ICAR-NBSS&LUP Sujala MWS Publ.439

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

BELUR-1 (4D3A2R2f) MICRO WATERSHED

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.

Citation: Rajendra Hegde, Ramesh Kumar, S.C., K.V. Niranjana, S. Srinivas, M.Lalitha, B.A. Dhanorkar, R.S. Reddy and S.K. Singh (2019). “Land resource inventory and socio-economic status of farm households for watershed planning and development of Belur-1 (4D3A2R2f) Microwatershed, Koppal Taluk and District, Karnataka”, ICAR-NBSS&LUP Sujala MWS Publ .439, ICAR – NBSS & LUP, RC, Bangalore. p.141 & 43.

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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 Belur-2 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
Date: 22-10-2019

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PART-A

LAND RESOURCE INVENTORY

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EXECUTIVE SUMMARY

The land resource inventory of Belur-1 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 514 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 86 per cent is covered by soil and 14 per cent by habitation and water body. The salient findings from the land resource inventory are summarized briefly below

- *The soils belong to 11 soil series and 18 soil phases (management units) and 7 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 5 per cent of the soils are shallow (25-50 cm), 14 per cent of the soils are moderately shallow (50-75 cm), 22 per cent moderately deep (75- 100 cm) and 45 per cent is deep (100-150cm) soils.*
- *About 9 per cent loamy (sandy loam and sandy clay loam) and 77per cent has clayey (sandy clay and clay) soils at the surface.*
- *About 20 per cent of the area has non-gravelly (<15%) soils, 62 per cent has gravelly soils (15-35 % gravel) and 4 per cent very gravelly (35-60 %) soils.*
- *With respect to available water capacity 28 per cent of the area has very low (<50mm/m), 22 per cent of the area has low (51-100 mm/m), 9 per cent medium (101-150 mm/m) and 27 per cent very high (>200 mm/m) in available water capacity.*

- *Entire area in the microwatershed is very gently sloping (1-3%) lands.*
- *An area of about 11 per cent is slightly eroded (e1) and 75 per cent is moderately eroded (e2) lands.*
- *An area of about 6% is moderately alkaline (pH 7.8-8.4), 76 per cent is strongly alkaline (pH 8.4-9.0) and 4% is very strongly alkaline (pH >9.0) in reaction.*
- *The Electrical Conductivity (EC) of the soils are dominantly <2 dSm^{-1} indicating that the soils are non saline.*
- *Organic carbon is low (<0.5%) in 1 per cent and medium (0.5-0.75%) in 85 per cent area of the soils.*
- *Available phosphorus is medium (23-57 kg/ha) in 79 per cent and high (>57 kg/ha) in 7 per cent area of the microwatershed.*
- *Available potassium is medium (145-337 kg/ha) in 68 per cent and high (>337 kg/ha) in 18 per cent area of the soils.*
- *Available sulphur is low (<10 ppm) in 26 per cent and medium (10-20 ppm) in 60 per cent area of the soils.*
- *Available boron is low (<0.5 ppm) in 80 per cent and medium (0.5-1.0) in 6 per cent area of the microwatershed.*
- *Available iron is deficient (<4.5 ppm) in 65 per cent and sufficient (>4.5 ppm) in 21 per cent area of the microwatershed.*
- *Available zinc is deficient (<0.6 ppm) in 75 per cent and sufficient (>0.6 ppm) in 11 per cent area of the microwatershed.*
- *Available manganese and copper is sufficient in the entire area of the microwatershed.*
- *The land suitability for 31 major agricultural and horticultural crops grown in the microwatershed was assessed and the areas that are highly suitable (class S1) and moderately suitable (class 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	*96(19)*	*165(32)*	*Sapota*	*15(3)*	*143(28)*
Maize	*15(3)*	*246(48)*	*Pomegranate*	*47(9)*	*251(49)*
Bajra	*125(24)*	*247(48)*	*Musambi*	*96(19)*	*202(39)*
Groundnut	-	*237(46)*	*Lime*	*96(19)*	*202(39)*
Sunflower	*96(19)*	*91(17)*	*Amla*	*47(9)*	*371(72)*
Redgram	*15(3)*	*170(33)*	*Cashew*	*47(9)*	*111(22)*
Bengal gram	*81(16)*	*180(34)*	*Jackfruit*	*15(3)*	*143(28)*
Cotton	*81(16)*	*180(34)*	*Jamun*	-	*218(43)*
Chilli	*15(3)*	*143(27)*	*Custard apple*	*128(25)*	*290(56)*
Tomato	*15(3)*	*65(12)*	*Tamarind*	-	*208(41)*
Brinjal	*47(9)*	*227(44)*	*Mulberry*	*47(9)*	*174(34)*
Onion	*47(9)*	*46(9)*	*Marigold*	*15(3)*	*246(47)*
Bhendi	*47(9)*	*227(44)*	*Chrysanthemum*	*15(3)*	*246(47)*
Drumstick	*47(9)*	*186(36)*	*Jasmine*	*15(3)*	*106(20)*
Mango	-	*59(11)*	*Crossandra*	*15(3)*	*67(12)*
Guava	*15(3)*	*143(28)*			

- *Apart from the individual crop suitability, a proposed crop plan has been prepared for the 7 identified LMUs by considering only the highly and moderately suitable lands for different crops and cropping systems with food, fodder, fibre and other horticulture crops.*
- *Maintaining soil-health is vital for crop production and conserve soil and land resource base for maintaining ecological balance and to mitigate climate change. For this, several ameliorative measures have been suggested to these problematic soils like saline/alkali, highly eroded, sandy soils etc.,*
- *Soil and water conservation and drainage line 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 Belur-1 microwatershed in Koppal Taluk, Koppal 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 Belur-1 micro-watershed is located in the central part of Karnataka in Koppal taluk and district (Fig 2.1). It lies between $15^0$13' and $15^0$15' North latitudes and $76^0$05' and $76^0$07' East longitudes and covers an area of about 514 ha. It is about 17 km from Koppal town. It comprises Beelura and Gudlanura villages. It bounded by Beelura on the north and east and Gudlanura village on the west and southern side of the microwatershed.

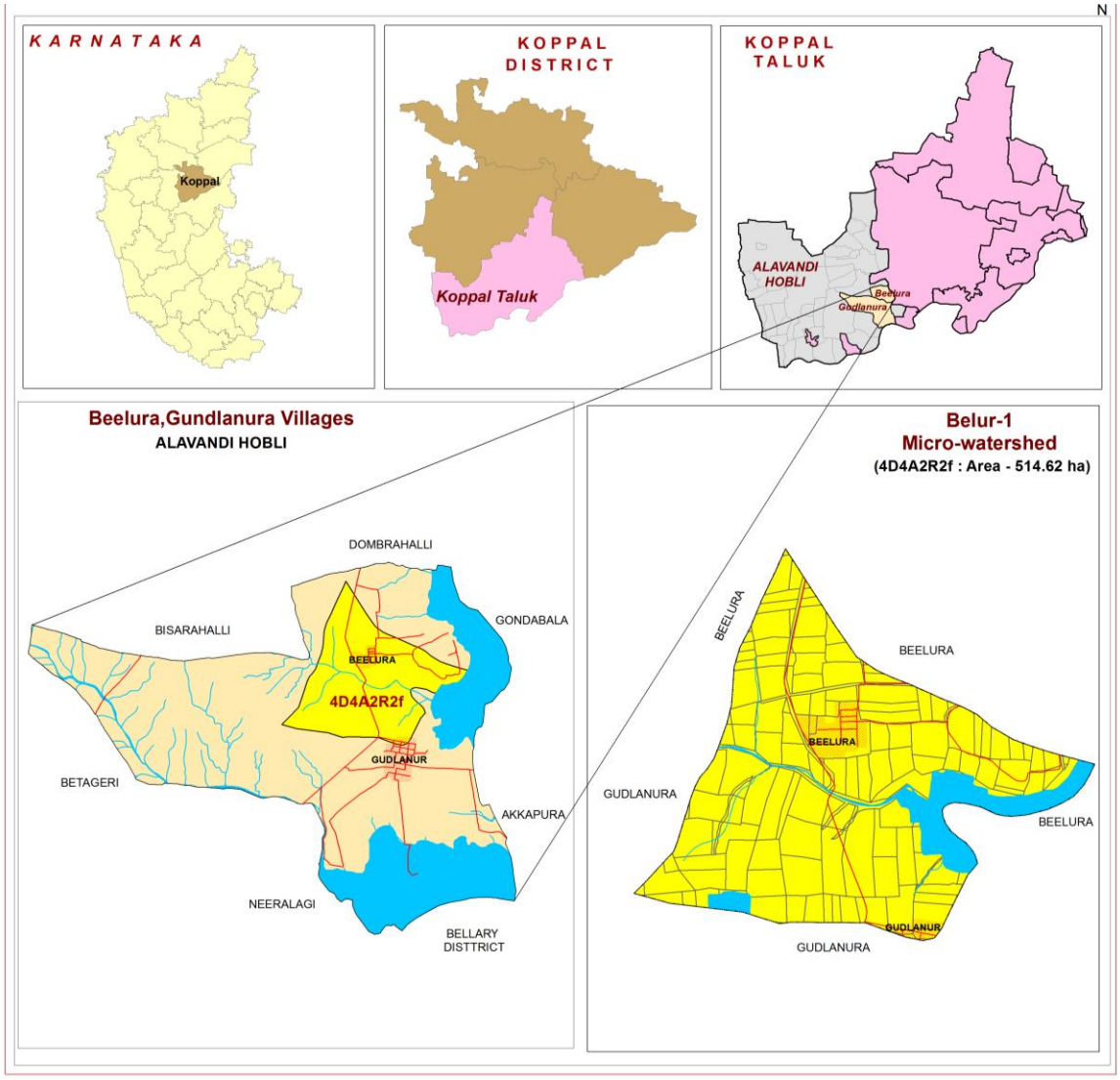


Fig.2.1 Location map of Belur-1 Microwatershed

2.2 Geology

Major rock formations observed in the microwatershed are granite gneiss and alluvium (Fig.2.2 a 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 Bikkanahalli 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 paleo black soils originally formed at higher elevation, but now occupying river valleys.

Fig.2.2a Granite and granite gneiss rocks

Fig.2.2b Alluvium

2.3 Physiography

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

plains based on slope and its relief features. The elevation ranges from 503 to 530 m in the gently sloping uplands. The mounds and ridges are mostly covered by rock outcrops.

2.4 Drainage

The area is drained by several small seasonal streams that join Hire *halla* and Chenna *halla* along its course. Though, the streams are not perennial, during rainy season they carry large quantities of rain water. The microwatershed has only few small tanks which are not able to store the water flowing during the rainy season. Due to this, the ground water recharge is very much affected in the villages. This is reflected in the failure of many bore wells in the villages. If the available rain water is properly harnessed by constructing tanks and recharge structures at appropriate places in the villages, then the drinking and irrigation needs of the area can be easily met. The drainage network is dendritic to sub parallel.

2.5 Climate

The district falls under semiarid tract of the state and is categorized as drought - prone with total annual rainfall of 662 mm (Table 2.1). Of this, a maximum of 424 mm precipitation is received during south–west monsoon period from June to September, north-east monsoon contributes about 161 mm and prevails from October to early December and the remaining 77 mm is received during the rest of the year. The winter season is from December to February. During April and May, the temperatures reach up to 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 to 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**	

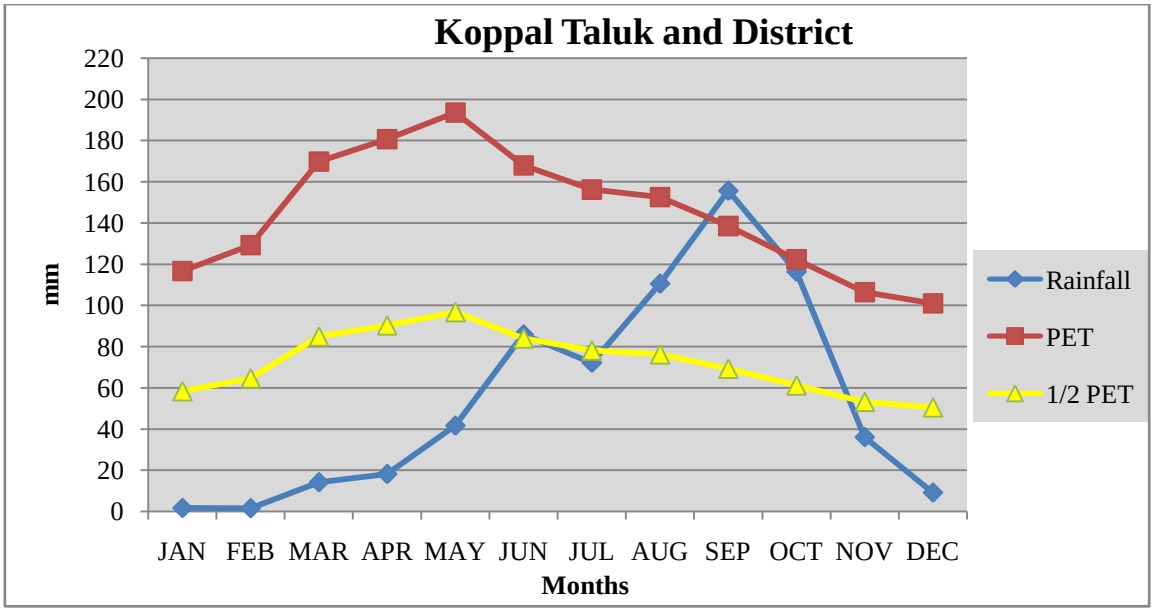


Fig. 2.3 Rainfall distribution in Koppal Taluk and District

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 Belur-1 microwatershed

2.7 Land Utilization

About 91 per cent area (Table 2.2) in Koppal district is cultivated at present and about 17 per cent of the area is sown more than once. An area of about 3 per cent is currently barren. Forests occupy a small area of about 5 per cent and the tree cover is in a very poor state. Most of the mounds, ridges and boulder 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 Belur-1 microwatershed is presented in Fig.2.6. Simultaneously, enumeration of existing wells (bore wells) and conservation structures is made and their location in different survey numbers is marked on the cadastral map. Map showing the location of wells and conservation structures in Belur-1 microwatershed is given in 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 Belur-1 Microwatershed

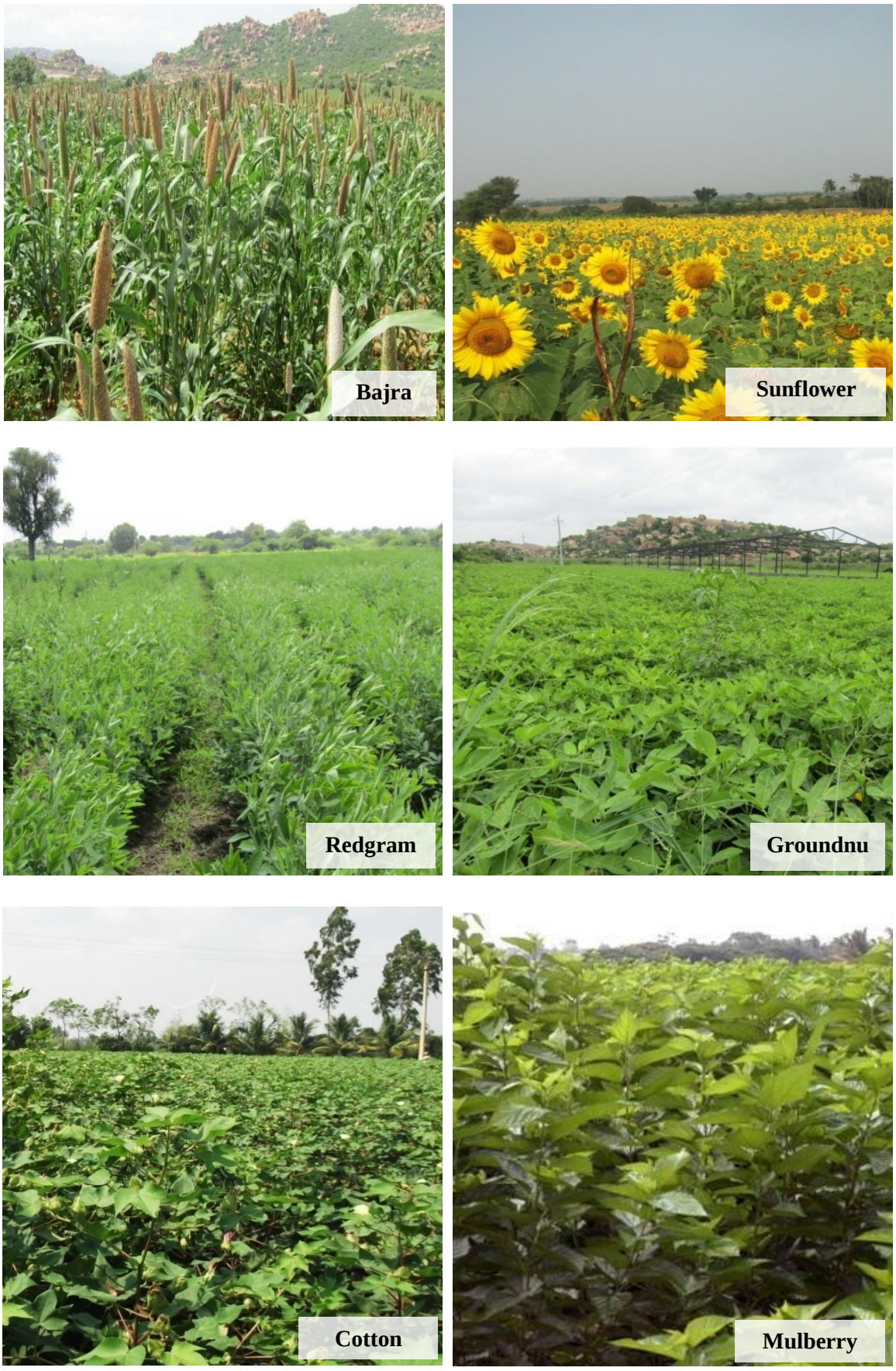


Fig.2.5 (b) Different crops and cropping systems in Belur-1 Microwatershed

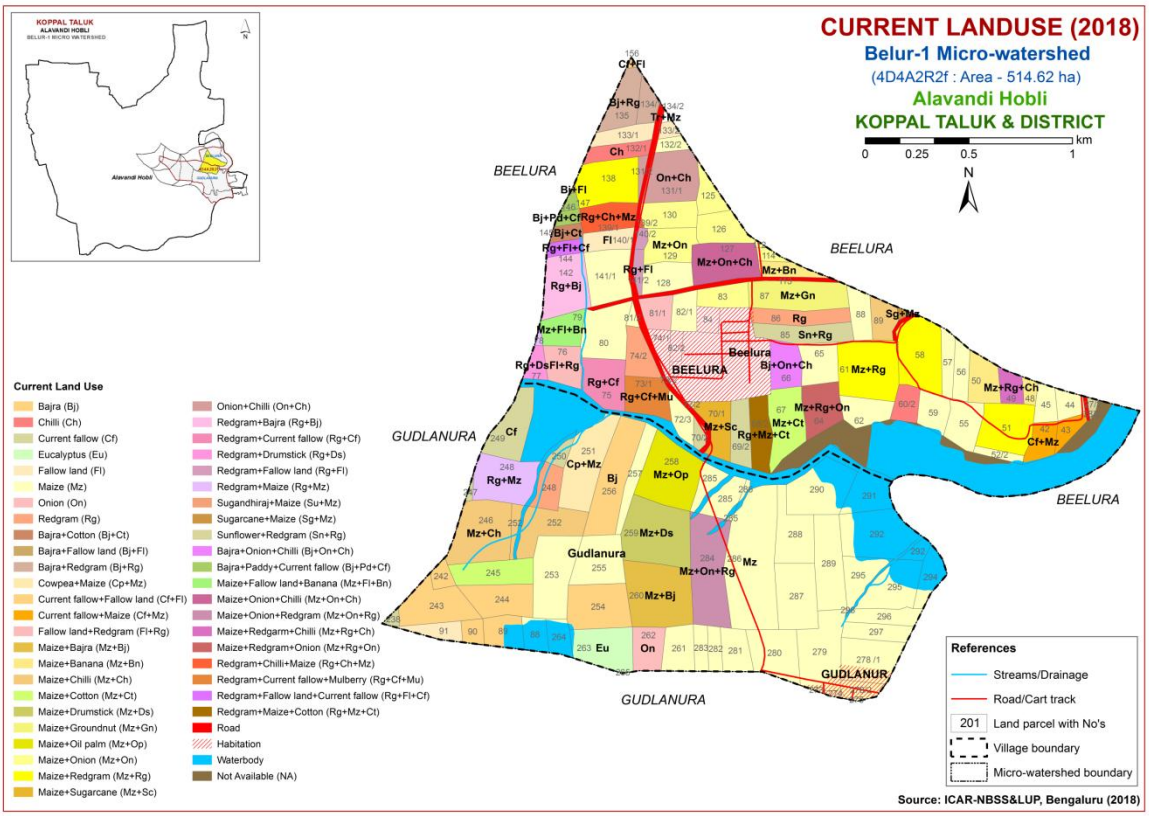


Fig.2.6 Current Land Use map of Belur-1 Microwatershed

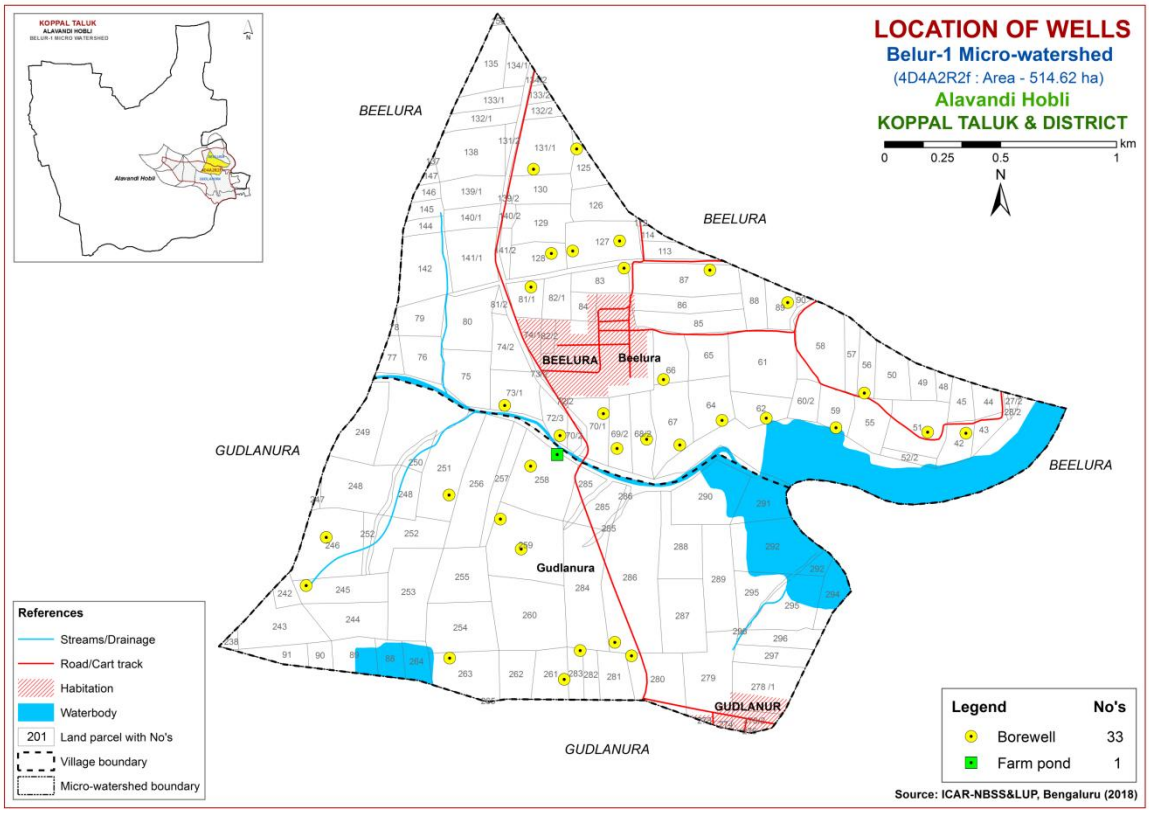


Fig.2.7 Location of wells and conservation structures map of Belur-1 Microwatershed

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 Belur-1 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 514 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)

G3 Valleys/ lowlands
- G31 Valleys, pink tones
- G32 Valleys gray mixed with pink tones

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

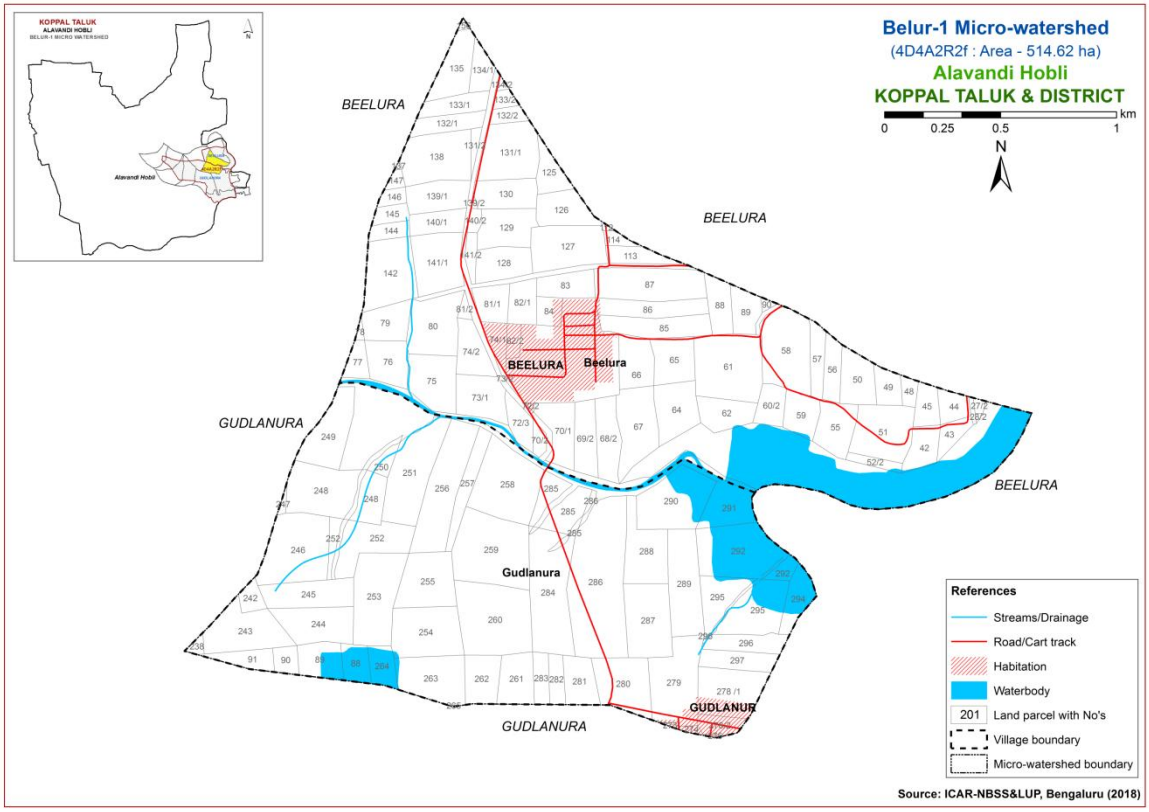


Fig 3.1 Scanned and Digitized Cadastral map of Belur-1 Microwatershed

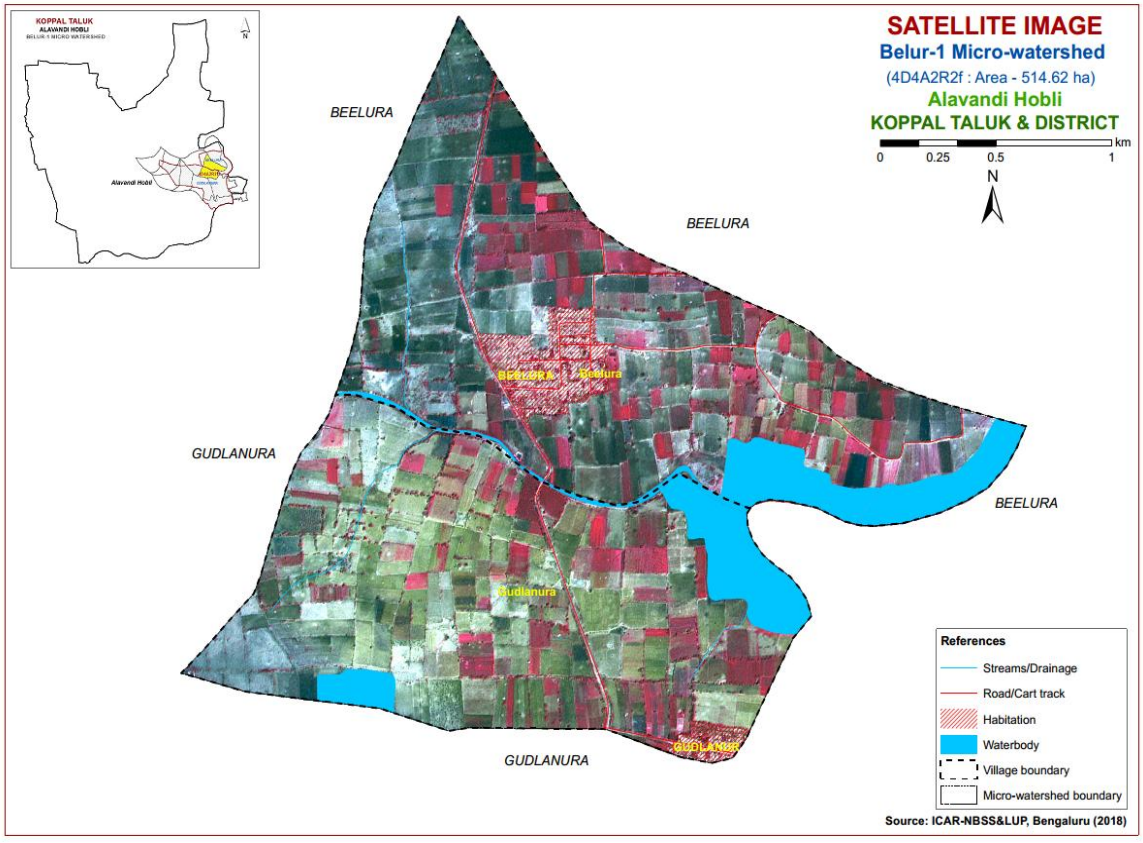


Fig.3.2 Satellite Image of Belur-1 Microwatershed

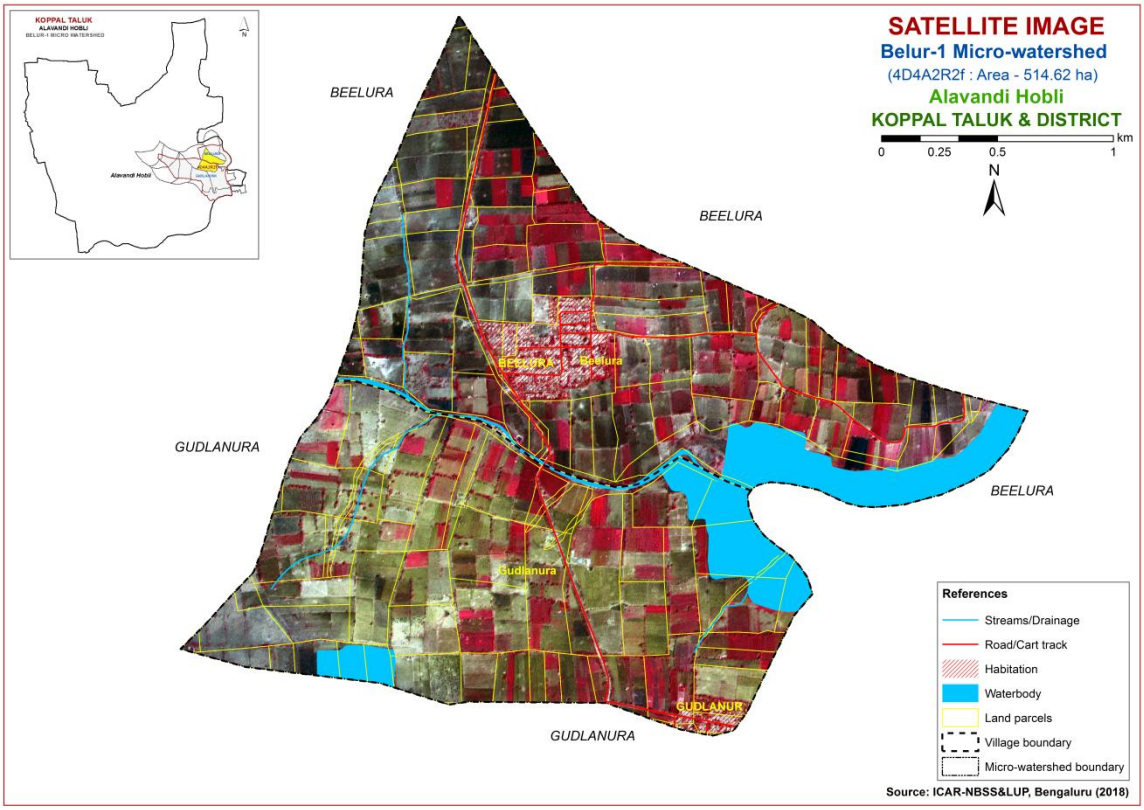


Fig.3.3 Cadastral map overlaid on IRS PAN+LISS IV merged imagery of Belur-1 Microwatershed

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).

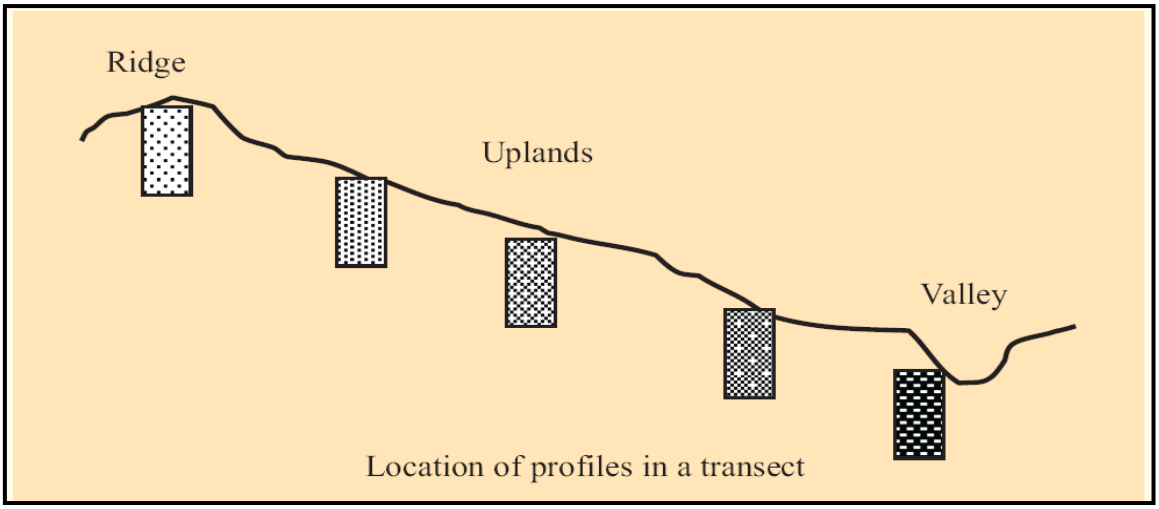


Fig: 3.4. Location of profiles in a transect

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, 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, 11 soil series were identified in Belur-1 microwatershed.

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

Soils of Granite Gneiss Landscape							
Sl. No.	**Soil Series**	**Depth (cm)**	**Colour (moist)**	**Texture**	**Gravel (%)**	**Horizon sequence**	**Calcareo-usness**
1	Kaggalipura (KGP)	25-50	2.5YR2.5/4,3/4, 3/6	gsc	15-35	Ap-Bt-Cr	-
2	Mukhadahalli (MKH)	50-75	5YR3/3,3/4,4/3,5/4, 6/6 2.5YR3/4	gsc	>35	Ap-Bt-Cr	-
3	Hooradhahalli (HDH)	75-100	2.5YR2.5/4,3/4,3/6	gsc-gc	>35	Ap-Bt-Cr	-
4	Kumchahalli (KMH)	100-150	2.5YR3/4,3/6	sc	<15	Bt-Cr	-
5	Balapur (BPR)	100-150	2.5YR2.5/4,3/4	gsc-gc	>35	Ap-Bt-Cr	-
Soils of Alluvial landscape							
6	Muttal (MTL)	25-50	10YR 3/2, 3/3, 4/2 7.5YR3/2,3/3,6/4	gc	15-35	Ap-Bw-Ck	e-ev
7	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
8	Dambarahalli (DRL)	75-100	10YR 2/1, 3/1, 4/3	c	<15	Ap-Bss-Ck	e-es
9	Gatareddihal (GRH)	100-150	10YR 2/1, 3/1, 2.5Y 4/3, 5/4	c	<15	Ap-Bss-BC-C	es
10	Kavalur (KVR)	100-150	10 YR 2/2, 3/1, 3/2, 3/3, 4/4	c	-	Ap-Bss-Bck-Cr	es-ev
11	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

3.4 Soil Mapping

The area under each soil series was further separated into soil phases and their boundaries delineated on the cadastral map based on the variations observed in the texture of the surface soil, slope, erosion, presence of gravel, stoniness etc. A soil phase is a subdivision of soil series based mostly on surface features that affect its use and management. The soil mapping units are shown on the map (Fig.3.5) in the form of symbols. During the survey many soil profile pits, few mini pits 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 mini pits, road cuts, terrace cuts etc., were studied to validate the soil boundaries on the soil map.

The soil map shows the geographic distribution of 18 mapping units representing 11 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 18 phases mapped in the microwatershed. Each mapping unit (soil phase) delineated on

the map has similar soil and site characteristics. In other words, all the farms or survey numbers included in one soil phase will have similar management needs and have to be treated accordingly.

3.5 Land Management Units

The 18 soil phases identified and mapped in the microwatershed were regrouped into 7 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 chosen for identification and delineation of LMU's. For Belur-1 microwatershed, five soil and site characteristics, namely the soil depth, soil texture, slope, erosion and gravel content have been considered for defining LMUs. The land use classes are expected to behave similarly for a given level of management.

3.6 Laboratory Characterization

Soil samples for each series were collected from representative master profiles for laboratory characterization by following the methods outlined in the Laboratory Manual (Sarma *et al*, 1987). Surface soil samples collected in the year 2018 from farmer's fields in Belur-1 microwatershed (49 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 Belur-1 Microwatershed

Soil map unit No*	Soil Series	Soil Phase	Mapping Unit Description	Area in ha (%)
Soils of Granite and Granite gneiss Landscape				
17	KGP	Kaggalipura soils are shallow (25-50 cm), well drained, have dark reddish brown to dark red, gravelly sandy clay soils occurring on nearly level to moderately sloping uplands under cultivation.		**0.08(0.02)**
		KGPhB2g1	Sandy clay loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)	0.08(0.02)
	MKH	Mukhadahalli soils are moderately shallow (50-75 cm), well drained, have dark brown to reddish brown, red gravelly sandy clay soils occurring on very gently to gently sloping uplands under cultivation.		**33(6.49)**
77		MKHcB2g1	Sandy loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)	23(4.54)
90		MKHiB2g1	Sandy clay surface, slope 1-3%, moderate erosion, gravelly (15-35%)	10(1.95)
	HDH	Hooradhahalli soils are moderately deep (75-100 cm), well drained, dark red to dark reddish brown, red		**111(21.51)**

Soil map unit No*	Soil Series	Soil Phase	Mapping Unit Description	Area in ha (%)
		gravelly sandy clay to clay soils occurring on nearly level to moderately sloping uplands under cultivation.		
128		HDHiB2g1	Sandy clay surface, slope 1-3%, moderate erosion, gravelly (15-35%)	111(21.51)
	KMH	Kumchahalli soils are moderately shallow (100-150 cm), well drained, have dark brown to reddish brown, red sandy clay soils occurring on very gently to gently sloping uplands under cultivation.		**47(9.18)**
201		KMHiB2	Sandy clay surface, slope 1-3%, moderate erosion	15(2.95)
202		KMHiB2g1	Sandy clay surface, slope 1-3%, moderate erosion, gravelly (15-35%)	32(6.23)
	BPR	Balapur soils are deep (100-150 cm), well drained, have dark reddish brown to dark red, gravelly sandy clay to clay soils occurring on nearly level to gently sloping uplands under cultivation.		**46(9.03)**
231		BPRhB2g1	Sandy clay loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)	23(4.55)
239		BPRiB2	Sandy clay surface, slope 1-3%, moderate erosion	23(4.48)
Soils of Alluvial Landscape				
	MTL	Muttal soils are shallow (25-50 cm), well drained, have very dark grayish brown to dark brown, calcareous black gravelly clay soils occurring on nearly level to gently sloping plains under cultivation.		**27(5.07)**
305		MTLiB2g2	Sandy clay surface, slope 1-3%, moderate erosion, very gravelly (35-60%)	2(0.31)
311		MTLmB2g1	Clay surface, slope 1-3%, moderate erosion, gravelly (15-35%)	11(2.07)
312		MTLmB2g2	Clay surface, slope 1-3%, moderate erosion, very gravelly (35-60%)	14(2.69)
	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.		**40(7.95)**
337		RNKmB2g1	Clay surface, slope 1-3%, moderate erosion, gravelly (15-35%)	33(6.5)
338		RNKmB2g2	Clay surface, slope 1-3%, moderate erosion, very gravelly (35-60%)	7(1.45)
	DRL	Dambarahalli soils are moderately deep (75-100 cm), 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.		**2(0.42)**

Soil map unit No*	Soil Series	Soil Phase	Mapping Unit Description	Area in ha (%)
350		DRLmB2	Clay surface, slope 1-3%, moderate erosion	2(0.42)
	GRH	Gatareddihal soils are deep (100-150 cm), moderately well drained, have light olive brown to very dark gray, calcareous black, sodic cracking clay soils occurring on nearly level to very gently sloping plains under cultivation.		**3(0.6)**
373		GRHmB2	Clay surface, slope 1-3%, moderate erosion	3(0.6)
	KVR	Kavalur soils are deep (100-150 cm), moderately well drained, have dark yellowish brown to very dark grayish brown, calcareous black cracking clay soils occurring on nearly level to very gently sloping plains under cultivation.		**12(2.25)**
388		KVRmB1	Clay surface, slope 1-3%, slight erosion	12(2.25)
	LGD	Lakshmangudda soils are deep (100-150 cm), well drained, have light olive brown to very dark gray, calcareous cracking clay soils occurring on nearly level uplands under cultivation.		**123(23.9)**
393		LGDmB1	Clay surface, slope 1-3%, slight erosion	45(8.82)
477		LGDmB2g1	Clay surface, slope 1-3%, moderate erosion, gravelly (15-35%)	78(15.08)
1000	Others	Habitation and water body		**70(13.59)**

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

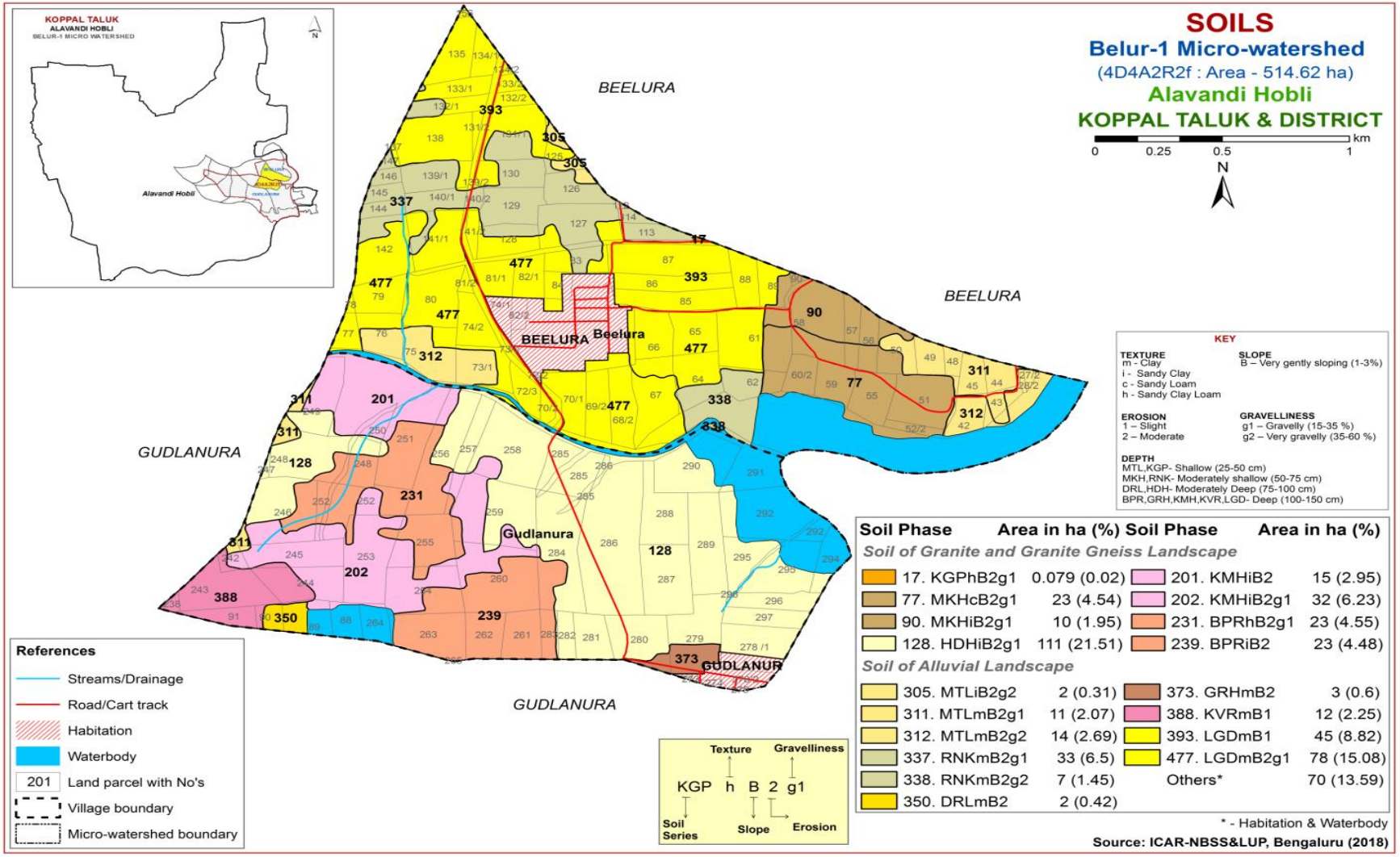


Fig 3.5 Soil Phase or Management Units of Belur-1 Microwatershed

Chapter 4

THE SOILS

Detailed information pertaining to the nature, extent and distribution of different kinds of soils occurring in Belur-1 microwatershed is provided in this chapter. The microwatershed area has been identified as granite gneiss and alluvial landscape based on geology. In all, 11 soil series were 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 11 soil series identified followed by 18 soil phases (management units) mapped (Fig. 3.5) are furnished below. The physical and chemical characteristics of soil series identified in Belur-1 microwatershed are given in Table 4.1 along with soil classification. The soils in any one map unit differ from place to place in their depth, texture, slope, gravelliness, erosion or any other site characteristic that affect management. The soil phase map can be used for identifying the suitability of areas for growing specific crops or for other alternative uses and also for deciding the type of conservation structures needed. The detailed information on soil and site-characteristics like soil depth, surface soil texture, slope, erosion, gravelliness, AWC, LCC etc, with respect to each of the soil phase identified is given village/survey number wise for the microwatershed in Appendix-I.

4.1 Soils of Granite and Granite gneiss Landscape

In this landscape, 5 soil series were identified and mapped. Of these series, HDH series occupies maximum area of 111 ha (22%) followed by KMH 47 ha (9%), BPR 46 ha (9%), MKH 33 ha (6%) and KGP <1 ha (<1%).The brief description of the soil series along with the soil phases identified and mapped is given below.

4.1.1 Kaggalipura (KGP) Series: Kaggalipura soils are shallow (25-50 cm), well drained, have brown to dark reddish brown, gravelly sandy clay soils. They have developed from weathered granite gneiss and occur on very gently sloping uplands. The Kaggalipura series has been classified as a member of the clayey, mixed, isohyperthermic family of (Paralithic) Rhodustalfs.

The thickness of the solum ranges from 30 to 50 cm. The thickness of A-horizon ranges from 10 to 17 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 sandy clay with 10 to 25 per cent gravel. The thickness of B horizon ranges from 24 to 50 cm. Its colour is in 2.5 YR hue with value 2.5 and chroma 4. Its texture is sandy clay loam to sandy clay soils with gravel content of 15 to 35 per cent. The available water capacity is low (51-100 mm/m). Only one soil phase was identified and mapped.

Landscape and soil profile characteristics of Kaggalipura (KGP) Series

4.1.2 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 very low (<50 mm/m). Two soil phases were identified and mapped.

Landscape and soil profile characteristics of Mukhadahalli (MKH) Series

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

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

Landscape and soil profile characteristics of Hooradhahalli (HDH) Series

4.1.4 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 weathered 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 (151-200 mm/m). Two soil phases were identified and mapped.

Landscape and soil profile characteristics of Kumchahalli (KMH) Series

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

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

Landscape Soil Profile Characteristics of Balapur (BPR) Series

4.2 Soils of Alluvial Landscape

In this landscape, 6 soil series were identified and mapped. Of these series, LGD series occupies maximum area of 123 ha (24%) followed by RNK 40 ha (8%), MTL 27 ha (5%), KVR 12 ha (2%), GRH 3 ha (1%) and DRL 2 ha (<1%).The brief description of the soil series along with the soil phases identified and mapped is given below.

4.2.1 Muttal (MTL) Series: Muttal soils are shallow (25-50 cm), well drained, have dark brown to very dark grayish brown, calcareous gravelly clay soils. They have developed from alluvium and occur on nearly level to very gently sloping plains. The Muttal series has been classified as a member of the clayey, mixed, (calc) isohyperthermic family of (Paralithic) Haplustepts.

The thickness of the solum ranges from 30 to 50 cm. The thickness of A horizon ranges from 15 to 18 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 18 to 32 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. The available water capacity is low (51-100 mm/m). Three soil phases were identified and mapped.

Landscape and soil profile characteristics of Muttal (MTL) Series

4.2.2 Ravanaki (RNK) Series: Ravanaki soils are moderately shallow (50-75 cm), well drained, have dark brown to very dark grayish brown, calcareous clayey soils. They have developed from alluvium and occur on nearly level to very gently sloping uplands. The Ravanaki soil series has been classified as a member of the very fine, smectitic, (Calc) isohyperthermic 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 medium (51-100 mm/m). Two soil phases were identified and mapped.

Landscape and Soil Profile Characteristics of Ravanaki (RNK) 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 Dambarahalli 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 is calcareous. The available water capacity is high (151-200 mm/m). Only one soil phase was identified and mapped.

Landscape and soil profile characteristics of Dambarahalli (DRL) Series

4.2.4 Gatareddihal (GRH) Series: Gatareddihal soils are deep (100-150 cm), moderately well drained have black or dark grey to light olive brown, calcareous sodic clay soils. They are developed from alluvium and occur on nearly level to very gently sloping plains under cultivation. The Gatareddihal series has been classified as member of the very fine, smectitic, (calc) isohyperthermic family of Sodic Haplusterts.

The thickness of the solum ranges from 102 to 149 cm. The thickness of A-horizon ranges from 12 to 19 cm. Its colour is in 7.5 YR, 10 YR hue with value 3 to 4 and chroma 1 to 6. The texture is sandy clay loam to clay. The thickness of B-horizon ranges from 86 to 117 cm. Its colour is in 10 YR and 7.5 YR hue with value 3 and chroma 2 to 6. Texture is clay with less than 15 per cent gravel. The available water capacity is very high (>200 mm/m). Only one soil phase was identified and mapped.

Landscape and soil profile characteristics of Gatareddihal (GRH) Series

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

The thickness of the solum is 113 to 143 cm. The thickness of A horizon ranges from 9 to 24 cm. Its colour is in 10 YR hue with value 3 and chroma 1. The texture is clay with no gravel. The thickness of B horizon ranges from 89 to 134 cm. Its colour is in 10 YR hue with value 3 and chroma 1. Its texture is clay. The available water capacity is very high (>200 mm/m). Only one soil phase was identified and mapped.

Landscape and soil profile characteristics of Kavalur (KVR) series

4.2.6 Lakshmangudda (LGD) Series: Lakshmangudda soils are deep (100-150 cm), well drained, have light olive brown to very dark gray calcareous clayey soils. They have developed from alluvium and occur on nearly level uplands. 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 Very high (151-200 mm/m). Two soil phases were identified and mapped.

Landscape and Soil Profile Characteristics of Lakshmangudda (LGD) Series

Table: 4.1 Physical and Chemical Characteristics of Soil Series identified in Belur-1 microwatershed

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: 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

Contd…

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

Contd…

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

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

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

Contd…

Series Name: Muttal (MTL), **Pedon:** RM-13
Location: $15^0$14'30.8"N, $75^0$56'50.6"E, Gatareddihalla village, Koppal Taluk and District
Analysis at: NBSS&LUP, Regional Centre, Bangalore. **Classification:** Clayey, mixed, (calc) isohyperthermic (Paralithic) 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
0-20	Ap	39.05	13.74	47.21	3.05	5.05	8.21	14.63	8.11	15-30	c	29.95	17.94
20-34	Bwk	28.77	19.57	51.66	4.81	4.71	4.92	9.09	5.24	10	c	33.44	21.56

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-20	8.27	-	-	0.202	0.79	6.10	-	-	0.62	0.25	-	36.64	0.78	-	0.69
20-34	8.36	-	-	0.177	0.99	23.04	-	-	0.29	0.38	-	39.60	0.77	-	0.96

Contd…

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
55-80	Bc	12.53	15.43	72.04	2.60	1.92	1.47	3.16	3.39	10	c	56.82	43.73

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
55-80	8.35	-	-	4.53	0.91	11.40	-	-	0.75	28.97	-	54.80	0.76	-	21.14

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: Gatareddihal (GRH), **Pedon:** R-7
Location: $15^0$14'20.8"N, $76^0$04'28.4" E Gudlanur village, Koppal Taluk and District
Analysis at: NBSS&LUP, Regional Centre, Bangalore. **Classification:** Very fine, smectitic, isohyperthermic (Calc) Sodic 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
0-18	Ap	20.07	19.71	60.23	1.76	3.75	3.64	3.42	7.50	-	c	41.70	29.56
18-51	Bss1	15.11	17.47	67.42	3.16	3.04	2.25	3.38	3.27	-	c	59.43	38.52
51-80	Bss2	13.19	18.74	68.07	1.80	2.93	2.37	3.04	3.04	-	c	60.69	40.91
80-107	Bss3	17.54	19.50	62.96	2.46	4.13	3.24	4.25	3.46	-	c	57.25	37.31
107-131	BC	9.42	17.48	73.10	1.48	1.82	1.36	1.93	2.84	-	c	64.62	43.98

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	9.08	-	-	0.23	0.33	6.89	-	-	0.70	6.36	-	63.21	1.05	100.00	7.11
18-51	9.19	-	-	0.61	0.49	9.10	-	-	0.54	14.20	-	66.05	0.98	100.00	15.98
51-80	9.27	-	-	0.56	0.29	9.36	-	-	0.49	14.75	-	65.63	0.96	100.00	17.07
80-107	9.28	-	-	0.57	0.39	9.62	-	-	0.44	14.64	-	63.95	1.02	100.00	17.49
107-131	9.04	-	-	1.08	0.31	8.32	-	-	0.52	16.40	-	68.36	0.94	100.00	17.30

Contd…

Series Name: Kavalura (KVR), **Pedon:** A2/RM-9
Location: $15^0$18'86.8"N, $75^0$56'56.3"E, Kavalura 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
0-24	Ap	36.18	17.80	46.02	7.04	7.47	6.62	9.28	5.76	10	c	28.20	18.75
24-50	Bss1	38.79	15.36	45.85	6.25	6.25	9.70	10.67	5.93	05	c	27.16	18.81
50-85	Bss2	36.80	14.66	48.54	9.63	8.23	7.03	7.58	4.33	<5	c	30.16	22.17
85-124	Bss3	22.66	17.24	60.09	4.18	3.85	5.28	5.06	4.29	<5	c	40.34	31.42

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}							%	%
0-24	8.4	-	-	0.265	0.2	8.04	-	-	0.97	0.65		43.25	0.94		0.60
24-50	9.27	-	-	0.23	0.37	8.04	-	-	0.31	3.21		41.66	0.91		3.08
50-85	9.44	-	-	0.297	0.41	8.64	-	-	0.35	6.43		43.99	0.91		5.85
85-124	9.37	-	-	0.46	0.41	11.40	-	-	0.42	7.99		51.09	0.85		6.26

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, isohyperthermic (calc) Typic Haplusterts

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-17	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

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 recognized 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 18 soil map units identified in the Belur-1 microwatershed are grouped under 2 land capability classes and 4 land capability subclasses (Fig. 5.1).

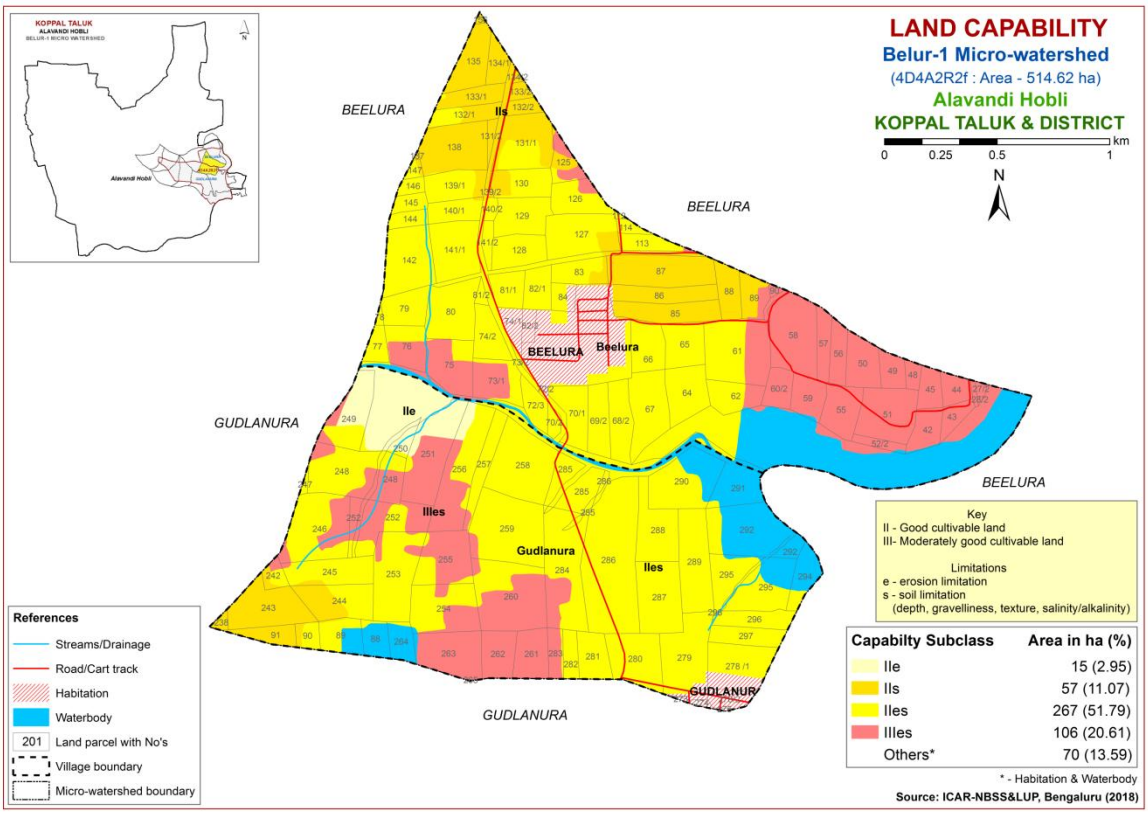


Fig. 5.1 Land Capability classification map of Belur-1 Microwatershed

Entire cultivated area in the microwatershed is suitable for agriculture. Good lands (Class II) cover a maximum area of about 339 ha (66%) and are distributed in all parts of the microwatershed with minor problems of soil and erosion. Moderately good (Class III) lands covers an area of about 106 ha (20%) and are distributed in the northern, western, eastern and southern part of the microwatershed with major problems of soil and erosion. An area of about 70 ha (14%) is covered by others (habitation and water body).

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). The area extent and their geographical distribution in the microwatershed is given in Fig. 5.2.

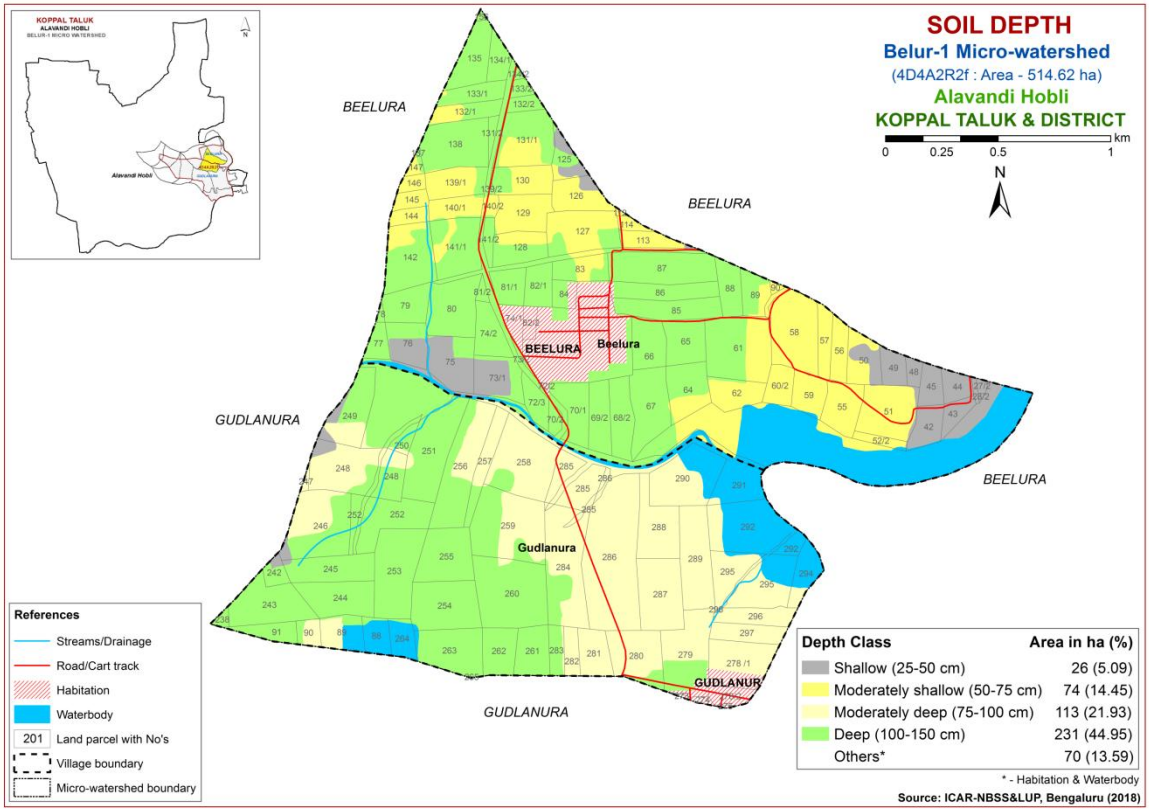


Fig. 5.2 Soil Depth map of Belur-1 Microwatershed

Shallow (25-50 cm) soils cover an area of about 26 ha (5%) and are distributed in the northern, western and eastern part of the microwatershed. Moderately shallow (50-75 cm) soils cover an area of about 74 ha (14%) and distributed in the northern and eastern

part of the microwatershed. An area of about 113 ha (22%) is moderately deep soils (75-100 cm) and are distributed in the western and southern part of the microwatershed. Deep (100-150 cm) soils occupy a maximum area of about 231 ha (45%) and are distributed in all parts of the microwatershed.

The most productive lands cover about 231 ha (45%) where all climatically adopted long duration crops can be grown. Problem soils cover about 26 ha (5%) where only short duration crops can be grown.

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 behavior, microbial activity and crop suitability. The textural classes used for LRI were used to classify and a surface soil texture map was generated. The area extent and their geographical distribution in the microwatershed is shown in Fig 5.3.

An area of about 46 ha (9%) is loamy at the surface and are distributed in the eastern and western part of the microwatershed. Maximum area of about 398 ha (77%) is clayey at the surface and are distributed in all parts of the microwatershed.

The most productive lands with respect to surface soil texture are clayey soils that (77%) 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 productive lands are loamy (9%) soils which also have high potential for soil- water retention and nutrient availability but have no drainage or other physical problems.

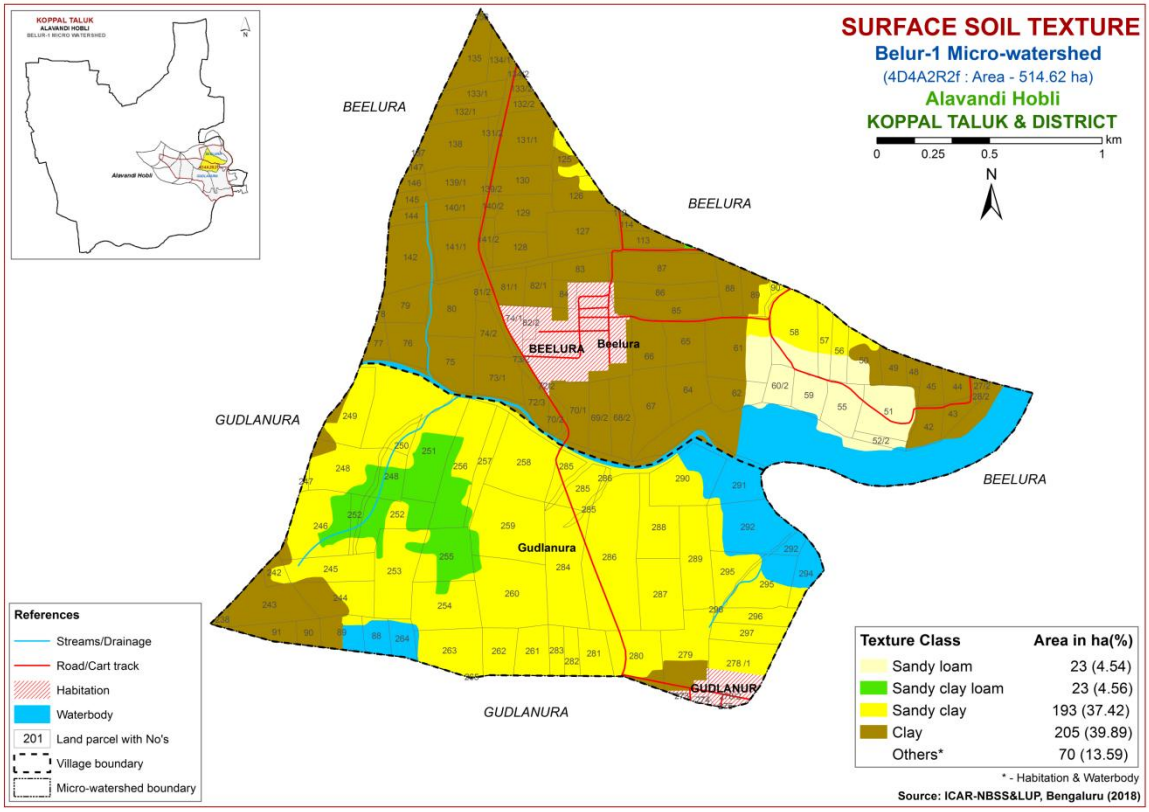


Fig. 5.3 Surface Soil Texture map of Belur-1 Microwatershed

5.4 Soil Gravelliness

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

The soils that are non-gravelly (<15% gravel) cover an area of about 100 ha (20%) and distributed in the northern, eastern, western and southern part of the microwatershed. Maximum area of about 321 ha (62%) is covered by gravelly (15-35% gravel) soils and are distributed in all parts of the microwatershed. Very gravelly (35-60%) soils cover an area of about 23 ha (4%) and are distributed in the northern, western and eastern part of the microwatershed (Fig. 5.4).

The most productive lands with respect to gravelliness are found to be 20 per cent that are non gravelly (<15%) soils. These are most productive soils and have potential for growing both annual and perennial crops. The problem soils that are very gravelly (35-60%) cover an area of about 4 per cent where only short duration crops can be grown.

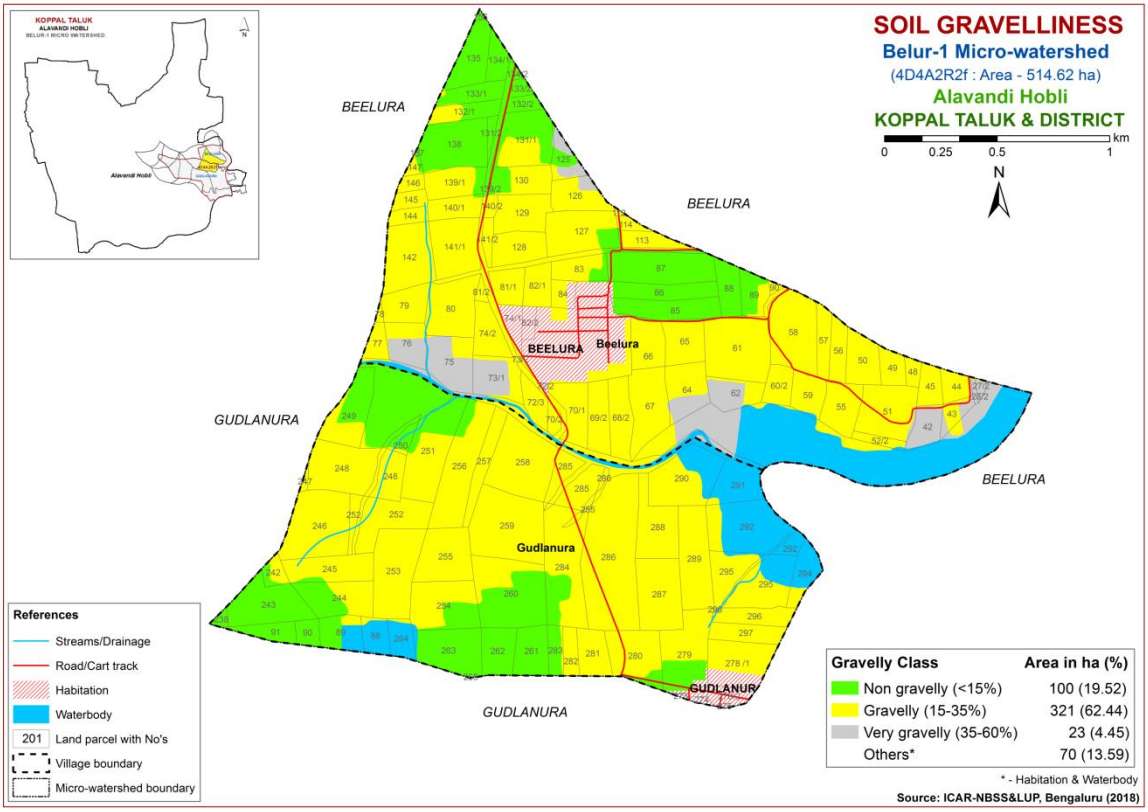


Fig. 5.4 Soil Gravelliness map of Belur-1 Microwatershed

5.5 Available Water Capacity

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

Maximum area of about 144 ha (28%) in the microwatershed has soils that are very low (<50 mm/m) in available water capacity and are distributed in all parts of the microwatershed. An area of about 113 ha (22%) has soils that are low (51 to 100 mm/m) in available water capacity and are distributed in the northern, eastern, western and southern part of the microwatershed. An area of about 49 ha (9%) has soils that are medium (101-150 mm/m) in available water capacity and are distributed in the western part of the microwatershed. An area of about 138 ha (27%) is very high (>200 mm/m) in available water capacity and are distributed in the northern, western, southern and eastern part of the microwatershed.

An area of about 144 ha (28%) in the microwatershed has soils that are problematic with regard to available water capacity. Here, only short duration crops can

be grown and the probability of crop failure is very high. These areas are best put to other alternative uses. An area of about 138 ha (27%) has soils that have high potential (>200 mm/m) with regard to available water capacity where all climatically adapted long duration crops can be grown successfully.

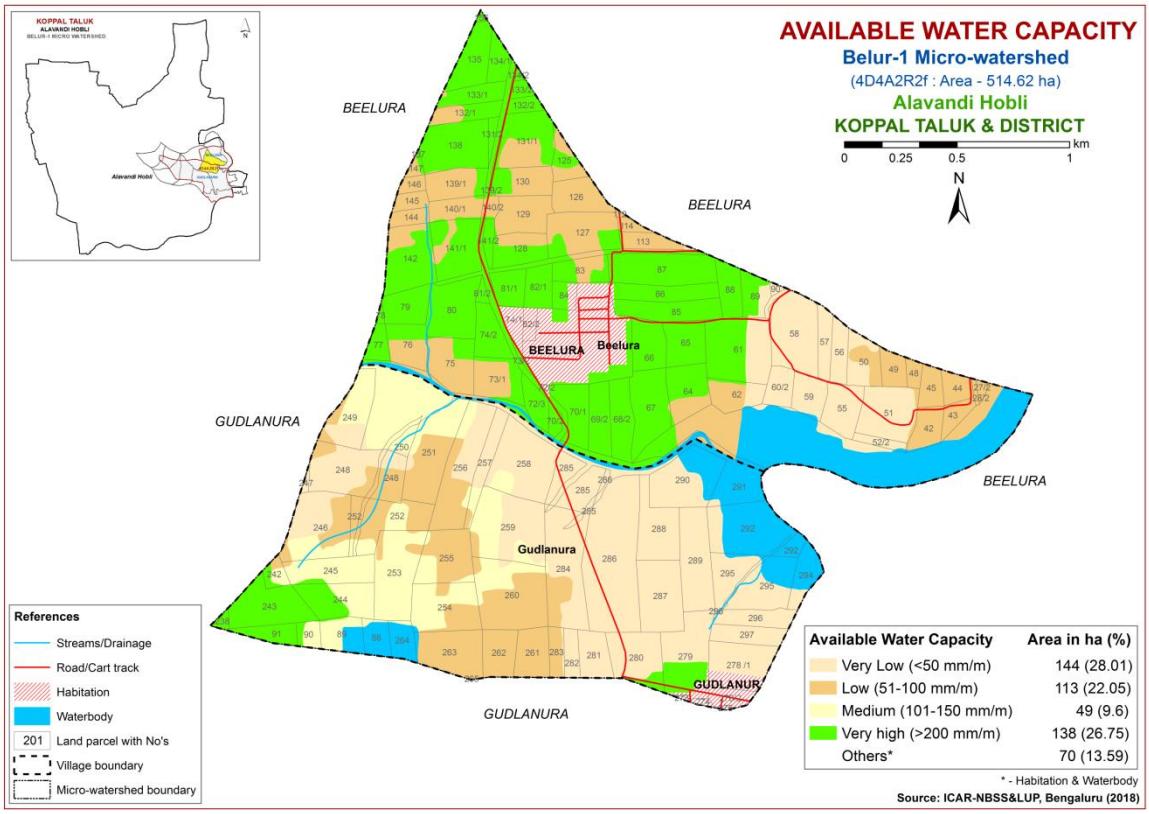


Fig. 5.5 Soil Available Water Capacity map of Belur-1 Microwatershed

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 three 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).

Entire area in the microwatershed has very gently sloping (1-3%) lands and are distributed in all parts of the microwatershed. In these areas, all climatically adapted annual and perennial crops can be grown without much soil and water conservation and other land development measures.

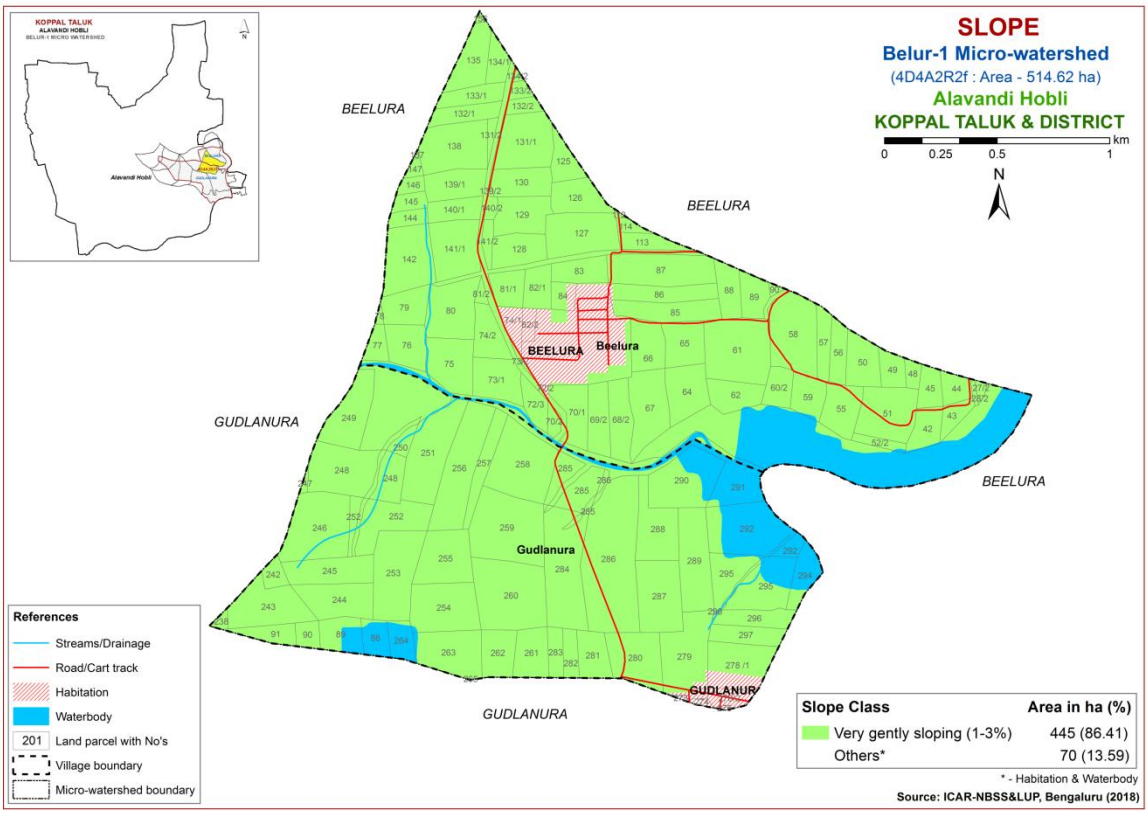


Fig. 5.6 Soil Slope map of Belur-1 Microwatershed

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.

Slightly eroded (e1 class) lands cover an area of about 57 ha (11%) and are distributed in the northern, eastern and western part of the microwatershed. Maximum area of about 388 ha (75%) is moderately eroded (e2 class) and distributed in all parts of the microwatershed. Moderately eroded lands are problematic and need appropriate soil and water conservation and other land development measures.

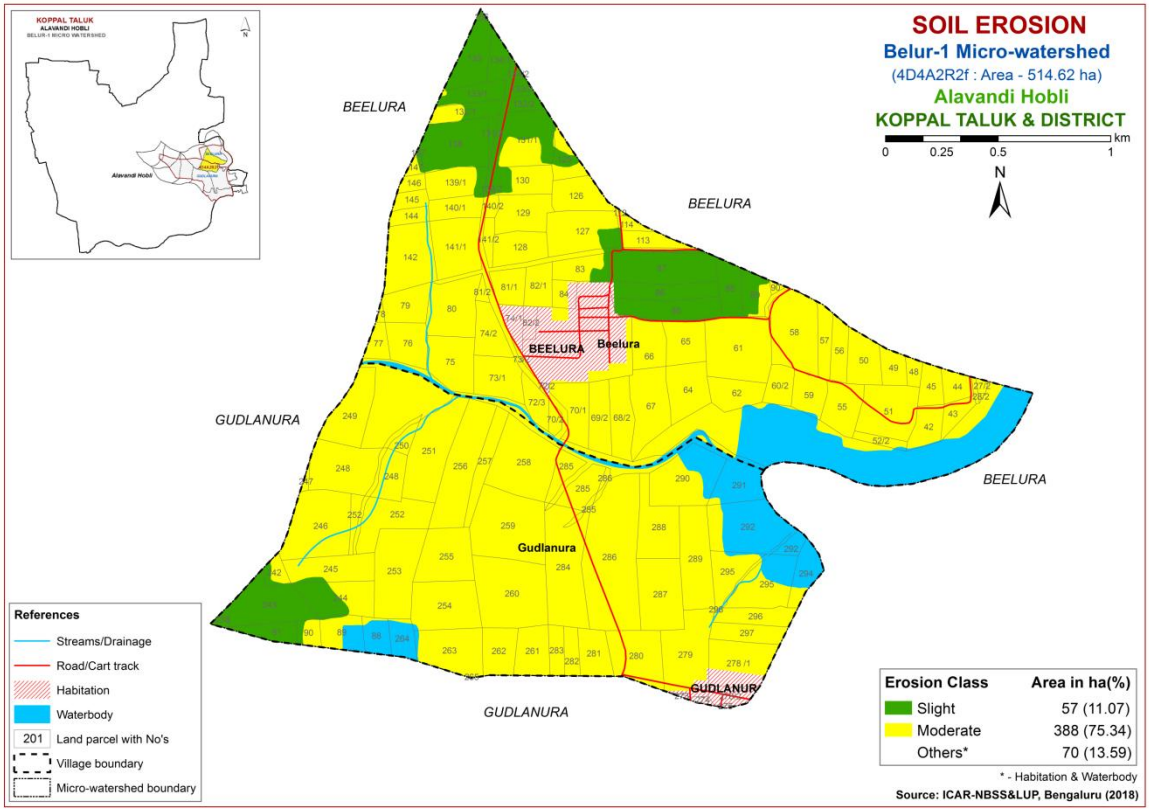


Fig. 5.7 Soil Erosion map of Belur-1 Microwatershed

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 characterized by low rainfall and high temperatures. Hence, it is necessary to know the fertility (macro and micro nutrients) status of the soils of the watersheds for assessing the kind and amount of fertilizers required for each of the crop intended to be grown. For this purpose, the surface soil samples collected from the grid points (one soil sample at every 320 m grid interval) all over the microwatershed through land resource inventory in the year 2017 were analyzed 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)

An area of about 29 ha (6%) is moderately alkaline (pH 7.8-8.4) and are distributed in the eastern part of the microwatershed. Maximum area of about 394 ha (76%) is strongly alkaline (pH 8.4-9.0) and are distributed in all parts of the microwatershed. An area of about 22 ha (4%) is very strongly alkaline (pH>9.0) and are distributed in the western part of the microwatershed. Thus, major soils in the microwatershed are alkaline in reaction (Fig.6.1).

6.2 Electrical Conductivity (EC)

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

6.3 Organic Carbon

An area of about 6 ha (1%) is low (<0.5%) and distributed in the western part of the microwatershed. Maximum area of about 439 ha (85%) is medium (0.5-0.75%) in organic carbon content and distributed in all parts of the microwatershed (Fig.6.3).

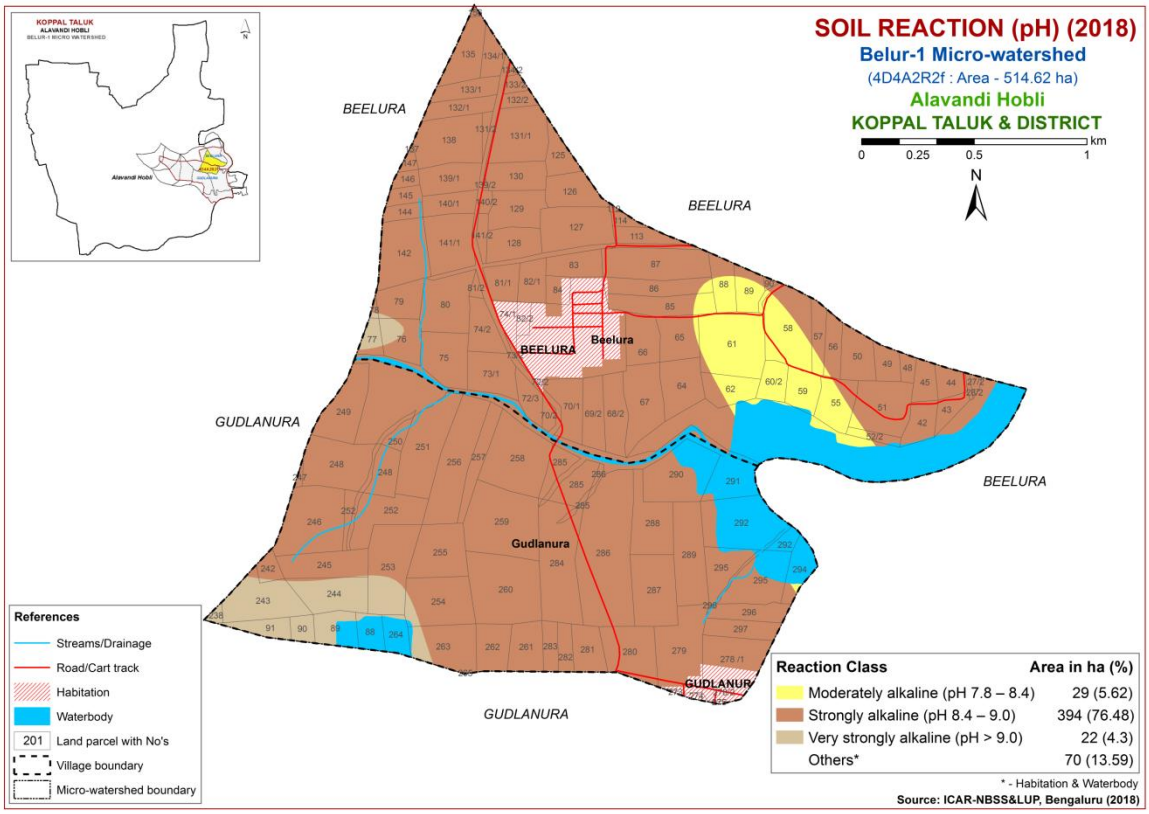


Fig.6.1 Soil Reaction (pH) map of Belur-1 Microwatershed

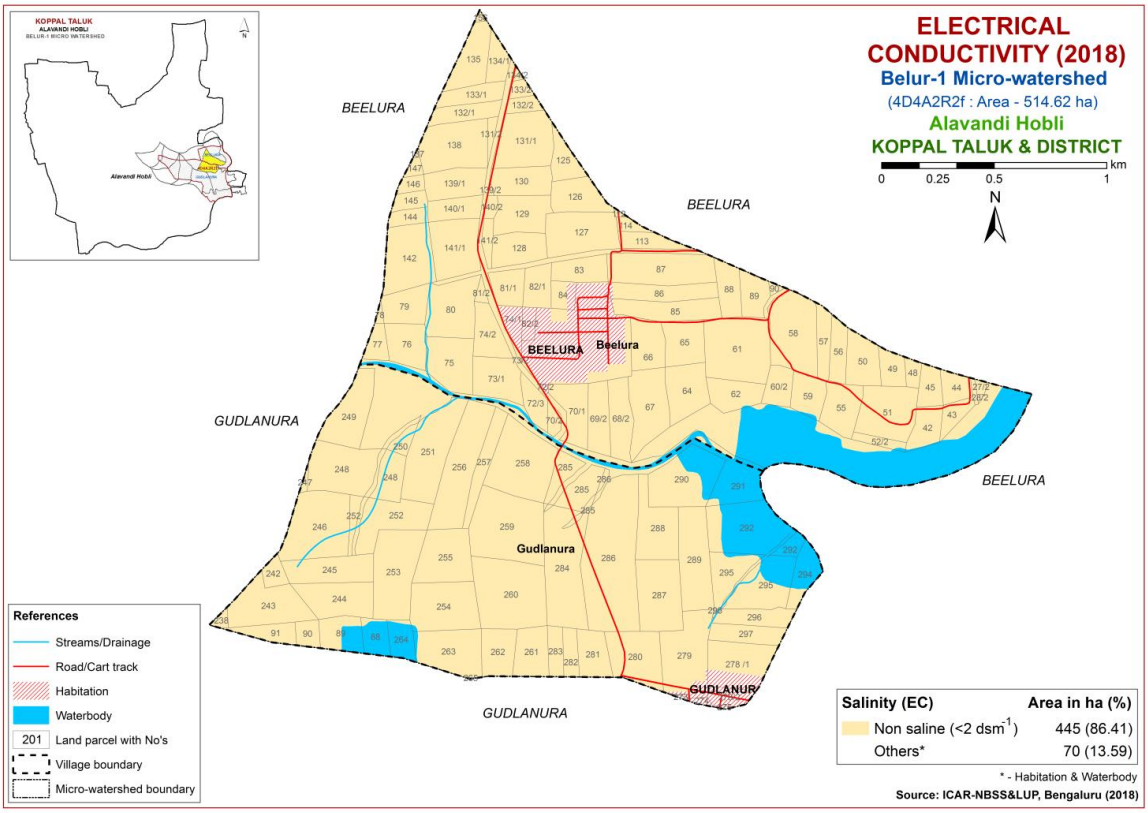


Fig.6.2 Electrical Conductivity (EC) map of Belur-1 Microwatershed

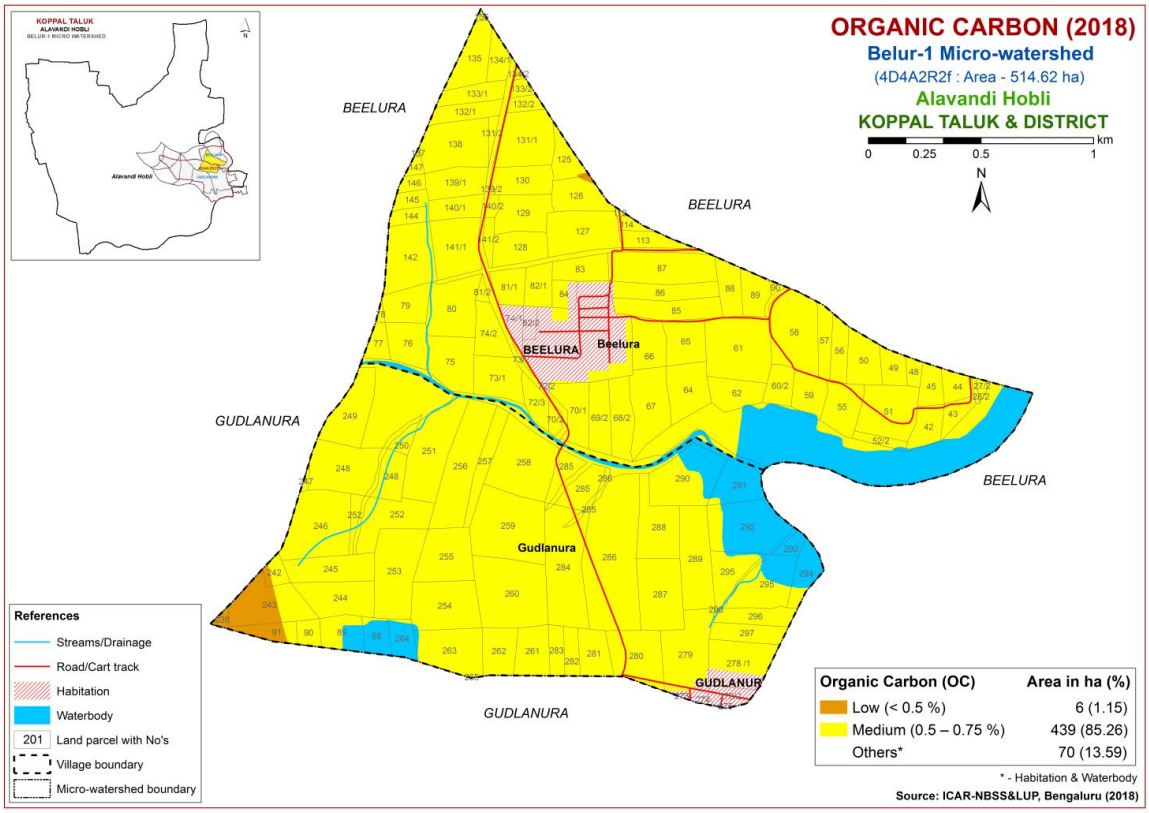


Fig.6.3 Soil Organic Carbon map of Belur-1 Microwatershed

6.4 Available Phosphorus

Available phosphorus content is medium (23-57 kg/ha) in a maximum area of about 409 ha (79%) and are distributed in all parts of the microwatershed. An area of about 35 ha (7%) is high (>57 kg/ha) and are distributed in the eastern part of the microwatershed. Apply additional 25% phosphorous in areas where it is low and medium in available phosphorous (Fig 6.4).

6.5 Available Potassium

Medium (145-337 kg/ha) in a maximum area of about 352 ha (68%) and are distributed in all parts of the microwatershed. An area of about 93 ha (18%) is high (>337 kg/ha) in available potassium and are distributed in the eastern part of the microwatershed (Fig. 6.5). Apply additional 25% potassium in areas where it is low and medium in available potassium.

6.6 Available Sulphur

Available sulphur content is low (<10 ppm) in an area of about 137 ha (26%) and are distributed in the western and southern part of the microwatershed. Maximum area of about 308 ha (60%) is medium (10-20 ppm) in available sulphur and are distributed in all parts of the microwatershed. The areas that are low and medium in available sulphur need to be applied with magnesium sulphate or gypsum or factomphos (p) fertilizer (13% sulphur) for 2-3 years for the deficiency to be corrected.

6.7 Available Boron

Available boron content in Belur-1 microwatershed is low (< 0.5ppm) in a maximum area of about 411 ha (80%) and distributed in all parts of the microwatershed. An area of about 34 ha (6%) is medium (0.5-1.0 ppm) and distributed in the eastern part of the microwatershed (Fig.6.7).

6.8 Available Iron

Available iron content is deficient (<4.5 ppm) in a maximum area of about 338 ha (65%) and are distributed in all parts of the microwatershed. Sufficient (>4.5 ppm) in an area of about 107 ha (21%) and are distributed in the northern parts of the microwatershed (Fig 6.8).

6.9 Available Manganese

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

6.10 Available Copper

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

6.11 Available Zinc

Available zinc content is deficient (<0.6 ppm) in a maximum area of about 385 ha (75%) and are distributed in all parts of the microwatershed (Fig 6.11). An area of about 60 ha (11%) is sufficient (>0.6 ppm) and are distributed in the eastern part of the microwatershed.

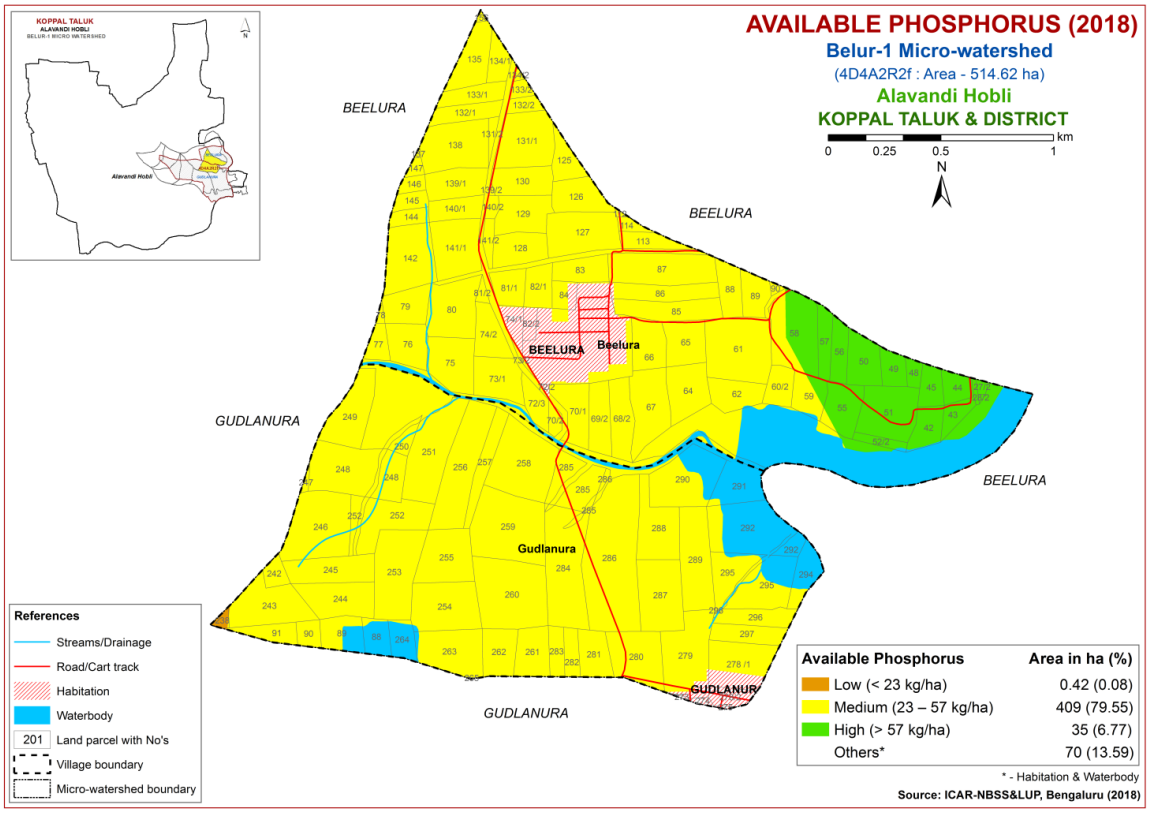


Fig.6.4 Soil Available Phosphorus map of Belur-1 Microwatershed

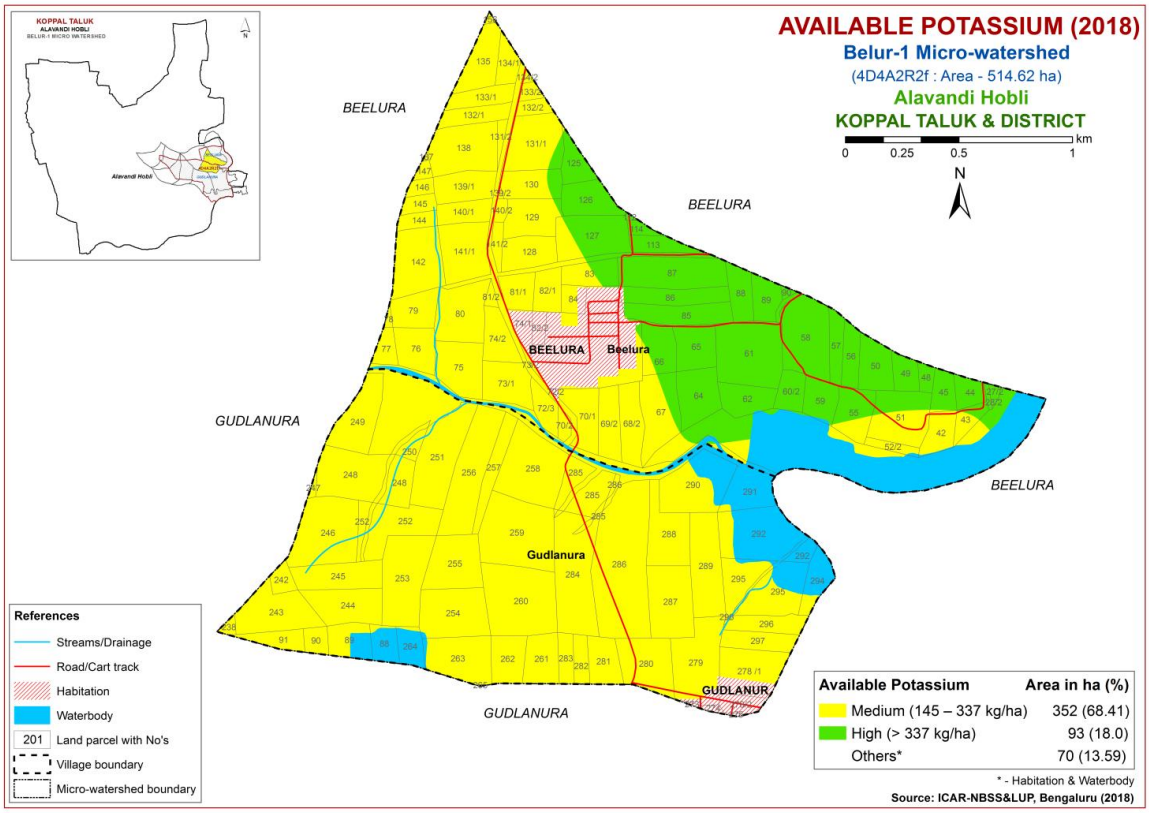


Fig.6.5 Soil Available Potassium map of Belur-1 Microwatershed

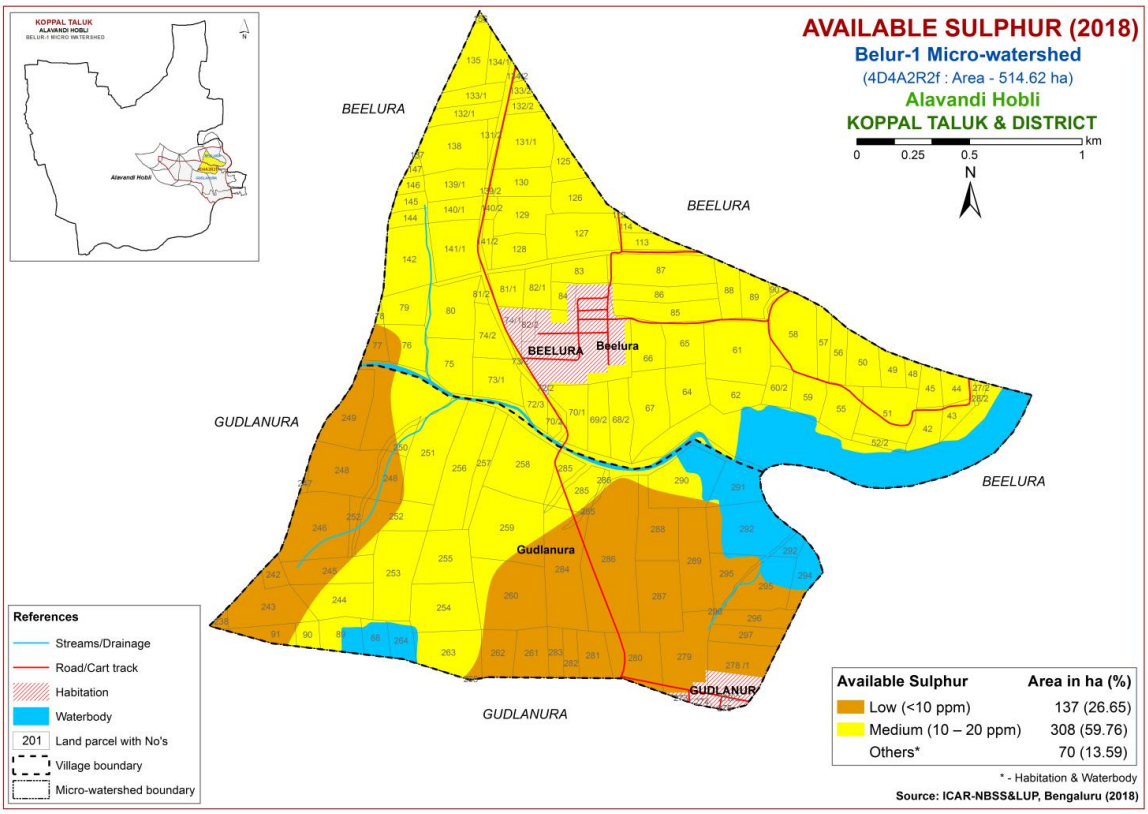


Fig.6.6 Soil Available Sulphur map of Belur-1 Microwatershed

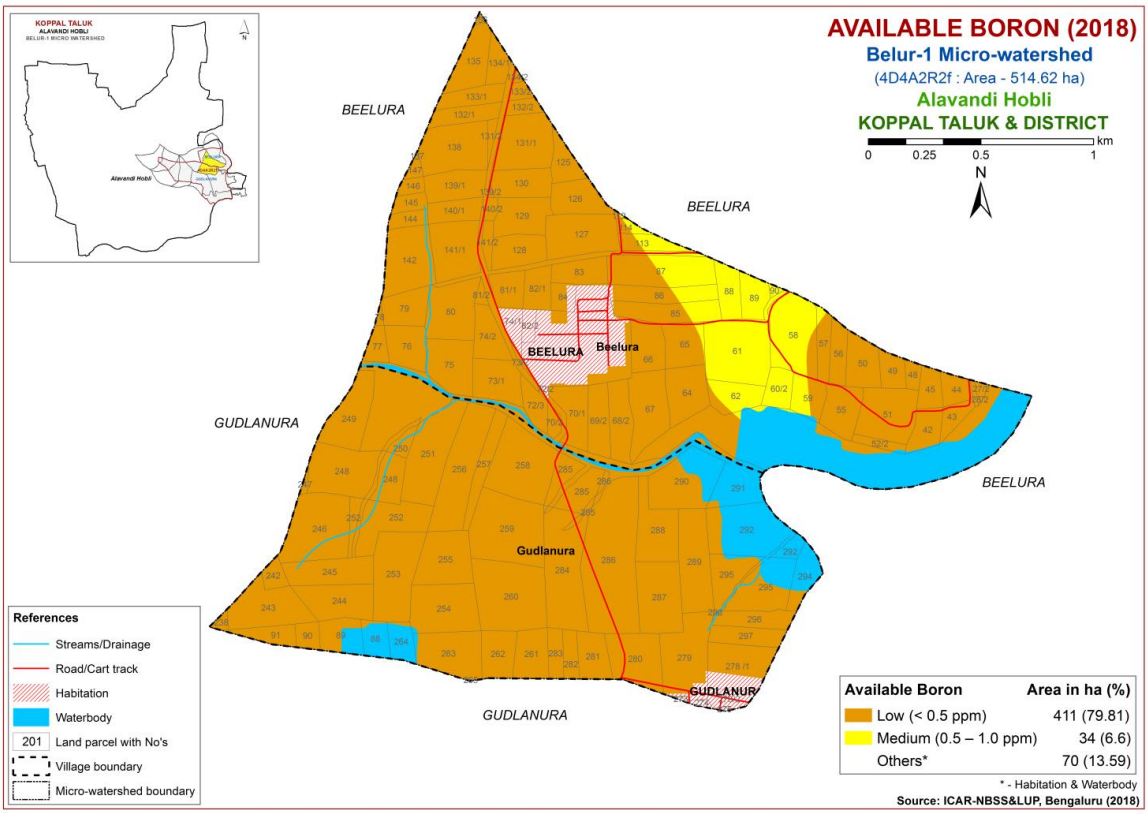


Fig.6.7 Soil Available Boron map of Belur-1 Microwatershed

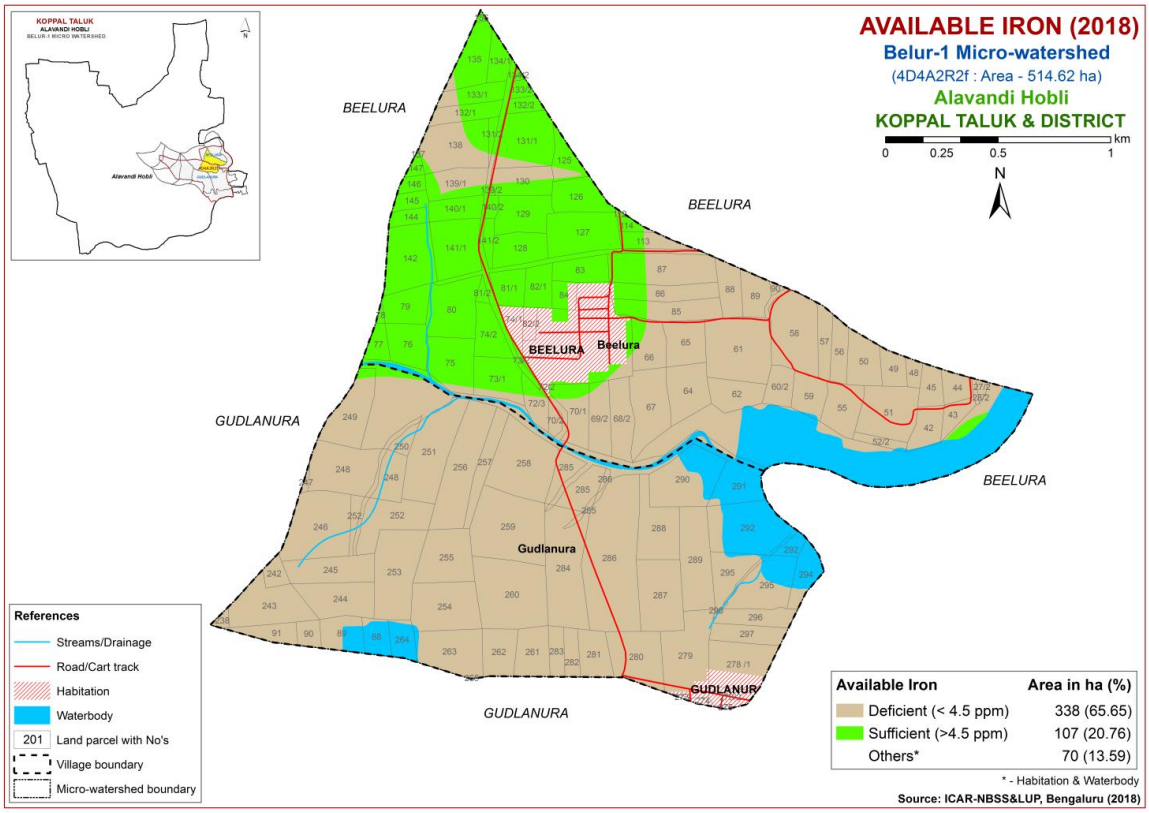


Fig.6.8 Soil Available Iron map of Belur-1 Microwatershed

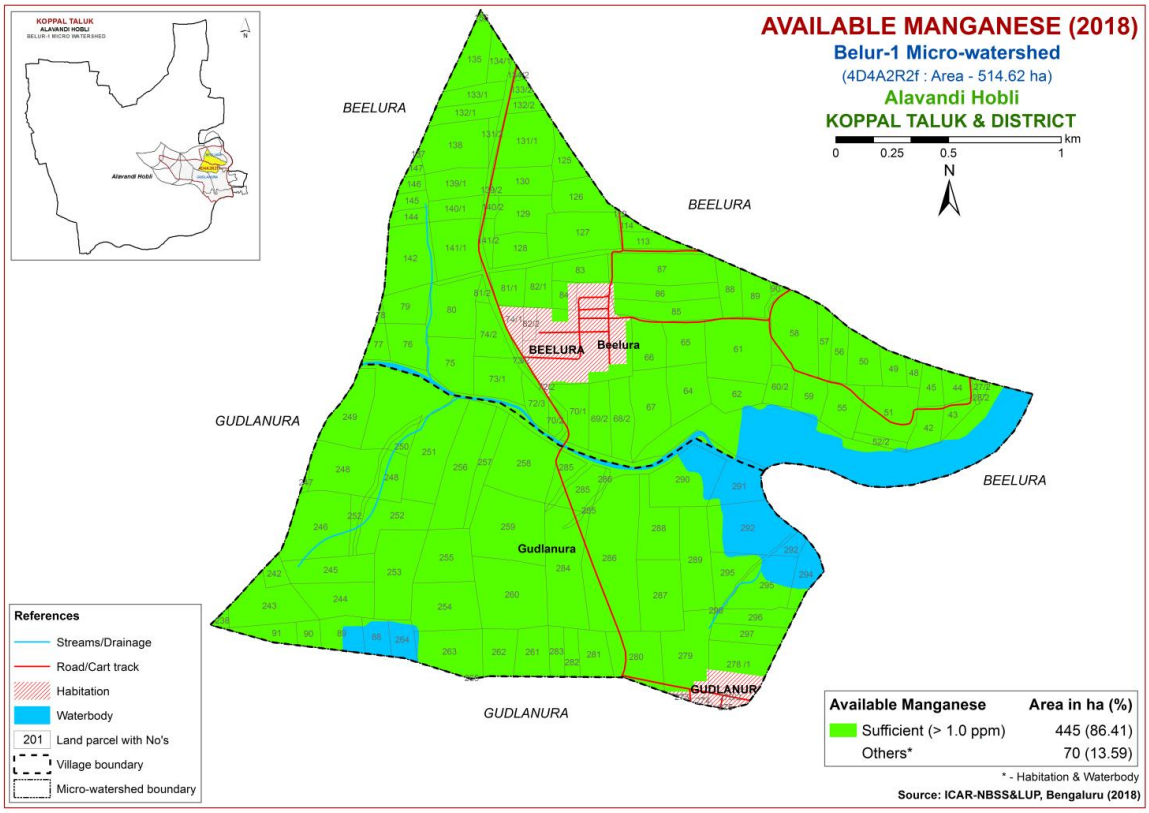


Fig.6.9 Soil Available Manganese map of Belur-1 Microwatershed

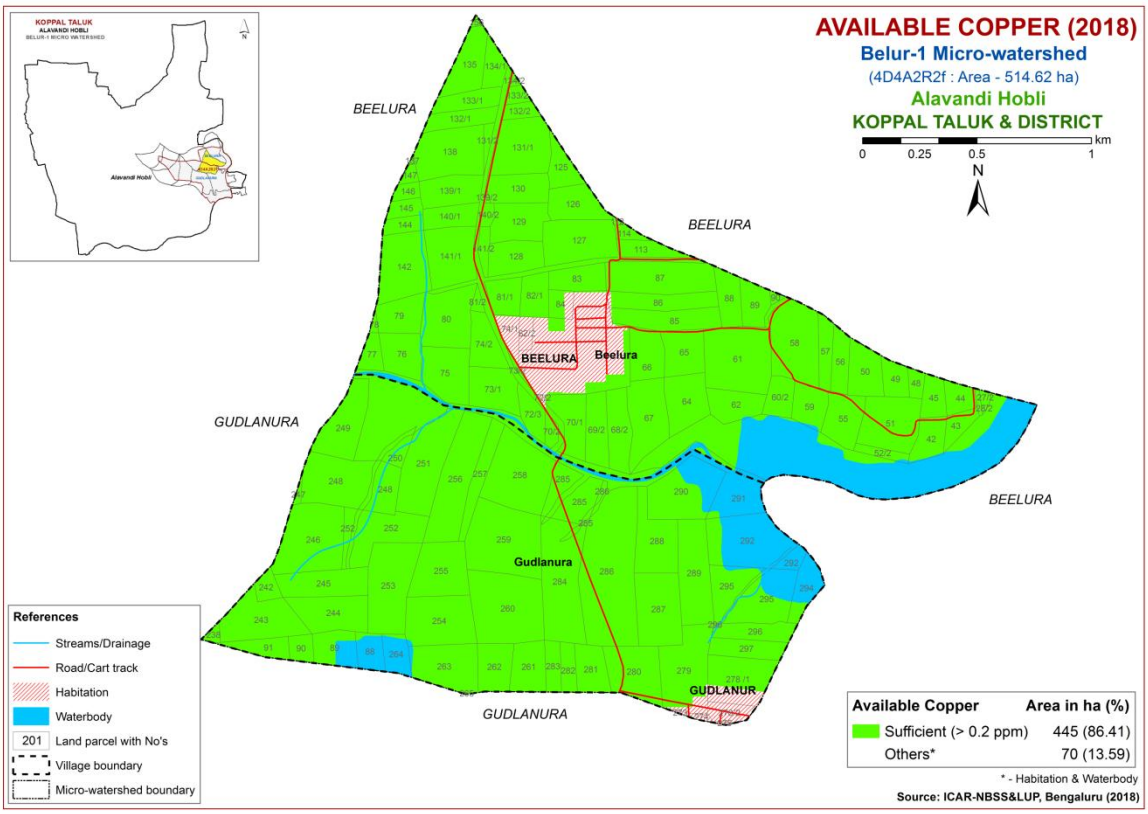


Fig.6.10 Soil Available Copper map of Belur-1 Microwatershed

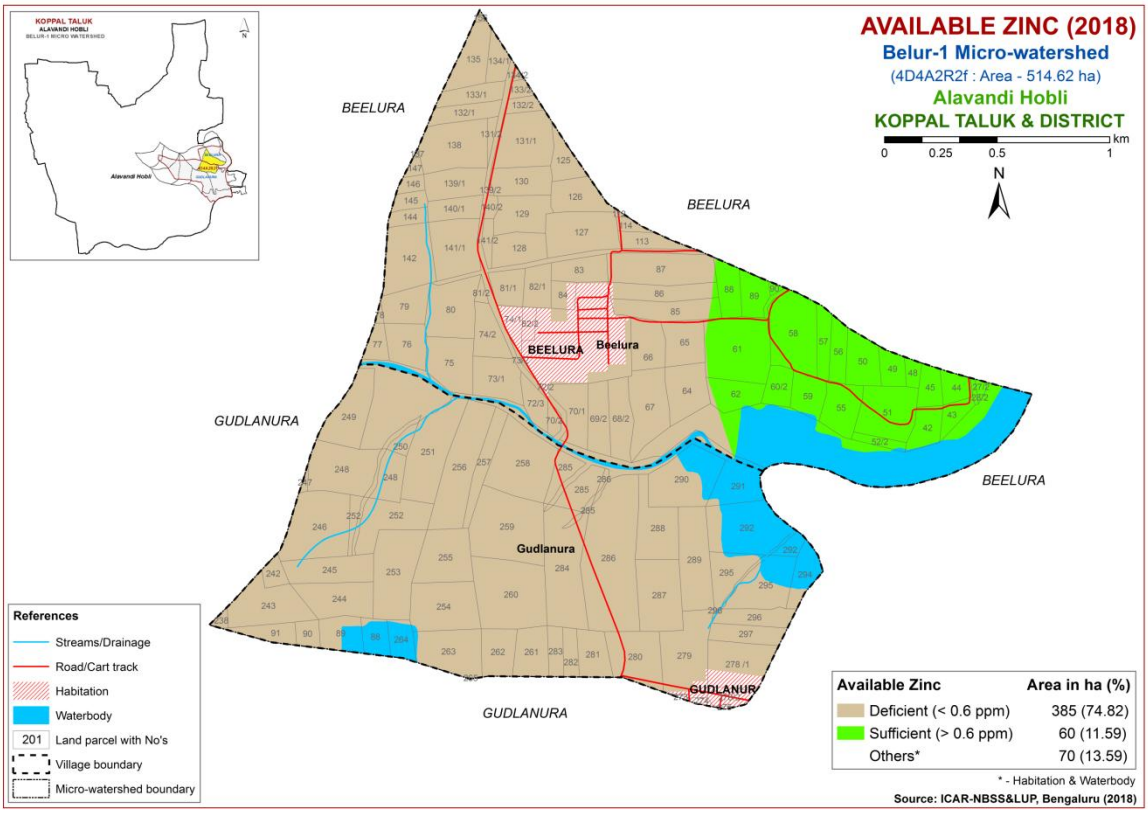


Fig.6.11 Soil Available Zinc map of Belur-1 Microwatershed

Chapter 7

LAND SUITABILITY FOR MAJOR CROPS

The soil and land resource units (soil phases) of Belur-1 microwatershed were assessed for their suitability for growing food, fodder, fibre and other horticulture crops by following the procedure as outlined in FAO, 1976 and 1983. Crop requirements were developed for each of the crop from the available research data and also by referring to Naidu *et. al.* (2006) and Natarajan *et. al* (2015). The soil and land characteristics were matched with the crop requirements to arrive at the crop suitability. The soil and land characteristics table (Table 7.1) were matched with the crop requirements (Tables 7.2-7.32) to arrive at the crop suitability and the criteria 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 and N1 are divided into subclasses based on the kinds of limitations encountered. The limitations that affect crop production are 'c' for erratic rainfall and its distribution and length of growing period (LGP), 'e' for erosion hazard, 'r' for rooting condition, 't' for lighter or heavy texture, 'g' for gravelliness or stoniness, 'n' for nutrient availability, 'l' for topography, 'm' for moisture availability, 's' for sodium 'z' for calcareousness and 'w' for drainage. These limitations are indicated as lower case letters to the class symbol. For example, moderately suitable lands with the limitations of soil depth and erosion are designated as S2re. For the microwatershed, the soil mapping units were evaluated and classified up to subclass level.

Using the above criteria, the soil map units of the microwatershed were evaluated and land suitability maps for 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.

Highly suitable (Class S1) lands occupy an area of about 96 ha (19%) for growing sorghum and occur in the northern, central, western and southern part of the

microwatershed. An area of about 165 ha (32%) is moderately suitable (Class S2) for growing sorghum and distributed in the northern and western part of the microwatershed with minor limitations of nutrient availability, rooting depth, calcareousness and gravelliness. Maximum area of about 183 ha (35%) is marginally suitable (Class S3) for growing sorghum and distributed in all parts of the microwatershed. They have moderate limitations of gravelliness and rooting depth.

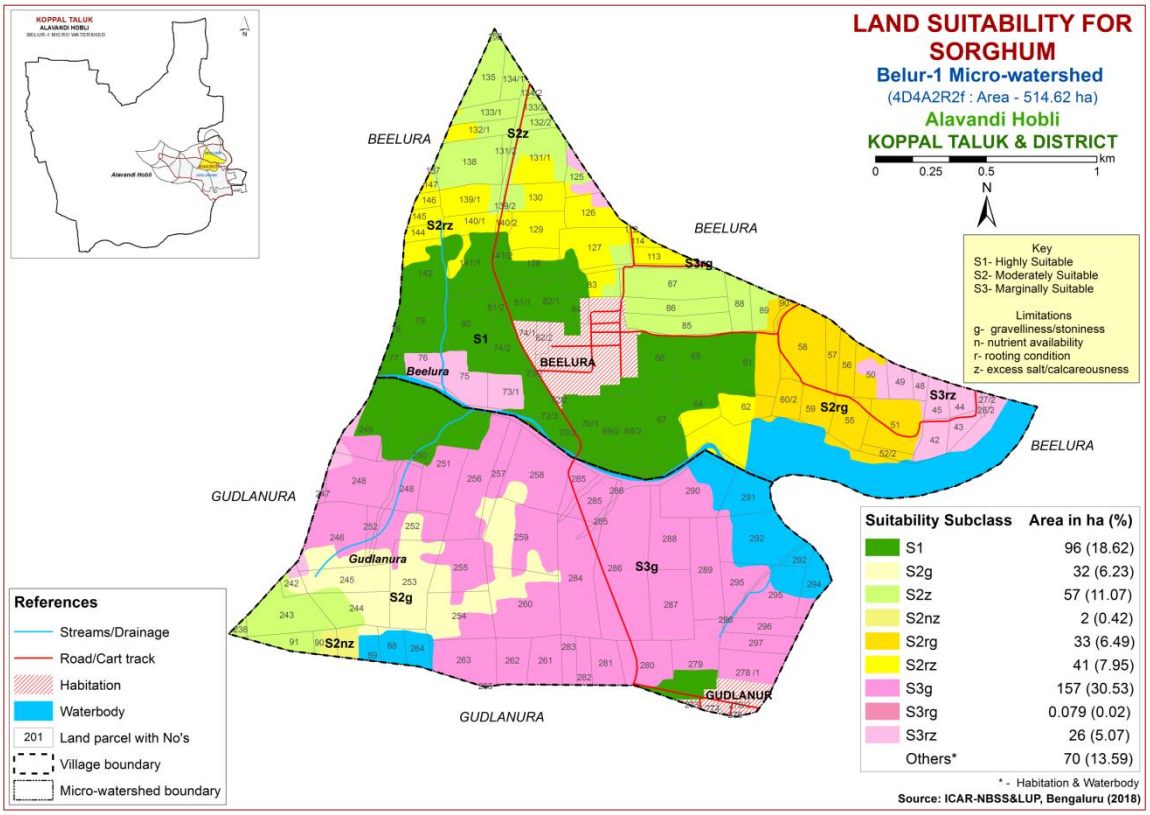


Fig. 7.1 Land Suitability map of Sorghum

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 are given in Figure 7.2.

Highly suitable (Class S1) lands occupy an area of about 15 ha (3%) for growing Maize and occur in the western part of the microwatershed. Maximum area of about 246 ha (48%) is moderately suitable (Class S2) for growing sorghum and distributed all parts of the microwatershed with minor limitations of texture, rooting depth, calcareousness and gravelliness. An area of about 183 ha (35%) is marginally suitable (Class S3) for growing Maize and distributed in the western, eastern and southern part of the microwatershed. They have moderate limitations of gravelliness, texture, calcareousness and rooting depth.

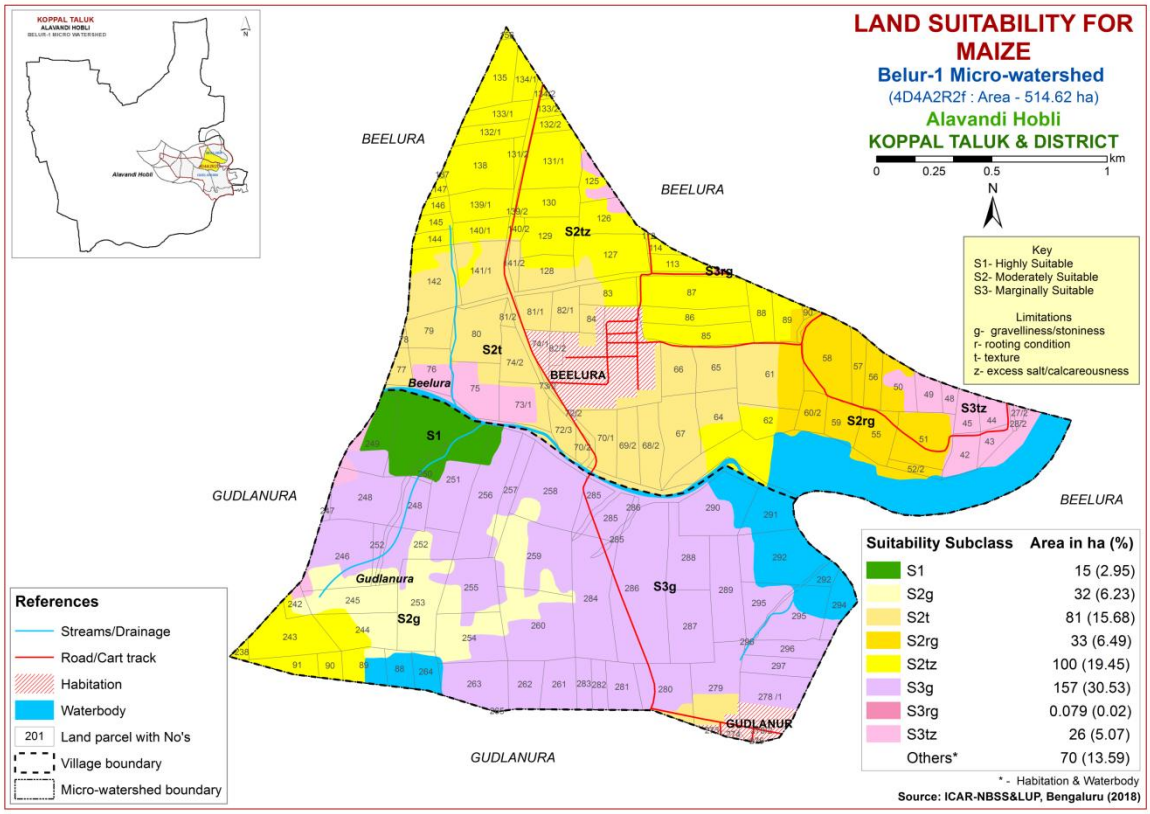


Fig. 7.2 Land Suitability map of Maize

7.3 Land Suitability for Bajra (*Pennisetum glaucum)*

Bajra is one of the major food crop grown in an area of 2.34 lakh ha in Karnataka in the northern districts. The crop requirements (Table 7.4) for growing bajra were matched with the soil-site characteristics (Table 7.1) of the soils of the microwatershed and 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.

Highly suitable (Class S1) lands occupy an area of about 125 ha (24%) for growing Bajra and occur in the northwestern, western and central part of the microwatershed. Maximum area of about 247 ha (48%) is moderately suitable (Class S2) for growing Bajra and distributed in all parts of the microwatershed with minor limitations of rooting depth, texture, calcareousness and gravelliness. An area of about 72 ha (14%) is marginally suitable (Class S3) for growing Bajra and distributed in the northern, eastern and western part of the microwatershed. They have moderate limitations of gravelliness, calcareousness and rooting depth.

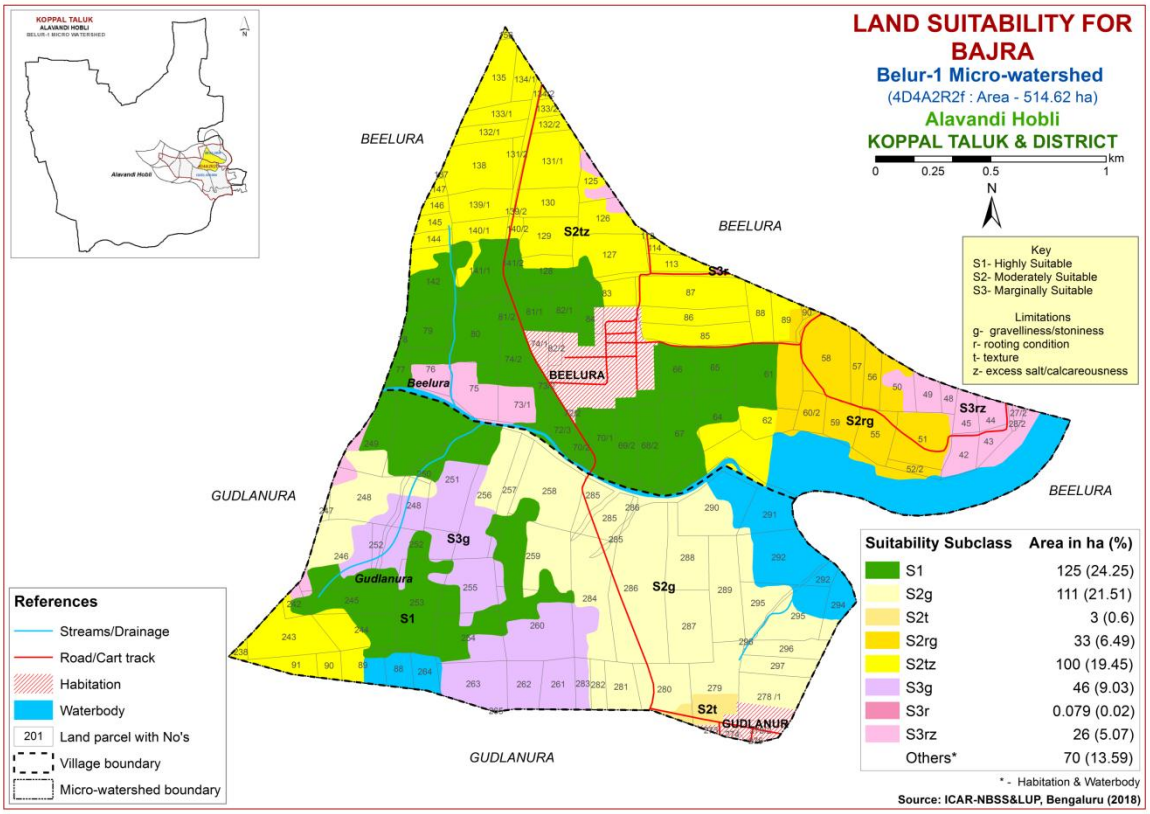


Fig. 7.3 Land Suitability map of Bajra

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.

No highly suitable (Class S1) lands for growing Groundnut in the microwatershed. Maximum area of about 237 ha (46%) is moderately suitable (Class S2) for growing Groundnut and distributed in all parts of the microwatershed with minor limitations of rooting depth, texture and gravelliness. Marginally suitable (Class S3) lands cover an area of about 207 ha (40%) and occur in the northern, western, eastern and southern part of the microwatershed with major limitations of gravelliness, texture, calcareousness and rooting depth.

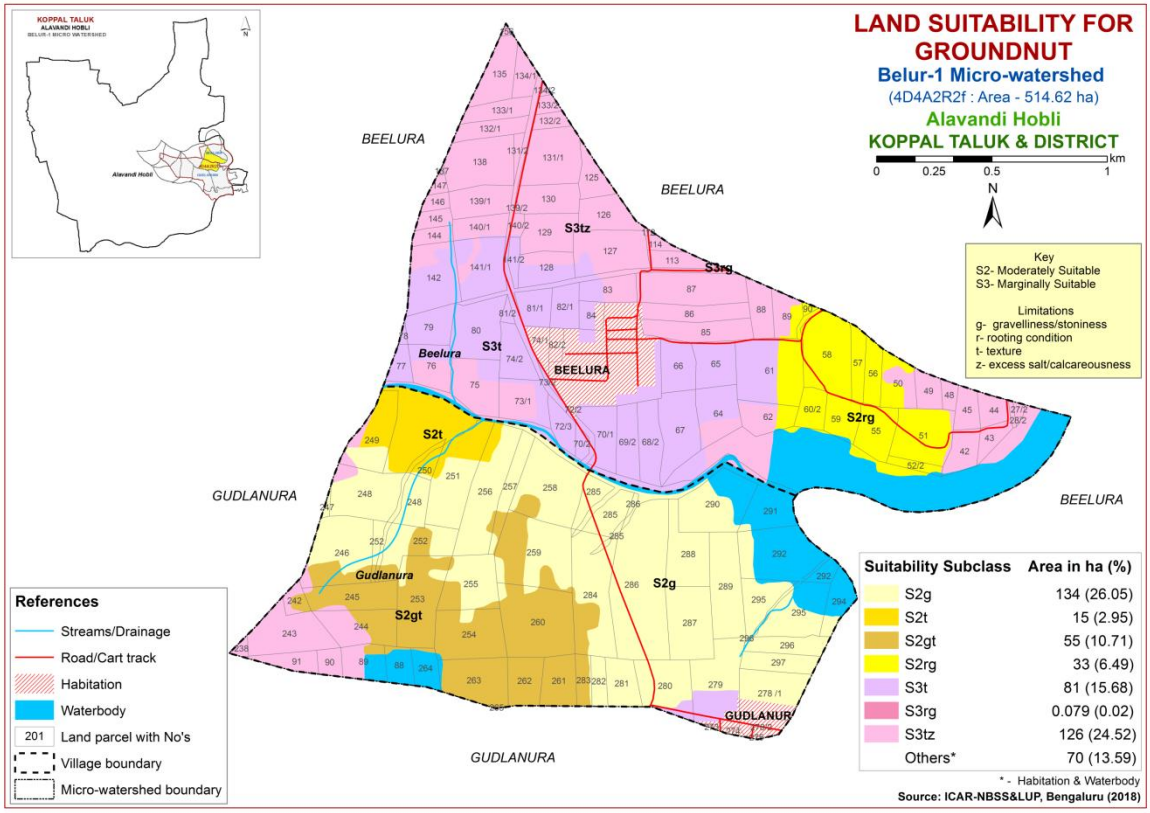


Fig. 7.4 Land Suitability map of Groundnut

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.

An area of about 96 ha (19%) is highly suitable (Class S1) lands for growing Sunflower and distributed in the northwestern, western, central and southern part of the microwatershed. An area of about 91 ha (17%) is moderately suitable (Class S2) and distributed in the northern, northeastern and western part of the microwatershed with minor limitations of rooting depth, gravelliness and calcareousness. Marginally suitable (Class S3) lands cover a maximum area of about 231 ha (45%) and distributed in all parts of the microwatershed. They have moderate limitations of gravelliness, calcareousness and rooting depth. An area of about 26 ha (5%) is currently not suitable (Class N1) for growing Sunflower and are distributed in the northern, eastern and western part of the microwatershed with severe limitations of rooting depth and calcareousness.

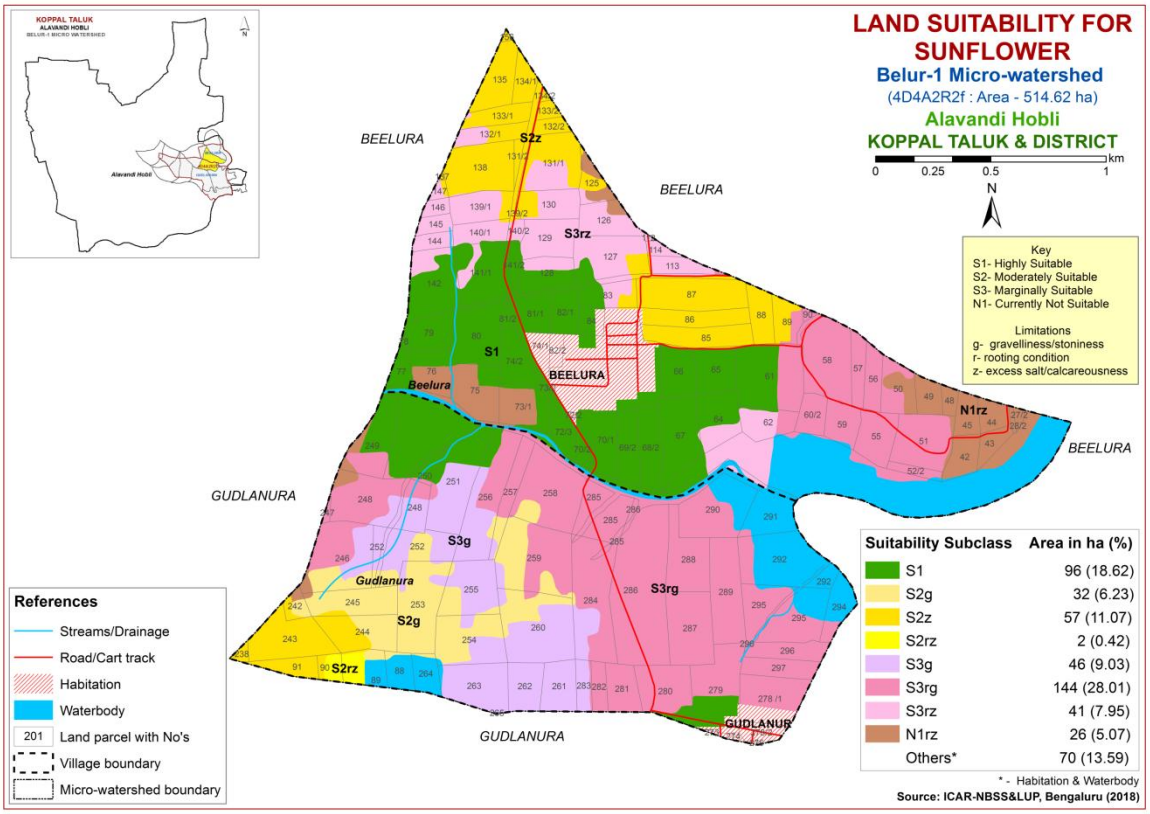


Fig. 7.5 Land Suitability map of Sunflower

7.6 Land Suitability for Redgram (*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 about 15 ha (3%) is highly suitable (Class S1) lands for growing Redgram and distributed in the western part of the microwatershed. An area of about 170 ha (33%) is moderately suitable (Class S2) and distributed in the northern, eastern, western, central and southern part of the microwatershed with minor limitations of texture, rooting depth, calcareousness and gravelliness. Marginally suitable (Class S3) lands cover a maximum area of about 233 ha (45%) and distributed in all parts of the microwatershed. They have moderate limitations of gravelliness, calcareousness and rooting depth. An area of about 26 ha (5%) is currently not suitable (Class N1) for growing Redgram and are distributed in the northern, eastern and western part of the microwatershed with severe limitations of rooting depth, calcareousness and gravelliness.

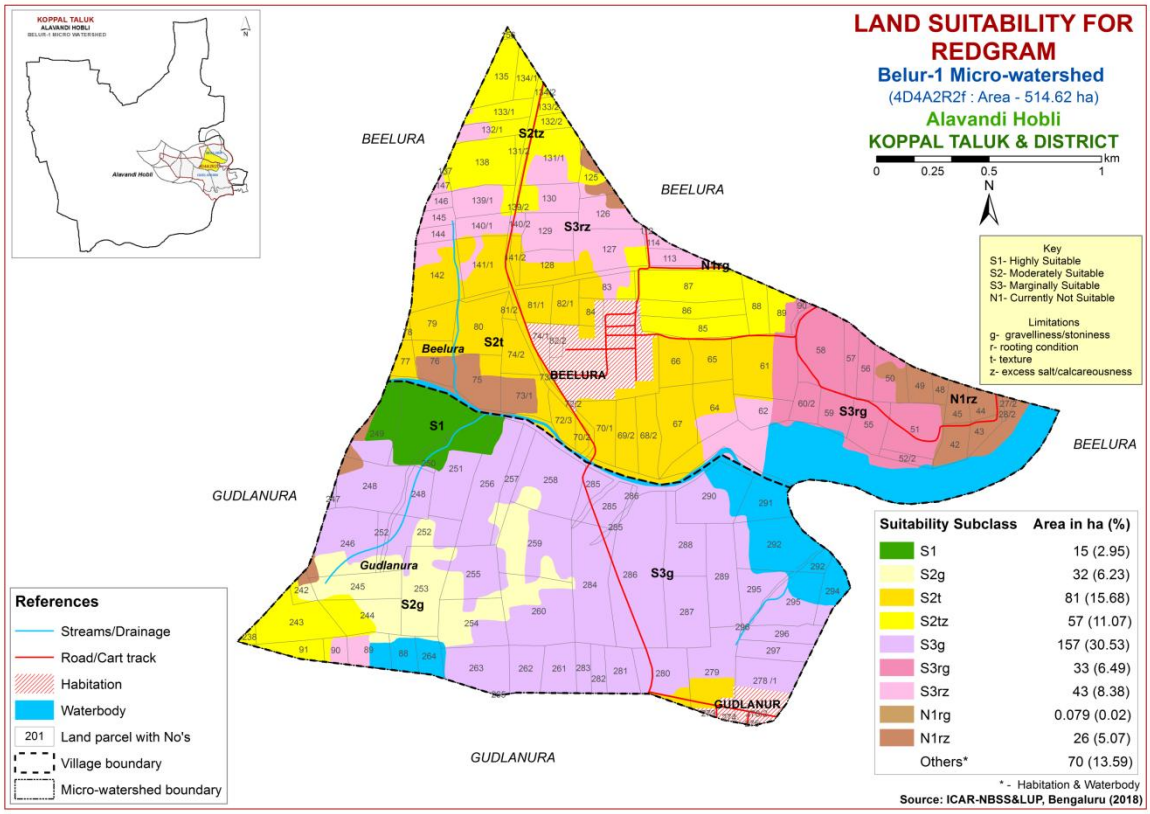


Fig. 7.6 Land Suitability map of Redgram

7.7 Land Suitability for Bengal gram (*Cicer arietinum*)

Bengal gram 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 Bell ary districts. The crop requirements for growing Bengal gram (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 Bengal gram 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 about 81 ha (16%) is highly suitable (Class S1) for growing Bengal gram and are distributed in the northwestern, central and southern part of the microwatershed. An area of about 180 ha (34%) is moderately suitable (Class S2) and are distributed in the northern, eastern and western part of the microwatershed. They have minor limitations of gravelliness, texture, calcareousness and rooting depth. Marginally suitable (Class S3) lands occupy a maximum area of about 183 ha (36%) and are distributed in all parts of the microwatershed with moderate limitations of rooting depth, texture, calcareousness and gravelliness.

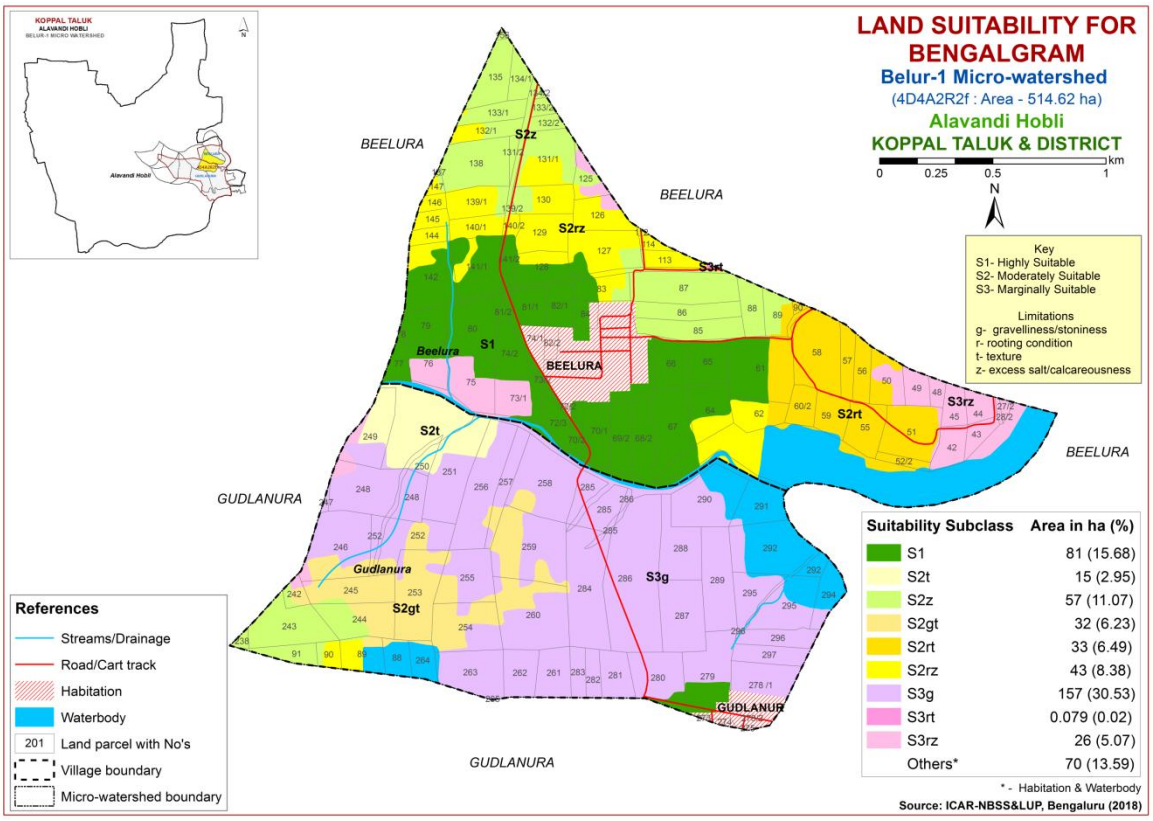


Fig. 7.7 Land Suitability map of Bengal gram

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.

Highly suitable (Class S1) lands occupy an area of about 81 ha (16%) for growing Cotton and occur in the northwestern, central and southern part of the microwatershed. An area of about 180 ha (34%) is moderately suitable (Class S2) for growing Cotton and distributed in the northern, eastern and western part of the microwatershed with minor limitations of calcareousness, rooting depth, texture and gravelliness. Maximum area of about 183 ha (36%) is marginally suitable (Class S3) for growing Cotton and distributed in all parts of the microwatershed. They have moderate limitations of gravelliness, texture, calcareousness and rooting depth.

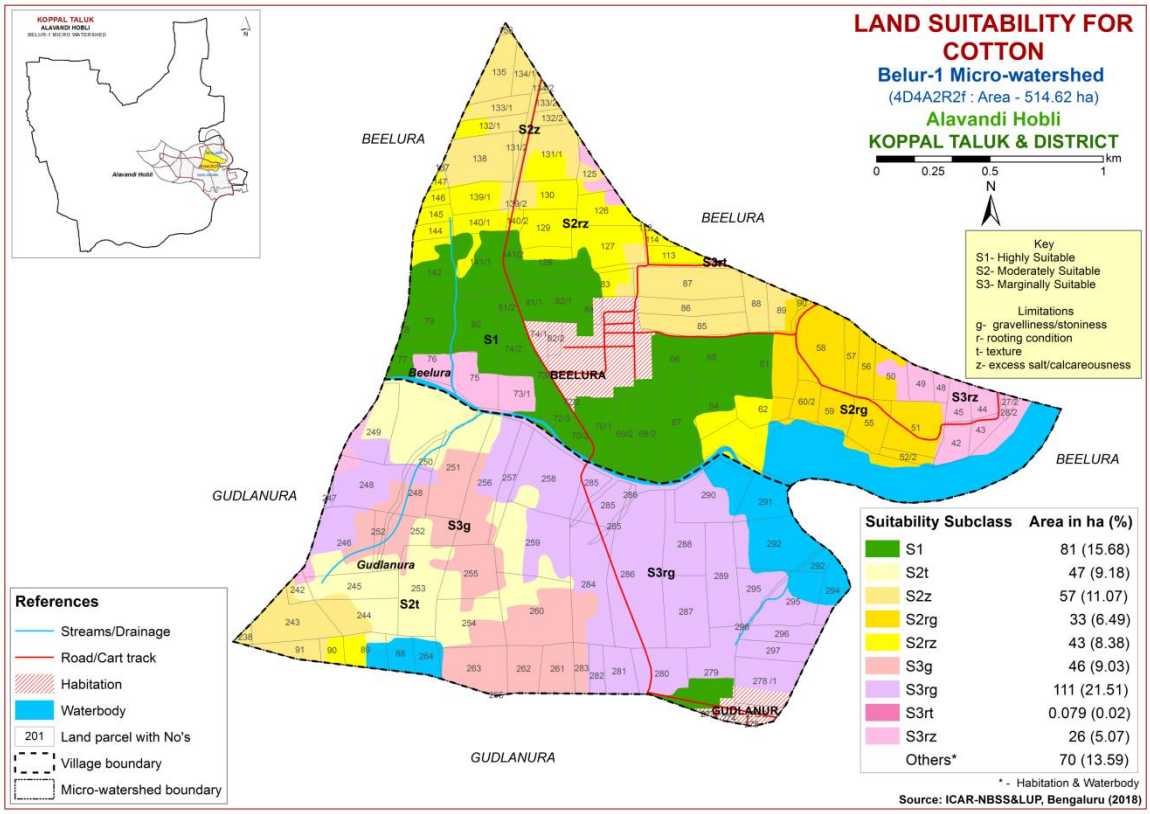


Fig. 7.8 Land Suitability map of Cotton

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

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

An area of 15 ha (3%) is highly suitable (Class S1) lands for growing Chilli and distributed in the western part of the microwatershed. An area of about 143 ha (27%) is moderately suitable (Class S2) and are distributed in the northern, eastern, central and western part of the microwatershed. They have minor limitations of gravelliness, rooting depth and texture. Marginally suitable (Class S3) lands occupy a maximum area of about 286 ha (56%) and are distributed in all parts of the microwatershed with moderate limitations of rooting depth, texture, calcareouness and gravelliness.

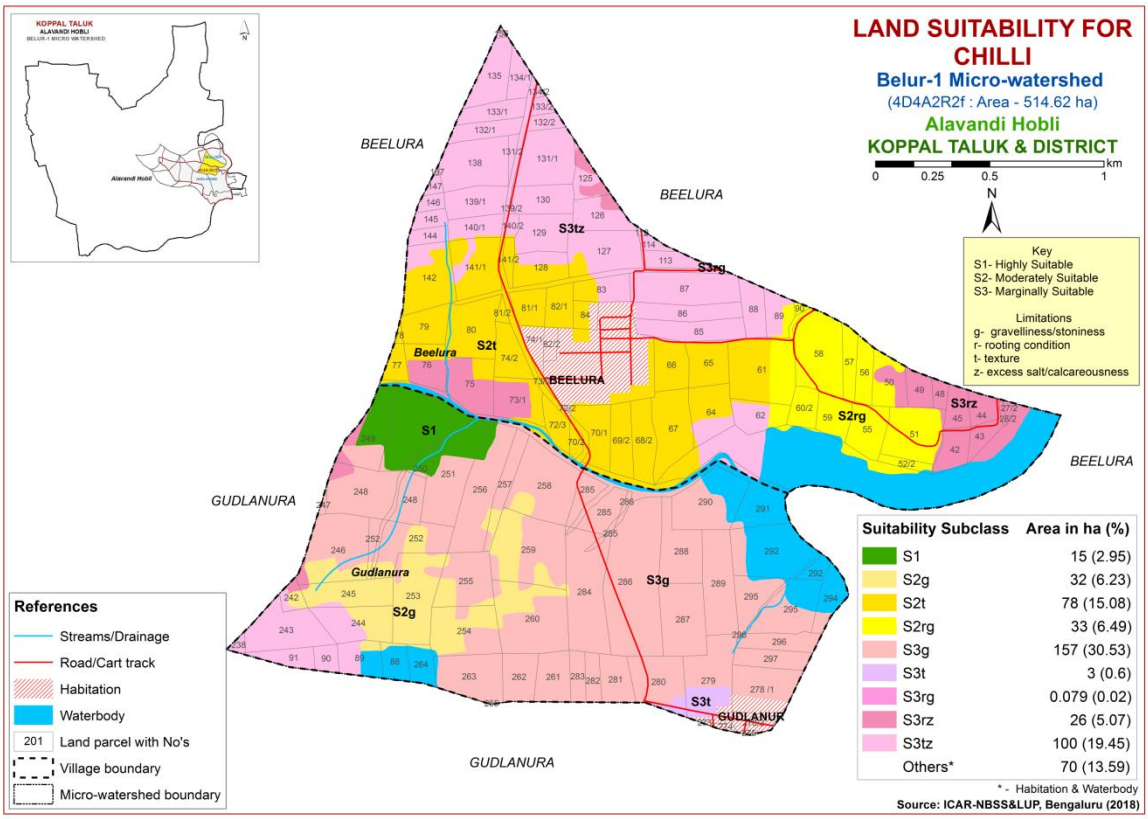


Fig. 7.9 Land Suitability map of Chilli

7.10 Land Suitability for Tomato (*Solanum lycopersicum*)

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

An area of about 15 ha (3%) is highly suitable (Class S1) lands for growing Tomato and distributed in the western part of the microwatershed. An area of about 65 ha (12%) is moderately suitable (Class S2) and are distributed in the eastern and western part of the microwatershed. They have minor limitations of gravelliness and rooting depth. Marginally suitable (Class S3) lands occupy a maximum area of about 364 ha (71%) and are distributed in all parts of the microwatershed with moderate limitations of rooting depth, texture, calcareousness and gravelliness.

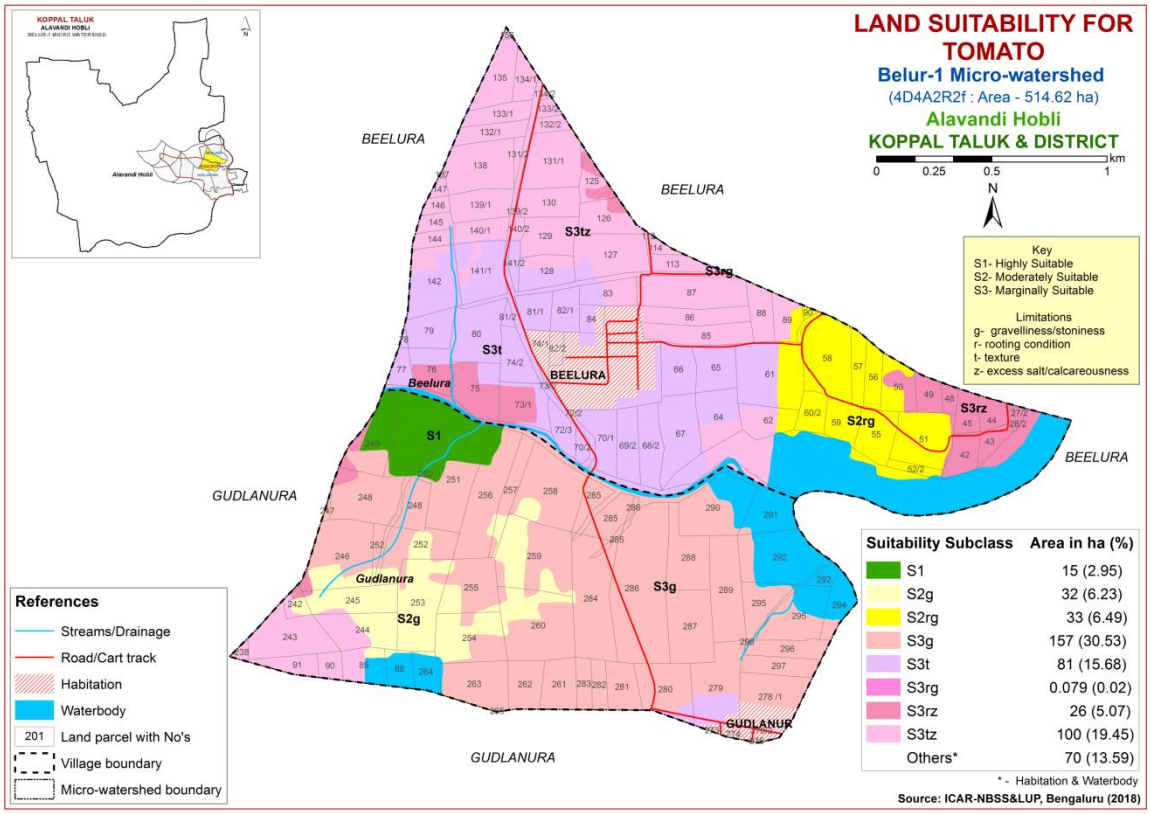


Fig. 7.10 Land Suitability map of Tomato

7.11 Land Suitability for Brinjal (*Solanum melongena*)

Brinjal is one of the most important vegetable crop grown in the state. 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 is given in Figure 7.11.

An area of about 47 ha (9%) is highly suitable (Class S1) lands for growing Brinjal and distributed in the western and southwestern part of the microwatershed. Maximum area of about 227 ha (44%) is moderately suitable (Class S2) for growing Brinjal and distributed in all parts of the microwatershed with minor limitations of texture, rooting depth, calcareousness and gravelliness. Marginally suitable (Class S3) lands cover an area of about 170 ha (33%) and occur in the eastern, western and southern part of the microwatershed with major limitations of gravelliness and rooting depth.

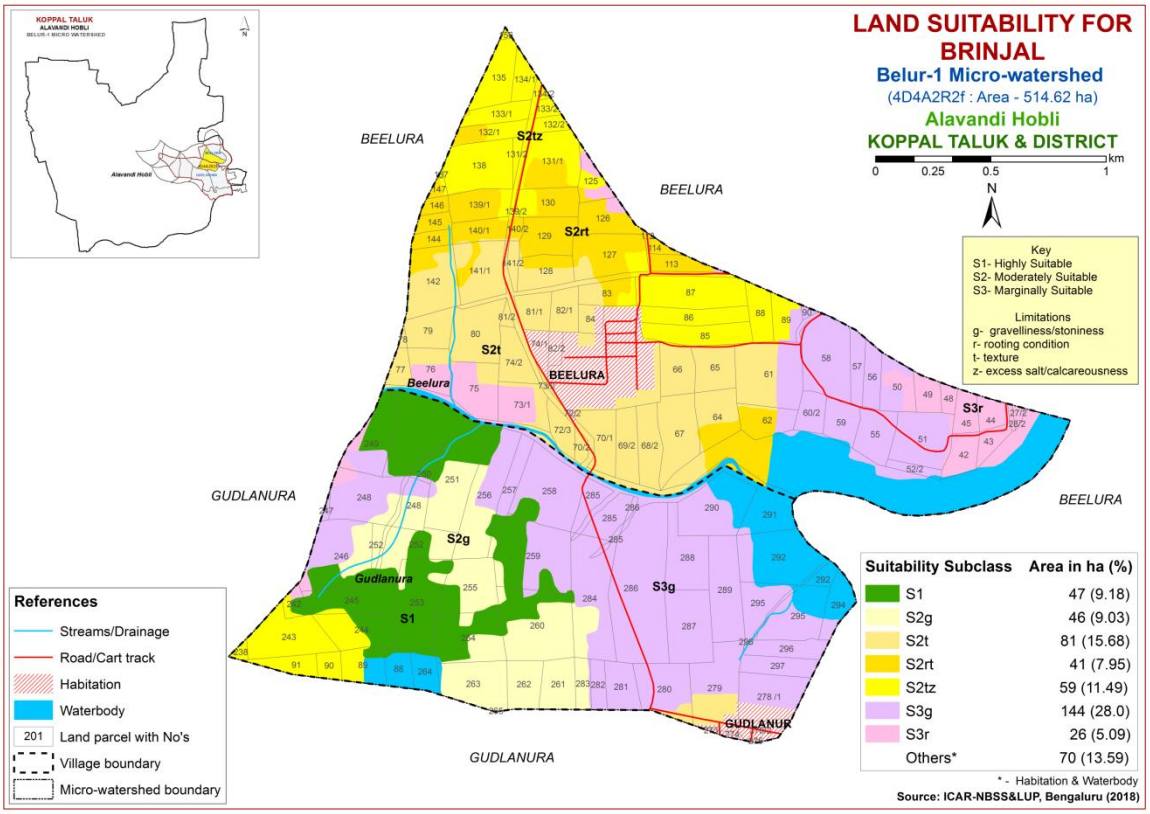


Fig 7.11 Land Suitability map of Brinjal

7.12 Land Suitability for Onion (*Allium cepa L.*,)

Onion is one of the most important vegetable crop grown in the state. 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 is given in Figure 7.12.

An area of about 47 ha (9%) is highly suitable (Class S1) lands for growing Onion and distributed in the western and southwestern part of the microwatershed. An area of about 46 ha (9%) is moderately suitable (Class S2) for growing Onion and distributed in the southwestern and southern part of the microwatershed with minor limitation of gravelliness. Marginally suitable (Class S3) lands cover a maximum area of about 351 ha (68%) and occur in all parts of the microwatershed with major limitations of gravelliness, texture, calcareousness and rooting depth.

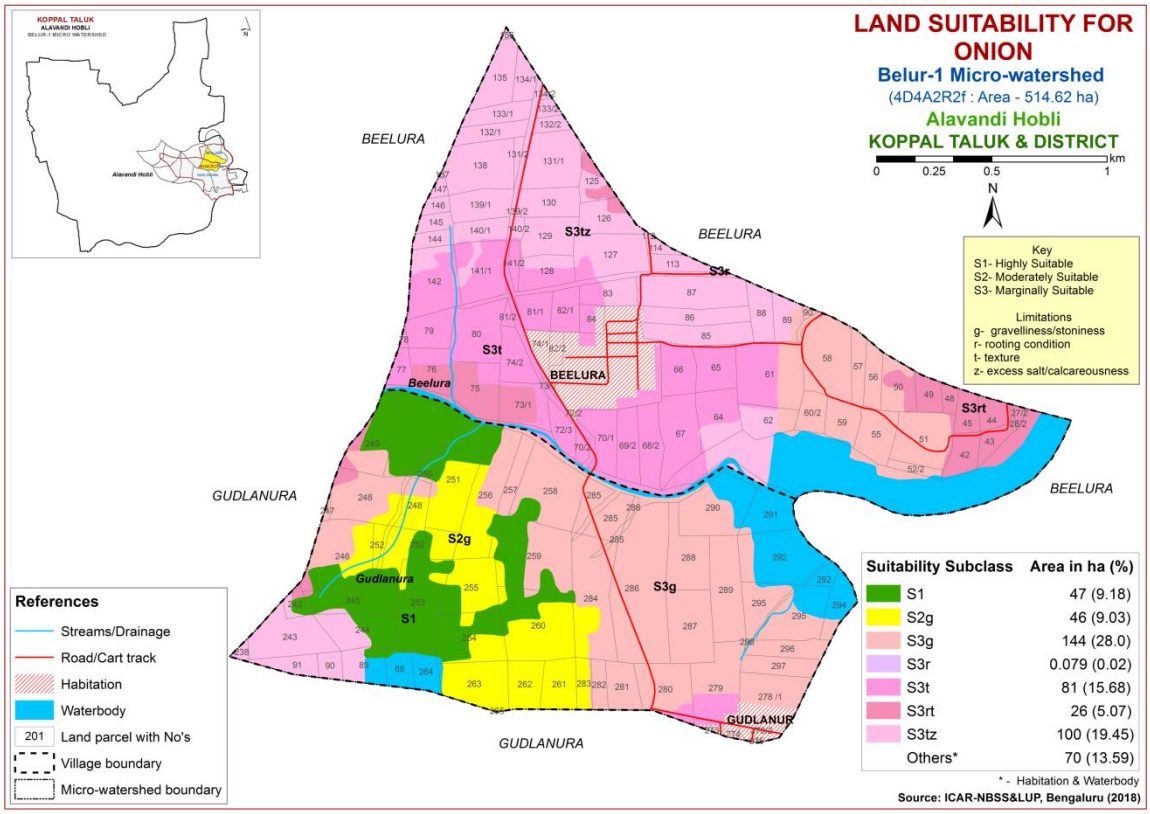


Fig 7.12 Land Suitability map of Onion

7.13 Land Suitability for Bhendi (*Abelmoschus esculentus*)

Bhendi is one of the most important vegetable crop grown in the state. 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 is given in Figure 7.13.

An area of about 47 ha (9%) is highly suitable (Class S1) lands for growing Bhendi and distributed in the western and southwestern part of the microwatershed. Maximum area of about 227 ha (44%) is moderately suitable (Class S2) for growing Bhendi and distributed in all parts of the microwatershed with minor limitations of texture, rooting depth, calcareousness and gravelliness. Marginally suitable (Class S3) lands cover an area of about 170 ha (33%) and occur in the eastern, western and southern part of the microwatershed with major limitations of gravelliness and rooting depth.

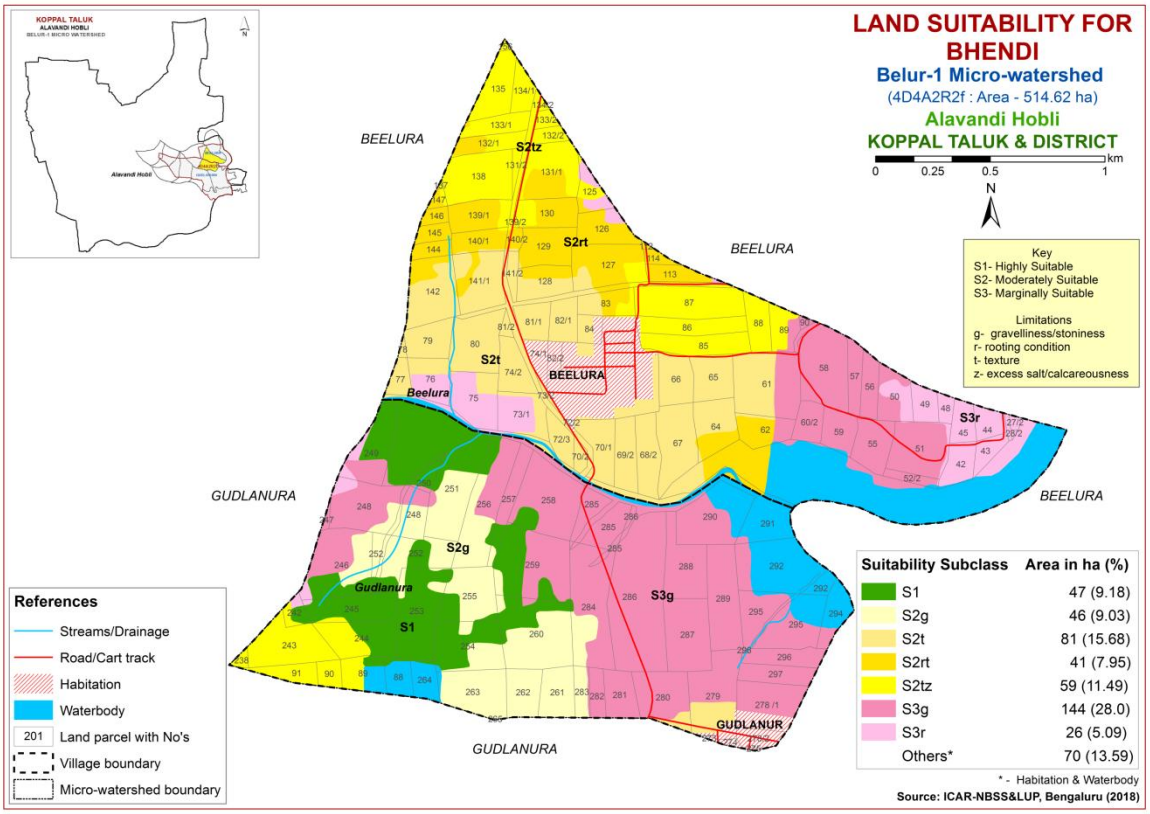


Fig 7.13 Land Suitability map of Bhendi

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 are given in Figure 7.14.

An area of about 47 ha (9%) is highly suitable (Class S1) lands for growing Drumstick and are distributed in the western part of the microwatershed. Maximum area of about 186 ha (36%) is moderately suitable (Class S2) and distributed in all parts of the microwatershed with minor limitations of texture, rooting depth, calcareousness and drainage. Marginally suitable (Class S3) lands cover a maximum area of about 185 ha (36%) and distributed in all parts of the microwatershed. They have moderate limitations of gravelliness, calcareousness and rooting depth. An area of about 26 ha (5%) is currently not suitable (Class N1) for growing Drumstick and are distributed in the northern, western and eastern part of the microwatershed with severe limitations of rooting depth and calcareousness.

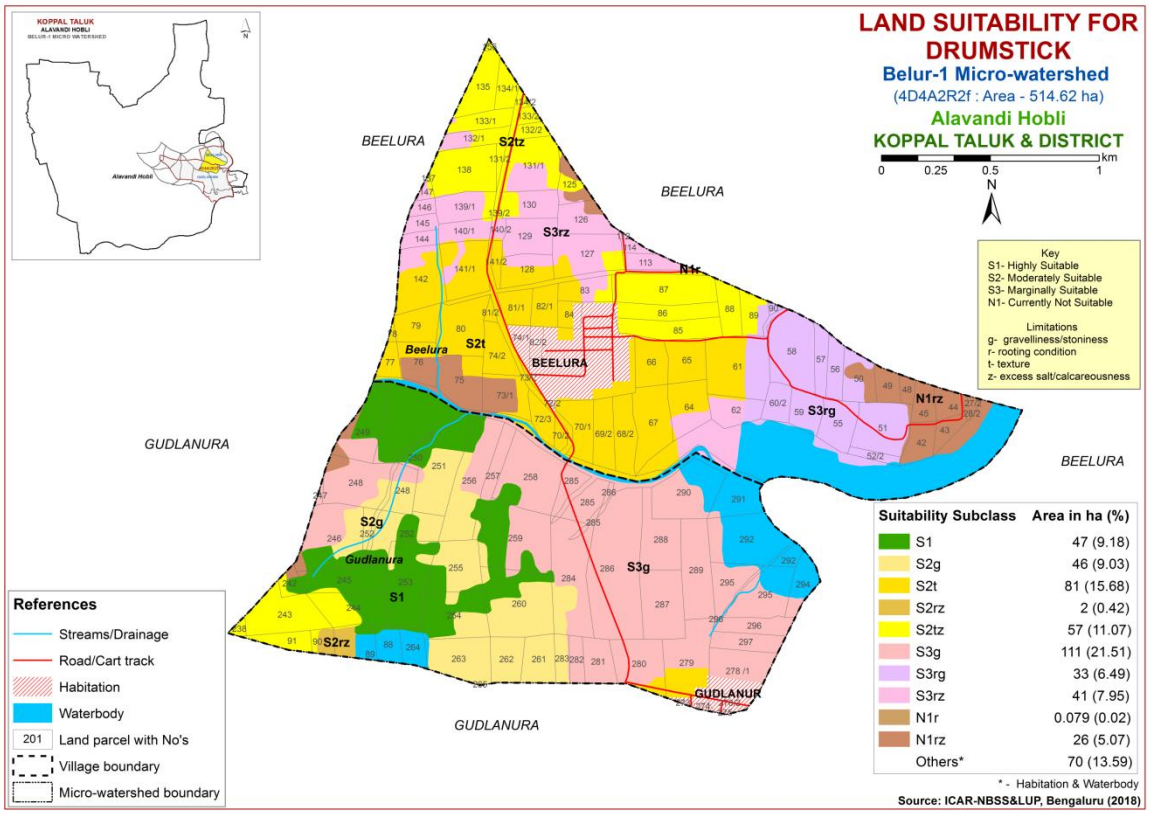


Fig. 7.14 Land Suitability map of Drumstick

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.

No highly suitable (Class S1) lands for growing Mango in the microwatershed. An area of about 59 ha (11%) is moderately suitable (Class S2) and distributed in the western and southwestern part of the microwatershed. Marginally suitable (Class S3) lands cover a maximum area of about 285 ha (56%) and distributed in all parts of the microwatershed. They have moderate limitations of gravelliness, texture, calcareousness and rooting depth. An area of about 100 ha (19%) is currently not suitable (Class N1) for growing Mango and are distributed in the northern, western and western part of the microwatershed with severe limitations of rooting depth, texture, calcareousness and gravelliness.

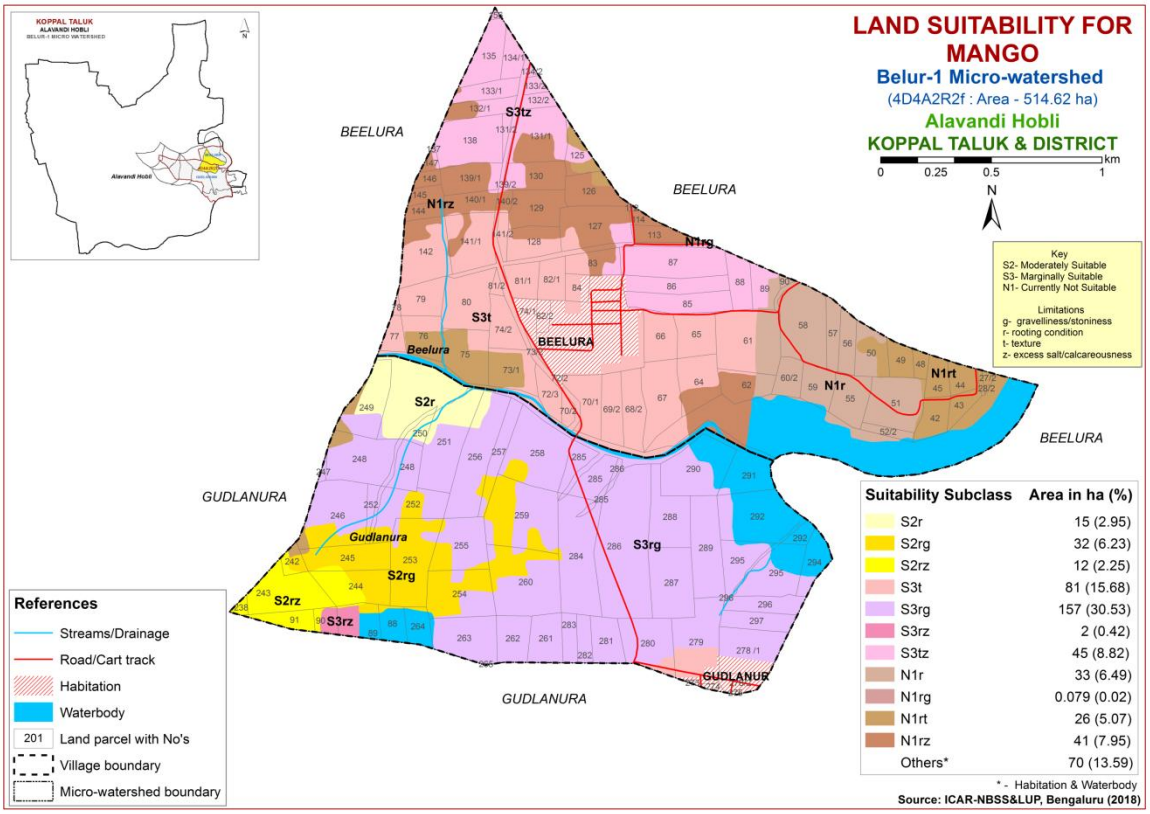


Fig. 7.15 Land Suitability map of Mango

7.16 Land Suitability for Guava (*Psidium guajava*)

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

An area of 15 ha (3%) is highly suitable (Class S1) lands for growing Guava and distributed in the western part of the microwatershed. An area of about 143 ha (28%) is moderately suitable (Class S2) and distributed in the western and southern part of the microwatershed with minor limitations of rooting depth and gravelliness. Marginally suitable (Class S3) lands cover a maximum area of about 260 ha (50%) and distributed in all parts of the microwatershed. They have moderate limitations of gravelliness, texture, calcareousness and rooting depth. An area of about 26 ha (5%) is currently not suitable (Class N1) for growing Guava and are distributed in the northern, western and eastern part of the microwatershed with severe limitations of rooting depth, texture and gravelliness.

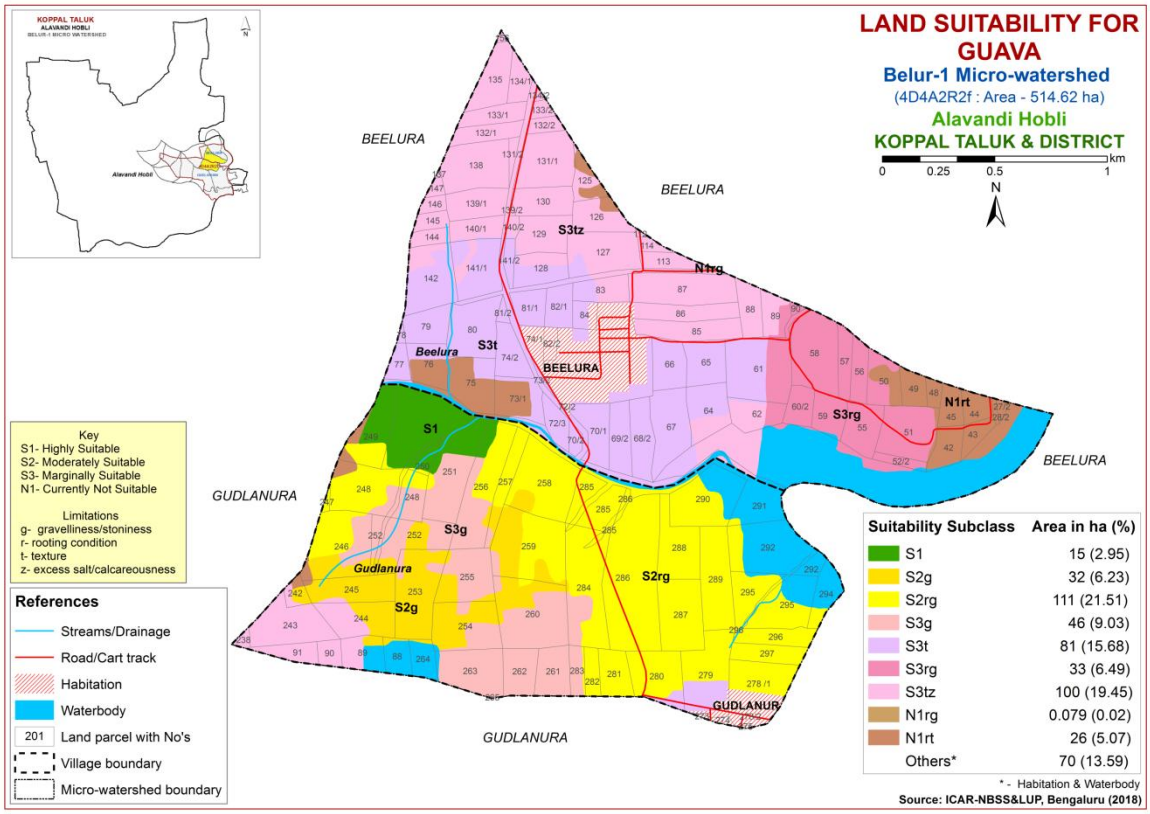


Fig. 7.16 Land Suitability map of Guava

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 15 ha (3%) is highly suitable (Class S1) lands for growing Sapota and distributed in the western part of the microwatershed. An area of about 143 ha (28%) is moderately suitable (Class S2) and distributed in the western and southern part of the microwatershed with minor limitations of rooting depth and gravelliness. Marginally suitable (Class S3) lands cover a maximum area of about 260 ha (50%) and distributed in all parts of the microwatershed. They have moderate limitations of gravelliness, texture, calcareousness and rooting depth. An area of about 26 ha (5%) is currently not suitable (Class N1) for growing Sapota and are distributed in the northern, western and eastern part of the microwatershed with severe limitations of rooting depth, texture and gravelliness.

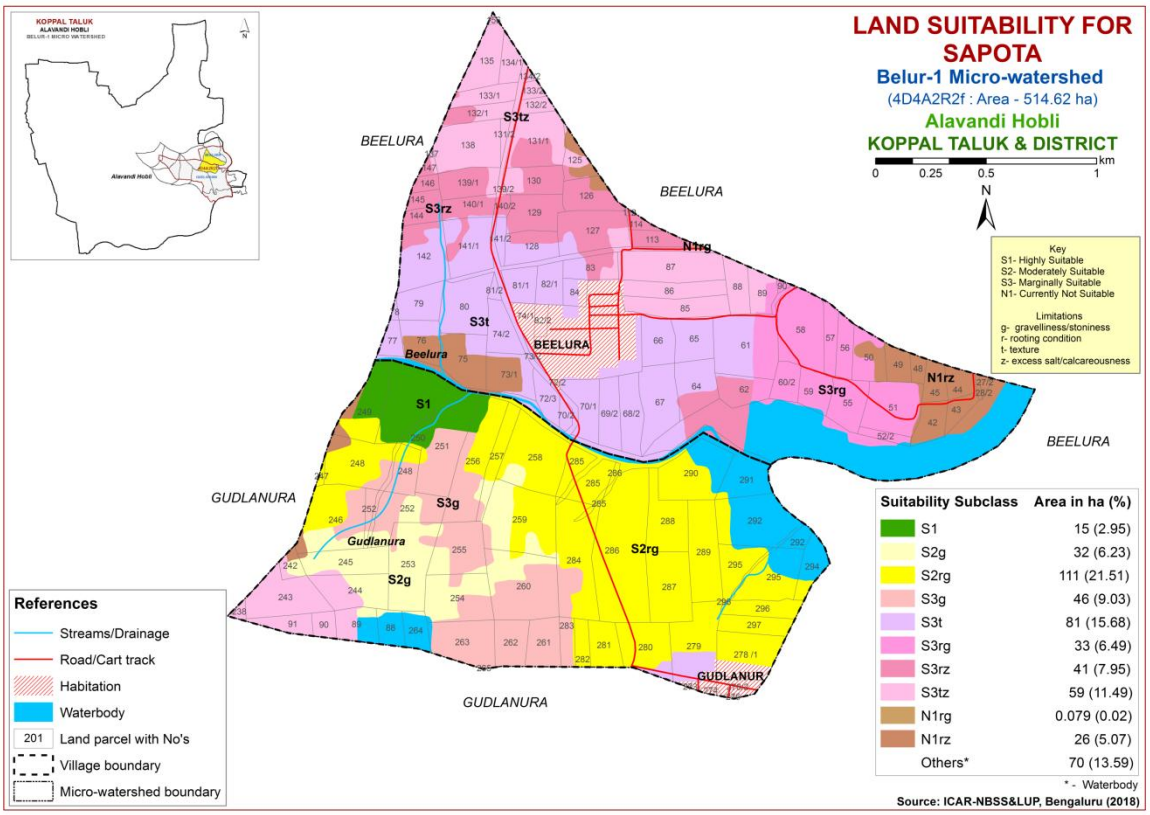


Fig. 7.17 Land Suitability map of Sapota

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 about 47 ha (9%) is highly suitable (Class S1) lands for growing Pomegranate and distributed in the western part of the microwatershed. Maximum area of about 251 ha (49%) is moderately suitable (Class S2) and distributed in all parts of the microwatershed with minor limitations of texture, rooting depth, calcareousness and gravelliness. Marginally suitable (Class S3) lands cover an area of about 120 ha (23%) and distributed in the northern, eastern and western part of the microwatershed. They have moderate limitations of gravelliness, calcareouness and rooting depth. An area of about 26 ha (5%) is currently not suitable (Class N1) for growing Pomegranate and are distributed in the northern, western and eastern part of the microwatershed with severe limitations of rooting depth, calcareousness and gravelliness.

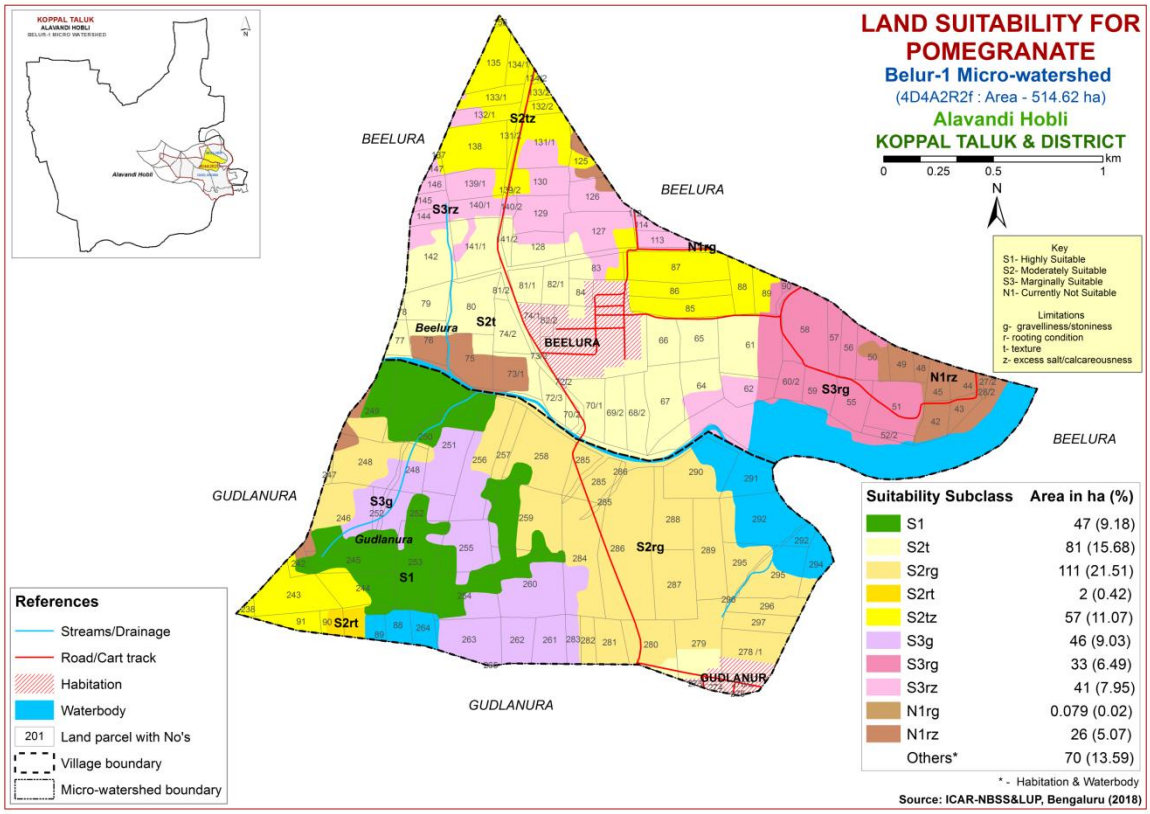


Fig. 7.18 Land Suitability map of Pomegranate

7.19 Land Suitability for Musambi (*Citrus limetta*)

Musambi is one of the most important fruit crop grown in an area of 5446 ha in almost all the districts of the state. The crop requirements (Table 7.20) for growing musambi were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing Musambi was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.19.

An area of about 96 ha (19%) is highly suitable (Class S1) lands for growing Musambi and distributed in the northern, western, southern and central part of the microwatershed. Maximum area of about 202 ha (39%) is moderately suitable (Class S2) and distributed in all parts of the microwatershed with minor limitations of rooting depth, calcareousness and gravelliness. Marginally suitable (Class S3) lands cover an area of about 120 ha (23%) and distributed in the northern, eastern, western and southern parts of the microwatershed. They have moderate limitations of gravelliness, calcareousness and rooting depth. An area of about 26 ha (5%) is currently not suitable (Class N1) for growing Musambi and are distributed in the northern, eastern and western part of the microwatershed with severe limitations of rooting depth, calcareousness and gravelliness.

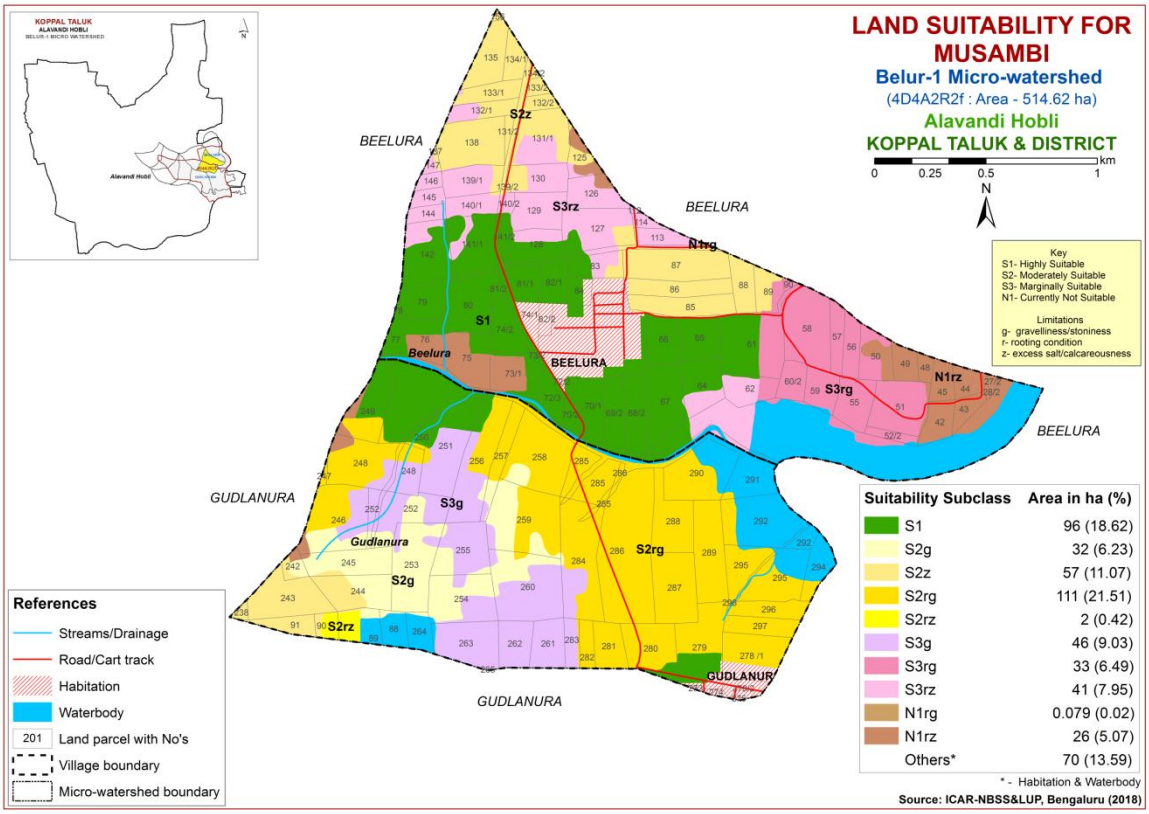


Fig. 7.19 Land Suitability map of Musambi

7.20 Land Suitability for Lime (*Citrus sp*)

Lime is one of the most important fruit crop grown in an area of 11752 ha in almost all the districts of the State. The crop requirements 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.

An area of about 96 ha (19%) is highly suitable (Class S1) lands for growing Lime and distributed in the northern, western, southern and central part of the microwatershed. Maximum area of about 202 ha (39%) is moderately suitable (Class S2) and distributed in all parts of the microwatershed with minor limitations of rooting depth, calcareousness and gravelliness. Marginally suitable (Class S3) lands cover an area of about 120 ha (23%) and distributed in the northern, eastern, western and southern parts of the microwatershed. They have moderate limitations of gravelliness, calcareousness and rooting depth. An area of about 26 ha (5%) is currently not suitable (Class N1) for growing Lime and are distributed in the northern, eastern and western part of the microwatershed with severe limitations of rooting depth, calcareousness and gravelliness.

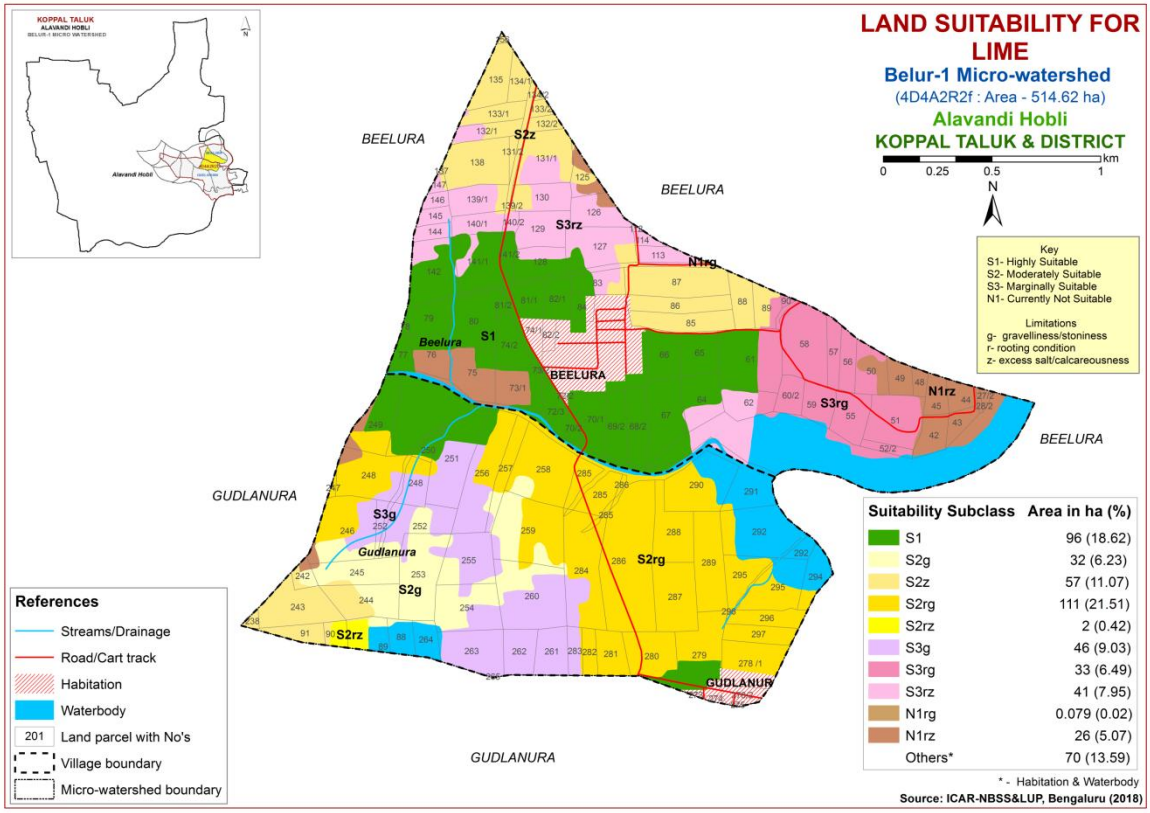


Fig. 7.20 Land Suitability map of Lime

7.21 Land Suitability for Amla (*Phyllanthus emblica*)

Amla is one of the most important fruit and medicinal crop grown in an area of 151 ha and distributed in almost all the districts of the state. The crop requirements (Table 7.22) for growing amla were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing amla was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.21.

An area of about 47 ha (9%) is highly suitable (Class S1) for growing Amla and are distributed in the western and southwestern part of the microwatershed. Maximum area of about 371 ha (72%) is moderately suitable (Class S2) and are distributed in all parts of the microwatershed. They have minor limitations of gravelliness, rooting depth, texture and calcareousness. Marginally suitable (Class S3) lands occupy an area of about 26 ha (5%) and are distributed in the northern, eastern and western part of the microwatershed with moderate limitations of rooting depth, texture and calcareousness.

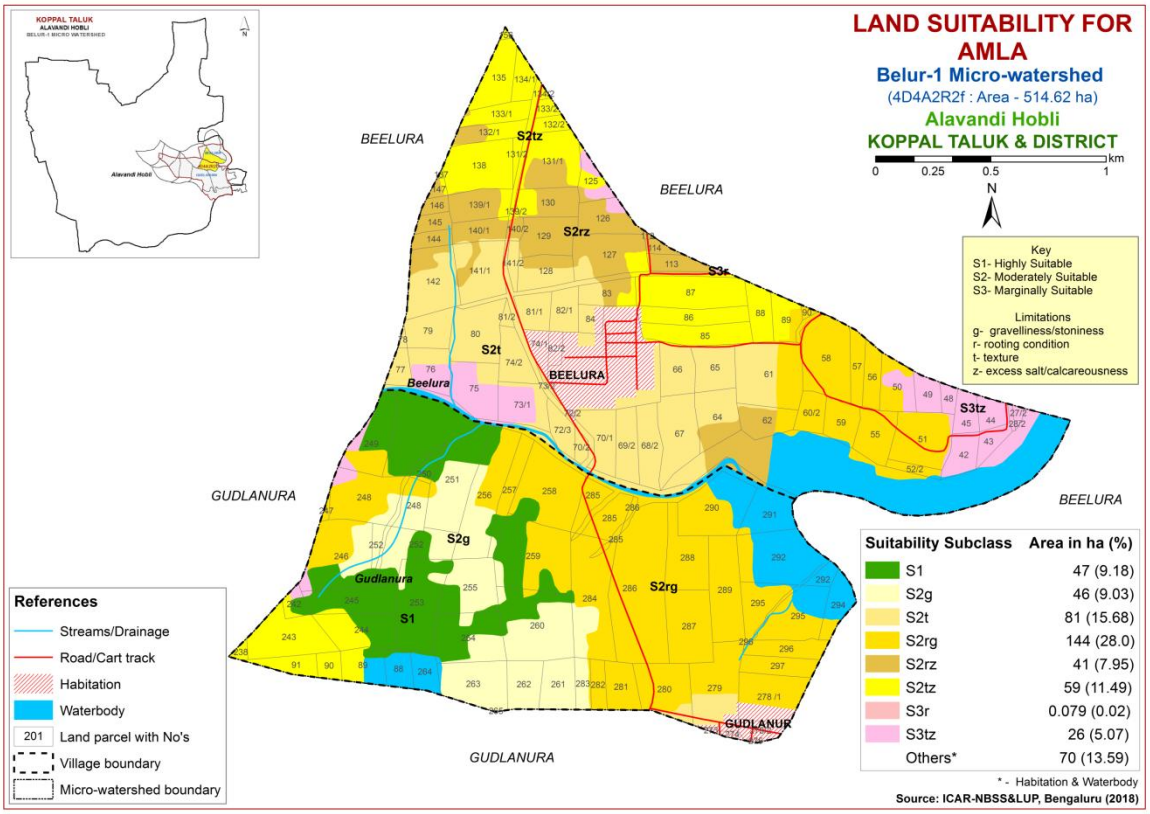


Fig. 7.21 Land Suitability map of Amla

7.22 Land Suitability for Cashew (*Anacardium occidentale)*

Cashew is one of the most important nut crop grown in an area of 7052 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 of about 47 ha (9%) is highly suitable (Class S1) lands for growing Cashew and distributed in the western and southwestern part of the microwatershed. An area of about 111 ha (22%) is moderately suitable (Class S2) and distributed in the western and southern part of the microwatershed with minor limitations of rooting depth and gravelliness. Marginally suitable (Class S3) lands cover an area of about 79 ha (15%) and distributed in the western, eastern and southern part of the microwatershed. They have moderate limitations of gravelliness and rooting depth. Maximum area of about 207 ha (40%) is currently not suitable (Class N1) for growing Cashew and are distributed in all parts of the microwatershed with severe limitations of rooting depth, texture and calcareousness.

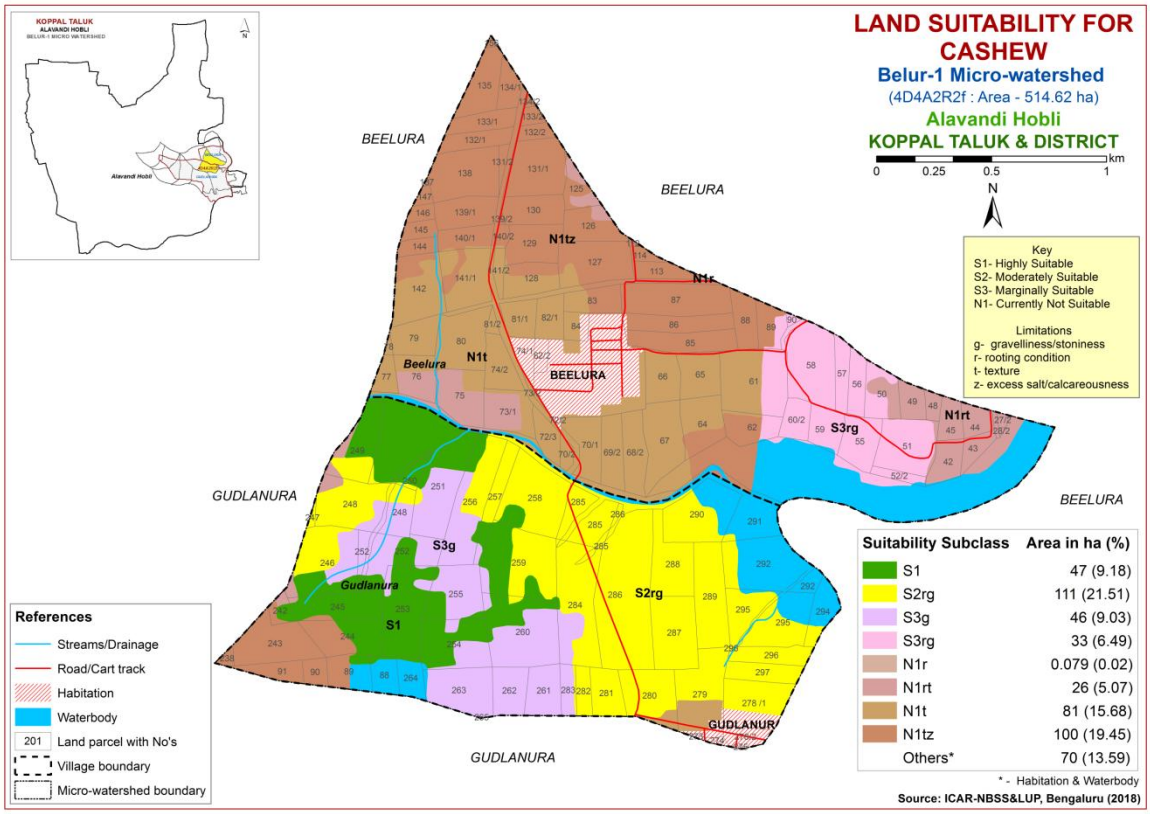


Fig. 7.22 Land Suitability map of Cashew

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 (Table.7.24) for growing jackfruit were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing jackfruit was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in figure 7.23.

An area of 15 ha (3%) is highly suitable (Class S1) lands for growing Jackfruit and distributed in the western part of the microwatershed. An area of about 143 ha (28%) is moderately suitable (Class S2) and distributed in the western and southern part of the microwatershed with minor limitations of rooting depth and gravelliness. Marginally suitable (Class S3) lands cover a maximum area of about 260 ha (50%) and distributed in all parts of the microwatershed. They have moderate limitations of gravelliness, texture, calcareousness and rooting depth. An area of about 26 ha (5%) is currently not suitable (Class N1) for growing Jackfruit and are distributed in the northern, western and eastern part of the microwatershed with severe limitations of rooting depth, texture and gravelliness.

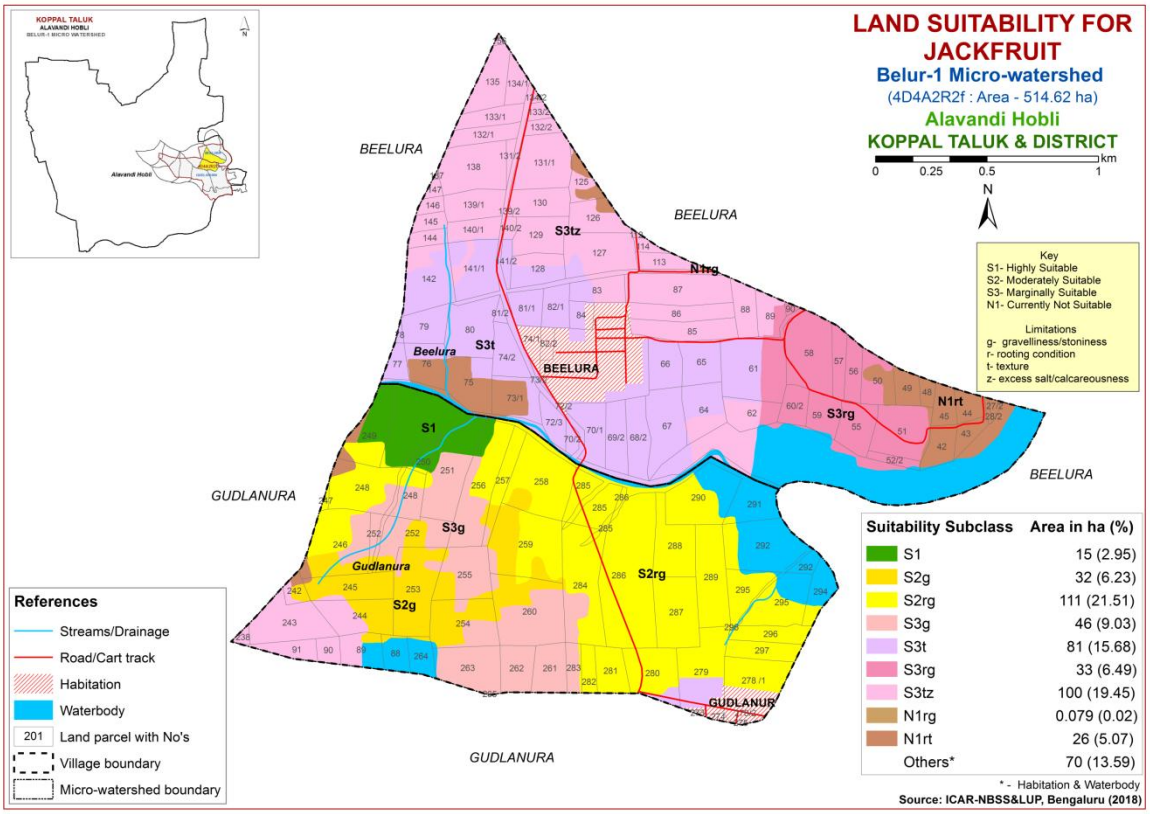


Fig. 7.23 Land Suitability map of Jackfruit

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 (Table 7.25) for growing Jamun were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing Jamun was generated .The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.24.

No highly suitable (Class S1) lands for growing Jamun in the microwatershed. Maximum area of about 218 ha (43%) is moderately suitable (Class S2) and distributed in all parts of the microwatershed with minor limitations of rooting depth, texture, calcareousness and gravelliness. Marginally suitable (Class S3) lands cover an area of about 200 ha (38%) and distributed in the northern, central, western, eastern and southern part of the microwatershed. They have moderate limitations of gravelliness, texture, calcareousness and rooting depth. An area of about 26 ha (5%) is currently not suitable (Class N1) for growing Jamun and are distributed in the northern, western and eastern part of the microwatershed with severe limitations of rooting depth, texture and gravelliness.

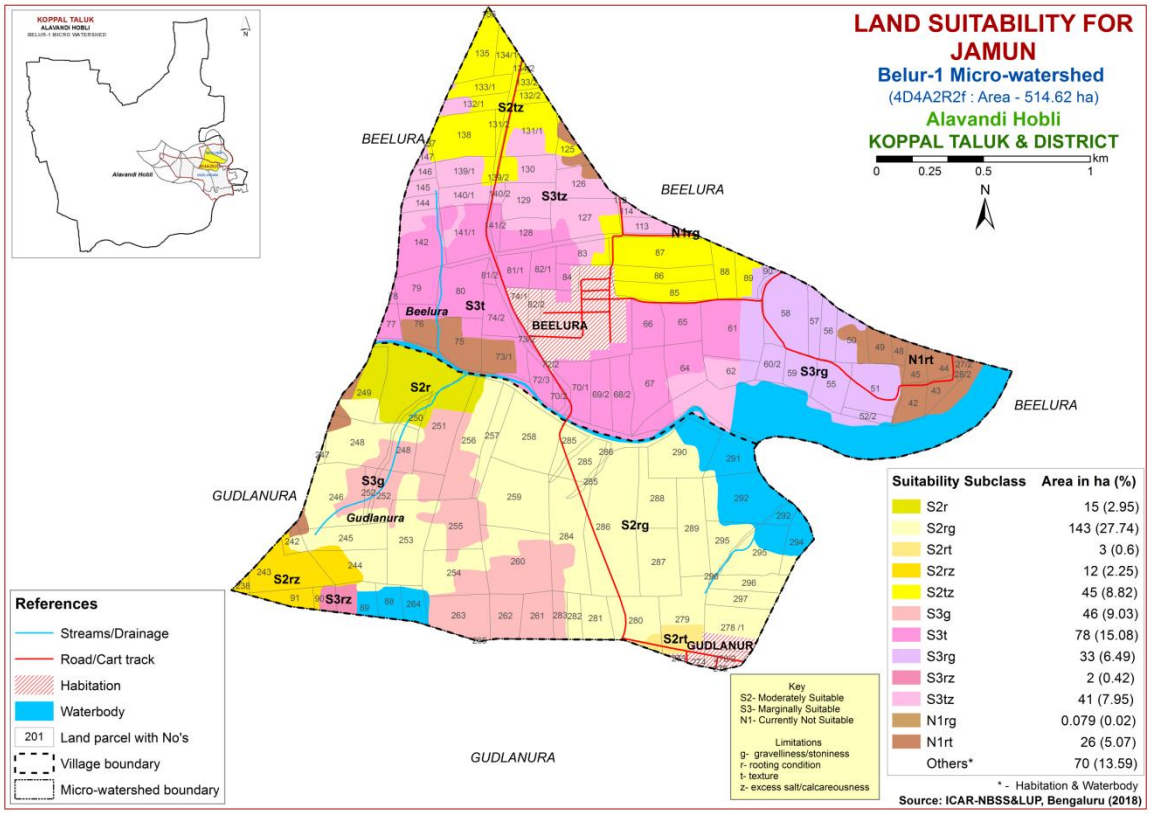


Fig. 7.24 Land Suitability map of Jamun

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

Custard apple is one of the most important fruit crop grown in 1426 ha in almost all the districts of the State. The crop requirements (Table 7.26) for growing custard apple were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing custard apple was generated .The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.25.

An area of about 128 ha (25%) is highly suitable (Class S1) for growing Custard Apple and are distributed in the northern, western, central and southern part of the microwatershed. Maximum area of about 290 ha (56%) is moderately suitable (Class S2) and are distributed in all parts of the microwatershed. They have minor limitations of gravelliness, rooting depth and calcareousness. Marginally suitable (Class S3) lands occupy an area of about 26 ha (5%) and are distributed in the northern, eastern and western part of the microwatershed with moderate limitations of gravelliness, rooting depth and calcareousness.

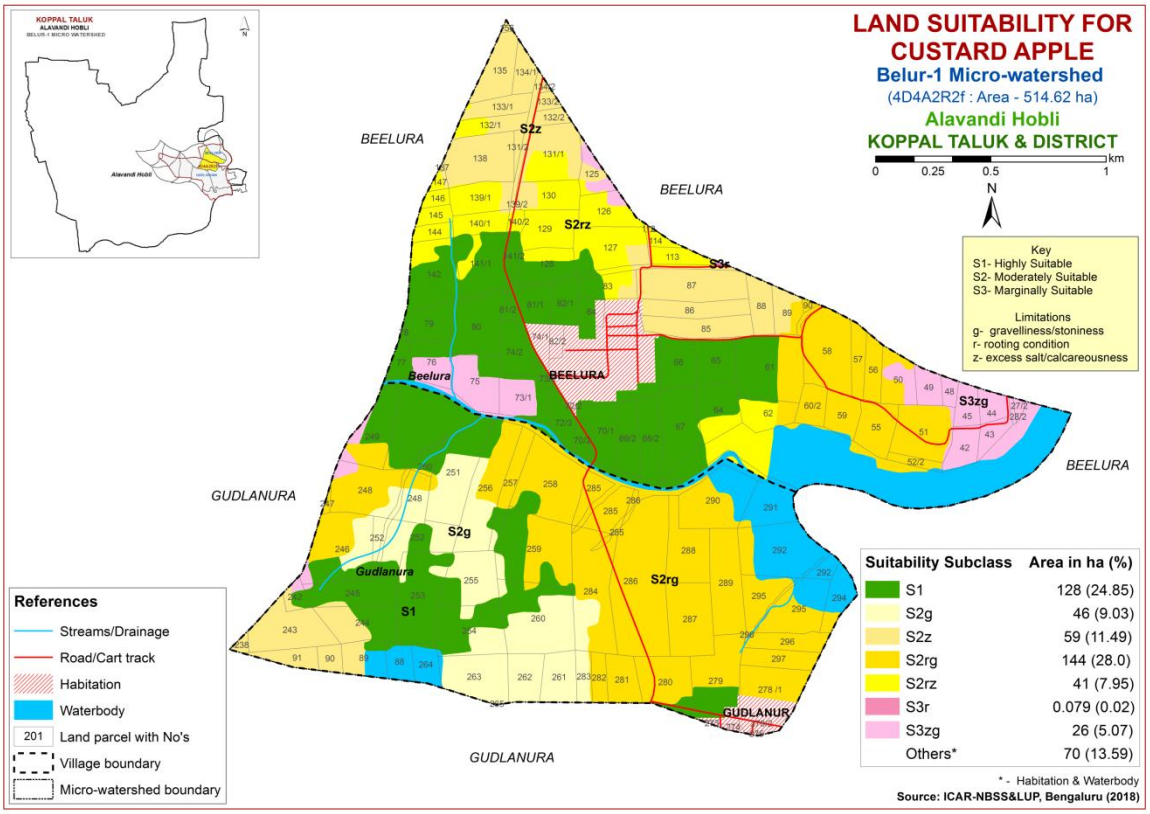


Fig. 7.25 Land Suitability map of Custard Apple

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 (Table 7.27) for growing tamarind were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing tamarind was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.26.

No highly suitable (Class S1) lands for growing Tamarind in the microwatershed. Maximum area of about 208 ha (41%) is moderately suitable (Class S2) and distributed in all parts of the microwatershed with minor limitations of rooting depth, texture, gravelliness and calcareousness. Marginally suitable (Class S3) lands cover an area of about 136 ha (26%) and distributed in the western and southern part of the microwatershed. They have moderate limitations of gravelliness, calcareousness and rooting depth. An area of about 100 ha (19%) is currently not suitable (Class N1) for growing Tamarind and are distributed in the northern, western and eastern part of the microwatershed with severe limitations of rooting depth, calcareousness and gravelliness.

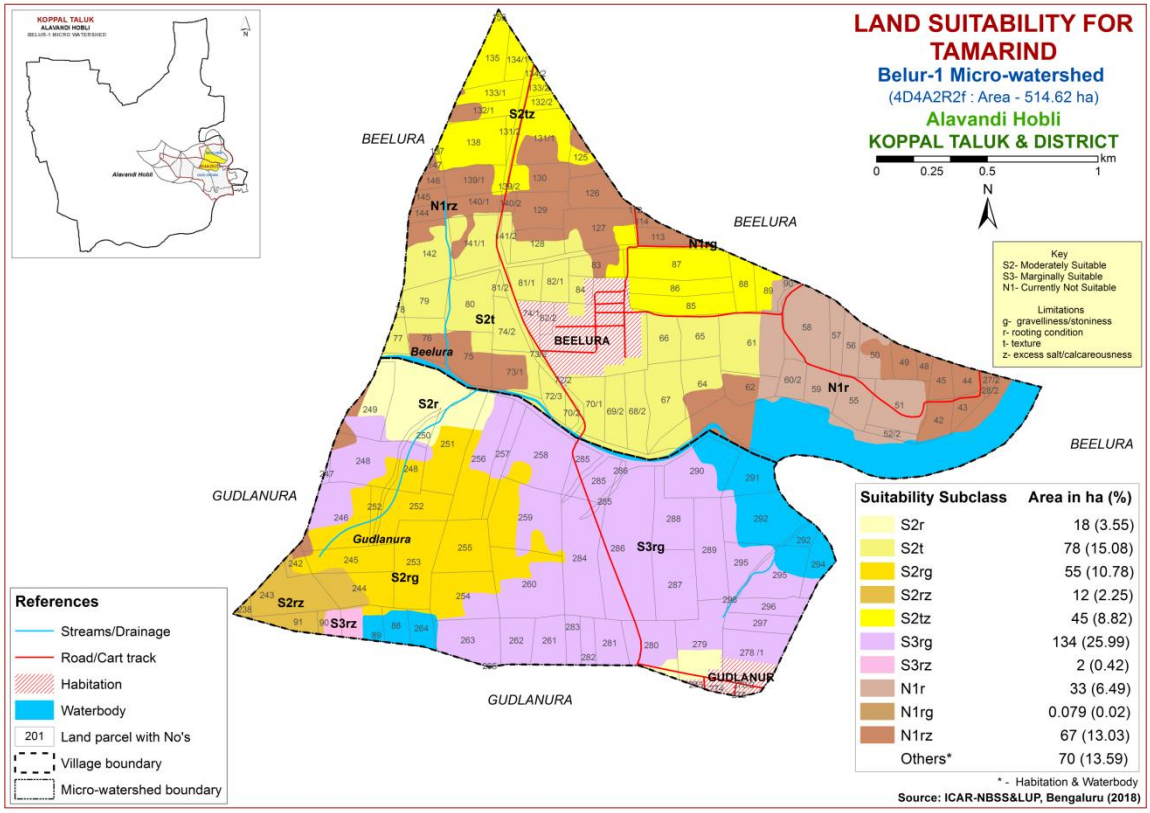


Fig. 7.26 Land Suitability map of Tamarind

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 about 47 ha (9%) is highly suitable (Class S1) lands for growing Mulberry and distributed in the western and southwestern part of the microwatershed. An area of about 174 ha (34%) is moderately suitable (Class S2) and distributed in the western and southern part of the microwatershed with minor limitations of texture, gravelliness and calcareousness. Marginally suitable (Class S3) lands cover a maximum area of about 197 ha (38%) and distributed in all parts of the microwatershed. They have moderate limitations of gravelliness, texture, calcareousness and rooting depth. An area of about 26 ha (5%) is currently not suitable (Class N1) for growing Mulberry and are distributed in eastern and western part of the microwatershed with severe limitations of rooting depth and calcareousness.

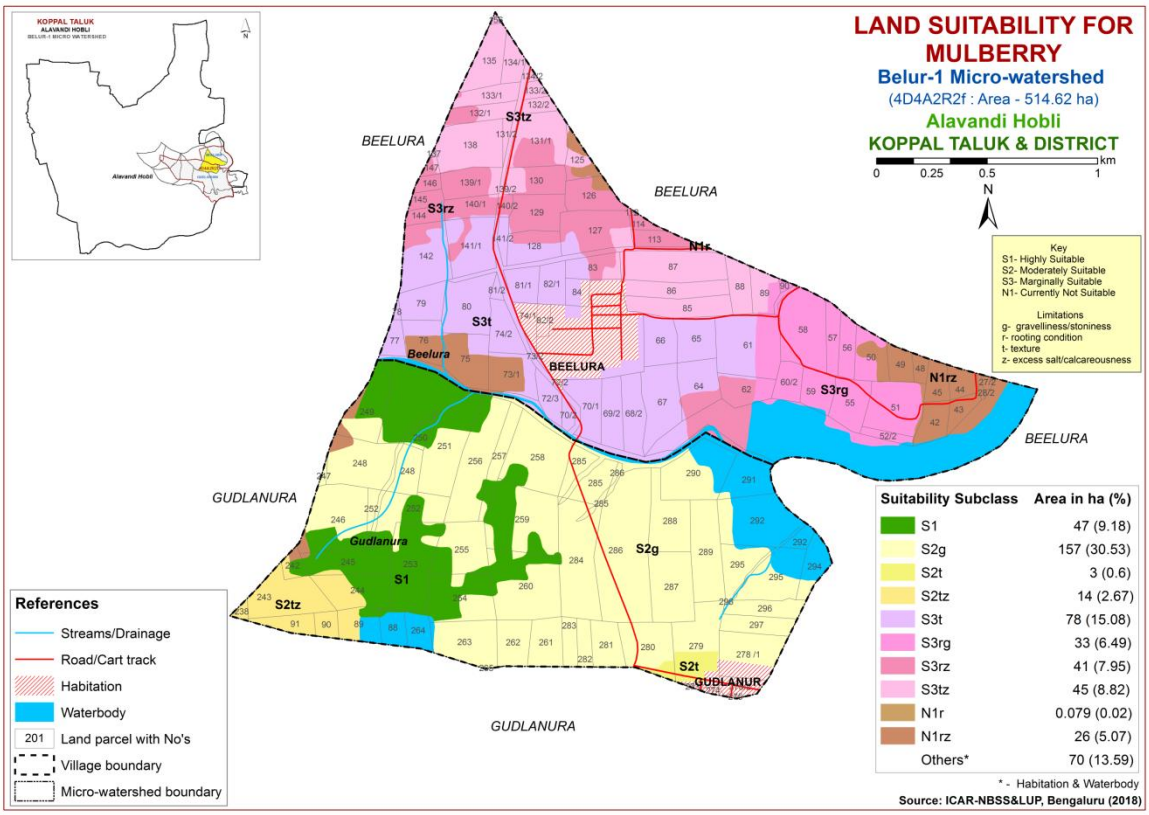


Fig. 7.27 Land Suitability map of Mulberry

7.28 Land Suitability for Marigold (*Tagetes erecta*)

Marigold is one of the most important flower crop grown in an area of 9108 ha in almost all the districts of the state. The crop requirements (Table 7.29) for growing marigold were matched with the soil-site characteristics 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 about 15 ha (3%) is highly suitable (Class S1) for growing Marigold and distributed in the western part of the microwatershed. Maximum area of about 246 ha (47%) is moderately suitable (Class S2) and are distributed in all parts of the microwatershed. They have minor limitations of gravelliness, rooting depth, texture and calcareousness. Marginally suitable (Class S3) lands occupy an area of about 183 ha (36%) and are distributed in the northern, western, eastern and southern part of the microwatershed with moderate limitations of rooting depth, texture, calcareousness and gravelliness.

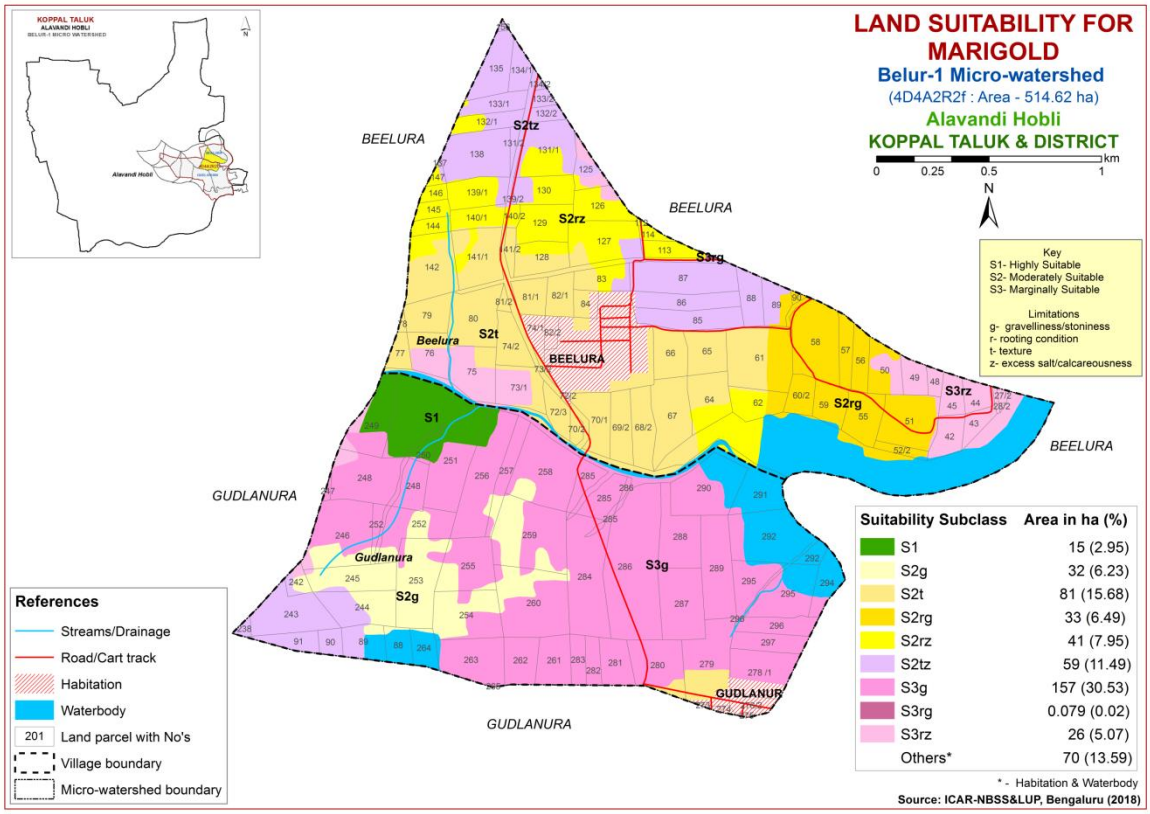


Fig. 7.28 Land Suitability map of Marigold

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 (Table 7.30) for growing chrysanthemum were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing chrysanthemum was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed is given in Figure 7.29.

An area of about 15 ha (3%) is highly suitable (Class S1) for growing Chrysanthemum and distributed in the western part of the microwatershed. Maximum area of about 246 ha (47%) is moderately suitable (Class S2) and are distributed in all parts of the microwatershed. They have minor limitations of gravelliness, rooting depth, texture and calcareousness. Marginally suitable (Class S3) lands occupy an area of about 183 ha (36%) and are distributed in the northern, western, eastern and southern part of the microwatershed with moderate limitations of rooting depth, texture, calcareousness and gravelliness.

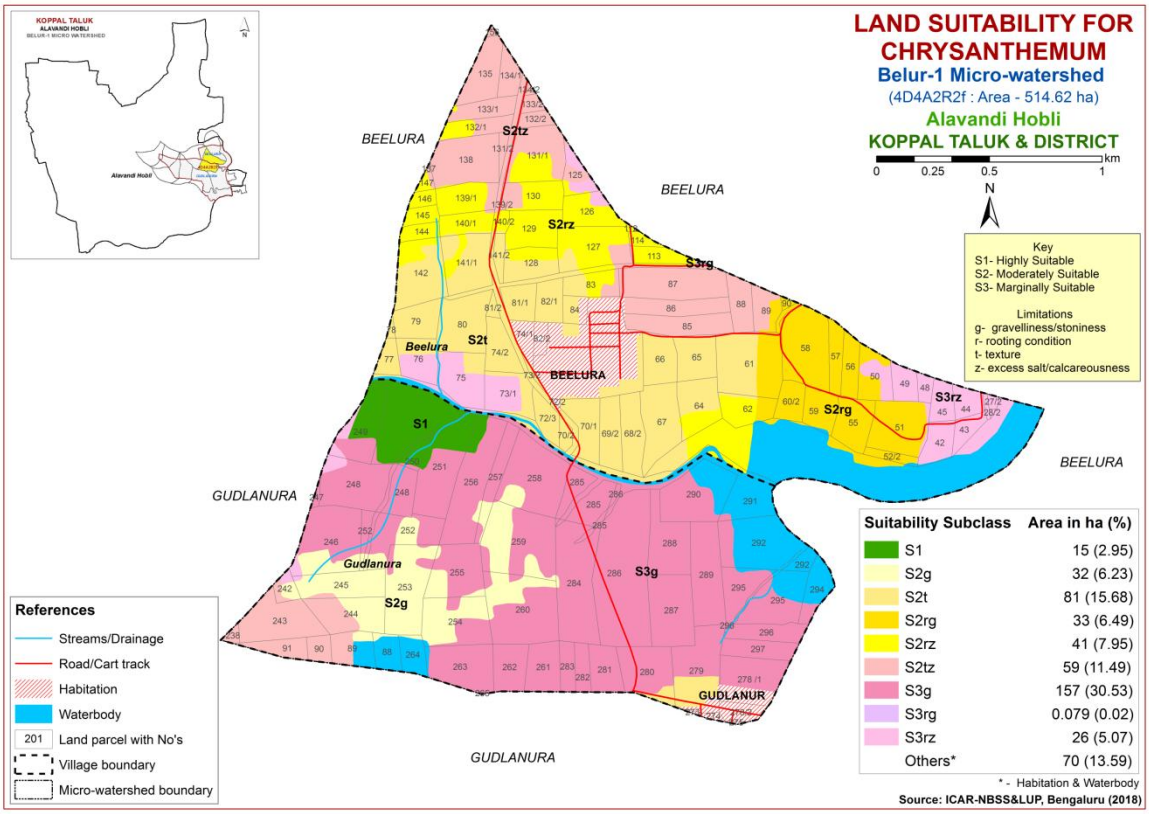


Fig. 7.29 Land Suitability map of Chrysanthemum

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

Jasmine is one of the most important flower crop grown in an area of 803 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 about 15 ha (3%) is highly suitable (Class S1) for growing Jasmine and distributed in the western part of the microwatershed. An area of about 106 ha (20%) is moderately suitable (Class S2) and are distributed in the northern, southwestern and eastern part of the microwatershed. They have minor limitations of gravelliness, rooting depth and calcareousness. Marginally suitable (Class S3) lands occupy a maximum area of about 323 ha (63%) and are distributed in all parts of the microwatershed with moderate limitations of rooting depth, texture, calcareousness and gravelliness.

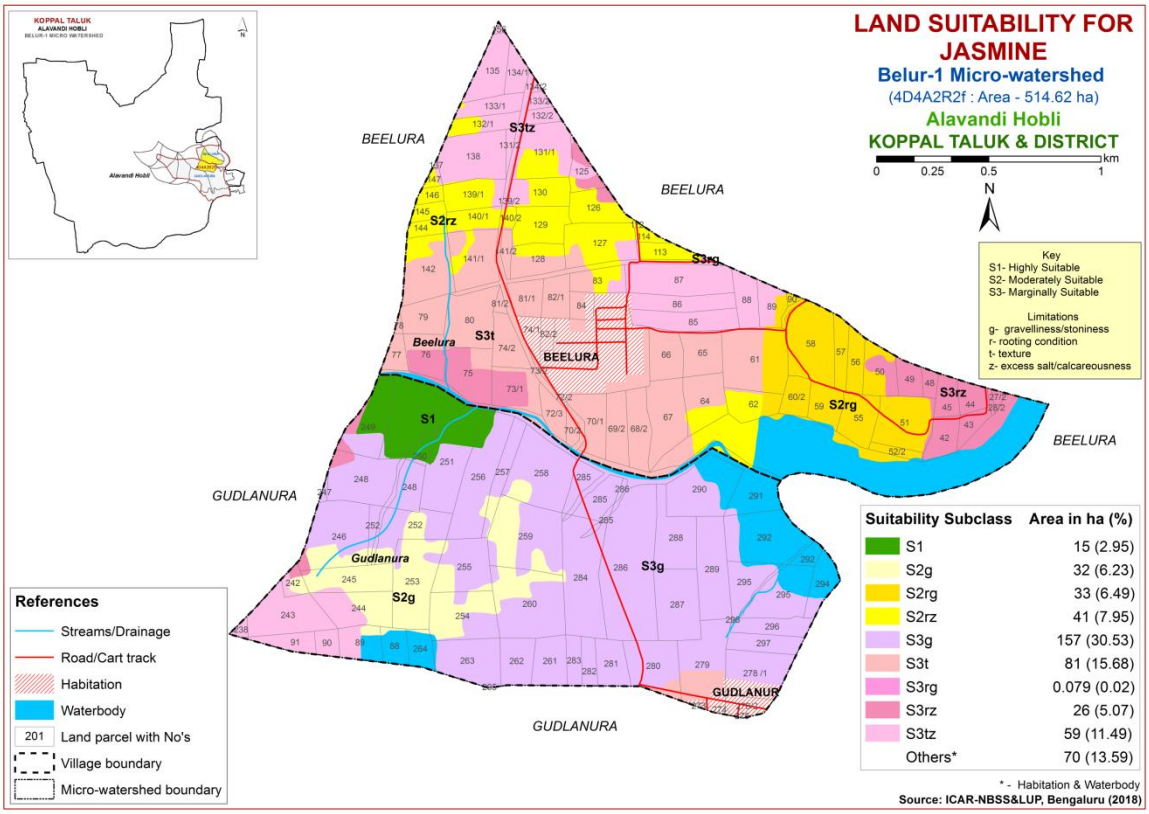


Fig. 7.30 Land Suitability map of Jasmine

7. 31 Land Suitability for Crossandra *(Crossandra infundibuliformis)*

Crossandra is one of the most important flower crop grown in almost all the districts of the State (Table 7.32). Land suitability map for growing crossandra was generated (Table 7.1). The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.31.

An area of about 15 ha (3%) is highly suitable (Class S1) for growing Crossandra and distributed in the western part of the microwatershed. An area of about 67 ha (12%) is moderately suitable (Class S2) and are distributed in the southwestern and eastern part of the microwatershed. They have minor limitations of gravelliness, rooting depth and calcareousness. Marginally suitable (Class S3) lands occupy a maximum area of about 362 ha (71%) and are distributed in all parts of the microwatershed with moderate limitations of rooting depth, texture, calcareousness and gravelliness.

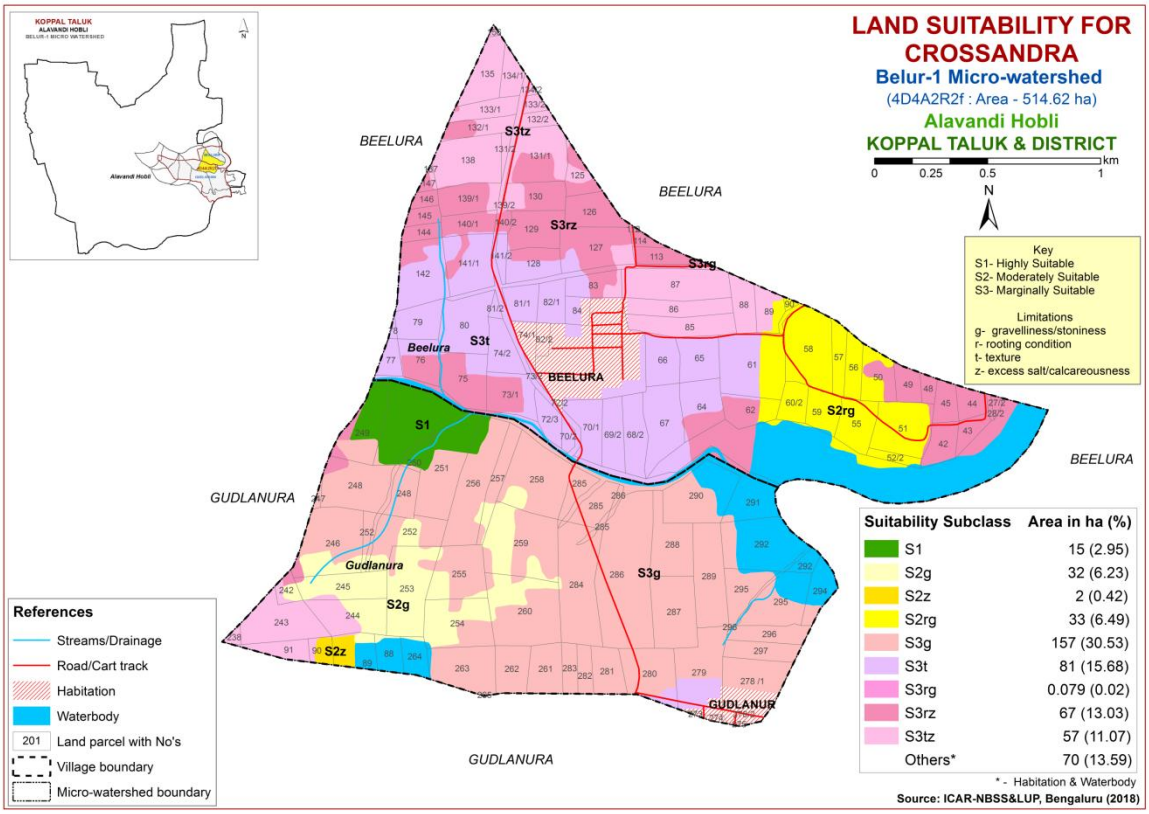


Fig. 7.31 Land Suitability map of Crossandra

Table 7.1 Soil-Site Characteristics of Belur-1 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 (dSm^{-1})	ESP	CEC [Cmol $(p^+)kg^{-1}$]	BS (%)
					Surface	Sub-surface	Surface	Sub-surface								
KGPhB2g1	662	<90	WD	25-50	scl	gsc	15-35	15-35	<50	1-3	moderate	-	-	-	-	-
MKHcB2g1	662	<90	WD	50-75	sl	gsc	15-35	>35	51-100	1-3	moderate	7.38	0.09	1.49	15.00	93.00
MKHiB2g1	662	<90	WD	50-75	sc	gsc	15-35	>35	51-100	1-3	moderate	7.38	0.09	1.49	15.00	93.00
HDHiB2g1	662	<90	WD	75-100	sc	gsc-gc	15-35	>35	51-100	1-3	moderate	6.54	0.07	7.11	5.84	84.00
KMHiB2	662	<90	WD	100-150	sc	sc	<15	<15	101-150	1-3	moderate	7.2	0.19	0.54	15.07	100
KMHiB2g1	662	<90	WD	100-150	sc	sc	15-35	<15	101-150	1-3	moderate	7.2	0.19	0.54	15.07	100
BPRhB2g1	662	<90	WD	100-150	scl	gsc-gc	15-35	>35	51-100	1-3	moderate	6.64	0.03	0.51	5.45	63.48
BPRiB2	662	<90	WD	100-150	sc	gsc-gc	<15	>35	51-100	1-3	moderate	6.64	0.03	0.51	5.45	63.48
MTLiB2g2	662	<90	WD	25-50	sc	gc	35-60	15-35	51-100	1-3	moderate	8.27	0.20	0.69	37.00	-
MTLmB2g1	662	<90	WD	25-50	c	gc	15-35	15-35	51-100	1-3	moderate	8.27	0.20	0.69	37.00	-
MTLmB2g2	662	<90	WD	25-50	c	gc	35-60	15-35	51-100	1-3	moderate	8.27	0.20	0.69	37.00	-
RNKmB2g1	662	<90	MWD	50-75	c	c	15-35	<15	101-150	1-3	moderate	8.86	0.48	16.94	37.0	8.86
RNKmB2g2	662	<90	MWD	50-75	c	c	35-60	<15	101-150	1-3	moderate	8.86	0.48	16.94	37.0	8.86
DRLmB2	662	<90	MWD	75-100	c	c	<15	<15	151-200	1-3	moderate	8.78	0.42	5.62	49.70	100
GRHmB2	662	<90	MWD	100-150	c	c	<15	<15	>200	1-3	moderate	9.08	0.23	7.11	63.21	100
KVRmB1	662	<90	MWD	100-150	c	c	<15	<15	>200	1-3	slight	8.4	0.26	0.60	43.25	-
LGDmB1	662	<90	WD	100-150	c	c	<15	<15	>200	1-3	slight	8.03	1.93	1.82	32.37	100
LGDmB2g1	662	<90	WD	100-150	c	c	15-35	<15	>200	1-3	moderate	7.68	1.85	1.66	42.18	100

Table 7.2 Land suitability criteria for Sorghum

Land use requirement			Rating			
Soil –site characteristics		**Unit**	**Highly suitable (S1)**	**Moderately suitable (S2)**	**Marginally suitable (S3)**	**Not suitable (N1)**
Climatic regime	Mean temperature in growing season	°C	26–30	30–34; 24–26	34–40; 20–24	>40; <20
	Mean max. temp. in growing season	°C				
	Mean min. tempt. in growing season	°C				
	Mean RH in growing season	%				
	Total rainfall	mm				
	Rainfall in growing season	mm				
Land quality	Soil-site 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, c (red), c (black)	scl, cl	ls, sl	-
	pH	1:2.5	5.5-7.8	5.0-5.5 7.8-9.0	>9.0	-
	CEC	C mol (p+)/Kg				
	BS	%				
	CaCO3 in root zone	%		<5	5-10	10-15
	OC	%				
Rooting conditions	Effective soil depth	cm	>75	50-75	25-50	<25
	Stoniness	%				
	Coarse fragments	Vol %	<15	15-35	35-60	60-80
Soil toxicity	Salinity (EC saturation extract)	ds/m	<2	2-4	4-8	>8
	Sodicity (ESP)	%	5-10	10-15	>15	
Erosion hazard	Slope	%	0-3	3-5	5-10	>10

Table 7.3 Land suitability criteria for Maize

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

Table 7.4 Land suitability criteria for Bajra

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

Table 7.5 Land suitability criteria for Groundnut

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

Table 7.6 Land suitability criteria for Sunflower

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

Table 7.7 Land suitability criteria for Redgram

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

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 18 soil map units identified in Belur-1 microwatershed have been grouped into 7 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.7.31) 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 7 Land Management Units along with brief description of soil and site characteristics are given below.

LMU	Mapping unit	Soil and site characteristics
1	201.KMHiB2 202.KMHiB2g1	Deep (100-150 cm), red sandy clay soils, slope (1-3%), moderate erosion, gravelly (15-35%).
2	388.KVRmB1 393.LGDmB1 477.LGDmB2g1 350.DRLmB2 373.GRHmB2	Moderately deep to deep (75-150 cm), black calcareous clay soils, slope (1-3%), slight to moderate erosion, gravelly (15-35%).
3	231.BPRhB2g1 239.BPRiB2 128. HDHiB2g1	Moderately deep to deep (75-150 cm), red sandy clay loam to sandy clay soils, slope (1-3%), moderate erosion, gravelly (15-35%).
4	337.RNKmB2g1 338.RNKmB2g2	Moderately shallow (50-75 cm), black calcareous clay soils, slope (1-3%), moderate erosion, gravelly to very gravelly (15-60%).
5	77.MKHcB2g1 90.MKHiB2g1	Moderately shallow (50-75 cm), red sandy loam to clay soils, slope (1-3%), moderate erosion, gravelly (15-35%).
6	305.MTLiB2g2 311.MTLmB2g1 312.MTLmB2g2	Shallow (25-50 cm), black calcareous clay soils, slope (1-3%), moderate erosion, gravelly to very gravelly (15-60%).
7	17.KGPhB2g1	Shallow (25-50 cm), red sandy clay loam soils, slope (1-3%), moderate erosion, gravelly (15-35%)

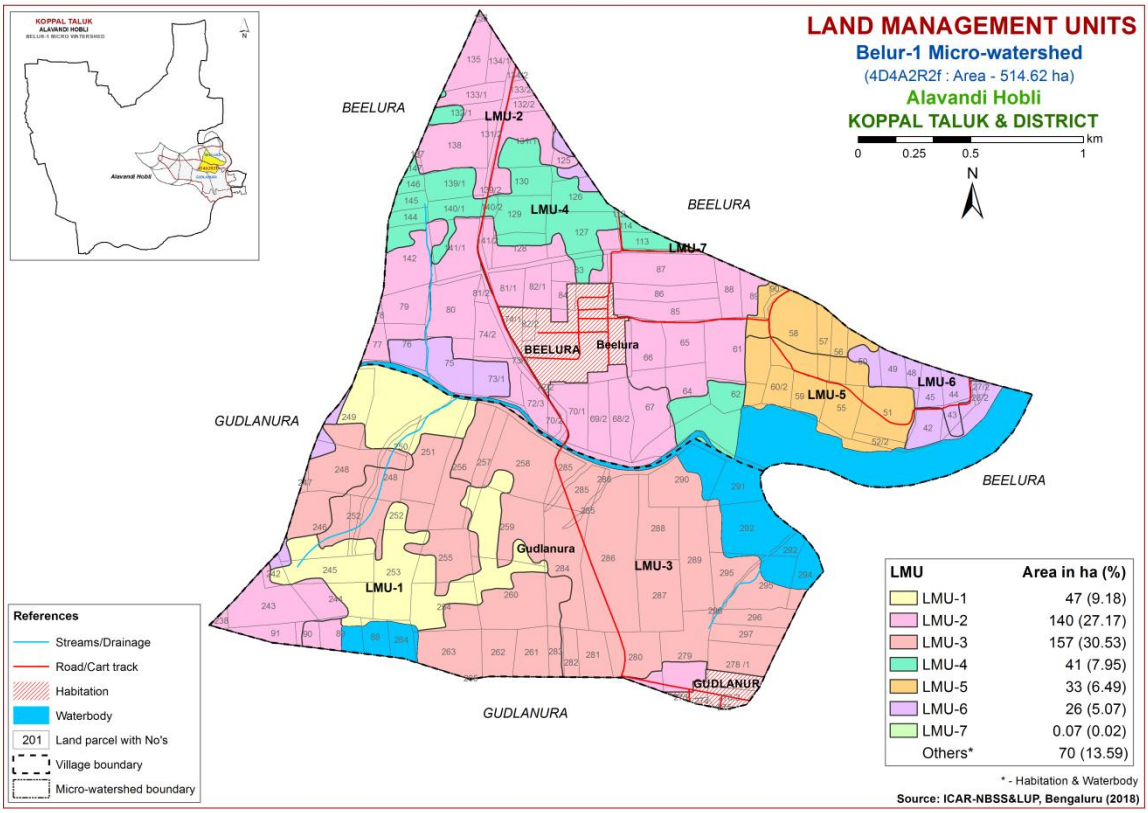


Fig 7.32 Land Management Units map of Belur-1 microwatershed

7.33 Proposed Crop Plan for Belur-1 Microwatershed

After assessing the land suitability for the 31 crops, the proposed crop plan has been prepared for the 7 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 Belur-1 Microwatershed

LMU	Soil Map Units	Survey Number	Field Crops	Horticulture Crops	Suitable Interventions
1	201.KMHiB2 202.KMHiB2g1	**Gudlanur :**242,245,249,250, 253,254	Maize, Sorghum, Sunflower, Bajra, Finger millet, Groundnut, Red gram, Cowpea, Field bean, Castor, Mulberry	**Fruit crops:** Mango, Pomegranate, Guava, Sapota, Jackfruit, Jamun, Tamarind, Lime, Musambi, Amla, Custard apple, Cashew **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)
2	388.KVRmB1 393.LGDmB1 477.LGDmB2g1 350.DRLmB2 373.GRHmB2	**Beelura:**61,64,65,66,67,68/2,69/2,70/1,70/2,72/3,73/2,74/2,77,78,79,80,81/1,81/2,82/1,84,85,86,87,88,89,128,131/1,131/2,132/1,132/2,133/1,133/2,134/1,134/2,135,137,138,139/2,141/1,141/2,142,156 **Gudlanur :**89,90,91 ,238,243, 244	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, Chrysanthemum, Crossandra, Jasmine	Application of FYM, Biofertilizers and micronutrients, drip irrigation, mulching, suitable soil and water conservation practices
3	231.BPRhB2g1 239.BPRiB2 128. HDHiB2g1	**Gudlanur**:246,247,248,251,252, 255,256,257,258,259,260,261,262,263,265,278/1,279,280,281,282,283,284,285,286,287,288,289, 290,295, 296, 297	Groundnut, Bajra, Horse gram, Castor, Mulberry	**Fruit crops:** Musambi, Lime, Jamun, Jackfruit, Amla, Custard apple, Tamarind **Vegetable crops:** Drumstick, Curry leaves	Drip irrigation, mulching, suitable soil and water conservation practices (Crescent Bunding with Catch Pit etc)
4	337.RNKmB2g1 338.RNKmB2g2	**Beelura:**62,83,112,113,114,126, 127,129,130,139/1,140/1,140/2,144,145,146,147	Sorghum, Bajra, Bengal gram, Linseed, Safflower,	**Fruit crops:** Amla, Custard apple **Flower crops:** Marigold,	Application of FYM, Biofertilizers and micronutrients, drip

LMU	Soil Map Units	Survey Number	Field Crops	Horticulture Crops	Suitable Interventions
			Coriander	Jasmine, Chrysanthemum	irrigation, mulching, suitable soil and water conservation practices
5	77.MKHcB2g1 90.MKHiB2g1	**Beelura:**51,52/2,55,56,57,58,59, 60/2,90	Sorghum, 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)
6	305.MTLiB2g2 311.MTLmB2g1 312.MTLmB2g2	**Beelura:'**27/2,28/2,42,43,44,45, 48,49,50,73/1,75,76, 125	Bengal gram	**Agri-Silvi-Pasture:** Hybrid Napier, *Styloxanthes hamata*, *Styloxanthes scabra*	Use of short duration varieties, sowing across the slope
7	17.KGPhB2g1	**Beelura:**113	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

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 Belur-1 Microwatershed

- The soil phases with sizeable area identified in the microwatershed belonged to the soil series of LGD 123 ha (24%), HDH 111 ha (22%), KMH 47 ha (9%), BPR 46 ha (9%), RNK 40 ha (8%), MKH 33 ha (6%), MTL 27 ha (5%), KVR 12 ha (2%), GRH 3 ha (1%), DRL 2 ha (<1%) and KGP <1 ha (<1%).
- As per land capability classification, entire area in the microwatershed falls under arable land category (Class II and III). The major limitations identified in the arable lands were soil and erosion.

- ❖ On the basis of soil reaction, an area of about 29 ha (6%) is moderately alkaline (pH 7.8-8.4), 394 ha (76%) is strongly alkaline (pH 8.4-9.0) and 22 ha (4%) is very strongly alkaline (pH >9.0) in reaction.

Soil Health Management

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

Alkaline soils

About 445 ha (86%) is under alkaline soils (moderately to very strongly alkaline soils).

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

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. An area of about 57 ha (11%) is under slight erosion and 388 ha (75%) is under moderate erosion. The areas with 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 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 Belur-1 Microwatershed.
- **Organic Carbon:** An area of about 6 ha (1%) is low (<0.5%) and 439 ha (85%) is medium (0.5-0.75%) in OC content. 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 445 ha area where OC is less than 0.75 per cent. 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**: Available phosphorus is medium (23-57 kg/ha) in 409 ha (79%) and high (>57 kg/ha) in 35 ha (7%) area of the microwatershed. The areas with medium phosphorus content additional 25% phosphorus from the RDF to be applied.
- **Available Potassium:** Available potassium is medium (145-337 kg/ha) in 352 ha (68%) and high (>337 kg/ha) in 93 ha (18%) area of the microwatershed. The areas with

high potassium content reduce 25% from the RDF to avoid the excess application of fertilizer and apply additional 25% potassium in areas where it is low and medium.

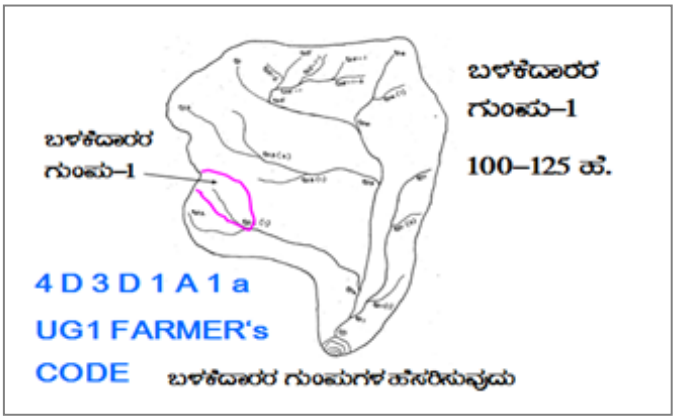
- **Available Sulphur:** Available sulphur is low (<10 ppm) in 137 ha (26%) and medium (10-20 ppm) in 308 ha (60%) area of the microwatershed. Areas with low and medium in available sulphur need to be applied with magnesium sulphate or gypsum or Factamphos (p) fertitilizer (13% sulphur) for 2-3 years for the deficiency to be corrected.
- **Available Iron:** Available iron is deficient (<4.5 ppm) in 338 ha (65%) and sufficient (>4.5 ppm) in 107 ha (21%) area of the microwatershed. Application of iron sulphate @ 25 kg/ha for 2-3 years to correct the deficiency.
- **Available Zinc:** Available zinc is deficient (<0.6 ppm) in 385 ha (75%) and sufficient (>0.6 ppm) in 60 ha (11%) area of the microwatershed. Application of zinc sulphate @ 25 kg/ha is to be followed in areas that are deficient in available zinc.
- **Available Boron:** Available boron is low in (<0.5ppm) 411 ha (80%) and medium (0.5-1.0 ppm) in 34 ha (6%) area in the microwatershed. The areas with low and medium in boron content need to be applied with sodium borate @ 10 kg/ha as soil application or 0.2% borax as foliar spray to correct the deficiency.
- **Available Manganese**: It is sufficient (>1.0 ppm) in the entire area of the microwatershed.
- **Available Copper:** Available copper is sufficient (>0.2 ppm) in the entire area of the microwatershed.
- **Soil Alkalinity:** Entire area in the microwatershed has 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 Belur-1 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.

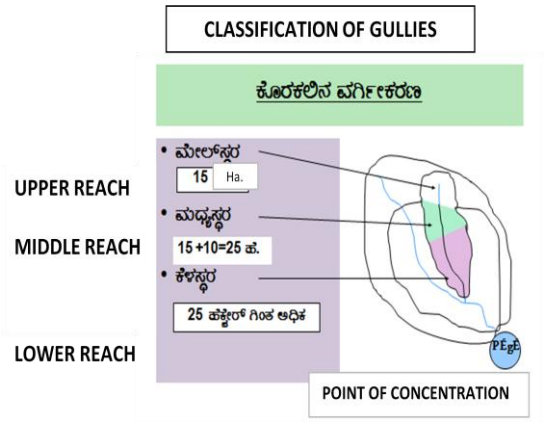
- Naming of user groups and farmers
- Identification of arable and non arable lands
- Identification of drainage lines and gullies
- Identification of non treatable areas
- Identification of priority areas in the arable lands
- Treatment plan for arable lands
- Location of water harvesting and recharge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

9.1 Treatment Plan

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

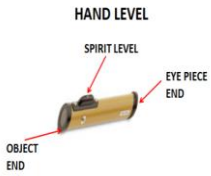
9.1.1 Arable Land Treatment

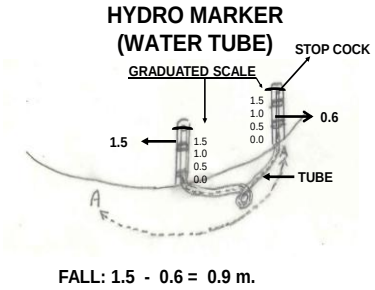
A. BUNDING

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.

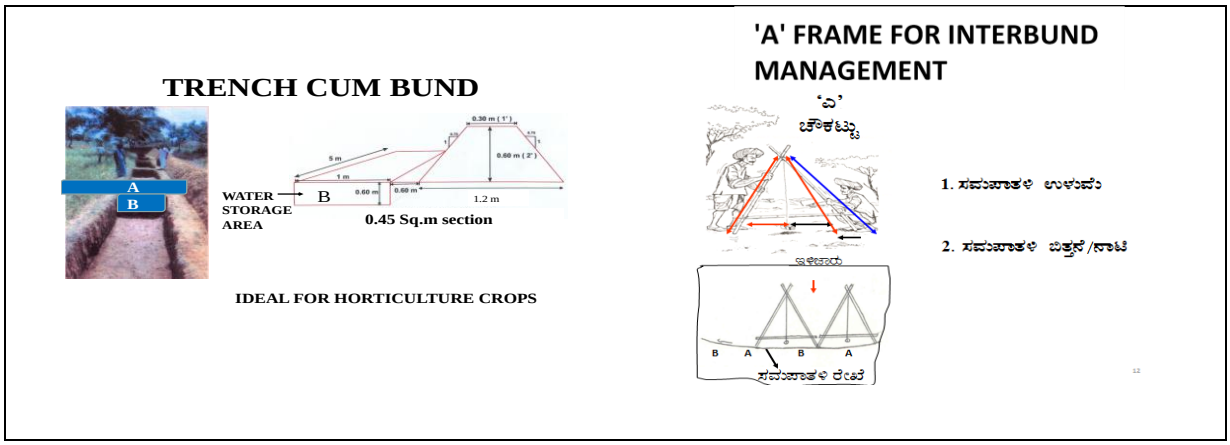
Recommended Bund Section

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 clayey black soils	
0.45	2	0.75	01:01	0.92		
0.45	2.4	0.75	1.3:1	1.07	Shallow clayey black soils	
0.6	3.1	0.7	1.78:1	1.29	Medium clayey black soils	
0.5	3	0.85	1.47:1	1.49		

Formation of Trench cum Bund

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

Details of Borrow Pit dimensions are given below



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

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

B. Waterways

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

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

c) The design details are given in the Manual.

C. Farm Ponds

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

D. Diversion Channel

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

9.1.2 Non-Arable Land Treatment

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

9.1.3 Treatment of Natural Water Course/ Drainage Lines

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

9.2 Recommended Soil and Water Conservation Measures

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

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

A map (Fig. 9.1) showing soil and water conservation plan with different kinds of structures recommended has been prepared which shows the spatial distribution and extent of area. A maximum area of about 238 ha (46%) needs trench cum bunding. An area of about 207 ha (40%) needs graded bunding. The conservation plan prepared may be presented to all the stakeholders including farmers and after considering their suggestions, the conservation plan for the microwatershed may be finalized in a participatory approach.

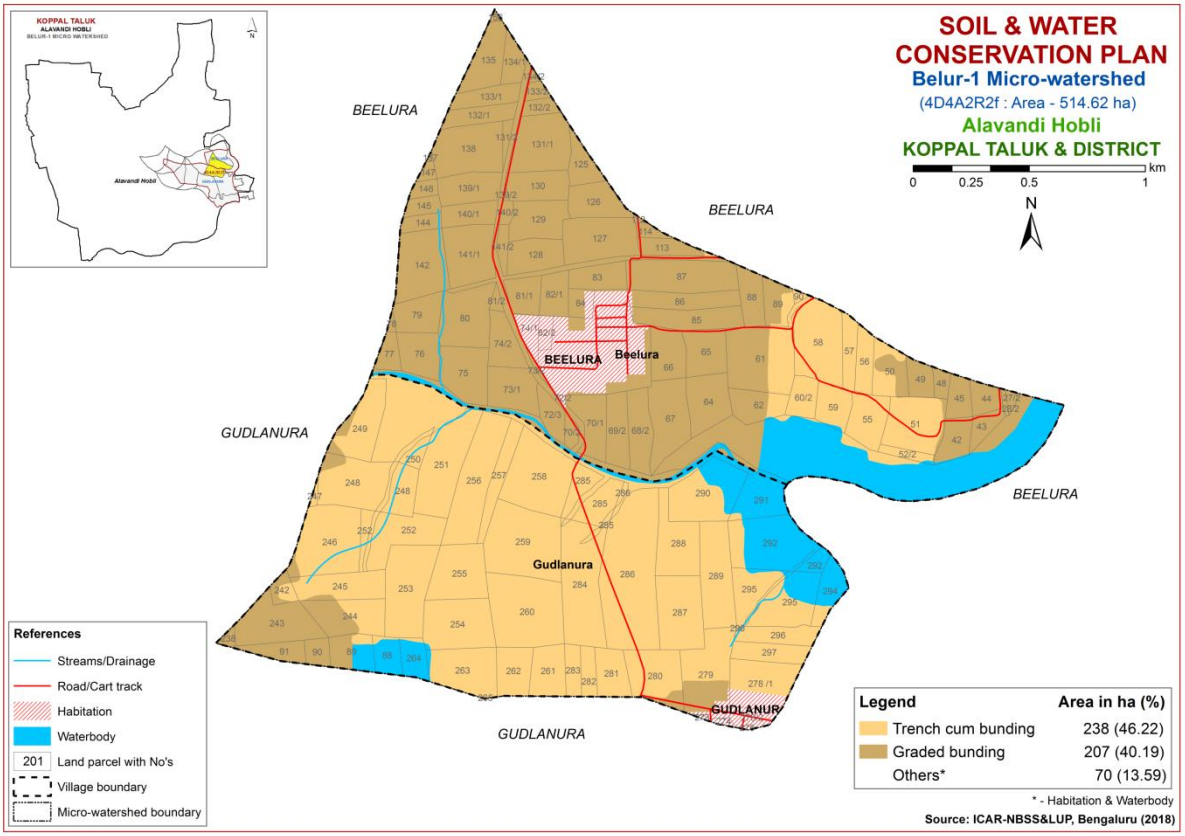


Fig. 9.1 Soil and Water Conservation Plan map of Belur-1 Microwatershed

9.3 Greening of Microwatershed

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

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

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

Dry Deciduous Species			Temp (°C)	Rainfall (mm)
1.	Bevu	*Azadiracta indica*	21–32	400 –1,200
2.	Tapasi	*Holoptelia integrifolia*	20-30	500 - 1000
3.	Seetaphal	*Anona Squamosa*	20-40	400 - 1000
4.	Honge	*Pongamia pinnata*	20 -50	500–2,500
5.	Kamara	*Hardwikia binata*	25 -35	400 - 1000
6.	Bage	*Albezzia lebbek*	20 - 45	500 - 1000
7.	Ficus	*Ficus bengalensis*	20 - 50	500–2,500
8.	Sisso	*Dalbargia Sissoo*	20 - 50	500 -2000
9.	Ailanthus	*Ailanthus excelsa*	20 - 50	500 - 1000
10.	Hale	*Wrightia tinctoria*	25 - 45	500 - 1000
11.	Uded	*Steriospermum chelanoides*	25 - 45	500 -2000
12.	Dhupa	*Boswella Serrata*	20 - 40	500 - 2000
13.	Nelli	*Emblica Officinalis*	20 - 50	500 -1500
14.	Honne	*Pterocarpus marsupium*	20 - 40	500 - 2000
Moist Deciduous Species			**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

Belur-1 (2R2f) Microwatershed

Soil Phase Information

Village	Survey Number	Area (ha)	Soil Phase	LMU	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	WELLS	Land Capability	Conservation Plan
Beelura	27/2	0.27	MTLmB2g2	LMU-6	Shallow (25-50 cm)	Clay	Very gravelly (35-60%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Current fallow (Cf)	Not Available	IIIes	Graded bunding
Beelura	28/2	0.07	MTLmB2g2	LMU-6	Shallow (25-50 cm)	Clay	Very gravelly (35-60%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Current fallow (Cf)	Not Available	IIIes	Graded bunding
Beelura	42	2.32	MTLmB2g2	LMU-6	Shallow (25-50 cm)	Clay	Very gravelly (35-60%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Current fallow+Maize (Cf+Mz)	Borewell	IIIes	Graded bunding
Beelura	43	1.42	MTLmB2g1	LMU-6	Shallow (25-50 cm)	Clay	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Current fallow+Maize (Cf+Mz)	Not Available	IIIes	Graded bunding
Beelura	44	1.63	MTLmB2g1	LMU-6	Shallow (25-50 cm)	Clay	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIIes	Graded bunding
Beelura	45	1.8	MTLmB2g1	LMU-6	Shallow (25-50 cm)	Clay	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIIes	Graded bunding
Beelura	48	0.81	MTLmB2g1	LMU-6	Shallow (25-50 cm)	Clay	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Banana (Mz+Bn)	Not Available	IIIes	Graded bunding
Beelura	49	1.72	MTLmB2g1	LMU-6	Shallow (25-50 cm)	Clay	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Redgarm+Chilli (Mz+Rg+Ch)	Not Available	IIIes	Graded bunding
Beelura	50	3.2	MTLmB2g1	LMU-6	Shallow (25-50 cm)	Clay	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Banana (Mz+Bn)	Not Available	IIIes	Graded bunding
Beelura	51	5.72	MKHcB2g1	LMU-5	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Redgram (Mz+Rg)	Borewell	IIIes	Trench cum bunding
Beelura	52/2	0.94	MKHcB2g1	LMU-5	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIIes	Trench cum bunding
Beelura	55	3.5	MKHcB2g1	LMU-5	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIIes	Trench cum bunding
Beelura	56	2.03	MKHiB2g1	LMU-5	Moderately shallow (50-75 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Borewell	IIIes	Trench cum bunding
Beelura	57	1.91	MKHiB2g1	LMU-5	Moderately shallow (50-75 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIIes	Trench cum bunding
Beelura	58	6.91	MKHiB2g1	LMU-5	Moderately shallow (50-75 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Redgram (Mz+Rg)	Not Available	IIIes	Trench cum bunding
Beelura	59	2.57	MKHcB2g1	LMU-5	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Borewell	IIIes	Trench cum bunding
Beelura	60/2	2.03	MKHcB2g1	LMU-5	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Chilli (Ch)	Not Available	IIIes	Trench cum bunding
Beelura	61	8.06	LGDmB2g1	LMU-2	Deep (100-150 cm)	Clay	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Redgram (Mz+Rg)	Not Available	IIes	Graded bunding
Beelura	62	2.97	RNKmB2g2	LMU-4	Moderately shallow (50-75 cm)	Clay	Very gravelly (35-60%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Borewell	IIes	Graded bunding
Beelura	64	4.1	LGDmB2g1	LMU-2	Deep (100-150 cm)	Clay	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Redgram+Onion (Mz+Rg+On)	Borewell	IIes	Graded bunding
Beelura	65	3.49	LGDmB2g1	LMU-2	Deep (100-150 cm)	Clay	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Graded bunding

Village	Survey Number	Area (ha)	Soil Phase	LMU	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	WELLS	Land Capability	Conservation Plan
Beelura	66	3.26	LGDmB2g1	LMU-2	Deep (100-150 cm)	Clay	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Bajra+Onion+Chilli (Bj+On+Ch)	Borewell	IIes	Graded bunding
Beelura	67	5.41	LGDmB2g1	LMU-2	Deep (100-150 cm)	Clay	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Cotton (Mz+Ct)	Borewell	IIes	Graded bunding
Beelura	68/2	3.45	LGDmB2g1	LMU-2	Deep (100-150 cm)	Clay	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram+Maize+Cotton (Rg+Mz+Ct)	Borewell	IIes	Graded bunding
Beelura	69/2	3.03	LGDmB2g1	LMU-2	Deep (100-150 cm)	Clay	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Current fallow (Cf)	Borewell	IIes	Graded bunding
Beelura	70/1	3.38	LGDmB2g1	LMU-2	Deep (100-150 cm)	Clay	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Sugarcane (Mz+Sc)	Borewell	IIes	Graded bunding
Beelura	70/2	0.7	LGDmB2g1	LMU-2	Deep (100-150 cm)	Clay	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Current fallow (Cf)	Not Available	IIes	Graded bunding
Beelura	72/2	0.08	Habitation	Others	Others	Others	Others	Others	Others	Others	Maize (Mz)	Not Available	Others	Others
Beelura	72/3	1.82	LGDmB2g1	LMU-2	Deep (100-150 cm)	Clay	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Borewell	IIes	Graded bunding
Beelura	73/1	3.86	MTLmB2g2	LMU-6	Shallow (25-50 cm)	Clay	Very gravelly (35-60%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram+Currently fallow+Mulberry (Rg+Cf+Mu)	Borewell	IIIes	Graded bunding
Beelura	73/2	0.02	LGDmB2g1	LMU-2	Deep (100-150 cm)	Clay	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Habitation	Not Available	IIes	Graded bunding
Beelura	74/1	1.51	Habitation	Others	Others	Others	Others	Others	Others	Others	Habitation	Not Available	Others	Others
Beelura	74/2	2.88	LGDmB2g1	LMU-2	Deep (100-150 cm)	Clay	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Beelura	75	4.62	MTLmB2g2	LMU-6	Shallow (25-50 cm)	Clay	Very gravelly (35-60%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram+Currently fallow (Rg+Cf)	Not Available	IIIes	Graded bunding
Beelura	76	3.23	MTLmB2g2	LMU-6	Shallow (25-50 cm)	Clay	Very gravelly (35-60%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Fallow land+Redgram (Fl+Rg)	Not Available	IIIes	Graded bunding
Beelura	77	1.34	LGDmB2g1	LMU-2	Deep (100-150 cm)	Clay	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram+Drumstick (Rg+Ds)	Not Available	IIes	Graded bunding
Beelura	78	0.22	LGDmB2g1	LMU-2	Deep (100-150 cm)	Clay	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram+Maize (Rg+Mz)	Not Available	IIes	Graded bunding
Beelura	79	2.99	LGDmB2g1	LMU-2	Deep (100-150 cm)	Clay	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Fallow land+Banana (Mz+Fl+Bn)	Not Available	IIes	Graded bunding
Beelura	80	5.44	LGDmB2g1	LMU-2	Deep (100-150 cm)	Clay	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Graded bunding
Beelura	81/1	2.24	LGDmB2g1	LMU-2	Deep (100-150 cm)	Clay	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Onion (On)	Borewell	IIes	Graded bunding
Beelura	81/2	0.41	LGDmB2g1	LMU-2	Deep (100-150 cm)	Clay	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Graded bunding
Beelura	82/1	2.26	LGDmB2g1	LMU-2	Deep (100-150 cm)	Clay	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Graded bunding
Beelura	82/2	0.87	Habitation	Others	Others	Others	Others	Others	Others	Others	Habitation	Not Available	Others	Others
Beelura	83	2.61	RNKmB2g1	LMU-4	Moderately shallow (50-75 cm)	Clay	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Onion (Mz+On)	Borewell	IIes	Graded bunding

Village	Survey Number	Area (ha)	Soil Phase	LMU	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	WELLS	Land Capability	Conservation Plan
Beelura	84	1.33	LGDmB2g1	LMU-2	Deep (100-150 cm)	Clay	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Habitation	Not Available	IIes	Graded bunding
Beelura	85	4.04	LGDmB1	LMU-2	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+Redgram (Sn+Rg)	Not Available	IIs	Graded bunding
Beelura	86	3.44	LGDmB1	LMU-2	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Redgram (Rg)	Not Available	IIs	Graded bunding
Beelura	87	6.44	LGDmB1	LMU-2	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Maize+Groundnut (Mz+Gn)	Borewell	IIs	Graded bunding
Beelura	88	2.43	LGDmB1	LMU-2	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Graded bunding
Beelura	89	2.22	LGDmB1	LMU-2	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Maize+Chilli (Mz+Ch)	Borewell	IIs	Graded bunding
Beelura	90	0.23	MKHiB2g1	LMU-5	Moderately shallow (50-75 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Sugarcane+Maize (Sg+Mz)	Not Available	IIIes	Trench cum bunding
Beelura	112	0.11	RNKmB2g1	LMU-4	Moderately shallow (50-75 cm)	Clay	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Onion (Mz+On)	Not Available	IIes	Graded bunding
Beelura	113	1.81	RNKmB2g1	LMU-4	Moderately shallow (50-75 cm)	Clay	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Banana (Mz+Bn)	Not Available	IIes	Graded bunding
Beelura	114	0.67	RNKmB2g1	LMU-4	Moderately shallow (50-75 cm)	Clay	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Onion (Mz+On)	Not Available	IIes	Graded bunding
Beelura	125	2.07	MTLiB2g2	LMU-6	Shallow (25-50 cm)	Sandy clay	Very gravelly (35-60%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Onion (Mz+On)	Borewell	IIIes	Graded bunding
Beelura	126	3.32	RNKmB2g1	LMU-4	Moderately shallow (50-75 cm)	Clay	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Onion (Mz+On)	Not Available	IIes	Graded bunding
Beelura	127	5.76	RNKmB2g1	LMU-4	Moderately shallow (50-75 cm)	Clay	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Onion+Chilli (Mz+On+Ch)	Borewell	IIes	Graded bunding
Beelura	128	3.28	LGDmB2g1	LMU-2	Deep (100-150 cm)	Clay	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Borewell	IIes	Graded bunding
Beelura	129	3.91	RNKmB2g1	LMU-4	Moderately shallow (50-75 cm)	Clay	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Onion (Mz+On)	Not Available	IIes	Graded bunding
Beelura	130	3.37	RNKmB2g1	LMU-4	Moderately shallow (50-75 cm)	Clay	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Onion (Mz+On)	Not Available	IIes	Graded bunding
Beelura	131/1	5.86	LGDmB1	LMU-2	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Onion+Chilli (On+Ch)	Borewell	IIs	Graded bunding
Beelura	131/2	0.54	LGDmB1	LMU-2	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Onion+Chilli (On+Ch)	Not Available	IIs	Graded bunding
Beelura	132/1	2.28	LGDmB1	LMU-2	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Chilli (Ch)	Not Available	IIs	Graded bunding
Beelura	132/2	1.01	LGDmB1	LMU-2	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Graded bunding
Beelura	133/1	2.27	LGDmB1	LMU-2	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Fallow land (Fl)	Not Available	IIs	Graded bunding
Beelura	133/2	0.7	LGDmB1	LMU-2	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Fallow land (Fl)	Not Available	IIs	Graded bunding
Beelura	134/1	1.69	LGDmB1	LMU-2	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Bajra+Redgram (Bj+Rg)	Not Available	IIs	Graded bunding
Beelura	134/2	0.21	LGDmB1	LMU-2	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Tube Rose+Maize (Tr+Mz)	Not Available	IIs	Graded bunding

Village	Survey Number	Area (ha)	Soil Phase	LMU	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	WELLS	Land Capability	Conservation Plan
Beelura	135	3.73	LGDmB1	LMU-2	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Bajra+Redgram (Bj+Rg)	Not Available	IIs	Graded bunding
Beelura	137	0.07	LGDmB1	LMU-2	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Bajra+Fallow land (Bj+Fl)	Not Available	IIs	Graded bunding
Beelura	138	6.12	LGDmB1	LMU-2	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Maize+Redgram (Mz+Rg)	Not Available	IIs	Graded bunding
Beelura	139/1	3.41	RNKmB2g1	LMU-4	Moderately shallow (50-75 cm)	Clay	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram+Chilli+Maize (Rg+Ch+Mz)	Not Available	IIes	Graded bunding
Beelura	139/2	0.11	LGDmB1	LMU-2	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Redgram+Chilli+Maize (Rg+Ch+Mz)	Not Available	IIs	Graded bunding
Beelura	140/1	2.28	RNKmB2g1	LMU-4	Moderately shallow (50-75 cm)	Clay	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Fallow land (Fl)	Not Available	IIes	Graded bunding
Beelura	140/2	0.53	RNKmB2g1	LMU-4	Moderately shallow (50-75 cm)	Clay	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram+Fallow land (Rg+Fl)	Not Available	IIes	Graded bunding
Beelura	141/1	5.23	LGDmB2g1	LMU-2	Deep (100-150 cm)	Clay	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Graded bunding
Beelura	141/2	0.88	LGDmB2g1	LMU-2	Deep (100-150 cm)	Clay	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram+Fallow land (Rg+Fl)	Not Available	IIes	Graded bunding
Beelura	142	5.97	LGDmB2g1	LMU-2	Deep (100-150 cm)	Clay	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram+Bajra (Rg+Bj)	Not Available	IIes	Graded bunding
Beelura	144	1.19	RNKmB2g1	LMU-4	Moderately shallow (50-75 cm)	Clay	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram+Fallow land+Current fallow (Rg+Fl+Cf)	Not Available	IIes	Graded bunding
Beelura	145	1.12	RNKmB2g1	LMU-4	Moderately shallow (50-75 cm)	Clay	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Bajra+Cotton (Bj+Ct)	Not Available	IIes	Graded bunding
Beelura	146	0.79	RNKmB2g1	LMU-4	Moderately shallow (50-75 cm)	Clay	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Bajra+Paddy+Current fallow (Bj+Pd+Cf)	Not Available	IIes	Graded bunding
Beelura	147	0.5	RNKmB2g1	LMU-4	Moderately shallow (50-75 cm)	Clay	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Bajra+Paddy+Current fallow (Bj+Pd+Cf)	Not Available	IIes	Graded bunding
Beelura	156	0.15	LGDmB1	LMU-2	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Current fallow+Fallow land (Cf+Fl)	Not Available	IIs	Graded bunding
Gudlanura	88	1.87	Waterbody	Others	Others	Others	Others	Others	Others	Others	Maize (Mz)	Not Available	Others	Others
Gudlanura	89	2.85	DRLmB2	LMU-2	Moderately deep (75-100 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Bajra (Bj)	Not Available	IIes	Graded bunding
Gudlanura	90	1.21	DRLmB2	LMU-2	Moderately deep (75-100 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Bajra (Bj)	Not Available	IIes	Graded bunding
Gudlanura	91	1.88	KVRmB1	LMU-2	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Fallow land (Fl)	Not Available	IIs	Graded bunding
Gudlanura	238	0.42	KVRmB1	LMU-2	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Current fallow (Cf)	Not Available	IIs	Graded bunding
Gudlanura	242	1.13	KMHiB2g1	LMU-1	Deep (100-150 cm)	Sandy clay	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Bajra (Bj)	Not Available	IIes	Trench cum bunding
Gudlanura	243	5.81	KVRmB1	LMU-2	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Bajra (Bj)	Not Available	IIs	Graded bunding
Gudlanura	244	4.78	KVRmB1	LMU-2	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Bajra (Bj)	Not Available	IIs	Graded bunding

Village	Survey Number	Area (ha)	Soil Phase	LMU	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	WELLS	Land Capability	Conservation Plan
Gudlanura	245	4.47	KMHiB2g1	LMU-1	Deep (100-150 cm)	Sandy clay	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Cotton (Mz+Ct)	Borewell	IIes	Trench cum bunding
Gudlanura	246	7.95	HDHiB2g1	LMU-3	Moderately deep (75-100 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Chilli (Mz+Ch)	Borewell	IIes	Trench cum bunding
Gudlanura	247	0.25	HDHiB2g1	LMU-3	Moderately deep (75-100 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Current fallow (Cf)	Not Available	IIes	Trench cum bunding
Gudlanura	248	8.63	HDHiB2g1	LMU-3	Moderately deep (75-100 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram+Maize (Rg+Mz)	Not Available	IIes	Trench cum bunding
Gudlanura	249	4.97	KMHiB2	LMU-1	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Current fallow (Cf)	Not Available	IIe	Trench cum bunding
Gudlanura	250	0.92	KMHiB2	LMU-1	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Current fallow (Cf)	Not Available	IIe	Trench cum bunding
Gudlanura	251	7.41	BPRhB2g1	LMU-3	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cowpea+Maize (Cp+Mz)	Borewell	IIIes	Trench cum bunding
Gudlanura	252	5.73	BPRhB2g1	LMU-3	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Chilli (Mz+Ch)	Not Available	IIIes	Trench cum bunding
Gudlanura	253	7.4	KMHiB2g1	LMU-1	Deep (100-150 cm)	Sandy clay	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Gudlanura	254	6.33	KMHiB2g1	LMU-1	Deep (100-150 cm)	Sandy clay	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Bajra (Bj)	Not Available	IIes	Trench cum bunding
Gudlanura	255	5.4	BPRhB2g1	LMU-3	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIIes	Trench cum bunding
Gudlanura	256	7.98	BPRhB2g1	LMU-3	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Bajra (Bj)	Not Available	IIIes	Trench cum bunding
Gudlanura	257	2.77	HDHiB2g1	LMU-3	Moderately deep (75-100 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Gudlanura	258	7.98	HDHiB2g1	LMU-3	Moderately deep (75-100 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Oil palm (Mz+Op)	1 Borewell, 1 Farm pond	IIes	Trench cum bunding
Gudlanura	259	9.37	HDHiB2g1	LMU-3	Moderately deep (75-100 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Drumstick (Mz+Ds)	2 Borewell	IIes	Trench cum bunding
Gudlanura	260	9.33	BPRiB2	LMU-3	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Bajra (Mz+Bj)	Not Available	IIIes	Trench cum bunding
Gudlanura	261	3.23	BPRiB2	LMU-3	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Borewell	IIIes	Trench cum bunding
Gudlanura	262	3.11	BPRiB2	LMU-3	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Onion (On)	Not Available	IIIes	Trench cum bunding
Gudlanura	263	5.45	BPRiB2	LMU-3	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Eucalyptus (Eu)	Borewell	IIIes	Trench cum bunding
Gudlanura	264	1.89	Waterbody	Others	Others	Others	Others	Others	Others	Others	Maize (Mz)	Not Available	Others	Others
Gudlanura	265	0.03	BPRiB2	LMU-3	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Bajra (Bj)	Not Available	IIIes	Trench cum bunding
Gudlanura	273	0.1	Habitation	Others	Others	Others	Others	Others	Others	Others	Maize (Mz)	Not Available	Others	Others
Gudlanura	274	0.26	Habitation	Others	Others	Others	Others	Others	Others	Others	Maize (Mz)	Not Available	Others	Others
Gudlanura	275	0.08	Habitation	Others	Others	Others	Others	Others	Others	Others	Maize (Mz)	Not Available	Others	Others

Village	Survey Number	Area (ha)	Soil Phase	LMU	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	WELLS	Land Capability	Conservation Plan
Gudlanura	278 /1	5.51	HDHiB2g1	LMU-3	Moderately deep (75-100 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Gudlanura	278/2	1.48	Habitation	Others	Others	Others	Others	Others	Others	Others	Maize (Mz)	Not Available	Others	Others
Gudlanura	279	7.14	HDHiB2g1	LMU-3	Moderately deep (75-100 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Gudlanura	280	5.3	HDHiB2g1	LMU-3	Moderately deep (75-100 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Borewell	IIes	Trench cum bunding
Gudlanura	281	2.81	HDHiB2g1	LMU-3	Moderately deep (75-100 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Gudlanura	282	1.42	HDHiB2g1	LMU-3	Moderately deep (75-100 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Gudlanura	283	1.5	BPRiB2	LMU-3	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Borewell	IIIes	Trench cum bunding
Gudlanura	284	9.06	HDHiB2g1	LMU-3	Moderately deep (75-100 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Onion+Redgram (Mz+On+Rg)	Not Available	IIes	Trench cum bunding
Gudlanura	285	4.08	HDHiB2g1	LMU-3	Moderately deep (75-100 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Gudlanura	286	15.38	HDHiB2g1	LMU-3	Moderately deep (75-100 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Borewell	IIes	Trench cum bunding
Gudlanura	287	6.16	HDHiB2g1	LMU-3	Moderately deep (75-100 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Gudlanura	288	4.97	HDHiB2g1	LMU-3	Moderately deep (75-100 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Gudlanura	289	6.2	HDHiB2g1	LMU-3	Moderately deep (75-100 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Gudlanura	290	6.74	HDHiB2g1	LMU-3	Moderately deep (75-100 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Gudlanura	291	3.37	Waterbody	Others	Others	Others	Others	Others	Others	Others	Maize (Mz)	Not Available	Others	Others
Gudlanura	292	8.11	Waterbody	Others	Others	Others	Others	Others	Others	Others	Maize (Mz)	Not Available	Others	Others
Gudlanura	294	2.49	Waterbody	Others	Others	Others	Others	Others	Others	Others	Maize (Mz)	Not Available	Others	Others
Gudlanura	295	8.24	HDHiB2g1	LMU-3	Moderately deep (75-100 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Gudlanura	296	2.59	HDHiB2g1	LMU-3	Moderately deep (75-100 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Gudlanura	297	2.59	HDHiB2g1	LMU-3	Moderately deep (75-100 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding

Appendix II

Belur-1 (2R2f) 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
Beelura	27/2	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Beelura	28/2	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Beelura	42	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Beelura	43	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Beelura	44	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Beelura	45	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Beelura	48	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Beelura	49	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Beelura	50	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Beelura	51	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Beelura	52/2	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Beelura	55	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Beelura	56	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Beelura	57	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Beelura	58	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Beelura	59	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)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Beelura	60/2	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)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Beelura	61	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)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Beelura	62	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)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Beelura	64	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)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	65	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)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	66	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)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)

Village	Survey No	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Beelura	67	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)
Beelura	68/2	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)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	69/2	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)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	70/1	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)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	70/2	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)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	72/2	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Beelura	72/3	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)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	73/1	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)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	73/2	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)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	74/1	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Beelura	74/2	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)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	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)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	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)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	77	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)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	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)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	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)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	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)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	81/1	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)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	81/2	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)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	82/1	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)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	82/2	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Beelura	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)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	84	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)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	85	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)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	86	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)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)

Village	Survey No	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Beelura	87	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)	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)
Beelura	88	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)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Beelura	89	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)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Beelura	90	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)	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)
Beelura	112	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)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	113	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)	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)
Beelura	114	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)	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)
Beelura	125	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)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	126	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)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	127	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)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	128	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)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	129	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)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	130	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)
Beelura	131/1	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)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	131/2	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)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	132/1	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)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	132/2	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)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	133/1	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)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	133/2	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)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	134/1	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)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	134/2	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)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	135	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)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	137	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)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	138	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)

Village	Survey No	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Beelura	139/1	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)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	139/2	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)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	140/1	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)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	140/2	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)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	141/1	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)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	141/2	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)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	142	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)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	144	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)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	145	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)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	146	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)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	147	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)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Beelura	156	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)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Gudlan ura	88	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Gudlan ura	89	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)
Gudlan ura	90	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)
Gudlan ura	91	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Gudlan ura	238	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	Low (< 0.5 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Gudlan ura	242	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)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Gudlan ura	243	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Gudlan ura	244	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)
Gudlan ura	245	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)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Gudlan ura	246	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)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Gudlan ura	247	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)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Gudlan ura	248	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)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)

Village	Survey No	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Gudlanura	249	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)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Gudlanura	250	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)
Gudlanura	251	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)
Gudlanura	252	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)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Gudlanura	253	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)
Gudlanura	254	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)
Gudlanura	255	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)
Gudlanura	256	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)
Gudlanura	257	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)
Gudlanura	258	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)
Gudlanura	259	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)
Gudlanura	260	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)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Gudlanura	261	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)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Gudlanura	262	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)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Gudlanura	263	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)
Gudlanura	264	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Gudlanura	265	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)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Gudlanura	273	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Gudlanura	274	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Gudlanura	275	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Gudlanura	278 /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)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Gudlanura	278/2	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Gudlanura	279	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)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Gudlanura	280	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)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)

Village	Survey No	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Gudlanura	281	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)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Gudlanura	282	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)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Gudlanura	283	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)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Gudlanura	284	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)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Gudlanura	285	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)
Gudlanura	286	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)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Gudlanura	287	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)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Gudlanura	288	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)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Gudlanura	289	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)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Gudlanura	290	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)
Gudlanura	291	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Gudlanura	292	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Gudlanura	294	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Gudlanura	295	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)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Gudlanura	296	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)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Gudlanura	297	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)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)

Appendix III

Belur-1 (2R2f) 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
Beelura	27/2	N1rt	S3tz	N1rz	S3rz	N1rt	S3rz	N1rz	N1rz	S3rz	N1rz	N1rz	S3tz	N1rt	S3zg	N1rt	N1rt	N1rz	S3tz	S3rz	S3rz	S3rz	S3rz	N1rz	S3rz	S3rz	S3r	S3r	S3rz	N1rz	N1rz	S3rt
Beelura	28/2	N1rt	S3tz	N1rz	S3rz	N1rt	S3rz	N1rz	N1rz	S3rz	N1rz	N1rz	S3tz	N1rt	S3zg	N1rt	N1rt	N1rz	S3tz	S3rz	S3rz	S3rz	S3rz	N1rz	S3rz	S3rz	S3r	S3r	S3rz	N1rz	N1rz	S3rt
Beelura	42	N1rt	S3tz	N1rz	S3rz	N1rt	S3rz	N1rz	N1rz	S3rz	N1rz	N1rz	S3tz	N1rt	S3zg	N1rt	N1rt	N1rz	S3tz	S3rz	S3rz	S3rz	S3rz	N1rz	S3rz	S3rz	S3r	S3r	S3rz	N1rz	N1rz	S3rt
Beelura	43	N1rt	S3tz	N1rz	S3rz	N1rt	S3rz	N1rz	N1rz	S3rz	N1rz	N1rz	S3tz	N1rt	S3zg	N1rt	N1rt	N1rz	S3tz	S3rz	S3rz	S3rz	S3rz	N1rz	S3rz	S3rz	S3r	S3r	S3rz	N1rz	N1rz	S3rt
Beelura	44	N1rt	S3tz	N1rz	S3rz	N1rt	S3rz	N1rz	N1rz	S3rz	N1rz	N1rz	S3tz	N1rt	S3zg	N1rt	N1rt	N1rz	S3tz	S3rz	S3rz	S3rz	S3rz	N1rz	S3rz	S3rz	S3r	S3r	S3rz	N1rz	N1rz	S3rt
Beelura	45	N1rt	S3tz	N1rz	S3rz	N1rt	S3rz	N1rz	N1rz	S3rz	N1rz	N1rz	S3tz	N1rt	S3zg	N1rt	N1rt	N1rz	S3tz	S3rz	S3rz	S3rz	S3rz	N1rz	S3rz	S3rz	S3r	S3r	S3rz	N1rz	N1rz	S3rt
Beelura	48	N1rt	S3tz	N1rz	S3rz	N1rt	S3rz	N1rz	N1rz	S3rz	N1rz	N1rz	S3tz	N1rt	S3zg	N1rt	N1rt	N1rz	S3tz	S3rz	S3rz	S3rz	S3rz	N1rz	S3rz	S3rz	S3r	S3r	S3rz	N1rz	N1rz	S3rt
Beelura	49	N1rt	S3tz	N1rz	S3rz	N1rt	S3rz	N1rz	N1rz	S3rz	N1rz	N1rz	S3tz	N1rt	S3zg	N1rt	N1rt	N1rz	S3tz	S3rz	S3rz	S3rz	S3rz	N1rz	S3rz	S3rz	S3r	S3r	S3rz	N1rz	N1rz	S3rt
Beelura	50	N1rt	S3tz	N1rz	S3rz	N1rt	S3rz	N1rz	N1rz	S3rz	N1rz	N1rz	S3tz	N1rt	S3zg	N1rt	N1rt	N1rz	S3tz	S3rz	S3rz	S3rz	S3rz	N1rz	S3rz	S3rz	S3r	S3r	S3rz	N1rz	N1rz	S3rt
Beelura	51	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
Beelura	52/2	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
Beelura	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
Beelura	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
Beelura	57	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
Beelura	58	N1r	S2rg	S3rg	S2rg	S3rg	S2rg	N1r	S3rg	S2rt	S3rg	S3rg	S2rg	S3rg	S2rg	S3rg	S3rg	S3rg	S2rg	S2rg	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S3g	S3g	S2rg	S3rg	S3rg	S3g
Beelura	59	N1r	S2rg	S3rg	S2rg	S3rg	S2rg	N1r	S3rg	S2rt	S3rg	S3rg	S2rg	S3rg	S2rg	S3rg	S3rg	S3rg	S2rg	S2rg	S2rg	S2rg	S2rg	S3rg	S2rg	S2rg	S3g	S3g	S2rg	S3rg	S3rg	S3g
Beelura	60/2	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
Beelura	61	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S3t	S1	S3t	S2t	S3t	S2t	S2t	S2t	S1	S3t	S2t	S2t	S3t	S2t	S3t	S3t
Beelura	62	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
Beelura	64	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S3t	S1	S3t	S2t	S3t	S2t	S2t	S2t	S1	S3t	S2t	S2t	S3t	S2t	S3t	S3t
Beelura	65	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S3t	S1	S3t	S2t	S3t	S2t	S2t	S2t	S1	S3t	S2t	S2t	S3t	S2t	S3t	S3t
Beelura	66	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S3t	S1	S3t	S2t	S3t	S2t	S2t	S2t	S1	S3t	S2t	S2t	S3t	S2t	S3t	S3t
Beelura	67	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S3t	S1	S3t	S2t	S3t	S2t	S2t	S2t	S1	S3t	S2t	S2t	S3t	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
Beelura	68/2	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S3t	S1	S3t	S2t	S3t	S2t	S2t	S2t	S1	S3t	S2t	S2t	S3t	S2t	S3t	S3t
Beelura	69/2	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S3t	S1	S3t	S2t	S3t	S2t	S2t	S2t	S1	S3t	S2t	S2t	S3t	S2t	S3t	S3t
Beelura	70/1	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S3t	S1	S3t	S2t	S3t	S2t	S2t	S2t	S1	S3t	S2t	S2t	S3t	S2t	S3t	S3t
Beelura	70/2	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S3t	S1	S3t	S2t	S3t	S2t	S2t	S2t	S1	S3t	S2t	S2t	S3t	S2t	S3t	S3t
Beelura	72/2	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
Beelura	72/3	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S3t	S1	S3t	S2t	S3t	S2t	S2t	S2t	S1	S3t	S2t	S2t	S3t	S2t	S3t	S3t
Beelura	73/1	N1rt	S3tz	N1rz	S3rz	N1rt	S3rz	N1rz	N1rz	S3rz	N1rz	N1rz	S3tz	N1rt	S3zg	N1rt	N1rt	N1rz	S3tz	S3rz	S3rz	S3rz	S3rz	N1rz	S3rz	S3rz	S3r	S3r	S3rz	N1rz	N1rz	S3rt
Beelura	73/2	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S3t	S1	S3t	S2t	S3t	S2t	S2t	S2t	S1	S3t	S2t	S2t	S3t	S2t	S3t	S3t
Beelura	74/1	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
Beelura	74/2	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S3t	S1	S3t	S2t	S3t	S2t	S2t	S2t	S1	S3t	S2t	S2t	S3t	S2t	S3t	S3t
Beelura	75	N1rt	S3tz	N1rz	S3rz	N1rt	S3rz	N1rz	N1rz	S3rz	N1rz	N1rz	S3tz	N1rt	S3zg	N1rt	N1rt	N1rz	S3tz	S3rz	S3rz	S3rz	S3rz	N1rz	S3rz	S3rz	S3r	S3r	S3rz	N1rz	N1rz	S3rt
Beelura	76	N1rt	S3tz	N1rz	S3rz	N1rt	S3rz	N1rz	N1rz	S3rz	N1rz	N1rz	S3tz	N1rt	S3zg	N1rt	N1rt	N1rz	S3tz	S3rz	S3rz	S3rz	S3rz	N1rz	S3rz	S3rz	S3r	S3r	S3rz	N1rz	N1rz	S3rt
Beelura	77	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S3t	S1	S3t	S2t	S3t	S2t	S2t	S2t	S1	S3t	S2t	S2t	S3t	S2t	S3t	S3t
Beelura	78	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S3t	S1	S3t	S2t	S3t	S2t	S2t	S2t	S1	S3t	S2t	S2t	S3t	S2t	S3t	S3t
Beelura	79	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S3t	S1	S3t	S2t	S3t	S2t	S2t	S2t	S1	S3t	S2t	S2t	S3t	S2t	S3t	S3t
Beelura	80	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S3t	S1	S3t	S2t	S3t	S2t	S2t	S2t	S1	S3t	S2t	S2t	S3t	S2t	S3t	S3t
Beelura	81/1	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S3t	S1	S3t	S2t	S3t	S2t	S2t	S2t	S1	S3t	S2t	S2t	S3t	S2t	S3t	S3t
Beelura	81/2	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S3t	S1	S3t	S2t	S3t	S2t	S2t	S2t	S1	S3t	S2t	S2t	S3t	S2t	S3t	S3t
Beelura	82/1	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S3t	S1	S3t	S2t	S3t	S2t	S2t	S2t	S1	S3t	S2t	S2t	S3t	S2t	S3t	S3t
Beelura	82/2	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
Beelura	83	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
Beelura	84	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S3t	S1	S3t	S2t	S3t	S2t	S2t	S2t	S1	S3t	S2t	S2t	S3t	S2t	S3t	S3t
Beelura	85	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
Beelura	86	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
Beelura	87	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
Beelura	88	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
Beelura	89	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
Beelura	90	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
Beelura	112	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
Beelura	113	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
Beelura	114	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
Beelura	125	N1rt	S3tz	N1rz	S3rz	N1rt	S3rz	N1rz	N1rz	S3rz	N1rz	N1rz	S3tz	N1rt	S3zg	N1rt	N1rt	N1rz	S3tz	S3rz	S3rz	S3rz	S3rz	N1rz	S3rz	S3rz	S3r	S3r	S3rz	N1rz	N1rz	S3rt
Beelura	126	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
Beelura	127	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
Beelura	128	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S3t	S1	S3t	S2t	S3t	S2t	S2t	S2t	S1	S3t	S2t	S2t	S3t	S2t	S3t	S3t
Beelura	129	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
Beelura	130	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
Beelura	131/1	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
Beelura	131/2	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
Beelura	132/1	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
Beelura	132/2	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
Beelura	133/1	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
Beelura	133/2	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
Beelura	134/1	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
Beelura	134/2	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
Beelura	135	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
Beelura	137	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
Beelura	138	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
Beelura	139/1	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
Beelura	139/2	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
Beelura	140/1	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
Beelura	140/2	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
Beelura	141/1	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S3t	S1	S3t	S2t	S3t	S2t	S2t	S2t	S1	S3t	S2t	S2t	S3t	S2t	S3t	S3t
Beelura	141/2	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S3t	S1	S3t	S2t	S3t	S2t	S2t	S2t	S1	S3t	S2t	S2t	S3t	S2t	S3t	S3t
Beelura	142	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S3t	S1	S3t	S2t	S3t	S2t	S2t	S2t	S1	S3t	S2t	S2t	S3t	S2t	S3t	S3t
Beelura	144	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
Beelura	145	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
Beelura	146	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
Beelura	147	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
Beelura	156	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
Gudlanura	88	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
Gudlanura	89	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
Gudlanura	90	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
Gudlanura	91	S2rz	S2tz	S3tz	S2z	S3tz	S2z	S2rz	S2z	S2z	S2z	S2tz	S2tz	S3tz	S2z	N1tz	S2rz	S2z	S3tz	S3tz	S3tz	S2tz	S2tz	S2tz	S2tz	S3tz	S2tz	S2tz	S3tz	S2tz	S2tz	S3tz
Gudlanura	238	S2rz	S2tz	S3tz	S2z	S3tz	S2z	S2rz	S2z	S2z	S2z	S2tz	S2tz	S3tz	S2z	N1tz	S2rz	S2z	S3tz	S3tz	S3tz	S2tz	S2tz	S2tz	S2tz	S3tz	S2tz	S2tz	S3tz	S2tz	S2tz	S3tz
Gudlanura	242	S2rg	S2g	S2g	S2g	S2g	S2t	S2rg	S2g	S2gt	S2g	S2g	S1	S2g	S1	S1	S2rg	S2g	S2gt	S2g	S2g	S2g	S2g	S1	S1	S2g	S1	S1	S2g	S1	S1	S1
Gudlanura	243	S2rz	S2tz	S3tz	S2z	S3tz	S2z	S2rz	S2z	S2z	S2z	S2tz	S2tz	S3tz	S2z	N1tz	S2rz	S2z	S3tz	S3tz	S3tz	S2tz	S2tz	S2tz	S2tz	S3tz	S2tz	S2tz	S3tz	S2tz	S2tz	S3tz
Gudlanura	244	S2rz	S2tz	S3tz	S2z	S3tz	S2z	S2rz	S2z	S2z	S2z	S2tz	S2tz	S3tz	S2z	N1tz	S2rz	S2z	S3tz	S3tz	S3tz	S2tz	S2tz	S2tz	S2tz	S3tz	S2tz	S2tz	S3tz	S2tz	S2tz	S3tz
Gudlanura	245	S2rg	S2g	S2g	S2g	S2g	S2t	S2rg	S2g	S2gt	S2g	S2g	S1	S2g	S1	S1	S2rg	S2g	S2gt	S2g	S2g	S2g	S2g	S1	S1	S2g	S1	S1	S2g	S1	S1	S1
Gudlanura	246	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
Gudlanura	247	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

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
Gudlanura	248	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
Gudlanura	249	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
Gudlanura	250	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
Gudlanura	251	S3rg	S3g	S3g	S3g	S3g	S3g	S2rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Gudlanura	252	S3rg	S3g	S3g	S3g	S3g	S3g	S2rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Gudlanura	253	S2rg	S2g	S2g	S2g	S2g	S2t	S2rg	S2g	S2gt	S2g	S2g	S1	S2g	S1	S1	S2rg	S2g	S2gt	S2g	S2g	S2g	S2g	S1	S1	S2g	S1	S1	S2g	S1	S1	S1
Gudlanura	254	S2rg	S2g	S2g	S2g	S2g	S2t	S2rg	S2g	S2gt	S2g	S2g	S1	S2g	S1	S1	S2rg	S2g	S2gt	S2g	S2g	S2g	S2g	S1	S1	S2g	S1	S1	S2g	S1	S1	S1
Gudlanura	255	S3rg	S3g	S3g	S3g	S3g	S3g	S2rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Gudlanura	256	S3rg	S3g	S3g	S3g	S3g	S3g	S2rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Gudlanura	257	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
Gudlanura	258	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
Gudlanura	259	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
Gudlanura	260	S3rg	S3g	S3g	S3g	S3g	S3g	S3rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2gt	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Gudlanura	261	S3rg	S3g	S3g	S3g	S3g	S3g	S3rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2gt	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Gudlanura	262	S3rg	S3g	S3g	S3g	S3g	S3g	S3rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2gt	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Gudlanura	263	S3rg	S3g	S3g	S3g	S3g	S3g	S3rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2gt	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Gudlanura	264	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
Gudlanura	265	S3rg	S3g	S3g	S3g	S3g	S3g	S3rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2gt	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Gudlanura	273	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
Gudlanura	274	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
Gudlanura	275	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
Gudlanura	278/1	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S3g	S3g	S2g	S3g
Gudlanura	278/2	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
Gudlanura	279	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
Gudlanura	280	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

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
Gudlanura	281	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
Gudlanura	282	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
Gudlanura	283	S3rg	S3g	S3g	S3g	S3g	S3g	S3rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2gt	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Gudlanura	284	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
Gudlanura	285	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
Gudlanura	286	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
Gudlanura	287	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
Gudlanura	288	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
Gudlanura	289	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
Gudlanura	290	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
Gudlanura	291	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
Gudlanura	292	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
Gudlanura	294	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
Gudlanura	295	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
Gudlanura	296	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
Gudlanura	297	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

PART-B

SOCIO-ECONOMIC STATUS OF FARM HOUSEHOLDS

CONTENTS

LIST OF TABLES

Chapter 1

SALIENT FINDINGS OF THE STUDY

- *Results indicated that, 35 farmers were sampled in Belur-1 micro watershed among them 8 (22.86%) were marginal farmers, 6 (17.14 %) were small farmers, 7 (20 %) were semi medium farmers, 8 (22.86%) were medium farmers, large farmers 1(2.86%) and 5 (10.20 %) landless farmers were also interviewed for the survey.*
- *The data indicated that there were 194 population households were there in the studied micro watershed. Among them 100 (51.55%) men and 94 (48.45%) were women. The average family size of landless farmers was 4, marginal and medium farmers were 5, small and semi medium farmer was 6 and large farmer was 11. On an average the family size was 5.*
- *The data indicated that 49 (25.26%) people were in 0-15 years of age, 76 (39.18 %) were in 16-35 years of age, 54 (27.84 %) were in 36-60 years of age and 15 (7.73%) were above 61 years of age.*
- *The results indicated that the Belur-1 had 28.35 per cent illiterates, 30.41 per cent of them had primary school education, 14.43 per cent of them had middle school, 11.86 per cent them had high school education, 5.15 per cent of them had PUC education, 1.03 per cent them had Diploma education, 0.52 had ITI education, 3.61 per cent of them had degree education, 1.03 per cent of them had masters education and 3.61 per cent them had others.*
- *The results indicated that, 85.71 per cent of households practicing agriculture, 11.43 per cent of the household heads were agricultural labour and 2.86 per cent of the household heads were general labour.*
- *The results indicated that agriculture was the major occupation for 59.79 per cent of the household members, 6.70 per cent were agricultural labourers, 0.52 per cent were general labours, 1.03 percent were in private sector, 24.74 per cent of them were students, 3.61 per cent of them were children and 3.09 per cent were housewives. In case of landless households 5 per cent were agriculture, 50 per cent were agriculture labour, 5 per cent were general labour and 15 per cent were students. In case of marginal farmers 76.74 per cent were agriculturist, 2.33 percent were in private service and 16.28 per cent were students. In case of small farmers 57.14 per cent of them were agriculturist and 40 per cent of them were students. In case of semi medium farmers 62.12 per cent of the family members were agriculturist, 2.33 per cent were in private service, 20.93 per cent of them were students, 4.65 per cent were housewives and 6.98 per cent were children. In case of medium farmers 59.52 per cent of the family members were agriculturist, 4.76 per cent were agriculture labour, 2.38 per cent were children and 33.33 per cent of them were students. In case of large farmers 81.82 per cent were doing agriculture, 9.09 per cent were both agriculture labour and students respectively.*

- *The results showed that 0.52 per cent of them participated in cooperative bank and 99.48 per cent of them have not participated in any local institutions. Only small farmers were found to participate in one or the other local institutions.*
- *The results indicated that 57.14 per cent of the households possess thatched house and 45.71 per cent of the households possess Pucca house. 100 per cent of the land less farmers possess thatched house and 100 per cent of the large farmers possess Pucca house.*
- *The results showed that, 100 per cent of the households possess TV and Mixer grinder respectively. 8.57 per cent of the households possess bicycle, 34.29 per cent of the households possess motor cycle and 97.14 per cent of the households possess mobile phones.*
- *The results showed that the average value television was Rs. 6257, mixer grinder was Rs.1485, bicycle was Rs.3000, motor cycle was Rs.34583 and mobile phone was Rs.1376.*
- *The results indicated that about 20 per cent of the households possess both bullock cart and plough, 2.86 per cent of the households possess both power tiller and tractor respectively. 17.14 per cent of the households possess sprayer, 88.57 per cent of the households possess weeder and 2.86 per cent of the households possess thresher.*
- *The results showed that the average value of bullock cart was Rs.18000; the average value of plough was Rs. 1500, the average value of power tiller was Rs. 25000, the average value of tractor was Rs. 500000, the average value of sprayer was Rs. 5000, the average value of weeder was Rs. 26 and the average value of thresher was Rs. 20000.*
- *The results indicated that, 17.14 per cent of the households possess bullocks, 37.14 per cent of the households possess local cow, 8.57 per cent of the households possess buffalo and 5.71 per cent of the households possess.*
- *In case of marginal farmers, 12.50 per cent of the households possess bullock and 25 per cent of the household possess local cow, 12.50 per cent household possess buffalo and sheep respectively. In case of small farmers, 33.33 per cent of households possess bullock, 66.67 per cent possess local cow and 16.67 per cent of the households possess sheep. In case of semi medium farmers, 14.29 per cent of the households possess bullock, 28.57 per cent of the household possess local cow and 16.67 per cent of the households possess sheep. In case of medium farmers 12.50 per cent of the household possess bullock and 50 per cent of the household possess local cow. In large farmers 100 per cent of the household possess bullock, local cow and sheep respectively.*
- *The results indicated that, average own labour men available in the micro watershed was 2, average own labour (women) available was 1.84, average hired*

labour (men) available was 7.30 and average hired labour (women) available was 7.20.

- *In case of marginal farmers, average own labour men available was 1.88, average own labour (women) was also 2.13, average hired labour (men) was 7.38 and average hired labour (women) available was 7. In case of small farmers, average own labour men available was 1.67, average own labour (women) was 1.50, average hired labour (men) was 7 and average hired labour (women) available was 7.17. In case of semi medium farmers, average own labour men available was 2.43, average own labour (women) was 1.86, average hired labour (men) was 7.29 and average hired labour (women) available was 7. In medium farmers average own labour men available was 1.63, average own labour (women) was 1.63, average hired labour (men) was 7.50 and average hired labour (women) available was 7.50. In case of large farmers, average own labour men available was 5, average own labour (women) was 4, average hired labour (men) was 7 and average hired labour (women) available was 8.*
- *The results indicated that, 85.71 per cent of the household opined that hired labour was adequate.*
- *The results indicated that, households of the Belur-1 micro watershed possess 24.79 ha (42.06 %) of dry land and 34.15 ha (57.94 %) of irrigated land. Marginal farmers possess 2.74 ha (62.59 %) of dry land and 1.63ha (37.14%) of irrigated land. Small farmers possess 6.05 ha (78.65 %) of dry land and 1.64 ha (21.35 %) of irrigated land. Semi medium farmers possess 3.38 ha (26.89 %) of dry land and 9.17 ha (73.11%) of irrigated land. Medium farmers possess 12.63 ha (45.34%) of dry land and 15.22 ha (54.66%) of irrigated land. Large farmers possess 6.48 ha (100%) of irrigated land.*
- *The results indicated that, the average value of dry land was Rs. 318325.99 and average value of irrigated was Rs. 494643.91. In case of marginal famers, the average land value was Rs. 949999.98 for dry land and Rs. 2690098.94 for irrigated land. In case of small famers, the average land value was Rs. 396256.68 for dry land Rs. 1216748.79 for irrigated land. In case of semi medium famers, the average land value was Rs. 294682.25 for dry land and Rs. 610145.56 for irrigated land. In case of medium famers, the average land value was Rs. 150416.67 for dry land and Rs. 256060.61 for irrigated land. In case of large farmers the average land value was Rs.154375 for irrigated land.*
- *The results indicated that, there were 15 functioning and 3 de-functioning bore wells in the micro watershed.*
- *The results indicated that, bore well was the major irrigation source for 42.86 per cent of the farmers.*
- *The results indicated that on an average the depth of the bore well was 36.66 meters.*

- *The results indicated that, in case of marginal farmers there was 1.88 ha of irrigated land, in case of small farmers there was 1.62 ha of irrigated land, semi medium farmers were having 8.10 ha of irrigated land, medium farmers were having 8.10 ha of irrigated land and large farmers having 3.24 ha of irrigated land. On an average there was 22.93 ha irrigated land.*
- *The results indicated that, farmers have grown bajra (4.57 ha), brinjal (0.40 ha), chilly (1.21 ha), cotton (4.13 ha), groundnut (1.38 ha), maize (23.32 ha), onion (1.21 ha) and sugar cane (1.21 ha) in kharif season. Marginal farmers have grown bajra, cotton, groundnut and maize. Small farmers have grown bajra, maize and onion. Semi medium farmers have grown brinjal, cotton, maize and onion. Medium farmers have grown bajra, chilly, cotton, maize, onion and sugar cane. Large farmers have grown cotton, maize and onion.*
- *The results indicated that, the cropping intensity in Belur-1 micro watershed was found to be 55.74 per cent. In case of marginal farmers it was 99.63 per cent, in small farmers it was 99.70, in semi medium farmers it was 62.75, in medium farmers it was 39.99 per cent and in case of large farmers the cropping intensity was 53.33 per cent.*
- *The results indicated that, 100 per cent of the households have bank account and 2.86 per cent possess savings. Among marginal farmers 100 percent of them possess bank account. 100 per cent of small farmers possess bank account and 12.50 per cent of them possess savings. Semi medium, medium and large category of farmers possesses 100 per cent of bank account.*
- *The results indicated that, 20 per cent of the landless, 62.50 per cent of marginal, 66.67 per cent of small, 42.86 per cent of the semi medium and 62.50 per cent of medium farmers have borrowed credit from different sources.*
- *The results indicated that, 44.44 per cent have availed loan from Grameena bank.*
- *The results indicated that, marginal, small, semi medium and medium have availed Rs. 25400, Rs. 42500, Rs. 16666.67 and Rs. 110000 respectively. Overall average credit amount availed by households in the micro watershed is 49833.33.*
- *The results indicated that, 100 per cent of the households have borrowed loan for agriculture production.*
- *Results indicated that 100 percent of the households have unpaid their loan.*
- *The results indicated that 9.09 per cent of the households were opined that they were helped to perform timely agricultural operations, higher rate of interest and forced to sell the produce at low price to repay loan in time respectively.*
- *The results indicated that, the total cost of cultivation for bajra was Rs. 26836.07. The gross income realized by the farmers was Rs. 30613.70. The net income from bajra cultivation was Rs. 3777.63, thus the benefit cost ratio was found to be 1:1.14.*

- *The results indicated that, the total cost of cultivation for maize was Rs. 23553.87. The gross income realized by the farmers was Rs. 35161.80. The net income from maize cultivation was Rs. 11607.92. Thus the benefit cost ratio was found to be 1:1.49.*
- *The results indicated that, the total cost of cultivation for Chilly was Rs. 19910.02. The gross income realized by the farmers was Rs. 276640. The net income from Chilly cultivation was Rs. 256729.98. Thus the benefit cost ratio was found to be 1:13.89.*
- *The results indicated that, the total cost of cultivation for groundnut was Rs. 104680.63. The gross income realized by the farmers was Rs. 109091.66. The net income from groundnut cultivation was Rs. 4411.03. Thus the benefit cost ratio was found to be 1:1.04.*
- *The results indicated that, the total cost of cultivation for brinjal was Rs. 54847.38. The gross income realized by the farmers was Rs. 111150. The net income from brinjal cultivation was Rs. 56302.62. Thus the benefit cost ratio was found to be 1:2.03.*
- *The results indicated that, the total cost of cultivation for cotton was Rs. 44525.95. The gross income realized by the farmers was Rs. 104092.86. The net income from cotton cultivation was Rs. 59566.91. Thus the benefit cost ratio was found to be 1:2.34.*
- *The results indicated that, the total cost of cultivation for onion was Rs. 48293.62. The gross income realized by the farmers was Rs. 126793.33. The net income from onion cultivation was Rs. 78499.71. Thus the benefit cost ratio was found to be 1:2.63.*
- *The results indicated that, the total cost of cultivation for sugar cane was Rs. 28816.35. The gross income realized by the farmers was Rs. 98800. The net income from sugar cane cultivation was Rs. 69983.65. Thus the benefit cost ratio was found to be 1:3.43.*
- *The results indicated that, 65.71 per cent of the households opined that dry fodder was adequate and 2.86 per cent of the households opined that green fodder was adequate.*
- *The results indicated that, in land less farmers, the average income from wage was Rs.29000. In case of marginal farmers the average income from wage was Rs.15250, agriculture was Rs.41625, dairy farm was Rs.2250 and goat farming was Rs.3750. In case of small farmers the average income from wage was Rs.20000, agriculture was Rs.47500 and dairy farm was Rs.2833.33. In semi medium farmers the average income from business was Rs.12857.14, wage was Rs.17142.86, agriculture was Rs.113000 and dairy farm was Rs.1000. In medium farmers the average annual income from wage was Rs.17142.86, agriculture was*

Rs.46000 and dairy farm was Rs.9375. In large farmers the average annual income from wage was Rs.35000, agriculture was Rs.170000 and was Rs.8000.

- *The results indicated that, in marginal, small, semi medium and large farmers the average expenditure from agriculture was Rs.14000, Rs.14166.67, Rs.38142.86 and Rs.56000 respectively. In medium farmers the average expenditure from agriculture was rs.21714.29 and dairy farm was Rs.7000.*
- *The results indicated that, sampled households have grown 21 coconut trees in their field.*
- *The results indicated that, households have planted 8 teak trees, 60 neem trees and 1 Peeple trees in their field.*
- *The results indicate that, households have an average additional investment capacity of Rs. 9371.43 for land development, Rs.2857.14 for irrigation facility, Rs.5514.29 for improved crop production, Rs.457.14 for improved livestock management and Rs.85.71 for orchard development and maintenance. Marginal farmers have an average additional investment capacity of Rs. 9500 for land development, Rs.2750 for irrigation facility, Rs. 5625 in improved crop production and Rs.750 for improved live stock management. Small farmers have an average additional investment capacity of Rs.9666.67 for land development, Rs.3333.33 for irrigation facility, Rs.5833.33 for improved crop production, Rs.833.33 for livestock management and Rs.500 for orchard development/maintenance. Semi medium farmers have additional investment capacity of Rs.11571.41 for land development, 3428.57 for irrigation facility and Rs.7285.71 for improved crop production. Medium farmers have an average additional investment capacity of Rs.11250 for land development, Rs.3000 for irrigation facility, Rs.6250 for improved crop production and Rs.625 for improved livestock management. Large farmers have an additional investment capacity of Rs.23000 for land development, Rs.10000 for irrigation facility and Rs.12000 for improved crop production.*
- *The results indicated that for 74.29 per cent and 14.29 per cent of the households were dependent on loan from the bank and soft loan for land development respectively. For irrigation facility 28.57 per cent of household were dependent on loan from the bank and 8.57 per cent of the household were dependent on soft loan. 62.86 per cent and 14.29 of the household were depending on loan from bank and soft loan for improved crop production respectively. 8.57 per cent of the household were dependent on loan from bank for improved livestock management.2.86 per cent of the household were dependent on loan from bank for orchard development/maintenance.*
- *The results indicated that, brinjal, chilly; cotton and onion crops were sold to the extent of 100 per cent. Bajra, groundnut and maize crops were sold to the extent of 82.50per cent, 96 per cent and 96.92 per cent.*

- *The results indicated that, 100 percent of the households have sold their produce to local/village merchant.*
- *The results indicated that, 100 per cent of households used tractor as a mode of transport and 25.71 per cent of the household used truck.*
- *The results indicated that, 85.71 per cent of the households have shown interest in soil testing.*
- *The results indicated that, 82.86 per cent of the households have experienced the soil and water erosion problems i.e. 100 percent of marginal, small, semi medium farmers and large farmers and 87.50 percent of medium farmers.*
- *The results indicated that, 100 percent of the household used fire wood as a source of fuel and 20 per cent of the household used LPG as source of fuel.*
- *The results indicated that, piped supply was the major source of drinking water for 51.43 per cent of the households and 42.86 per cent of the household were using bore well as a source of drinking water.*
- *The results indicated that, electricity was the major source of light for 100 per cent of the households.*
- *The results indicated that, 45.71 per cent of the households possess sanitary toilet i.e. 40 per cent of the landless, 100 per cent of marginal, 50 per cent of small, 66.67 per cent of semi medium, 8.33 per cent of medium and 100 per cent of large farmers had sanitary toilet facility.*
- *The results indicated that, 100 per cent of the sampled household's possessed BPL card.*
- *The results indicated that, 31.43 per cent of the households participated in NREGA programme which included 100 per cent of the landless, 25 per cent of the marginal farmers, 16.67 per cent of the small farmers, 12.50 per cent of the medium farmers and 100 percent of the large farmers.*
- *The results indicated that, cereals and pulses were adequate for 100 per cent of the household respectively. Vegetables, milk, egg and meat were adequate for 97.14 per cent, 80 per cent, 37.14 per cent and 14.29 per cent of the households.*
- *The results indicated that, Oilseed, vegetables, fruits, milk, egg and meat were inadequate for 25.71 per cent, 2.86 per cent, 62.86 per cent, 5.71 per cent, 62.86 per cent and 80 per cent of the household respectively.*
- *The results indicated that, oilseed and fruits were inadequate for 62.86 per cent and 14.29 per cent of the household respectively.*
- *The results indicated that, Lower fertility status of the soil was the constraint experienced by 80 per cent of the households, wild animal menace on farm field (74.29%), frequent incidence of pest and diseases (68.57%), inadequacy of irrigation water (22.86%), high cost of Fertilizers and plant protection chemicals (54.29%), high rate of interest on credit (25.71%), low price for the agricultural commodities (71.43%), lack of marketing facilities in the area (68.57%),*

inadequate extension services (48.57 %), lack of transport for safe transport of the agricultural produce to the market (74.29%) and less rain fall (14.29%) .

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 Jains. The district occupies an area of 7,190 km² and has a population of 1,196,089, which 16.58% were urban as of 2001. The Koppal district was formed after split of Raichur district. It consists of four taluks namely Koppal, Gangavathi, Kushtagi and Yelburga.

The undulating topography with black cotton soil shrips, cut across by numerous nalas or streams is the major characteristic feature of the study region. The Koppal district is having partly red sandy and black soil suitable for agriculture and horticulture crops. Majority of Gangavathi taluk is having black soil. The taluk is also having very few hills with xerophilous vegetation. The partly red sandy soil and black soil of mixed geographical origin are found in the Yelburga taluk.

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

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

Description of the micro-watershed

Belur-1 micro-watershed (Katarki sub-watershed, Koppal Taluk and District) is located at North latitude $15^0$15’28.261’’ to $15^0$13’48.319’’ and East longitude $76^0$7’19.99’’ to $76^0$5’22.598’’ E covering an area of 514.83 ha and spread across Beelura and Gudlanura 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 Belur-1 micro watershed is presented in Table 1 and it indicated that 35 farmers were sampled in Belur-1 micro watershed among them 8 (22.86%) were marginal farmers, 6 (17.14 %) were small farmers, 7 (20 %) were semi medium farmers, 8 (22.86%) were medium farmers, large farmers 1(2.86%) and 5 (10.20 %) landless farmers were also interviewed for the survey.

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

S.N.	Particulars	LL (5)		MF (8)		SF (6)		SMF (7)		MDF (8)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Farmers	5	14.29	8	22.86	6	17.14	7	20	8	22.86	1	2.86	35	100

Population characteristics: The population characteristics of households sampled for socio-economic survey in Belur-1 micro watershed is presented in Table 2. The data indicated that there were 194 population households were in the studied micro watershed. Among them 100 (51.55%) men and 94 (48.45%) were women. The average family size of landless farmers was 4, marginal and medium farmers were 5, small and semi medium farmer was 6 and large farmer was 11.

Table 2: Population characteristics of Belur-1 micro-watershed

S. N.	Particulars	LL (20)		MF (43)		SF (35)		SMF (43)		MDF (42)		LF (11)		All (194)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Male	11	55	19	44.19	18	51.43	25	58.14	22	52.38	5	45.45	100	51.55
2	Female	9	45	24	55.81	17	48.57	18	41.86	20	47.62	6	54.55	94	48.45
Total		20	100	43	100	35	100	43	100	42	100	11	100	194	100
Average		4		5		6		6		5		11		5	

Age wise classification of population: The age wise classification of household members in Belur-1 micro watershed is presented in Table 3. The data indicated that 49 (25.26%) people were in 0-15 years of age, 76 (39.18 %) were in 16-35 years of age, 54 (27.84 %) were in 36-60 years of age and 15 (7.73%) were above 61 years of age.

Table 3: Age wise classification of household members in Belur-1 micro watershed

Sl. No.	Particulars	LL (20)		MF (43)		SF (35)		SMF (43)		MDF (42)		LF (11)		All (194)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	0-15 years	6	30	5	11.63	12	34.29	11	25.58	14	33.33	1	9.09	49	25.26
2	16-35 years	9	45	20	46.51	12	34.29	17	39.53	10	23.81	8	72.73	76	39.18
3	36-60 years	3	15	13	30.23	11	31.43	11	25.58	14	33.33	2	18.18	54	27.84
4	> 61 years	2	10	5	11.63	0	0	4	9.30	4	9.52	0	0	15	7.73
Total		20	100	43	100	35	100	43	100	42	100	11	100	194	100

Education level of household members: Education level of household members in Belur-1 micro watershed is presented in Table 4. The results indicated that the Belur-1 had 28.35 per cent illiterates, 30.41 per cent of them had primary school education, 14.43 per cent of them had middle school, 11.86 per cent them had high school education, 5.15

per cent of them had PUC education, 1.03 per cent them had Diploma education, 0.52 had ITI education, 3.61 per cent of them had degree education, 1.03 per cent of them had masters education and 3.61 per cent them had others.

Table 4: Education level of household members in Belur-1 micro watershed

Sl. No.	Particulars	LL (20)		MF (43)		SF (35)		SMF (43)		MDF (42)		LF (11)		All (194)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Illiterate	7	35	16	37.21	6	17.14	9	20.93	13	30.95	4	36.36	55	28.35
2	Primary School	7	35	14	32.56	13	37.14	11	25.58	12	28.57	2	18.18	59	30.41
3	Middle School	1	5	2	4.65	5	14.29	10	23.26	7	16.67	3	27.27	28	14.43
4	High School	2	10	5	11.63	5	14.29	5	11.63	4	9.52	2	18.18	23	11.86
5	PUC	0	0	3	6.98	4	11.43	3	6.98	0	0	0	0	10	5.15
6	Diploma	0	0	1	2.33	1	2.86	0	0	0	0	0	0	2	1.03
7	ITI	0	0	1	2.33	0	0	0	0	0	0	0	0	1	0.52
8	Degree	0	0	1	2.33	1	2.86	1	2.33	4	9.52	0	0	7	3.61
9	Masters	0	0	0	0	0	0	1	2.33	1	2.38	0	0	2	1.03
10	Others	3	1	0	0	0	0	3	6.98	1	2.38	0	0	7	3.61
Total		20	100	43	100	35	100	43	100	42	100	11	100	194	100

Occupation of household heads: The data regarding the occupation of the household heads in Belur-1 micro watershed is presented in Table 5. The results indicated that, 85.71 per cent of households practicing agriculture, 11.43 per cent of the household heads were agricultural labour and 2.86 per cent of the household heads were general labour.

Table 5: Occupation of household heads in Belur-1 micro watershed

S. N.	Particulars	LL (5)		MF (8)		SF (6)		SMF (7)		MDF (8)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Agriculture	0	0	8	100	6	100	7	100	8	100	1	100	30	85.71
2	Agricultural Labour	4	80	0	0	0	0	0	0	0	0	0	0	4	11.43
3	General Labour	1	20	0	0	0	0	0	0	0	0	0	0	1	2.86
Total		5	100	8	100	6	100	7	100	8	100	1	100	35	100

Table 6: Occupation of family members in Belur-1 micro watershed

Sl. No.	Particulars	LL (20)		MF (43)		SF (35)		SMF (43)		MDF (42)		LF (11)		All (194)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Agriculture	1	5	3	76.74	20	57.14	28	65.12	25	59.52	9	81.82	116	59.79
2	Agricultural Labour	10	50	0	0	0	0	0	0	2	4.76	1	9.09	13	6.70
3	General Labour	1	5	0	0	0	0	0	0	0	0	0	0	1	0.52
4	Private Service	0	0	1	2.33	0	0	1	2.33	0	0	0	0	2	1.03
5	Student	3	15	7	16.28	14	40	9	20.93	14	33.33	1	9.09	48	24.74
6	Others	1	5	0	0	0	0	0	0	0	0	0	0	1	0.52
7	Housewife	1	5	2	4.65	1	2.86	2	4.65	0	0	0	0	6	3.09
8	Children	3	15	0	0	0	0	3	6.98	1	2.38	0	0	7	3.61
Total		20	100	43	100	35	100	43	100	42	100	11	100	194	100

Occupation of the household members: The data regarding the occupation of the household members in Belur-1 micro watershed is presented in Table 6. The results indicated that agriculture was the major occupation for 59.79 per cent of the household members, 6.70 per cent were agricultural labourers, 0.52 per cent were general labours,

1.03 percent were in private sector, 24.74 per cent of them were students, 3.61 per cent of them were children and 3.09 per cent were housewives. In case of landless households 5 per cent were agriculture, 50 per cent were agriculture labour, 5 per cent were general labour and 15 per cent were students. In case of marginal farmers 76.74 per cent were agriculturist, 2.33 percent were in private service and 16.28 per cent were students. In case of small farmers 57.14 per cent of them were agriculturist and 40 per cent of them were students. In case of semi medium farmers 62.12 per cent of the family members were agriculturist, 2.33 per cent were in private service, 20.93 per cent of them were students, 4.65 per cent were housewives and 6.98 per cent were children. In case of medium farmers 59.52 per cent of the family members were agriculturist, 4.76 per cent were agriculture labour, 2.38 per cent were children and 33.33 per cent of them were students. In case of large farmers 81.82 per cent were doing agriculture, 9.09 per cent were both agriculture labour and students respectively.

Institutional participation of the household members: The data regarding the institutional participation of the household members in Belur-1 micro-watershed is presented in Table 7. The results showed that 0.52 per cent of them participated in cooperative bank and 99.48 per cent of them have not participated in any local institutions. Only small farmers were found to participate in one or the other local institutions.

Table 7: Institutional Participation of household members in Belur-1 micro watershed

S. N.	Particulars	LL (20)		MF (43)		SF (35)		SMF (43)		MDF (42)		LF (11)		All (194)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	No Participation	20	100	43	100	34	97.14	43	100	42	100	11	100	193	99.48
2	Cooperative bank	0	0	0	0	1	2.86	0	0	0	0	0	0	1	0.52
Total		20	100	43	100	35	100	43	100	42	100	11	100	194	100

Type of house owned: The data regarding the type of house owned by the households in Belur-1 micro watershed is presented in Table 8. The results indicated that 57.14 per cent of the households possess thatched house and 45.71 per cent of the households possess Pucca house. 100 per cent of the land less farmers possess thatched house and 100 per cent of the large farmers possess Pucca house.

Table 8: Type of house owned by households in Belur-1 micro watershed

S. N.	Particulars	LL(20)		MF (43)		SF (35)		SMF(43)		MDF(42)		LF(11)		All (194)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Thatched	5	100	5	62.50	1	16.67	5	71.43	4	50	0	0	20	57.14
2	Pucca/RCC	0	0	3	37.50	5	83.33	3	42.86	4	50	1	100	16	45.71
Total		5	100	8	100	6	100	8	100	8	100	1	100	36	100

Durable Assets owned by the households: The data regarding the Durable Assets owned by the households in Belur-1 micro watershed is presented in Table 9. The results showed that, 100 per cent of the households possess TV and Mixer grinder respectively.

8.57 per cent of the households possess bicycle, 34.29 per cent of the households possess motor cycle and 97.14 per cent of the households possess mobile phones.

Table 9: Durable Assets owned by households in Belur-1 micro watershed

Sl. No.	Particulars	LL (5)		MF (8)		SF (6)		SMF (7)		MDF(8)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Television	5	100	8	100	6	100	7	100	8	100	1	100	35	100
2	Mixer/Grinder	5	100	8	100	6	100	7	100	8	100	1	100	35	100
3	Bicycle	0	0	0	0	3	50	0	0	0	0	0	0	3	8.57
4	Motor Cycle	0	0	4	50	3	50	3	42.86	2	25	0	0	12	34.29
5	Mobile Phone	5	100	7	87.50	6	100	7	100	8	100	1	100	34	97.14

Average value of durable assets: The data regarding the average value of durable assets owned by the households in Belur-1 micro watershed is presented in Table 10. The results showed that the average value television was Rs. 6257, mixer grinder was Rs.1485, bicycle was Rs.3000, motor cycle was Rs.34583 and mobile phone was Rs.1376.

Table 10: Average value (Rs.) of durable assets owned by households in Belur-1 micro watershed

Sl.No.	Particulars	LL (5)	MF (8)	SF (6)	SMF (7)	MDF (8)	LF (1)	All (35)
1	Television	5800	6250	6333	6285	6500	6000	6257
2	Mixer/Grinder	1500	1562	1500	1428	1437	1500	1485
3	Bicycle	0	0	3000	0	0	0	3000
4	Motor Cycle	0	36250	31666	35000	35000	0	34583
5	Mobile Phone	2000	1692	1142	1142	1428	50	1376

Farm Implements owned: The data regarding the farm implements owned by the households in Belur-1 micro watershed is presented in Table 11. About 20 per cent of the households possess both bullock cart and plough, 2.86 per cent of the households possess both power tiller and tractor respectively. 17.14 per cent of the households possess sprayer, 88.57 per cent of the households possess weeder and 2.86 per cent of the households possess thresher.

Table 11: Farm Implements owned by households in Belur-1 micro watershed

Sl. No.	Particulars	LL(5)		MF (8)		SF (6)		SMF (7)		MDF (8)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Bullock Cart	0	0	1	12.50	3	50	1	14.29	1	12.50	1	100	7	20
2	Plough	0	0	1	12.50	3	50	1	14.29	1	12.50	1	100	7	20
3	Power Tiller	0	0	0	0	0	0	1	14.29	0	0	0	0	1	2.86
4	Tractor	0	0	0	0	0	0	1	14.29	0	0	0	0	1	2.86
5	Sprayer	0	0	0	0	3	50	0	0	2	25	1	100	6	17.14
6	Weeder	2	40	7	87.50	6	100	7	100	8	100	1	100	31	88.57
7	Thresher	0	0	0	0	0	0	0	0	0	0	1	100	1	2.86

Average value of farm implements: The data regarding the average value of farm Implements owned by the households in Belur-1 micro watershed is presented in Table 12. The results showed that the average value of bullock cart was Rs.18000; the average

value of plough was Rs. 1500, the average value of power tiller was Rs. 25000, the average value of tractor was Rs. 500000, the average value of sprayer was Rs. 5000, the average value of weeder was Rs. 26 and the average value of thresher was Rs. 20000.

Table 12: Average value (Rs.) of farm implements owned by households in Belur-1 micro watershed

Sl. No.	Particulars	LL (5)	MF (8)	SF (6)	SMF (7)	MDF (8)	LF (1)	All (35)
1	Bullock Cart	0	18000	18000	18000	18000	18000	18000
2	Plough	0	1500	1500	1500	1500	1500	1500
3	Power Tiller	0	0	0	25000	0	0	25000
4	Tractor	0	0	0	500000	0	0	500000
5	Sprayer	0	0	5000	0	5000	5000	5000
7	Weeder	40	25	25	28	24	25	26
8	Thresher	0	0	0	0	0	20000	20000

Livestock possession by the households: The data regarding the Livestock possession by the households in Belur-1 micro watershed is presented in Table 13. The results indicated that, 17.14 per cent of the households possess bullocks, 37.14 per cent of the households possess local cow, 8.57 per cent of the households possess buffalo and 5.71 per cent of the households possess.

Table 13: Livestock possession by households in Belur-1 micro watershed

Sl. No.	Particulars	MF (8)		SF (6)		SMF (7)		MDF (8)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Bullock	1	12.50	2	33.33	1	14.29	1	12.50	1	100	6	17.14
2	Local cow	2	25	4	66.67	2	28.57	4	50	1	100	13	37.14
3	Buffalo	1	12.50	0	0	1	14.29	0	0	1	100	3	8.57
4	Sheep	1	12.50	1	16.67	0	0	0	0	0	0	2	5.71

Average Labour availability: The data regarding the average labour availability in Belur-1 micro watershed is presented in Table 14. The results indicated that, average own labour men available in the micro watershed was 2, average own labour (women) available was 1.84, average hired labour (men) available was 7.30 and average hired labour (women) available was 7.20.

Table 14: Average Labour availability in Belur-1 micro watershed

Sl. No.	Particulars	MF (8)	SF (6)	SMF (7)	MDF (8)	LF (1)	All (35)
		N	N	N	N	N	N
1	Own labour Male	1.88	1.67	2.43	1.63	5.00	2
2	Own Labour Female	2.13	1.50	1.86	1.63	4.00	1.84
3	Hired labour Male	7.38	7.00	7.29	7.50	7.00	7.30
4	Hired labour Female	7.00	7.17	7.00	7.50	8.00	7.20

Adequacy of Hired Labour: The data regarding the adequacy of hired labour in Belur-1 micro watershed is presented in Table 15. The results indicated that, 85.71 per cent of the household opined that hired labour was adequate.

Table 15: Adequacy of Hired Labour in Belur-1 micro watershed

Sl.No.	Particulars	MF (8)		SF (6)		SMF (7)		MDF (8)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Adequate	8	100	6	100	7	100	8	100	1	100	30	85.71

Distribution of land (ha): The data regarding the distribution of land (ha) in Belur-1 micro watershed is presented in Table 16. The results indicated that, households of the Belur-1 micro watershed possess 24.79 ha (42.06 %) of dry land and 34.15 ha (57.94 %) of irrigated land. Marginal farmers possess 2.74 ha (62.59 %) of dry land and 1.63ha (37.14%) of irrigated land. Small farmers possess 6.05 ha (78.65 %) of dry land and 1.64 ha (21.35 %) of irrigated land. Semi medium farmers possess 3.38 ha (26.89 %) of dry land and 9.17 ha (73.11%) of irrigated land. Medium farmers possess 12.63 ha (45.34%) of dry land and 15.22 ha (54.66%) of irrigated land. Large farmers possess 6.48 ha (100%) of irrigated land.

Table 16: Distribution of land (Ha) in Belur-1 micro watershed

Sl. No.	Particulars	MF (8)		SF (6)		SMF (7)		MDF (8)		LF (1)		All (35)	
		ha	%	ha	%	ha	%	ha	%	ha	%	ha	%
1	Dry	2.74	62.59	6.05	78.65	3.38	26.89	12.63	45.34	0	0	24.79	42.06
2	Irrigated	1.63	37.41	1.64	21.35	9.17	73.11	15.22	54.66	6.48	100	34.15	57.94
Total		4.37	100	7.70	100	12.55	100	27.85	100	6.48	100	58.94	100

Average land value (Rs./ha): The data regarding the average land value (Rs./ha) in Belur-1 micro watershed is presented in Table 17. The results indicated that, the average value of dry land was Rs. 318325.99 and average value of irrigated was Rs. 494643.91. In case of marginal famers, the average land value was Rs. 949999.98 for dry land and Rs. 2690098.94 for irrigated land. In case of small famers, the average land value was Rs. 396256.68 for dry land Rs. 1216748.79 for irrigated land. In case of semi medium famers, the average land value was Rs. 294682.25 for dry land and Rs. 610145.56 for irrigated land. In case of medium famers, the average land value was Rs. 150416.67 for dry land and Rs. 256060.61 for irrigated land. In case of large farmers the average land value was Rs.154375 for irrigated land.

Table 17: Average land value (Rs. /ha) in Belur-1 micro watershed

Sl. No.	Particulars	MF (8)	SF (6)	SMF (7)	MDF (8)	LF (1)	All (35)
		N	N	N	N	N	N
1	Dry	949999.98	396256.68	294682.25	150416.67	0	318325.99
2	Irrigated	2690098.94	1216748.79	610145.56	256060.61	154375	494643.91

Table 18: Status of bore wells in Belur-1 micro watershed

Sl. No.	Particulars	LL(5)	MF(8)	SF(6)	SMF(7)	MDF(8)	LF(1)	All(35)
		N	N	N	N	N	N	N
1	De-functioning	0	0	0	0	3	0	3
2	Functioning	0	4	2	5	3	1	15

Status of bore wells: The data regarding the status of bore wells in Belur-1 micro watershed is presented in Table 18. The results indicated that, there were 15 functioning and 3 de-functioning bore wells in the micro watershed.

Source of irrigation: The data regarding the source of irrigation in Belur-1 micro watershed is presented in Table 19. The results indicated that, bore well was the major irrigation source for 42.86 per cent of the farmers.

Table 19: Source of irrigation in Belur-1 micro watershed

Sl.No.	Particulars	MF (8)		SF (6)		SMF (7)		MDF (8)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Bore Well	4	50	2	33.33	5	71.43	3	37.50	1	100	15	42.86

Depth of water: The data regarding the depth of water in Belur-1 micro watershed is presented in Table 20.The results indicated that on an average the depth of the bore well was 36.66 meters.

Table 20: Depth of water in Belur-1 micro watershed

Sl.No.	Particulars	MF (8)	SF (6)	SMF (7)	MDF (8)	LF (1)	All (35)
		N	N	N	N	N	N
1	Bore Well	42.67	26.92	62.27	33.53	76.20	36.66

Irrigated Area (ha): The data regarding the irrigated area in Belur-1 micro watershed is presented in Table 21. The results indicated that, in case of marginal farmers there was 1.88 ha of irrigated land, in case of small farmers there was 1.62 ha of irrigated land, semi medium farmers were having 8.10 ha of irrigated land, medium farmers were having 8.10 ha of irrigated land and large farmers having 3.24 ha of irrigated land. On an average there was 22.93 ha irrigated land.

Table 21: Irrigated Area (ha) in Belur-1 micro watershed

Sl.No.	Particulars	MF (8)	SF (6)	SMF (7)	MDF (8)	LF (1)	All (35)
1	Kharif	1.88	1.62	8.10	6.07	3.24	20.91
2	Rabi	0.00	0.00	0.00	2.02	0.00	2.02
Total		1.88	1.62	8.10	8.10	3.24	22.93

Table 22: Cropping pattern in Belur-1 micro watershe Area (ha)

Sl.No.	Particulars	MF (8)	SF (6)	SMF (7)	MDF (8)	LF (1)	All (35)
1	Kharif - Bajra	0.46	2.09	0.00	2.02	0.00	4.57
2	Kharif - Brinjal	0.00	0.00	0.40	0.00	0.00	0.40
3	Kharif - Chilly	0.00	0.00	0.00	1.21	0.00	1.21
4	Kharif - Cotton	0.49	0.00	2.02	0.81	0.81	4.13
5	Kharif - Groundnut	1.38	0.00	0.00	0.00	0.00	1.38
6	Kharif - Maize	2.03	5.09	5.67	8.91	1.62	23.32
7	Kharif - Onion	0.00	0.81	1.62	2.02	0.81	5.26
8	Kharif - Sugarcane	0.00	0.00	0.00	1.21	0.00	1.21
Total		4.36	7.98	9.72	16.19	3.24	41.49

Cropping pattern: The data regarding the cropping pattern in Belur-1 micro watershed is presented in Table 22. The results indicated that, farmers have grown bajra (4.57 ha),

brinjal (0.40 ha), chilly (1.21 ha), cotton (4.13 ha), groundnut (1.38 ha), maize (23.32 ha), onion (1.21 ha) and sugar cane (1.21 ha) in kharif season. Marginal farmers have grown bajra, cotton, groundnut and maize. Small farmers have grown bajra, maize and onion. Semi medium farmers have grown brinjal, cotton, maize and onion. Medium farmers have grown bajra, chilly, cotton, maize, onion and sugar cane. Large farmers have grown cotton, maize and onion.

Cropping intensity: The data regarding the cropping intensity in Belur-1 micro watershed is presented in Table 23. The results indicated that, the cropping intensity in Belur-1 micro watershed was found to be 55.74 per cent. In case of marginal farmers it was 99.63 per cent, in small farmers it was 99.70, in semi medium farmers it was 62.75, in medium farmers it was 39.99 per cent and in case of large farmers the cropping intensity was 53.33 per cent.

Table 23: Cropping intensity (%) in Belur-1 micro watershed

Sl.No.	Particulars	MF (8)	SF (6)	SMF (7)	MDF (8)	LF (1)	All (35)
1	Cropping Intensity	99.63	99.70	62.75	39.99	53.33	55.74

Possession of Bank account: The data regarding the possession of Bank account and savings in Belur-1 micro watershed is presented in Table 24. The results indicated that, 100 per cent of the households have bank account and 2.86 per cent possess savings. Among marginal farmers 100 percent of them possess bank account. 100 per cent of small farmers possess bank account and 12.50 per cent of them possess savings. Semi medium, medium and large category of farmers possesses 100 per cent of bank account.

Table 24: Possession of Bank account and savings in Belur-1 micro watershed

Sl. No.	Particulars	LL (5)		MF (8)		SF (6)		SMF (7)		MDF (8)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Account	5	100	8	100	6	100	7	100	8	100	1	100	35	100
2	Savings	0	0	1	12.50	0	0	0	0	0	0	0	0	1	2.86

Borrowing status: The data regarding the possession of borrowing status in Belur-1 micro watershed is presented in Table 25. The results indicated that, 20 per cent of the landless, 62.50 per cent of marginal, 66.67 per cent of small, 42.86 per cent of the semi medium and 62.50 per cent of medium farmers have borrowed credit from different sources.

Table 25: Borrowing status in Belur-1 micro watershed

Sl.No.	Particulars	LL (5)		MF (8)		SF (6)		SMF (7)		MDF (8)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Credit Availed	1	20	5	62.50	4	66.67	3	42.86	5	62.50	18	51.43

Table 26: Source of credit availed by households in Belur-1 micro watershed

Sl. No.	Particulars	MF (5)		SF (4)		SMF (3)		MDF (5)		All (18)	
		N	%	N	%	N	%	N	%	N	%
1	Grameena Bank	3	60	2	50	1	33.33	2	40	8	44.44

Source of credit: The data regarding the source of credit availed by households in Belur-1 micro watershed is presented in Table 26. The results indicated that, 44.44 per cent have availed loan from Grameena bank.

Average credit amount: The data regarding the average credit amount availed by households in Belur-1 micro watershed is presented in Table 27. The results indicated that, marginal, small, semi medium and medium have availed Rs. 25400, Rs. 42500, Rs. 16666.67 and Rs. 110000 respectively. Overall average credit amount availed by households in the micro watershed is 49833.33.

Table 27: Average Credit amount availed by households in Belur-1 micro watershed

Sl.No.	Particulars	MF (5)	SF (4)	SMF (3)	MDF (5)	All (18)
		N	N	N	N	N
1	Average Credit	25400	42500	16666.67	110000	49833.33

Purpose of credit borrowed (institutional Source): The data regarding the purpose of credit borrowed from institutional sources by households in Belur-1 micro watershed is presented in Table 28. The results indicated that, 100 per cent of the households have borrowed loan for agriculture production.

Table 28: Purpose of credit borrowed (institutional Source) by households in Belur-1 micro watershed

Sl.No.	Particulars	MF (3)		SF (2)		SMF (1)		MDF (2)		All (8)	
		N	%	N	%	N	%	N	%	N	%
1	Agriculture production	3	100	2	100	1	100	2	100	8	100

Repayment status of households (Institutional): The data regarding the repayment status of credit borrowed from institutional sources by households in Belur-1 micro watershed is presented in Table 30. Results indicated that 100 percent of the households have unpaid their loan.

Table 30: Repayment status of households (Institutional) in Belur-1 micro watershed

Sl.No.	Particulars	MF (3)		SF (2)		SMF (1)		MDF (2)		All (8)	
		N	%	N	%	N	%	N	%	N	%
1	Un paid	3	100.00	2	100.00	1	100.00	2	100.00	8	100.00

Opinion on institutional sources of credit: The data regarding opinion on institutional sources of credit by households in Belur-1 micro watershed is presented in Table 32. The results indicated that 9.09 per cent of the households were opined that they were helped to perform timely agricultural operations, higher rate of interest and forced to sell the produce at low price to repay loan in time respectively.

Table 32: Opinion on institutional sources of credit in Belur-1 micro watershed

Sl. No.	Particulars	MF (3)		SF (2)		SMF (1)		MDF(2)		All (8)	
		N	%	N	%	N	%	N	%	N	%
1	Helped to perform timely agricultural operations	1	33.33	1	50	0	0	1	50	3	37.50
2	Higher rate of interest	1	33.33	1	50	1	100	1	50	4	50

Cost of Cultivation of Bajra: The data regarding the cost of cultivation of bajra in Belur-1 micro watershed is presented in Table 33. The results indicated that, the total cost of cultivation for bajra was Rs. 26836.07. The gross income realized by the farmers was Rs. 30613.70. The net income from bajra cultivation was Rs. 3777.63, thus the benefit cost ratio was found to be 1:1.14.

Table 33: Cost of Cultivation of Bajra in Belur-1 micro watershed

Sl. No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	37.96	6195.67	23.09
2	Bullock		Pairs/day	1.67	965.90	3.60
3	Tractor		Hours	3.17	1927.90	7.18
4	Machinery		Hours	0.00	0.00	0.00
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	12.48	1749.80	6.52
6	FYM		Quintal	23.16	2865.55	10.68
7	Fertilizer + micronutrients		Quintal	3.11	2665.43	9.93
8	Pesticides (PPC)		Kgs / liters	1.24	1235.00	4.60
9	Irrigation		Number	0.00	0.00	0.00
10	Depreciation charges			0.00	83.20	0.31
11	Land revenue and Taxes			0.00	4.45	0.02
II	**Cost B1**					
12	Interest on working capital				1021.89	3.81
13	**Cost B1 = (Cost A1 + sum of 15 and 16)**				18714.79	69.74
III	**Cost B2**					
14	Rental Value of Land				320.00	1.19
15	**Cost B2 = (Cost B1 + Rental value)**				19034.79	70.93
IV	**Cost C1**					
16	Family Human Labour			25.68	5361.63	19.98
17	**Cost C1 = (Cost B2 + Family Labour)**				24396.42	90.91
V	**Cost C2**					
18	Risk Premium				0.00	0.00
19	**Cost C2 = (Cost C1 + Risk Premium)**				24396.42	90.91
VI	**Cost C3**					
20	Managerial Cost				2439.64	9.09
21	**Cost C3 = (Cost C2 + Managerial Cost)**				26836.07	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		18.33	26395.20	
		b) Main Crop Sales Price (Rs.)			1440.00	
	By Product	e) Main Product (q)		19.18	4218.50	
		f) Main Crop Sales Price (Rs.)			220.00	
b.	Gross Income (Rs.)				30613.70	
c.	Net Income (Rs.)				3777.63	
d.	Cost per Quintal (Rs./q.)				1464.05	
e.	Benefit Cost Ratio (BC Ratio)				1:1.14	

Cost of Cultivation of Maize: The data regarding the cost of cultivation of maize in Belur-1 micro watershed is presented in Table 34. The results indicated that, the total cost of cultivation for maize was Rs. 23553.87. The gross income realized by the farmers was Rs. 35161.80. The net income from maize cultivation was Rs. 11607.92. Thus the benefit cost ratio was found to be 1:1.49.

Table 34: Cost of Cultivation of Maize in Belur-1 micro watershed

Sl. No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	31.29	5156.59	21.89
2	Bullock		Pairs/day	1.23	725.18	3.08
3	Tractor		Hours	2.27	1510.58	6.41
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	12.91	2390.01	10.15
6	FYM		Quintal	18.41	2275.53	9.66
7	Fertilizer + micronutrients		Quintal	2.60	2136.95	9.07
8	Pesticides (PPC)		Kgs /liters	0.96	993.22	4.22
9	Irrigation		Number	1.34	0.00	0.00
10	Depreciation charges			0.00	1022.42	4.34
11	Land revenue and Taxes			0.00	4.72	0.02
II	**Cost B1**					
12	Interest on working capital				935.49	3.97
13	**Cost B1 = (Cost A1 + sum of 15 and 16)**				17150.69	72.81
III	**Cost B2**					
14	Rental Value of Land				404.44	1.72
15	**Cost B2 = (Cost B1 + Rental value)**				17555.14	74.53
IV	**Cost C1**					
16	Family Human Labour			17.77	3857.48	16.38
17	**Cost C1 = (Cost B2 + Family Labour)**				21412.61	90.91
V	**Cost C2**					
18	Risk Premium				0.00	0.00
19	**Cost C2 = (Cost C1 + Risk Premium)**				21412.61	90.91
VI	**Cost C3**					
20	Managerial Cost				2141.26	9.09
21	**Cost C3 = (Cost C2 + Managerial Cost)**				23553.87	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		29.27	32395.36	
		b) Main Crop Sales Price (Rs.)			1106.67	
	By Product	e) Main Product (q)		14.07	2766.44	
		f) Main Crop Sales Price (Rs.)			196.67	
b.	Gross Income (Rs.)				35161.80	
c.	Net Income (Rs.)				11607.92	
d.	Cost per Quintal (Rs./q.)				804.63	
e.	Benefit Cost Ratio (BC Ratio)				1:1.49	

Cost of Cultivation of Chilly: The data regarding the cost of cultivation of Chilly in Belur-1 micro watershed is presented in Table 37. The results indicated that, the total cost of cultivation for Chilly was Rs. 19910.02. The gross income realized by the farmers was Rs. 276640. The net income from Chilly cultivation was Rs. 256729.98. Thus the benefit cost ratio was found to be 1:13.89.

Table 37: Cost of Cultivation of Chilly in Belur-1 micro watershed

Sl. No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	30.46	5063.50	25.43
2	Bullock		Pairs/day	0.00	0.00	0.00
3	Tractor		Hours	3.29	1976.00	9.92
4	Machinery		Hours	0.82	494.00	2.48
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	4.94	1729.00	8.68
6	FYM		Quintal	16.47	1976.00	9.92
7	Fertilizer + micronutrients		Quintal	2.47	2264.17	11.37
8	Pesticides (PPC)		Kgs / liters	0.82	823.33	4.14
9	Irrigation		Number	4.12	0.00	0.00
10	Depreciation charges			0.00	83.98	0.42
11	Land revenue and Taxes			0.00	4.94	0.02
II	**Cost B1**					
12	Interest on working capital				815.10	4.09
13	**Cost B1 = (Cost A1 + sum of 15 and 16)**				15230.02	76.49
III	**Cost B2**					
14	Rental Value of Land				400.00	2.01
15	**Cost B2 = (Cost B1 + Rental value)**				15630.02	78.50
IV	**Cost C1**					
16	Family Human Labour			11.53	2470.00	12.41
17	**Cost C1 = (Cost B2 + Family Labour)**				18100.02	90.91
V	**Cost C2**					
18	Risk Premium				0.00	0.00
19	**Cost C2 = (Cost C1 + Risk Premium)**				18100.02	90.91
VI	**Cost C3**					
20	Managerial Cost				1810.00	9.09
21	**Cost C3 = (Cost C2 + Managerial Cost)**				19910.02	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		23.05	276640.00	
		b) Main Crop Sales Price (Rs.)			12000.00	
b.	Gross Income (Rs.)				276640.00	
c.	Net Income (Rs.)				256729.98	
d.	Cost per Quintal (Rs./q.)				863.65	
e.	Benefit Cost Ratio (BC Ratio)				1:13.89	

Cost of Cultivation of Ground nut: The data regarding the cost of cultivation of groundnut in Belur-1 micro watershed is presented in Table 39. The results indicated that, the total cost of cultivation for groundnut was Rs. 104680.63. The gross income realized by the farmers was Rs. 109091.66. The net income from groundnut cultivation was Rs. 4411.03. Thus the benefit cost ratio was found to be 1:1.04.

Table 39: Cost of Cultivation of Groundnut in Belur-1 micro watershed

Sl. No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	96.19	15567.86	14.87
2	Bullock		Pairs/day	2.20	1331.06	1.27
3	Tractor		Hours	5.08	3183.56	3.04
4	Machinery		Hours	0.00	0.00	0.00
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	288.17	43636.67	41.69
6	FYM		Quintal	43.91	5269.33	5.03
7	Fertilizer + micronutrients		Quintal	7.41	6346.53	6.06
8	Pesticides (PPC)		Kgs/liters	2.88	2881.67	2.75
9	Irrigation		Number	9.06	0.00	0.00
10	Depreciation charges			0.00	3.03	0.00
11	Land revenue and Taxes			0.00	4.94	0.00
II	**Cost B1**					
12	Interest on working capital				6976.10	6.66
13	**Cost B1 = (Cost A1 + sum of 15 and 16)**				85200.74	81.39
III	**Cost B2**					
14	Rental Value of Land				666.67	0.64
15	**Cost B2 = (Cost B1 + Rental value)**				85867.41	82.03
IV	**Cost C1**					
16	Family Human Labour			44.32	9296.81	8.88
17	**Cost C1 = (Cost B2 + Family Labour)**				95164.21	90.91
V	**Cost C2**					
18	Risk Premium				0.00	0.00
19	**Cost C2 = (Cost C1 + Risk Premium)**				95164.21	90.91
VI	**Cost C3**					
20	Managerial Cost				9516.42	9.09
21	**Cost C3 = (Cost C2 + Managerial Cost)**				104680.63	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		36.36	109091.66	
		b) Main Crop Sales Price (Rs.)			3000.00	
b.	Gross Income (Rs.)				109091.66	
c.	Net Income (Rs.)				4411.03	
d.	Cost per Quintal (Rs./q.)				2878.70	
e.	Benefit Cost Ratio (BC Ratio)				1:1.04	

Cost of Cultivation of brinjal: The data regarding the cost of cultivation of brinjal in Belur-1 micro watershed is presented in Table 41. The results indicated that, the total cost of cultivation for brinjal was Rs. 54847.38. The gross income realized by the farmers was Rs. 111150. The net income from brinjal cultivation was Rs. 56302.62. Thus the benefit cost ratio was found to be 1:2.03.

Table 41: Cost of Cultivation of brinjal in Belur-1 micro watershed

Sl. No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	64.22	10621.00	19.36
2	Bullock		Pairs/day	0.00	0.00	0.00
3	Tractor		Hours	4.94	3458.00	6.30
4	Machinery		Hours	0.00	0.00	0.00
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	4.94	4693.00	8.56
6	FYM		Quintal	49.40	6422.00	11.71
7	Fertilizer + micronutrients		Quintal	7.41	7632.30	13.92
8	Pesticides (PPC)		Kgs / liters	2.47	2470.00	4.50
9	Irrigation		Number	7.41	0.00	0.00
10	Depreciation charges			0.00	4.94	0.01
11	Land revenue and Taxes			0.00	4.94	0.01
II	**Cost B1**					
12	Interest on working capital				2546.08	4.64
13	**Cost B1 = (Cost A1 + sum of 15 and 16)**				37852.26	69.01
III	**Cost B2**					
14	Rental Value of Land				400.00	0.73
15	**Cost B2 = (Cost B1 + Rental value)**				38252.26	69.74
IV	**Cost C1**					
16	Family Human Labour			54.34	11609.00	21.17
17	**Cost C1 = (Cost B2 + Family Labour)**				49861.26	90.91
V	**Cost C2**					
18	Risk Premium				0.00	0.00
19	**Cost C2 = (Cost C1 + Risk Premium)**				49861.26	90.91
VI	**Cost C3**					
20	Managerial Cost				4986.13	9.09
21	**Cost C3 = (Cost C2 + Managerial Cost)**				54847.38	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		74.10	111150.00	
		b) Main Crop Sales Price (Rs.)			1500.00	
b.	Gross Income (Rs.)				111150.00	
c.	Net Income (Rs.)				56302.62	
d.	Cost per Quintal (Rs./q.)				740.18	
e.	Benefit Cost Ratio (BC Ratio)				1:2.03	

Cost of Cultivation of cotton: The data regarding the cost of cultivation of cotton in Belur-1 micro watershed is presented in Table 41. The results indicated that, the total cost of cultivation for cotton was Rs. 44525.95. The gross income realized by the farmers was Rs. 104092.86. The net income from cotton cultivation was Rs. 59566.91. Thus the benefit cost ratio was found to be 1:2.34.

Table 41: Cost of Cultivation of cotton in Belur-1 micro watershed

Sl. No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	56.05	9291.32	20.87
2	Bullock		Pairs/day	1.94	1129.14	2.54
3	Tractor		Hours	5.18	3252.17	7.30
4	Machinery		Hours	0.00	0.00	0.00
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	6.00	5913.89	13.28
6	FYM		Quintal	37.64	4704.76	10.57
7	Fertilizer + micronutrients		Quintal	4.35	3702.06	8.31
8	Pesticides (PPC)		Kgs / liters	2.18	2270.05	5.10
9	Irrigation		Number	4.86	0.00	0.00
10	Depreciation charges			0.00	275.46	0.62
11	Land revenue and Taxes			0.00	4.70	0.01
II	**Cost B1**					
12	Interest on working capital				1990.89	4.47
13	**Cost B1 = (Cost A1 + sum of 15 and 16)**				32534.44	73.07
III	**Cost B2**					
14	Rental Value of Land				514.29	1.16
15	**Cost B2 = (Cost B1 + Rental value)**				33048.73	74.22
IV	**Cost C1**					
16	Family Human Labour			33.82	7429.41	16.69
17	**Cost C1 = (Cost B2 + Family Labour)**				40478.13	90.91
V	**Cost C2**					
18	Risk Premium				0.00	0.00
19	**Cost C2 = (Cost C1 + Risk Premium)**				40478.13	90.91
VI	**Cost C3**					
20	Managerial Cost				4047.81	9.09
21	**Cost C3 = (Cost C2 + Managerial Cost)**				44525.95	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		34.70	104092.86	
		b) Main Crop Sales Price (Rs.)			3000.00	
b.	Gross Income (Rs.)				104092.86	
c.	Net Income (Rs.)				59566.91	
d.	Cost per Quintal (Rs./q.)				1283.26	
e.	Benefit Cost Ratio (BC Ratio)				1:2.34	

Cost of Cultivation of onion: The data regarding the cost of cultivation of onion in Belur-1 micro watershed is presented in Table 41. The results indicated that, the total cost of cultivation for onion was Rs. 48293.62. The gross income realized by the farmers was Rs. 126793.33. The net income from onion cultivation was Rs. 78499.71. Thus the benefit cost ratio was found to be 1:2.63.

Table 41: Cost of Cultivation of onion in Belur-1 micro watershed

Sl. No	Particulars	Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**				
1	Hired Human Labour	Man days	66.42	10984.64	22.75
2	Bullock	Pairs/day	1.78	1001.72	2.07
3	Tractor	Hours	3.98	2483.31	5.14
4	Machinery	Hours	0.14	96.06	0.20
5	Seed Main Crop (Establishment and Maintenance)	Kgs (Rs.)	5.76	6561.97	13.59
6	FYM	Quintal	30.88	4013.75	8.31
7	Fertilizer + micronutrients	Quintal	4.80	4494.03	9.31
8	Pesticides (PPC)	Kgs / liters	1.92	1921.11	3.98
9	Irrigation	Number	2.33	0.00	0.00
10	Depreciation charges		0.00	3262.32	6.76
11	Land revenue and Taxes		0.00	4.76	0.01
II	**Cost B1**				
12	Interest on working capital			2038.90	4.22
13	**Cost B1 = (Cost A1 + sum of 15 and 16)**			36862.56	76.33
III	**Cost B2**				
14	Rental Value of Land			407.41	0.84
15	**Cost B2 = (Cost B1 + Rental value)**			37269.97	77.17
IV	**Cost C1**				
16	Family Human Labour		31.01	6633.32	13.74
17	**Cost C1 = (Cost B2 + Family Labour)**			43903.29	90.91
V	**Cost C2**				
18	Risk Premium			0.00	0.00
19	**Cost C2 = (Cost C1 + Risk Premium)**			43903.29	90.91
VI	**Cost C3**				
20	Managerial Cost			4390.33	9.09
21	**Cost C3 = (Cost C2 + Managerial Cost)**			48293.62	100.00
VII	**Economics of the Crop**				
a.	Main Product	a) Main Product (q)	135.85	126793.33	
		b) Main Crop Sales Price (Rs.)		933.33	
b.	Gross Income (Rs.)			126793.33	
c.	Net Income (Rs.)			78499.71	
d.	Cost per Quintal (Rs./q.)			355.49	
e.	Benefit Cost Ratio (BC Ratio)			1:2.63	

Cost of Cultivation of sugar cane: The data regarding the cost of cultivation of sugar cane in Belur-1 micro watershed is presented in Table 41. The results indicated that, the total cost of cultivation for sugar cane was Rs. 28816.35. The gross income realized by the farmers was Rs. 98800. The net income from sugar cane cultivation was Rs. 69983.65. Thus the benefit cost ratio was found to be 1:3.43.

Table 41: Cost of Cultivation of sugar cane in Belur-1 micro watershed

Sl. No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	37.87	6669.00	23.14
2	Bullock		Pairs/day	0.00	0.00	0.00
3	Tractor		Hours	3.29	1976.00	6.86
4	Machinery		Hours	0.00	0.00	0.00
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	2470.00	7410.00	25.71
6	FYM		Quintal	16.47	1976.00	6.86
7	Fertilizer + micronutrients		Quintal	1.65	1276.17	4.43
8	Pesticides (PPC)		Kgs / liters	0.82	823.33	2.86
9	Irrigation		Number	4.94	0.00	0.00
10	Depreciation charges			0.00	1.65	0.01
11	Land revenue and Taxes			0.00	4.94	0.02
II	**Cost B1**					
12	Interest on working capital				1378.26	4.78
13	**Cost B1 = (Cost A1 + sum of 15 and 16)**				21515.35	74.66
III	**Cost B2**					
14	Rental Value of Land				400.00	1.39
15	**Cost B2 = (Cost B1 + Rental value)**				21915.35	76.05
IV	**Cost C1**					
16	Family Human Labour			19.76	4281.33	14.86
17	**Cost C1 = (Cost B2 + Family Labour)**				26196.68	90.91
V	**Cost C2**					
18	Risk Premium				0.00	0.00
19	**Cost C2 = (Cost C1 + Risk Premium)**				26196.68	90.91
VI	**Cost C3**					
20	Managerial Cost				2619.67	9.09
21	**Cost C3 = (Cost C2 + Managerial Cost)**				28816.35	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		411.67	98800.00	
		b) Main Crop Sales Price (Rs.)			240.00	
b.	Gross Income (Rs.)				98800.00	
c.	Net Income (Rs.)				69983.65	
d.	Cost per Quintal (Rs./q.)				70.00	
e.	Benefit Cost Ratio (BC Ratio)				1:3.43	

Adequacy of fodder: The data regarding the adequacy of fodder in Belur-1 micro watershed is presented in Table 42. The results indicated that, 65.71 per cent of the households opined that dry fodder was adequate and 2.86 per cent of the households opined that green fodder was adequate.

Table 42: Adequacy of fodder in Belur-1 micro watershed

S. N.	Particulars	MF (8)		SF (6)		SMF (7)		MDF (8)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Adequate-Dry Fodder	6	75	5	83.33	4	57.14	7	87.50	1	100	23	65.71
2	Adequate-Green Fodder	1	12.50	0	0.00	0	0.00	0	0.00	0	0.00	1	2.86

Average Annual gross income of households: The results of the overall average annual gross income of the household in Belur-1 is presented in table 43. The results indicated that, in land less farmers, the average income from wage was Rs.29000. In case of marginal farmers the average income from wage was Rs.15250, agriculture was Rs.41625, dairy farm was Rs.2250 and goat farming was Rs.3750. In case of small farmers the average income from wage was Rs.20000, agriculture was Rs.47500 and dairy farm was Rs.2833.33. In semi medium farmers the average income from business was Rs.12857.14, wage was Rs.17142.86, agriculture was Rs.113000 and dairy farm was Rs.1000. In medium farmers the average annual income from wage was Rs.17142.86, agriculture was Rs.46000 and dairy farm was Rs.9375. In large farmers the average annual income from wage was Rs.35000, agriculture was Rs.170000 and was Rs.8000.

Table 43: Average Annual gross income (Rs.) of households in Belur-1 micro watershed

S.N.	Particulars	LL (5)	MF (8)	SF (6)	SMF (7)	MDF (8)	LF (1)	All (35)
1	Business	0	0	0	12857.14	0	0	2571.43
2	Wage	29000	15250	20000	17142.86	16625	35000	19285.71
3	Agriculture	0	41625	47500	113000	46000	170000	55628.57
4	Dairy Farm	0	2250	2833.33	1000	9375	8000	3571.43
5	Goat Farming	0	3750	0.00	0	0	0	857.14
Income(Rs.)		29,000	62875	70333.33	144000	72000	213000	81914.29

Average Annual expenditure of households: The results of the overall average annual expenditure of the household in Belur-1 were presented in Table 44. The results indicated that, in marginal, small, semi medium and large farmers the average expenditure from agriculture was Rs.14000, Rs.14166.67, Rs.38142.86 and Rs.56000 respectively. In medium farmers the average expenditure from agriculture was rs.21714.29 and dairy farm was Rs.7000.

Table 44: Average Annual expenditure of households in Belur-1 micro watershed

Sl. No.	Particulars	MF (8)	SF (6)	SMF (7)	MDF (8)	LF (1)	All (35)
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1	Agriculture	14,000	14,166.67	38,142.86	21,714.29	56,000	19,200
2	Dairy Farm	0	0	0	7,000	0	800
Total		14,000	14,166.67	38,142.86	28,714.29	56,000	151,023.81
Average		1,750	2,361.11	5,448.98	3,589.29	56,000	4,314.97

Horticulture species grown: The data regarding horticulture species grown in Belur-1 micro watershed is presented in Table 45. The results indicated that, sampled households have grown 21 coconut trees in their field.

Table 45: Horticulture species grown in Belur-1 micro watershed

Sl.No.	Particulars	MF (8)		MDF (8)		All (35)	
		Field	Backyard	Field	Backyard	Field	Backyard
1	Coconut	4	0	17	0	21	0

Forest species grown: The data regarding forest species grown in Belur-1 micro watershed is presented in Table 46. The results indicated that, households have planted 8 teak trees, 60 neem trees and 1 Peeple trees in their field.

Table 46: Forest species grown in Belur-1 micro watershed

Sl.No.	Particulars	MF (8)		SF (6)		SMF (7)		MDF (8)		LF (1)		All (35)	
		F	B	F	B	F	B	F	B	F	B	F	B
1	Teak	0	0	8	0	0	0	0	0	0	0	8	0
2	Neem	8	0	10	0	16	0	22	0	4	0	60	0
3	Peeple Tree	0	0	0	0	0	0	1	0	0	0	1	0

Table 44: Average additional investment (Rs.) capacity of households in Belur-1 micro –watershed

Sl. No.	Particulars	MF(8)	SF (6)	SMF (7)	MDF (8)	LF (1)	All (35)
1	Land development	9500	9666.67	11571.43	11,250	23000	9371.43
2	Irrigation facility	2750	3333.33	3428.57	3000	10000	2857.14
3	Improved crop production	5625	5833.33	7285.71	6250	12000	5514.29
4	Improved livestock management	750	833.33	0	625	0	457.14
5	Orchard development/ maintenan	0	500.00	0	0	0	85.71

Average additional investment capacity: The data regarding average additional investment capacity in Belur-1 micro watershed is presented in Table 44. The results indicate that, households have an average additional investment capacity of Rs. 9371.43 for land development, Rs.2857.14 for irrigation facility, Rs.5514.29 for improved crop production, Rs.457.14 for improved livestock management and Rs.85.71 for orchard development and maintenance. Marginal farmers have an average additional investment capacity of Rs. 9500 for land development, Rs.2750 for irrigation facility, Rs. 5625 in improved crop production and Rs.750 for improved live stock management. Small farmers have an average additional investment capacity of Rs.9666.67 for land development, Rs.3333.33 for irrigation facility, Rs.5833.33 for improved crop production, Rs.833.33 for livestock management and Rs.500 for orchard development/maintenance. Semi medium farmers have additional investment capacity of Rs.11571.41 for land development, 3428.57 for irrigation facility and Rs.7285.71 for improved crop production. Medium farmers have an average additional investment capacity of Rs.11250 for land development, Rs.3000 for irrigation facility, Rs.6250 for improved crop production and Rs.625 for improved livestock management. Large farmers have an

additional investment capacity of Rs.23000 for land development, Rs.10000 for irrigation facility and Rs.12000 for improved crop production.

Source of funds for additional investment: The data regarding source of funds for additional investment in Belur-1 micro watershed is presented in Table 45. The results indicated that for 74.29 per cent and 14.29 per cent of the households were dependent on loan from the bank and soft loan for land development respectively. For irrigation facility 28.57 per cent of household were dependent on loan from the bank and 8.57 per cent of the household were dependent on soft loan. 62.86 per cent and 14.29 of the household were depending on loan from bank and soft loan for improved crop production respectively. 8.57 per cent of the household were dependent on loan from bank for improved livestock management.2.86 per cent of the household were dependent on loan from bank for orchard development/maintenance.

Table 45: Source of funds for additional investment capacity in Belur-1 micro watershed

Sl. No	Item	Land development		Irrigation facility		Improved crop production		Improved livestock management		Orchard development/ maintenance	
		N	%	N	%	N	%	N	%	N	%
1	Loan from bank	26	74.29	10	28.57	22	62.86	3	8.57	1	2.86
2	Soft loan	5	14.29	3	8.57	5	14.29	0	0.0	0	0.0

Marketing of the agricultural produce: The data regarding marketing of the agricultural produce in Belur-1 micro watershed is presented in Table 46. The results indicated that, brinjal, chilly; cotton and onion crops were sold to the extent of 100 per cent. Bajra, groundnut and maize crops were sold to the extent of 82.50per cent, 96 per cent and 96.92 per cent.

Table 46: Marketing of the agricultural produce in Belur-1 micro watershed

Sl. No	Crops	Output obtained (q)	Output retained (q)	Output sold (q)	Output sold (%)	Avg. Price obtained(Rs/q)
1	Bajra	80.0	14.0	66.0	82.5	1440.0
2	Brinjal	30.0	0.0	30.0	100.0	1500.0
3	Chilly	28.0	0.0	28.0	100.0	12000.0
4	Cotton	130.0	0.0	130.0	100.0	3000.0
5	Groundnut	50.0	2.0	48.0	96.0	3000.0
6	Maize	650.0	20.0	630.0	96.92	1105.56
7	Onion	810.0	0.0	810.0	100.0	933.33
8	Sugarcane	500.0	450.0	50.0	10.0	240.0

Marketing Channels used for sale of agricultural produce: The data regarding marketing channels used for sale of agricultural produce in Belur-1 micro watershed is presented in Table 47. The results indicated that, 100 percent of the households have sold their produce to local/village merchant.

Table 47: Marketing Channels used for sale of agricultural produce in Belur-1 micro watershed

Sl. No.	Particulars	MF (8)		SF (6)		SMF(7)		MDF(8)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Local/village Merchant	8	100	6	100	7	100	8	100	1	100	35	100

Mode of transport of agricultural produce: The data regarding mode of transport of agricultural produce in Belur-1 micro watershed is presented in Table 48. The results indicated that, 100 per cent of households used tractor as a mode of transport and 25.71 per cent of the household used truck.

Table 48: Mode of transport of agricultural produce in Belur-1 micro watershed

Sl. No.	Particulars	MF (8)		SF (6)		SMF (7)		MDF (8)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Tractor	7	87.50	5	83.33	8	114.29	13	162.50	1	100	35	100
2	Truck	1	12.50	2	33.33	5	71.43	1	12.50	0	0	9	25.71

Interest towards soil testing: The data regarding interest shown towards soil testing in Belur-1 micro watershed is presented in Table 49. The results indicated that, 85.71 per cent of the households have shown interest in soil testing.

Table 49: Interest shown towards soil testing in Belur-1 micro watershed

Sl.No.	Particulars	MF (8)		SF (6)		SMF (7)		MDF (8)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Interest in soil test	8	100	6	100	7	100	8	100	1	100	30	85.71

Incidence of soil and water erosion problems: The data regarding incidence of soil and water erosion problems in Abbagiri micro watershed is presented in Table 50. The results indicated that, 82.86 per cent of the households have experienced the soil and water erosion problems i.e. 100 percent of marginal, small, semi medium farmers and large farmers and 87.50 percent of medium farmers.

Table 50: Incidence of soil and water erosion problems in Belur-1 micro watershed

Sl. No.	Particulars	MF (8)		SF (6)		SMF(7)		MDF (8)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Soil and water erosion problems in the farm	8	100	6	100	7	100	7	87.50	1	100	29	82.86

Usage pattern of fuel for domestic use: The data regarding usage pattern of fuel for domestic use in Belur-1 micro watershed is presented in Table 51. The results indicated that, 100 percent of the household used fire wood as a source of fuel and 20 per cent of the household used LPG as source of fuel.

Table 51: Usage pattern of fuel for domestic use in Belur-1 micro watershed

Sl. No.	Particulars	LL (5)		MF (8)		SF (6)		SMF (7)		MDF (8)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Fire Wood	5	100	8	100	6	100	7	100	8	100	1	100	35	100
2	LPG	0	0	2	25	2	33.33	2	28.57	1	12.50	0	0	7	20

Source of drinking water: The data regarding source of drinking water in Belur-1 micro watershed is presented in Table 52. The results indicated that, piped supply was the major source of drinking water for 51.43 per cent of the households and 42.86 per cent of the household were using bore well as a source of drinking water.

Table 52: Source of drinking water in Belur-1 micro watershed

Sl. No.	Particulars	LL (5)		MF (8)		SF (6)		SMF (7)		MDF (8)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Piped supply	5	100	5	62.50	3	50	2	28.57	3	37.50	0	0	18	51.43
2	Bore Well	0	0	2	25	2	33.33	5	71.43	5	62.50	1	100	15	42.86

Source of light: The data regarding source of light in Belur-1 micro watershed is presented in Table 53. The results indicated that, electricity was the major source of light for 100 per cent of the households.

Table 53: Source of light in Belur-1 micro watershed

Sl. No.	Particulars	LL (5)		MF (8)		SF (6)		SMF(7)		MDF(8)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Electricity	5	100	8	100	6	100	7	100	8	100	1	100	35	100

Existence of Sanitary toilet facility: The data regarding existence of sanitary toilet facility in Belur-1 micro watershed is presented in Table 54. The results indicated that, 45.71 per cent of the households possess sanitary toilet i.e. 40 per cent of the landless, 100 per cent of marginal, 50 per cent of small, 66.67 per cent of semi medium, 8.33 per cent of medium and 100 per cent of large farmers had sanitary toilet facility.

Table 54: Existence of Sanitary toilet facility in Belur-1 micro watershed

S. N.	Particulars	LL (5)		MF (8)		SF (6)		SMF (7)		MDF (8)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Sanitary toilet facility	5	100	8	100	6	100	7	100	1	12.50	1	100	28	80

Possession of PDS card: The data regarding possession of PDS card in Belur-1 micro watershed is presented in Table 55. The results indicated that, 100 per cent of the sampled household's possessed BPL card.

Table 55: Possession of PDS card in Belur-1 micro watershed

Sl. No.	Particulars	LL (5)		MF (8)		SF (6)		SMF(7)		MDF(8)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	BPL	5	100	8	100	6	100	7	100	8	100	1	100	35	100

Table 56: Participation in NREGA programme in Belur-1 micro watershed

Sl. No.	Particulars	LL (5)		MF (8)		SF (6)		SMF (7)		MDF (8)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Participation in NREGA programme	5	100	2	25	1	16.67	1	14.29	1	12.50	1	100	11	31.43

Participation in NREGA programme: The data regarding participation in NREGA programme in Belur-1 micro watershed is presented in Table 56. The results indicated that, 31.43 per cent of the households participated in NREGA programme which included

100 per cent of the landless, 25 per cent of the marginal farmers, 16.67 per cent of the small farmers, 12.50 per cent of the medium farmers and 100 percent of the large farmers.

Adequacy of food items: The data regarding adequacy of food items in Belur-1 micro watershed is presented in Table 57. The results indicated that, cereals and pulses were adequate for 100 per cent of the household respectively. Vegetables, milk, egg and meat were adequate for 97.14 per cent, 80 per cent, 37.14 per cent and 14.29 per cent of the households.

Table 57: Adequacy of food items in Belur-1 micro watershed

S.N.	Particulars	LL (5)		MF (8)		SF (6)		SMF (7)		MDF (8)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Cereals	5	100	8	100	6	100	7	100	8	100	1	100	35	100
2	Pulses	5	100	8	100	6	100	7	100	8	100	1	100	35	100
3	Vegetables	5	100	8	100	6	100	7	100	8	100	0	0	34	97.14
4	Milk	2	40	8	100	5	83	6	86	6	75	1	100	28	80
5	Egg	4	80	1	13	1	17	3	43	3	38	1	100	13	37.14
6	Meat	3	60	0	0	1	17	1	14	0	0	0	0	5	14.29

Response on Inadequacy of food items: The data regarding inadequacy of food items in Belur-1 micro watershed is presented in Table 58. The results indicated that, Oilseed, vegetables, fruits, milk, egg and meat were inadequate for 25.71 per cent, 2.86 per cent, 62.86 per cent, 5.71 per cent, 62.86 per cent and 80 per cent of the household respectively.

Table 58: Response on Inadequacy of food items in Belur-1 micro watershed

Sl. No.	Particulars	LL (5)		MF (8)		SF (6)		SMF (7)		MDF (8)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Oilseed	1	20	1	13	3	50	2	29	1	13	1	100	9	25.71
2	Vegetables	0	0	0	0	0	0	0	0	0	0	1	100	1	2.86
3	Fruits	0	0	7	88	5	83	4	57	5	63	1	100	22	62.86
4	Milk	1	20	0	0	1	17	0	0	0	0	0	0	2	5.71
5	Egg	1	20	7	88	5	83	4	57	5	63	0	0	22	62.86
6	Meat	1	20	8	100	4	67	6	86	8	100	1	100	28	80.00

Response on market surplus of food items: The data regarding market surplus of food items in Belur-1 micro watershed is presented in Table 59. The results indicated that, oilseed and fruits were inadequate for 62.86 per cent and 14.29 per cent of the household respectively.

Table 59: Response on market surplus of food items in Belur-1 micro watershed

Sl.No.	Particulars	MF (8)		SF (6)		SMF (7)		MDF (8)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Oilseed	7	87.50	3	50.00	5	71.43	7	87.50	22	62.86
2	Fruits	1	12.50	0	0.00	2	28.57	2	25.00	5	14.29

Farming constraints: The data regarding farming constraints experienced by households in Belur-1 micro watershed is presented in Table 60. The results indicated that, Lower

fertility status of the soil was the constraint experienced by 80 per cent of the households, wild animal menace on farm field (74.29%), frequent incidence of pest and diseases (68.57%), inadequacy of irrigation water (22.86%), high cost of Fertilizers and plant protection chemicals (54.29%), high rate of interest on credit (25.71%), low price for the agricultural commodities (71.43%), lack of marketing facilities in the area (68.57%), inadequate extension services (48.57 %), lack of transport for safe transport of the agricultural produce to the market (74.29%) and less rain fall (14.29%) .

Table 60: Farming constraints Experienced in Belur-1 micro watershed

S. N.	Particulars	MF (8)		SF (6)		SMF (7)		MDF (8)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Lower fertility status of the soil	7	87.50	5	83.33	7	100	8	100	1	100	28	80
2	Wild animal menace on farm field	7	87.50	6	100	5	71.43	7	87.50	1	100	26	74.29
3	Frequent incidence of pest and diseases	7	87.50	3	50	5	71.43	8	100	1	100	24	68.57
4	Inadequacy of irrigation water	3	37.50	2	33.33	0	0	2	25	1	100	8	22.86
5	High cost of Fertilizers and plan protection chemicals	6	75	4	66.67	5	71.43	3	37.50	1	100	19	54.29
6	High rate of interest on credit	0	0	2	33.33	3	42.86	3	37.50	1	100	9	25.71
7	Low price for the agricultural commodities	6	75	6	100	7	100	5	62.50	1	100	25	71.43
8	Lack of marketing facilities in the area	7	87.50	5	83.33	6	85.71	5	62.50	1	100	24	68.57
9	Inadequate extension services	4	50	2	33.33	5	71.43	5	62.50	1	100	17	48.57
10	Lack of transport for safe transport of the Agril produce to the market.	7	87.50	6	100	6	85.71	6	75	1	100	26	74.29
11	Less rainfall	3	37.50	0	0	0	0	2	25.00	0	0	5	14.29

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.

Results indicated that, 35 farmers were sampled in Belur-1 micro watershed among them 8 (22.86%) were marginal farmers, 6 (17.14 %) were small farmers, 7 (20 %) were semi medium farmers, 8 (22.86%) were medium farmers, large farmers 1(2.86%) and 5 (10.20 %) landless farmers were also interviewed for the survey. The data indicated that there were 194 population households were there in the studied micro watershed. Among them 100 (51.55%) men and 94 (48.45%) were women. The average family size of landless farmers was 4, marginal and medium farmers were 5, small and semi medium farmer was 6 and large farmer was 11. On an average the family size was 5. The data indicated that 49 (25.26%) people were in 0-15 years of age, 76 (39.18 %) were in 16-35 years of age, 54 (27.84 %) were in 36-60 years of age and 15 (7.73%) were above 61 years of age.

The results indicated that the Belur-1 had 28.35 per cent illiterates, 30.41 per cent of them had primary school education, 14.43 per cent of them had middle school, 11.86 per cent them had high school education, 5.15 per cent of them had PUC education, 1.03 per cent them had Diploma education, 0.52 had ITI education, 3.61 per cent of them had degree education, 1.03 per cent of them had masters education and 3.61 per cent them had others. The results indicated that, 85.71 per cent of households practicing agriculture, 11.43 per cent of the household heads were agricultural labour and 2.86 per cent of the household heads were general labour.

The results indicated that agriculture was the major occupation for 59.79 per cent of the household members, 6.70 per cent were agricultural labourers, 0.52 per cent were general labours, 1.03 percent were in private sector, 24.74 per cent of them were students, 3.61 per cent of them were children and 3.09 per cent were housewives. In case of landless households 5 per cent were agriculture, 50 per cent were agriculture labour, 5 per cent were general labour and 15 per cent were students. In case of marginal farmers 76.74 per cent were agriculturist, 2.33 percent were in private service and 16.28 per cent were students. In case of small farmers 57.14 per cent of them were agriculturist and 40 per cent of them were students. In case of semi medium farmers 62.12 per cent of the family members were agriculturist, 2.33 per cent were in private service, 20.93 per cent of them were students, 4.65 per cent were housewives and 6.98 per cent were children. In

case of medium farmers 59.52 per cent of the family members were agriculturist, 4.76 per cent were agriculture labour, 2.38 per cent were children and 33.33 per cent of them were students. In case of large farmers 81.82 per cent were doing agriculture, 9.09 per cent were both agriculture labour and students respectively.

The results showed that 0.52 per cent of them participated in cooperative bank and 99.48 per cent of them have not participated in any local institutions. Only small farmers were found to participate in one or the other local institutions. The results indicated that 57.14 per cent of the households possess thatched house and 45.71 per cent of the households possess Pucca house. 100 per cent of the land less farmers possess thatched house and 100 per cent of the large farmers possess Pucca house.

The results showed that, 100 per cent of the households possess TV and Mixer grinder respectively. 8.57 per cent of the households possess bicycle, 34.29 per cent of the households possess motor cycle and 97.14 per cent of the households possess mobile phones. The results showed that the average value television was Rs. 6257, mixer grinder was Rs.1485, bicycle was Rs.3000, motor cycle was Rs.34583 and mobile phone was Rs.1376. The results indicated that about 20 per cent of the households possess both bullock cart and plough, 2.86 per cent of the households possess both power tiller and tractor respectively. 17.14 per cent of the households possess sprayer, 88.57 per cent of the households possess weeder and 2.86 per cent of the households possess thresher.

The results showed that the average value of bullock cart was Rs.18000; the average value of plough was Rs. 1500, the average value of power tiller was Rs. 25000, the average value of tractor was Rs. 500000, the average value of sprayer was Rs. 5000, the average value of weeder was Rs. 26 and the average value of thresher was Rs. 20000. The results indicated that, 17.14 per cent of the households possess bullocks, 37.14 per cent of the households possess local cow, 8.57 per cent of the households possess buffalo and 5.71 per cent of the households possess.

In case of marginal farmers, 12.50 per cent of the households possess bullock and 25 per cent of the household possess local cow, 12.50 per cent household possess buffalo and sheep respectively. In case of small farmers, 33.33 per cent of households possess bullock, 66.67 per cent possess local cow and 16.67 per cent of the households possess sheep. In case of semi medium farmers, 14.29 per cent of the households possess bullock, 28.57 per cent of the household possess local cow and 16.67 per cent of the households possess sheep. In case of medium farmers 12.50 per cent of the household possess bullock and 50 per cent of the household possess local cow. In large farmers 100 per cent of the household possess bullock, local cow and sheep respectively.

The results indicated that, average own labour men available in the micro watershed was 2, average own labour (women) available was 1.84, average hired labour (men) available was 7.30 and average hired labour (women) available was 7.20. In case

of marginal farmers, average own labour men available was 1.88, average own labour (women) was also 2.13, average hired labour (men) was 7.38 and average hired labour (women) available was 7. In case of small farmers, average own labour men available was 1.67, average own labour (women) was 1.50, average hired labour (men) was 7 and average hired labour (women) available was 7.17. In case of semi medium farmers, average own labour men available was 2.43, average own labour (women) was 1.86, average hired labour (men) was 7.29 and average hired labour (women) available was 7. In medium farmers average own labour men available was 1.63, average own labour (women) was 1.63, average hired labour (men) was 7.50 and average hired labour (women) available was 7.50. In case of large farmers, average own labour men available was 5, average own labour (women) was 4, average hired labour (men) was 7 and average hired labour (women) available was 8.

The results indicated that, 85.71 per cent of the household opined that hired labour was adequate. The results indicated that, households of the Belur-1 micro watershed possess 24.79 ha (42.06 %) of dry land and 34.15 ha (57.94 %) of irrigated land. Marginal farmers possess 2.74 ha (62.59 %) of dry land and 1.63ha (37.14%) of irrigated land. Small farmers possess 6.05 ha (78.65 %) of dry land and 1.64 ha (21.35 %) of irrigated land. Semi medium farmers possess 3.38 ha (26.89 %) of dry land and 9.17 ha (73.11%) of irrigated land. Medium farmers possess 12.63 ha (45.34%) of dry land and 15.22 ha (54.66%) of irrigated land. Large farmers possess 6.48 ha (100%) of irrigated land.

The results indicated that, the average value of dry land was Rs. 318325.99 and average value of irrigated was Rs. 494643.91. In case of marginal famers, the average land value was Rs. 949999.98 for dry land and Rs. 2690098.94 for irrigated land. In case of small famers, the average land value was Rs. 396256.68 for dry land Rs. 1216748.79 for irrigated land. In case of semi medium famers, the average land value was Rs. 294682.25 for dry land and Rs. 610145.56 for irrigated land. In case of medium famers, the average land value was Rs. 150416.67 for dry land and Rs. 256060.61 for irrigated land. In case of large farmers the average land value was Rs.154375 for irrigated land. The results indicated that, there were 15 functioning and 3 de-functioning bore wells in the micro watershed. The results indicated that, bore well was the major irrigation source for 42.86 per cent of the farmers. The results indicated that on an average the depth of the bore well was 36.66 meters.

The results indicated that, in case of marginal farmers there was 1.88 ha of irrigated land, in case of small farmers there was 1.62 ha of irrigated land, semi medium farmers were having 8.10 ha of irrigated land, medium farmers were having 8.10 ha of irrigated land and large farmers having 3.24 ha of irrigated land. On an average there was 22.93 ha irrigated land. The results indicated that, farmers have grown bajra (4.57 ha), brinjal (0.40 ha), chilly (1.21 ha), cotton (4.13 ha), groundnut (1.38 ha), maize (23.32 ha), onion (1.21 ha) and sugar cane (1.21 ha) in kharif season. Marginal farmers have grown

bajra, cotton, groundnut and maize. Small farmers have grown bajra, maize and onion. Semi medium farmers have grown brinjal, cotton, maize and onion. Medium farmers have grown bajra, chilly, cotton, maize, onion and sugar cane. Large farmers have grown cotton, maize and onion.

The results indicated that, the cropping intensity in Belur-1 micro watershed was found to be 55.74 per cent. In case of marginal farmers it was 99.63 per cent, in small farmers it was 99.70, in semi medium farmers it was 62.75, in medium farmers it was 39.99 per cent and in case of large farmers the cropping intensity was 53.33 per cent. The results indicated that, 100 per cent of the households have bank account and 2.86 per cent possess savings. Among marginal farmers 100 percent of them possess bank account. 100 per cent of small farmers possess bank account and 12.50 per cent of them possess savings. Semi medium, medium and large category of farmers possesses 100 per cent of bank account. The results indicated that, 20 per cent of the landless, 62.50 per cent of marginal, 66.67 per cent of small, 42.86 per cent of the semi medium and 62.50 per cent of medium farmers have borrowed credit from different sources. The results indicated that, 44.44 per cent have availed loan from Grameena bank. The results indicated that, marginal, small, semi medium and medium have availed Rs. 25400, Rs. 42500, Rs. 16666.67 and Rs. 110000 respectively. Overall average credit amount availed by households in the micro watershed is 49833.33.

The results indicated that, 100 per cent of the households have borrowed loan for agriculture production. Results indicated that 100 percent of the households have unpaid their loan. The results indicated that 9.09 per cent of the households were opined that they were helped to perform timely agricultural operations, higher rate of interest and forced to sell the produce at low price to repay loan in time respectively. The results indicated that, the total cost of cultivation for bajra was Rs. 26836.07. The gross income realized by the farmers was Rs. 30613.70. The net income from bajra cultivation was Rs. 3777.63, thus the benefit cost ratio was found to be 1:1.14.

The results indicated that, the total cost of cultivation for maize was Rs. 23553.87. The gross income realized by the farmers was Rs. 35161.80. The net income from maize cultivation was Rs. 11607.92. Thus the benefit cost ratio was found to be 1:1.49. The results indicated that, the total cost of cultivation for Chilly was Rs. 19910.02. The gross income realized by the farmers was Rs. 276640. The net income from Chilly cultivation was Rs. 256729.98. Thus the benefit cost ratio was found to be 1:13.89. The results indicated that, the total cost of cultivation for groundnut was Rs. 104680.63. The gross income realized by the farmers was Rs. 109091.66. The net income from groundnut cultivation was Rs. 4411.03. Thus the benefit cost ratio was found to be 1:1.04. The results indicated that, the total cost of cultivation for brinjal was Rs. 54847.38. The gross income realized by the farmers was Rs. 111150. The net income from brinjal cultivation was Rs. 56302.62. Thus the benefit cost ratio was found to be 1:2.03. The results

indicated that, the total cost of cultivation for cotton was Rs. 44525.95. The gross income realized by the farmers was Rs. 104092.86. The net income from cotton cultivation was Rs. 59566.91. Thus the benefit cost ratio was found to be 1:2.34. The results indicated that, the total cost of cultivation for onion was Rs. 48293.62. The gross income realized by the farmers was Rs. 126793.33. The net income from onion cultivation was Rs. 78499.71. Thus the benefit cost ratio was found to be 1:2.63.

The results indicated that, the total cost of cultivation for sugar cane was Rs. 28816.35. The gross income realized by the farmers was Rs. 98800. The net income from sugar cane cultivation was Rs. 69983.65. Thus the benefit cost ratio was found to be 1:3.43. The results indicated that, 65.71 per cent of the households opined that dry fodder was adequate and 2.86 per cent of the households opined that green fodder was adequate. The results indicated that, in land less farmers, the average income from wage was Rs.29000. In case of marginal farmers the average income from wage was Rs.15250, agriculture was Rs.41625, dairy farm was Rs.2250 and goat farming was Rs.3750. In case of small farmers the average income from wage was Rs.20000, agriculture was Rs.47500 and dairy farm was Rs.2833.33. In semi medium farmers the average income from business was Rs.12857.14, wage was Rs.17142.86, agriculture was Rs.113000 and dairy farm was Rs.1000. In medium farmers the average annual income from wage was Rs.17142.86, agriculture was Rs.46000 and dairy farm was Rs.9375. In large farmers the average annual income from wage was Rs.35000, agriculture was Rs.170000 and was Rs.8000.

The results indicated that, in marginal, small, semi medium and large farmers the average expenditure from agriculture was Rs.14000, Rs.14166.67, Rs.38142.86 and Rs.56000 respectively. In medium farmers the average expenditure from agriculture was rs.21714.29 and dairy farm was Rs.7000. The results indicated that, sampled households have grown 21 coconut trees in their field. The results indicated that, households have planted 8 teak trees, 60 neem trees and 1 Peeple trees in their field. The results indicate that, households have an average additional investment capacity of Rs. 9371.43 for land development, Rs.2857.14 for irrigation facility, Rs.5514.29 for improved crop production, Rs.457.14 for improved livestock management and Rs.85.71 for orchard development and maintenance. Marginal farmers have an average additional investment capacity of Rs. 9500 for land development, Rs.2750 for irrigation facility, Rs. 5625 in improved crop production and Rs.750 for improved live stock management. Small farmers have an average additional investment capacity of Rs.9666.67 for land development, Rs.3333.33 for irrigation facility, Rs.5833.33 for improved crop production, Rs.833.33 for livestock management and Rs.500 for orchard development/maintenance. Semi medium farmers have additional investment capacity of Rs.11571.41 for land development, 3428.57 for irrigation facility and Rs.7285.71 for improved crop production. Medium farmers have an average additional investment capacity of Rs.11250 for land development, Rs.3000 for

irrigation facility, Rs.6250 for improved crop production and Rs.625 for improved livestock management. Large farmers have an additional investment capacity of Rs.23000 for land development, Rs.10000 for irrigation facility and Rs.12000 for improved crop production.

The results indicated that for 74.29 per cent and 14.29 per cent of the households were dependent on loan from the bank and soft loan for land development respectively. For irrigation facility 28.57 per cent of household were dependent on loan from the bank and 8.57 per cent of the household were dependent on soft loan. 62.86 per cent and 14.29 of the household were depending on loan from bank and soft loan for improved crop production respectively. 8.57 per cent of the household were dependent on loan from bank for improved livestock management.2.86 per cent of the household were dependent on loan from bank for orchard development/maintenance. The results indicated that, brinjal, chilly; cotton and onion crops were sold to the extent of 100 per cent. Bajra, groundnut and maize crops were sold to the extent of 82.50per cent, 96 per cent and 96.92 per cent.

The results indicated that, 100 percent of the households have sold their produce to local/village merchant. The results indicated that, 100 per cent of households used tractor as a mode of transport and 25.71 per cent of the household used truck. The results indicated that, 85.71 per cent of the households have shown interest in soil testing. The results indicated that, 82.86 per cent of the households have experienced the soil and water erosion problems i.e. 100 percent of marginal, small, semi medium farmers and large farmers and 87.50 percent of medium farmers. The results indicated that, 100 percent of the household used fire wood as a source of fuel and 20 per cent of the household used LPG as source of fuel. The results indicated that, piped supply was the major source of drinking water for 51.43 per cent of the households and 42.86 per cent of the household were using bore well as a source of drinking water.

The results indicated that, electricity was the major source of light for 100 per cent of the households. The results indicated that, 45.71 per cent of the households possess sanitary toilet i.e. 40 per cent of the landless, 100 per cent of marginal, 50 per cent of small, 66.67 per cent of semi medium, 8.33 per cent of medium and 100 per cent of large farmers had sanitary toilet facility. The results indicated that, 100 per cent of the sampled household's possessed BPL card. The results indicated that, 31.43 per cent of the households participated in NREGA programme which included 100 per cent of the landless, 25 per cent of the marginal farmers, 16.67 per cent of the small farmers, 12.50 per cent of the medium farmers and 100 percent of the large farmers.

The results indicated that, cereals and pulses were adequate for 100 per cent of the household respectively. Vegetables, milk, egg and meat were adequate for 97.14 per cent, 80 per cent, 37.14 per cent and 14.29 per cent of the households. The results indicated that, Oilseed, vegetables, fruits, milk, egg and meat were inadequate for 25.71

per cent, 2.86 per cent, 62.86 per cent, 5.71 per cent, 62.86 per cent and 80 per cent of the household respectively. The results indicated that, oilseed and fruits were inadequate for 62.86 per cent and 14.29 per cent of the household respectively. The results indicated that, Lower fertility status of the soil was the constraint experienced by 80 per cent of the households, wild animal menace on farm field (74.29%), frequent incidence of pest and diseases (68.57%), inadequacy of irrigation water (22.86%), high cost of Fertilizers and plant protection chemicals (54.29%), high rate of interest on credit (25.71%), low price for the agricultural commodities (71.43%), lack of marketing facilities in the area (68.57%), inadequate extension services (48.57 %), lack of transport for safe transport of the agricultural produce to the market (74.29%) and less rain fall (14.29%) .