of the microwatershed. Maximum area of 378 ha (48%) is medium (0.5-0.75%) in organic carbon content and is distributed in the major part of the

microwatershed. An area of 258 ha (33%) is high (>0.75%) and is distributed northern part of the microwatershed (Fig. 6.3).

6.4 Available Phosphorus

An cultivated area of 1 ha (<1%) and is distributed in the southern part of the microwatershed. Maximum area of about 740 ha (93%) is medium (23-57 kg/ha) in available phosphorus and is distributed in the major part of the microwatershed (Fig. 6.4).

6.5 Available Potassium

An area of 0.1 ha (<1%) is low (<145 kg/ha) and is distributed in the western part of the microwatershed. Medium (145-337 kg/ha) in available potassium content occupy an area of 453 ha (57%) and are distributed in the major part of the microwatershed. An area of about 288 ha (36%) is high (>337 kg/ha) and are distributed in the northern part of the microwatershed (Fig. 6.5).

6.6 Available Sulphur

Soils that are low (<10 ppm) in available sulphur content in an area of <1 ha (<1%) and are distributed in the eastern part of the microwatershed. An area of 273 ha (34%) is medium (10-20 ppm) and are distributed in the western, southern and eastern part of the microwatershed. Maximum area of 468 ha (59%) is high (>20 ppm) in available sulphur content and are distributed in the major part of the microwatershed (Fig. 6.6).

6.7 Available Boron

Available boron content is low (<0.5 ppm) in an area of 368 ha (47%) and are distributed in the southern and eastern part of the microwatershed. Maximum area of about 370 ha (47%) is medium (0.5-1.0 ppm) in available boron and are distributed in the major part of the microwatershed. High (>1.0 ppm) in available boron occur in an area of 3 ha (<1%) and are distributed in the central part of the microwatershed (Fig. 6.7).

6.8 Available Iron

Available iron content is sufficient (>4.5 ppm) in a maximum area of 583 ha (74%) and are distributed in the major part of the microwatershed. It is deficient (<4.5 ppm) in about 158 ha (20%) and distributed in the eastern part of the microwatershed (Fig. 6.8).

6.9 Available Manganese

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

6.10 Available Copper

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

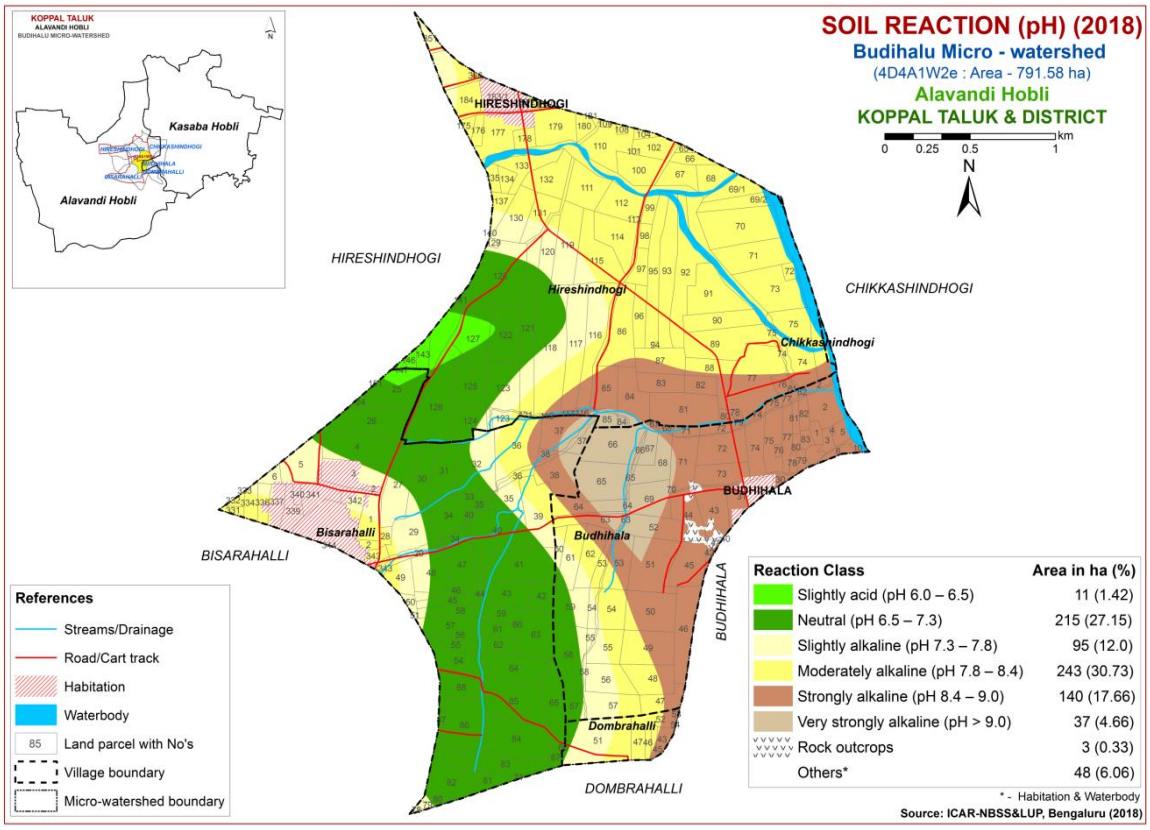


Fig. 6.1 Soil Reaction (pH) map of Budihalu Microwatershed

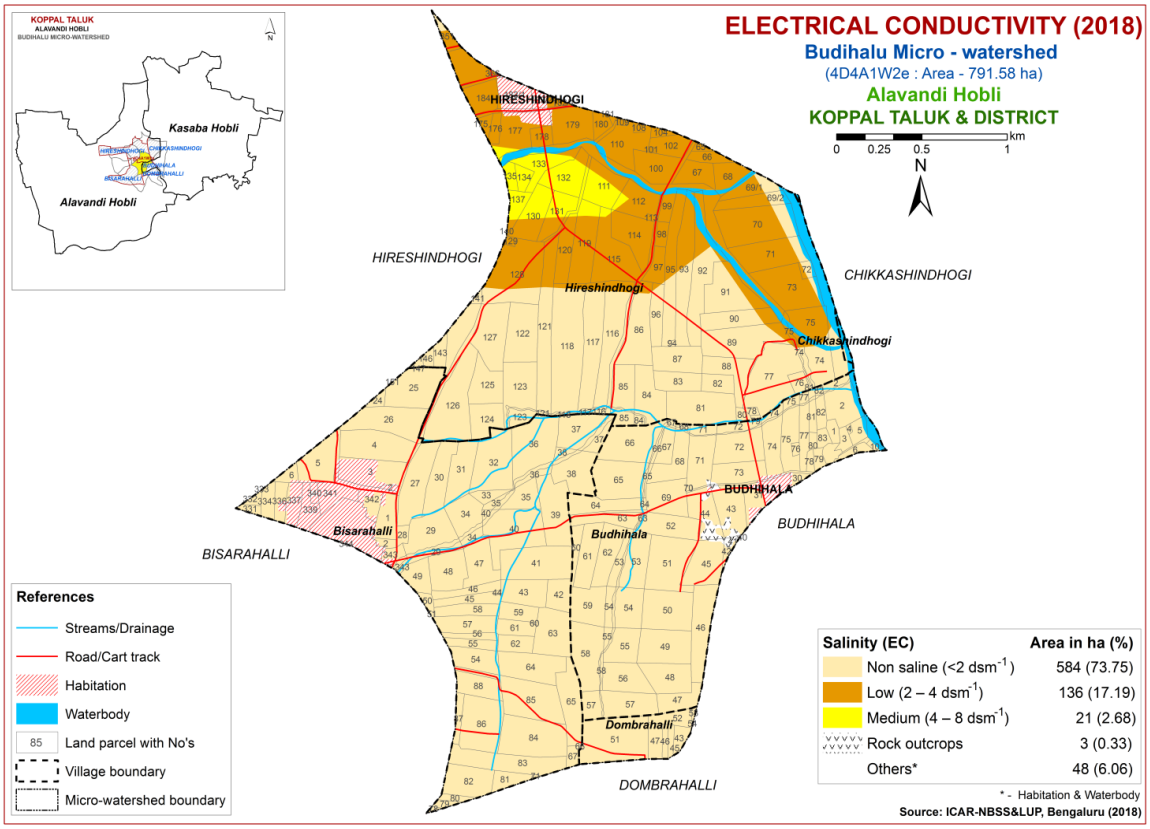


Fig. 6.2 Electrical Conductivity (EC) map of Budihalu Microwatershed

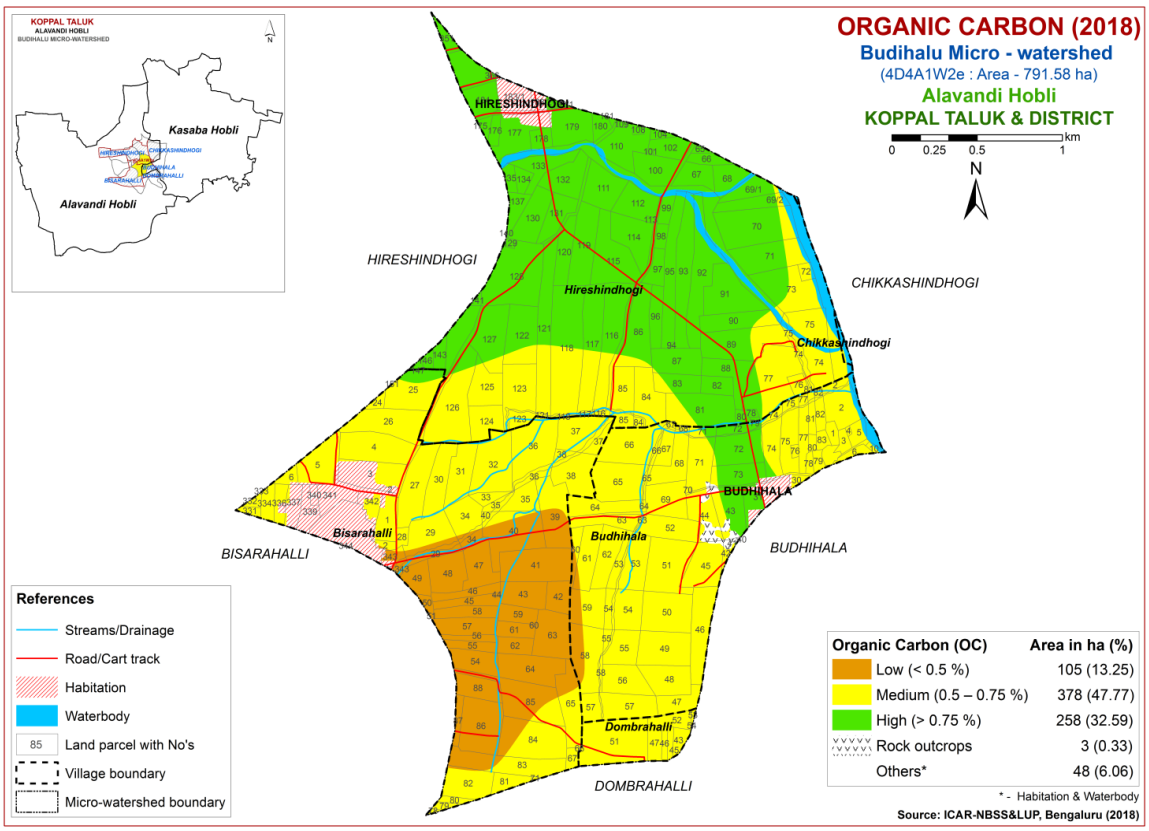


Fig. 6.3 Soil Organic Carbon map of Budihalu Microwatershed

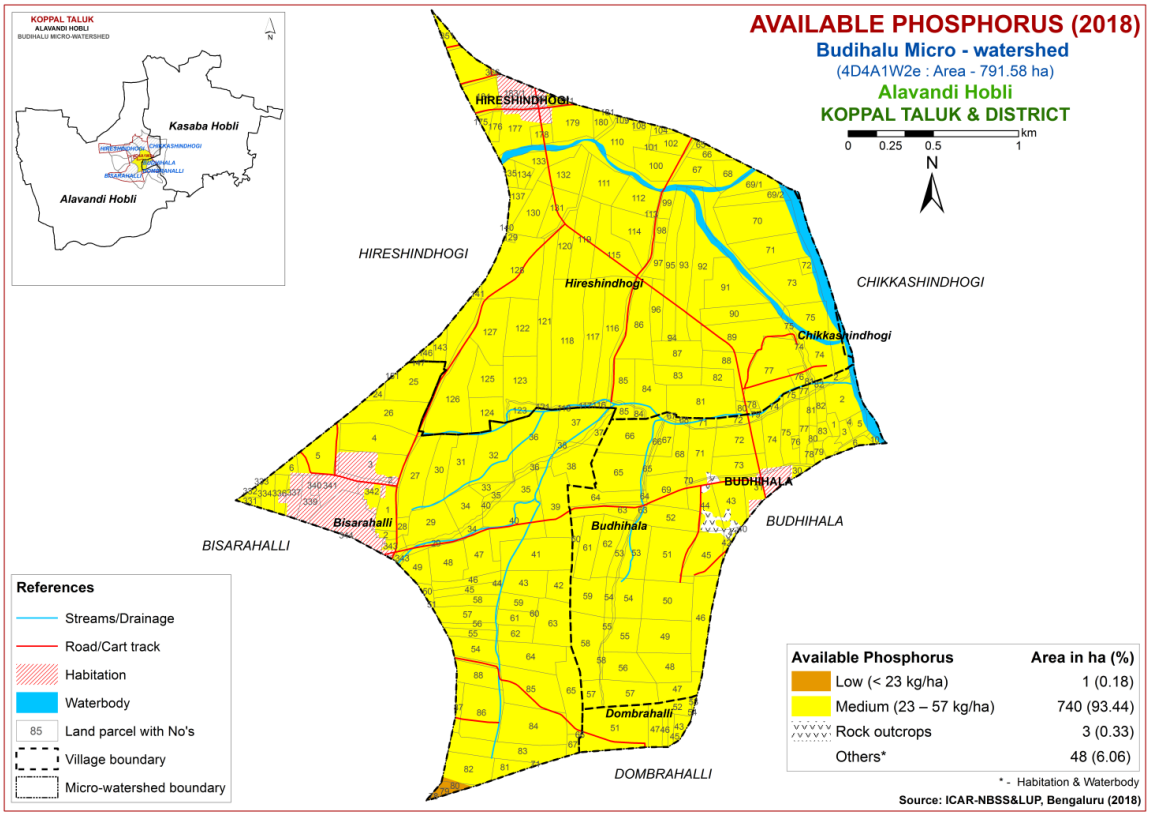


Fig. 6.4 Soil Available Phosphorus map of Budihalu Microwatershed

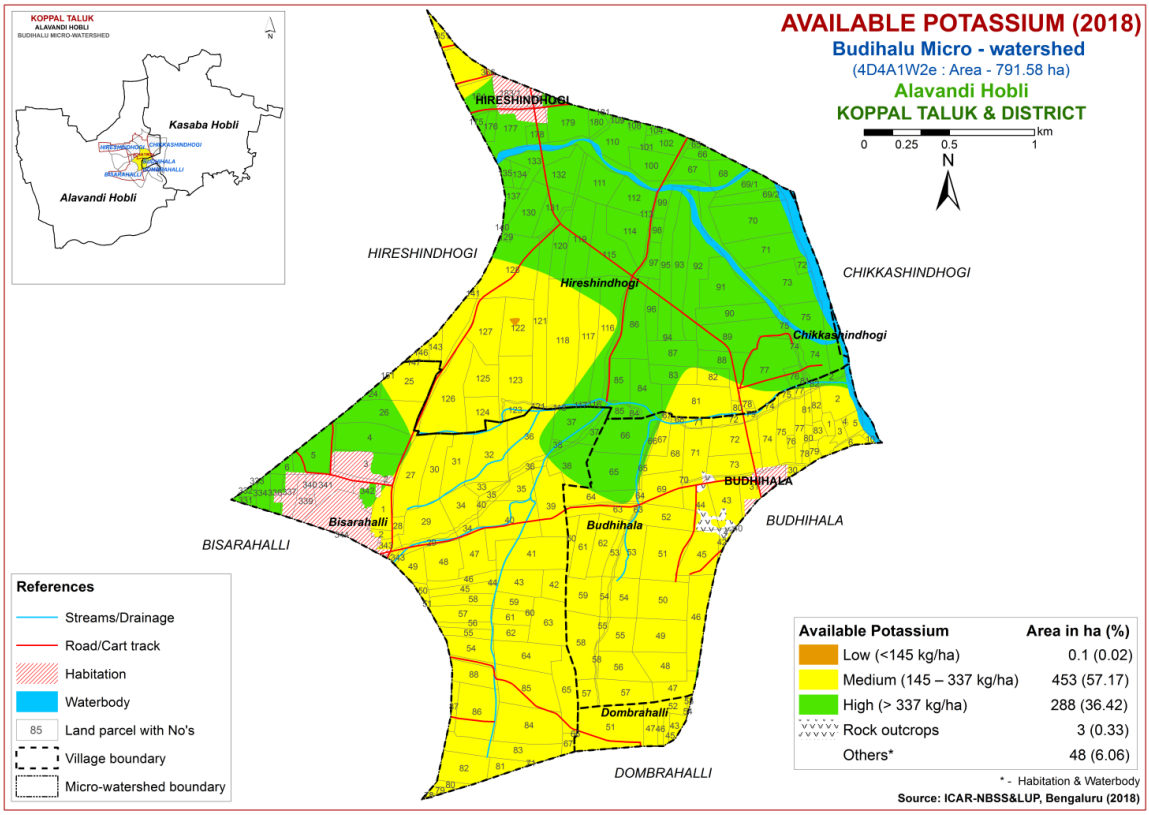


Fig. 6.5 Soil Available Potassium map of Budihalu Microwatershed

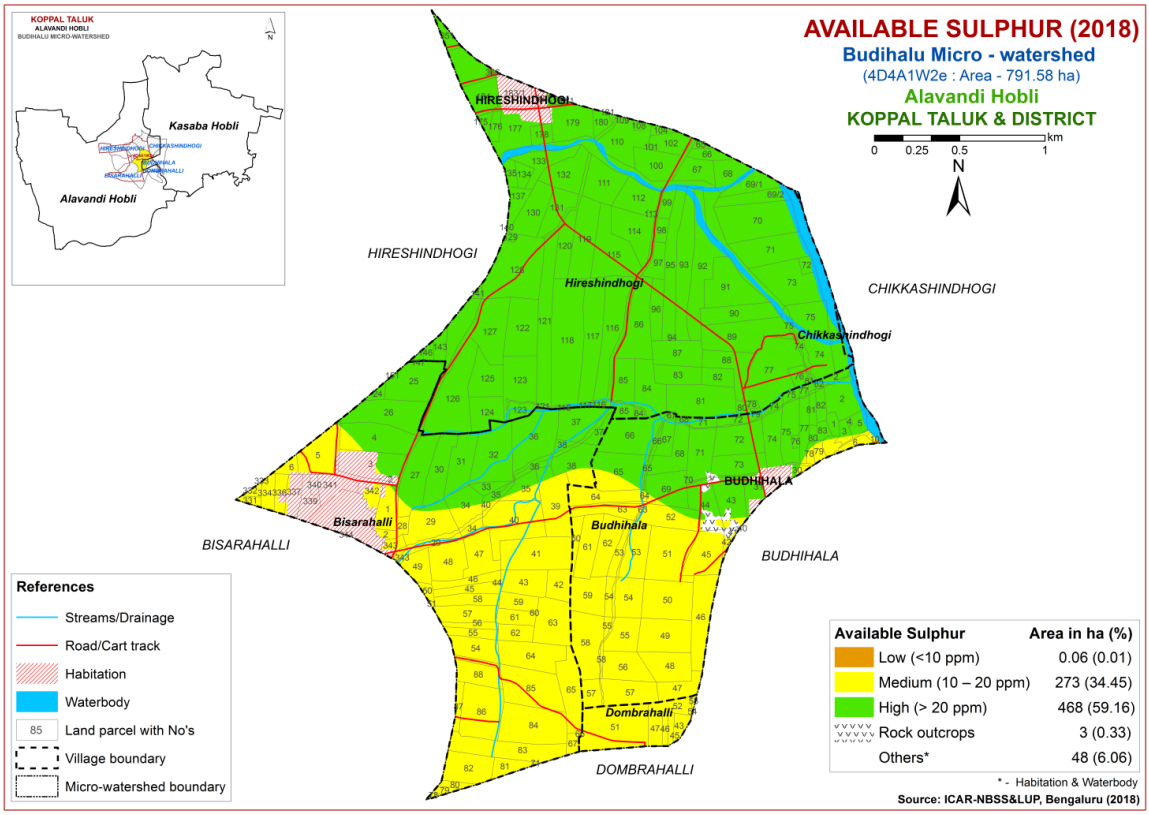


Fig. 6.6 Soil Available Sulphur map of Budihalu Microwatershed

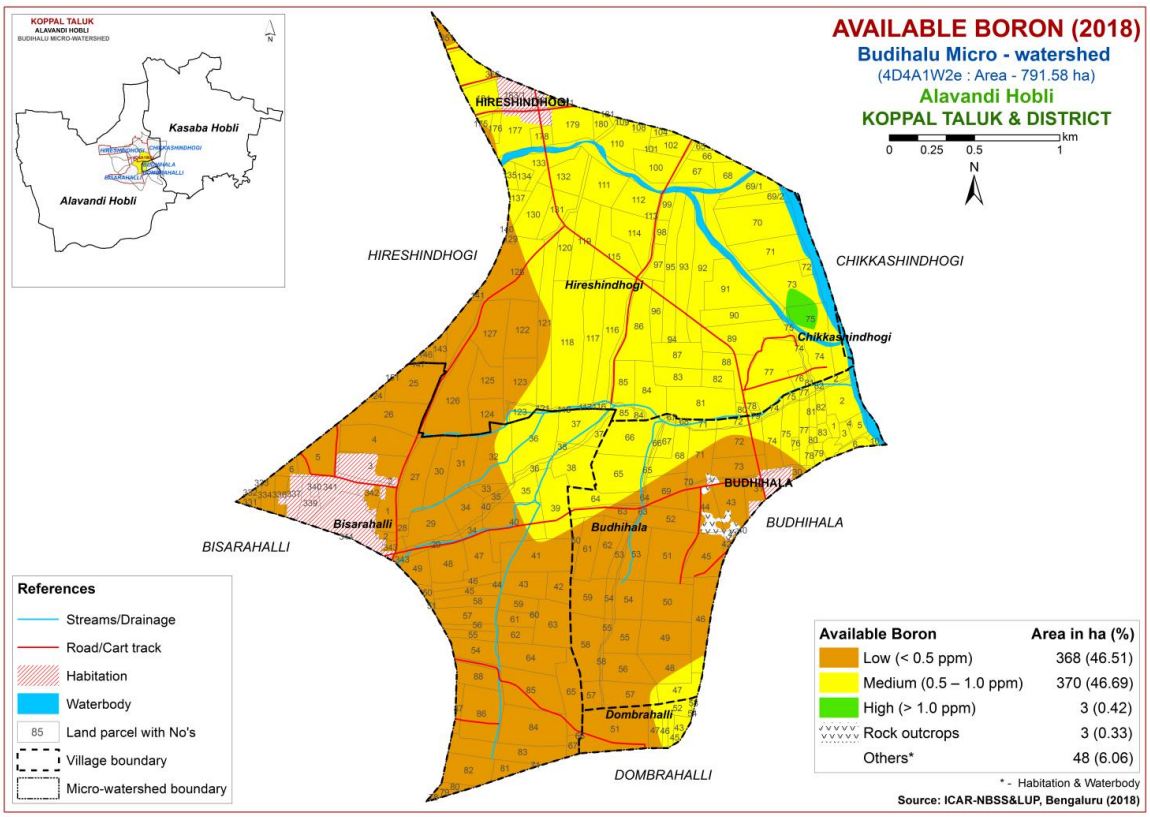


Fig. 6.7 Soil Available Boron map of Budihalu Microwatershed

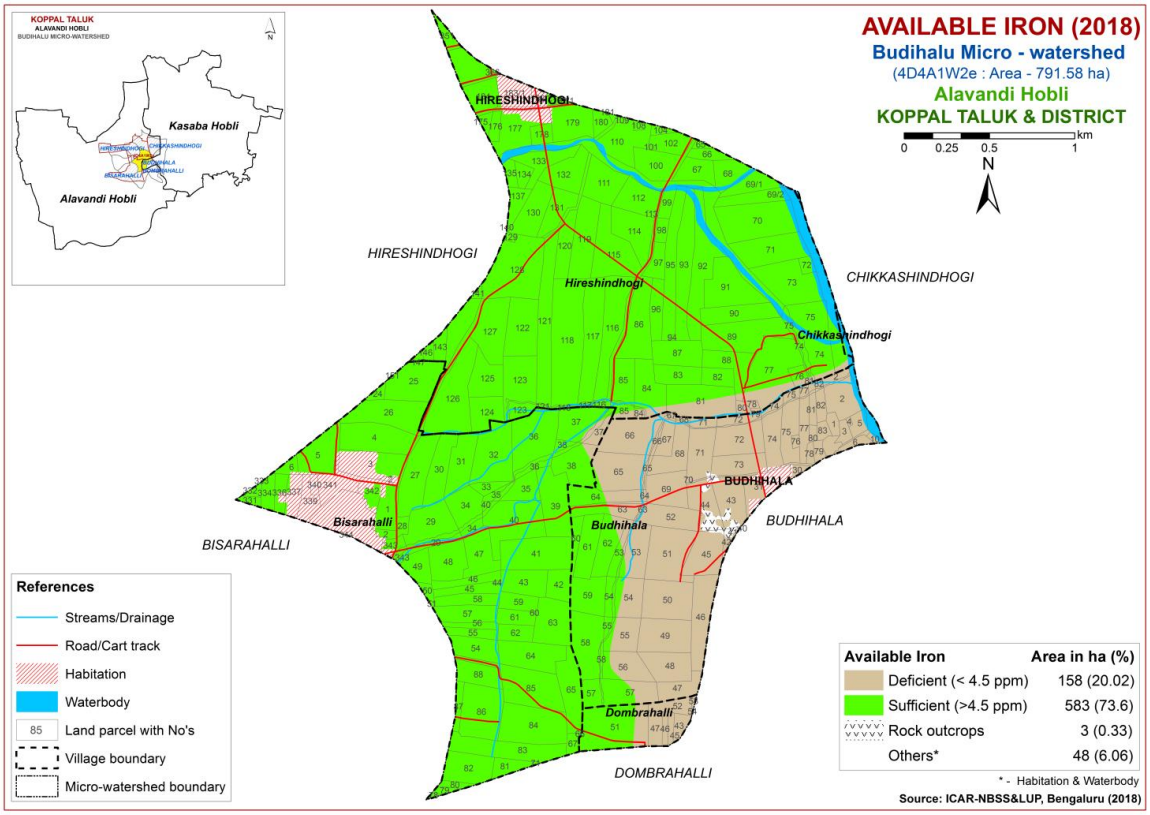


Fig. 6.8 Soil Available Iron map of Budihalu Microwatershed

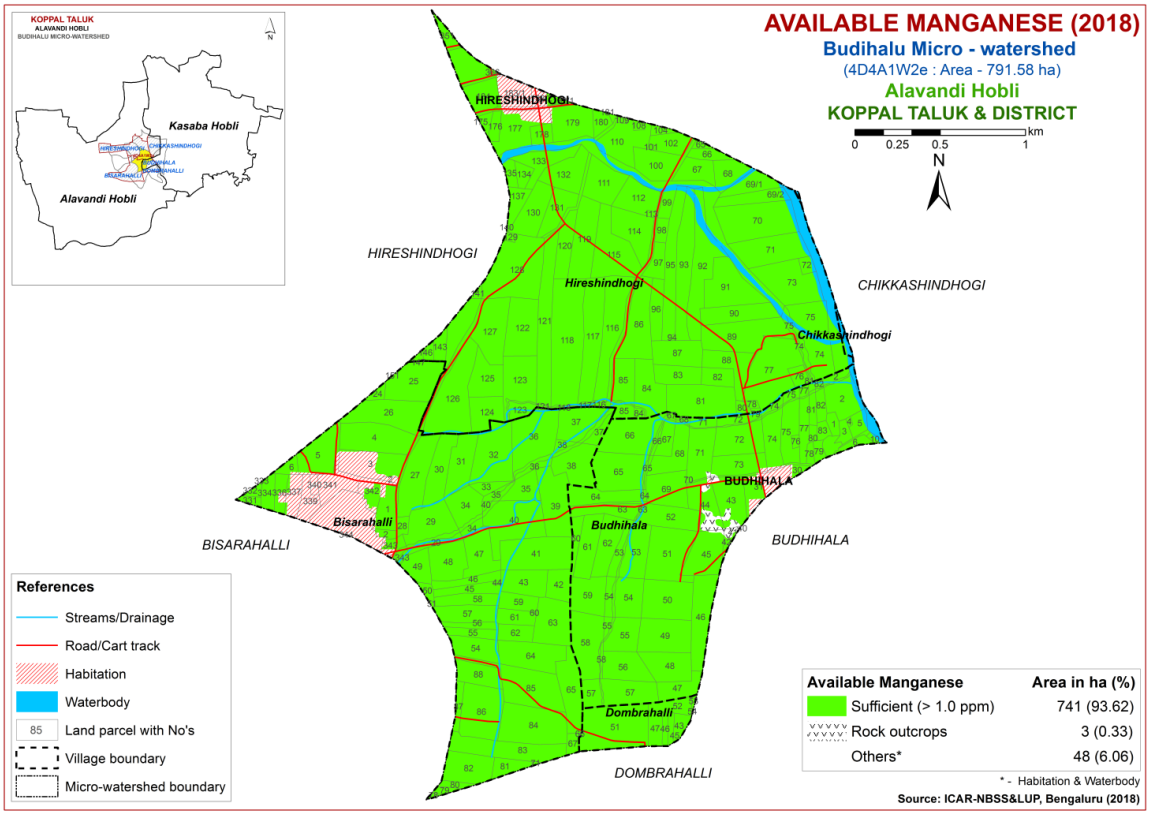


Fig. 6.9 Soil Available Manganese map of Budihalu Microwatershed

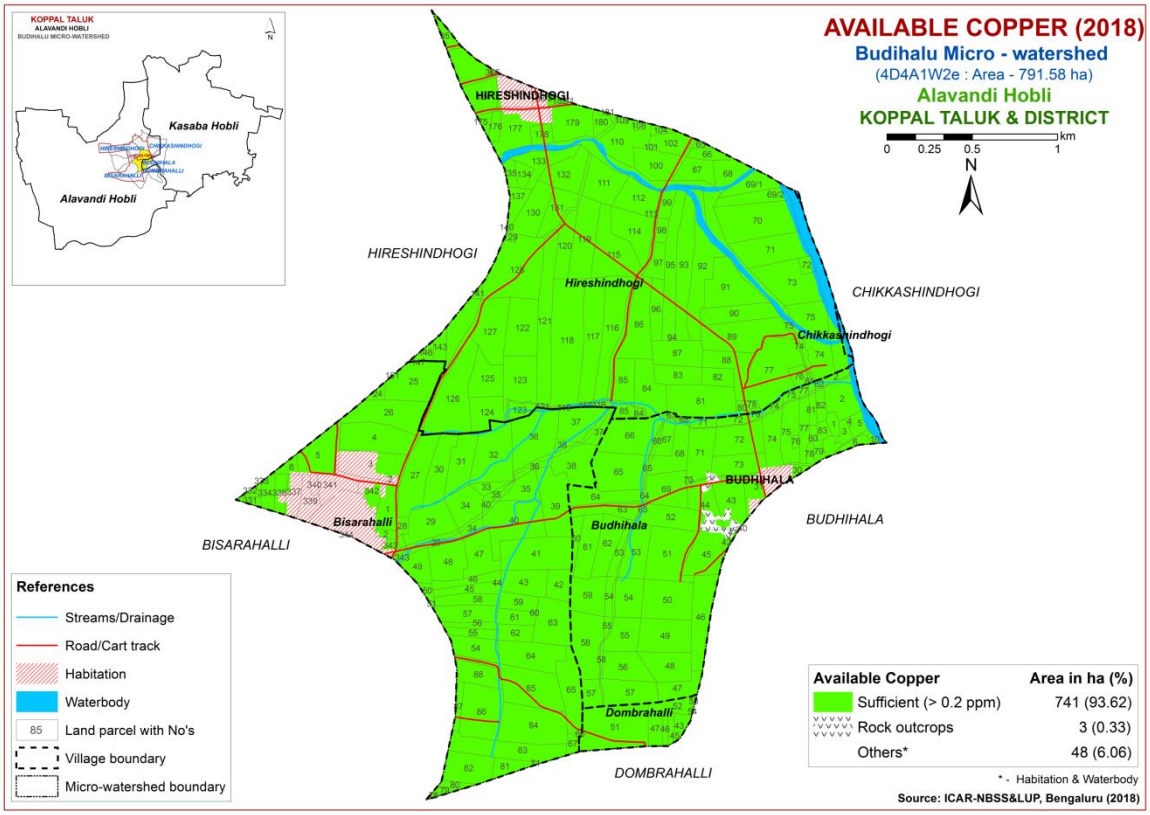


Fig. 6.10 Soil Available Copper map of Budihalu Microwatershed

6.11 Available Zinc

Available zinc content is deficient (<0.6 ppm) in maximum area of 574 ha (72%) and are distributed in the major part of the microwatershed. An area of 167 ha (21%) is sufficient (>0.6 ppm) and are distributed in the northern and northeastern part of the microwatershed (Fig. 6.11).

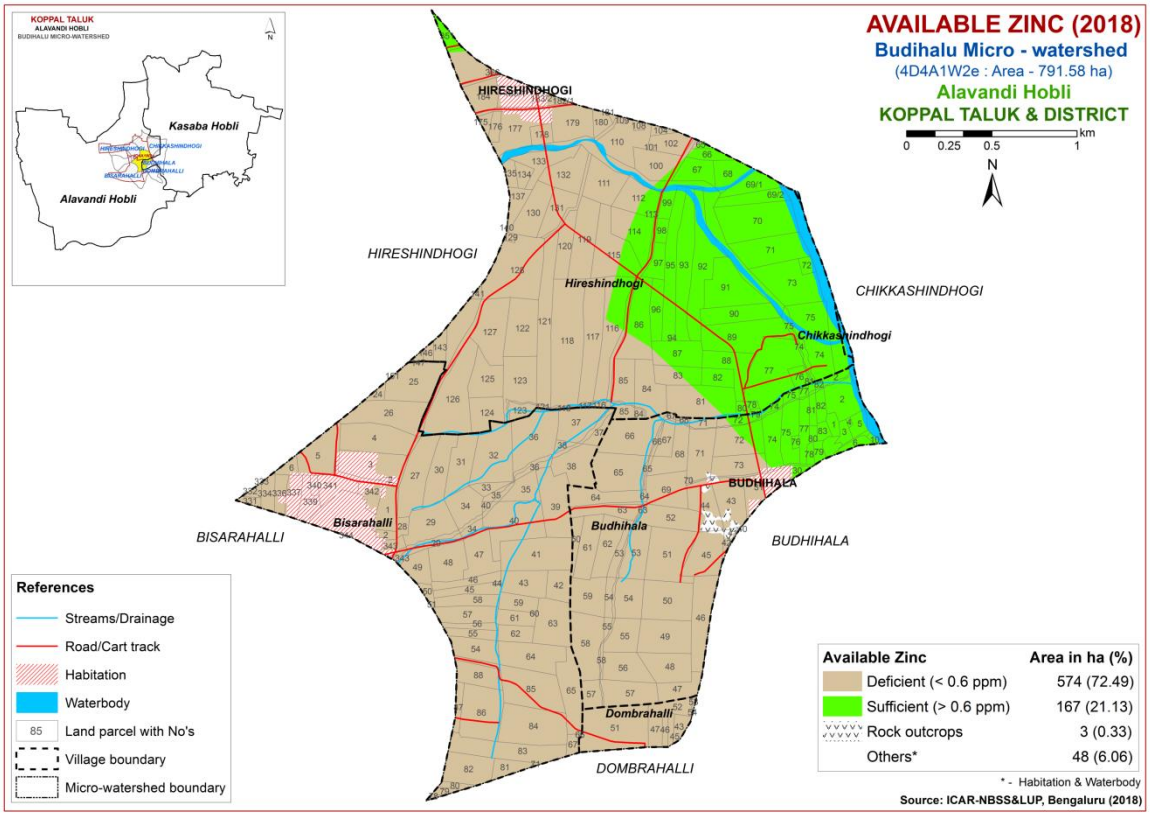


Fig. 6.11 Soil Available Zinc map of Budihalu Microwatershed

Chapter 7

LAND SUITABILITY FOR MAJOR CROPS

The soil and land resource units (soil phases) of Budihalu Microwatershed were assessed for their suitability for growing food, fodder, fibre and other horticulture crops by following the procedure as outlined in FAO, 1976 and 1983. Crop requirements were developed for each of the crop from the available research data and also by referring to Naidu *et. al.* (2006) and Natarajan *et. al* (2015). The crop requirements (Table 7.2 to 7.33) were matched with the soil and land characteristics (Table 7.1) to arrive at the crop suitability. The entire tables are given at the end of the Chapter. 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 's' for sodium 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 31 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 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 282 ha (36%) is highly suitable (Class S1) lands for growing sorghum and are distributed in the northern, eastern, central and western part of the microwatershed. An area of 389 ha (49%) is moderately suitable (Class S2) and are distributed in the major part of the microwatershed. They have minor limitations of

gravelliness, calcareousness, nutrient availability and rooting condition. An area of about 71 ha (9%) is marginally suitable (Class S3) for growing sorghum and are distributed in the northern, eastern and southern part of the microwatershed with moderate limitations of gravelliness and rooting condition.

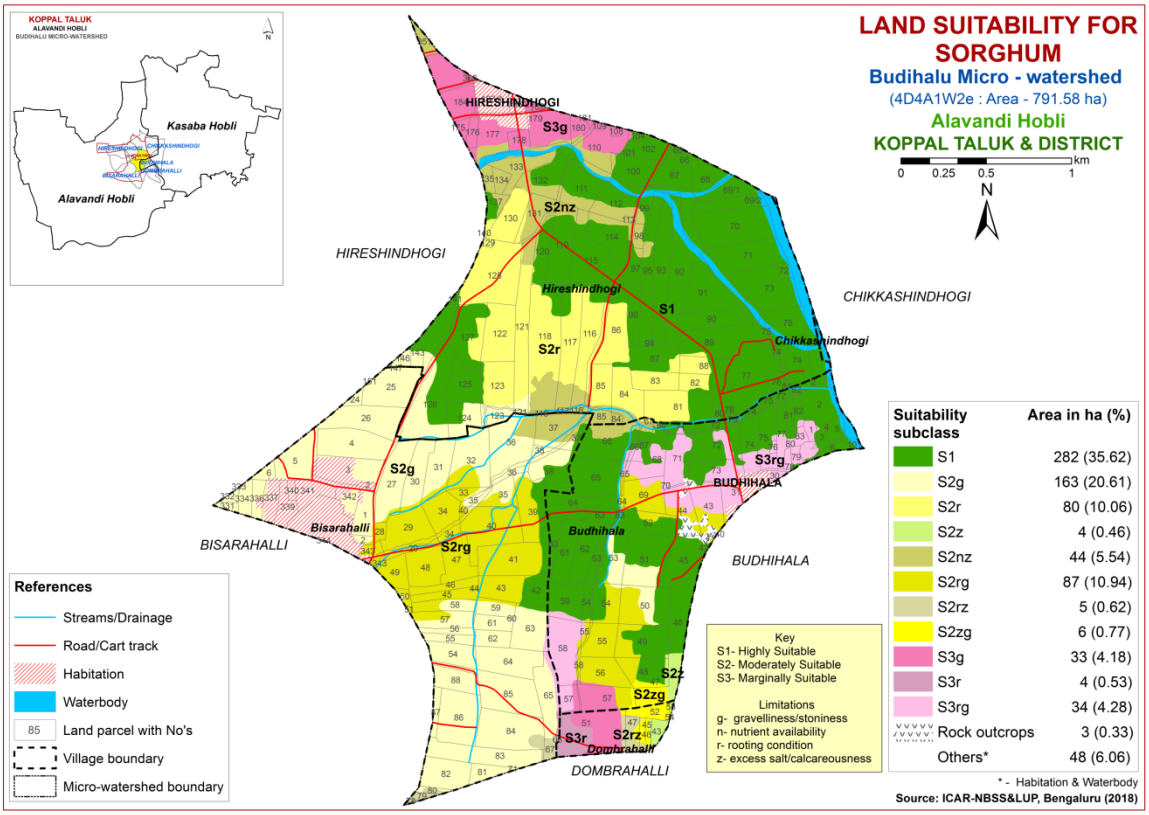


Fig. 7.1 Land Suitability map of Sorghum

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.

An area of 87 ha (11%) is highly suitable (Class S1) lands for growing maize and are distributed in the western, central and eastern part of the microwatershed. An area of 584 ha (74%) is moderately suitable (Class S2) for growing maize and are distributed in the major part of the microwatershed with minor limitations of gravelliness, calcareousness, rooting condition and texture. Marginally suitable (Class S3) lands cover an area of 71 ha (9%) and are distributed in the northern, eastern and southern part of the microwatershed. They have moderate limitations of gravelliness and rooting condition.

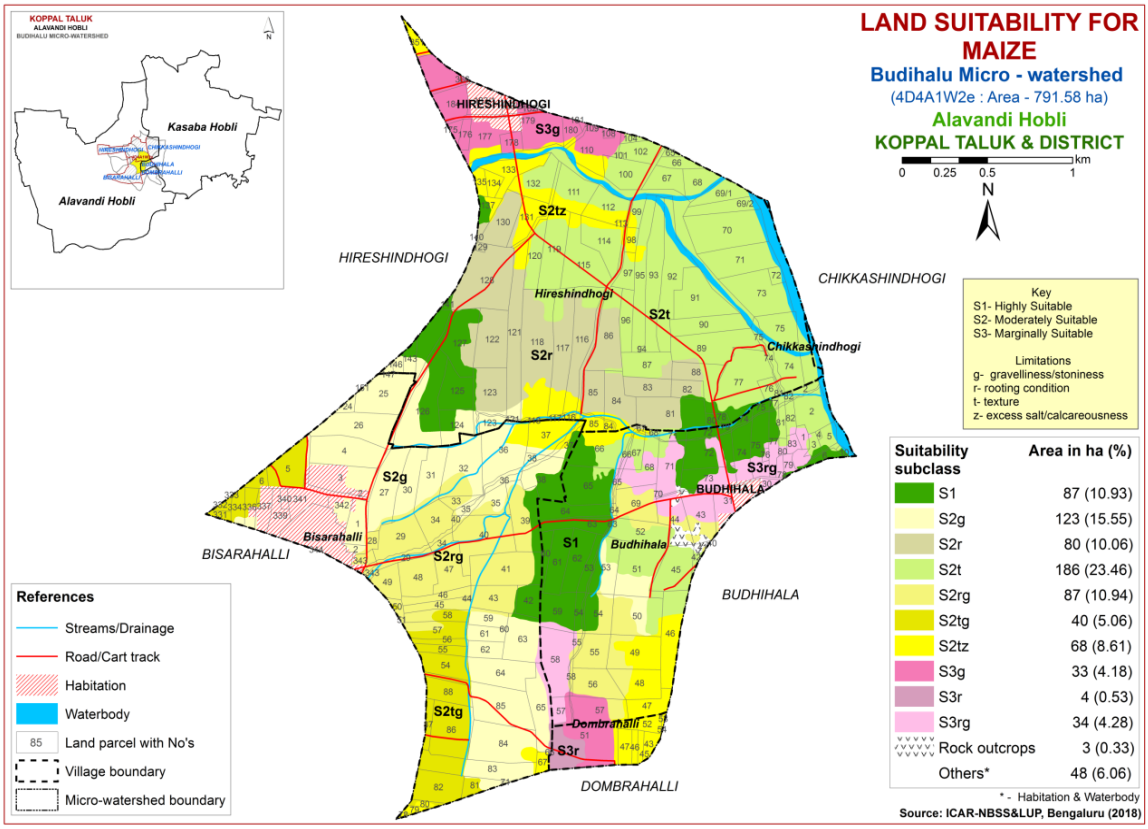


Fig. 7.2 Land Suitability map of Maize

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 the northern districts of the Karnataka State. The crop requirements for growing bajra (Table 7.4) were matched with the soil-site characteristics (Table 7.1) of the soils of the microwatershed and a 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.

An area of 334 ha (42%) is highly suitable (Class S1) for growing bajra and are distributed in the western, northern, eastern and southern part of the microwatershed. Maximum area of 362 ha (46%) is moderately suitable (Class S2) and are distributed in the major part of the microwatershed with minor limitations of texture, rooting condition, gravelliness and calcareousness. Marginally suitable (Class S3) lands cover an area of 45 ha (6%) and are distributed in the eastern, northern, southern and western part of the microwatershed. They have moderate limitations of gravelliness, texture and rooting depth.

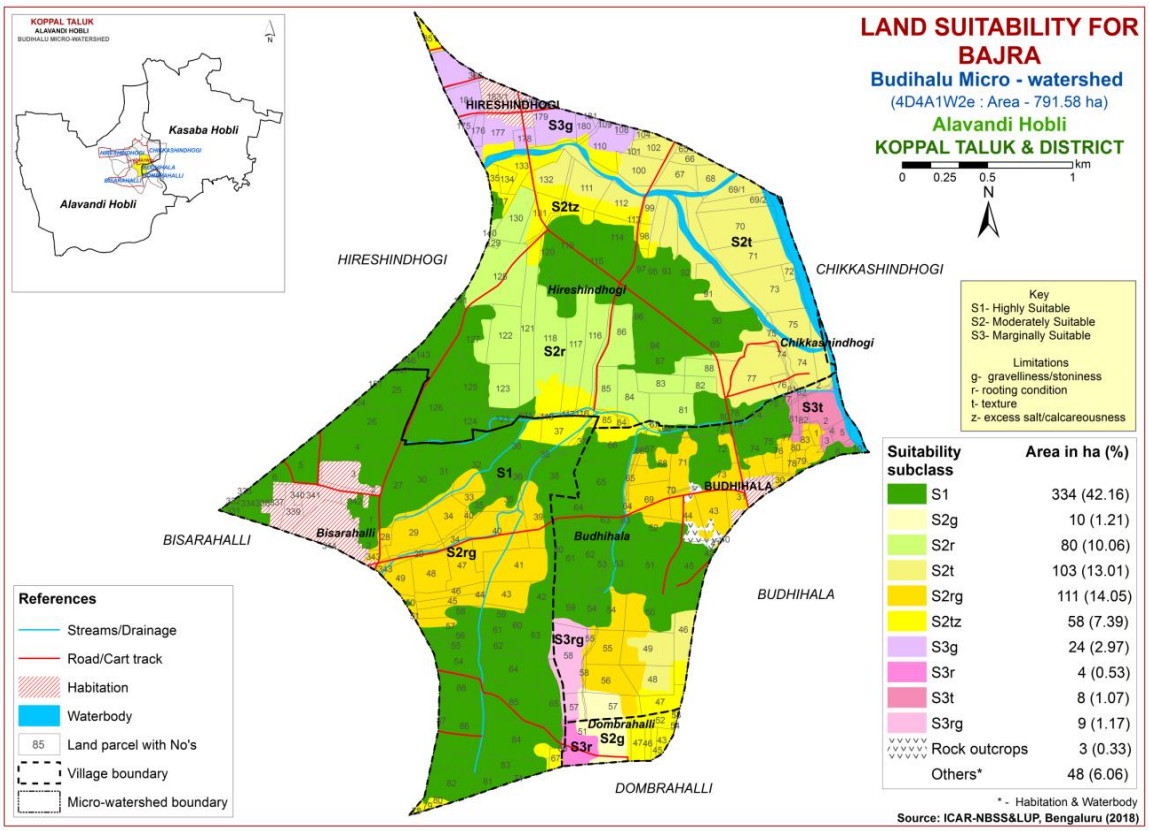


Fig. 7.3 Land Suitability map of Bajra

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.

An area of 174 ha (22%) is highly suitable (Class S1) for growing groundnut and are distributed in the southern, eastern, northern, central and western part of the microwatershed. An area of 313 ha (39%) is moderately suitable (Class S2) and are distributed in the major part of the microwatershed. They have minor limitations of texture, rooting condition and gravelliness. Maximum area of 255 ha (32%) is marginally suitable (Class S3) for groundnut and are distributed in the northern, eastern, southern and central part of the microwatershed. They have moderate limitations of rooting condition, calcareousness, gravelliness and texture.

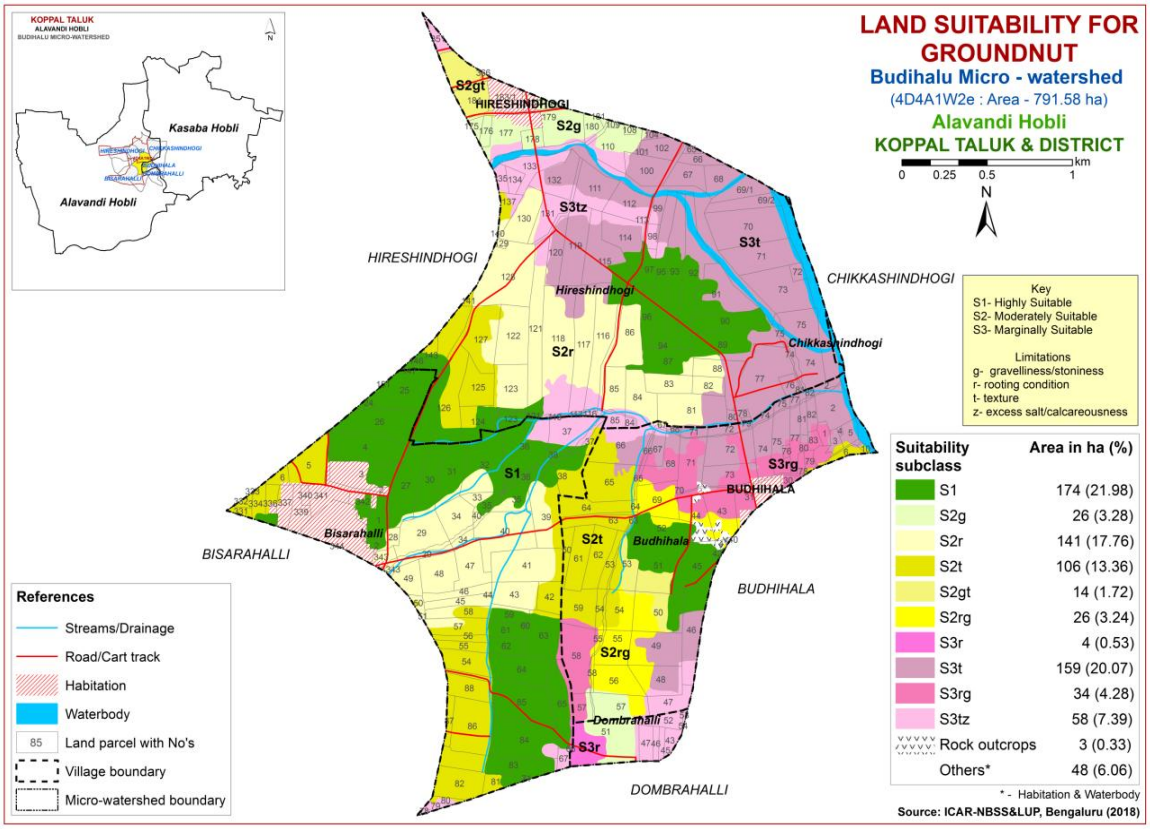


Fig. 7.4 Land Suitability map of Groundnut

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.

Maximum area of 271 ha (34%) is highly suitable (Class S1) for growing sunflower and are distributed in the major part of the microwatershed. An area of 228 ha (29%) is moderately suitable (Class S2) and are distributed in the northern, western, southern, central and eastern part of the microwatershed. They have minor limitations of gravelliness, calcareousness and rooting condition. An area of 230 ha (29%) is marginally suitable (Class S3) for growing sunflower and are distributed in the northern, western, eastern and southern part of the microwatershed with moderate limitations of rooting condition, calcareousness and gravelliness. Currently not suitable (Class N1) lands cover an area of 13 ha (2%) and are distributed in the southern part of the microwatershed with severe limitation of rooting condition.

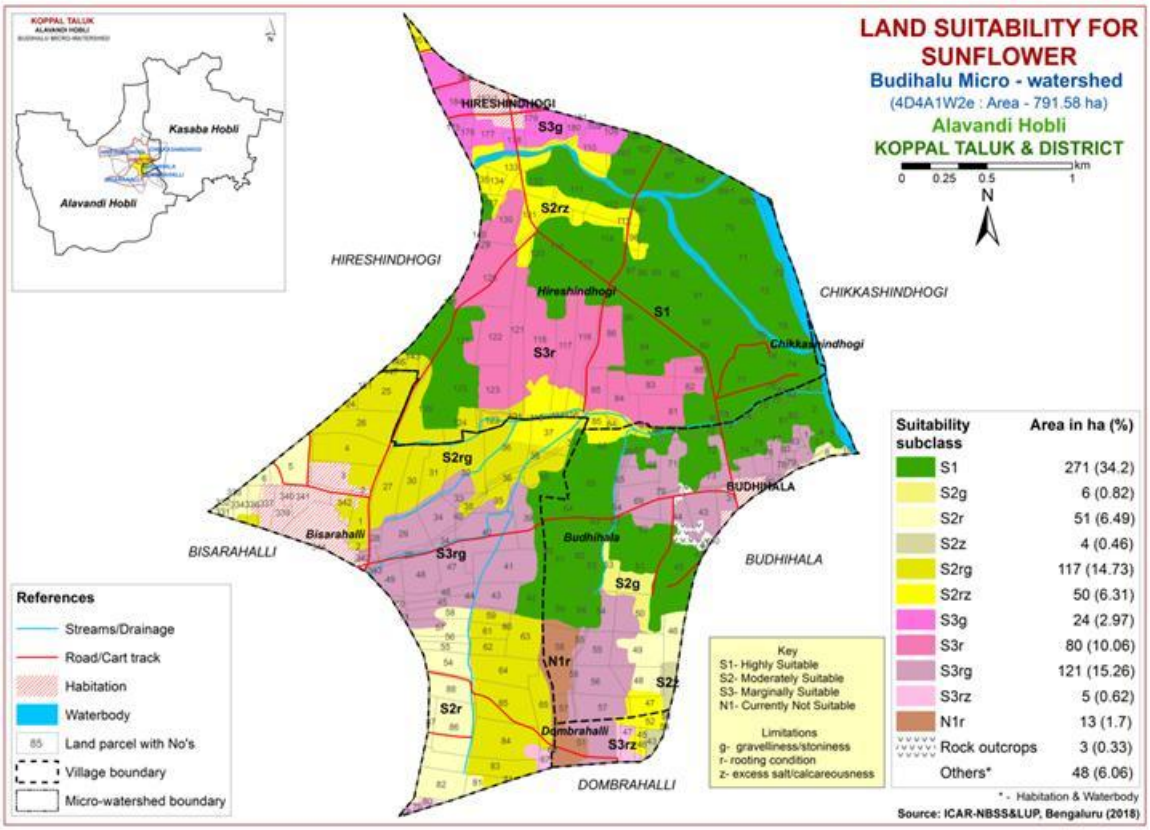


Fig. 7.5 Land Suitability map of Sunflower

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

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

An area of 169 ha (21%) is highly suitable (Class S1) lands for growing red gram and are distributed in the central, northern, eastern and western part of the microwatershed. Moderately suitable (Class S2) lands occupy a maximum area of 286 ha (36%) and are distributed in the major part of the microwatershed with minor limitations of gravelliness, texture, rooting condition and calcareousness. Marginally suitable (Class S3) lands cover an area of 273 ha (34%) and are distributed in the northern, central, southern, eastern part of the microwatershed. They have moderate limitations of gravelliness, calcareousness and rooting condition. Currently not suitable (Class N1) lands cover an area of 13 ha (2%) for growing red gram and are distributed in the southern part of the microwatershed with severe limitation of rooting condition.

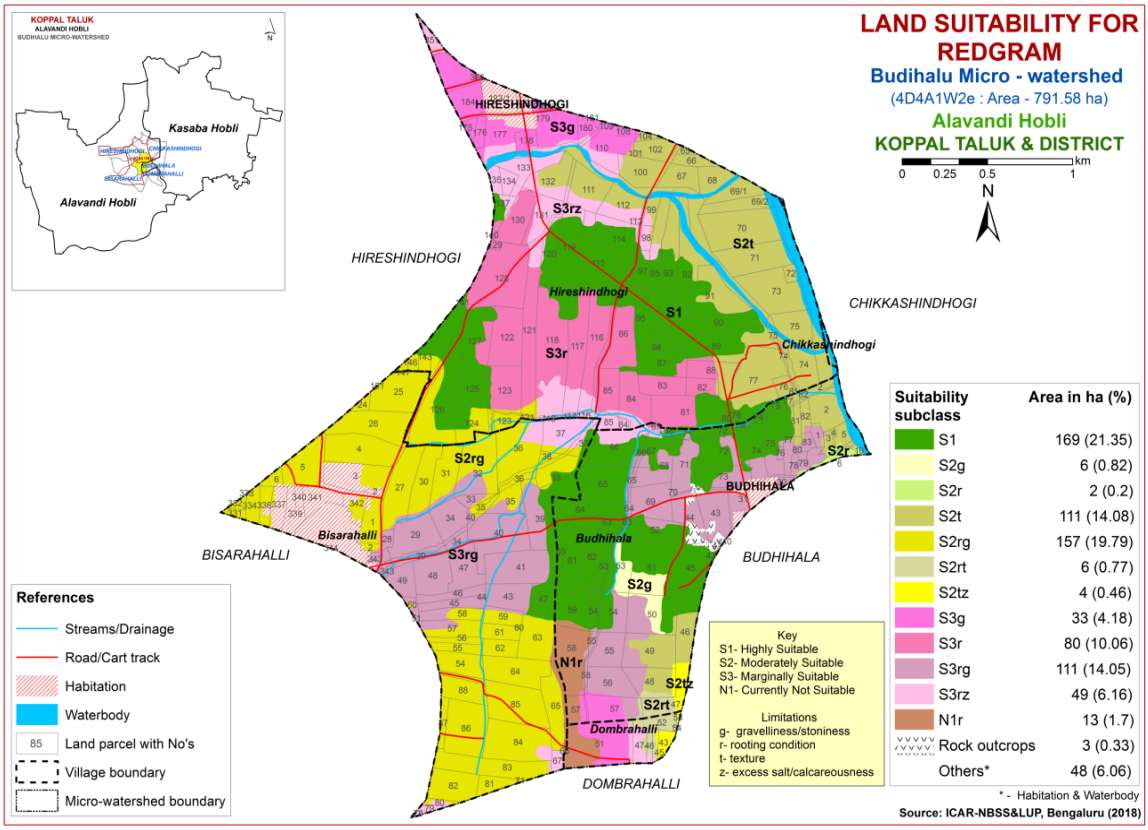


Fig. 7.6 Land Suitability map of Redgram

7.7 Land Suitability for Bengalgram (*Cicer arietinum*)

Bengalgram is one of the major pulse crop grown in an area of 9.39 lakh ha in northern Karnataka in Bijapur, Gulbarga, Raichur, Bidar, Belgaum, Dharwad and Bellary districts. The crop requirements for growing Bengalgram (Table 7.8) were matched with the soil-site characteristics (Table 7.1) of the soils of the microwatershed and a land suitability map for growing Bengalgram was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.7.

An area of 111 ha (14%) is highly suitable (Class S1) for growing bengalgram and are distributed in the northeastern and southeastern part of the microwatershed. Moderately suitable lands (Class S2) occupy an area of 585 ha (74%) and are distributed in the major part of the microwatershed with minor limitations of gravelliness, calcareousness, texture and rooting condition. Marginally suitable (Class S3) lands cover an area of 46 ha (6%) and are distributed in the northern, northwestern and southern part of the microwatershed. They have moderate limitations of rooting condition, texture and gravelliness.

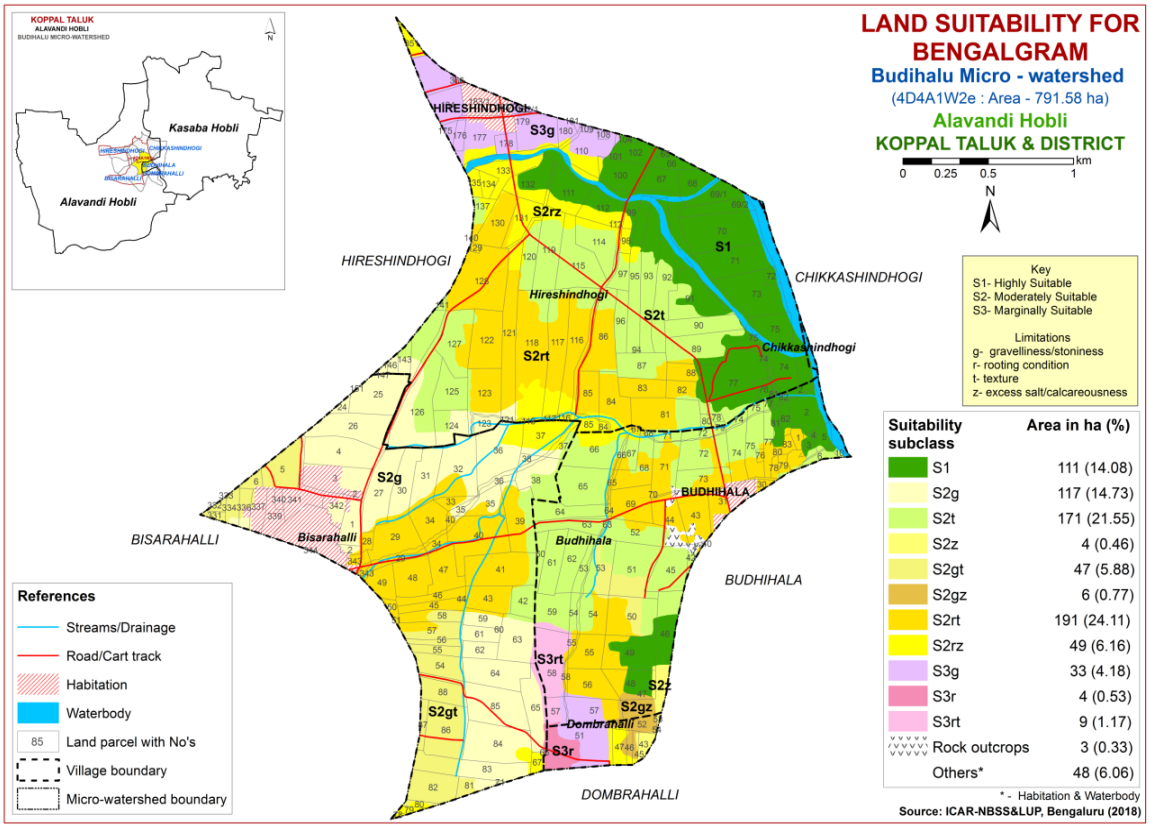


Fig. 7.7 Land Suitability map of Bengalgram

7.8 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, Gulbarga, Bijapur, Bidar, Bellary, Chitradurga and Chamarajnagar districts. The crop requirements for growing cotton (Table 7.9) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing cotton was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.8.

An area of 237 ha (30%) is highly suitable (Class S1) for growing cotton and are distributed in the northern, eastern and western part of the microwatershed. Moderately suitable (Class S2) lands occupy a maximum area of 434 ha (55%) and are distributed in the major part of the microwatershed. They have minor limitations of rooting condition, gravelliness, texture and calcareousness. Marginally suitable (Class S3) lands cover an area of 71 ha (9%) and are distributed in the northern, eastern and southern part of the microwatershed. They have moderate limitations of gravelliness, texture and rooting condition.

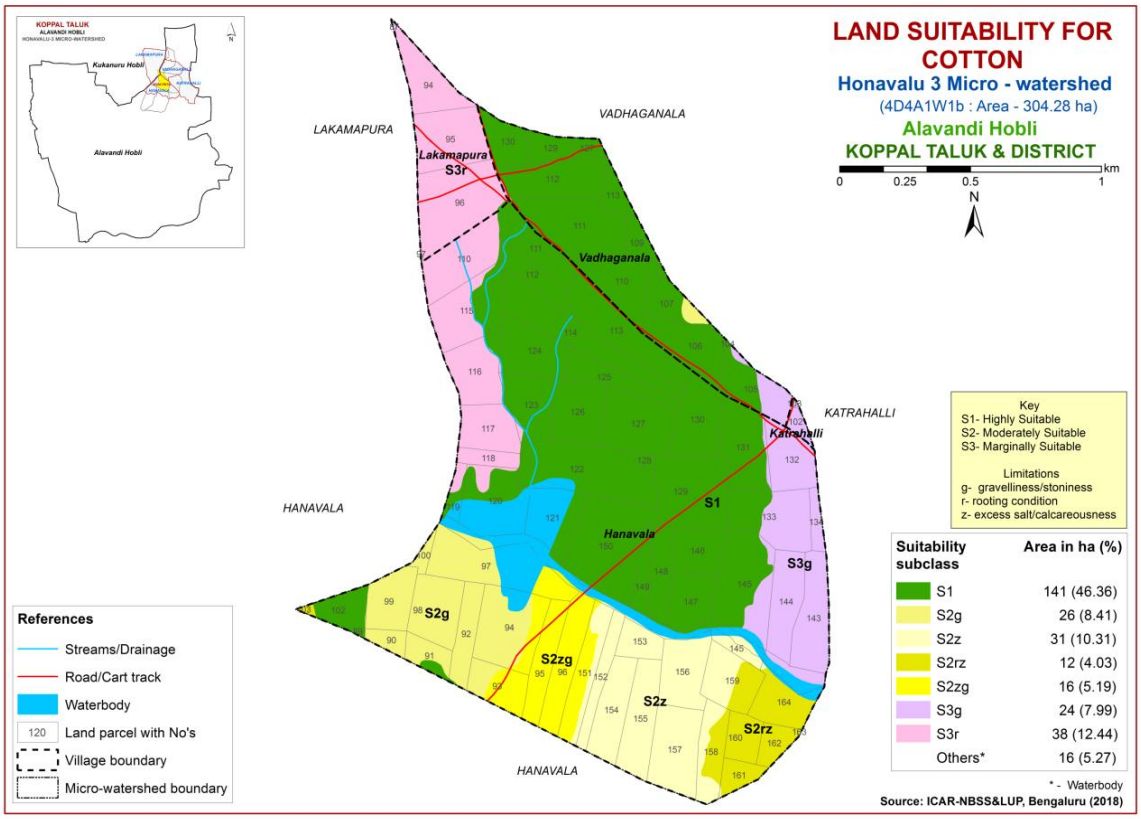


Fig. 7.8 Land Suitability map of Cotton

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

Chilli is one of the most important commercial spice crop grown in an area of 0.89 lakh ha in all the districts of 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.

An area of 184 ha (23%) is highly suitable (Class S1) lands for growing chilli and are distributed in the eastern, western, northern, central and southern part of the microwatershed. Moderately suitable (Class S2) lands cover a maximum area of 317 ha (40%) and are distributed in the major part of the microwatershed. They have minor limitations of gravelliness, rooting condition and texture. Marginally suitable (Class S3) lands cover an area of about 240 ha (30%) and are distributed in the northern, eastern, central and southern part of the microwatershed. They have moderate limitations of gravelliness, texture, calcareousness and rooting condition.

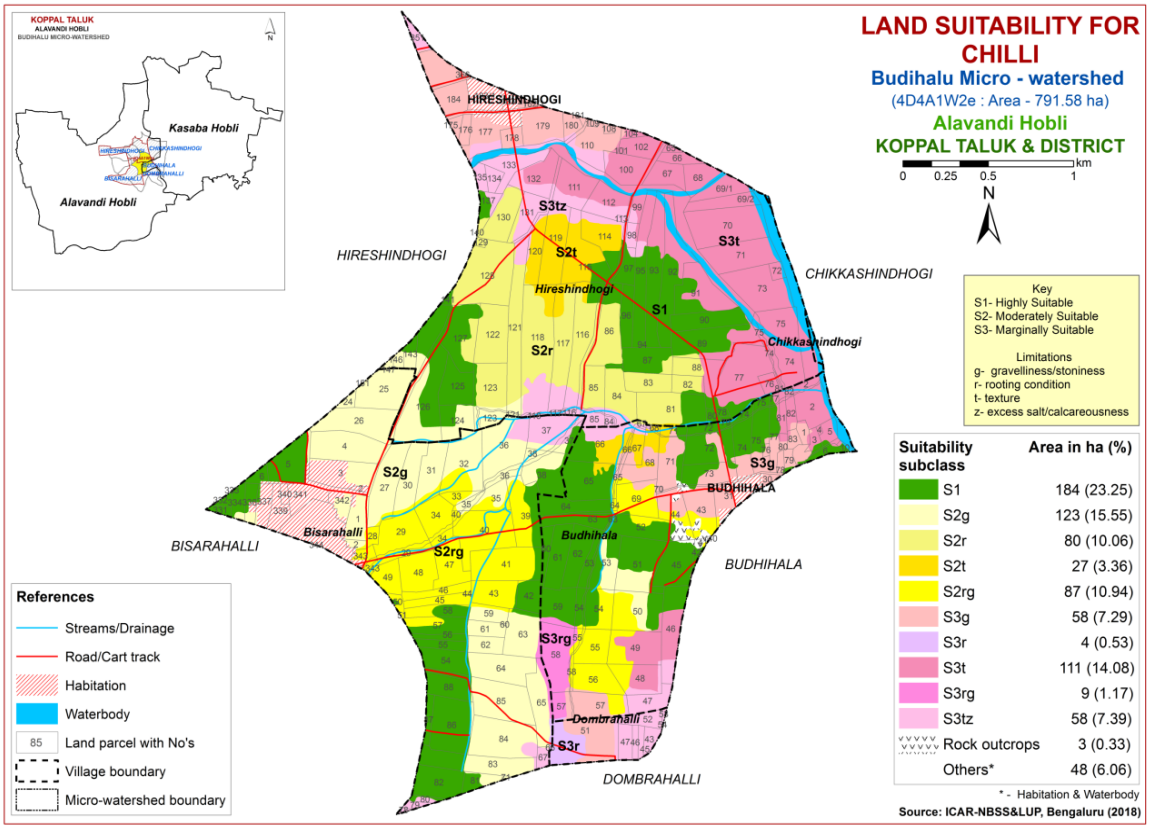


Fig. 7.9 Land Suitability map of Chilli

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 7.11) 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.

An area of 184 ha (23%) is highly suitable (Class S1) lands for growing tomato and are distributed in the northern, western, southern, central and eastern part of the microwaterhsed. Maximum area of 323 ha (41%) is moderately suitable (Class S2) and are distributed in the major part of the microwatershed. They have minor limitations of gravelliness, texture, calcareousness and rooting condition. Marginally suitable (Class S3) lands occupy an area of 235 ha (30%) and are distributed in the northern, eastern, central and southern part of the microwatershed with moderate limitations of gravelliness, rooting condition, texture, drainage and calcareousness.

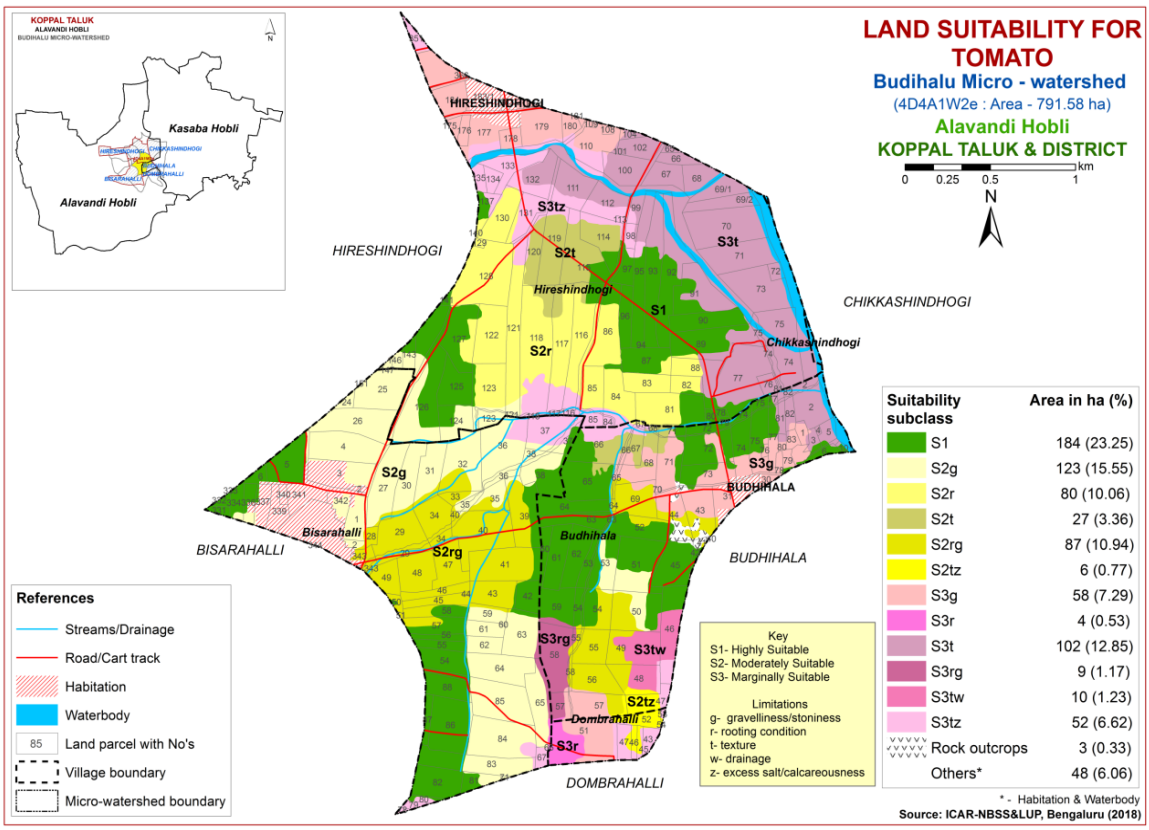


Fig. 7.10 Land Suitability map of Tomato

7.11 Land Suitability for Brinjal (*Solanum melongena*)

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

An area of 208 ha (26%) is highly suitable (Class S1) lands for growing brinjal and are distributed in the central, eastern, southern and western part of the microwatershed. Maximum area of about 460 ha (58%) is moderately suitable (Class S2) and are distributed in the major part of the microwatershed with minor limitations of texture, calcareousness, gravelliness and rooting condition. Marginally suitable lands (Class S3) for growing brinjal occur in an area of 73 ha (9%) and are distributed in the eastern and southern part of the microwatershed with moderate limitations of rooting depth and gravelliness.

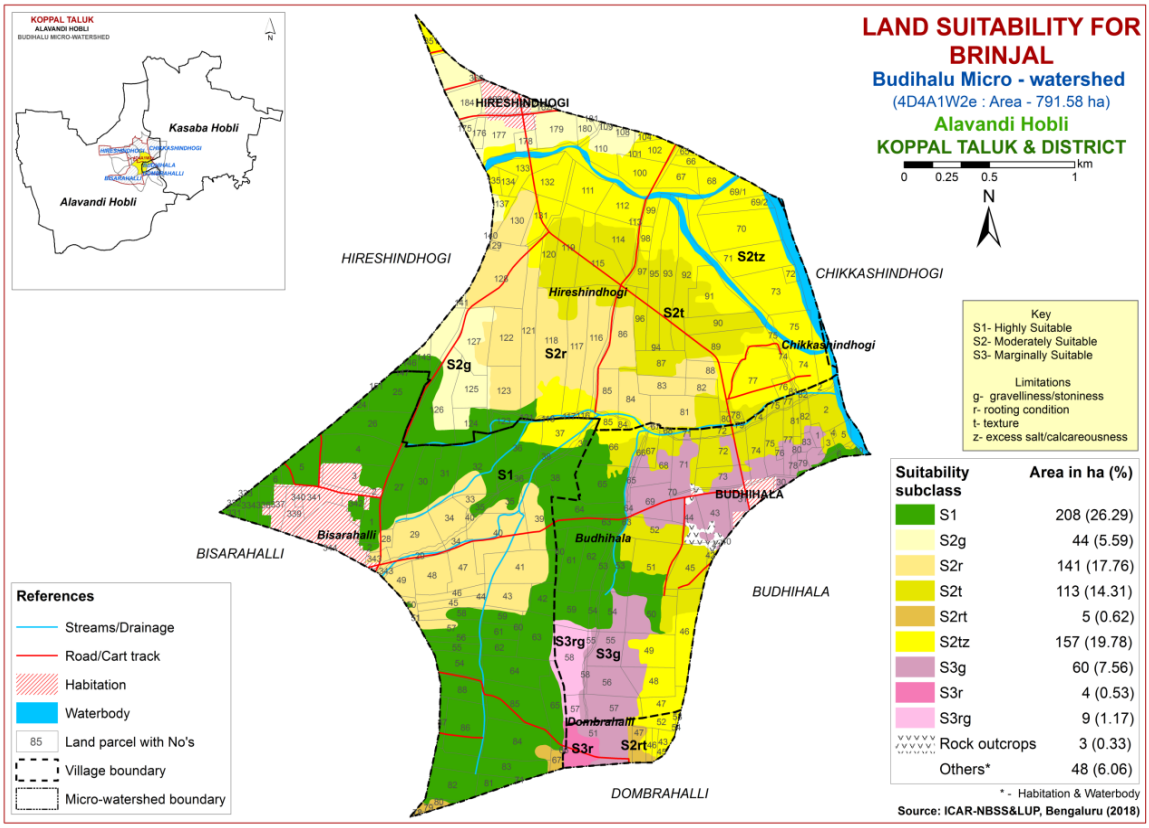


Fig. 7.11 Land Suitability map of Brinjal

7.12 Land Suitability for Onion (*Allium cepa*)

Onion is one of the most important vegetable crop grown in Raichur, Dharwad, Belgaum, Gulbarga, Bijapur, Bidar, Bellary, Chitradurga and Tumakuru districts. The crop requirements for growing onion (Table 7.13) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing Onion was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.12.

An area of 166 ha (21%) is highly suitable (Class S1) lands for growing onion and are distributed in the central, western and southern part of the microwatershed. Moderately suitable (Class S2) lands occur in a maximum area of 333 ha (42%) for growing onion and are distributed in the major part of the microwatershed. Marginally suitable lands (Class S3) for growing onion occupy an area of 242 ha (31%) and are distributed in the northern, eastern, central and southern part of the microwatershed with moderate limitations of rooting depth, calcareousness, gravelliness and texture.

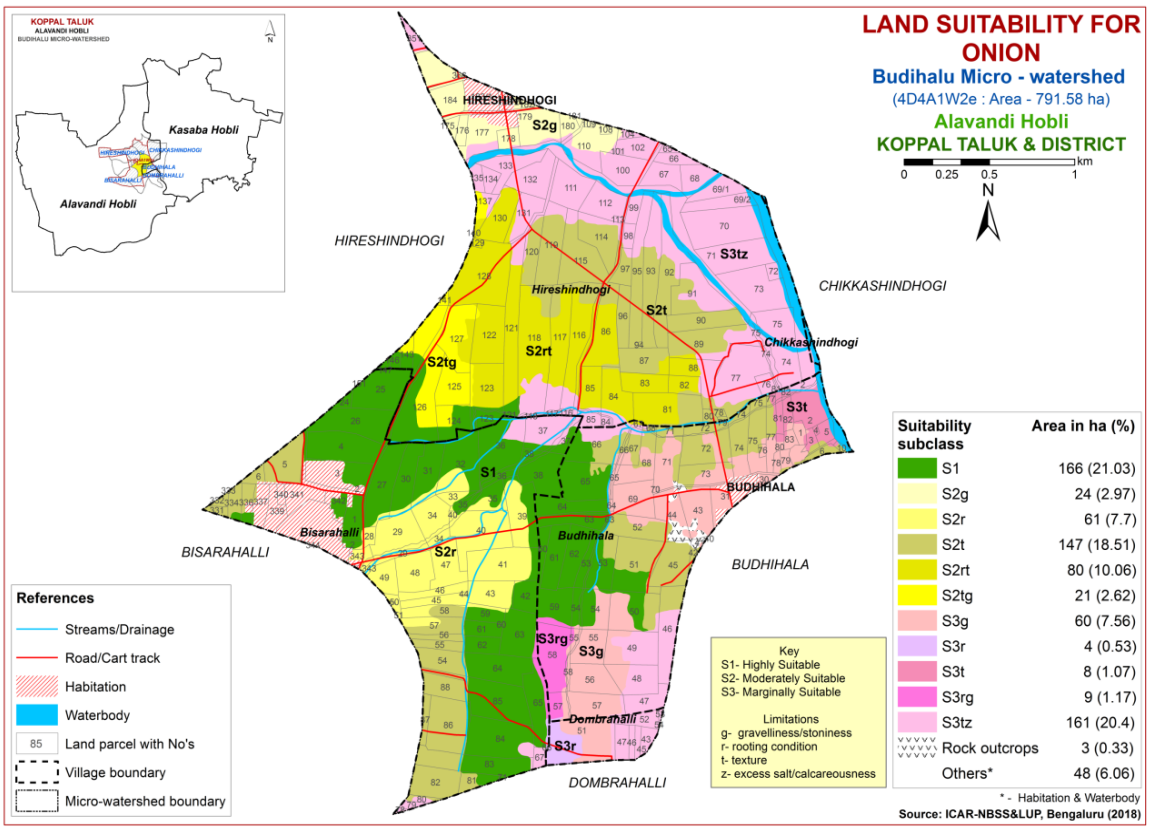


Fig. 7.12 Land Suitability map of Onion

7.13 Land Suitability for Bhendi (*Abelmoschus esculentus*)

Bhendi is one of the most important vegetable crop grown in all the districts. The crop requirements for growing bhendi (Table 7.14) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing bhendi was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.13.

An area of 166 ha (21%) is highly suitable (Class S1) lands for growing bhendi and are distributed in the central, southern and western part of the microwatershed. Maximum area of about 502 ha (63%) is moderately suitable (Class S2) and are distributed in all parts of the microwatershed with minor limitations of texture, calcareousness, gravelliness and rooting condition. Marginally suitable lands (Class S3) occur in an area of 73 ha (9%) and are distributed in the eastern and southern part of the microwatershed with moderate limitations of rooting depth and gravelliness.

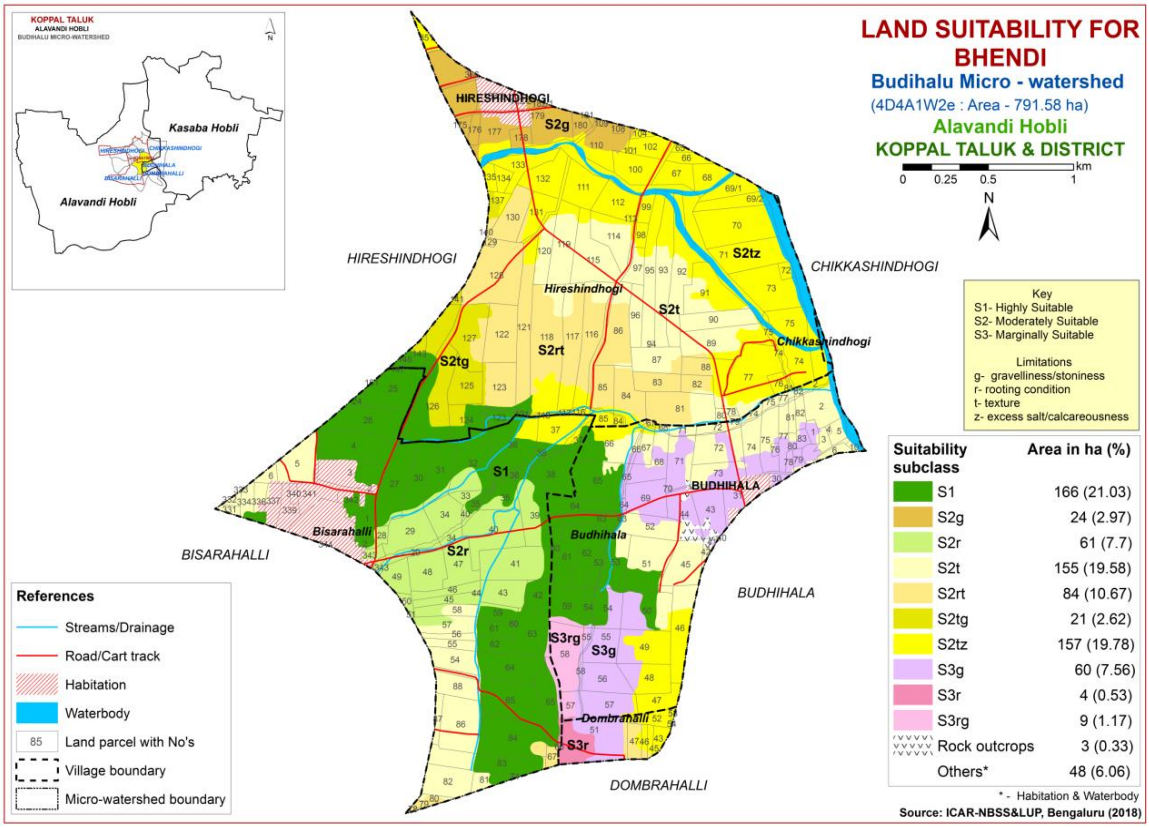


Fig. 7.13 Land Suitability map of Bhendi

7.14 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 7.15) 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 7.14.

An area of 175 ha (22%) is highly suitable (Class S1) lands for growing drumstick and are distributed in the northern, eastern, central and western part of the microwaterhsed. Maximum area of 349 ha (44%) is moderately suitable (Class S2) and are distributed in all parts of the microwatershed. They have minor limitations of gravelliness, texture, rooting condition and calcareousness. Marginally suitable (Class S3) lands cover an area of 206 ha (26%) and are distributed in the western, central, southern and eastern part of the microwatershed. They have moderate limitations of calcareousness, gravelliness and rooting condition. Currently not suitable (Class N1) lands cover an area of 13 ha (2%) and are distributed in the southern part of the microwatershed with severe limitation of rooting condition.

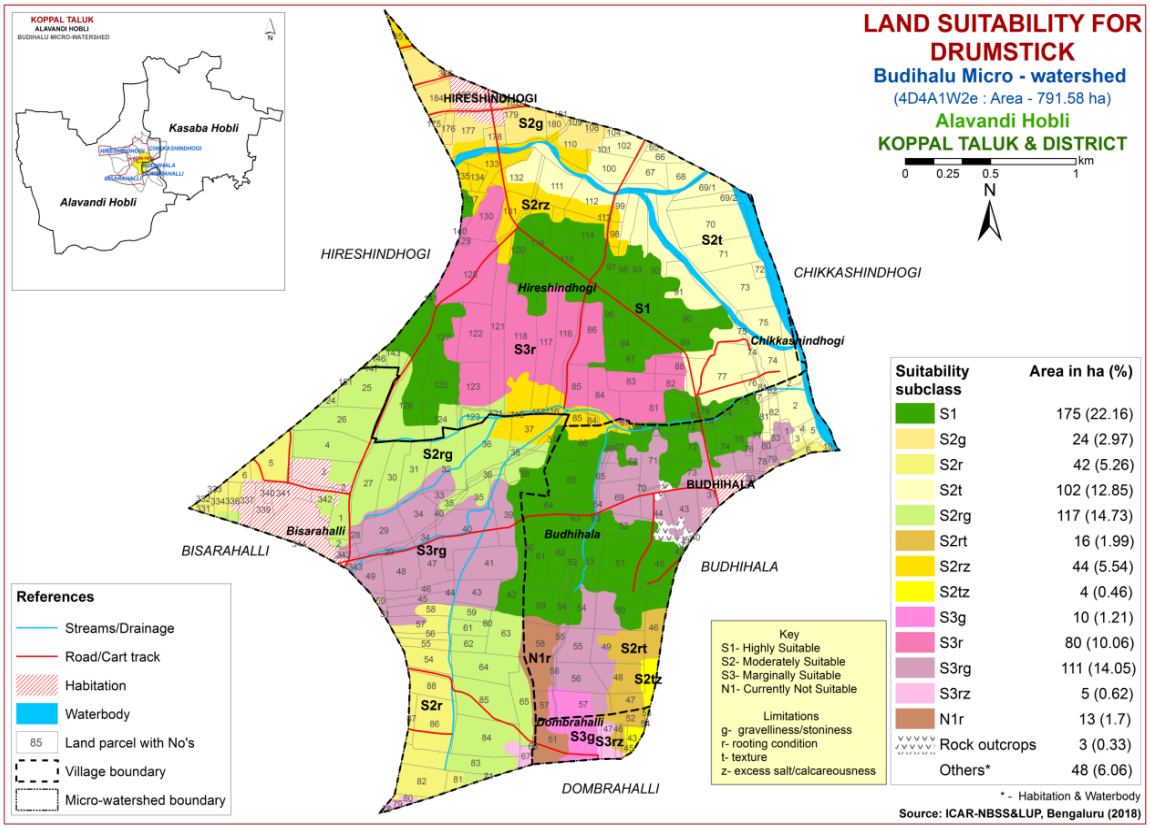


Fig. 7.14 Land Suitability map of Drumstick

7.15 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 7.16) for growing mango were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing mango was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.15.

An area of 126 ha (16%) is highly (Class S1) suitable lands for growing mango and are distributed in the northern, eastern and western part of the microwaterhsed. Moderately suitable (Class S2) lands occupy an area of 49 ha (6%) and are distributed in the central part of the microwatershed. They have minor limitations of gravelliness and rooting condition. Marginally suitable (Class S3) lands cover an area of 357 ha (45%) and are distributed in all parts of the microwatershed. They have moderate limitations of texture, gravelliness, rooting condition and calcareousness. An area of 210 ha (26%) is currently not suitable (Class N1) for growing mango and occur in the western, northern, central and southern part of the microwatershed with severe limitations of calcareousness, gravelliness and rooting condition.

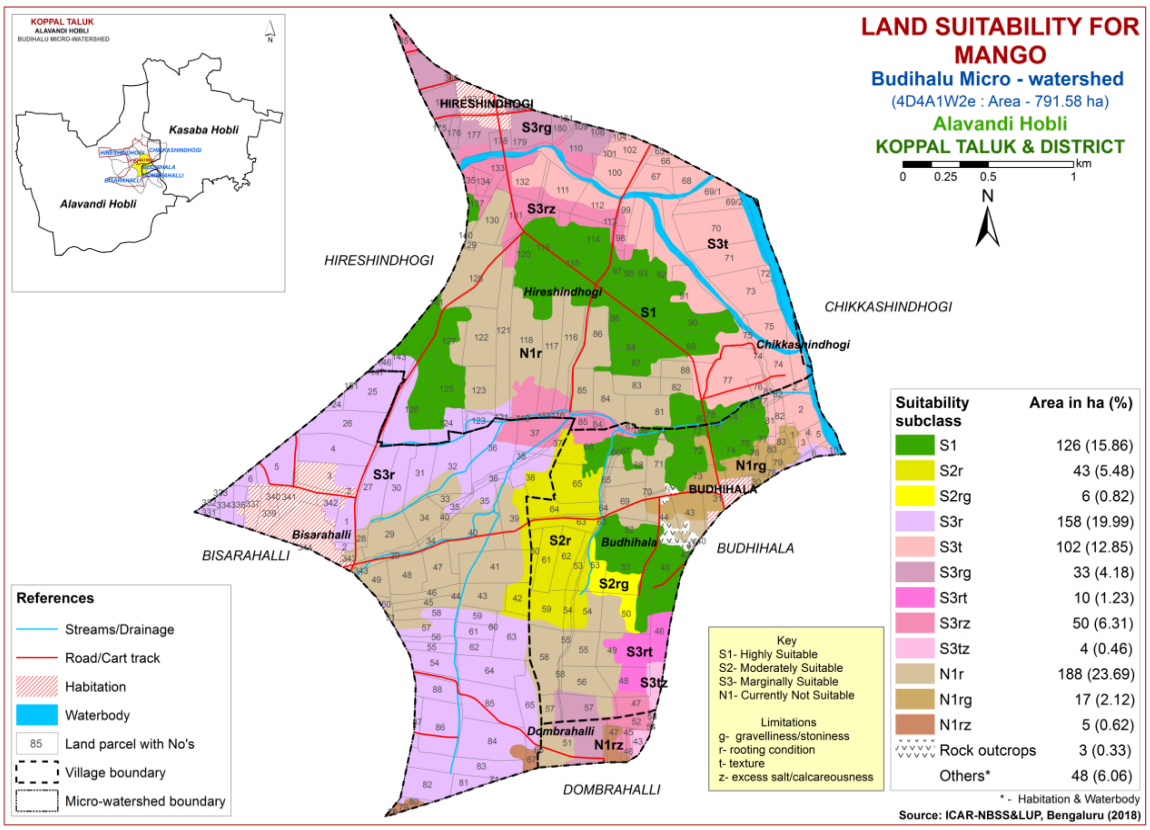


Fig. 7.15 Land Suitability map of Mango

7.16 Land suitability for Guava (*Psidium guajava*)

Guava is one of the most important fruit crop grown in an area of about 0.64 lakh 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.

An area of 148 ha (19%) is highly (Class S1) suitable lands for growing guava and are distributed in the northern, central and eastern part of the microwatershed. An area of about 195 ha (25%) is moderately suitable (Class S2) and are distributed in the western, eastern and southern part of the microwatershed. They have minor limitations of gravelliness, rooting condition and textures. Marginally suitable (Class S3) lands cover a maximum area of 384 ha (49%) and are distributed in the major part of the microwatershed. They have moderate limitations of gravelliness, texture, rooting condition and calcareousness. An area of about 13 ha (2%) area is currently not suitable (Class N1) for growing guava and occur in the southern part of the microwatershed with severe limitation of rooting condition.

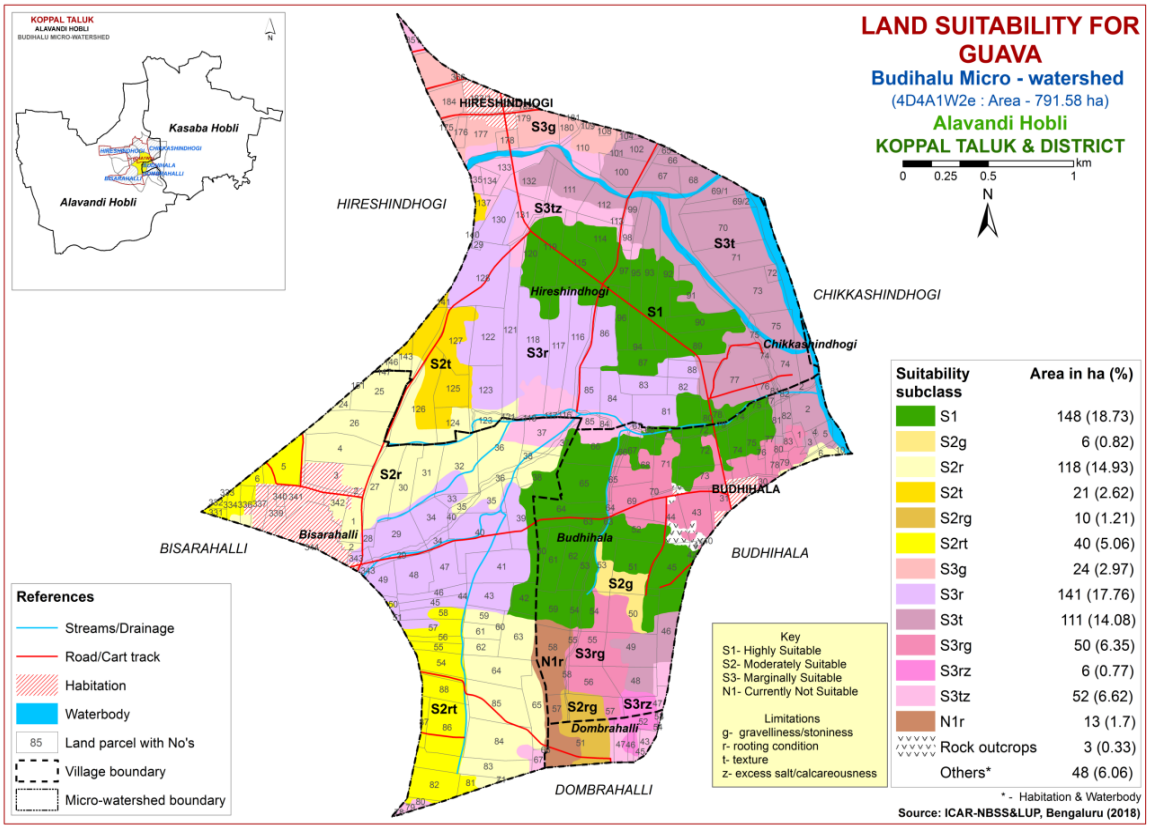


Fig. 7.16 Land Suitability map of Guava

7.17 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 7.18) 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 7.17.

An area of 169 ha (21%) is highly suitable (Class S1) lands for growing sapota and are distributed in the northern, western, eastern and central part of the microwatershed. An area of about 180 ha (23%) is moderately suitable (Class S2) and are distributed in the eastern, western and southern part of the microwaterhsed. They have minor limitations of gravelliness, rooting condition and calcareousness. Marginally suitable (Class S3) lands cover a maximum area of 380 ha (48%) and are distributed in the major part of the microwatershed. They have moderate limitations of gravelliness, texture, rooting condition and calcareousness. An area of 13 ha (2%) is currently not suitable (Class N1) for growing sapota and occur in the southern part of the microwatershed with severe limitation of rooting condition.

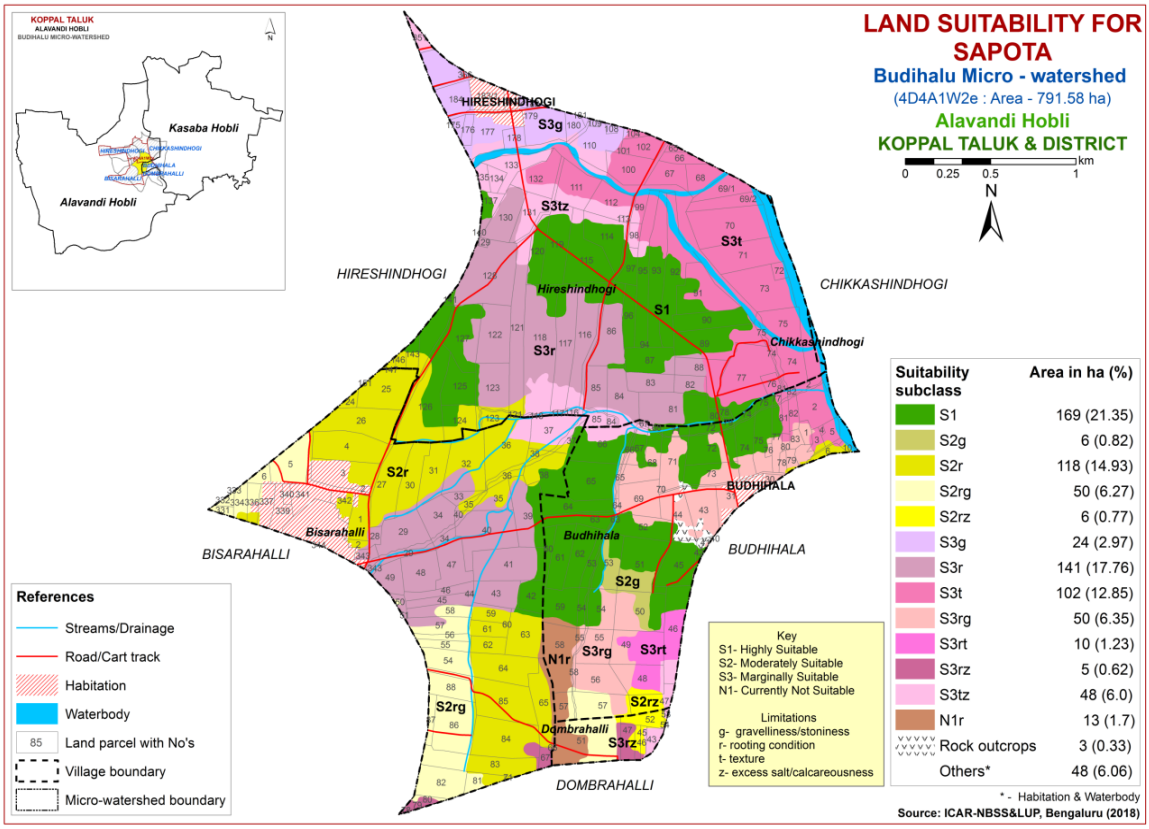


Fig. 7.17 Land Suitability map of Sapota

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

An area of 175 ha (22%) is highly suitable (Class S1) lands for growing pomegranate and are distributed in the northern, western, eastern and central part of the microwatershed. Moderately suitable (Class S2) lands occupy an area of 334 ha (42%) and are distributed in all parts of the microwatershed. They have minor limitations of texture, rooting condition, gravelliness and calcareousness. An area of 220 ha (28%) is marginally suitable (Class S3) for growing pomegranate and are distributed in the northern, western, central, southern and eastern part of the microwatershed. They have moderate limitations of rooting condition, calcareousness and gravelliness. An area of 13 ha (2%) is currently not suitable (Class N1) for growing pomegranate and are distributed in the southern part of the microwatershed with severe limitation of rooting condition.

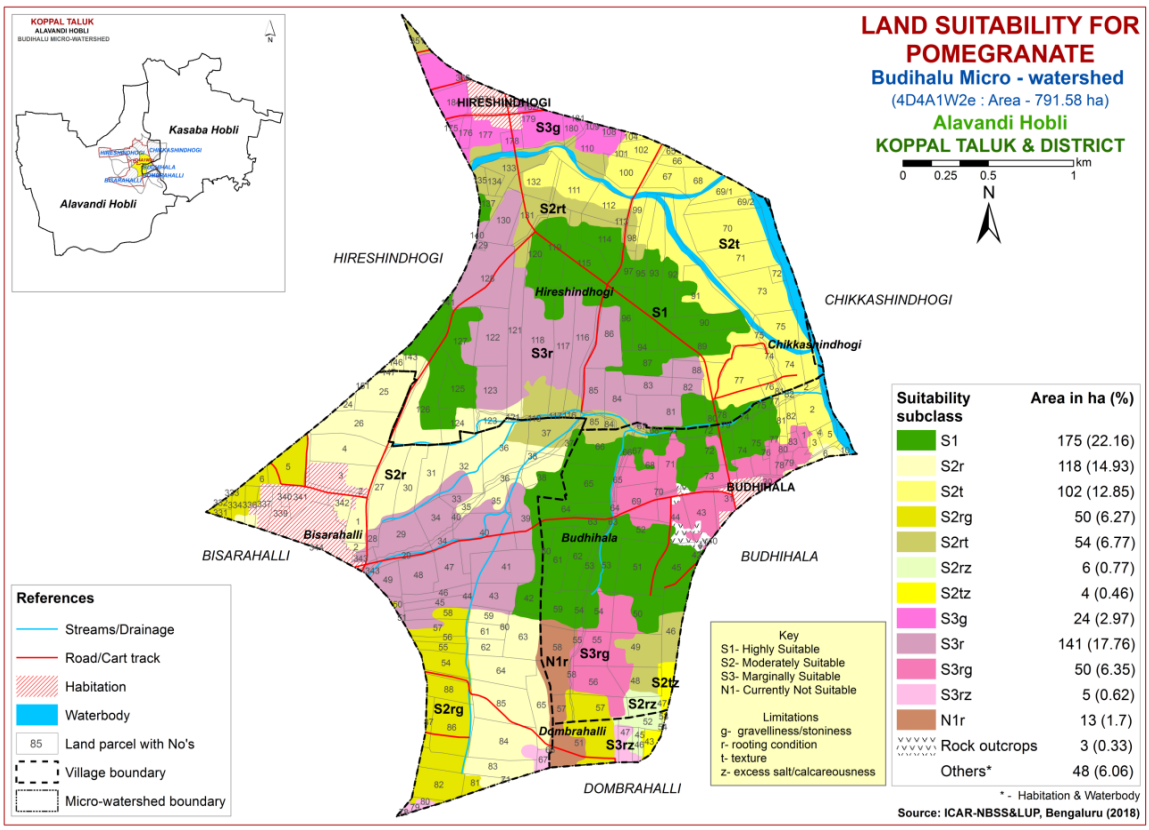


Fig. 7.18 Land Suitability map of Pomegranate

7.19 Land Suitability for Musambi (*Citrus limetta*)

Musambi is one of the most important fruit crop grown in almost all the districts of the State. The crop requirements for growing musambi (Table 7.20) 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 7.19.

Maximum area of 271 ha (34%) is highly suitable (Class S1) for growing musambi and are distributed in the major part of the microwatershed. An area of 238 ha (30%) is moderately suitable (Class S2) and are distributed in the northern, western, eastern and southern part of the microwatershed. They have minor limitations of calcareousness, rooting condition and gravelliness. Marginally suitable (Class S3) lands occur in an area of 220 ha (28%) and are distributed in the northern, western, central, eastern and southern part of the microwatershed with moderate limitations of rooting condition, calcareousness and gravelliness. An area of 13 ha (2%) is currently not suitable (Class N1) for growing musambi and are distributed in the southern part of the microwatershed. They have severe limitation of rooting condition.

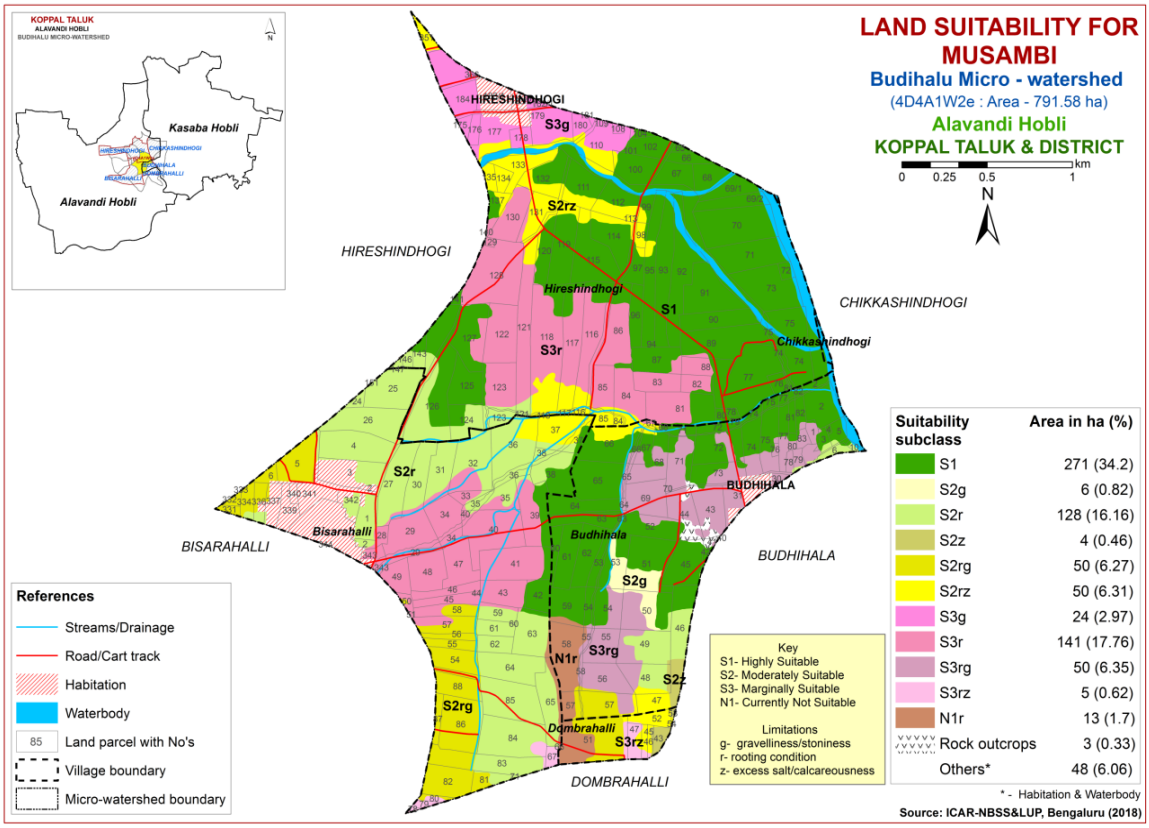


Fig. 7.19 Land Suitability map of Musambi

7.20 Land Suitability for Lime (*Citrus sp*)

Lime is one of the most important fruit crop grown in an area of 0.11 lakh ha in almost all the districts of the State. The crop requirements for growing lime (Table 7.21) 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 7.20.

Maximum area of 271 ha (34%) is highly suitable (Class S1) for growing lime and are distributed in the major part of the microwatershed. An area of 238 ha (30%) is moderately suitable (Class S2) and are distributed in the northern, western, southern and eastern part of the microwatershed. They have minor limitations of calcareousness, rooting condition and gravelliness. Marginally suitable (Class S3) lands occur in an area of 220 ha (28%) for growing lime and distributed in the northern, western, central, eastern and southern part of the microwatershed with moderate limitations of rooting condition, calcareousness and gravelliness. An area of 13 ha (2%) is currently not suitable (Class N1) for growing lime and are distributed in the southern part of the microwatershed with severe limitation of rooting condition.

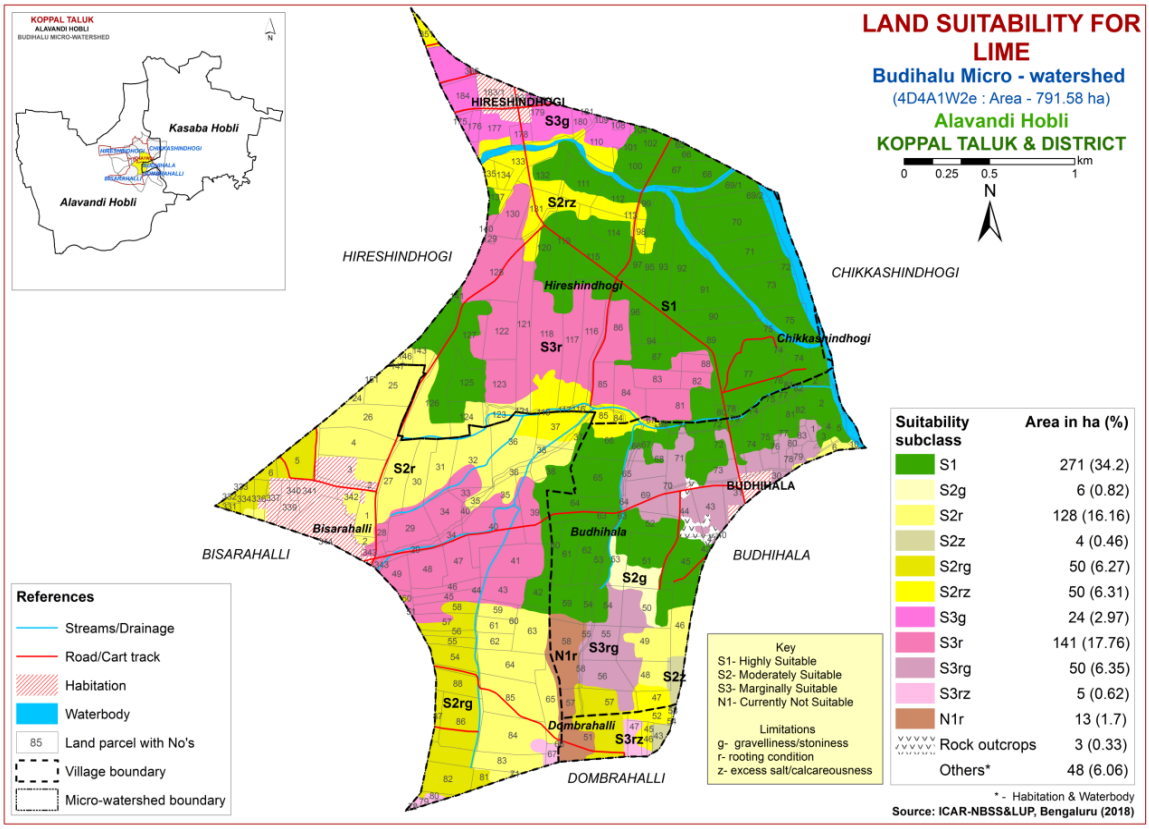


Fig. 7.20 Land Suitability map of Lime

7.21 Land Suitability for Amla (*Phyllanthus emblica*)

Amla is one of the most important medicinal crop grown in 151 ha area and distributed in almost all the districts of the State. The crop requirements for growing amla (Table 7.22) 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 7.21.

An area of 334 ha (42%) is highly suitable (Class S1) for growing amla and are distributed in the western, southern, central, eastern and northern part of the microwatershed. An area of 395 ha (50%) has soils that are moderately suitable (Class S2) and are distributed in the major part of the microwatershed. They have minor limitations of rooting condition, gravelliness, texture and calcareousness. The marginally suitable (Class S3) lands cover an area of 13 ha (2%) and occur in the southern part of the microwatershed with moderate limitations of rooting condition and gravelliness.

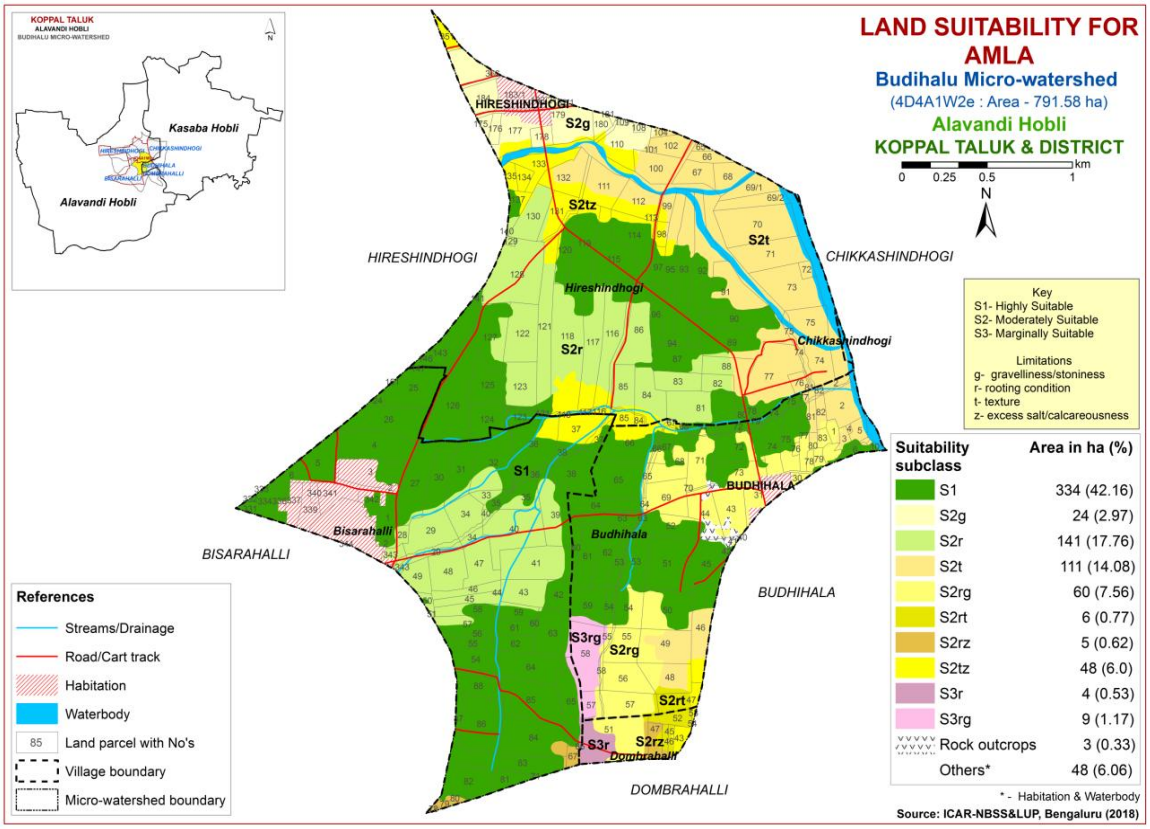


Fig. 7.21 Land Suitability map of Amla

7.22 Land Suitability for Cashew (*Anacardium occidentale)*

Cashew is one of the most important nut crop grown in an area of 1.24 lakh ha in almost all the districts of the State. The crop requirements for growing cashew (Table 7.23) 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 7.22.

An area 109 ha (14%) is highly (Class S1) and are distributed in the northern, eastern and central part of the microwatershed. Moderately (Class S2) suitable lands occur in an area of 235 ha (30%) and are distributed in the major part of the microwatershed. Marginally suitable (Class S3) lands occur in an area of 215 ha (27%) for growing cashew and are distributed in the northern, central, eastern and western part of the microwatershed with moderate limitations of gravelliness and rooting condition. An area of about 182 ha (23%) is currently not suitable (Class N1) for growing cashew and are distributed in the northern, central, eastern and southern part of the microwaterhsed with severe limitations of texture, rooting condition and calcareousness.

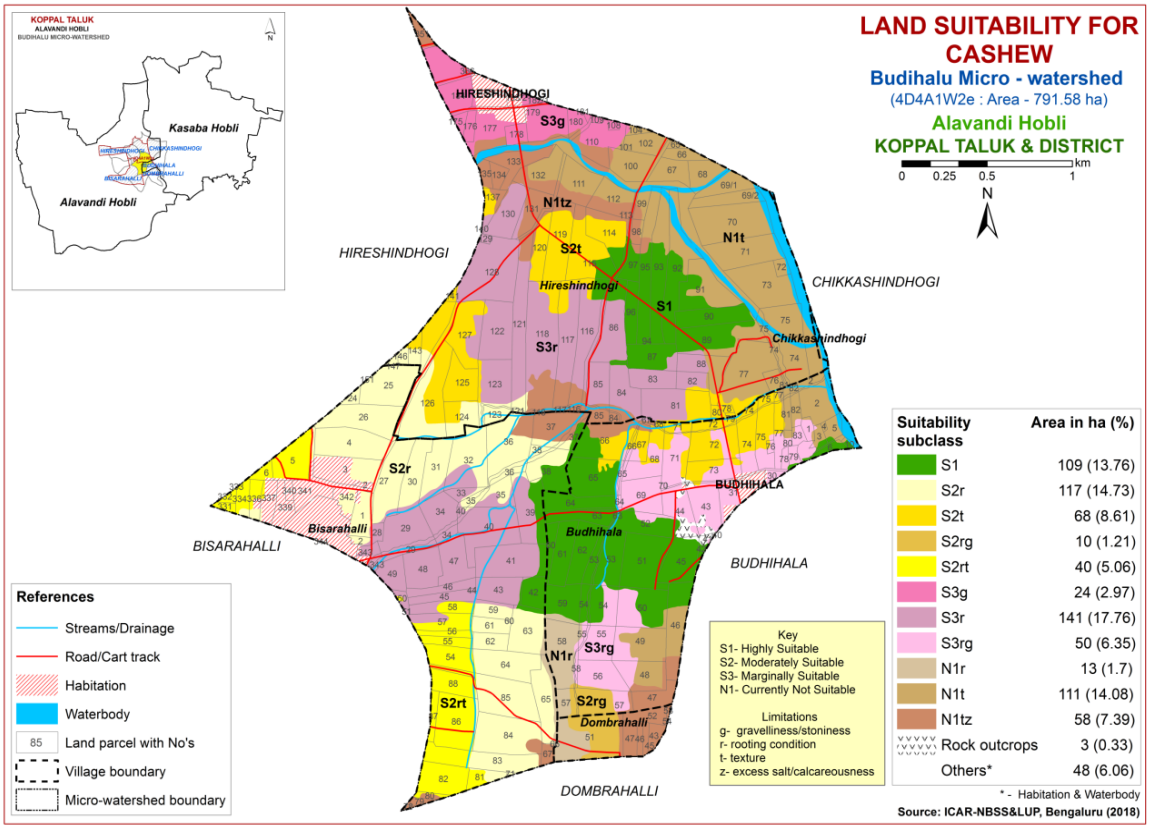


Fig. 7.22 Land Suitability map of Cashew

7.23 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 for growing jackfruit (Table 7.24) 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 7.23.

An area of 169 ha (21%) is highly (Class S1) lands suitable for growing jackfruit and are distributed in the northern, eastern and western part of the microwatershed. An area of about 174 ha (22%) is moderately suitable (Class S2) and are distributed in the western, eastern and southern part of the microwatershed. They have minor limitations of gravelliness and rooting condition. Marginally suitable (Class S3) lands cover a maximum area of 384 ha (49%) and are distributed in the major part of the microwatershed. They have moderate limitations of gravelliness, texture, rooting condition and calcareousness. An area of 13 ha (2%) is currently not suitable (Class N1) for growing jackfruit and occur in the soutehrn part of the microwatershed with severe limitation of rooting condition.

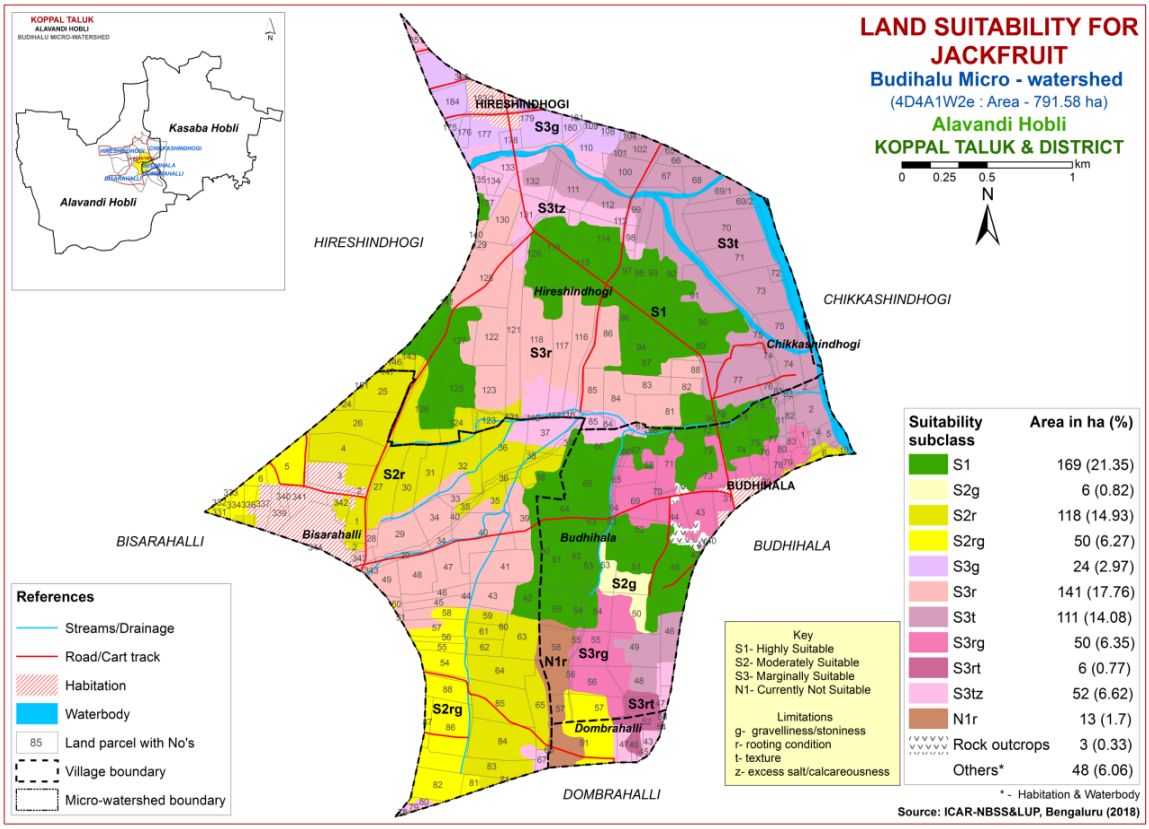


Fig. 7.23 Land Suitability map of Jackfruit

7.24 Land Suitability for Jamun (*Syzygium cumini*)

Jamun is an important fruit crop grown in almost all the districts of the State. The crop requirements for growing jamun (Table 7.25) 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 7.24.

An area of 126 ha (16%) is highly suitable (Class S1) lands for growing jamun and are distributed in the northern, eastern and western part of the microwatershed. An area of 321 ha (41%) is moderately suitable (Class S2) and occur in the major part of the microwatershed. They have minor limitations of gravelliness, rooting condition, texture and calcareousness. Marginally suitable (Class S3) lands cover an area of 281 ha (35%) and are distributed in the northern, central, eastern and western part of the microwatershed with moderate limitations of rooting condition, texture, calcareousness and gravelliness. An area of 13 ha (2%) is currently not suitable (Class N1) for growing jamun and are distributed in the southern part of the microwatershed with severe limitation of rooting condition.

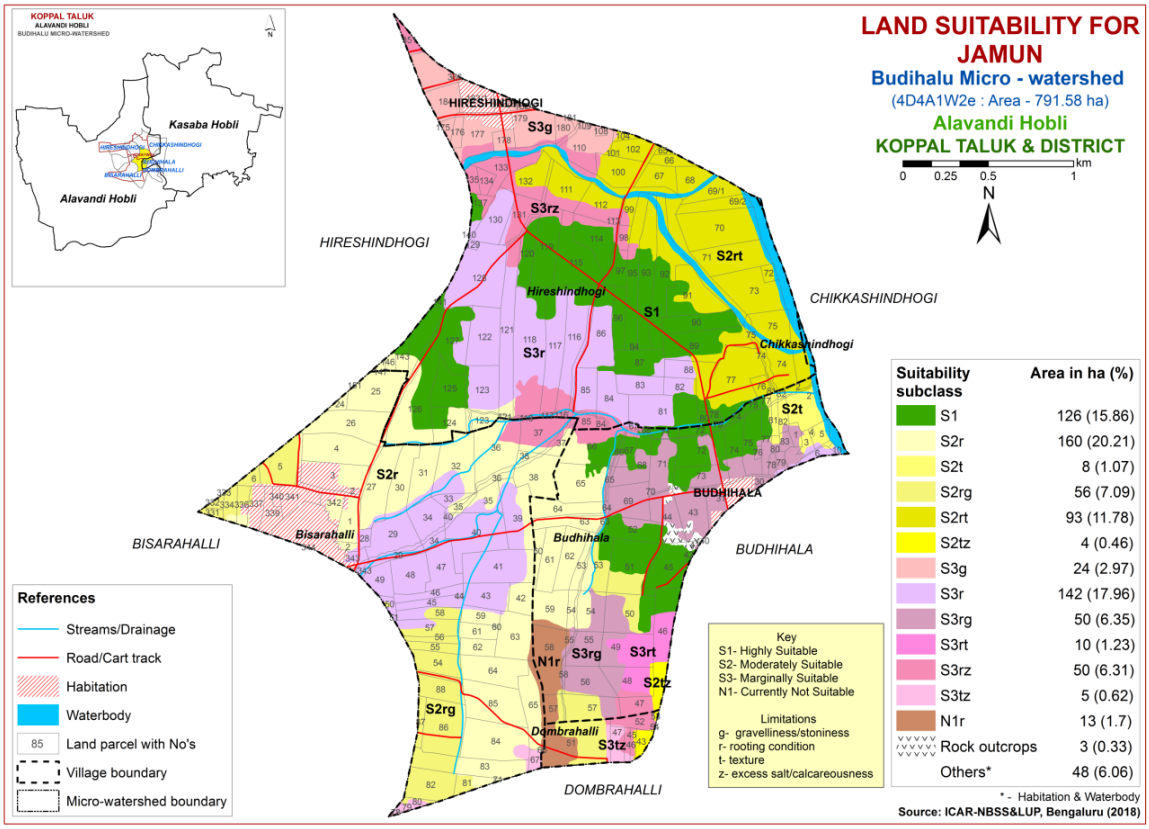


Fig. 7.24 Land Suitability map of Jamun

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

Custard apple is one of the most important fruit crop grown in almost all the districts of the State. The crop requirements for growing custard apple (Table 7.26) 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 7.25.

Maximum area of 445 ha (56%) is highly (Class S1) suitable for growing custard apple and are distributed in the major part of the microwatershed. An area of 284 ha (36%) is moderately suitable (Class S2) and are distributed in the northern, central, eastern, southern and western part of the microwatershed. They have minor limitations of gravelliness, rooting condition and calcareousness. An area of 13 ha (2%) is marginally suitable (Class S3) for growing custard apple and are distributed in the southern part of the microwatershed with moderate limitation s of rooting condition and gravelliness.

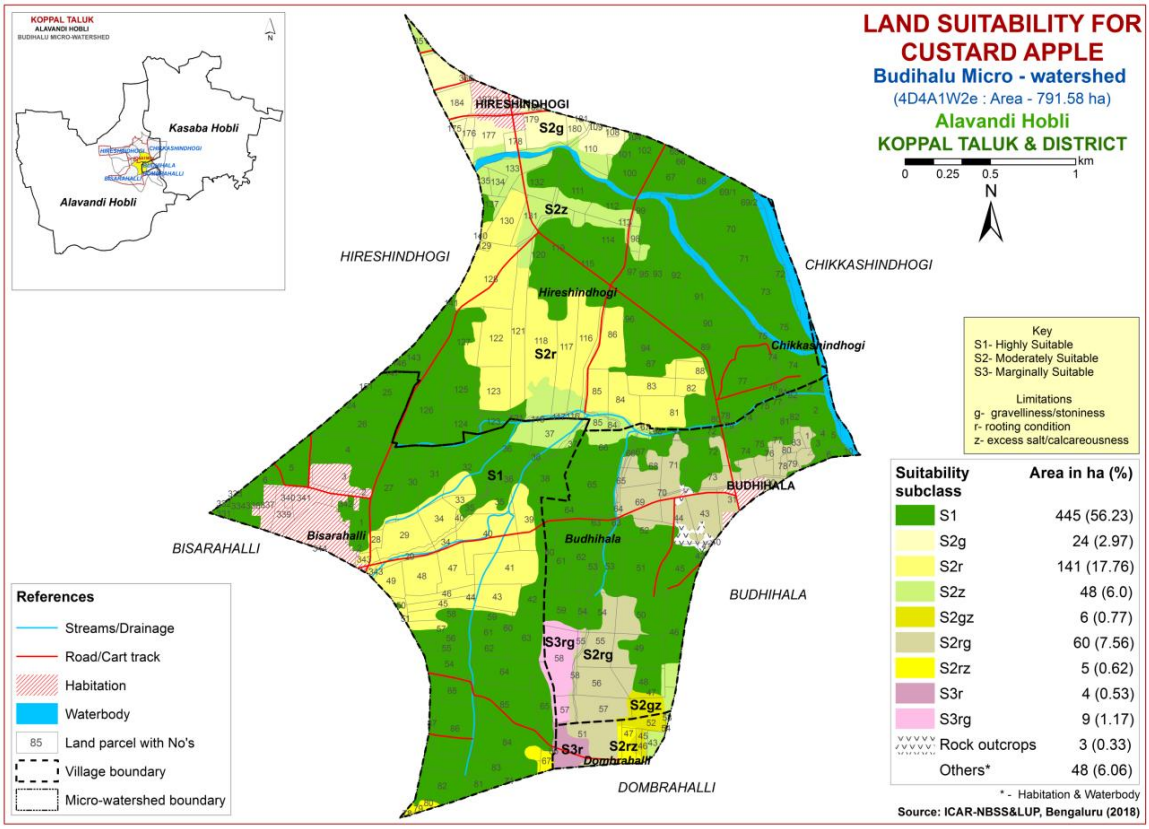


Fig. 7.25 Land Suitability map of Custard Apple

7.26 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 for growing tamarind (Table 7.27) 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 7.26.

An area of 126 ha (16%) is highly (Class S1) suitable lands for growing tamarind and are distributed in the northern, eastern and western part of the microwatershed. An area of 154 ha (20%) is moderately suitable (Class S2) and are distributed in the northern, eastern part of the microwatershed. They have minor limitations of texture, gravelliness, rooting condition and calcareousness. Maximum area of 251 ha (32%) is marginally suitable (Class S3) and occur in the major part of the microwatershed with moderate limitations of gravelliness, calcareousness and rooting condition. An area of 210 ha (26%) is currently not suitable (Class N1) and are distributed in the western, central, eastern and southern part of the microwatershed with severe limitations of rooting condition, calcareousness and gravelliness.

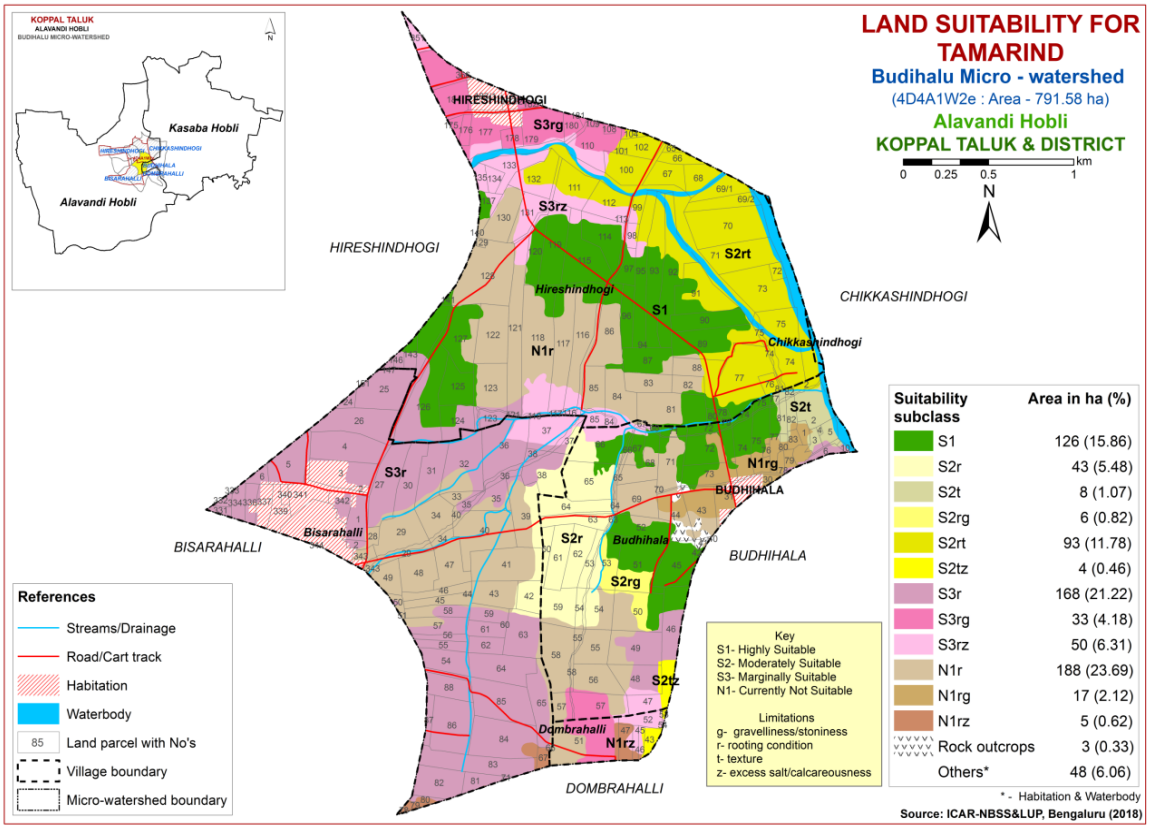


Fig. 7.26 Land Suitability map of Tamarind

7.27 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 7.28) 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 7.27.

An area of 149 ha (19%) is highly suitable (Class S1) for growing mulberry and are distributed in the western, central, northern and eastern part of the microwatershed. Moderately suitable (Class S2) lands occupy an area of 365 ha (46%) and are distributed in the major part of the microwatershed. They have minor limitations of calcareousness, gravelliness, rooting condition, drainage and texture. Marginally suitable (Class S3) lands cover an area of 214 ha (27%) and are distributed in the western, southern, central and eastern part of the microwatershed. They have moderate limitations of rooting condition, texture, gravelliness and calcareousness. An area of 13 ha (2%) is currently not suitable (Class N1) and are distributed in the southern part of the microwatershed with severe limitation of rooting depth.

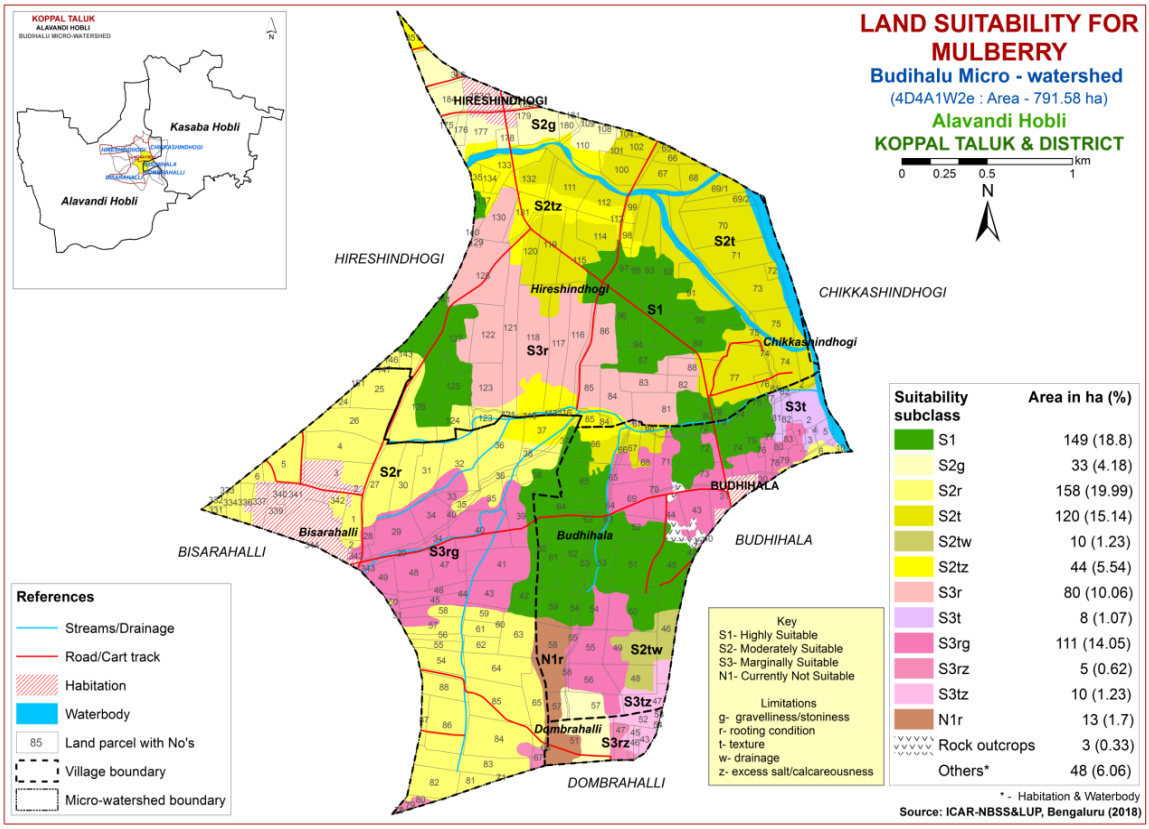


Fig. 7.27 Land Suitability map of Mulberry

7.28 Land Suitability for Marigold (*Tagetes erecta*)

Marigold is one of the most important flower crop grown in an area of 1858 ha in almost all the districts of the State. The crop requirements for growing marigold (Table 7.29) 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 7.28.

An area of 144 ha (18%) is highly suitable (Class S1) lands for growing marigold and are distributed in the northern, eastern, central and western part of the microwatershed. Maximum area of 527 ha (66%) is moderately suitable (Class S2) and are distributed in the major part of the microwatershed. They have minor limitations of texture, gravelliness, rooting condition, drainage and calcareousness. An area of 71 ha (9%) is marginally suitable (Class S3) for growing marigold and are distributed in the eastern, southern and northern part of the microwatershed. They have moderate limitations of gravelliness and rooting condition.

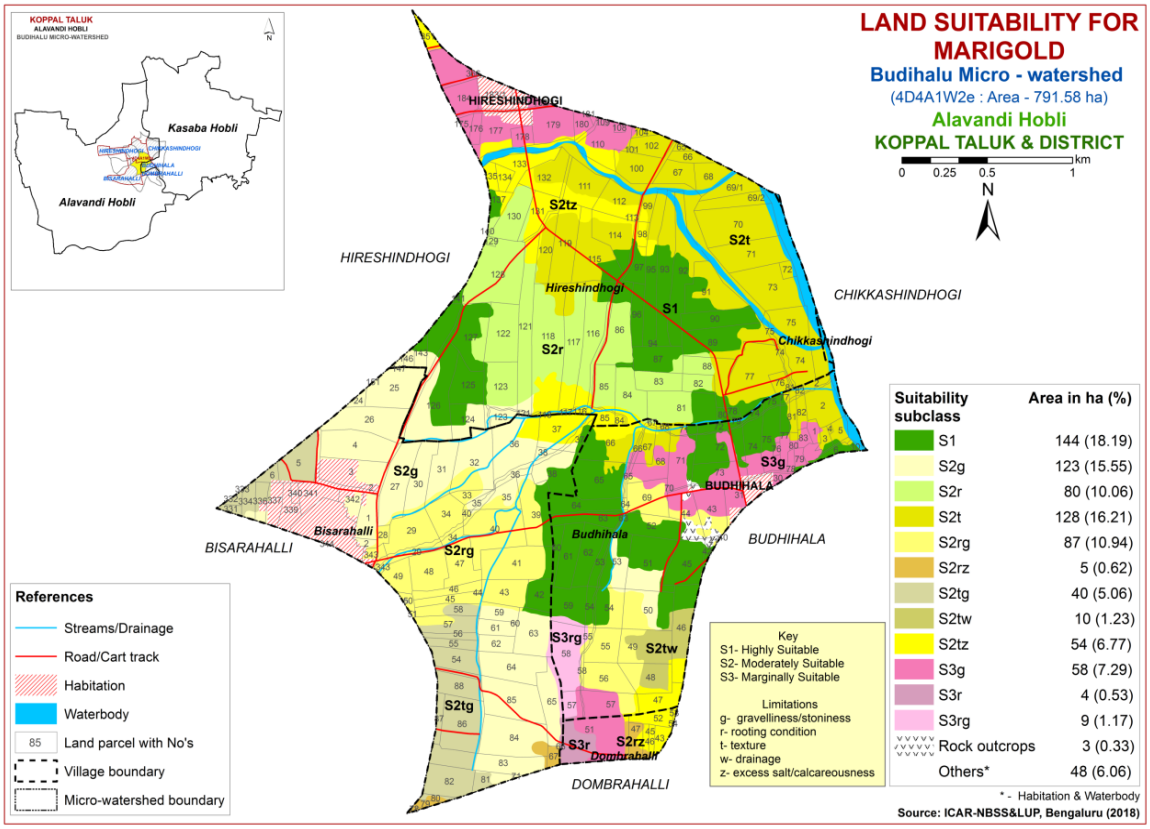


Fig. 7.28 Land Suitability map of Marigold

7.29 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 for growing chrysanthemum (Table 7.30) 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 7.29.

An area of 144 ha (18%) is highly suitable (Class S1) lands for growing chrysanthemum and are distributed in the northern, eastern, central and western part of the microwatershed. Maximum area of 527 ha (66%) is moderately suitable (Class S2) for growing chrysanthemum and are distributed in the major part of the microwatershed. They have minor limitations of calcareousness, gravelliness, drainage, rooting condition and texture. An area of 71 ha (9%) is marginally suitable (Class S3) for growing chrysanthemum and occur in the northern, eastern and southern part of the microwatershed. They have moderate limitations of gravelliness and rooting condition.

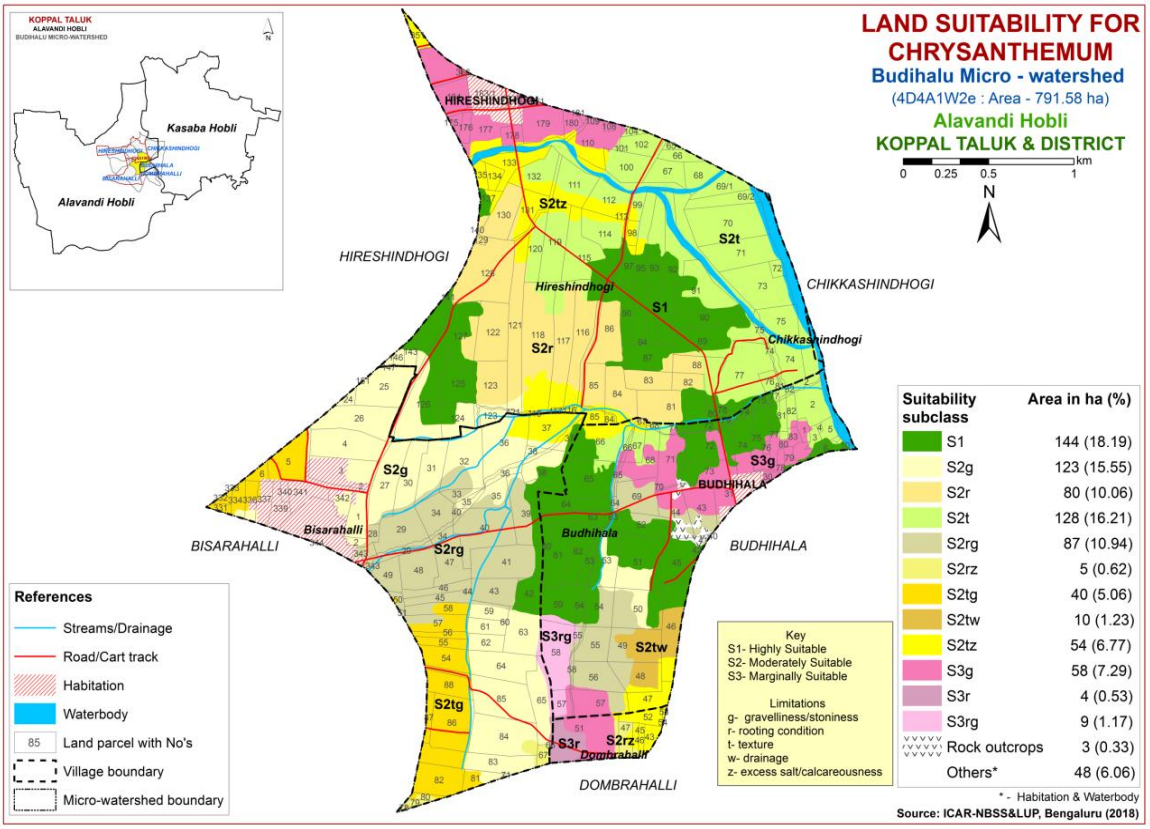


Fig. 7.29 Land Suitability map of Chrysanthemum

7. 30 Land Suitability for Jasmine *(Jasminum sp.)*

Jasmine is one of the most important flower crop grown in an area of 6146 ha in almost all the districts of the State. The crop requirements (Table 7.31) 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 7.30.

An area of 144 ha (18%) is highly suitable lands (Class S1) for growing jasmine and are distributed in the northern, eastern, central and western part of the microwatershed. Maximum area of 362 ha (46%) is moderately suitable (Class S2) for growing jasmine and occur in the major part of the microwatershed. They have minor limitations of rooting condition, calcareousness, texture and gravelliness. An area of 237 ha (30%) is marginally suitable (Class S3) for growing jasmine and are distributed in the northern, eastern, southern and central part of the microwatershed. They have moderate limitations of gravelliness, rooting condition, texture, drainage and calcareousness.

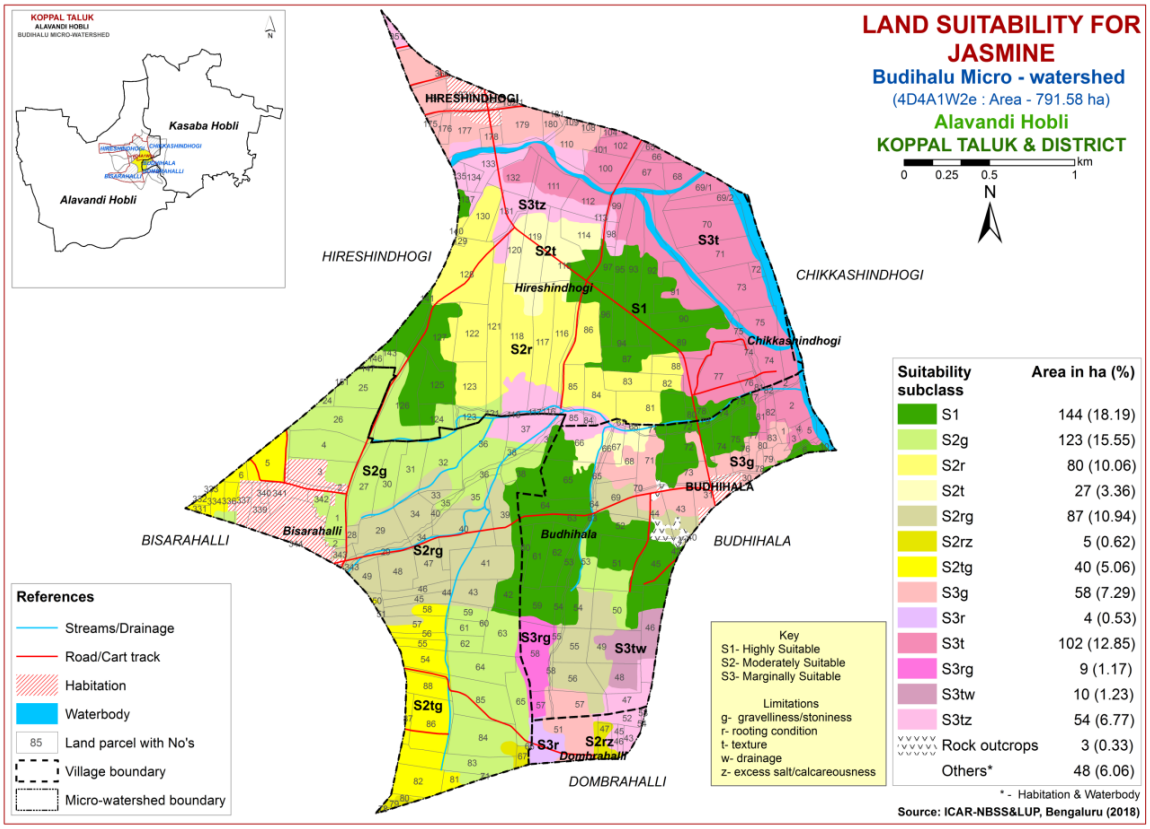


Fig. 7.30 Land Suitability map of Jasmine

7. 31 Land Suitability for Crossandra *(Crossandra in fundibuliformis)*

Crossandra is one of the most important flower crop grown in an area of 6146 ha in almost all the districts of the State. The crop requirements (Table 7.32) 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 7.31.

An area of 171 ha (22%) is highly suitable lands (Class S1) for growing crossandra and are distributed in the central, eastern, northern and western part of the microwatershed. Maximum area of 476 ha (60%) is moderately suitable (Class S2) for growing crossandra and occur in the major part of the microwatershed. They have minor limitations of texture, calcareousness, rooting condition and gravelliness. An area of 96 ha (12%) is marginally suitable (Class S3) for growing jasmine and are distributed in the northern, eastern, southern part of the microwatershed. They have moderate limitations of gravelliness, rooting condition, texture and calcareousness.

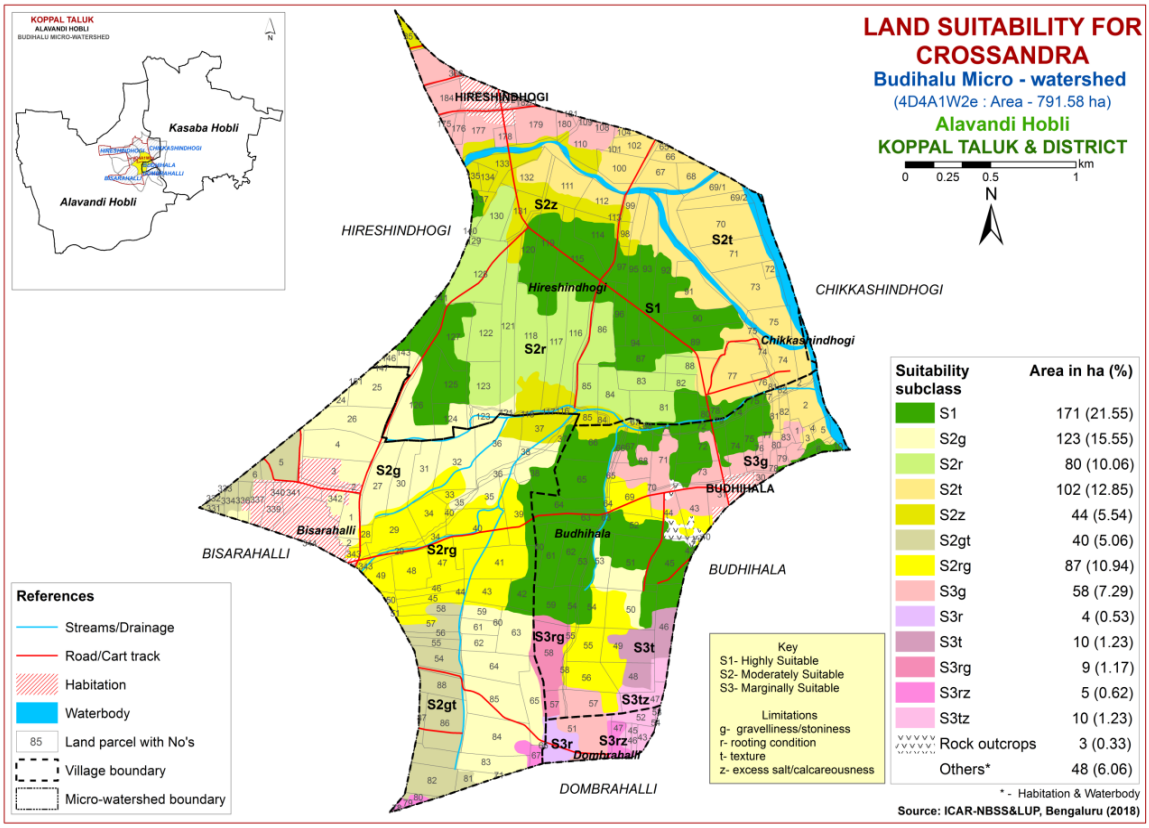


Fig. 7.31 Land Suitability map of Crossandra

Table 7.1 Soil-Site Characteristics of Budihalu Microwatershed

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								
CSRiB2	662	90	WD	25-50	sc	scl	-	<15	50-100	1-3	Moderate	-	-	-	-	-
ABRbB2g2	662	90	WD	25-50	ls	gsc	35-60	>35	<50	1-3	Moderate	6.13	0.02	0.36	3.60	58.76
MKHcB2g2	662	90	WD	50-75	sl	gsc	35-60	>35	50-100	1-3	Moderate	7.38	0.09	1.49	14.84	93
MKHhB2g1	662	90	WD	50-75	scl	gsc	15-35	>35	50-100	1-3	Moderate	7.38	0.09	1.49	14.84	93
MKHiB2g1	662	90	WD	50-75	sc	gsc	15-35	>35	50-100	1-3	Moderate	7.38	0.09	1.49	14.84	93
LKRiB2	662	90	WD	50-75	sc	gsc	-	40-60	50-100	1-3	Moderate	8.18	0.30	4.51	12.19	100
LKRiB2g1	662	90	WD	50-75	sc	gsc	15-35	40-60	50-100	1-3	Moderate	8.18	0.30	4.51	12.19	100
TDHcB1	662	90	WD	50-75	sl	sc-c	-	<15	100-150	1-3	Slight	9.19	0.18	5.82	3.57	100
KTPiB1g1	662	90	WD	50-75	sc	gsc	15-35	15-35	101-150	1-3	Slight	6.42	0.07	0.05	4.41	100
HDHiB2g1	662	90	WD	75-100	sc	gsc-gc	15-35	>35	50-100	1-3	Moderate	6.54	0.07	7.11	5.84	84.07
GHThB2g1	662	90	WD	75-100	sl	gscl	15-35	15-35	100-150	1-3	Moderate	5.70	0.06	4.10	3.17	73
GHTiB1	662	90	WD	75-100	sc	gscl	-	15-35	100-150	1-3	Slight	5.70	0.06	4.10	3.17	73
BSRcB1	662	90	WD	75-100	sl	gsc	-	15-35	50-100	1-3	Slight	6.59	0.12	6.0	8.80	77.55
BSRiB1g1	662	90	WD	75-100	sc	gsc	15-35	15-35	50-100	1-3	Slight	6.59	0.12	6.0	8.80	77.55
GDPiB2	662	90	WD	100-150	sc	gsc-gc	-	35-60	51-100	1-3	Moderate	7.88	0.10	2.87	7.8	97
BPRhB1	662	90	WD	100-150	scl	gsc-gc	-	>35	100-150	1-3	Slight	6.64	0.03	0.51	5.45	63.48
BPRiB2	662	90	WD	100-150	sc	gsc-gc	-	>35	100-150	1-3	Moderate	6.64	0.03	0.51	5.45	63.48
KMHcB2	662	90	WD	100-150	sl	sc	-	<15	150-200	1-3	Moderate	7.2	0.19	0.54	15.07	100

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								
KMHiB2g1	662	90	WD	100-150	sc	sc	15-35	<15	150-200	1-3	Moderate	7.2	0.19	0.54	15.07	100
RTRcB2	662	90	WD	>150	sl	c	-	-	150-200	1-3	Moderate	5.08	0.03	2.06	9.21	50.50
RTRhA1	662	90	WD	>150	scl	c	-	-	150-200	0-1	Slight	5.08	0.03	2.06	9.21	50.50
RTRiB2	662	90	WD	>150	sc	c	-	-	150-200	1-3	Moderate	5.08	0.03	2.06	9.21	50.50
HLKhB2	662	90	WD	<150	scl	c	-	<15	150-200	1-3	Moderate	-	-	-	-	-
HLKiB1	662	90	WD	>150	sc	c	-	<15	150-200	1-3	Slight	-	-	-	-	-
RNKiA1	662	90	MWD	50-75	sc	c	-	<15	51-100	0-1	Slight	8.86	0.48	6.78	37	-
RNKmB2	662	90	MWD	50-75	c	c	-	<15	51-100	1-3	Moderate	8.86	0.48	6.78	37	-
NSPmB2	662	90	MWD	75-100	c	c	-	-	101-150	1-3	Moderate	9.16	0.61	8.60	51.09	-
DRLmB1	662	90	MWD	75-100	c	c	-	<15	151-200	1-3	Slight	8.78	0.42	5.62	49.70	100
DRLmB2	662	90	MWD	75-100	c	c	-	<15	151-200	1-3	Moderate	8.78	0.42	5.62	49.70	100
BWTmB1	662	90	MWD	75-100	c	gsc-gc	-	>35	51-100	1-3	Slight	-	-	-	-	-
LGDmB1	662	90	WD	100-150	c	c	-	<15	150-200	1-3	Slight	8.03	1.93	32.37	1.82	100
HDLmB1	662	90	MWD	100-150	c	c	-	-	>200	1-3	Slight	9.06	0.37	5.09	62.63	-
BDRmB2	662	90	MWD	>150	c	c	-	<15	>200	1-3	Moderate	8.73	0.20	4.37	40.56	-

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

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 regime1	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+)/K g				
	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 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 7.8 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 7.9 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/excessively 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 7.10 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 Brinjal

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	Well drained	Moderately well drained	Poorly drained	V. Poorly drained
	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				
	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	7.3-8.4 5.0-6.0	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
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 7.13 Land suitability criteria for Onion

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	20-30	30-35	35-40	>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 /imperfectly	-	Poorly to 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 7.3-7.8	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	15-35	35-60	60-80
Soil toxicity	Salinity (EC saturation extract)	ds/m	<1.0	1.0-2.0	2.0-4.0	<4
	Sodicity (ESP)	%	<5	5-10	10-15	>15
Erosion hazard	Slope	%	<3	3-5	5-10	>10

Table 7.14 Land suitability criteria for Bhendi

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	Imperfectly drained	Poorly to very poorly drained
	Water logging in growing season	Days				
Nutrient availability	Texture	Class	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)	%	<5	5-10	10-15	>15
Erosion hazard	Slope	%	<3	3-5	5-10	>10

Table 7.15 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 7.16 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 7.17 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 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 7.19 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 7.20 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 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 7.23 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 7.24 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 7.25 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 7.26 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 7.27 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 7.28 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 7.29 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 7.30 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 7.31 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

7.32 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

7.32 Land Management Units (LMUs)

The 33 soil map units identified in Budihalu Microwatershed have been grouped into 9 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 Units map (Fig. 7.32) 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 nine Land Management Units along with brief description of soil and site characteristics are given below.

LMU	Soil map unit number	Mapping unit	Soil and site characteristics
1	433,380, 393, 348, 350, 362	BDRmB2, HDLmB1, LGDmB1, DRLmB1, DRLmB2, NSPmB2	Moderately deep to very deep, black calcareous to non calcareous clay soils
2	367	BWTmB1	Moderately deep black gravelly calcareous sandy clay to clay soils
3	270, 273, 285, 286, 288, 197, 202,159, 165, 142,144	HLKhB2, HLKiB1, RTRcB2, RTRhA1, RTRiB2, KMHcB2, KMHiB2g1, BSRcB1, BSRiB1g1, GHThB2g1, GHTiB1	Moderately deep to very deep, red sandy clay loam to clay soils
4	228, 239, 269,128	BPRhB1, BPRiB2, GDPiB2, HDHiB2g1	Moderately deep to deep, red gravelly sandy clay to clay soils
5	74,55	KTPiB1g1, TDHcB1	Moderately shallow, red sandy clay to sandy clay loam soils
6	329, 336	RNKiA1, RNKmB2	Moderately shallow, black calcareous clay soils
7	53, 54,78, 85, 90	LKRiB2, LKRiB2g1, MKHcB2g2, MKHhB2g1, MKHiB2g1	Moderately shallow, red gravelly sandy clay to sandy clay loam soils
8	39	CSRiB2	Shallow, red loamy soils
9	470	ABRbB2g2	Shallow, red gravelly sandy clay to clay soils

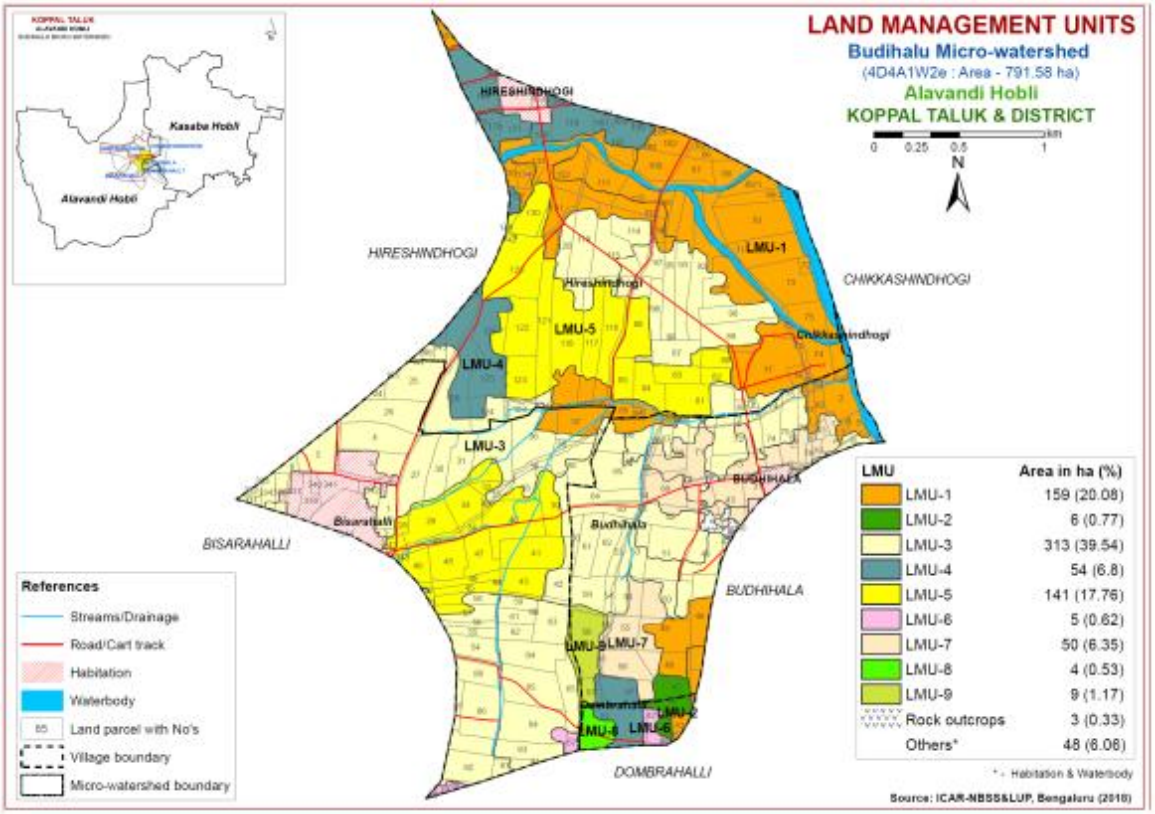


Fig 7.32 Land Management Units map of Budihalu Microwatershed

7.33 Proposed Crop Plan for Budihalu Microwatershed

After assessing the land suitability for the 31 crops, the proposed crop plan has been prepared for the 9 identified LMUs by considering only the highly (Class S1) and moderately (Class S2) suitable lands for each of the 31 crops. The resultant proposed crop plan is presented in Table 7.33.

Table 7.33 Proposed Crop Plan for Budihalu Microwatershed

LMU	Soil Map Units	Survey Number	Soil characters	Field Crops	Horticulture Crops	Suitable Interventions
LMU 1 159 ha (20%)	433.BDRmB2 380.HDLmB1 393.LGDmB1 348.DRLmB1 350.DRLmB2 362.NSPmB2	**Bisarahalli :** 37 **Budhihala :** 2,3,4, 5,46,48,49,81,82 **Dombrahalli :** 43,53 **Hireshindhogi:**65,66,67,68, 69/1,69/2,70,71,72,73,74,75, 76,77,88,91,98,99,100,101,1 02,104,111,112,113,131,132 ,133,134,135, 351	Moderately deep to very deep, black calcareous to non calcareous clay soils	Maize, Sorghum, Sunflower, Cotton, Bengal gram, Safflower, Linseed, Bajra , Soybean	**Fruit crops:** Sapota, Pomegranate, Jamun, Lime, Musambi, Tamarind, Amla, Custard apple **Vegetables:** Drumstick, Chilli, Coriander, Tomato, Bhendi **Flowers:** Marigold, Jasmine Chrysanthemum, Crossandra,	Application of FYM, Biofertilizers and micronutrients, drip irrigation, mulching, suitable soil and water conservation practices
LMU 2 6 ha (1%)	367.BWTmB1	**Budhihala :** 47 **Dombrahalli:**45,46,52,54	Moderately deep black gravelly calcareous sandy clay to clay soils	Sorghum, Sunflower, Bajra, , Cotton, Red gram, Bengalgram,	**Fruit crops:** Lime, Musambi, Sapota, Pomegranate, Amla, Custard apple, **Flower crops**: Marigold, Chrysanthemum **Vegetables:** Bhendi, Brinjal Drumstick	Application of FYM, Biofertilizers and micronutrients, drip irrigation, mulching, suitable soil and water conservation practices
LMU 3 313 ha (40%)	270.HLKhB2 273.HLKiB1 285.RTRcB2 286.RTRhA1 288.RTRiB2 197.KMHcB2 202.KMHiB2g1 159.BSRcB1 165.BSRiB1g1 142.GHThB2g1 144.GHTiB1	**Bisarahalli:**1,2,24,25,26,27, 30,31,32,35,36,38,4,42,5,54, 55,56,57,58,59,6,60,61,62,6 3,64,65,71,81,82,83,84,85,8 6,87,88,331,332,333,334,33 6, 342, **Budhihala:**6,10,42,45,51,52 ,53,54,59,60,61,62,63,64,65, 66,67,72,73,74,75,77 **Hireshindhogi:**78,79,80,87, 89,90,92,93,94,95,96,97,114 ,115,119,120,124,126,143,1 46,147,151	Moderately deep to very deep, red sandy clay loam to clay soils	Maize, Sorghum, Sunflower, Bajra, Finger millet, Groundnut, Red gram, Cowpea, Field bean, Castor, Mulberry	**Fruit crops:** Mango, Pomegranate, Guava, Sapota, Jackfruit, Tamarind, Lime, Musambi, Amla, Custard apple **Vegetable crops:** Drumstick, Tomato, Bhendi, Chilli, Brinjal, Onion, Curry leaves **Flower crops:** Marigold, Chrysanthemum, Jasmine, Crossandra	Drip irrigation, mulching, suitable soil and water conservation practices (Crescent Bunding with Catch Pit etc)
LMU 4 54 ha (7%)	228.BPRhB1 239.BPRiB2 269.GDPiB2	**Budhihala:** 57 **Dombrahalli :** 51 **Hireshindhogi:**108,109,110	Moderately deep to deep, red gravelly	Groundnut, Bajra, Horse gram, Castor,	**Fruit crops:** Musambi, Lime, Jamun, Jackfruit Amla, Custard apple, Tamarind	Drip irrigation, mulching, suitable soil and water

LMU	Soil Map Units	Survey Number	Soil characters	Field Crops	Horticulture Crops	Suitable Interventions
	128.HDHiB2g1	,125,127,137,141,175,176,177,178,179,180,181,182/1,184,366	sandy clay to clay soils	Mulberry	**Vegetable crops:** Drumstick, Curry leaves	conservation practices (Crescent Bunding with Catch Pit etc)
LMU 5 141 ha (18%)	74.KTPiB1g1 55.TDHcB1	**Bisarahalli:**28,29,33,34,343,39,40,41,43,44,45,46,47,48,49,50,51 **Hireshindhogi:**81,82,83,84,85,86,116,117,118,121,122,123,128,129,130,140	Moderately shallow, red sandy clay to sandy clay loam soils	Sorghum, Groundnut, Bajra, Green gram, Black gram, Cowpea, Horse gram, Castor,	**Fruit crops:** Lime, Musambi, Amla, Custard apple, Cashew **Flower crops:** Marigold, Chrysanthemum, Crossandra, Jasmine	Drip irrigation, Mulching, suitable soil and water conservation practises (Crescent Bunding with Catch Pit etc)
LMU 6 5 ha (1%)	329.RNKiA1 336.RNKmB2	**Bisarahalli:**67,78,79,80 **Dombrahalli:**47	Moderately shallow, black calcareous clay soils	Sorghum, Bajra, Bengal gram, linseed, Safflower, Coriander	**Fruit crops:** Amla, Custard apple **Flower crops:** Marigold, Jasmine Chrysanthemum	Application of FYM, Biofertilizers and micronutrients, drip irrigation, mulching, suitable soil and water conservation practices
LMU 7 50 ha (6%)	53.LKRiB2 54.LKRiB2g1 78.MKHcB2g2 85.MKHhB2g1 90.MKHiB2g1	**Budhihala:**1,30,39,43,44,50,55,56,68,69,70,71,76,78,79,80,83	Moderately shallow, red gravelly sandy clay to sandy clay loam soils	Groundnut, Bajra, Castor	**Fruit crops:** Lime, Musambi, Amla, Cashew, Custard apple,	Drip irrigation, mulching, suitable soil and water conservation practices (Crescent Bunding with Catch Pit etc)
LMU 8 4 ha (1%)	39.CSRiB2	**Bisarahalli :** 66	Shallow, red loamy soils	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
LMU 9 9 ha (1%)	470.ABRbB2g2	**Budhihala :** 58	Shallow, red gravelly sandy clay to clay soils	Horse gram	**Agri-Silvi-Pasture:** Custard apple, Hybrid Napier, *Styloxanthes hamata*, Glyricidia, *Styloxanthes scabra*	Use of short duration varieties, sowing across the slope and split application of nitrogen fertilizers

Chapter 8

SOIL HEALTH MANAGEMENT

8.1 Soil Health

Soil health is basic to plant health and plant health is basic to human and bovine 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 characteristics 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 Budihalu Microwatershed

- The soil phases with sizeable area identified in the microwatershed belonged to the soil series of Gollarahatti (GHT) 117 (15%), Handrala (HDL) 93 ha (12%), Thammadahalli (TDH) 80 ha (10%), Kethanapura (KTP) 61 ha (8%), Ranatur (RTR) 57 ha (7%), Kumchahalli (KMH) 49 ha (6%), Hallikere (HLK) 48 ha (6%), Dambarahalli (DRL) 44 ha (6%), Bisarahalli (BSR) 42 ha (5%), Mukhadahalli (MKH) 34 ha (4%), Balapur (BPR) 23 ha (3%), Giddadapalya (GDP) 21 ha (3%), Lakkur (LKR) 17 ha (2%), Hooradhahalli (HDH) 10 ha (2%), Narasapura (NSP) 10 ha (1%), Abbigere (ABR) 9 ha (1%), Bardur (BDR) 8 ha (1%), Bedwatti (BWT) 6 ha

(1%), Ravanaki (RNK) 5 ha (1%), Chikkasavanur 4 ha (1%) and Lakshmangudda (LGD) occupy minor area of about 4 ha (<1%) in the microwatershed.

- ❖ As per land capability classification, entire area in the microwatershed falls under arable land category (Class II & III). The major limitations identified in the arable lands were soil and erosion.
- ❖ On the basis of soil reaction, an area of 11 ha (1%) is slightly acid (pH 6.0-6.5), 215 ha (27%) is neutral (pH 6.5-7.3),95 ha (12%) is slightly alkaline (pH 7.3-7.8), 243 ha (31%) is moderately alkaline (pH 7.8-8.4), 140 ha (18%) is strongly alkaline (pH 8.4-9.0) and about 37 ha (5%) is very strongly alkaline (pH >9.0) in the microwatershed. Entire area in the microwatershed is slightly acid to very strongly alkaline 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 acid soils cover an area of 11 ha.

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

Liming materials:

1. $CaCO_3$ (Calcium Carbonate). More than 90% use in India.
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.

Alkaline soils

Moderately to very strongly alkaline soils cover an entire cultivated area of 515 ha.

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

Neutral soils

Neutral soils cover about 215 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.

Soil Degradation

Soil erosion is one of the major factor affecting the soil health in the microwatershed. Out of total 792 ha area in the microwatershed, an area of about 463 ha (58%) is suffering from slight erosion and 278 ha (35%) is suffering from moderate erosion. The areas suffering from moderate erosion 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 (Saturation plan) 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 Honavalu-3 Microwatershed.
- **Organic Carbon:** The OC content (an index of available Nitrogen) is low (<0.5%) in 105 ha (13%), medium (0.5-0.75%) in 378 ha (48%) and 258 ha (33%) is high (>0.75%). The areas that are low and medium in OC needs to be further improved by applying farmyard manure and rotating crops with cereals and legumes or mixed cropping.
- **Promoting green manuring:** Growing of green manuring crops 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 483 ha area where OC is low and medium. For example, for rainfed maize, recommended level is 50 kg N per ha and an additional 12 kg /ha needs to be applied for all the crops grown in these plots.
- **Available Phosphorus:** An entire area of about 1 ha (<1%) is low (<23 kg/ha) and 740 ha (93%) is medium (23-57 kg/ha) in available phosphorus. Hence for all the crops, 25% additional P-needs to be applied where it is medium.
- **Available Potassium:** Available potassium is low (<145 kg/ha) in 0.1 ha (<1%), medium (145-337 kg/ha) in 453 ha (57%) and high (>337 kg/ha) in 288 (36%) in the microwatershed. Additional 25% potassium needs to be applied in areas where it is low and medium.
- **Available Sulphur:** Available sulphur is a very critical nutrient for oilseed crops. Available sulphur is low (<10 ppm) in 0.06 ha (<1%), 273 ha (34%) is medium (10-20 ppm) and high (>20 ppm) in 468 ha (59%) in the microwatershed.
- **Available Boron:** An area of about 368 ha (47%) is low (<0.5 ppm) and 370 ha (47%) is medium (0.5-1.0 ppm) in available boron content. The areas that are low and

medium need to be applied with sodium borate @ 10 kg/ha as soil application or 0.2% borax as foliar spray to correct the deficiency. It is high (>1.0 ppm) in an area of 3 ha (<1%) in the microwatershed.

- **Available Iron:** An area of 158 ha (20%) is deficient (<4.5 ppm) and 583 ha (74%) is sufficient (>4.5 ppm) in available iron in the microwatershed. To manage iron deficiency, iron sulphate@25 kg/ha needs to be applied for 2-3 years in the deficient areas.
- **Available Manganese:** Entire area in the microwatershed is sufficient (>1.0 ppm) in available manganese.
- **Available Copper:** Entire area is sufficient (>0.2 ppm) in available copper in the microwatershed.
- **Available Zinc:** Major area is deficient (<0.6 ppm) in an 574 ha (72%) and sufficient (>0.6 ppm) in 167 ha (21%) in the microwatershed. Application of zinc sulphate @ 25 kg/ha is to be followed in areas that are deficient in available zinc.
- **Soil Acidity:** The microwatershed has 11 ha (1%) area with soils that are slightly acid. These areas need application of lime (Calcium Carbonate).
- **Soil Alkalinity:** Maximum area of the microwatershed has 515 ha (65%) soils that are moderately 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.

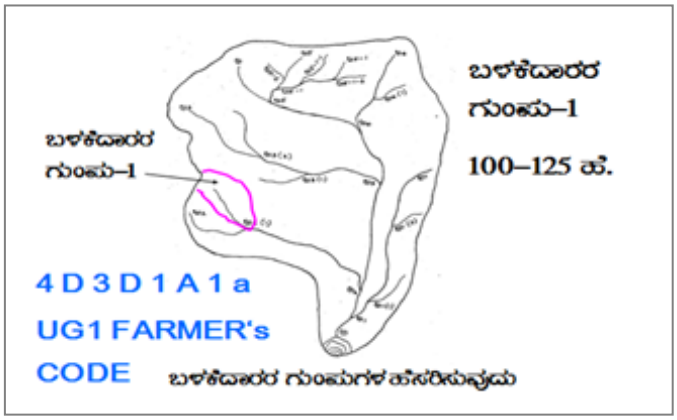
Land suitability for various crops: Areas that are highly, moderately and marginally suitable and not suitable for growing various crops are indicated. Along with the suitability, various constraints that are limiting the productivity are also indicated. For example, in case of cotton, gravel content, 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.

Chapter 9

SOIL AND WATER CONSERVATION TREATMENT PLAN

For preparing soil and water conservation treatment plan for Budihalu 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 to be collected.

Steps for Survey and Preparation of Treatment Plan

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

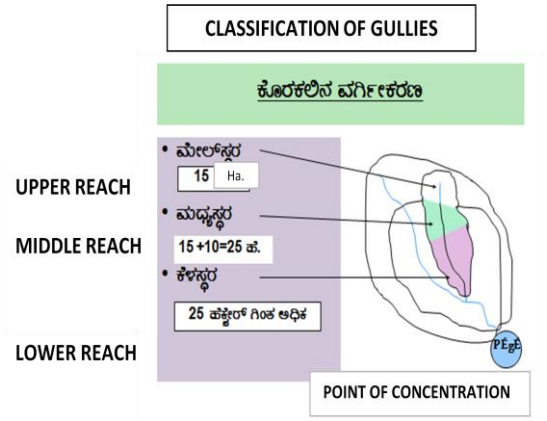
- Naming of user groups and farmers
- Identification of arable and non arable lands
- Identification of drainage lines and gullies
- Identification of non treatable areas
- Identification of priority areas in the arable lands
- Treatment plan for arable lands
- Location of water harvesting and recharge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

9.1 Treatment Plan

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

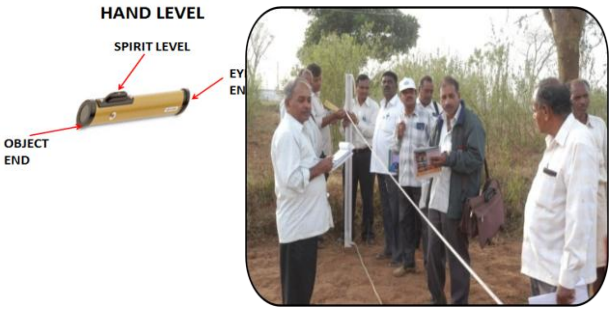
9.1.1 Arable Land Treatment

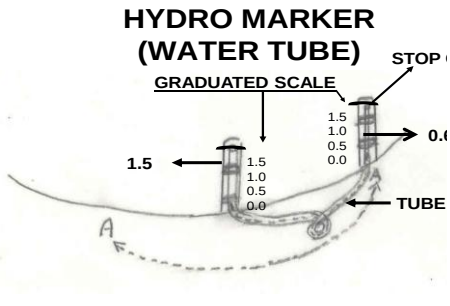
A. BUNDING

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

Measurement of Land Slope

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





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

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

Note: i) The above intervals are maximum.

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

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

Section of the Bund

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

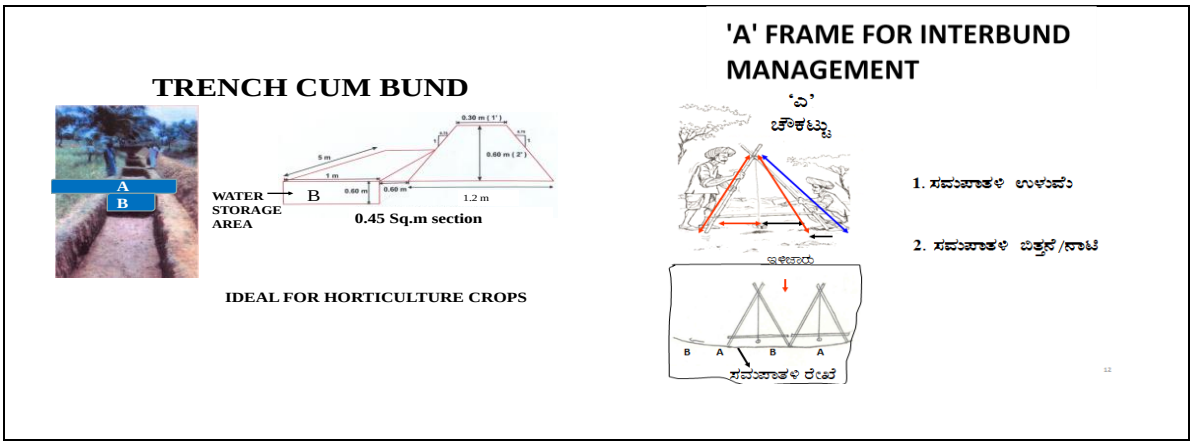
Recommended Bund Section

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

Formation of Trench cum Bund

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

Details of Borrow Pit dimensions are given below



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

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

B. Waterways

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

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

c) The design details are given in the Manual.

C. Farm Ponds

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

D. Diversion channel

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

9.1.2 Non-Arable Land Treatment

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

9.1.3 Treatment of Natural Water Course/ Drainage Lines

a) The cadastral map has to be updated as regards the network of drainage lines (gullies/ *nalas/hallas*) and existing structures are marked to the scale and storage capacity of the existing water bodies are documented.
b) The drainage line will be demarcated into Upper Reach, Middle Reach and Lower Reach.
c) Considering the Catchment, *Nala* bed and bank conditions, suitable structures are decided.
d) Number of storage structures (Check dam/ *Nala* bund/ Percolation tank) will be decided considering the commitments and available runoff in water budgeting and quality of water in the wells and site suitability.
e) Detailed 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. 9.1) showing soil and water conservation plan with different kinds of structures recommended has been prepared which shows the spatial distribution and extent of area. An area of about 167 ha (21%) area requires Graded Bunding, 533 ha (67%) requires Trench cum Bunding and 41 ha (5%) requires Strengthening of existing bunds in the microwatershed. The conservation plan prepared may be presented to all the stakeholders including farmers and after including their suggestions, the conservation plan for the microwatershed may be finalised in a participatory approach.

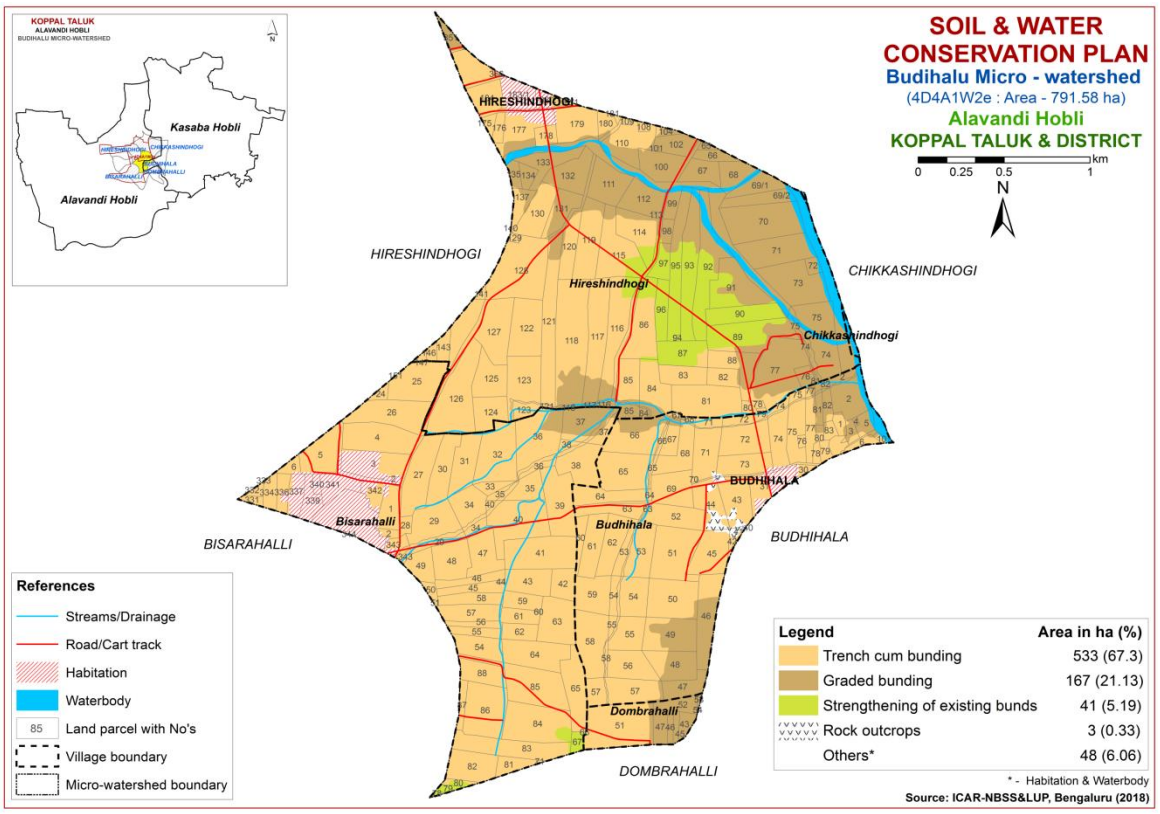


Fig. 9.1 Soil and Water Conservation Plan map of Budihalu Microwatershed

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

Budihalu-1 (1W2e) Microwatershed

Soil Phase Information

Village	Survey No	Area (ha)	Soil Phase	LMU	Soil Depth	Soil Gravelliness	Surface Soil Texture	Available Water Capacity	Slope	Soil Erosion	Current Land Use	Wells	Land Capability	Conservation Plan
Bisarahalli	1	3.06	GHTiB1	LMU-3	Moderately deep (75-100 cm)	Non gravelly (<15%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Habitation	Not Available	IIs	Trench cum bunding
Bisarahalli	2	0.88	GHTiB1	LMU-3	Moderately deep (75-100 cm)	Non gravelly (<15%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Habitation	Not Available	IIs	Trench cum bunding
Bisarahalli	3	5.44	Habitation	Others	Others	Others	Others	Others	Others	Others	Habitation	Not Available	Others	Others
Bisarahalli	4	6.77	GHTiB1	LMU-3	Moderately deep (75-100 cm)	Non gravelly (<15%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Trench cum bunding
Bisarahalli	5	4.78	BSRiB1g1	LMU-3	Moderately deep (75-100 cm)	Gravelly (15-35%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize+Current fallow (Mz+Cf)	Not Available	IIs	Trench cum bunding
Bisarahalli	6	0.96	BSRiB1g1	LMU-3	Moderately deep (75-100 cm)	Gravelly (15-35%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+Cotton+Fallow land (Sf+Ct+Fl)	Not Available	IIs	Trench cum bunding
Bisarahalli	24	0.66	GHTiB1	LMU-3	Moderately deep (75-100 cm)	Non gravelly (<15%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Trench cum bunding
Bisarahalli	25	6.42	GHTiB1	LMU-3	Moderately deep (75-100 cm)	Non gravelly (<15%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize+Chilli (Mz+Ch)	Not Available	IIs	Trench cum bunding
Bisarahalli	26	6.7	GHTiB1	LMU-3	Moderately deep (75-100 cm)	Non gravelly (<15%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize+Redgram (Mz+Rg)	2 Borewell	IIs	Trench cum bunding
Bisarahalli	27	6.53	GHTiB1	LMU-3	Moderately deep (75-100 cm)	Non gravelly (<15%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Trench cum bunding
Bisarahalli	28	0.77	KTPiB1g1	LMU-5	Moderately shallow (50-75 cm)	Gravelly (15-35%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Habitation	Not Available	IIs	Trench cum bunding
Bisarahalli	29	6.15	KTPiB1g1	LMU-5	Moderately shallow (50-75 cm)	Gravelly (15-35%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize+Redgram (Mz+Rg)	Not Available	IIs	Trench cum bunding
Bisarahalli	30	4.56	GHTiB1	LMU-3	Moderately deep (75-100 cm)	Non gravelly (<15%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize+Jowar (Mz+Jw)	Not Available	IIs	Trench cum bunding
Bisarahalli	31	4.55	GHTiB1	LMU-3	Moderately deep (75-100 cm)	Non gravelly (<15%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize+Chilli+Cotton (Mz+Ch+Ct)	3 Borewell	IIs	Trench cum bunding
Bisarahalli	32	7.44	GHTiB1	LMU-3	Moderately deep (75-100 cm)	Non gravelly (<15%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize+Bajra+Redgram (Mz+Bj+Rg)	1 Borewell	IIs	Trench cum bunding
Bisarahalli	33	1.1	KTPiB1g1	LMU-5	Moderately shallow (50-75 cm)	Gravelly (15-35%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Bajra (Bj)	Not Available	IIs	Trench cum bunding
Bisarahalli	34	4.29	KTPiB1g1	LMU-5	Moderately shallow (50-75 cm)	Gravelly (15-35%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Trench cum bunding
Bisarahalli	35	3.16	GHTiB1	LMU-3	Moderately deep (75-100 cm)	Non gravelly (<15%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Bajra (Bj)	1 Borewell	IIs	Trench cum bunding
Bisarahalli	36	8.27	GHTiB1	LMU-3	Moderately deep (75-100 cm)	Non gravelly (<15%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize+Bajra+Chilli (Mz+Bj+Ch)	3 Borewell	IIs	Trench cum bunding
Bisarahalli	37	5.43	DRLmB1	LMU-1	Moderately deep (75-100 cm)	Non gravelly (<15%)	Clay	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Slight	Maize+Fallow land (Mz+Fl)	2 Borewell	IIs	Graded bunding
Bisarahalli	38	5.3	GHTiB1	LMU-3	Moderately deep (75-100 cm)	Non gravelly (<15%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Redgram+Sunflower+Maize (Rg+Sf+Mz)	Not Available	IIs	Trench cum bunding
Bisarahalli	39	6.44	KTPiB1g1	LMU-5	Moderately shallow (50-75 cm)	Gravelly (15-35%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Chilli+Maize+Groundnut+Bajra (Ch+Mz+Gn+Bj)	2 Borewell	IIs	Trench cum bunding

Village	Survey No	Area (ha)	Soil Phase	LMU	Soil Depth	Soil Gravelliness	Surface Soil Texture	Available Water Capacity	Slope	Soil Erosion	Current Land Use	Wells	Land Capability	Conservation Plan
Bisarahalli	40	8.12	KTPiB1g1	LMU-5	Moderately shallow (50-75 cm)	Gravelly (15-35%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Bajra+Chilli+Sunflower (Bj+Ch+Sf)	Not Available	IIs	Trench cum bunding
Bisarahalli	41	7.81	KTPiB1g1	LMU-5	Moderately shallow (50-75 cm)	Gravelly (15-35%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Bajra+Maize (Bj+Mz)	3 Borewell	IIs	Trench cum bunding
Bisarahalli	42	2.5	KMHcB2	LMU-3	Deep (100-150 cm)	Non gravelly (<15%)	Sandy loam	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Maize (Ct+Mz)	1 Borewell	IIes	Trench cum bunding
Bisarahalli	43	3.92	KTPiB1g1	LMU-5	Moderately shallow (50-75 cm)	Gravelly (15-35%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Bajra (Bj)	1 Borewell	IIs	Trench cum bunding
Bisarahalli	44	0.1	KTPiB1g1	LMU-5	Moderately shallow (50-75 cm)	Gravelly (15-35%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Bajra (Bj)	Not Available	IIs	Trench cum bunding
Bisarahalli	45	2.06	KTPiB1g1	LMU-5	Moderately shallow (50-75 cm)	Gravelly (15-35%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Bajra (Bj)	Not Available	IIs	Trench cum bunding
Bisarahalli	46	1.92	KTPiB1g1	LMU-5	Moderately shallow (50-75 cm)	Gravelly (15-35%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize+Redgram (Mz+Rg)	Not Available	IIs	Trench cum bunding
Bisarahalli	47	4.33	KTPiB1g1	LMU-5	Moderately shallow (50-75 cm)	Gravelly (15-35%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Bajra+Maize (Bj+Mz)	Not Available	IIs	Trench cum bunding
Bisarahalli	48	4.56	KTPiB1g1	LMU-5	Moderately shallow (50-75 cm)	Gravelly (15-35%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Bajra+Maize (Bj+Mz)	1 Borewell	IIs	Trench cum bunding
Bisarahalli	49	2.55	KTPiB1g1	LMU-5	Moderately shallow (50-75 cm)	Gravelly (15-35%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize+Chilli (Mz+Ch)	1 Borewell	IIs	Trench cum bunding
Bisarahalli	50	0.63	KTPiB1g1	LMU-5	Moderately shallow (50-75 cm)	Gravelly (15-35%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Bajra+Redgram+Current fallow (Bj+Rg+Cf)	Not Available	IIs	Trench cum bunding
Bisarahalli	51	0.09	KTPiB1g1	LMU-5	Moderately shallow (50-75 cm)	Gravelly (15-35%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize+Redgram (Mz+Rg)	Not Available	IIs	Trench cum bunding
Bisarahalli	54	3.45	BSRiB1g1	LMU-3	Moderately deep (75-100 cm)	Gravelly (15-35%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Bajra+Chilli (Bj+Ch)	1 Borewell	IIs	Trench cum bunding
Bisarahalli	55	1.61	BSRiB1g1	LMU-3	Moderately deep (75-100 cm)	Gravelly (15-35%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Trench cum bunding
Bisarahalli	56	1.14	BSRiB1g1	LMU-3	Moderately deep (75-100 cm)	Gravelly (15-35%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Trench cum bunding
Bisarahalli	57	3.52	BSRiB1g1	LMU-3	Moderately deep (75-100 cm)	Gravelly (15-35%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Bengalgram+Maize (Bg+Mz)	1 Borewell	IIs	Trench cum bunding
Bisarahalli	58	2.51	BSRiB1g1	LMU-3	Moderately deep (75-100 cm)	Gravelly (15-35%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Bajra+Redgram (Bj+Rg)	1 Borewell	IIs	Trench cum bunding
Bisarahalli	59	2.15	GHThB2g1	LMU-3	Moderately deep (75-100 cm)	Gravelly (15-35%)	Sandy clay loam	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Bisarahalli	60	0.03	GHThB2g1	LMU-3	Moderately deep (75-100 cm)	Gravelly (15-35%)	Sandy clay loam	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Bisarahalli	61	1.93	GHThB2g1	LMU-3	Moderately deep (75-100 cm)	Gravelly (15-35%)	Sandy clay loam	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Bisarahalli	62	2.01	GHThB2g1	LMU-3	Moderately deep (75-100 cm)	Gravelly (15-35%)	Sandy clay loam	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut (Gn)	Not Available	IIes	Trench cum bunding
Bisarahalli	63	5.48	GHThB2g1	LMU-3	Moderately deep (75-100 cm)	Gravelly (15-35%)	Sandy clay loam	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Current fallow (Mz+Cf)	Not Available	IIes	Trench cum bunding
Bisarahalli	64	5.8	GHThB2g1	LMU-3	Moderately deep (75-100 cm)	Gravelly (15-35%)	Sandy clay loam	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Bajra (Bj)	Not Available	IIes	Trench cum bunding
Bisarahalli	65	5.25	GHThB2g1	LMU-3	Moderately deep (75-100 cm)	Gravelly (15-35%)	Sandy clay loam	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding

Village	Survey No	Area (ha)	Soil Phase	LMU	Soil Depth	Soil Gravelliness	Surface Soil Texture	Available Water Capacity	Slope	Soil Erosion	Current Land Use	Wells	Land Capability	Conservation Plan
Bisarahalli	66	0.03	CSRiB2	LMU-8	Shallow (25-50 cm)	Non gravelly (<15%)	Sandy clay	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Bajra (Bj)	Not Available	IIIes	Trench cum bunding
Bisarahalli	67	0.87	RNKiA1	LMU-6	Moderately shallow (50-75 cm)	Non gravelly (<15%)	Sandy clay	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Bajra (Bj)	Not Available	IIs	Graded bunding
Bisarahalli	71	0.09	GHThB2g1	LMU-3	Moderately deep (75-100 cm)	Gravelly (15-35%)	Sandy clay loam	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Bajra (Mz+Bj)	Not Available	IIes	Trench cum bunding
Bisarahalli	78	0.15	RNKiA1	LMU-6	Moderately shallow (50-75 cm)	Non gravelly (<15%)	Sandy clay	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Bajra+Maize (Bj+Mz)	Not Available	IIs	Graded bunding
Bisarahalli	79	0.5	RNKiA1	LMU-6	Moderately shallow (50-75 cm)	Non gravelly (<15%)	Sandy clay	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Bajra+Maize (Bj+Mz)	Not Available	IIs	Graded bunding
Bisarahalli	80	0.64	RNKiA1	LMU-6	Moderately shallow (50-75 cm)	Non gravelly (<15%)	Sandy clay	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Bajra (Bj)	Not Available	IIs	
Bisarahalli	81	1.77	BSRiB1g1	LMU-3	Moderately deep (75-100 cm)	Gravelly (15-35%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Bajra+Onion (Bj+On)	Not Available	IIs	Trench cum bunding
Bisarahalli	82	4.76	BSRiB1g1	LMU-3	Moderately deep (75-100 cm)	Gravelly (15-35%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize+Sugarcane (Mz+Sc)	2 Borewell	IIs	Trench cum bunding
Bisarahalli	83	6.76	GHThB2g1	LMU-3	Moderately deep (75-100 cm)	Gravelly (15-35%)	Sandy clay loam	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Sugarcane+Maize+Groundnut+Bajra (Sc+Mz+Gn+Bj)	Not Available	IIes	Trench cum bunding
Bisarahalli	84	8.25	GHThB2g1	LMU-3	Moderately deep (75-100 cm)	Gravelly (15-35%)	Sandy clay loam	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Bajra+Groundnut (Bj+Gn)	Not Available	IIes	Trench cum bunding
Bisarahalli	85	7.52	GHThB2g1	LMU-3	Moderately deep (75-100 cm)	Gravelly (15-35%)	Sandy clay loam	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Groundnut+Chilli (Mz+Gn+Ch)	2 Borewell	IIes	Trench cum bunding
Bisarahalli	86	7.27	BSRiB1g1	LMU-3	Moderately deep (75-100 cm)	Gravelly (15-35%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Bajra+Maize (Bj+Mz)	Not Available	IIs	Trench cum bunding
Bisarahalli	87	1.13	BSRiB1g1	LMU-3	Moderately deep (75-100 cm)	Gravelly (15-35%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize+Chilli (Mz+Ch)	Not Available	IIs	Trench cum bunding
Bisarahalli	88	3.28	BSRiB1g1	LMU-3	Moderately deep (75-100 cm)	Gravelly (15-35%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Bajra+Maize (Bj+Mz)	Not Available	IIs	Trench cum bunding
Bisarahalli	331	0.59	BSRiB1g1	LMU-3	Moderately deep (75-100 cm)	Gravelly (15-35%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Trench cum bunding
Bisarahalli	332	0.52	BSRiB1g1	LMU-3	Moderately deep (75-100 cm)	Gravelly (15-35%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize+Sunflower (Mz+Sf)	Not Available	IIs	Trench cum bunding
Bisarahalli	333	0	BSRiB1g1	LMU-3	Moderately deep (75-100 cm)	Gravelly (15-35%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize+Sunflower (Mz+Sf)	Not Available	IIs	Trench cum bunding
Bisarahalli	334	1.53	BSRiB1g1	LMU-3	Moderately deep (75-100 cm)	Gravelly (15-35%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Chilli+Sunflower (Ch+Sf)	Not Available	IIs	Trench cum bunding
Bisarahalli	336	1.56	BSRiB1g1	LMU-3	Moderately deep (75-100 cm)	Gravelly (15-35%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Not Available (NA)	Not Available	IIs	Trench cum bunding
Bisarahalli	337	2.1	Habitation	Others	Others	Others	Others	Others	Others	Others	Habitation	Not Available	Others	Others
Bisarahalli	339	2.18	Habitation	Others	Others	Others	Others	Others	Others	Others	Habitation	Not Available	Others	Others
Bisarahalli	340	0.53	Habitation	Others	Others	Others	Others	Others	Others	Others	Habitation	Not Available	Others	Others
Bisarahalli	341	2.64	Habitation	Others	Others	Others	Others	Others	Others	Others	Habitation	Not Available	Others	Others
Bisarahalli	342	1.78	GHTiB1	LMU-3	Moderately deep (75-100 cm)	Non gravelly (<15%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Habitation	Not Available	IIs	Trench cum bunding

Village	Survey No	Area (ha)	Soil Phase	LMU	Soil Depth	Soil Gravelliness	Surface Soil Texture	Available Water Capacity	Slope	Soil Erosion	Current Land Use	Wells	Land Capability	Conservation Plan
Bisarahalli	343	1.48	KTPiB1g1	LMU-5	Moderately shallow (50-75 cm)	Gravelly (15-35%)	Sandy clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Habitation	Not Available	IIs	Trench cum bunding
Bisarahalli	344	0.02	Habitation	Others	Others	Others	Others	Others	Others	Others	Habitation	Not Available	Others	Others
Budhihala	1	0.82	LKRiB2g1	LMU-7	Moderately shallow (50-75 cm)	Gravelly (15-35%)	Sandy clay	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Budhihala	2	4.71	BDRmB2	LMU-1	Very deep (>150 cm)	Non gravelly (<15%)	Clay	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Graded bunding
Budhihala	3	0.84	BDRmB2	LMU-1	Very deep (>150 cm)	Non gravelly (<15%)	Clay	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Graded bunding
Budhihala	4	0.14	BDRmB2	LMU-1	Very deep (>150 cm)	Non gravelly (<15%)	Clay	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Graded bunding
Budhihala	5	1.22	BDRmB2	LMU-1	Very deep (>150 cm)	Non gravelly (<15%)	Clay	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Graded bunding
Budhihala	6	0.86	BSRcB1	LMU-3	Moderately deep (75-100 cm)	Non gravelly (<15%)	Sandy loam	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Trench cum bunding
Budhihala	10	0.34	BSRcB1	LMU-3	Moderately deep (75-100 cm)	Non gravelly (<15%)	Sandy loam	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Trench cum bunding
Budhihala	30	0.61	LKRiB2	LMU-7	Moderately shallow (50-75 cm)	Non gravelly (<15%)	Sandy clay	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIIes	Trench cum bunding
Budhihala	31	4.02	Habitation	Others	Others	Others	Others	Others	Others	Others	Habitation	Not Available	Others	Others
Budhihala	39	0	MKHhB2g1	LMU-7	Moderately shallow (50-75 cm)	Gravelly (15-35%)	Sandy clay loam	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIIes	Trench cum bunding
Budhihala	40	0.05	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Maize (Mz)	Not Available	Ro	Ro
Budhihala	41	0.26	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Maize+Banana (Mz+Ba)	Not Available	Ro	Ro
Budhihala	42	0.52	RTRiB2	LMU-3	Very deep (>150 cm)	Non gravelly (<15%)	Sandy clay	High (151-200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIe	Trench cum bunding
Budhihala	43	4.86	LKRiB2g1	LMU-7	Moderately shallow (50-75 cm)	Gravelly (15-35%)	Sandy clay	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Budhihala	44	4.27	LKRiB2g1	LMU-7	Moderately shallow (50-75 cm)	Gravelly (15-35%)	Sandy clay	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Bajra (Bj)	Not Available	IIes	Trench cum bunding
Budhihala	45	5.08	RTRiB2	LMU-3	Very deep (>150 cm)	Non gravelly (<15%)	Sandy clay	High (151-200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIe	Trench cum bunding
Budhihala	46	5.95	NSPmB2	LMU-1	Moderately deep (75-100 cm)	Non gravelly (<15%)	Clay	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Current fallow (Mz+Cf)	Not Available	IIes	Graded bunding
Budhihala	47	2.76	BWTmB1	LMU-2	Moderately deep (75-100 cm)	Non gravelly (<15%)	Clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIIs	Graded bunding
Budhihala	48	4.54	NSPmB2	LMU-1	Moderately deep (75-100 cm)	Non gravelly (<15%)	Clay	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Graded bunding
Budhihala	49	5.98	NSPmB2	LMU-1	Moderately deep (75-100 cm)	Non gravelly (<15%)	Clay	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Graded bunding
Budhihala	50	6.59	MKHiB2g1	LMU-7	Moderately shallow (50-75 cm)	Gravelly (15-35%)	Sandy clay	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Cluster bean (Mz+Cb)	Not Available	IIIes	Trench cum bunding
Budhihala	51	7.67	RTRcB2	LMU-3	Very deep (>150 cm)	Non gravelly (<15%)	Sandy loam	High (151-200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram+Groundnut+Maize (Rg+Gn+Mz)	Not Available	IIe	Trench cum bunding

Village	Survey No	Area (ha)	Soil Phase	LMU	Soil Depth	Soil Gravelliness	Surface Soil Texture	Available Water Capacity	Slope	Soil Erosion	Current Land Use	Wells	Land Capability	Conservation Plan
Budhihala	52	4.3	RTRcB2	LMU-3	Very deep (>150 cm)	Non gravelly (<15%)	Sandy loam	High (151-200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Banana (Mz+Ba)	1 Borewell	IIe	Trench cum bunding
Budhihala	53	5.83	KMHcB2	LMU-3	Deep (100-150 cm)	Non gravelly (<15%)	Sandy loam	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Banana+Drumstick (Ba+Ds)	Not Available	IIes	Trench cum bunding
Budhihala	54	4.77	KMHcB2	LMU-3	Deep (100-150 cm)	Non gravelly (<15%)	Sandy loam	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Banana+Maize+Cotton (Ba+Mz+Ct)	Not Available	IIes	Trench cum bunding
Budhihala	55	3.95	MKHiB2g1	LMU-7	Moderately shallow (50-75 cm)	Gravelly (15-35%)	Sandy clay	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIIes	Trench cum bunding
Budhihala	56	4.28	MKHiB2g1	LMU-7	Moderately shallow (50-75 cm)	Gravelly (15-35%)	Sandy clay	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIIes	Trench cum bunding
Budhihala	57	6.4	HDHiB2g1	LMU-4	Moderately deep (75-100 cm)	Gravelly (15-35%)	Sandy clay	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Budhihala	58	6.57	ABRbB2g2	LMU-9	Shallow (25-50 cm)	Very gravelly (35-60%)	Loamy sand	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIIes	Trench cum bunding
Budhihala	59	4.36	KMHcB2	LMU-3	Deep (100-150 cm)	Non gravelly (<15%)	Sandy loam	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Budhihala	60	1.38	KMHcB2	LMU-3	Deep (100-150 cm)	Non gravelly (<15%)	Sandy loam	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Budhihala	61	4.11	KMHcB2	LMU-3	Deep (100-150 cm)	Non gravelly (<15%)	Sandy loam	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Budhihala	62	4.11	KMHcB2	LMU-3	Deep (100-150 cm)	Non gravelly (<15%)	Sandy loam	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Budhihala	63	2.69	KMHcB2	LMU-3	Deep (100-150 cm)	Non gravelly (<15%)	Sandy loam	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Budhihala	64	3.77	KMHcB2	LMU-3	Deep (100-150 cm)	Non gravelly (<15%)	Sandy loam	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Budhihala	65	6.76	KMHcB2	LMU-3	Deep (100-150 cm)	Non gravelly (<15%)	Sandy loam	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Budhihala	66	6.86	HLKhB2	LMU-3	Very deep (>150 cm)	Non gravelly (<15%)	Sandy clay loam	High (151-200 mm/m)	Very gently sloping (1-3%)	Moderate	Sparse Vegetation+Maize (Sv+Mz)	Not Available	IIes	Trench cum bunding
Budhihala	67	1.88	HLKhB2	LMU-3	Very deep (>150 cm)	Non gravelly (<15%)	Sandy clay loam	High (151-200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Budhihala	68	4.06	MKHcB2g2	LMU-7	Moderately shallow (50-75 cm)	Very gravelly (35-60%)	Sandy loam	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIIes	Trench cum bunding
Budhihala	69	4.64	MKHhB2g1	LMU-7	Moderately shallow (50-75 cm)	Gravelly (15-35%)	Sandy clay loam	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	1 Borewell	IIIes	Trench cum bunding
Budhihala	70	0.09	MKHcB2g2	LMU-7	Moderately shallow (50-75 cm)	Very gravelly (35-60%)	Sandy loam	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIIes	Trench cum bunding
Budhihala	71	5.26	MKHcB2g2	LMU-7	Moderately shallow (50-75 cm)	Very gravelly (35-60%)	Sandy loam	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIIes	Trench cum bunding
Budhihala	72	6.35	HLKiB1	LMU-3	Very deep (>150 cm)	Non gravelly (<15%)	Sandy clay	High (151-200 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	1 Borewell	IIs	Trench cum bunding
Budhihala	73	3.76	HLKiB1	LMU-3	Very deep (>150 cm)	Non gravelly (<15%)	Sandy clay	High (151-200 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Trench cum bunding
Budhihala	74	3.87	HLKiB1	LMU-3	Very deep (>150 cm)	Non gravelly (<15%)	Sandy clay	High (151-200 mm/m)	Very gently sloping (1-3%)	Slight	Maize+Bajra (Mz+Bj)	Not Available	IIs	Trench cum bunding
Budhihala	75	4	HLKiB1	LMU-3	Very deep (>150 cm)	Non gravelly (<15%)	Sandy clay	High (151-200 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Trench cum bunding

Village	Survey No	Area (ha)	Soil Phase	LMU	Soil Depth	Soil Gravelliness	Surface Soil Texture	Available Water Capacity	Slope	Soil Erosion	Current Land Use	Wells	Land Capability	Conservation Plan
Budhihala	76	0.32	LKRiB2g1	LMU-7	Moderately shallow (50-75 cm)	Gravelly (15-35%)	Sandy clay	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Budhihala	77	2.41	HLKiB1	LMU-3	Very deep (>150 cm)	Non gravelly (<15%)	Sandy clay	High (151-200 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Trench cum bunding
Budhihala	78	0.52	LKRiB2g1	LMU-7	Moderately shallow (50-75 cm)	Gravelly (15-35%)	Sandy clay	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Budhihala	79	0.74	LKRiB2g1	LMU-7	Moderately shallow (50-75 cm)	Gravelly (15-35%)	Sandy clay	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Budhihala	80	0.44	LKRiB2g1	LMU-7	Moderately shallow (50-75 cm)	Gravelly (15-35%)	Sandy clay	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Budhihala	81	0.97	BDRmB2	LMU-1	Very deep (>150 cm)	Non gravelly (<15%)	Clay	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Graded bunding
Budhihala	82	1.29	BDRmB2	LMU-1	Very deep (>150 cm)	Non gravelly (<15%)	Clay	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Graded bunding
Budhihala	83	0.73	LKRiB2g1	LMU-7	Moderately shallow (50-75 cm)	Gravelly (15-35%)	Sandy clay	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Chikkashindhogi	RIVER	0.85	Waterbody	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Dombrahalli	43	1.14	LGDmB1	LMU-1	Deep (100-150 cm)	Non gravelly (<15%)	Clay	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Maize+Currentfallow+Onion (Mz+Cf+On)	1 Borewell	IIs	Graded bunding
Dombrahalli	45	0.62	BWTmB1	LMU-2	Moderately deep (75-100 cm)	Non gravelly (<15%)	Clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Banana (Ba)	Not Available	IIIs	Graded bunding
Dombrahalli	46	0.69	BWTmB1	LMU-2	Moderately deep (75-100 cm)	Non gravelly (<15%)	Clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Banana (Ba)	Not Available	IIIs	Graded bunding
Dombrahalli	47	1.68	RNKmB2	LMU-6	Moderately shallow (50-75 cm)	Non gravelly (<15%)	Clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Current fallow (Mz+Cf)	Not Available	IIes	Graded bunding
Dombrahalli	51	9.94	HDHiB2g1	LMU-4	Moderately deep (75-100 cm)	Gravelly (15-35%)	Sandy clay	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram+Maize+Onion (Rg+Mz+On)	Not Available	IIes	Trench cum bunding
Dombrahalli	52	1.9	BWTmB1	LMU-2	Moderately deep (75-100 cm)	Non gravelly (<15%)	Clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Not Available (NA)	Not Available	IIIs	Graded bunding
Dombrahalli	53	0.16	LGDmB1	LMU-1	Deep (100-150 cm)	Non gravelly (<15%)	Clay	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Graded bunding
Dombrahalli	54	0.01	BWTmB1	LMU-2	Moderately deep (75-100 cm)	Non gravelly (<15%)	Clay	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIIs	Graded bunding

Appendix II

Budihalu-1 (1W2e) Microwatershed

Soil Fertility Information

Village	Survey No	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Bisarahalli	1	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Bisarahalli	2	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Bisarahalli	3	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Bisarahalli	4	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Bisarahalli	5	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Bisarahalli	6	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Bisarahalli	24	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Bisarahalli	25	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Bisarahalli	26	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Bisarahalli	27	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Bisarahalli	28	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Bisarahalli	29	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Bisarahalli	30	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Bisarahalli	31	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Bisarahalli	32	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Bisarahalli	33	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Bisarahalli	34	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Bisarahalli	35	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Bisarahalli	36	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Bisarahalli	37	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Bisarahalli	38	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Bisarahalli	39	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (< 0.5 %)	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)
Bisarahalli	40	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	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)

Bisarahalli	**41**	**Neutral (pH 6.5 – 7.3)**	**Non saline (<2 dsm)**	**Low (< 0.5 %)**	**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)**
Bisarahalli	**42**	**Neutral (pH 6.5 – 7.3)**	**Non saline (<2 dsm)**	**Low (< 0.5 %)**	**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)**
Bisarahalli	**43**	**Neutral (pH 6.5 – 7.3)**	**Non saline (<2 dsm)**	**Low (< 0.5 %)**	**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)**
Bisarahalli	**44**	**Neutral (pH 6.5 – 7.3)**	**Non saline (<2 dsm)**	**Low (< 0.5 %)**	**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)**
Bisarahalli	**45**	**Neutral (pH 6.5 – 7.3)**	**Non saline (<2 dsm)**	**Low (< 0.5 %)**	**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)**
Bisarahalli	**46**	**Neutral (pH 6.5 – 7.3)**	**Non saline (<2 dsm)**	**Low (< 0.5 %)**	**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)**
Bisarahalli	**47**	**Neutral (pH 6.5 – 7.3)**	**Non saline (<2 dsm)**	**Low (< 0.5 %)**	**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)**
Bisarahalli	**48**	**Neutral (pH 6.5 – 7.3)**	**Non saline (<2 dsm)**	**Low (< 0.5 %)**	**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)**
Bisarahalli	**49**	**Slightly alkaline (pH 7.3 – 7.8)**	**Non saline (<2 dsm)**	**Low (< 0.5 %)**	**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)**
Bisarahalli	**50**	**Slightly alkaline (pH 7.3 – 7.8)**	**Non saline (<2 dsm)**	**Low (< 0.5 %)**	**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)**
Bisarahalli	**51**	**Slightly alkaline (pH 7.3 – 7.8)**	**Non saline (<2 dsm)**	**Low (< 0.5 %)**	**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)**
Bisarahalli	**54**	**Neutral (pH 6.5 – 7.3)**	**Non saline (<2 dsm)**	**Low (< 0.5 %)**	**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)**
Bisarahalli	**55**	**Neutral (pH 6.5 – 7.3)**	**Non saline (<2 dsm)**	**Low (< 0.5 %)**	**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)**
Bisarahalli	**56**	**Neutral (pH 6.5 – 7.3)**	**Non saline (<2 dsm)**	**Low (< 0.5 %)**	**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)**
Bisarahalli	**57**	**Neutral (pH 6.5 – 7.3)**	**Non saline (<2 dsm)**	**Low (< 0.5 %)**	**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)**
Bisarahalli	**58**	**Neutral (pH 6.5 – 7.3)**	**Non saline (<2 dsm)**	**Low (< 0.5 %)**	**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)**
Bisarahalli	**59**	**Neutral (pH 6.5 – 7.3)**	**Non saline (<2 dsm)**	**Low (< 0.5 %)**	**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)**
Bisarahalli	**60**	**Neutral (pH 6.5 – 7.3)**	**Non saline (<2 dsm)**	**Low (< 0.5 %)**	**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)**
Bisarahalli	**61**	**Neutral (pH 6.5 – 7.3)**	**Non saline (<2 dsm)**	**Low (< 0.5 %)**	**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)**
Bisarahalli	**62**	**Neutral (pH 6.5 – 7.3)**	**Non saline (<2 dsm)**	**Low (< 0.5 %)**	**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)**
Bisarahalli	**63**	**Neutral (pH 6.5 – 7.3)**	**Non saline (<2 dsm)**	**Low (< 0.5 %)**	**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)**
Bisarahalli	**64**	**Neutral (pH 6.5 – 7.3)**	**Non saline (<2 dsm)**	**Low (< 0.5 %)**	**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)**
Bisarahalli	**65**	**Neutral (pH 6.5 – 7.3)**	**Non saline (<2 dsm)**	**Medium (0.5 – 0.75 %)**	**Medium (23 – 57 kg/ha)**	**Medium (145 – 337 kg/ha)**	**Medium (10 – 20 ppm)**	**Low (< 0.5 ppm)**	**Sufficient (>4.5 ppm)**	**Sufficient (> 1.0 ppm)**	**Sufficient (> 0.2 ppm)**	**Deficient (< 0.6 ppm)**
Bisarahalli	**66**	**Neutral (pH 6.5 – 7.3)**	**Non saline (<2 dsm)**	**Medium (0.5 – 0.75 %)**	**Medium (23 – 57 kg/ha)**	**Medium (145 – 337 kg/ha)**	**Medium (10 – 20 ppm)**	**Low (< 0.5 ppm)**	**Sufficient (>4.5 ppm)**	**Sufficient (> 1.0 ppm)**	**Sufficient (> 0.2 ppm)**	**Deficient (< 0.6 ppm)**
Bisarahalli	**67**	**Neutral (pH 6.5 – 7.3)**	**Non saline (<2 dsm)**	**Medium (0.5 – 0.75 %)**	**Medium (23 – 57 kg/ha)**	**Medium (145 – 337 kg/ha)**	**Medium (10 – 20 ppm)**	**Low (< 0.5 ppm)**	**Sufficient (>4.5 ppm)**	**Sufficient (> 1.0 ppm)**	**Sufficient (> 0.2 ppm)**	**Deficient (< 0.6 ppm)**

Bisarahalli	71	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Bisarahalli	78	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 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)
Bisarahalli	79	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 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)
Bisarahalli	80	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 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)
Bisarahalli	81	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Bisarahalli	82	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Bisarahalli	83	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Bisarahalli	84	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Bisarahalli	85	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	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)
Bisarahalli	86	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	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)
Bisarahalli	87	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	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)
Bisarahalli	88	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	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)
Bisarahalli	331	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Bisarahalli	332	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Bisarahalli	333	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Bisarahalli	334	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Bisarahalli	336	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Bisarahalli	337	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Bisarahalli	339	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Bisarahalli	340	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Bisarahalli	341	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Bisarahalli	342	Others	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Bisarahalli	343	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (< 0.5 %)	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)
Bisarahalli	344	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Budhihala	1	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Budhihala	2	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)

Budhihala	**3**	**Strongly alkaline (pH 8.4 – 9.0)**	**Non saline (<2 dsm)**	**Medium (0.5 – 0.75 %)**	**Medium (23 – 57 kg/ha)**	**Medium (145 – 337 kg/ha)**	**High (> 20 ppm)**	**Medium (0.5 – 1.0 ppm)**	**Deficient (< 4.5 ppm)**	**Sufficient (> 1.0 ppm)**	**Sufficient (> 0.2 ppm)**	**Sufficient (> 0.6 ppm)**
Budhihala	**4**	**Strongly alkaline (pH 8.4 – 9.0)**	**Non saline (<2 dsm)**	**Medium (0.5 – 0.75 %)**	**Medium (23 – 57 kg/ha)**	**Medium (145 – 337 kg/ha)**	**High (> 20 ppm)**	**Medium (0.5 – 1.0 ppm)**	**Deficient (< 4.5 ppm)**	**Sufficient (> 1.0 ppm)**	**Sufficient (> 0.2 ppm)**	**Sufficient (> 0.6 ppm)**
Budhihala	**5**	**Strongly alkaline (pH 8.4 – 9.0)**	**Non saline (<2 dsm)**	**Medium (0.5 – 0.75 %)**	**Medium (23 – 57 kg/ha)**	**Medium (145 – 337 kg/ha)**	**High (> 20 ppm)**	**Medium (0.5 – 1.0 ppm)**	**Deficient (< 4.5 ppm)**	**Sufficient (> 1.0 ppm)**	**Sufficient (> 0.2 ppm)**	**Sufficient (> 0.6 ppm)**
Budhihala	**6**	**Strongly alkaline (pH 8.4 – 9.0)**	**Non saline (<2 dsm)**	**Medium (0.5 – 0.75 %)**	**Medium (23 – 57 kg/ha)**	**Medium (145 – 337 kg/ha)**	**Medium (10 – 20 ppm)**	**Medium (0.5 – 1.0 ppm)**	**Deficient (< 4.5 ppm)**	**Sufficient (> 1.0 ppm)**	**Sufficient (> 0.2 ppm)**	**Sufficient (> 0.6 ppm)**
Budhihala	**10**	**Strongly alkaline (pH 8.4 – 9.0)**	**Non saline (<2 dsm)**	**Medium (0.5 – 0.75 %)**	**Medium (23 – 57 kg/ha)**	**Medium (145 – 337 kg/ha)**	**Medium (10 – 20 ppm)**	**Medium (0.5 – 1.0 ppm)**	**Deficient (< 4.5 ppm)**	**Sufficient (> 1.0 ppm)**	**Sufficient (> 0.2 ppm)**	**Sufficient (> 0.6 ppm)**
Budhihala	**30**	**Strongly alkaline (pH 8.4 – 9.0)**	**Non saline (<2 dsm)**	**Medium (0.5 – 0.75 %)**	**Medium (23 – 57 kg/ha)**	**Medium (145 – 337 kg/ha)**	**Medium (10 – 20 ppm)**	**Low (< 0.5 ppm)**	**Deficient (< 4.5 ppm)**	**Sufficient (> 1.0 ppm)**	**Sufficient (> 0.2 ppm)**	**Sufficient (> 0.6 ppm)**
Budhihala	**31**	**Others**	**Others**	**Others**	**Others**	**Others**	**Others**	**Others**	**Others**	**Others**	**Others**	**Others**
Budhihala	**39**	**Strongly alkaline (pH 8.4 – 9.0)**	**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)**	**Deficient (< 4.5 ppm)**	**Sufficient (> 1.0 ppm)**	**Sufficient (> 0.2 ppm)**	**Deficient (< 0.6 ppm)**
Budhihala	**40**	**Ro**	**Ro**	**Ro**	**Ro**	**Ro**	**Ro**	**Ro**	**Ro**	**Ro**	**Ro**	**Ro**
Budhihala	**41**	**Ro**	**Ro**	**Ro**	**Ro**	**Ro**	**Ro**	**Ro**	**Ro**	**Ro**	**Ro**	**Ro**
Budhihala	**42**	**Strongly alkaline (pH 8.4 – 9.0)**	**Non saline (<2 dsm)**	**Medium (0.5 – 0.75 %)**	**Medium (23 – 57 kg/ha)**	**Medium (145 – 337 kg/ha)**	**Medium (10 – 20 ppm)**	**Low (< 0.5 ppm)**	**Deficient (< 4.5 ppm)**	**Sufficient (> 1.0 ppm)**	**Sufficient (> 0.2 ppm)**	**Deficient (< 0.6 ppm)**
Budhihala	**43**	**Strongly alkaline (pH 8.4 – 9.0)**	**Non saline (<2 dsm)**	**High (> 0.75 %)**	**Medium (23 – 57 kg/ha)**	**Medium (145 – 337 kg/ha)**	**High (> 20 ppm)**	**Low (< 0.5 ppm)**	**Deficient (< 4.5 ppm)**	**Sufficient (> 1.0 ppm)**	**Sufficient (> 0.2 ppm)**	**Deficient (< 0.6 ppm)**
Budhihala	**44**	**Strongly alkaline (pH 8.4 – 9.0)**	**Non saline (<2 dsm)**	**Medium (0.5 – 0.75 %)**	**Medium (23 – 57 kg/ha)**	**Medium (145 – 337 kg/ha)**	**High (> 20 ppm)**	**Low (< 0.5 ppm)**	**Deficient (< 4.5 ppm)**	**Sufficient (> 1.0 ppm)**	**Sufficient (> 0.2 ppm)**	**Deficient (< 0.6 ppm)**
Budhihala	**45**	**Strongly alkaline (pH 8.4 – 9.0)**	**Non saline (<2 dsm)**	**Medium (0.5 – 0.75 %)**	**Medium (23 – 57 kg/ha)**	**Medium (145 – 337 kg/ha)**	**Medium (10 – 20 ppm)**	**Low (< 0.5 ppm)**	**Deficient (< 4.5 ppm)**	**Sufficient (> 1.0 ppm)**	**Sufficient (> 0.2 ppm)**	**Deficient (< 0.6 ppm)**
Budhihala	**46**	**Strongly alkaline (pH 8.4 – 9.0)**	**Non saline (<2 dsm)**	**Medium (0.5 – 0.75 %)**	**Medium (23 – 57 kg/ha)**	**Medium (145 – 337 kg/ha)**	**Medium (10 – 20 ppm)**	**Low (< 0.5 ppm)**	**Deficient (< 4.5 ppm)**	**Sufficient (> 1.0 ppm)**	**Sufficient (> 0.2 ppm)**	**Deficient (< 0.6 ppm)**
Budhihala	**47**	**Moderately alkaline (pH 7.8 – 8.4)**	**Non saline (<2 dsm)**	**Medium (0.5 – 0.75 %)**	**Medium (23 – 57 kg/ha)**	**Medium (145 – 337 kg/ha)**	**Medium (10 – 20 ppm)**	**Medium (0.5 – 1.0 ppm)**	**Deficient (< 4.5 ppm)**	**Sufficient (> 1.0 ppm)**	**Sufficient (> 0.2 ppm)**	**Deficient (< 0.6 ppm)**
Budhihala	**48**	**Moderately alkaline (pH 7.8 – 8.4)**	**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)**	**Deficient (< 0.6 ppm)**
Budhihala	**49**	**Strongly alkaline (pH 8.4 – 9.0)**	**Non saline (<2 dsm)**	**Medium (0.5 – 0.75 %)**	**Medium (23 – 57 kg/ha)**	**Medium (145 – 337 kg/ha)**	**Medium (10 – 20 ppm)**	**Low (< 0.5 ppm)**	**Deficient (< 4.5 ppm)**	**Sufficient (> 1.0 ppm)**	**Sufficient (> 0.2 ppm)**	**Deficient (< 0.6 ppm)**
Budhihala	**50**	**Strongly alkaline (pH 8.4 – 9.0)**	**Non saline (<2 dsm)**	**Medium (0.5 – 0.75 %)**	**Medium (23 – 57 kg/ha)**	**Medium (145 – 337 kg/ha)**	**Medium (10 – 20 ppm)**	**Low (< 0.5 ppm)**	**Deficient (< 4.5 ppm)**	**Sufficient (> 1.0 ppm)**	**Sufficient (> 0.2 ppm)**	**Deficient (< 0.6 ppm)**
Budhihala	**51**	**Strongly alkaline (pH 8.4 – 9.0)**	**Non saline (<2 dsm)**	**Medium (0.5 – 0.75 %)**	**Medium (23 – 57 kg/ha)**	**Medium (145 – 337 kg/ha)**	**Medium (10 – 20 ppm)**	**Low (< 0.5 ppm)**	**Deficient (< 4.5 ppm)**	**Sufficient (> 1.0 ppm)**	**Sufficient (> 0.2 ppm)**	**Deficient (< 0.6 ppm)**
Budhihala	**52**	**Very strongly alkaline (pH > 9.0)**	**Non saline (<2 dsm)**	**Medium (0.5 – 0.75 %)**	**Medium (23 – 57 kg/ha)**	**Medium (145 – 337 kg/ha)**	**Medium (10 – 20 ppm)**	**Low (< 0.5 ppm)**	**Deficient (< 4.5 ppm)**	**Sufficient (> 1.0 ppm)**	**Sufficient (> 0.2 ppm)**	**Deficient (< 0.6 ppm)**
Budhihala	**53**	**Strongly alkaline (pH 8.4 – 9.0)**	**Non saline (<2 dsm)**	**Medium (0.5 – 0.75 %)**	**Medium (23 – 57 kg/ha)**	**Medium (145 – 337 kg/ha)**	**Medium (10 – 20 ppm)**	**Low (< 0.5 ppm)**	**Deficient (< 4.5 ppm)**	**Sufficient (> 1.0 ppm)**	**Sufficient (> 0.2 ppm)**	**Deficient (< 0.6 ppm)**
Budhihala	**54**	**Moderately alkaline (pH 7.8 – 8.4)**	**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)**	**Deficient (< 0.6 ppm)**
Budhihala	**55**	**Slightly alkaline (pH 7.3 – 7.8)**	**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)**	**Deficient (< 0.6 ppm)**
Budhihala	**56**	**Slightly alkaline (pH 7.3 – 7.8)**	**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)**	**Deficient (< 0.6 ppm)**
Budhihala	**57**	**Slightly alkaline (pH 7.3 – 7.8)**	**Non saline (<2 dsm)**	**Medium (0.5 – 0.75 %)**	**Medium (23 – 57 kg/ha)**	**Medium (145 – 337 kg/ha)**	**Medium (10 – 20 ppm)**	**Low (< 0.5 ppm)**	**Sufficient (>4.5 ppm)**	**Sufficient (> 1.0 ppm)**	**Sufficient (> 0.2 ppm)**	**Deficient (< 0.6 ppm)**

Budhihala	58	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Budhihala	59	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Budhihala	60	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Budhihala	61	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Budhihala	62	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Budhihala	63	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Budhihala	64	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Budhihala	65	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Budhihala	66	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Budhihala	67	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Budhihala	68	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Budhihala	69	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Budhihala	70	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Budhihala	71	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Budhihala	72	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Budhihala	73	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Budhihala	74	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Budhihala	75	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Budhihala	76	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Budhihala	77	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Budhihala	78	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Budhihala	79	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Budhihala	80	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Budhihala	81	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Budhihala	82	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)

Budhihala	**83**	**Strongly alkaline (pH 8.4 – 9.0)**	**Non saline (<2 dsm)**	**Medium (0.5 – 0.75 %)**	**Medium (23 – 57 kg/ha)**	**Medium (145 – 337 kg/ha)**	**High (> 20 ppm)**	**Medium (0.5 – 1.0 ppm)**	**Deficient (< 4.5 ppm)**	**Sufficient (> 1.0 ppm)**	**Sufficient (> 0.2 ppm)**	**Sufficient (> 0.6 ppm)**
Chikkashindhogi	**RIVER**	**Others**	**Others**	**Others**	**Others**	**Others**	**Others**	**Others**	**Others**	**Others**	**Others**	**Others**
Dombrahalli	**43**	**Strongly alkaline (pH 8.4 – 9.0)**	**Non saline (<2 dsm)**	**Medium (0.5 – 0.75 %)**	**Medium (23 – 57 kg/ha)**	**Medium (145 – 337 kg/ha)**	**Medium (10 – 20 ppm)**	**Medium (0.5 – 1.0 ppm)**	**Deficient (< 4.5 ppm)**	**Sufficient (> 1.0 ppm)**	**Sufficient (> 0.2 ppm)**	**Deficient (< 0.6 ppm)**
Dombrahalli	**45**	**Moderately alkaline (pH 7.8 – 8.4)**	**Non saline (<2 dsm)**	**Medium (0.5 – 0.75 %)**	**Medium (23 – 57 kg/ha)**	**Medium (145 – 337 kg/ha)**	**Medium (10 – 20 ppm)**	**Medium (0.5 – 1.0 ppm)**	**Deficient (< 4.5 ppm)**	**Sufficient (> 1.0 ppm)**	**Sufficient (> 0.2 ppm)**	**Deficient (< 0.6 ppm)**
Dombrahalli	**46**	**Moderately alkaline (pH 7.8 – 8.4)**	**Non saline (<2 dsm)**	**Medium (0.5 – 0.75 %)**	**Medium (23 – 57 kg/ha)**	**Medium (145 – 337 kg/ha)**	**Medium (10 – 20 ppm)**	**Medium (0.5 – 1.0 ppm)**	**Deficient (< 4.5 ppm)**	**Sufficient (> 1.0 ppm)**	**Sufficient (> 0.2 ppm)**	**Deficient (< 0.6 ppm)**
Dombrahalli	**47**	**Moderately alkaline (pH 7.8 – 8.4)**	**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)**	**Deficient (< 0.6 ppm)**
Dombrahalli	**51**	**Slightly alkaline (pH 7.3 – 7.8)**	**Non saline (<2 dsm)**	**Medium (0.5 – 0.75 %)**	**Medium (23 – 57 kg/ha)**	**Medium (145 – 337 kg/ha)**	**Medium (10 – 20 ppm)**	**Low (< 0.5 ppm)**	**Sufficient (>4.5 ppm)**	**Sufficient (> 1.0 ppm)**	**Sufficient (> 0.2 ppm)**	**Deficient (< 0.6 ppm)**
Dombrahalli	**52**	**Moderately alkaline (pH 7.8 – 8.4)**	**Non saline (<2 dsm)**	**Medium (0.5 – 0.75 %)**	**Medium (23 – 57 kg/ha)**	**Medium (145 – 337 kg/ha)**	**Medium (10 – 20 ppm)**	**Medium (0.5 – 1.0 ppm)**	**Deficient (< 4.5 ppm)**	**Sufficient (> 1.0 ppm)**	**Sufficient (> 0.2 ppm)**	**Deficient (< 0.6 ppm)**
Dombrahalli	**53**	**Strongly alkaline (pH 8.4 – 9.0)**	**Non saline (<2 dsm)**	**Medium (0.5 – 0.75 %)**	**Medium (23 – 57 kg/ha)**	**Medium (145 – 337 kg/ha)**	**Medium (10 – 20 ppm)**	**Medium (0.5 – 1.0 ppm)**	**Deficient (< 4.5 ppm)**	**Sufficient (> 1.0 ppm)**	**Sufficient (> 0.2 ppm)**	**Deficient (< 0.6 ppm)**
Dombrahalli	**54**	**Strongly alkaline (pH 8.4 – 9.0)**	**Non saline (<2 dsm)**	**Medium (0.5 – 0.75 %)**	**Medium (23 – 57 kg/ha)**	**Medium (145 – 337 kg/ha)**	**Medium (10 – 20 ppm)**	**Medium (0.5 – 1.0 ppm)**	**Deficient (< 4.5 ppm)**	**Sufficient (> 1.0 ppm)**	**Sufficient (> 0.2 ppm)**	**Deficient (< 0.6 ppm)**

Appendix III

Budihalu-1 (1W2e) Microwatershed

Soil Suitability Information

Village	Survey Number	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
Bisarahalli	1	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
Bisarahalli	2	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
Bisarahalli	3	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Bisarahalli	4	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
Bisarahalli	5	S3r	S2tg	S2rg	S2g	S2rt	S2rg	S3r	S2rg	S2gt	S2r	S2rg	S1	S2rg	S1	S2rt	S2rg	S2rg	S2t	S1	S1	S2tg	S2tg	S2rg	S1	S2tg	S2t	S1	S2gt	S2r	S2r	S2t
Bisarahalli	6	S3r	S2tg	S2rg	S2g	S2rt	S2rg	S3r	S2rg	S2gt	S2r	S2rg	S1	S2rg	S1	S2rt	S2rg	S2rg	S2t	S1	S1	S2tg	S2tg	S2rg	S1	S2tg	S2t	S1	S2gt	S2r	S2r	S2t
Bisarahalli	24	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
Bisarahalli	25	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
Bisarahalli	26	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
Bisarahalli	27	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
Bisarahalli	28	N1r	S2rg	S3r	S2rg	S3r	S2rg	N1r	S3r	S2rt	S3rg	S3rg	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2rg	S2rg	S2rg	S2rg	S3r	S2rg	S2rg	S2r	S2r	S2rg	S3rg	S3rg	S2r
Bisarahalli	29	N1r	S2rg	S3r	S2rg	S3r	S2rg	N1r	S3r	S2rt	S3rg	S3rg	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2rg	S2rg	S2rg	S2rg	S3r	S2rg	S2rg	S2r	S2r	S2rg	S3rg	S3rg	S2r
Bisarahalli	30	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
Bisarahalli	31	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
Bisarahalli	32	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
Bisarahalli	33	N1r	S2rg	S3r	S2rg	S3r	S2rg	N1r	S3r	S2rt	S3rg	S3rg	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2rg	S2rg	S2rg	S2rg	S3r	S2rg	S2rg	S2r	S2r	S2rg	S3rg	S3rg	S2r
Bisarahalli	34	N1r	S2rg	S3r	S2rg	S3r	S2rg	N1r	S3r	S2rt	S3rg	S3rg	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2rg	S2rg	S2rg	S2rg	S3r	S2rg	S2rg	S2r	S2r	S2rg	S3rg	S3rg	S2r
Bisarahalli	35	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
Bisarahalli	36	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
Bisarahalli	37	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
Bisarahalli	38	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
Bisarahalli	39	N1r	S2rg	S3r	S2rg	S3r	S2rg	N1r	S3r	S2rt	S3rg	S3rg	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2rg	S2rg	S2rg	S2rg	S3r	S2rg	S2rg	S2r	S2r	S2rg	S3rg	S3rg	S2r
Bisarahalli	40	N1r	S2rg	S3r	S2rg	S3r	S2rg	N1r	S3r	S2rt	S3rg	S3rg	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2rg	S2rg	S2rg	S2rg	S3r	S2rg	S2rg	S2r	S2r	S2rg	S3rg	S3rg	S2r
Bisarahalli	41	N1r	S2rg	S3r	S2rg	S3r	S2rg	N1r	S3r	S2rt	S3rg	S3rg	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2rg	S2rg	S2rg	S2rg	S3r	S2rg	S2rg	S2r	S2r	S2rg	S3rg	S3rg	S2r

Village	Survey Number	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
Bisarahalli	42	S2r	S1	S1	S1	S1	S2t	S2r	S1	S2t	S1	S1	S1	S1	S1	S1	S2r	S1	S2t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Bisarahalli	43	N1r	S2rg	S3r	S2rg	S3r	S2rg	N1r	S3r	S2rt	S3rg	S3rg	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2rg	S2rg	S2rg	S2rg	S3r	S2rg	S2rg	S2r	S2r	S2rg	S3rg	S3rg	S2r
Bisarahalli	44	N1r	S2rg	S3r	S2rg	S3r	S2rg	N1r	S3r	S2rt	S3rg	S3rg	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2rg	S2rg	S2rg	S2rg	S3r	S2rg	S2rg	S2r	S2r	S2rg	S3rg	S3rg	S2r
Bisarahalli	45	N1r	S2rg	S3r	S2rg	S3r	S2rg	N1r	S3r	S2rt	S3rg	S3rg	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2rg	S2rg	S2rg	S2rg	S3r	S2rg	S2rg	S2r	S2r	S2rg	S3rg	S3rg	S2r
Bisarahalli	46	N1r	S2rg	S3r	S2rg	S3r	S2rg	N1r	S3r	S2rt	S3rg	S3rg	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2rg	S2rg	S2rg	S2rg	S3r	S2rg	S2rg	S2r	S2r	S2rg	S3rg	S3rg	S2r
Bisarahalli	47	N1r	S2rg	S3r	S2rg	S3r	S2rg	N1r	S3r	S2rt	S3rg	S3rg	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2rg	S2rg	S2rg	S2rg	S3r	S2rg	S2rg	S2r	S2r	S2rg	S3rg	S3rg	S2r
Bisarahalli	48	N1r	S2rg	S3r	S2rg	S3r	S2rg	N1r	S3r	S2rt	S3rg	S3rg	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2rg	S2rg	S2rg	S2rg	S3r	S2rg	S2rg	S2r	S2r	S2rg	S3rg	S3rg	S2r
Bisarahalli	49	N1r	S2rg	S3r	S2rg	S3r	S2rg	N1r	S3r	S2rt	S3rg	S3rg	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2rg	S2rg	S2rg	S2rg	S3r	S2rg	S2rg	S2r	S2r	S2rg	S3rg	S3rg	S2r
Bisarahalli	50	N1r	S2rg	S3r	S2rg	S3r	S2rg	N1r	S3r	S2rt	S3rg	S3rg	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2rg	S2rg	S2rg	S2rg	S3r	S2rg	S2rg	S2r	S2r	S2rg	S3rg	S3rg	S2r
Bisarahalli	51	N1r	S2rg	S3r	S2rg	S3r	S2rg	N1r	S3r	S2rt	S3rg	S3rg	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2rg	S2rg	S2rg	S2rg	S3r	S2rg	S2rg	S2r	S2r	S2rg	S3rg	S3rg	S2r
Bisarahalli	54	S3r	S2tg	S2rg	S2g	S2rt	S2rg	S3r	S2rg	S2gt	S2r	S2rg	S1	S2rg	S1	S2rt	S2rg	S2rg	S2t	S1	S1	S2tg	S2tg	S2rg	S1	S2tg	S2t	S1	S2gt	S2r	S2r	S2t
Bisarahalli	55	S3r	S2tg	S2rg	S2g	S2rt	S2rg	S3r	S2rg	S2gt	S2r	S2rg	S1	S2rg	S1	S2rt	S2rg	S2rg	S2t	S1	S1	S2tg	S2tg	S2rg	S1	S2tg	S2t	S1	S2gt	S2r	S2r	S2t
Bisarahalli	56	S3r	S2tg	S2rg	S2g	S2rt	S2rg	S3r	S2rg	S2gt	S2r	S2rg	S1	S2rg	S1	S2rt	S2rg	S2rg	S2t	S1	S1	S2tg	S2tg	S2rg	S1	S2tg	S2t	S1	S2gt	S2r	S2r	S2t
Bisarahalli	57	S3r	S2tg	S2rg	S2g	S2rt	S2rg	S3r	S2rg	S2gt	S2r	S2rg	S1	S2rg	S1	S2rt	S2rg	S2rg	S2t	S1	S1	S2tg	S2tg	S2rg	S1	S2tg	S2t	S1	S2gt	S2r	S2r	S2t
Bisarahalli	58	S3r	S2tg	S2rg	S2g	S2rt	S2rg	S3r	S2rg	S2gt	S2r	S2rg	S1	S2rg	S1	S2rt	S2rg	S2rg	S2t	S1	S1	S2tg	S2tg	S2rg	S1	S2tg	S2t	S1	S2gt	S2r	S2r	S2t
Bisarahalli	59	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
Bisarahalli	60	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
Bisarahalli	61	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
Bisarahalli	62	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
Bisarahalli	63	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
Bisarahalli	64	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
Bisarahalli	65	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
Bisarahalli	66	N1r	S3r	N1r	S3r	N1r	S3r	N1r	N1r	S3r	N1r	N1r	S3r	N1r	S3r	N1r	N1r	N1r	S3r	S3r	S3r	S3r	S3r	N1r	S3r	S3r	S3r	S3r	S3r	N1r	N1r	S3r
Bisarahalli	67	N1rz	S2tz	S3rz	S2rz	S3tz	S2rz	N1rz	S3rz	S2rz	S3rz	S3rz	S2rz	S3tz	S2rz	N1tz	S3tz	S3rz	S3tz	S3tz	S3tz	S2rz	S2rz	S3rz	S2tz	S2rz	S2rt	S2rt	S3rz	S3rz	S3rz	S3tz
Bisarahalli	71	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
Bisarahalli	78	N1rz	S2tz	S3rz	S2rz	S3tz	S2rz	N1rz	S3rz	S2rz	S3rz	S3rz	S2rz	S3tz	S2rz	N1tz	S3tz	S3rz	S3tz	S3tz	S3tz	S2rz	S2rz	S3rz	S2tz	S2rz	S2rt	S2rt	S3rz	S3rz	S3rz	S3tz
Bisarahalli	79	N1rz	S2tz	S3rz	S2rz	S3tz	S2rz	N1rz	S3rz	S2rz	S3rz	S3rz	S2rz	S3tz	S2rz	N1tz	S3tz	S3rz	S3tz	S3tz	S3tz	S2rz	S2rz	S3rz	S2tz	S2rz	S2rt	S2rt	S3rz	S3rz	S3rz	S3tz

Village	Survey Number	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
Bisarahalli	80	N1rz	S2tz	S3rz	S2rz	S3tz	S2rz	N1rz	S3rz	S2rz	S3rz	S3rz	S2rz	S3tz	S2rz	N1tz	S3tz	S3rz	S3tz	S3tz	S3tz	S2rz	S2rz	S3rz	S2tz	S2rz	S2rt	S2rt	S3rz	S3rz	S3rz	S3tz
Bisarahalli	81	S3r	S2tg	S2rg	S2g	S2rt	S2rg	S3r	S2rg	S2gt	S2r	S2rg	S1	S2rg	S1	S2rt	S2rg	S2rg	S2t	S1	S1	S2tg	S2tg	S2rg	S1	S2tg	S2t	S1	S2gt	S2r	S2r	S2t
Bisarahalli	82	S3r	S2tg	S2rg	S2g	S2rt	S2rg	S3r	S2rg	S2gt	S2r	S2rg	S1	S2rg	S1	S2rt	S2rg	S2rg	S2t	S1	S1	S2tg	S2tg	S2rg	S1	S2tg	S2t	S1	S2gt	S2r	S2r	S2t
Bisarahalli	83	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
Bisarahalli	84	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
Bisarahalli	85	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
Bisarahalli	86	S3r	S2tg	S2rg	S2g	S2rt	S2rg	S3r	S2rg	S2gt	S2r	S2rg	S1	S2rg	S1	S2rt	S2rg	S2rg	S2t	S1	S1	S2tg	S2tg	S2rg	S1	S2tg	S2t	S1	S2gt	S2r	S2r	S2t
Bisarahalli	87	S3r	S2tg	S2rg	S2g	S2rt	S2rg	S3r	S2rg	S2gt	S2r	S2rg	S1	S2rg	S1	S2rt	S2rg	S2rg	S2t	S1	S1	S2tg	S2tg	S2rg	S1	S2tg	S2t	S1	S2gt	S2r	S2r	S2t
Bisarahalli	88	S3r	S2tg	S2rg	S2g	S2rt	S2rg	S3r	S2rg	S2gt	S2r	S2rg	S1	S2rg	S1	S2rt	S2rg	S2rg	S2t	S1	S1	S2tg	S2tg	S2rg	S1	S2tg	S2t	S1	S2gt	S2r	S2r	S2t
Bisarahalli	331	S3r	S2tg	S2rg	S2g	S2rt	S2rg	S3r	S2rg	S2gt	S2r	S2rg	S1	S2rg	S1	S2rt	S2rg	S2rg	S2t	S1	S1	S2tg	S2tg	S2rg	S1	S2tg	S2t	S1	S2gt	S2r	S2r	S2t
Bisarahalli	332	S3r	S2tg	S2rg	S2g	S2rt	S2rg	S3r	S2rg	S2gt	S2r	S2rg	S1	S2rg	S1	S2rt	S2rg	S2rg	S2t	S1	S1	S2tg	S2tg	S2rg	S1	S2tg	S2t	S1	S2gt	S2r	S2r	S2t
Bisarahalli	333	S3r	S2tg	S2rg	S2g	S2rt	S2rg	S3r	S2rg	S2gt	S2r	S2rg	S1	S2rg	S1	S2rt	S2rg	S2rg	S2t	S1	S1	S2tg	S2tg	S2rg	S1	S2tg	S2t	S1	S2gt	S2r	S2r	S2t
Bisarahalli	334	S3r	S2tg	S2rg	S2g	S2rt	S2rg	S3r	S2rg	S2gt	S2r	S2rg	S1	S2rg	S1	S2rt	S2rg	S2rg	S2t	S1	S1	S2tg	S2tg	S2rg	S1	S2tg	S2t	S1	S2gt	S2r	S2r	S2t
Bisarahalli	336	S3r	S2tg	S2rg	S2g	S2rt	S2rg	S3r	S2rg	S2gt	S2r	S2rg	S1	S2rg	S1	S2rt	S2rg	S2rg	S2t	S1	S1	S2tg	S2tg	S2rg	S1	S2tg	S2t	S1	S2gt	S2r	S2r	S2t
Bisarahalli	337	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
Bisarahalli	339	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
Bisarahalli	340	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
Bisarahalli	341	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
Bisarahalli	342	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
Bisarahalli	343	N1r	S2rg	S3r	S2rg	S3r	S2rg	N1r	S3r	S2rt	S3rg	S3rg	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2rg	S2rg	S2rg	S2rg	S3r	S2rg	S2rg	S2r	S2r	S2rg	S3rg	S3rg	S2r
Bisarahalli	344	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
Budhihala	1	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
Budhihala	2	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2t	S1	S3t	S3t	S3t	S2t	S2t	S2t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S3t
Budhihala	3	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2t	S1	S3t	S3t	S3t	S2t	S2t	S2t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S3t
Budhihala	4	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2t	S1	S3t	S3t	S3t	S2t	S2t	S2t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S3t

Village	Survey Number	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
Budhihala	5	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2t	S1	S3t	S3t	S3t	S2t	S2t	S2t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S3t
Budhihala	6	S3r	S1	S2r	S1	S2r	S2rt	S3r	S2r	S2t	S2r	S2r	S1	S2r	S1	S1	S3r	S2r	S2t	S1	S1	S1	S1	S2r	S1	S1	S2t	S1	S1	S2r	S2r	S2t
Budhihala	10	S3r	S1	S2r	S1	S2r	S2rt	S3r	S2r	S2t	S2r	S2r	S1	S2r	S1	S1	S3r	S2r	S2t	S1	S1	S1	S1	S2r	S1	S1	S2t	S1	S1	S2r	S2r	S2t
Budhihala	30	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
Budhihala	31	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
Budhihala	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
Budhihala	40	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
Budhihala	41	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
Budhihala	42	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S2t	S2t	S1	S1	S1	S2t
Budhihala	43	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
Budhihala	44	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
Budhihala	45	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S2t	S2t	S1	S1	S1	S2t
Budhihala	46	S3rt	S2tz	S3rt	S1	S3t	S1	S3r	S2r	S1	S2r	S2t	S2t	S3t	S1	N1t	S3rt	S2r	S3t	S3t	S3tw	S2tw	S2tw	S2rt	S2t	S3tw	S2tz	S2tz	S3t	S2rt	S2tw	S3tz
Budhihala	47	S3rz	S2tz	S2rz	S2zg	S3rz	S2rt	S3rz	S2rz	S2gz	S2rz	S2rt	S2rt	S3rt	S2gz	N1tz	S3rz	S2rz	S3tz	S3tz	S2tz	S2tz	S2tz	S2rz	S2tz	S3tz	S2tz	S2tz	S3tz	S2rt	S3tz	S3tz
Budhihala	48	S3rt	S2tz	S3rt	S1	S3t	S1	S3r	S2r	S1	S2r	S2t	S2t	S3t	S1	N1t	S3rt	S2r	S3t	S3t	S3tw	S2tw	S2tw	S2rt	S2t	S3tw	S2tz	S2tz	S3t	S2rt	S2tw	S3tz
Budhihala	49	S3rt	S2tz	S3rt	S1	S3t	S1	S3r	S2r	S1	S2r	S2t	S2t	S3t	S1	N1t	S3rt	S2r	S3t	S3t	S3tw	S2tw	S2tw	S2rt	S2t	S3tw	S2tz	S2tz	S3t	S2rt	S2tw	S3tz
Budhihala	50	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
Budhihala	51	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S2t	S2t	S1	S1	S1	S2t
Budhihala	52	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S2t	S2t	S1	S1	S1	S2t
Budhihala	53	S2r	S1	S1	S1	S1	S2t	S2r	S1	S2t	S1	S1	S1	S1	S1	S1	S2r	S1	S2t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Budhihala	54	S2r	S1	S1	S1	S1	S2t	S2r	S1	S2t	S1	S1	S1	S1	S1	S1	S2r	S1	S2t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Budhihala	55	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
Budhihala	56	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
Budhihala	57	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
Budhihala	58	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
Budhihala	59	S2r	S1	S1	S1	S1	S2t	S2r	S1	S2t	S1	S1	S1	S1	S1	S1	S2r	S1	S2t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1

Village	Survey Number	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
Budhihala	60	S2r	S1	S1	S1	S1	S2t	S2r	S1	S2t	S1	S1	S1	S1	S1	S1	S2r	S1	S2t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Budhihala	61	S2r	S1	S1	S1	S1	S2t	S2r	S1	S2t	S1	S1	S1	S1	S1	S1	S2r	S1	S2t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Budhihala	62	S2r	S1	S1	S1	S1	S2t	S2r	S1	S2t	S1	S1	S1	S1	S1	S1	S2r	S1	S2t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Budhihala	63	S2r	S1	S1	S1	S1	S2t	S2r	S1	S2t	S1	S1	S1	S1	S1	S1	S2r	S1	S2t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Budhihala	64	S2r	S1	S1	S1	S1	S2t	S2r	S1	S2t	S1	S1	S1	S1	S1	S1	S2r	S1	S2t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Budhihala	65	S2r	S1	S1	S1	S1	S2t	S2r	S1	S2t	S1	S1	S1	S1	S1	S1	S2r	S1	S2t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Budhihala	66	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S2t	S1	S1	S3t	S2t	S2t	S2t	S2t	S1	S1	S2t	S2t	S2t	S1	S1	S2t	S2t
Budhihala	67	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S2t	S1	S1	S3t	S2t	S2t	S2t	S2t	S1	S1	S2t	S2t	S2t	S1	S1	S2t	S2t
Budhihala	68	N1r	S3rg	S3rg	S3rg	S3rg	S3g	N1r	S3rg	S2rt	S3rg	S3rg	S2rg	S3rg	S2rg	S3rg	S3rg	S3rg	S3rg	S3g	S3g	S3g	S3g	S3rg	S2rg	S3g	S3g	S3g	S3g	S3rg	S3rg	S3g
Budhihala	69	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
Budhihala	70	N1r	S3rg	S3rg	S3rg	S3rg	S3g	N1r	S3rg	S2rt	S3rg	S3rg	S2rg	S3rg	S2rg	S3rg	S3rg	S3rg	S3rg	S3g	S3g	S3g	S3g	S3rg	S2rg	S3g	S3g	S3g	S3g	S3rg	S3rg	S3g
Budhihala	71	N1r	S3rg	S3rg	S3rg	S3rg	S3g	N1r	S3rg	S2rt	S3rg	S3rg	S2rg	S3rg	S2rg	S3rg	S3rg	S3rg	S3rg	S3g	S3g	S3g	S3g	S3rg	S2rg	S3g	S3g	S3g	S3g	S3rg	S3rg	S3g
Budhihala	72	S1	S1	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S2t	S1	S1	S3t	S1	S1	S1	S1	S1	S1	S1	S2t	S2t	S1	S1	S1	S2t
Budhihala	73	S1	S1	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S2t	S1	S1	S3t	S1	S1	S1	S1	S1	S1	S1	S2t	S2t	S1	S1	S1	S2t
Budhihala	74	S1	S1	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S2t	S1	S1	S3t	S1	S1	S1	S1	S1	S1	S1	S2t	S2t	S1	S1	S1	S2t
Budhihala	75	S1	S1	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S2t	S1	S1	S3t	S1	S1	S1	S1	S1	S1	S1	S2t	S2t	S1	S1	S1	S2t
Budhihala	76	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
Budhihala	77	S1	S1	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S2t	S1	S1	S3t	S1	S1	S1	S1	S1	S1	S1	S2t	S2t	S1	S1	S1	S2t
Budhihala	78	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
Budhihala	79	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
Budhihala	80	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
Budhihala	81	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2t	S1	S3t	S3t	S3t	S2t	S2t	S2t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S3t
Budhihala	82	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2t	S1	S3t	S3t	S3t	S2t	S2t	S2t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S3t
Budhihala	83	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
Chikkashindhogi	RIVER	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
Dombrahalli	43	S3tz	S2tz	S3tz	S2z	S3tz	S2z	S2tz	S2z	S2z	S2z	S2tz	S2tz	S3tz	S2z	N1tz	S2tz	S2z	S3tz	S3tz	S3tz	S2tz	S2tz	S2tz	S2tz	S3tz	S2tz	S2tz	S3tz	S2tz	S3tz	S3tz

Village	Survey Number	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
Dombrahalli	45	S3rz	S2tz	S2rz	S2zg	S3rz	S2rt	S3rz	S2rz	S2gz	S2rz	S2rt	S2rt	S3rt	S2gz	N1tz	S3rz	S2rz	S3tz	S3tz	S2tz	S2tz	S2tz	S2rz	S2tz	S3tz	S2tz	S2tz	S3tz	S2rt	S3tz	S3tz
Dombrahalli	46	S3rz	S2tz	S2rz	S2zg	S3rz	S2rt	S3rz	S2rz	S2gz	S2rz	S2rt	S2rt	S3rt	S2gz	N1tz	S3rz	S2rz	S3tz	S3tz	S2tz	S2tz	S2tz	S2rz	S2tz	S3tz	S2tz	S2tz	S3tz	S2rt	S3tz	S3tz
Dombrahalli	47	N1rz	S2tz	S3rz	S2rz	S3tz	S2rz	N1rz	S3rz	S2rz	S3rz	S3rz	S2rz	S3tz	S2rz	N1tz	S3tz	S3rz	S3tz	S3tz	S3tz	S2rz	S2rz	S3rz	S2tz	S2rz	S2rt	S2rt	S3rz	S3rz	S3rz	S3tz
Dombrahalli	51	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
Dombrahalli	52	S3rz	S2tz	S2rz	S2zg	S3rz	S2rt	S3rz	S2rz	S2gz	S2rz	S2rt	S2rt	S3rt	S2gz	N1tz	S3rz	S2rz	S3tz	S3tz	S2tz	S2tz	S2tz	S2rz	S2tz	S3tz	S2tz	S2tz	S3tz	S2rt	S3tz	S3tz
Dombrahalli	53	S3tz	S2tz	S3tz	S2z	S3tz	S2z	S2tz	S2z	S2z	S2z	S2tz	S2tz	S3tz	S2z	N1tz	S2tz	S2z	S3tz	S3tz	S3tz	S2tz	S2tz	S2tz	S2tz	S3tz	S2tz	S2tz	S3tz	S2tz	S3tz	S3tz
Dombrahalli	54	S3rz	S2tz	S2rz	S2zg	S3rz	S2rt	S3rz	S2rz	S2gz	S2rz	S2rt	S2rt	S3rt	S2gz	N1tz	S3rz	S2rz	S3tz	S3tz	S2tz	S2tz	S2tz	S2rz	S2tz	S3tz	S2tz	S2tz	S3tz	S2rt	S3tz	S3tz

Ro –Rock outcrops

PART-B

SOCIO-ECONOMIC STATUS OF FARM HOUSEHOLDS

CONTENTS

LIST OF TABLES

Chapter 1

SALIENT FINDINGS OF THE SURVEY

- *The data indicated that there were 97 (53.59%) men and 84 (46.41%) were women among the sampled households. The average family size of landless farmers' was 4.5, marginal farmers' was 4.4, small farmers' was 5.0, semi medium farmers' was 5.2, medium farmers' was 6.2 and for large farmers' it was 7.0.*
- *The data indicated that 22 (12.15%) people were in 0-15 years of age, 76 (41.99%) were in 16-35 years of age, 62 (34.25 %) were in 36-60 years of age and 21 (11.60%) were above 61 years of age.*
- *The results indicated that Budihalu micro watershed had 34.81 per cent illiterates, 0.55 per cent were functional literates, 19.89 per cent of the people had primary school education, 6.63 per cent of them had middle school education, 16.02 per cent of them had high school education, 10.50 per cent of them had PUC education, 5.52 per cent of them had degree education and 0.55 had studied ITI.*
- *The results indicate that, 91.43 per cent of households practicing agriculture, 2.86 per cent of the household heads were in government service and 8.57 per cent of the households heads had other occupation. The results indicate that agriculture was the major occupation for 55.80 per cent of the household members, 14.36 per cent were agricultural labourers, 16.57 per cent were students, 3.31 per cent were children and housewives, 1.66 per cent were in government service.*
- *The results show that 96.69 per cent of the population has not participated in any local institution, 1.10 per cent have participated in sthree shakthi sangha and 0.55 per cent each have participated in gram panchayat, taluk panchayat, dairy cooperative and raitha sangha.*
- *The results indicate that 68.57 per cent of the households possess Katcha house, 11.43 per cent of them possess pucca house, 2.86 per cent of them possess thatched house and 17.14 per cent of them possess semi pucca house.*
- *The results shows that 74.29 per cent of the households possess TV, 17.14 per cent of the households possess Mixer grinder, 42.86 per cent of the households possess bicycle, 34.29 per cent of the households possess motor cycle, 82.86 per cent of the households possess mobile phones, 2.86 per cent of the households possess radio, 5.71 per cent of the households possess DVD player and 5.71 per cent of the households possess auto.*
- *The results shows that the average value of television was Rs.4730, mixer grinder was Rs. 2033, bicycle was Rs.3686, motor cycle was Rs. 29214, auto was Rs. 175000, mobile phone was Rs.1477, radio was Rs. 1000 and DVD player was Rs. 1600.*
- *About 17.14 per cent of the households possess plough, 22.86 per cent of them possess bullock cart, 2.86 per cent of the households possess sprayer, and 2.86 per cent of the households possess tractor.*

- *The results show that the average value of plough was Rs.2333, bullock cart was Rs.22250, sprayer was Rs.3000 and tractor was Rs.300000.*
- *The results indicate that, 20 per cent of the households possess bullocks, 25.17 per cent of the households possess local cow, 8.57 per cent of the households possess crossbred cows, 2.86 per cent of the households possess buffalo, 8.57 per cent of the households possess goat, 5.71 per cent of the households possess sheep and 45.71 per cent of the households possess poultry birds.*
- *The results indicate that, average own labour (men) available in the micro watershed was 2.39, average own labour (women) available was 1.67, average hired labour (men) available was 2.30 and average hired labour (women) available was 1.67.*
- *The results indicate that, 60 per cent of the household opined that hired labour was adequate and 34.29 per cent of the households opined that hired labour was inadequate. About 55.56 per cent of the marginal farmers, 70 per cent of small, 100 per cent of semi medium and 33.33 medium farmers and 50 per cent of large farmers have opined that the hired labour was adequate.*
- *The results indicate that, households of the Budihalu micro watershed possess 53.60 ha (73%) of dry land and 19.83 ha (27%) of irrigated land. Marginal farmers possess 5.99 ha (100%) of dry land.*
- *The results indicate that, the average value of dry land was Rs. 170,772.45 and average value of irrigated land was Rs. 357,971.02.*
- *The results indicate that, there were 13 functioning and 5 de-functioning bore wells in the micro watershed.*
- *Bore well was the major irrigation source in the micro water shed which was possessed by small farmers, medium farmers, semi medium farmers and large farmers. The depth of bore well was found to be 34.21 meters.*
- *The results indicate that, small farmers had 1.01 ha, semi medium farmers had 5.67 ha, medium farmers had 8.24 ha and large farmers had 3.24 ha of irrigated area. Farmers have grown Maize (26.66 ha), Bajra (4.78 ha), Sunflower (4.05 ha), Redgram (8.1 ha), Bengal gram (1.01 ha) and Sorghum (2.23 ha). Marginal farmers have grown maize, cotton, bajra, sunflower, sorghum and groundnut. Small farmers have grown maize, cotton, bajra, and sorghum. Semi medium farmers have grown maize, cotton, sunflower, sorghum and banana. Medium farmers have grown maize, red gram, cotton, bajra, sunflower, onion, sorghum and bengal gram. Large farmers have grown maize, cotton and chilly.*
- *The results indicate that, the cropping intensity in Budihalu micro watershed was found to be 61.92 per cent. In case of Marginal farmers it was 100 per cent, for small farmers it was 76.94 per cent, in case of semi medium farmers it was 78.95 per cent, medium farmers had cropping intensity of 66.67 per cent and large farmers had a cropping intensity of 35.71 per cent.*

- *The results indicate that, 22.86 per cent of the households have bank account and 17.14 per cent of the households have savings. Among landless, medium and large farmers nobody possessed bank account and savings.*
- *The results indicate that, 44.44 per cent of marginal, 30 per cent of small and 16.67 per cent semi medium have borrowed credit from different sources.*
- *Around 25 per cent have availed loan from commercial bank, 12.5 per cent have availed loan from cooperative bank, 37.5 per cent have availed loan from grameena bank and 12.5 per cent have availed loan from money lender.*
- *Overall average credit amount availed by households in the micro watershed is Rs. 234000. The results indicate that, 100 per cent of the households have borrowed loan for agricultural production purpose.*
- *The results indicate that, 16.67 per cent of the households have repaid their loan partially. The data also shows that 66.67 per cent of households have unpaid their loans and only 16.67 per cent of households have fully repaid their loans taken from institutional sources.*
- *Around 100 per cent of the households have not repaid their loan borrowed from non institutional sources.*
- *The results indicate that, the total cost of cultivation for maize was Rs. 30217.71. The gross income realized by the farmers was Rs. 37123.44. The net income from maize cultivation was Rs. 6905.72, thus the benefit cost ratio was found to be 1:1.23.*
- *The total cost of cultivation for redgram was Rs. 10077.65. The gross income realized by the farmers was Rs. 14806.28. The net income from redgram cultivation was Rs.4728.63. Thus the benefit cost ratio was found to be 1:1.47.*
- *The total cost of cultivation for cotton was Rs. 34942.88. The gross income realized by the farmers was Rs. 54239.18. The net income from cotton cultivation was Rs. 19296.30, thus the benefit cost ratio was found to be 1:1.55.*
- *The total cost of cultivation for bajra was Rs. 54100.63. The gross income realized by the farmers was Rs. 12054.82. The net income from bajra cultivation was Rs. -42045.81. Thus the benefit cost ratio was found to be 1:0.22.*
- *The total cost of cultivation for sunflower was Rs. 31049.45. The gross income realized by the farmers was Rs. 31250.07. The net income from sunflower cultivation was Rs. 200.63. Thus the benefit cost ratio was found to be 1:1.01.*
- *The total cost of cultivation for onion was Rs. 16968.62. The gross income realized by the farmers was Rs. 19924.67. The net income from onion cultivation was Rs. 2956.05. Thus the benefit cost ratio was found to be 1:1.17.*
- *The total cost of cultivation for sorghum was Rs. 17508.50. The gross income realized by the farmers was Rs. 61750. The net income from sorghum cultivation was Rs. 44241.50. Thus the benefit cost ratio was found to be 1:3.53.*

- *The total cost of cultivation for banana was Rs. 40661.40. The gross income realized by the farmers was Rs. 3161600. The net income from banana cultivation was Rs. 3120938.60. Thus the benefit cost ratio was found to be 1:77.75.*
- *The total cost of cultivation for bengal gram was Rs. 47423.61. The gross income realized by the farmers was Rs. 1729.00. The net income from bengal gram cultivation was Rs. -45694.61. Thus the benefit cost ratio was found to be 1:0.04.*
- *The total cost of cultivation for groundnut was Rs. 28538.75. The gross income realized by the farmers was Rs. 32968.22. The net income from groundnut cultivation was Rs. 4429.47. Thus the benefit cost ratio was found to be 1:1.16.*
- *The total cost of cultivation for chilly was Rs. 16581.91. The gross income realized by the farmers was Rs. 12350. The net income from chilly cultivation was Rs. -4231.91. Thus the benefit cost ratio was found to be 1:0.74.*
- *The results indicate that, 34.29 per cent of the households opined that dry fodder was adequate which includes 8.57 per cent of marginal farmers and 40 per cent of small farmers. Around 40 per cent of the households opined that green fodder was adequate. The data revealed that 8.57 per cent of the farmers opined that dry fodder is inadequate.*
- *The results indicated that, banana, Bengal gram, chilly, groundnut, jowar, onion, redgram and sorghum were sold to the extent of 100 per cent.*
- *Around 34.29 per cent of the households have sold their produce to agents/traders, 68.57 per cent of the households have sold their produce to village merchants, 28.57 per cent of the households have sold their produce in regulated markets and 11.43 per cent of the households have sold their produce in cooperative marketing society.*
- *Around 17.14 per cent of the households have carried head load, 77.14 per cent have used cart and 57.14 per cent have used tractor as a mode of transport for their agricultural produce.*
- *The results indicated that, 11.43 per cent of the households have shown interest in soil testing i.e. 22.22 per cent of marginal farmers, 10 per cent of small farmers and 14.29 per cent of medium farmers have shown interest in soil testing.*
- *The results indicated that, 14.29 per cent of the households have adopted field bunding which includes 22.22 per cent of marginal, 20 per cent of small farmers, and 14.29 per cent of medium farmers.*
- *Around 8.57 per cent of soil conservation structure is constructed by farmers on their own, and another 5.71 per cent is constructed by farmers' organization.*
- *The results indicated that, 3.03 per cent of the households used dung cake as a source of fuel, 93.94 per cent used fire wood and another 3.03 per cent of the households used LPG.*
- *Piped supply was the major source for drinking water for 48.57 per cent of the households, bore well was the major source for 40 per cent of the households, open*

well was the major source for 11.43 per cent of the households and canal was the major source of drinking water for 2.86 per cent of the households.

- *Electricity was the major source of light for 100 per cent of the households in micro watershed.*
- *The results indicated that, 37.14 per cent of the households possess sanitary toilet i.e. 50 per cent of landless, 44.44 per cent of the marginal, 30 per cent of the small, 50 per cent of the semi medium and 14.29 per cent of the medium farmers had sanitary toilet facility.*
- *Around 80 per cent of the sampled households possessed BPL card and 14.29 per cent possessed APL card.*
- *Around 60 per cent of the households participated in NREGA programme which included 100 per cent of landless farmers, 33.33 percent of the marginal, 50 per cent of the small, 66.67 per cent of the semi medium, 85.71 percent of the medium farmers and 100 per cent of the small farmers.*
- *The results indicated that, cereals were adequate for 97.14 per cent of the households, pulses were adequate for 60 per cent of the households, oilseeds were adequate for 20 per cent of the households, vegetables were adequate for 40 per cent of the households, fruits were adequate for 25.71 per cent of the households, milk was adequate for 48.57 per cent of the households, eggs were adequate for 22.86 per cent of the households and meat was adequate for 28.57 per cent of the households.*
- *The results indicated that, lower fertility status of the soil was the constraint experienced by 3.03 per cent of the households, wild animal menace on farm field (60.61%), frequent incidence of pest and diseases (51.52%), high cost of Fertilizers and plant protection chemicals (15.15%), high rate of interest on credit (24.24%), lack of marketing facilities in the area (12.12%), lack of transport for safe transport of the agricultural produce to the market (90.91%), less rainfall (100%), source of Agri-technology information(Newspaper/TV/Mobile) (96.97).*

Chapter 2

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.

Chapter 3

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 Jainas. 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.[2] The Koppal district was formed after split of Raichur district.

Geographers are very particular about the physiography or relief of a region. It plays a very important role in the spatial analysis of agricultural situation of the study area. The undulating topography with black cotton soil shrips, cut across by numerous nalas or streams is the major characteristic feature of the study region. Three physiographic divisions have made considering the local conditions of landforms and crops grown in the district. On the basis of physiography, Koppal district can be divided into three major divisions.3 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 Ephemaral in nature, these come under Tungabhadra sub-basin. The drainage exhibit dentritic to subdentric 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

Budihalu micro-watershed (Hire shindhogi sub-watershed, Koppal Taluk and District) is located at North latitude 15^0 15’ 32.764” and 15^0 18’ 0.063” and East longitude 76^0 4’ 17.265” and 76^0 6’ 30.764” covering an area of 791.93 ha and spread across Budihalu, Hire shindhogi, Chikka shindhogi and Bisarahallil 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.

Chapter 4

SALIENT FEATURES OF THE SURVEY

Households sampled for socio-economic survey: The data on households sampled for socio economic survey in Budihalu micro watershed is presented in Table 1 and it indicated that 35 farmers were sampled in Budihalu micro watershed among them 2 (5.71%) were landless, 9 (25.71%) were marginal farmers, 10 (28.57%) were small farmers, 6 (17.14%) were semi medium farmers, 6 (17.14%) were medium farmers and 2 (5.17%) were large farmers.

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

Sl.No.	Particulars	LL (2)		MF (9)		SF (10)		SMF (6)		MDF (6)		LF (2)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Farmers	2	5.71	9	25.71	10	28.57	6	17.14	6	17.14	2	5.71	35	100

Population characteristics: The population characteristics of households sampled for socio-economic survey in Budihalu micro watershed is presented in Table 2. The data indicated that there were 97 (53.59%) men and 84 (46.41%) were women among the sampled households. The average family size of landless farmers' was 4.5, marginal farmers' was 4.4, small farmers' was 5.0, semi medium farmers' was 5.2, medium farmers' was 6.2 and for large farmers' it was 7.0.

Table 2. Population characteristics of Budihalu micro-watershed

Sl. No.	Particulars	LL (9)		MF (40)		SF (50)		SMF(31)		MDF(37)		LF (14)		All (181)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Male	5	55.56	22	55.00	32	64.00	16	51.61	17	45.95	5	35.71	97	53.59
2	Female	4	44.44	18	45.00	18	36.00	15	48.39	20	54.05	9	64.29	84	46.41
Total		9	100	40	100	50	100	31	100	37	100	14	100	181	100
Average		4.5		4.4		5.0		5.2		6.2		7.0		5.2	

Age wise classification of population: The age wise classification of household members in Budihalu micro watershed is presented in Table 3. The data indicated that 22 (12.15%) people were in 0-15 years of age, 76 (41.99%) were in 16-35 years of age, 62 (34.25 %) were in 36-60 years of age and 21 (11.60%) were above 61 years of age.

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

Sl. No.	Particulars	LL (9)		MF(40)		SF (50)		SMF(31)		MDF(37)		LF (14)		All (181)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	0-15 years of age	3	33.3	5	12.5	5	10.00	3	9.68	2	5.41	4	28.57	22	12.15
2	16-35 years of age	4	44.4	14	35.0	25	50.00	13	41.94	17	45.95	3	21.43	76	41.99
3	36-60 years of age	2	22.2	17	42.5	16	32.00	12	38.71	11	29.73	4	28.57	62	34.25
4	> 61 years	0	0.0	4	10.0	4	8.00	3	9.68	7	18.92	3	21.43	21	11.60
Total		9	100.0	40	100	50	100	31	100	37	100	14	100	181	100

Education level of household members: Education level of household members in Budihalu micro watershed is presented in Table 4. The results indicated that the Budihalu had 34.81 per cent illiterates, 0.55 per cent were functional literates, 19.89 per cent of the people had primary school education, 6.63 per cent of them had middle school education,

16.02 per cent of them had high school education, 10.50 per cent of them had PUC education, 5.52 per cent of them had degree education and 0.55 had studied ITI.

Table 4. Education level of household members in Budihalu micro watershed

Sl. No.	Particulars	LL (9)		MF (40)		SF (50)		SMF (31		MDF(37)		LF (14)		All (181)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Illiterate	1	11.11	17	42.50	14	28.00	15	48.39	13	35.14	3	21.43	63	34.81
2	Functional Literate	0	0.00	1	2.50	0	0.00	0	0.00	0	0.00	0	0.00	1	0.55
3	Primary School	2	22.22	9	22.50	12	24.00	3	9.68	7	18.92	3	21.43	36	19.89
4	Middle School	1	11.11	2	5.00	6	12.00	2	6.45	1	2.70	0	0.00	12	6.63
5	High School	1	11.11	5	12.50	7	14.00	6	19.35	9	24.32	1	7.14	29	16.02
6	PUC	1	11.11	3	7.50	6	12.00	4	12.90	4	10.81	1	7.14	19	10.50
7	Diploma	1	11.11	0	0.00	0	0.00	1	3.23	0	0.00	0	0.00	2	1.10
8	ITI	0	0.00	1	2.50	0	0.00	0	0.00	0	0.00	0	0.00	1	0.55
9	Degree	1	11.11	1	2.50	4	8.00	0	0.00	3	8.11	1	7.14	10	5.52
10	Masters	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	2	14.29	2	1.10
11	Others	1	11.11	1	2.50	1	2.00	0	0.00	0	0.00	3	21.43	6	3.31
Total		9	100	40	100	50	100	31	100	37	100	14	100	181	100

Occupation of household heads: The data regarding the occupation of the household heads in Budihalu micro watershed is presented in Table 5. The results indicate that, 91.43 per cent of households practicing agriculture, 2.86 per cent of the household heads were in government service and 8.57 per cent of the households heads had other occupation.

Table 5: Occupation of household heads in Budihalu micro watershed

Sl.No.	Particulars	LL (2)		MF (9)		SF (10)		SMF (6)		MDF (6)		LF (2)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Agriculture	2	100	10	111.11	8	80	5	83.33	5	83.33	2	100	32	91.43
2	Government Service	0	0	0	0	1	10	0	0	0	0	0	0	1	2.86
3	Others	0	0	0	0	1	10	1	16.67	1	16.67	0	0	3	8.57
Total		2	100	10	100	10	100	6	100	6	100	2	100	36	100

Table 6: Occupation of family members in Budihalu micro watershed

Sl. No.	Particulars	LL (9)		MF (40)		SF (50)		SMF (31)		MDF (37)		LF (14)		All (181)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Agriculture	3	33.33	29	72.50	25	50.00	22	70.97	17	45.95	5	35.71	101	55.80
2	Agricultural Labour	1	11.11	0	0.00	6	12.00	2	6.45	14	37.84	3	21.43	26	14.36
3	General Labour	0	0.00	0	0.00	1	2.00	0	0.00	0	0.00	0	0.00	1	0.55
4	Household industry	0	0.00	0	0.00	1	2.00	0	0.00	0	0.00	0	0.00	1	0.55
5	Government Service	1	11.11	0	0.00	1	2.00	0	0.00	0	0.00	1	7.14	3	1.66
6	Private Service	0	0.00	0	0.00	1	2.00	0	0.00	0	0.00	0	0.00	1	0.55
7	Trade & Business	0	0.00	0	0.00	1	2.00	0	0.00	0	0.00	0	0.00	1	0.55
8	Student	4	44.44	7	17.50	10	20.00	4	12.90	3	8.11	2	14.29	30	16.57
9	Others	0	0.00	0	0.00	1	2.00	2	6.45	2	5.41	0	0.00	5	2.76
10	Housewife	0	0.00	1	2.50	2	4.00	1	3.23	1	2.70	1	7.14	6	3.31
11	Children	0	0.00	3	7.50	1	2.00	0	0.00	0	0.00	2	14.29	6	3.31
Total		9	100	40	100	50	100	31	100	37	100	14	100	181	100

Occupation of the household members: The data regarding the occupation of the household members in Budihalu micro watershed is presented in Table 6. The results indicate that agriculture was the major occupation for 55.80 per cent of the household members, 14.36 per cent were agricultural labourers, 16.57 per cent were students, 3.31 per cent were children and housewives, 1.66 per cent were in government service.

Institutional participation of the household members: The data regarding the institutional participation of the household members in Budihalu micro watershed is presented in Table 7. The results show that 96.69 per cent of the population has not participated in any local institution, 1.10 per cent have participated in sthree shakthi sangha and 0.55 per cent each have participated in gram panchayat, taluk panchayat, dairy cooperative and raitha sangha.

Table 7. Institutional Participation of household members in Budihalu micro watershed

Sl. No.	Particulars	LL (9)		MF (40)		SF (50)		SMF (31)		MDF (37)		LF (14)		All (181)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Gram Panchayat	0	0	0	0	1	2	0	0	0	0	0	0	1	0.55
2	Taluk Panchayat	0	0	0	0	1	2	0	0	0	0	0	0	1	0.55
3	Sthree Shakthi Sangha	0	0	1	2.50	1	2	0	0	0	0	0	0	2	1.10
4	Dairy Cooperative	0	0	1	2.50	0	0	0	0	0	0	0	0	1	0.55
5	Raitha Sangha	0	0	0	0	1	2	0	0	0	0	0	0	1	0.55
6	No Participation	9	100	38	95	46	92	31	100	37	100	14	100	175	96.69
Total		9	100	40	100	50	100	31	100	37	100	14	100	181	100

Type of house owned: The data regarding the type of house owned by the households in Budihalu micro watershed is presented in Table 8. The results indicate that 68.57 per cent of the households possess Katcha house, 11.43 per cent of them possess pucca house, 2.86 per cent of them possess thatched house and 17.14 per cent of them possess semi pucca house.

Table 8. Type of house owned by households in Budihalu micro watershed

Sl.No.	Particulars	LL (2)		MF (9)		SF (10)		SMF (6)		MDF (6)		LF (2)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Thatched	0	0.00	0	0.00	1	10.00	0	0.00	0	0.00	0	0.00	1	2.86
2	Katcha	2	100	4	44.44	7	70.00	5	83.33	5	83.33	1	50.00	24	68.57
3	Pucca/RCC	0	0.00	1	11.11	2	20.00	1	16.67	0	0.00	0	0.00	4	11.43
4	Semi pacca	0	0.00	4	44.44	0	0.00	0	0.00	1	16.67	1	50.00	6	17.14
Total		2	100	9	100	10	100	6	100	6	100	2	100	35	100

Durable Assets owned by the households: The data regarding the Durable Assets owned by the households in Budihalu micro watershed is presented in Table 9. The results shows that 74.29 per cent of the households possess TV, 17.14 per cent of the households possess Mixer grinder, 42.86 per cent of the households possess bicycle, 34.29 per cent of the households possess motor cycle, 82.86 per cent of the households

possess mobile phones, 2.86 per cent of the households possess radio, 5.71 per cent of the households possess DVD player and 5.71 per cent of the households possess auto.

Table 9. Durable Assets owned by households in Budihalu micro watershed

Sl.No.	Particulars	LL (2)		MF (9)		SF (10)		SMF (6)		MDF (6)		LF (2)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Radio	0	0	0	0	0	0	0	0	1	16.67	0	0	1	2.86
2	Television	1	50	3	33.33	9	90	5	83.33	6	100	2	100	26	74.29
3	DVD/VCD Player	0	0	0	0	1	10	0	0	1	16.67	0	0	2	5.71
4	Mixer/Grinder	1	50	1	11.11	2	20	0	0	1	16.67	1	50	6	17.14
5	Bicycle	0	0	6	66.67	4	40	2	33.33	3	50	0	0	15	42.86
6	Motor Cycle	1	50	1	11.11	3	30	3	50	3	50	1	50	12	34.29
7	Auto	0	0	0	0	2	20	0	0	0	0	0	0	2	5.71
8	Mobile Phone	1	50	7	77.78	10	100	4	66.67	5	83.33	2	100	29	82.86
9	Blank	1	50	1	11.11	0	0	1	16.67	0	0	0	0	3	8.57

Average value of durable assets: The data regarding the average value of durable assets owned by the households in Budihalu micro watershed is presented in Table 10. The results shows that the average value of television was Rs.4730, mixer grinder was Rs. 2033, bicycle was Rs.3686, motor cycle was Rs. 29214, auto was Rs. 175000, mobile phone was Rs.1477, radio was Rs. 1000 and DVD player was Rs. 1600.

Table 10. Average value of durable assets owned by households in Budihalu micro watershed (Avg value in Rs)

Sl.No.	Particulars	LL (2)	MF (9)	SF (10)	SMF (6)	MDF (6)	LF (2)	All (35)
1	Radio	0.00	0.00	0.00	0.00	1,000	0.00	1,000
2	Television	3,000	4,666	4,555	5,000	4,500	6,500	4,730
3	DVD/VCD Player	0.00	0.00	1,200	0.00	2,000	0.00	1,600
4	Mixer/Grinder	2,000	1,200	2,500	0.00	2,000	2,000	2,033
5	Bicycle	0.00	3,466	7,250	800	1,300	0.00	3,686
6	Motor Cycle	20,000	25,000	23,000	43,333	25,000	45,000	29,214
7	Auto	0.00	0.00	175,000	0.00	0.00	0.00	175,000
8	Mobile Phone	500	1,956	2,190	1,125	833	1,000	1,477

Farm Implements owned: The data regarding the farm implements owned by the households in Budihalu micro watershed is presented in Table 11. About 17.14 per cent of the households possess plough, 22.86 per cent of them possess bullock cart, 2.86 per cent of the households possess sprayer, and 2.86 per cent of the households possess tractor.

Table 11. Farm Implements owned by households in Budihalu micro watershed

Sl.No.	Particulars	LL (2)		MF (9)		SF (10)		SMF (6)		MDF (6)		LF (2)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Bullock Cart	0	0	3	33.33	2	20	1	16.67	1	16.67	1	50	8	22.86
2	Plough	0	0	2	22.22	1	10	1	16.67	2	33.33	0	0	6	17.14
3	Tractor	0	0	0	0	0	0	0	0	1	16.67	0	0	1	2.86
4	Sprayer	0	0	0	0	0	0	0	0	1	16.67	0	0	1	2.86
5	Blank	2	100	6	66.67	8	80	5	83.33	3	50	1	50	25	71.43

Average value of farm implements: The data regarding the average value of farm Implements owned by the households in Budihalu micro watershed is presented in Table 12. The results show that the average value of plough was Rs.2333, bullock cart was Rs.22250, sprayer was Rs.3000 and tractor was Rs.300000.

Table 12. Average value of farm implements owned by households in Budihalu micro watershed (Avg value in Rs)

Sl.No.	Particulars	LL(2)	MF (9)	SF (10)	SMF (6)	MDF (6)	LF (2)	All (35)
1	Bullock Cart	0.00	17,666.00	25,000.00	35,000.00	25,000.00	15,000.00	22,250.00
2	Plough	0.00	2,000.00	3,000.00	2,000.00	2,500.00	0.00	2,333.00
3	Tractor	0.00	0.00	0.00	0.00	300,000.00	0.00	300,000.00
4	Sprayer	0.00	0.00	0.00	0.00	3,000.00	0.00	3,000.00

Livestock possession by the households: The data regarding the Livestock possession by the households in Budihalu micro watershed is presented in Table 13. The results indicate that, 20 per cent of the households possess bullocks, 25.17 per cent of the households possess local cow, 8.57 per cent of the households possess crossbred cows, 2.86 per cent of the households possess buffalo, 8.57 per cent of the households possess goat, 5.71 per cent of the households possess sheep and 45.71 per cent of the households possess poultry birds.

Table 13. Livestock possession by households in Budihalu micro watershed

Sl.No.	Particulars	LL (2)		MF (9)		SF (10)		SMF (6)		MDF (6)		LF (2)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Bullock	0	0	3	33.33	2	20	1	16.67	1	16.67	0	0	7	20
2	Local cow	1	50	0	0	3	30	3	50	2	33.33	0	0	9	25.71
3	Crossbred cow	0	0	0	0	0	0	1	16.67	1	16.67	1	50	3	8.57
4	Buffalo	0	0	0	0	0	0	0	0	0	0	1	50	1	2.86
5	Sheep	0	0	0	0	1	10	0	0	1	16.67	0	0	2	5.71
6	Goat	0	0	2	22.22	0	0	1	16.67	0	0	0	0	3	8.57
8	Poultry birds	0	0	0	0	0	0	1	16.67	0	0	0	0	1	2.86
9	blank	1	50	6	66.67	4	40	1	16.67	3	50	1	50	16	45.71

Average Labour availability: The data regarding the average labour availability in Budihalu micro watershed is presented in Table 14. The results indicate that, average own labour (men) available in the micro watershed was 2.39, average own labour (women) available was 1.67, average hired labour (men) available was 2.30 and average hired labour (women) available was 1.67.

Table 14. Average Labour availability in Budihalu micro watershed

Sl.No.	Particulars	LL (2)	MF (9)	SF (10)	SMF (6)	MDF (6)	LF (2)	All (35)
		N	N	N	N	N	N	N
1	Own labour Male	0.00	1.78	2.80	2.67	2.50	2.00	2.39
2	Own Labour Female	0.00	1.44	1.40	2.33	2.00	1.00	1.67
3	Hired labour Male	0.00	2.67	2.30	2.50	2.00	1.00	2.30
4	Hired labour Female	0.00	0.89	1.80	2.00	2.50	1.00	1.67

Adequacy of Hired Labour: The data regarding the adequacy of hired labour in Budihalu micro watershed is presented in Table 15. The results indicate that, 60 per cent of the household opined that hired labour was adequate and 34.29 per cent of the households opined that hired labour was inadequate. About 55.56 per cent of the marginal farmers, 70 per cent of small, 100 per cent of semi medium and 33.33 medium farmers and 50 per cent of large farmers have opined that the hired labour was adequate.

Table 15. Adequacy of Hired Labour in Budihalu micro watershed

Sl.No.	Particulars	LL (2)		MF (9)		SF (10)		SMF (6)		MDF (6)		LF (2)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Adequate	0	0.00	5	55.56	7	70.00	6	100	2	33.33	1	50.00	21	60.00
2	Inadequate	0	0.00	4	44.44	3	30.00	0	0.00	4	66.67	1	50.00	12	34.29

Distribution of land (ha): The data regarding the distribution of land (ha) in Budihalu micro watershed is presented in Table 16. The results indicate that, households of the Budihalu micro watershed possess 53.60 ha (73%) of dry land and 19.83 ha (27%) of irrigated land.

Table 16. Distribution of land (Ha) in Budihalu micro watershed

Sl.No.	Particulars	MF (9)		SF (10)		SMF (6)		MDF (7)		LF (1)		All (35)	
		ha	%	ha	%	ha	%	ha	%	ha	%	ha	%
1	Dry	5.99	100	10.81	91.00	6.07	50	26.68	73.85	4.05	55.56	53.60	73.00
2	Irrigated	0	0	1.07	9.00	6.07	50	9.45	26.15	3.24	44.44	19.83	27.00
Total		5.99	100	11.87	100	12.14	100	36.13	100	7.28	100	73.42	100

Average land value (Rs/ha): The data regarding the average land value (Rs/ha) in Budihalu micro watershed is presented in Table 17. The results indicate that, the average value of dry land was Rs. 170,772.45 and average value of irrigated land was Rs. 357,971.02.

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

Sl.No.	Particulars	MF (9)	SF (10)	SMF (6)	MDF (6)	LF (2)	All (35)
1	Dry	508,676.58	385,764.04	247,000.00	146,975.21	29,959.57	170,772.45
2	Irrigated	0.00	748,484.85	395,200.00	370,500.00	195,859.03	357,971.02

Status of bore wells: The data regarding the status of bore wells in Budihalu micro watershed is presented in Table 18. The results indicate that, there were 13 functioning and 5 de-functioning bore wells in the micro watershed.

Table 18. Status of bore wells in Budihalu micro watershed

Sl.No.	Particulars	LL (2)	MF (9)	SF (10)	SMF (6)	MDF (6)	LF (2)	All (35)
		N	N	N	N	N	N	N
1	De-functioning	0	0	0	1	4	0	5
2	Functioning	0	0	2	3	6	2	13

Source of irrigation: The data regarding the source of irrigation in Budihalu micro watershed is presented in Table 19. The results indicate that, bore well was the major irrigation source in the micro water shed which was possessed by small farmers, medium farmers, semi medium farmers and large farmers.

Table 19. Source of irrigation in Budihalu micro watershed

Sl.No.	Particulars	LL (2)		MF (9)		SF (10)		SMF (6)		MDF (6)		LF (2)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Bore Well	0	0.00	0	0.00	2	20.00	3	50.00	8	133.33	2	100	15	42.86

Depth of water (Avg in meters): The data regarding the irrigated area (ha) in Budihalu micro watershed is presented in Table 20. The results indicate that, the depth of bore well was found to be 34.21 meters.

Table 20. Depth of water (Avg in meters) in Budihalu micro watershed

Sl.No.	Particulars	LL(2)	MF(9)	SF(10)	SMF(6)	MDF(6)	LF (2)	All(35)
1	Bore Well	0.00	0.00	22.86	56.18	67.16	114.30	34.21

Irrigated Area (ha): The data regarding the irrigated area (ha) in Budihalu micro watershed is presented in Table 21. The results indicate that, small farmers had 1.01 ha, semi medium farmers had 5.67 ha, medium farmers had 8.24 ha and large farmers had 3.24 ha of irrigated area.

Table 21. Irrigated Area (ha) in Budihalu micro watershed

Sl.No.	Particulars	MF (9)	SF (10)	SMF (6)	MDF (7)	LF (1)	All (35)
1	Kharif	0.00	1.01	5.67	8.24	3.24	18.16
2	Rabi	0.00	0.00	0.81	0.00	0.00	0.81
Total		0.00	1.01	6.48	8.24	3.24	18.97

Table 22. Cropping pattern in Budihalu micro watershe (Area in Ha)

Sl.No.	Particulars	MF (9)	SF (10)	SMF (6)	MDF (7)	LF (1)	All (35)
1	Kharif - Maize	2.23	7.09	4.66	11.07	1.62	26.66
2	Kharif - Red gram (togari)	0	0	0	8.1	0	8.1
3	Kharif - Cotton	0.4	1.21	2.43	1.21	1.62	6.88
4	Kharif - Bajra	1.34	1.42	0	2.02	0	4.78
5	Kharif - Sunflower	0.4	0	1.62	2.02	0	4.05
6	Rabi - Maize	0.4	0	1.62	0	0	2.02
7	Kharif - Onion	0	0	0	1.62	0	1.62
8	Rabi - Bajra	0	1.62	0	0	0	1.62
9	Kharif - Sorghum	0.81	0.61	0.81	0	0	2.23
10	Rabi - Sorghum	0	0	0	1.21	0	1.21
11	Kharif - Banana	0	0	1.01	0	0	1.01
12	Rabi - Bengal gram	0	0	0	1.01	0	1.01
13	Kharif - Ground nut	0.96	0	0	0	0	0.96
14	Kharif - Bengal gram	0	0	0	0.81	0	0.81
15	Kharif - Chilly	0	0	0	0	0.81	0.81
Total		6.54	11.94	12.15	29.09	4.05	63.77

Cropping pattern: The data regarding the cropping pattern in Budihalu micro watershed is presented in Table 22. The results indicate that, farmers have grown Maize (26.66 ha), Bajra (4.78 ha), Sunflower (4.05 ha), Redgram (8.1 ha), Bengal gram (1.01 ha) and Sorghum (2.23 ha). Marginal farmers have grown maize, cotton, bajra, sunflower, sorghum and groundnut. Small farmers have grown maize, cotton, bajra, and sorghum.

Semi medium farmers have grown maize, cotton, sunflower, sorghum and banana. Medium farmers have grown maize, red gram, cotton, bajra, sunflower, onion, sorghum and bengal gram. Large farmers have grown maize, cotton and chilly.

Cropping intensity: The data regarding the cropping intensity in Budihalu micro watershed is presented in Table 23. The results indicate that, the cropping intensity in Budihalu micro watershed was found to be 61.92 per cent.

Table 23. Cropping intensity (%) in Budihalu micro watershed

Sl.No.	Particulars	LL (2)	MF (9)	SF (10)	SMF (6)	MDF (7)	LF (1)	All (35)
1	Cropping intensity	0.00	100	76.94	78.95	53.68	35.71	61.92

Possession of Bank account: The data regarding the possession of Bank account and savings in Budihalu micro watershed is presented in Table 24. The results indicate that, 22.86 per cent of the households have bank account and 17.14 per cent of the households have savings. Among landless, medium and large farmers nobody possessed bank account and savings.

Table 24. Possession of Bank account and savings in Budihalu micro watershed

Sl.No.	Particulars	LL (2)		MF (9)		SF (10)		SMF (6)		MDF (7)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Account	0	0.00	3	33.33	4	40.00	1	16.67	0	0.00	0	0.00	8	22.86
2	Savings	0	0.00	3	33.33	3	30.00	0	0.00	0	0.00	0	0.00	6	17.14

Borrowing status: The data regarding the possession of borrowing status in Budihalu micro watershed is presented in Table 25. The results indicate that, 44.44 per cent of marginal, 30 per cent of small and 16.67 per cent semi medium have borrowed credit from different sources.

Table 25. Borrowing status in Budihalu micro watershed

Sl.No.	Particulars	LL (2)		MF (9)		SF (10)		SMF (6)		MDF (7)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Credit Availed	0	0.00	4	44.44	3	30.00	1	16.67	0	0.00	0	0.00	8	22.86

Source of credit: The data regarding the source of credit availed by households in Budihalu micro watershed is presented in Table 26. The results indicate that, 25 per cent have availed loan from commercial bank, 12.5 per cent have availed loan from cooperative bank, 37.5 per cent have availed loan from grameena bank and 12.5 per cent have availed loan from money lender.

Table 26. Source of credit availed by households in Budihalu micro watershed

Sl.No.	Particulars	LL (0)		MF (4)		SF (3)		SMF (1)		MDF (0)		LF (0)		All (8)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Commercial Bank	0	0.00	1	25.00	0	0.00	0	0.00	0	0.00	0	0.00	1	25.00
2	Cooperative Bank	0	0.00	1	25.00	0	0.00	0	0.00	0	0.00	0	0.00	1	12.50
3	Grameena Bank	0	0.00	0	0.00	2	66.67	1	100	0	0.00	0	0.00	3	37.50
4	Money Lender	0	0.00	0	0.00	1	33.33	0	0.00	0	0.00	0	0.00	1	12.50

Average credit amount: The data regarding the average credit amount availed by households in Budihalu micro watershed is presented in Table 27. The results indicate that, marginal, small, and semi medium farmers have availed Rs. 15500, Rs. 43333, and Rs. 80000 respectively. Overall average credit amount availed by households in the micro watershed is Rs. 234000.

Table 27. Average Credit amount availed by households in Budihalu micro watershed (Rupees.)

Sl.No.	Particulars	MF (4)	SF (3)	SMF (1)	MDF (0)	LF (0)	All (8)
1	Average Credit	15,500.00	43,333.33	80,000.00	0.00	0.00	234,000.00

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

Table 28. Purpose of credit borrowed (institutional Source) by households in Budihalu micro watershed

Sl.No.	Particulars	MF (1)		SF (2)		SMF (1)		MDF (1)		All (5)	
		N	%	N	%	N	%	N	%	N	%
1	Agriculture production	1	100	2	100	1	100	1	100	5	100

Repayment status of households (Institutional): The data regarding the repayment status of credit borrowed from institutional sources by households in Budihalu micro watershed is presented in Table 29. The results indicate that, 16.67 per cent of the households have repaid their loan partially. The data also shows that 66.67 per cent of households have unpaid their loans and only 16.67 per cent of households have fully repaid their loans.

Table 29. Repayment status of households (Institutional) **in Budihalu micro watershed**

Sl.No.	Particulars	LL (0)		MF (2)		SF (2)		SMF (1)		MDF (1)		LF (0)		All (6)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Partially paid	0	0.00	1	50.00	0	0.00	0	0.00	0	0.00	0	0.00	1	16.67
2	Un paid	0	0.00	0	0.00	2	100	1	100	1	100	0	0.00	4	66.67
3	Fully paid	0	0.00	1	50.00	0	0.00	0	0.00	0	0.00	0	0.00	1	16.67

Repayment status of households (Private): The data regarding the repayment status of credit borrowed from private sources by households in Budihalu micro watershed is presented in Table 30. Results indicated that 100 per cent of the households have not repaid their loan.

Table 30. Repayment status of households (Private) in Budihalu micro watershed

Sl.No.	Particulars	LL (0)		MF (0)		SF (1)		SMF (0)		MDF (0)		LF (0)		All (1)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Un paid	0	0.00	0	0.00	1	100	0	0.00	0	0.00	0	0.00	1	100

Cost of Cultivation of Maize: The data regarding the cost of cultivation of maize in Budihalu micro watershed is presented in Table 31. The results indicate that, the total cost of cultivation for maize was Rs. 30217.71. The gross income realized by the farmers was Rs. 37123.44. The net income from maize cultivation was Rs. 6905.72, thus the benefit cost ratio was found to be 1:1.23.

Table 31. Cost of Cultivation of Maize in Budihalu micro watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	35.49	6417.01	21.24
2	Bullock		Pairs/day	2.07	1140.65	3.77
3	Tractor		Hours	3.06	2073.79	6.86
4	Machinery		Hours	1.62	1500.13	4.96
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	19.39	2624.97	8.69
6	Seed Inter Crop		Kgs.	0.00	0.00	0.00
7	FYM		Quintal	16.39	2599.61	8.60
8	Fertilizer + micronutrients		Quintal	3.78	3578.37	11.84
9	Pesticides (PPC)		Kgs /liters	1.11	1034.15	3.42
10	Irrigation		Number	2.56	0.00	0.00
11	Repairs			0.00	0.00	0.00
12	Msc. Charges (Marketing costs etc)			0.00	0.00	0.00
13	Depreciation charges			0.00	207.27	0.69
14	Land revenue and Taxes			0.00	4.63	0.02
II	**Cost B1**					
16	Interest on working capital				1180.73	3.91
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**				22361.32	74.00
III	**Cost B2**					
18	Rental Value of Land				279.44	0.92
19	**Cost B2 = (Cost B1 + Rental value)**				22640.76	74.93
IV	**Cost C1**					
20	Family Human Labour			21.72	4827.59	15.98
21	**Cost C1 = (Cost B2 + Family Labour)**				27468.36	90.90
V	**Cost C2**					
22	Risk Premium				2.29	0.01
23	**Cost C2 = (Cost C1 + Risk Premium)**				27470.65	90.91
VI	**Cost C3**					
24	Managerial Cost				2747.06	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**				30217.71	100
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		22.58	29921.85	
		b) Main Crop Sales Price (Rs.)			1325.00	
	By Product	e) Main Product (q)		13.83	7201.59	
		f) Main Crop Sales Price (Rs.)			520.83	
b.	Gross Income (Rs.)				37123.44	
c.	Net Income (Rs.)				6905.72	
d.	Cost per Quintal (Rs./q.)				1338.10	
e.	Benefit Cost Ratio (BC Ratio)				1:1.23	

Cost of cultivation of Red gram: The data regarding the cost of cultivation of redgram in Budihalu micro watershed is presented in Table 32. The results indicate that, the total cost of cultivation for redgram was Rs. 10077.65. The gross income realized by the farmers was Rs. 14806.28. The net income from redgram cultivation was Rs.4728.63. Thus the benefit cost ratio was found to be 1:1.47.

Table 32. Cost of Cultivation of Red gram in Budihalu micro watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	13.49	2305.33	22.88
2	Bullock		Pairs/day	0.82	494.00	4.90
3	Tractor		Hours	1.46	1138.94	11.30
4	Machinery		Hours	0.00	0.00	0.00
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	11.21	1514.02	15.02
6	Seed Inter Crop		Kgs.	0.00	0.00	0.00
7	FYM		Quintal	2.74	548.89	5.45
8	Fertilizer + micronutrients		Quintal	1.10	885.08	8.78
9	Pesticides (PPC)		Kgs / liters	0.27	274.44	2.72
10	Irrigation		Number	0.00	0.00	0.00
11	Repairs			0.00	0.00	0.00
12	Msc. Charges (Marketing costs etc)			0.00	0.00	0.00
13	Depreciation charges			0.00	123.50	1.23
14	Land revenue and Taxes			0.00	3.84	0.04
II	**Cost B1**					
16	Interest on working capital				386.77	3.84
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**				7674.83	76.16
III	**Cost B2**					
18	Rental Value of Land				333.33	3.31
19	**Cost B2 = (Cost B1 + Rental value)**				8008.17	79.46
IV	**Cost C1**					
20	Family Human Labour			5.95	1152.67	11.44
21	**Cost C1 = (Cost B2 + Family Labour)**				9160.83	90.90
V	**Cost C2**					
22	Risk Premium				0.67	0.01
23	**Cost C2 = (Cost C1 + Risk Premium)**				9161.50	90.91
VI	**Cost C3**					
24	Managerial Cost				916.15	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**				10077.65	100
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		5.35	14806.28	
		b) Main Crop Sales Price (Rs.)			2766.67	
b.	Gross Income (Rs.)				14806.28	
c.	Net Income (Rs.)				4728.63	
d.	Cost per Quintal (Rs./q.)				1883.09	
e.	Benefit Cost Ratio (BC Ratio)				1:1.47	

Cost of Cultivation of Cotton: The data regarding the cost of cultivation of cotton in Budihalu micro watershed is presented in Table 33. The results indicate that, the total cost of cultivation for cotton was Rs. 34942.88. The gross income realized by the farmers was Rs. 54239.18. The net income from cotton cultivation was Rs. 19296.30, thus the benefit cost ratio was found to be 1:1.55.

Table 33. Cost of Cultivation of Cotton in Budihalu micro watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	35.29	6807.79	19.48
2	Bullock		Pairs/day	1.59	917.43	2.63
3	Tractor		Hours	3.68	2442.07	6.99
4	Machinery		Hours	1.03	970.36	2.78
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	12.23	5348.73	15.31
6	Seed Inter Crop		Kgs.	0.00	0.00	0.00
7	FYM		Quintal	9.76	2599.38	7.44
8	Fertilizer + micronutrients		Quintal	3.94	4004.93	11.46
9	Pesticides (PPC)		Kgs / ltrs	1.21	870.38	2.49
10	Irrigation		Number	3.91	0.00	0.00
11	Repairs			0.00	0.00	0.00
12	Msc. Charges (Marketing costs etc)			0.00	0.00	0.00
13	Depreciation charges			0.00	7.08	0.02
14	Land revenue and Taxes			0.00	5.76	0.02
II	**Cost B1**					
16	Interest on working capital				1539.32	4.41
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**				25513.23	73.01
III	**Cost B2**					
18	Rental Value of Land				338.10	0.97
19	**Cost B2 = (Cost B1 + Rental value)**				25851.32	73.98
IV	**Cost C1**					
20	Family Human Labour			24.55	5910.65	16.92
21	**Cost C1 = (Cost B2 + Family Labour)**				31761.97	90.90
V	**Cost C2**					
22	Risk Premium				4.29	0.01
23	**Cost C2 = (Cost C1 + Risk Premium)**				31766.26	90.91
VI	**Cost C3**					
24	Managerial Cost				3176.63	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**				34942.88	100
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		14.11	54239.18	
		b) Main Crop Sales Price (Rs.)			3842.86	
b.	Gross Income (Rs.)				54239.18	
c.	Net Income (Rs.)				19296.30	
d.	Cost per Quintal (Rs./q.)				2475.71	
e.	Benefit Cost Ratio (BC Ratio)				1:1.55	

Cost of Cultivation of Bajra: The data regarding the cost of cultivation of bajra in Budihalu micro watershed is presented in Table 34. The results indicate that, the total cost of cultivation for bajra was Rs. 54100.63. The gross income realized by the farmers was Rs. 12054.82. The net income from bajra cultivation was Rs. -42045.81. Thus the benefit cost ratio was found to be 1:0.22.

Table 34. Cost of Cultivation of Bajra in Budihalu micro watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	81.53	15667.85	28.96
2	Bullock		Pairs/day	12.27	6275.43	11.60
3	Tractor		Hours	2.10	1383.20	2.56
4	Machinery		Hours	3.36	2459.14	4.55
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	8.91	1005.18	1.86
6	Seed Inter Crop		Kgs.	0.00	0.00	0.00
7	FYM		Quintal	22.20	3503.39	6.48
8	Fertilizer + micronutrients		Quintal	4.92	5009.03	9.26
9	Pesticides (PPC)		Kgs/liters	1.40	1399.67	2.59
10	Irrigation		Number	4.12	0.00	0.00
11	Repairs			0.00	0.00	0.00
12	Msc. Charges (Marketing costs etc)			0.00	0.00	0.00
13	Depreciation charges			0.00	157.04	0.29
14	Land revenue and Taxes			0.00	4.12	0.01
II	**Cost B1**					
16	Interest on working capital				1310.28	2.42
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**				38174.33	70.56
III	**Cost B2**					
18	Rental Value of Land				457.14	0.84
19	**Cost B2 = (Cost B1 + Rental value)**				38631.47	71.41
IV	**Cost C1**					
20	Family Human Labour			54.38	10549.21	19.50
21	**Cost C1 = (Cost B2 + Family Labour)**				49180.68	90.91
V	**Cost C2**					
22	Risk Premium				1.71	0.00
23	**Cost C2 = (Cost C1 + Risk Premium)**				49182.39	90.91
VI	**Cost C3**					
24	Managerial Cost				4918.24	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**				54100.63	100
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		9.38	11098.02	
		b) Main Crop Sales Price (Rs.)			1183.33	
	By Product	e) Main Product (q)		9.26	956.80	
		f) Main Crop Sales Price (Rs.)			103.33	
b.	Gross Income (Rs.)				12054.82	
c.	Net Income (Rs.)				-42045.81	
d.	Cost per Quintal (Rs./q.)				5768.51	
e.	Benefit Cost Ratio (BC Ratio)				1:0.22	

Cost of cultivation of Sunflower: The data regarding the cost of cultivation of sunflower in Budihalu micro watershed is presented in Table 35. The results indicate that, the total cost of cultivation for sunflower was Rs. 31049.45. The gross income realized by the farmers was Rs. 31250.07. The net income from sunflower cultivation was Rs. 200.63. Thus the benefit cost ratio was found to be 1:1.01.

Table 35. Cost of Cultivation of Sunflower in Budihalu micro watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	37.92	7063.69	22.75
2	Bullock		Pairs/day	4.17	2145.81	6.91
3	Tractor		Hours	2.06	1265.88	4.08
4	Machinery		Hours	1.03	864.50	2.78
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	5.35	3725.58	12.00
6	Seed Inter Crop		Kgs.	0.00	0.00	0.00
7	FYM		Quintal	29.50	3224.72	10.39
8	Fertilizer + micronutrients		Quintal	2.57	2922.83	9.41
9	Pesticides (PPC)		Kgs /liters	0.72	555.75	1.79
10	Irrigation		Number	0.00	0.00	0.00
11	Repairs			0.00	0.00	0.00
12	Msc. Charges (Marketing costs etc)			0.00	0.00	0.00
13	Depreciation charges			0.00	1528.32	4.92
14	Land revenue and Taxes			0.00	2.88	0.01
II	**Cost B1**					
16	Interest on working capital				1251.77	4.03
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**				24551.73	79.07
III	**Cost B2**					
18	Rental Value of Land				425.00	1.37
19	**Cost B2 = (Cost B1 + Rental value)**				24976.73	80.44
IV	**Cost C1**					
20	Family Human Labour			15.80	3247.54	10.46
21	**Cost C1 = (Cost B2 + Family Labour)**				28224.27	90.90
V	**Cost C2**					
22	Risk Premium				2.50	0.01
23	**Cost C2 = (Cost C1 + Risk Premium)**				28226.77	90.91
VI	**Cost C3**					
24	Managerial Cost				2822.68	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**				31049.45	100
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		7.68	31250.07	
		b) Main Crop Sales Price (Rs.)			4066.67	
b.	Gross Income (Rs.)				31250.07	
c.	Net Income (Rs.)				200.63	
d.	Cost per Quintal (Rs./q.)				4040.56	
e.	Benefit Cost Ratio (BC Ratio)				1:1.01	

Cost of cultivation of Onion: The data regarding the cost of cultivation of onion in Budihalu micro watershed is presented in Table 36. The results indicate that, the total cost of cultivation for onion was Rs. 16968.62. The gross income realized by the farmers was Rs. 19924.67. The net income from onion cultivation was Rs. 2956.05. Thus the benefit cost ratio was found to be 1:1.17.

Table 36. Cost of Cultivation of Onion in Budihalu micro watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	25.32	4631.25	26.45
2	Bullock		Pairs/day	0.00	0.00	0.00
3	Tractor		Hours	1.85	1389.38	7.94
4	Machinery		Hours	0.62	463.13	2.65
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	4.32	2809.63	16.05
6	Seed Inter Crop		Kgs.	0.00	0.00	0.00
7	FYM		Quintal	12.35	1235.00	7.05
8	Fertilizer + micronutrients		Quintal	1.24	938.60	5.36
9	Pesticides (PPC)		Kgs / liters	1.24	1235.00	7.05
10	Irrigation		Number	1.24	0.00	0.00
11	Repairs			0.00	0.00	0.00
12	Msc. Charges (Marketing costs etc)			0.00	0.00	0.00
13	Depreciation charges			0.00	0.01	0.00
14	Land revenue and Taxes			0.00	4.94	0.03
II	**Cost B1**					
16	Interest on working capital				746.19	4.26
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**				13453.11	76.84
III	**Cost B2**					
18	Rental Value of Land				333.33	1.90
19	**Cost B2 = (Cost B1 + Rental value)**				13786.45	78.74
IV	**Cost C1**					
20	Family Human Labour			8.65	2130.38	12.17
21	**Cost C1 = (Cost B2 + Family Labour)**				15916.82	90.91
V	**Cost C2**					
22	Risk Premium				0.00	0.00
23	**Cost C2 = (Cost C1 + Risk Premium)**				15916.82	90.91
VI	**Cost C3**					
24	Managerial Cost				1591.68	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**				17508.50	100
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		30.88	61750.00	
		b) Main Crop Sales Price (Rs.)			2000.00	
b.	Gross Income (Rs.)				61750.00	
c.	Net Income (Rs.)				44241.50	
d.	Cost per Quintal (Rs./q.)				567.08	
e.	Benefit Cost Ratio (BC Ratio)				1:3.53	

Cost of cultivation of Sorghum: The data regarding the cost of cultivation of sorghum in Budihalu micro watershed is presented in Table 37. The results indicate that, the total cost of cultivation for sorghum was Rs. 17508.50. The gross income realized by the farmers was Rs. 61750. The net income from sorghum cultivation was Rs. 44241.50. Thus the benefit cost ratio was found to be 1:3.53.

Table 37. Cost of Cultivation of Sorghum in Budihalu micro watershed

Sl.No	Particulars	Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**				
1	Hired Human Labour	Man days	53.52	9118.42	33.59
2	Bullock	Pairs/day	1.24	617.50	2.27
3	Tractor	Hours	1.24	926.25	3.41
4	Machinery	Hours	0.82	617.50	2.27
5	Seed Main Crop (Establishment and Maintenance)	Kgs (Rs.)	8.23	1086.80	4.00
6	Seed Inter Crop	Kgs.	0.00	0.00	0.00
7	FYM	Quintal	40.14	6051.50	22.29
8	Fertilizer + micronutrients	Quintal	2.26	1564.33	5.76
9	Pesticides (PPC)	Kgs /liters	0.00	0.00	0.00
10	Irrigation	Number	0.00	0.00	0.00
11	Repairs		0.00	0.00	0.00
12	Msc. Charges (Marketing costs etc)		0.00	0.00	0.00
13	Depreciation charges		0.00	0.03	0.00
14	Land revenue and Taxes		0.00	4.12	0.02
II	**Cost B1**				
16	Interest on working capital			1044.32	3.85
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**			21030.76	77.48
III	**Cost B2**				
18	Rental Value of Land			383.33	1.41
19	**Cost B2 = (Cost B1 + Rental value)**			21414.09	78.89
IV	**Cost C1**				
20	Family Human Labour		15.44	3262.46	12.02
21	**Cost C1 = (Cost B2 + Family Labour)**			24676.55	90.91
V	**Cost C2**				
22	Risk Premium			0.00	0.00
23	**Cost C2 = (Cost C1 + Risk Premium)**			24676.55	90.91
VI	**Cost C3**				
24	Managerial Cost			2467.66	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**			27144.21	100
VII	**Economics of the Crop**				
a.	Main Product	a) Main Product (q)	9.67	9674.17	
		b) Main Crop Sales Price (Rs.)		1000.00	
b.	Gross Income (Rs.)			9674.17	
c.	Net Income (Rs.)			-17470.04	
d.	Cost per Quintal (Rs./q.)			2805.84	
e.	Benefit Cost Ratio (BC Ratio)			1:0.36	

Cost of cultivation of Banana: The data regarding the cost of cultivation of banana in Budihalu micro watershed is presented in Table 38. The results indicate that, the total cost of cultivation for banana was Rs. 40661.40. The gross income realized by the farmers was Rs. 3161600. The net income from banana cultivation was Rs. 3120938.60. Thus the benefit cost ratio was found to be 1:77.75.

Table 38. Cost of Cultivation of Banana in Budihalu micro watershed

Sl.No	Particulars	Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**				
1	Hired Human Labour	Man days	32.60	6224.40	15.31
2	Bullock	Pairs/day	5.93	2964.00	7.29
3	Tractor	Hours	2.96	1778.40	4.37
4	Machinery	Hours	0.99	988.00	2.43
5	Seed Main Crop (Establishment and Maintenance)	Kgs (Rs.)	1482.00	11856.00	29.16
6	Seed Inter Crop	Kgs.	0.00	0.00	0.00
7	FYM	Quintal	49.40	4940.00	12.15
8	Fertilizer + micronutrients	Quintal	1.98	1086.80	2.67
9	Pesticides (PPC)	Kgs / liters	1.98	1580.80	3.89
10	Irrigation	Number	1.98	0.00	0.00
11	Repairs		0.00	0.00	0.00
12	Msc. Charges (Marketing costs etc)		0.00	0.00	0.00
13	Depreciation charges		0.00	0.02	0.00
14	Land revenue and Taxes		0.00	4.94	0.01
II	**Cost B1**				
16	Interest on working capital			2335.63	5.74
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**			33758.99	83.02
III	**Cost B2**				
18	Rental Value of Land			400.00	0.98
19	**Cost B2 = (Cost B1 + Rental value)**			34158.99	84.01
IV	**Cost C1**				
20	Family Human Labour		14.82	2805.92	6.90
21	**Cost C1 = (Cost B2 + Family Labour)**			36964.91	90.91
V	**Cost C2**				
22	Risk Premium			0.00	0.00
23	**Cost C2 = (Cost C1 + Risk Premium)**			36964.91	90.91
VI	**Cost C3**				
24	Managerial Cost			3696.49	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**			40661.40	100
VII	**Economics of the Crop**				
a.	Main Product	a) Main Product (q)	395.20	3161600.00	
		b) Main Crop Sales Price (Rs.)		8000.00	
b.	Gross Income (Rs.)			3161600.00	
c.	Net Income (Rs.)			3120938.60	
d.	Cost per Quintal (Rs./q.)			102.89	
e.	Benefit Cost Ratio (BC Ratio)			1:77.75	

Cost of cultivation of Bengal gram: The data regarding the cost of cultivation of bengal gram in Budihalu micro watershed is presented in Table 39. The results indicate that, the total cost of cultivation for bengal gram was Rs. 47423.61. The gross income realized by the farmers was Rs. 1729.00. The net income from bengal gram cultivation was Rs. -45694.61. Thus the benefit cost ratio was found to be 1:0.04.

Table 39. Cost of Cultivation of Bengal gram in Budihalu micro watershed

Sl.No	Particulars	Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**				
1	Hired Human Labour	Man days	38.29	7348.25	15.49
2	Bullock	Pairs/day	0.00	0.00	0.00
3	Tractor	Hours	2.47	1852.50	3.91
4	Machinery	Hours	2.47	1482.00	3.13
5	Seed Main Crop (Establishment and Maintenance)	Kgs (Rs.)	18.53	1852.50	3.91
6	Seed Inter Crop	Kgs.	0.00	0.00	0.00
7	FYM	Quintal	24.70	4940.00	10.42
8	Fertilizer + micronutrients	Quintal	4.94	9880.00	20.83
9	Pesticides (PPC)	Kgs / liters	1.24	1235.00	2.60
10	Irrigation	Number	6.18	0.00	0.00
11	Repairs		0.00	0.00	0.00
12	Msc. Charges (Marketing costs etc)		0.00	0.00	0.00
13	Depreciation charges		0.00	0.02	0.00
14	Land revenue and Taxes		0.00	0.00	0.00
II	**Cost B1**				
16	Interest on working capital			2150.10	4.53
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**			30740.37	64.82
III	**Cost B2**				
18	Rental Value of Land			1000.00	2.11
19	**Cost B2 = (Cost B1 + Rental value)**			31740.37	66.93
IV	**Cost C1**				
20	Family Human Labour		49.40	11362.00	23.96
21	**Cost C1 = (Cost B2 + Family Labour)**			43102.37	90.89
V	**Cost C2**				
22	Risk Premium			10.00	0.02
23	**Cost C2 = (Cost C1 + Risk Premium)**			43112.37	90.91
VI	**Cost C3**				
24	Managerial Cost			4311.24	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**			47423.61	100
VII	**Economics of the Crop**				
a.	Main Product	a) Main Product (q)	1.24	1729.00	
		b) Main Crop Sales Price (Rs.)		1400.00	
b.	Gross Income (Rs.)			1729.00	
c.	Net Income (Rs.)			-45694.61	
d.	Cost per Quintal (Rs./q.)			38399.69	
e.	Benefit Cost Ratio (BC Ratio)			1:0.04	

Cost of cultivation of Groundnut: The data regarding the cost of cultivation of groundnut in Budihalu micro watershed is presented in Table 40. The results indicate that, the total cost of cultivation for groundnut was Rs. 28538.75. The gross income realized by the farmers was Rs. 32968.22. The net income from groundnut cultivation was Rs. 4429.47. Thus the benefit cost ratio was found to be 1:1.16.

Table 40. Cost of Cultivation of Groundnut in Budihalu micro watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	33.49	6593.64	23.10
2	Bullock		Pairs/day	3.14	1569.92	5.50
3	Tractor		Hours	1.05	784.96	2.75
4	Machinery		Hours	1.05	1046.61	3.67
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	20.93	2093.22	7.33
6	Seed Inter Crop		Kgs.	0.00	0.00	0.00
7	FYM		Quintal	20.93	2093.22	7.33
8	Fertilizer + micronutrients		Quintal	3.14	2878.18	10.09
9	Pesticides (PPC)		Kgs / liters	2.09	1674.58	5.87
10	Irrigation		Number	0.00	0.00	0.00
11	Repairs			0.00	0.00	0.00
12	Msc. Charges (Marketing costs etc)			0.00	0.00	0.00
13	Depreciation charges			0.00	523.31	1.83
14	Land revenue and Taxes			0.00	4.94	0.02
II	**Cost B1**					
16	Interest on working capital				1048.70	3.67
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**				20311.27	71.17
III	**Cost B2**					
18	Rental Value of Land				400.00	1.40
19	**Cost B2 = (Cost B1 + Rental value)**				20711.27	72.57
IV	**Cost C1**					
20	Family Human Labour			23.03	5233.05	18.34
21	**Cost C1 = (Cost B2 + Family Labour)**				25944.32	90.91
V	**Cost C2**					
22	Risk Premium				0.00	0.00
23	**Cost C2 = (Cost C1 + Risk Premium)**				25944.32	90.91
VI	**Cost C3**					
24	Managerial Cost				2594.43	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**				28538.75	100
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		7.33	32968.22	
		b) Main Crop Sales Price (Rs.)			4500.00	
b.	Gross Income (Rs.)				32968.22	
c.	Net Income (Rs.)				4429.47	
d.	Cost per Quintal (Rs./q.)				3895.40	
e.	Benefit Cost Ratio (BC Ratio)				1:1.16	

Cost of cultivation of Chilly: The data regarding the cost of cultivation of chilly in Budihalu micro watershed is presented in Table 41. The results indicate that, the total cost of cultivation for chilly was Rs. 16581.91. The gross income realized by the farmers was Rs. 12350. The net income from chilly cultivation was Rs. -4231.91. Thus the benefit cost ratio was found to be 1:0.74.

Table 41. Cost of Cultivation of Chilly in Budihalu micro watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	22.23	4322.50	26.07
2	Bullock		Pairs/day	0.00	0.00	0.00
3	Tractor		Hours	1.24	926.25	5.59
4	Machinery		Hours	0.00	0.00	0.00
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	1.24	370.50	2.23
6	Seed Inter Crop		Kgs.	0.00	0.00	0.00
7	FYM		Quintal	0.00	0.00	0.00
8	Fertilizer + micronutrients		Quintal	2.47	3458.00	20.85
9	Pesticides (PPC)		Kgs / liters	1.24	926.25	5.59
10	Irrigation		Number	0.00	0.00	0.00
11	Repairs			0.00	0.00	0.00
12	Msc. Charges (Marketing costs etc)			0.00	0.00	0.00
13	Depreciation charges			0.00	0.02	0.00
14	Land revenue and Taxes			0.00	0.00	0.00
II	**Cost B1**					
16	Interest on working capital				571.77	3.45
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**				10575.29	63.78
III	**Cost B2**					
18	Rental Value of Land				166.67	1.01
19	**Cost B2 = (Cost B1 + Rental value)**				10741.96	64.78
IV	**Cost C1**					
20	Family Human Labour			17.29	4322.50	26.07
21	**Cost C1 = (Cost B2 + Family Labour)**				15064.46	90.85
V	**Cost C2**					
22	Risk Premium				10.00	0.06
23	**Cost C2 = (Cost C1 + Risk Premium)**				15074.46	90.91
VI	**Cost C3**					
24	Managerial Cost				1507.45	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**				16581.91	100
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		6.18	12350.00	
		b) Main Crop Sales Price (Rs.)			2000.00	
b.	Gross Income (Rs.)				12350.00	
c.	Net Income (Rs.)				-4231.91	
d.	Cost per Quintal (Rs./q.)				2685.33	
e.	Benefit Cost Ratio (BC Ratio)				1:0.74	

Adequacy of fodder: The data regarding the adequacy of fodder in Budihalu micro watershed is presented in Table 42. The results indicate that, 34.29 per cent of the households opined that dry fodder was adequate which includes 8.57 per cent of marginal farmers and 40 per cent of small farmers. Around 40 per cent of the households opined that green fodder was adequate. The data revealed that 8.57 per cent of the farmers opined that dry fodder is inadequate.

Table 42. Adequacy of fodder in Budihalu micro watershed

Sl. No.	Particulars	LL (2)		MF (9)		SF (10)		SMF (6)		MDF (7)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Adequate-Dry Fodder	0	0.00	2	22.22	4	40.00	4	66.67	2	28.57	0	0.00	12	34.29
2	Inadequate-Dry Fodder	1	50.00	0	0.00	1	10.00	0	0.00	1	14.29	0	0.00	3	8.57
3	Adequate-Green Fodder	0	0.00	2	22.22	5	50.00	4	66.67	3	42.86	0	0.00	14	40.00
4	Inadequate-Green Fodder	1	50.00	1	11.11	1	10.00	0	0.00	0	0.00	0	0.00	3	8.57

Average annual gross income: The data regarding the average annual gross income in Budihalu micro watershed is presented in Table 43. The results indicate that the average annual gross income is Rs.52500 for landless farmers. For marginal farmers it was Rs 45982.22, for small farmers it was Rs.193225, for semi medium farmers it was Rs.83.766.67, for medium farmers it was Rs.102428.57 and Rs.150000.

Table 43. Average annual gross income in Budihalu micro watershed

(Avg value in Rs.)

Sl. No.	Particulars	LL (2)	MF (9)	SF (10)	SMF (6)	MDF (7)	LF (1)	All (35)
1	Service/salary	47,500.	0.00	24,500.00	0.00	0.00	0.00	9,714.29
2	Business	0.00	555.56	2,000.00	0.00	17,857.14	0.00	4,285.71
3	Wage	0.00	10,000.00	2,500.00	0.00	857.14	0.00	3,457.14
4	Agriculture	0.00	34,871.11	136,225.0	77,100	83,285.71	150,000.0	82,048.29
6	Non Farm income	5,000.0	0.00	27,000.00	0.00	0.00	0.00	8,000.00
7	Dairy Farm	0.00	0.00	1,000.00	6,666.67	428.57	0.00	1,514.29
8	Goat Farming	0.00	555.56	0.00	0.00	0.00	0.00	142.86
Income(Rs.)		52,500.	45,982.22	193,225.0	83,766.6	102,428.5	150,000.0	109,162.5

Table 44. Average annual expenditure in Budihalu micro watershed

(Avg value in Rs.)

Sl.No.	Particulars	MF (9)	SF (10)	SMF (6)	MDF (7)	LF (1)	All (35)
1	Service/salary	0.00	31,000.00	0.00	0.00	0.00	1,771.43
2	Business	500.00	10,000.00	0.00	50,000.00	0.00	3,157.14
3	Wage	21,840.00	20,000.00	0.00	1,000.00	0.00	2,472.00
4	Agriculture	21,277.78	34,600.00	43,500.00	61,428.57	75,000.00	37,242.86
5	Farm income	0.00	0.00	0.00	0.00	0.00	0.00
6	Non Farm income	0.00	6,666.67	0.00	0.00	0.00	571.43
7	Dairy Farm	0.00	3,000.00	5,666.67	1,000.00	0.00	600.00
8	Goat Farming	1,000.00	0.00	0.00	0.00	0.00	28.57
Total		44,617.78	105,266.67	49,166.67	113,428.57	75,000.00	387,479.68
Average		4,957.53	10,526.67	8,194.44	16,204.08	75,000.00	11,070.85

Average annual expenditure: The data regarding the average annual expenditure in Budihalu micro watershed is presented in Table 44. The results indicate that the average annual expenditure is Rs. 11070.85. For marginal farmers it was Rs 4957.53, for small farmers it was Rs. 10526.67, for semi medium farmers it was Rs. 8194.44 and for medium farmers it was Rs. 16204.08 and for large farmers it was Rs. 75000.

Horticulture species grown: The data regarding horticulture species grown in Budihalu micro watershed is presented in Table 45. The results indicate that, sampled households have grown 27 coconut, and 1 guava trees in their field and 1 coconut tree in their backyard.

Table 45. Horticulture species grown in Budihalu micro watershed

S.N	Particulars	MF (9)		SF (10)		SMF (6)		MDF (7)		LF (1)		All (35)	
		F	B	F	B	F	B	F	B	F	B	F	B
1	Coconut	2	1	25	0	0	0	0	0	0	0	27	1
2	Guava	1	0	0	0	0	0	0	0	0	0	1	0

***F= Field B=Back Yard**

Forest species grown: The data regarding forest species grown in Budihalu micro watershed is presented in Table 46. The results indicate that, households have planted 68 neem trees, 11 tamarind trees, 9 banyan trees and 1 acacia tree in their field. Households have also planted 2 neem trees in their backyard.

Table 46. Forest species grown in Budihalu micro watershed

S.N	Particulars	MF (9)		SF(10)		SMF (6)		MDF (7)		LF (1)		All (35)	
		F	B	F	B	F	B	F	B	F	B	F	B
1	Neem	17	1	16	0	6	1	29	0	0	0	68	2
2	Tamarind	1	0	7	0	2	0	1	0	0	0	11	0
3	Banyan	0	0	4	0	2	0	3	0	0	0	9	0
4	Acacia	0	0	0	0	0	0	1	0	0	0	1	0

***F= Field B=Back Yard**

Table 47. Marketing of the agricultural produce in Budihalu micro watershed

Sl.No	Crops	Output obtained(q)	Output retained (q)	Output sold (q)	Output sold (%)	Avg. Price obtained (Rs/q)
1	Bajra	64.0	5.0	59.0	92.19	1185.71
2	Banana	400.0	0.0	400.0	100.0	8000.0
3	Bengal Gram	1.0	0.0	1.0	100.0	1400.0
4	Chilly	5.0	0.0	5.0	100.0	2000.0
5	Cotton	88.0	3.0	85.0	96.59	3842.86
6	Ground Nut	7.0	0.0	7.0	100.0	4500.0
7	Jowar	8.0	0.0	8.0	100.0	3200.0
8	Maize	653.0	15.0	638.0	97.7	1320.0
9	Onion	50.0	0.0	50.0	100.0	2000.0
10	Red Gram	43.0	0.0	43.0	100.0	2766.67
11	Sorghum	13.0	0.0	13.0	100.0	1000.0
12	Sunflower	37.0	4.0	33.0	89.19	4000.0

Marketing of the agricultural produce: The data regarding marketing of the agricultural produce in Budihalu micro watershed is presented in Table 47. The results indicated that, banana, Bengal gram, chilly, groundnut, jowar, onion, redgram and sorghum were sold to the extent of 100 per cent.

Marketing Channels used for sale of agricultural produce: The data regarding marketing channels used for sale of agricultural produce in Budihalu micro watershed is presented in Table 48. The results indicated that, 34.29 per cent of the households have sold their produce to agents/traders, 68.57 per cent of the households have sold their produce to village merchants, 28.57 per cent of the households have sold their produce in regulated markets and 11.43 per cent of the households have sold their produce in cooperative marketing society and Contract marketing arrangement.

Table 48. Marketing Channels used for sale of agricultural produce in Budihalu micro watershed

Sl.No.	Particulars	MF (9)		SF (10)		SMF (6)		MDF(7)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Agent/Traders	5	55.56	2	20.00	2	33.33	3	42.86	0	0.00	12	34.29
2	Local/village Merchant	3	33.33	9	90.00	6	100	6	85.71	0	0.00	24	68.57
3	Regulated Market	3	33.33	2	20.00	1	16.67	3	42.86	1	100	10	28.57
4	Cooperative marketing Society	0	0.00	1	10.00	1	16.67	1	14.29	1	100	4	11.43
5	Contract marketing arrangement	0	0.00	0	0.00	0	0.00	3	42.86	1	100	4	11.43

Mode of transport of agricultural produce: The data regarding mode of transport of agricultural produce in Budihalu micro watershed is presented in Table 49. The results indicated that 17.14 per cent of the households have carried head load, 77.14 per cent have used cart and 57.14 per cent have used tractor as a mode of transport for their agricultural produce.

Table 49. Mode of transport of agricultural produce in Budihalu micro watershed

Sl.No.	Particulars	MF (9)		SF (10)		SMF (6)		MDF (7)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Head Load	3	33.33	1	10.00	0	0.00	2	28.57	0	0.00	6	17.14
2	Cart	6	66.67	10	100	9	150.00	2	28.57	0	0.00	27	77.14
3	Tractor	2	22.22	3	30.00	1	16.67	11	157.14	3	300.00	20	57.14
4	Truck	0	0.00	0	0.00	0	0.00	1	14.29	0	0.00	1	2.86

Interest towards soil testing: The data regarding interest shown towards soil testing in Budihalu micro watershed is presented in Table 50. The results indicated that, 11.43 per cent of the households have shown interest in soil testing i.e. 22.22 per cent of marginal farmers, 10 per cent of small farmers and 14.29 per cent of medium farmers have shown interest in soil testing.

Table 50. Interest shown towards soil testing in Budihalu micro watershed

Sl. No.	Particulars	MF (9)		SF (10)		SMF (6)		MDF (7)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Interest in soil test	2	22.22	1	10.00	0	0.00	1	14.29	0	0.00	4	11.43

Soil and water conservation practices and structures adopted: The data regarding soil and water conservation practices and structures adopted in Budihalu micro watershed is presented in Table 51. The results indicated that, 14.29 per cent of the households have adopted field bunding which includes 22.22 per cent of marginal, 20 per cent of small farmers, and 14.29 per cent of medium farmers.

Table 51. Soil and water conservation practices and structures adopted in Budihalu micro watershed

Sl. No.	Particulars	MF (9)		SF (10)		SMF(6)		MDF (7)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Field Bunding	2	22.22	2	20.00	0	0.00	1	14.29	0	0.00	5	14.29

Agencies involved in soil conservation structures: The data regarding agencies involved in soil conservation structures in Budihalu micro watershed is presented in Table 52. The results indicated that 8.57 per cent of soil conservation structure is constructed by farmers on their own, and another 5.71 per cent is constructed by farmers' organization.

Table 52. Agencies involved in soil conservation structures in Budihalu micro watershed

Sl. No.	Particulars	MF (9)		SF (10)		SMF (6)		MDF (7)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Own	1	11.11	2	20.00	0	0.00	0	0.00	0	0.00	3	8.57
2	Farmer organization	1	11.11	0	0.00	0	0.00	1	14.29	0	0.00	2	5.71

Usage pattern of fuel for domestic use: The data regarding usage pattern of fuel for domestic use in Budihalu micro watershed is presented in Table 53. The results indicated that, 3.03 per cent of the households used dung cake as a source of fuel, 93.94 per cent used fire wood and another 3.03 per cent of the households used LPG.

Table 53. Usage pattern of fuel for domestic use in Budihalu micro watershed

Sl.No.	Particulars	MF (9)		SF (10)		SMF (6)		MDF (7)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
2	Fire Wood	8	88.89	10	100	6	100	5	71.43	0	0.00	31	88.57
3	Kerosene	1	11.11	0	0.00	0	0.00	0	0.00	0	0.00	1	2.86
5	LPG	0	0.00	0	0.00	1	16.67	2	28.57	1	100	4	11.43

Table 54. Source of drinking water in Budihalu micro watershed

Sl.No.	Particulars	LL (2)		MF (9)		SF (10)		SMF (6)		MDF (7)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Piped supply	1	50.00	4	44.44	5	50.00	4	66.67	3	42.86	0	0.00	17	48.57
2	Bore Well	1	50.00	5	55.56	3	30.00	0	0.00	4	57.14	1	100	14	40.00
3	Open well	0	0.00	1	11.11	1	10.00	2	33.33	0	0.00	0	0.00	4	11.43
4	Canal/Nala	0	0.00	0	0.00	1	10.00	0	0.00	0	0.00	0	0.00	1	2.86

Source of drinking water: The data regarding source of drinking water in Budihalu micro watershed is presented in Table 54. The results indicated that, piped supply was the major source for drinking water for 48.57 per cent of the households, bore well was the major source for 40 per cent of the households, open well was the major source for 11.43

per cent of the households and canal was the major source of drinking water for 2.86 per cent of the households.

Source of light: The data regarding source of light in Budihalu micro watershed is presented in Table 55. The results indicated that, electricity was the major source of light for 100 per cent of the households in micro watershed.

Table 55. Source of light in Budihalu micro watershed

Sl.No.	Particulars	LL (2)		MF (9)		SF (10)		SMF (6)		MDF (7)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Electricity	2	100	9	100	10	100	6	100	7	100	1	100	35	100

Existence of Sanitary toilet facility: The data regarding existence of sanitary toilet facilit**y** in Budihalu micro watershed is presented in Table 56. The results indicated that, 37.14 per cent of the households possess sanitary toilet i.e. 50 per cent of landless, 44.44 per cent of the marginal, 30 per cent of the small, 50 per cent of the semi medium and 14.29 per cent of the medium farmers had sanitary toilet facility.

Table 56. Existence of Sanitary toilet facility in Budihalu micro watershed

Sl.No.	Particulars	LL (2)		MF (9)		SF (10)		SMF (6)		MDF (7)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Sanitary toilet facility	1	50.00	4	44.44	3	30.00	3	50.00	1	14.29	1	100	13	37.14

Possession of PDS card: The data regarding possession of PDS card in Budihalu micro watershed is presented in Table 57. The results indicated that, 80 per cent of the sampled households possessed BPL card and 14.29 per cent possessed APL card.

Table 57. Possession of PDS card in Budihalu micro watershed

Sl.No.	Particulars	LL (2)		MF (9)		SF (10)		SMF (6)		MDF (7)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	APL	0	0.00	0	0.00	3	30.00	0	0.00	1	14.29	1	100	5	14.29
2	BPL	1	50.00	9	100	7	70.00	6	100	5	71.43	0	0.00	28	80.00
3	Not Possessed	1	50.00	0	0.00	0	0.00	0	0.00	1	14.29	0	0.00	2	5.71

Participation in NREGA programme: The data regarding participation in NREGA programme in Budihalu micro watershed is presented in Table 58. The results indicated that, 60 per cent of the households participated in NREGA programme which included 100 per cent of landless farmers, 33.33 percent of the marginal, 50 per cent of the small, 66.67 per cent of the semi medium, 85.71 percent of the medium farmers and 100 per cent of the small farmers.

Table 58. Participation in NREGA programme in Budihalu micro watershed

Sl. No.	Particulars	LL (2)		MF (9)		SF (10)		SMF(6)		MDF(7)		LF(1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Participation in NREGA programme	2	100	3	33.33	5	50.00	4	66.67	6	85.71	1	100	21	60.00

Adequacy of food items: The data regarding adequacy of food items in Budihalu micro watershed is presented in Table 59. The results indicated that, cereals were adequate for

97.14 per cent of the households, pulses were adequate for 60 per cent of the households, oilseeds were adequate for 20 per cent of the households, vegetables were adequate for 40 per cent of the households, fruits were adequate for 25.71 per cent of the households, milk was adequate for 48.57 per cent of the households, eggs were adequate for 22.86 per cent of the households and meat was adequate for 28.57 per cent of the households.

Table 59. Adequacy of food items in Budihalu micro watershed

Sl.No.	Particulars	LL (2)		MF (9)		SF (10)		SMF (6)		MDF (7)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Cereals	1	50.00	9	100	10	100	6	100	7	100	1	100	34	97.14
2	Pulses	0	0.00	5	55.56	7	70.00	6	100	3	42.86	0	0.00	21	60.00
3	Oilseed	0	0.00	0	0.00	3	30.00	2	33.33	2	28.57	0	0.00	7	20.00
4	Vegetables	1	50.00	6	66.67	2	20.00	2	33.33	3	42.86	0	0.00	14	40.00
5	Fruits	1	50.00	3	33.33	2	20.00	1	16.67	2	28.57	0	0.00	9	25.71
6	Milk	1	50.00	5	55.56	6	60.00	2	33.33	3	42.86	0	0.00	17	48.57
7	Egg	1	50.00	5	55.56	0	0.00	1	16.67	1	14.29	0	0.00	8	22.86
8	Meat	1	50.00	4	44.44	2	20.00	1	16.67	2	28.57	0	0.00	10	28.57

Response on Inadequacy of food items: The data regarding inadequacy of food items in Budihalu micro watershed is presented in Table 60. The results indicated that, pulses were inadequate for 40 per cent of the households, oilseeds were inadequate for 51.43 per cent of the households, vegetables were inadequate for 48.57 per cent of the households, fruits were inadequate for 54.29 per cent of the households, milk was inadequate for 28.57 per cent of the households, eggs were inadequate for 31.43 per cent of the households and meat was inadequate for 25.71 per cent of the households.

Table 60. Response on Inadequacy of food items in Budihalu micro watershed

Sl.No.	Particulars	LL (2)		MF (9)		SF (10)		SMF (6)		MDF (7)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Cereals	1	50.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	2.86
2	Pulses	2	100	4	44.44	3	30.00	0	0.00	4	57.14	1	100	14	40.00
3	Oilseed	1	50.00	10	111.11	4	40.00	2	33.33	1	14.29	0	0.00	18	51.43
4	Vegetables	0	0.00	5	55.56	6	60.00	4	66.67	2	28.57	0	0.00	17	48.57
5	Fruits	0	0.00	5	55.56	6	60.00	4	66.67	4	57.14	0	0.00	19	54.29
6	Milk	0	0.00	4	44.44	3	30.00	2	33.33	0	0.00	1	100	10	28.57
7	Egg	0	0.00	1	11.11	5	50.00	2	33.33	3	42.86	0	0.00	11	31.43
8	Meat	0	0.00	2	22.22	4	40.00	2	33.33	1	14.29	0	0.00	9	25.71

Table 61. Response on Market surplus of food items in Budihalu micro watershed

Sl.No.	Particulars	LL (2)		MF (9)		SF (10)		SMF (6)		MDF (7)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Cereals	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2	Pulses	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3	Oilseed	1	50.00	1	11.11	3	30.00	2	33.33	4	57.14	1	100	12	34.29
4	Vegetables	1	50.00	1	11.11	2	20.00	0	0.00	2	28.57	1	100	7	20.00
5	Fruits	1	50.00	0	0.00	2	20.00	1	16.67	1	14.29	0	0.00	5	14.29
6	Milk	0	0.00	0	0.00	0	0.00	3	50.00	1	14.29	0	0.00	4	11.43
7	Egg	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
8	Meat	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Response on market surplus of food items: The data regarding market surplus of food items in Budihalu micro watershed is presented in Table 61. The results indicated that, oilseeds, vegetables, fruits and milk were market surplus for 34.29, 20, 14.29 and 11.43 per cent of the households respectively.

Table 62. Farming constraints Experienced in Budihalu micro watershed

Sl. No.	Particulars	MF (9)		SF (10)		SMF (6)		MDF (7)		LF(1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Lower fertility status of the soil	2	22.22	1	10.00	0	0.00	1	14.29	0	0.00	4	11.43
2	Wild animal menace on farm field	0	0.00	3	30.00	3	50.00	4	57.14	0	0.00	10	28.57
3	Frequent incidence of pest and diseases	5	55.56	7	70.00	3	50.00	6	85.71	1	100	22	62.86
4	Inadequacy of irrigation water	2	22.22	2	20.00	1	16.67	0	0.00	0	0.00	5	14.29
5	High cost of Fertilizers and plant protection chemicals	4	44.44	3	30.00	1	16.67	2	28.57	0	0.00	10	28.57
6	High rate of interest on credit	6	66.67	4	40.00	0	0.00	2	28.57	0	0.00	12	34.29
7	Low price for the agricultural commodities	2	22.22	1	10.00	1	16.67	0	0.00	1	100	5	14.29
8	Lack of marketing facilities in the area	3	33.33	2	20.00	3	50.00	2	28.57	0	0.00	10	28.57
9	Inadequate extension services	1	11.11	0	0.00	0	0.00	0	0.00	0	0.00	1	2.86
10	Lack of transport for safe transport of the Agril produce to the market.	6	66.67	6	60.00	6	100	7	100	1	100	26	74.29
11	Less rainfall	10	111.11	10	100	6	100	7	100	1	100	34	97.14
12	Source of Agri-technology information(Newspaper/TV/Mobile)	6	66.67	4	40.00	2	33.33	5	71.43	1	100	18	51.43

Farming constraints: The data regarding farming constraints experienced by households in Budihalu micro watershed is presented in Table 62. The results indicated that, lower fertility status of the soil was the constraint experienced by 3.03 per cent of the households, wild animal menace on farm field (60.61%), frequent incidence of pest and diseases (51.52%), high cost of Fertilizers and plant protection chemicals (15.15%), high rate of interest on credit (24.24%), lack of marketing facilities in the area (12.12%), lack of transport for safe transport of the agricultural produce to the market (90.91%), less rainfall (100%), source of Agri-technology information(Newspaper/TV/Mobile) (96.97).

Chapter 5

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.

The data indicated that there were 97 (53.59%) men and 84 (46.41%) were women among the sampled households. The average family size of landless farmers' was 4.5, marginal farmers' was 4.4, small farmers' was 5.0, semi medium farmers' was 5.2, medium farmers' was 6.2 and for large farmers' it was 7.0.

The data indicated that 22 (12.15%) people were in 0-15 years of age, 76 (41.99%) were in 16-35 years of age, 62 (34.25 %) were in 36-60 years of age and 21 (11.60%) were above 61 years of age.

The results indicated that Budihalu micro watershed had 34.81 per cent illiterates, 0.55 per cent were functional literates, 19.89 per cent of the people had primary school education, 6.63 per cent of them had middle school education, 16.02 per cent of them had high school education, 10.50 per cent of them had PUC education, 5.52 per cent of them had degree education and 0.55 had studied ITI.

The results indicate that, 91.43 per cent of households practicing agriculture, 2.86 per cent of the household heads were in government service and 8.57 per cent of the households heads had other occupation. The results indicate that agriculture was the major occupation for 55.80 per cent of the household members, 14.36 per cent were agricultural labourers, 16.57 per cent were students, 3.31 per cent were children and housewives, 1.66 per cent were in government service.

The results show that 96.69 per cent of the population has not participated in any local institution, 1.10 per cent have participated in sthree shakthi sangha and 0.55 per cent each have participated in gram panchayat, taluk panchayat, dairy cooperative and raitha sangha.

The results indicate that 68.57 per cent of the households possess Katcha house, 11.43 per cent of them possess pucca house, 2.86 per cent of them possess thatched house and 17.14 per cent of them possess semi pucca house.

The results shows that 74.29 per cent of the households possess TV, 17.14 per cent of the households possess Mixer grinder, 42.86 per cent of the households possess bicycle, 34.29 per cent of the households possess motor cycle, 82.86 per cent of the households possess mobile phones, 2.86 per cent of the households possess radio, 5.71

per cent of the households possess DVD player and 5.71 per cent of the households possess auto. The results shows that the average value of television was Rs.4730, mixer grinder was Rs. 2033, bicycle was Rs.3686, motor cycle was Rs. 29214, auto was Rs. 175000, mobile phone was Rs.1477, radio was Rs. 1000 and DVD player was Rs. 1600.

About 17.14 per cent of the households possess plough, 22.86 per cent of them possess bullock cart, 2.86 per cent of the households possess sprayer, and 2.86 per cent of the households possess tractor. The results show that the average value of plough was Rs.2333, bullock cart was Rs.22250, sprayer was Rs.3000 and tractor was Rs.300000.

The results indicate that, 20 per cent of the households possess bullocks, 25.17 per cent of the households possess local cow, 8.57 per cent of the households possess crossbred cows, 2.86 per cent of the households possess buffalo, 8.57 per cent of the households possess goat, 5.71 per cent of the households possess sheep and 45.71 per cent of the households possess poultry birds.

The results indicate that, average own labour (men) available in the micro watershed was 2.39, average own labour (women) available was 1.67, average hired labour (men) available was 2.30 and average hired labour (women) available was 1.67. In case of marginal farmers, average own labour men available was 1.78, average own labour (women) was 1.44, average hired labour (men) was 2.67 and average hired labour (women) available was 0.89. In case of small farmers, average own labour men available was 2.80, average own labour (women) was 1.40, average hired labour (men) was 2.30 and average hired labour (women) available was 1.80. In case of semi medium farmers, average own labour men available was 2.67, average own labour (women) was 2.33, average hired labour (men) was 2.5 and average hired labour (women) available was 2. In case of medium farmers, average own labour men available was 2.5, average own labour (women) was 2, average hired labour (men) was 2 and average hired labour (women) available was 2.50. In case of large farmers, average own labour men available was 2, average own labour (women) was 1, average hired labour (men) was 1 and average hired labour (women) available was 1.

The results indicate that, 60 per cent of the household opined that hired labour was adequate and 34.29 per cent of the households opined that hired labour was inadequate. About 55.56 per cent of the marginal farmers, 70 per cent of small, 100 per cent of semi medium and 33.33 medium farmers and 50 per cent of large farmers have opined that the hired labour was adequate.

The results indicate that, households of the Budihalu micro watershed possess 53.60 ha (73%) of dry land and 19.83 ha (27%) of irrigated land. Marginal farmers possess 5.99 ha (100%) of dry land. Small farmers possess 10.81 ha (91%) of dry land and 1.07 ha (9%) possess irrigated land. Semi medium farmers possess 6.07 ha (50%) of dry land and 6.07 ha (50%) of irrigated land. Medium farmers possess 26.68 ha (75.16%)

of dry land and 9.45 ha (26.15%) of irrigated land. Large farmers possess 4.05 ha (55.56%) of dry land and 3.24 (44.44%) of irrigated land.

The results indicate that, the average value of dry land was Rs. 170,772.45 and average value of irrigated land was Rs. 357,971.02. In case of marginal famers, the average land value was Rs. 508,676.58 for dry land and. In case of small famers, the average land value was Rs. 385,764.04 for dry land. In case of semi medium famers, the average land value was Rs. 247,000 for dry land and Rs. 395,200 for irrigated land. In case of medium famers, the average land value was Rs. 146,975.21 for dry land.

The results indicate that, there were 13 functioning and 5 de-functioning bore wells in the micro watershed. Bore well was the major irrigation source in the micro water shed which was possessed by small farmers, medium farmers, semi medium farmers and large farmers. The depth of bore well was found to be 34.21 meters.

The results indicate that, small farmers had 1.01 ha, semi medium farmers had 5.67 ha, medium farmers had 8.24 ha and large farmers had 3.24 ha of irrigated area. Farmers have grown Maize (26.66 ha), Bajra (4.78 ha), Sunflower (4.05 ha), Redgram (8.1 ha), Bengal gram (1.01 ha) and Sorghum (2.23 ha). Marginal farmers have grown maize, cotton, bajra, sunflower, sorghum and groundnut. Small farmers have grown maize, cotton, bajra, and sorghum. Semi medium farmers have grown maize, cotton, sunflower, sorghum and banana. Medium farmers have grown maize, red gram, cotton, bajra, sunflower, onion, sorghum and bengal gram. Large farmers have grown maize, cotton and chilly.

The results indicate that, the cropping intensity in Budihalu micro watershed was found to be 61.92 per cent. In case of Marginal farmers it was 100 per cent, for small farmers it was 76.94 per cent, in case of semi medium farmers it was 78.95 per cent, medium farmers had cropping intensity of 66.67 per cent and large farmers had a cropping intensity of 35.71 per cent.

The results indicate that, 22.86 per cent of the households have bank account and 17.14 per cent of the households have savings. Among landless, medium and large farmers nobody possessed bank account and savings. The results indicate that, 44.44 per cent of marginal, 30 per cent of small and 16.67 per cent semi medium have borrowed credit from different sources. Around 25 per cent have availed loan from commercial bank, 12.5 per cent have availed loan from cooperative bank, 37.5 per cent have availed loan from grameena bank and 12.5 per cent have availed loan from money lender. The results indicate that, marginal, small, and semi medium farmers have availed Rs. 15500, Rs. 43333, and Rs. 80000 respectively. Overall average credit amount availed by households in the micro watershed is Rs. 234000. The results indicate that, 100 per cent of the households have borrowed loan for agricultural production purpose.

The results indicate that, 16.67 per cent of the households have repaid their loan partially. The data also shows that 66.67 per cent of households have unpaid their loans and only 16.67 per cent of households have fully repaid their loans taken from institutional sources. Around100 per cent of the households have not repaid their loan borrowed from non institutional sources.

The results indicate that, the total cost of cultivation for maize was Rs. 30217.71. The gross income realized by the farmers was Rs. 37123.44. The net income from maize cultivation was Rs. 6905.72, thus the benefit cost ratio was found to be 1:1.23. The total cost of cultivation for redgram was Rs. 10077.65. The gross income realized by the farmers was Rs. 14806.28. The net income from redgram cultivation was Rs.4728.63. Thus the benefit cost ratio was found to be 1:1.47. The total cost of cultivation for cotton was Rs. 34942.88. The gross income realized by the farmers was Rs. 54239.18. The net income from cotton cultivation was Rs. 19296.30, thus the benefit cost ratio was found to be 1:1.55. The total cost of cultivation for bajra was Rs. 54100.63. The gross income realized by the farmers was Rs. 12054.82. The net income from bajra cultivation was Rs. -42045.81. Thus the benefit cost ratio was found to be 1:0.22. The total cost of cultivation for sunflower was Rs. 31049.45. The gross income realized by the farmers was Rs. 31250.07. The net income from sunflower cultivation was Rs. 200.63. Thus the benefit cost ratio was found to be 1:1.01. The total cost of cultivation for onion was Rs. 16968.62. The gross income realized by the farmers was Rs. 19924.67. The net income from onion cultivation was Rs. 2956.05. Thus the benefit cost ratio was found to be 1:1.17. The total cost of cultivation for sorghum was Rs. 17508.50. The gross income realized by the farmers was Rs. 61750. The net income from sorghum cultivation was Rs. 44241.50. Thus the benefit cost ratio was found to be 1:3.53. The total cost of cultivation for banana was Rs. 40661.40. The gross income realized by the farmers was Rs. 3161600. The net income from banana cultivation was Rs. 3120938.60. Thus the benefit cost ratio was found to be 1:77.75. The total cost of cultivation for bengal gram was Rs. 47423.61. The gross income realized by the farmers was Rs. 1729.00. The net income from bengal gram cultivation was Rs. -45694.61. Thus the benefit cost ratio was found to be 1:0.04. The total cost of cultivation for groundnut was Rs. 28538.75. The gross income realized by the farmers was Rs. 32968.22. The net income from groundnut cultivation was Rs. 4429.47. Thus the benefit cost ratio was found to be 1:1.16. The total cost of cultivation for chilly was Rs. 16581.91. The gross income realized by the farmers was Rs. 12350. The net income from chilly cultivation was Rs. -4231.91. Thus the benefit cost ratio was found to be 1:0.74.

The results indicate that, 34.29 per cent of the households opined that dry fodder was adequate which includes 8.57 per cent of marginal farmers and 40 per cent of small farmers. Around 40 per cent of the households opined that green fodder was adequate. The data revealed that 8.57 per cent of the farmers opined that dry fodder is inadequate.

The results indicate that the average annual gross income is Rs.52500 for landless farmers. For marginal farmers it was Rs 45982.22, for small farmers it was Rs.193225, for semi medium farmers it was Rs.83.766.67, for medium farmers it was Rs.102428.57 and Rs.150000. The average annual expenditure is Rs. 11070.85. For marginal farmers it was Rs 4957.53, for small farmers it was Rs. 10526.67, for semi medium farmers it was Rs. 8194.44 and for medium farmers it was Rs. 16204.08 and for large farmers it was Rs. 75000.

The results indicate that, sampled households have grown 27 coconut, and 1 guava trees in their field and 1 coconut tree in their backyard. Households have planted 68 neem trees, 11 tamarind trees, 9 banyan trees and 1 acacia tree in their field. Households have also planted 2 neem trees in their backyard.

The results indicated that, banana, Bengal gram, chilly, groundnut, jowar, onion, redgram and sorghum were sold to the extent of 100 per cent. Around 34.29 per cent of the households have sold their produce to agents/traders, 68.57 per cent of the households have sold their produce to village merchants, 28.57 per cent of the households have sold their produce in regulated markets and 11.43 per cent of the households have sold their produce in cooperative marketing society. Around 17.14 per cent of the households have carried head load, 77.14 per cent have used cart and 57.14 per cent have used tractor as a mode of transport for their agricultural produce.

The results indicated that, 11.43 per cent of the households have shown interest in soil testing i.e. 22.22 per cent of marginal farmers, 10 per cent of small farmers and 14.29 per cent of medium farmers have shown interest in soil testing.

The results indicated that, 14.29 per cent of the households have adopted field bunding which includes 22.22 per cent of marginal, 20 per cent of small farmers, and 14.29 per cent of medium farmers. Around 8.57 per cent of soil conservation structure is constructed by farmers on their own, and another 5.71 per cent is constructed by farmers' organization.

The results indicated that, 3.03 per cent of the households used dung cake as a source of fuel, 93.94 per cent used fire wood and another 3.03 per cent of the households used LPG. Piped supply was the major source for drinking water for 48.57 per cent of the households, bore well was the major source for 40 per cent of the households, open well was the major source for 11.43 per cent of the households and canal was the major source of drinking water for 2.86 per cent of the households. Electricity was the major source of light for 100 per cent of the households in micro watershed.

The results indicated that, 37.14 per cent of the households possess sanitary toilet i.e. 50 per cent of landless, 44.44 per cent of the marginal, 30 per cent of the small, 50 per cent of the semi medium and 14.29 per cent of the medium farmers had sanitary toilet

facility. Around 80 per cent of the sampled households possessed BPL card and 14.29 per cent possessed APL card.

Around 60 per cent of the households participated in NREGA programme which included 100 per cent of landless farmers, 33.33 percent of the marginal, 50 per cent of the small, 66.67 per cent of the semi medium, 85.71 percent of the medium farmers and 100 per cent of the small farmers.

The results indicated that, cereals were adequate for 97.14 per cent of the households, pulses were adequate for 60 per cent of the households, oilseeds were adequate for 20 per cent of the households, vegetables were adequate for 40 per cent of the households, fruits were adequate for 25.71 per cent of the households, milk was adequate for 48.57 per cent of the households, eggs were adequate for 22.86 per cent of the households and meat was adequate for 28.57 per cent of the households.

The results indicated that, pulses were inadequate for 40 per cent of the households, oilseeds were inadequate for 51.43 per cent of the households, vegetables were inadequate for 48.57 per cent of the households, fruits were inadequate for 54.29 per cent of the households, milk was inadequate for 28.57 per cent of the households, eggs were inadequate for 31.43 per cent of the households and meat was inadequate for 25.71 per cent of the households. Oilseeds, vegetables, fruits and milk were market surplus for 34.29, 20, 14.29 and 11.43 per cent of the households respectively.

The results indicated that, lower fertility status of the soil was the constraint experienced by 3.03 per cent of the households, wild animal menace on farm field (60.61%), frequent incidence of pest and diseases (51.52%), high cost of Fertilizers and plant protection chemicals (15.15%), high rate of interest on credit (24.24%), lack of marketing facilities in the area (12.12%), lack of transport for safe transport of the agricultural produce to the market (90.91%), less rainfall (100%), source of Agri-technology information (Newspaper /TV/Mobile) (96.97).