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

## BISARAHALLI-1 (4D4A1W2d) MICROWATERSHED

**Alavandi Hobli, Koppal Taluk & District, Karnataka**

Karnataka Watershed Development Project – II

**SUJALA – III**

**World Bank funded Project**

THE WORLD BANK

ICAR – NATIONAL BUREAU OF SOIL SURVEY AND LAND USE PLANNING

ICAR - NBSS & LUP

WATERSHED DEVELOPMENT DEPARTMENT
GOVT. OF KARNATAKA, BANGALORE

## About ICAR - NBSS&LUP

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

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

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## PREFACE

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

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

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

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

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

ICAR-NBSS&LUP, Regional Centre, Bangalore has taken up a project sponsored by the Karnataka Watershed Development Project-II, (Sujala-III), Government of Karnataka funded by the World Bank under Component -1 Land Resource Inventry. This study was taken up to demonstrate the utility of such a database in reviewing, monitoring and evaluating all the land based watershed development programs on a scientific footing. To meet the requirements of various land use planners at grassroots level, the present study on "Land Resource Inventory and Socio-Economic Status of Farm Households for Watershed Planning and Development of for Bisarahalli-1 microwatershed in Koppal Taluk and 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 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 **S.K. SINGH**
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# PART-A

## LAND RESOURCE INVENTORY

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## *EXECUTIVE SUMMARY*

*The land resource inventory of Bisarahalli-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 boundries. The soil map shows the geographic distribution and extent, characterstics, classification and use potentials of the soils in the microwartershed.*

*The present study covers an area of 571 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 105 mm during the rest of the year. An area of about 97 per cent is covered by soils, three per cent by waterbodies, settlements and others. The salient findings from the land resource inventory are summarized briefly below.*

- *The soils belong to 14 soil series and 21soil phases (management units) and 9 land use classes.*
- *The length of crop growing period is about <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 250 m grid interval.*
- *Land suitability for growing major agricultural and horticultural crops were assessed and maps showing the degree of suitability along with constraints were generated.*
- *About 97 per cent area is suitable for agriculture and 3% is not suitable for agriculture.*
- *About 40 per cent of the soils are moderately shallow (50-75 cm) to shallow (25-50 cm) and about 57 per cent are moderately deep to very deep soils.*
- *About 24 per cent of the area has loamy soils at the surface and 73 per cent of the area has clayey soils.*
- *About 30 per cent of the area has non-gravelly soils, 60 per cent gravelly soils (15-35 % gravel) and 7 per cent very gravelly (35- 60% gravel) soils.*
- *About 17 per cent medium (101-150 mm/m), 67 per cent low (51-100 mm/m) to very low (<50mm/m) in available water capacity and 13 per cent area has very high (>200mm/m) available water capacity.*

- *About 84 per cent area has very gently sloping (1-3%) lands and 12 per cent area has nearly level (0-1%) lands.*
- *An area of about 85 per cent has soils that are slightly eroded (e1) and 12 per cent moderately eroded (e2).*
- *An area of about 41 per cent has soils that are moderately alkaline (pH 7.8 to 8.4), 26 per cent strongly alkaline (pH 8.4 to 9.0) and 8 per cent has very strongly alkaline (pH>9.0). A very small area of about 2 per cent is neutral (2%) in reaction.*
- *The Electrical Conductivity (EC) of the soils are dominantly <2 $dsm^{-1}$ indicating that the soils are non-saline.*
- *About 57 per cent of the soils are medium (0.5-0.75%) in organic carbon, low (<0.5%) in about 36 per cent and 2 per cent of the soils are high (>0.75%) in organic carbon.*
- *An area of about 50 per cent low (<23 kg/ha), 45 per cent medium (23-57 kg/ha) in available phosphorus and one per cent of the area has high (>57 kg/ha) available phosphorus.*
- *About 54 per cent medium (145-337 kg/ha), low (<145 kg/ha) in 6 per cent and 37 per cent high (>337 kg/ha) in available potassium.*
- *Available sulphur is medium (10-20 ppm) in about 71 per cent area and about 26 per cent area is high (>10 ppm).*
- *Available boron is low (0.5 ppm) in about 79 per cent area and medium (0.5-1.0 ppm) in 18 per cent area.*
- *Available iron is deficient in about 47 per cent area and sufficient in 50 per cent area.*
- *Available zinc is deficient in about 76 per cent area and sufficient in 21 per cent area.*
- *Available manganese and copper are sufficient in all the soils.*

- *The land suitability for 27 major crops grown in the microwatershed were assessed and the areas that are highly suitable (S1) and moderately suitable (S2) are given below. It is however to be noted that a given soil may be suitable for various crops but what specific crop to be grown may be decided by the farmer looking to his capacity to invest on various inputs, marketing infrastructure, price and finally the demand and supply position.*

***Land suitability for various crops in the microwatershed***

| Crop | Suitability Area in ha (%) | | | Crop | Suitability Area in ha (%) | |
|---|---|---|---|---|---|---|
| | Highly suitable (S1) | Moderately suitable (S2) | | | Highly suitable (S1) | Moderately suitable (S2) |
| *Sorghum* | *20 (3)* | *287 (50)* | | *Jackfruit* | *44 (8)* | *56 (10)* |
| *Maize* | *17(3)* | *163(28)* | | *Jamun* | *-* | *174(30)* |
| *Cotton* | *3(<1)* | *373(65)* | | *Musambi* | *47 (8)* | *179(31)* |
| *Redgram* | *17(3)* | *225(39)* | | *Lime* | *47 (8)* | *179(31)* |
| *Bengal gram* | *3(<1)* | *381 (67)* | | *Cashew* | *44 (8)* | *85(15)* |
| *Bajra* | *92 (16)* | *96(17)* | | *Custard apple* | *166(29)* | *248 (43)* |
| *Groundnut* | *11 (2)* | *229(40)* | | *Amla* | *92 (16)* | *321(56)* |
| *Chilli* | *54 (9)* | *127 (22)* | | *Tamarind* | *-* | *126(22)* |
| *Drumstick* | *44 (8)* | *251(34)* | | *Marigold* | *17(3)* | *290(51)* |
| *Mulbery* | *92 (16)* | *239 (42)* | | *Chrysanthemum* | *17(3)* | *290(51)* |
| *Pomegranate* | *44 (8)* | *182(32)* | | *Jasmine* | *17(3)* | *164(28)* |
| *Tomato* | *54 (9)* | *127(22)* | | *Crossandra* | *17(3)* | *285(50)* |
| *Guava* | *44 (8)* | *56(10)* | | | | |
| *Mango* | *-* | *52(9)* | | | | |
| *Sapota* | *44 (8)* | *56(10)* | | | | |

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

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

*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 a 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 (>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. Here, an attempt is being made to uplink the LRI data generated under Sujala-III Project to the Landscape Ecological Units (LEUs) map. For this, the major physiographic region, *i.e*., South Deccan Plateau is taken as an example.

The land resource inventory aims to provide site specific database for Bisarahalli-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 Bisarahalli-1 Microwatershed is located in the central part of northern Karnataka in Koppal Taluk, Koppal District, Karnataka State (Fig.2.1). It comprises parts of Bisarahalli and Bikanahalli villages. It lies between $15^0$15' and $15^0$16'North latitudes and $76^0$3' and $76^0$5' East longitudes and covers an area of 571 ha. It is about 15 km from koppal town and is surrounded by Bikanalli village on the northwest and Bisarahalii village on the northeast side.

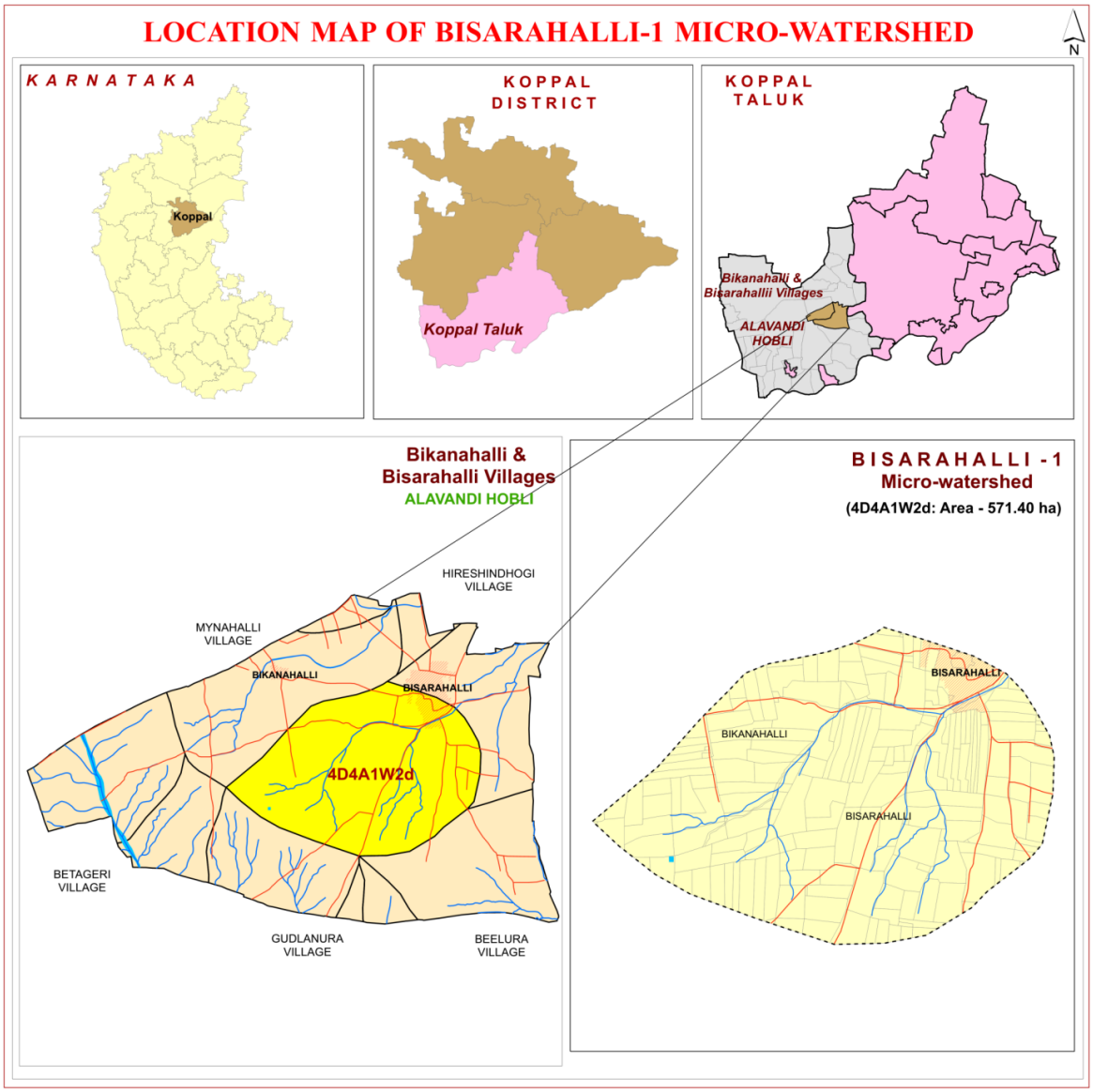



Fig.2.1 Location map of Bisarahalli-1 Microwatershed

## 2.2 Geology

Major rock formations observed in the microwatershed are granite gneiss and alluvium (Figs.2.2a and b). Granite gneisses are essentially pink to gray and are coarse to medium grained. They consist primarily of quartz, feldspar, biotite and hornblende. The gray granite gneisses are highly weathered, fractured and fissured upto a depth of about 10 m. Dolerite dykes and quartz veins are common with variable width and found to occur in Bisarahalli village. The soil thickness of the alluvium generally is limited to less than a meter, except in river valleys where it is very deep extending to tens of meters. Such soils are transported and represent palaeo black soil originally formed at higher elevation, but now occupying river valleys.

Fig.2.2a Granite and granite gneiss rocks

Fig.2.2 b Alluvium

## 2.3 Physiography

Physiographically, the area has been identified as Granite Gneiss and Alluvial landscapes based on geology. The microwatershed area has been further divided into mounds/ridges, summits, side slopes and very gently sloping uplands and nearly level plains based on slope and its relief features. The elevation ranges from 517 to 533 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). Maximum of 424 mm precipitation takes place during south–west monsoon period from June to September, north-east monsoon contributes about 161 mm and prevails from October to early December and the remaining 77 mm takes place during the rest of the year. The winter season is from December to February. During April and May, the temperatures reach up to 45°C and in December and January, the temperatures will go down to 16°C. Rainfall distribution is shown in Figure 2.3.

**Table 2.1 Mean Monthly Rainfall, PET, 1/2 PET at Koppal Taluk & 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** | |

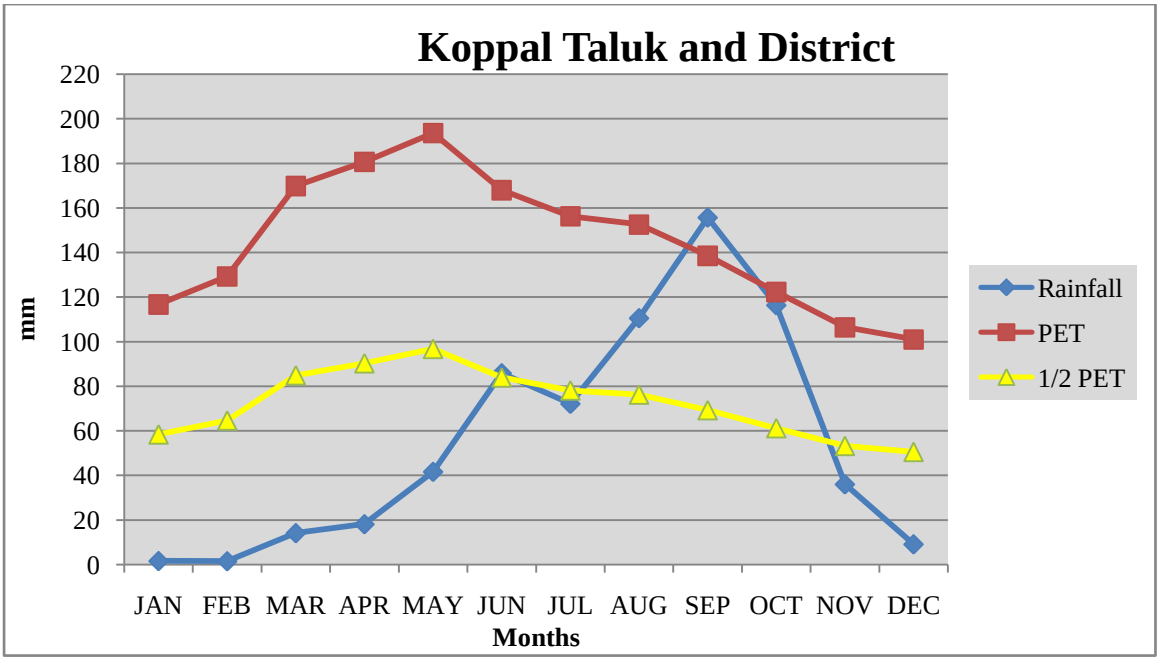



Fig. 2.3 Rainfall distribution in Koppal Taluk and District

The average Potential Evapo Transpiration (PET) is 144 mm and varies from a low of 50 mm in December to 97 mm in the months of September and October. The PET is always higher than precipitation in all the months except in the month of December. Generally, the Length of crop Growing Period (LGP) is <90 days and starts from 2$^{nd}$ week of August to 2$^{nd}$ week of November.

**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.

Apart from the continuing deforestation, the presence of large population of goats, sheep and other cattle in the micowatershed 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.

## 2.7 Land Utilization

About 91 per cent area (Table 2.2) in Koppal district is cultivated at present and about 16 per cent of the area is sown more than once. An area of about 3 per cent is currently barren. Forests occupy a small area of about 5.3 per cent and the tree cover is in a very poor state. Most of the mounds, ridges and bouldery areas have very poor vegetative cover. Major crops grown in the area are sorghum, maize, cotton, safflower, sunflower, red gram, horse gram, onion, mulberry, pomegranate, sugarcane, bengalgram and groundnut. 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 Bisarahalli-1Microwatershed is presented in Fig.2.4.

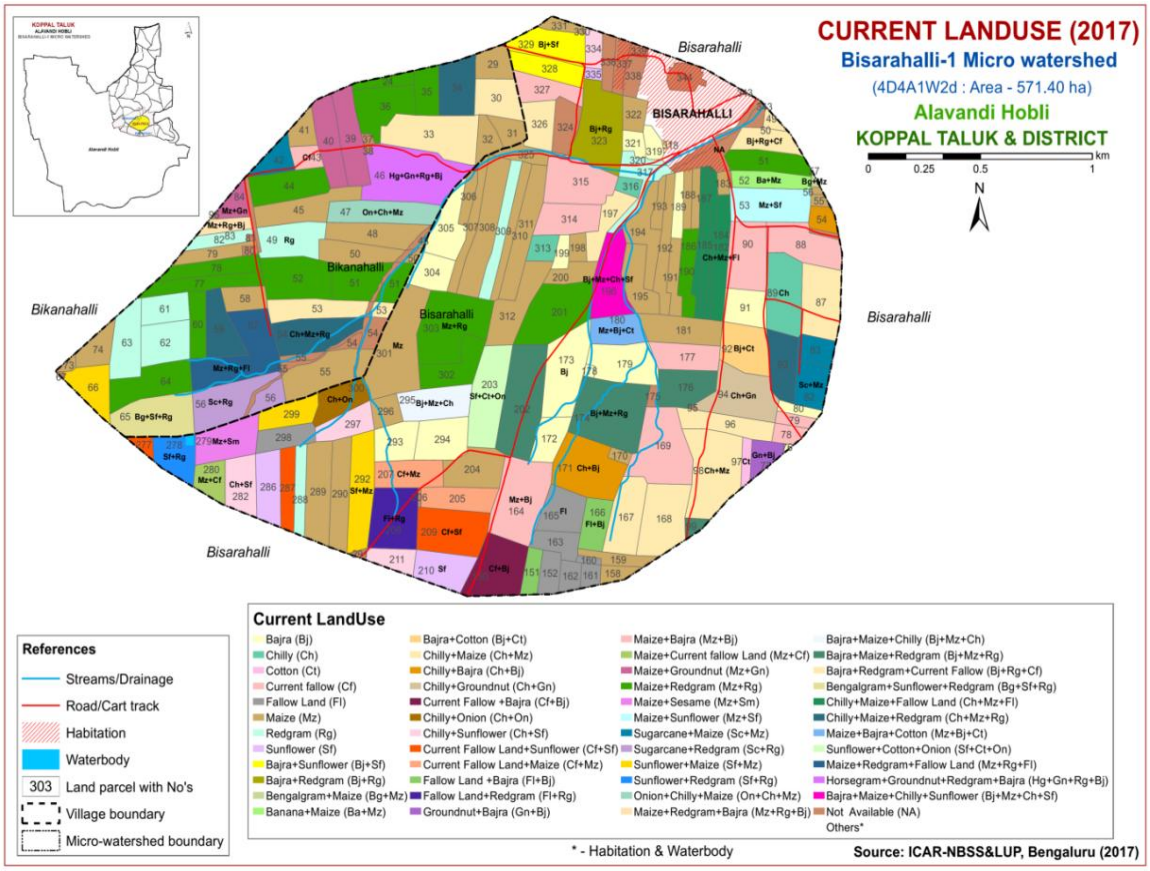



Fig.2.4 Current Land Use – Bisarahalli-1Microwatershed

Simultaneously, enumeration of existing wells (bore wells and open wells) and other soil and water conservation structures in the microwatershed is made and their location in different survey numbers is located on the cadastral map. Map showing the location of wells, soil conservation structures and other water bodies in Bisarahalli-1 Microwatershed is given Fig.2.5. The different crops and cropping systems adopted in the microwatershed is presented in the Figure 2.6.

**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 | Forest | 29451 | 5.33 |
| 6 | Cultivable wasteland | 2568 | 0.46 |
| 7 | Permanent Pasture land | 14675 | 2.66 |
| 8 | Barren land | 16627 | 3.01 |
| 9 | Non agricultural land | 40591 | 7.35 |
| 10 | Current fallow | 19660 | 3.56 |

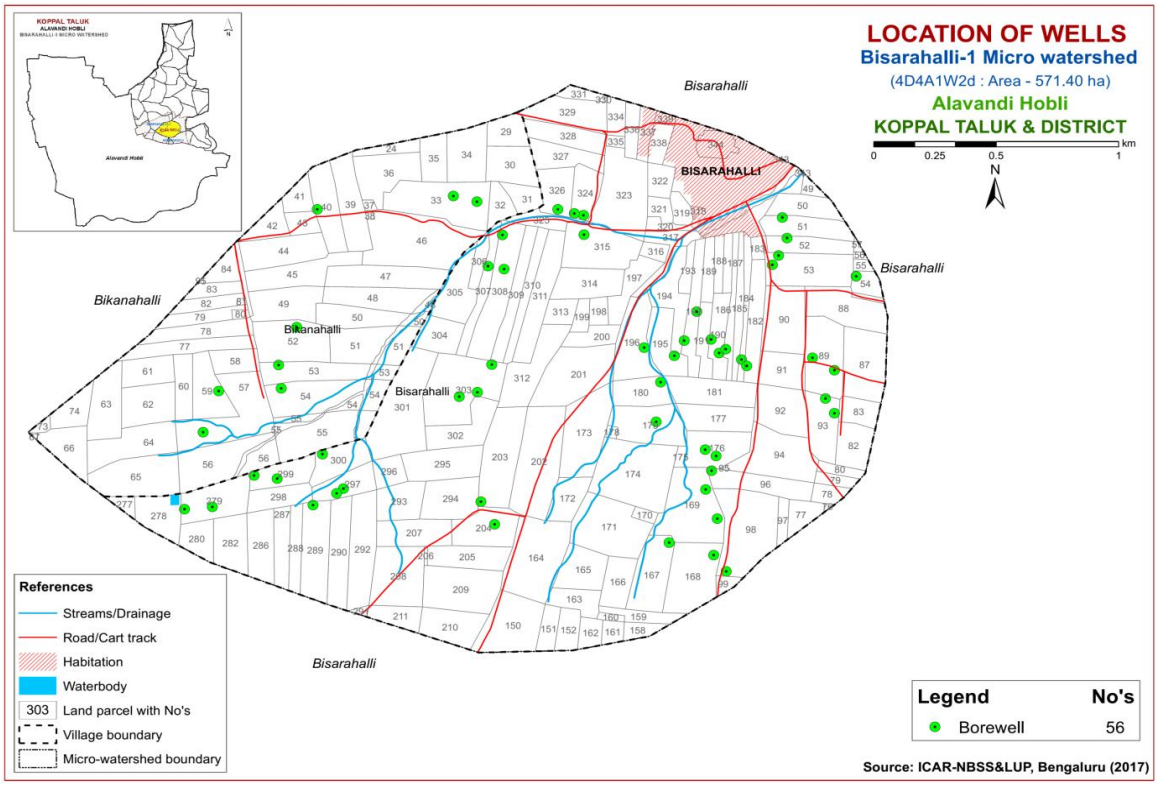



Fig.2.5 Location of wells and conservation structures- Bisarahalli-1 Microwatershed


Fig.2.6 Different crops and cropping systems in Bisarahalli-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 to a given level of management. This was achieved in Bisarahalli-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 (slope, erosion, drainage, occurrence of rock fragments etc.) and followed by grouping of similar areas based on soil-site characteristics into homogeneous (management units) units and showing their extent and geographic distribution on the microwatershed cadastral map. The detailed soil survey at 1:7920 scale was carried out in 571 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 as a base. The cadastral map shows field boundaries with their survey numbers, location of tanks, streams and other permanent features of the area (Fig. 3.1). Apart from the cadastral map, remote sensing data products from Cartosat-1 and LISS IV merged at the scale of 1:7920 were used in conjunction with the cadastral map to identify the 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 ranite gneiss and alluvium landscape and is divided into landforms such as ridges, mounds and uplands based on slope. They were further subdivided into physiographic/ image interpretation units based on image characteristics. The image interpretation legend for physiography is given below.

**Image Interpretation Legend for Physiography**

**G- Granite gneiss landscape**

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

**DSe Alluvial plains**

**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

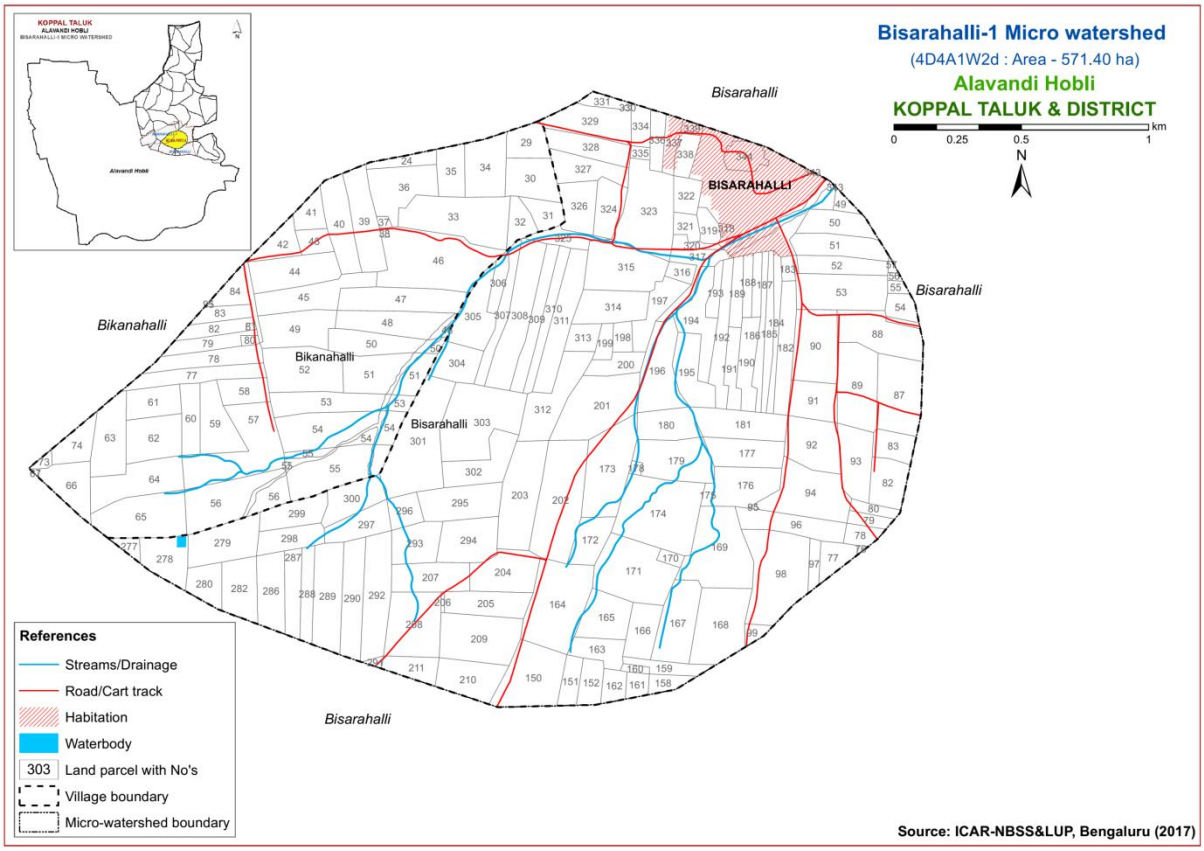



Fig 3.1 Scanned and Digitized Cadastral map of Bisarahalli-1 Microwatershed

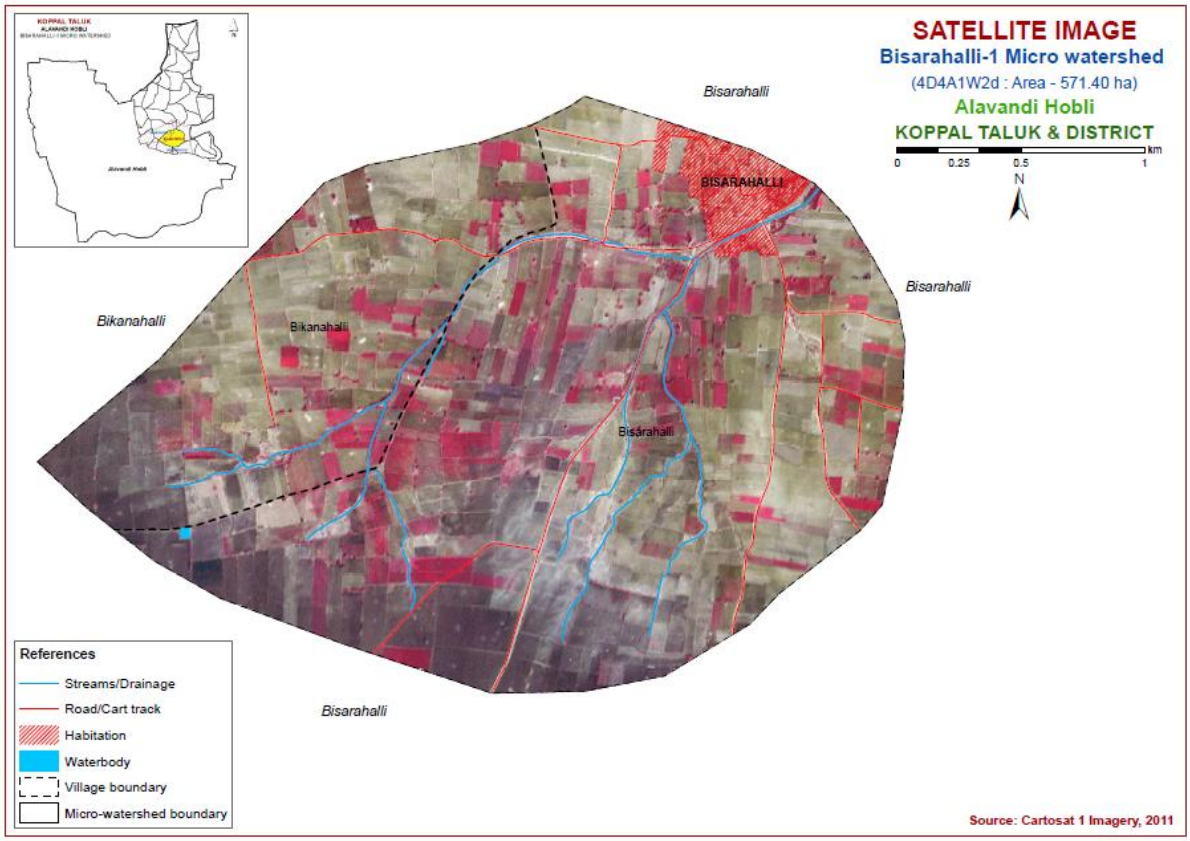



Fig.3.2 Satellite Image of Bisarahalli-1 Microwatershed

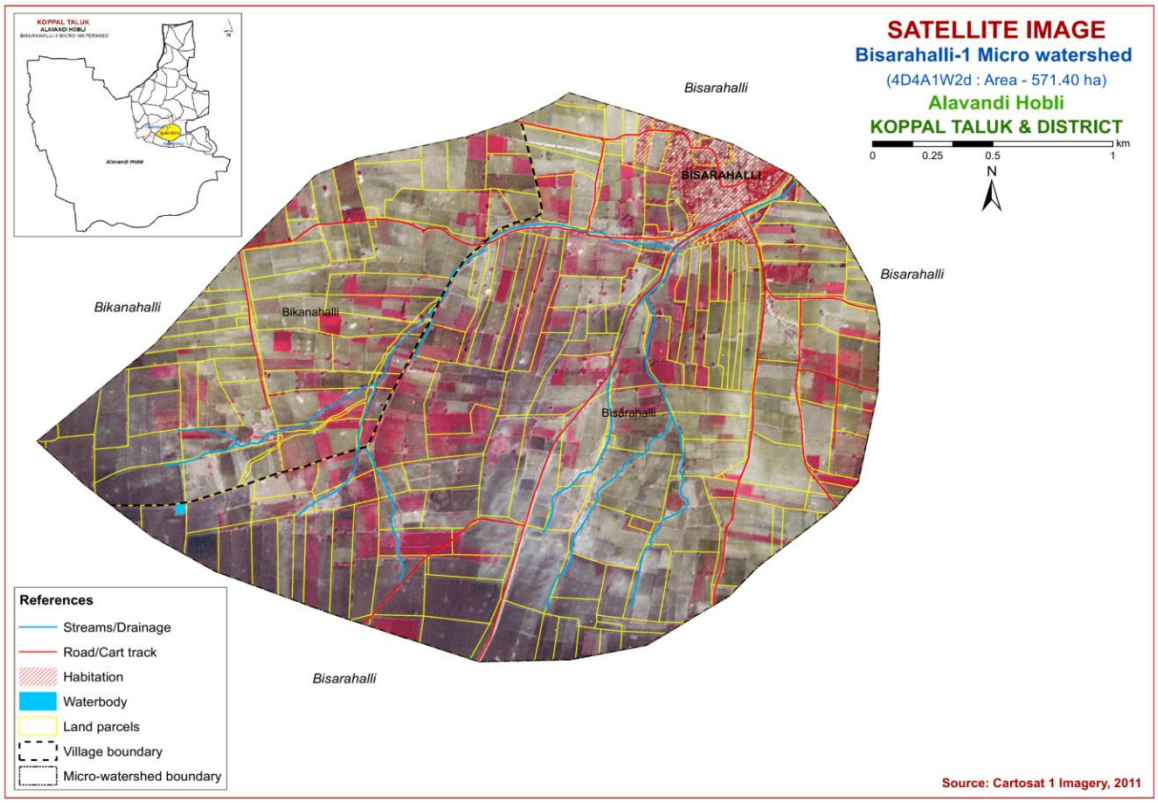



Fig.3.3 Cadastral map overlaid on IRS PAN+LISS IV merged imagery of Bisarahalli-1 Microwatershed

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

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

transect study, profiles were also studied at random, almost like in a grid pattern, outside the transect areas to validate the soil map unit boundariers.

Based on the soil characteristics, the soils were grouped into different soil series. Soil series is the most homogeneous unit having similar horizons and properties and behaves similarly for a given level of management. Soil depth, texture, colour, kind of horizon and horizon sequence, amount and nature of gravel present, 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, 14 soil series were identified in Bisarahalli-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** | **Texture** | **Gravel (%)** | **Horizon sequence** | **Calcareo-usness** |
| 1 | Chikkasavanur (CSR) | 25-50 | 7.5YR3/2,3/3,3/4 | scl | <15 | Ap-Bw-Cr | - |
| 2 | Kethanapura (KTP) | 50-75 | 2.5YR3/4, 3/6 | scl | 15-35 | Ap-Bt-Cr | - |
| 3 | Mukhadahalli (MKH) | 50-75 | 5YR3/3,3/4,4/3, 5/4, 6/6 2.5YR3/4 | scl | >35 | Ap-Bt-Cr | - |
| 4 | Hatti (HTI) | 50-75 | 5YR3/3,3/4 | sc | 15-35 | Ap-Bt-Cr | - |
| 5 | Gollarahatti (GHT) | 75-100 | 2.5YR3/4,4/6 | scl | 15-35 | Ap-Bt-Cr | - |
| 6 | Bisarahalli (BSR) | 75-100 | 5YR3/3,3/4 | sc | 15-35 | Ap-Bt-Cr | - |
| 7 | Bidanagere (BDG) | 75-100 | 5YR3/3,3/4,4/3, 5/4,6/6 2.5YR3/4 | sc | >35 | Ap-Bt-Cr | - |
| 8 | Kumchahalli (KMH) | 100-150 | 2.5YR3/4, 3/6 | scl-sc | <15 | Ap-Bt-Cr | - |
| 9 | Balapur (BPR) | 100-150 | 2.5YR2.5/4,3/4 | sc-c | 15-35 | Ap-Bt-Cr | - |
| 10 | Niduvalalu (NDL) | >150 | 7.5YR3/2,3/3,3/4 | sc | 15-35 | Ap-Bt-Cr | - |
| **Soils of Alluvial Landscape** | | | | | | | |
| 11 | Muttal (MTL) | 25-50 | 10YR3/2,3/3,4/2 7.5YR3/2,3/3,6/4 | sc-c | 15-35 | Ap-Bw-Ck | e-ev |
| 12 | Ravanaki (RNK) | 50-75 | 7.5YR3/2,3/3,5/2,5/3 10YR3/1,3/2,4/2,5/1,6/1 | sc-c | - | Ap-Bw-Cr | e-ev |
| 13 | Dambarahalli (DRL) | 75-100 | 10YR2/1,3/1,4/3 | c | - | Ap-Bw-Ck | e-es |
| 14 | Gatareddihal (GRH) | 100-150 | 10YR2/1,3/1 2.5Y4/3,5/4 | c | | Ap-Bw-BC-C | e |

### 3.4 Laboratory Characterization

Soil samples were collected from representative master profiles for laboratory characterization by following the methods outlined in the Laboratory Manual (Sarma *et al*, 1987). Surface soil samples collected from Bisarahalli and part of Bikanahalli farmer's fields (57 samples) for fertility status (major and micronutrients) at 250 m grid interval was analyzed in the laboratory (Katyal and Rattan, 2003). By linking the soil fertility data to the survey numbers through GIS, soil fertility maps were generated using kriging method for the microwatershed.

### 3.5 Finalization of Soil Maps

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.3.4) in the form of symbols. During the survey about 9 soil profile pits, few minipits and a few auger bores representing different landforms occurring in the microwatershed were studied. All the profile locations are indicated on the village cadastral map in the form of a triangle. In addition to the profile study, spot observations in the form of minipits, road cuts, terrace cuts etc., were studied to validate the soil boundaries on the soil map.

The soil map shows the geographic distribution of 21 mapping units representing 14 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 21 phases mapped in the microwatershed. Each mapping unit (soil phase) delineated on the map has similar soil and site characteristics. In other words, all the farms or survey numbers included in one phase will have similar management needs and have to be treated accordingly.

The 21 soil phases identified and mapped in the microwatershed were regrouped into 9 Land Use Classes (LUC's) for the purpose of preparing a proposed crop plan for sustained development of the microwatershed. The database (soil phases) generated under LRI was utilized for identifying Land Use Classes (LUC's) based on the management needs. One or more than one soil site characteristic having influence on the management have been choosen for identification and delineation of LUCs. For Bisarahalli-1 Microwatershed, five soil and site characteristics, namely soil depth, soil texture, slope, erosion and gravel content have been considered for defining LUCs. The land use classes are expected to behave similarly for a given level of management.

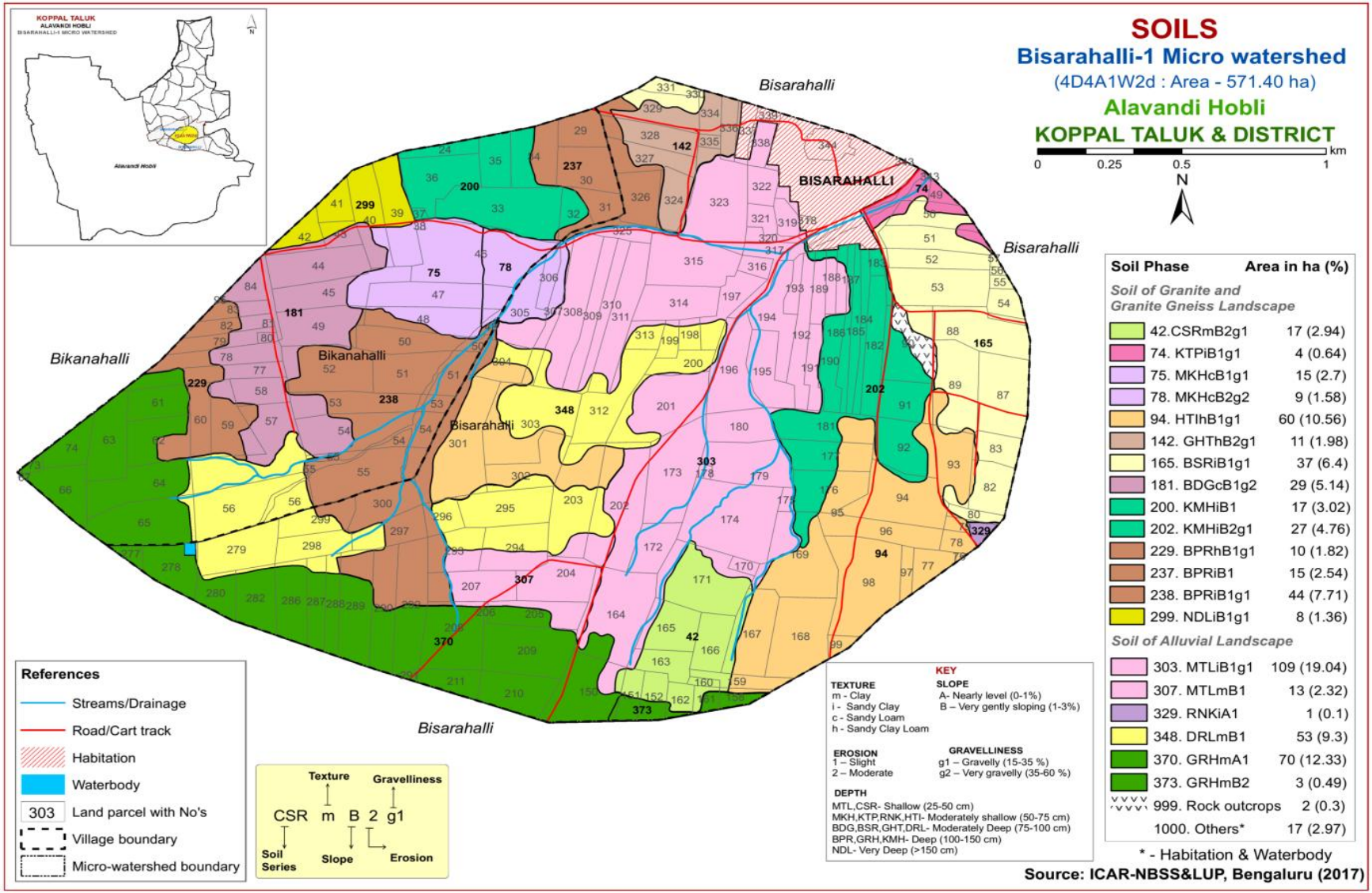



Fig 3.4 Soil Phase or Management Units- Bisarahalli-1 Microwatershed

**Table 3.2 Soil map unit description of Bisarahalli-1 Microwatershed**

| Sl. No. | Soil Series | Soil Phases | Mapping Unit description | Area in ha (%) |
|---|---|---|---|---|
| **SOILS OF GRANITE GNEISS LANDSCAPE** | | | | |
| | CSR | Chikkasavanur soils are shallow (25-50 cm), well drained, have dark brown to light yellowish brown, red sandy clay loam soils occurring on gently sloping uplands under cultivation | | **17 (2.94)** |
| 42 | | CSRmB2g1 | Clay surface, slope 1-3%, moderate erosion, gravelly (15-35%) | 17 (2.94) |
| | KTP | Kethanapura soils are moderately shallow (50-75 cm), well drained, have dark reddish brown gravelly red sandy clay loam soils occurring on very gently sloping uplands under cultivation | | **4 (0.64)** |
| 74 | | KTPiB1g1 | Sandy clay surface, slope 1-3%, slight erosion, gravelly (15-35%) | 4 (0.64) |
| | MKH | Mukhadahalli soils are moderately shallow (50-75 cm), well drained, have dark brown to reddish brown gravelly red sandy clay loam soils occurring on gently sloping uplands under cultivation | | **24 (4.28)** |
| 75 | | MKHcB1g1 | Sandy loam surface, slope 1-3%, slight erosion, gravelly (15-35%) | 15 (2.7) |
| 78 | | MKHcB2g2 | Sandy loam surface, slope 1-3%, moderate erosion, very gravelly (35-60%) | 9 (1.58) |
| | HTI | Hatti soils are moderately shallow (50-75 cm), well drained, have dark reddish brown gravelly red sandy clay soils occurring on very gently sloping uplands under cultivation | | **60 (10.56)** |
| 94 | | HTIiB1g1 | Sandy clay surface, slope 1-3%, slight erosion, gravelly (15-35%) | 60 (10.56) |
| | GHT | Gollarahatti soils are moderately deep (75-100 cm), well drained, have dark reddish brown to dark red gravelly sandy clay loam soils occurring on very gently sloping uplands under cultivation | | **11 (1.98)** |
| 142 | | GHThB2g1 | Sandy clay loam surface, slope 1-3%, moderate erosion, gravelly (15-35%) | 11 (1.98) |
| | BSR | Bisarahalli soils are moderately deep (75-100 cm), well drained, have dark reddish brown gravelly red sandy clay soils occurring on very gently sloping uplands under | | **37 (6.4)** |

| | | | | |
|---|---|---|---|---|
| | | cultivation | | |
| 165 | | BSRiB1g1 | Sandy clay surface, slope 1-3%, slight erosion, gravelly (15-35%) | 37 (6.4) |
| | BDG | Bidanagere soils are moderately deep (75-100 cm), well drained, have dark reddish brown gravelly red sandy clay loam to sandy clay soils occurring on very gently sloping uplands under cultivation | | **29 (5.14)** |
| 181 | | BDGcB1g2 | Sandy loam surface, slope 1-3%, slight erosion, very gravelly (35-60%) | 29 (5.14) |
| | KMH | Kumchahalli soils are deep (100-150cm), well drained, have dark reddish brown to dark red sandy clay loam to sandy clay red soils occurring on very gently sloping uplands under cultivation | | **44 (7.78)** |
| 200 | | KMHiB1 | Sandy clay surface, slope 1-3%, slight erosion | 17 (3.02) |
| 202 | | KMHiB2g1 | Sandy clay surface, slope 1-3%, moderate erosion, gravelly (15-35%) | 27 (4.76) |
| | BPR | Balapur soils are deep (100-150 cm), well drained, have dark reddish brown to dark red gravelly sandy clay to clay soils occurring on very gently sloping uplands under cultivation | | **69 (12.07)** |
| 229 | | BPRhB1g1 | Sandy clay loam surface, slope 1-3%, slight erosion, gravelly (15-35%) | 10 (1.82) |
| 237 | | BPRiB1 | Sandy clay surface, slope 1-3%, slight erosion | 15 (2.54) |
| 238 | | BPRiB1g1 | Sandy clay surface, slope 1-3%, slight erosion, gravelly (15-35%) | 44 (7.71) |
| | NDL | Niduvalalu soils are very deep (>150 cm), well drained, have red to dark reddish brown gravelly red sandy clay soils occurring on very gently sloping uplands under cultivation | | **8 (1.36)** |
| 299 | | NDLiB1g1 | Sandy clay surface, slope 1-3%, slight erosion, gravelly (15-35%) | 8 (1.36) |
| **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 sandy clay to clay soils occurring on gently to very gently sloping plains under cultivation | | **122 (21.36)** |
| 303 | | MTLiB1g1 | Sandy clay surface, slope 1-3%, slight erosion, gravelly (15-35%) | 109 (19.04) |

| | | | | |
|---|---|---|---|---|
| 307 | | MTLmB1 | Clay surface, slope 1-3%, slight erosion | 13 (2.32) |
| | RNK | Ravanaki soils are moderately shallow (50-75 cm), moderately well drained, have dark brown to very dark grayish brown and dark gray, calcareous gravelly sandy clay to clay black soils occurring on very gently sloping uplands under cultivation | | **1 (0.1)** |
| 329 | | RNKiA1 | Sandy clay surface, slope 0-1%, slight erosion | 1 (0.1) |
| | 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 uplands under cultivation | | **53 (9.3)** |
| 348 | | DRLmB1 | Clay surface, slope 1-3%, slight erosion | 53 (9.3) |
| | GRH | Gatareddihal soils are deep (100-150 cm), moderately well drained, have light olive brown to very dark gray, calcareous black cracking clay soils occurring on very gently sloping uplands under cultivation | | **73 (12.82)** |
| 370 | | GRHmA1 | Clay surface, slope 0-1%, slight erosion | 70 (12.33) |
| 373 | | GRHmB2 | Clay surface, slope 1-3%, moderate erosion | 3 (0.49) |
| 999 | | Rock outcrops | Rock lands, both massive and bouldery | 2 (0.3) |
| 1000 | | Habitation & Waterbody | | 17 (3.0) |

*Chapter 4*

# THE SOILS

Detailed information pertaining to the nature, extent and distribution of different kinds of soils occurring in Bisarahalli-1 Microwatershed is provided in this chapter. The microwatershed area has been identified as Granite gnesis and Alluvium Landscapes based on geology. In all, 14 soil series are identified. Soil formation is the result of the combined effect of environmental and terrain factors that are reflected in soil morphology. The soil formation is dominantly influenced by the parent material, climate and relief.

A brief description of each of the 14 soil series identified followed by 21 soil phases (management units) mapped under each series (Fig. 3.4) are furnished below. The soils in any one map unit differ from place to place in their depth, texture, slope, gravelliness, erosion or any other site characteristic that affect management. The soil phase map can be used for identifying the suitability of areas for growing specific crops or for other alternative uses and also for deciding the type of conservation structures needed. The detailed information on soil and site-characteristics like soil depth, surface soil texture, slope, erosion, gravelliness, AWC, LCC etc, with respect to each of the soil phase identified is given village/survey number wise for the microwatershed in Appendix-I.

## 4.1 Soils of Granite Gneiss and Alluvial Landscape

In this landscape, 10 soil series are identified and mapped. Of these, Balapur (BPR) soil series occupies maximum area of about 69 ha (12%) and Hatti (HTI) 60 ha (11%) area. The brief description of each soil series and their phases identified in the microwatershed are given below.

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

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

Only one phase was identified and mapped:

| | |
|---|---|
| CSRmB2g1 | Clay surface, slope 1-3%, moderate erosion, gravelly (15-35%) |

Landscape and soil profile characteristics of Chikkasavanur (CSR) Series

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

The thickness of the solum ranges from 53 to 72 cm. The thickness of A horizon ranges from 11 to 16 cm. Its colour is in 5YR and 2.5 YR hue with value 3 to 4 and chroma 3 to 6. The texture varies from loamy sand to sandy clay loam with 15 to 40 per cent gravel. The thickness of B horizon varies from 41 to 56 cm. Its colour is in 2.5 YR hue with value 3 and chroma 4 to 6. Texture is dominantly sandy clay loam with 15 to 35 per cent gravel. The available water capacity is medium (100-150 mm/m).

Only one phase was identified and mapped:

| | |
|---|---|
| KTPiB1g1 | Sandy clay surface, slope 1-3%, slight erosion, gravelly (15-35%) |

Landscape and soil profile characteristics of Kethanapura (KTP) Series

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

The thickness of the solum ranges from 51 to 72 cm. The thickness of A horizon ranges from 12 to 17 cm. Its colour is in 5 YR and 7.5 YR hue with value 3 to 4 and chroma 2 to 4. The texture varies from loamy sand to sandy loam with 20 to 45 per cent gravel. The thickness of B horizon ranges from 40 to 58 cm. Its colour is in 2.5 YR and 5 YR hue with value and chroma 3 to 6. Texture is sandy clay loam to sandy clay with 35 to 50 per cent gravel. The available water capacity is low (50-100 mm/m).

Two phases were identified and mapped:

| | |
|---|---|
| MKHcB1g1 | Sandy loam surface, slope 1-3%, slight erosion, gravelly (15-35%) |
| MKHcB2g2 | Sandy loam surface, slope 1-3%, moderate erosion, very gravelly (35-60%) |

Landscape and soil profile characteristics of Mukhadahalli (MKH) Series

**4.1.4 Hatti (HTI) Series:** Hatti soils are moderately shallow (50-75cm), well drained, have dark reddish brown gravelly sandy clay soils. They are developed from weathered granite gneiss and occur on very gently sloping uplands under cultivation.

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

Only one phase was identified and mapped:

| | |
|---|---|
| HTIiB1g1 | Sandy clay surface, slope 1-3%, slight erosion, gravelly (15-35%) |


Landscape and soil profile characteristics of Hatti (HTI) Series.

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

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

Only one phase was identified and mapped:

| | |
|---|---|
| GHThB2g1 | Sandy clay loam surface, slope 1-3%, moderate erosion, gravelly (15-35%) |

Landscape and soil profile characteristics of Gollarahatti (GHT) Series

**4.1.6 Bisarahalli (BSR) Series:** Bisarahalli soils are moderately deep (75-100 cm), well drained, have dark reddish brown gravelly sandy clay soils. They have developed from weathered granite gneiss and occur on very gently sloping uplands under cultivation.

The thickness of the solum ranges from 75 to 98 cm. The thickness of A horizon ranges from 17 to 25 cm. Its colour is in 5 YR hue with value 3 to 4 and chroma 3 to 6. The texture varies from sandy clay loam to sandy clay with 15 to 35 per cent gravel. The thickness of B horizon ranges from 61 to 79 cm. Its colour is in 5 YR hue with value 3

and chroma 3 to 4. Its texture is gravelly sandy clay with gravel content of 15-35 per cent. The available water capacity is low (50-100 mm/m).
Only one phase was identified and mapped:

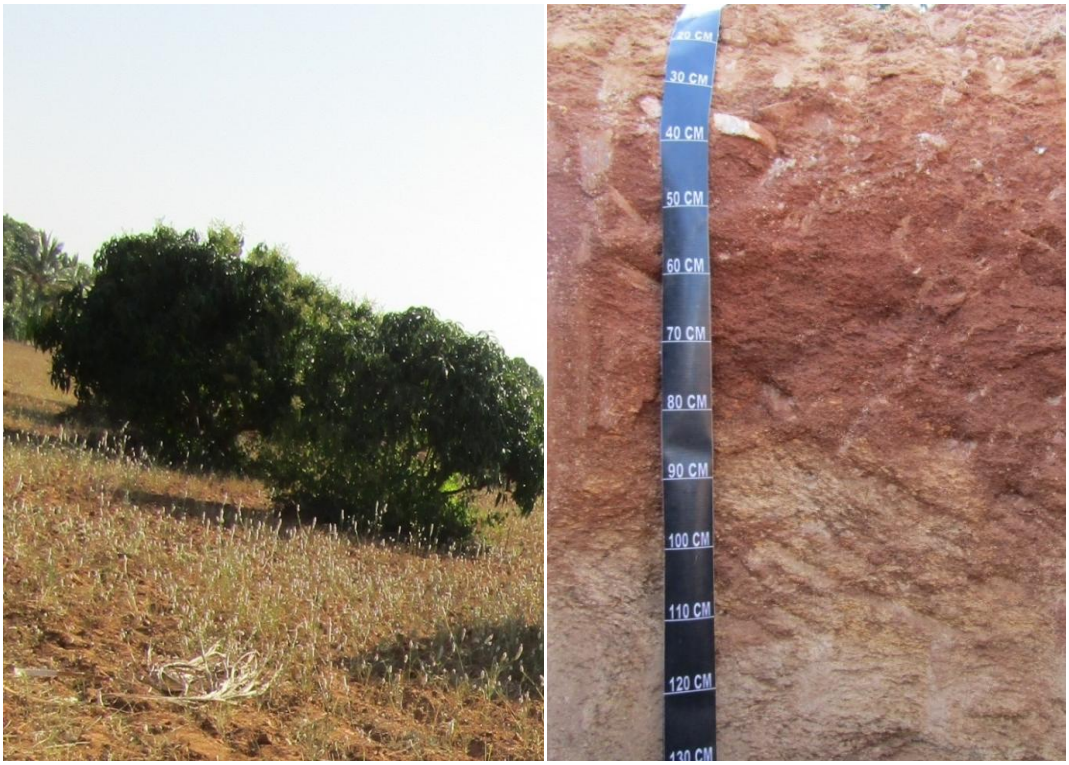
| | |
|---|---|
| BSRiB1g1 | Sandy clay surface, slope 1-3%, slight erosion, gravelly (15-35%) |

Landscape and soil profile characteristics of Bisarahalli (BSR) Series.

**4.1.7 Bidanagere (BDG) Series:** Bidanagere soils are moderately deep (75-100 cm), well drained, have dark reddish brown gravelly sandy clay loam to sandy clay soils. They have developed from weathered granite gneiss and occur on very gently sloping uplands under cultivation.

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

| | |
|---|---|
| BDGcB1g2 | Sandy loam surface, slope 1-3%, slight erosion, very gravelly (35-60%) |



Landscape Soil Profile Characteristics of Bidanagere (BDG) Series

**4.1.8 Kumchahalli (KMH) Series:** Kumchahalli soils are deep (100-150cm), well drained, have dark reddish brown to dark red sandy clay loam to sandy clay soils. They have developed from granite gneiss and occur on nearly level to very gently sloping uplands. The Kumchahalli series has been tentatively 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. The available water capacity is high (150-200 mm/m). Two phases were identified and mapped:

| | |
|---|---|
| KMHiB1 | Sandy clay surface, slope 1-3%, slight erosion |
| KMHiB2g1 | Sandy clay surface, slope 1-3%, moderate erosion, gravelly (15-35%) |

Landscape and soil profile characteristics of Kumchahalli (KMH) Series

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

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

Three phases were identified and mapped:

| | |
|---|---|
| BPRhB1g1 | Sandy clay loam surface, slope 1-3%, slight erosion, gravelly (15-35%) |
| BPRiB1 | Sandy clay surface, slope 1-3%, slight erosion |
| BPRiB1g1 | Sandy clay surface, slope 1-3%, slight erosion, gravelly (15-35%) |

Landscape and soil profile characteristics of Balapur (BPR) Series

**4.1.10 Niduvalalu (NDL) Series:** Niduvalalu soils are very deep (>150 cm), well drained, have dark red and dark reddish brown sandy clay soils. They have developed from granite gneiss and occur on nearly level to very gently sloping uplands under cultivation.

The thickness of the solum is more than 150 cm. The thickness of A-horizon ranges from 11 to 15 cm. Its colour is in 5 YR hue with value 3 to 4 and chroma 4 to 6. The texture varies from sandy loam to sandy clay loam with 10 to 30 per cent gravel. The thickness of B-horizon ranges from 150 to 160 cm. Its colour is in 2.5 YR and 5 YR hue with value 2.5 to 4 and chroma 4 to 6. Its texture is sandy clay and ranges from sandy loam to sandy clay loam with 20 to 75 per cent gravel. The available water capacity is low (50-100 mm/m).

Only one phase was identified and mapped:

| | |
|---|---|
| NDLiB1g1 | Sandy clay surface, slope 1-3%, slight erosion, gravelly (15-35%) |

Landscape Soil Profile Characteristics of Niduvalalu (NDL) Series

**4.2 Soils of Alluvial Landscape**

In this landscape, 4 soil series are identified and mapped. Muttal (MTL) series occupies major area of about 122 ha (21%) followed by Gatareddihal (GRH) 73 ha (13%). The brief description of each 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 sandy clay to clay soils. They have developed from granite gneiss and occur on nearly level to very gently sloping uplands. The Muttal series has been tentatively classified as a member of the fine, mixed (calcareous), isohyperthermic family of Typic Haplusterts.

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 with gravel content of 15 to 35 per cent. The available water capacity is low (50-100 mm/m).

Two phases were identified and mapped:

| | |
|---|---|
| MTLiB1g1 | Sandy clay surface, slope 1-3%, slight erosion, gravelly (15-35%) |
| MTLmB1 | Clay surface, slope 1-3%, slight erosion |


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 sandy clay to clay soils. They have developed from granite gneiss and occur on nearly level to very gently sloping uplands.

The thickness of the solum ranges from 55 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 15 to 35 per cent. The available water capacity is low (51-100 mm/m).

Only one phase was identified and mapped:

| | |
|---|---|
| RNKiA1 | Sandy clay surface, slope 0-1%, slight erosion |

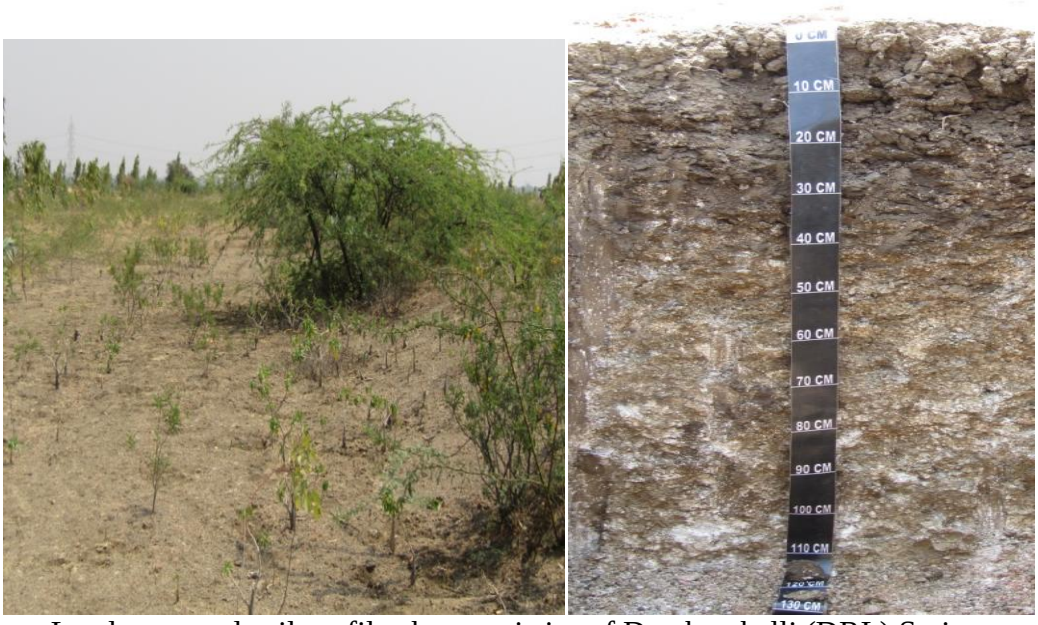

Landscape and Soil Profile Characteristics of Ravanaki (RNK) Series

**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 clay soils. They have developed from weathered granite gneiss and occur on very gently to gently sloping uplands under cultivation.

The thickness of the solum ranges from 78 to 98 cm. The thickness of A horizon ranges from 13 to 24 cm. Its colour is in 10 YR hue with value 3 to 4 and chroma 1 to 2. The texture is clay. The thickness of B horizon ranges from 54 to 85 cm. Its colour is in 10 YR hue with value 2 to 4 and chroma 1 to 3. Its texture is clay and are calcareous. The available water capacity is high (150-200 mm/m).

Only one phase was identified and mapped:

| | |
|---|---|
| DRLmB1 | Clay surface, slope 1-3%, slight erosion |



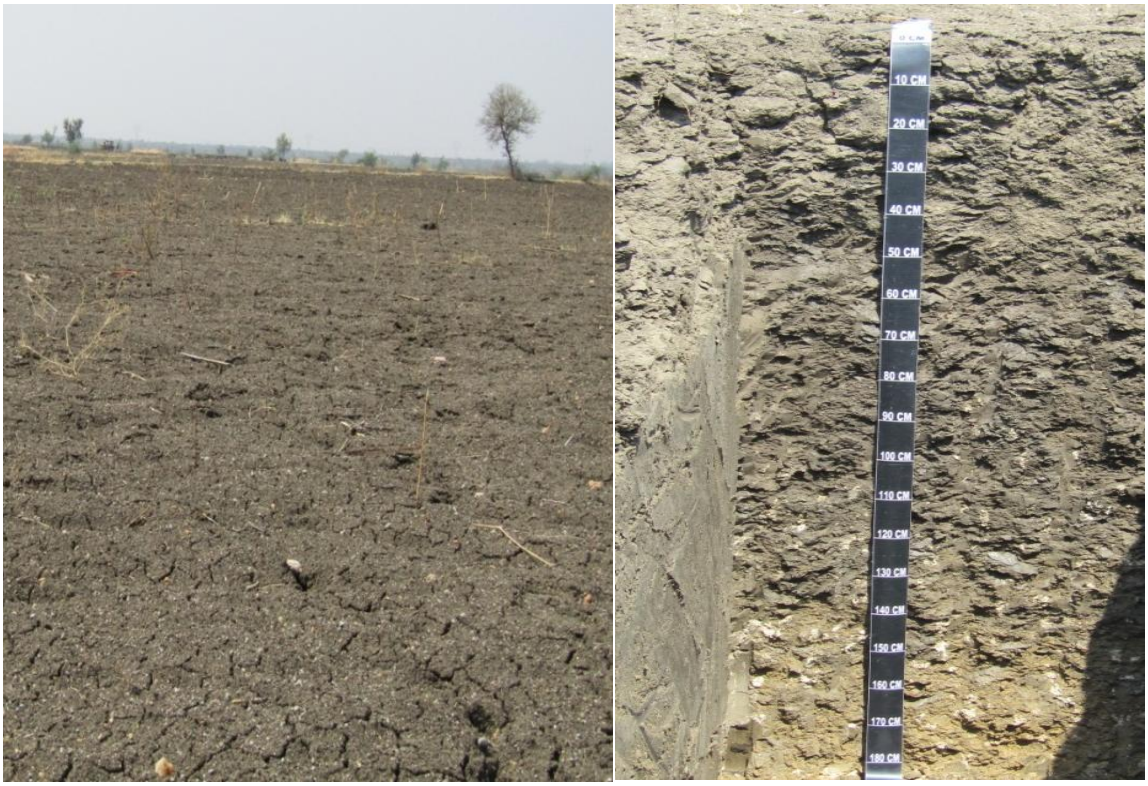

Landscape and soil profile characteristics of Dambarahalli (DRL) Series.

**4.2.4 Gattareddihal (GRH) Series:** Gatareddihal soils are deep (100-150 cm), moderately well drained, have black to dark grey and light olive brown clay soils. They are developed from weathered granite gneiss and occur on nearly level to very gently sloping uplands under cultivation.

The thickness of the solum ranges from 108 to 129 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 sandy clay to clay. The available water capacity is very high (>200 mm/m).

Two phases were identified and mapped:

| | |
|---|---|
| GRHmA1 | Clay surface, slope 0-1%, slight erosion |
| GRHmB2 | Clay surface, slope 1-3%, moderate erosion |




Landscape and soil profile characteristics of Gatareddihal (GRH) Series.

*Chapter 5*

# INTERPRETATION FOR LAND RESOURCE MANAGEMENT

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

## 5.1 Land Capability Classification

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

*Land characteristics*: Slope, erosion, drainage, rock outcrops.
*Climate*: Total rainfall and its distribution, and length of crop growing period.

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

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

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

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

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

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

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

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

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

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

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

The 21 soil map units identified in the Bisarahalli-1 microwatershed are grouped under two land capability classes and five land capability subclasses (Fig. 5.1).

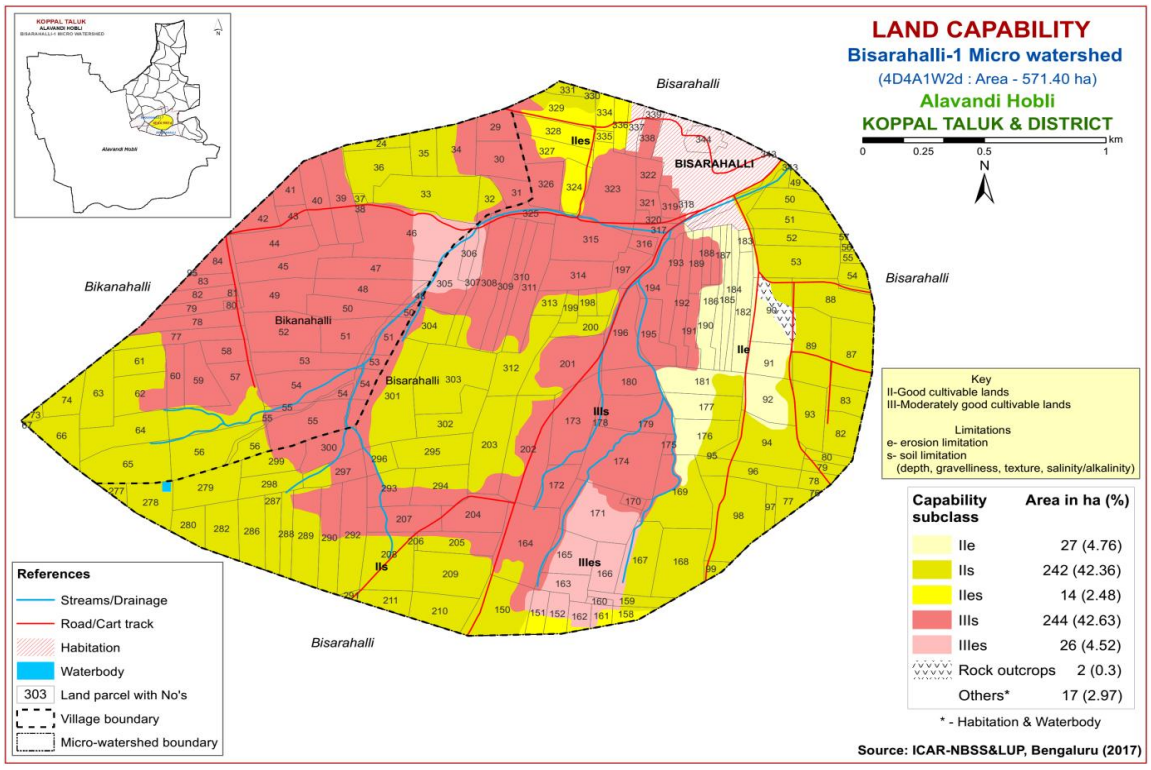



Fig. 5.1 Land Capability map of Bisarahalli-1 Microwatershed

An area of about 97 % in the microwatershed is suitable for agriculture and 3 % is not suitable for agriculture. Good cultivable lands (Class II) cover a maximum area of about 50 per cent and are distributed in the northern, southwestern, central and eastern part of the micowatershed with minor problems of soil and erosion. Moderately good cultivable lands (Class III) cover an area of about 47 per cent and are distributed in the northwestern, northern and central part of the microwatershed with moderate problems of erosion and soil. Rock outcrops and other miscellaneous areas cover about 19 ha (3%) that have very severe limitations that preclude them for any crop productivity, but well suited for wildlife, recreation and installation of wind mills.

## 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).

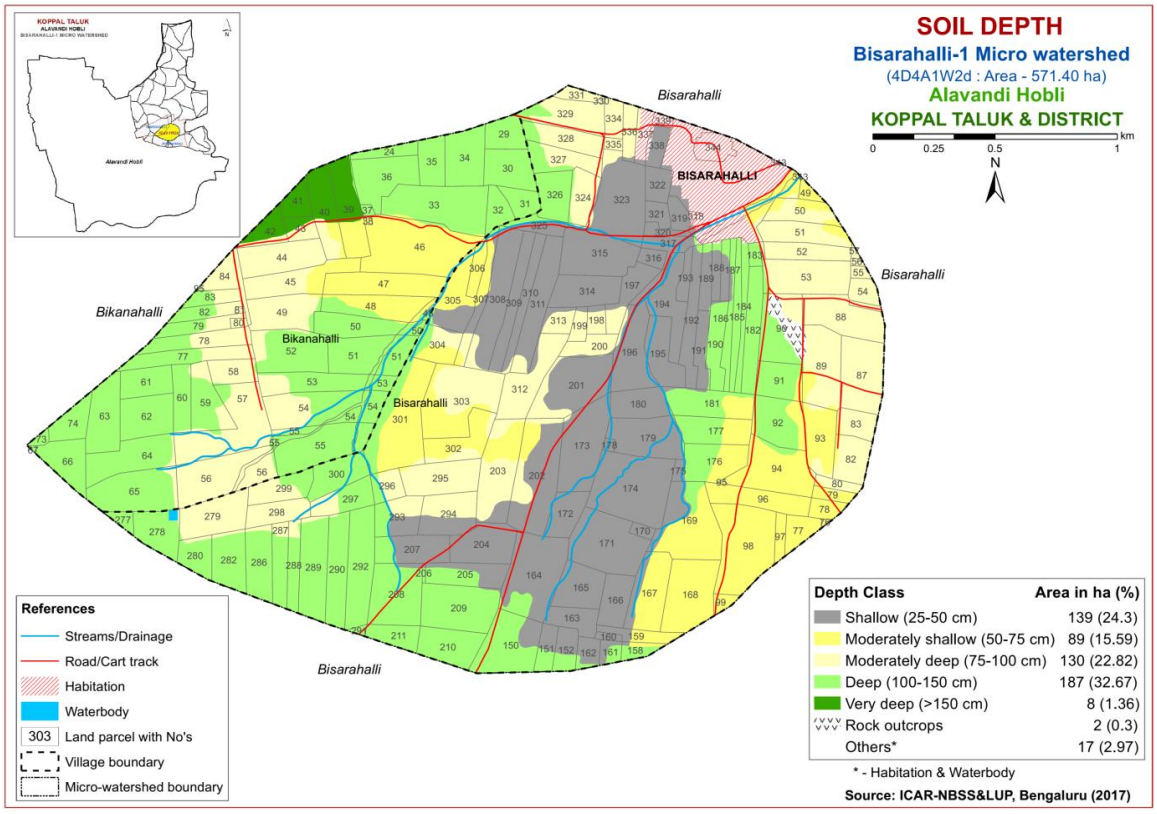



Fig. 5.2 Soil Depth map of Bisarahalli-1 Microwatershed

Shallow (25-50 cm) soils occupy an area of about 139 ha (24%) and are distributed in the northern, central and southern part of the microwatershed. Moderately shallow soils (50-75 cm) occupy an area of about 89 ha (16%) and occur in the southeastern and central part of the microwatershed. An area of about 130 ha (23%) is moderately deep (75-100 cm) and are distributed in the northwestern, central and northeastern part of the microwatershed. Deep (100-150 cm) soils occupy maximum area of about 187 ha (33%) and occur in the western, northwestern, southwestern and central part of the microwatershed. Very deep (>150 cm) soils occupy a small area of about 8 ha (1%) and are distributed in a small patch in the northwestern part of the microwatershed.

The most problem lands with a maximum area of about 228 ha (40%) having moderately shallow (<25 cm) and shallow (25-50 cm) rooting depth. They are not suitable for growing agricultural crops but well suited for pasture, forestry or other recreational purposes. Occasionally, short duration crops may be grown if rainfall is normal. The most productive lands cover about 195 ha (34%) where all climatically adopted long duration crops 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 behaviour, microbial activity and crop suitability.

An area of 136 ha (24%) has soils that are loamy at the surface and are distributed in the northwestern, northern, central and southeastern part of the microwatershed. Clayey soils occupy maximum area of about 417 ha (73%) and occur in all parts of the microwatershed (Fig. 5.3).

The most productive lands (97%) with respect to surface soil texture are the loamy and clayey soils that have high potential for soil-water retention and availability, and nutrient retention and availability, but have problems of drainage, infiltration, workability and other physical problems in clayey soils.

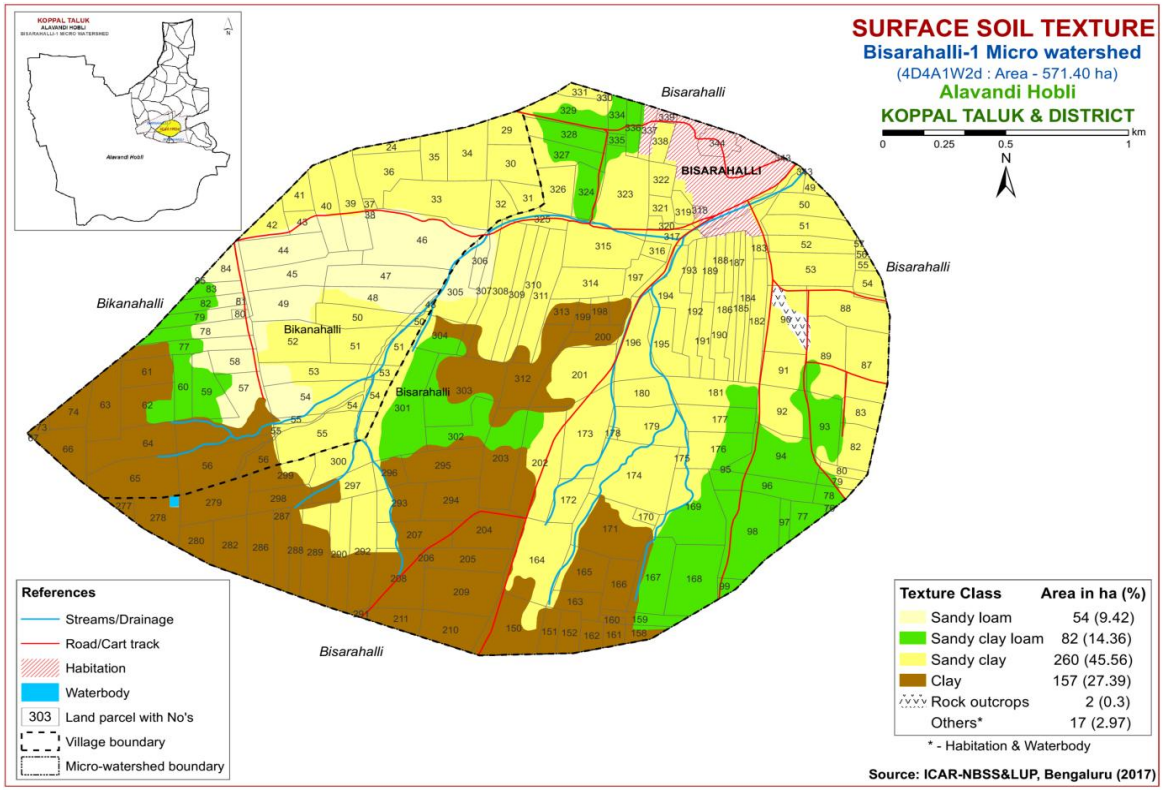



Fig. 5.3 Surface Soil Texture map of Bisarahalli-1 Microwatershed

## 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.

A small area of about 38 ha (7%) has soils that are very gravelly (35-60% gravel) and are distributed in the northwestern and central part of the microwatershed (Fig. 5.4). Maximum area of 342 ha (60%) is covered by gravelly (15-35% gravel) soils and are distributed in all parts of the microwatershed. The soils that are non-gravelly (<15% gravel) cover an area of about 172 ha (30%) and are distributed in the southwestern, central and northwestern part of the microwatershed.

The most productive lands with respect to nongravelliness are found to be 30%. They are non-gravelly with less than 15 per cent gravel and have potential for growing both annual and perennial crops. The problem soils (7%) that are very gravelly (35-60%) where only short duration crops can be grown.

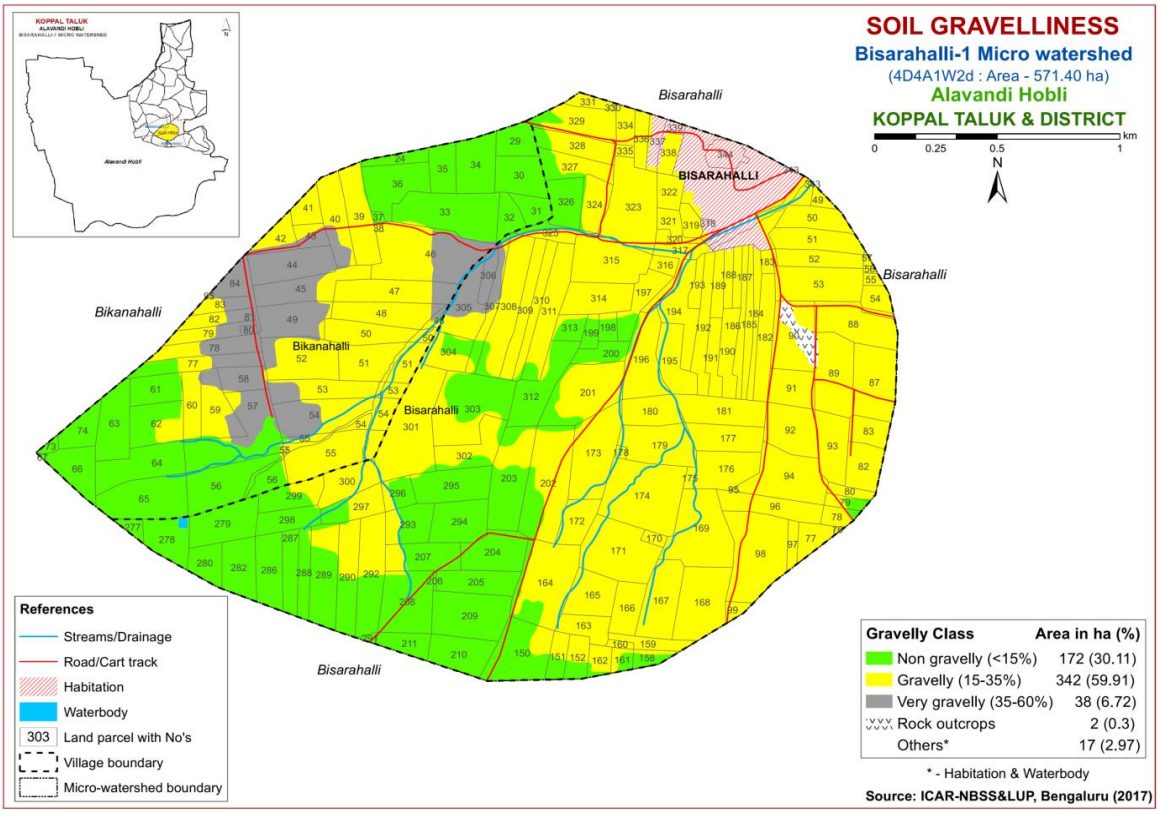



Fig. 5.4 Soil Gravelliness map of Bisarahalli-1 Microwatershed

## 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 (Fig. 5.5).

An area of about 71 ha (12%) in the microwatershed has soils that are very low (<50 mm/m) in available water capacity and are distributed in the northwestern and eastern parts of the microwatershed. Major area of about 311 ha (54%) has soils that are low (51-100 mm/m) in available water capacity and are distributed in all parts of the microwatershed. An area of about 98 ha (17%) area is medium (101-150 mm/m) in available water capacity and are distributed in the central and northwestern part of the microwateshed.

An area of about 382 ha (67%) in the microwatershed has soils that are problematic with regard to available water capacity. Here, only short or medium duration crops can be grown and the probability of crop failure is very high. These areas are best put to other alternative uses.

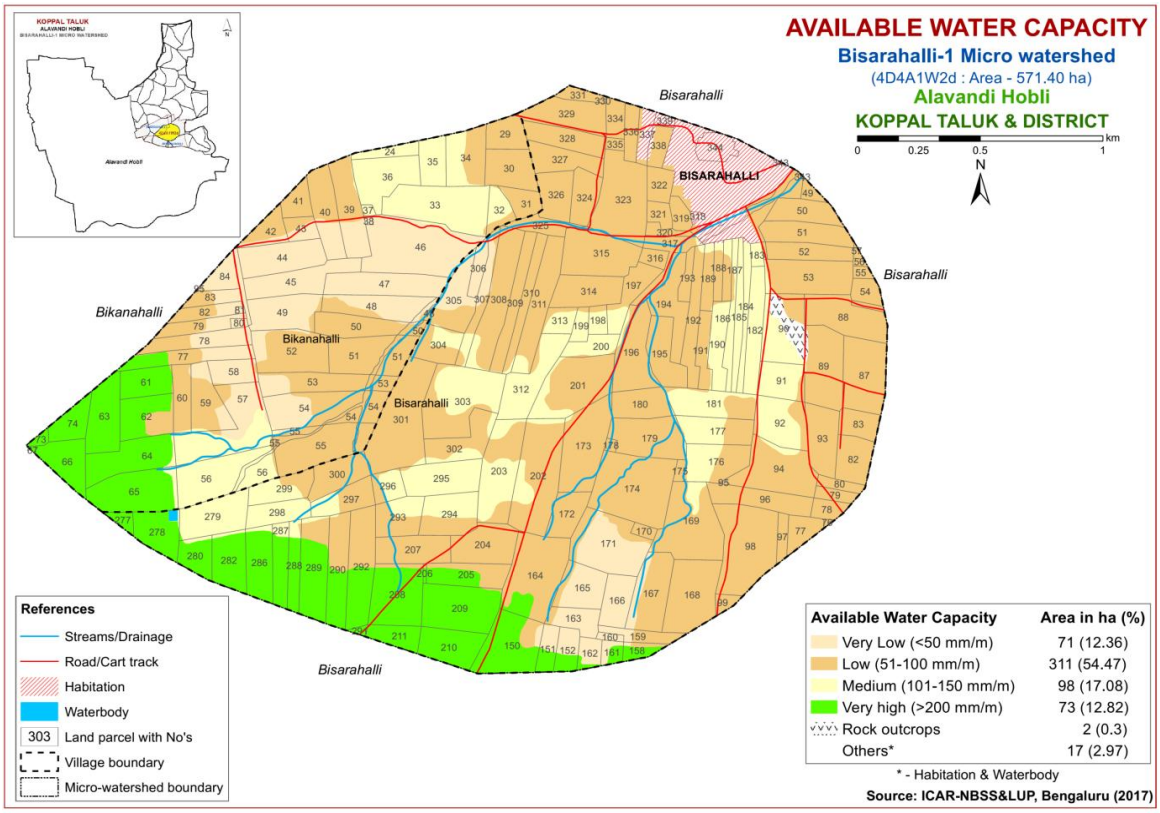



Fig. 5.5 Soil Available Water Capacity map of Bisarahalli-1 Microwatershed

## 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 four slope classes and a slope map was generated showing the area extent and their geographic distribution of different slope classes in the microwatershed (Fig. 5.6).

Major area of about 482 ha (84%) falls under very gently sloping (1-3% slope) lands and is distributed in major parts of the microwatershed. Nearly level (0-1%) lands occupy an area of about 71 ha (12%) and occur in the western and southwestern part of the microwatershed.

In all these areas, all climatically adapted annual and perennial crops can be grown without much soil and water conservation and other land development measures.

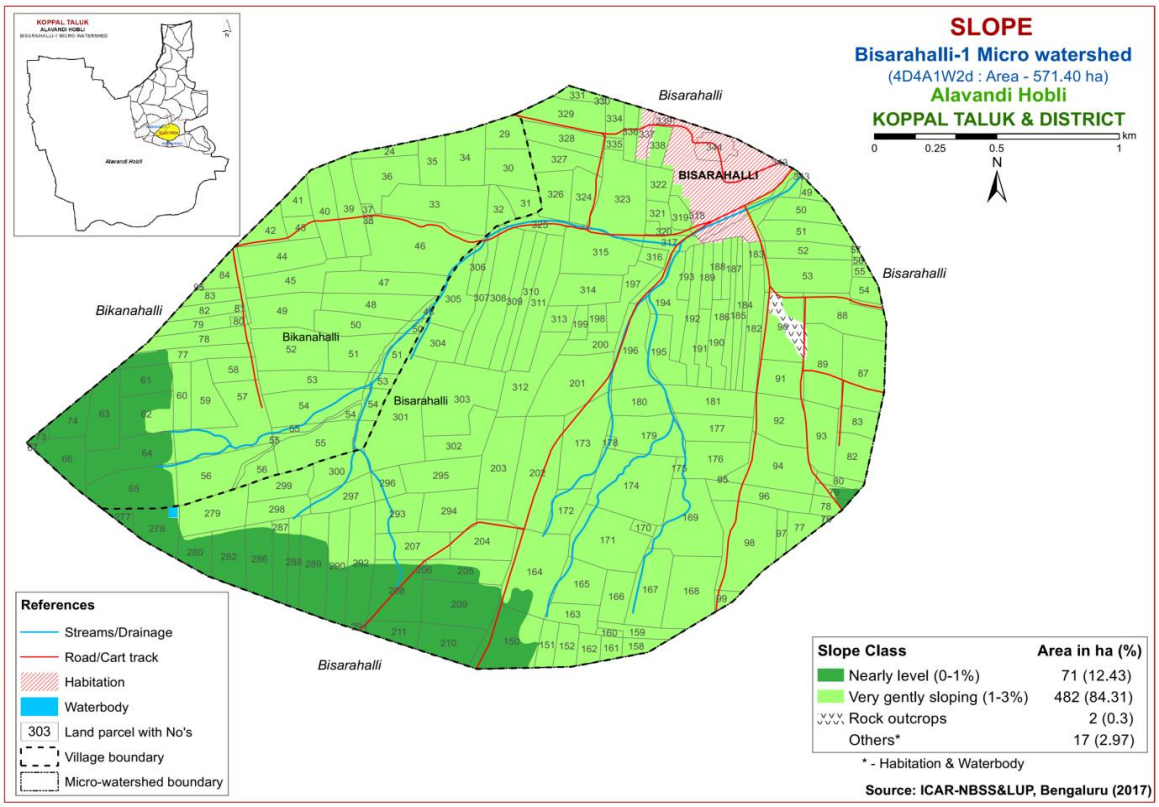



Fig. 5.6 Soil Slope map of Bisarahalli-1 Microwatershed

## 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.

Soils that are moderately eroded (e2 class) cover an area of about 67 ha (12%) in the microwatershed. They are distributed in the northern, central and southern part of the microwatershed. Slightly eroded (e1 class) soils cover major area of about 486 ha (85%) and are distributed in all parts of the microwatershed. The moderately eroded areas (12%) are problematic and need appropriate soil and water conservation and other land development measures.

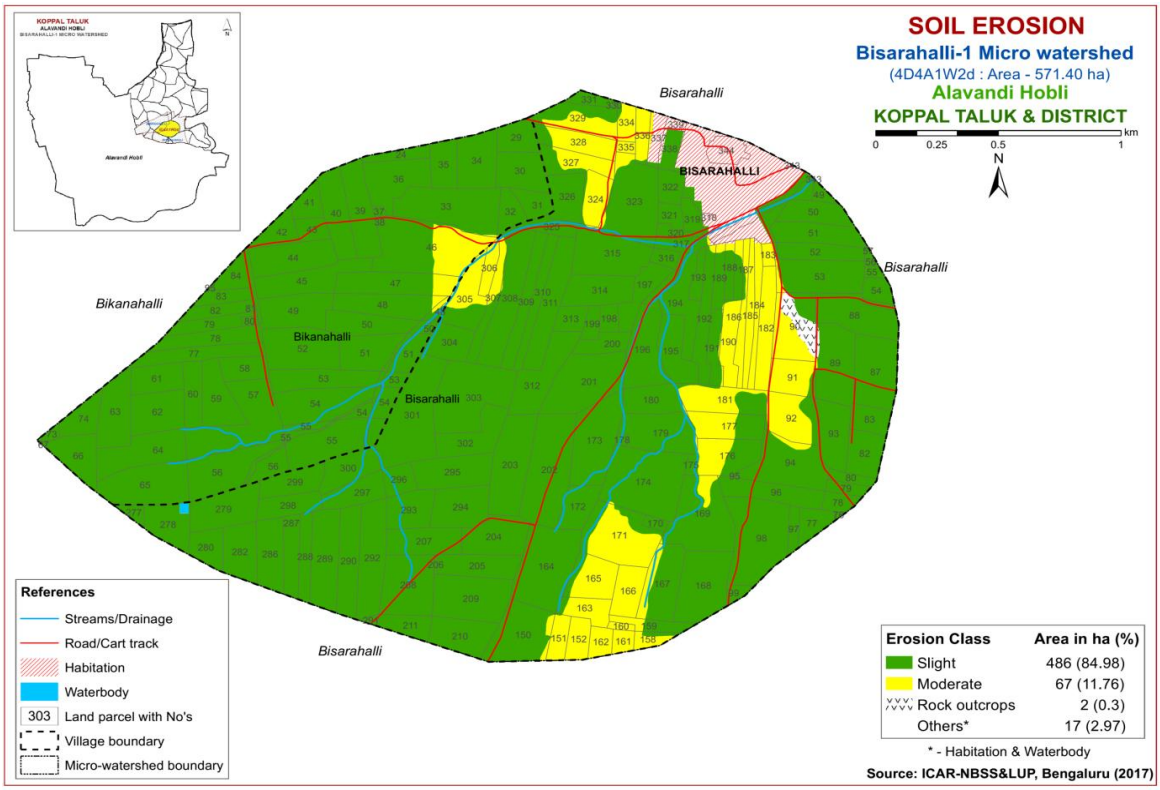



Fig. 5.7 Soil Erosion map of Bisarahalli-1 Microwatershed

*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. Hence, it is necessary to know the fertility (macro and micro nutrients) status of the soils of the watersheds for assessing the kind and amount of fertilizers required for each of the crop intended to be grown. For this purpose, the surface soil samples collected from the grid points (one soil sample at every 250 m grid interval) all over the microwatershed through land resource inventory in the year 2015 were analysed for pH, EC, organic carbon, available phosphorus and potassium and for micronutrients like zinc, boron, copper, iron and manganese, and secondary nutrient sulphur.

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

## 6.1 Soil Reaction (pH)

The soil analysis of the Bisarahalli-1 microwatershed for soil reaction (pH) showed that major area of about 233 ha (41%) is moderately alkaline (pH 7.8-8.4) and is distributed in the northwestern, central, northeastern, southern, and southeastern part of the microwatershed. An area of about 47 ha (8%) is under strongly alkaline (pH 8.4-9.0) and is distributed in the southern part of the microwatershed. An area of about 111 ha (20%) is slightly alkaline (pH 7.3-7.8) and distributed in the central, eastern and northeastern part of the microwatershed. A very small area of about 12 ha (2%) is neutral (6.5-7.3) and are distributed in the northern and eastern part of the microwatershed (Fig.6.1).

## 6.2 Electrical Conductivity (EC)

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

## 6.3 Organic Carbon

The soil organic carbon content of the microwatershed is medium (0.5-0.75%) covering maximum area of about 325 ha (57%) and is distributed in major part of the microwatershed. An area of 208 ha (36%) is low (<0.5%) in organic carbon content and is distributed in the northern, northwestern, southern and northeastern parts of the microwatershed. A very small area of about 19 ha (3%) is high (>0.75%) in organic carbon content and occur in the southwestern part of the microwatershed (Fig.6.3).

## 6.4 Available Phosphorus

Available phosphorus content is low (<23 kg/ha) in an area of about 289 ha (50%) and occur in the southwestern, southeastern and northern part of the microwatershed. An area of about 256 ha (45%) is medium (23-57 kg/ha) and are distributed in the northwestern, central and northeastern part of the microwatershed. Very small area of about 8 ha (>57 kg/ha) is high in available phosphorus (Fig 6.4).

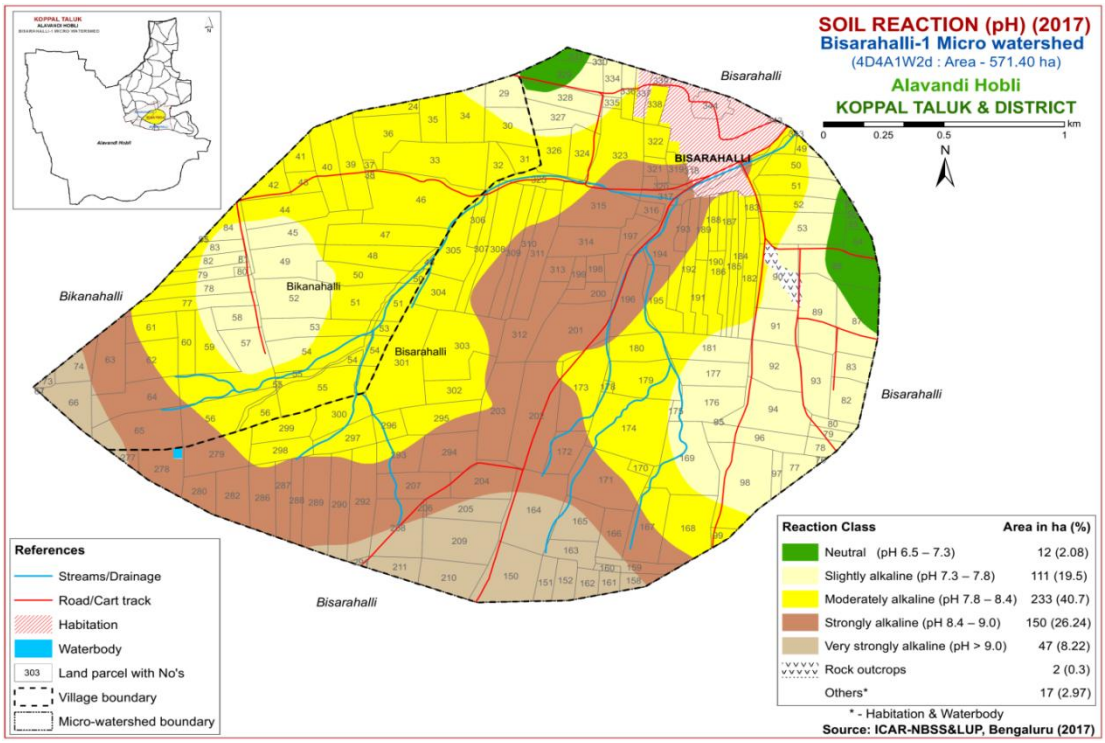



Fig.6.1 Soil Reaction (pH) map of Bisarahalli-1 Microwatershed

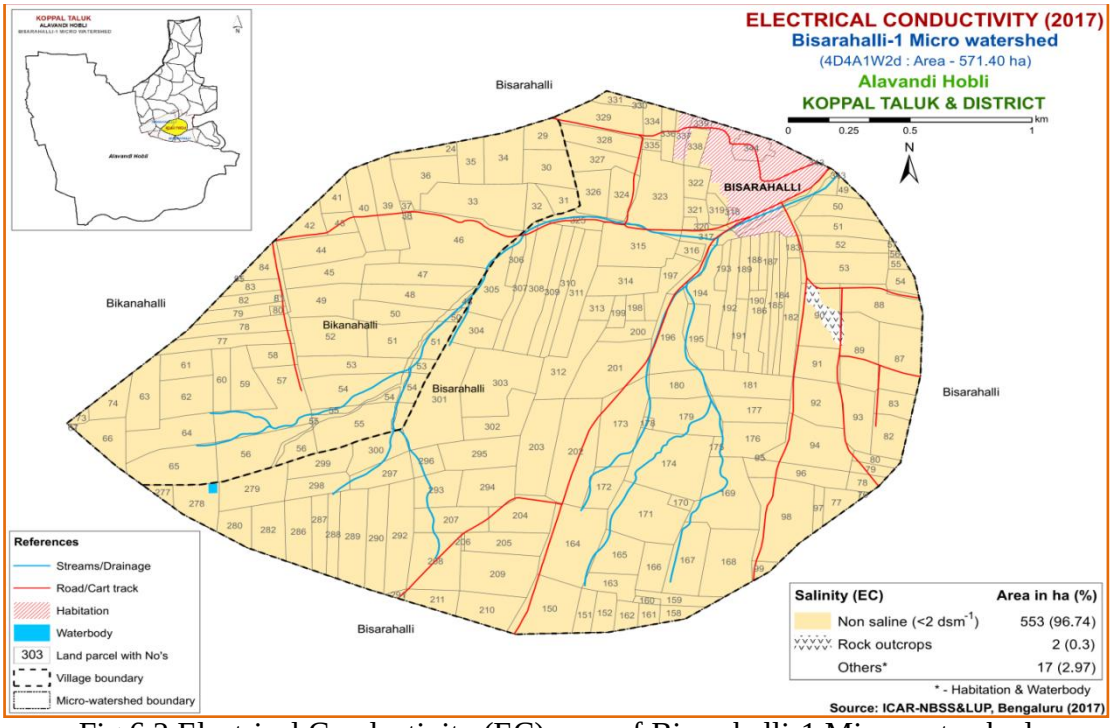



Fig.6.2 Electrical Conductivity (EC) map of Bisarahalli-1 Microwatershed

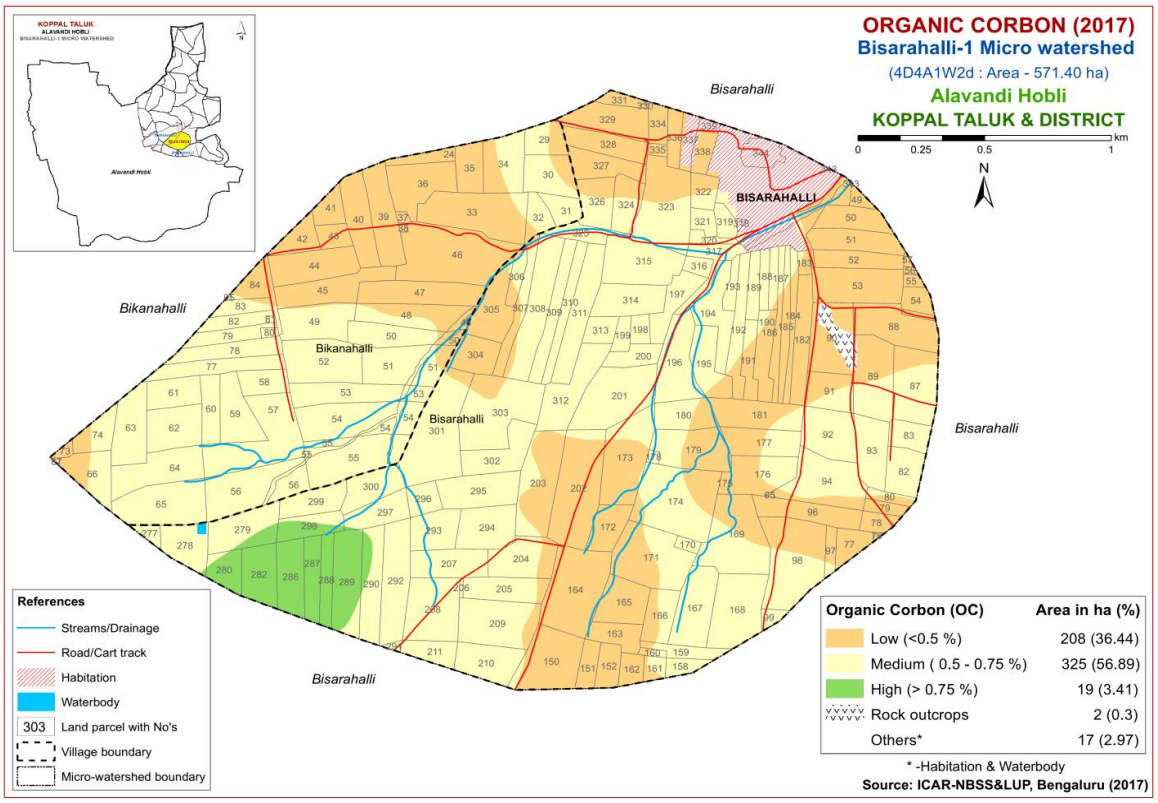



Fig.6.3 Soil Organic Carbon map of Bisarahalli-1 Microwatershed

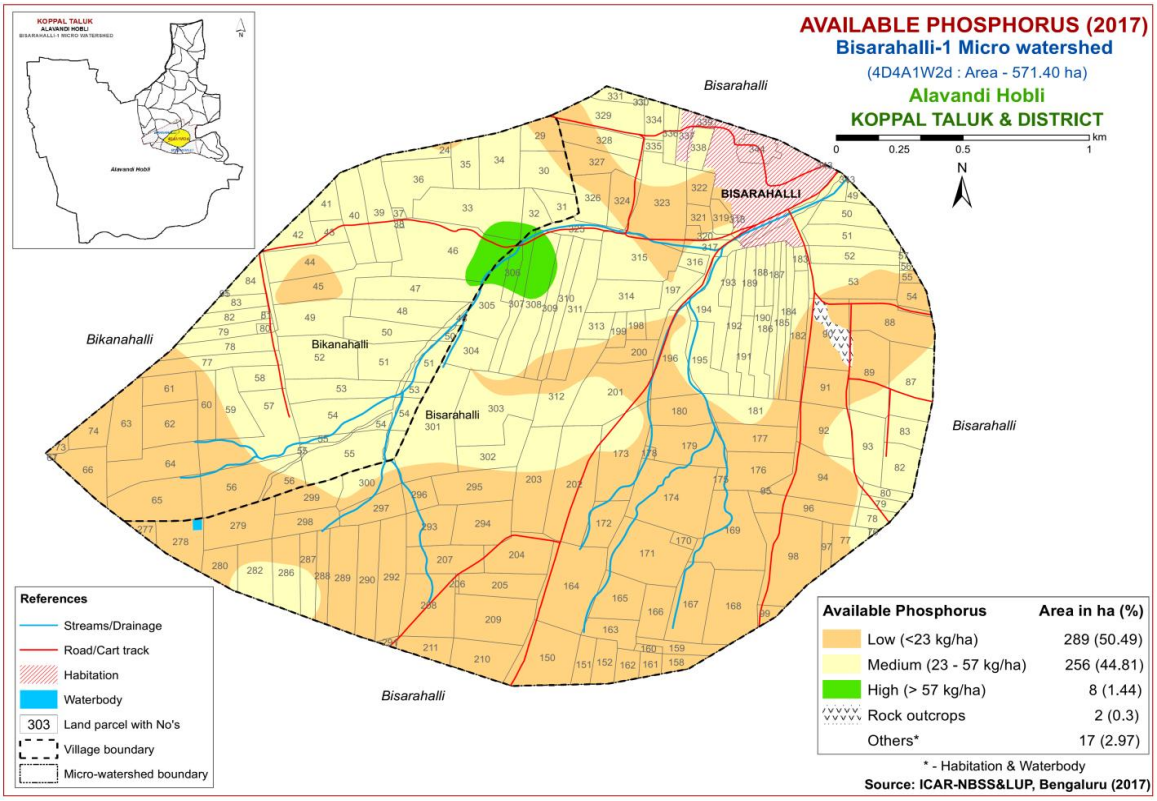



Fig.6.4 Soil Available Phosphorus map of Bisarahalli-1 Microwatershed

### 6.5 Available Potassium

Available potassium content is medium (145-337 kg/ha) in maximum area of about 307 ha (54%) and is distributed in major part of the microwatershed. An area of about 213 ha (37%) is high (>337 kg/ha) and is distributed in the western and central part of the microwatershed. A very small area of about 32 ha (6%) is low (<145 kg/ha) in available potassium and are distributed in the eastern and central part of the microwatershed (Fig.6.5).

### 6.6 Available Sulphur

Maximum area of about 406 ha (71%) is medium (10-20 ppm) in available sulphur and is distributed in all parts of the microwatershed. An area of about 147 ha (26%) is high (>20 ppm) in available sulphur and are distributed in the southwestern and northwestern part of the microwatershed (Fig.6.6).

### 6.7 Available Boron

Available boron content is low (<0.5 ppm) in maximum area of 450 ha (79%) in the microwatershed and is distributed in all parts of the microwatershed. An area of about 103 ha (18%) is low (<0.5 ppm) in available boron and is distributed in the southern and central part of the microwatershed (Fig.6.7).

### 6.8 Available Iron

Available iron content is sufficient (>4.5 ppm) in an area of 286 ha (50%) and is distributed in the western, northwestern and eastern part of the microwatershed. About 267 ha (48%) area is deficient (<4.5 ppm) in available iron content and is distributed in the southern, central and eastern part of the microwatershed (Fig 6.8).

### 6.9 Available Manganese

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

### 6.10 Available Copper

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

### 6.11 Available Zinc

Available zinc content is deficient (<0.6 ppm) in maximum area of 432 ha (75%) and are distributed in all parts of the microwatershed area (Fig 6.11). An area of about 121 ha (21%) is sufficient (>0.6ppm) in available zinc content and occur in the northwestern and southwestern part of the microwatershed area.

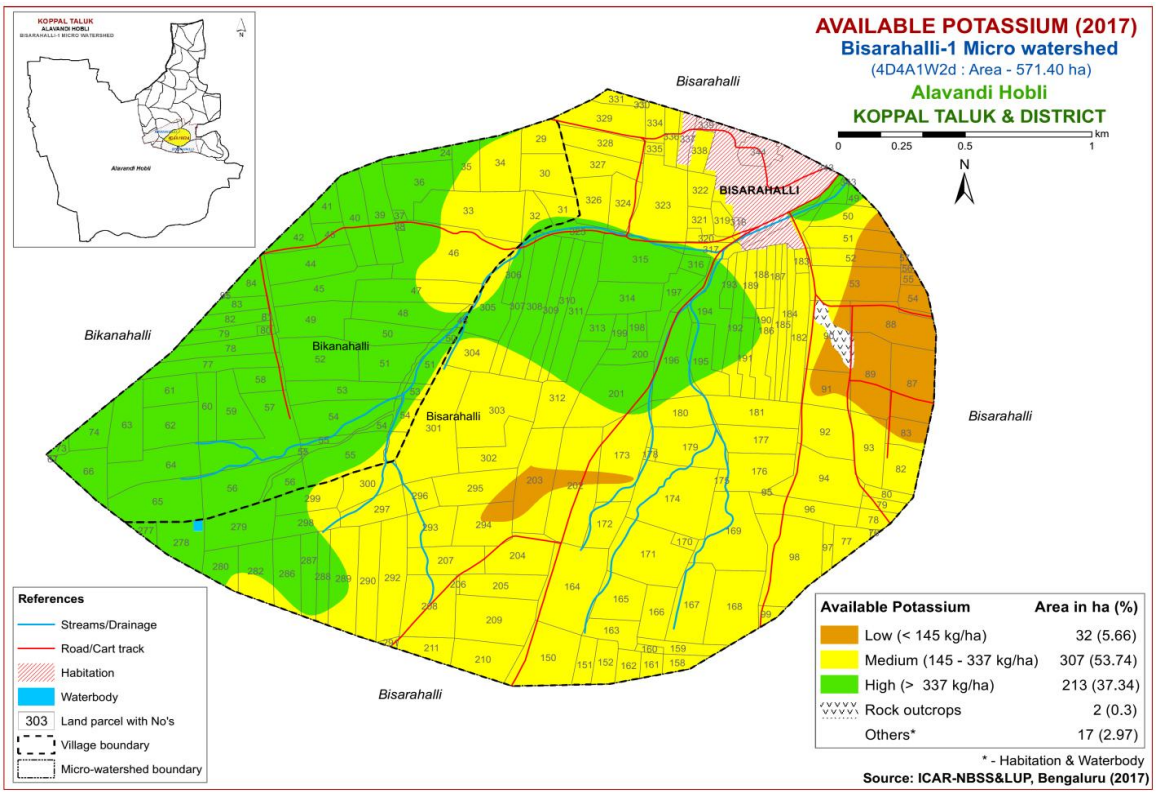



Fig.6.5 Soil Available Potassium map of Bisarahalli-1 Microwatershed

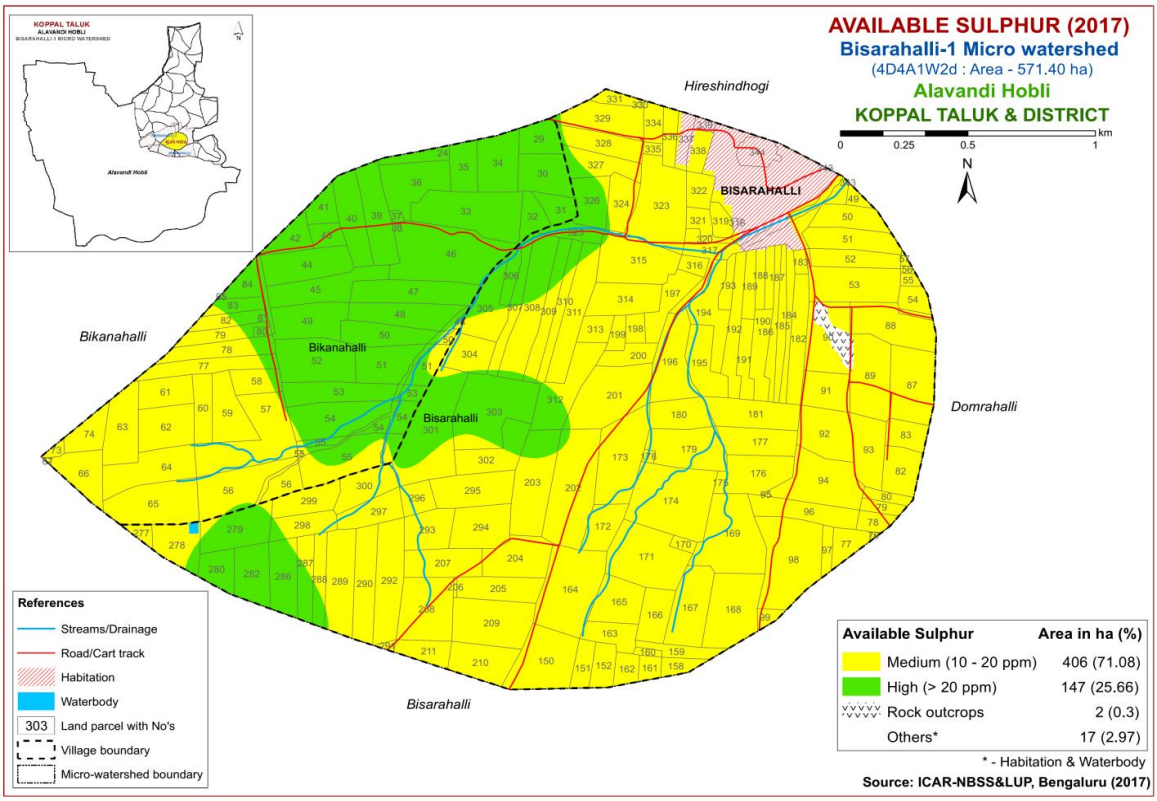



Fig.6.6 Soil Available Sulphur map of Bisarahalli-1 Microwatershed

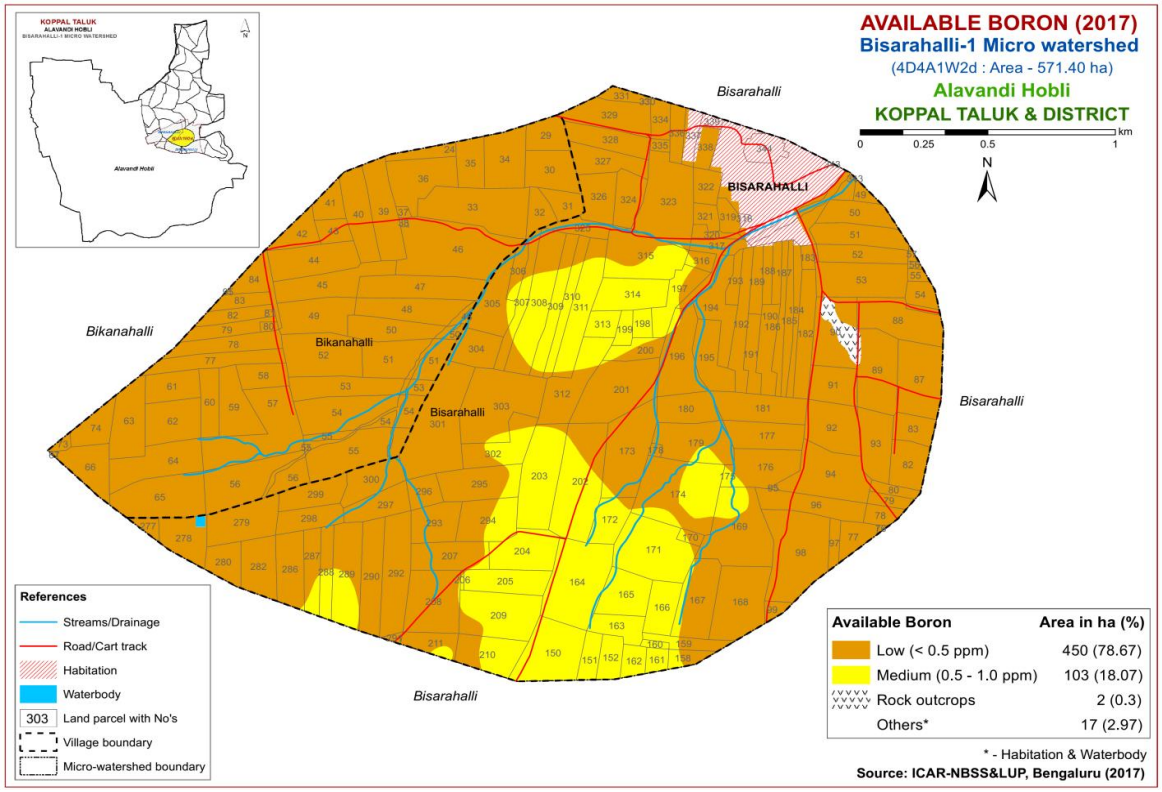



Fig.6.7 Soil Available Boron map of Bisarahalli-1 Microwatershed

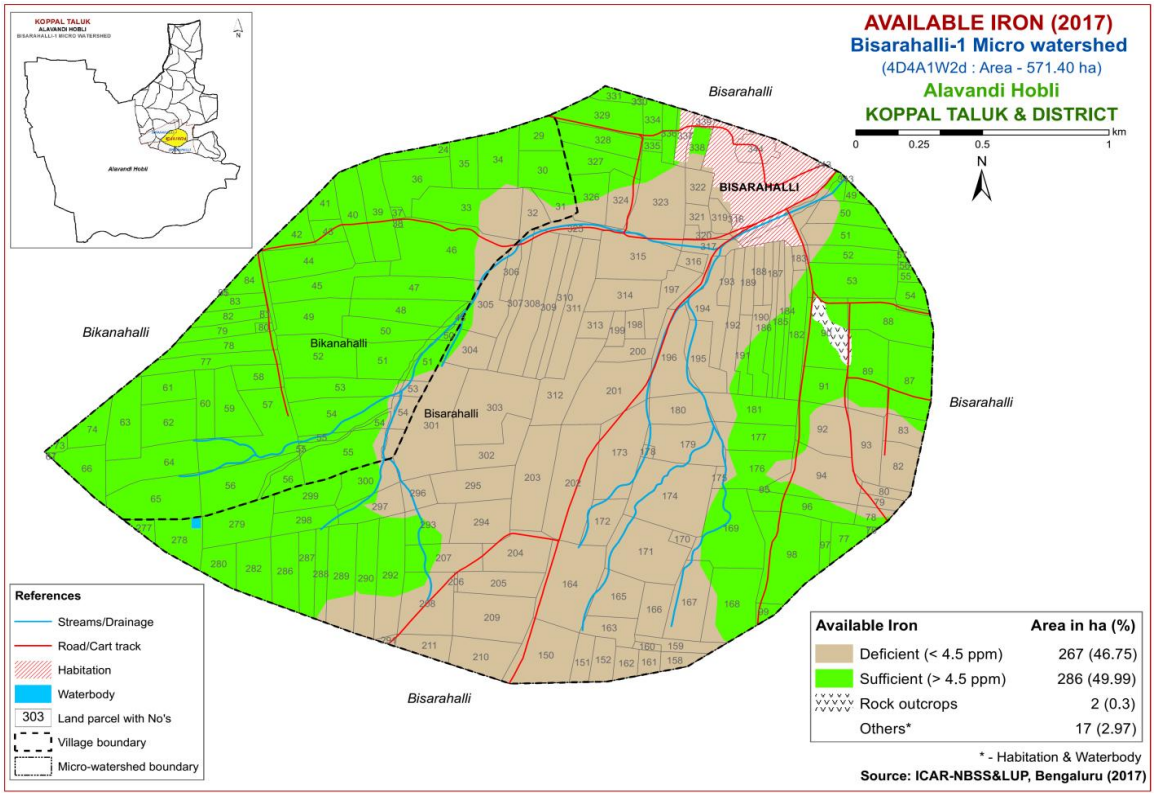



Fig.6.8 Soil Available Iron map of Bisarahalli-1 Microwatershed

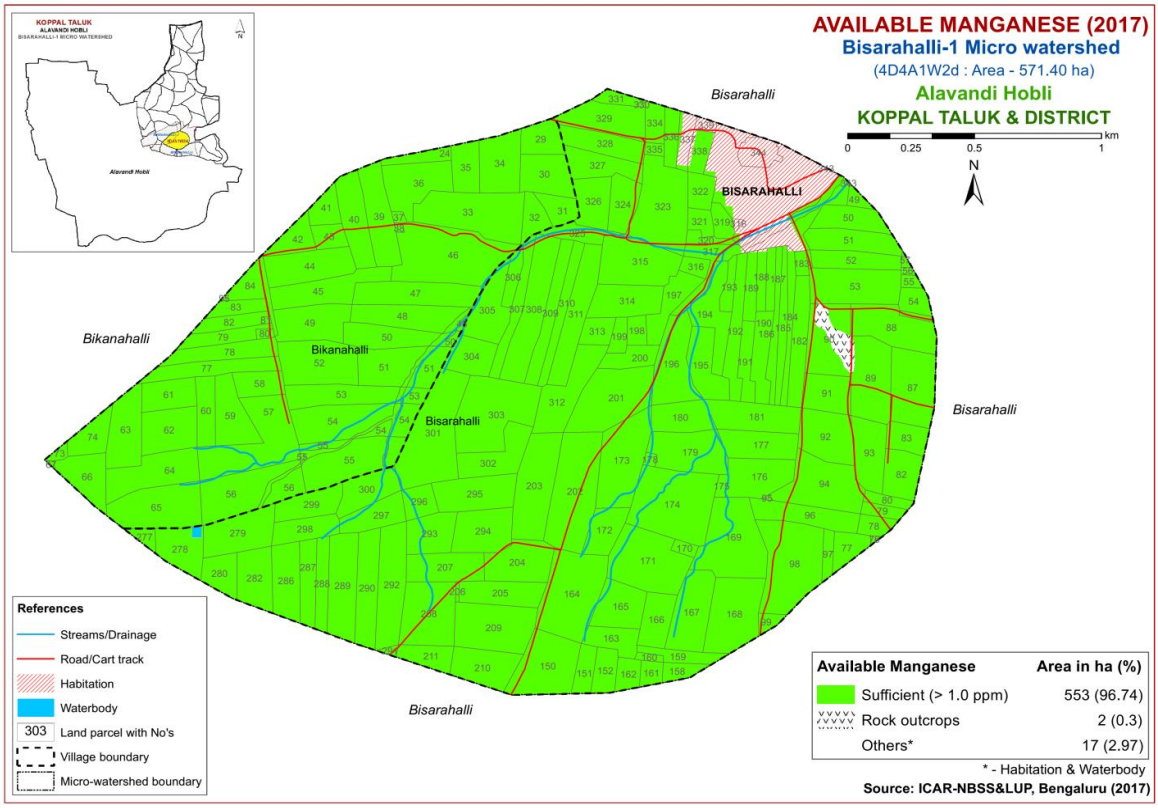



Fig.6.9 Soil Available Manganese map of Bisarahalli-1 Microwatershed

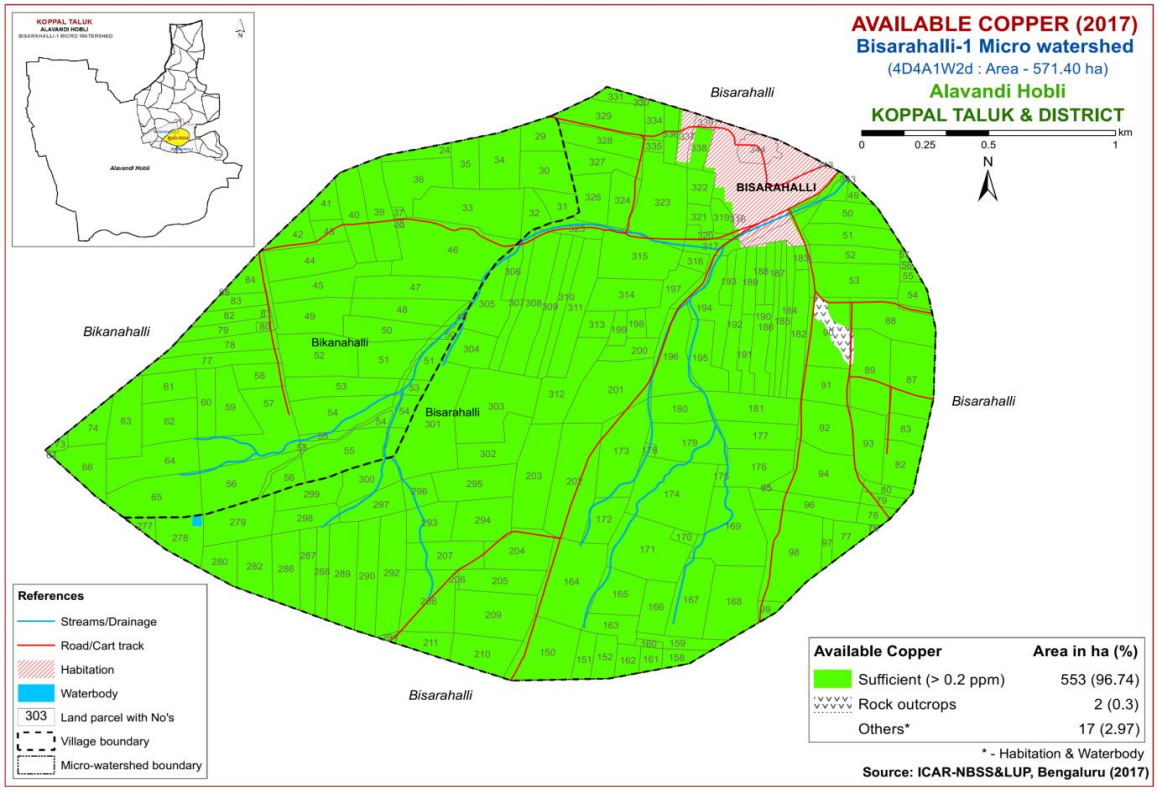



Fig.6.10 Soil Available Copper map of Bisarahalli-1 Microwatershed

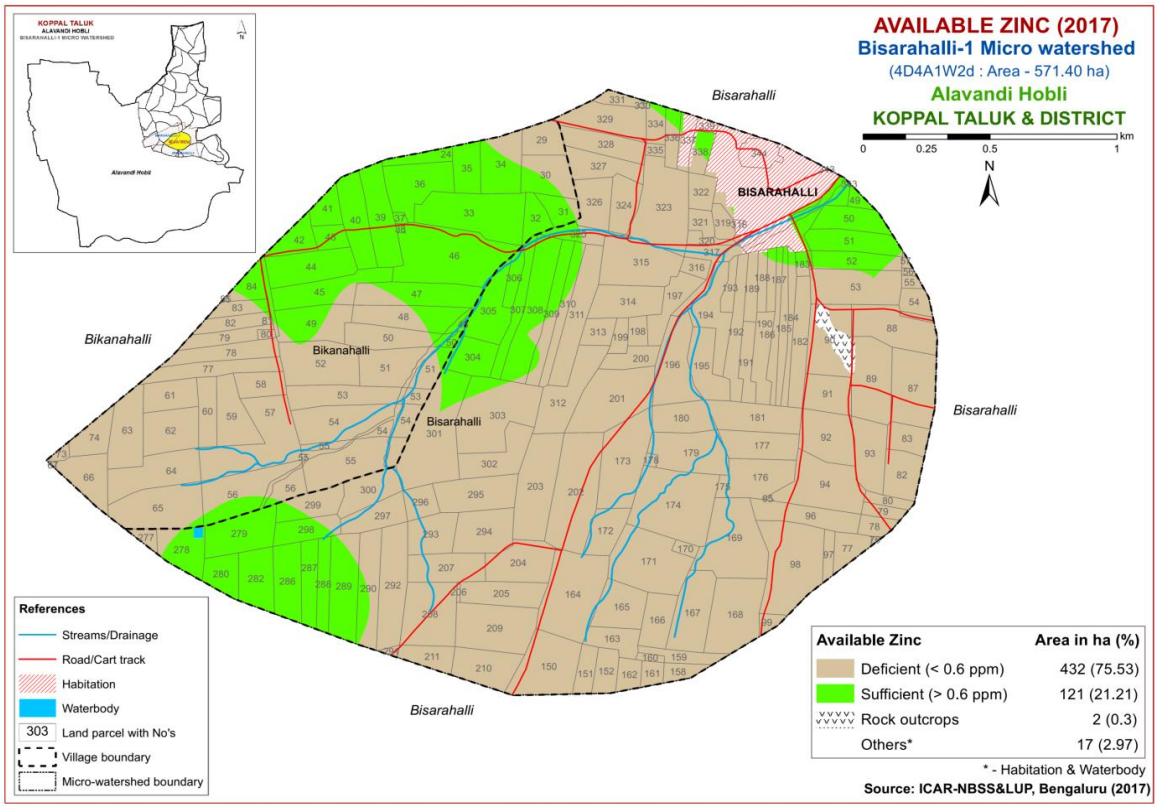



Fig.6.11 Soil Available Zinc map of Bisarahalli-1 Microwatershed

*Chapter 7*

# LAND SUITABILITY FOR MAJOR CROPS

The soil and land resource units (soil phases) of Bisarahalli-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 crop requirements were matched with the soil and land characteristics (Table 7.1) to arrive at the crop suitability. In FAO land suitability classification, two orders are recognized. Order S- Suitable and Order N- Not suitable. The orders have Classes, subclasses and units. Order-S has three classes, Class S1- Highly Suitable, Class S2- Moderately Suitable and Class S3- Marginally Suitable. Order N has two Classes, N1- Currently not Suitable and N2- Permanently not Suitable. There are no subclasses within the Class S1 as they will have very minor or no limitations for crop growth. Classes S2 and S3 are divided into subclasses based on the kinds of limitations encountered. The limitations that affect crop production are 'c' for erratic rainfall and its distribution and length of growing period (LGP), 'e' for erosion hazard, 'r' for rooting condition, 't' for lighter or heavy texture, 'g' for gravelliness or stoniness, 'n' for nutrient availability, 'l' for topography, 'm' for moisture availability, 'z' for calcareousness and 'w' for drainage. These limitations are indicated as lower case letters to the class symbol. For example, moderately suitable land with the limitations of soil depth and erosion is designated as S2. 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 23 major annual and perennial crops were generated. The detailed information on the kind of suitability of each of the soil phase for the crops assessed are given village/ survey number wise for the microwatershed in Appendix-III.

## 7.1 Land Suitability for Sorghum (*Sorghum bicolor*)

Sorghum is one of the major crops grown in Karnataka in an area of 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 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) land occupying very small area of about 20 ha (3%) for growing sorghum and occur in the northwestern part of the microwatershed. Maximum area of about 287 ha (50%) is moderately suitable (Class S2) for growing sorghum and are distributed in all parts of the microwatershed.

**Table 7.1 Soil-Site Characteristics of Bisarahalli-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 | ESP | CEC [Cmol $(p^+)kg^{-1}$] | BS (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Surface | Sub-surface | Sur-face | Sub-surface | | | | | | | | |
| CSRmB2g1 | 662 | 150 | WD | 25-50 | c | scl | 15-35 | <15 | 50-100 | 1-3 | slight | | | | | |
| KTPiB1g1 | 662 | 150 | WD | 50-75 | sc | scl | 15-35 | 15-35 | 50-100 | 0-1 | slight | | | | | |
| MKHcB1g1 | 662 | 150 | WD | 50-75 | sl | scl | 15-35 | >35 | 50-100 | 0-1 | slight | | | | | |
| MKHcB2g2 | 662 | 150 | WD | 50-75 | sl | scl | 35-60 | >35 | 50-100 | 1-3 | moderate | | | | | |
| HTIiB1g1 | 662 | 150 | WD | 50-75 | sc | sc | 15-35 | 15-35 | 100-150 | 0-1 | slight | | | | | |
| GHThB2g1 | 662 | 150 | WD | 75-100 | scl | scl | 15-35 | 15-35 | 100-150 | 1-3 | moderate | | | | | |
| BSRiB1g1 | 662 | 150 | WD | 75-100 | sc | sc | 15-35 | 15-35 | 100-150 | 0-1 | slight | | | | | |
| BDGcB1g2 | 662 | 150 | WD | 75-100 | sl | scl-sc | 35-60 | 35-60 | 75 | 0-1 | slight | | | | | |
| KMHiB1 | 662 | 150 | WD | 100-150 | sc | scl-sc | - | <15 | 150-200 | 0-1 | slight | | | | | |
| KMHiB2g1 | 662 | 150 | WD | 100-150 | sc | scl-sc | 15-35 | <15 | 150-200 | 1-3 | moderate | | | | | |
| BPRhB1g1 | 662 | 150 | WD | 100-150 | scl | sc-c | 15-35 | >35 | 75 | 0-1 | slight | | | | | |
| BPRiB1 | 662 | 150 | WD | 100-150 | sc | sc-c | - | >35 | 75 | 0-1 | slight | | | | | |
| BPRiB1g1 | 662 | 150 | WD | 100-150 | sc | sc-c | 15-35 | >35 | 75 | 0-1 | slight | | | | | |
| NDLiB1g1 | 662 | 150 | WD | >150 | sc | sc | 15-35 | >35 | 75 | 0-1 | slight | | | | | |
| MTLiB1g1 | 662 | 150 | WD | 25-50 | sc | sc-c | 15-35 | 15-35 | 75 | 0-1 | slight | | | | | |
| MTLmB1 | 662 | 150 | WD | 25-50 | c | sc-c | - | 15-35 | 75 | 0-1 | slight | | | | | |
| RNKiA1 | 662 | 150 | MWD | 50-75 | sc | sc-c | - | 15-35 | 100-150 | 0-1 | slight | | | | | |
| DRLmB1 | 662 | 150 | WD | 75-100 | c | c | - | <15 | 150-200 | 0-1 | slight | | | | | |
| GRHmA1 | 662 | 150 | MWD | 100-150 | c | scl | - | 15-35 | >200 | 0-1 | slight | | | | | |
| GRHmB2 | 662 | 150 | MWD | 100-150 | c | scl | - | 15-35 | >200 | 1-3 | moderate | | | | | |

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

They have minor limitations of rooting depth, gravelliness, nutrient availability and calcareousness. Marginally suitable lands (Class S3) for growing sorghum occupy an area of about 246 ha (43%) and occur in all parts of the microwatershed with moderate limitations of gravelliness, rooting depth and calcareousness.

**Table 7.2 Crop suitability criteria for Sorghum**

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

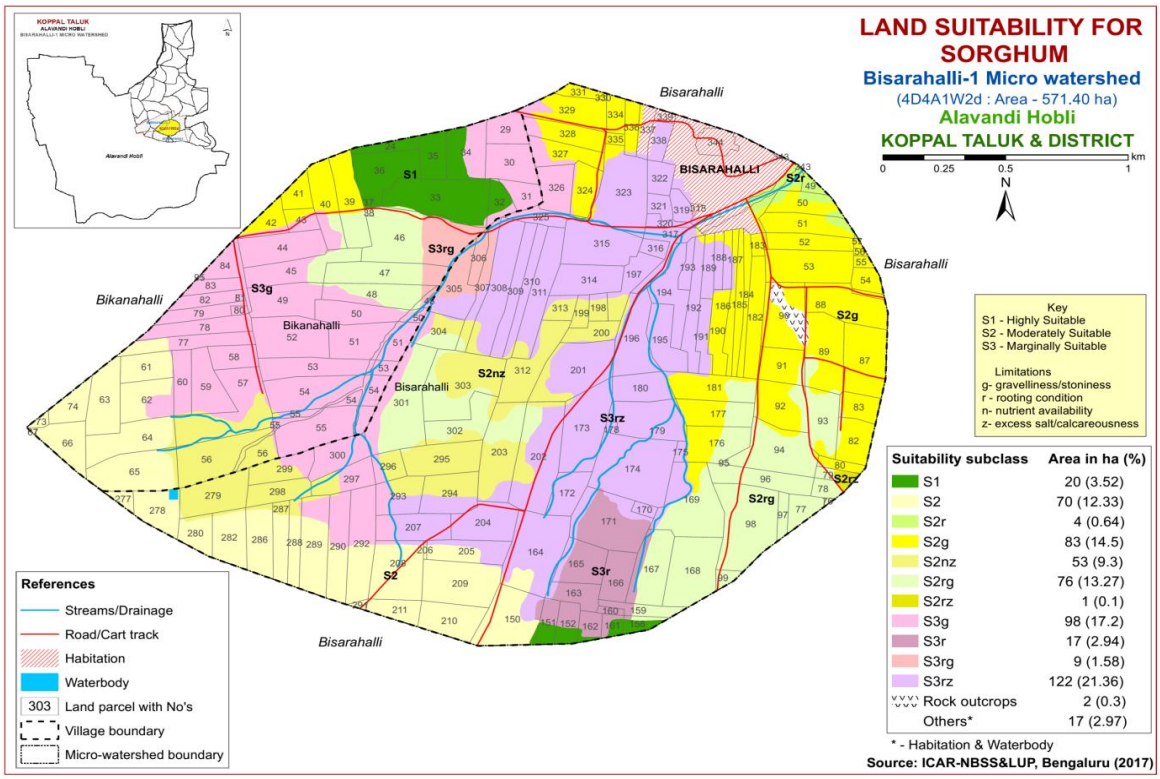



Fig. 7.1 Land Suitability map of Sorghum

## 7.2 Land Suitability for Maize (*Zea mays*)

Maize is the most important food crop grown in an area of 13.37 lakh ha in almost all the districts of the State. The crop requirements for growing maize (Table 7.3) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing maize was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.2.

A very small area of about 17 ha (3%) is highly suitable (Class S1) for growing maize and are distributed in the northwestern part of the microwatershed. Moderately suitable (Class S2) lands occupy an area of about 163 ha (28%) and are distributed in the northern, eastern, central and northwestern part of the microwatershed. They have minor limitations of gravelliness, rooting depth and texture. Marginally suitable (Class S3) lands cover a maximum area of about 373 ha (65%) and occur in all parts of the microwatershed. They have moderate limitations of gravelliness, texture, rooting depth and calcareousness.

**Table 7.3 Crop suitability criteria for Maize**

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

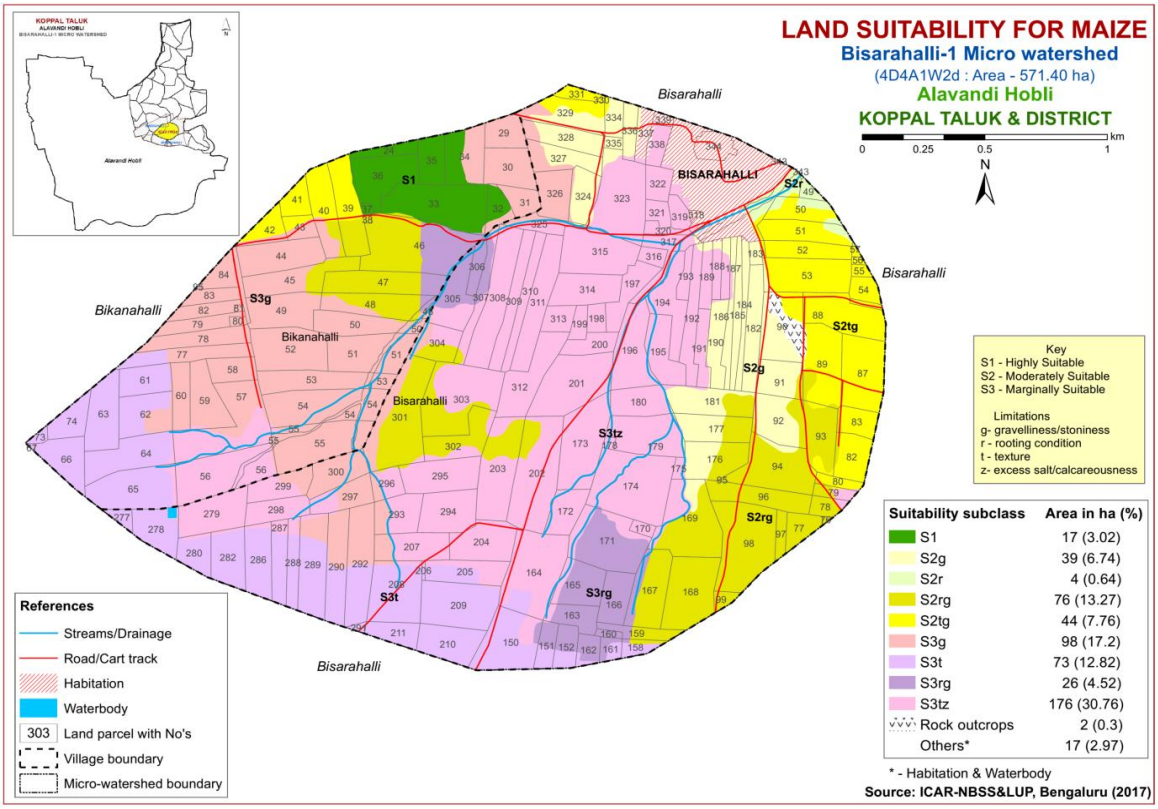



Fig. 7.2 Land Suitability map of Maize

### 7.3 Land suitability criteria for Red gram (*Cajanus Cajan)*

Redgram is the most important food crop grown in an area of 7.28 lakh ha in almost all the districts of the State. The crop requirements for growing maize (Table 7.4) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing redgram was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.3.

Highly suitable (Class S1) lands occupy a very small area of about 17 ha (3%) for growing redgram and are distributed in the northwestern part the microwatershed. Moderately suitable (Class S2) lands occupy major area of about 225 ha (39%) and is distributed in the western, southern, northern and eastern parts of the microwatershed. They have minor limitations of gravelliness, texture and rooting depth. Marginally suitable lands (Class S3) occupy an area of about 172 ha (30%) and occur in the northwestern, central and southeastern part of the microwatershed and they have moderate limitation of gravelliness, rooting depth and calcareousness. An area of about 139 ha (24%) is not suitable (Class N) and are distributed in the central part of the microwatershed. They have severe limitations of rooting depth and calcareousness.

**Table 7.4 Land suitability criteria for Red gram**

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

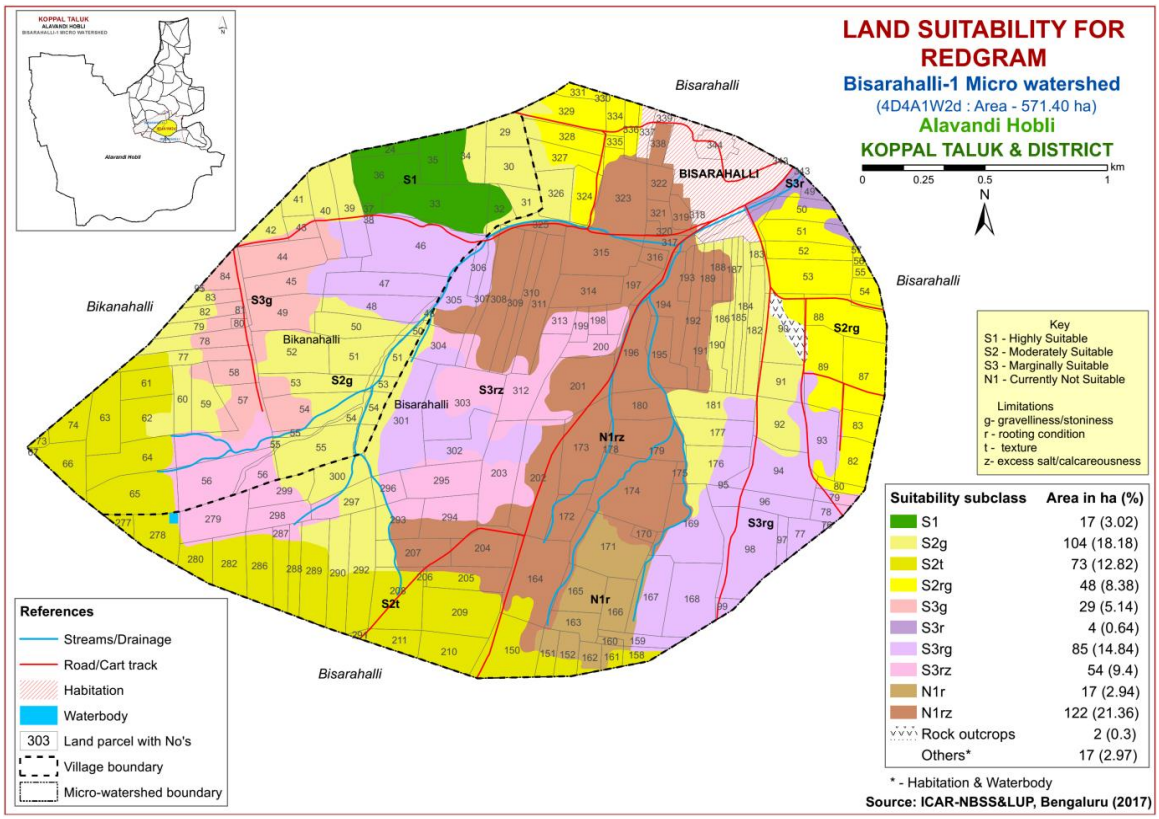



Fig. 7.3 Land Suitability map of Red gram

## 7.4 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 of the Karnataka state. The crop requirements for growing bajra were matched with the soil-site characteristics (Table 7.1) of the soils of the microwatershed and land suitability map for growing bajra was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.4.

An area of about 92 ha (16%) is highly suitable (Class S1) for growing bajra. They are distributed in the northern and eastern part of the microwatershed. Moderately suitable lands (Class S2) cover an area of 96 ha (17%) and are distributed in the northwestern, central and southeastern part of the microwatershed. They have minor limitations of gravelliness and rooting depth. Marginally suitable lands (Class S3) for occupy maximum area of about 364 ha (63%) and are distributed in all parts of the microwatershed with moderate limitations of gravelliness, rooting depth, texture and calcareousness.

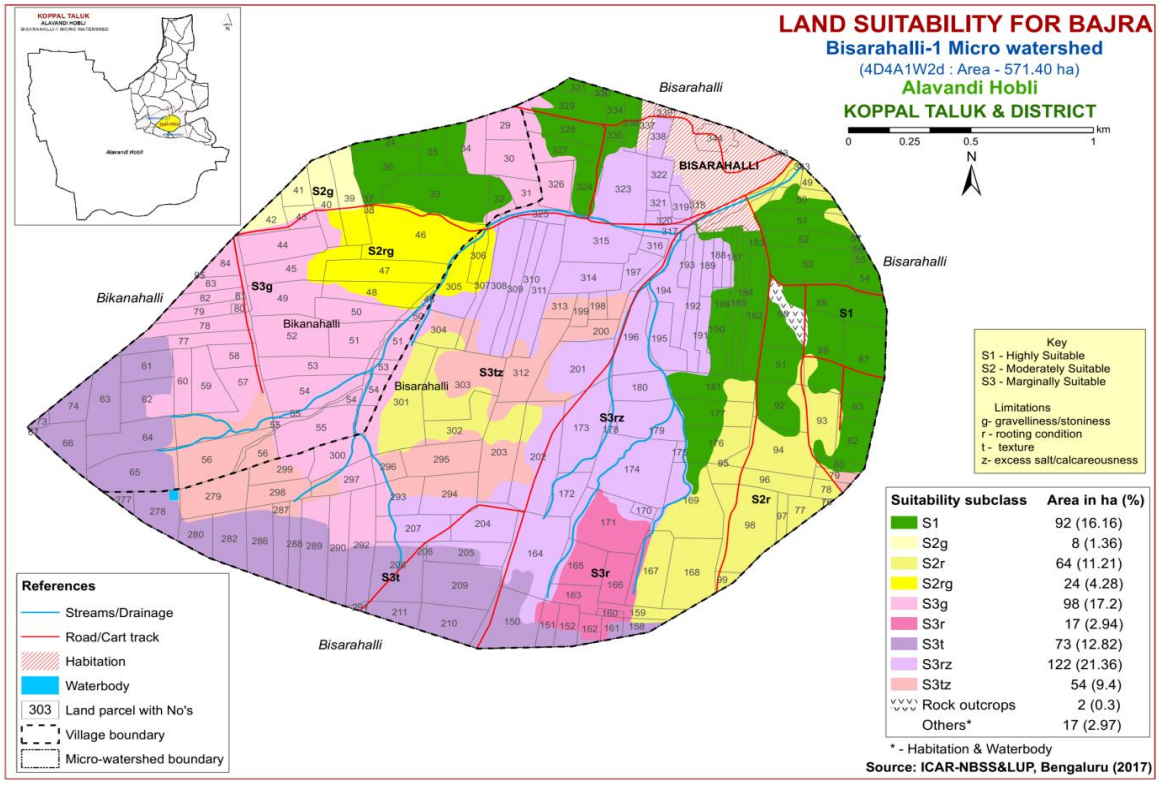



Fig. 7.4 Land Suitability map of Bajra

## 7.5 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 7.5.

A very small area of about 11 ha (2%) is highly suitable (Class S1) for growing groundnut and are distributed in the northern part the microwatershed. An area of about 229 ha (40%) is moderately suitable (Class S2) for groundnut and are distributed in the northern, northwestern, central and eastern part of the microwatershed. They have minor limitations of gravelliness, rooting depth and texture. Marginally suitable (Class S3) lands occupy major area of about 312 ha (51%) and are distributed in all parts of the microwatershed with moderate limitations of gravelliness, rooting depth, texture and calcareousness.

**Table 7.5 Crop suitability criteria for Groundnut**

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

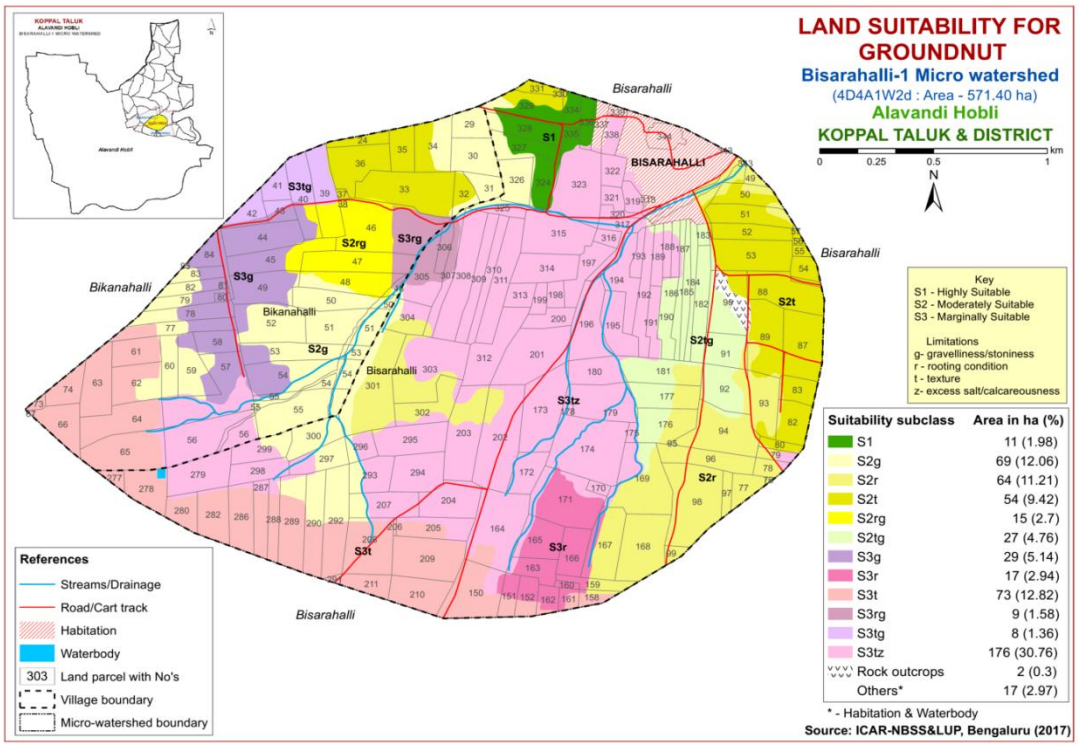



Fig. 7.5 Land Suitability map of Groundnut

## 7.6 Land Suitability for Cotton (*Gossypium hirsutum*)

Cotton is 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 7.6) 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 7.6.

Highly suitable (Class S1) lands occupy a very small area of about 3 ha (<1%) and are distributed in the northwestern part of the microwatershed. Maximum area of about 373 ha (65%) is moderately suitable (Class S2) and are distributed in all parts of the microwatershed with minor limitations of gravelliness, rooting depth and texture. The marginally suitable (Class S3) lands cover an area of about 177 ha (31%) and occur in the northwestern, northern, southern and central part of the microwatershed. They have moderate limitations of gravelliness, rooting depth and calcareousness.

**Table 7.6 Crop suitability criteria for Cotton**

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

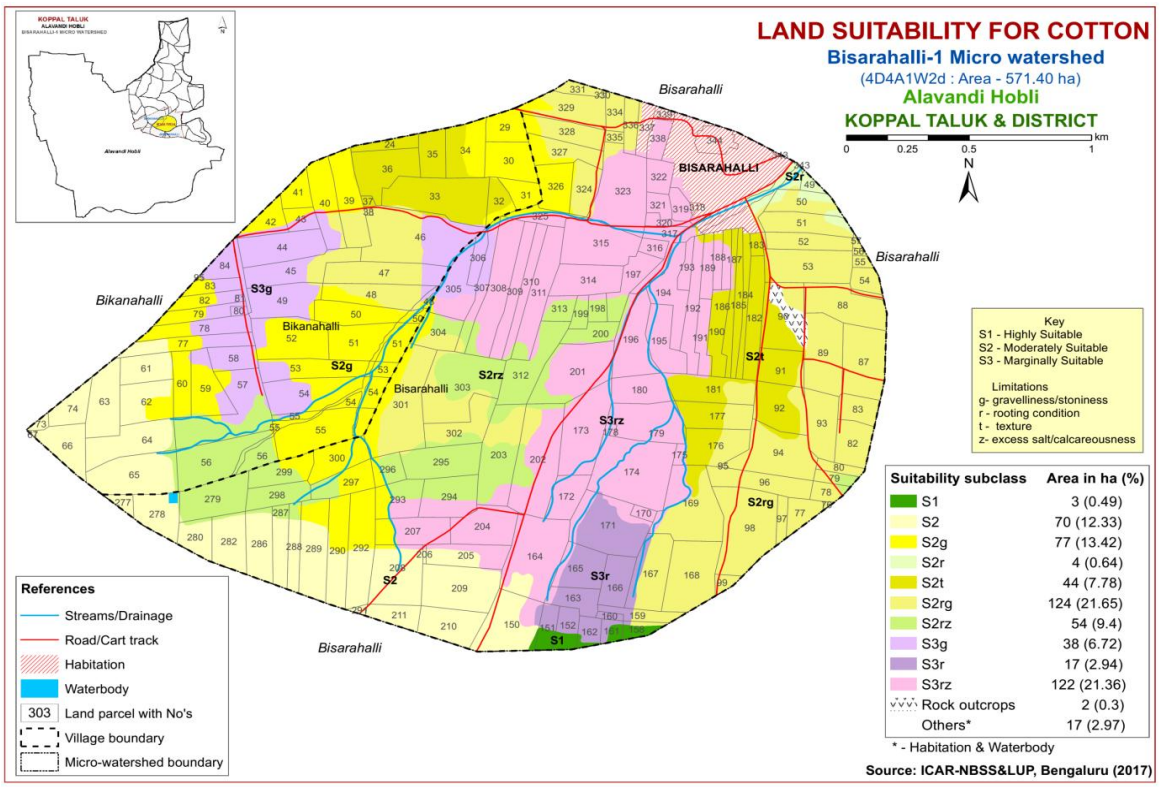



Fig. 7.6 Land Suitability map of Cotton

## 7.7 Land Suitability for Bengal gram (*Cicer aerativum*)

Bengal gram is the most important pulse crop grown in about 9.39 lakh ha area in Bijapur, Raichur, Kalaburgi, Dharwad, Belgaum and Bellary districts. The crop requirements for growing bengal gram (Table 7.7) were matched with the soil-site characteristics and a land suitability map for growing bengal gram was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.7.

Highly suitable (Class S1) lands occupy a very small area of about 3 ha (<1%) for growing bengal gram and occur in the southern part of the microwatershed. Maximum area of about 381 ha (67%) has soils that are moderately suitable (Class S2) and are distributed in all parts of the microwatershed. They have minor limitations of gravelliness, texture, rooting depth and calcareousness. The marginally suitable (Class S3) lands cover an area of about 168 ha (29%) and occur in the northwestern, northeastern, central and southern part of the microwatershed. They have moderate limitations of gravelliness, rooting depth and calcareousness.

**Table 7.7 Land suitability criteria for Bengal gram**

| Crop requirement | | Rating | | | |
|---|---|---|---|---|---|
| **Soil –site characteristics** | **unit** | **Highly suitable S1** | **Moderately Suitable S2** | **Marginally suitable S3** | **Not suitable N** |
| Slope | % | <3 | 3-5 | 5-10 | >10 |
| LGP | Days | >100 | 90-100 | 70-90 | <70 |
| Soil drainage | class | Well drained | Mod. to well drained; imperfectly drained | Poorly drained; excessively drained | Very Poorly drained |
| Soil reaction | pH | 6.0-7.5 | 5.5-5.7, 7.6-8.0 | 8.1-9.0;4.5-5.4 | >9.0 |
| Surface soil texture | Class | l, scl, sil, cl, | sicl, sic, c | Sl, c>60% | |
| Soil depth | Cm | >75 | 51-75 | 25-50 | <25 |
| Gravel content | % vol. | <15 | 15-35 | >35 | |
| Salinity (ECe) | $dsm^{-1}$ | <1.0 | 1.0-2.0 | >2.0 | |
| Sodicity (ESP) | % | <10 | 10-15 | >15 | |

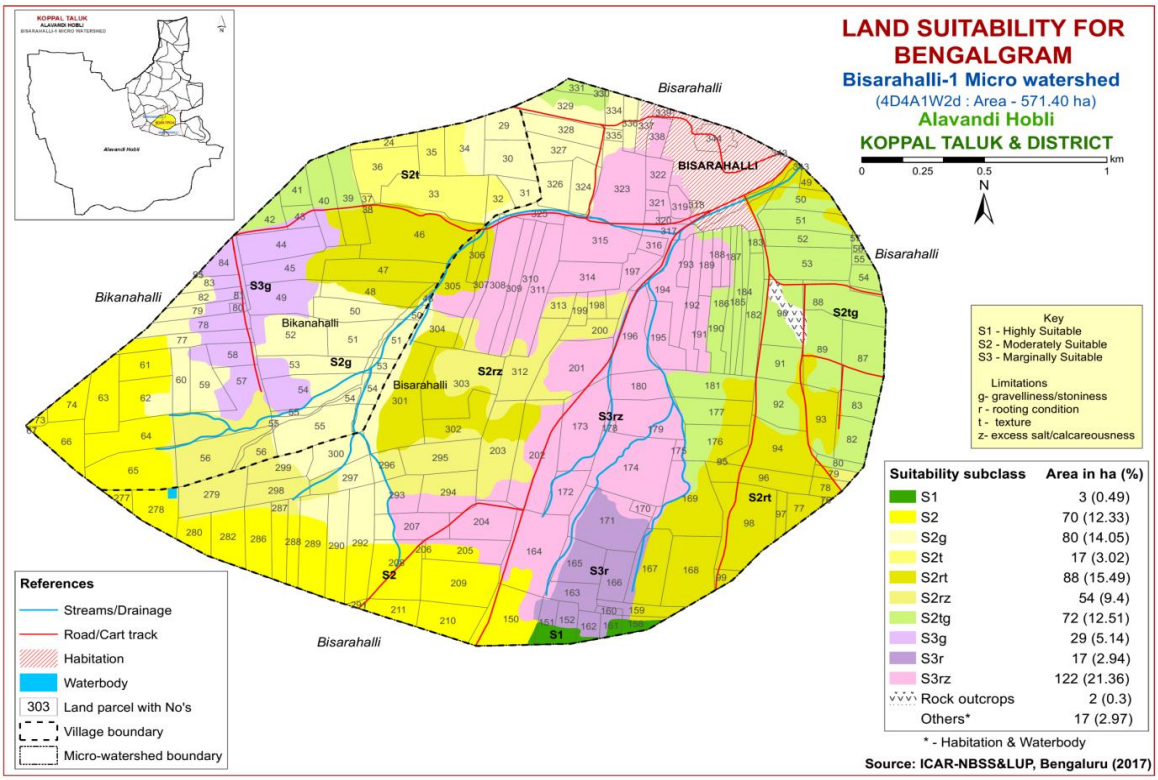



Fig. 7.7 Land Suitability map of Bengalgram

### 7.8 Land Suitability for Chilli (*Capsicum annuum L*)

Chilli is one of the major fruit and spice crop grown in an area of 0.42 lakh ha in Karnataka State. The crop requirements for growing chilli (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 chilli was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.8.

Highly suitable (Class S1) lands occupy an area of about 54 ha (9%) and occur in the northern and eastern part of the microwatershed. Moderately suitable (Class S2) lands cover an area of about 127 ha (22%) and are distributed in the northern, northwestern and southeastern part of the microwatershed. They have minor limitations of gravelliness, rooting depth and texture. Major area of about 373 ha (65%) is marginally suitable (Class S3) lands for growing chilli and are distributed in all parts of the microwatershed and they have moderate limitations of gravelliness, rooting depth, calcareousness and texture.

**Table 7.8 Crop suitability criteria for Chilli**

| **Crop requirement** | | **Rating** | | | |
|---|---|---|---|---|---|
| **Soil –site characteristics** | **Unit** | **Highly suitable (S1)** | **Moderately Suitable (S2)** | **Marginally suitable (S3)** | **Not suitable (N)** |
| Mean temperature in growing season | $^{0}$c | 20-30 | 30-35<br>13-15 | 35-40<br>10-12 | >40<br><10 |
| Slope | % | <3 | 3-5 | 5-10 | >10 |
| LGP | Days | >150 | 120-150 | 90-120 | <90 |
| Soil drainage | Class | Well drained | Moderately drained | Imp./ poor drained/excessively | Very poorly drained |
| Soil reaction | pH | 6.5-7.8<br>6.0-7.0 | 7.8-8.4 | 8.4-9.0<br>5.0-5.9 | >9.0 |
| Surface soil texture | Class | scl, cl, sil | sl, sc, sic,c(m/k) | C(ss), ls, s | |
| Soil depth | Cm | >75 | 50-75 | 25-50 | <25 |
| Gravel content | % vol. | <15 | 15-35 | 35-60 | >60 |
| Salinity (ECe) | $dsm^{-1}$ | <1.0 | 1.0-2.0 | 2.0-4.0 | <4 |
| Sodicity (ESP) | % | <5 | 5-10 | 10-15 | |

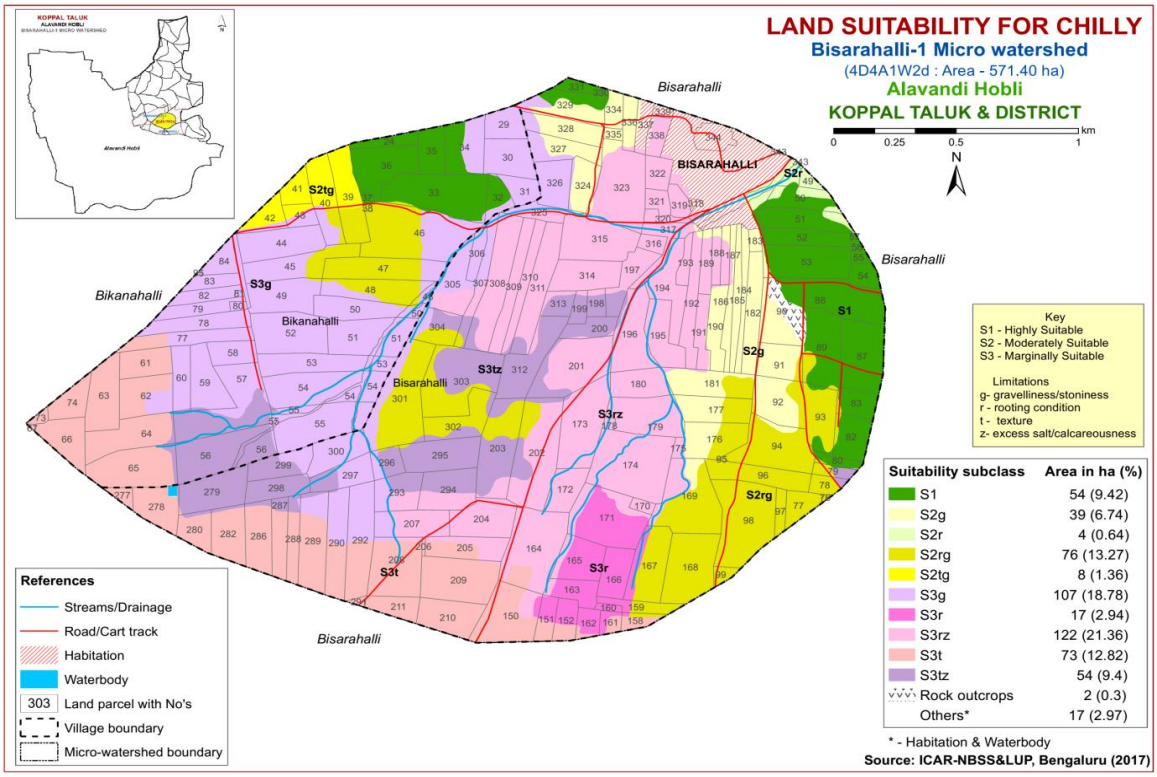



Fig. 7.8 Land Suitability map of chilli

### 7.9 Land Suitability for Tomato (*Solanum lycopersicum*)

Tomato is the most important vegetable and fruit crop grown in an area of 0.65 lakh ha in almost all the districts of the State. The crop requirements (Table 7.9) 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 7.9.

Highly suitable (Class S1) lands occupy an area of about 54 ha (9%) and are distributed in the northern and eastern part of the microwatershed. An area of about 127 ha (22%) in the microwatershed is moderately suitable (Class S2) for growing tomato and are distributed in the northern, central and southeastern part of the microwatershed. They have minor limitations of gravelliness, rooting depth and texture. The marginally suitable (Class S3) lands cover maximum area of about 373 ha (65%) and are distributed in all parts of the microwatershed. They have moderate limitations of gravelliness, rooting depth, texture and calcareousness.

**Table 7.9 Crop suitability criteria for Tomato**

| Crop requirement | | | Rating | | | |
|---|---|---|---|---|---|---|
| **Soil-site characteristics** | | **Unit** | **Highly suitable (S1)** | **Moderately Suitable (S2)** | **Marginally suitable (S3)** | **Not suitable (N)** |
| Climate | Temperature in growing season | $^0$c | 25-28 | 29-32<br>20-24 | 15-19<br>33-36 | <15<br>>36 |
| Soil moisture | Growing period | Days | >150 | 120-150 | 90-120 | |
| Soil aeration | Soil drainage | Class | Well drained | Moderately well drained | Imperfectly drained | Poorly drained |
| Nutrient availability | Texture | Class | l, sl, cl, scl | Sic, sicl, sc, c(m/k) | C (ss) | ls, s |
| | pH | 1:2.5 | 6.0-7.0 | 5.0-5.9<br>7.1-8.5 | <5;<br>>8.5 | |
| | $CaCO_3$ in root zone | % | Non calcareous | Slightly calcareous | Strongly calcareous | |
| Rooting conditions | Soil depth | Cm | >75 | 50-75 | 25-50 | <25 |
| | Gravel content | % vol. | <15 | 15-35 | >35 | |
| Soil toxicity | Salinity | ds/m | Non saline | slight | strongly | |
| | Sodicity (ESP) | % | <10 | 10-15 | >15 | - |
| Erosion | Slope | % | 1-3 | 3-5 | 5-10 | >10 |

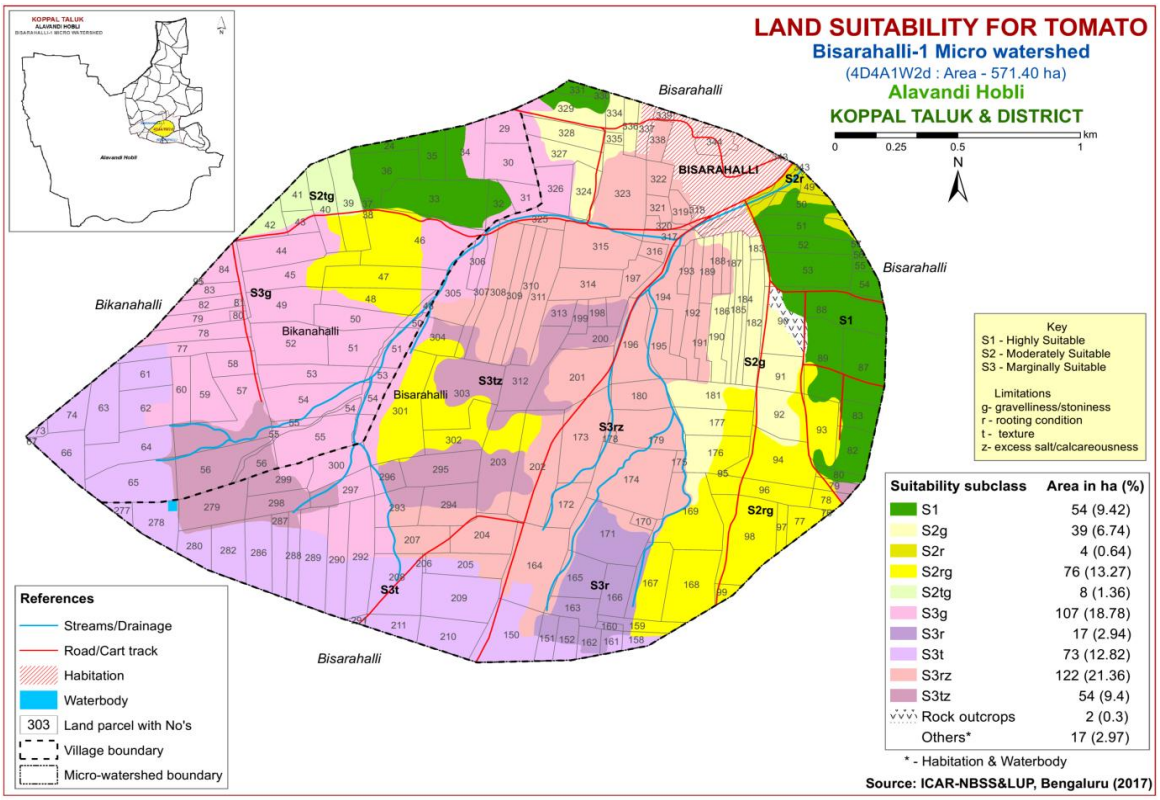



Fig. 7.9 Land Suitability map of Tomato

### 7.10 Land Suitability for Drumstick (*Moringa oleifera)*

Drumstick is the most important vegetable crop grown in 2403 ha area in the state. The crop requirements for growing drumstick (Table 7.10) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing drumstick was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.10.

Highly suitable (Class S1) lands occupy an area of about 44 ha (8%) for growing drumstick and occur in the northwestern and central part of the microwatershed. Moderately suitable (Class S2) lands occupy an area of about 251 ha (34%) and occur in the western, northern, central and eastern part of the microwatershed. They have minor limitation of gravelliness, rooting depth, texture and calcareousness. Marginally suitable lands cover an area of about 118 ha (21%) and occur in the northwestern, central, southeastern and northeastern part of the microwatershed. They have moderate limitations of gravelliness, rooting depth and texture. An area of about 139 ha (24%) is not suitable (Class N) and occur in the southeastern, central and northern part of the microwatershed and they have severe limitations of rooting depth and calcareousness.

**Table 7.10 Land suitability criteria for Drumstick**

| **Crop requirement** | | | **Rating** | | | |
|---|---|---|---|---|---|---|
| **Soil-site characteristics** | | **Unit** | **Highly suitable (S1)** | **Moderately Suitable (S2)** | **Marginally suitable (S3)** | **Not suitable (N)** |
| Soil aeration | Soil drainage | Class | Well drained | Moderately well drained | Poorly drained | V. Poorly drained |
| Nutrient availability | Texture | Class | Sc, scl, cl, c (red) | Sl, c (black) | ls | S |
| | pH | 1:2.5 | 5.5-6.5 | 5-5.5<br>6.5-7.3 | 7.8-8.4 | >8.4 |
| Rooting conditions | Soil depth | Cm | >100 | 75-100 | 50-75 | <50 |
| | Gravel content | % vol. | 0-35 | 35-60 | 60-80 | >80 |
| Erosion | Slope | % | 0-3 | 3-10 | - | >10 |

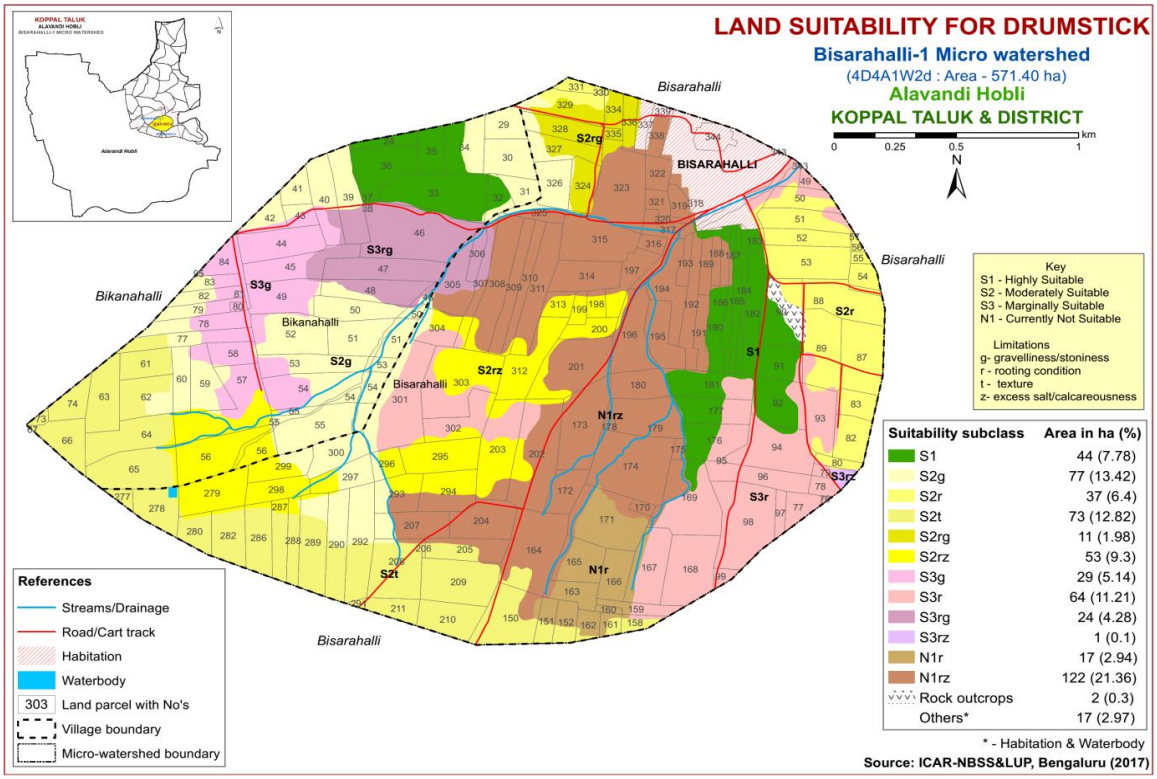



Fig. 7.10 Land Suitability map of Drumstick

### 7.11 Land Suitability for Mulbery (*Morus nigra*)

Mulbery is the most important crop grown in about 1.66 lakh ha in all the districts of the state. The crop requirements for growing mulbery (Table 7.11) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing mulbery was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.11.

Highly suitable (Class S1) lands occupy an area of about 92 ha (16%) for growing mulbery and occur in the northern and eastern part of the microwatershed. Moderately suitable (Class S2) lands occupy maximum area of about 239 ha (42%) and occur in all parts of the microwatershed. They have minor limitations of gravelliness, rooting depth, texture and calcareousness. Marginally suitable lands cover an area of about 168 ha (29%) and occur in the northwestern, central, southeastern and northeastern part of the microwatershed. They have moderate limitations of gravelliness, rooting depth and calcareousness.

**Table 7.11 Land suitability criteria for Mulberry**

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

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

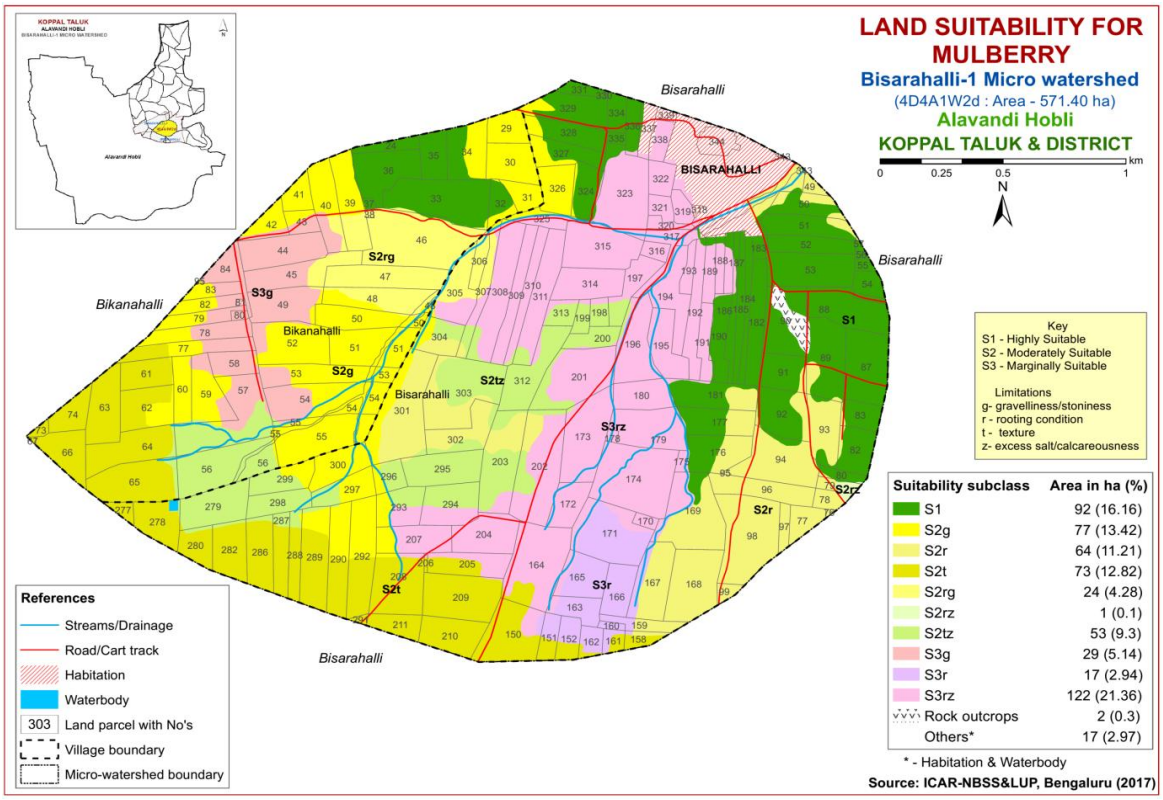



Fig. 7.11 Land Suitability map of Mulberry

## 7.12 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 7.12) 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 7.12.

An area of about 44 ha (8%) in the microwatershed is highly suitable (Class S1) for growing pomegranate and are distributed in the northern and central part of the microwatershed. Moderately suitable (Class S2) lands occupy an area of about 182 ha (32%) and are distributed in the northwestern, southwestern, central and eastern part of the microwatershed. They have minor limitations of gravelliness, rooting depth and calcareousness. Marginally suitable (Class S3) lands for growing pomegranate occupy major area of about 187 ha (33%) and are distributed in the northwestern, northern and southeastern part of the microwatershed with moderate limitations of gravelliness, rooting depth and calcareousness. An area of about 134 ha (24%) is not suitable (Class N) for growing pomegranate and occur in the southwestern, eastern and northeastern part of the microwatershed and they have severe limitations of gravelliness and rooting depth.

**Table 7.12 Crop suitability criteria for Pomegranate**

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

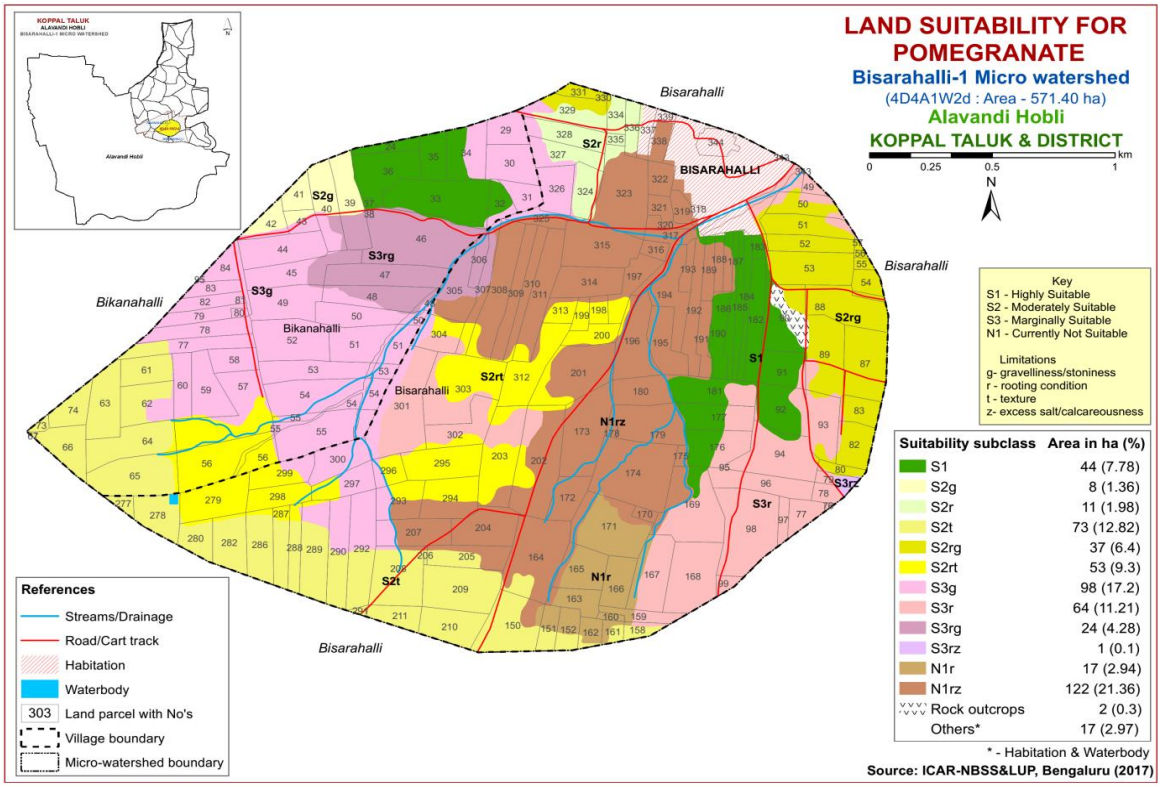



Fig. 7.12 Land Suitability map of Pomegranate

### 7.13 Land suitability for Guava (*Psidium guajava*)

Guava is 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 7.13) 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 7.13.

An area of about 44 ha (8%) is highly suitable (Class S1) for growing guava and occur in the northern and eastern part of the microwatershed. Moderately suitable (Class S2) lands occupy an area of about 56 ha (10%) and occur in the northern, central and southeastern part with minor limitations of rooting depth, texture and gravelliness. The marginally suitable (Class S3) lands cover major area of about 313 ha (55%) and are distributed in all parts of the microwatershed and they have moderate limitations of gravelliness, rooting depth, texture and calcareousness. An area of about 139 ha (24%) is not suitable (Class N) for growing guava and are distributed in the central part of the microwatershed with severe limitations of rooting depth, gravelliness and texture.

**Table 7.13 Crop suitability criteria for Guava**

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

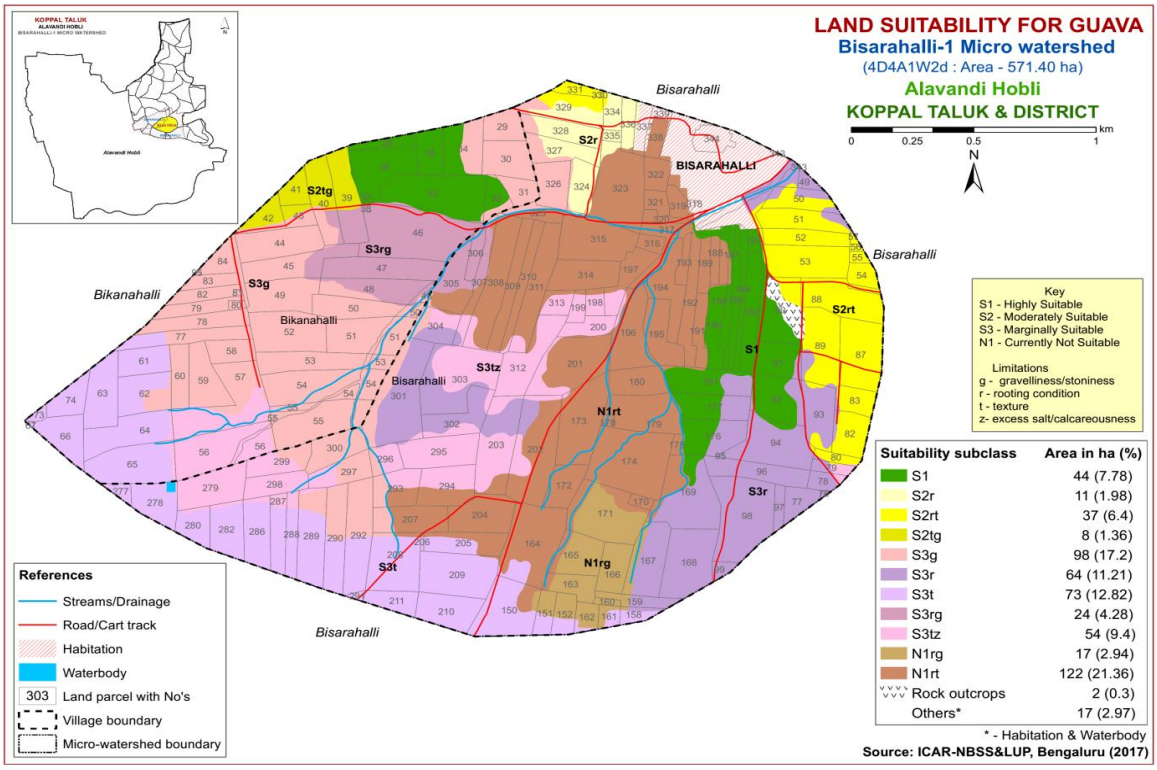



Fig. 7.13 Land Suitability map of Guava

### 7.14 Land suitability for Mango (*Mangifera indica*)

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

There are no highly suitable (Class S1) lands for growing mango. An area of about 52 ha (9%) is moderately suitable (Class S2) for growing mango and occur in the northwestern and central part of the microwatershed with minor limitations of gravelliness and rooting depth. Marginally suitable (Class S3) lands occupy major area of about 272 ha (48%) and are distributed in all parts of the microwatershed. They have minor limitations of gravelliness, rooting depth, texture and calcareousness. An area of about 228 ha (40%) is not suitable (Class N) for growing mango and occur in the southeastern and central part of the microwatershed.

**Table 7.14 Crop suitability criteria for Mango**

| **Crop requirement** | | | **Rating** | | | |
|---|---|---|---|---|---|---|
| **Soil-site characteristics** | | **Unit** | **Highly suitable (S1)** | **Moderately Suitable (S2)** | **Marginally suitable (S3)** | **Not suitable (N)** |
| Climate | Temp. in growing season | $^0$C | 28-32 | 24-27<br>33-35 | 36-40 | 20-24 |
| | Min. temp. before flowering | $^0$C | 10-15 | 15-22 | >22 | |
| Soil moisture | Growing period | Days | >180 | 150-180 | 120-150 | <120 |
| Soil aeration | Soil drainage | Class | Well drained | Mod. To imperfectly drained | Poor drained | Very poorly drained |
| | Water table | M | >3 | 2.50-3.0 | 2.5-1.5 | <1.5 |
| Nutrient availability | Texture | Class | Sc, l, sil, cl | Sl, sc, sic, l, c | C (<60%) | C (>60%), |
| | pH | 1:2.5 | 5.5-7.5 | 7.6-8.55.0-5.4 | 8.6-9.04.0-4.9 | >9.0<4.0 |
| | OC | % | High | medium | low | |
| | $CaCO_3$ in root zone | % | Non calcareous | <5 | 5-10 | >10 |
| Rooting conditions | Soil depth | cm | >200 | 125-200 | 75-125 | <75 |
| | Gravel content | %vol | Non-gravelly | <15 | 15-35 | >35 |
| Soil toxicity | Salinity | dS/m | Non saline | <2.0 | 2.0-3.0 | >3.0 |
| | Sodicity | % | Non sodic | <10 | 10-15 | >15 |
| Erosion | Slope | % | <3 | 3-5 | 5-10 | |

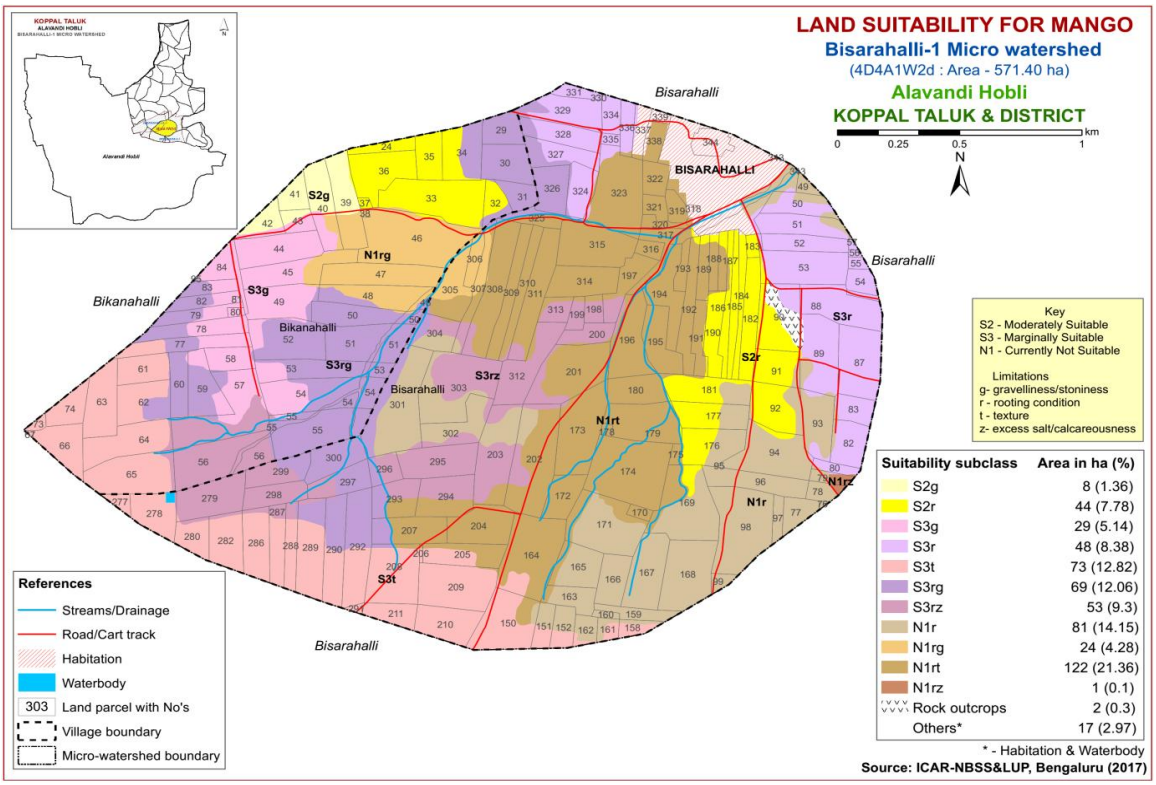



Fig. 7.14 Land Suitability map of Mango

### 7.15 Land suitability for Sapota (*Manilkara zapota*)

Sapota is the most important fruit crop grown in an area of about 29373 ha in almost all the districts of the state. The crop requirements (Table 7.15) for growing sapota were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing sapota was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.15.

Highly suitable (Class S1) lands occupy an area of about 44 ha (8%) for growing sapota and occur in the northwestern and central part of the microwatershed. An area of about 56 ha (10%) is moderately suitable (Class S2) and occur in the northwestern, northern and eastern part of the microwatershed. They have minor limitations of gravelliness and rooting depth. The marginally suitable (Class S3) cover major area of about 313 ha (55%) and are distributed in all parts of the microwatershed. They have moderate limitations of gravelliness, rooting depth, texture and calcareousness. An area of about 139 ha (24%) is not suitable (Class N) for growing sapota and are distributed in the southern, central and northern part of the microwatershed. They have severe limitations of rooting depth and calcareousness.

**Table 7.15 Crop suitability criteria for Sapota**

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

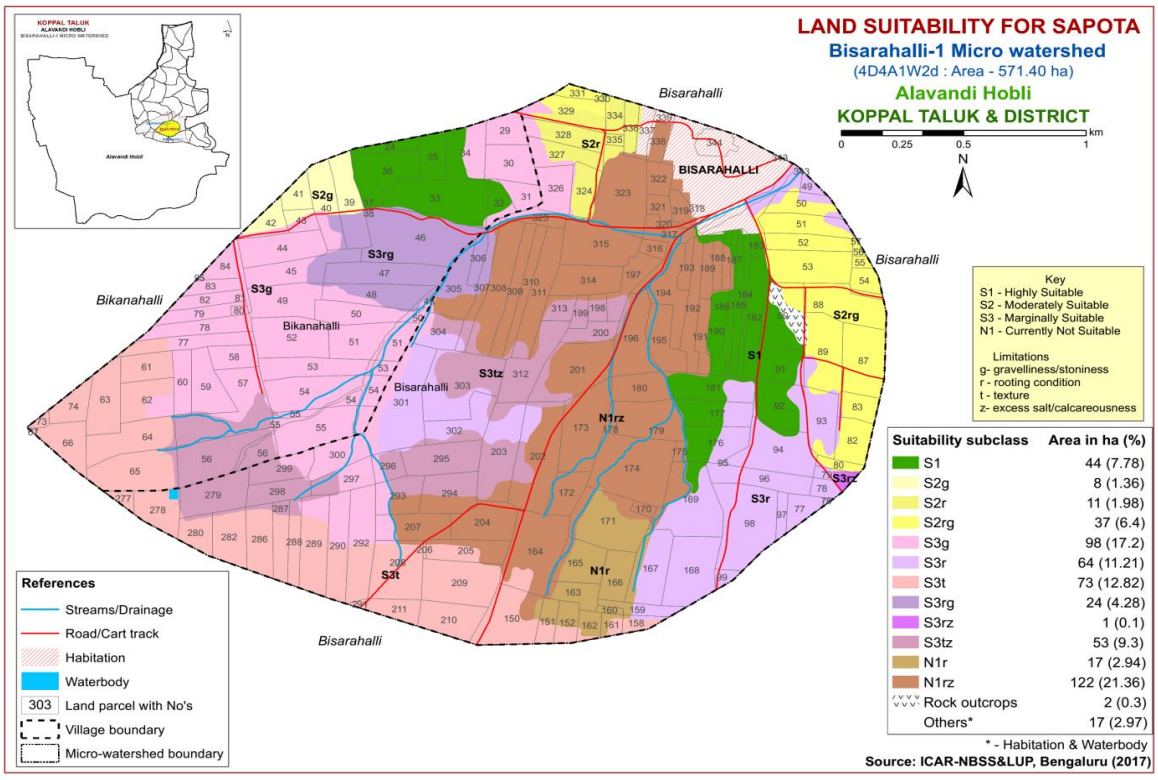



Fig. 7.15 Land Suitability map of Sapota

### 7.16 Land Suitability for Jackfruit (*Artocarpus heterophyllus*)

Jackfruit is the most important fruit crop grown in 5368 ha in all the districts of the state. The crop requirements for growing jackfruit were matched with the soil-site characteristics and a land suitability map for growing jackfruit was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in figure 7.16.

An area of about 44 ha (8%) is highly suitable (Class S1) for growing jackfruit and are distributed in the northwestern and central part of the microwatershed. An area of about 56 ha (10%) is moderately suitable (Class S2) and occur in the northern and eastern part of the microwatershed. They have minor limitations of gravelliness and rooting depth. The marginally suitable (Class S3) lands cover major area of about 313 ha (55%) and are distributed in all parts of the microwatershed. They have moderate limitations of gravelliness, rooting depth, texture and calcareousness. An area of about 139 ha (24%) is not suitable (Class N) for growing jackfruit and occur in the northern, central and southern part of the microwatershed.

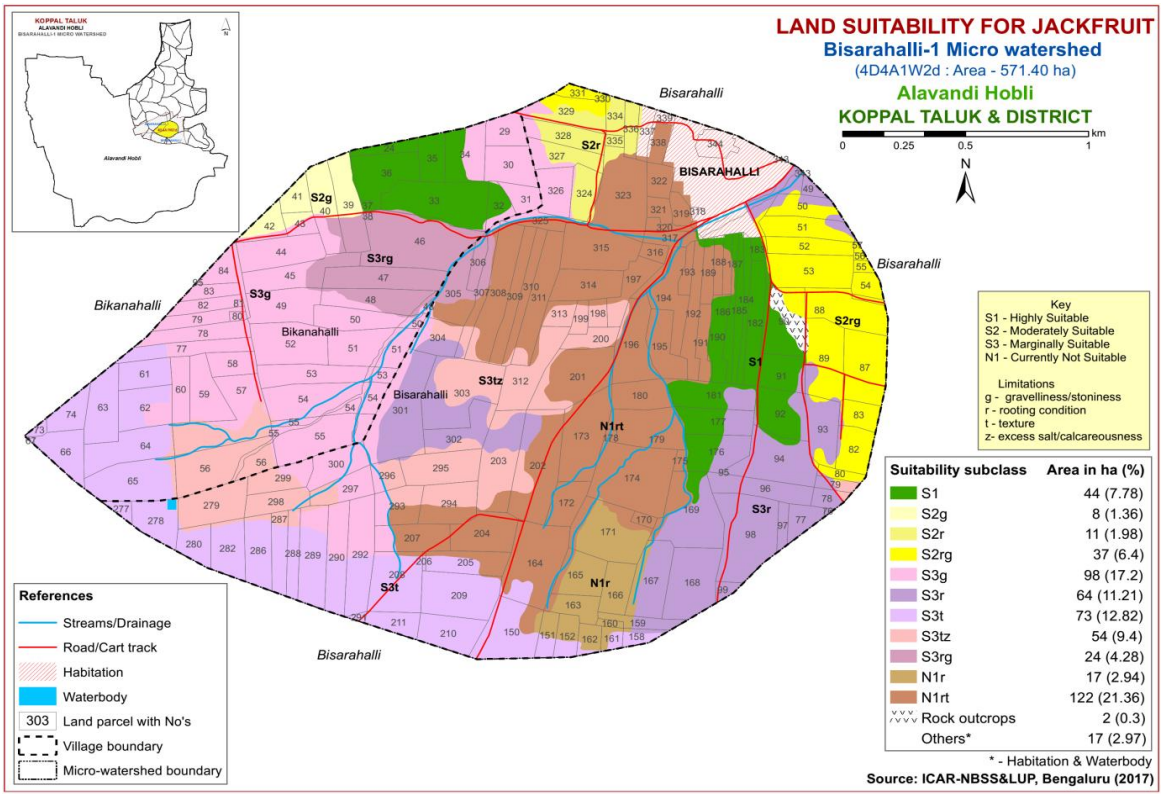



Fig. 7.16 Land Suitability map of Jackfruit

### 7.17 Land Suitability for Jamun (*Syzygium cumini*)

Jamun is an important fruit crop grown in almost all the districts of the state. The crop requirements for growing jamun were matched with the soil-site characteristics and a land suitability map for growing jamun was generated. The area extent and their

geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.17.

There are no highly suitable (Class S1) lands for growing jamun. An area of about 174 ha (30%) is moderately suitable (Class S2) and occur in the western, southwestern, northern and eastern part of the microwatershed. They have minor limitations of gravelliness, rooting depth and calcareousness. The marginally suitable (Class S3) lands cover maximum area of about 187 ha (33%) and are distributed in the western, central, northern and southeastern part of the microwatershed with moderate limitations of gravelliness, rooting depth, calcareousness and texture. An area of about 139 ha (24%) is not suitable for growing jamun and are distributed in the southern, central and northern part of the microwatershed.

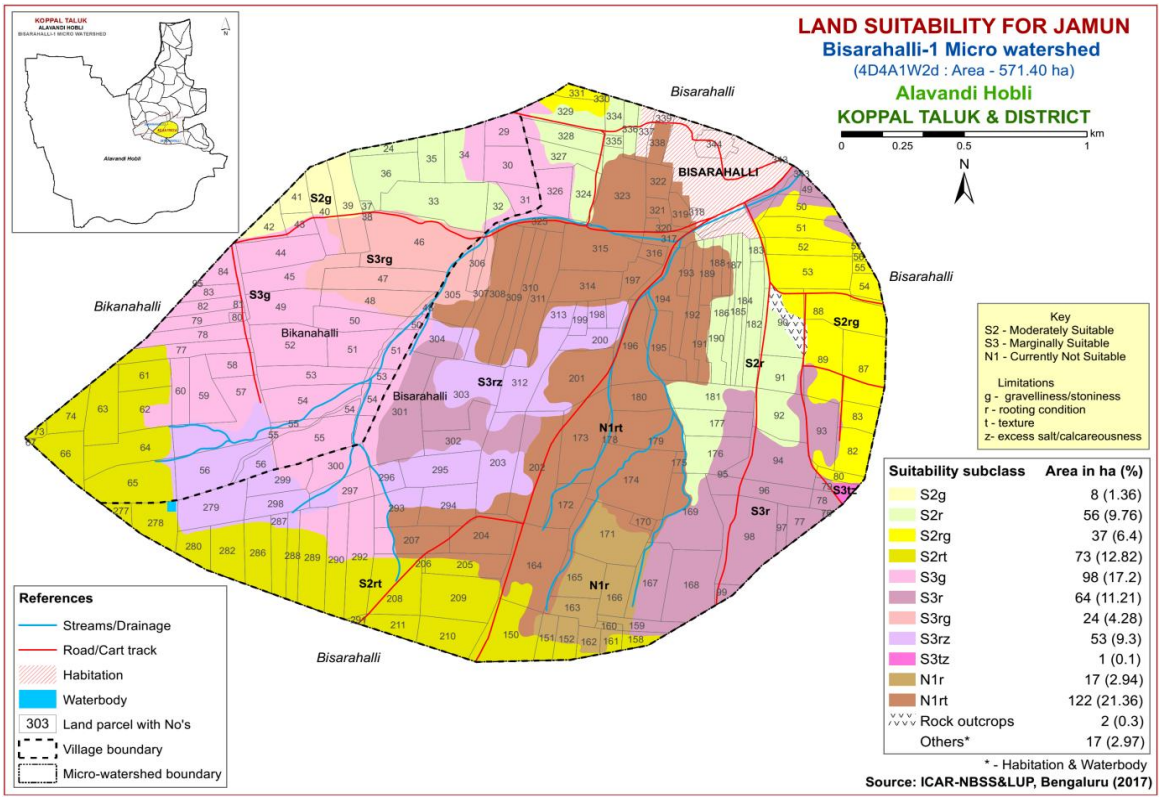



Fig. 7.17 Land Suitability map of Jamun

## 7.18 Land Suitability for Musambi (*Citrus limetta*)

Musambi is the most important fruit crop grown in an area of 5446 ha in almost all the districts of the state. The crop requirements for growing musambi were matched with the soil-site characteristics and a land suitability map for growing musambi was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.18.

An area of about 47 ha (8%) is highly suitable (Class S1) for growing musambi and are distributed in the northern and central part of the microwatershed. An area of about 179 ha (31%) is moderately suitable (Class 2) and occurs in the northwestern, central, northern and eastern part of the microwatershed. They have minor limitations of gravelliness, rooting depth and calcareousness. An area of about 187 ha (33%) is

marginally suitable (Class S3) for growing musambi and are distributed in the western, central, northern and southeastern part of the microwatershed with moderate limitations of gravelliness and rooting depth. An area of about 139 ha (24%) is not suitable (Class N) for growing musambi and are distributed in the northern, southern and central part of the microwatershed.

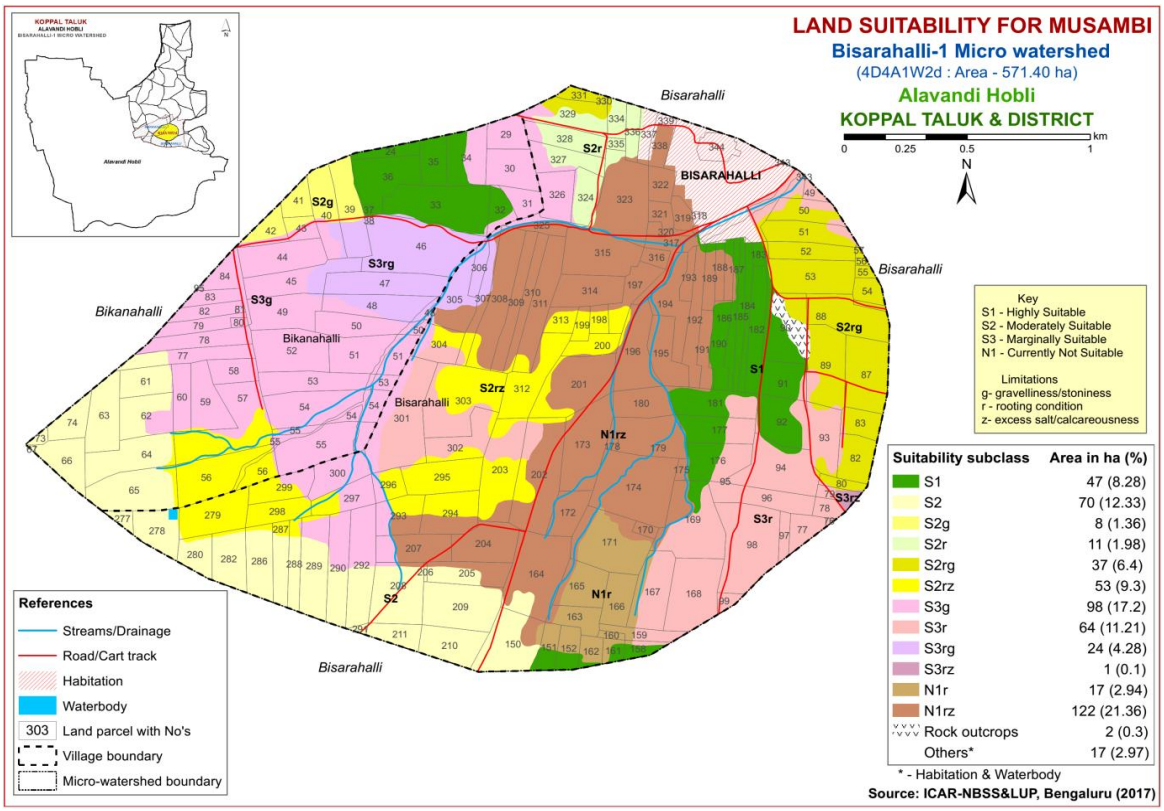



Fig. 7.18 Land Suitability map of Musambi

## 7.19 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 7.16) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing lime was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.19.

Highly suitable (Class S1) for growing lime occupy an area of about 47 ha (8%) and are distributed in the northern and central part of the microwatershed. An area of about 179 ha (31%) is moderately suitable (Class 2) and occur in the northwestern and central part of the microwatershed with minor limitation of gravelliness, rooting depth and calcareousness. Maximum area of about 187 ha (33%) is marginally suitable (Class S3) and are distributed in the western, central and northeastern part of the microwatershed. They have moderate limitations of gravelliness, rooting depth and calcareousness. An area of about 139 ha (24%) is not suitable (Class N) for growing lime and are distributed in the southern, central and northern parts of the microwatershed. They have severe limitations of gravelliness, rooting depth and calcareousness

**Table 7.16 Crop suitability criteria for Lime**

| Crop requirement | | | Rating | | | |
|---|---|---|---|---|---|---|
| Soil –site characteristics | | Unit | Highly suitable (S1) | Moderately suitable (S2) | Marginally suitable (S3) | Not suitable(N) |
| Climate | Temperature in growing season | $^0$C | 28-30 | 31-35<br>24-27 | 36-40<br>20-23 | >40<br><20 |
| Soil moisture | Growing period | Days | 240-265 | 180-240 | 150-180 | <150 |
| Soil aeration | Soil drainage | Class | Well drained | Mod. to imperfectly drained | Poorly | Very poorly |
| Nutrient availability | Texture | Class | Scl, l, sicl, cl, s | Sc, sc, c | C(>70%) | S, ls |
| | pH | 1:2.5 | 6.0-7.5 | 5.5-6.47.6-8.0 | 4.0-5.4<br>8.1-8.5 | <4.0<br>>8.5 |
| | $CaCO_3$ in root zone | % | Non calcareous | Upto 5 | 5-10 | >10 |
| Rooting conditions | Soil depth | Cm | >150 | 100-150 | 50-100 | <50 |
| | Gravel content | % vol. | Non gravelly | 15-35 | 35-55 | >55 |
| Soil toxicity | Salinity | dS/m | Non saline | Upto 1.0 | 1.0-2.5 | >2.5 |
| | Sodicity | % | Non sodic | 5-10 | 10-15 | >15 |
| Erosion | Slope | % | <3 | 3-5 | 5-10 | |

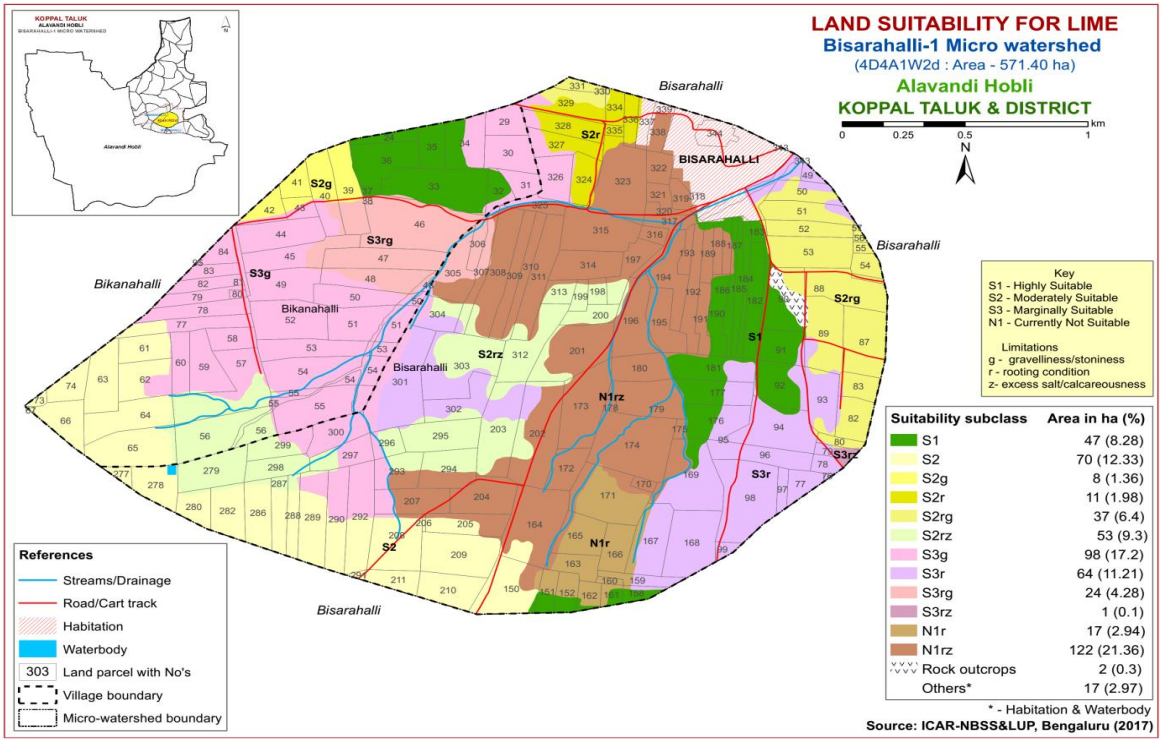



Fig. 7.19 Land Suitability map of Lime

## 7.20 Land Suitability for Cashew (*Anacardium occidentale)*

Cashew is one of the most important fruit crop grown in an area of 7052 ha in almost all the districts of the State. The crop requirements for growing cashew were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing cashew was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.20.

Highly suitable (Class S1) lands occupy an area of about 44 ha (8%) and are distributed in the northern and central part of the microwatershed. An area of about 85 ha (15%) is moderately suitable and occur in the northern, northwestern and eastern part of the microwatershed with minor limitations of rooting depth, texture and gravelliness. The marginally suitable (Class S3) lands cover an area of about 157 ha (28%) and are distributed in the western, northern, central and southeastern part of the microwatershed. They have moderate limitations of gravelliness and rooting depth. Maximum area of about 266 ha (46%) is not suitable (Class N) for growing cashew and are distributed in major part of the microwatershed.

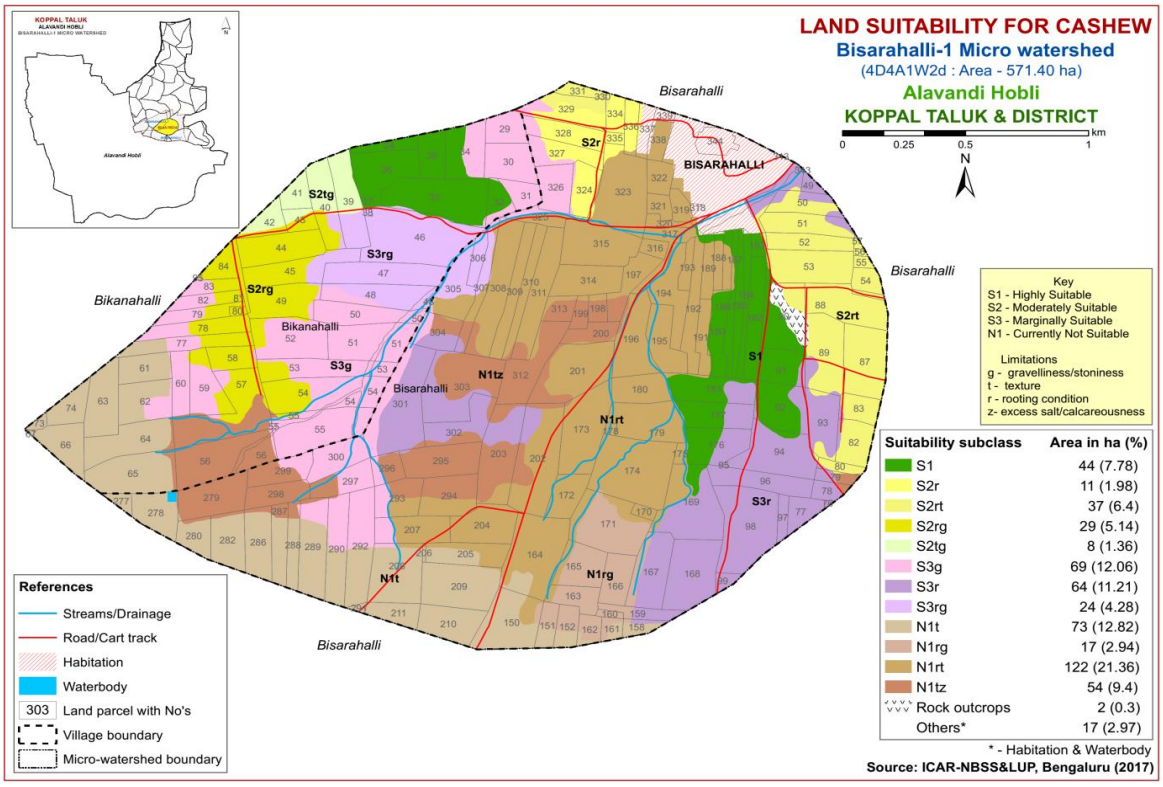



Fig. 7.20 Land Suitability map of Cashew

## 7.21 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 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 7.21.

An area of about 166 ha (29%) is highly suitable (Class S1) for growing custard apple. They are distributed in the southwestern, northern and eastern part of the microwatershed. Maximum area of about 248 ha (43%) is moderately suitable (Class S2) and occur in all parts of the microwatershed. They have minor limitations of gravelliness, rooting depth and calcareousness. An area of about 139 ha (24%) is marginally suitable (Class S3) for growing custard apple and are distributed in the southwestern and northeastern part of the microwatershed with severe limitations of calcareousness, rooting depth and gravelliness.

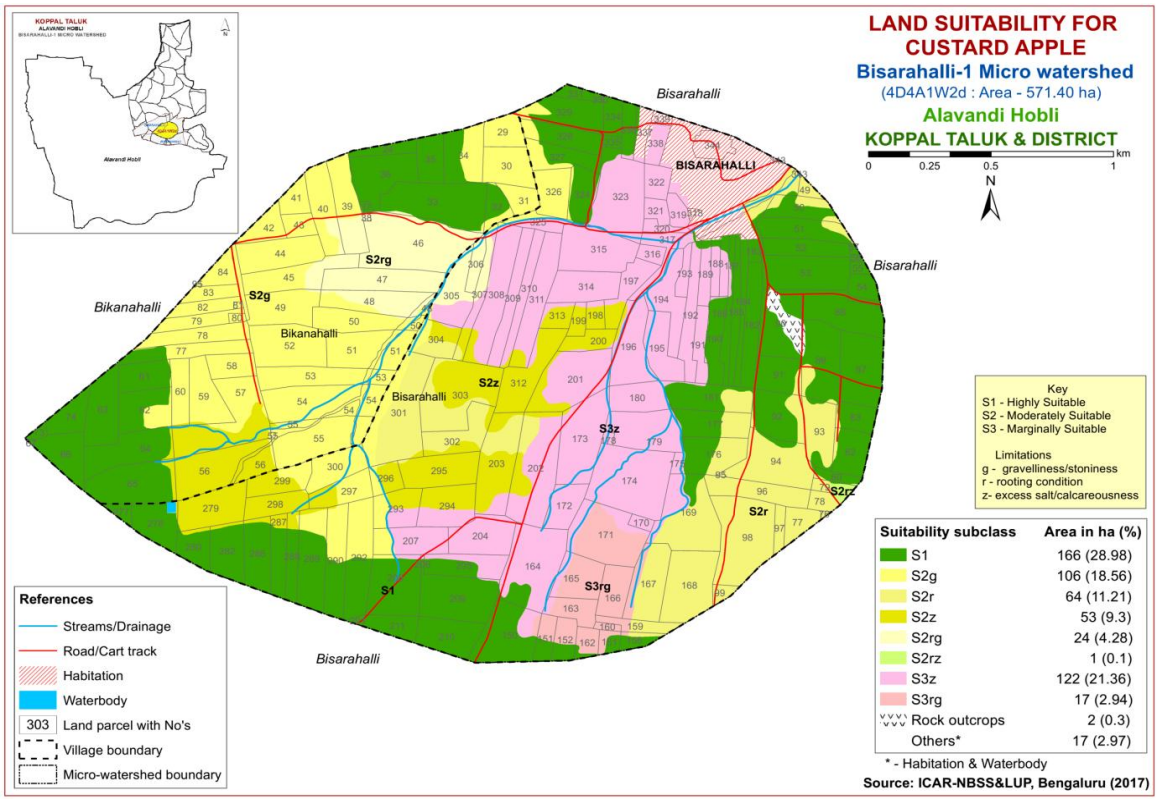



Fig. 7.21 Land Suitability map of Custard Apple

### 7.22 Land Suitability for Amla (*Phyllanthus emblica*)

Amla is one of the most important medicinal plant grown in 151 ha in all the districts of the State. The crop requirements for growing amla were matched with the soil-site characteristics and a land suitability map for growing amla was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.22.

Highly suitable (Class S1) lands occupy an area of about 92 ha (16%) for growing amla and occur in the northern and eastern part of the microwatershed. Maximum area of about 321 ha (56%) has soils that are moderately suitable (Class S2) and are distributed in all parts of the microwatershed. They have minor limitations of rooting depth, gravelliness, texture and calcareousness. The marginally suitable (Class S3) lands cover

an area of about 139 ha (24%) and occur in the southern, central and northeastern part of the microwatershed with moderate problems of rooting depth, gravelliness and texture.

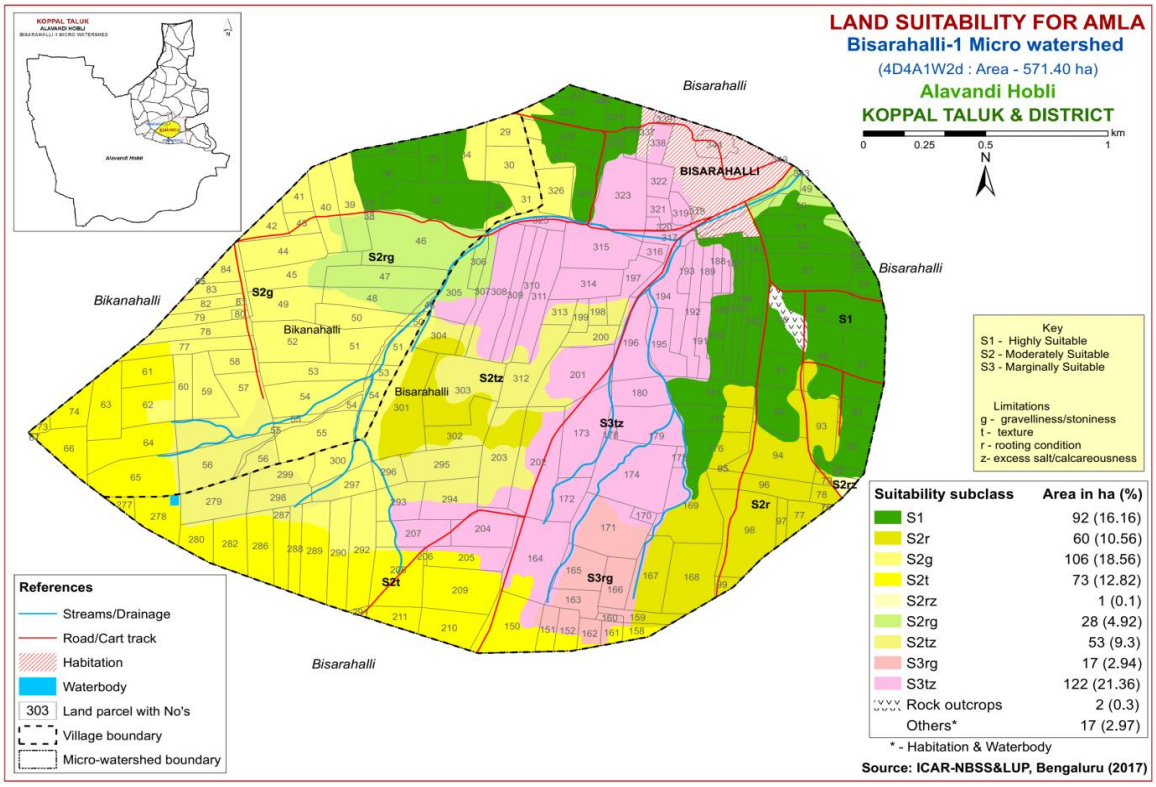



Fig. 7.22 Land Suitability map of Amla

### 7.23 Land Suitability for Tamarind (*Tamarindus indica*)

Tamarind is the most important spice crop grown in 14897 ha in all the districts of the state. The crop requirements for growing tamarind were matched with the soil-site characteristics and a land suitability map for growing tamarind was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.23.

There are no highly suitable lands (Class S1) for growing tamarind. An area of about 126 ha (22%) is moderately suitable (Class S2) and occurs in the northwestern, southwestern and central part of the microwatershed. They have minor limitations of gravelliness and rooting depth. An area of about 199 ha (35%) is marginally suitable (Class S3) and occur in the northwestern, central and northern part of the microwatershed. They have moderate limitations of gravelliness, rooting depth and calcareousness. Maximum area of about 228 ha (40%) is not suitable (Class N) for growing tamarind and are distributed in major parts of the microwatershed. They have severe limitations of rooting depth, gravelliness and calcareousness.

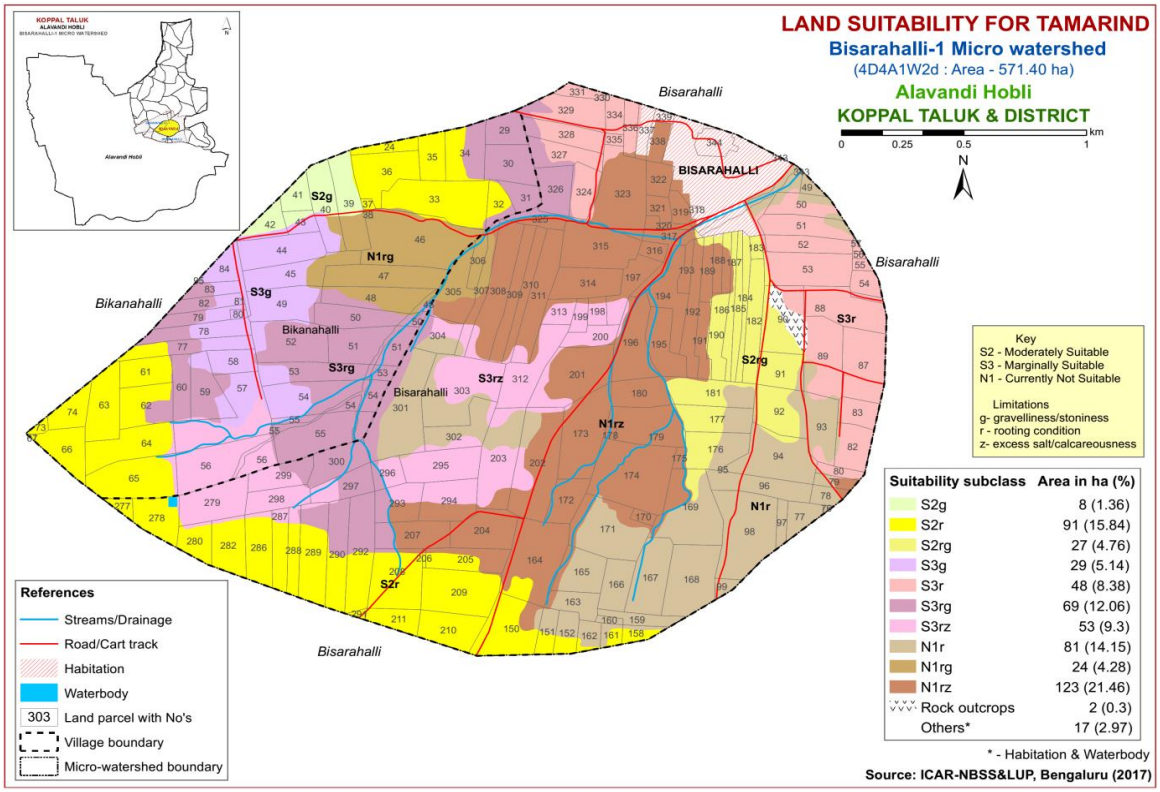



Fig. 7.23 Land Suitability map of Tamarind

## 7.24 Land Suitability for Marigold (*Tagetes erecta*)

Marigold is the most important flower crop grown in an area of 9108 ha in almost all the districts of the state. The crop requirements 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 7.24.

Highly suitable (Class S1) land occupies a very small area of about 17 ha (3%) and is distributed in the northwestern part of the microwatershed. Maximum area of about 290 ha (51%) is moderately suitable (Class S2) for growing marigold and occur in all parts of the microwatershed. They have minor limitations of gravelliness, rooting depth, calcareousness and texture. Marginally suitable (Class S3) lands cover an area of about 246 ha (43%) and occur in the northern, southwestern, southern and central part of the microwatershed. They have moderate limitations of gravelliness, rooting depth and calcareousness.

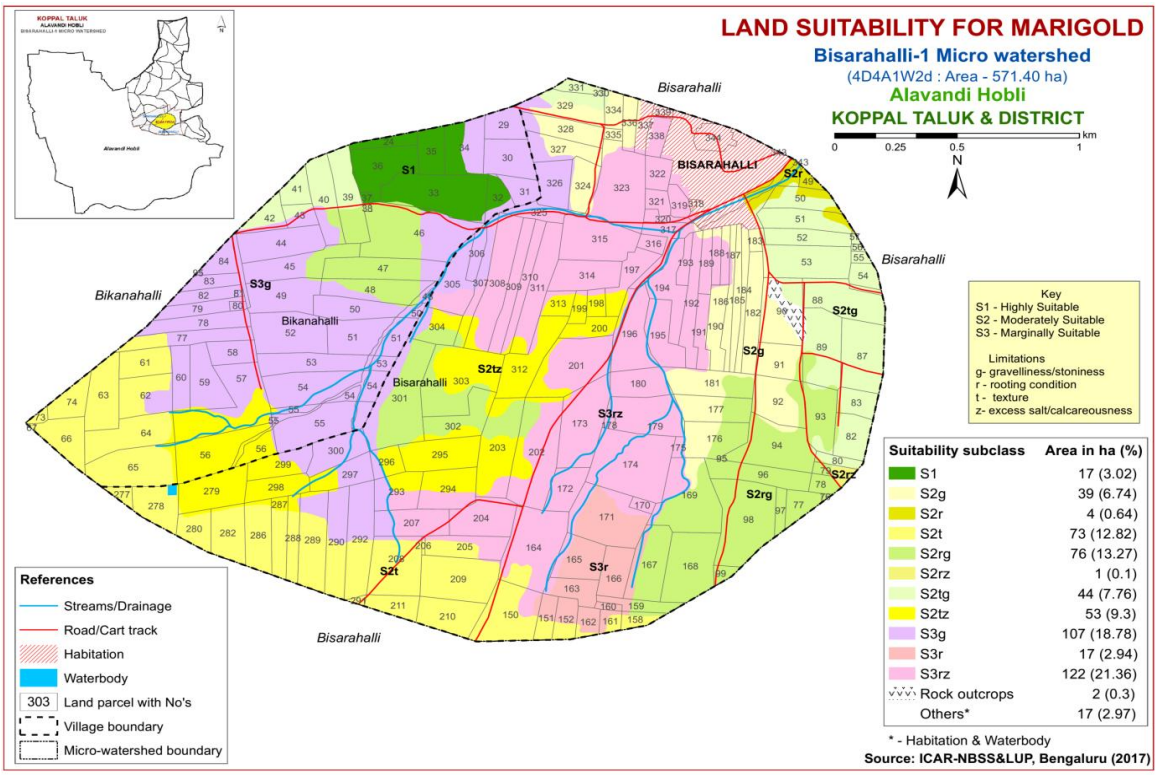



Fig. 7.24 Land Suitability map of Marigold

### 7.25 Land Suitability for Chrysanthemum (*Chrysanthemum indicum*)

Chrysanthemum is the most important flower crop grown in an area of 4978 ha in almost all the districts of the State. The crop requirements for growing chrysanthemum were matched with the soil-site characteristics 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 7.25.

Highly suitable (Class S1) land occupies a very small area of about 17 ha (3%) for growing chrysanthemum and are distributed in the northwestern part of the microwatershed. Maximum area of about 290 ha (51%) is moderately suitable (Class S2) and occur in all parts of the microwatershed. They have minor limitations of gravelliness, rooting depth, calcareousness and texture. Marginally suitable (Class S3) lands cover an area of about 246 ha (43%) and occur in the northern, southwestern, southern and central part of the microwatershed. They have moderate limitations of gravelliness, rooting depth and calcareousness.

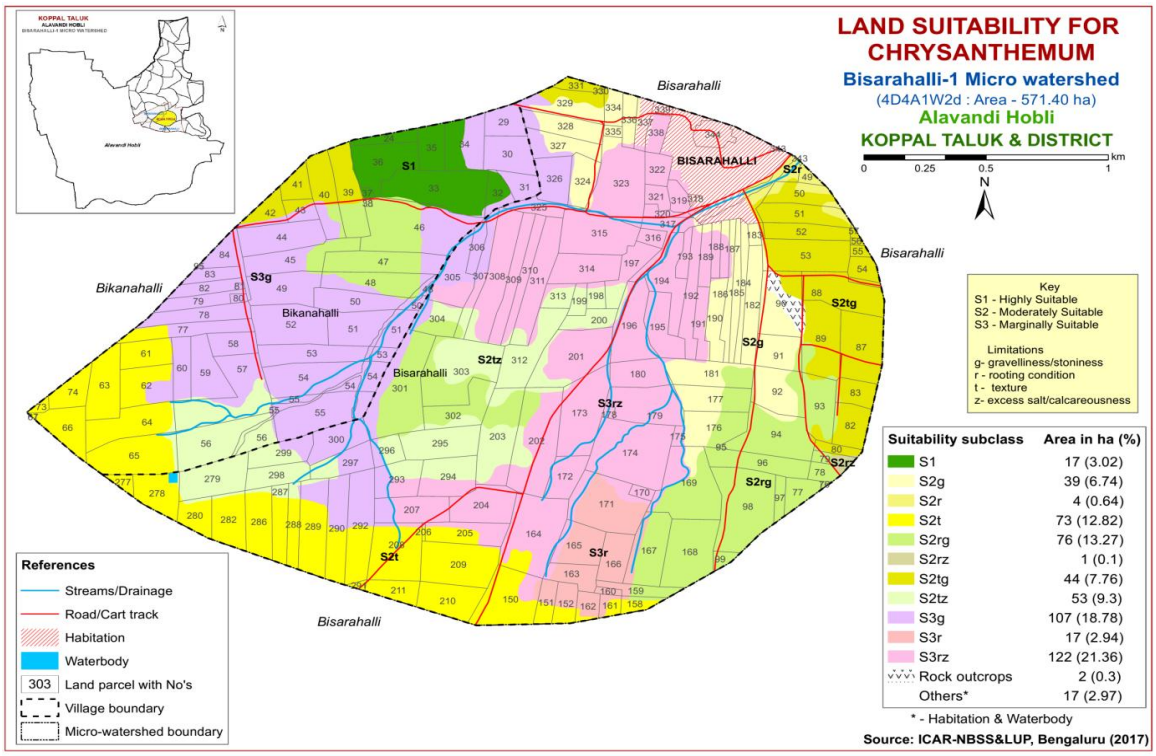



Fig. 7.25 Land Suitability map of Chrysanthemum

## 7. 26 Land Suitability for Jasmine *(Jasminum sp.)*

Jasmine is the most important flower crop grown in an area of 803 ha in almost all the districts of the State. The crop requirements (Table 7.17) 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 7.26.

Highly suitable (Class S1) lands occupy very small area of about 17 ha (3%) is for growing jasmine and are distributed in the northwestern part of the microwatershed. Moderately suitable (Class S2) lands occupy an area of about 164 ha (28%) and occur in the eastern, central, northern and northwestern part of the microwatershed with minor limitations of rooting depth, gravelliness, calcareousness and texture. Major area of about 372 ha (65%) is marginally suitable (Class S3) and are distributed in major parts of the microwatershed. They have moderate limitations of gravelliness, rooting depth, calcareousness and texture.

**Table 7.17 Land suitability criteria for jasmine (irrigated)**

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

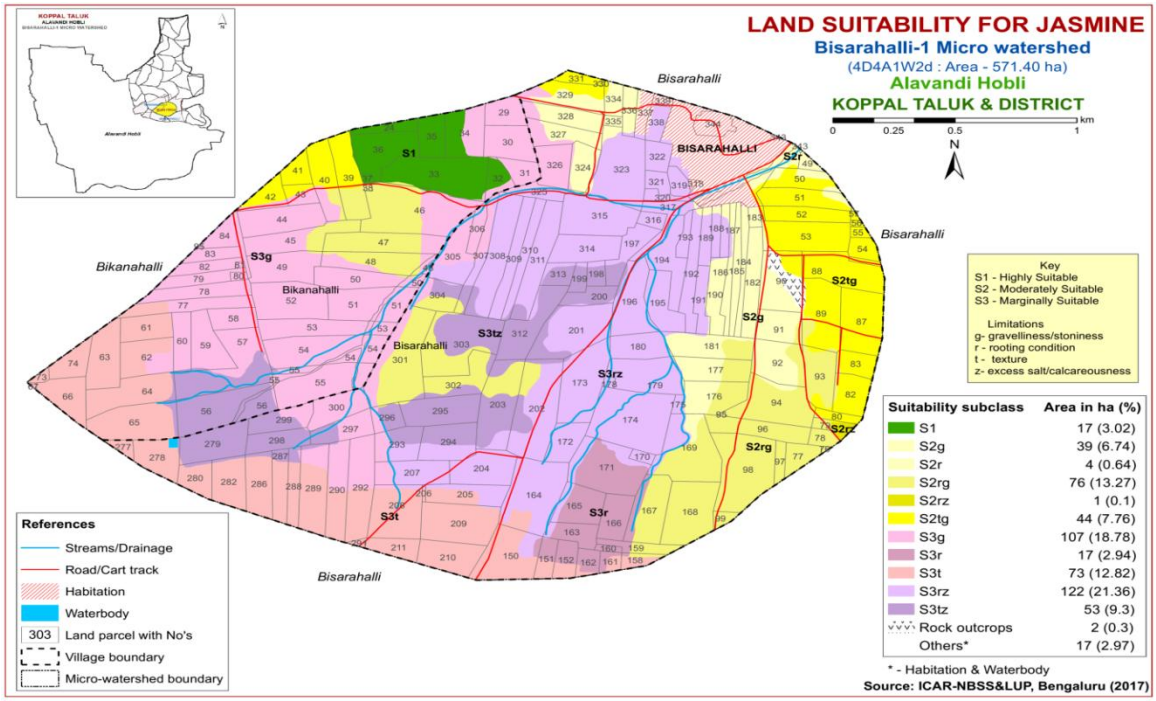



Fig. 7.26 Land Suitability map of Jasmine

## 7.27 Land Suitability for Crossandra (*Crossandra infundibuliformis*)

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

Highly suitable (Class S1) lands occupy a very small area of about 17 ha (3%) for growing crossandra and are distributed in the northwestern part of the microwatershed. Maximum area of about 285 ha (50%) is moderately suitable (Class S2) and occur in major parts of the microwatershed. They have minor limitations of gravelliness, rooting depth, calcareousness and texture. Marginally suitable (Class S3) lands cover an area of about 251 ha (44%) and occur in the northeastern, southwestern, southern and central part of the microwatershed. They have moderate limitations of gravelliness, rooting depth, texture and calcareousness.

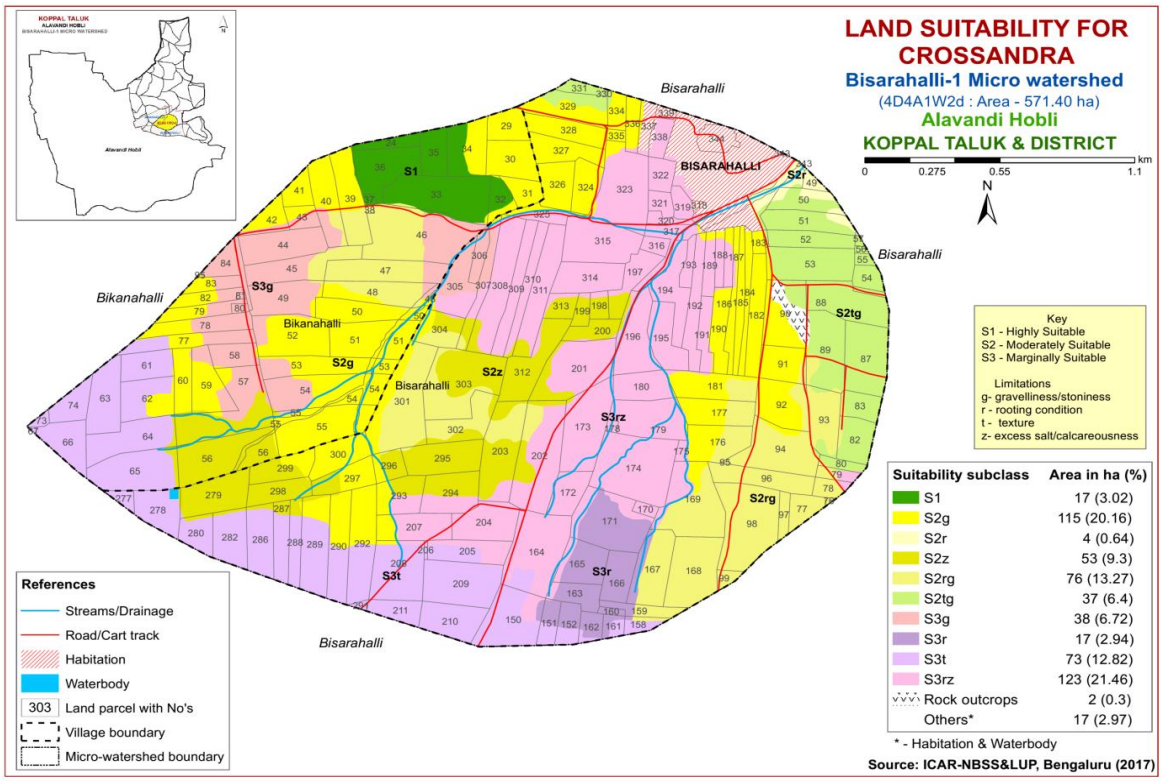



Fig. 7.27 Land Suitability map of Crossandra

## 7.28 Proposed Crop Plan for Bisarahalli-1 Microwatershed

After assessing the land suitability for the 27 crops, the proposed crop plan has been prepared for the 9 identified LUCs by considering only the highly (Class S1) and moderately (Class S2) suitable lands for each of the 27 crops. The resultant proposed crop plan is presented in Table 7.19.

**Table 7.18 Proposed Crop Plan for Bisarahalli-1 Microwatershed**

| LMC No | Mapping Units | Survey Number | Field Crops/ Forestry | Horticulture Crops with suitable Interventions | Suitable Interventions |
|---|---|---|---|---|---|
| 1 | GRHmA1<br>GRHmB2<br>(Deep to very deep, black clay soils) | **Bikanahalli:**<br>61,62,63,64,65,66,67,73,74<br>**Bisarahalli:**<br>150,158,161,206,208,209,210,211,277,278,280,282,286,287,288,289,290,291 | Sunflower, Sorghum, Cotton, Bengal gram, Safflower, Linseed, Bajra | **Fruit crops:** Amla, Custard apple, Jamun, Lime, Musambi, Tamarind, Pomegranate<br>**Vegetables:** Drumstick, Chilli, Coriander<br>**Flowers:**<br>Marigold, Chrysanthemum | Application of FYM, Biofertilizers and micronutrients, drip irrigation, Mulching, suitable soil and water conservation practises |
| 2 | NDLiB1g1<br>BPRhB1g1<br>BPRiB1<br>BPRiB1g1<br>(Deep to very deep, red gravelly clay soils) | **Bikanahalli:**<br>29,30,31,34,39,40,41,42,50,51,52,53,54,55,59,60,79,82,83,95<br>**Bisarahalli:**<br>292,297,300,326 | Groundnut, Redgram, Bajra, Horsegram | **Fruit crops:**<br>Amla, Cashew, Custard apple<br>**Vegetables:**<br>Drumstick, Coriander | Dripirrigation, mulching, suitable soil and water conservation practises (Crescent Bunding with Catch Pit etc) |
| 3 | DRLmB1<br>(Moderately deep, calcareous black clay soils) | **Bikanahalli:**<br>56,57<br>**Bisarahalli:**<br>198,199,200,203,279,293,294,295,296,298,299,303,312,313 | Sunflower , Sorghum, Bajra, Bengal gram, safflower, Linseed, Coriander | **Fruit crops:** Amla, Custard apple, Lime, Pomegranate, Musambi<br>**Vegetables:**<br>Drumstick, Coriander<br>**Flowers:**<br>Marigold, Chrysanthemum | Application of FYM, Biofertilizers and micronutrients, drip irrigation, Mulching, suitable soil and water conservation practises |

| | | | | | |
|---|---|---|---|---|---|
| 4 | KMHiB1<br>KMHiB2g1<br>BSRiB1g1<br>GHThB2g1<br>(Moderately deep to deep, red sandy clay to sandy clay loam soils) | **Bikanahalli:**<br>24,32,33,35,36,37<br>**Bisarahalli:**<br>50,51,52,53,54,55,56,57,<br>80,82,83,87,88,89,90,91,<br>92,176,177,181,182,183,<br>184,185,186,190,324,327,328,329,330,331,334,335,336, | Maize, Sorghum, Bajra,<br>Groundnut,<br>Redgram | **Fruit crops:** Guava, Jackfruit, Jamun, Mango, Tamarind**,**<br>Amla, Custard apple, Lime, Pomegranate, Musambi<br>**Vegetables:** Drumstick, Tomato, Chilli, Coriander<br>**Flowers:** Marigold, Jasmine, Chrysanthemum, | Drip irrigation,<br>mulching, suitable soil and water conservation practises (Crescent Bunding with Catch Pit etc) |
| 5 | BDGcB1g2<br>(Moderately deep, gravelly sandy clay to sandy clay loam soils) | **Bikanahalli:**<br>43,44,45,49,58,77,78,80,<br>81,84 | Groundnut,<br>Redgram, Bajra,<br>Horsegram | **Fruit crops:**<br>Amla, Cashew, Custard apple<br>**Vegetables:**<br>Drumstick, Coriander | Drip irrigation,<br>mulching, suitable soil and water<br>conservation practises (Crescent Bunding with Catch Pit etc) |
| 6 | RNKiA1<br>(Moderately shallow,<br>calcareous black gravelly sandy clay to clay soils) | **Bisarahalli:**<br>78,79,80 | Bengal gram,<br>Sorghum,<br>Coriander | **Fruit crops:**<br>Amla, Custard apple<br>**Flowers:**<br>Marigold,Chrysanthemum, Jasmine | Application of FYM, Biofertilizers and micronutrients, drip irrigation, mulching, suitable soil and water conservation practises |
| 7 | HTIhB1g1<br>KTPiB1g1<br>MKHcB1g1<br>MKHcB2g2 | **Bisarahalli:**<br>38,46,47,48<br>**Bisarahalli:**<br>49,76,77,78,79,93,94,95, | Maize, Sorghum,<br>Groundnut, Bajra | **Fruit crops:**<br>Amla, Custard apple<br>**Vegetables:** Tomato, Chilli, Coriander | Drip irrigation, mulching, suitable soil and water conservation practises (Crescent Bunding with |

| | | | | | |
|---|---|---|---|---|---|
| | (Moderately shallow, red gravelly sandy clay to sandy clay loam soils) | 96,97,98,99,159,167,168, 169,301,302,304,305,306,307,343 | | **Flowers:** Marigold,Chrysanthemum, Jasmine | Catch Pit etc) |
| 8 | MTLiB1g1 MTLmB1 (Shallow, calcareous Black gravelly sandy clay to clay soils) | **Bisarahalli:** 164,170,172,173,174,175,178,179,180,187,188,189,191,192,193,194,195,196,197,201,202,204,205,207,308, 309,310,311,314,315,316,317,319,320,321,322,323,325,338 | Bengal gram, Horsegram | **Agri-Silvi-Pasture:** Hybrid Napier, *Styloxanthes hamata, Styloxanthes scabra* | Use of medium duration varieties, sowing across the slope, drip irrigation and mulching is recommended |
| 9 | CSRmB2g1 (Shallow, red loamy soils) | **Bisarahalli:** 151,152,160,162,163,165, 166,171 | - | **Agri-Silvi-Pasture:** Hybrid Napier, *Styloxanthes hamata, Styloxanthes scabra* | Use of medium duration varieties, sowing across the slope, drip irrigation and mulching is recommended |

*Chapter 8*

# SOIL HEALTH MANAGEMENT

## 8.1 Soil Health

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

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

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

**The most important characterististics of a healthy soil are**

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

**Characteristics of Bisarahalli-1 Microwatershed**

- The soil phases with sizeable area identified in the microwatershed belonged to the soil series of MTL (122 ha), GRH (73 ha), BPR (69 ha), HDH (69 ha), HTI (60 ha), DRL (53 ha), KMH (44 ha), BSR (37 ha), BDG (29 ha), MKH (24 ha), CSR (17 ha), GHT (11 ha), KTP (4 ha), and RNK (1 ha).
- As per land capability Classification, about 97 per cent 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, maximum area of about 233 ha (41%) is moderately alkaline (pH 7.8-8.4). An area of about 150 ha (26%) is under strongly alkaline (pH 8.4-9.0), 47 ha (8%) (pH >9.0) is very strongly alkaline and about 111 ha (20%) is under slightly alkaline (pH 7.3-7.8). Very small area of about 12 ha (2%) is under neutral (pH 6.5-7.3) 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**

(Slightly alkaline to 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 – 5 kg/ha (once in three years).

**Neutral soils**

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

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

**Soil Degradation**

Soil erosion is one of the major factor affecting the soil health in the microwatershed. The entire area is suffering from slight to moderate erosion. These areas need immediate soil and water conservation and, other land development and land husbandry practices for restoring soil health.

**Disseminate information and communicate benefits**

Any large scale implementation of soil health management requires that supporting information is made available widely, particularly through channels familiar to

farmers and extension workers. Given the very high priority attached to soil health especially by the Central Government on issuing Soil-Health Cards to all the farmers, media outlets like regional, state and national newspapers, Radio and Dooradarshan programs in local languages but also modern information and communication technologies such as Cellular phones and the Internet, which can be much more effective in reaching the younger farmers.

**Inputs for Net Planning 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 Bisarahalli-1 Microwatershed.

- **Organic Carbon:** The OC content is medium (0.5-0.75%) in maximum area of about 325 ha (57%), low (<0.5%) in 208 ha (36%) and high (>0.5%) in about 19 ha (3%). 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 334 ha area where OC is less than 0.5% and 311 ha area is medium (0.5-0.75%) to high (>0.75%) in OC. For example, for rainfed maize, recommended level is 50 kg N per ha and an additional 12 kg /ha needs to be applied for all the crops grown in these plots.

- **Available Phosphorus**: In 289 ha (50%) area, the available phosphorus is low and 256 ha (45%) is medium in available phosphorus. Hence for all the crops, 25% additional P-needs to be applied. Very small area of about 8 ha (1%) is high in available phosphorus.
- **Available Potassium:** Available potassium is medium in 307 ha (54%) area of the microwatershed and 32 ha (6%) is low in available potassium. For all crops, additional 25 % potassium may be applied. It is high in 213 ha (37%) area of the microwatershed.
- **Available Sulphur:** Available sulphur is a very critical nutrient for oilseed crops. Available sulphur is medium in maximum area of about 406 ha (71%) in the microwatershed. These areas need to be applied with magnesium sulphate or gypsum or Factamphos (p) fertitilizer (13% sulphur) for 2-3 years for the deficiency to be corrected. It is high in 147 ha (26%) area of the microwatershed.
- **Available iron:** It is deficient in an area of 267 ha (47%) in the microwatershed. To manage iron deficiency, iron sulphate @ 25kg /ha needs to be applied for 2-3 years. It is sufficient in the rest of 286 ha (50%) area in the microwatershed.
- **Available Zinc:** It is deficient (<0.6 ppm) in maximum area of 432 ha (76%) and sufficient (>0.6 ppm) in 121 ha (21%) in the microwatershed. Application of zinc sulphate @ 25kg/ha is to be followed in areas that are deficient in available zinc.
- **Soil alkalinity:** The microwatershed has 541 ha (95%) area with soils that are slightly 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.

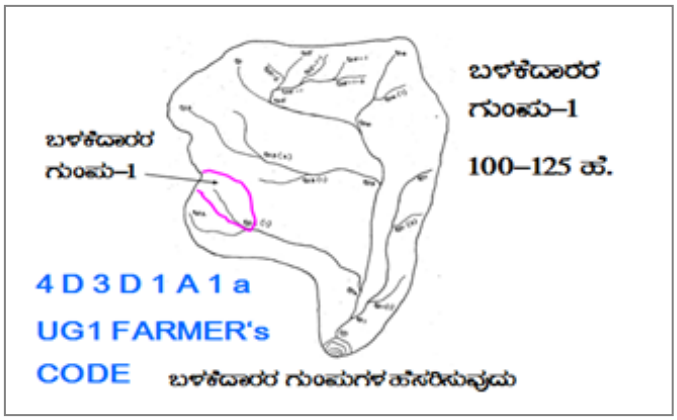
**Land Suitability for various crops:** Areas that are highly, moderately and marginally suitable for growing various crops are indicated. Along with the suitability, various constraints that are limiting the productivity are also indicated. For example, in case of cotton, gravel content, rooting depth 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 Bisarahalli-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 has to be collected.

### Steps for Survey and Preparation of Treatment Plan

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

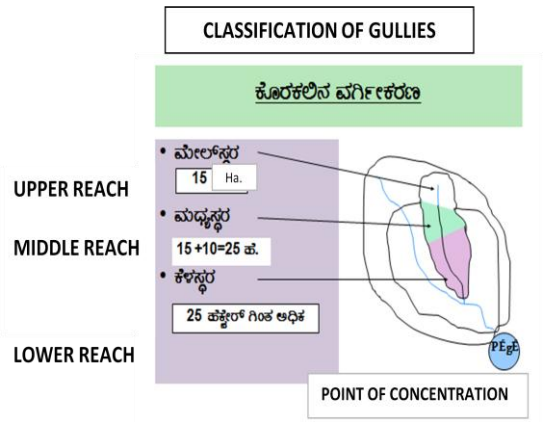
- Naming of user groups and farmers
- Identification of arable and non arable lands
- Identification of drainage lines and gullies
- Identification of non treatable areas
- Identification of priority areas in the arable lands
- Treatment plan for arable lands
- Location of water harvesting and recharge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

## 9.1 Treatment Plan

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

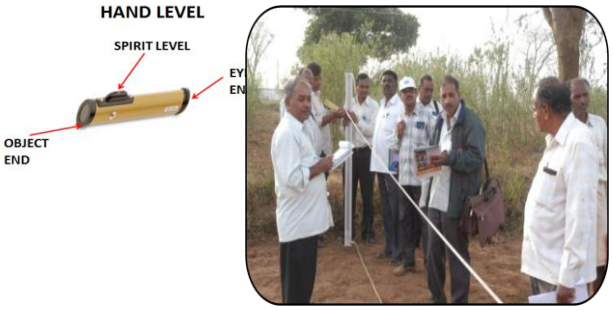
### 9.1.1 Arable Land Treatment

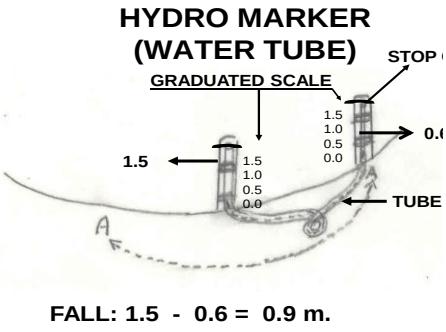
### A. BUNDING

| Steps for Survey and Preparation of Treatment Plan | | USER GROUP-1 |
|---|---|---|
| Cadastral map (1:7920 scale) is enlarged to a scale of 1:2500 scale<br>Existing network of waterways, pothissa boundaries, grass belts, natural drainage lines/ watercourse, cut ups/ terraces are marked on the cadastral map to the scale<br>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 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 ($bg_0$ - loamy sand, <15% gravel). The recommended sections for different soils are given below.

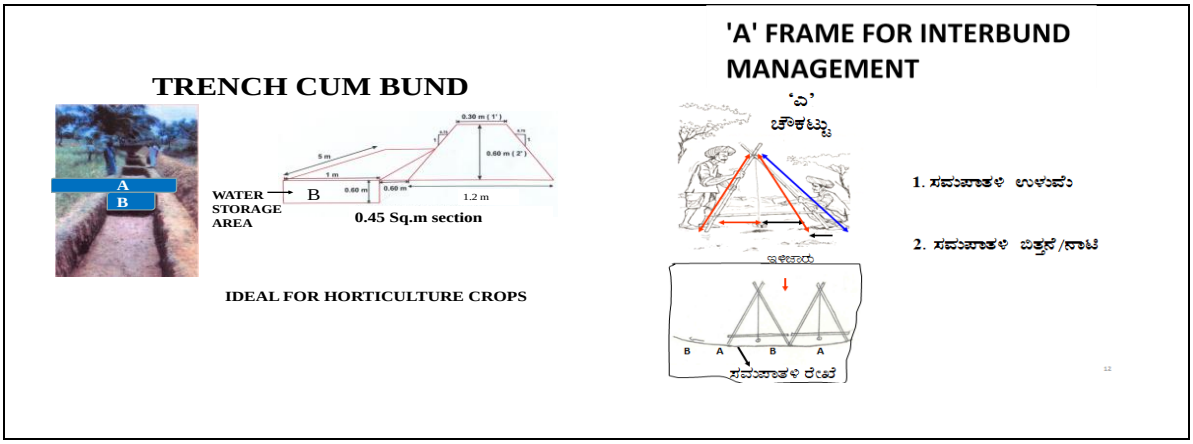
**Recommended Bund Section**

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

**Formation of Trench cum Bund**

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

Details of Borrow Pit dimensions are given below



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

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

**B. Waterways**

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

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

**c)** The design details are given in the Manual.

**C. Farm Ponds**

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

**D. Diversion channel**

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

**9.1.2 Non-Arable Land Treatment**

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

### 9.1.3 Treatment of Natural Water Course/ Drainage Lines

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

## 9.2 Recommended Soil and Water Conservation Measures

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

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

A map (Fig. 9.1) showing soil and water conservation plan with different kinds of structures recommended has been prepared which shows the spatial distribution and extent of area. Maximum area of about 304 ha (53%) requires trench cum bunding. About 248 ha (43%) area needs graded bunding. The conservation plan prepared may be presented to all the stakeholders including farmers and after including their suggestions, the conservation plan for the microwatershed may be finalised in a participatory approach.

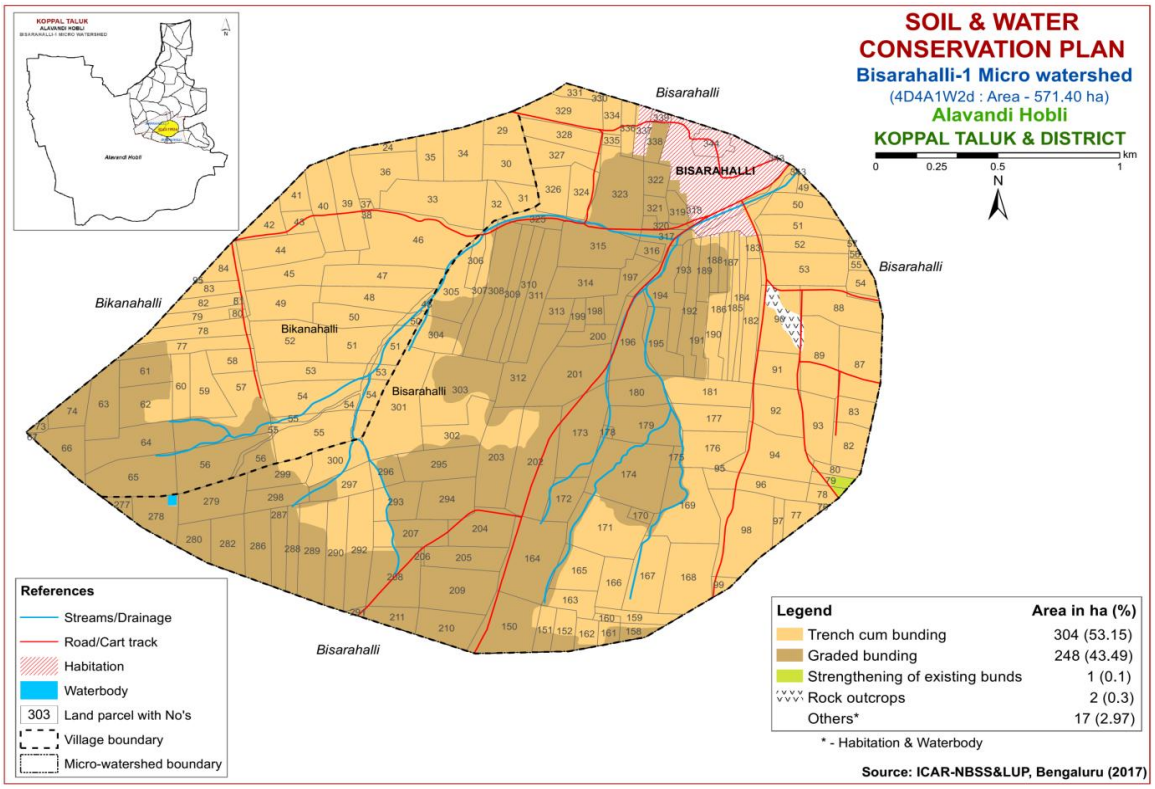



Fig. 9.1 Soil and Water Conservation Plan map of Bisarahalli-1 Microwatershed

### 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 and VII) and also the lands that are not suitable or marginally suitable for growing annual and perennial crops. The method of planting these trees is given below.

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

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

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

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# Appendix I

## Bisarahalli Microwatershed

### Soil Phase Information

| Village | Survey Number | Total Area (ha) | Soil Phase/Series | Parent Material* | LUC | Soil Depth | Surface Soil Texture | Soil Gravelliness | AWC | Slope | Soil Erosion | CLU Code | WELLS | LCC | Conservation Plan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bisarahalli | 49 | 0.51 | KTPiB 1g1 | SGGGLS | Others | Moderately shallow (50-75 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Chilly+Maize (Ch+Mz) | Not Available | IIs | Trench cum bunding |
| Bisarahalli | 50 | 2.48 | BSRiB 1g1 | SGGGLS | LUC-7 | Moderately deep (75-100 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Bajra+Redgram +Current Fallow (Bj+Rg+Cf) | Not Available | IIs | Trench cum bunding |
| Bisarahalli | 51 | 3.09 | BSRiB 1g1 | SGGGLS | LUC-7 | Moderately deep (75-100 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize+Redgram (Mz+Rg) | 1 Borewell | IIs | Trench cum bunding |
| Bisarahalli | 52 | 2.4 | BSRiB 1g1 | SGGGLS | LUC-4 | Moderately deep (75-100 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Banana+Maize (Ba+Mz) | 1 Borewell | IIs | Trench cum bunding |
| Bisarahalli | 53 | 4.99 | BSRiB 1g1 | SGGGLS | LUC-4 | Moderately deep (75-100 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize+Sunflower (Mz+Sf) | 2 Borewell | IIs | Trench cum bunding |
| Bisarahalli | 54 | 1.17 | BSRiB 1g1 | SGGGLS | LUC-4 | Moderately deep (75-100 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Chilly+Bajra (Ch+Bj) | 1 Borewell | IIs | Trench cum bunding |
| Bisarahalli | 55 | 0.37 | BSRiB 1g1 | SGGGLS | LUC-4 | Moderately deep (75-100 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize (Mz) | Not Available | IIs | Trench cum bunding |
| Bisarahalli | 56 | 0.15 | BSRiB 1g1 | SGGGLS | LUC-4 | Moderately deep (75-100 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize (Mz) | Not Available | IIs | Trench cum bunding |
| Bisarahalli | 57 | 0.15 | BSRiB 1g1 | SGGGLS | LUC-4 | Moderately deep (75-100 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Bengalgram+Maize (Bg+Mz) | Not Available | IIs | Trench cum bunding |
| Bisarahalli | 76 | 0.09 | HTIhB 1g1 | SGGGLS | LUC-4 | Moderately shallow (50-75 cm) | Sandy clay loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Bajra (Bj) | Not Available | IIs | Trench cum bunding |
| Bisarahalli | 77 | 1.55 | HTIhB 1g1 | SGGGLS | LUC-4 | Moderately shallow (50-75 cm) | Sandy clay loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Groundnut+Bajra (Gn+Bj) | Not Available | IIs | Trench cum bunding |
| Bisarahalli | 78 | 1.03 | HTIhB 1g1 | SGGGLS | LUC-7 | Moderately shallow (50-75 cm) | Sandy clay loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize+Bajra (Mz+Bj) | Not Available | IIs | Trench cum bunding |
| Bisarahalli | 79 | 0.82 | HTIhB 1g1 | SGGGLS | LUC-7 | Moderately shallow (50-75 cm) | Sandy clay loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize+Bajra (Mz+Bj) | Not Available | IIs | Trench cum bunding |
| Bisarahalli | 80 | 0.79 | BSRiB 1g1 | SGGGLS | LUC-7 | Moderately deep (75-100 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Bajra (Bj) | Not Available | IIs | Trench cum bunding |
| Bisarahalli | 82 | 2.63 | BSRiB 1g1 | SGGGLS | LUC-7 | Moderately deep (75-100 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Sugarcane+Maize (Sc+Mz) | Not Available | IIs | Trench cum bunding |
| Bisarahalli | 83 | 1.76 | BSRiB 1g1 | SGGGLS | LUC-4 | Moderately deep (75-100 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Sugarcane+Maize (Sc+Mz) | Not Available | IIs | Trench cum bunding |

| Village | Survey Number | Total Area (ha) | Soil Phase /Series | Parent Material * | LUC | Soil Depth | Surface Soil Texture | Soil Gravelliness | AWC | Slope | Soil Erosion | CLU Code | WELLS | LCC | Conservation Plan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bisarahalli | 87 | 5.11 | BSRiB 1g1 | SGGGLS | LUC-4 | Moderately deep (75-100 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Chilly+Maize (Ch+Mz) | Not Available | IIs | Trench cum bunding |
| Bisarahalli | 88 | 4.58 | BSRiB 1g1 | SGGGLS | LUC-4 | Moderately deep (75-100 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize+Bajra (Mz+Bj) | Not Available | IIs | Trench cum bunding |
| Bisarahalli | 89 | 5.13 | BSRiB 1g1 | SGGGLS | LUC-4 | Moderately deep (75-100 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Chilly (Ch) | 2 Borewell | IIs | Trench cum bunding |
| Bisarahalli | 90 | 4.84 | KMHi B2g1 | SGGGLS | LUC-4 | Deep (100-150 cm) | Sandy clay | Gravelly (15-35%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Maize+Bajra (Mz+Bj) | Not Available | IIe | Trench cum bunding |
| Bisarahalli | 91 | 2.78 | KMHi B2g1 | SGGGLS | LUC-4 | Deep (100-150 cm) | Sandy clay | Gravelly (15-35%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Bajra (Bj) | Not Available | IIe | Trench cum bunding |
| Bisarahalli | 92 | 4.02 | KMHi B2g1 | SGGGLS | LUC-4 | Deep (100-150 cm) | Sandy clay | Gravelly (15-35%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Bajra+Cotton (Bj+Ct) | Not Available | IIe | Trench cum bunding |
| Bisarahalli | 93 | 3.41 | HTIhB 1g1 | SGGGLS | LUC-4 | Moderately shallow (50-75 cm) | Sandy clay loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Chilly+Maize+Redgram (Ch+Mz+Rg) | 2 Borewell | IIs | Trench cum bunding |
| Bisarahalli | 94 | 5.63 | HTIhB 1g1 | SGGGLS | LUC-4 | Moderately shallow (50-75 cm) | Sandy clay loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Chilly+Groundnut (Ch+Gn) | Not Available | IIs | Trench cum bunding |
| Bisarahalli | 95 | 0.05 | HTIhB 1g1 | SGGGLS | LUC-7 | Moderately shallow (50-75 cm) | Sandy clay loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Not Available (NA) | Not Available | IIs | Trench cum bunding |
| Bisarahalli | 96 | 3.34 | HTIhB 1g1 | SGGGLS | LUC-7 | Moderately shallow (50-75 cm) | Sandy clay loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Chilly+Maize (Ch+Mz) | 1 Borewell | IIs | Trench cum bunding |
| Bisarahalli | 97 | 0.81 | HTIhB 1g1 | SGGGLS | LUC-7 | Moderately shallow (50-75 cm) | Sandy clay loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Cotton (Ct) | Not Available | IIs | Trench cum bunding |
| Bisarahalli | 98 | 7.59 | HTIhB 1g1 | SGGGLS | LUC-7 | Moderately shallow (50-75 cm) | Sandy clay loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Chilly+Maize (Ch+Mz) | 1 Borewell | IIs | Trench cum bunding |
| Bisarahalli | 99 | 0.58 | HTIhB 1g1 | SALS | LUC-7 | Moderately shallow (50-75 cm) | Sandy clay loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Bajra+Maize+Redgram (Bj+Mz+Rg) | Not Available | IIs | Trench cum bunding |
| Bisarahalli | 150 | 5.46 | GRHm A1 | SGGGLS | LUC-7 | Deep (100-150 cm) | Clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | Current Fallow +Bajra (Cf+Bj) | Not Available | IIs | Graded bunding |
| Bisarahalli | 151 | 1.38 | CSRm B2g1 | SGGGLS | LUC-7 | Shallow (25-50 cm) | Clay | Gravelly (15-35%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Fallow Land +Bajra (Fl+Bj) | Not Available | IIIes | Trench cum bunding |
| Bisarahalli | 152 | 1.6 | CSRm B2g1 | SALS | LUC-1 | Shallow (25-50 cm) | Clay | Gravelly (15-35%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Fallow Land (Fl) | Not Available | IIIes | Trench cum bunding |
| Bisarahalli | 158 | 0.97 | GRHm B2 | SGGGLS | LUC-9 | Deep (100-150 cm) | Clay | Non gravelly (<15%) | Very high (>200 mm/m) | Very gently sloping (1-3%) | Moderate | Maize (Mz) | Not Available | IIes | Graded bunding |
| Bisarahalli | 159 | 1.41 | HTIhB 1g1 | SGGGLS | LUC-9 | Moderately shallow (50-75 cm) | Sandy clay loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize (Mz) | Not Available | IIs | Trench cum bunding |

| Village | Survey Number | Total Area (ha) | Soil Phase /Series | Parent Material * | LUC | Soil Depth | Surface Soil Texture | Soil Gravelliness | AWC | Slope | Soil Erosion | CLU Code | WELLS | LCC | Conservation Plan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bisarahalli | 160 | 0.31 | CSRmB2g1 | SALS | LUC-1 | Shallow (25-50 cm) | Clay | Gravelly (15-35%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Fallow Land (Fl) | Not Available | IIIes | Trench cum bunding |
| Bisarahalli | 161 | 0.83 | GRHmB2 | SGGGLS | LUC-7 | Deep (100-150 cm) | Clay | Non gravelly (<15%) | Very high (>200 mm/m) | Very gently sloping (1-3%) | Moderate | Fallow Land (Fl) | Not Available | IIes | Graded bunding |
| Bisarahalli | 162 | 1.16 | CSRmB2g1 | SGGGLS | LUC-9 | Shallow (25-50 cm) | Clay | Gravelly (15-35%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Fallow Land (Fl) | Not Available | IIIes | Trench cum bunding |
| Bisarahalli | 163 | 1.98 | CSRmB2g1 | SALS | LUC-1 | Shallow (25-50 cm) | Clay | Gravelly (15-35%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Fallow Land (Fl) | Not Available | IIIes | Trench cum bunding |
| Bisarahalli | 164 | 7.32 | MTLiB1g1 | SGGGLS | LUC-9 | Shallow (25-50 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize+Bajra (Mz+Bj) | Not Available | IIIs | Graded bunding |
| Bisarahalli | 165 | 3.26 | CSRmB2g1 | SGGGLS | LUC-9 | Shallow (25-50 cm) | Clay | Gravelly (15-35%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Fallow Land (Fl) | Not Available | IIIes | Trench cum bunding |
| Bisarahalli | 166 | 2.49 | CSRmB2g1 | SGGGLS | LUC-8 | Shallow (25-50 cm) | Clay | Gravelly (15-35%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Fallow Land +Bajra (Fl+Bj) | Not Available | IIIes | Trench cum bunding |
| Bisarahalli | 167 | 4.48 | HTIhB1g1 | SGGGLS | LUC-9 | Moderately shallow (50-75 cm) | Sandy clay loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Chilly+Maize (Ch+Mz) | 1 Borewell | IIs | Trench cum bunding |
| Bisarahalli | 168 | 5.66 | HTIhB1g1 | SALS | LUC-9 | Moderately shallow (50-75 cm) | Sandy clay loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Chilly+Maize (Ch+Mz) | 1 Borewell | IIs | Trench cum bunding |
| Bisarahalli | 169 | 7 | HTIhB1g1 | SGGGLS | LUC-7 | Moderately shallow (50-75 cm) | Sandy clay loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize+Bajra (Mz+Bj) | 2 Borewell | IIs | Trench cum bunding |
| Bisarahalli | 170 | 0.47 | MTLiB1g1 | SALS | LUC-7 | Shallow (25-50 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize (Mz) | Not Available | IIIs | Graded bunding |
| Bisarahalli | 171 | 6.5 | CSRmB2g1 | SALS | LUC-7 | Shallow (25-50 cm) | Clay | Gravelly (15-35%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Chilly+Bajra (Ch+Bj) | Not Available | IIIes | Trench cum bunding |
| Bisarahalli | 172 | 2.36 | MTLiB1g1 | SALS | LUC-8 | Shallow (25-50 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Bajra (Bj) | Not Available | IIIs | Graded bunding |
| Bisarahalli | 173 | 6.01 | MTLiB1g1 | SALS | LUC-9 | Shallow (25-50 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Bajra (Bj) | Not Available | IIIs | Graded bunding |
| Bisarahalli | 174 | 8.32 | MTLiB1g1 | SGGGLS | LUC-8 | Shallow (25-50 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Bajra+Maize+Redgram (Bj+Mz+Rg) | Not Available | IIIs | Graded bunding |
| Bisarahalli | 175 | 0.36 | MTLiB1g1 | SGGGLS | LUC-8 | Shallow (25-50 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Not Available (NA) | Not Available | IIIs | Graded bunding |
| Bisarahalli | 176 | 3.67 | KMHiB2g1 | SALS | LUC-8 | Deep (100-150 cm) | Sandy clay | Gravelly (15-35%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Bajra+Maize+Redgram (Bj+Mz+Rg) | 2 Borewell | IIe | Trench cum bunding |
| Bisarahalli | 177 | 3.22 | KMHiB2g1 | SALS | LUC-8 | Deep (100-150 cm) | Sandy clay | Gravelly (15-35%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Maize+Bajra (Mz+Bj) | Not Available | IIe | Trench cum bunding |

| Village | Survey Number | Total Area (ha) | Soil Phase /Series | Parent Material * | LUC | Soil Depth | Surface Soil Texture | Soil Gravelliness | AWC | Slope | Soil Erosion | CLU Code | WELLS | LCC | Conservation Plan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bisarahalli | 178 | 0.23 | MTLiB 1g1 | SALS | LUC-4 | Shallow (25-50 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Bajra (Bj) | Not Available | IIIs | Graded bunding |
| Bisarahalli | 179 | 4.63 | MTLiB 1g1 | SGGGLS | LUC-4 | Shallow (25-50 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Bajra (Bj) | 1 Borewell | IIIs | Graded bunding |
| Bisarahalli | 180 | 2.75 | MTLiB 1g1 | SGGGLS | LUC-8 | Shallow (25-50 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize+Bajra+Cotton (Mz+Bj+Ct) | 1 Borewell | IIIs | Graded bunding |
| Bisarahalli | 181 | 3.94 | KMHi B2g1 | SGGGLS | LUC-8 | Deep (100-150 cm) | Sandy clay | Gravelly (15-35%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Maize (Mz) | Not Available | IIe | Trench cum bunding |
| Bisarahalli | 182 | 3.19 | KMHi B2g1 | SGGGLS | LUC-8 | Deep (100-150 cm) | Sandy clay | Gravelly (15-35%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Chilly+Maize+Fallow Land (Ch+Mz+Fl) | 1 Borewell | IIe | Trench cum bunding |
| Bisarahalli | 183 | 0.48 | KMHi B2g1 | SGGGLS | LUC-4 | Deep (100-150 cm) | Sandy clay | Gravelly (15-35%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Maize (Mz) | Not Available | IIe | Trench cum bunding |
| Bisarahalli | 184 | 1.55 | KMHi B2g1 | SALS | LUC-4 | Deep (100-150 cm) | Sandy clay | Gravelly (15-35%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Chilly+Maize+Fallow Land (Ch+Mz+Fl) | 1 Borewell | IIe | Trench cum bunding |
| Bisarahalli | 185 | 1.79 | KMHi B2g1 | SALS | LUC-4 | Deep (100-150 cm) | Sandy clay | Gravelly (15-35%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Chilly+Maize+Fallow Land (Ch+Mz+Fl) | Not Available | IIe | Trench cum bunding |
| Bisarahalli | 186 | 1.65 | KMHi B2g1 | SALS | LUC-4 | Deep (100-150 cm) | Sandy clay | Gravelly (15-35%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Chilly+Maize+Fallow Land (Ch+Mz+Fl) | 1 Borewell | IIe | Trench cum bunding |
| Bisarahalli | 187 | 0.9 | MTLiB 1g1 | SGGGLS | LUC-4 | Shallow (25-50 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize (Mz) | Not Available | IIIs | Graded bunding |
| Bisarahalli | 188 | 0.93 | MTLiB 1g1 | SALS | LUC-4 | Shallow (25-50 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize (Mz) | Not Available | IIIs | Graded bunding |
| Bisarahalli | 189 | 1.25 | MTLiB 1g1 | SALS | LUC-8 | Shallow (25-50 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Bajra (Bj) | Not Available | IIIs | Graded bunding |
| Bisarahalli | 190 | 2.37 | KMHi B2g1 | SALS | LUC-8 | Deep (100-150 cm) | Sandy clay | Gravelly (15-35%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Maize+Redgram (Mz+Rg) | 2 Borewell | IIe | Trench cum bunding |
| Bisarahalli | 191 | 1.64 | MTLiB 1g1 | SALS | LUC-8 | Shallow (25-50 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize (Mz) | Not Available | IIIs | Graded bunding |
| Bisarahalli | 192 | 2.82 | MTLiB 1g1 | SALS | LUC-4 | Shallow (25-50 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize (Mz) | 2 Borewell | IIIs | Graded bunding |
| Bisarahalli | 193 | 0.87 | MTLiB 1g1 | SALS | LUC-8 | Shallow (25-50 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize (Mz) | Not Available | IIIs | Graded bunding |
| Bisarahalli | 194 | 3.47 | MTLiB 1g1 | SALS | LUC-8 | Shallow (25-50 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize (Mz) | Not Available | IIIs | Graded bunding |

| Village | Survey Number | Total Area (ha) | Soil Phase/Series | Parent Material* | LUC | Soil Depth | Surface Soil Texture | Soil Gravelliness | AWC | Slope | Soil Erosion | CLU Code | WELLS | LCC | Conservation Plan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bisarahalli | 195 | 3.13 | MTLiB 1g1 | SALS | LUC-8 | Shallow (25-50 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize (Mz) | 1 Borewell | IIIs | Graded bunding |
| Bisarahalli | 196 | 4.67 | MTLiB 1g1 | SALS | LUC-8 | Shallow (25-50 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Bajra+Maize+Chilly+Sunflower (Bj+Mz+Ch+Sf) | 1 Borewell | IIIs | Graded bunding |
| Bisarahalli | 197 | 2.5 | MTLiB 1g1 | SALS | LUC-8 | Shallow (25-50 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Chilly+Maize (Ch+Mz) | Not Available | IIIs | Graded bunding |
| Bisarahalli | 198 | 0.89 | DRLm B1 | SALS | LUC-8 | Moderately deep (75-100 cm) | Clay | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Maize (Mz) | Not Available | IIs | Graded bunding |
| Bisarahalli | 199 | 0.86 | DRLm B1 | SALS | LUC-8 | Moderately deep (75-100 cm) | Clay | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Bajra (Bj) | Not Available | IIs | Graded bunding |
| Bisarahalli | 200 | 1.66 | DRLm B1 | SALS | LUC-3 | Moderately deep (75-100 cm) | Clay | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Maize (Mz) | Not Available | IIs | Graded bunding |
| Bisarahalli | 201 | 6.38 | MTLiB 1g1 | SALS | LUC-3 | Shallow (25-50 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize+Redgram (Mz+Rg) | Not Available | IIIs | Graded bunding |
| Bisarahalli | 202 | 7.88 | MTLiB 1g1 | SALS | LUC-3 | Shallow (25-50 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Bajra+Maize+Redgram (Bj+Mz+Rg) | Not Available | IIIs | Graded bunding |
| Bisarahalli | 203 | 6.01 | DRLm B1 | SALS | LUC-8 | Moderately deep (75-100 cm) | Clay | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Sunflower+Cotton+Onion (Sf+Ct+On) | 1 Borewell | IIs | Graded bunding |
| Bisarahalli | 204 | 3.89 | MTLm B1 | SALS | LUC-8 | Shallow (25-50 cm) | Clay | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize (Mz) | 1 Borewell | IIIs | Graded bunding |
| Bisarahalli | 205 | 3.13 | MTLm B1 | SALS | LUC-3 | Shallow (25-50 cm) | Clay | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | CurrentFallow Land+Maize (Cf+Mz) | Not Available | IIIs | Graded bunding |
| Bisarahalli | 206 | 0.11 | GRHm A1 | SALS | LUC-8 | Deep (100-150 cm) | Clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | Not Available (NA) | Not Available | IIs | Graded bunding |
| Bisarahalli | 207 | 3.47 | MTLm B1 | SALS | LUC-8 | Shallow (25-50 cm) | Clay | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | CurrentFallow Land+Maize (Cf+Mz) | Not Available | IIIs | Graded bunding |
| Bisarahalli | 208 | 5.28 | GRHm A1 | SALS | LUC-1 | Deep (100-150 cm) | Clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | FallowLand+Redgram (Fl+Rg) | Not Available | IIs | Graded bunding |
| Bisarahalli | 209 | 5.63 | GRHm A1 | SALS | LUC-8 | Deep (100-150 cm) | Clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | CurrentFallowLand+Sunflower (Cf+Sf) | Not Available | IIs | Graded bunding |
| Bisarahalli | 210 | 3.45 | GRHm A1 | SALS | LUC-1 | Deep (100-150 cm) | Clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | Sunflower (Sf) | Not Available | IIs | Graded bunding |
| Bisarahalli | 211 | 1.81 | GRHm A1 | SALS | LUC-1 | Deep (100-150 cm) | Clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | Chilly+Sunflower (Ch+Sf) | Not Available | IIs | Graded bunding |

| Village | Survey Number | Total Area (ha) | Soil Phase/Series | Parent Material* | LUC | Soil Depth | Surface Soil Texture | Soil Gravelliness | AWC | Slope | Soil Erosion | CLU Code | WELLS | LCC | Conservation Plan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bisarahalli | 277 | 0.63 | GRHmA1 | SALS | LUC-1 | Deep (100-150 cm) | Clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | CurrentFallowLand+Sunflower (Cf+Sf) | Not Available | IIs | Graded bunding |
| Bisarahalli | 278 | 3.02 | GRHmA1 | SALS | LUC-1 | Deep (100-150 cm) | Clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | Sunflower+Redgram (Sf+Rg) | Not Available | IIs | Graded bunding |
| Bisarahalli | 279 | 4.11 | DRLmB1 | SALS | LUC-1 | Moderately deep (75-100 cm) | Clay | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Maize+Sesame (Mz+Sm) | 2 Borewell | IIs | Graded bunding |
| Bisarahalli | 280 | 1.97 | GRHmA1 | SALS | LUC-1 | Deep (100-150 cm) | Clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | Maize+Current fallow Land (Mz+Cf) | Not Available | IIs | Graded bunding |
| Bisarahalli | 282 | 3.18 | GRHmA1 | SALS | LUC-3 | Deep (100-150 cm) | Clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | Chilly+Sunflower (Ch+Sf) | Not Available | IIs | Graded bunding |
| Bisarahalli | 286 | 3.23 | GRHmA1 | SALS | LUC-1 | Deep (100-150 cm) | Clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | Sunflower (Sf) | Not Available | IIs | Graded bunding |
| Bisarahalli | 287 | 2.19 | GRHmA1 | SALS | LUC-1 | Deep (100-150 cm) | Clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | CurrentFallowLand+Sunflower (Cf+Sf) | Not Available | IIs | Graded bunding |
| Bisarahalli | 288 | 1.83 | GRHmA1 | SALS | LUC-1 | Deep (100-150 cm) | Clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | Redgram (Rg) | Not Available | IIs | Graded bunding |
| Bisarahalli | 289 | 4.69 | GRHmA1 | SALS | LUC-1 | Deep (100-150 cm) | Clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | Maize (Mz) | 1 Borewell | IIs | Graded bunding |
| Bisarahalli | 290 | 3.87 | GRHmA1 | SALS | LUC-1 | Deep (100-150 cm) | Clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | Maize (Mz) | Not Available | IIs | Graded bunding |
| Bisarahalli | 291 | 0.21 | GRHmA1 | SALS | LUC-1 | Deep (100-150 cm) | Clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | Not Available (NA) | Not Available | IIs | Graded bunding |
| Bisarahalli | 292 | 5.07 | BPRiB1g1 | SGGGLS | LUC-1 | Deep (100-150 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Sunflower+Maize (Sf+Mz) | Not Available | IIIs | Trench cum bunding |
| Bisarahalli | 293 | 2.87 | DRLmB1 | SALS | LUC-1 | Moderately deep (75-100 cm) | Clay | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Bajra (Bj) | Not Available | IIs | Graded bunding |
| Bisarahalli | 294 | 3.82 | DRLmB1 | SALS | LUC-2 | Moderately deep (75-100 cm) | Clay | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Bajra (Bj) | Not Available | IIs | Graded bunding |
| Bisarahalli | 295 | 4.12 | DRLmB1 | SGGGLS | LUC-3 | Moderately deep (75-100 cm) | Clay | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Bajra+Maize+Chilly (Bj+Mz+Ch) | Not Available | IIs | Graded bunding |
| Bisarahalli | 296 | 1.55 | DRLmB1 | SGGGLS | LUC-3 | Moderately deep (75-100 cm) | Clay | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Maize (Mz) | Not Available | IIs | Graded bunding |
| Bisarahalli | 297 | 2.55 | BPRiB1g1 | SGGGLS | LUC-3 | Deep (100-150 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Chilly+Sunflower (Ch+Sf) | 2 Borewell | IIIs | Trench cum bunding |

| Village | Survey Number | Total Area (ha) | Soil Phase/Series | Parent Material* | LUC | Soil Depth | Surface Soil Texture | Soil Gravelliness | AWC | Slope | Soil Erosion | CLU Code | WELLS | LCC | Conservation Plan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bisarahalli | 298 | 2.3 | DRLmB1 | SALS | LUC-3 | Moderately deep (75-100 cm) | Clay | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Fallow Land (Fl) | Not Available | IIs | Graded bunding |
| Bisarahalli | 299 | 2.58 | DRLmB1 | SGGGLS | LUC-2 | Moderately deep (75-100 cm) | Clay | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Sunflower+Maize (Sf+Mz) | 2 Borewell | IIs | Graded bunding |
| Bisarahalli | 300 | 2.88 | BPRiB1g1 | SGGGLS | LUC-3 | Deep (100-150 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Chilly+Onion (Ch+On) | 1 Borewell | IIIs | Trench cum bunding |
| Bisarahalli | 301 | 8.16 | HTIhB1g1 | SGGGLS | LUC-3 | Moderately shallow (50-75 cm) | Sandy clay loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize (Mz) | Not Available | IIs | Trench cum bunding |
| Bisarahalli | 302 | 3.47 | HTIhB1g1 | SGGGLS | LUC-2 | Moderately shallow (50-75 cm) | Sandy clay loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize+Redgram (Mz+Rg) | Not Available | IIs | Trench cum bunding |
| Bisarahalli | 303 | 7.51 | DRLmB1 | SALS | LUC-7 | Moderately deep (75-100 cm) | Clay | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Maize+Redgram (Mz+Rg) | 3 Borewell | IIs | Graded bunding |
| Bisarahalli | 304 | 2.5 | HTIhB1g1 | SALS | LUC-7 | Moderately shallow (50-75 cm) | Sandy clay loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Bajra (Bj) | Not Available | IIs | Trench cum bunding |
| Bisarahalli | 305 | 3.54 | MKHcB2g2 | SALS | LUC-3 | Moderately shallow (50-75 cm) | Sandy loam | Very gravelly (35-60%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Bajra (Bj) | Not Available | IIIes | Trench cum bunding |
| Bisarahalli | 306 | 1.12 | MKHcB2g2 | SALS | LUC-7 | Moderately shallow (50-75 cm) | Sandy loam | Very gravelly (35-60%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Maize (Mz) | Not Available | IIIes | Trench cum bunding |
| Bisarahalli | 307 | 2.26 | MKHcB2g2 | SALS | LUC-7 | Moderately shallow (50-75 cm) | Sandy loam | Very gravelly (35-60%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Maize (Mz) | 1 Borewell | IIIes | Trench cum bunding |
| Bisarahalli | 308 | 5.66 | MTLiB1g1 | SALS | LUC-7 | Shallow (25-50 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize (Mz) | 2 Borewell | IIIs | Graded bunding |
| Bisarahalli | 309 | 2.88 | MTLiB1g1 | SALS | LUC-7 | Shallow (25-50 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Redgram (Rg) | Not Available | IIIs | Graded bunding |
| Bisarahalli | 310 | 2.25 | MTLiB1g1 | SALS | LUC-8 | Shallow (25-50 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize (Mz) | Not Available | IIIs | Graded bunding |
| Bisarahalli | 311 | 4.62 | MTLiB1g1 | SALS | LUC-8 | Shallow (25-50 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize (Mz) | Not Available | IIIs | Graded bunding |
| Bisarahalli | 312 | 4.42 | DRLmB1 | Others | LUC-8 | Moderately deep (75-100 cm) | Clay | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Maize (Mz) | Not Available | IIs | Graded bunding |
| Bisarahalli | 313 | 1.31 | DRLmB1 | SALS | LUC-8 | Moderately deep (75-100 cm) | Clay | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Chilly (Ch) | Not Available | IIs | Graded bunding |
| Bisarahalli | 314 | 3.49 | MTLiB1g1 | SALS | LUC-3 | Shallow (25-50 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize+Bajra (Mz+Bj) | Not Available | IIIs | Graded bunding |
| Bisarahalli | 315 | 5.25 | MTLiB1g1 | SALS | LUC-3 | Shallow (25-50 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize+Bajra (Mz+Bj) | 1 Borewell | IIIs | Graded bunding |

| Village | Survey Number | Total Area (ha) | Soil Phase /Series | Parent Material * | LUC | Soil Depth | Surface Soil Texture | Soil Gravelliness | AWC | Slope | Soil Erosion | CLU Code | WELLS | LCC | Conservation Plan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bisarahalli | 316 | 0.75 | MTLiB 1g1 | SALS | LUC-8 | Shallow (25-50 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Chilly (Ch) | Not Available | IIIs | Graded bunding |
| Bisarahalli | 317 | 2.02 | MTLiB 1g1 | SALS | LUC-8 | Shallow (25-50 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Redgram (Rg) | Not Available | IIIs | Graded bunding |
| Bisarahalli | 318 | 0.13 | Habitation | SGGGLS | LUC-8 | Others | Others | Others | Others | Others | Others | Bajra (Bj) | Not Available | Others | Others |
| Bisarahalli | 319 | 0.98 | MTLiB 1g1 | SALS | LUC-8 | Shallow (25-50 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Bajra (Bj) | Not Available | IIIs | Graded bunding |
| Bisarahalli | 320 | 0.66 | MTLiB 1g1 | SGGGLS | Others | Shallow (25-50 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Redgram (Rg) | Not Available | IIIs | Graded bunding |
| Bisarahalli | 321 | 0.95 | MTLiB 1g1 | SGGGLS | LUC-8 | Shallow (25-50 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Bajra (Bj) | Not Available | IIIs | Graded bunding |
| Bisarahalli | 322 | 1.43 | MTLiB 1g1 | SGGGLS | LUC-8 | Shallow (25-50 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize (Mz) | Not Available | IIIs | Graded bunding |
| Bisarahalli | 323 | 6.71 | MTLiB 1g1 | SGGGLS | LUC-8 | Shallow (25-50 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Bajra+Redgram (Bj+Rg) | Not Available | IIIs | Graded bunding |
| Bisarahalli | 324 | 2.3 | GHThB2g1 | SGGGLS | LUC-8 | Moderately deep (75-100 cm) | Sandy clay loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Not Available (NA) | 2 Borewell | IIes | Trench cum bunding |
| Bisarahalli | 325 | 1.48 | MTLiB 1g1 | SGGGLS | LUC-8 | Shallow (25-50 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize (Mz) | Not Available | IIIs | Graded bunding |
| Bisarahalli | 326 | 2.65 | BPRiB 1 | SGGGLS | LUC-4 | Deep (100-150 cm) | Sandy clay | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Chilly+Maize (Ch+Mz) | 1 Borewell | IIIs | Trench cum bunding |
| Bisarahalli | 327 | 2.73 | GHThB2g1 | SGGGLS | LUC-8 | Moderately deep (75-100 cm) | Sandy clay loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Maize+Bajra (Mz+Bj) | Not Available | IIes | Trench cum bunding |
| Bisarahalli | 328 | 2.81 | GHThB2g1 | SGGGLS | LUC-2 | Moderately deep (75-100 cm) | Sandy clay loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Bajra+Sunflower (Bj+Sf) | Not Available | IIes | Trench cum bunding |
| Bisarahalli | 329 | 3.75 | GHThB2g1 | SGGGLS | LUC-4 | Moderately deep (75-100 cm) | Sandy clay loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Bajra+Sunflower (Bj+Sf) | Not Available | IIes | Trench cum bunding |
| Bisarahalli | 330 | 0.04 | BSRiB 1g1 | SGGGLS | LUC-4 | Moderately deep (75-100 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize (Mz) | Not Available | IIs | Trench cum bunding |
| Bisarahalli | 331 | 0.8 | BSRiB 1g1 | SGGGLS | LUC-4 | Moderately deep (75-100 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize (Mz) | Not Available | IIs | Trench cum bunding |
| Bisarahalli | 334 | 1.21 | GHThB2g1 | SGGGLS | LUC-4 | Moderately deep (75-100 cm) | Sandy clay loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Chilly+Sunflower (Ch+Sf) | Not Available | IIes | Trench cum bunding |
| Bisarahalli | 335 | 0.37 | GHThB2g1 | SGGGLS | LUC-4 | Moderately deep (75-100 cm) | Sandy clay loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Sunflower (Sf) | Not Available | IIes | Trench cum bunding |
| Bisarahalli | 336 | 1.28 | GHThB2g1 | SGGGLS | LUC-4 | Moderately deep (75-100 cm) | Sandy clay loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Not Available (NA) | Not Available | IIes | Trench cum bunding |

| Village | Survey Number | Total Area (ha) | Soil Phase /Series | Parent Material * | LUC | Soil Depth | Surface Soil Texture | Soil Gravelliness | AWC | Slope | Soil Erosion | CLU Code | WELLS | LCC | Conservation Plan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bisarahalli | 337 | 1.23 | Habitation | Others | LUC-4 | Others | Others | Others | Others | Others | Others | Not Available (NA) | Not Available | Others | Others |
| Bisarahalli | 338 | 1.3 | MTLiB1g1 | SALS | LUC-4 | Shallow (25-50 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Not Available (NA) | Not Available | IIIs | Graded bunding |
| Bisarahalli | 339 | 0.39 | Habitation | Others | Others | Others | Others | Others | Others | Others | Others | Not Available (NA) | Not Available | Others | Others |
| Bisarahalli | 343 | 0.04 | KTPiB1g1 | SGGGLS | LUC-8 | Moderately shallow (50-75 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Not Available (NA) | Not Available | IIs | Trench cum bunding |
| Bisarahalli | 344 | 1.63 | Habitation | Others | Others | Others | Others | Others | Others | Others | Others | Not Available (NA) | Not Available | Others | Others |
| Bikanahalli | 24 | 1.15 | KMHiB1 | SGGGLS | LUC-4 | Deep (100-150 cm) | Sandy clay | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Maize+Redgram (Mz+Rg) | Not Available | IIs | Trench cum bunding |
| Bikanahalli | 29 | 2.02 | BPRiB1 | SGGGLS | LUC-2 | Deep (100-150 cm) | Sandy clay | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize (Mz) | Not Available | IIIs | Trench cum bunding |
| Bikanahalli | 30 | 3.17 | BPRiB1 | SGGGLS | LUC-2 | Deep (100-150 cm) | Sandy clay | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Chilly+Maize (Ch+Mz) | Not Available | IIIs | Trench cum bunding |
| Bikanahalli | 31 | 1.48 | BPRiB1 | SGGGLS | LUC-2 | Deep (100-150 cm) | Sandy clay | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize (Mz) | Not Available | IIIs | Trench cum bunding |
| Bikanahalli | 32 | 1.49 | KMHiB1 | SGGGLS | LUC-4 | Deep (100-150 cm) | Sandy clay | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Maize (Mz) | Not Available | IIs | Trench cum bunding |
| Bikanahalli | 33 | 6.74 | KMHiB1 | SGGGLS | LUC-4 | Deep (100-150 cm) | Sandy clay | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Chilly+Maize (Ch+Mz) | 2 Borewell | IIs | Trench cum bunding |
| Bikanahalli | 34 | 3.73 | BPRiB1 | SGGGLS | LUC-2 | Deep (100-150 cm) | Sandy clay | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Chilly+Maize+Redgram (Ch+Mz+Rg) | Not Available | IIIs | Trench cum bunding |
| Bikanahalli | 35 | 2.14 | KMHiB1 | SGGGLS | LUC-4 | Deep (100-150 cm) | Sandy clay | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Maize+Redgram (Mz+Rg) | Not Available | IIs | Trench cum bunding |
| Bikanahalli | 36 | 4.24 | KMHiB1 | SGGGLS | LUC-4 | Deep (100-150 cm) | Sandy clay | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Maize+Redgram (Mz+Rg) | Not Available | IIs | Trench cum bunding |

| Village | Survey Number | Total Area (ha) | Soil Phase /Series | Parent Material * | LUC | Soil Depth | Surface Soil Texture | Soil Gravelliness | AWC | Slope | Soil Erosion | CLU Code | WELLS | LCC | Conservation Plan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bikanahalli | 37 | 0.22 | KMHiB1 | SGGGLS | LUC-4 | Deep (100-150 cm) | Sandy clay | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Not Available (NA) | Not Available | IIs | Trench cum bunding |
| Bikanahalli | 38 | 0.12 | MKHcB1g1 | SGGGLS | LUC-7 | Moderately shallow (50-75 cm) | Sandy loam | Gravelly (15-35%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Slight | Not Available (NA) | Not Available | IIIs | Trench cum bunding |
| Bikanahalli | 39 | 4.04 | NDLiB1g1 | SGGGLS | LUC-2 | Very deep (>150 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize+Groundnut (Mz+Gn) | Not Available | IIIs | Trench cum bunding |
| Bikanahalli | 40 | 3.61 | NDLiB1g1 | SGGGLS | LUC-2 | Very deep (>150 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize+Groundnut (Mz+Gn) | 1 Borewell | IIIs | Trench cum bunding |
| Bikanahalli | 41 | 1.44 | NDLiB1g1 | SGGGLS | LUC-2 | Very deep (>150 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize (Mz) | Not Available | IIIs | Trench cum bunding |
| Bikanahalli | 42 | 1.81 | NDLiB1g1 | SGGGLS | LUC-2 | Very deep (>150 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Sugarcane+Maize (Sc+Mz) | Not Available | IIIs | Trench cum bunding |
| Bikanahalli | 43 | 1.22 | BDGcB1g2 | SGGGLS | LUC-5 | Moderately deep (75-100 cm) | Sandy loam | Very gravelly (35-60%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Slight | Current fallow (Cf) | Not Available | IIIs | Trench cum bunding |
| Bikanahalli | 44 | 4.16 | BDGcB1g2 | SGGGLS | LUC-5 | Moderately deep (75-100 cm) | Sandy loam | Very gravelly (35-60%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Slight | Maize+Redgram (Mz+Rg) | Not Available | IIIs | Trench cum bunding |
| Bikanahalli | 45 | 4.11 | BDGcB1g2 | SGGGLS | LUC-5 | Moderately deep (75-100 cm) | Sandy loam | Very gravelly (35-60%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Slight | Maize (Mz) | Not Available | IIIs | Trench cum bunding |
| Bikanahalli | 46 | 8.94 | MKHcB1g1 | SGGGLS | LUC-7 | Moderately shallow (50-75 cm) | Sandy loam | Gravelly (15-35%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Slight | Horsegram+Groundnut+Redgram+Bajra (Hg+Gn+Rg+Bj) | Not Available | IIIs | Trench cum bunding |
| Bikanahalli | 47 | 4.48 | MKHcB1g1 | SGGGLS | LUC-7 | Moderately shallow (50-75 cm) | Sandy loam | Gravelly (15-35%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Slight | Onion+Chilly+Maize (On+Ch+Mz) | Not Available | IIIs | Trench cum bunding |
| Bikanahalli | 48 | 3.91 | MKHcB1g1 | SGGGLS | LUC-7 | Moderately shallow (50-75 cm) | Sandy loam | Gravelly (15-35%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Slight | Maize (Mz) | Not Available | IIIs | Trench cum bunding |

| Village | Survey Number | Total Area (ha) | Soil Phase /Series | Parent Material * | LUC | Soil Depth | Surface Soil Texture | Soil Gravelliness | AWC | Slope | Soil Erosion | CLU Code | WELLS | LCC | Conservation Plan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bikanahalli | 49 | 3.95 | BDGcB 1g2 | SGGGLS | LUC-5 | Moderately deep (75-100 cm) | Sandy loam | Very gravelly (35-60%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Slight | Redgram (Rg) | Not Available | IIIs | Trench cum bunding |
| Bikanahalli | 50 | 3.26 | BPRiB 1g1 | SGGGLS | LUC-2 | Deep (100-150 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize (Mz) | Not Available | IIIs | Trench cum bunding |
| Bikanahalli | 51 | 4.89 | BPRiB 1g1 | SGGGLS | LUC-2 | Deep (100-150 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize+Redgram (Mz+Rg) | Not Available | IIIs | Trench cum bunding |
| Bikanahalli | 52 | 5.21 | BPRiB 1g1 | SGGGLS | LUC-2 | Deep (100-150 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize+Redgram (Mz+Rg) | 1 Borewell | IIIs | Trench cum bunding |
| Bikanahalli | 53 | 4.16 | BPRiB 1g1 | SGGGLS | LUC-2 | Deep (100-150 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Chilly+Maize (Ch+Mz) | 1 Borewell | IIIs | Trench cum bunding |
| Bikanahalli | 54 | 6.17 | BDGcB 1g2 | SGGGLS | LUC-5 | Moderately deep (75-100 cm) | Sandy loam | Very gravelly (35-60%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Slight | Chilly+Maize+Redgram (Ch+Mz+Rg) | 1 Borewell | IIIs | Trench cum bunding |
| Bikanahalli | 55 | 5.71 | BPRiB 1g1 | SGGGLS | LUC-2 | Deep (100-150 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize (Mz) | Not Available | IIIs | Trench cum bunding |
| Bikanahalli | 56 | 6.16 | DRLm B1 | SALS | LUC-3 | Moderately deep (75-100 cm) | Clay | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Sugarcane+Redgram (Sc+Rg) | Not Available | IIs | Graded bunding |
| Bikanahalli | 57 | 7.19 | DRLm B1 | SALS | LUC-3 | Moderately deep (75-100 cm) | Clay | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Maize+Redgram +Fallow Land (Mz+Rg+Fl) | 1 Borewell | IIs | Graded bunding |
| Bikanahalli | 58 | 1.91 | BDGcB 1g2 | SGGGLS | LUC-5 | Moderately deep (75-100 cm) | Sandy loam | Very gravelly (35-60%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Slight | Maize (Mz) | Not Available | IIIs | Trench cum bunding |
| Bikanahalli | 59 | 3.39 | BPRh B1g1 | SGGGLS | LUC-2 | Deep (100-150 cm) | Sandy clay loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Chilly+Maize+Redgram (Ch+Mz+Rg) | 1 Borewell | IIIs | Trench cum bunding |
| Bikanahalli | 60 | 2.06 | BPRh B1g1 | SGGGLS | LUC-2 | Deep (100-150 cm) | Sandy clay loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize+Redgram (Mz+Rg) | Not Available | IIIs | Trench cum bunding |

| Village | Survey Number | Total Area (ha) | Soil Phase /Series | Parent Material * | LUC | Soil Depth | Surface Soil Texture | Soil Gravelliness | AWC | Slope | Soil Erosion | CLU Code | WELLS | LCC | Conservation Plan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bikanahalli | 61 | 2.48 | GRHmA1 | SALS | LUC-1 | Deep (100-150 cm) | Clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | Redgram (Rg) | Not Available | IIs | Graded bunding |
| Bikanahalli | 62 | 3.67 | GRHmA1 | SALS | LUC-1 | Deep (100-150 cm) | Clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | Redgram (Rg) | Not Available | IIs | Graded bunding |
| Bikanahalli | 63 | 3.84 | GRHmA1 | SALS | LUC-1 | Deep (100-150 cm) | Clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | Redgram (Rg) | Not Available | IIs | Graded bunding |
| Bikanahalli | 64 | 4.64 | GRHmA1 | SALS | LUC-1 | Deep (100-150 cm) | Clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | Maize+Redgram (Mz+Rg) | Not Available | IIs | Graded bunding |
| Bikanahalli | 65 | 5.64 | GRHmA1 | SALS | LUC-1 | Deep (100-150 cm) | Clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | Bengalgram+Sunflower+Redgram (Bg+Sf+Rg) | Not Available | IIs | Graded bunding |
| Bikanahalli | 66 | 2.99 | GRHmA1 | SALS | LUC-1 | Deep (100-150 cm) | Clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | Sunflower+Maize (Sf+Mz) | Not Available | IIs | Graded bunding |
| Bikanahalli | 67 | 0.06 | GRHmA1 | SALS | LUC-1 | Deep (100-150 cm) | Clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | Not Available (NA) | Not Available | IIs | Graded bunding |
| Bikanahalli | 73 | 0.35 | GRHmA1 | SALS | LUC-1 | Deep (100-150 cm) | Clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | Maize (Mz) | Not Available | IIs | Graded bunding |
| Bikanahalli | 74 | 2.03 | GRHmA1 | SALS | LUC-1 | Deep (100-150 cm) | Clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | Maize (Mz) | Not Available | IIs | Graded bunding |
| Bikanahalli | 77 | 3.05 | BDGcB1g2 | SGGGLS | LUC-5 | Moderately deep (75-100 cm) | Sandy loam | Very gravelly (35-60%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Slight | Maize+Redgram (Mz+Rg) | Not Available | IIIs | Trench cum bunding |
| Bikanahalli | 78 | 2.79 | BDGcB1g2 | SGGGLS | LUC-5 | Moderately deep (75-100 cm) | Sandy loam | Very gravelly (35-60%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Slight | Maize+Redgram (Mz+Rg) | Not Available | IIIs | Trench cum bunding |
| Bikanahalli | 79 | 1.73 | BPRhB1g1 | SGGGLS | LUC-2 | Deep (100-150 cm) | Sandy clay loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize (Mz) | Not Available | IIIs | Trench cum bunding |

| Village | Survey Number | Total Area (ha) | Soil Phase /Series | Parent Material * | LUC | Soil Depth | Surface Soil Texture | Soil Gravelliness | AWC | Slope | Soil Erosion | CLU Code | WELLS | LCC | Conservation Plan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bikanahalli | 80 | 0.26 | BDGcB 1g2 | SGGGLS | LUC-5 | Moderately deep (75-100 cm) | Sandy loam | Very gravelly (35-60%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Slight | Not Available (NA) | Not Available | IIIs | Trench cum bunding |
| Bikanahalli | 81 | 0.1 | BDGcB 1g2 | SGGGLS | LUC-5 | Moderately deep (75-100 cm) | Sandy loam | Very gravelly (35-60%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Slight | Not Available (NA) | Not Available | IIIs | Trench cum bunding |
| Bikanahalli | 82 | 1.46 | BPRh B1g1 | SGGGLS | LUC-2 | Deep (100-150 cm) | Sandy clay loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Redgram (Rg) | Not Available | IIIs | Trench cum bunding |
| Bikanahalli | 83 | 1.26 | BPRh B1g1 | SGGGLS | LUC-2 | Deep (100-150 cm) | Sandy clay loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize+Redgram +Bajra(Mz+Rg+ Bj) | Not Available | IIIs | Trench cum bunding |
| Bikanahalli | 84 | 1.43 | BDGcB 1g2 | SGGGLS | LUC-5 | Moderately deep (75-100 cm) | Sandy loam | Very gravelly (35-60%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Slight | Maize+Groundnut (Mz+Gn) | Not Available | IIIs | Trench cum bunding |
| Bikanahalli | 95 | 0.04 | BPRh B1g1 | SGGGLS | LUC-2 | Deep (100-150 cm) | Sandy clay loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Not Available (NA) | Not Available | IIIs | Trench cum bunding |

NOTE *: SGGGLS-Soils of Granite and Granite Gnesis Landscape
SALS- Soils of Alluvial Landscape
LUC- Land Use Class
AWC- Available Water Capacity
LCC- Land Capability Class
CLU- Current Land Use

# Appendix II

## Bisarahalli Microwatershed

### Soil Fertility Information

| Village | Survey Number | Soil Reaction | Salinity (EC) | Organic Carbon | Available Phosphorus | Available Potassium | Available Sulphur | Available Boron | Available Iron | Available Manganese | Available Copper | Available Zinc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bisarahalli | 49 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Low (<0.5 %) | 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) | Sufficient (> 0.6 ppm) |
| Bisarahalli | 50 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Low (<0.5 %) | Medium (23 - 57 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Bisarahalli | 51 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Low (<0.5 %) | Medium (23 - 57 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Bisarahalli | 52 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Low (<0.5 %) | Medium (23 - 57 kg/ha) | Low (< 145 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Bisarahalli | 53 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm ) | Low (<0.5 %) | Medium (23 - 57 kg/ha) | Low (< 145 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 54 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm ) | Low (<0.5 %) | Low (<23 kg/ha) | Low (< 145 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 55 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm ) | Low (<0.5 %) | Low (<23 kg/ha) | Low (< 145 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 56 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm ) | Low (<0.5 %) | Medium (23 - 57 kg/ha) | Low (< 145 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 57 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm ) | Low (<0.5 %) | Medium (23 - 57 kg/ha) | Low (< 145 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 76 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm ) | Low (<0.5 %) | Medium (23 - 57 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 77 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm ) | Low (<0.5 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 78 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm ) | Low (<0.5 %) | Medium (23 - 57 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 79 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm ) | Low (<0.5 %) | Medium (23 - 57 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 80 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm ) | Low (<0.5 %) | Medium (23 - 57 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 82 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Medium (23 - 57 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 83 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Medium (23 - 57 kg/ha) | Low (< 145 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 87 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Medium (23 - 57 kg/ha) | Low (< 145 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 88 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm ) | Low (<0.5 %) | Low (<23 kg/ha) | Low (< 145 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 89 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm ) | Low (<0.5 %) | Low (<23 kg/ha) | Low (< 145 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 90 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm ) | Low (<0.5 %) | Low (<23 kg/ha) | Low (< 145 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |

| Village | Survey Number | Soil Reaction | Salinity (EC) | Organic Carbon | Available Phosphorus | Available Potassium | Available Sulphur | Available Boron | Available Iron | Available Manganese | Available Copper | Available Zinc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bisarahalli | 91 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm ) | Low (<0.5 %) | Low (<23 kg/ha) | Low (< 145 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 92 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 93 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Medium (23 - 57 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 94 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 95 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm ) | Low (<0.5 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 96 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm ) | Low (<0.5 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 97 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm ) | Low (<0.5 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 98 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 99 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 150 | Very strongly alkaline (pH > 9.0) | Non saline (<2 dsm ) | Low (<0.5 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Medium (0.5 - 1.0 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 151 | Very strongly alkaline (pH > 9.0) | Non saline (<2 dsm ) | Low (<0.5 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Medium (0.5 - 1.0 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 152 | Very strongly alkaline (pH > 9.0) | Non saline (<2 dsm ) | Low (<0.5 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Medium (0.5 - 1.0 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 158 | Very strongly alkaline (pH > 9.0) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 159 | Strongly alkaline (pH 8.4 – 9.0) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 160 | Very strongly alkaline (pH > 9.0) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Medium (0.5 - 1.0 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 161 | Very strongly alkaline (pH > 9.0) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Medium (0.5 - 1.0 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 162 | Very strongly alkaline (pH > 9.0) | Non saline (<2 dsm ) | Low (<0.5 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Medium (0.5 - 1.0 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 163 | Very strongly alkaline (pH > 9.0) | Non saline (<2 dsm ) | Low (<0.5 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Medium (0.5 - 1.0 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 164 | Very strongly alkaline (pH > 9.0) | Non saline (<2 dsm ) | Low (<0.5 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Medium (0.5 - 1.0 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 165 | Very strongly alkaline (pH > 9.0) | Non saline (<2 dsm ) | Low (<0.5 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Medium (0.5 - 1.0 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 166 | Strongly alkaline (pH 8.4 – 9.0) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Medium (0.5 - 1.0 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 167 | Strongly alkaline (pH 8.4 – 9.0) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |

| Village | Survey Number | Soil Reaction | Salinity (EC) | Organic Carbon | Available Phosphorus | Available Potassium | Available Sulphur | Available Boron | Available Iron | Available Manganese | Available Copper | Available Zinc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bisarahalli | 168 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 169 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 170 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 171 | Strongly alkaline (pH 8.4 – 9.0) | Non saline (<2 dsm ) | Low (<0.5 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Medium (0.5 - 1.0 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 172 | Strongly alkaline (pH 8.4 – 9.0) | Non saline (<2 dsm ) | Low (<0.5 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Medium (0.5 - 1.0 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 173 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Low (<0.5 %) | Low (<23 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) |
| Bisarahalli | 174 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 175 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm ) | Low (<0.5 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Medium (0.5 - 1.0 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 176 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm ) | Low (<0.5 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 177 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm ) | Low (<0.5 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 178 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 179 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Low (<0.5 %) | Low (<23 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) |
| Bisarahalli | 180 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 181 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm ) | Low (<0.5 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 182 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Low (<0.5 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 183 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Low (<0.5 %) | Medium (23 - 57 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Bisarahalli | 184 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Low (<0.5 %) | Medium (23 - 57 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 185 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Low (<0.5 %) | Medium (23 - 57 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 186 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Low (<0.5 %) | Medium (23 - 57 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 187 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Medium (23 - 57 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 188 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Medium (23 - 57 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 189 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Medium (23 - 57 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |

| Village | Survey Number | Soil Reaction | Salinity (EC) | Organic Carbon | Available Phosphorus | Available Potassium | Available Sulphur | Available Boron | Available Iron | Available Manganese | Available Copper | Available Zinc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bisarahalli | 190 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Low (<0.5 %) | Medium (23 - 57 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 191 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Low (<0.5 %) | Medium (23 - 57 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 192 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Medium (23 - 57 kg/ha) | High (> 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 193 | 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) |
| Bisarahalli | 194 | 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) |
| Bisarahalli | 195 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Medium (23 - 57 kg/ha) | High (> 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 196 | Strongly alkaline (pH 8.4 – 9.0) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 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) |
| Bisarahalli | 197 | 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) |
| Bisarahalli | 198 | Strongly alkaline (pH 8.4 – 9.0) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 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) |
| Bisarahalli | 199 | 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) |
| Bisarahalli | 200 | Strongly alkaline (pH 8.4 – 9.0) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 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) |
| Bisarahalli | 201 | 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) |
| Bisarahalli | 202 | Strongly alkaline (pH 8.4 – 9.0) | Non saline (<2 dsm ) | Low (<0.5 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Medium (0.5 - 1.0 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 203 | Strongly alkaline (pH 8.4 – 9.0) | Non saline (<2 dsm ) | Low (<0.5 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Medium (0.5 - 1.0 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 204 | Strongly alkaline (pH 8.4 – 9.0) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Medium (0.5 - 1.0 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 205 | Very strongly alkaline (pH > 9.0) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Medium (0.5 - 1.0 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 206 | Strongly alkaline (pH 8.4 – 9.0) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Medium (0.5 - 1.0 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 207 | Strongly alkaline (pH 8.4 – 9.0) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 208 | Very strongly alkaline (pH > 9.0) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 209 | Very strongly alkaline (pH > 9.0) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Medium (0.5 - 1.0 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 210 | Very strongly alkaline (pH > 9.0) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Medium (0.5 - 1.0 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 211 | Very strongly alkaline (pH > 9.0) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |

| Village | Survey Number | Soil Reaction | Salinity (EC) | Organic Carbon | Available Phosphorus | Available Potassium | Available Sulphur | Available Boron | Available Iron | Available Manganese | Available Copper | Available Zinc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bisarahalli | 277 | Strongly alkaline (pH 8.4 – 9.0) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 kg/ha) | High (> 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 278 | Strongly alkaline (pH 8.4 – 9.0) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 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) | Sufficient (> 0.6 ppm) |
| Bisarahalli | 279 | Strongly alkaline (pH 8.4 – 9.0) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 kg/ha) | High (> 337 kg/ha) | High (> 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Bisarahalli | 280 | Strongly alkaline (pH 8.4 – 9.0) | Non saline (<2 dsm ) | High (> 0.75 %) | Low (<23 kg/ha) | High (> 337 kg/ha) | High (> 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Bisarahalli | 282 | Strongly alkaline (pH 8.4 – 9.0) | Non saline (<2 dsm ) | High (> 0.75 %) | Medium (23 - 57 kg/ha) | High (> 337 kg/ha) | High (> 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Bisarahalli | 286 | Strongly alkaline (pH 8.4 – 9.0) | Non saline (<2 dsm ) | High (> 0.75 %) | Medium (23 - 57 kg/ha) | High (> 337 kg/ha) | High (> 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Bisarahalli | 287 | Strongly alkaline (pH 8.4 – 9.0) | Non saline (<2 dsm ) | High (> 0.75 %) | Medium (23 - 57 kg/ha) | High (> 337 kg/ha) | High (> 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Bisarahalli | 288 | Strongly alkaline (pH 8.4 – 9.0) | Non saline (<2 dsm ) | High (> 0.75 %) | Low (<23 kg/ha) | High (> 337 kg/ha) | Medium (10 - 20 ppm) | Medium (0.5 - 1.0 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Bisarahalli | 289 | Strongly alkaline (pH 8.4 – 9.0) | Non saline (<2 dsm ) | High (> 0.75 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Bisarahalli | 290 | Strongly alkaline (pH 8.4 – 9.0) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 291 | Very strongly alkaline (pH > 9.0) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 292 | Strongly alkaline (pH 8.4 – 9.0) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 293 | Strongly alkaline (pH 8.4 – 9.0) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 294 | Strongly alkaline (pH 8.4 – 9.0) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 295 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 296 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 297 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 298 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | High (> 0.75 %) | Low (<23 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) | Sufficient (> 0.6 ppm) |
| Bisarahalli | 299 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 300 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 301 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Medium (23 - 57 kg/ha) | Medium (145 - 337 kg/ha) | High (> 20 ppm) | Low (< 0.5 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 302 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Medium (23 - 57 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Medium (0.5 - 1.0 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |

| Village | Survey Number | Soil Reaction | Salinity (EC) | Organic Carbon | Available Phosphorus | Available Potassium | Available Sulphur | Available Boron | Available Iron | Available Manganese | Available Copper | Available Zinc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bisarahalli | 303 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Medium (23 - 57 kg/ha) | Medium (145 - 337 kg/ha) | High (> 20 ppm) | Low (< 0.5 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 304 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Low (<0.5 %) | Medium (23 - 57 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Bisarahalli | 305 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Low (<0.5 %) | Medium (23 - 57 kg/ha) | High (> 337 kg/ha) | High (> 20 ppm) | Low (< 0.5 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Bisarahalli | 306 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | High (> 57 kg/ha) | High (> 337 kg/ha) | High (> 20 ppm) | Low (< 0.5 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Bisarahalli | 307 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Low (<0.5 %) | Medium (23 - 57 kg/ha) | High (> 337 kg/ha) | High (> 20 ppm) | Low (< 0.5 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Bisarahalli | 308 | 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) |
| Bisarahalli | 309 | 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) |
| Bisarahalli | 310 | 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) |
| Bisarahalli | 311 | 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) |
| Bisarahalli | 312 | 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) |
| Bisarahalli | 313 | 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) |
| Bisarahalli | 314 | 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) |
| Bisarahalli | 315 | 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) |
| Bisarahalli | 316 | 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) |
| Bisarahalli | 317 | 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) |
| Bisarahalli | 318 | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others |
| Bisarahalli | 319 | Strongly alkaline (pH 8.4 – 9.0) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 320 | 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) |
| Bisarahalli | 321 | Strongly alkaline (pH 8.4 – 9.0) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 322 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Low (<0.5 %) | Low (<23 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) |
| Bisarahalli | 323 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 324 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 325 | 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) | High (> 20 ppm) | Low (< 0.5 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |

| Village | Survey Number | Soil Reaction | Salinity (EC) | Organic Carbon | Available Phosphorus | Available Potassium | Available Sulphur | Available Boron | Available Iron | Available Manganese | Available Copper | Available Zinc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bisarahalli | 326 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Medium (23 - 57 kg/ha) | Medium (145 - 337 kg/ha) | High (> 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 327 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm ) | Low (<0.5 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 328 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm ) | Low (<0.5 %) | Medium (23 - 57 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 329 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm ) | Low (<0.5 %) | Medium (23 - 57 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 330 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm ) | Low (<0.5 %) | Medium (23 - 57 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 331 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm ) | Low (<0.5 %) | Medium (23 - 57 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 334 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm ) | Low (<0.5 %) | Medium (23 - 57 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 335 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm ) | Low (<0.5 %) | Medium (23 - 57 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 336 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm ) | Low (<0.5 %) | Medium (23 - 57 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bisarahalli | 337 | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others |
| Bisarahalli | 338 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Low (<0.5 %) | Medium (23 - 57 kg/ha) | Medium (145 - 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Bisarahalli | 339 | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others |
| Bisarahalli | 343 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Low (<0.5 %) | 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) | Sufficient (> 0.6 ppm) |
| Bisarahalli | 344 | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others |
| Bikanahalli | 24 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Low (<0.5 %) | Medium (23 - 57 kg/ha) | High (> 337 kg/ha) | High (> 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Bikanahalli | 29 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 kg/ha) | Medium (145 - 337 kg/ha) | High (> 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bikanahalli | 30 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Medium (23 - 57 kg/ha) | Medium (145 - 337 kg/ha) | High (> 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bikanahalli | 31 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Medium (23 - 57 kg/ha) | Medium (145 - 337 kg/ha) | High (> 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Bikanahalli | 32 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Medium (23 - 57 kg/ha) | Medium (145 - 337 kg/ha) | High (> 20 ppm) | Low (< 0.5 ppm) | Deficient (< 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Bikanahalli | 33 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Low (<0.5 %) | Medium (23 - 57 kg/ha) | Medium (145 - 337 kg/ha) | High (> 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Bikanahalli | 34 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Medium (23 - 57 kg/ha) | Medium (145 - 337 kg/ha) | High (> 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Bikanahalli | 35 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Low (<0.5 %) | Medium (23 - 57 kg/ha) | Medium (145 - 337 kg/ha) | High (> 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Bikanahalli | 36 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Low (<0.5 %) | Medium (23 - 57 kg/ha) | High (> 337 kg/ha) | High (> 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |

| Village | Survey Number | Soil Reaction | Salinity (EC) | Organic Carbon | Available Phosphorus | Available Potassium | Available Sulphur | Available Boron | Available Iron | Available Manganese | Available Copper | Available Zinc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bikanahalli | 37 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Low (<0.5 %) | Medium (23 - 57 kg/ha) | High (> 337 kg/ha) | High (> 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Bikanahalli | 38 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Low (<0.5 %) | Medium (23 - 57 kg/ha) | High (> 337 kg/ha) | High (> 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Bikanahalli | 39 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Low (<0.5 %) | Medium (23 - 57 kg/ha) | High (> 337 kg/ha) | High (> 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Bikanahalli | 40 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Low (<0.5 %) | Medium (23 - 57 kg/ha) | High (> 337 kg/ha) | High (> 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Bikanahalli | 41 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Low (<0.5 %) | Medium (23 - 57 kg/ha) | High (> 337 kg/ha) | High (> 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Bikanahalli | 42 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Low (<0.5 %) | Medium (23 - 57 kg/ha) | High (> 337 kg/ha) | High (> 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Bikanahalli | 43 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Low (<0.5 %) | Medium (23 - 57 kg/ha) | High (> 337 kg/ha) | High (> 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Bikanahalli | 44 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Low (<0.5 %) | Medium (23 - 57 kg/ha) | High (> 337 kg/ha) | High (> 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Bikanahalli | 45 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm ) | Low (<0.5 %) | Low (<23 kg/ha) | High (> 337 kg/ha) | High (> 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Bikanahalli | 46 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Low (<0.5 %) | Medium (23 - 57 kg/ha) | Medium (145 - 337 kg/ha) | High (> 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Bikanahalli | 47 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Low (<0.5 %) | Medium (23 - 57 kg/ha) | High (> 337 kg/ha) | High (> 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Bikanahalli | 48 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Low (<0.5 %) | Medium (23 - 57 kg/ha) | High (> 337 kg/ha) | High (> 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bikanahalli | 49 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Medium (23 - 57 kg/ha) | High (> 337 kg/ha) | High (> 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Bikanahalli | 50 | 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) | High (> 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bikanahalli | 51 | 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) | High (> 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bikanahalli | 52 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Medium (23 - 57 kg/ha) | High (> 337 kg/ha) | High (> 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bikanahalli | 53 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Medium (23 - 57 kg/ha) | High (> 337 kg/ha) | High (> 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bikanahalli | 54 | 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) | High (> 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bikanahalli | 55 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Medium (23 - 57 kg/ha) | High (> 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bikanahalli | 56 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 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) |
| Bikanahalli | 57 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Medium (23 - 57 kg/ha) | High (> 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bikanahalli | 58 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Medium (23 - 57 kg/ha) | High (> 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |

| Village | Survey Number | Soil Reaction | Salinity (EC) | Organic Carbon | Available Phosphorus | Available Potassium | Available Sulphur | Available Boron | Available Iron | Available Manganese | Available Copper | Available Zinc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bikanahalli | 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) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bikanahalli | 60 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 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) |
| Bikanahalli | 61 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 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) |
| Bikanahalli | 62 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 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) |
| Bikanahalli | 63 | Strongly alkaline (pH 8.4 – 9.0) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 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) |
| Bikanahalli | 64 | Strongly alkaline (pH 8.4 – 9.0) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 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) |
| Bikanahalli | 65 | Strongly alkaline (pH 8.4 – 9.0) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 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) |
| Bikanahalli | 66 | Very strongly alkaline (pH > 9.0) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 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) |
| Bikanahalli | 67 | Very strongly alkaline (pH > 9.0) | Non saline (<2 dsm ) | Low (<0.5 %) | Low (<23 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) |
| Bikanahalli | 73 | Very strongly alkaline (pH > 9.0) | Non saline (<2 dsm ) | Low (<0.5 %) | Low (<23 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) |
| Bikanahalli | 74 | Very strongly alkaline (pH > 9.0) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Low (<23 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) |
| Bikanahalli | 77 | Moderately alkaline (pH 7.8 – 8.4) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Medium (23 - 57 kg/ha) | High (> 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bikanahalli | 78 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Medium (23 - 57 kg/ha) | High (> 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bikanahalli | 79 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Medium (23 - 57 kg/ha) | High (> 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bikanahalli | 80 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Medium (23 - 57 kg/ha) | High (> 337 kg/ha) | High (> 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bikanahalli | 81 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Medium (23 - 57 kg/ha) | High (> 337 kg/ha) | High (> 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bikanahalli | 82 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Medium (23 - 57 kg/ha) | High (> 337 kg/ha) | Medium (10 - 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bikanahalli | 83 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm ) | Medium ( 0.5 - 0.75 %) | Medium (23 - 57 kg/ha) | High (> 337 kg/ha) | High (> 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| Bikanahalli | 84 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm ) | Low (<0.5 %) | Medium (23 - 57 kg/ha) | High (> 337 kg/ha) | High (> 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Bikanahalli | 95 | 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) | High (> 20 ppm) | Low (< 0.5 ppm) | Sufficient (> 4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |
| | | | | | | | | | | | | |

Note: EC- Electrical Conductivity

# Appendix III

## Bisarahalli Microwatershed

### Soil Suitability Information

| Village | Survey Number | Sorgham | Maize | Redgram | Bajra | Groundnut | Sunflower | Cotton | Bengalgram | Chilly | Tomato | Drumstick | Mulberry | Pomegranate | Guava | Mango | Sapota | Jackfruit | Jamun | Musambi | Lime | Cashew | Custard-apple | Amla | Tamarind | Marigold | Chrysanthemum | Jasmine | Crasanda |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bisarahalli | 49 | S2r | S2r | S3r | S2r | S2r | S3r | S2r | S2rt | S2r | S2r | S3r | S2r | S3rg | S3r | N1r | S3r | S3r | S3r | S3r | S3r | S3r | S2r | S2rg | N1r | S2r | S2r | S2r | S2r |
| Bisarahalli | 50 | S2g | S2tg | S2rg | S1 | S2t | S2r | S2rg | S2tg | S1 | S1 | S2r | S1 | S2rg | S2rt | S3r | S2rg | S2rg | S2rg | S2rg | S2rg | S2rt | S1 | S1 | S3r | S2tg | S2tg | S2tg | S2tg |
| Bisarahalli | 51 | S2g | S2tg | S2rg | S1 | S2t | S2r | S2rg | S2tg | S1 | S1 | S2r | S1 | S2rg | S2rt | S3r | S2rg | S2rg | S2rg | S2rg | S2rg | S2rt | S1 | S1 | S3r | S2tg | S2tg | S2tg | S2tg |
| Bisarahalli | 52 | S2g | S2tg | S2rg | S1 | S2t | S2r | S2rg | S2tg | S1 | S1 | S2r | S1 | S2rg | S2rt | S3r | S2rg | S2rg | S2rg | S2rg | S2rg | S2rt | S1 | S1 | S3r | S2tg | S2tg | S2tg | S2tg |
| Bisarahalli | 53 | S2g | S2tg | S2rg | S1 | S2t | S2r | S2rg | S2tg | S1 | S1 | S2r | S1 | S2rg | S2rt | S3r | S2rg | S2rg | S2rg | S2rg | S2rg | S2rt | S1 | S1 | S3r | S2tg | S2tg | S2tg | S2tg |
| Bisarahalli | 54 | S2g | S2tg | S2rg | S1 | S2t | S2r | S2rg | S2tg | S1 | S1 | S2r | S1 | S2rg | S2rt | S3r | S2rg | S2rg | S2rg | S2rg | S2rg | S2rt | S1 | S1 | S3r | S2tg | S2tg | S2tg | S2tg |
| Bisarahalli | 55 | S2g | S2tg | S2rg | S1 | S2t | S2r | S2rg | S2tg | S1 | S1 | S2r | S1 | S2rg | S2rt | S3r | S2rg | S2rg | S2rg | S2rg | S2rg | S2rt | S1 | S1 | S3r | S2tg | S2tg | S2tg | S2tg |
| Bisarahalli | 56 | S2g | S2tg | S2rg | S1 | S2t | S2r | S2rg | S2tg | S1 | S1 | S2r | S1 | S2rg | S2rt | S3r | S2rg | S2rg | S2rg | S2rg | S2rg | S2rt | S1 | S1 | S3r | S2tg | S2tg | S2tg | S2tg |
| Bisarahalli | 57 | S2g | S2tg | S2rg | S1 | S2t | S2r | S2rg | S2tg | S1 | S1 | S2r | S1 | S2rg | S2rt | S3r | S2rg | S2rg | S2rg | S2rg | S2rg | S2rt | S1 | S1 | S3r | S2tg | S2tg | S2tg | S2tg |
| Bisarahalli | 76 | S2rg | S2rg | S3rg | S2r | S2r | S3rg | S2rg | S2rt | S2rg | S2rg | S3r | S2r | S3r | S3r | N1r | S3r | S3r | S3r | S3r | S3r | S3r | S2r | S2r | N1r | S2rg | S2rg | S2rg | S2rg |
| Bisarahalli | 77 | S2rg | S2rg | S3rg | S2r | S2r | S3rg | S2rg | S2rt | S2rg | S2rg | S3r | S2r | S3r | S3r | N1r | S3r | S3r | S3r | S3r | S3r | S3r | S2r | S2r | N1r | S2rg | S2rg | S2rg | S2rg |
| Bisarahalli | 78 | S2rg | S2rg | S3rg | S2r | S2r | S3rg | S2rg | S2rt | S2rg | S2rg | S3r | S2r | S3r | S3r | N1r | S3r | S3r | S3r | S3r | S3r | S3r | S2r | S2r | N1r | S2rg | S2rg | S2rg | S2rg |
| Bisarahalli | 79 | S2rg | S2rg | S3rg | S2r | S2r | S3rg | S2rg | S2rt | S2rg | S2rg | S3r | S2r | S3r | S3r | N1r | S3r | S3r | S3r | S3r | S3r | S3r | S2r | S2r | N1r | S2rg | S2rg | S2rg | S2rg |
| Bisarahalli | 80 | S2g | S2tg | S2rg | S1 | S2t | S2r | S2rg | S2tg | S1 | S1 | S2r | S1 | S2rg | S2rt | S3r | S2rg | S2rg | S2rg | S2rg | S2rg | S2rt | S1 | S1 | S3r | S2tg | S2tg | S2tg | S2tg |
| Bisarahalli | 82 | S2g | S2tg | S2rg | S1 | S2t | S2r | S2rg | S2tg | S1 | S1 | S2r | S1 | S2rg | S2rt | S3r | S2rg | S2rg | S2rg | S2rg | S2rg | S2rt | S1 | S1 | S3r | S2tg | S2tg | S2tg | S2tg |
| Bisarahalli | 83 | S2g | S2tg | S2rg | S1 | S2t | S2r | S2rg | S2tg | S1 | S1 | S2r | S1 | S2rg | S2rt | S3r | S2rg | S2rg | S2rg | S2rg | S2rg | S2rt | S1 | S1 | S3r | S2tg | S2tg | S2tg | S2tg |
| Bisarahalli | 87 | S2g | S2tg | S2rg | S1 | S2t | S2r | S2rg | S2tg | S1 | S1 | S2r | S1 | S2rg | S2rt | S3r | S2rg | S2rg | S2rg | S2rg | S2rg | S2rt | S1 | S1 | S3r | S2tg | S2tg | S2tg | S2tg |
| Bisarahalli | 88 | S2g | S2tg | S2rg | S1 | S2t | S2r | S2rg | S2tg | S1 | S1 | S2r | S1 | S2rg | S2rt | S3r | S2rg | S2rg | S2rg | S2rg | S2rg | S2rt | S1 | S1 | S3r | S2tg | S2tg | S2tg | S2tg |

| Village | Survey Number | Sorgham | Maize | Redgram | Bajra | Groundnut | Sunflower | Cotton | Bengalgram | Chilly | Tomato | Drumstick | Mulberry | Pomegranate | Guava | Mango | Sapota | Jackfruit | Jamun | Musambi | Lime | Cashew | Custard-apple | Amla | Tamarind | Marigold | Chrysanthemum | Jasmine | Crasanda |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bisarahalli | 89 | S2g | S2tg | S2rg | S1 | S2t | S2r | S2rg | S2tg | S1 | S1 | S2r | S1 | S2rg | S2rt | S3r | S2rg | S2rg | S2rg | S2rg | S2rg | S2rt | S1 | S1 | S3r | S2tg | S2tg | S2tg | S2tg |
| Bisarahalli | 90 | S2g | S2g | S2g | S1 | S2tg | S2g | S2t | S2tg | S2g | S2g | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S2rg | S2g | S2g | S2g | S2g |
| Bisarahalli | 91 | S2g | S2g | S2g | S1 | S2tg | S2g | S2t | S2tg | S2g | S2g | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S2rg | S2g | S2g | S2g | S2g |
| Bisarahalli | 92 | S2g | S2g | S2g | S1 | S2tg | S2g | S2t | S2tg | S2g | S2g | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S2rg | S2g | S2g | S2g | S2g |
| Bisarahalli | 93 | S2rg | S2rg | S3rg | S2r | S2r | S3rg | S2rg | S2rt | S2rg | S2rg | S3r | S2r | S3r | S3r | N1r | S3r | S3r | S3r | S3r | S3r | S3r | S2r | S2r | N1r | S2rg | S2rg | S2rg | S2rg |
| Bisarahalli | 94 | S2rg | S2rg | S3rg | S2r | S2r | S3rg | S2rg | S2rt | S2rg | S2rg | S3r | S2r | S3r | S3r | N1r | S3r | S3r | S3r | S3r | S3r | S3r | S2r | S2r | N1r | S2rg | S2rg | S2rg | S2rg |
| Bisarahalli | 95 | S2rg | S2rg | S3rg | S2r | S2r | S3rg | S2rg | S2rt | S2rg | S2rg | S3r | S2r | S3r | S3r | N1r | S3r | S3r | S3r | S3r | S3r | S3r | S2r | S2r | N1r | S2rg | S2rg | S2rg | S2rg |
| Bisarahalli | 96 | S2rg | S2rg | S3rg | S2r | S2r | S3rg | S2rg | S2rt | S2rg | S2rg | S3r | S2r | S3r | S3r | N1r | S3r | S3r | S3r | S3r | S3r | S3r | S2r | S2r | N1r | S2rg | S2rg | S2rg | S2rg |
| Bisarahalli | 97 | S2rg | S2rg | S3rg | S2r | S2r | S3rg | S2rg | S2rt | S2rg | S2rg | S3r | S2r | S3r | S3r | N1r | S3r | S3r | S3r | S3r | S3r | S3r | S2r | S2r | N1r | S2rg | S2rg | S2rg | S2rg |
| Bisarahalli | 98 | S2rg | S2rg | S3rg | S2r | S2r | S3rg | S2rg | S2rt | S2rg | S2rg | S3r | S2r | S3r | S3r | N1r | S3r | S3r | S3r | S3r | S3r | S3r | S2r | S2r | N1r | S2rg | S2rg | S2rg | S2rg |
| Bisarahalli | 99 | S2rg | S2rg | S3rg | S2r | S2r | S3rg | S2rg | S2rt | S2rg | S2rg | S3r | S2r | S3r | S3r | N1r | S3r | S3r | S3r | S3r | S3r | S3r | S2r | S2r | N1r | S2rg | S2rg | S2rg | S2rg |
| Bisarahalli | 150 | S2 | S3t | S2t | S3t | S3t | S2 | S2 | S2 | S3t | S3t | S2t | S2t | S2t | S3t | S3t | S3t | S3t | S2rt | S2 | S2 | N1t | S1 | S2t | S2r | S2t | S2t | S3t | S3t |
| Bisarahalli | 151 | S3r | S3rg | N1r | S3r | S3r | N1r | S3r | S3r | S3r | S3r | N1r | S3r | N1r | N1rg | N1r | N1r | N1r | N1r | N1r | N1r | N1rg | S3rg | S3rg | N1r | S3r | S3r | S3r | S3r |
| Bisarahalli | 152 | S3r | S3rg | N1r | S3r | S3r | N1r | S3r | S3r | S3r | S3r | N1r | S3r | N1r | N1rg | N1r | N1r | N1r | N1r | N1r | N1r | N1rg | S3rg | S3rg | N1r | S3r | S3r | S3r | S3r |
| Bisarahalli | 158 | S1 | S3t | S2t | S3t | S3t | S1 | S1 | S1 | S3t | S3t | S2t | S2t | S2t | S3t | S3t | S3t | S3t | S2rt | S1 | S1 | N1t | S1 | S2t | S2r | S2t | S2t | S3t | S3t |
| Bisarahalli | 159 | S2rg | S2rg | S3rg | S2r | S2r | S3rg | S2rg | S2rt | S2rg | S2rg | S3r | S2r | S3r | S3r | N1r | S3r | S3r | S3r | S3r | S3r | S3r | S2r | S2r | N1r | S2rg | S2rg | S2rg | S2rg |
| Bisarahalli | 160 | S3r | S3rg | N1r | S3r | S3r | N1r | S3r | S3r | S3r | S3r | N1r | S3r | N1r | N1rg | N1r | N1r | N1r | N1r | N1r | N1r | N1rg | S3rg | S3rg | N1r | S3r | S3r | S3r | S3r |
| Bisarahalli | 161 | S1 | S3t | S2t | S3t | S3t | S1 | S1 | S1 | S3t | S3t | S2t | S2t | S2t | S3t | S3t | S3t | S3t | S2rt | S1 | S1 | N1t | S1 | S2t | S2r | S2t | S2t | S3t | S3t |
| Bisarahalli | 162 | S3r | S3rg | N1r | S3r | S3r | N1r | S3r | S3r | S3r | S3r | N1r | S3r | N1r | N1rg | N1r | N1r | N1r | N1r | N1r | N1r | N1rg | S3rg | S3rg | N1r | S3r | S3r | S3r | S3r |
| Bisarahalli | 163 | S3r | S3rg | N1r | S3r | S3r | N1r | S3r | S3r | S3r | S3r | N1r | S3r | N1r | N1rg | N1r | N1r | N1r | N1r | N1r | N1r | N1rg | S3rg | S3rg | N1r | S3r | S3r | S3r | S3r |
| Bisarahalli | 164 | S3rz | S3tz | N1rz | S3rz | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz | N1rz | S3rz | N1rz | N1rt | N1rt | N1rz | N1rt | N1rt | N1rz | N1rz | N1rt | S3z | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz |

| Village | Survey Number | Sorgham | Maize | Redgram | Bajra | Groundnut | Sunflower | Cotton | Bengalgram | Chilly | Tomato | Drumstick | Mulberry | Pomegranate | Guava | Mango | Sapota | Jackfruit | Jamun | Musambi | Lime | Cashew | Custard-apple | Amla | Tamarind | Marigold | Chrysanthemum | Jasmine | Crasanda |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bisarahalli | 165 | S3r | S3rg | N1r | S3r | S3r | N1r | S3r | S3r | S3r | S3r | N1r | S3r | N1r | N1rg | N1r | N1r | N1r | N1r | N1r | N1r | N1rg | S3rg | S3rg | N1r | S3r | S3r | S3r | S3r |
| Bisarahalli | 166 | S3r | S3rg | N1r | S3r | S3r | N1r | S3r | S3r | S3r | S3r | N1r | S3r | N1r | N1rg | N1r | N1r | N1r | N1r | N1r | N1r | N1rg | S3rg | S3rg | N1r | S3r | S3r | S3r | S3r |
| Bisarahalli | 167 | S2rg | S2rg | S3rg | S2r | S2r | S3rg | S2rg | S2rt | S2rg | S2rg | S3r | S2r | S3r | S3r | N1r | S3r | S3r | S3r | S3r | S3r | S3r | S2r | S2r | N1r | S2rg | S2rg | S2rg | S2rg |
| Bisarahalli | 168 | S2rg | S2rg | S3rg | S2r | S2r | S3rg | S2rg | S2rt | S2rg | S2rg | S3r | S2r | S3r | S3r | N1r | S3r | S3r | S3r | S3r | S3r | S3r | S2r | S2r | N1r | S2rg | S2rg | S2rg | S2rg |
| Bisarahalli | 169 | S2rg | S2rg | S3rg | S2r | S2r | S3rg | S2rg | S2rt | S2rg | S2rg | S3r | S2r | S3r | S3r | N1r | S3r | S3r | S3r | S3r | S3r | S3r | S2r | S2r | N1r | S2rg | S2rg | S2rg | S2rg |
| Bisarahalli | 170 | S3rz | S3tz | N1rz | S3rz | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz | N1rz | S3rz | N1rz | N1rt | N1rt | N1rz | N1rt | N1rt | N1rz | N1rz | N1rt | S3z | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz |
| Bisarahalli | 171 | S3r | S3rg | N1r | S3r | S3r | N1r | S3r | S3r | S3r | S3r | N1r | S3r | N1r | N1rg | N1r | N1r | N1r | N1r | N1r | N1r | N1rg | S3rg | S3rg | N1r | S3r | S3r | S3r | S3r |
| Bisarahalli | 172 | S3rz | S3tz | N1rz | S3rz | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz | N1rz | S3rz | N1rz | N1rt | N1rt | N1rz | N1rt | N1rt | N1rz | N1rz | N1rt | S3z | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz |
| Bisarahalli | 173 | S3rz | S3tz | N1rz | S3rz | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz | N1rz | S3rz | N1rz | N1rt | N1rt | N1rz | N1rt | N1rt | N1rz | N1rz | N1rt | S3z | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz |
| Bisarahalli | 174 | S3rz | S3tz | N1rz | S3rz | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz | N1rz | S3rz | N1rz | N1rt | N1rt | N1rz | N1rt | N1rt | N1rz | N1rz | N1rt | S3z | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz |
| Bisarahalli | 175 | S3rz | S3tz | N1rz | S3rz | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz | N1rz | S3rz | N1rz | N1rt | N1rt | N1rz | N1rt | N1rt | N1rz | N1rz | N1rt | S3z | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz |
| Bisarahalli | 176 | S2g | S2g | S2g | S1 | S2tg | S2g | S2t | S2tg | S2g | S2g | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S2rg | S2g | S2g | S2g | S2g |
| Bisarahalli | 177 | S2g | S2g | S2g | S1 | S2tg | S2g | S2t | S2tg | S2g | S2g | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S2rg | S2g | S2g | S2g | S2g |
| Bisarahalli | 178 | S3rz | S3tz | N1rz | S3rz | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz | N1rz | S3rz | N1rz | N1rt | N1rt | N1rz | N1rt | N1rt | N1rz | N1rz | N1rt | S3z | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz |
| Bisarahalli | 179 | S3rz | S3tz | N1rz | S3rz | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz | N1rz | S3rz | N1rz | N1rt | N1rt | N1rz | N1rt | N1rt | N1rz | N1rz | N1rt | S3z | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz |
| Bisarahalli | 180 | S3rz | S3tz | N1rz | S3rz | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz | N1rz | S3rz | N1rz | N1rt | N1rt | N1rz | N1rt | N1rt | N1rz | N1rz | N1rt | S3z | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz |
| Bisarahalli | 181 | S2g | S2g | S2g | S1 | S2tg | S2g | S2t | S2tg | S2g | S2g | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S2rg | S2g | S2g | S2g | S2g |
| Bisarahalli | 182 | S2g | S2g | S2g | S1 | S2tg | S2g | S2t | S2tg | S2g | S2g | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S2rg | S2g | S2g | S2g | S2g |
| Bisarahalli | 183 | S2g | S2g | S2g | S1 | S2tg | S2g | S2t | S2tg | S2g | S2g | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S2rg | S2g | S2g | S2g | S2g |
| Bisarahalli | 184 | S2g | S2g | S2g | S1 | S2tg | S2g | S2t | S2tg | S2g | S2g | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S2rg | S2g | S2g | S2g | S2g |
| Bisarahalli | 185 | S2g | S2g | S2g | S1 | S2tg | S2g | S2t | S2tg | S2g | S2g | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S2rg | S2g | S2g | S2g | S2g |

| Village | Survey Number | Sorgham | Maize | Redgram | Bajra | Groundnut | Sunflower | Cotton | Bengalgram | Chilly | Tomato | Drumstick | Mulberry | Pomegranate | Guava | Mango | Sapota | Jackfruit | Jamun | Musambi | Lime | Cashew | Custard-apple | Amla | Tamarind | Marigold | Chrysanthemum | Jasmine | Crasanda |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bisarahalli | 186 | S2g | S2g | S2g | S1 | S2tg | S2g | S2t | S2tg | S2g | S2g | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S2rg | S2g | S2g | S2g | S2g |
| Bisarahalli | 187 | S3rz | S3tz | N1rz | S3rz | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz | N1rz | S3rz | N1rz | N1rt | N1rt | N1rz | N1rt | N1rt | N1rz | N1rz | N1rt | S3z | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz |
| Bisarahalli | 188 | S3rz | S3tz | N1rz | S3rz | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz | N1rz | S3rz | N1rz | N1rt | N1rt | N1rz | N1rt | N1rt | N1rz | N1rz | N1rt | S3z | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz |
| Bisarahalli | 189 | S3rz | S3tz | N1rz | S3rz | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz | N1rz | S3rz | N1rz | N1rt | N1rt | N1rz | N1rt | N1rt | N1rz | N1rz | N1rt | S3z | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz |
| Bisarahalli | 190 | S2g | S2g | S2g | S1 | S2tg | S2g | S2t | S2tg | S2g | S2g | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S2rg | S2g | S2g | S2g | S2g |
| Bisarahalli | 191 | S3rz | S3tz | N1rz | S3rz | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz | N1rz | S3rz | N1rz | N1rt | N1rt | N1rz | N1rt | N1rt | N1rz | N1rz | N1rt | S3z | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz |
| Bisarahalli | 192 | S3rz | S3tz | N1rz | S3rz | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz | N1rz | S3rz | N1rz | N1rt | N1rt | N1rz | N1rt | N1rt | N1rz | N1rz | N1rt | S3z | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz |
| Bisarahalli | 193 | S3rz | S3tz | N1rz | S3rz | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz | N1rz | S3rz | N1rz | N1rt | N1rt | N1rz | N1rt | N1rt | N1rz | N1rz | N1rt | S3z | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz |
| Bisarahalli | 194 | S3rz | S3tz | N1rz | S3rz | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz | N1rz | S3rz | N1rz | N1rt | N1rt | N1rz | N1rt | N1rt | N1rz | N1rz | N1rt | S3z | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz |
| Bisarahalli | 195 | S3rz | S3tz | N1rz | S3rz | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz | N1rz | S3rz | N1rz | N1rt | N1rt | N1rz | N1rt | N1rt | N1rz | N1rz | N1rt | S3z | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz |
| Bisarahalli | 196 | S3rz | S3tz | N1rz | S3rz | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz | N1rz | S3rz | N1rz | N1rt | N1rt | N1rz | N1rt | N1rt | N1rz | N1rz | N1rt | S3z | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz |
| Bisarahalli | 197 | S3rz | S3tz | N1rz | S3rz | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz | N1rz | S3rz | N1rz | N1rt | N1rt | N1rz | N1rt | N1rt | N1rz | N1rz | N1rt | S3z | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz |
| Bisarahalli | 198 | S2nz | S3tz | S3rz | S3tz | S3tz | S2rz | S2rz | S2rz | S3tz | S3tz | S2rz | S2tz | S2rt | S3tz | S3rz | S3tz | S3tz | S3rz | S2rz | S2rz | N1tz | S2z | S2tz | S3rz | S2tz | S2tz | S3tz | S2z |
| Bisarahalli | 199 | S2nz | S3tz | S3rz | S3tz | S3tz | S2rz | S2rz | S2rz | S3tz | S3tz | S2rz | S2tz | S2rt | S3tz | S3rz | S3tz | S3tz | S3rz | S2rz | S2rz | N1tz | S2z | S2tz | S3rz | S2tz | S2tz | S3tz | S2z |
| Bisarahalli | 200 | S2nz | S3tz | S3rz | S3tz | S3tz | S2rz | S2rz | S2rz | S3tz | S3tz | S2rz | S2tz | S2rt | S3tz | S3rz | S3tz | S3tz | S3rz | S2rz | S2rz | N1tz | S2z | S2tz | S3rz | S2tz | S2tz | S3tz | S2z |
| Bisarahalli | 201 | S3rz | S3tz | N1rz | S3rz | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz | N1rz | S3rz | N1rz | N1rt | N1rt | N1rz | N1rt | N1rt | N1rz | N1rz | N1rt | S3z | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz |
| Bisarahalli | 202 | S3rz | S3tz | N1rz | S3rz | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz | N1rz | S3rz | N1rz | N1rt | N1rt | N1rz | N1rt | N1rt | N1rz | N1rz | N1rt | S3z | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz |
| Bisarahalli | 203 | S2nz | S3tz | S3rz | S3tz | S3tz | S2rz | S2rz | S2rz | S3tz | S3tz | S2rz | S2tz | S2rt | S3tz | S3rz | S3tz | S3tz | S3rz | S2rz | S2rz | N1tz | S2z | S2tz | S3rz | S2tz | S2tz | S3tz | S2z |
| Bisarahalli | 204 | S3rz | S3tz | N1rz | S3rz | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz | N1rz | S3rz | N1rz | N1rt | N1rt | N1rz | N1rt | N1rt | N1rz | N1rz | N1rt | S3z | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz |
| Bisarahalli | 205 | S3rz | S3tz | N1rz | S3rz | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz | N1rz | S3rz | N1rz | N1rt | N1rt | N1rz | N1rt | N1rt | N1rz | N1rz | N1rt | S3z | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz |
| Bisarahalli | 206 | S2 | S3t | S2t | S3t | S3t | S2 | S2 | S2 | S3t | S3t | S2t | S2t | S2t | S3t | S3t | S3t | S3t | S2rt | S2 | S2 | N1t | S1 | S2t | S2r | S2t | S2t | S3t | S3t |

| Village | Survey Number | Sorgham | Maize | Redgram | Bajra | Groundnut | Sunflower | Cotton | Bengalgram | Chilly | Tomato | Drumstick | Mulberry | Pomegranate | Guava | Mango | Sapota | Jackfruit | Jamun | Musambi | Lime | Cashew | Custard-apple | Amla | Tamarind | Marigold | Chrysanthemum | Jasmine | Crasanda |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bisarahalli | 207 | S3rz | S3tz | N1rz | S3rz | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz | N1rz | S3rz | N1rz | N1rt | N1rt | N1rz | N1rt | N1rt | N1rz | N1rz | N1rt | S3z | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz |
| Bisarahalli | 208 | S2 | S3t | S2t | S3t | S3t | S2 | S2 | S2 | S3t | S3t | S2t | S2t | S2t | S3t | S3t | S3t | S3t | S2rt | S2 | S2 | N1t | S1 | S2t | S2r | S2t | S2t | S3t | S3t |
| Bisarahalli | 209 | S2 | S3t | S2t | S3t | S3t | S2 | S2 | S2 | S3t | S3t | S2t | S2t | S2t | S3t | S3t | S3t | S3t | S2rt | S2 | S2 | N1t | S1 | S2t | S2r | S2t | S2t | S3t | S3t |
| Bisarahalli | 210 | S2 | S3t | S2t | S3t | S3t | S2 | S2 | S2 | S3t | S3t | S2t | S2t | S2t | S3t | S3t | S3t | S3t | S2rt | S2 | S2 | N1t | S1 | S2t | S2r | S2t | S2t | S3t | S3t |
| Bisarahalli | 211 | S2 | S3t | S2t | S3t | S3t | S2 | S2 | S2 | S3t | S3t | S2t | S2t | S2t | S3t | S3t | S3t | S3t | S2rt | S2 | S2 | N1t | S1 | S2t | S2r | S2t | S2t | S3t | S3t |
| Bisarahalli | 277 | S2 | S3t | S2t | S3t | S3t | S2 | S2 | S2 | S3t | S3t | S2t | S2t | S2t | S3t | S3t | S3t | S3t | S2rt | S2 | S2 | N1t | S1 | S2t | S2r | S2t | S2t | S3t | S3t |
| Bisarahalli | 278 | S2 | S3t | S2t | S3t | S3t | S2 | S2 | S2 | S3t | S3t | S2t | S2t | S2t | S3t | S3t | S3t | S3t | S2rt | S2 | S2 | N1t | S1 | S2t | S2r | S2t | S2t | S3t | S3t |
| Bisarahalli | 279 | S2nz | S3tz | S3rz | S3tz | S3tz | S2rz | S2rz | S2rz | S3tz | S3tz | S2rz | S2tz | S2rt | S3tz | S3rz | S3tz | S3tz | S3rz | S2rz | S2rz | N1tz | S2z | S2tz | S3rz | S2tz | S2tz | S3tz | S2z |
| Bisarahalli | 280 | S2 | S3t | S2t | S3t | S3t | S2 | S2 | S2 | S3t | S3t | S2t | S2t | S2t | S3t | S3t | S3t | S3t | S2rt | S2 | S2 | N1t | S1 | S2t | S2r | S2t | S2t | S3t | S3t |
| Bisarahalli | 282 | S2 | S3t | S2t | S3t | S3t | S2 | S2 | S2 | S3t | S3t | S2t | S2t | S2t | S3t | S3t | S3t | S3t | S2rt | S2 | S2 | N1t | S1 | S2t | S2r | S2t | S2t | S3t | S3t |
| Bisarahalli | 286 | S2 | S3t | S2t | S3t | S3t | S2 | S2 | S2 | S3t | S3t | S2t | S2t | S2t | S3t | S3t | S3t | S3t | S2rt | S2 | S2 | N1t | S1 | S2t | S2r | S2t | S2t | S3t | S3t |
| Bisarahalli | 287 | S2 | S3t | S2t | S3t | S3t | S2 | S2 | S2 | S3t | S3t | S2t | S2t | S2t | S3t | S3t | S3t | S3t | S2rt | S2 | S2 | N1t | S1 | S2t | S2r | S2t | S2t | S3t | S3t |
| Bisarahalli | 288 | S2 | S3t | S2t | S3t | S3t | S2 | S2 | S2 | S3t | S3t | S2t | S2t | S2t | S3t | S3t | S3t | S3t | S2rt | S2 | S2 | N1t | S1 | S2t | S2r | S2t | S2t | S3t | S3t |
| Bisarahalli | 289 | S2 | S3t | S2t | S3t | S3t | S2 | S2 | S2 | S3t | S3t | S2t | S2t | S2t | S3t | S3t | S3t | S3t | S2rt | S2 | S2 | N1t | S1 | S2t | S2r | S2t | S2t | S3t | S3t |
| Bisarahalli | 290 | S2 | S3t | S2t | S3t | S3t | S2 | S2 | S2 | S3t | S3t | S2t | S2t | S2t | S3t | S3t | S3t | S3t | S2rt | S2 | S2 | N1t | S1 | S2t | S2r | S2t | S2t | S3t | S3t |
| Bisarahalli | 291 | S2 | S3t | S2t | S3t | S3t | S2 | S2 | S2 | S3t | S3t | S2t | S2t | S2t | S3t | S3t | S3t | S3t | S2rt | S2 | S2 | N1t | S1 | S2t | S2r | S2t | S2t | S3t | S3t |
| Bisarahalli | 292 | S3g | S3g | S2g | S3g | S2g | S3g | S2g | S2g | S3g | S3g | S2g | S2g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3rg | S3g | S3g | S3g | S2g |
| Bisarahalli | 293 | S2nz | S3tz | S3rz | S3tz | S3tz | S2rz | S2rz | S2rz | S3tz | S3tz | S2rz | S2tz | S2rt | S3tz | S3rz | S3tz | S3tz | S3rz | S2rz | S2rz | N1tz | S2z | S2tz | S3rz | S2tz | S2tz | S3tz | S2z |
| Bisarahalli | 294 | S2nz | S3tz | S3rz | S3tz | S3tz | S2rz | S2rz | S2rz | S3tz | S3tz | S2rz | S2tz | S2rt | S3tz | S3rz | S3tz | S3tz | S3rz | S2rz | S2rz | N1tz | S2z | S2tz | S3rz | S2tz | S2tz | S3tz | S2z |
| Bisarahalli | 295 | S2nz | S3tz | S3rz | S3tz | S3tz | S2rz | S2rz | S2rz | S3tz | S3tz | S2rz | S2tz | S2rt | S3tz | S3rz | S3tz | S3tz | S3rz | S2rz | S2rz | N1tz | S2z | S2tz | S3rz | S2tz | S2tz | S3tz | S2z |
| Bisarahalli | 296 | S2nz | S3tz | S3rz | S3tz | S3tz | S2rz | S2rz | S2rz | S3tz | S3tz | S2rz | S2tz | S2rt | S3tz | S3rz | S3tz | S3tz | S3rz | S2rz | S2rz | N1tz | S2z | S2tz | S3rz | S2tz | S2tz | S3tz | S2z |

| Village | Survey Number | Sorgham | Maize | Redgram | Bajra | Groundnut | Sunflower | Cotton | Bengalgram | Chilly | Tomato | Drumstick | Mulberry | Pomegranate | Guava | Mango | Sapota | Jackfruit | Jamun | Musambi | Lime | Cashew | Custard-apple | Amla | Tamarind | Marigold | Chrysanthemum | Jasmine | Crasanda |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bisarahalli | 297 | S3g | S3g | S2g | S3g | S2g | S3g | S2g | S2g | S3g | S3g | S2g | S2g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3rg | S3g | S3g | S3g | S2g |
| Bisarahalli | 298 | S2nz | S3tz | S3rz | S3tz | S3tz | S2rz | S2rz | S2rz | S3tz | S3tz | S2rz | S2tz | S2rt | S3tz | S3rz | S3tz | S3tz | S3rz | S2rz | S2rz | N1tz | S2z | S2tz | S3rz | S2tz | S2tz | S3tz | S2z |
| Bisarahalli | 299 | S2nz | S3tz | S3rz | S3tz | S3tz | S2rz | S2rz | S2rz | S3tz | S3tz | S2rz | S2tz | S2rt | S3tz | S3rz | S3tz | S3tz | S3rz | S2rz | S2rz | N1tz | S2z | S2tz | S3rz | S2tz | S2tz | S3tz | S2z |
| Bisarahalli | 300 | S3g | S3g | S2g | S3g | S2g | S3g | S2g | S2g | S3g | S3g | S2g | S2g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3rg | S3g | S3g | S3g | S2g |
| Bisarahalli | 301 | S2rg | S2rg | S3rg | S2r | S2r | S3rg | S2rg | S2rt | S2rg | S2rg | S3r | S2r | S3r | S3r | N1r | S3r | S3r | S3r | S3r | S3r | S3r | S2r | S2r | N1r | S2rg | S2rg | S2rg | S2rg |
| Bisarahalli | 302 | S2rg | S2rg | S3rg | S2r | S2r | S3rg | S2rg | S2rt | S2rg | S2rg | S3r | S2r | S3r | S3r | N1r | S3r | S3r | S3r | S3r | S3r | S3r | S2r | S2r | N1r | S2rg | S2rg | S2rg | S2rg |
| Bisarahalli | 303 | S2nz | S3tz | S3rz | S3tz | S3tz | S2rz | S2rz | S2rz | S3tz | S3tz | S2rz | S2tz | S2rt | S3tz | S3rz | S3tz | S3tz | S3rz | S2rz | S2rz | N1tz | S2z | S2tz | S3rz | S2tz | S2tz | S3tz | S2z |
| Bisarahalli | 304 | S2rg | S2rg | S3rg | S2r | S2r | S3rg | S2rg | S2rt | S2rg | S2rg | S3r | S2r | S3r | S3r | N1r | S3r | S3r | S3r | S3r | S3r | S3r | S2r | S2r | N1r | S2rg | S2rg | S2rg | S2rg |
| Bisarahalli | 305 | S3rg | S3rg | S3rg | S2rg | S3rg | S3rg | S3g | S2rt | S3g | S3g | S3rg | S2rg | S3rg | S3rg | N1rg | S3rg | S3rg | S3rg | S3rg | S3rg | S3rg | S2rg | S2rg | N1rg | S3g | S3g | S3g | S3g |
| Bisarahalli | 306 | S3rg | S3rg | S3rg | S2rg | S3rg | S3rg | S3g | S2rt | S3g | S3g | S3rg | S2rg | S3rg | S3rg | N1rg | S3rg | S3rg | S3rg | S3rg | S3rg | S3rg | S2rg | S2rg | N1rg | S3g | S3g | S3g | S3g |
| Bisarahalli | 307 | S3rg | S3rg | S3rg | S2rg | S3rg | S3rg | S3g | S2rt | S3g | S3g | S3rg | S2rg | S3rg | S3rg | N1rg | S3rg | S3rg | S3rg | S3rg | S3rg | S3rg | S2rg | S2rg | N1rg | S3g | S3g | S3g | S3g |
| Bisarahalli | 308 | S3rz | S3tz | N1rz | S3rz | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz | N1rz | S3rz | N1rz | N1rt | N1rt | N1rz | N1rt | N1rt | N1rz | N1rz | N1rt | S3z | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz |
| Bisarahalli | 309 | S3rz | S3tz | N1rz | S3rz | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz | N1rz | S3rz | N1rz | N1rt | N1rt | N1rz | N1rt | N1rt | N1rz | N1rz | N1rt | S3z | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz |
| Bisarahalli | 310 | S3rz | S3tz | N1rz | S3rz | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz | N1rz | S3rz | N1rz | N1rt | N1rt | N1rz | N1rt | N1rt | N1rz | N1rz | N1rt | S3z | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz |
| Bisarahalli | 311 | S3rz | S3tz | N1rz | S3rz | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz | N1rz | S3rz | N1rz | N1rt | N1rt | N1rz | N1rt | N1rt | N1rz | N1rz | N1rt | S3z | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz |
| Bisarahalli | 312 | S2nz | S3tz | S3rz | S3tz | S3tz | S2rz | S2rz | S2rz | S3tz | S3tz | S2rz | S2tz | S2rt | S3tz | S3rz | S3tz | S3tz | S3rz | S2rz | S2rz | N1tz | S2z | S2tz | S3rz | S2tz | S2tz | S3tz | S2z |
| Bisarahalli | 313 | S2nz | S3tz | S3rz | S3tz | S3tz | S2rz | S2rz | S2rz | S3tz | S3tz | S2rz | S2tz | S2rt | S3tz | S3rz | S3tz | S3tz | S3rz | S2rz | S2rz | N1tz | S2z | S2tz | S3rz | S2tz | S2tz | S3tz | S2z |
| Bisarahalli | 314 | S3rz | S3tz | N1rz | S3rz | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz | N1rz | S3rz | N1rz | N1rt | N1rt | N1rz | N1rt | N1rt | N1rz | N1rz | N1rt | S3z | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz |
| Bisarahalli | 315 | S3rz | S3tz | N1rz | S3rz | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz | N1rz | S3rz | N1rz | N1rt | N1rt | N1rz | N1rt | N1rt | N1rz | N1rz | N1rt | S3z | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz |
| Bisarahalli | 316 | S3rz | S3tz | N1rz | S3rz | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz | N1rz | S3rz | N1rz | N1rt | N1rt | N1rz | N1rt | N1rt | N1rz | N1rz | N1rt | S3z | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz |
| Bisarahalli | 317 | S3rz | S3tz | N1rz | S3rz | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz | N1rz | S3rz | N1rz | N1rt | N1rt | N1rz | N1rt | N1rt | N1rz | N1rz | N1rt | S3z | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz |

| Village | Survey Number | Sorgham | Maize | Redgram | Bajra | Groundnut | Sunflower | Cotton | Bengalgram | Chilly | Tomato | Drumstick | Mulberry | Pomegranate | Guava | Mango | Sapota | Jackfruit | Jamun | Musambi | Lime | Cashew | Custard-apple | Amla | Tamarind | Marigold | Chrysanthemum | Jasmine | Crasanda |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bisarahalli | 318 | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others |
| Bisarahalli | 319 | S3rz | S3tz | N1rz | S3rz | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz | N1rz | S3rz | N1rz | N1rt | N1rt | N1rz | N1rt | N1rt | N1rz | N1rz | N1rt | S3z | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz |
| Bisarahalli | 320 | S3rz | S3tz | N1rz | S3rz | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz | N1rz | S3rz | N1rz | N1rt | N1rt | N1rz | N1rt | N1rt | N1rz | N1rz | N1rt | S3z | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz |
| Bisarahalli | 321 | S3rz | S3tz | N1rz | S3rz | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz | N1rz | S3rz | N1rz | N1rt | N1rt | N1rz | N1rt | N1rt | N1rz | N1rz | N1rt | S3z | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz |
| Bisarahalli | 322 | S3rz | S3tz | N1rz | S3rz | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz | N1rz | S3rz | N1rz | N1rt | N1rt | N1rz | N1rt | N1rt | N1rz | N1rz | N1rt | S3z | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz |
| Bisarahalli | 323 | S3rz | S3tz | N1rz | S3rz | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz | N1rz | S3rz | N1rz | N1rt | N1rt | N1rz | N1rt | N1rt | N1rz | N1rz | N1rt | S3z | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz |
| Bisarahalli | 324 | S2g | S2g | S2rg | S1 | S1 | S2rg | S2rg | S2g | S2g | S2g | S2rg | S1 | S2r | S2r | S3r | S2r | S2r | S2r | S2r | S2r | S2r | S1 | S1 | S3r | S2g | S2g | S2g | S2g |
| Bisarahalli | 325 | S3rz | S3tz | N1rz | S3rz | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz | N1rz | S3rz | N1rz | N1rt | N1rt | N1rz | N1rt | N1rt | N1rz | N1rz | N1rt | S3z | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz |
| Bisarahalli | 326 | S3g | S3g | S2g | S3g | S2g | S3g | S2g | S2g | S3g | S3g | S2g | S2g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3rg | S3g | S3g | S3g | S2g |
| Bisarahalli | 327 | S2g | S2g | S2rg | S1 | S1 | S2rg | S2rg | S2g | S2g | S2g | S2rg | S1 | S2r | S2r | S3r | S2r | S2r | S2r | S2r | S2r | S2r | S1 | S1 | S3r | S2g | S2g | S2g | S2g |
| Bisarahalli | 328 | S2g | S2g | S2rg | S1 | S1 | S2rg | S2rg | S2g | S2g | S2g | S2rg | S1 | S2r | S2r | S3r | S2r | S2r | S2r | S2r | S2r | S2r | S1 | S1 | S3r | S2g | S2g | S2g | S2g |
| Bisarahalli | 329 | S2g | S2g | S2rg | S1 | S1 | S2rg | S2rg | S2g | S2g | S2g | S2rg | S1 | S2r | S2r | S3r | S2r | S2r | S2r | S2r | S2r | S2r | S1 | S1 | S3r | S2g | S2g | S2g | S2g |
| Bisarahalli | 330 | S2g | S2tg | S2rg | S1 | S2t | S2r | S2rg | S2tg | S1 | S1 | S2r | S1 | S2rg | S2rt | S3r | S2rg | S2rg | S2rg | S2rg | S2rg | S2rt | S1 | S1 | S3r | S2tg | S2tg | S2tg | S2tg |
| Bisarahalli | 331 | S2g | S2tg | S2rg | S1 | S2t | S2r | S2rg | S2tg | S1 | S1 | S2r | S1 | S2rg | S2rt | S3r | S2rg | S2rg | S2rg | S2rg | S2rg | S2rt | S1 | S1 | S3r | S2tg | S2tg | S2tg | S2tg |
| Bisarahalli | 334 | S2g | S2g | S2rg | S1 | S1 | S2rg | S2rg | S2g | S2g | S2g | S2rg | S1 | S2r | S2r | S3r | S2r | S2r | S2r | S2r | S2r | S2r | S1 | S1 | S3r | S2g | S2g | S2g | S2g |
| Bisarahalli | 335 | S2g | S2g | S2rg | S1 | S1 | S2rg | S2rg | S2g | S2g | S2g | S2rg | S1 | S2r | S2r | S3r | S2r | S2r | S2r | S2r | S2r | S2r | S1 | S1 | S3r | S2g | S2g | S2g | S2g |
| Bisarahalli | 336 | S2g | S2g | S2rg | S1 | S1 | S2rg | S2rg | S2g | S2g | S2g | S2rg | S1 | S2r | S2r | S3r | S2r | S2r | S2r | S2r | S2r | S2r | S1 | S1 | S3r | S2g | S2g | S2g | S2g |
| Bisarahalli | 337 | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others |
| Bisarahalli | 338 | S3rz | S3tz | N1rz | S3rz | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz | N1rz | S3rz | N1rz | N1rt | N1rt | N1rz | N1rt | N1rt | N1rz | N1rz | N1rt | S3z | S3tz | N1rz | S3rz | S3rz | S3rz | S3rz |

| Village | Survey Number | Sorgham | Maize | Redgram | Bajra | Groundnut | Sunflower | Cotton | Bengalgram | Chilly | Tomato | Drumstick | Mulberry | Pomegranate | Guava | Mango | Sapota | Jackfruit | Jamun | Musambi | Lime | Cashew | Custard-apple | Amla | Tamarind | Marigold | Chrysanthemum | Jasmine | Crasanda |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bisarahalli | 339 | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others |
| Bisarahalli | 343 | S2r | S2r | S3r | S2r | S2r | S3r | S2r | S2rt | S2r | S2r | S3r | S2r | S3r | S3r | N1r | S3r | S3r | S3r | S3r | S3r | S3r | S3r | S2r | S2rg | N1r | S2r | S2r | S2r | S2r |
| Bisarahalli | 344 | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others |
| Bikanahalli | 24 | S1 | S1 | S1 | S1 | S2t | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S1 | S1 |
| Bikanahalli | 29 | S3g | S3g | S2g | S3g | S2g | S3g | S2g | S2g | S3g | S3g | S2g | S2g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3rg | S3g | S3g | S3g | S2g |
| Bikanahalli | 30 | S3g | S3g | S2g | S3g | S2g | S3g | S2g | S2g | S3g | S3g | S2g | S2g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3rg | S3g | S3g | S3g | S2g |
| Bikanahalli | 31 | S3g | S3g | S2g | S3g | S2g | S3g | S2g | S2g | S3g | S3g | S2g | S2g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3rg | S3g | S3g | S3g | S2g |
| Bikanahalli | 32 | S1 | S1 | S1 | S1 | S2t | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S1 | S1 |
| Bikanahalli | 33 | S1 | S1 | S1 | S1 | S2t | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S1 | S1 |
| Bikanahalli | 34 | S3g | S3g | S2g | S3g | S2g | S3g | S2g | S2g | S3g | S3g | S2g | S2g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3rg | S3g | S3g | S3g | S2g |
| Bikanahalli | 35 | S1 | S1 | S1 | S1 | S2t | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S1 | S1 |
| Bikanahalli | 36 | S1 | S1 | S1 | S1 | S2t | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S1 | S1 |
| Bikanahalli | 37 | S1 | S1 | S1 | S1 | S2t | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S1 | S1 |
| Bikanahalli | 38 | S2rg | S2rg | S3rg | S2rg | S2rg | S3rg | S2rg | S2rt | S2rg | S2rg | S3rg | S2rg | S3rg | S3rg | N1rg | S3rg | S3rg | S3rg | S3rg | S3rg | S3rg | S2rg | S2rg | N1rg | S2rg | S2rg | S2rg | S2rg |
| Bikanahalli | 39 | S2g | S2tg | S2g | S2g | S3tg | S2g | S2g | S2tg | S2tg | S2tg | S2g | S2g | S2g | S2tg | S2g | S2g | S2g | S2g | S2g | S2g | S2tg | S2g | S2g | S2g | S2tg | S2tg | S2tg | S2g |
| Bikanahalli | 40 | S2g | S2tg | S2g | S2g | S3tg | S2g | S2g | S2tg | S2tg | S2tg | S2g | S2g | S2g | S2tg | S2g | S2g | S2g | S2g | S2g | S2g | S2tg | S2g | S2g | S2g | S2tg | S2tg | S2tg | S2g |
| Bikanahalli | 41 | S2g | S2tg | S2g | S2g | S3tg | S2g | S2g | S2tg | S2tg | S2tg | S2g | S2g | S2g | S2tg | S2g | S2g | S2g | S2g | S2g | S2g | S2tg | S2g | S2g | S2g | S2tg | S2tg | S2tg | S2g |
| Bikanahalli | 42 | S2g | S2tg | S2g | S2g | S3tg | S2g | S2g | S2tg | S2tg | S2tg | S2g | S2g | S2g | S2tg | S2g | S2g | S2g | S2g | S2g | S2g | S2tg | S2g | S2g | S2g | S2tg | S2tg | S2tg | S2g |
| Bikanahalli | 43 | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2rg | S2g | S2g | S3g | S3g | S3g | S3g | S3g |
| Bikanahalli | 44 | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2rg | S2g | S2g | S3g | S3g | S3g | S3g | S3g |

| Village | Survey Number | Sorgham | Maize | Redgram | Bajra | Groundnut | Sunflower | Cotton | Bengalgram | Chilly | Tomato | Drumstick | Mulberry | Pomegranate | Guava | Mango | Sapota | Jackfruit | Jamun | Musambi | Lime | Cashew | Custard-apple | Amla | Tamarind | Marigold | Chrysanthemum | Jasmine | Crasanda |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bikanahalli | 45 | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2rg | S2g | S2g | S3g | S3g | S3g | S3g | S3g |
| Bikanahalli | 46 | S2rg | S2rg | S3rg | S2rg | S2rg | S3rg | S2rg | S2rt | S2rg | S2rg | S3rg | S2rg | S3rg | S3rg | N1rg | S3rg | S3rg | S3rg | S3rg | S3rg | S3rg | S2rg | S2rg | N1rg | S2rg | S2rg | S2rg | S2rg |
| Bikanahalli | 47 | S2rg | S2rg | S3rg | S2rg | S2rg | S3rg | S2rg | S2rt | S2rg | S2rg | S3rg | S2rg | S3rg | S3rg | N1rg | S3rg | S3rg | S3rg | S3rg | S3rg | S3rg | S2rg | S2rg | N1rg | S2rg | S2rg | S2rg | S2rg |
| Bikanahalli | 48 | S2rg | S2rg | S3rg | S2rg | S2rg | S3rg | S2rg | S2rt | S2rg | S2rg | S3rg | S2rg | S3rg | S3rg | N1rg | S3rg | S3rg | S3rg | S3rg | S3rg | S3rg | S2rg | S2rg | N1rg | S2rg | S2rg | S2rg | S2rg |
| Bikanahalli | 49 | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2rg | S2g | S2g | S3g | S3g | S3g | S3g | S3g |
| Bikanahalli | 50 | S3g | S3g | S2g | S3g | S2g | S3g | S2g | S2g | S3g | S3g | S2g | S2g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3rg | S3g | S3g | S3g | S2g |
| Bikanahalli | 51 | S3g | S3g | S2g | S3g | S2g | S3g | S2g | S2g | S3g | S3g | S2g | S2g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3rg | S3g | S3g | S3g | S2g |
| Bikanahalli | 52 | S3g | S3g | S2g | S3g | S2g | S3g | S2g | S2g | S3g | S3g | S2g | S2g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3rg | S3g | S3g | S3g | S2g |
| Bikanahalli | 53 | S3g | S3g | S2g | S3g | S2g | S3g | S2g | S2g | S3g | S3g | S2g | S2g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3rg | S3g | S3g | S3g | S2g |
| Bikanahalli | 54 | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2rg | S2g | S2g | S3g | S3g | S3g | S3g | S3g |
| Bikanahalli | 55 | S3g | S3g | S2g | S3g | S2g | S3g | S2g | S2g | S3g | S3g | S2g | S2g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3rg | S3g | S3g | S3g | S2g |
| Bikanahalli | 56 | S2nz | S3tz | S3rz | S3tz | S3tz | S2rz | S2rz | S2rz | S3tz | S3tz | S2rz | S2tz | S2rt | S3tz | S3rz | S3tz | S3tz | S3rz | S2rz | S2rz | N1tz | S2z | S2tz | S3rz | S2tz | S2tz | S3tz | S2z |
| Bikanahalli | 57 | S2nz | S3tz | S3rz | S3tz | S3tz | S2rz | S2rz | S2rz | S3tz | S3tz | S2rz | S2tz | S2rt | S3tz | S3rz | S3tz | S3tz | S3rz | S2rz | S2rz | N1tz | S2z | S2tz | S3rz | S2tz | S2tz | S3tz | S2z |
| Bikanahalli | 58 | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2rg | S2g | S2g | S3g | S3g | S3g | S3g | S3g |
| Bikanahalli | 59 | S3g | S3g | S2g | S3g | S2g | S3g | S2g | S2g | S3g | S3g | S2g | S2g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3rg | S3g | S3g | S3g | S2g |
| Bikanahalli | 60 | S3g | S3g | S2g | S3g | S2g | S3g | S2g | S2g | S3g | S3g | S2g | S2g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3rg | S3g | S3g | S3g | S2g |
| Bikanahalli | 61 | S2 | S3t | S2t | S3t | S3t | S2 | S2 | S2 | S3t | S3t | S2t | S2t | S2t | S3t | S3t | S3t | S3t | S2rt | S2 | S2 | N1t | S1 | S2t | S2r | S2t | S2t | S3t | S3t |
| Bikanahalli | 62 | S2 | S3t | S2t | S3t | S3t | S2 | S2 | S2 | S3t | S3t | S2t | S2t | S2t | S3t | S3t | S3t | S3t | S2rt | S2 | S2 | N1t | S1 | S2t | S2r | S2t | S2t | S3t | S3t |
| Bikanahalli | 63 | S2 | S3t | S2t | S3t | S3t | S2 | S2 | S2 | S3t | S3t | S2t | S2t | S2t | S3t | S3t | S3t | S3t | S2rt | S2 | S2 | N1t | S1 | S2t | S2r | S2t | S2t | S3t | S3t |
| Bikanahalli | 64 | S2 | S3t | S2t | S3t | S3t | S2 | S2 | S2 | S3t | S3t | S2t | S2t | S2t | S3t | S3t | S3t | S3t | S2rt | S2 | S2 | N1t | S1 | S2t | S2r | S2t | S2t | S3t | S3t |
| Bikanahalli | 65 | S2 | S3t | S2t | S3t | S3t | S2 | S2 | S2 | S3t | S3t | S2t | S2t | S2t | S3t | S3t | S3t | S3t | S2rt | S2 | S2 | N1t | S1 | S2t | S2r | S2t | S2t | S3t | S3t |

| Village | Survey Number | Sorgham | Maize | Redgram | Bajra | Groundnut | Sunflower | Cotton | Bengalgram | Chilly | Tomato | Drumstick | Mulberry | Pomegranate | Guava | Mango | Sapota | Jackfruit | Jamun | Musambi | Lime | Cashew | Custard-apple | Amla | Tamarind | Marigold | Chrysanthemum | Jasmine | Crasanda |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bikanahalli | 66 | S2 | S3t | S2t | S3t | S3t | S2 | S2 | S2 | S3t | S3t | S2t | S2t | S2t | S3t | S3t | S3t | S3t | S2rt | S2 | S2 | N1t | S1 | S2t | S2r | S2t | S2t | S3t | S3t |
| Bikanahalli | 67 | S2 | S3t | S2t | S3t | S3t | S2 | S2 | S2 | S3t | S3t | S2t | S2t | S2t | S3t | S3t | S3t | S3t | S2rt | S2 | S2 | N1t | S1 | S2t | S2r | S2t | S2t | S3t | S3t |
| Bikanahalli | 73 | S2 | S3t | S2t | S3t | S3t | S2 | S2 | S2 | S3t | S3t | S2t | S2t | S2t | S3t | S3t | S3t | S3t | S2rt | S2 | S2 | N1t | S1 | S2t | S2r | S2t | S2t | S3t | S3t |
| Bikanahalli | 74 | S2 | S3t | S2t | S3t | S3t | S2 | S2 | S2 | S3t | S3t | S2t | S2t | S2t | S3t | S3t | S3t | S3t | S2rt | S2 | S2 | N1t | S1 | S2t | S2r | S2t | S2t | S3t | S3t |
| Bikanahalli | 77 | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2rg | S2g | S2g | S3g | S3g | S3g | S3g | S3g |
| Bikanahalli | 78 | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2rg | S2g | S2g | S3g | S3g | S3g | S3g | S3g |
| Bikanahalli | 79 | S3g | S3g | S2g | S3g | S2g | S3g | S2g | S2g | S3g | S3g | S2g | S2g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3rg | S3g | S3g | S3g | S2g |
| Bikanahalli | 80 | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2rg | S2g | S2g | S3g | S3g | S3g | S3g | S3g |
| Bikanahalli | 81 | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2rg | S2g | S2g | S3g | S3g | S3g | S3g | S3g |
| Bikanahalli | 82 | S3g | S3g | S2g | S3g | S2g | S3g | S2g | S2g | S3g | S3g | S2g | S2g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3rg | S3g | S3g | S3g | S2g |
| Bikanahalli | 83 | S3g | S3g | S2g | S3g | S2g | S3g | S2g | S2g | S3g | S3g | S2g | S2g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3rg | S3g | S3g | S3g | S2g |
| Bikanahalli | 84 | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2rg | S2g | S2g | S3g | S3g | S3g | S3g | S3g |
| Bikanahalli | 95 | S3g | S3g | S2g | S3g | S2g | S3g | S2g | S2g | S3g | S3g | S2g | S2g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3rg | S3g | S3g | S3g | S2g |

# PART-B

## SOCIO-ECONOMIC STATUS OF FARM HOUSEHOLDS

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***Chapter 1***

## *EXECUTIVE SUMMARY*

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

***Methodology:*** *The Bisarahalli-1 micro-watershed (Koppal taluk, and district) is located in between $15^0$15' – $15^0$16' North latitudes and $76^0$3' – $76^0$5' East longitudes, covering an area of about 571.40 ha, bounded by Bisarahalli and Bikanahalli villages. Agro Ecological Region (AER) – 3: (Deccan plateau, hot arid ecosubregion) Karnataka Plateau (Rayalseema as inclusion), hot arid ESR with deep loamy and clayey mixed Red and Black soils, low to medium AWC and LGP 60-90 days. We used soil resource map as basis for sampling farm households to test the hypothesis that soil quality influence crop selection, and conservation investment of farm households. The level of technology adoption and productivity gaps and livelihood patterns were analyses. The cost of soil degradation and ecosystem services were quantified for each watershed.*

***Results:*** *The socio-economic outputs for the Bisarahalli-1 Microwatershed in Koppal taluk and district are presented here*

***Social Indicators;***

- *Male and female ratio is 52.8 to 47.2 per cent to the total sample population.*
- *Younger age 18 to 50 years group of population is around 52 per cent to the total population.*
- *Literacy population is around 61 per cent.*
- *Social groups belong to SC/ST is around 32.3 per cent.*
- *Wood is the source of energy for a cooking among 94.8 per cent.*
- *About 75 per cent of households have a yashaswini health card.*
- *Majority of farm households (75 %) are having MGNREGA card for rural employments.*
- *Dependence on ration cards through public distribution system is around 92.7 per cent.*
- *Swach bharath program providing closed toilet facilities around 87.5 per cent.*
- *Institutional participation is only 3.9 per cent.*
- *Rural migration to unban centre for employment is prevalent among 4.7 per cent.*
- *Women participation is decisions making are around 35.3 per cent of households were found.*

***Economic Indicators;***

- *The average land holding is 1.8 ha indicates that majority of farm households are belong to marginal and small farmers. The dry land account for 70.4 % and irrigated land 9.8 % of total cultivated land among the sample farmers.*

- *Agriculture is the main occupation among 16.1 per cent and Agriculture is the main and non agriculture labour is predominant subsidiary occupation for 61.7 per cent.*
- *The average value of domestic assets is around Rs 43462 per household. Mobile and television are mass popular mass communication media.*
- *The average farm assets a value is around Rs 147511 per household, about 9.4 per cent of sample farmers are owing plough.*
- *The average livestock value is around Rs 19645 per livestock; about 43.7 per cent of household are having livestock.*
- *The average per capita food consumption is around 754.4 grams (1799.1 kilo calories) against national institute of nutrition (NIN) recommendation at 827 gram. Around 17.7 per cent of sample farmers are consuming less than the NIN recommendation.*
- *The annual average income is around Rs 30895 per household. About 15.5 per cent of farm households are below poverty line.*
- *The per capita monthly expenditure is around Rs 485 per household.*

***Environmental Indicators-Ecosystem Services;***

- *The value of ecosystem service helps to support investment to decision on soil and water conservation and in promoting sustainable land use.*
- *The onsite cost of different soil nutrients lost due to soil erosion is around Rs 9574.8 per ha/year. The total cost of annual soil nutrients is around Rs 66276 per year for the total area of 571.4 ha.*
- *The average value of ecosystem service for food production is around Rs.10363/ha/year. Per hectare food grain production services is maximum in chillies (Rs.60584) followed by onion (Rs.16554), green gram (Rs.13308), red gram (Rs.9023), cotton (Rs.6411), groundnut (Rs.5170), sunflower (Rs.5069), black gram (Rs.4409), sorghum (Rs.2120), bengal gram (Rs.1445), bajra (Rs.696) and maize is negative returns.*
- *The average value of ecosystem service for fodder production is around Rs 3978/ ha/year. Per hectare fodder production services is maximum in maize (Rs 5641) followed by bajra (Rs 5468), groundnut (Rs 3188) and sorghum (Rs 1616).*
- *The data on water requirement for producing one quintal of grain is considered for estimating the total value of water required for crop production. The per hectare value of water used and value of water was maximum in green gram (Rs 85289) followed by cotton (Rs.61368), bajra (Rs.56254), black gram (Rs.51173), bengal gram (Rs.51173), red gram (Rs.44643), sunflower (Rs.31952), sorghum (Rs.31723), groundnut (Rs.27684), maize (Rs.20862), onion (Rs.11197), ragi (Rs.10564) and chillies (Rs.8126).*

***Economic Land Evaluation;***

- *The major cropping pattern is maize (32.2 %) followed by red gram (17 %), groundnut (16.4 %), bajra (13.8 %), sunflower (8.8 %), cotton (4.8 %), sorghum (3 %), onion (1.1 %), bengal gram (0.6 %), black gram (0.6 %), chillies (0.6 %), green gram (0.6 %) and ragi (0.6 %).*
- *The distribution of major soil series are Muttal (MTL) and Chikkasavanur (CSR) soil series having shallow soil depth covering an area around 21.36 per cent and 2.94 per cent of area respectively. The moderately shallow soil depth of soil series were Hatti (HTI) of share of area 10.56 %, Kethanapura (KTP) is 0.64 % and Mukhadahalli (MKH) is 4.28 %. The soil series having moderately deep soil depth are Dambarahalli (DRL) of 9.3 %, Bisarahalli (BSR) of 6.4 %, Bidanagere (BDG) of 5.14 % and Gollarahatti (GHT) of 1.98 %. Gatareddihal (GRH) of 12.82 %, Balapur (BPR) of 12.07 %, Kumchahalli (KMH) of 7.78 %, this soil series having deep soil depth and Niduvalalu (NDL) soil series very deep soil depth which area is 1.36 per cent.*
- *The total cost of cultivation and benefit cost ratio (BCR) in study area for bajra is Rs.22148/ha (with BCR of 1.27).*
- *In bengal gram the cost of cultivation is Rs 21526/ha (with BCR of 1.07).*
- *In black gram the cost of cultivation is Rs 21526/ha and benefit cost ratio is 1.20.*
- *The cost of cultivation of chillies is Rs.53036/ha (with BCR of 1.30).*
- *In cotton the cost of cultivation is Rs 34715/ha (with BCR of 1.17).*
- *In green gram the cost of cultivation is Rs.43502/ha (With BCR of 1.30).*
- *In groundnut the cost of cultivation is Rs. 31317/ha (with BCR of 1.31).*
- *The total cost of cultivation for maize is Rs. 28054/ha (with BCR of 1.30).*
- *In onion the cost of cultivation is Rs.24942/ha (with BCR of 1.25).*
- *In ragi the cost of cultivation is Rs.14965/ha (with BCR of 1.44).*
- *In red gram the cost of cultivation is Rs 20950/ha (with BCR of 1.58).*
- *In sorghum cost of cultivation is Rs. 15920/ha (with BCR of 1.21) and sunflower cultivation is Rs 25139/ha (with BCR of 1.19).*
- *The land management practices reported by the farmers are crop rotation, tillage practices, fertilizer application and use of Farm Yard Manure (FYM). Due to higher wages farmer are following labour saving strategies is not prating soil and water conservation measures. Less ownership of livestock limiting application of FYM.*
- *It was observed soil quality influences on the type and intensity of land use. Fertilizer applications are deeper soils to maximize returns.*

***Suggestions;***

- *Involving farmers is watershed planning helps in strengthing institutional participation.*

- *The per capita food consumption and monthly income is very low. Diversifying income generation activities from crop and livestock production in order to reduce risk related to drought and market prices.*
- *Majority of farmers reported that they are not getting timely support/extension services from the concerned development departments.*
- *By strengthing agricultural extension for providing timely advice improved technology there is scope to increase in net income of farm households.*
- *By adopting recommended package of practices by following the soil test fertiliser recommendation, there is scope to increase yield in chillies (92.4 %), onion (81.5 %), maize (71.2 %), red gram (44.4 %), ragi (43.5 %), sorghum (37.8 %), black gram (34.8 %), bengal gram (16.7 %), cotton (14.2 %), sun flower (13.1 %) and bajra (10.7 %).*

*Chapter 2*

# INTRODUCTION

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

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

The present study aims to characterize socio-economic status of farm households, assess the land and water use status, evaluate the economic viability of land use and prioritize farming constraints and suggest the measures for soil and water conservation for sustainable agriculture.

## Objectives of the study

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

*Chapter 3*

# METHODOLOGY

## *Study area*

**Agro-climatic Zone 3: Northern Dry Zone:** This zone is the largest in the state with a geographical area of 5.04 M ha, of which about 3.55 M ha is under cultivation. Irrigation is available to about 0.49 M ha. The zone encompasses the entire districts of Bijapur and Bellary, 6 taluks of Koppal, 5 taluks of Dharwad and 5 taluks of Belgaum. Of the 35 taluks in the zone, 9 taluks have a mean elevation of 800-900 m MSL while the rest have an elevation of 450-800 m. The rainfall is similar to that of the northeastern dry zone, ranging between 465 and 785 mm. Black soils are predominant in the zone with depth ranging from shallow to deep. General cropping season is *kharif* in shallow black soils and *rabi* in medium and deep black soils. Important crops grown are jowar, maize, bajra, groundnut, pulses, sunflower, cotton and sugarcane.

The Bisarahalli-1 micro-watershed (Koppal taluk and district) is located in between $15^0$15' – $15^0$16' North latitudes and $76^0$3' – $76^0$5' East longitudes, covering an area of about 571.40 ha, bounded by Bisarahalli and Bikanahalli villages. **Agro Ecological Region (AER) – 3: (Deccan plateau, hot arid ecosubregion)** Karnataka Plateau (Rayalseema as inclusion), hot arid ESR with deep loamy and clayey mixed red and black soils, low to medium AWC and LGP 60-90 days (Figure 1).

## Sampling Procedure:

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

## Sources of data and analysis:

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

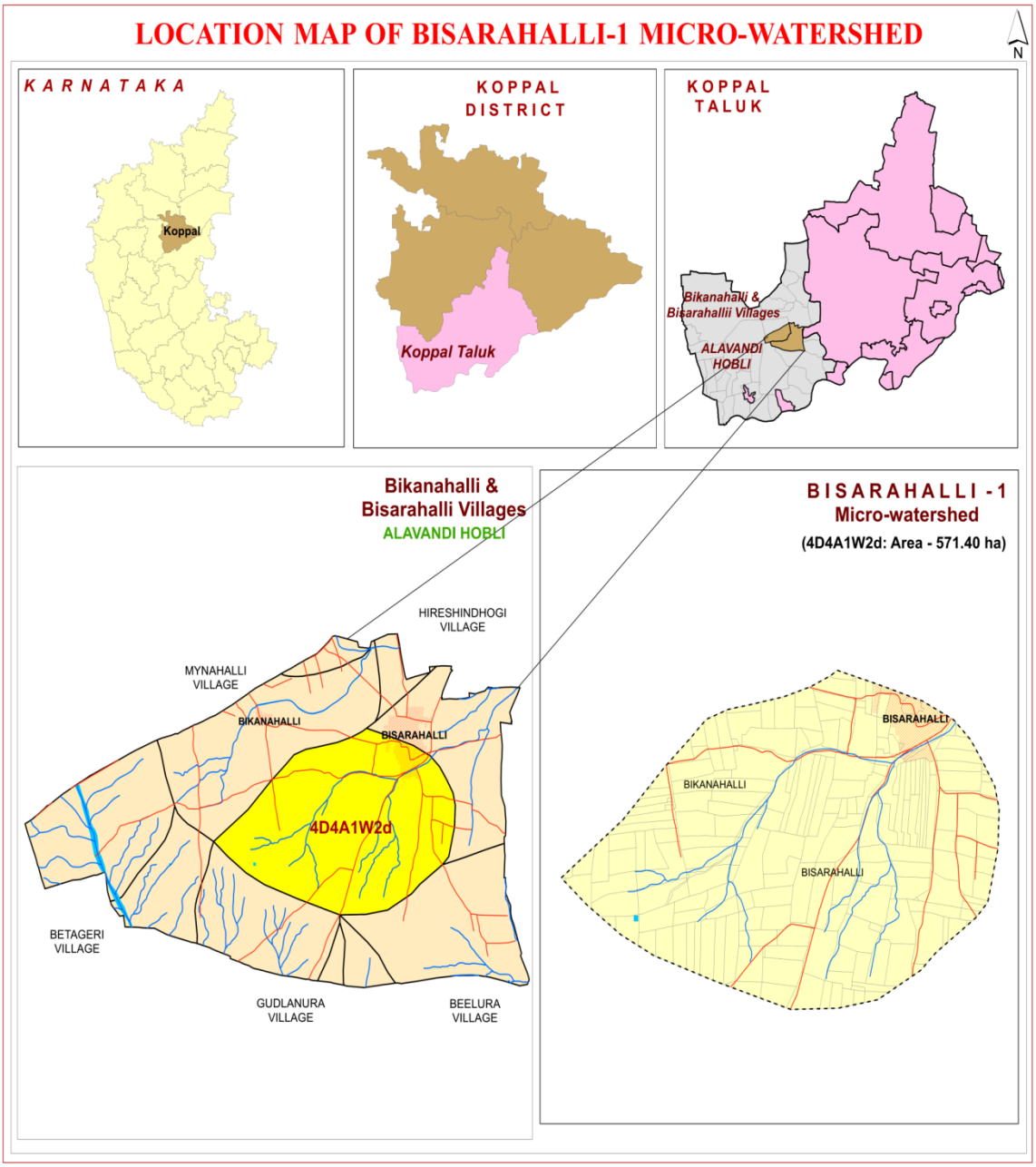



Figure 1: Location of study area

**Steps followed in socio-economic assessment**

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

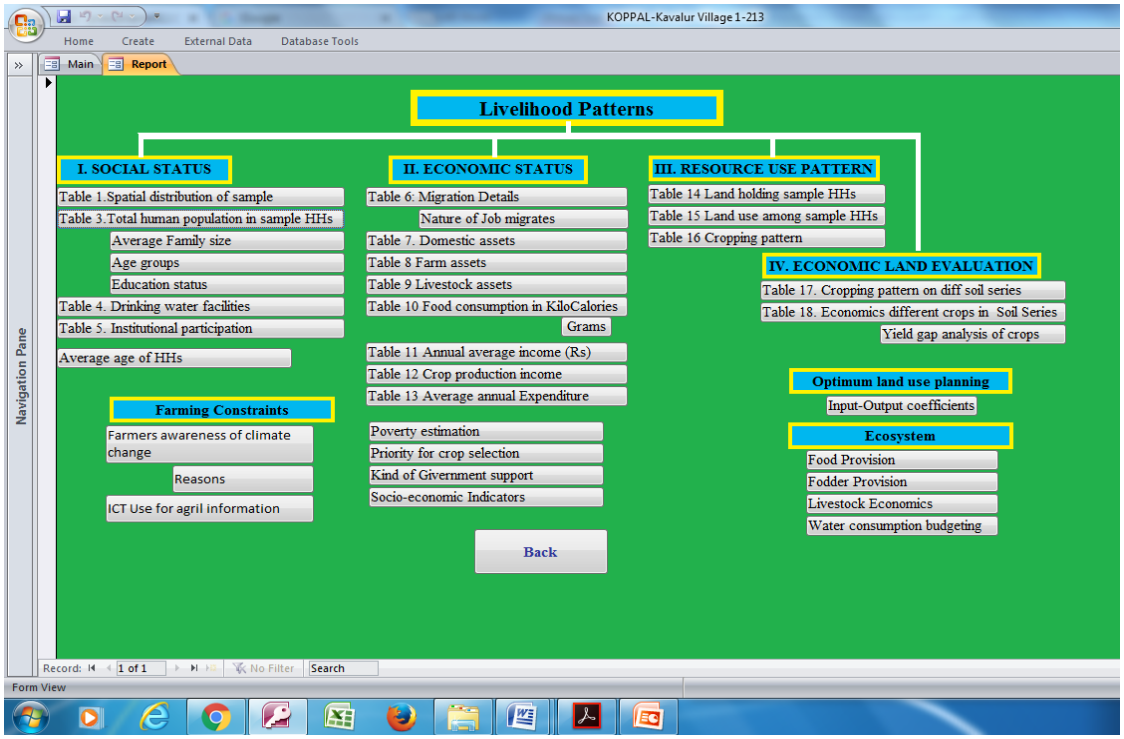



Figure 2: ALPES FRAMEWORK

The sample farmers were post classified in to marginal and small (0.00 to <=2 ha), medium and semi medium (>2to <=10 ha) and large (>10 ha). The steps involved in estimation of soil potential involve estimation of total cost of cultivation, the yield/gross returns and net income per hectare. The cost of inputs such seed, manure and fertilizer, plant protection chemicals, payment towards human and bullock labour and interest on working capita are included under operational costs. In the case of perennial crops, the cost of establishment was estimated by using actual physical requirements and prevailing market prices. Estimation cost included maintenance cost up to bearing period. The value of main product and by product from the crop enterprise at the market rates were the gross returns of the crop. Net returns were worked out by deducting establishment and maintained cost from gross returns.

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

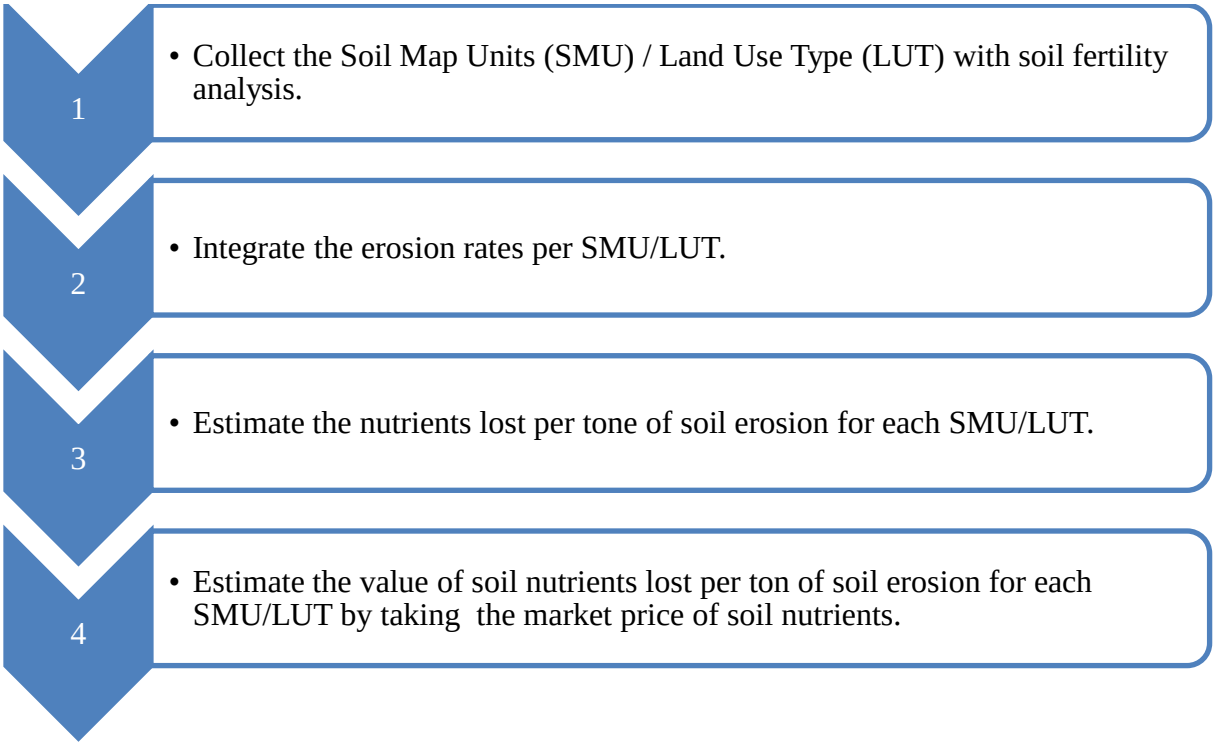
Economic suitability classes: once each land use –land area combination has been assigned an economic value by the land evaluation, the question arises as to its 'suitability', that is, the degree to which it satisfies the land user. The FAO framework defines two suitability orders: 'S'(suitable if benefit cost ratio (BCR)>1) and 'N'(not suitable if (BCR<1), which are dived into five economic suitability classes:'S1'(highly

suitable if BCR>3), 'S2'(suitable if BCR>2 and <3),'S3'(Marginally suitable if BCR >1 and <2), 'N1'(Not suitable for economic reasons but physically suitable) and 'N2'(not suitable for physical reasons). The limit between 'S3' and 'N1'must be at least at the point of financial feasibility (i.e. net returns, NPV, or IRR>0 and BCR>1). The other limits depend on social factors such as farm size, family size, alternative employment or investment possibilities and wealth expectations; these need to be specified for the Soil series.

**Economic Valuation of Soil ecosystem services:**

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

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



*Chapter 4*

# RESULTS AND DISCUSSIONS

The main purpose to characterise the socio-economic systems in the watershed is to identify the existing production constraints and propose the potential/alternate options for agro-technology transfer and for bridging the adoption and yield gap. The demographic information shows that the household population dynamics encompasses the socioeconomic status of the farmer. For a rural family, the household size should be optimal to earn a comfortable livelihood through farm and non-farm wage earning. The Total number of population in watershed area was 510, out of which 52.8 per cent were males and 47.2 per cent females. Average family size of the households is 5.31. Age is an important factor, which affects the potential employment and mobility status of respondents. The data on age wise distribution of farmers in the sample households indicated that majority of the farmers are coming under the age group of 0 to18 years (29.6 %) followed by 30 to 50 years (26.5 %) 18 to 30 years (25.5 %) and more than 50 years (18.4 %). Hence, in the study area in general, the respondents were of young and middle age, indicating thereby that the households had almost settled with whatever livelihood options they were practicing and sample respondents were young by age who could venture into various options of livelihood sources. Data on literacy indicated that 39 per cent of respondents were illiterate and 61 per cent literate (Table 1).

**Table 1: Human population among sample households in Bisarahalli-1 Microwatershed**

| Particulars | Units | Value |
|---|---|---|
| Total human population in sample HHs | Number | 510.0 |
| Male | % to total Population | 52.8 |
| Female | % to total Population | 47.2 |
| Average family size | Number | 5.31 |
| **Age group** | | |
| 0 to 18 years | % to total Population | 29.6 |
| 18 to 30 years | % to total Population | 25.5 |
| 30 to 50 years | % to total Population | 26.5 |
| >50 years | % to total Population | 18.4 |
| Average age | Age in years | 32.3 |
| **Education Status** | | |
| Illiterates | % to total Population | 39.0 |
| Literates | % to total Population | 61.0 |
| Primary School (<5 class) | % to total Population | 20.2 |
| Middle School (6- 8 Class) | % to total Population | 13.5 |
| High School (9- 10 Class | % to total Population | 13.9 |
| Others | % to total Population | 13.3 |

The ethnic groups among the sample farm households found to be 47.9 per cent belonging to Other Backward Castes (OBC) followed by Schedule Casts (SC) of 29.2 per cent, 19.8 per cent belonging to General Castes and only 3.1 per cent belong to Schedule

Tribes (ST) (Table 2 and Figure 3). About 94.8 per cent of sample households are using fire wood as source of fuel for cooking. All the sample farmers (98.9 %) are having electricity connection. About 75 per cent are sample households having health cards. Majority (75 %) are having MNREGA job cards for employment generation. About 92.7 per cent of farm households are having ration cards for taking food grains from public distribution system. About 87.5 per cent of farm households are having toilet facilities.

**Table 2: Basic needs of sample households in Bisarahalli-1 Microwatershed**

| Particulars | Units | Value |
|---|---|---|
| **Social groups** | | |
| SC | % of Households | 29.2 |
| ST | % of Households | 3.1 |
| OBC | % of Households | 47.9 |
| Others | % of Households | 19.8 |
| **Types of fuel use for cooking** | | |
| Fire wood | % of Households | 94.8 |
| Gas | % of Households | 4.2 |
| Kerosene | % of Households | 1.0 |
| **Energy supply for home** | | |
| Electricity | % of Households | 98.9 |
| Solar Lamp | % of Households | 1.1 |
| **Number of households having Health card** | | |
| Yes | % of Households | 75.0 |
| No | % of Households | 25.0 |
| **MGNREGA Card** | | |
| Yes | % of Households | 75.0 |
| No | % of Households | 25.0 |
| **Ration Card** | | |
| Yes | % of Households | 92.7 |
| No | % of Households | 7.3 |
| **Households with toilet** | | |
| Yes | % of Households | 87.5 |
| No | % of Households | 12.5 |
| **Drinking water facilities** | | |
| Dug well | % of Households | 80.2 |
| Hand Pum | % of Households | 19.8 |

The data collected on the source of drinking water in the study area is presented in Table 2. Majority of the sample respondents are having dug well source for water supply for domestic purpose (80.2 %).

Only 3.92 per cent of the farmers are participating in community based organizations (Table 3). Among them majority were participating in credit cooperative societies (1.76 %), user groups (1.18 %), marketing co-operatives societies (0.39 %), diary co-operatives societies (0.2 %), taluk panchayat (0.2 %) and self help group organization (0.20 %) like Sri Dharmasthala Swasahaya Sangha, Stri Shakhti Sangha.

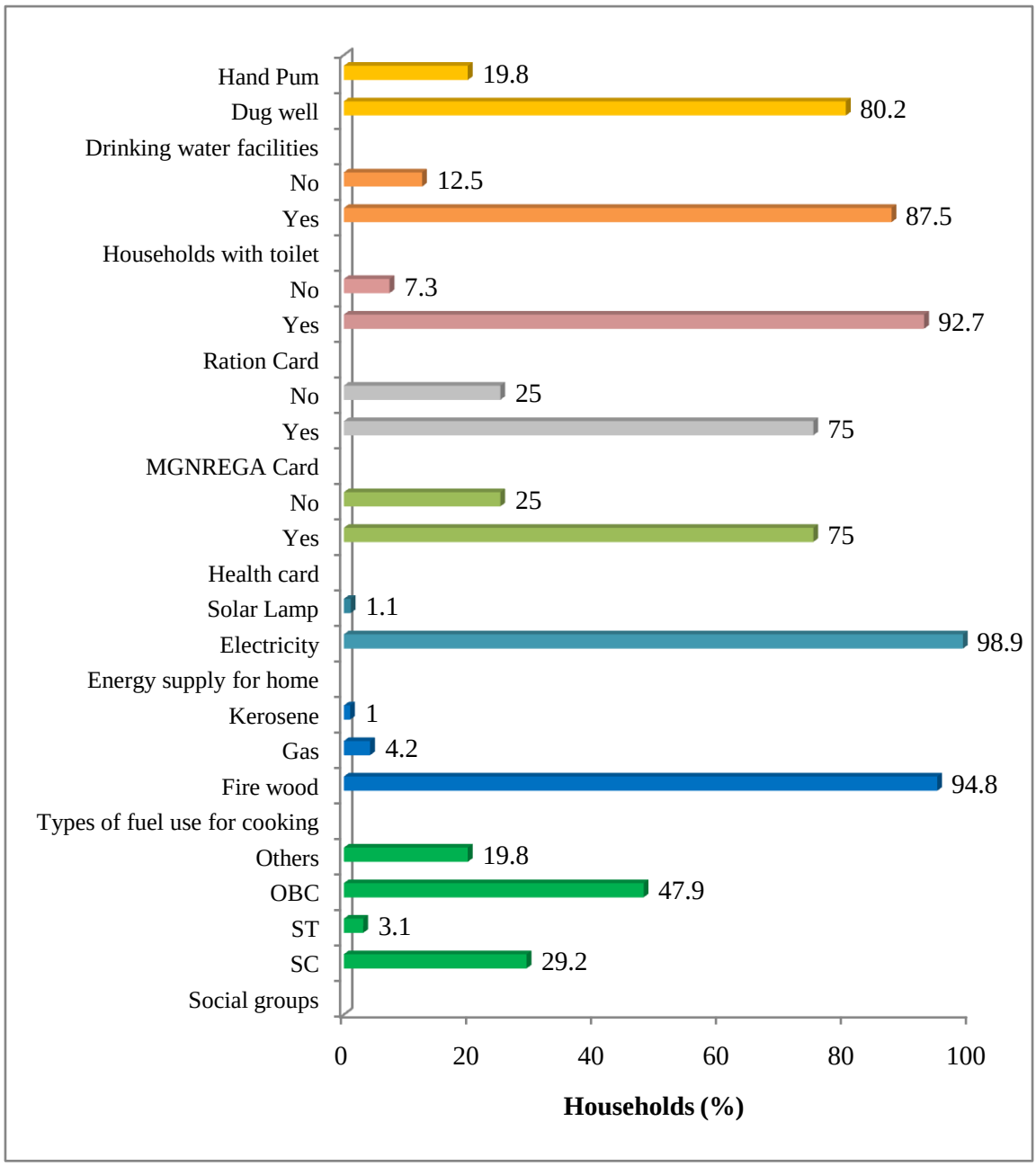



Figure 3: Basic needs of sample households in Bisarahalli-1 Microwatershed

**Table 3: Institutional participation among the sample population in Bisarahalli-1 Microwatershed**

| Particulars | Units | Value |
|---|---|---|
| No. Of people participating | **% to total Population** | 3.92 |
| Co-operative Societies-Dairy | % of Participating total Population | 0.20 |
| Co-operative Societies - Marketing | % of Participating total Population | 0.39 |
| Co-operative Societies - Credit | % of Participating total Population | 1.76 |
| Self help groups(SHG's | % of Participating total Population | 0.20 |
| Users groups | % of Participating total Population | 1.18 |
| Taluk panchayat | % of Participating total Population | 0.20 |
| No. Of people not participating | **% to total Population** | 96.08 |

The data on migration in Bisarahalli-1 Micro-watershed is given in Table 4. It indicated that around 4.17 per cent of samples households were migrated. The average distance travelled for seeking employment is 79 km.

**Table 4: Migration details among the sample households in Bisarahalli-1 micro-watershed**

| **Particulars** | **Value** |
|---|---|
| % of households showing migration | 4.17 |
| % of persons migrating | 0.98 |
| No. of months migrated in a year | 8.5 |
| Average Distance of migration(Km) | 78.5 |
| **Nature of job** | |
| Job/wage/work (%) | 70 |
| Education of the children | 30 |

The occupational pattern (Table 5) among sample households shows that agriculture is the main occupation around 16.1 per cent of farmers followed by subsidiary occupations like non agricultural labour (61.7 %), agricultural labour (15.5 %), household industries/artisan activity (2.9 %) and self employed (1.8 %). About 0.9 per cent of the households are government service, dairy farming (0.3 %) and professional (doctor/ engineer) (0.6%) as main occupation.

**Table 5: Occupational pattern in sample households in Bisarahalli-1 Microwatershed**

| **Occupation** | | **% to total population** |
|---|---|---|
| **Main** | **Subsidiary** | |
| Agriculture | Agriculture | 16.1 |
| | Agriculture Labour | 15.5 |
| | Non Agriculture Labour | 61.7 |
| | HH Industries/Artisan activity (Specify) | 2.9 |
| | Self employed | 1.8 |
| Dairy farming | | 0.3 |
| Govt. service | | 0.9 |
| Professional (Doctor/Engineer) | | 0.6 |
| Grand Total | | 100.0 |
| **Family labour availability** | | **Man days/month** |
| Male | | 55.9 |
| Female | | 36.3 |
| Total | | 92.2 |

The important assets especially with reference to domestic assets were analyzed and are given in Table 6 and Figure 4. The important domestic assets possessed by all categories of farmers are mobile phones (100 %) followed by television (77.1 %), mixer/grinder (67.1 %), bicycle (42.7 %), motorcycle (28.1 %), auto (2.1 %), landline phone (2.1 %), refrigerator (2.1 %), four wheeler (1 %) and radio (1 %). The average value of domestic assets is around Rs 43462 per households (Table 6).

**Table 6: Domestic assets among the sample households in Bisarahalli-1 Microwatershed**

| Particulars | % of households | Average value in Rs |
|---|---|---|
| Auto | 2.1 | 200000 |
| Bicycle | 42.7 | 3271 |
| Four wheeler | 1.0 | 150000 |
| Landline Phone | 2.1 | 2000 |
| Mixer/grinder | 67.7 | 1870 |
| Mobile Phone | 100.0 | 5369 |
| Motorcycle | 28.1 | 47846 |
| Radio | 1.0 | 5000 |
| Refrigerator | 2.1 | 15000 |
| Television | 77.1 | 4265 |
| Average value | 43462 | |

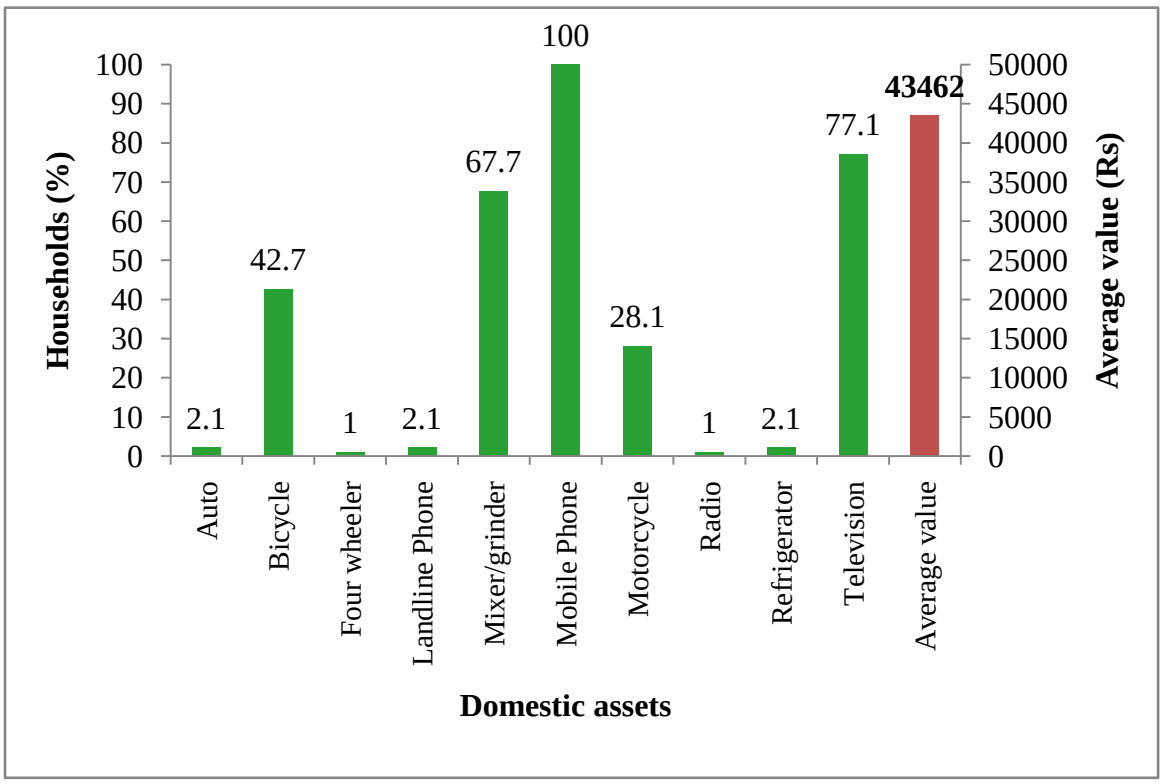



Figure 4: Domestic assets among the sample households in Bisarahalli-1 Microwatershed

The most popularly owned farm equipments were sickles, plough, cattle shed; pump sets, chaff cutter, bullock cart, sprayer and thresher. Plough and sickle were commonly present in all the sampled farmers; these were primary implements in agriculture. The per cent of households owned bullock cart (14.6 %), plough (9.4 %), owned tractor (1.0 %), seed cum fertilizer drill (1.0%) and drip/sprinkler (1.0 %) was found highest among the sample farmers. The average value of farm assets is around Rs 147511 per households (Table 7 and Figure 5).

**Table 7: Farm assets among samples households in Bisarahalli-1 Microwatershed**

| Particulars | % of households | Average value in Rs |
|---|---|---|
| Bullock cart | 14.6 | 12857 |
| Drip/Sprinkler | 1.0 | 20000 |
| Plough | 9.4 | 1700 |
| Seed Cum Fertilizer Drill | 1.0 | 3000 |
| Tractor | 1.0 | 700000 |
| Average value | 147511 | |

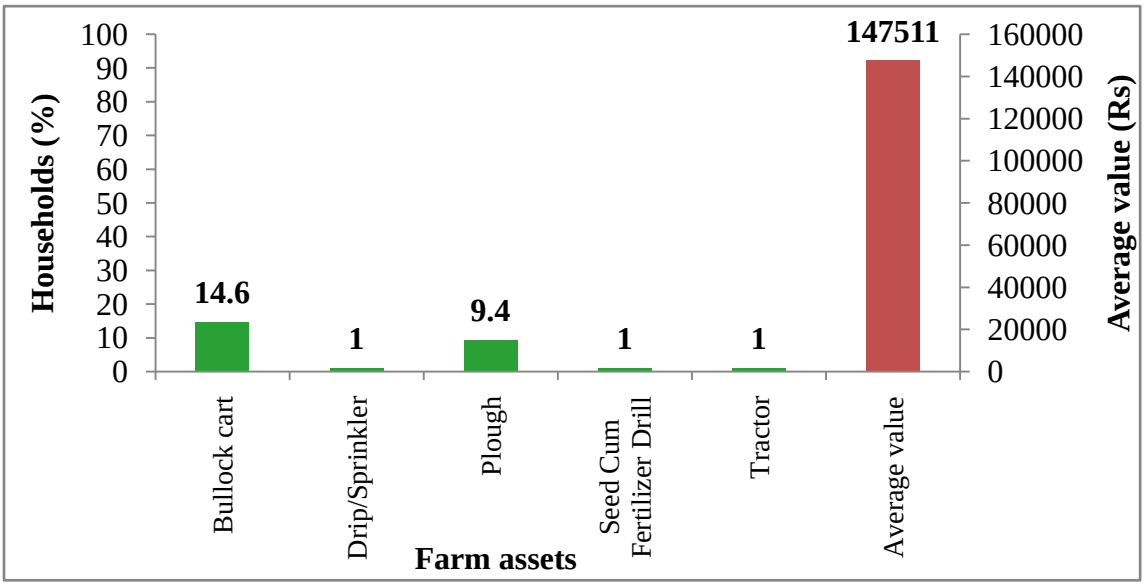



Figure 5: Farm assets among samples households in Bisarahalli-1 Microwatershed

Livestock is an integral component of the conventional farming systems (Table 8 and Figure 6). The highest livestock population is bullocks were around 18.1 per cent and local dry cow (14.9 %), local milching cow (14.9 %), poultry (9.6 %), crossbred milching cow (8.5 %), dry buffalos (8.5 %), goats (8.5 %), sheep's (8.5 %), crossbred dry cow (4.3 %) and milching buffalos (4.3 %). The average livestock value was Rs 19645 per livestock.

**Table 8: Livestock assets among sample households in Bisarahalli-1 micro-watershed**

| Particulars | % of livestock population | Average value in Rs |
|---|---|---|
| Local Dry Cow | 14.9 | 11357 |
| Local Milching Cow | 14.9 | 18500 |
| Crossbred Dry Cow | 4.3 | 16500 |
| Crossbred Milching Cow | 8.5 | 50000 |
| Dry Buffalos | 8.5 | 17250 |
| Milching Buffalos | 4.3 | 21250 |
| Bullocks | 18.1 | 35647 |
| Goats | 8.5 | 21250 |
| Sheeps | 8.5 | 4500 |
| Poultry | 9.6 | 200 |
| Average value | 19645 | |

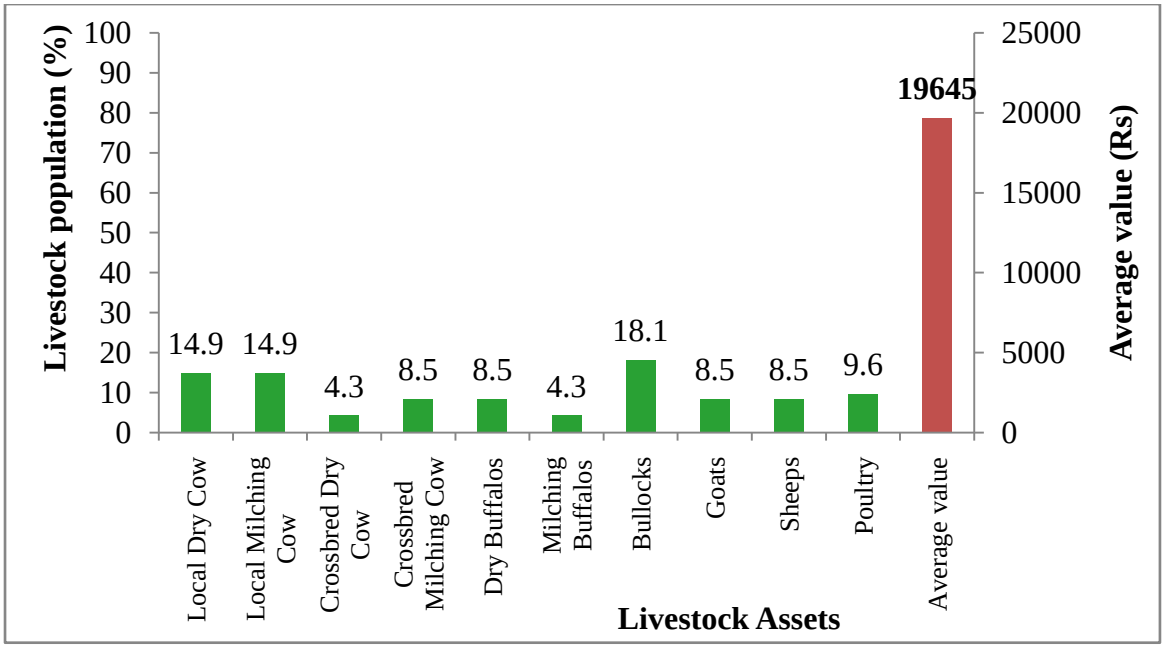



Figure 6: Livestock assets among sample households in Bisarahalli-1 micro-watershed

Average milk produced in sample households is 714 litters/ annum. Among the farm households, sorghum, bajra, groundnut, ragi and maize are the main crops for domestic food and fodder for animals. About 2078 kg /ha of average fodder is available per season for the livestock feeding (Table 9).

**Table 9: Milk produced and fodder availability of sample households in Bisarahalli-1 Microwatershed**

| **Particulars** | |
|---|---|
| **Name of the Livestock** | **Ltr./Lactation/animal** |
| Crossbred Milching Cow | 773 |
| Local Milching Cow | 650 |
| Milching Buffalos | 720 |
| Average Milk produced | 714 |
| **Fodder produces** | **Fodder yield (kg/ha.)** |
| Maize | 3288 |
| Bajra | 1732 |
| Sorghum | 1293 |
| Groundnut | 1580 |
| Ragi | 2500 |
| Average fodder availability | 2078 |
| Livestock having households (%) | 43.7 |
| Livestock population (Numbers) | 156 |

A woman participation in decision making is in this micro-watershed is presented in Table 10. About 47.1 per cent of women participation in local organisation activates, 23.5 per cent women earning for her family requirement and 35.5 per cent of women taking decision in her family and agriculture related activities.

**Table 10: Women empowerment of sample households in Bisarahalli-1 Microwatershed**

% to Grand Total

| Particulars | Yes | No |
|---|---|---|
| Women participation in local organization activities | 47.1 | 52.9 |
| Women elected as panchayat member | 0.0 | 100.0 |
| Women earning for her family requirement | 23.5 | 76.5 |
| Women taking decision in her family and agriculture related activities | 35.3 | 64.7 |

The food intake in terms of kilo calorie (kcal) per person per day was calculated and presented in the Table 11 and Figure 7. More quantity of cereals are consumed by sample farmers which accounted for 1153.4 kcal per person. The other important food items consumed was pulses 164.7 kcal followed by cooking oil 181.1 kcal, milk 77.8 kcal, VegeTable 19.4 kcal, Egg 169.4 kcal and Meat 32.3 kcal. In the sampled households, farmers were consuming less (1799.1 kcal) than NIN- recommended food requirement (2250 kcal).

**Table 11: Per capita daily consumption of food among the sample farmers in Bisarahalli-1 Microwatershed**

| Particulars | NIN recommendation (gram/ per day/ person) | Present level of consumption (gram/ per day/ person) | Kilo Calories /day/person |
|---|---|---|---|
| Cereals | 396.0 | 339.2 | 1153.4 |
| Pulses | 43.0 | 48.0 | 164.7 |
| Milk | 200.0 | 119.8 | 77.8 |
| VegeTable | 143.0 | 80.9 | 19.4 |
| Cooking Oil | 31.0 | 31.9 | 181.8 |
| Egg | 0.5 | 113.1 | 169.6 |
| Meat | 14.2 | 21.5 | 32.3 |
| Total | **827.7** | **754.4** | **1799.1** |
| Threshold of NIN recommendation | | 827 gram* | 2250 Kcal* |
| % Below NIN | | 17.7 | 20.8 |
| % Above NIN | | 82.3 | 79.2 |

Note: * day/person

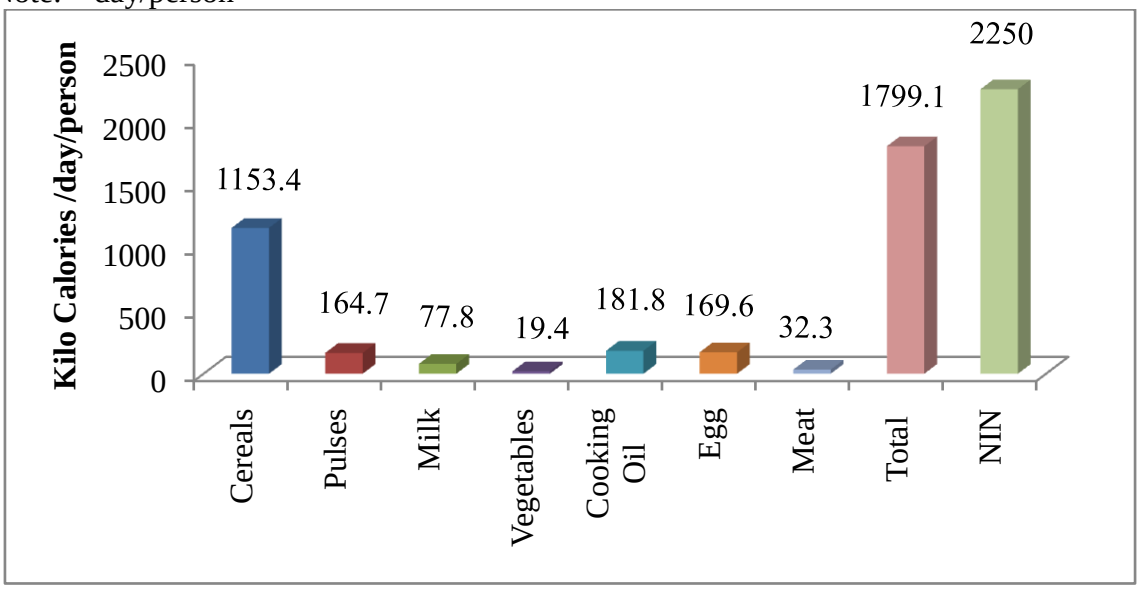



Figure 7: Per capita daily consumption of food among the sample farmers in Bisarahalli-1 Microwatershed

**Annual income of the sample HHs:** The average annual household income is around Rs 30895. Major source of income to the farmers in the study area is from livestock (Rs 19169) followed by crop production (Rs. 7949). The income from nonfarm income was very low at Rs 3776. The monthly per capita income is Rs.485, which is less than the threshold monthly income of Rs 975 for considering above poverty line. Due to the fact that erratic rainfall and shortage of water, farmers are diverting from crop production activities to enable the household for a comfortable livelihood. The incomes from the other aforesaid sources are very meagre (Table 12).

**Table 12: Annual average income of HHs from various sources in Bisarahalli-1 Microwatershed**

| Particulars | Income * |
|---|---|
| Nonfarm income (Rs) | 3776 (4.2) |
| Livestock income (Rs) | 19169 (25.0) |
| Crop Production (Rs) | 7949 (100.0) |
| ***Total Annual Income (Rs)*** | ***30895*** |
| Average monthly per capita income (Rs) | 485 |
| **Threshold for Poverty level (Rs 975 per month/person)** | |
| % of households below poverty line | 15.5 |
| % of households above poverty line | 84.5 |

* Figure in the parenthesis indicates % of Households

The average annual expenditure of farm households indicated that farmers in the study area spend highest on food (Rs. 70690) followed by education, clothing, social function and health. Now a days education is most important among all of us. In today's competitive world, education is a necessity for man after food, clothing, and shelter. It is the only fundamental way by which a desired change in the society can happen. The average per capita monthly expenditure is around Rs 1582 and about 15.5 per cent of farm households are below poverty line and 84.5 per of farm households are above poverty line (Table 13 and Figure 8).

**Table 13: Average annual expenditure of sample HHs in Bisarahalli-1 Microwatershed**

| Particulars | Value in Rupees | Per cent |
|---|---|---|
| Food | 70690 | 70.1 |
| Education | 11288 | 11.2 |
| Clothing | 5875 | 5.8 |
| Social functions | 5068 | 5.0 |
| Health | 7901 | 7.8 |
| Total Expenditure (Rs/year) | 100821 | 100.0 |
| Monthly per capita expenditure (Rs) | 1582 | |

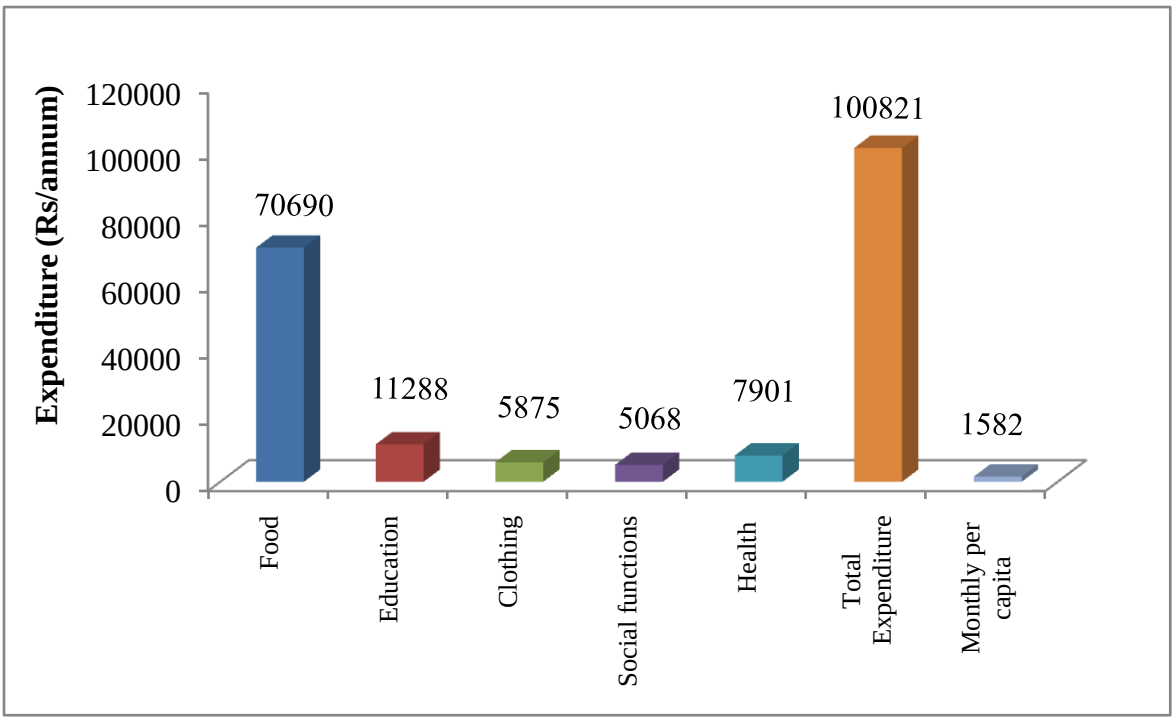



Figure 8: Average annual expenditure of sample HHs in Bisarahalli-1 Microwatershed

**Land holding:** Total sample households are 97 and total area cultivated by them is 147.9 ha. The average land holding of sample HHs is 1.8 ha. Large number of sample HHs (7) belong to small size group with an average holding size of 7.5 ha followed by medium farmers (25) with an average holding size of 2.8 ha and a small farmers (65) with a average land holding size of 0.8 ha (Table 14).

**Table 14: Distribution of land holding among the sample households in Basirahalli 1 Microwatershed**

| Particulars | Units | Values |
|---|---|---|
| **Small farmers** | | |
| Total Sample HHs in number | Number | 65 |
| Total Land Holding | ha | 52.3 |
| Average Total land holding | ha | 0.8 |
| **Medium farmers** | | |
| Total Sample HHs in number | Number | 25 |
| Total Land Holding | ha | 70.2 |
| Average Total land holding | ha | 2.8 |
| **Large farmers** | | |
| Total Sample HHs in number | Number | 7 |
| Total Land Holding | ha | 52.4 |
| Average Total land holding | ha | 7.5 |
| **Total farmers** | | |
| Total Sample HHs in number | Number | 97 |
| Total Land Holding | ha | 147.9 |
| Average Total land holding | ha | 1.8 |

**Land use:** The total land owned by the sample households of area were 147.8 ha which was under dry land area was 130.2 ha, Irrigated land was 29.8 ha and fallow land was 14.9 ha. The average land holding per household is worked out to be 1.8 ha (Table 15).

**Table 15: Land holding among samples households in Bisarahalli-1 Microwatershed**

| Particulars | Per cent | Area in ha |
|---|---|---|
| Irrigated land | 17.0 | 29.8 |
| Rainfed Land | 74.4 | 130.2 |
| Fallow Land | 8.5 | 14.9 |
| Total land holding | 100.0 | 174.8 |
| Average land holding | 1.8 | |

In the micro-watershed, the prevalent present land uses under perennial plants are neem trees (66.6 %) followed by tamarind (10 %), coconut (8.3 %), mango (5.3 %), banyan tree (alada) (3.7 %), teak (3.5 %), pongamia (1.1 %), lime (0.9 %), acacia (0.5 %) and eucalyptus (0.2 %) (Table 16).

**Table 16: Number of trees/plants covered in sample farm households in Bisarahalli-1 Microwatershed**

| Particulars | Number of Plants/trees | Per cent |
|---|---|---|
| Acacia | 3 | 0.5 |
| Banyan tree(Alada) | 21 | 3.7 |
| Coconut | 47 | 8.3 |
| Eucalyptus | 1 | 0.2 |
| Lime | 5 | 0.9 |
| Mango | 30 | 5.3 |
| Neem trees | 379 | 66.6 |
| Pongamia | 6 | 1.1 |
| Tamarind | 57 | 10.0 |
| Teak | 20 | 3.5 |
| Grand Total | 569 | 100.0 |

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

The present dominant crops grown in dry lands in the study area were by maize (25.5 %) followed by red gram (17 %), groundnut (16.4 %), bajra (13.8 %), sunflower (7.1 %), sorghum (2.6 %), cotton (2.3 %), onion (1.1 %), black gram (0.6 %), chillies (0.6 %), green gram (0.6 %) and ragi (0.6 %) which are taken during *kharif* and maize (6.7 %), cotton (2.6 %), sunflower (1.7 %), bengal gram (0.6 %) and sorghum (0.4 %) during *rabi* season respectively. The cropping intensity was 113.6 per cent (Table 17 and Figure 9).

**Table 17: Present cropping pattern and cropping intensity in Bisarahalli-1 Microwatershed**

% to Grand Total

| Crops | Kharif | Rabi | Grand Total |
|---|---|---|---|
| Bajra | 13.8 | 0.0 | 13.8 |
| Bengal gram | 0.0 | 0.6 | 0.6 |
| Black gram | 0.6 | 0.0 | 0.6 |
| Chillies | 0.6 | 0.0 | 0.6 |
| Cotton | 2.3 | 2.6 | 4.8 |
| Green gram | 0.6 | 0.0 | 0.6 |
| Groundnut | 16.4 | 0.0 | 16.4 |
| Maize | 25.5 | 6.7 | 32.2 |
| Onion | 1.1 | 0.0 | 1.1 |
| Ragi | 0.6 | 0.0 | 0.6 |
| Red gram | 17.0 | 0.0 | 17.0 |
| Sorghum | 2.6 | 0.4 | 3.0 |
| Sunflower | 7.1 | 1.7 | 8.8 |
| Grand Total | 88.0 | 12.0 | 100.0 |
| Cropping intensity (%) | 113.6 | | |

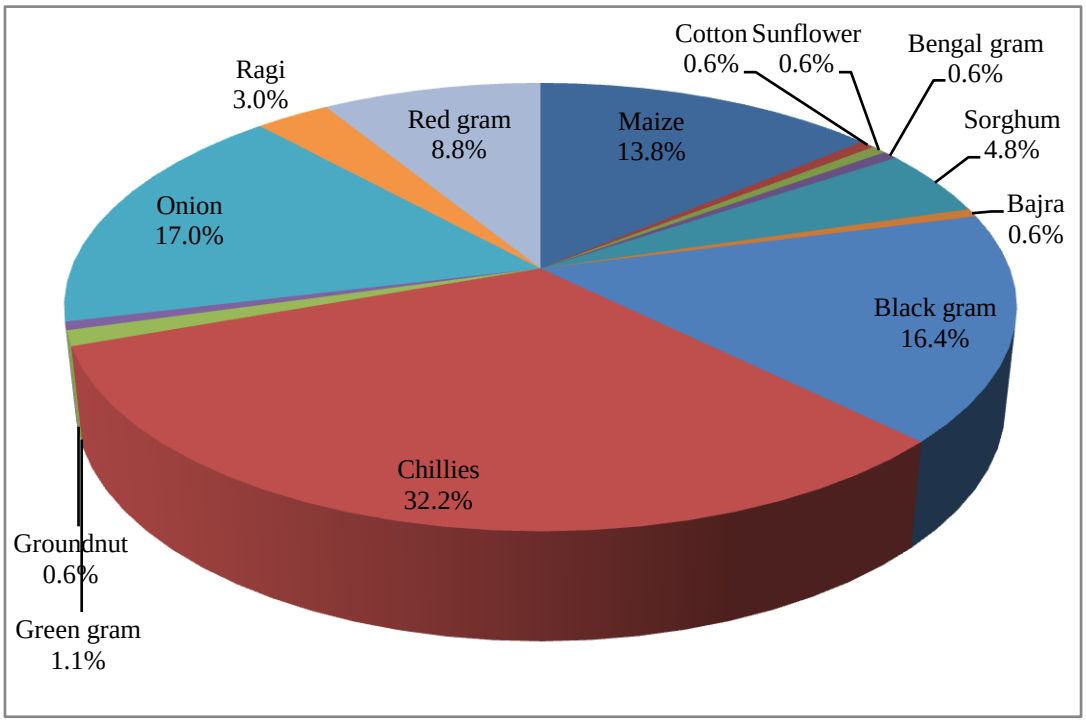



Figure 9: Present cropping pattern in Bisarahalli-1 Microwatershed

**Economic land evaluation**

In Bisarahalli-1 micro-watershed, 14 soil series are identified and mapped (Table 18). The distribution of major soil series are Muttal covering an area around 122 ha (21.36 %) followed by Gatareddihal 73 ha (12.82 %), Balapur 69 ha (12.07 %), Hatti 60 ha (10.56 %), Dambarahalli 53 ha (9.3 %), Kumchahalli 44 ha (7.78 %), Bisarahalli 37 ha (6.4 %), Bidanagere 29 ha (5.14 %), Mukhadahalli 24 ha (4.28 %), Chikkasavanur 17 ha (2.94 %), Gollarahatti 11 ha (1.98 %), Niduvalalu 8 ha (1.36 %), Kethanapura 4 ha (0.64 %) and Ravanaki 1 ha (0.1 %)

**Table 18: Distribution of soil series in Bisarahalli-1 Microwatershed**

| Sl. No | Soil Series | Area in ha (%) |
|---|---|---|
| 1 | **Chikkasavanur (CSR)** | 17 (2.94) |
| 2 | Bidanagere (BDG) | 29 (5.14) |
| 3 | Balapur (BPR) | 69 (12.07) |
| 4 | Bisarahalli (BSR) | 37 (6.4) |
| 5 | Dambarahalli (DRL) | 53 (9.3) |
| 6 | Gollarahatti (GHT) | 11 (1.98) |
| 7 | Gatareddihal (GRH) | 73 (12.82) |
| 8 | Hatti (HTI) | 60 (10.56) |
| 9 | Kumchahalli (KMH) | 44 (7.78) |
| 10 | Kethanapura (KTP) | 4 (0.64) |
| 11 | Mukhadahalli (MKH) | 24 (4.28) |
| 12 | Muttal (MTL) | 122 (21.36) |
| 13 | Niduvalalu (NDL) | 8 (1.36) |
| 14 | Ravanaki (RNK) | 1 (0.1) |
| Rock outcrops | | 2 (0.3) |
| Others | | 17 (3.0) |
| Total | | 571.4 |

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

**Table 19: Alternative land use options for different size group of farmers (Benefit Cost Ratio) in Bisarahalli-1 Microwatershed.**

| Particulars | Small Farmers | Medium Farmers | Large farmers | Pooled farmers |
|---|---|---|---|---|
| Bikkanahalli village | Bajra (1.48), Cotton (1.08), Green gram (1.22), Groundnut (1.18), Maize (1.47), Onion (1.49), Redgram (1.76), Sunflower (1.29) | Bajra (1.19), Cotton (1.43), Groundnut (1.34), Maize (1.26), Onion (1.13), Ragi (1.44), Redgram (1.8), Sunflower (1.16) | Bajra (1.19), Black gram (1.2), Cotton (1.72), Groundnut (1.65), Maize (1.46), Red gram (1.57), Sunflower (1.1) | Bajra (1.41), Black gram (1.2), Cotton (1.17), Green gram (1.22), Groundnut (1.33), Maize (1.39), Onion (1.25), Ragi (1.44), Red gram (1.74), Sunflower (1.22) |
| Bisarahalli village | Bajra (1.1) Bengal gram (1.07) Chillies (1.03) Green gram (1.39) Groundnut (1.12) Maize (1.12) Red gram (1.34) Sorghum (1.11) Sunflower (1.04) | Bajra (1.13) Chillies (1.57) Maize (1.19) Red gram (1.25) Sorghum (1.26) Sunflower (0) | Bajra (0.92) Groundnut (1.27) Maize (1.08) Sunflower (1.24) | Bajra (1.1) Bengal gram (1.07) Chillies (1.3) Green gram (1.39) Groundnut (1.2) Maize (1.15) Red gram (1.29) Sorghum (1.21) Sunflower (1.09) |

The productivity of different crops grown in Bisarahalli-1 micro-watershed under potential yield of the crops is given in Table 20.

**Table 20: Economic land evaluation and bridging yield gap for different crops in Bisarahalli-1 micro-watershed**

| Particulars | Bajra | Bengal gram | Black gram | Chillies | Cotton | Green gram | Groundnut | Maize | Onion | Ragi | Red gram | Sor ghum | Sun flower |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total cost (Rs/ha) | 22148 | 21526 | 21526 | 53036 | 34715 | 43502 | 31317 | 28054 | 24942 | 14965 | 20950 | 15920 | 25139 |
| Gross Return (Rs/ha) | 28161 | 22971 | 25935 | 71630 | 38517 | 56810 | 39344 | 33867 | 30035 | 21613 | 30146 | 19624 | 30095 |
| Net returns (Rs/ha) | 6013 | 1445 | 4409 | 18594 | 3802 | 13308 | 8027 | 5812 | 5093 | 6647 | 9197 | 3703 | 4956 |
| B:C | 1.27 | 1.07 | 1.20 | 1.30 | 1.17 | 1.30 | 1.31 | 1.30 | 1.25 | 1.44 | 1.58 | 1.21 | 1.19 |
| **Farmers Practices (FP)** | | | | | | | | | | | | | |
| FYM (t/ha) | 2.4 | 2.5 | 2.5 | 5.0 | 3.4 | 5.0 | 2.8 | 2.1 | 2.1 | 1.3 | 2.4 | 1.4 | 2.1 |
| Nitrogen (kg/ha) | 51.3 | 80.0 | 48.7 | 78.5 | 111.9 | 66.8 | 52.6 | 55.1 | 61.1 | 40.0 | 48.6 | 18.6 | 61.3 |
| Phosphorus (kg/ha) | 48.3 | 57.5 | 48.5 | 67.3 | 81.8 | 45.3 | 37.6 | 38.5 | 44.7 | 28.8 | 47.7 | 29.9 | 45.4 |
| Potash (kg/ha) | 10.7 | 0.0 | 0.0 | 38.5 | 0.0 | 5.0 | 1.7 | 7.7 | 2.8 | 0.0 | 3.1 | 11.3 | 4.2 |
| Grain (Qtl/ha) | 11.9 | 7.5 | 7.5 | 18.8 | 15.9 | 12.5 | 10.0 | 16.6 | 41.7 | 8.8 | 7.6 | 11.7 | 9.8 |
| Price of Yield (Rs/Qtl) | 1805 | 3100 | 3500 | 6300 | 2380 | 4520 | 3702 | 1615 | 1008 | 2500 | 3710 | 1733 | 3208 |
| **Package of Practice (POP)** | | | | | | | | | | | | | |
| FYM (t/ha) | 7.5 | 7.5 | 0.0 | 25.0 | 12.5 | 7.5 | 7.5 | 7.5 | 30.0 | 6.3 | 7.5 | 7.5 | 6.9 |
| Nitrogen (kg/ha) | 50.0 | 13.0 | 25.0 | 142.9 | 150.0 | 13.0 | 25.0 | 100.0 | 125.0 | 40.0 | 25.0 | 65.0 | 37.5 |
| Phosphorus (kg/ha) | 25.0 | 25.0 | 50.0 | 71.4 | 75.0 | 25.0 | 50.0 | 50.0 | 50.0 | 40.0 | 50.0 | 40.0 | 50.0 |
| Potash (kg/ha) | 0.0 | 25.0 | 25.0 | 71.4 | 75.0 | 25.0 | 25.0 | 25.0 | 75.0 | 0.0 | 25.0 | 40.0 | 37.5 |
| Grain (Qtl/ha) | 13.3 | 9.0 | 11.5 | 246.4 | 18.5 | 6.3 | 9.0 | 57.5 | 225.0 | 15.5 | 13.8 | 18.8 | 11.3 |
| **% of Adoption/yield gap (POP-FP) / (POP)** | | | | | | | | | | | | | |
| FYM (%) | 67.9 | 66.7 | 0.0 | 80.0 | 72.4 | 33.3 | 62.5 | 71.8 | 93.1 | 80.0 | 68.0 | 81.2 | 69.5 |
| Nitrogen (%) | -2.6 | -515.4 | -95.0 | 45.0 | 25.4 | -413.5 | -110.5 | 44.9 | 51.1 | 0.0 | -94.6 | 71.4 | -63.3 |
| Phosphorus (%) | -93.2 | -130.0 | 3.1 | 5.8 | -9.0 | -81.0 | 24.9 | 23.0 | 10.5 | 28.1 | 4.5 | 25.1 | 9.2 |
| Potash (%) | 0.0 | 100.0 | 100.0 | 46.0 | 100.0 | 80.0 | 93.2 | 69.3 | 96.3 | 0.0 | 87.7 | 71.9 | 88.8 |
| Grain (%) | 10.7 | 16.7 | 34.8 | 92.4 | 14.2 | -100.0 | -11.1 | 71.2 | 81.5 | 43.5 | 44.4 | 37.8 | 13.1 |
| **Value of yield and Fertilizer (Rs)** | | | | | | | | | | | | | |
| Additional Cost (Rs/ha) | 3838 | 3266 | -2217 | 21612 | 10715 | 1364 | 5372 | 6776 | 30359 | 5495 | 5357 | 7664 | 5359 |
| Additional Benefits (Rs/ha) | 2564 | 4650 | 14000 | 1434375 | 6262 | -28250 | -3706 | 66131 | 184800 | 16875 | 22642 | 12296 | 4733 |
| Net change Income (Rs/ha) | -1274 | 1384 | 16217 | 1412763 | -4453 | -29614 | -9079 | 59355 | 154441 | 11380 | 17285 | 4632 | -626 |

The data on cost of cultivation and benefit cost ratio (BCR) of different crops is given in Table 20. The total cost of cultivation in study area for bajra is Rs.22148/ha (with BCR of 1.27), bengal gram cost of cultivation is Rs 21526/ha with BCR of 1.07, black gram cultivation is Rs 21526/ha and benefit cost ratio is 1.20, the cost of cultivation of chillies is Rs.53036/ha in (with BCR of 1.30), cotton cultivation is Rs 34715/ha (with of 1.17), Cost of cultivation of green gram is Rs.43502/ha (with BCR of 1.30), groundnut is Rs. 31317/ha (with BCR of 1.31), total cost of cultivation for maize is Rs. 28054/ha (with BCR of 1.30), onion cultivation is Rs.24942/ha (with BCR of 1.25), ragi cultivation is Rs.14965/ha (with BCR of 1.44), red gram cultivation is Rs 20950/ha (with BCR of 1.58), sorghum cost of cultivation is Rs. 15920/ha (with BCR of 1.21) and sunflower cultivation is Rs 25139/ha (with BCR of 1.19).

The data on FYM, Nitrogen, Phosphorus and Potash application by the farmers to different crops and recommended FYM for different crops is given in Table 20. There is a huge gap between FYM application by farmers and recommended FYM in all the crops across the soils. There is a larger yield gap in crops grown across different soil series. Adequate knowledge about recommended package of practices is the pre-requisite for their use in cultivation of crops. It is a fact that, recommended practices are major contributing factors to yield. Inadequate knowledge about recommended practices leads to their improper adoption. Strengthening of extension services by concerned agency is required to increase adoption of recommended cultivation practices and ultimately reducing the gap. By adopting soil-test fertiliser recommendation, there is scope to increase yield and income to a maximum of Rs 1412763 in chillies and a minimum of Rs 1384 in black gram cultivation.

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

**Table 21: Estimation of onsite cost of soil erosion in Bisarahalli-1 micro-watershed**

| Particulars | Quantity(kg) | | Value (Rs) | |
|---|---|---|---|---|
| | Per ha | Total | Per ha | Total |
| Organic matter | 53.91 | 9398.13 | 339.65 | 59208.21 |
| Phosphorus | 0.07 | 11.87 | 3.00 | 522.29 |
| Potash | 0.75 | 130.22 | 14.94 | 2604.45 |
| Iron | 0.03 | 4.83 | 1.33 | 231.78 |
| Manganese | 0.05 | 8.42 | 13.29 | 2316.38 |
| Cupper | 0.01 | 1.03 | 3.32 | 579.22 |
| Zinc | 0.00 | 0.54 | 0.12 | 21.63 |
| Sulpher | 0.11 | 19.38 | 4.45 | 775.24 |
| Boron | 0.00 | 0.44 | 0.10 | 17.73 |
| Total | 54.93 | 9574.87 | 380.19 | 66276.93 |

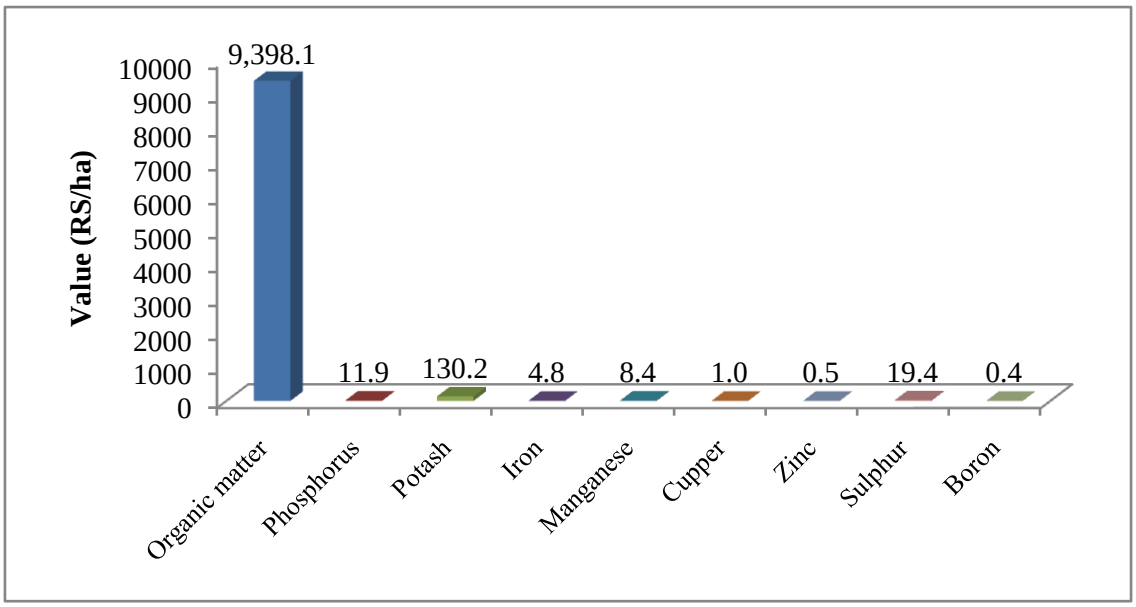



Figure 10: Estimation of onsite cost of soil erosion in Bisarahalli-1 micro-watershed

The onsite cost of different soil nutrients lost due to soil erosion is given in Table 21 and Figure 10. The average value of soil nutrient loss is around Rs 9574.8 per ha/year. The total cost of annual soil nutrients is around Rs 66276.9 per year for the total area of 571.40 ha.

The average value of ecosystem service for food grain production is around Rs 10363/ ha/year (Table 22 and Figure 11). Per hectare food grain production services is maximum in chillies (Rs 60584) followed by onion (Rs 16554), green gram (Rs 13308), red gram (Rs 9023), cotton (Rs 6411/ha), groundnut (Rs 5170/ha), sunflower (Rs 5069), black gram (Rs 4409), sorghum (Rs 2120), bengal gram (Rs 1445), bajra (Rs 696) and maize is negative returns.

**Table 22: Ecosystem services of food grain production in Bisarahalli-1 Microwatershed**

| Production items | Crops | Area in ha | Yield (Qtl/ha) | Price (Rs/Qtl) | Gross Returns (Rs/ha) | Cost of Cultivation (Rs/ha) | Total Value (Rs) | Net Returns (Rs/ha) |
|---|---|---|---|---|---|---|---|---|
| Cereals | Bajra | 19.5 | 12.6 | 1818 | 22844 | 22148 | 446327 | 696 |
| | Maize | 45.8 | 17.1 | 1618 | 27618 | 28054 | 1263542 | -436 |
| | Sorghum | 4.3 | 10.4 | 1733 | 18040 | 15920 | 78150 | 2120 |
| Pulses | Bengal gram | 0.8 | 7.4 | 3100 | 22971 | 21526 | 18600 | 1445 |
| | Black gram | 0.8 | 7.4 | 3500 | 25935 | 21526 | 21000 | 4409 |
| | Green gram | 0.8 | 12.4 | 4600 | 56810 | 43502 | 46000 | 13308 |
| | Red gram | 24.1 | 8.2 | 3655 | 29972 | 20950 | 722009 | 9023 |
| Oil seeds | Groundnut | 23.2 | 10.0 | 3667 | 36488 | 31317 | 847340 | 5170 |
| | Sunflower | 12.6 | 9.5 | 3182 | 30209 | 25139 | 379137 | 5069 |
| VegeTable | Chillies | 0.8 | 24.7 | 4600 | 113620 | 53036 | 92000 | 60584 |
| | Onion | 1.6 | 41.2 | 1008 | 41496 | 24942 | 67200 | 16554 |
| Commercial crops | Cotton | 6.9 | 15.2 | 2700 | 41126 | 34715 | 283050 | 6411 |
| Grand Total | | 141.2 | 14.7 | 2932 | 38927 | 28565 | 355363 | 10363 |

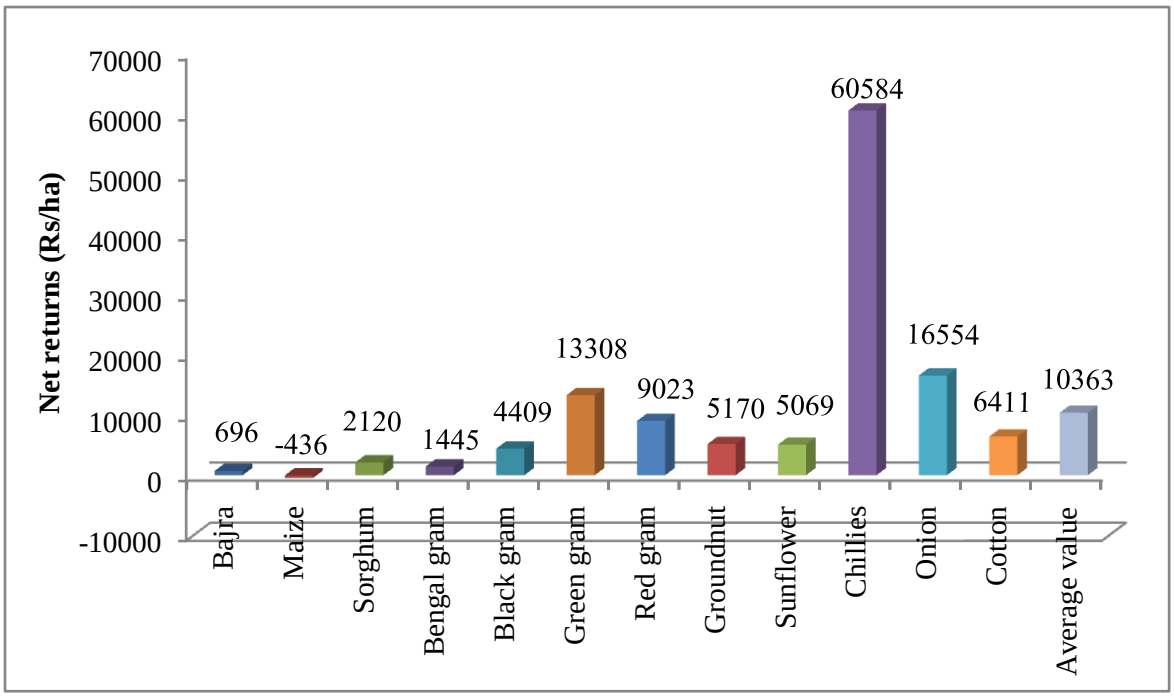


Figure 11: Ecosystem services of food grain production in Bisarahalli-1 Microwatershed

The average value of ecosystem service for fodder production is around Rs 3978/ ha/year (Table 23). Per hectare fodder production services is maximum in maize (Rs 5641) followed by bajra (Rs 5468), groundnut (Rs 3188) and sorghum (Rs 1616).

**Table 23: Ecosystem services of fodder production in Bisarahalli-1 Microwatershed**

| Production items | Crops | Area in ha | Yield (Qtl/ha) | Price (Rs/Qtl) | Total returns (Rs) | Net Returns (Rs/ha) |
|---|---|---|---|---|---|---|
| Cereals | Bajra | 19.5 | 3.3 | 1674 | 106828 | 5468 |
| | Maize | 45.8 | 3.2 | 1765 | 258067 | 5641 |
| | Sorghum | 4.3 | 0.9 | 1867 | 6999 | 1616 |
| Oil seeds | Groundnut | 23.2 | 2.3 | 1389 | 74034 | 3188 |
| Grand Total | | 92.8 | 2.4 | 1674 | 111482 | 3978 |

The water demand for production of different crops was worked out in arriving at the ecosystem services of water support to crop growth. The data on water requirement for producing one quintal of grain is considered for estimating the total value of water required for crop production. The per hectare value of water used and value of water was maximum (Table 24 and Figure 12) in green gram (Rs 85289) followed by cotton (Rs 61368), bajra (Rs 56254), black gram (Rs 51173), bengal gram (Rs 51173), red gram (Rs 44643), sunflower (Rs 31952), sorghum (Rs 31723), groundnut (Rs 27684), maize (Rs 20862), onion (Rs 11197), ragi (Rs 10564) and chillies (Rs 8126).

**Table 24: Ecosystem services of water supply in Bisarahalli-1 Microwatershed**

| Crops | Yield (Qtl/ha) | Virtual water (cubic meter) per ha | Value of Water (Rs/ha) | Water consumption (Cubic meters/Qtl) |
|---|---|---|---|---|
| Bajra | 12.6 | 5625 | 56254 | 448 |
| Bengal gram | 7.4 | 5117 | 51173 | 691 |
| Black gram | 7.4 | 5117 | 51173 | 691 |
| Chillies | 24.7 | 813 | 8126 | 33 |
| Cotton | 15.2 | 6137 | 61368 | 403 |
| Green gram | 12.4 | 8529 | 85289 | 691 |
| Groundnut | 10.0 | 2768 | 27684 | 278 |
| Maize | 17.1 | 2086 | 20862 | 122 |
| Onion | 41.2 | 1120 | 11197 | 27 |
| Ragi | 8.6 | 1056 | 10564 | 122 |
| Red gram | 8.2 | 4464 | 44643 | 544 |
| Sorghum | 10.4 | 3172 | 31723 | 305 |
| Sunflower | 9.5 | 3195 | 31952 | 337 |
| Grand Total | 14.2 | 3785 | 37847 | 361 |

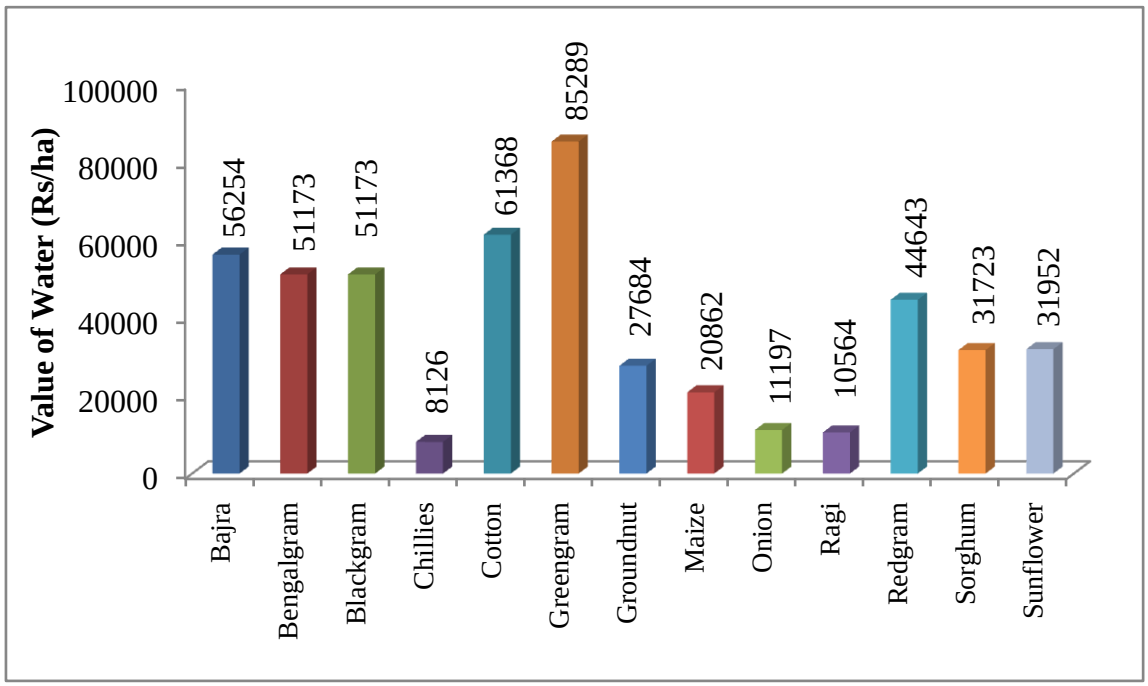



Figure 12: Ecosystem services of water supply in Bisarahalli-1 Microwatershed

The main constraints in farming is climate change particularly decline in rainfall and increasing temperature. Farmers reported that they are not getting timely support/extension services from the concerned development department (Table 25).

**Table 25: Farming constraints related land resources of sample households in Bisarahalli-1 Microwatershed**

| Particulars | Per cent |
|---|---|
| **Farmers awareness of climate change** | |
| Yes | 2.1 |
| No | 97.9 |
| **Perception on climate change** | |
| Decrease in rainfall | 100.0 |
| Increase in temperature | 0.0 |
| **Availability agricultural technology information** | |
| Yes | 3.1 |
| No | 96.9 |

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