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

## HANUMANAHATTI (4D4A1R2e) MICROWATERSHED

**Irakallagada 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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**WATERSHED DEVELOPMENT DEPARTMENT, GOVT. OF KARNATAKA, BANGALORE**

## PREFACE

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

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

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

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

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

ICAR-NBSS&LUP, Regional Centre, Bangalore has taken up a project sponsored by the Karnataka Watershed Development Project-II, (Sujala-III), Government of Karnataka funded by the World Bank under Component -1 Land Resource Inventry. This study was taken up to demonstrate the utility of such a database in reviewing, monitoring and evaluating all the land based watershed development programs on a scientific footing. To meet the requirements of various land use planners at grassroots level, the present study on "Land Resource Inventory and Socio-Economic Status of Farm Households for Watershed Planning and Development of for Hanumanahatti 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 plots and socio-economic status of farm households covering thirty per cent farmers randomely selected representing landed and landless class of farmers in the micro-watershed.The project report with the accompanying maps for the microwatershed will provide required detailed database for evolving effective land use plan, alternative land use options and conservation plans for the planners, administrators, agricutural extention personnel, KVK officials, developmental departments and other land users to manage the land resources in a sustainable manner.

It is hoped that this database will be useful to the planners, administrators and developmental agencies working in the area in not only for formulating location specific developmental schemes but also for their effective monitoring at the village/watershed level.

Nagpur
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# PART-A

## LAND RESOURCE INVENTORY

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## *EXECUTIVE SUMMARY*

*The land resource inventory of Hanumanahatti microwatershed was conducted using village cadastral maps and IRS satellite imagery on 1:7920 scale. The false colour composites of IRS imagery were interpreted for physiography and these physiographic delineations were used as base for mapping soils. The soils were studied in several transects and a soil map was prepared with phases of soil series as mapping units. Random checks were made all over the area outside the transects to confirm and validate the soil map unit boundaries. The soil map shows the geographic distribution and extent, characteristics, classification, behavior and use potentials of the soils in the microwatershed.*

*The present study covers an area of 469 ha in Koppal taluk and district, Karnataka. The climate is semiarid and categorized as drought - prone with an average annual rainfall of 662 mm, of which about 424 mm is received during south–west monsoon, 161 mm during north-east and the remaining 77 mm during the rest of the year. An area of about 97 per cent is covered by soils and 3 per cent by rock outcrops, habitation and water bodies, settlements and others. The salient findings from the land resource inventory are summarized briefly below.*

- *The soils belong to 15 soil series and 32 soil phases (management units) and 8 land management units.*
- *The length of crop growing period is <90 days and starts from 2$^{nd}$ week of August to 2$^{nd}$ week of November.*
- *From the master soil map, several interpretative and thematic maps like land capability, soil depth, surface soil texture, soil gravelliness, available water capacity, soil slope and soil erosion were generated.*
- *Soil fertility status maps for macro and micronutrients were generated based on the surface soil samples collected at every 320 m grid interval.*
- *Land suitability for growing 31 major agricultural and horticultural crops were assessed and maps showing the degree of suitability along with constraints were generated.*
- *Entire area is suitable for agriculture.*
- *About 5 per cent of the soils are shallow (50-75 cm), 17 per cent of the soils are moderately shallow (50-75 cm), 16 per cent of the soils are moderately deep (75-100 cm), 57 per cent area has deep (100-150 cm) and 2 per cent has very deep (>150 cm) soils.*
- *About 15 per cent has sandy soils at the surface, 43 per cent has loamy soils at the surface and 38 per cent has clayey soils at the surface.*
- *About 35 per cent of the area has non-gravelly (<15%) soils and 44 per cent gravelly (15-35% gravel) and 17per cent very gravelly (35-60%) soils.*

- *About 24 per cent are very low (<50 mm/m), 44 per cent low (51-100 mm/m), 15 per cent medium (101-150 mm/m) and 14 per cent very high (>200 mm/m) in available water capacity.*
- *An area of about 8 per cent has nearly level (0-1%) and 87 per cent area has very gently sloping (1-3%) and 2 per cent has gently sloping (3-5%) lands.*
- *An area of about 30 per cent has soils that are slightly eroded (e1) and 67 per cent moderately eroded (e2) lands.*
- *An area of about 20 per cent are moderately acid (pH 5.5-6.0), 20 per cent are slightly acid (pH 6.0-6.5), 53 per cent are neutral (pH 6.5-7.3) and 5 per cent are slightly alkaline (pH 7.3-7.8) in soil reaction.*
- *The Electrical Conductivity (EC) of the soils is <2 dS $m^{-1}$ and as such the soils are non-saline.*
- *Organic carbon is medium (0.5-0.75%) in 8 per cent and high (>0.75%) in 89 per cent area of the soils.*
- *Available phosphorus is high (>57 kg/ha) in the entire cultivated area in the microwatershed.*
- *About 96 per cent of the soils are medium (145-337 kg/ha) and <1 per cent soils are high (>337 kg/ha) in available potassium content.*
- *Available sulphur is low (<10 ppm) in about 90 per cent, medium (10-20 ppm) in 1 per cent and high (>320 ppm) in the area of about 5 per cent soils.*
- *Available boron is low (0.5 ppm) in about 95 per cent and medium (0.5-1.0 ppm) in 2 per cent area.*
- *Available iron is sufficient (>4.5 ppm) in the entire area of the microwatershed.*
- *Available zinc is deficient (<0.6 ppm) in 3 per cent and sufficient (>0.6 ppm) in about 93 per cent area.*
- *Available manganese and copper are sufficient in all the soils.*
- *The land suitability for 31 major agricultural and horticultural crops grown in the microwatershed were assessed and the areas that are highly suitable (S1) and moderately suitable (S2) are given below. It is however to be noted that a given soil may be suitable for various crops but what specific crop to be grown may be decided by the farmer looking to his capacity to invest on various inputs, marketing infrastructure, market price and finally the demand and supply position.*

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

| Crop | Suitability Area in ha (%) | | | Crop | Suitability Area in ha (%) | |
|---|---|---|---|---|---|---|
| | Highly suitable (S1) | Moderately suitable (S2) | | | Highly suitable (S1) | Moderately suitable (S2) |
| *Sorghum* | *72 (15)* | *148 (31)* | | *Sapota* | *30 (6)* | *112 (24)* |
| *Maize* | *8 (2)* | *212 (45)* | | *Pomegranate* | *30 (6)* | *177 (38)* |
| *Bajra* | *88 (19)* | *190 (41)* | | *Musambi* | *95 (20)* | *112 (24)* |
| *Groundnut* | *25 (5)* | *281 (60)* | | *Lime* | *95 (20)* | *112 (24)* |
| *Sunflower* | *72 (15)* | *99 (21)* | | *Amla* | *126 (27)* | *304 (65)* |
| *Red gram* | *8 (2)* | *164 (35)* | | *Cashew* | *8 (2)* | *135 (29)* |
| *Bengalgram* | *65 (14)* | *186 (40)* | | *Jackfruit* | *30 (6)* | *112 (24)* |
| *Cotton* | *65 (14)* | *156 (33)* | | *Jamun* | - | *207 (44)* |
| *Chilli* | *11 (2)* | *148 (31)* | | *Custard apple* | *161 (34)* | *269 (57)* |
| *Tomato* | *11 (2)* | *148 (31)* | | *Tamarind* | - | *134 (29)* |
| *Brinjal* | *107 (23)* | *235 (50)* | | *Mulberry* | *59 (13)* | *262 (56)* |
| *Onion* | *43 (9)* | *206 (44)* | | *Marigold* | *8 (2)* | *213 (45)* |
| *Bhendi* | *43 (9)* | *299 (63)* | | *Chrysanthemum* | *8 (2)* | *213 (45)* |
| *Drumstick* | *59 (13)* | *255 (54)* | | *Jasmine* | *8 (2)* | *148 (31)* |
| *Mango* | - | *69 (15)* | | *Crossandra* | *8 (2)* | *121 (26)* |
| *Guava* | *8 (2)* | *134 (29)* | | | | |

- *Apart from the individual crop suitability, a proposed crop plan has been prepared for the 8 identified LMUs by considering only the highly and moderately suitable lands for different crops and cropping systems with food, fodder, fibre and other horticulture crops that helps in maintaining productivity and ecological balance in the microwatershed.*
- *Maintaining soil-health is vital for crop production and conserve soil and land resource base for maintaining ecological balance and to mitigate climate change. For this, several ameliorative measures have been suggested for these problematic soils like saline/alkali, highly eroded, sandy soils etc.*
- *Soil and water conservation treatment plan has been prepared that would help in identifying the sites to be treated and also the type of structures required.*
- *As part of the greening programme, several tree species have been suggested to be planted in marginal and submarginal lands, field bunds and also in the hillocks, mounds and ridges. That would help in supplementing the farm income, provide fodder and fuel, and generate lot of biomass which in turn would help in maintaining the ecological balance and contribute to mitigating the climate change.*

*Chapter 1*

# INTRODUCTION

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

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

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

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

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

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

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

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

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

# GEOGRAPHICAL SETTING

## 2.1 Location and Extent

The Hanumanahatti Microwatershed is located in the central part of northern Karnataka in Koppal Taluk and District, Karnataka State (Fig. 2.1). It comprises parts of Irrakalagada, Hanamanahalli, Chandinahala, Kodadhala and Vaddarahatti villages. It lies between $15^0$28' – $15^0$29' North latitudes and $76^0$10' – $76^0$12' East longitudes and covers an area of 469 ha. It is about 18 km from Koppal town. It is surrounded by Chandinahala and Kodadhala villages on the north, Hanamanahalli on the south and west and Irrakalagada, Vaddarahatti village on the southeast and Chandinahala on the eastern side.

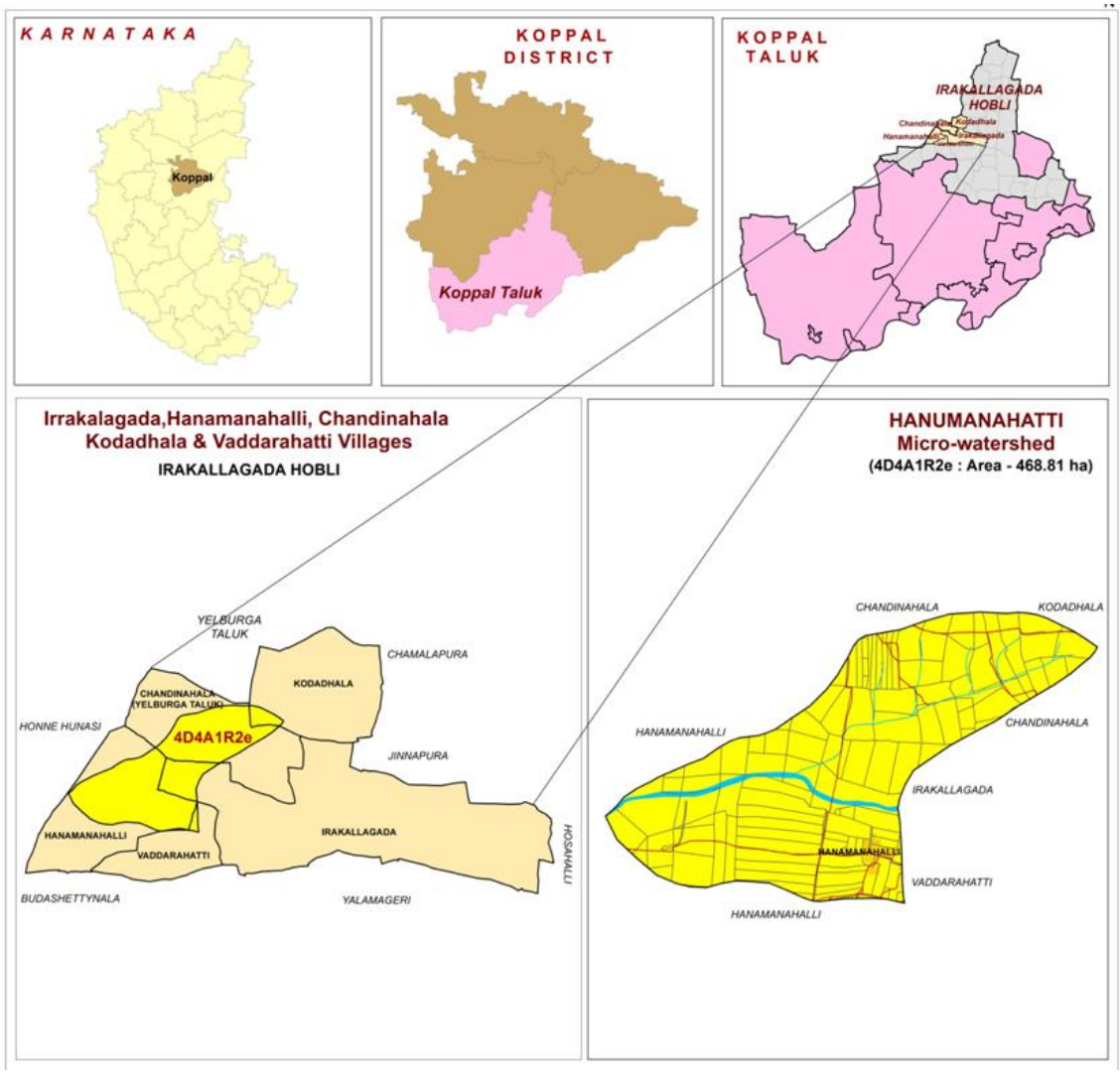


Fig. 2.1 Location map of Hanumanahatti Microwatershed

## 2.2 Geology

Major rock formations observed in the microwatershed are granite gneiss and alluvium (Figs. 2.2a and b). Granite gneisses are essentially pink to gray and are coarse to medium grained. They consist primarily of quartz, feldspar, biotite and hornblende. The gray granite gneisses are highly weathered, fractured and fissured upto a depth of about

10 m. Dolerite dykes and quartz veins are common with variable width and found to occur in the village. The thickness of the alluvium generally is limited to less than a meter, except in river valleys where it is very deep extending to tens of meters. Such soils are transported and represent palaeo black soils originally formed at higher elevation, but now occupying river valleys.

Fig. 2.2 a Granite and granite gneiss rocks

Fig. 2.2 b Alluvium

**2.3 Physiography**

Physiographically, the area has been identified as granite gneiss and alluvial landscapes based on geology. The microwatershed area has been further divided into summits, very gently sloping uplands and nearly level plains based on slope and its relief features. The elevation ranges from 506 to 569 m in the gently sloping uplands.

## 2.4 Drainage

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

## 2.5 Climate

The district falls under semiarid tract of the state and is categorized as drought-prone with an average annual rainfall of 662 mm (Table 2.1). Maximum of 424 mm precipitation takes place during the south-west monsoon period from June to September, north-east monsoon contributes about 161 mm and prevails from October to early December and the remaining 77 mm takes place during the rest of the year. The winter season is from December to February. During April and May, the temperatures reach up to 45 °C and in December and January, the temperatures will go down to 16 °C. Rainfall distribution is shown in Figure 2.3. The average Potential Evapo Transpiration (PET) is 145 mm and varies from a low of 101 mm in December and 193 mm in the month of May. The PET is always higher than precipitation in all the months except in the month of September. Generally, the Length of crop Growing Period (LGP) is <90 days and starts from 2$^{nd}$ week of August to 2$^{nd}$ week of November.

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

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

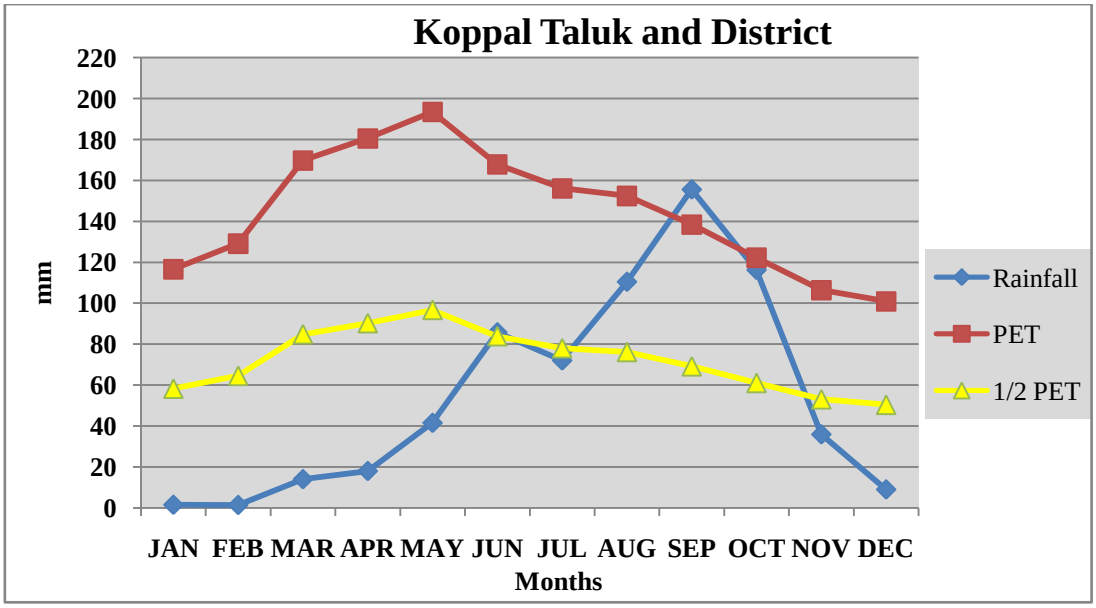


Fig. 2.3 Rainfall distribution in Koppal Taluk and District

## 2.6 Natural Vegetation

The natural vegetation is sparse comprising few tree species, shrubs and herbs. The mounds, ridges and boulders occupy sizeable areas which are under thin to moderately thick forest vegetation. Still, there are some remnants of the past forest cover which can be seen in patches in some ridges and hillocks in the microwatershed (Fig 2.4).

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

Fig 2.4 Natural vegetation of Hanumanahatti Microwatershed

## 2.7 Land Utilization

About 91 per cent area (Table 2.2) in Koppal district is cultivated at present and about 16 per cent of the area is sown more than once. The cropping intensity is 118 per cent. An area of about 3 per cent is currently barren. Forests occupy a small area of about 5 per cent and the tree cover is in a very poor state. Most of the mounds, ridges and bouldery areas have very poor vegetative cover. Major crops grown in the area are sorghum, maize, bajra, cotton, safflower, sunflower, red gram, horse gram, onion, mulberry, pomegranate, sugarcane, bengalgram and groundnut (Fig 2.5). While carrying out land resource inventory, the land use/land cover particulars are collected from all the survey numbers and a current land use map of the microwatershed is prepared. The current land use map prepared shows the arable and non-arable lands, other land uses and different types of crops grown in the area. The current land use map of Hanumanahatti Microwatershed is presented in Fig. 2.6. Simultaneously, enumeration of existing wells (bore wells and open wells) and other soil and water conservation structures in the microwatershed is made and their location in different survey numbers is marked on the cadastral map. Map showing the location of wells and other water bodies in Hanumanahatti Microwatershed is given Fig. 2.7.

**Table 2.2 Land Utilization in Koppal District**

| Sl. no. | Agricultural land use | Area ( ha) | Per cent |
|---|---|---|---|
| 1 | Total geographical area | 552495 | |
| 2 | Total cultivated area | 500542 | 90.6 |
| 3 | Area sown more than once | 92696 | 16.8 |
| 4 | Trees and groves | 210 | 0.04 |
| 5 | Cropping intensity | - | 118 |
| 6 | Forest | 29451 | 5.33 |
| 7 | Cultivable wasteland | 2568 | 0.46 |
| 8 | Permanent Pasture land | 14675 | 2.66 |
| 9 | Barren land | 16627 | 3.01 |
| 10 | Non agricultural land | 40591 | 7.35 |
| 11 | Current fallow | 19660 | 3.56 |

Fig. 2.5 (a) Different crops and cropping systems in Hanumanahatti Microwatershed


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

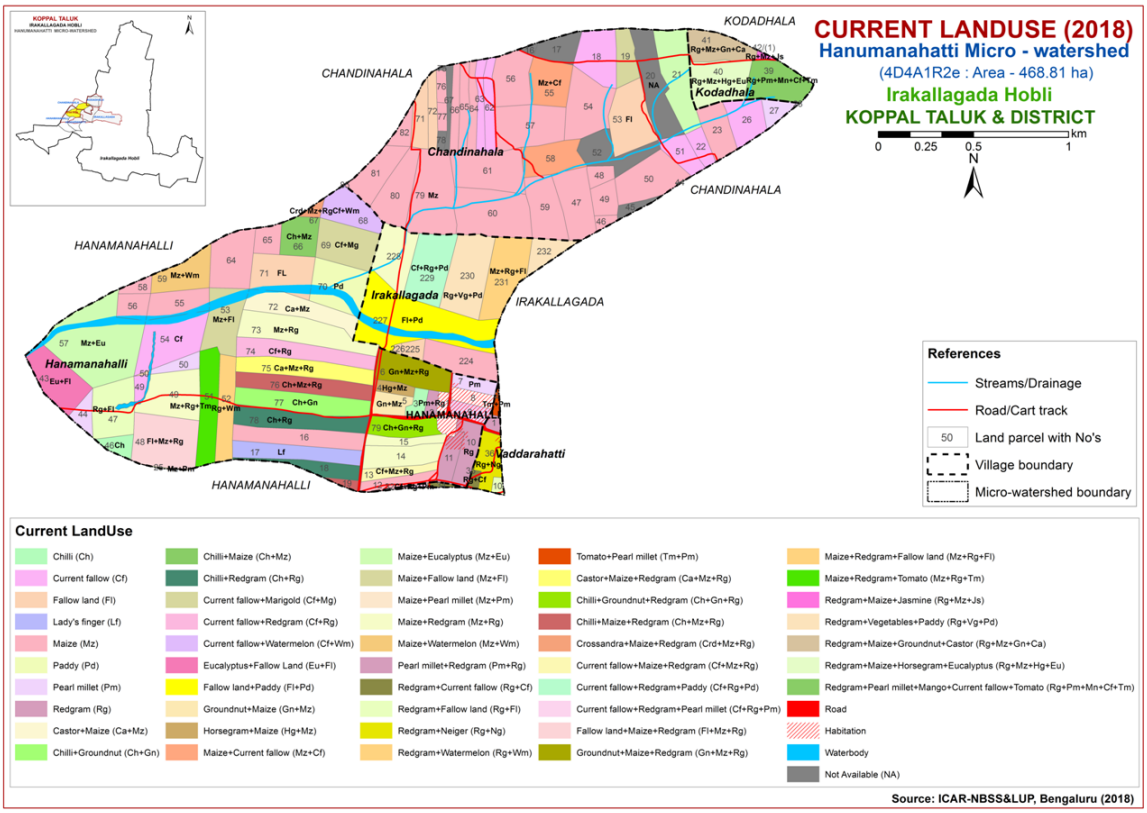


Fig. 2.6 Current Land Use – Hanumanahatti Microwatershed

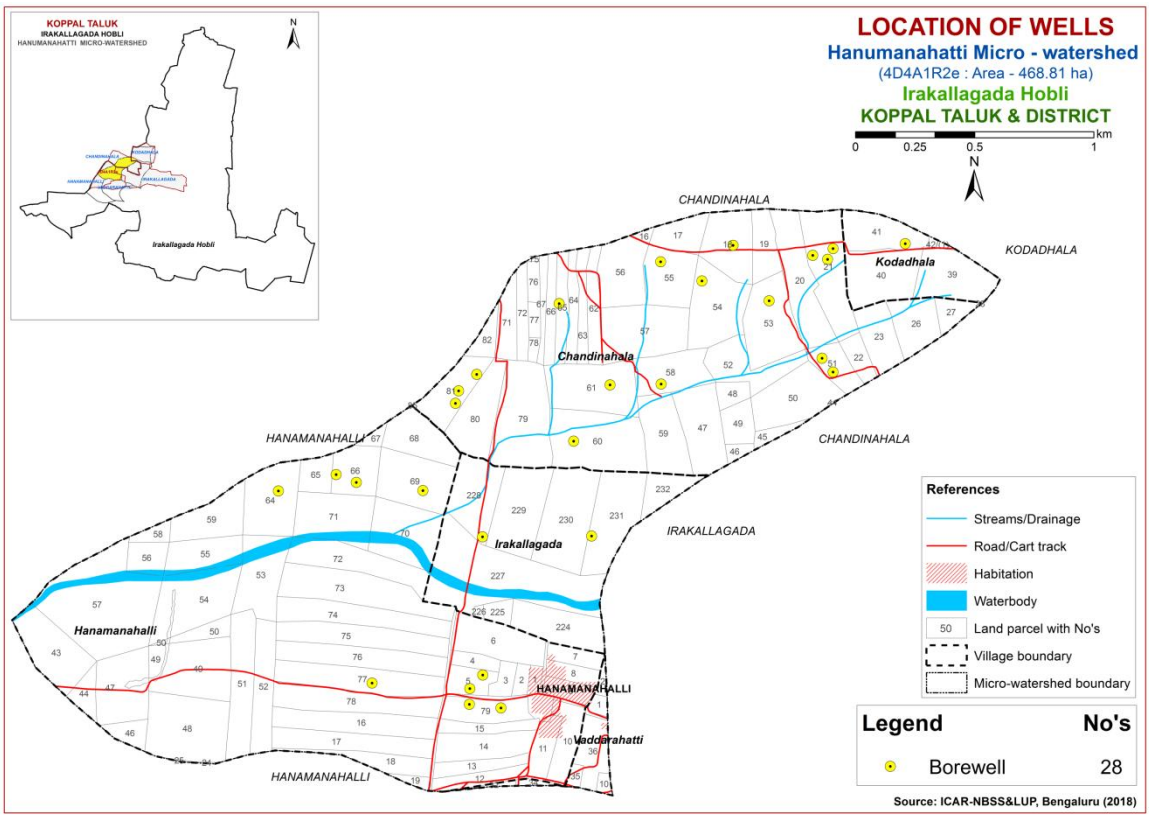


Fig. 2.7 Location of wells-Hanumanahatti Microwatershed

*Chapter 3*

# SURVEY METHODOLOGY

The purpose of land resource inventory is to delineate similar areas (soil series and phases), which respond or expected to respond similarly for a given level of management. This was achieved in Hanumanahatti Microwatershed by the detailed study of all the soil characteristics (depth, texture, colour, structure, consistence, coarse fragments, porosity, soil reaction, soil horizons etc.) and site characteristics (slope, erosion, drainage, occurrence of rock fragments etc.) followed by grouping of similar areas based on soil-site characteristics into homogeneous (management units) units and showing their extent and geographic distribution on the microwatershed cadastral map. The detailed soil survey at 1:7920 scale was carried out in 469 ha area. The methodology followed for carrying out land resource inventory was as per the guidelines given in Soil Survey Manual (IARI, 1971; Soil Survey Staff, 2006; Natarajan *et al.*, 2015) which is briefly described below.

## 3.1 Base Maps

The detailed survey of the land resources occurring in the microwatershed was carried out by using digitized cadastral map and satellite imagery as base supplied by the KSRSAC. The cadastral map shows field boundaries with their survey numbers, location of tanks, streams and other permanent features of the area (Fig. 3.1). Apart from the cadastral map, remote sensing data products from Cartosat-1 and LISS IV merged at the scale of 1:7920 were used in conjunction with the cadastral map to identify the geology, landscapes, landforms and other surface features. The imagery helped in the identification and delineation of boundaries between hills, uplands and lowlands, water bodies, forest and vegetated areas, roads, habitations and other cultural features of the area (Fig. 3.2). The cadastral map was overlaid on the satellite imagery (Fig. 3.3) that helps to identify the parcel boundaries and other permanent features. Apart from cadastral maps and images, toposheets of the area (1:50,000 scale) were used for initial traversing, identification of geology, landscapes and landforms, drainage features, present land use and also for selection of transects in the microwatershed.

## 3.2 Image Interpretation for Physiography

False Colour Composites (FCC) of Cartosat-I and LISS-IV merged satellite data covering the microwatershed area was visually interpreted using image interpretation elements and all the available collateral data with local knowledge. The delineated physiographic boundaries were transferred on to a cadastral map overlaid on satellite imagery. Physiographically, the area has been identified as granite gneiss and alluvial landscapes and is divided into landforms such as ridges, mounds and uplands based on slope. They were further subdivided into physiographic/ image interpretation units based on image characteristics. The image interpretation legend for physiography is given below.

**Image Interpretation Legend for Physiography**

**G- Granite gneiss landscape**

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

**DSe Alluvial landscape**

**Dse 1 Summit**

- Dse 11 Nearly level Summit with dark grey tone
- Dse 12 Nearly level Summit with medium grey tone
- Dse 13 Nearly level Summit with whitish grey tone
- Dse 14 Nearly level Summit with whitish tone (Calcareousness)
- Dse 15 Nearly level Summit with pinkish grey tone
- Dse 16 Nearly level Summit with medium pink tone
- Dse 17 Nearly level Summit with bluish white tone
- Dse 18 Nearly level Summit with greenish grey tone

**Dse 2 Very genetly sloping**

- Dse 21 Very gently sloping, whitish tone
- Dse 22 Very gently sloping, greyish pink tone
- Dse 23 Very gently sloping, whitish grey tone
- Dse 24 Very gently sloping, medium grey tone
- Dse 25 Very gently sloping, medium pink tone
- Dse 26 Very gently sloping, dark grey tone
- Dse 27 Very gently sloping, bluish grey tone
- Dse 28 Very gently sloping, greenish grey tone
- Dse 29 Very gently sloping, Pinkish grey

**Dsa 25 – Nearly Level Lands**

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

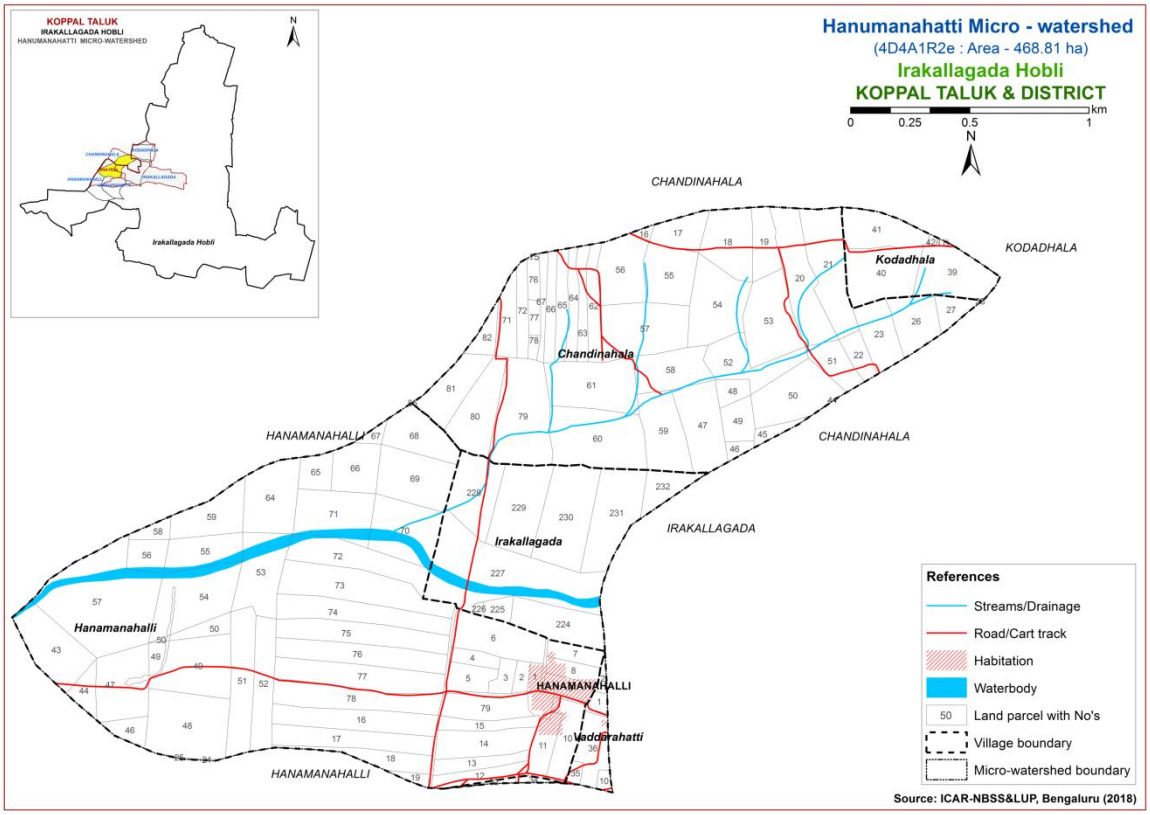


Fig. 3.1 Scanned and Digitized Cadastral map of Hanumanahatti Microwatershed

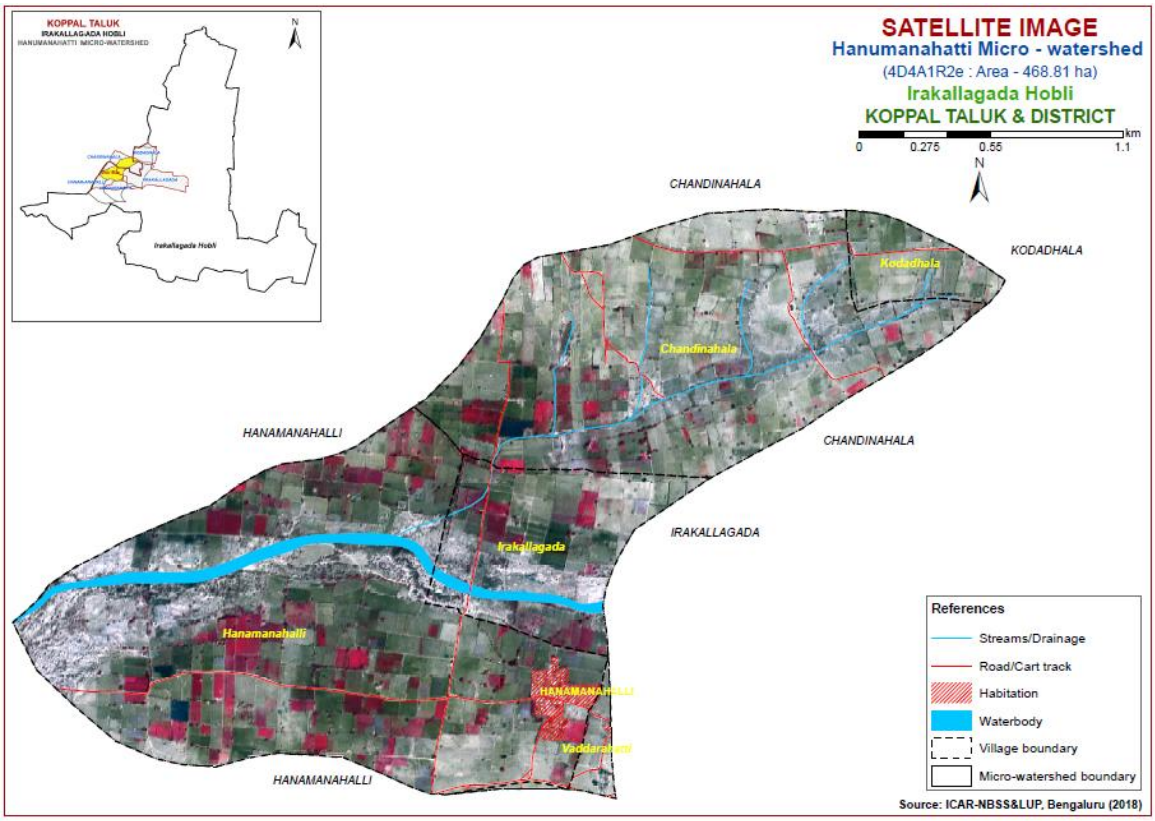


Fig. 3.2 Satellite Image of Hanumanahatti Microwatershed

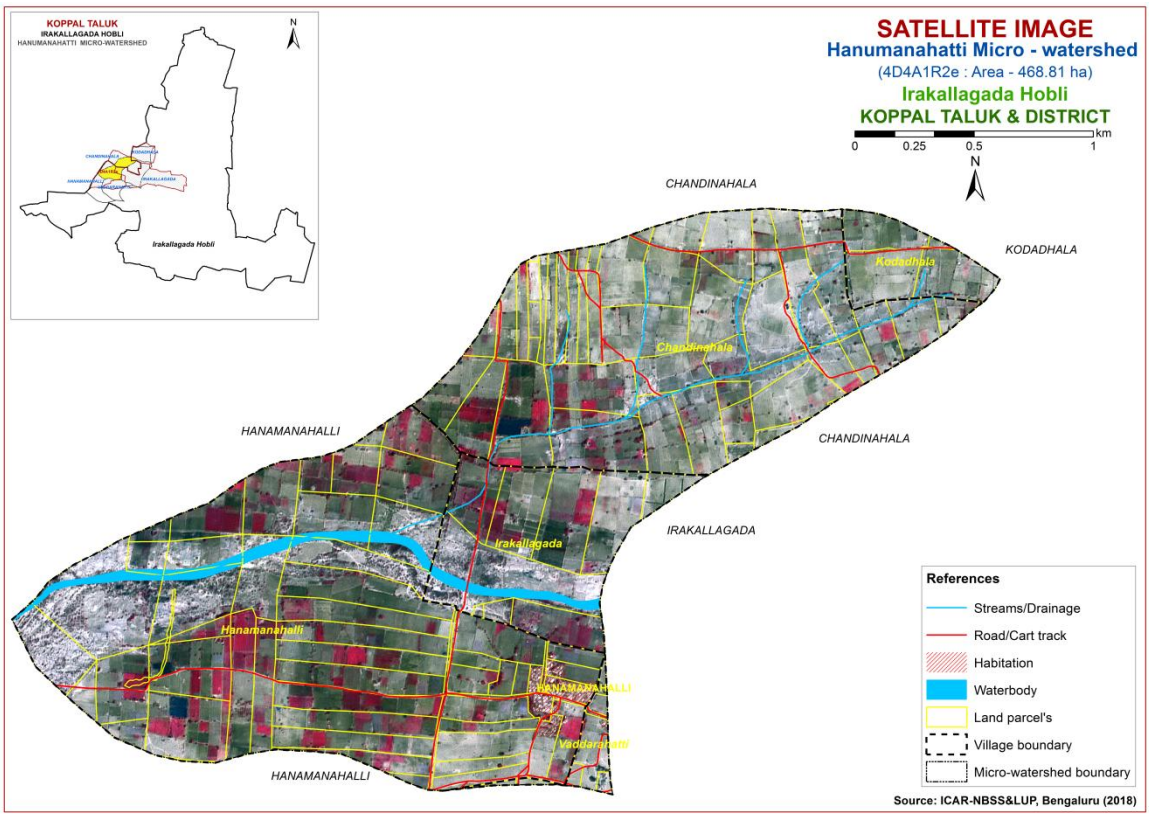


Fig. 3.3 Cadastral map overlaid on IRS PAN+LISS IV merged imagery of Hanumanahatti Microwatershed

### 3.3 Field Investigation

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

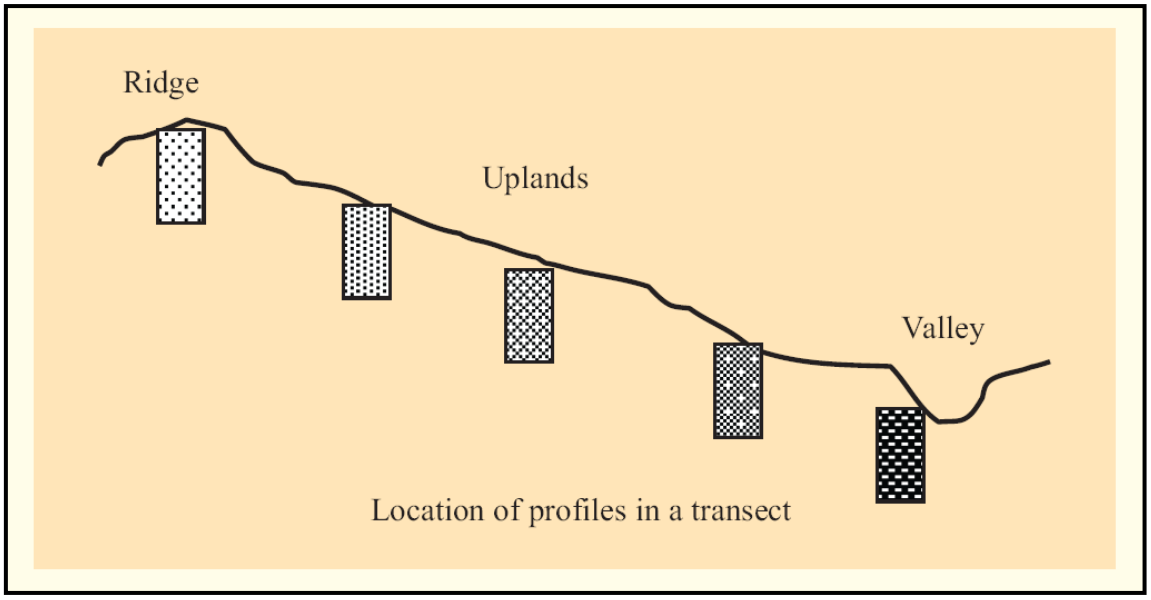


Fig. 3.4 Location of profiles in a transect

In the selected transect, soil profiles (Fig. 3.4) were located at closely spaced intervals to take care of any change in the land features like break in slope, erosion, gravel, stones etc. In the selected sites, soil profiles (vertical cut showing the soil layers from surface to the rock) were opened upto 200 cm or to the depth limited by rock or hard substratum and studied in detail for all their morphological and physical characteristics. The soil and site characteristics were recorded for all profile sites on a standard proforma as per the guidelines given in USDA Soil Survey Manual (Soil Survey Staff, 2012). Apart from the transect study, profiles were also studied at random, almost like in a grid pattern, outside the transect areas to validate the soil map unit boundaries.

Based on the soil characteristics, the soils were grouped into different soil series. Soil series is the most homogeneous unit having similar horizons and properties and behaves similarly for a given level of management. Soil depth, texture, colour, kind of horizon and horizon sequence, amount and nature of gravel present, calcareousness, nature of substratum etc, were used as the major differentiating characteristics for identifying soil series occurring in the area. The differentiating characteristics used for identifying the soil series are given in Table 3.1. Based on the above characteristics, 15 soil series were identified in Hanumanahatti Microwatershed.

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

| Soils of Granite gneiss Landscape | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Sl. No.** | **Soil Series** | **Depth (cm)** | **Colour (moist)** | **Texture** | **Gravel (%)** | **Horizon sequence** | **Calcareo-usness** |
| 1 | Abbiger (ABR) | 25-50 | 2.5YR 3/3, 3/4 | gsc | >35 | Ap-Bt-Cr | - |
| 2 | Lakkur (LKR) | 50-75 | 2.5YR 2.5/3, 2.5/4, 3/4, 3/6 | gsc | 40-60 | Ap-Bt-Bc-Cr | - |
| 3 | Kethanapura (KTP) | 50-75 | 2.5YR3/4, 3/6 | gsc | 15-35 | Ap-Bt-Cr | - |
| 4 | Mukhadahalli (MKH) | 50-75 | 5YR3/3,3/4,4/3, 5/4,6/6 2.5YR3/4 | gsc | >35 | Ap-Bt-Cr | - |
| 5 | Hooradhahalli (HDH) | 75-100 | 2.5YR2.5/4,3/4, 3/6 | gsc-gc | >35 | Ap-Bt-Cr | - |
| 6 | Gollarahatti (GHT) | 75-100 | 2.5YR3/4,3/6, 4/4,4/6 | gscl | 15-35 | Ap-Bt-Cr | - |
| 7 | Bisarahalli (BSR) | 75-100 | 5 YR 3/3, 3/4 | gsc | 15-35 | Ap-Bt-Cr | - |
| 8 | Chikkamegheri (CKM) | 75-100 | 2.5YR2.5/3,3/4, 3/6 | sc | - | Ap-Bt-Cr | - |
| 9 | Kumchahalli (KMH) | 100-150 | 2.5YR3/4, 3/6 | sc | <15 | Bt-Cr | - |
| 10 | Jedigere (JDG) | 100-150 | 5YR 4/6, 3/4, 7.5YR 3/4, 4/6 | sc-c | <15 | Ap-Bt-BC-Cr | - |
| 11 | Balapur (BPR) | 100-150 | 2.5YR2.5/4,3/4 | gsc-gc | >35 | Ap-Bt-Cr | - |
| 12 | Niduvalalu (NDL) | >150 | 2.5YR2.5/3,2.5/4, 3/3,4/6 | gsc | >35 | Ap-Bt | - |
| 13 | Sirur (SRR) | 100-150 | 10YR3/2,3/1,3/3, 5/2 | c | - | Ap-Bw-BCk-Crk | es-ev |
| **Soils of Alluvial Landscape** | | | | | | | |
| 14 | Ravanaki (RNK) | 50-75 | 7.5YR3/2,3/3,5/2,5/3 10YR3/1,3/2,4/1, 4/2, 5/1,6/1 | c | <15 | Ap-Bw-Cr | e-ev |
| 15 | Gatareddihal (GRH) | 100-150 | 10YR 2/1, 3/1, 2.5Y 4/3, 5/4 | c | <15 | Ap-Bss-BC-C | es |

### 3.4 Soil Mapping

The area under each soil series was further separated into 32 soil phases and their boundaries delineated on the cadastral map based on the variations observed in the texture of the surface soil, slope, erosion, presence of gravel, stoniness etc. A soil phase is a subdivision of soil series based mostly on surface features that affect its use and management.

The soil mapping units are shown on the soil map (Fig. 3.5) in the form of symbols. During the survey many soil profile pits, few minipits and a few auger bores representing different landforms occurring in the microwatershed were studied. In

addition to the profile study, spot observations in the form of minipits, road cuts, terrace cuts etc., were studied to validate the soil boundaries on the soil map. The soil map shows the geographic distribution of 32 mapping units representing 15 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 32 soil phases mapped in the microwatershed. Each mapping unit (soil phase) delineated on the map has similar soil and site characteristics. In other words, all the farms or survey numbers included in one phase will have similar management needs and have to be treated accordingly.

### 3.5 Laboratory Characterization

Soil samples for each soil series were collected from representative master profiles for laboratory characterization by following the methods outlined in the Laboratory Manual (Sarma *et al*, 1987). Surface soil samples collected in the year 2018 from Hanumanahatti farmer's fields for fertility status (major and micronutrients) at 320 m grid interval were analyzed in the laboratory (Katyal and Rattan, 2003). By linking the soil fertility data to the survey numbers through GIS, soil fertility maps were generated using Kriging method for the microwatershed.

**Table 3.2 Soil map unit description of Hanumanahatti Microwatershed**

| Soil map unit No* | Soil Series | Soil Phase Symbol | Mapping Unit Description | Area in ha (%) |
|---|---|---|---|---|
| **Soils of Granite gneiss Landscape** | | | | |
| | ABR | Abbigere soils are shallow (25-50 cm), well drained, have dark reddish brown red gravelly sandy clay soils occuring on very gently sloping uplands under cultivation | | **23 (4.98)** |
| 470 | | ABRbB2g2 | Loamy sand surface, slope 1-3%, moderate erosion, very gravelly (35-60%) | 23 (4.98) |
| | LKR | Lakkur soils are moderately shallow (50-75cm), well drained, have reddish brown to dark red gravelly sandy clay red soils occuring on nearly level to very gently and gently sloping uplands under cultivation | | **30 (6.49)** |
| 452 | | LKRhB2g1 | Sandy clay loam surface, slope 1-3%, moderate erosion, gravelly (15-35%) | 9 (1.96) |
| 47 | | LKRhB2g2 | Sandy clay loam surface, slope 1-3%, moderate erosion, very gravelly (35-60%) | 17 (3.72) |
| 54 | | LKRiB2g1 | Sandy clay surface, slope 1-3%, moderate erosion, gravelly (15-35%) | 4 (0.81) |
| | KTP | Kethanapura soils are moderately shallow (50-75 cm), well drained, have dark reddish brown, gravelly sandy clay soils occuring on very gently to gently sloping uplands under cultivation | | **0 .12 (0.02)** |
| 72 | | KTPhB2g1 | Sandy clay loam surface, slope 1-3%, moderate erosion, gravelly (15-35%) | 0 .12(0.02) |

| Soil map unit No* | Soil Series | Soil Phase Symbol | Mapping Unit Description | Area in ha (%) |
|---|---|---|---|---|
| | MKH | Mukhadahalli soils are moderately shallow (50-75 cm), well drained, have dark brown to reddish brown, gravelly sandy clay soils occuring on very gently to gently sloping uplands under cultivation | | **22 (4.66)** |
| 77 | | MKHcB2g1 | Sandy loam surface, slope 1-3%, moderate erosion, gravelly (15-35%) | 22 (4.66) |
| | HDH | Hooradhahalli soils are moderately deep (75-100 cm), well drained, have red to dark red and reddish brown gravelly sandy clay to clay soils occuring on very gently to gently sloping uplands under cultivation | | **37 (7.77)** |
| 111 | | HDHcB2g1 | Sandy loam surface, slope 1-3%, moderate erosion, gravelly (15-35%) | 19 (4.03) |
| 112 | | HDHcB2g2 | Sandy loam surface, slope 1-3%, moderate erosion, very gravelly (35-60%) | 18 (3.74) |
| | GHT | Gollarahatti soils are moderately deep (75-100 cm), well drained, have dark reddish brown to dark red gravelly sandy clay loam soils occuring on very gently to gently sloping uplands | | **25 (5.4)** |
| 134 | | GHTbB2g1 | Loamy sand surface, slope 1-3%, moderate erosion, gravelly (15-35%) | 2 (0.46) |
| 135 | | GHTcB1g1 | Sandy loam surface slope 1-3%, slight erosion, gravelly (15-35%) | 20 (4.23) |
| 137 | | GHTcB2 | Sandy loam surface, slope 1-3%, moderate erosion | 1 (0.19) |
| 142 | | GHThB2g1 | Sandy clay loam surface, slope 1-3%, moderate erosion, gravelly (15-35%) | 2 (0.52) |
| | BSR | Bisarahalli soils are moderately deep (75-100 cm), well drained, have dark reddish brown gravelly sandy clay red soils occuring on very gently sloping uplands under cultivation | | **3 (0.64)** |
| 162 | | BSRhB2g1 | Sandy clay loam surface, slope 1-3%, moderate erosion, gravelly (15-35%) | 3 (0.64) |
| | CKM | Chikkamegheri soils are moderately deep (75-100 cm), well drained, have dark brown to dark reddish brown and red sandy clay soils occuring on nearly level to very gently sloping uplands under cultivation | | **9 (1.88)** |
| 170 | | CKMbB2g1 | Loamy sand surface, slope 1-3%, moderate erosion, gravelly (15-35%) | 9 (1.88) |
| | KMH | Kumchahalli soils are deep (100-150 cm), well drained, have dark reddish brown to dark red sandy clay soils occuring on nearly level to very gently sloping uplands under cultivation | | **8 (1.62)** |
| 200 | | KMHiB1 | Sandy clay surface, slope 1-3%, slight erosion | 8 (1.62) |
| | JDG | Jedigere soils are deep (100-150 cm) well drained, have | | **51** |

| Soil map unit No* | Soil Series | Soil Phase Symbol | Mapping Unit Description | Area in ha (%) |
|---|---|---|---|---|
| | | yellowish red to strong brown sandy clay to clay soils occuring on nearly level to very gently sloping uplands under cultivation | | **(11.01)** |
| 211 | | JDGhB1g1 | Sandy clay loam surface, slope 1-3%, slight erosion, gravelly (15-35%) | 22 (4.79) |
| 213 | | JDGiB2g1 | Sandy clay surface, slope 1-3%, moderate erosion, gravelly (15-35%) | 29 (6.22) |
| | BPR | Balapur soils are deep (100-150 cm), well drained, have dark reddish brown to dark red, gravelly sandy clay to clay soils occuring on very gently to gently sloping uplands under cultivation | | **143 (30.45)** |
| 217 | | BPRbB2g1 | Loamy sand surface, slope 1-3%, moderate erosion, gravelly (15-35%) | 25 (5.26) |
| 219 | | BPRbB2g2 | Loamy sand surface, slope 1-3%, moderate erosion, very gravelly (35-60%) | 12 (2.53) |
| 224 | | BPRcB2 | Sandy loam surface, slope 1-3%, moderate erosion | 17 (3.69) |
| 225 | | BPRcB2g1 | Sandy loam surface, slope 1-3%, moderate erosion, gravelly (15-35%) | 15 (3.17) |
| 226 | | BPRcB2g2 | Sandy loam surface, slope 1-3%, moderate erosion, very gravelly (35-60%) | 9 (1.83) |
| 227 | | BPRcC2g1 | Sandy loam surface, slope 3-5%, moderate erosion, gravelly (15-35%) | 7 (1.52) |
| 229 | | BPRhB1g1 | Sandy clay loam surface, slope 1-3%, slight erosion, gravelly (15-35%) | 7 (1.59) |
| 232 | | BPRhB2g2 | Sandy clay loam surface, slope 1-3%, moderate erosion, very gravelly (35-60%) | 3 (0.67) |
| 237 | | BPRiB1 | Sandy clay surface, slope 1-3%,slight erosion | 17 (3.58) |
| 239 | | BPRiB2 | Sandy clay surface, slope 1-3%, moderate erosion | 31 (6.61) |
| | NDL | Niduvalalu soils are very deep (>150 cm), well drained, have dark red and dark reddish brown gravelly sandy clay soils occuring on nearly level to very gently sloping uplands under cultivation | | **10 (2.19)** |
| 291 | | NDLcB2g1 | Sandy loam surface, slope 1-3%, moderate erosion, gravelly (15-35%) | 10 (2.19) |
| | SRR | Sirur soils are deep (100-150 cm), moderately well drained, have very dark grayish brown to grayish brown, calcareous cracking clay soils occuring on nearly level to very gently sloping lowlands under cultivation | | **30 (6.31)** |
| 474 | | SRRmA1 | Clay surface, slope 0-1%,slight erosion | 30 (6.31) |
| **Alluvial landscape** | | | | |

| Soil map unit No* | Soil Series | Soil Phase Symbol | Mapping Unit Description | Area in ha (%) |
|---|---|---|---|---|
| | RNK | Ravanaki soils are moderately shallow (50-75 cm), well drained, have dark brown to very dark grayish brown, calcareous clay soils occuring on nearly level to very gently sloping plains under cultivation | | **27 (5.66)** |
| 333 | | RNKmB1 | Clay surface, slope 1-3%,slight erosion | 27 (5.66) |
| | GRH | Gatareddihal soils are deep (100-150 cm), moderately well drained, have black or dark grey to light olive brown, calcareous sodic clay soils occuring on nearly level to very gently sloping plains under cultivation | | **35 (7.5)** |
| 370 | | GRHmA1 | Clay surface, slope 0-1%, slight erosion | 9 (1.86) |
| 373 | | GRHmB2 | Clay surface, slope 1-3%, moderate erosion | 26 (5.64) |
| 999 | | Rock outcrops | Rock lands, both massive and bouldery with little or no soil | **1 (0.12)** |
| 1000 | | Others | Habitation and water body | **15 (3.3)** |

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

### 3.6 Land Management Units (LMU's)

The 32 soil phases identified and mapped in the microwatershed were regrouped into 7 Land Management Units (LMU's) for the purpose of preparing a Proposed Crop Plan for sustained development of the microwatershed. The database (soil phases) generated under LRI was utilized for identifying Land Management Units (LMU's) based on the management needs. One or more than one soil site characteristic having influence on the management have been choosen for identification and delineation of LMUs. For Hanumanahatti Microwatershed, five soil and site characteristics, namely soil depth, soil texture, slope, erosion and gravel content have been considered for defining LMUs. The Land Management Units are expected to behave similarly for a given level of management.

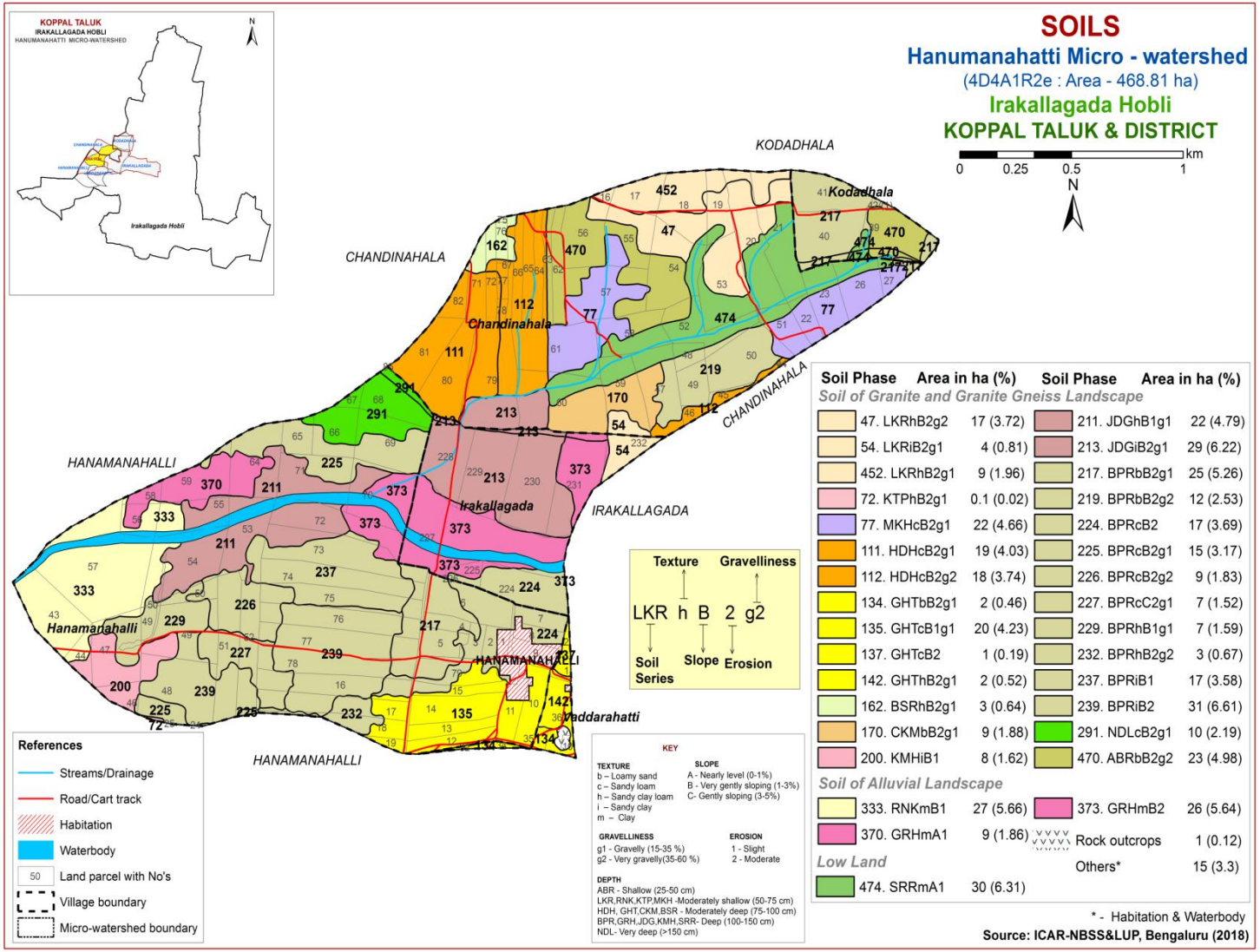


Fig 3.5 Soil Phase or Management Units-Hanumanahatti Microwatershed

*Chapter 4*

# THE SOILS

Detailed information pertaining to the nature, extent and distribution of different kinds of soils occurring in Hanumanahatti Microwatershed is provided in this chapter. The microwatershed area has been identified as granite gneiss and alluvial landscapes based on geology. In all, 15 soil series are identified. Soil formation is the result of the combined effect of environmental and terrain factors that are reflected in soil morphology. The soil formation is dominantly influenced by the parent material, climate, time and relief.

A brief description of each of the 15 soil series identified followed by 32 soil phases (management units) mapped (Fig. 3.4) are furnished below. The physical and chemical characteristics of soil series identified in Hanumanahatti Microwatershed are given in Table 4.1. The soils in any one map unit differ from place to place in their depth, texture, slope, gravelliness, erosion or any other site characteristic that affect management. The soil phase map can be used for identifying the suitability of areas for growing specific crops or for other alternative uses and also for deciding the type of conservation structures needed. The detailed information on soil and site-characteristics like soil depth, surface soil texture, slope, erosion, gravelliness, AWC, LCC etc, with respect to each of the soil phase identified is given village/survey number wise for the microwatershed in Appendix-I.

## 4.1 Soils of granite and granite gneiss landscape

In this landscape, 13 soil series are identified and mapped. Of these, Balapur (BPR) series occupies maximum area of 143 ha (30%), Jedigere (JDG) 51 ha (11%), Hooradhahalli (HDH) 37 ha (8%), Lakkur (LKR) 30 ha (6%), Sirur (SRR) 30 ha (6%), Gollarahatti (GHT) 25 ha (5%), Abbigere (ABR) 23 ha (5%), Mukhadahalli (MKH) 22 ha (5%), Niduvalalu (NDL) 10 ha (2%), Chikkamegheri (CKM) 9 ha (2%), Kumchahalli (KMH) 8 ha (2%), Bisarahalli (BSR) 3 ha (1%) and Kethanapura (KTP) occupy minor area of about 0.12 ha (<1%) in the microwatershed. The brief description of each soil series along with the soil phases identified and mapped is given below.

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

The thickness of the solum ranges from 28 to 48 cm. The thickness of A-horizon ranges from 12 to 17 cm. Its colour is in 5YR and 2.5 YR hue with value 3 to 4 and chroma 3 to 4. The texture is sandy clay with 20 to 35 per cent gravel. The thickness of B-horizon ranges from 16 to 32 cm. Its colour is in 2.5 YR and 5 YR hue with value 2.5

to 4 and chroma 2 to 3. Its texture is sandy clay to clay with gravel content of more than 35 per cent. The available water capacity is very low (<50 mm/m). Only one phase was identified and mapped.


Landscape and soil profile characteristics of Abbigere (ABR) Series

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

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

Landscape and soil profile characteristics of Lakkur (LKR) Series

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

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

Landscape and soil profile characteristics of Kethanapura (KTP) Series

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

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

Landscape and soil profile characteristics of Mukhadahalli (MKH) Series

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

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

Landscape and soil profile characteristics of Hooradhahalli (HDH) Series

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

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

Landscape and soil profile characteristics of Gollarahatti (GHT) Series

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

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

Landscape and soil profile characteristics of Bisarahalli (BSR) Series

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

The thickness of the solum ranges from 76 to 100 cm. The thickness of A horizon ranges from 11 to 24 cm. Its colour is in 7.5 YR, 5YR and 2.5 YR hue with value 2 to 4 and chroma 3 to 6. The texture varies from sandy clay loam to sandy clay with 10 to 15 per cent gravel. The thickness of B horizon ranges from 65 to 86 cm. Its colour is in 2.5 YR hue with value 2.5 to 3 and chroma 3 to 6. Its texture is dominantly sandy clay to clay. The available water capacity is medium (100-150 mm/m). Only one phase was identified and mapped.

Landscape and soil profile characteristics of Chikkamegheri (CKM) Series

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

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

Landscape and soil profile characteristics of Kumchahalli (KMH) Series

**4.1.10 Jedigere (JDG) Series:** Jedigere soils are deep (100-150 cm) well drained, have yellowish red to strong brown sandy clay to clay soils. They have developed from weathered granite gneiss and occur on nearly level to very gently sloping uplands under cultivation. The Jedigere series has been classified as a member of the fine, mixed, isohyperthermic family of Typic Haplustalfs.

The thickness of the solum ranges from 117 to 145 cm. The thickness of A horizon ranges from 13 to 21 cm. Its colour is in hue 5 YR and 7.5 YR with value 2 to 4 and chroma 2 to 6. Its texture is dominantly sandy clay and sand clay loam. The thickness of B horizon ranges from 104 to 124 cm. Its colour is in hue 5 YR and 7.5 YR with value 3 to 4 and chroma 3 to 6. Its texture is dominantly clay. The available water capacity is very high (>200 mm/m). Two phases were identified and mapped.

Landscape and Soil Profile Characteristics of Jedigere (JDG) Series

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

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

Landscape Soil Profile Characteristics of Balapur (BPR) Series

**4.1.12 Niduvalalu (NDL) Series:** Niduvalalu soils are very deep (>150 cm), well drained, have dark red and dark reddish brown gravelly sandy clay soils. They have developed from weathered granite gneiss and occur on nearly level to very gently sloping uplands under cultivation. The Niduvalalu series has been classified as a member of the clayey–skeletal, mixed isohyperthermic family of Rhodic Paleustalfs.

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 hue with value 2.5 to 4 and chroma 4 to 6. Its texture is sandy clay and ranges from gravelly sandy clay with 20 to 75 per cent gravel. The available water capacity is low (50-100 mm/m). Only one phase was identified and mapped.

Landscape and soil Profile Characteristics of Niduvalalu (NDL) Series

**4.1.13 Sirur (SRR) Series:** Sirur soils are deep (100-150 cm), moderately well drained, very dark grayish brown to grayish brown, calcareous cracking clay soils. They have developed from weathered granite gneiss and occur on nearly level to very gently sloping lowlands under cultivation. The Sirur series has been classified as a member of fine, smectitic (calc), isohyperthermic family of Vertic Haplustepts.

The thickness of the solum ranges from 108 to 146 cm. The thickness of A horizon ranges from 14 to 22 cm. Its colour is in 10 YR hue with value 3 to 4 and chroma 2 to 3. The texture is dominantly clay. The thickness of B horizon ranges from 98 to 128 cm. Its colour is in 10 YR hue with value 3 to 5 and chroma 1 to 3. Its texture is dominantly clay and are calcareous. The available water capacity is high (150-200 mm/m). Only one phase was identified and mapped.

Landscape and soil profile characteristics of Sirur (SRR) Series

**4.2 Soils of Alluvial Landscape**

In this landscape, two soil series have been identified and mapped. Of these, Gatareddihal (GRH) series occupies maximum area of 35 ha (8%) and Ravanaki (RNK) occupy an area of about 27 ha (6%) in the microwatershed. The brief description of soil series along with the soil phases identified and mapped is given below.

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

The thickness of the solum ranges from 50 to 75 cm. The thickness of A horizon ranges from 15 to 20 cm. Its colour is in 7.5 YR and 10 YR hue with value 2 to 3 and chroma 2.5 to 4. The texture varies from sandy clay to clay with 10 to 15 per cent gravel. The thickness of B horizon ranges from 35 to 60 cm. Its colour is in 10 YR and 7.5 YR hue with value 2 to 6 and chroma 2 to 4. Its texture is sandy clay to clay with gravel

content of 10 to 20 per cent. The available water capacity is low (51-100 mm/m). Only one phase was identified and mapped.

Landscape and soil Profile Characteristics of Ravanaki (RNK) Series

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

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

Landscape and soil profile characteristics of Gatareddihal (GRH) Series

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

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

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

| Depth (cm) | pH (1:2.5) | | | E.C. (1:2.5) | O.C. | $CaCO_3$ | Exchangeable bases | | | | | CEC | CEC/ Clay | Base saturation | ESP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Ca | Mg | K | Na | Total | | | | |
| | Water | $CaCl_2$ | M KCl | dS $m^{-1}$ | % | % | cmol $kg^{-1}$ | | | | | | | % | % |
| 0-10 | 6.13 | - | - | 0.02 | 0.81 | - | 1.56 | 0.50 | 0.04 | 0.01 | 2.12 | 3.60 | 0.34 | 58.76 | 0.36 |
| 10.-25 | 6.32 | - | - | 0.03 | 0.79 | - | 5.63 | 2.41 | 0.12 | 0.01 | 8.17 | 10.60 | 0.28 | 77.07 | 0.10 |
| 25-40 | 6.27 | - | - | 0.03 | 0.64 | - | 5.41 | 2.24 | 0.08 | 0.01 | 7.74 | 12.40 | 0.32 | 62.44 | 0.09 |

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

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

| Depth (cm) | pH (1:2.5) | | | E.C. (1:2.5) | O.C. | $CaCO_3$ | Exchangeable bases | | | | | CEC | CEC/ Clay | Base saturation | ESP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Ca | Mg | K | Na | Total | | | | |
| | Water | $CaCl_2$ | M KCl | dS $m^{-1}$ | % | % | cmol $kg^{-1}$ | | | | | | | % | % |
| 0-21 | 8.18 | - | - | 0.30 | 0.56 | 0.94 | - | - | 0.31 | 0.55 | 0.86 | 12.19 | 0.69 | 100.00 | 4.51 |
| 21-35 | 8.17 | - | - | 0.30 | 0.52 | 1.29 | - | - | 0.19 | 0.84 | 1.03 | 22.18 | 0.63 | 100.00 | 3.79 |
| 35-56 | 7.95 | - | - | 0.46 | 0.48 | 1.99 | - | - | 0.24 | 0.58 | 0.82 | 22.94 | 0.60 | 100.00 | 2.53 |

*Contd...*

**Series Name:** Kethanapura (KTP), **Pedon:** R-9
**Location:** $15^0$25'28.81"N, $76^0$22'00.76" E Jabbaragudda village, Koppal Taluk and District
**Analysis at:** NBSS&LUP, Regional Centre, Bangalore. **Classification:** Fine, mixed, isohyperthermic Rhodic Paleustalfs

| Depth (cm) | Horizon | Size class and particle diameter (mm) | | | | | | | | Coarse fragments w/w (%) | Texture Class (USDA) | % Moisture | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total | | | Sand | | | | | | | | |
| | | Sand (2.0-0.05) | Silt (0.05-0.002) | Clay (<0.002) | Very coarse (2.0-1.0) | Coarse (1.0-0.5) | Medium (0.5-0.25) | Fine (0.25-0.1) | Very fine (0.1-0.05) | | | 1/3 Bar | 15 Bar |
| 0-18 | Ap | 83.64 | 10.52 | 5.84 | 25.61 | 22.36 | 15.24 | 13.52 | 6.91 | 10 | ls | 7.92 | 2.58 |
| 18-38 | Bt1 | 46.06 | 5.63 | 48.31 | 21.58 | 9.54 | 3.53 | 4.15 | 7.26 | 30 | sc | 19.62 | 14.48 |
| 38-73 | Bt2 | 52.31 | 6.91 | 40.78 | 24.56 | 12.74 | 5.96 | 5.55 | 3.49 | 30 | sc | 17.73 | 11.95 |

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

*Contd...*

**Series Name:** Mukahadahalli (MKH), **Pedon:** R-11
**Location:** $15^0$22'05.4"N, $76^0$04'10.3"E, Halageri village, Koppal Taluk and District
**Analysis at:** NBSS&LUP, Regional Centre, Bangalore. **Classification:** Clayey-skeletal, mixed, isohyperthermic Typic Haplustalfs

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

| Depth (cm) | pH (1:2.5) | | | E.C. (1:2.5) | O.C. | $CaCO_3$ | Exchangeable bases | | | | | CEC | CEC/ Clay | Base saturation | ESP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Ca | Mg | K | Na | Total | | | | |
| | Water | $CaCl_2$ | M KCl | dS $m^{-1}$ | % | % | cmol $kg^{-1}$ | | | | | | | % | % |
| 0-19 | 7.38 | - | - | 0.09 | 0.2 | 0.00 | 8.97 | 4.32 | 0.26 | 0.22 | 13.77 | 14.84 | 0.58 | 93 | 1.49 |
| 19-32 | 7.5 | - | - | 0.106 | 0.41 | 0.00 | 15.98 | 3.27 | 0.16 | 0.50 | 19.91 | 20.88 | 0.63 | 95 | 2.38 |
| 32-58 | 7.46 | - | - | 0.173 | 0.49 | 0.00 | 19.71 | 4.53 | 0.23 | 1.32 | 25.79 | 25.76 | 0.62 | 100 | 5.11 |

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

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

| Depth (cm) | pH (1:2.5) | | | E.C. (1:2.5) | O.C. | $CaCO_3$ | Exchangeable bases | | | | | CEC | CEC/ Clay | Base saturation | ESP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Ca | Mg | K | Na | Total | | | | |
| | Water | $CaCl_2$ | M KCl | dS $m^{-1}$ | % | % | cmol $kg^{-1}$ | | | | | | | % | % |
| 0-18 | 6.54 | - | - | 0.07 | 0.60 | 0.00 | 2.68 | 1.38 | 0.44 | 0.42 | 4.91 | 5.84 | 0.48 | 84.07 | 7.11 |
| 18-33 | 5.90 | - | - | 0.07 | 0.52 | 0.00 | 3.99 | 1.27 | 0.09 | 0.37 | 5.71 | 8.61 | 0.26 | 66.32 | 4.29 |
| 33-58 | 6.16 | - | - | 0.07 | 0.44 | 0.00 | 4.92 | 1.67 | 0.08 | 0.55 | 7.22 | 10.00 | 0.24 | 72.23 | 5.50 |
| 58-90 | 6.39 | - | - | 0.06 | 0.40 | 0.00 | 4.30 | 2.02 | 0.08 | 0.46 | 6.87 | 9.21 | 0.21 | 74.61 | 5.05 |

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**Soil Series:** Gollarahatti (GHT), **Pedon:** RM-2
**Location:** $50^0$04'88.8"N, $75^0$37'65.2"E, (4D4A3I1f), Belhatti village, Shirahatti taluk, Gadag district.
**Analysis at:** NBSS&LUP, Regional Centre, Bengaluru **Classification:** Fine-loamy, mixed, isohyperthermic Typic Rhodustalfs

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

| Depth (cm) | pH (1:2.5) | | | E.C. (1:2.5) | O.C. | $CaCO_3$ | Exchangeable bases | | | | | CEC | CEC/ Clay | Base saturation | ESP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Ca | Mg | K | Na | Total | | | | |
| | Water | $CaCl_2$ | M KCl | dS $m^{-1}$ | % | % | cmol $kg^{-1}$ | | | | | | | % | % |
| 0-26 | 5.70 | - | - | 0.06 | 0.20 | 0.00 | 1.50 | 0.60 | 0.09 | 0.13 | 2.32 | 3.17 | 0.29 | 73.00 | 4.10 |
| 26-63 | 6.26 | - | - | 0.04 | 0.24 | 0.00 | 7.35 | 1.55 | 0.09 | 0.17 | 9.15 | 9.89 | 0.32 | 93.00 | 1.72 |
| 63-84 | 6.50 | - | - | 0.05 | 0.20 | 0.47 | - | - | 0.09 | 0.21 | 0.30 | 10.18 | 0.32 | 100.00 | 2.06 |

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**Series Name:** Bisarahalli (BSR) **Pedon:** R-9
**Location:** $15^0$25'21.0"N, $76^0$11'42.0"E Hatti village, Koppal Taluk and District
**Analysis at:** NBSS&LUP, Regional Centre, Bangalore**.** **Classification:** Fine, mixed, isohyperthermic Typic Paleustalfs

| Depth (cm) | Horizon | Size class and particle diameter (mm) | | | | | | | | Coarse fragments w/w (%) | Texture Class (USDA) | % Moisture | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total | | | Sand | | | | | | | | |
| | | Sand (2.0-0.05) | Silt (0.05-0.002) | Clay (<0.002) | Very coarse (2.0-1.0) | Coarse (1.0-0.5) | Medium (0.5-0.25) | Fine (0.25-0.1) | Very fine (0.1-0.05) | | | 1/3 Bar | 15 Bar |
| 0-14 | Ap | 70.11 | 9.29 | 20.60 | 22.31 | 15.97 | 11.98 | 9.83 | 10.03 | 20 | scl | 13.22 | 7.81 |
| 14-57 | Bt1 | 47.27 | 7.52 | 45.20 | 27.04 | 8.28 | 4.61 | 2.10 | 5.24 | 25 | sc | 16.39 | 13.31 |
| 57-80 | Bt2 | 41.93 | 8.67 | 49.40 | 21.95 | 6.83 | 4.76 | 4.66 | 3.73 | 30 | c | 21.41 | 15.41 |
| 80-99 | Bt3 | 49.02 | 9.87 | 41.11 | 19.90 | 10.78 | 6.84 | 6.42 | 5.08 | 40 | sc | 21.82 | 14.24 |

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

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**Series Name:** Chikkamegheri (CKM), **Pedon:** RM-2
**Location:** $15^0$21'40"N, $76^0$16'43"E, Gudanahalli village, Koppal Taluk and District
**Analysis at:** NBSS&LUP, Regional Centre, Bangalore. **Classification:** Fine, mixed, isohyperthermic Rhodic Paleustalfs

| Depth (cm) | Horizon | Size class and particle diameter (mm) | | | | | | | | Coarse fragments w/w (%) | Texture Class (USDA) | % Moisture | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total | | | Sand | | | | | | | | |
| | | Sand (2.0-0.05) | Silt (0.05-0.002) | Clay (<0.002) | Very coarse (2.0-1.0) | Coarse (1.0-0.5) | Medium (0.5-0.25) | Fine (0.25-0.1) | Very fine (0.1-0.05) | | | 1/3 Bar | 15 Bar |
| 0-10 | Ap | 66.80 | 5.51 | 27.69 | 10.14 | 10.04 | 20.29 | 14.75 | 11.58 | - | scl | 20.59 | 7.15 |
| 10-25 | Bt1 | 39.52 | 7.17 | 53.32 | 8.75 | 9.59 | 7.27 | 8.43 | 5.48 | - | c | 26.96 | 13.99 |
| 25-38 | Bt2 | 42.00 | 7.16 | 50.84 | 13.16 | 8.74 | 6.42 | 8.53 | 5.16 | - | c | 26.51 | 13.42 |
| 38-55 | Bt3 | 41.77 | 10.31 | 47.92 | 15.19 | 8.54 | 6.33 | 7.38 | 4.32 | 10 | c | 25.28 | 14.10 |
| 55-70 | Bt4 | 44.03 | 8.96 | 47.01 | 15.72 | 9.22 | 6.92 | 6.81 | 5.35 | 20 | c | 24.30 | 14.35 |
| 70-90 | Bt5 | 56.02 | 8.46 | 35.52 | 11.41 | 17.07 | 12.36 | 10.26 | 4.92 | 25 | sc | 20.59 | 13.06 |

| Depth (cm) | pH (1:2.5) | | | E.C. (1:2.5) | O.C. | $CaCO_3$ | Exchangeable bases | | | | | CEC | CEC/ Clay | Base saturation | ESP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Ca | Mg | K | Na | Total | | | | |
| | Water | $CaCl_2$ | M KCl | dS $m^{-1}$ | % | % | cmol $kg^{-1}$ | | | | | | | % | % |
| 0-10 | 7.99 | - | - | 0.326 | 0.83 | 4.44 | 9.35 | 4.76 | 0.28 | 0.54 | 14.93 | 12.50 | 0.45 | 119 | 1.73 |
| 10-25 | 7.36 | - | - | 0.345 | 0.99 | 2.40 | 10.37 | 4.84 | 0.10 | 1.18 | 16.48 | 17.60 | 0.33 | 94 | 2.67 |
| 25-38 | 6.69 | - | - | 0.477 | 0.79 | 0.00 | 10.25 | 4.20 | 0.09 | 1.61 | 16.15 | 16.10 | 0.32 | 100 | 4.00 |
| 38-55 | 6.45 | - | - | 0.548 | 0.63 | 0.00 | 9.43 | 2.86 | 0.10 | 1.52 | 13.91 | 14.80 | 0.31 | 94 | 4.11 |
| 55-70 | 6.35 | - | - | 0.532 | 0.71 | 0.00 | 9.59 | 2.79 | 0.11 | 1.66 | 14.16 | 14.60 | 0.31 | 97 | 4.56 |
| 70-90 | 6.44 | - | - | 0.613 | 0.27 | 0.00 | 9.58 | 3.10 | 0.19 | 1.87 | 14.74 | 14.70 | 0.41 | 100 | 5.08 |

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S**eries Name:** Kumchahalli (KMH), **Pedon:** RM-9
**Location:** $15^0$20’05”N, $76^0$13’21”E, Basapura village, Koppal Taluk and District
**Analysis at:** NBSS&LUP, Regional Centre, Bangalore. **Classification:** Fine, mixed, isohyperthermic Typic Rhodustalfs

| Depth (cm) | Horizon | Size class and particle diameter (mm) | | | | | | | | Coarse fragments w/w (%) | Texture Class (USDA) | % Moisture | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total | | | Sand | | | | | | | | |
| | | Sand (2.0-0.05) | Silt (0.05-0.002) | Clay (<0.002) | Very coarse (2.0-1.0) | Coarse (1.0-0.5) | Medium (0.5-0.25) | Fine (0.25-0.1) | Very fine (0.1-0.05) | | | 1/3 Bar | 15 Bar |
| 0-13 | Ap | 51.76 | 9.05 | 39.19 | 7.99 | 8.84 | 13.42 | 14.38 | 7.14 | - | sc | 20.08 | 13.69 |
| 13-27 | A21 | 53.50 | 8.12 | 38.38 | 7.00 | 11.05 | 15.21 | 14.33 | 5.91 | - | sc | 17.05 | 12.32 |
| 27-43 | A22 | 63.60 | 5.01 | 31.40 | 3.85 | 11.56 | 24.52 | 18.52 | 5.14 | - | scl | 11.76 | 9.09 |
| 43-64 | Bt1 | 48.74 | 5.91 | 45.35 | 8.87 | 9.31 | 12.49 | 12.27 | 5.81 | 10 | sc | 16.68 | 13.35 |
| 64-84 | Bt2 | 45.13 | 8.90 | 45.97 | 9.86 | 7.12 | 10.95 | 10.62 | 6.57 | 20 | sc | 17.45 | 13.42 |
| 84-114 | BC | 65.04 | 6.94 | 28.02 | 10.49 | 16.21 | 17.80 | 13.88 | 6.67 | 40 | scl | 13.20 | 9.75 |

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

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**Series Name:** Jedigere (JDG),**Pedon:** R5
**Location:** Chennahalu village, Yelburga Taluk and Koppal District
**Analysis at:** NBSS&LUP, Regional Centre, Bangalore. **Classification:** Fine, mixed, isohyperthermic Typic Haplustalfs

| Depth (cm) | Horizon | Size class and particle diameter (mm) | | | | | | | | Coarse fragments w/w (%) | Texture Class (USDA) | % Moisture | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total | | | Sand | | | | | | | | |
| | | Sand (2.0-0.05) | Silt (0.05-0.002) | Clay (<0.002) | Very coarse (2.0-1.0) | Coarse (1.0-0.5) | Medium (0.5-0.25) | Fine (0.25-0.1) | Very fine (0.1-0.05) | | | 1/3 Bar | 15 Bar |
| 0-14 | Ap | 70.63 | 8.33 | 21.04 | 16.26 | 23.58 | 13.41 | 11.59 | 5.79 | - | scl | 13.46 | 6.17 |
| 14-39 | Bt1 | 49.95 | 11.56 | 38.49 | 10.61 | 17.40 | 10.30 | 7.42 | 4.22 | - | sc | 23.07 | 13.70 |
| 39-62 | Bt2 | 45.88 | 11.44 | 42.68 | 10.72 | 16.70 | 9.28 | 6.80 | 2.37 | - | sc | 25.24 | 15.20 |
| 62-94 | Bt3 | 42.89 | 8.51 | 48.61 | 9.48 | 14.54 | 8.35 | 6.80 | 3.71 | - | c | 25.30 | 14.07 |
| 94-118 | Bt4 | 45.24 | 11.90 | 42.86 | 10.66 | 15.53 | 8.59 | 6.63 | 3.83 | - | sc | 23.52 | 13.58 |

| Depth (cm) | pH (1:2.5) | | | E.C. (1:2.5) | O.C. | $CaCO_3$ | Exchangeable bases | | | | | CEC | CEC/ Clay | Base saturation | ESP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Ca | Mg | K | Na | Total | | | | |
| | Water | $CaCl_2$ | M KCl | dS $m^{-1}$ | % | % | cmol $kg^{-1}$ | | | | | | | % | % |
| 0-14 | 6.11 | - | - | 0.078 | 0.83 | - | 5.58 | 2.49 | 0.18 | 0.19 | 8.45 | 9.41 | 0.45 | 90 | 2.06 |
| 14-39 | 6.87 | - | - | 0.123 | 0.67 | - | 12.01 | 5.62 | 0.32 | 0.29 | 18.24 | 18.22 | 0.47 | 100 | 1.59 |
| 39-62 | 7.65 | - | - | 0.121 | 0.50 | - | - | - | 0.42 | 0.43 | - | 21.68 | 0.51 | - | 1.99 |
| 62-94 | 8.21 | - | - | 0.188 | 0.28 | - | - | - | 0.34 | 0.41 | - | 21.09 | 0.43 | - | 1.93 |
| 94-118 | 8.23 | - | - | 0.189 | 0.24 | - | - | - | 0.33 | 0.36 | - | 17.62 | 0.41 | - | 2.02 |

*Contd...*

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

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

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

*Contd...*

**Series Name:** Niduvalalu (NDL) **Pedon:** R-20
**Location:** $15^0$12'78.8"N, $75^0$57'44.0" E Raghunathanahalli village, Koppal Taluk and District
**Analysis at:** NBSS&LUP, Regional Centre, Bangalore. **Classification:** Clayey –skeletal, mixed, isohyperthermic Rhodic Paleustalfs

| Depth (cm) | Horizon | Size class and particle diameter (mm) | | | | | | | | Coarse fragments w/w (%) | Texture Class (USDA) | % Moisture | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total | | | Sand | | | | | | | | |
| | | Sand (2.0-0.05) | Silt (0.05-0.002) | Clay (<0.002) | Very coarse (2.0-1.0) | Coarse (1.0-0.5) | Medium (0.5-0.25) | Fine (0.25-0.1) | Very fine (0.1-0.05) | | | 1/3 Bar | 15 Bar |
| 0-16 | Ap | 79.83 | 7.02 | 13.15 | 9.36 | 11.02 | 19.54 | 28.59 | 11.33 | 35-40 | sl | 14.30 | 5.17 |
| 16-31 | Bt1 | 54.75 | 10.89 | 34.36 | 12.81 | 7.47 | 12.17 | 11.95 | 10.35 | 55-60 | scl | 24.67 | 14.17 |
| 31-44 | Bt2 | 44.64 | 2.31 | 53.06 | 17.06 | 8.48 | 7.19 | 8.05 | 3.86 | 65-70 | c | 30.02 | 17.19 |
| 44-79 | Bt3 | 47.28 | 2.50 | 50.21 | 24.17 | 8.20 | 6.07 | 5.96 | 2.88 | 65-70 | sc | 27.19 | 14.87 |
| 79-107 | Bt4 | 47.79 | 8.17 | 44.04 | 13.38 | 5.72 | 11.11 | 11.87 | 5.72 | 60-65 | sc | 25.96 | 14.23 |
| 107-140 | Bt5 | 46.16 | 3.57 | 50.27 | 21.75 | 7.57 | 6.40 | 6.72 | 3.73 | 60-65 | sc | 27.28 | 15.13 |
| 140-180 | Bt6 | 49.47 | 3.94 | 46.59 | 22.49 | 8.21 | 6.29 | 7.78 | 4.69 | 65-70 | sc | 27.56 | 14.76 |

| Depth (cm) | pH (1:2.5) | | | E.C. (1:2.5) | O.C. | $CaCO_3$ | Exchangeable bases | | | | | CEC | CEC/ Clay | Base saturation | ESP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Ca | Mg | K | Na | Total | | | | |
| | Water | $CaCl_2$ | M KCl | dS $m^{-1}$ | % | % | cmol $kg^{-1}$ | | | | | | | % | % |
| 0-16 | 7.46 | - | - | 0.08 | 0.76 | | 6.26 | 4.05 | 0.12 | 0.09 | 10.52 | 11.45 | 0.87 | 91.88 | 0.32 |
| 16-31 | 7.84 | - | - | 0.28 | 1.05 | 2.86 | - | - | 0.18 | 1.41 | - | 27.36 | 0.80 | 100.00 | 2.06 |
| 31-44 | 7.69 | - | - | 0.46 | 0.81 | 2.99 | - | - | 0.24 | 2.63 | - | 32.59 | 0.61 | 100.00 | 3.23 |
| 44-79 | 7.92 | - | - | 0.11 | 0.35 | 1.69 | 16.29 | 3.51 | 0.14 | 2.63 | 22.57 | 22.56 | 0.45 | 100.03 | 4.66 |
| 79-107 | 7.86 | - | - | 0.09 | 0.23 | 1.43 | 12.98 | 2.83 | 0.10 | 1.82 | 17.73 | 17.88 | 0.41 | 99.19 | 4.07 |
| 107-140 | 8.20 | - | - | 0.07 | 0.23 | 1.17 | 16.26 | 3.41 | 0.13 | 1.85 | 21.65 | 20.82 | 0.41 | 104.01 | 3.56 |
| 140-180 | 8.11 | - | - | 0.20 | 0.15 | 1.82 | - | - | 0.11 | 1.29 | - | 20.71 | 0.44 | 100.00 | 2.49 |

*Contd...*

**Series Name:** Ravanaki (RNK), **Pedon:** RM-20
**Location:** $15^0$14'22.7"N, $75^0$57'45.8"E, Gatareddihalla village, Koppal Taluk and District
**Analysis at**: NBSS&LUP, Regional Centre, Bangalore. **Classification:** Very fine, smectitic, (calc), isohyperthermic Typic Haplustepts

| Depth (cm) | Horizon | Size class and particle diameter (mm) | | | | | | | | Coarse fragments w/w (%) | Texture Class (USDA) | % Moisture | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total | | | Sand | | | | | | | | |
| | | Sand (2.0-0.05) | Silt (0.05-0.002) | Clay (<0.002) | Very coarse (2.0-1.0) | Coarse (1.0-0.5) | Medium (0.5-0.25) | Fine (0.25-0.1) | Very fine (0.1-0.05) | | | 1/3 Bar | 15 Bar |
| 0-28 | Ap | 24.43 | 17.76 | 57.81 | 5.30 | 3.89 | 3.78 | 7.14 | 4.32 | 20 | c | 41.40 | 29.60 |
| 28-55 | Bw | 18.77 | 15.59 | 65.64 | 2.74 | 3.73 | 2.85 | 4.83 | 4.61 | 10 | c | 46.71 | 35.18 |

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

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**Series Name:** Gatareddihal (GRH) Pedon**:** R-7
**Location:** $15^0$14'20.8"N, $76^0$04'28.4" E Gudlanur village, Koppal Taluk and District
**Analysis at:** NBSS&LUP, Regional Centre, Bangalore. **Classification:** Very fine, smectitic, (calc) isohyperthermic Sodic Haplusterts

| Depth (cm) | Horizon | Size class and particle diameter (mm) | | | | | | | | Coarse fragments w/w (%) | Texture Class (USDA) | % Moisture | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total | | | Sand | | | | | | | | |
| | | Sand (2.0-0.05) | Silt (0.05-0.002) | Clay (<0.002) | Very coarse (2.0-1.0) | Coarse (1.0-0.5) | Medium (0.5-0.25) | Fine (0.25-0.1) | Very fine (0.1-0.05) | | | 1/3 Bar | 15 Bar |
| 0-18 | Ap | 20.07 | 19.71 | 60.23 | 1.76 | 3.75 | 3.64 | 3.42 | 7.50 | - | c | 41.70 | 29.56 |
| 18-51 | Bss1 | 15.11 | 17.47 | 67.42 | 3.16 | 3.04 | 2.25 | 3.38 | 3.27 | - | c | 59.43 | 38.52 |
| 51-80 | Bss2 | 13.19 | 18.74 | 68.07 | 1.80 | 2.93 | 2.37 | 3.04 | 3.04 | - | c | 60.69 | 40.91 |
| 80-107 | Bss3 | 17.54 | 19.50 | 62.96 | 2.46 | 4.13 | 3.24 | 4.25 | 3.46 | - | c | 57.25 | 37.31 |
| 107-131 | BC | 9.42 | 17.48 | 73.10 | 1.48 | 1.82 | 1.36 | 1.93 | 2.84 | - | c | 64.62 | 43.98 |

| Depth (cm) | pH (1:2.5) | | | E.C. (1:2.5) | O.C. | $CaCO_3$ | Exchangeable bases | | | | | CEC | CEC/ Clay | Base saturation | ESP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Ca | Mg | K | Na | Total | | | | |
| | Water | $CaCl_2$ | M KCl | dS $m^{-1}$ | % | % | cmol $kg^{-1}$ | | | | | | | % | % |
| 0-18 | 9.08 | - | - | 0.23 | 0.33 | 6.89 | - | - | 0.70 | 6.36 | - | 63.21 | 1.05 | 100.00 | 7.11 |
| 18-51 | 9.19 | - | - | 0.61 | 0.49 | 9.10 | - | - | 0.54 | 14.20 | - | 66.05 | 0.98 | 100.00 | 15.98 |
| 51-80 | 9.27 | - | - | 0.56 | 0.29 | 9.36 | - | - | 0.49 | 14.75 | - | 65.63 | 0.96 | 100.00 | 17.07 |
| 80-107 | 9.28 | - | - | 0.57 | 0.39 | 9.62 | - | - | 0.44 | 14.64 | - | 63.95 | 1.02 | 100.00 | 17.49 |
| 107-131 | 9.04 | - | - | 1.08 | 0.31 | 8.32 | - | - | 0.52 | 16.40 | - | 68.36 | 0.94 | 100.00 | 17.30 |

*Chapter 5*

# INTERPRETATION FOR LAND RESOURCE MANAGEMENT

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

## 5.1 Land Capability Classification

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

*Soil characteristics*: Soil depth, soil texture, coarse fragments, soil reaction, available water capacity, calcareousness, salinity/alkali *etc*.

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

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

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

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

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

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

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

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

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

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

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

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

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

The 32 soil map units identified in the Hanumanahatti Microwatershed are grouped under two land capability classes and five land capability subclasses (Fig. 5.1).

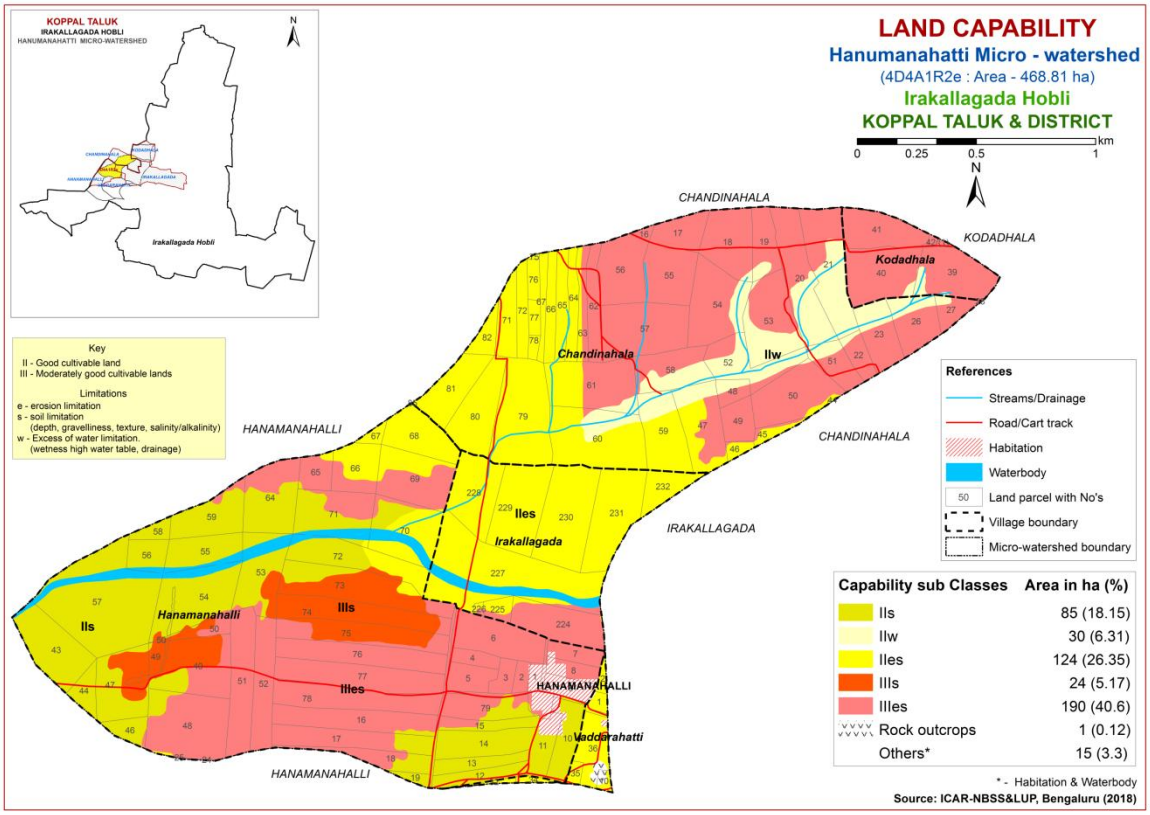



Fig. 5.1 Land Capability map of Hanumanahatti Microwatershed

Entire area of the microwatershed is suitable for agriculture. Maximum area of 239 ha (51%) are good lands (Class II) that have minor limitations and require moderate conservation practices and are distributed in the major part of the microwatershed. Moderately good lands (Class III) cover an area of 214 ha (46%) and are distributed in the northern, southern, eastern and western part of the microwatershed with moderate problems of soil that require special conservation practices. The other miscellaneous areas cover about 3 per cent is habitations and water bodies.

**5.2 Soil Depth**

Soil depth refers to the depth of the soil occurring above the parent material or hard rock. The depth of the soil determines the effective rooting depth for plants and in accordance with soil texture, mineralogy and gravel content, the capacity of the soil column to hold water and nutrient availability. Soil depth is one of the most important soil characteristic that is used in differentiating soils into different soil series. The soil depth classes used in identifying soils in the field are very shallow (<25 cm), shallow (25-50 cm), moderately shallow (50-75 cm), moderately deep (75-100 cm), deep (100-150 cm) and very deep (>150 cm). They were used to classify the soils into different depth classes and a soil depth map was generated (Fig. 5.2).

An area of 23 ha (5%) is shallow (25-50 cm) and are distributed in the northern and northeastern part of the microwatershed. Moderately shallow (50-75 cm) occur in an area of 79 ha (17%) and are distributed in the northern, eastern and western part of the microwatershed. Moderately deep soils (75-100 cm) occupy an area of 74 ha (16%) and occur in the southeastern, western and eastern part of the microwatershed. Deep (100-150 cm) to very deep (>150 cm) soils occupy a maximum area of 277 ha (59%) and are distributed in the major part of the microwatershed.

The most problem lands with an area of about 23 ha (5%) having shallow (25-50 cm) rooting depth. They are suitable for growing short duration agricultural crops but well suited for pasture, forestry or other recreational purposes. The most productive lands cover a maximum area about 277 ha (59%) where all climatically adapted long duration crops be grown.

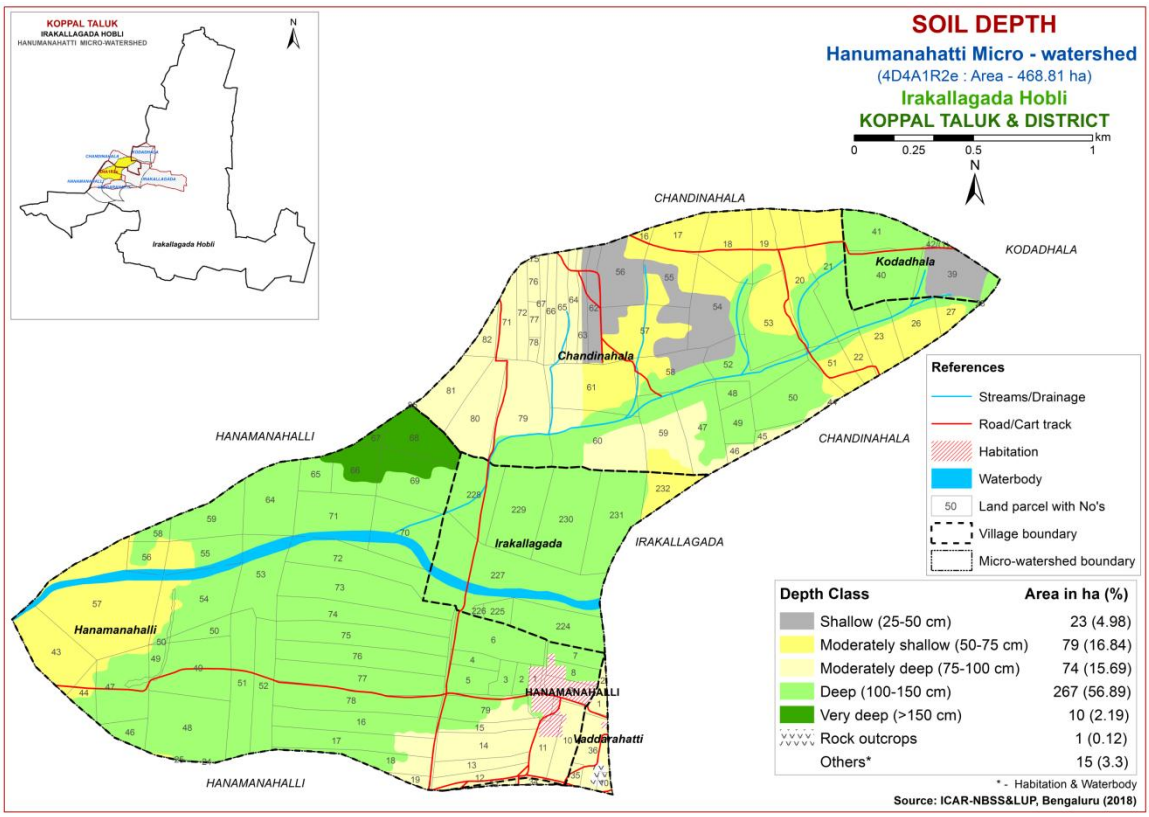



Fig. 5.2 Soil Depth map of Hanumanahatti Microwatershed

### 5.3 Surface Soil Texture

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

An area of 71 ha (15%) is sandy soils at the surface and are distributed in the northern, northeastern and southern part of the microwatershed. Maximum area of 202 ha (43%) has loamy soils at the surface and are distributed in the major part of the microwatershed. An area of 179 ha (38%) has clayey soils at the surface and are distributed in the northern, central and western part of the microwatershed (Fig. 5.3).

The most productive lands 179 ha (38%) with respect to surface soil texture are the clayey soils that have high potential for soil-water retention and availability, and nutrient retention and availability, but have more problems of drainage, infiltration, workability and other physical problems. The other most productive lands 202 ha (43%) are loamy soils which also have high potential for AWC, nutrient availability but have no drainage or other physical problems compared to loamy soils. The problem soils cover 15 per cent area which

have problem of moisture and nutrient availability and require frequent irrigation and nutrient management. They are better suited for root and tuber crops.

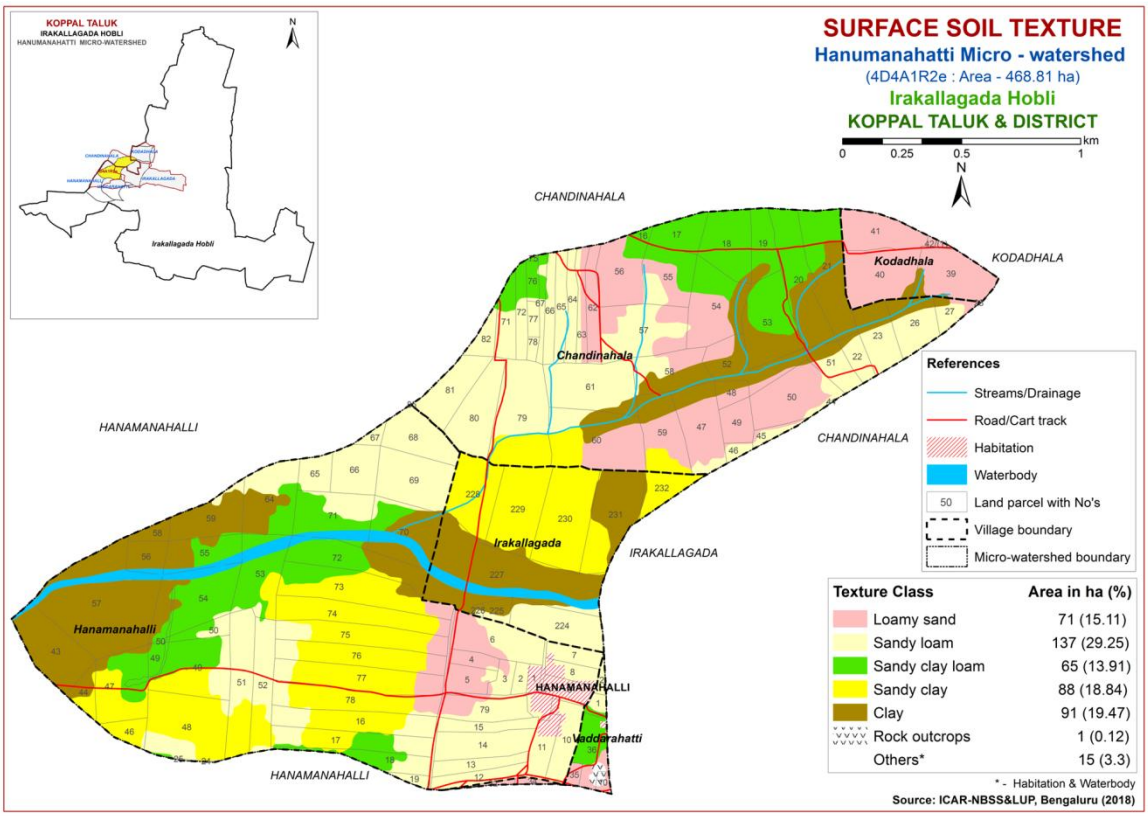



Fig. 5.3 Surface Soil Texture map of Hanumanahatti Microwatershed

## 5.4 Soil Gravelliness

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

The soils that are non-gravelly (<15% gravel) cover an area of 165 ha (35%) and are distributed in the northern, central, southern and western part of the microwatershed. Maximum area of 206 ha (44%) is covered by gravelly (15-35% gravel) soils and are distributed in the major part of the microwatershed. An area of 82 ha (17%) is very gravelly (35-60%) and are distributed in the northern, eastern and southern part of the microwatershed (Fig. 5.4).

The most productive lands with respect to gravelliness are found to be 35%. They are non-gravelly with less than 15 per cent gravel and have potential for growing both

annual and perennial crops. The problem soils that are gravelly (15-35%) to very gravelly (35-60%) cover 288 ha (61%) where only short or medium duration crops can be grown.

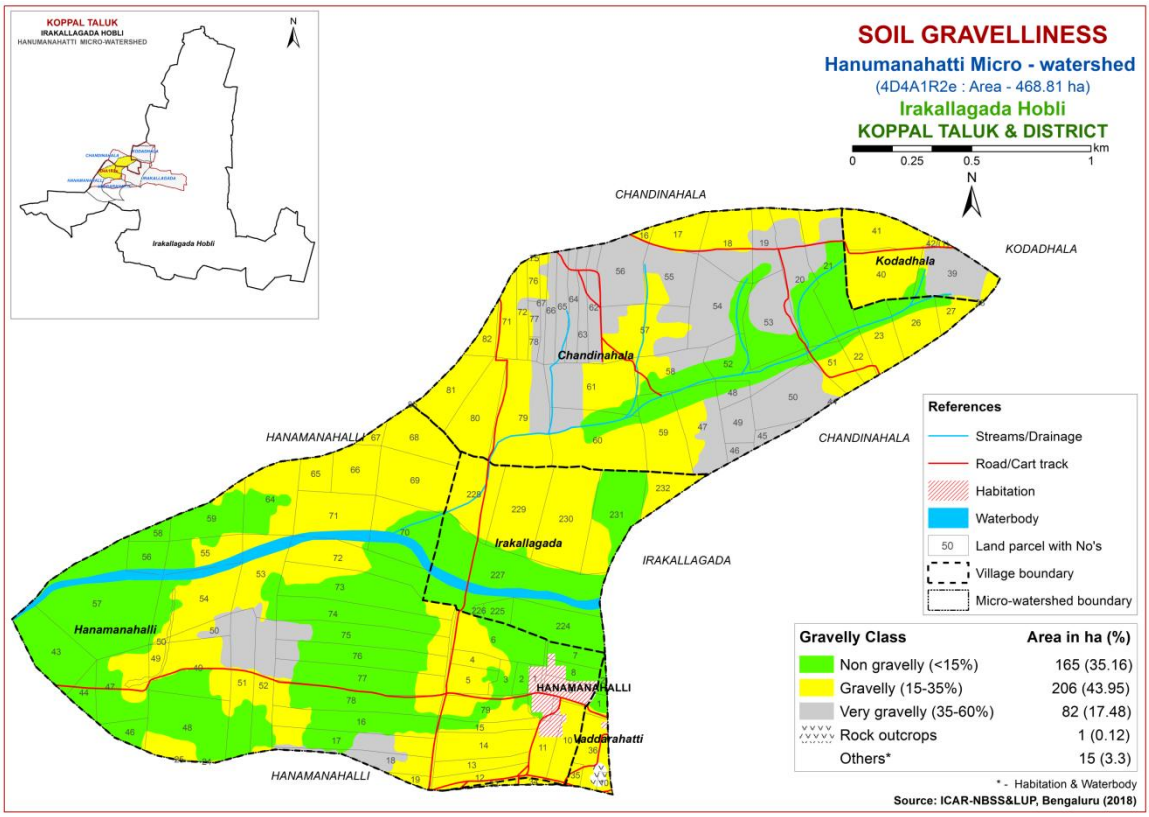



Fig. 5.4 Soil Gravelliness map of Hanumanahatti Microwatershed

## 5.5 Available Water Capacity

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

An area of about 112 ha (24%) are very low (<50 mm/m) in available water capacity and are distributed in the northern and eastern part of the microwatershed. Maximum area of about 208 ha (44%) has soils that are low (51-100 mm/m) in available water capacity and are distributed in the major part of the microwatershed. Soils with medium available water capacity (101-150 mm/m) occupy an area of 68 ha (15%) and are distributed in the central and western part of the microwatershed. An area of about 65 ha (14%) is very high (>200 mm/m) in available water capacity and are distributed in the northern, western, eastern and central part of the microwatershed.

An area of about 112 ha (24%) in the microwatershed has soils that are problematic with regard to available water capacity. Here, only short duration crops can be grown and the probability of crop failure is very high. These areas are best put to other alternative uses. The potential soils with respect to AWC cover about 65 ha (14%) that have very high AWC, where all climatically adapted long duration crops can be grown.

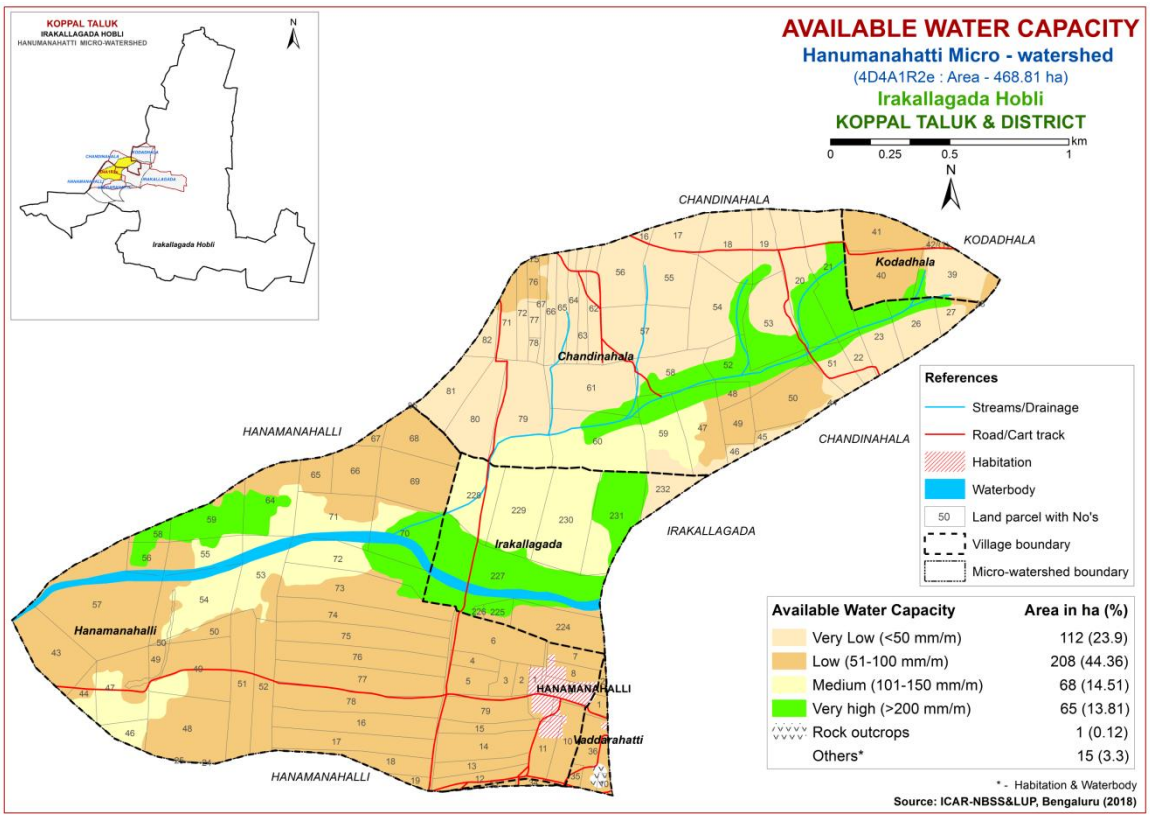



Fig. 5.5 Soil Available Water Capacity map of Hanumanahatti Microwatershed

## 5.6 Soil Slope

Soil slope refers to the inclination of the surface of the land. It is defined by gradient, shape and length, and is an integral feature of any soil as a natural body. Slope is considered important in soil genesis, land use and land development. The length and gradient of slope influences the rate of runoff, infiltration, erosion and deposition. The soil map units were grouped into four slope classes and a slope map was generated showing the area extent and their geographic distribution of different slope classes in the microwatershed (Fig. 5.6).

An area of 38 ha (8%) is nearly level (0-1%) and are distributed in the northern and western part of the microwatershed. Major area of about 407 ha (87%) falls under very gently sloping (1-3% slope) lands and are distributed in all parts of the microwatershed. An area of 7 ha (2%) is gently sloping (3-5%) and are distributed in the southern part of the mcirowatershed. In all these lands, all climatically adapted annual and perennial crops can be grown without much soil and water conservation and other land development measures.

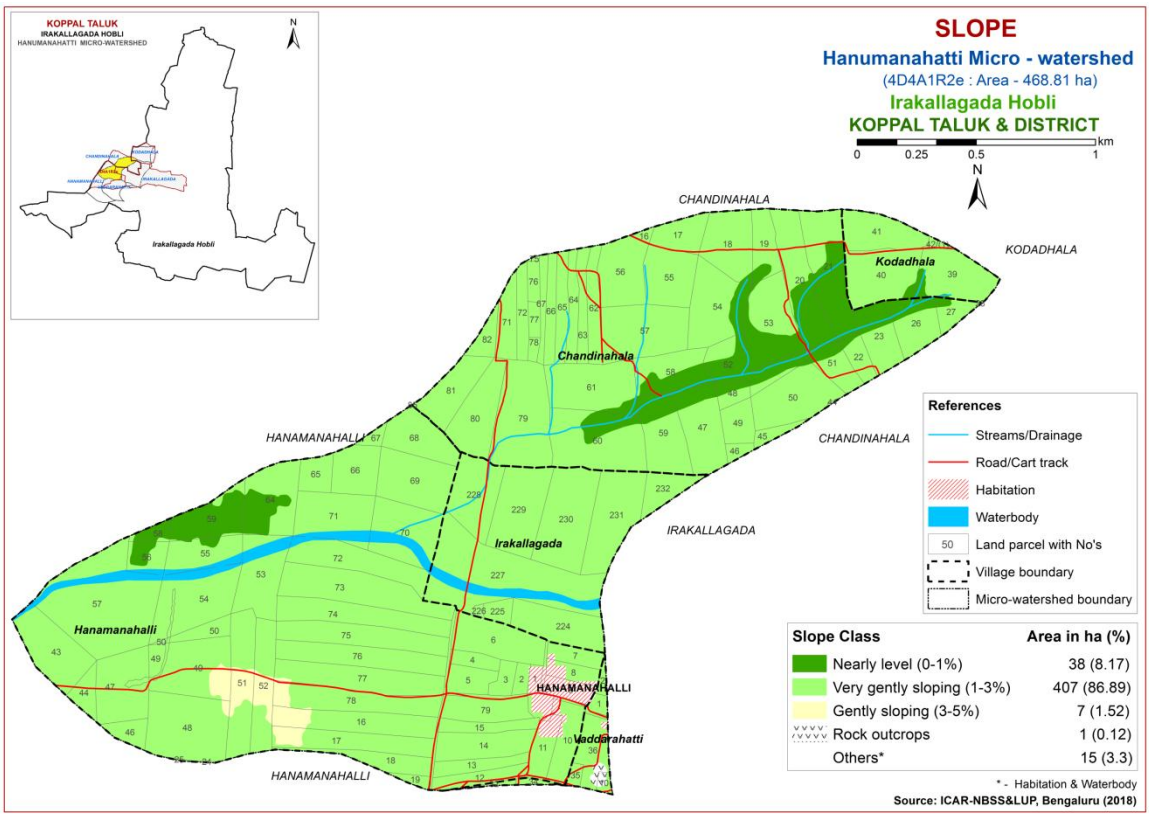



Fig. 5.6 Soil Slope map of Hanumanahatti Microwatershed

## 5.7 Soil Erosion

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

Soils that are slightly eroded (e1 Class) occupy an area of about 139 ha (30%) and are distributed in the northern, western and southern part of the microwatershed. Moderately eroded (e2 Class) soils cover a maximum area of 314 ha (67%) and are distributed in the major part of the microwatershed.

An area of about 314 ha (67%) in the microwatershed is problematic because of moderate erosion. These areas need soil and water conservation and other land development measures for restoring the soil health.

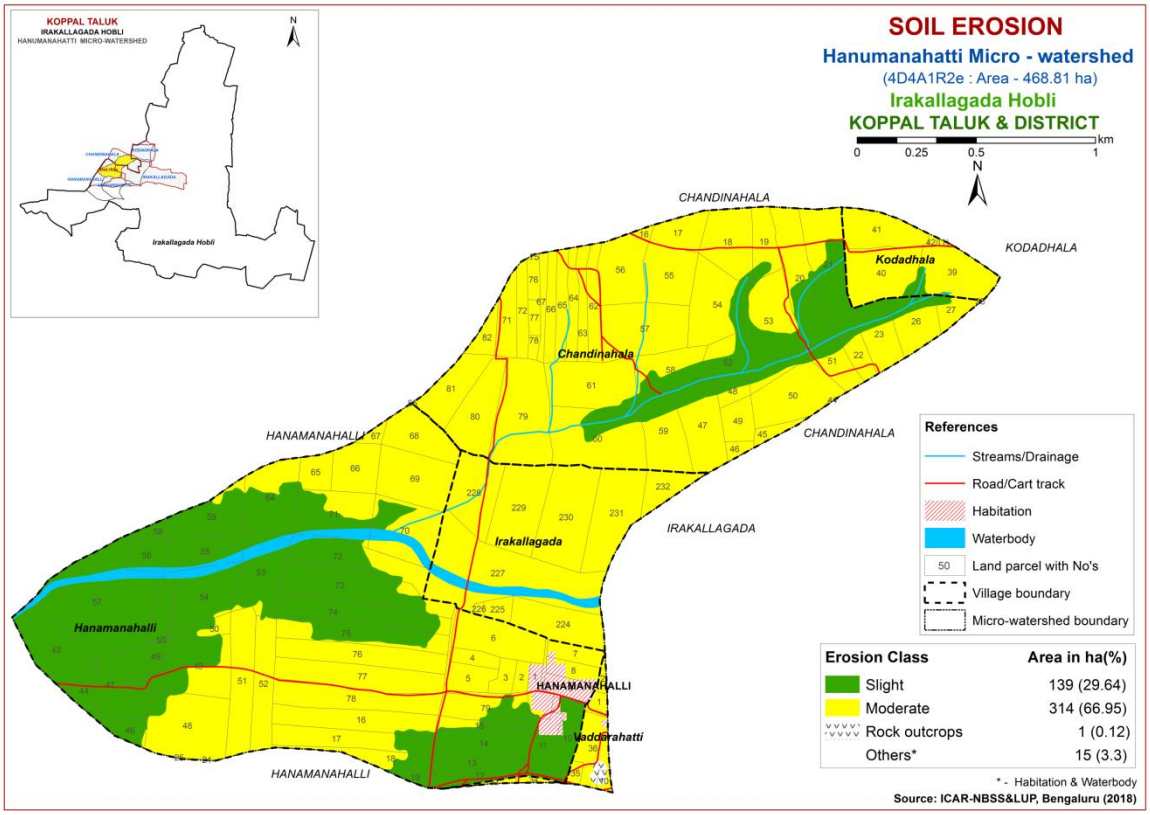



Fig. 5.7 Soil Erosion map of Hanumanahatti Microwatershed

*Chapter 6*

# FERTILITY STATUS

Soil fertility plays an important role in increasing crop yield. The adoption of high yielding varieties that require high amounts of nutrients has resulted in deficiency symptoms in crops and plants due to imbalanced fertilization and poor inherent fertility status, as these areas are characterised by low rainfall and high temperatures. Hence, it is necessary to know the fertility (macro and micro nutrients) status of the soils of the watersheds for assessing the kind and amount of fertilizers required for each of the crop intended to be grown. For this purpose, the surface soil samples collected from the grid points (one soil sample at every 320 m grid interval) all over the microwatershed through land resource inventory in the year 2018 were analysed for pH, EC, organic carbon, available phosphorus and potassium and for micronutrients like zinc, boron, copper, iron and manganese, and secondary nutrient sulphur.

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

## 6.1 Soil Reaction (pH)

The soil analysis of the Hanumanahatti Microwatershed for soil reaction (pH) showed that an area of 92 ha (20%) is moderately acid (pH 5.5-6.0) and is distributed in the northern and eastern part of the microwaterhsed. An area of 93 ha (20%) is slightly acid (pH 6.0-6.5) and is distributed in the northern, central and southern part of the microwaterhsed. Maximum area of 247 ha (53%) is neutral (pH 6.5-7.3) and is distributed in the major part of the microwatershed. Slightly alkaline (pH 7.3-7.8) soils occur in an area of 22 ha (5%) and are distributed in the eastern part of the microwatershed. Thus, entire soils in the microwatershed are acid covering 185 ha, neutral is 247 ha and alkaline is 22 ha.

## 6.2 Electrical Conductivity (EC)

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

## 6.3 Organic Carbon

The soil organic carbon content (an index of available Nitrogen) in the soils of the microwatershed is medium (0.5-0.75%) covering an area of 37 ha (8%) and is distributed in the western part of the microwatershed. Maximum area of 416 ha (89%) is high (>0.75%) and is distributed in the major part of the microwatershed (Fig. 6.3).

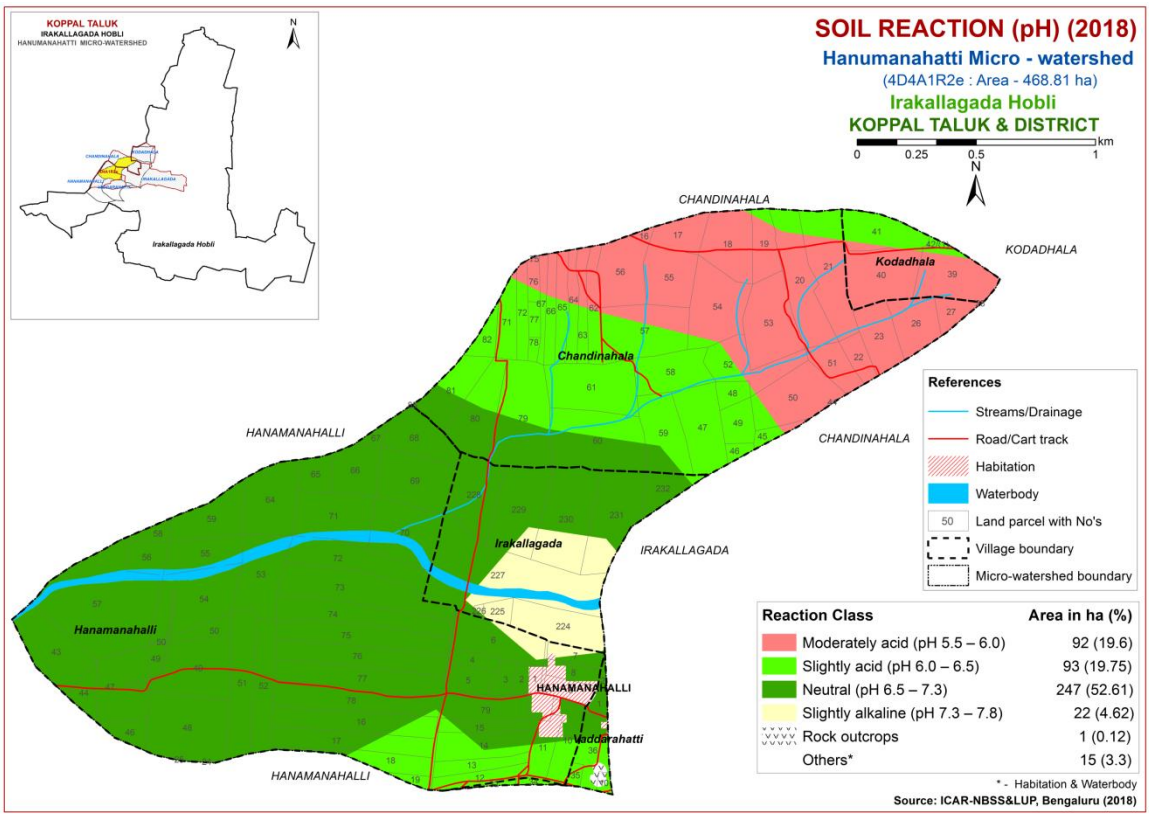



Fig. 6.1 Soil Reaction (pH) map of Hanumanahatti Microwatershed

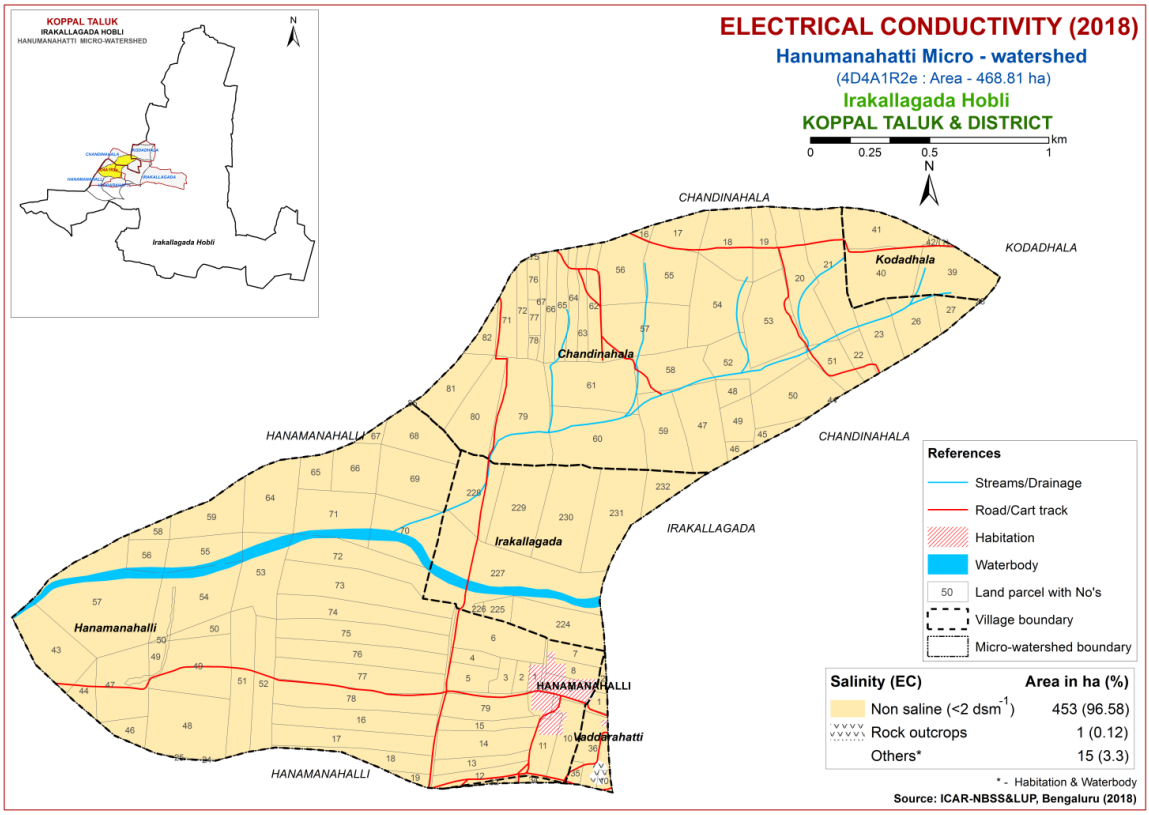



Fig. 6.2 Electrical Conductivity (EC) map of Hanumanahatti Microwatershed

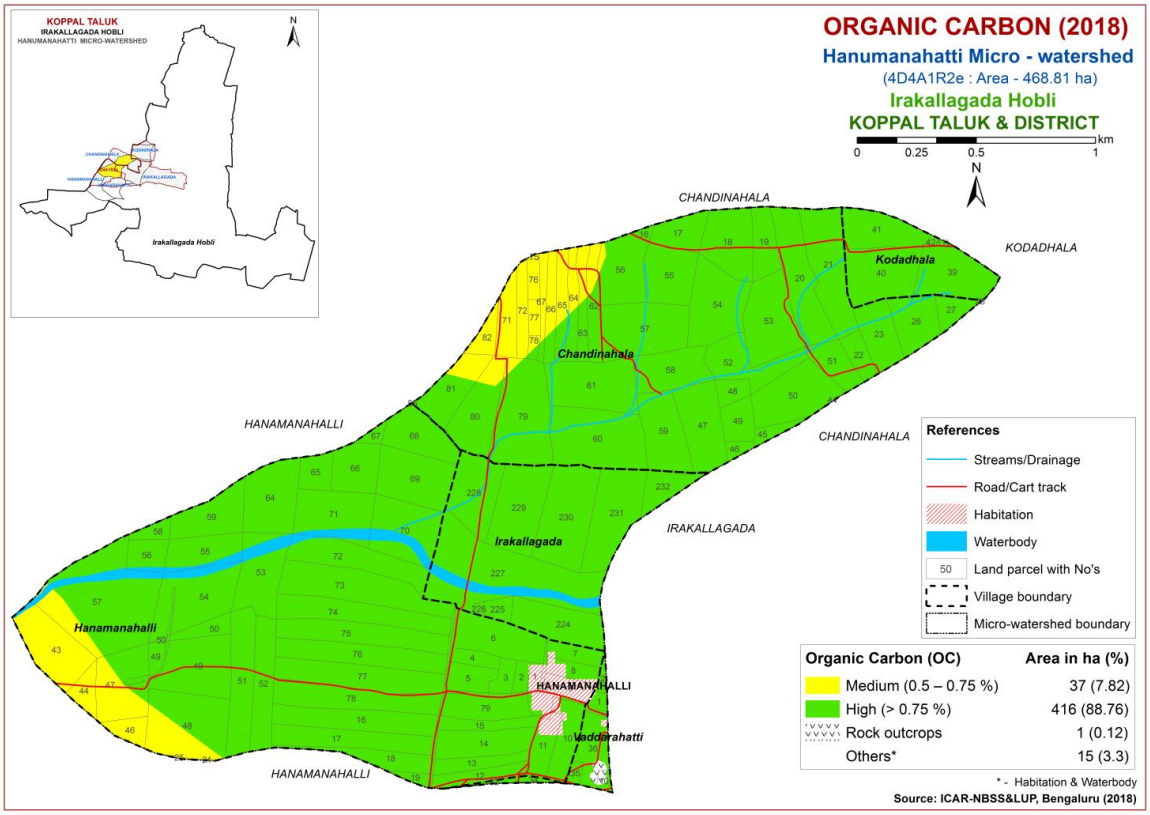



Fig. 6.3 Soil Organic Carbon map of Hanumanahatti Microwatershed

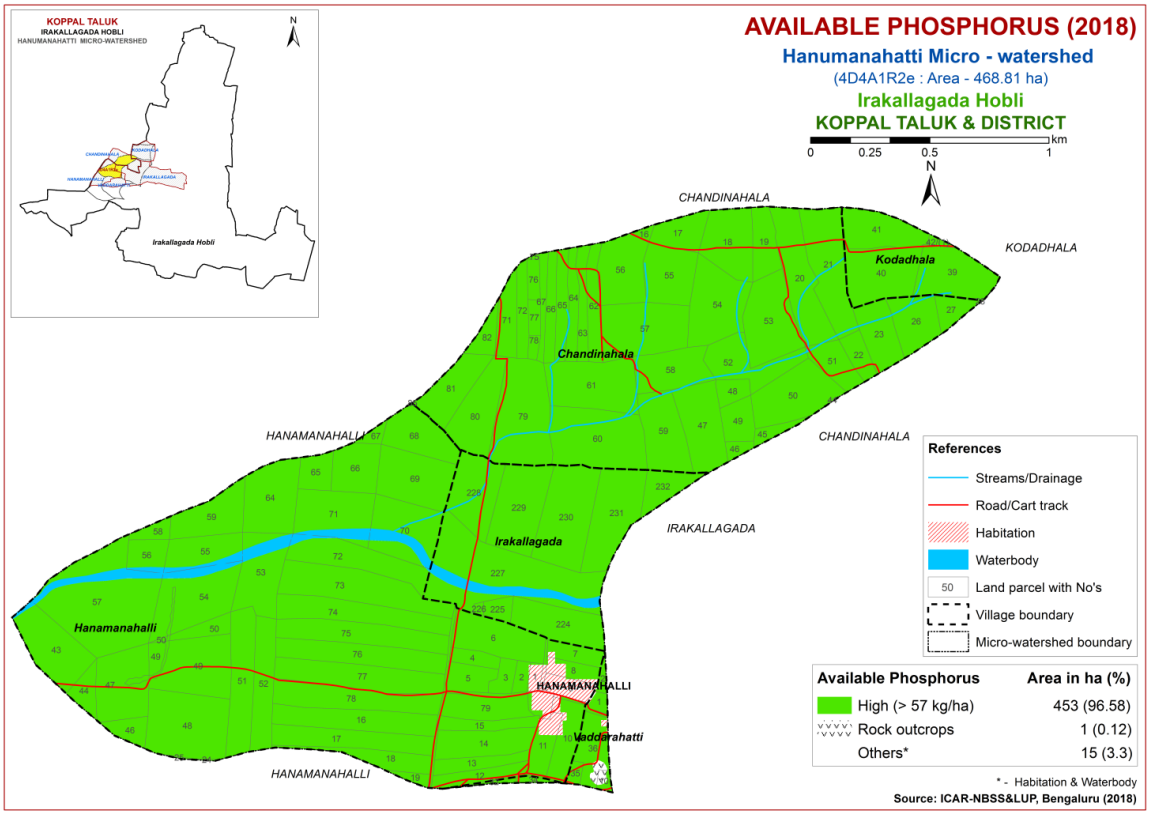



Fig. 6.4 Soil Available Phosphorus map of Hanumanahatti Microwatershed

### 6.4 Available Phosphorus

Entire area of about 453 ha (97%) is high (>57 kg/ha) and is distributed in the all parts of the microwatershed (Fig. 6.4).

### 6.5 Available Potassium

Maximum area of 452 ha (96%) is medium (145-337 kg/ha) in available potassium content and is distributed in the major part of the microwatershed. An area of about 1 ha (<1%) is high (>337 kg/ha) and is distributed in the western part of the microwatershed (Fig. 6.5).

### 6.6 Available Sulphur

Soils that are low (>10 ppm) in available sulphur content occupy a maximum area of 422 ha (90%) and is distributed in the major part of the microwatershed. An area of 6 ha (1%) is medium (10-20 ppm) and is distributed in the western part of the microwatershed. High (>20 ppm) in available sulphur occur in an area of 25 ha (5%) and is distributed in the western part of the microwatershed (Fig. 6.6).

### 6.7 Available Boron

Available boron content is low (<0.5 ppm) in a maximum area of 445 ha (95%) and is distributed in the major part of the microwatershed. An area of about 8 ha (2%) is medium (0.5-1.0 ppm) and is distributed in the western part of the microwatershed (Fig. 6.7).

### 6.8 Available Iron

Available iron content is sufficient (>4.5 ppm) in the entire cultivated area of about 453 ha (97%) and is distributed in all parts of the microwatershed (Fig. 6.8).

### 6.9 Available Manganese

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

### 6.10 Available Copper

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

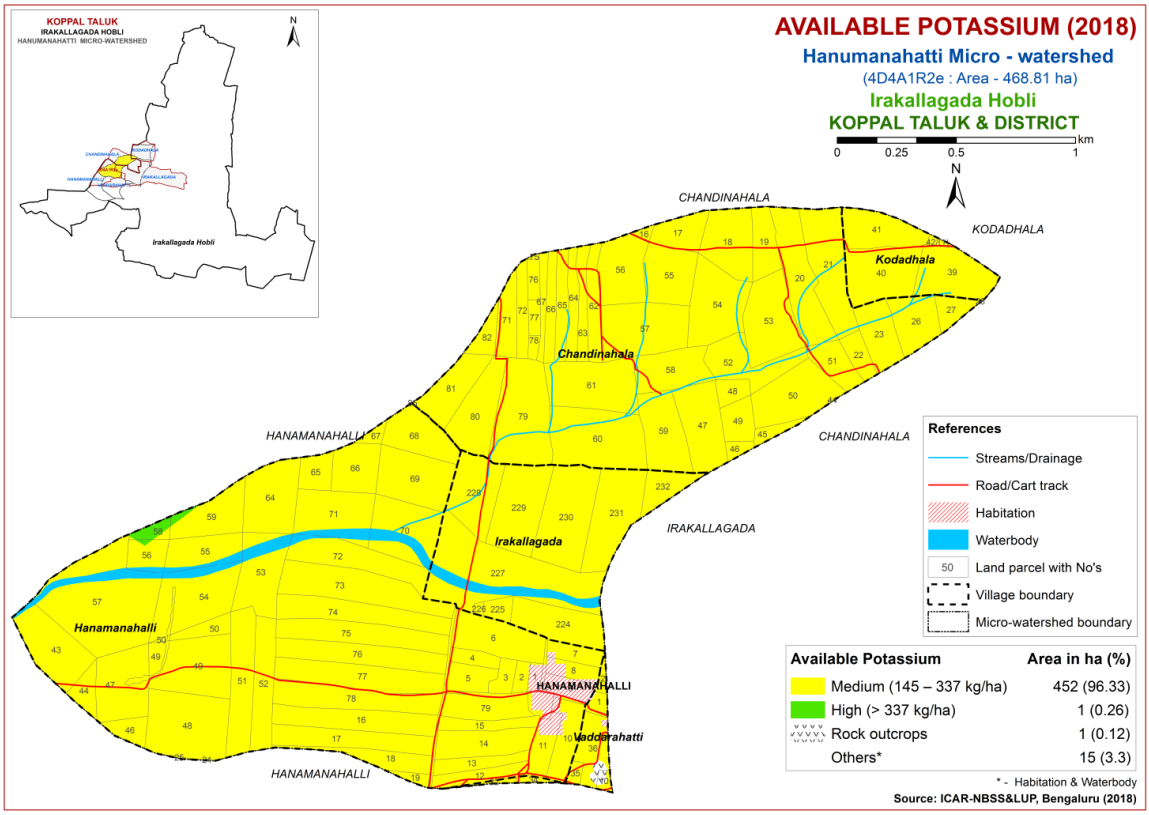



Fig. 6.5 Soil Available Potassium map of Hanumanahatti Microwatershed

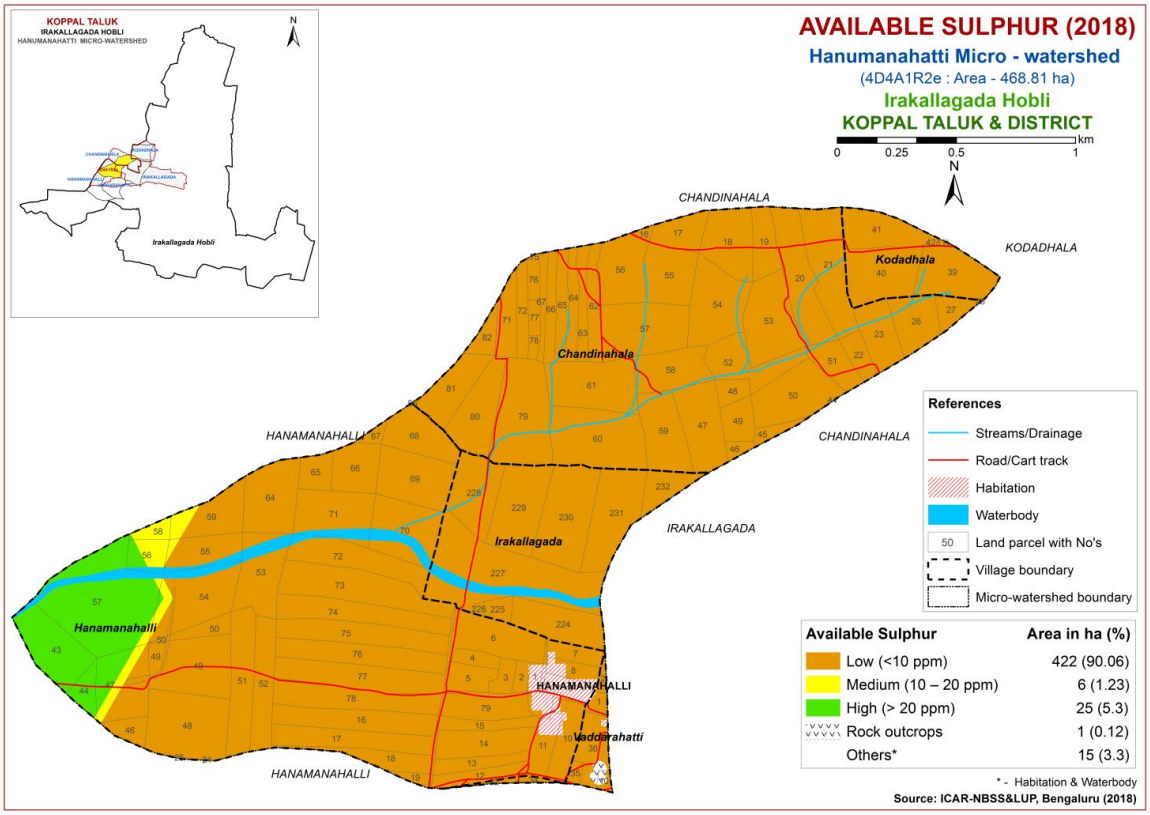



Fig. 6.6 Soil Available Sulphur map of Hanumanahatti Microwatershed

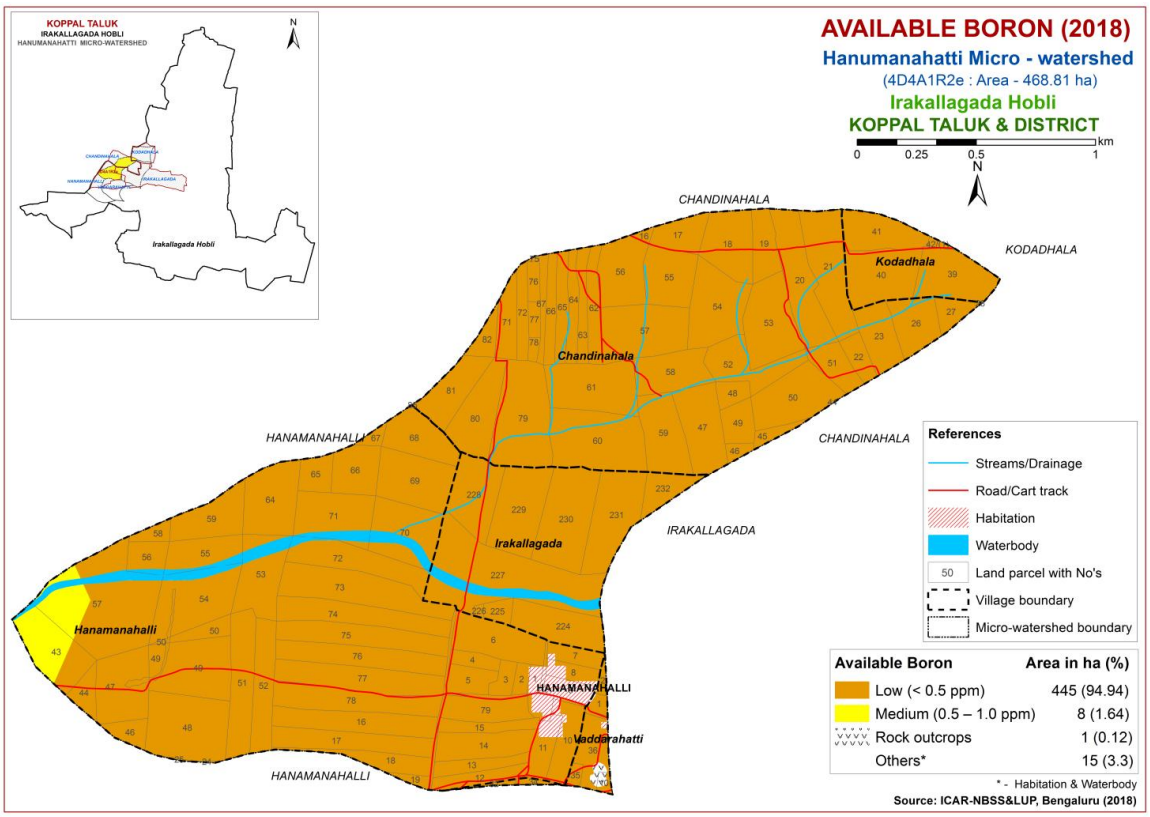



Fig. 6.7 Soil Available Boron map of Hanumanahatti Microwatershed

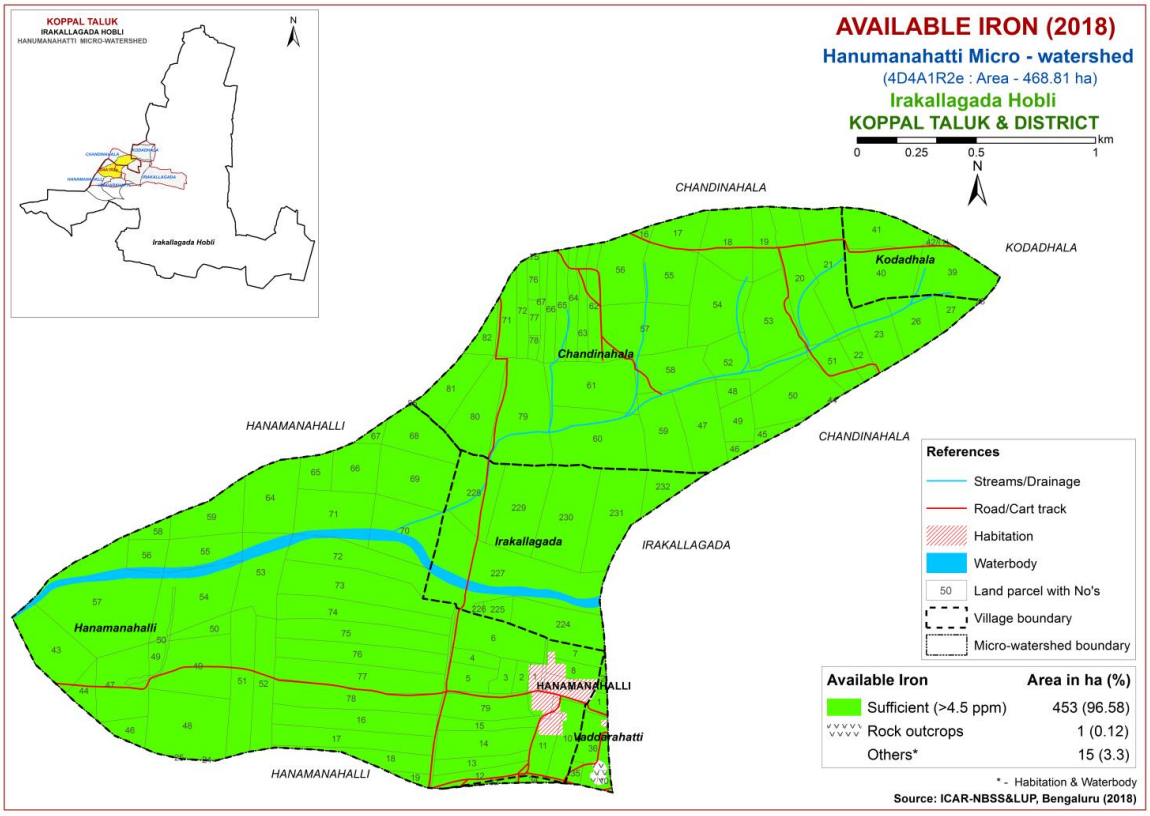



Fig. 6.8 Soil Available Iron map of Hanumanahatti Microwatershed

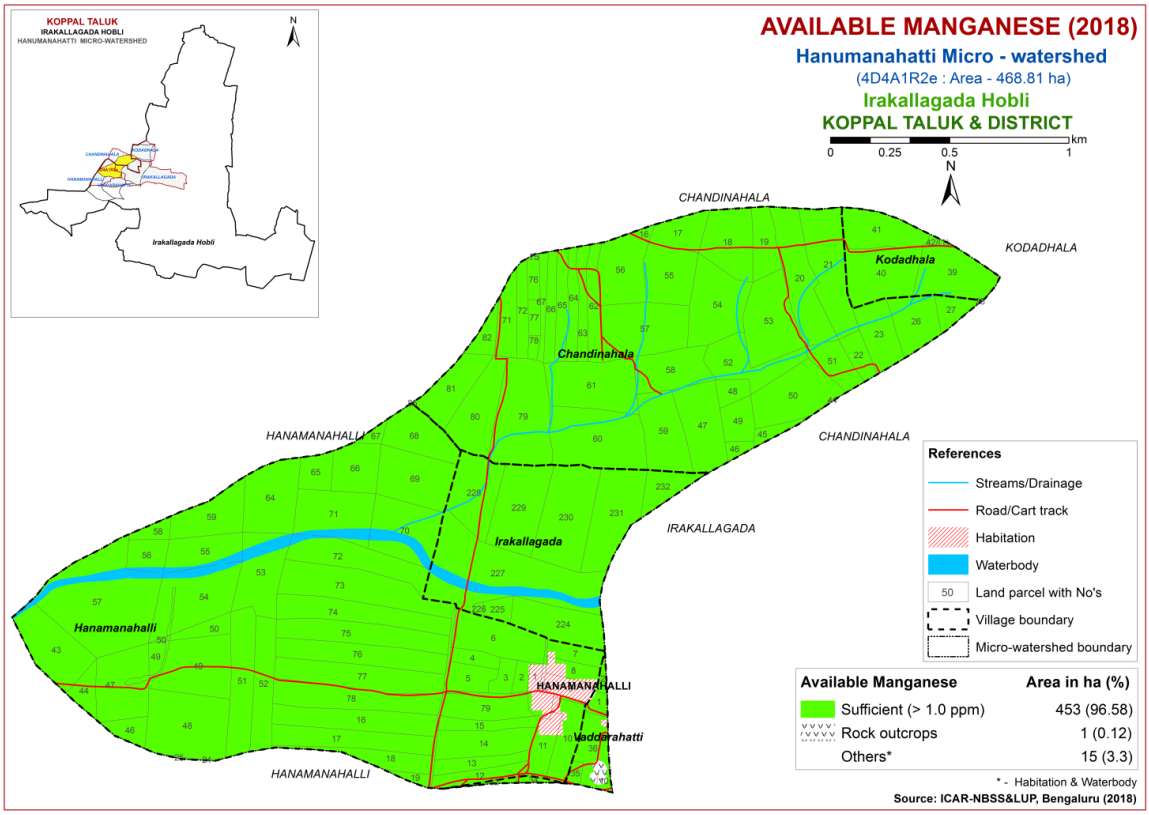



Fig. 6.9 Soil Available Manganese map of Hanumanahatti Microwatershed

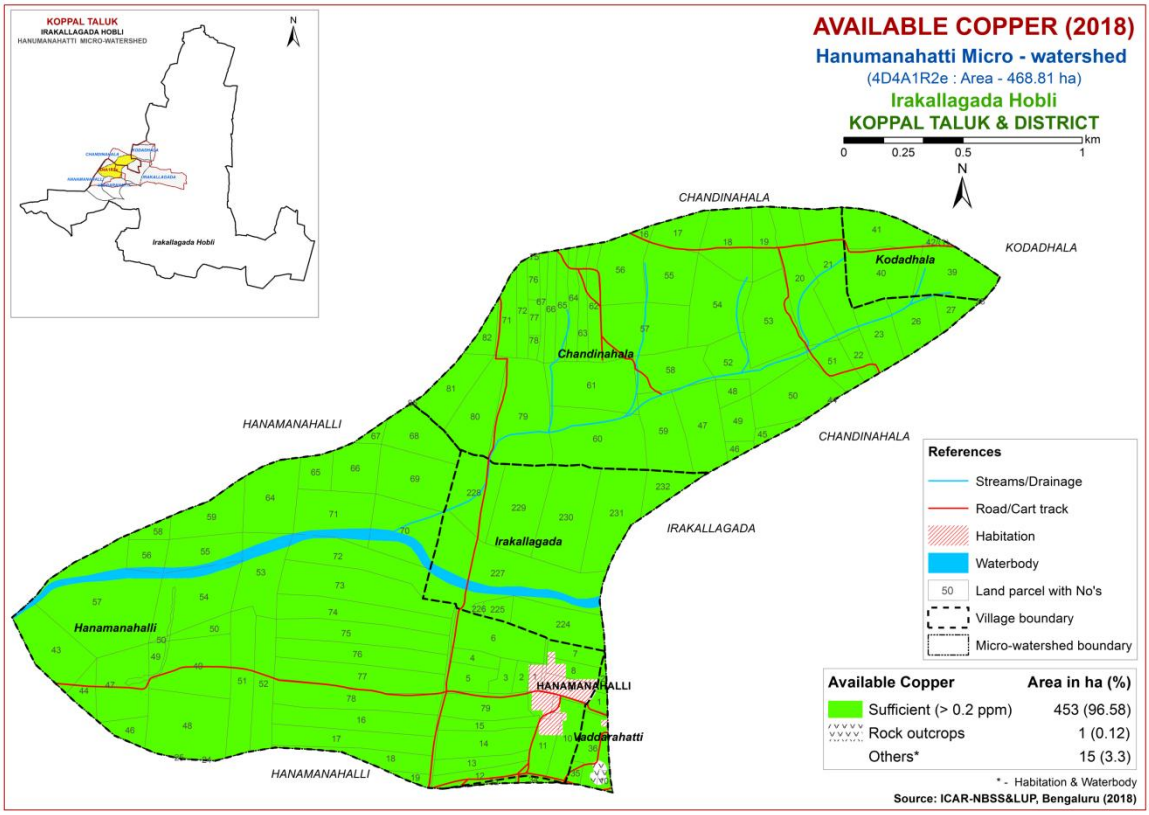



Fig. 6.10 Soil Available Copper map of Hanumanahatti Microwatershed

## 6.11 Available Zinc

Available zinc content is deficient (<0.6 ppm) in an area of 15 ha (3%) and is distributed in the western part of the microwatershed. Maximum area of 438 ha (93%) is sufficient (>0.6 ppm) and is distributed in the major part of the microwatershed (Fig. 6.11).

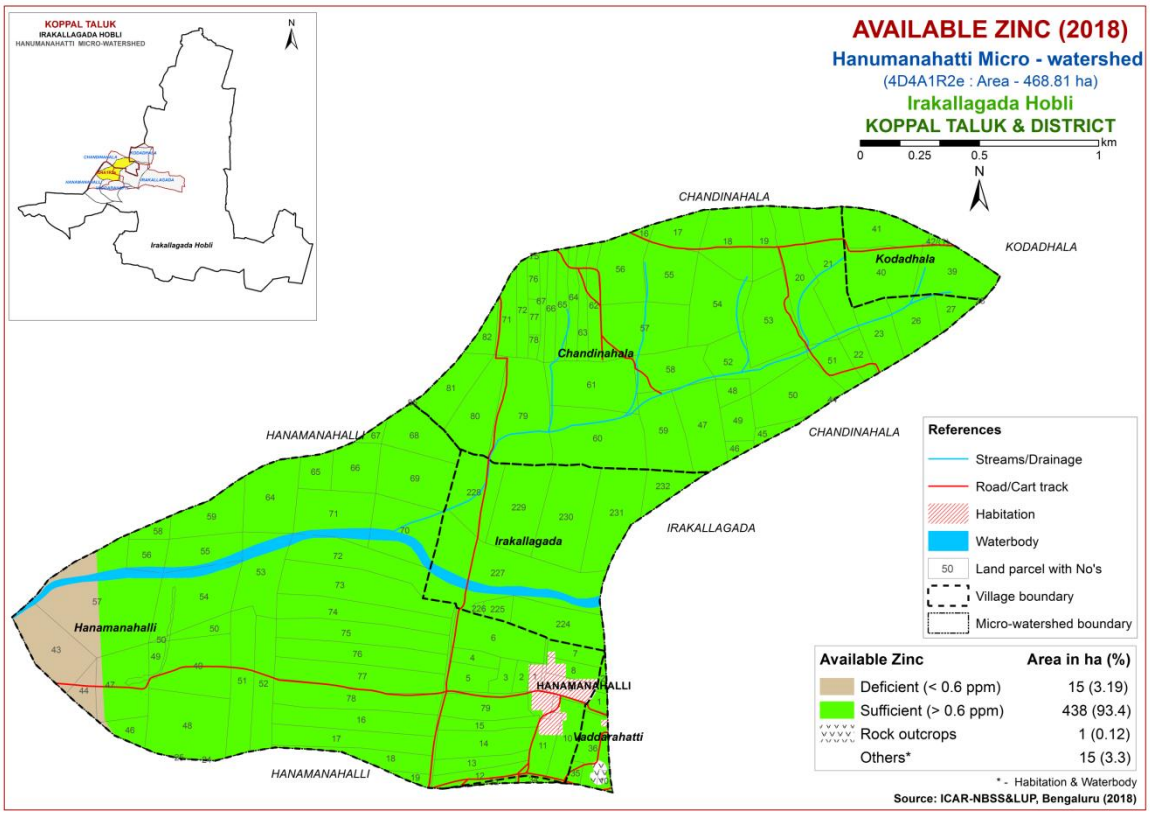



Fig. 6.11 Soil Available Zinc map of Hanumanahatti Microwatershed

*Chapter 7*

# LAND SUITABILITY FOR MAJOR CROPS

The soil and land resource units (soil phases) of Hanumanahatti Microwatershed were assessed for their suitability for growing food, fodder, fibre and other horticulture crops by following the procedure as outlined in FAO, 1976 and 1983. Crop requirements were developed for each of the crop from the available research data and also by referring to Naidu *et. al.* (2006) and Natarajan *et. al* (2015). The crop requirements (Table 7.2 to 7.33) were matched with the soil and land characteristics (Table 7.1) to arrive at the crop suitability. The criteria tables are given at the end of the Chapter. In FAO land suitability classification, two orders are recognized. Order S-Suitable and Order N- Not suitable. The orders have classes, subclasses and units. Order-S has three classes, Class S1-Highly Suitable, Class S2-Moderately Suitable and Class S3-Marginally Suitable. Order N has two Classes, N1-Currently not Suitable and N2-Permanently not Suitable. There are no subclasses within the Class S1 as they will have very minor or no limitations for crop growth. Classes S2, S3, N1 and N2 are divided into subclasses based on the kinds of limitations encountered. The limitations that affect crop production are 'c' for erratic rainfall and its distribution and length of growing period (LGP), 'e' for erosion hazard, 'r' for rooting condition, 't' for lighter or heavy texture, 'g' for gravelliness or stoniness, 'n' for nutrient availability, 'l' for topography, 'm' for moisture availability, 'z' for calcareousness 's' for sodium and 'w' for drainage. These limitations are indicated as lower case letters to the class symbol. For example, moderately suitable lands with the limitations of soil depth and erosion are designated as S2re. For the microwatershed, the soil mapping units were evaluated and classified up to subclass level.

Using the above criteria, the soil map units of the microwatershed were evaluated and land suitability maps for 31 major agricultural and horticultural crops were generated. The detailed information on the kind of suitability of each of the soil phase for the crops assessed are given village/ survey number wise for the microwatershed in Appendix-III.

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

Sorghum is one of the major food crop grown in Karnataka in an area of 10.47 lakh ha in Bijapur, Gulbarga, Raichur, Bidar, Belgaum, Dharwad, Bellary, Chitradurga, Mysore and Chamarajnagar districts. The crop requirements for growing sorghum (Table 7.2) were matched with the soil-site characteristics (Table 7.1) of the soils of the microwatershed and a land suitability map for growing sorghum was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure. 7.1.

An area of 72 ha (15%) is highly suitable (Class S1) for growing sorghum and are distributed in the northern, central and western part of the microwatershed. An area of 148 ha (31%) is moderately suitable (Class S2) and are distributed in the northeastern, central, southern and western part of the microwatershed. They have minor limitations of

gravelliness, calcareousness, texture and rooting condition. Maximum area of about 233 ha (50%) is marginally suitable (Class S3) for growing sorghum and are distributed in the major part of the microwatershed with moderate limitations of gravelliness and rooting condition.

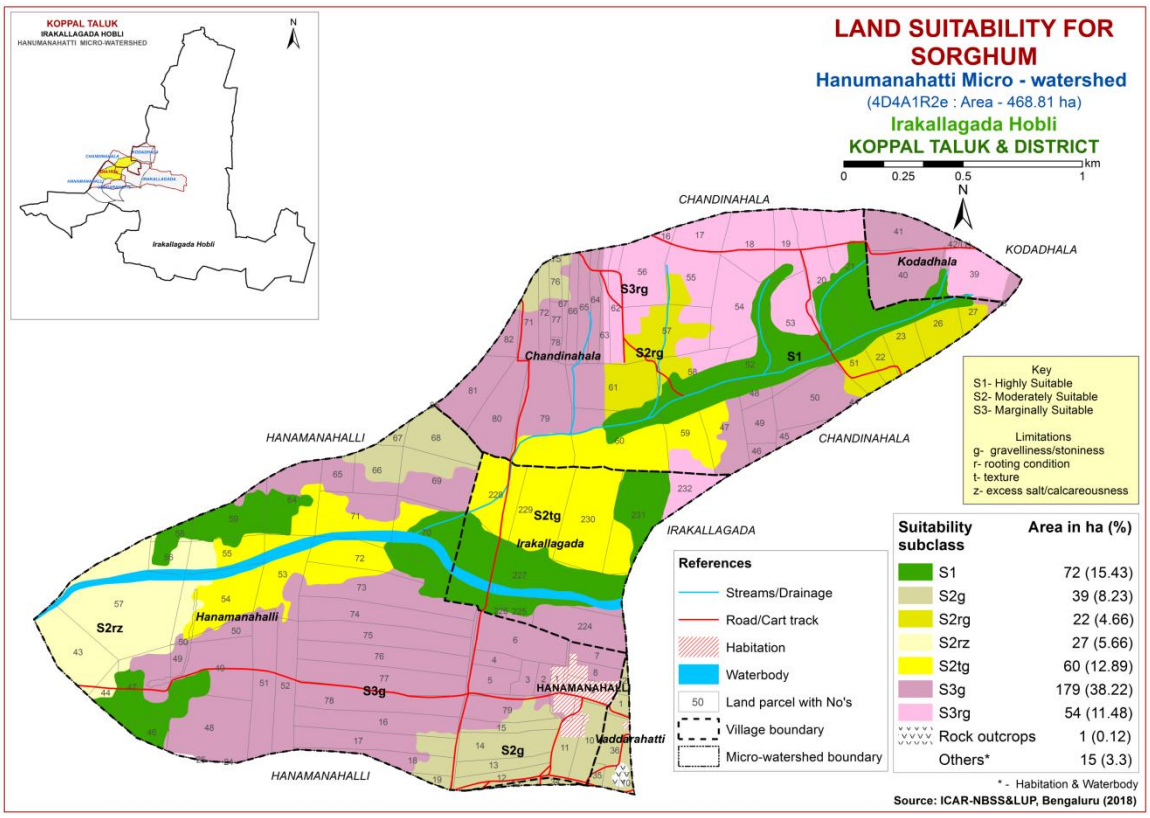



Fig. 7.1 Land Suitability map of Sorghum

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

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

An area of 8 ha (2%) is highly suitable (Class S1) for growing maize and are distributed in the western part of the microwatershed. Maximum area of 212 ha (45%) is moderately suitable (Class S2) and are distributed in the major part of the microwatershed with minor limitations of calcareousness, rooting condition, gravelliness and texture. Marginally suitable (Class S3) lands cover an area of 233 ha (50%) and are distributed in the major part of the microwatershed. They have moderate limitations of gravelliness and rooting condition.

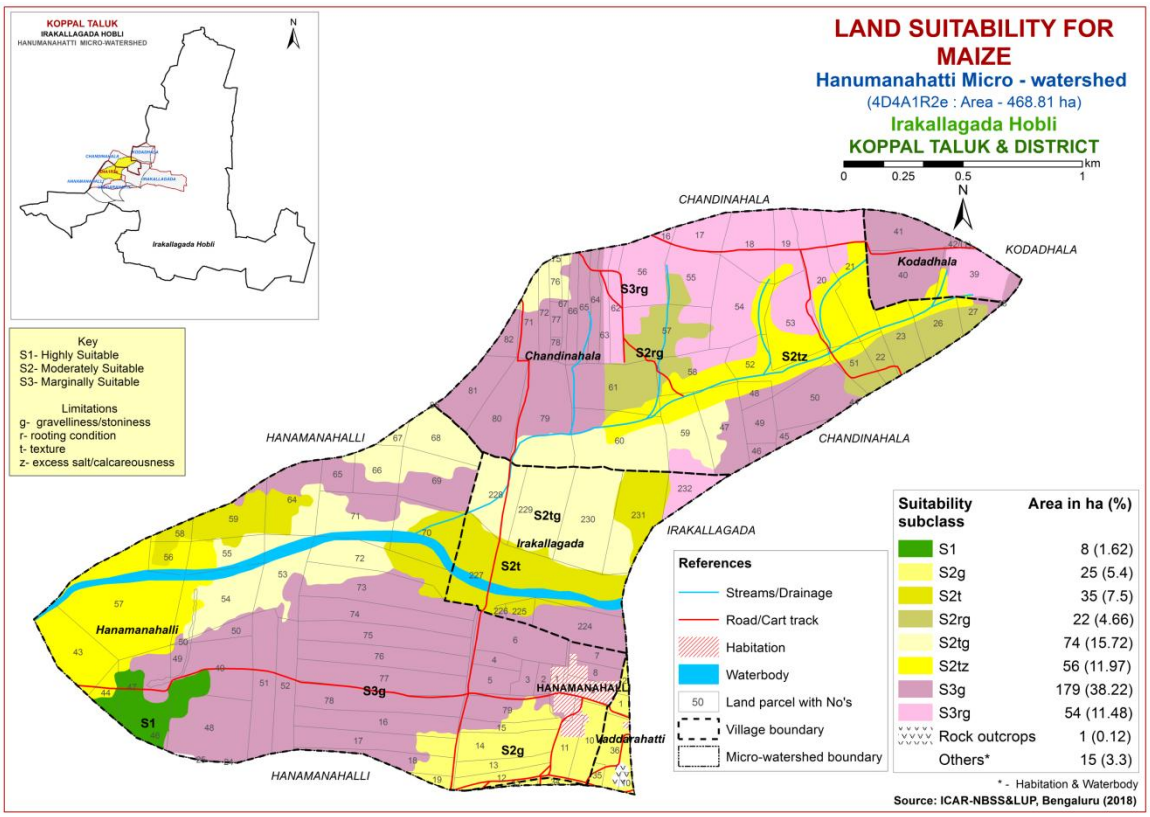



Fig. 7.2 Land Suitability map of Maize

### 7.3 Land Suitability for Bajra (*Pennisetum glaucum)*

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

An area of 88 ha (19%) is highly suitable (Class S1) for growing bajra and are distributed in the western, central and southern part of the microwatershed. Maximum area of 190 ha (41%) is moderately suitable (Class S2) and are distributed in the major part of the microwatershed with minor limitations of texture, rooting condition, gravelliness and calcareousness. Marginally suitable (Class S3) lands cover an area of 175 ha (37%) and are distributed in the northern, western, central and southern part of the microwatershed. They have moderate limitations of gravelliness, gravelliness and rooting condition.

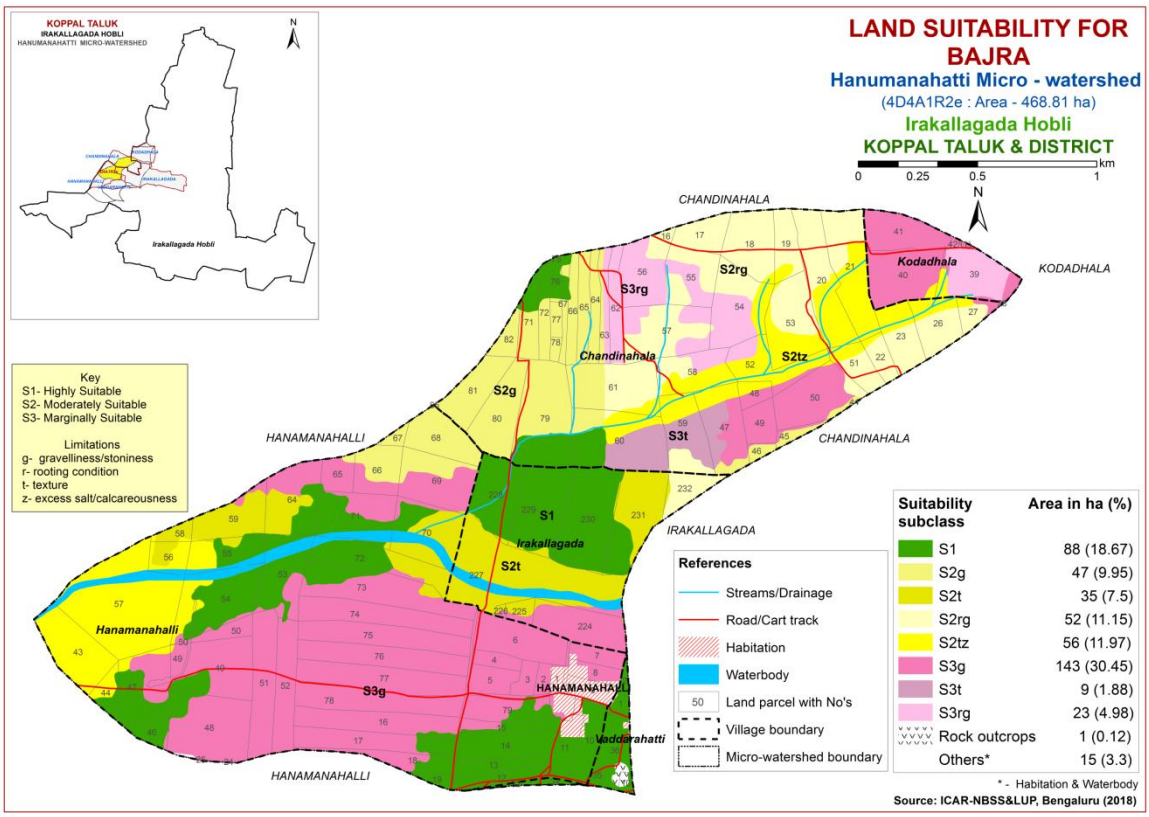



Fig. 7.3 Land Suitability map of Bajra

## 7.4 Land Suitability for Groundnut (*Arachis hypogaea*)

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

An area of 25 ha (5%) is highly suitable (Class S1) for growing groundnut and are distributed in the southern part of the microwatershed. Maximum area of 281 ha (60%) is moderately suitable (Class S2) and are distributed in the major part of the microwatershed. They have minor limitations of texture, gravelliness and rooting condition. An area of 147 ha (31%) is marginally suitable (Class S3) and are distributed in the northern, eastern, central and western part of the microwatershed. They have moderate limitations of rooting condition, gravelliness, calcareousness and texture.

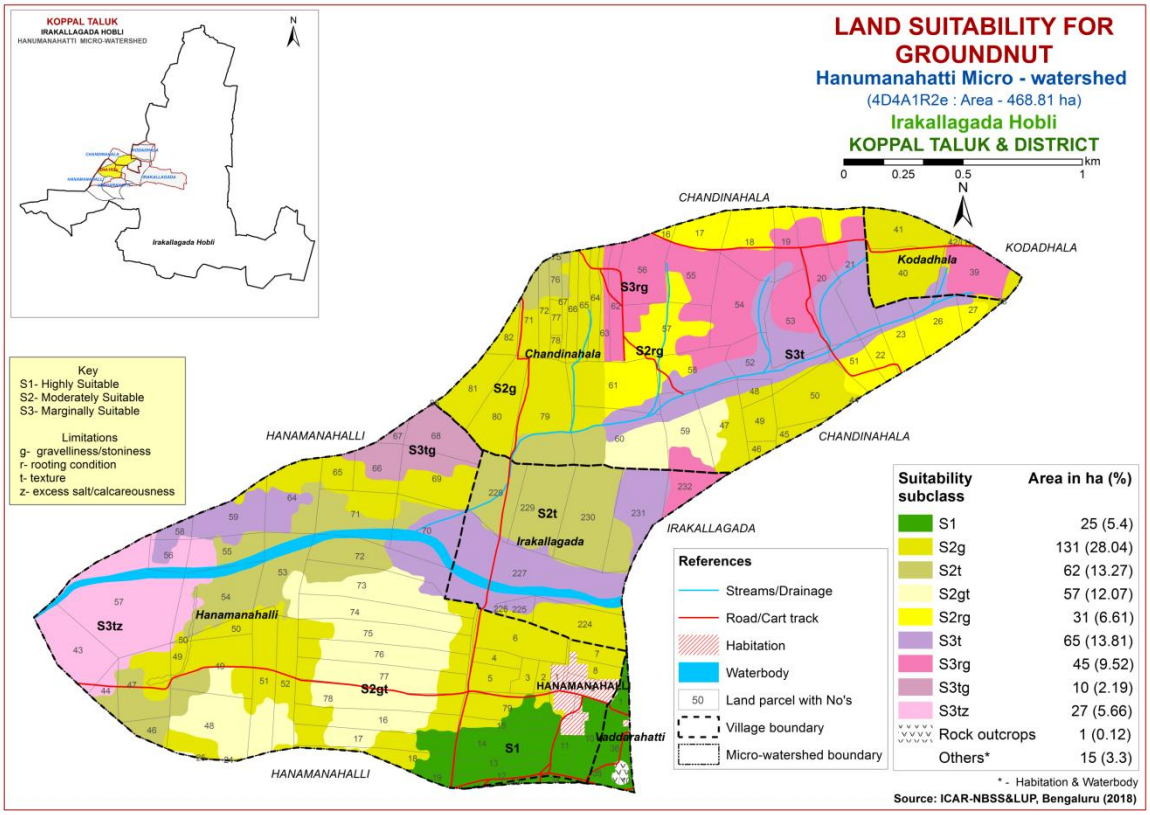



Fig. 7.4 Land Suitability map of Groundnut

## 7.5 Land Suitability for Sunflower (*Helianthus annus*)

Sunflower is one of the most important oilseed crop grown in an area of 3.56 lakh ha in the State in all the districts. The crop requirements for growing sunflower (Table 7.6) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing sunflower was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.5.

An area of 72 ha (15%) is highly suitable (Class S1) for growing sunflower and are distributed in the northern, eastern, central and western part of the microwatershed. An area of 99 ha (21%) is moderately suitable (Class S2) and are distributed in the western, central, southern part of the microwatershed. They have minor limitations of gravelliness and rooting condition. Maximum area of 259 ha (55%) is marginally suitable (Class S3) and are distributed in the major part of the microwatershed with moderate limitations of rooting condition, calcareousness and gravelliness. Currently not suitable (Class N1) lands cover an area of 235 ha (5%) and are distributed in the northern and northeastern part of the microwatershed with severe limitation of rooting condition.

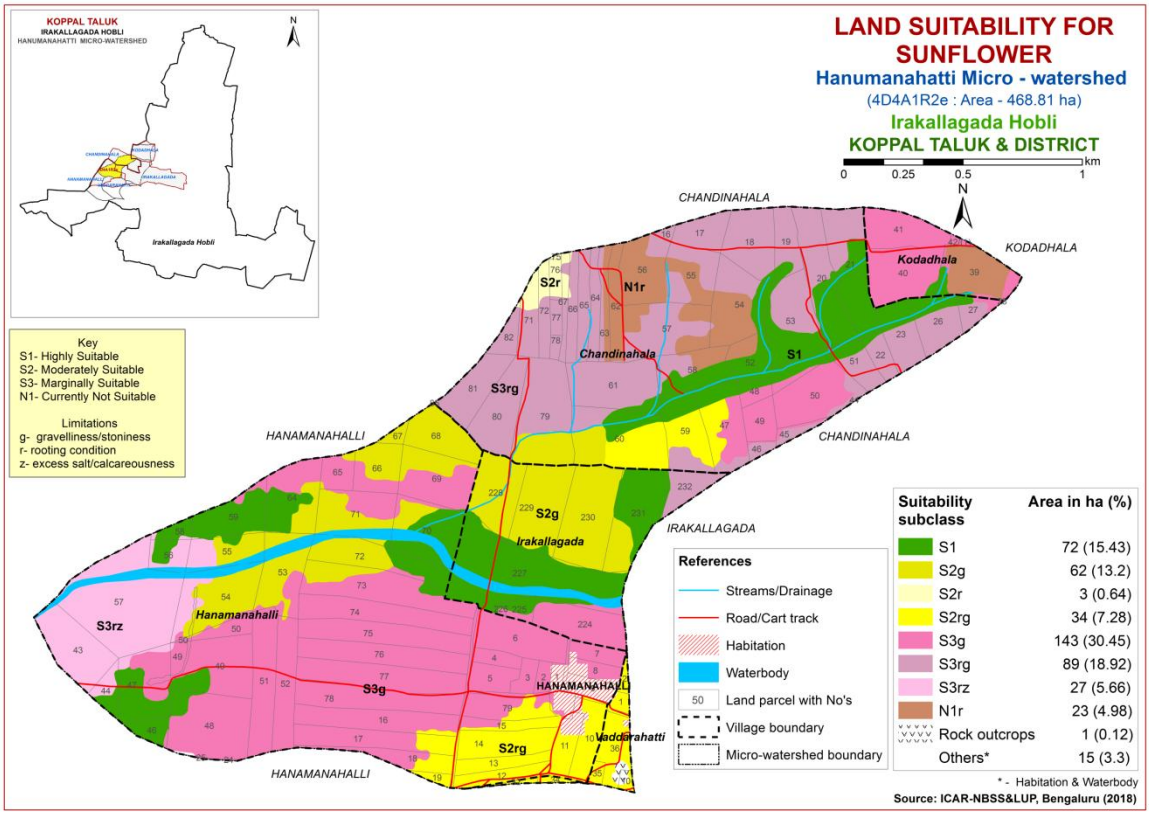



Fig. 7.5 Land Suitability map of Sunflower

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

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

A area of 8 ha (2%) is highly suitable (Class S1) for growing red gram and are distributed in the western part of the microwatershed. Moderately suitable (Class S2) lands occupy an area of 164 ha (35%) and are distributed in the northern, central, southern and western part of the microwatershed with minor limitations of gravelliness, texture, rooting condition and calcareousness. Marginally suitable (Class S3) lands cover a maximum area of 258 ha (55%) and are distributed in the major part of the microwatershed. They have moderate limitations of calcareousness, gravelliness and rooting condition. Currently not suitable (Class N1) lands cover an area of 23 ha (5%) for growing red gram and are distributed in the northern and northeastern part of the microwatershed with severe limitation of rooting condition.

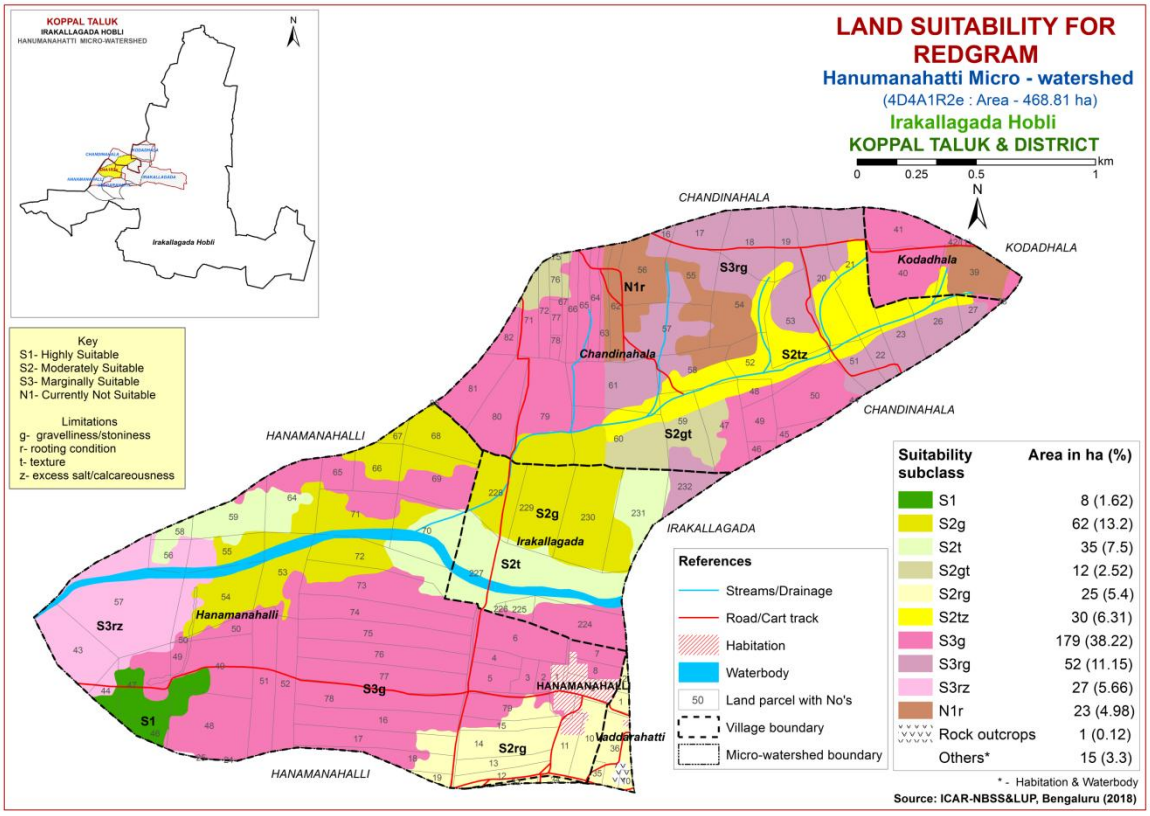



Fig. 7.6 Land Suitability map of Redgram

## 7.7 Land Suitability for Bengalgram (*Cicer arietinum*)

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

An area of 65 ha (14%) is highly suitable (Class S1) for growing bengalgram and are distributed in the northern, eastern, central and western part of the microwatershed. Moderately suitable lands (Class S2) occupy an area of 186 ha (40%) and are distributed in the northern, eastern, central, southern and western part of the microwatershed with minor limitations of gravelliness, calcareousness, texture and rooting condition. Marginally suitable (Class S3) lands cover a maximum area of 202 ha (43%) and are distributed in the major part of the microwatershed. They have moderate limitations of rooting condition, gravelliness and texture.

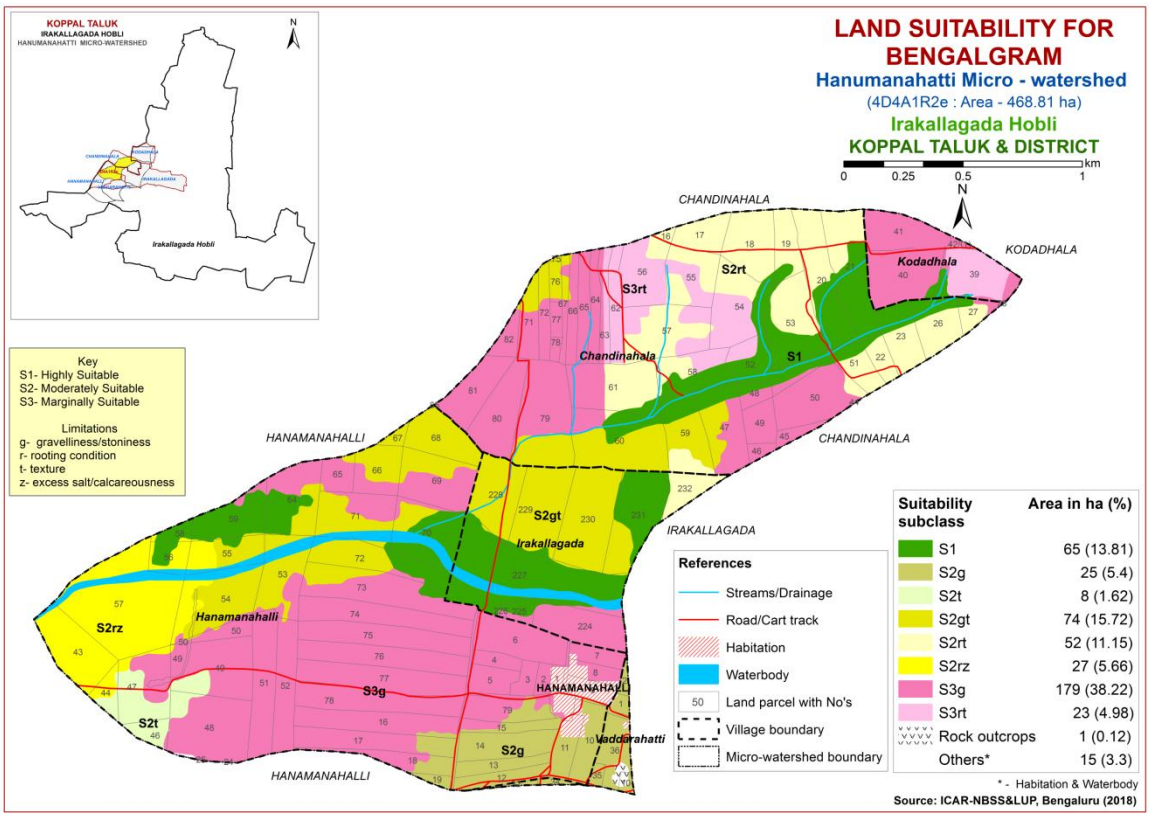



Fig. 7.7 Land Suitability map of Bengalgram

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

Cotton is one of the most important fibre crop grown in the State in about 8.75 lakh ha area in Raichur, Dharwad, Belgaum, Gulbarga, Bijapur, Bidar, Bellary, Chitradurga and Chamarajnagar districts. The crop requirements for growing cotton (Table 7.9) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing cotton was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.8.

An area of 65 ha (14%) is highly suitable (Class S1) for growing cotton and are distributed in the northern, eastern, central and western part of the microwatershed. Moderately suitable (Class S2) lands occupy an area of 156 ha (33%) and are distributed in the eastern, central, southern and western part of the microwatershed. They have minor limitations of rooting condition, gravelliness, texture and calcareousness. Marginally suitable (Class S3) lands cover a maximum area of 233 ha (50%) and are distributed in the major part of the microwatershed. They have moderate limitations of texture, gravelliness and rooting condition.

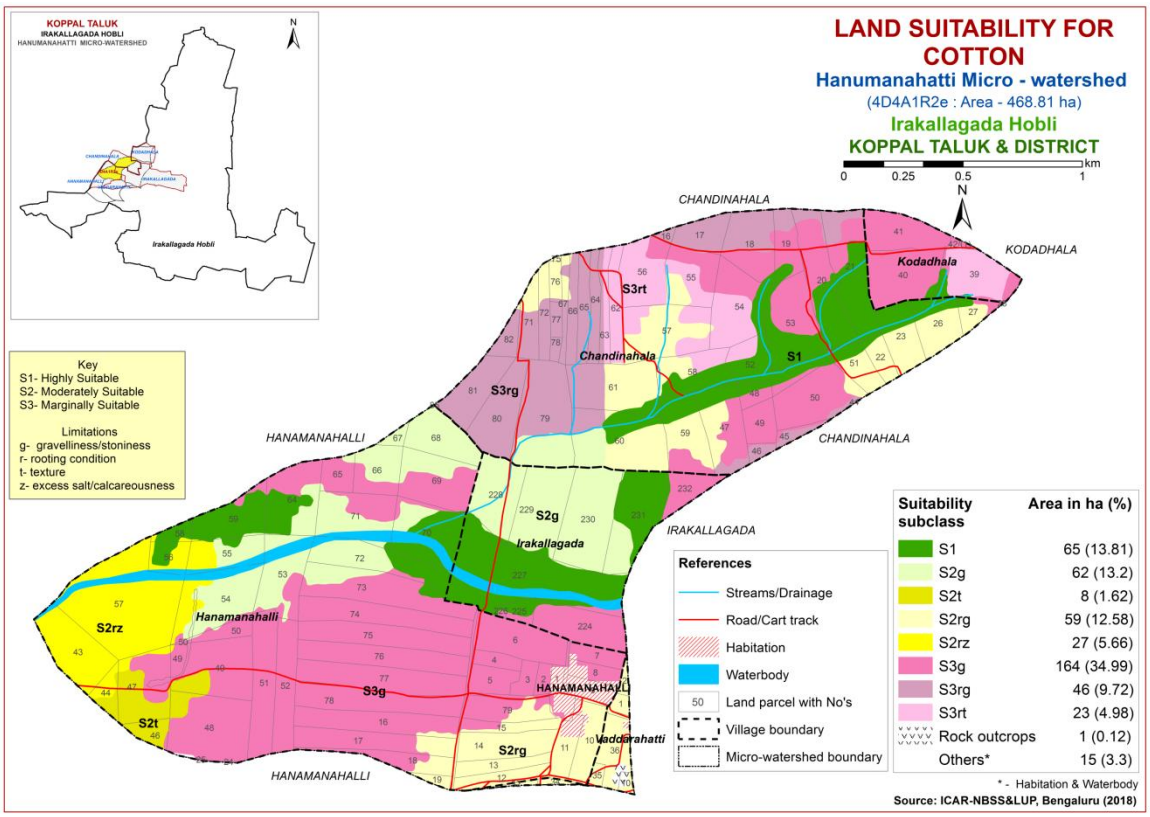



Fig. 7.8 Land Suitability map of Cotton

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

Chilli is one of the most important commercial spice crop grown in an area of 0.89 lakh ha in all the districts of Karnataka State. The crop requirements for growing chilli (Table 7.10) were matched with the soil-site characteristics (Table 7.1) of the soils of the microwatershed and a land suitability map for growing chilli was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.9.

An area of 11 ha (2%) is highly (Class S1) for growing chilli and are distributed on the western and northwestern part of the microwatershed. Moderately suitable (Class S2) lands occur in an area of 148 ha (31%) and are distributed in the northeastern, central, southern and western part of the microwatershed. They have minor limitations of rooting condition, texture and gravelliness. Maximum area of 295 ha (63%) is marginally suitable (Class S3) and are distributed in the major part of the microwatershed. They have moderate limitations of gravelliness, texture, rooting condition and calcareousness.

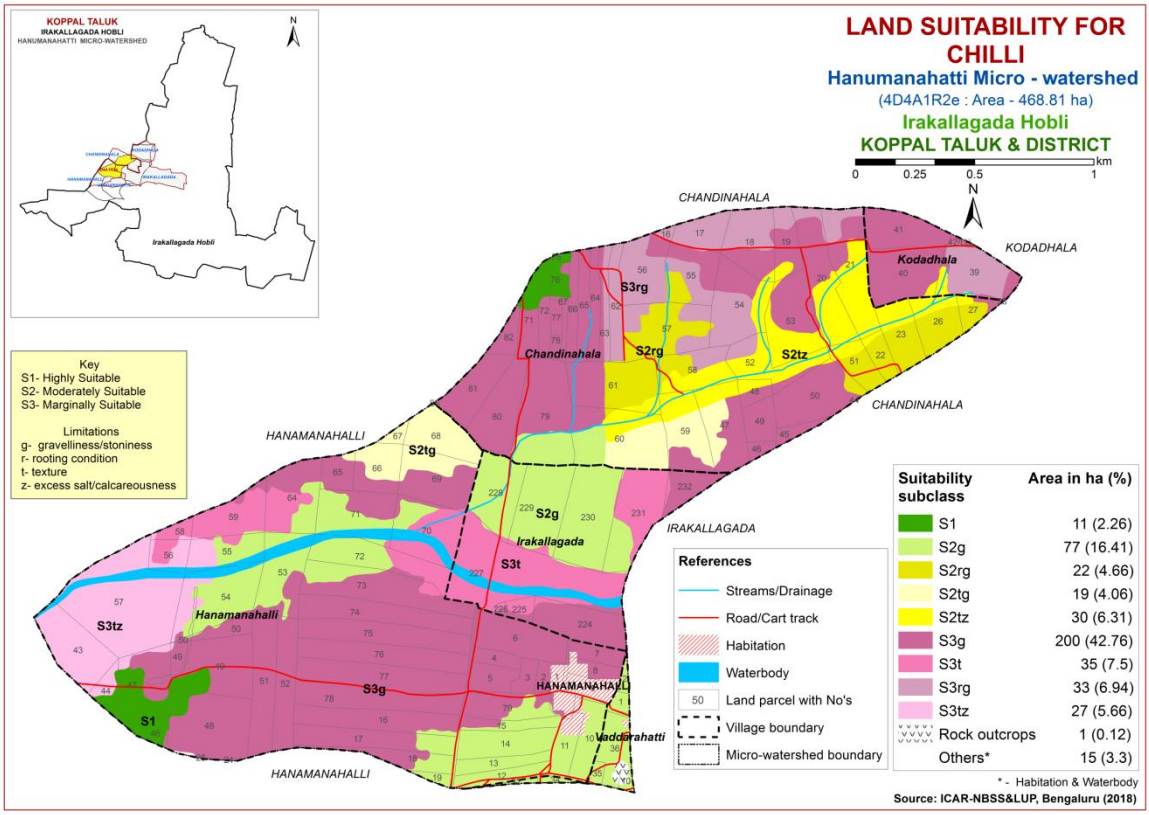



Fig. 7.9 Land Suitability map of Chilli

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

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

An area of 11 ha (2%) is highly (Class S1) suitable for growing tomato and are distributed in the northern and northwestern part of the microwatershed. Moderately suitable (Class S2) lands occur in an area of 148 ha (31%) and are distributed in the northeastern, central, southern and western part of the microwatershed with minor limitations of rooting condition, texture, calcareousness and gravelliness. Marginally suitable (Class S3) lands occupy a maximum area of 295 ha (63%) and are distributed in the major part of the microwatershed with moderate limitations of gravelliness, rooting condition, texture and calcareousness.

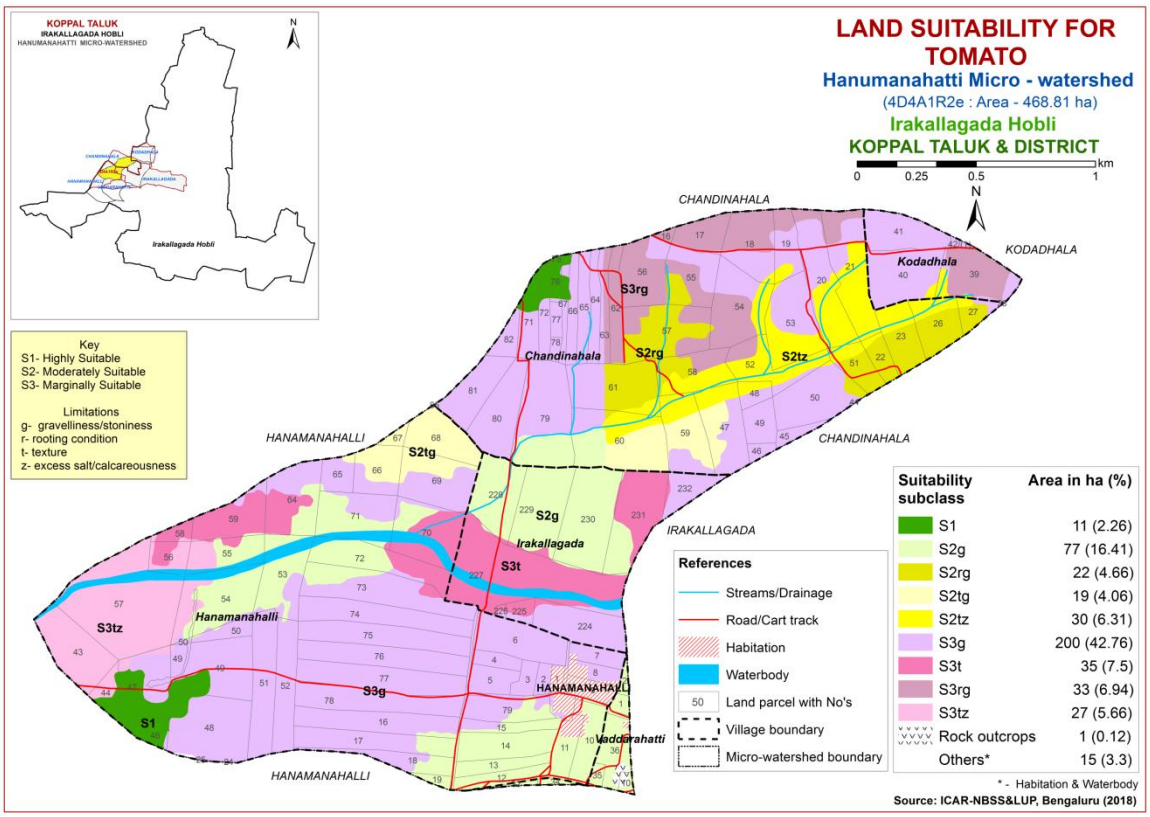



Fig. 7.10 Land Suitability map of Tomato

### 7.11 Land Suitability for Brinjal (*Solanum melongena*)

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

An area of 107 ha (23%) is highly suitable (Class S1) for growing brinjal and are distributed in the central, southern and western part of the microwatershed. Maximum area of about 235 ha (50%) is moderately suitable (Class S2) and are distributed in the major part of the microwatershed with minor limitations of texture, calcareousness, gravelliness and rooting depth. Marginally suitable lands (Class S3) occur in an area of 112 ha (24%) and are distributed in the northern and eastern part of the microwatershed with moderate limitations of rooting condition and gravelliness.

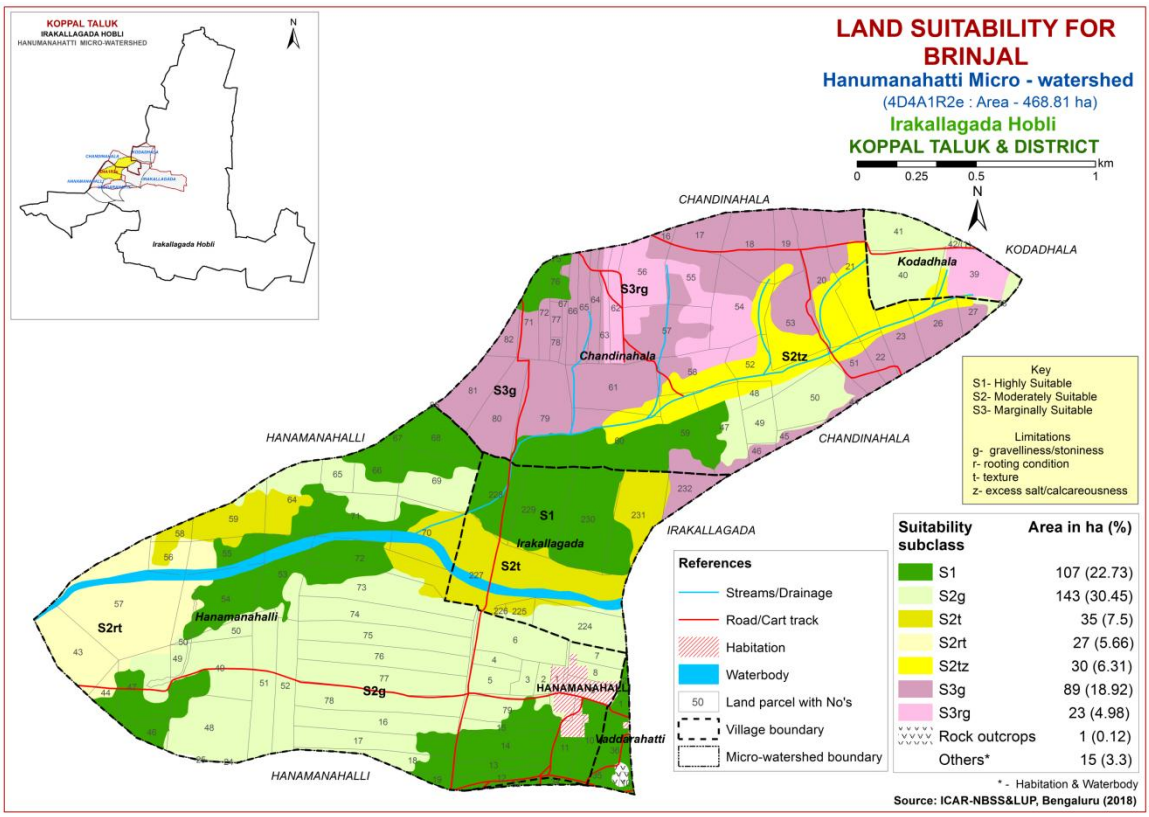



Fig. 7.11 Land Suitability map of Brinjal

### 7.12 Land Suitability for Onion (*Allium cepa*)

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

An area of 43 ha (9%) is highly (Class S1) suitable for growing onion and are distributed in the western and southern part of the microwatershed. Maximum area of 206 ha (44%) is moderately suitable (Class S2) and are distributed in the major part of the microwatershed. They have minor limitations of texture and gravelliness. Marginally suitable lands (Class S3) occupy a maximum area of 203 ha (43%) and are distributed in northern, eastern, central and western part of the microwatershed with moderate limitations of rooting depth, gravelliness, calcareousness and texture.

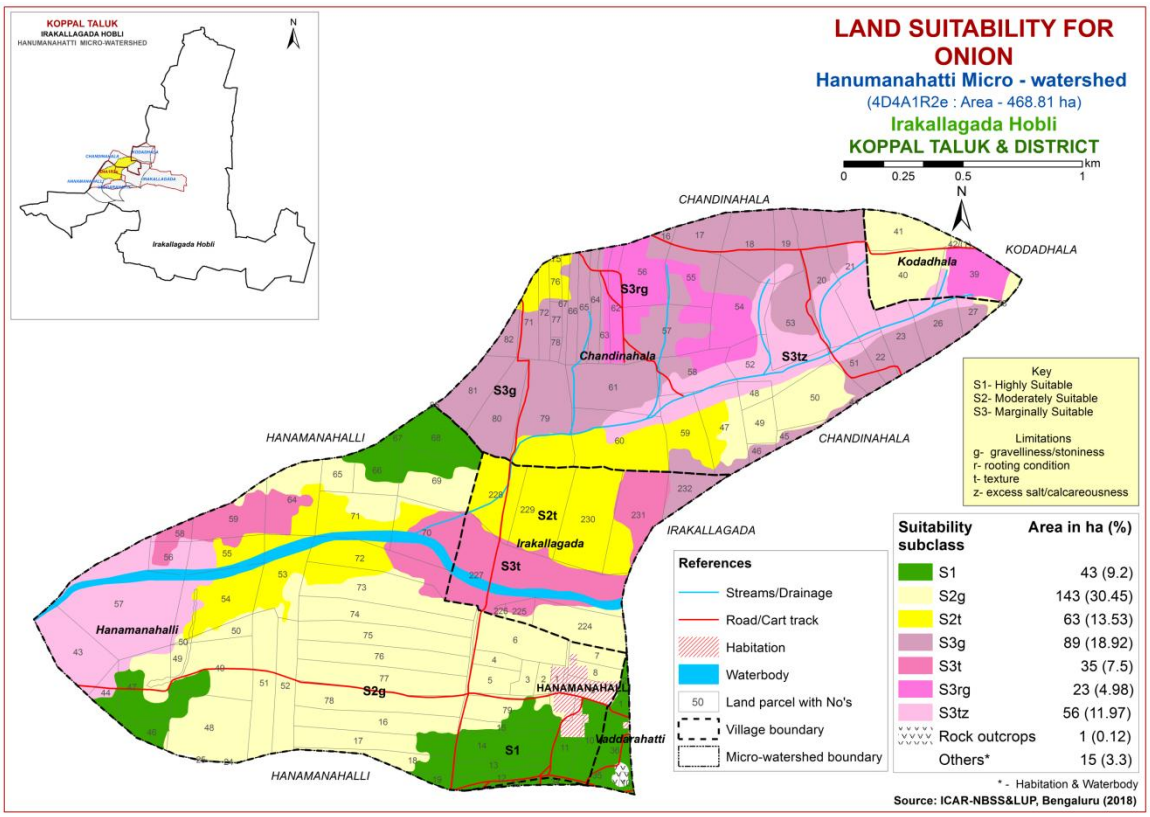



Fig. 7.12 Land Suitability map of Onion

### 7.13 Land Suitability for Bhendi (*Abelmoschus esculentus*)

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

An area of 43 ha (10%) is highly suitable (Class S1) for growing bhendi and are distributed in the western and southern part of the microwatershed. Maximum area of about 299 ha (63%) is moderately suitable (Class S2) and are distributed in the major part of the microwatershed with minor limitations of texture, calcareousness, gravelliness and rooting depth. Marginally suitable lands (Class S3) occur in an area of 112 ha (24%) and are distributed in the northern and eastern part of the microwatershed with moderate limitations of rooting depth and gravelliness.

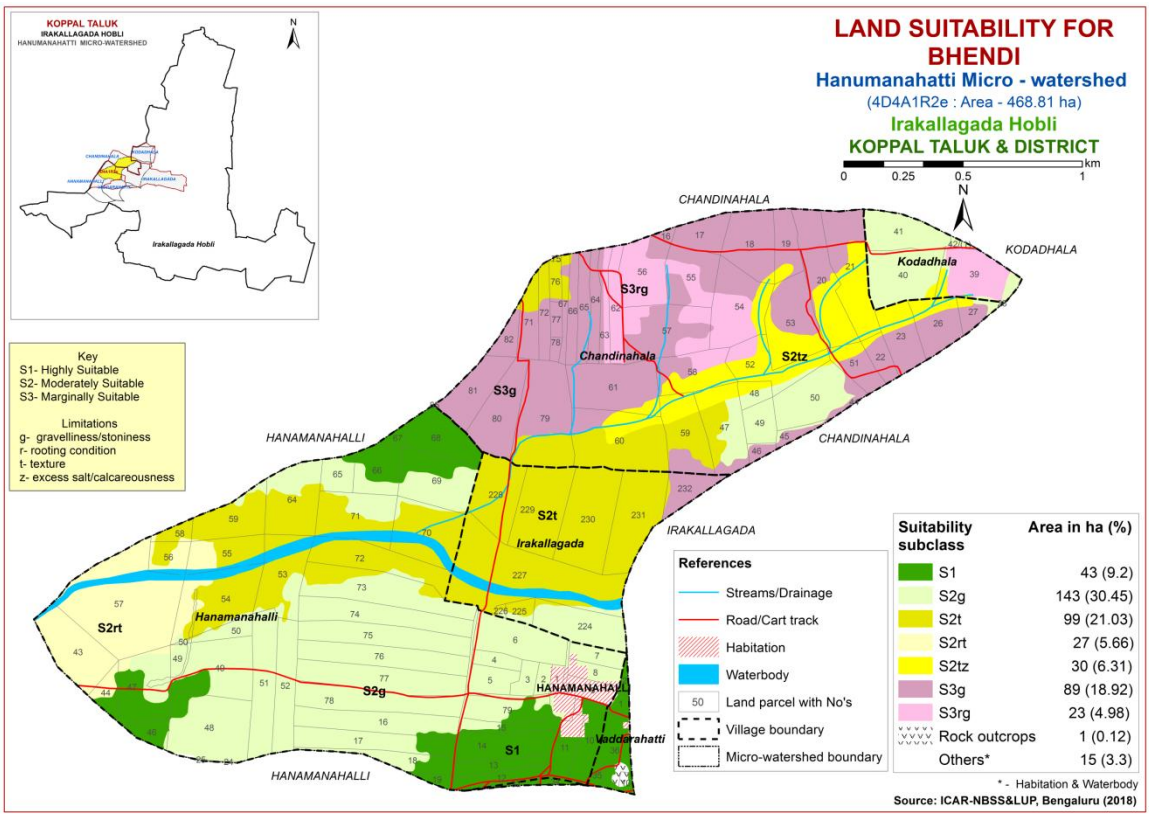



Fig. 7.13 Land Suitability map of Bhendi

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

Drumstick is one of the most important vegetable crop grown in 2403 ha area in the State. The crop requirements for growing drumstick (Table 7.15) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing drumstick was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.14.

An area of 59 ha (13%) is highly suitable (Class S1) for growing drumstick and are distributed in the western, southwestern and central part of the microwaterhsed. Maximum area of 255 ha (54%) is moderately suitable (Class S2) and are distributed in the major part of the microwatershed. They have minor limitations of texture, rooting condition, gravelliness and calcareousness. Marginally suitable (Class S3) lands cover an area of 115 ha (25%) and are distributed in the northern and eastern part of the microwatershed. They have moderate limitations of calcareousness, gravelliness and rooting condition. Currently not suitable (Class N1) lands cover an area of 23 ha (5%) and are distributed in the northern and northeastern part of the microwatershed with severe limitation of rooting condition.

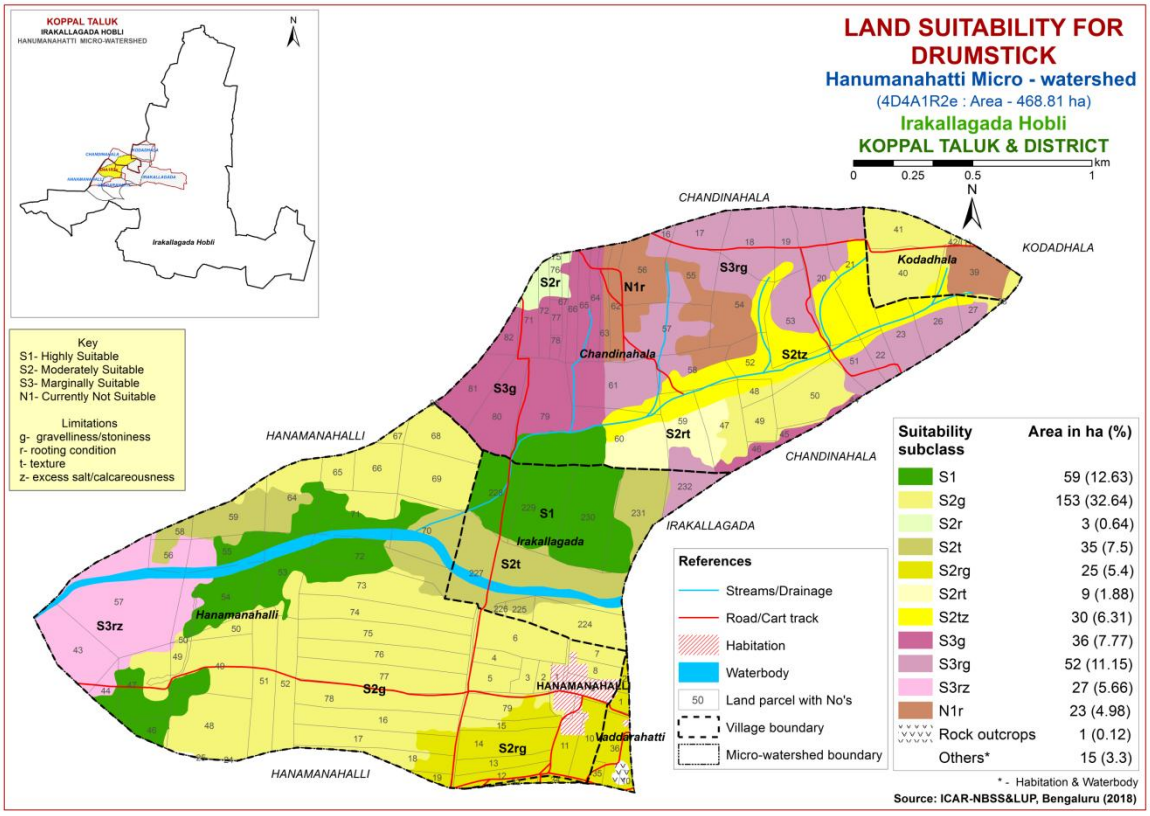



Fig. 7.14 Land Suitability map of Drumstick

### 7.15 Land Suitability for Mango (*Mangifera indica*)

Mango is one of the most important fruit crop grown in about 1.73 lakh ha in almost all the districts of the State. The crop requirements (Table 7.16) for growing mango were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing mango was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.15.

There are no highly (Class S1) suitable lands for growing mango in the microwaterhsed. Moderately suitable (Class S2) lands occupy an area of 69 ha (15%) and are distributed in the western, central and southwestern part of the microwatershed. They have minor limitations of gravelliness and rooting condition. Marginally suitable (Class S3) lands cover a maximum area of 281 ha (60%) and are distributed in the major part of the microwatershed. They have moderate limitations of texture, rooting condition, gravelliness and calcareousness. An area of 102 ha (22%) is currently not suitable (Class N1) for growing mango and occur in the northern and eastern part of the microwatershed with severe limitations of calcareousness, gravelliness and rooting condition.

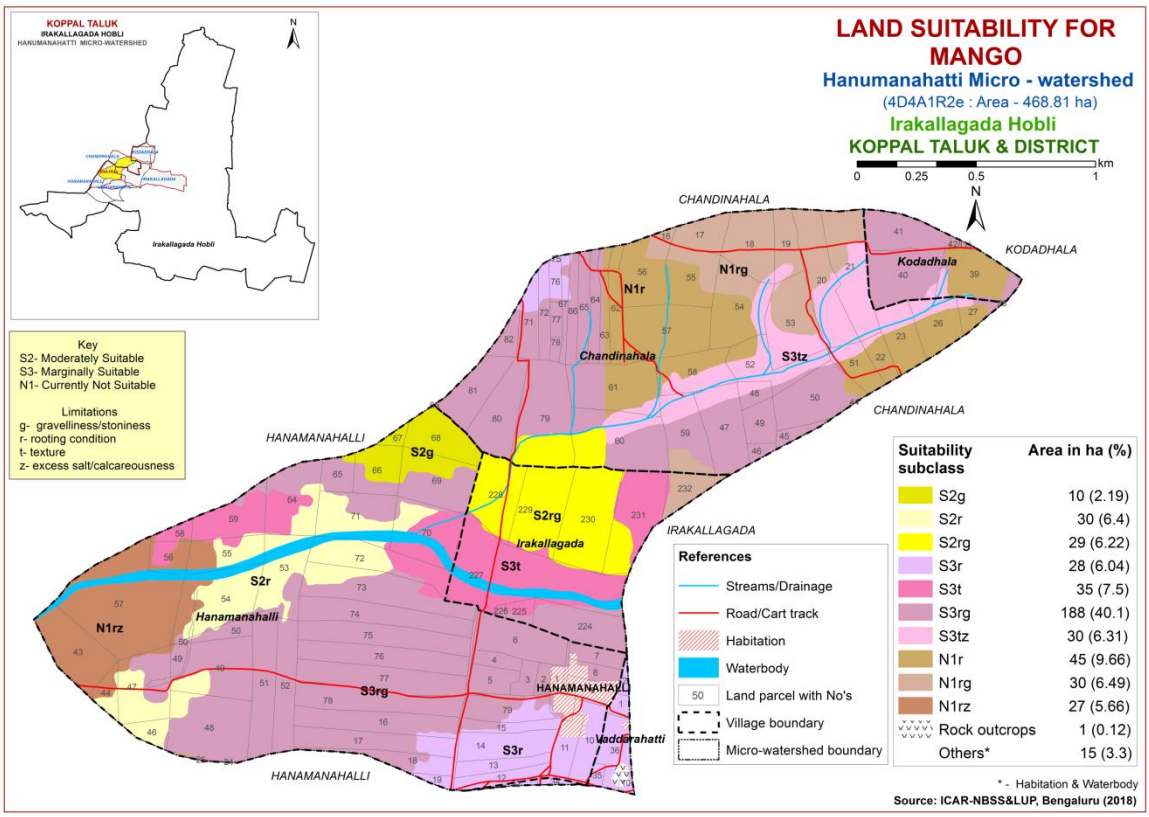



Fig. 7.15 Land Suitability map of Mango

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

Guava is one of the most important fruit crop grown in an area of about 0.64 lakh ha in almost all the districts of the State. The crop requirements (Table 7.17) for growing guava were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing guava was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.16.

An area of 8 ha (2%) is highly (Class S1) for growing guava and are distributed in the southwestern part of the microwatershed. Moderately suitable (Class S2) lands occur in an area of 134 ha (29%) and are distributed in the western, central, eastern and southern part of the microwatershed. They have minor limitations of rooting condition, gravelliness and texture. Maximum area of about 286 ha (61%) area is marginally suitable (Class S3) and occur in the major part of the microwatershed with moderate limitations of rooting condition, calcareousness, gravelliness and texture. An area of 23 ha (5%) is currently not suitable (Class N1) for growing guava and are distributed in the northern and northeastern part of the microwatershed with severe limitation of rooting condition.

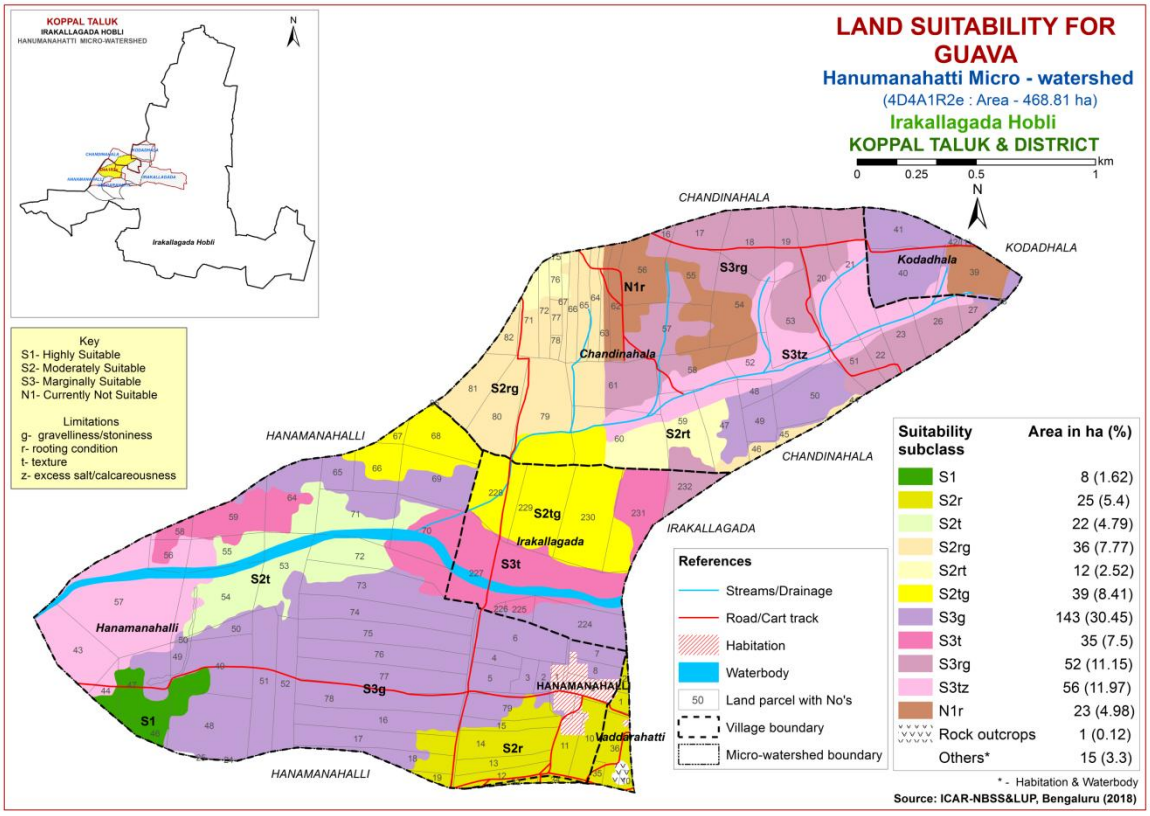



Fig. 7.16 Land Suitability map of Guava

### 7.17 Land Suitability for Sapota (*Manilkara zapota*)

Sapota is one of the most important fruit crop grown in an area of about 29373 ha in almost all the districts of the State. The crop requirements (Table 7.18) for growing sapota were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing sapota was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.17.

An area of 30 ha (6%) is highly suitable (Class S1) for growing sapota and are distributed in the western and southwestern part of the microwatershed. An area of 112 ha (24%) is moderately suitable (Class S2) and are distributed in the western, eastern and southern part of the microwatershed. They have minor limitations of rooting condition and gravelliness. Marginally suitable (Class S3) lands cover a maximum area of 287 ha (61%) and are distributed in the major part of the microwatershed. They have moderate limitations of texture, rooting condition, gravelliness and calcareousness. An area of 23 ha (5%) is currently not suitable (Class N1) for growing sapota and occur in the northern and northeastern part of the microwatershed with severe limitation of rooting condition.

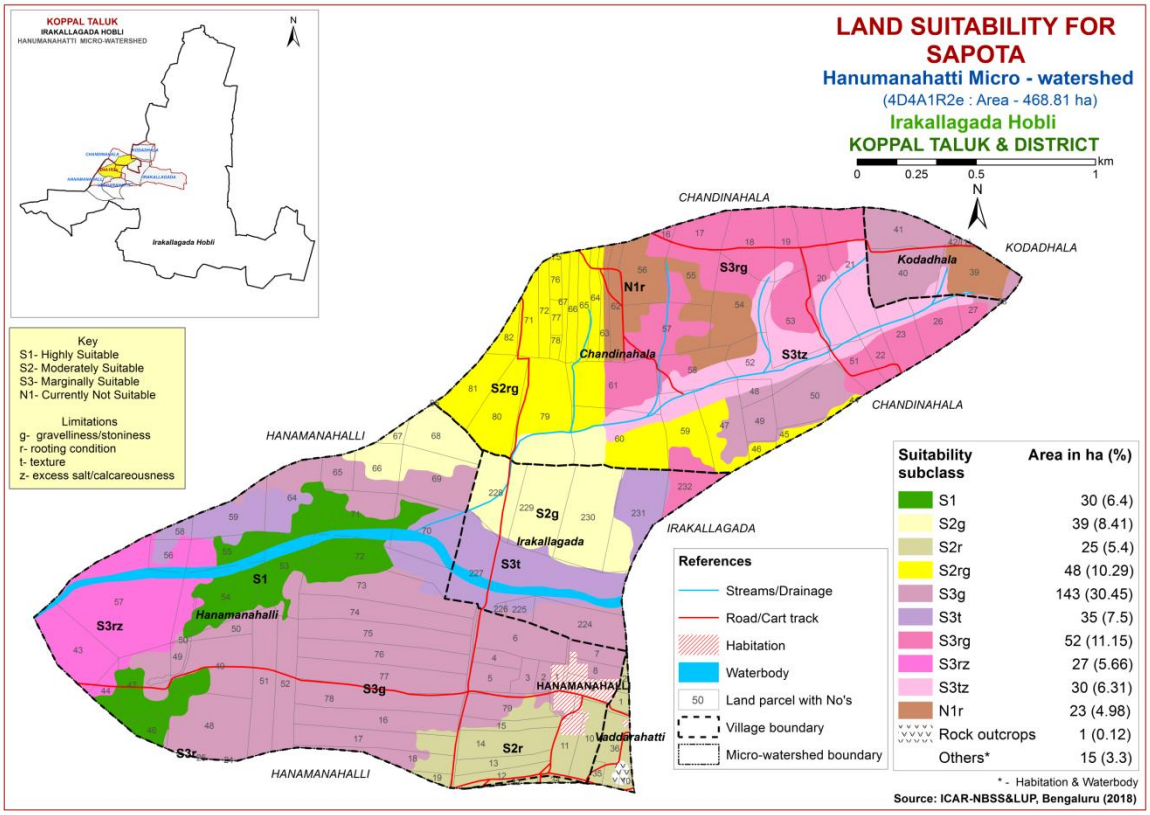



Fig. 7.17 Land Suitability map of Sapota

### 7.18 Land Suitability for Pomegranate (*Punica granatum*)

Pomegranate is one of the commercially grown fruit crop in about 18488 ha in Karnataka mainly in Bijapur, Bagalkot, Koppal, Gadag and Chitradurga districts. The crop requirements for growing pomegranate (Table 7.19) were matched with the soil-site characteristics (Table 7.1) of the soils of the microwatershed and a land suitability map for growing pomegranate was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.18.

An area of 30 ha (6%) is highly suitable (Class S1) for growing pomegranate and are distributed in the western and southwestern part of the microwatershed. Moderately suitable (Class S2) lands occupy an area of 177 ha (38%) and are distributed in the western, northern, central, eastern and southern part of the microwatershed. They have minor limitations of texture, rooting condition, gravelliness and calcareousness. Maximum area of 222 ha (47%) is marginally suitable (Class S3) for growing pomegranate and are distributed in the major part of the microwatershed. They have moderate limitations of rooting condition, calcareousness and gravelliness. An area of 23 ha (5%) is currently not suitable (Class N1) for growing pomegranate and are distributed in the northern and northeastern part of the microwatershed with severe limitation of rooting condition.

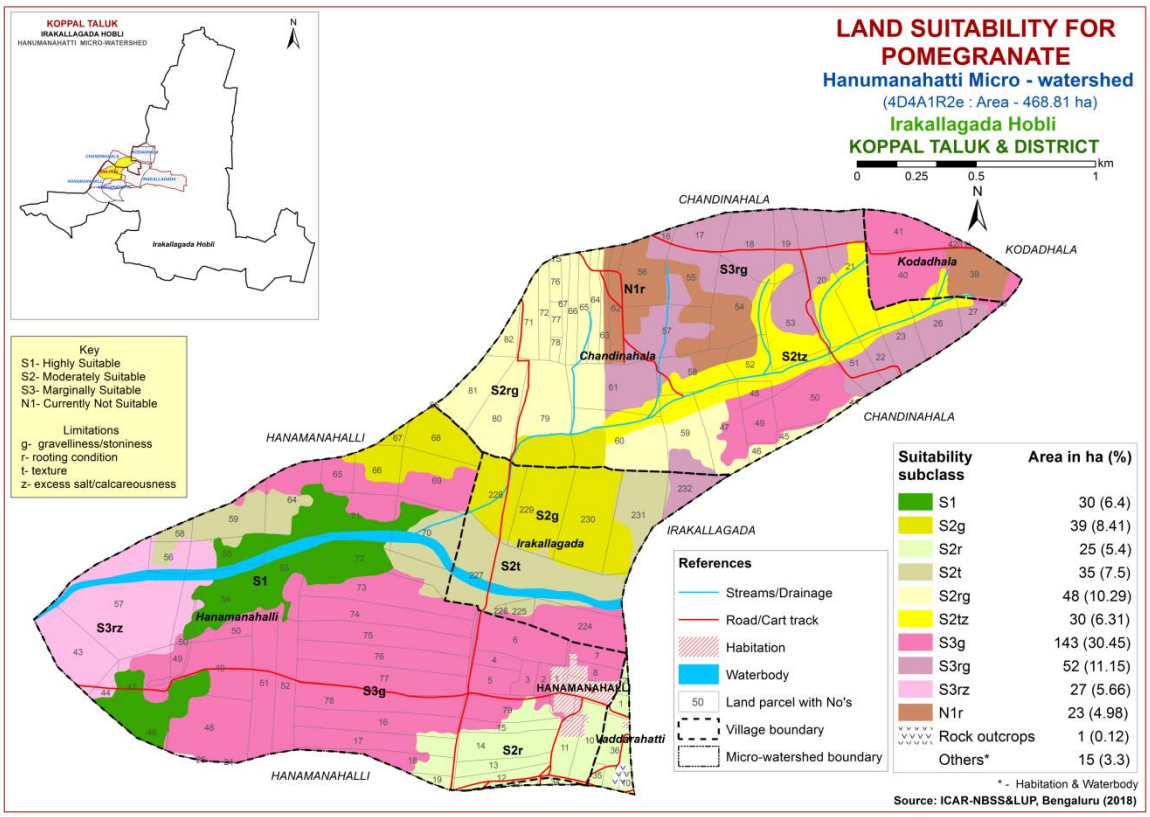



Fig. 7.18 Land Suitability map of Pomegranate

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

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

An area of 95 ha (20%) is highly suitable (Class S1) for growing musambi and are distributed in the northern, central, southwestern and eastern part of the microwatershed. An area of 112 ha (24%) is moderately suitable (Class S2) and are distributed in the western, central, southern and eastern part of the microwatershed. They have minor limitations of rooting condition and gravelliness. Marginally suitable (Class S3) lands occur in a maximum area of 222 ha (47%) and are distributed in the major part of the microwatershed with moderate limitations of rooting condition, calcareousness and gravelliness. An area of 23 ha (5%) is currently not suitable (Class N1) for growing musambi and are distributed in the northern and northeastern part of the microwatershed. They have severe limitation of rooting condition.

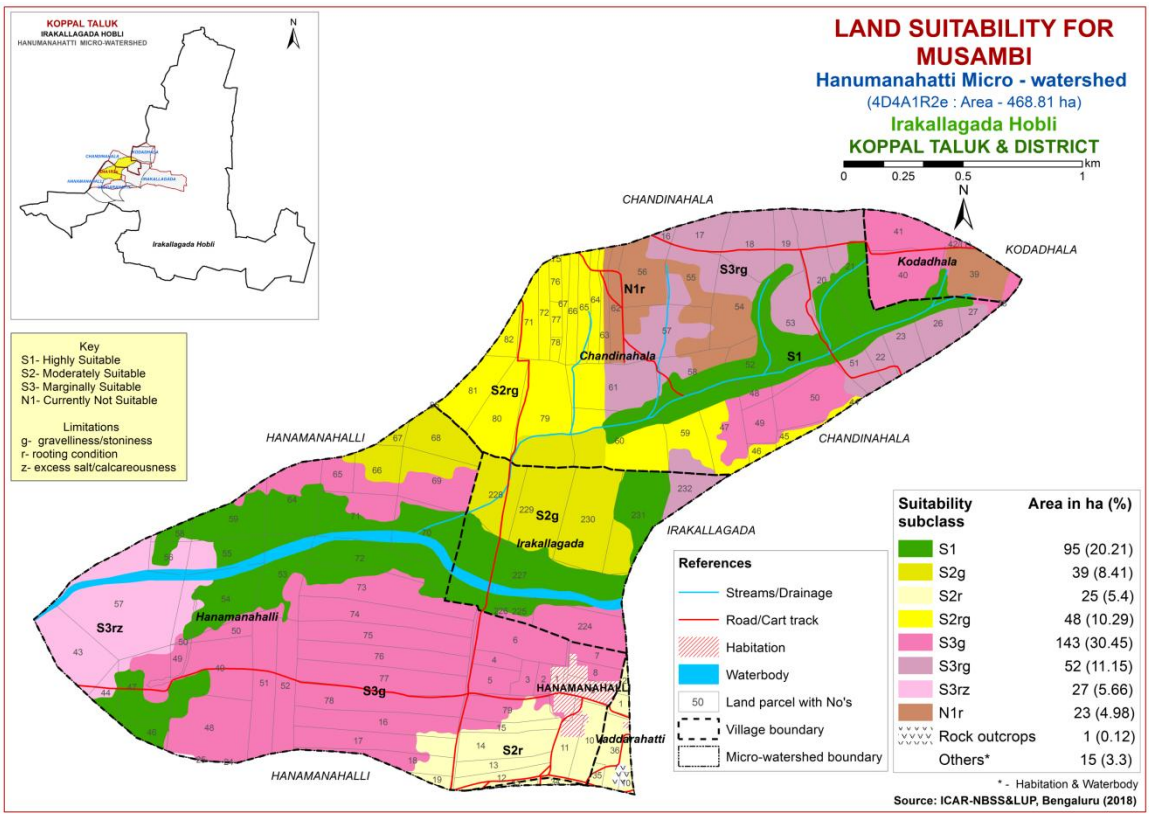



Fig. 7.19 Land Suitability map of Musambi

### 7.20 Land Suitability for Lime (*Citrus sp*)

Lime is one of the most important fruit crop grown in an area of 0.11 lakh ha in almost all the districts of the State. The crop requirements for growing lime (Table 7.21) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing lime was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.20.

An area of 95 ha (20%) is highly suitable (Class S1) for growing lime and are distributed in the western, central, northern, eastern and southwestern part of the microwatershed. An area of 112 ha (24%) is moderately suitable (Class S2) and are distributed in the western, central, eastern and southern part of the microwatershed. They have minor limitations of rooting condition and gravelliness. Marginally suitable (Class S3) lands occur in a maximum area of 222 ha (47%) and distributed in the major part of the microwatershed with moderate limitations of rooting condition, calcareousness and gravelliness. An area of 23 ha (5%) is currently not suitable (Class N1) for growing lime and are distributed in the northern and northeastern part of the microwatershed with severe limitation of rooting condition.

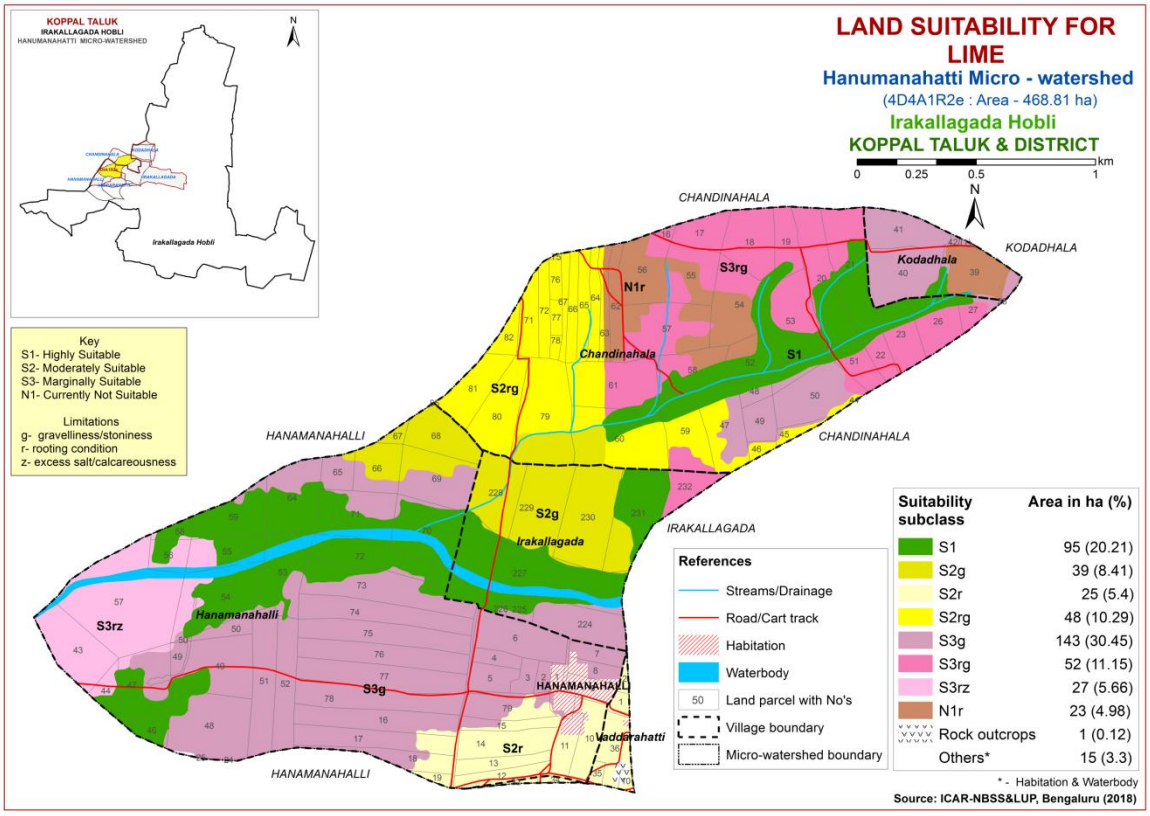



Fig. 7.20 Land Suitability map of Lime

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

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

An area of 126 ha (27%) is highly suitable (Class S1) for growing amla and are distributed in the northern, central, western, southwestern and southern part of the microwatershed. Maximum area of 304 ha (65%) has soils that are moderately suitable (Class S2) and are distributed in the major part of the microwatershed. They have minor limitations of rooting condition, texture, gravelliness and calcareousness. The marginally suitable (Class S3) lands cover an area of 23 ha (5%) and are distributed in the northern and northeastern part of the microwatershed with moderate limitations of rooting condition and gravelliness.

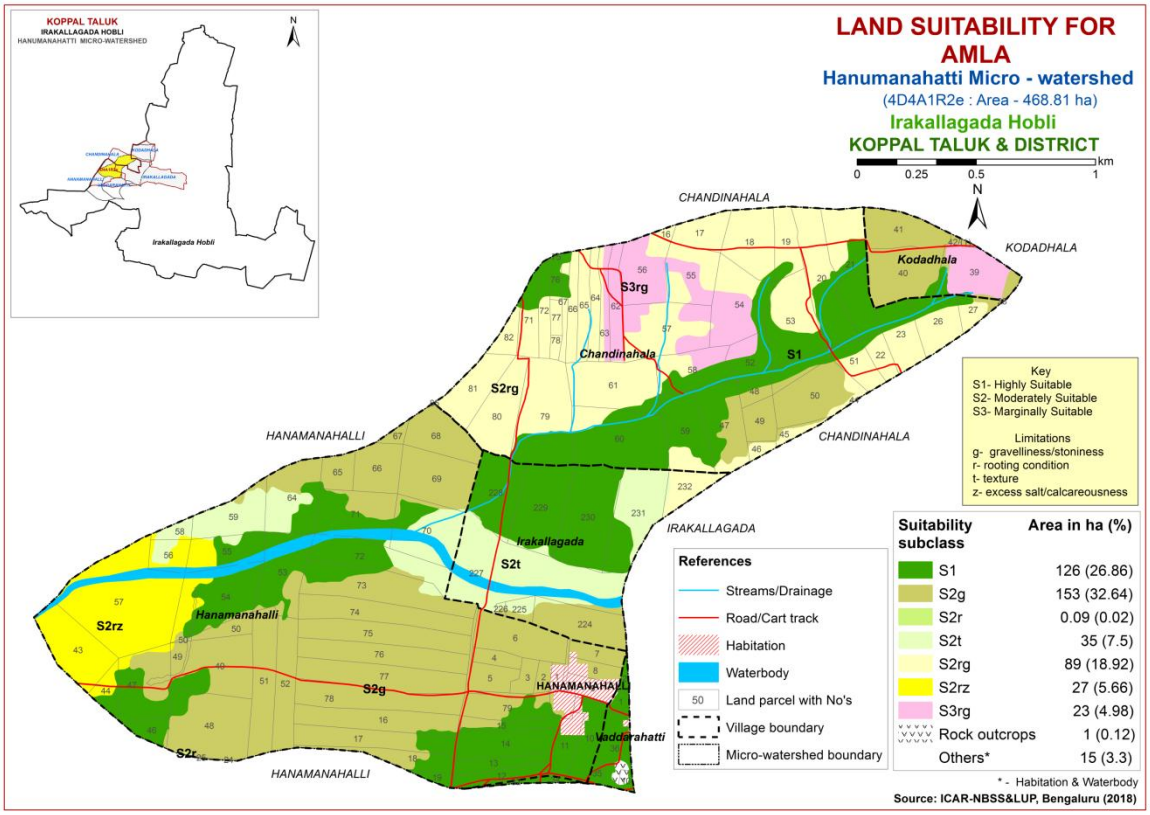



Fig. 7.21 Land Suitability map of Amla

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

Cashew is one of the most important nut crop grown in an area of 1.24 lakh ha in almost all the districts of the State. The crop requirements for growing cashew (Table 7.23) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing cashew was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.22.

An area of 8 ha (2%) is highly (Class S1) for growing cashew and are distributed in the southwestern part of the microwatershed. Moderately (Class S2) suitable lands occur in an area of 135 ha (29%) and are distributed in the western, central, eastern and southern part of the microwatershed. They have minor limitations of texture, rooting condition and gravelliness. Marginally suitable (Class S3) lands occur in a maximum area of 195 ha (42%) and are distributed in the major part of the microwatershed with moderate limitations of rooting condition and gravelliness. Maximum area of about 115 ha (24%) is currently not suitable (Class N1) for growing cashew and are distributed in all parts of the microwaterhsed with severe limitations of texture, rooting condition and calcareousness.

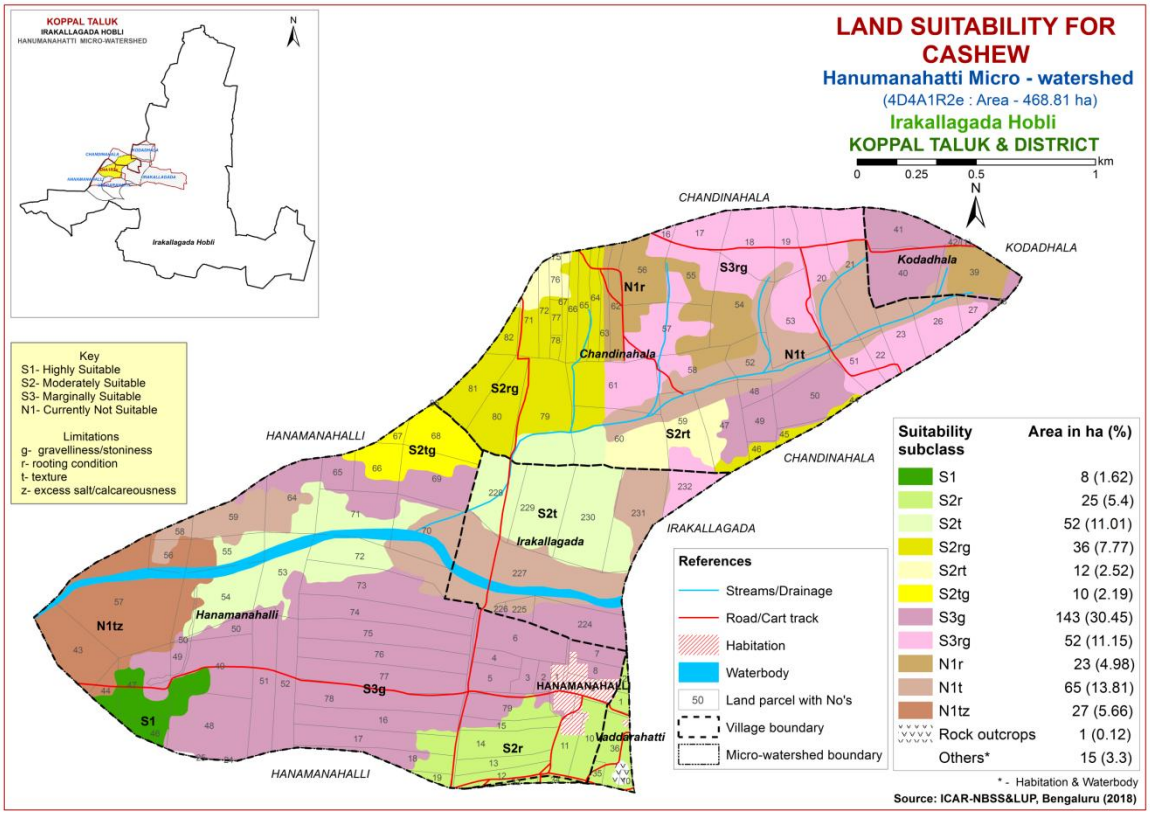



Fig. 7.22 Land Suitability map of Cashew

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

Jackfruit is one of the most important fruit crop grown in 5368 ha in all the districts of the State. The crop requirements for growing jackfruit (Table 7.24) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing jackfruit was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in figure 7.23.

An area of 30 ha (6%) is highly (Class S1) for growing jackfruit and are distributed in the western and southwestern part of the microwatershed. An area of 112 ha (24%) is moderately (Class S2) suitable and are distributed in the western, central, eastern and southern part of the microwatershed. They have minor limitations of gravelliness and rooting condition. Marginally suitable (Class S3) lands cover a maximum area of 286 ha (61%) and are distributed in the major part of the microwatershed. They have moderate limitations of rooting condition, texture, gravelliness and calcareousness. An area of 23 ha (5%) is currently not suitable (Class N1) for growing jackfruit and occur in the northern ad northeastern part of the microwatershed with severe limitation of rooting condition.

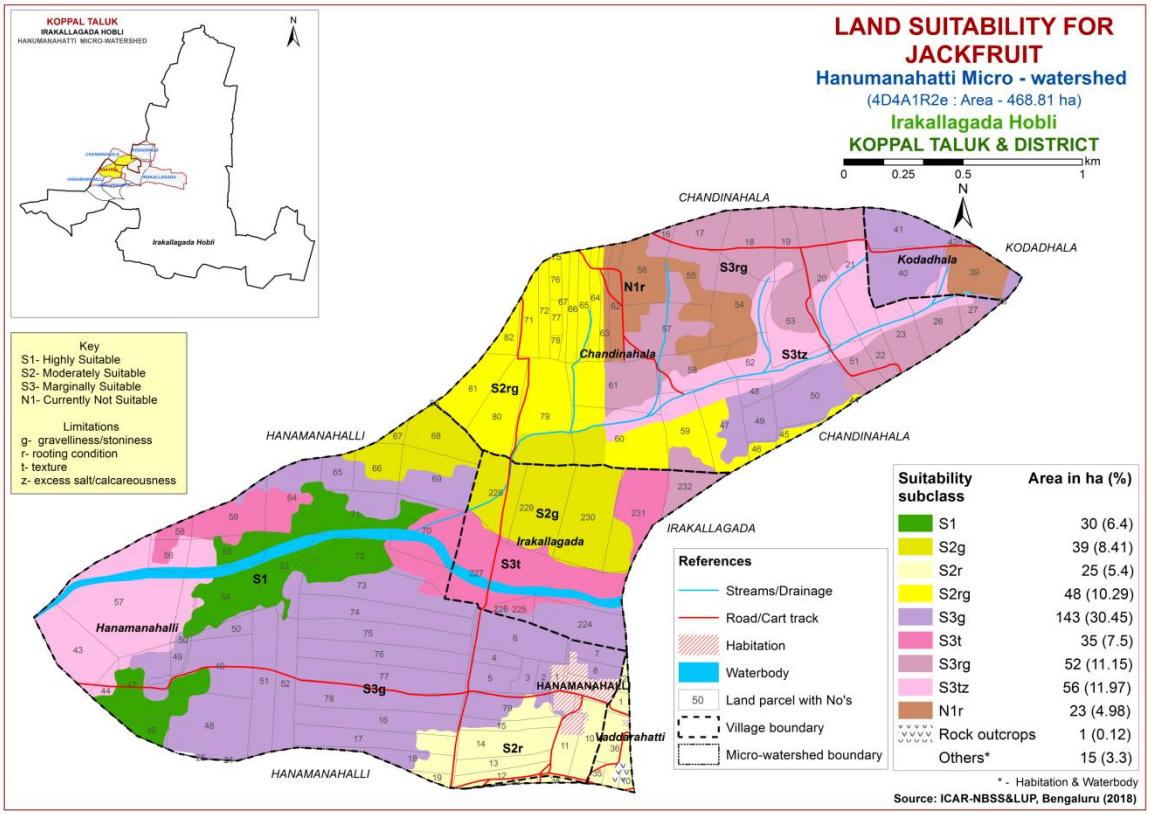



Fig. 7.23 Land Suitability map of Jackfruit

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

Jamun is an important fruit crop grown in almost all the districts of the State. The crop requirements for growing jamun (Table 7.25) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing jamun was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.24.

There are no highly suitable (Class S1) lands for growing jamun in the microwatershed. An area of 207 ha (44%) is moderately suitable (Class S2) and occur in the western, northern, central, eastern and southern part of the microwatershed. They have minor limitations of rooting condition, texture and gravelliness. Marginally suitable (Class S3) lands cover a maximum area of 222 ha (47%) and are distributed in the major part of the microwatershed with moderate limitations of rooting condition, texture, gravelliness and calcareousness. An area of 23 ha (5%) is currently not suitable (Class N1) for growing jamun and are distributed in the northern and northeastern part of the microwatershed with severe limitation of rooting condition.

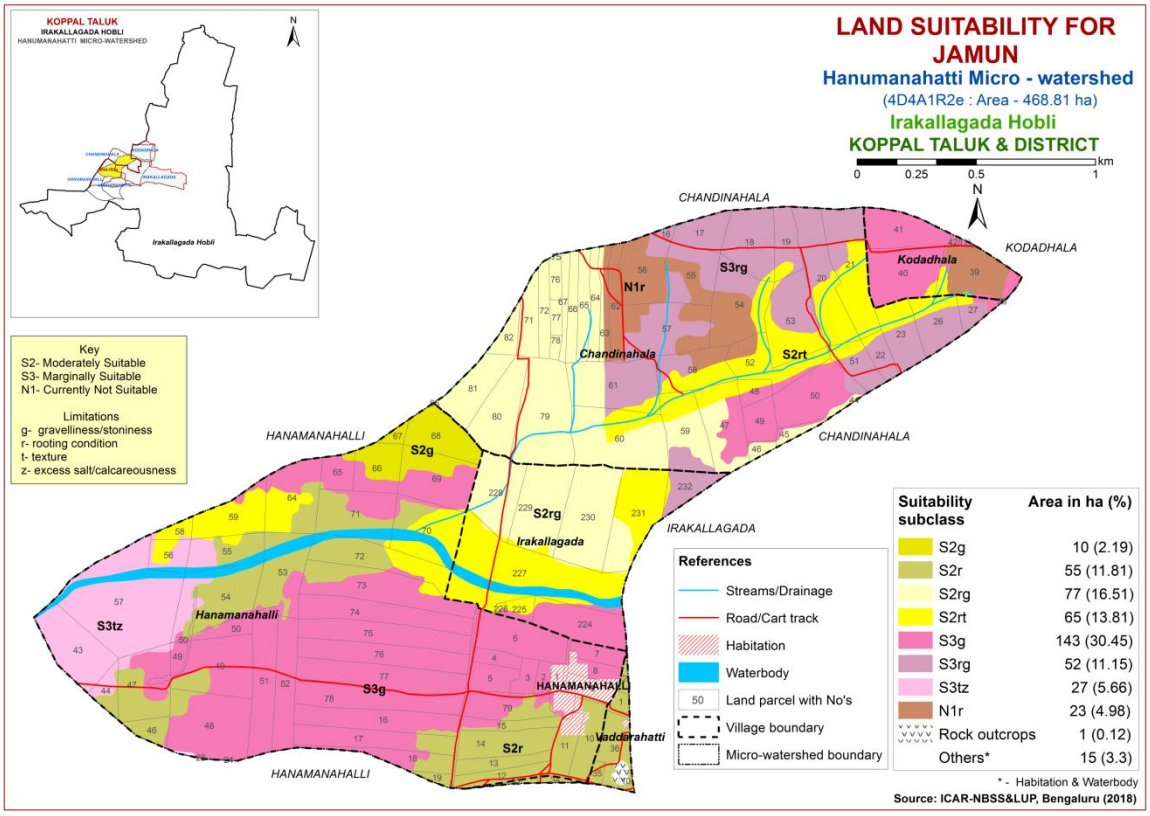



Fig. 7.24 Land Suitability map of Jamun

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

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

An area of 161 ha (34%) is highly (Class S1) suitable for growing custard apple and are distributed in the western, northern, central, southwestern and southern part of the microwatershed. Maximum area of 269 ha (57%) is moderately suitable (Class S2) and are distributed in the major part of the microwatershed. They have minor limitations of rooting condition, gravelliness and calcareousness. An area of 23 ha (5%) is marginally suitable (Class S3) for growing custard apple and are distributed in the northern and northeastern part of the microwatershed with moderate limitations of rooting condition and gravelliness.

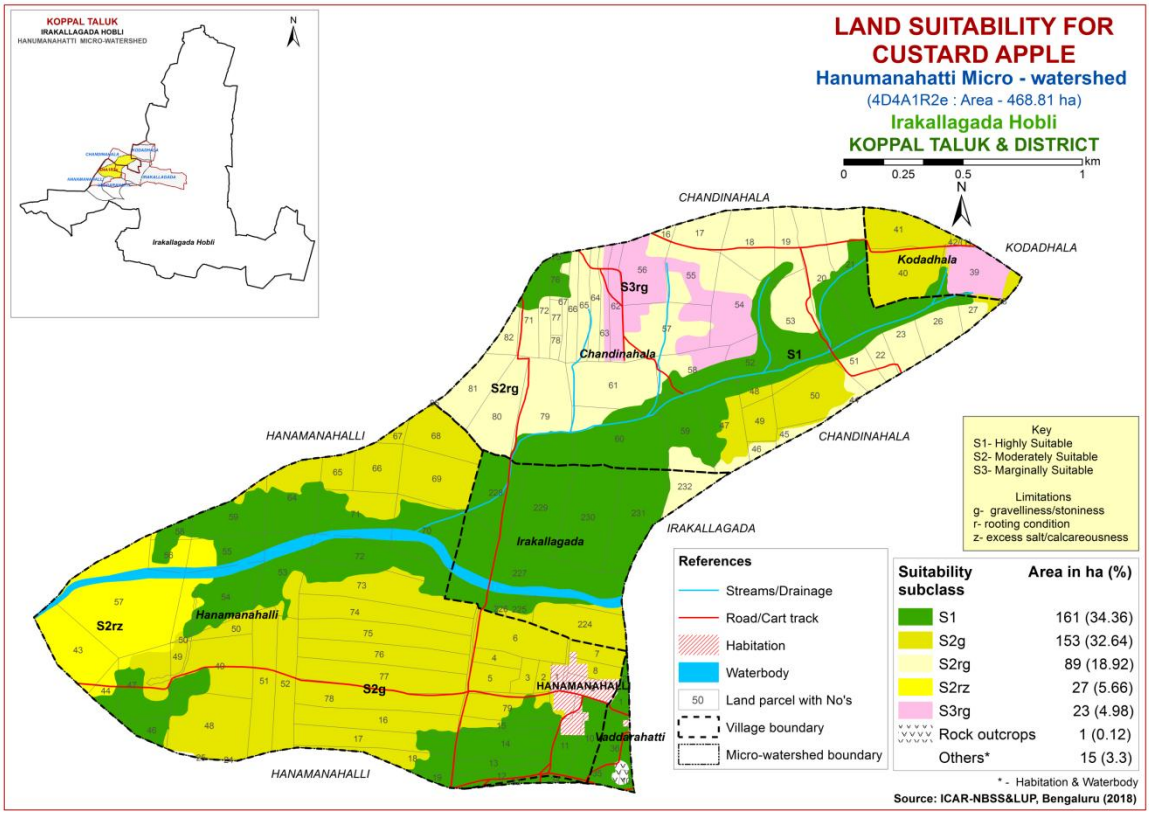



Fig. 7.25 Land Suitability map of Custard Apple

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

Tamarind is one of the most important spice crop grown in 14897 ha in all the districts of the State. The crop requirements for growing tamarind (Table 7.27) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing tamarind was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.26.

There are no highly (Class S1) suitable lands for growing tamarind in the microwatershed. An area of 134 ha (29%) is moderately suitable (Class S2) and occur in the northern, central, eastern and western part of the microwatershed. They have minor limitations of rooting condition, texture, gravelliness and calcareousness. Maximum area of 216 ha (46%) is marginally suitable (Class S3) and occur in major part of the microwatershed with moderate limitations of gravelliness and rooting condition. An area of 102 ha (22%) is currently not suitable (Class N1) and are distributed in the northern, eastern and northeastern part of the microwatershed with severe limitations of rooting condition, calcareousness and gravelliness.

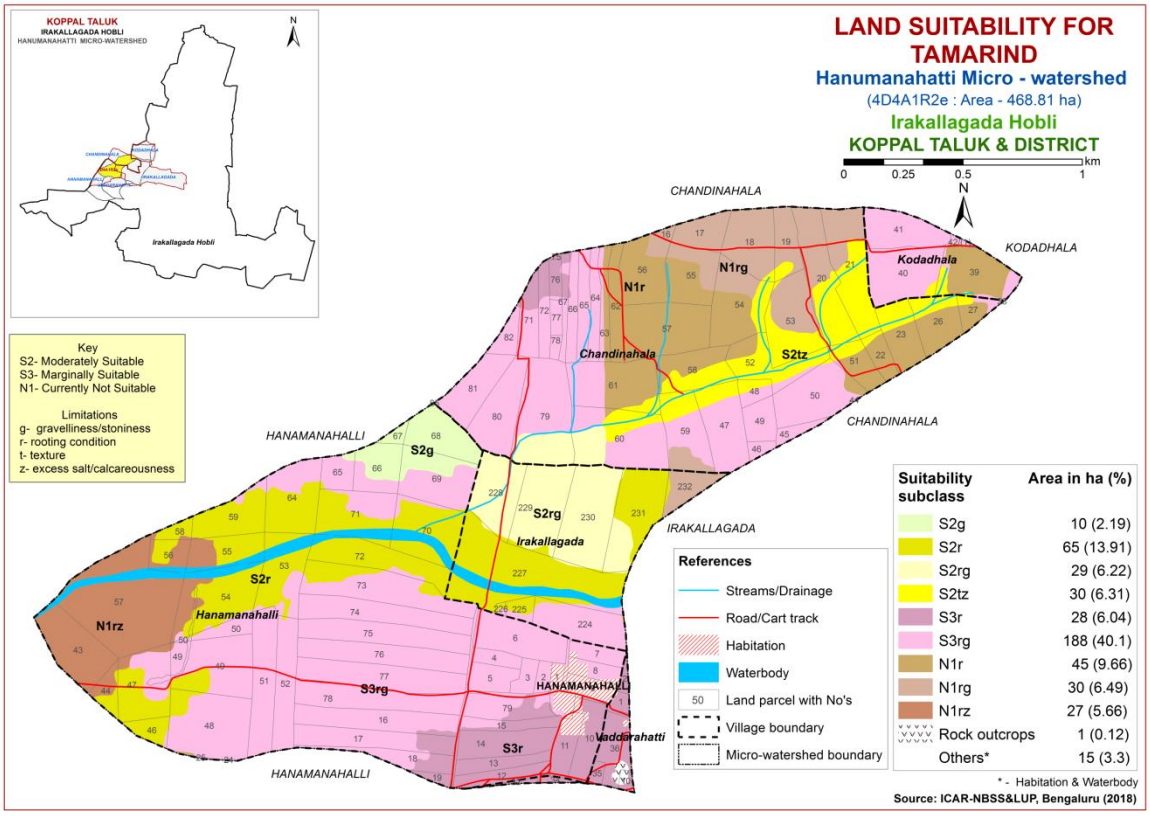



Fig. 7.26 Land Suitability map of Tamarind

### 7.27 Land Suitability for Mulberry (*Morus nigra*)

Mulberry is the most important leaf crop grown for rearing silkworms in about 1.66 lakh ha in all the districts of the State. The crop requirements for growing mulberry (Table 7.28) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing mulberry was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.27.

An area of 59 ha (13%) is highly suitable (Class S1) for growing mulberry and are distributed in the western, central and southwestern part of the microwatershed. Moderately suitable (Class S2) lands occupy a maximum area of 262 ha (56%) and are distributed in the major part of the microwatershed. They have minor limitations of gravelliness, rooting condition and texture. Marginally suitable (Class S3) lands cover an area of 109 ha (23%) and are distributed in the northern, eastern, western and northeastern part of the microwatershed. They have moderate limitations of rooting condition, gravelliness, texture and calcareousness. An area of 23 ha (5%) is currently not suitable (Class N1) and are distributed in the northern and northeastern part of the microwatershed with severe limitation of rooting condition.

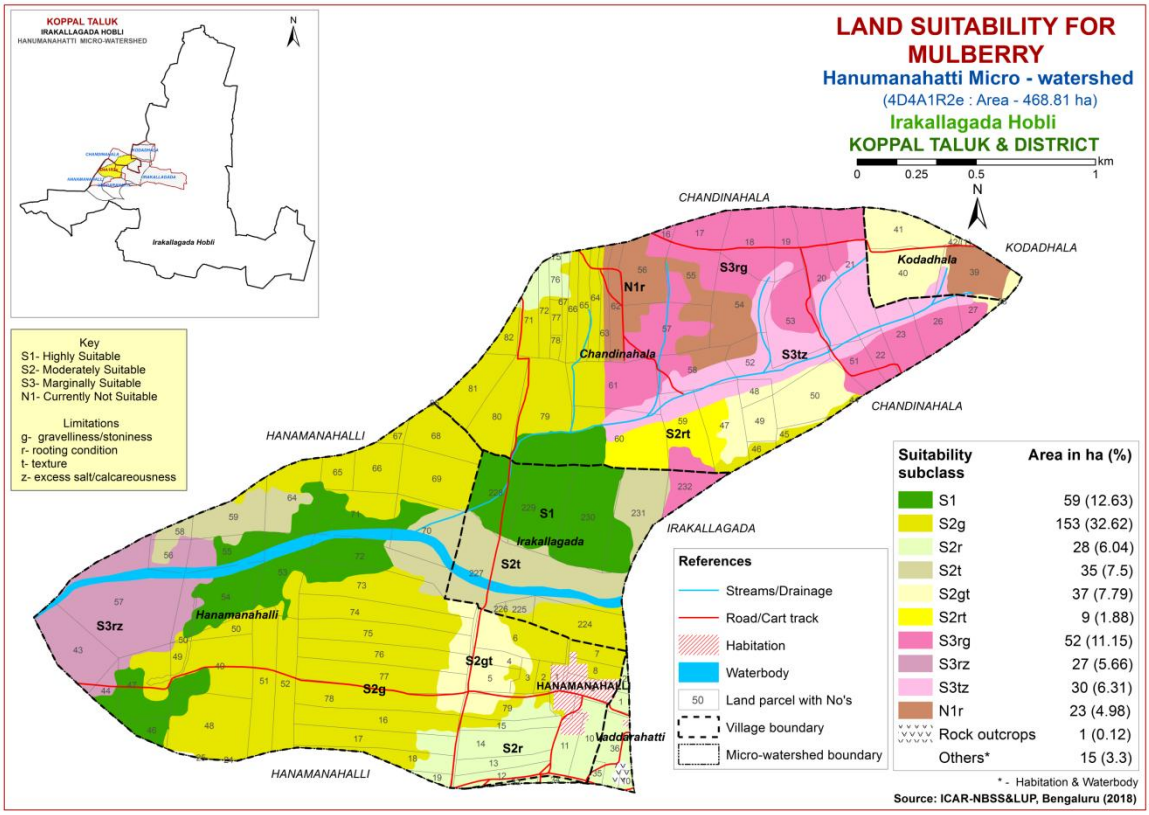



Fig. 7.27 Land Suitability map of Mulberry

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

Marigold is one of the most important flower crop grown in an area of 1858 ha in almost all the districts of the State. The crop requirements for growing marigold (Table 7.29) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing marigold was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.28.

An area of 8 ha (2%) is highly suitable (Class S1) for growing marigold and are distributed in the southwestern part of in the microwatershed. An area of 213 ha (45%) is moderately suitable (Class S2) and are distributed in the western, northern, central and southern part of the microwatershed. They have minor limitations of texture, gravelliness, rooting condition and calcareousness. Maximum area of 233 ha (50%) is marginally suitable (Class S3) and are distributed in the major part of the microwatershed. They have moderate limitations of gravelliness and rooting condition.

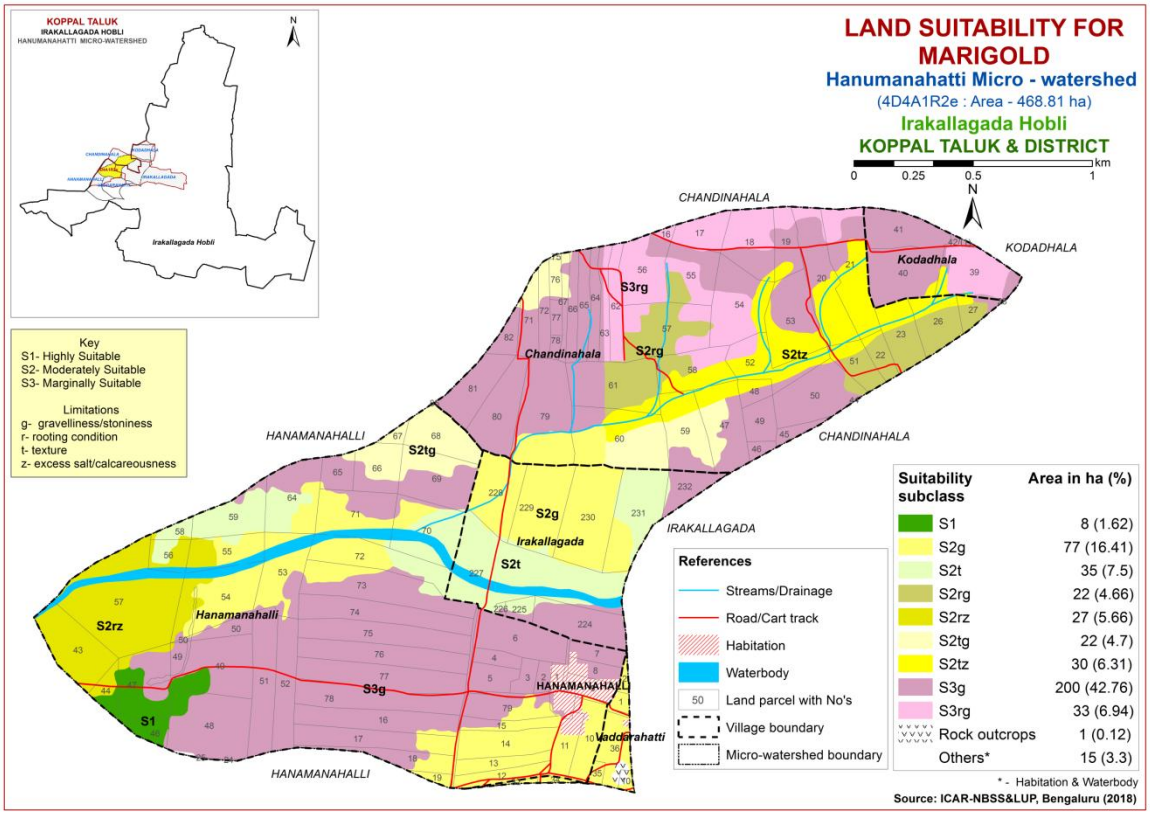



Fig. 7.28 Land Suitability map of Marigold

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

Chrysanthemum is one of the most important flower crop grown in an area of 4978 ha in almost all the districts of the State. The crop requirements for growing chrysanthemum (Table 7.30) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing chrysanthemum was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed is given in Figure 7.29.

An area of 8 ha (2%) is highly suitable (Class S1) for growing chrysanthemum and are distributed in the southwestern part of the microwatershed. An area of 213 ha (45%) is moderately suitable (Class S2) and are distributed in the western, northern, eastern and southern part of the microwatershed. They have minor limitations of calcareousness, rooting condition, gravelliness and texture. Maximum area of 233 ha (50%) is marginally suitable (Class S3) for growing chrysanthemum and occur in the major part of the microwatershed. They have moderate limitations of gravelliness and rooting condition.

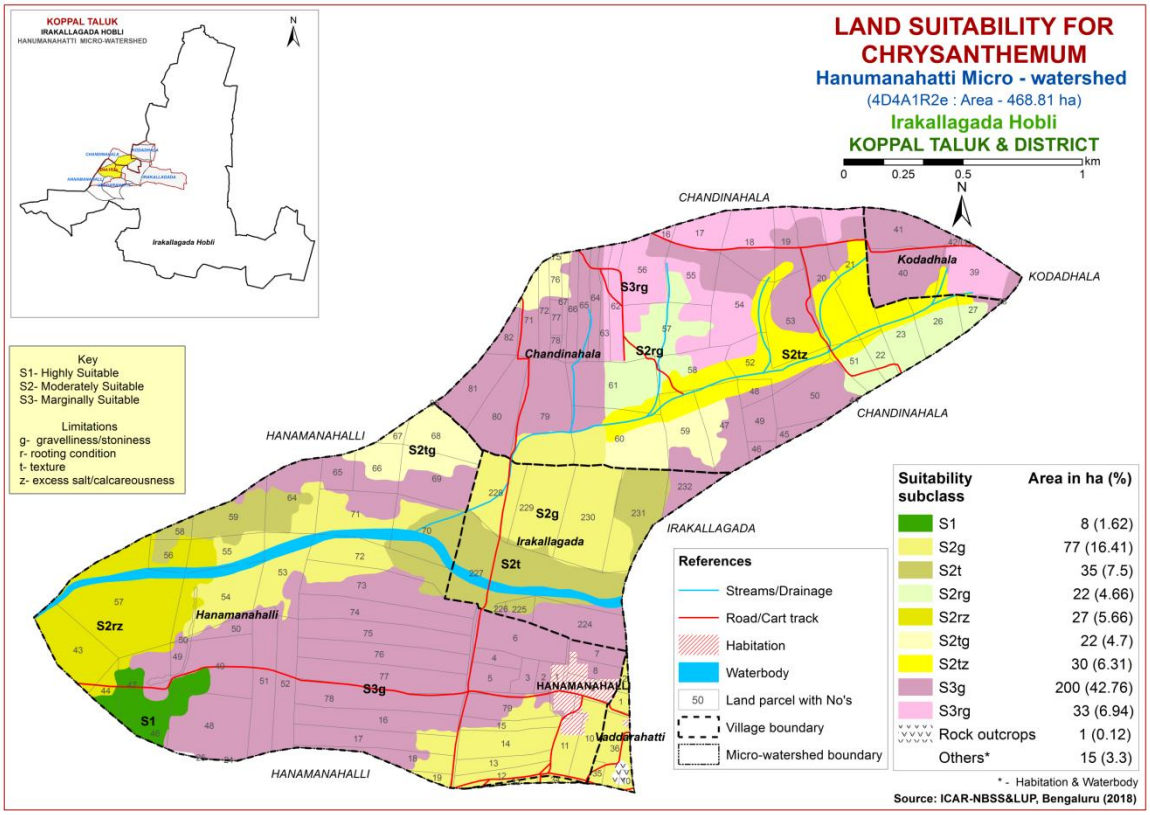



Fig. 7.29 Land Suitability map of Chrysanthemum

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

Jasmine is one of the most important flower crop grown in an area of 6146 ha in almost all the districts of the State. The crop requirements (Table 7.31) for growing jasmine were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing jasmine was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.30.

An area of 8 ha (2%) is highly suitable (Class S1) for growing jasmine and are distributed in the southwestern part of the microwatershed. An area of 148 ha (31%) is moderately suitable (Class S2) and occur in the western, central, northeastern and southern part of the microwatershed. They have minor limitations of rooting condition, texture, gravelliness and calcareousness. Maximum area of 298 ha (64%) is marginally suitable (Class S3) for growing jasmine and are distributed in all parts of the microwatershed. They have moderate limitations of gravelliness, rooting condition, texture and calcareousness.

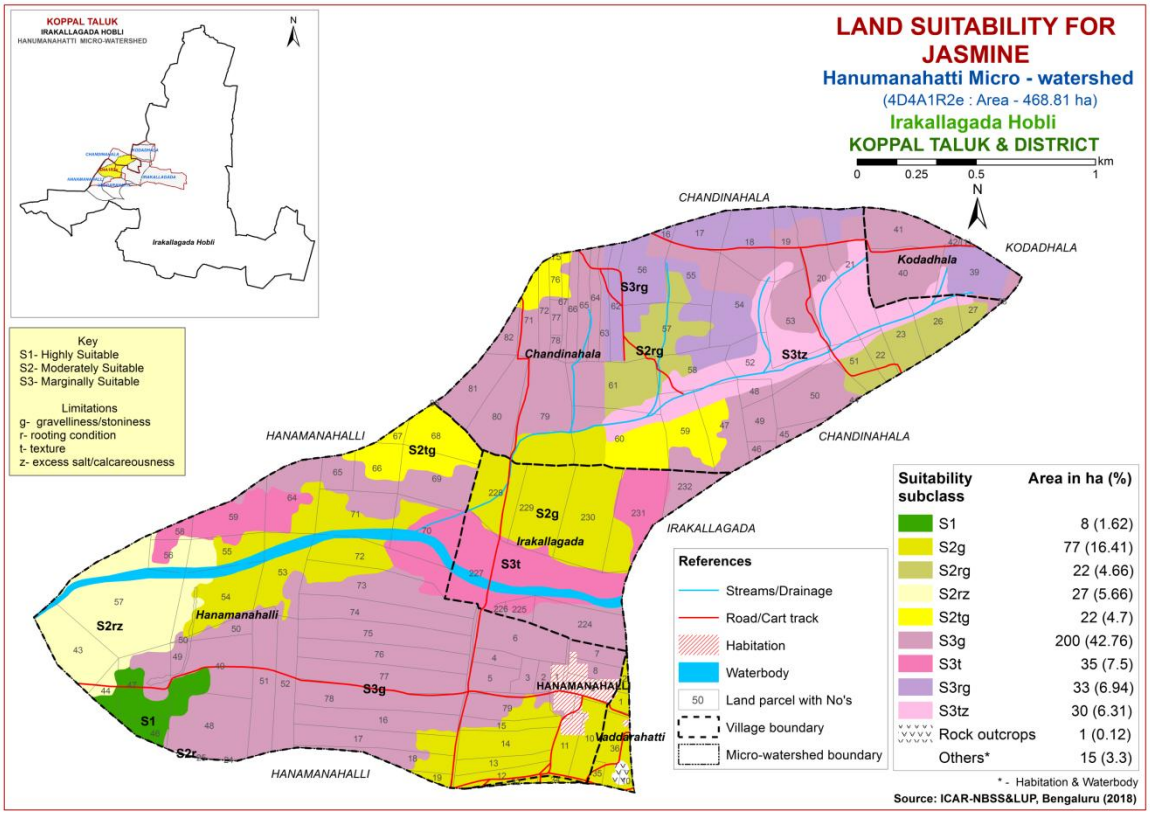



Fig. 7.30 Land Suitability map of Jasmine

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

Crossandra is one of the most important flower crop grown in an area of 6146 ha in almost all the districts of the State. The crop requirements (Table 7.32) for growing crossandra were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing crossandra was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.31.

An area of 8 ha (2%) is highly suitable (Class S1) for growing crossandra and are distributed in the southwestern part of the microwatershed. An area of 121 ha (26%) is moderately suitable (Class S2) for growing crossandra and occur in the northern, southern and northeastern part of the microwatershed. They have minor limitations of rooting condition, gravelliness and texture. Maximum area of 325 ha (69%) is marginally suitable (Class S3) for growing jasmine and are distributed in the major part of the microwatershed. They have moderate limitations of gravelliness, rooting condition, texture and calcareousness.

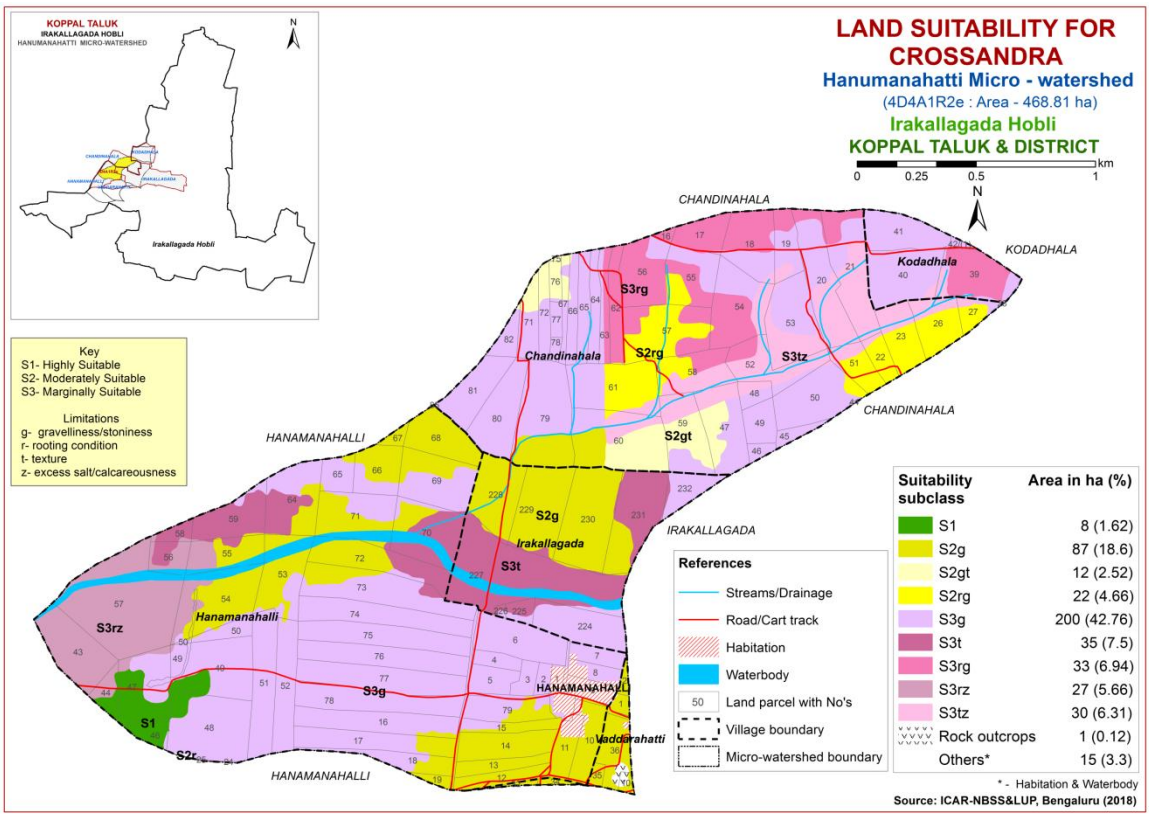



Fig. 7.31 Land Suitability map of Crossandra

## Table 7.1 Soil-Site Characteristics of Hanumanahatti Microwatershed

| Soil Map Units | Climate (P) (mm) | Growing period (Days) | Drainage Class | Soil depth (cm) | Soil texture | | Gravelliness | | AWC (mm/m) | Slope (%) | Erosion | pH | EC | ESP | CEC [Cmol ($p^+$) $kg^{-1}$] | BS (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Surf-ace | Sub-surface | Sur-face | Sub-surface | | | | | | | | |
| ABRbB2g2 | 662 | 90 | WD | 25-50 | ls | gsc | 35-60 | >35 | <50 | 1-3 | Moderate | 6.13 | 0.02 | 0.36 | 3.60 | 58.76 |
| LKRhB2g1 | 662 | 90 | WD | 50-75 | scl | gsc | 15-35 | 40-60 | 50-100 | 1-3 | Moderate | 8.18 | 0.30 | 4.51 | 12.19 | 100 |
| LKRhB2g2 | 662 | 90 | WD | 50-75 | scl | gsc | 35-60 | 40-60 | 50-100 | 1-3 | Moderate | 8.18 | 0.30 | 4.51 | 12.19 | 100 |
| LKRiB2g1 | 662 | 90 | WD | 50-75 | sc | gsc | 15-35 | 40-60 | 50-100 | 1-3 | Moderate | 8.18 | 0.30 | 4.51 | 12.19 | 100 |
| KTPhB2g1 | 662 | 90 | WD | 50-75 | scl | gsc | 15-35 | 15-35 | 101-150 | 1-3 | Moderate | 6.42 | 0.07 | 0.05 | 4.41 | 100 |
| MKHcB2g1 | 662 | 90 | WD | 50-75 | sl | gsc | 15-35 | >35 | 50-100 | 1-3 | Moderate | 7.38 | 0.09 | 1.49 | 14.84 | 93 |
| HDHcB2g1 | 662 | 90 | WD | 75-100 | sl | gsc-gc | 15-35 | >35 | 50-100 | 1-3 | Moderate | 6.54 | 0.07 | 7.11 | 5.84 | 84.7 |
| HDHcB2g2 | 662 | 90 | WD | 75-100 | sl | gsc-gc | 35-60 | >35 | 50-100 | 1-3 | Moderate | 6.54 | 0.07 | 7.11 | 5.84 | 84.7 |
| GHTbB2g1 | 662 | 90 | WD | 75-100 | ls | gscl | 15-35 | 15-35 | 100-150 | 1-3 | Moderate | 5.70 | 0.06 | 4.10 | 3.17 | 73 |
| GHTcB1g1 | 662 | 90 | WD | 75-100 | sl | gscl | 35-60 | 15-35 | 100-150 | 1-3 | Slight | 5.70 | 0.06 | 4.10 | 3.17 | 73 |
| GHTcB2 | 662 | 90 | WD | 75-100 | sl | gscl | - | 15-35 | 100-150 | 1-3 | Moderate | 5.70 | 0.06 | 4.10 | 3.17 | 73 |
| GHThB2g1 | 662 | 90 | WD | 75-100 | scl | gscl | 15-35 | 15-35 | 100-150 | 1-3 | Moderate | 5.70 | 0.06 | 4.10 | 3.17 | 73 |
| BSRhB2g1 | 662 | 90 | WD | 75-100 | scl | gsc | 15-35 | 15-35 | 50-100 | 1-3 | Moderate | 6.59 | 0.12 | 6.00 | 8.80 | 77.55 |
| CKMbB2g1 | 662 | 90 | WD | 75-100 | ls | sc | 15-35 | - | 100-150 | 1-3 | Moderate | 7.99 | 0.32 | 1.73 | 12.50 | 119 |
| KMHiB1 | 662 | 90 | WD | 100-150 | sc | sc | - | <15 | 150-200 | 1-3 | Slight | 7.2 | 0.19 | 0.54 | 15.07 | 100 |
| JDGhB1g1 | 662 | 90 | WD | 100-150 | scl | sc-c | 15-35 | <15 | >200 | 1-3 | Slight | 6.11 | 0.07 | 2.06 | 9.41 | 90 |
| JDGiB2g1 | 662 | 90 | WD | 100-150 | sc | sc-c | 15-35 | <15 | >200 | 1-3 | Moderate | 6.11 | 0.07 | 2.06 | 9.41 | 90 |
| BPRbB2g1 | 662 | 90 | WD | 100-150 | ls | gsc-gc | 15-35 | >35 | 51-100 | 1-3 | Moderate | 6.64 | 0.03 | 0.51 | 5.45 | 63.48 |
| BPRbB2g2 | 662 | 90 | WD | 100-150 | ls | gsc-gc | 35-60 | >35 | 51-100 | 1-3 | Moderate | 6.64 | 0.03 | 0.51 | 5.45 | 63.48 |
| BPRcB2 | 662 | 90 | WD | 100-150 | sl | gsc-gc | - | >35 | 51-100 | 1-3 | Moderate | 6.64 | 0.03 | 0.51 | 5.45 | 63.48 |
| BPRcB2g1 | 662 | 90 | WD | 100-150 | sl | gsc-gc | 15-35 | >35 | 51-100 | 1-3 | Moderate | 6.64 | 0.03 | 0.51 | 5.45 | 63.48 |
| BPRcB2g2 | 662 | 90 | WD | 100-150 | sl | gsc-gc | 35-60 | >35 | 51-100 | 1-3 | Moderate | 6.64 | 0.03 | 0.51 | 5.45 | 63.48 |

| 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 | Surface | Sub-surface | | | | | | | | |
| BPRcC2g1 | 662 | 90 | WD | 100-150 | sl | gsc-gc | 15-35 | >35 | 51-100 | 1-3 | Moderate | 6.64 | 0.03 | 0.51 | 5.45 | 63.48 |
| BPRhB1g1 | 662 | 90 | WD | 100-150 | scl | gsc-gc | 15-35 | >35 | 51-100 | 1-3 | Slight | 6.64 | 0.03 | 0.51 | 5.45 | 63.48 |
| BPRhB2g2 | 662 | 90 | WD | 100-150 | scl | gsc-gc | 35-60 | >35 | 51-100 | 1-3 | Moderate | 6.64 | 0.03 | 0.51 | 5.45 | 63.48 |
| BPRiB1 | 662 | 90 | WD | 100-150 | sc | gsc-gc | - | >35 | 51-100 | 1-3 | Slight | 6.64 | 0.03 | 0.51 | 5.45 | 63.48 |
| BPRiB2 | 662 | 90 | WD | 100-150 | sc | gsc-gc | - | >35 | 51-100 | 1-3 | Moderate | 6.64 | 0.03 | 0.51 | 5.45 | 63.48 |
| NDLcB2g1 | 662 | 90 | WD | >150 | sl | gsc | 15-35 | >35 | 50-100 | 1-3 | Moderate | 7.46 | 0.08 | 0.32 | 11.45 | 91.88 |
| SRRmA1 | 662 | 90 | WD | 100-150 | c | c | - | - | 150-200 | 0-1 | Slight | - | - | - | - | - |
| RNKmB1 | 662 | 90 | MWD | 50-75 | c | c | - | <15 | 51-100 | 1-3 | Slight | 8.86 | 0.48 | 16.94 | 37.0 | - |
| GRHmA1 | 662 | 90 | MWD | 100-150 | c | c | - | <15 | >200 | 0-1 | Slight | 9.08 | 0.23 | 7.11 | 63.21 | 100 |
| GRHmB2 | 662 | 90 | MWD | 100-150 | c | c | - | <15 | >200 | 1-3 | Moderate | 9.08 | 0.23 | 7.11 | 63.21 | 100 |

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

**Table 7.2 Land suitability criteria for Sorghum**

| Land use requirement | | | Rating | | | |
|---|---|---|---|---|---|---|
| **Soil –site characteristics** | | **Unit** | **Highly suitable (S1)** | **Moderately suitable (S2)** | **Marginally suitable (S3)** | **Not suitable (N1)** |
| Climatic regime1 | Mean temperature in growing season | °C | 26–30 | 30–34; 24–26 | 34–40; 20–24 | >40; <20 |
| | Mean max. temp. in growing season | °C | | | | |
| | Mean min. tempt. in growing season | °C | | | | |
| | Mean RH in growing season | % | | | | |
| | Total rainfall | mm | | | | |
| | Rainfall in growing season | mm | | | | |
| Land quality | Soil-site characteristics | | | | | |
| Moisture availability | Length of growing period for short duration | Days | | | | |
| | Length of growing period for long duration | | | | | |
| | AWC | mm/m | | | | |
| Oxygen availability to roots | Soil drainage | Class | Well drained | Moderately well drained | Poorly drained | V.poorly drained |
| | Water logging in growing season | Days | | | | |
| Nutrient availability | Texture | Class | sc, c (red), c (black) | scl, cl | ls, sl | - |
| | pH | 1:2.5 | 5.5-7.8 | 5.0-5.5 7.8-9.0 | >9.0 | - |
| | CEC | C mol (p+)/Kg | | | | |
| | BS | % | | | | |
| | CaCO3 in root zone | % | | <5 | 5-10 | 10-15 |
| | OC | % | | | | |
| Rooting conditions | Effective soil depth | cm | >75 | 50-75 | 25-50 | <25 |
| | Stoniness | % | | | | |
| | Coarse fragments | Vol % | <15 | 15-35 | 35-60 | 60-80 |
| Soil toxicity | Salinity (EC saturation extract) | dS/m | <2 | 2-4 | 4-8 | >8 |
| | Sodicity (ESP) | % | 5-10 | 10-15 | >15 | |
| Erosion hazard | Slope | % | 0-3 | 3-5 | 5-10 | >10 |

**Table 7.3 Land suitability criteria for Maize**

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

**Table 7.4 Land suitability criteria for Bajra**

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

**Table 7.5 Land suitability criteria for Groundnut**

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

**Table 7.6 Land suitability criteria for Sunflower**

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

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

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

**Table 7.8 Land suitability criteria for Bengal gram**

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

**Table 7.9 Land suitability criteria for Cotton**

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

**Table 7.10 Land suitability criteria for Chilli**

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

**Table 7.11 Land suitability criteria for Tomato**

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

**Table 7.12 Land suitability criteria for Brinjal**

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

**Table 7.13 Land suitability criteria for Onion**

| Land use requirement | | | Rating | | | |
|---|---|---|---|---|---|---|
| **Soil –site characteristics** | | **Unit** | **Highly suitable (S1)** | **Moderately suitable (S2)** | **Marginally suitable (S3)** | **Not suitable (N1)** |
| Climatic regime | Mean temperature in growing season | °C | 20-30 | 30-35 | 35-40 | >40 |
| | Mean max. temp. in growing season | °C | | | | |
| | Mean min. tempt. in growing season | °C | | | | |
| | Mean RH in growing season | % | | | | |
| | Total rainfall | mm | | | | |
| | Rainfall in growing season | mm | | | | |
| Land quality | Soil-site characteristic | | | | | |
| Moisture availability | Length of growing period for short duration | Days | | | | |
| | Length of growing period for long duration | | | | | |
| | AWC | mm/m | | | | |
| Oxygen availability to roots | Soil drainage | Class | Well drained | Moderately /imperfectly | - | Poorly to V poorly drained |
| | Water logging in growing season | Days | | | | |
| Nutrient availability | Texture | Class | sl,scl,cl,sc,c (red) | - | c (Black),ls | - |
| | pH | 1:2.5 | 6.0-7.3 | 5.0-6.0 7.3-7.8 | 7.8-8.4 | >8.4 |
| | CEC | C mol (p+)/ Kg | | | | |
| | BS | % | | | | |
| | CaCO3 in root zone | % | | <5 | 5-10 | >10 |
| | OC | % | | | | |
| Rooting conditions | Effective soil depth | cm | >75 | 50-75 | 25-50 | <25 |
| | Stoniness | % | | | | |
| | Coarse fragments | Vol % | <15 | 15-35 | 35-60 | 60-80 |
| Soil toxicity | Salinity (EC saturation extract) | ds/m | <1.0 | 1.0-2.0 | 2.0-4.0 | <4 |
| | Sodicity (ESP) | % | <5 | 5-10 | 10-15 | >15 |
| Erosion hazard | Slope | % | <3 | 3-5 | 5-10 | >10 |

**Table 7.14 Land suitability criteria for Bhendi**

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

**Table 7.15 Land suitability criteria for Drumstick**

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

**Table 7.16 Land suitability criteria for Mango**

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

**Table 7.17 Land suitability criteria for Guava**

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

**Table 7.18 Land suitability criteria for Sapota**

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

**Table 7.19 Land suitability criteria for Pomegranate**

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

**Table 7.20 Land suitability criteria for Musambi**

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

**Table 7.21 Land suitability criteria for Lime**

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

**Table 7.22 Land suitability criteria for Amla**

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

**Table 7.23 Land suitability criteria for Cashew**

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

**Table 7.24 Land suitability criteria for Jackfruit**

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

**Table 7.25 Land suitability criteria for Jamun**

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

**Table 7.26 Land suitability criteria for Custard apple**

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

**Table 7.27 Land suitability criteria for Tamarind**

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

**Table 7.28 Land suitability criteria for Mulberry**

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

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

**Table 7.29 Land suitability criteria for Marigold**

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

**Table 7.30 Land suitability criteria for Chrysanthemum**

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

**Table 7.31 Land suitability criteria for Jasmine (irrigated)**

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

**7.32 Land suitability criteria for Crossandra**

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

### 7.32 Land Management Units (LMUs)

The 32 soil map units identified in Hanumanahatti Microwatershed have been grouped into 8 Land Management Units (LMUs) for the purpose of preparing a Proposed Crop Plan. Land Management Units are grouped based on the similarities in respect of the type of soil, the depth of the soil, the surface soil texture, gravel content, AWC, slope, erosion etc. and a Land Management Units map (Fig. 7.32) has been generated. These Land Management Units are expected to behave similarly for a given level of management.

The map units that have been grouped into eight Land Management Units along with brief description of soil and site characteristics are given below.

| LMU | Mapping unit | Soil and site characteristics |
|---|---|---|
| 1 | HDHcB2g1, HDHcB2g2, BPRbB2g1, BPRbB2g2, BPRcB2, BPRcB2g1, BPRcB2g2, BPRcC2g1, BPRhB1g1, BPRhB2g2, BPRiB1, BPRiB2, NDLcB2g1 | Moderately deep to very deep, red gravelly sandy clay to clay soils |
| 2 | GRHmA1, GRHmB2 | Deep, black calcareous clay soils |
| 3 | SRRmA1 | Deep, calcareous lowland clay soils |
| 4 | GHTbB2g1, GHTcB1g1, GHTcB2, GHThB2g1, BSRhB2g1, CKMbB2g1, KMHiB1, JDGhB1g1, JDGiB2g1 | Moderately deep to deep, red sandy clay to sandy clay loams soils |
| 5 | RNKmB1 | Moderately shallow, black calcareous clay soils |
| 6 | LKRhB2g2, LKRiB2g1, MKHcB2g1, LKRhB2g1 | Moderately shallow, red gravelly sandy clay soils |
| 7 | KTPhB2g1 | Moderately shallow, red loamy soils |
| 8 | ABRbB2g2 | Shallow, red gravelly sandy clay to clay soils |

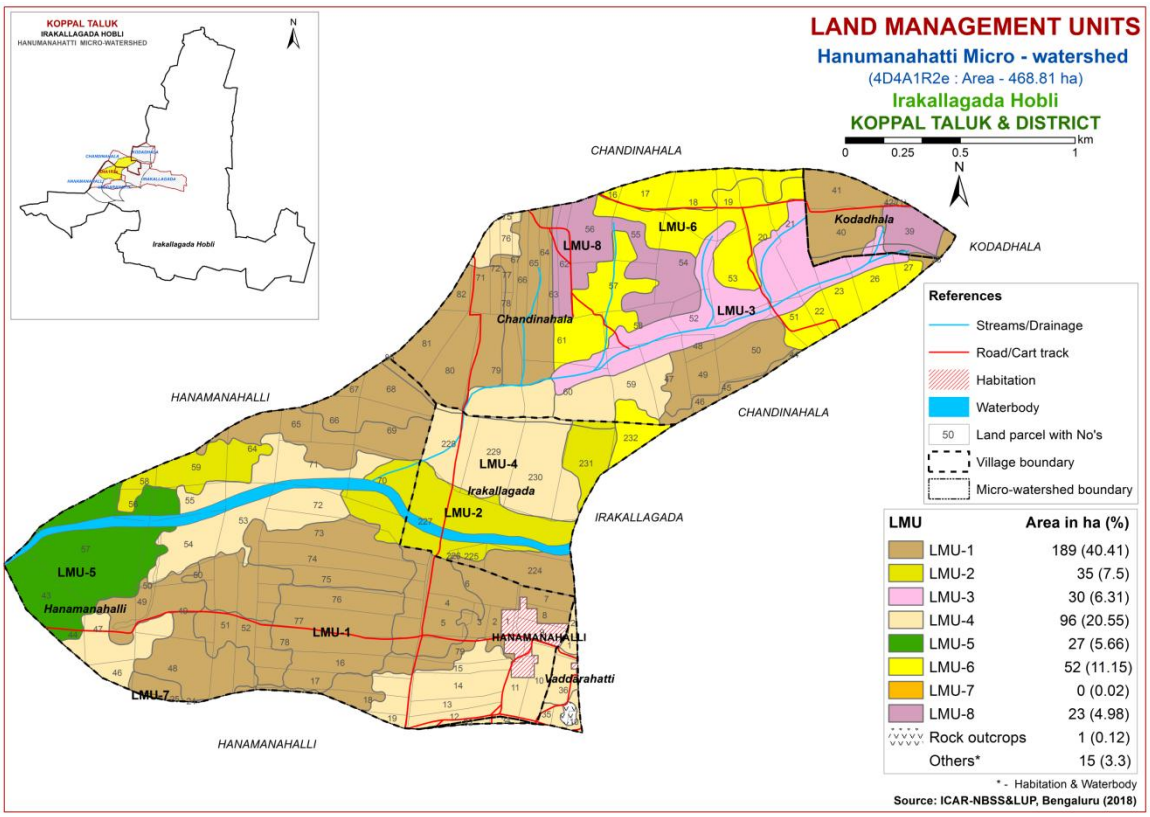



Fig 7.32 Land Management Units map of Hanumanahatti Microwatershed

### 7.33 Proposed Crop Plan for Hanumanahatti Microwatershed

After assessing the land suitability for the 31 crops, the proposed crop plan has been prepared for the 8 identified LMUs by considering only the highly (Class S1) and moderately (Class S2) suitable lands for each of the 31 crops. The resultant proposed crop plan is presented in Table 7.33.

**Table 7.33 Proposed Crop Plan for Hanumanahatti Microwatershed**

| LMU | Soil Map Units | Survey Number | Soil characters | Field Crops | Horticulture Crops | Suitable Interventions |
|---|---|---|---|---|---|---|
| LMU 1 189 ha (40%) | 111.HDHcB2g1 112.HDHcB2g2 217.BPRbB2g1 219.BPRbB2g2 224.BPRcB2 225.BPRcB2g1 226.BPRcB2g2 227.BPRcC2g1 229.BPRhB1g1 232.BPRhB2g2 237.BPRiB1 239.BPRiB2 291.NDLcB2g1 | **Chandinahala:**28,44,45,46,47,48,49,50,64,65,66,67,71,72,77,78,79,80,81,82,85 **Hanamanahalli:**3,4,5,6,7,8,16,17,18,24,25,48,49,50,51,52,65,66,67,68,69,73,74,75,76,77,78 **Irakallagada:**224 **Kodadhala:**40,41,42/(1) | Moderately deep to very deep, red gravelly sandy clay to clay soils | Groundnut, Bajra, Horse gram, Castor, Mulberry | **Fruit crops:** Musambi, Lime, Jamun, Jackfruit Amla, Custard apple, Tamarind **Vegetable crops:** Drumstick, Curry leaves | Drip irrigation, mulching, suitable soil and water conservation practices (Crescent Bunding with Catch Pit etc) |
| LMU 2 35 ha (8%) | 370.GRHmA1 373.GRHmB2 | **Hanamanahalli:**58,59,64,70 **Irakallagada:**225,226,227,231 | Deep, black calcareous clay soils | Maize, Sorghum, Sunflower, Cotton, Bengal gram, Safflower, Linseed, Bajra , Soybean | **Fruit crops:** Mango, Sapota, Pomegranate, Jamun, Lime, Musambi, Tamarind, Amla, Custard apple **Vegetables:** Drumstick, Chilli, Coriander, Tomato, Bhendi **Flowers:** Marigold, Jasmine, Chrysanthemum, Crossandra, | Application of FYM, Biofertilizers and micronutrients, drip irrigation, mulching, suitable soil and water conservation practices |
| LMU 3 30 ha (6%) | 474.SRRmA1 | **Chandinahala:**20,21,52,58 | Deep, calcareous lowland clay soils | Lowland Paddy, Maize, cotton | **Fruit crops:** Custard Apple, Amla **Vegetable crops:** Brinjal, Tomato, Chillies, Drumstick, Coriander **Flower crops:** Marigold, Chrysanthemum, Jasmine | Providing proper drainage, addition of organic manures, green leaf manuring, suitable conservation practices |
| LMU 4 96 ha | 134.GHTbB2g1 135.GHTcB1g1 | **Chandinahala:**59,60,75,76 | Moderately deep to deep, | Maize, Sorghum, | **Fruit crops:** Mango, Pomegranate, Guava, Sapota, | Drip irrigation, mulching, suitable soil and water |

| LMU | Soil Map Units | Survey Number | Soil characters | Field Crops | Horticulture Crops | Suitable Interventions |
|---|---|---|---|---|---|---|
| (21%) | 137.GHTcB2<br>142.GHThB2g1<br>162.BSRhB2g1<br>170.CKMbB2g1<br>200.KMHiB1<br>211.JDGhB1g1 | **Hanamanahalli:**10,11,12,13,14,15,19,46,47,53,54,55,71,72,79<br>**Irakallagada:**228,229,230<br>**Vaddarahatti:**1,2,10,32,34,35,36 | red sandy clay to sandy clay loams soils | Sunflower, Bajra, Finger millet, Groundnut, Red gram, Cowpea, Field bean, Castor, Mulberry | Jackfruit, Jamun, Tamarind, Lime, Musambi, Amla, Custard apple, Cashew<br>**Vegetable crops:** Drumstick, Tomato, Bhendi, Chilli, Brinjal, Onion, Curry leaves<br>**Flower crops:** Marigold, Chrysanthemum, Jasmine, Crossandra | conservation practices (Crescent Bunding with Catch Pit etc) |
| LMU 5<br>27 ha<br>(6%) | 333.RNKmB1 | **Hanamanahalli:**43,44,56,57 | Moderately shallow, black calcareous clay soils | Sorghum, Bajra, Bengal gram, Linseed, Safflower, Coriander | **Fruit crops:** Amla, Custard apple<br>**Flower crops:** Marigold, Jasmine, Chrysanthemum | Application of FYM, Biofertilizers and micronutrients, drip irrigation, mulching, suitable soil and water conservation practises |
| LMU 6<br>52 ha<br>(11%) | 47.LKRhB2g2<br>54.LKRiB2g1<br>77.MKHcB2g1<br>452.LKRhB2g1 | **Chandinahala:**16,17,18,19,22,23,26,27,51,53,55,57,61<br>**Irakallagada:**232 | Moderately shallow, red gravelly sandy clay soils | Sorghum, Groundnut, Bajra, Castor | **Fruit crops:** Lime, Musambi, Amla, Cashew, Custard apple, | Drip irrigation, mulching, suitable soil and water conservation practices (Crescent Bunding with Catch Pit etc) |
| LMU 7<br>0 ha<br>(0%) | 72.KTPhB2g1 | **Hanamanahalli:**25 | Moderately shallow, red loamy soils | Sorghum, Green gram, Black gram, Bajra, Groundnut, Cowpea, Horse gram, Castor, | **Fruit crops:** Lime, Musambi, Amla, Custard apple, Cashew<br>**Flower crops:** Marigold, Chrysanthemum, Crossandra, Jasmine | Drip irrigation, Mulching, suitable soil and water conservation practices (Crescent Bunding with Catch Pit etc) |
| LMU 8<br>23 ha<br>(5%) | 470.ABRbB2g2 | **Chandinahala:**54,56,62,63<br>**Kodadhala:**39 | Shallow, red gravelly sandy clay to clay soils | Green gram, Black gram, Horse gram | **Agri-Silvi-Pasture:** Custard apple, Hybrid Napier, *Styloxanthes hamata*, Glyricidia, *Styloxanthes scabra* | Use of short duration varieties, sowing across the slope and split application of nitrogen fertilizers |

*Chapter 8*

# SOIL HEALTH MANAGEMENT

## 8.1 Soil Health

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

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

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

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

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

**Characteristics of Hanumanahatti Microwatershed**

- The soil phases with sizeable area identified in the microwatershed belonged to the soil series of Balapur (BPR) 143 ha (30%)**,** Jedigere (JDG) 51 ha (11%)**,** Hooradhahalli (HDH) 37 ha (8%), Gatareddihal (GRH) 35 ha (8%), Lakkur (LKR) 30 ha (6%), Sirur (SRR) 30 ha (6%), Ravanaki (RNK) 27 ha (6%), Gollarahatti (GHT) 25 ha (5%), Abbigere (ABR) 23 ha (5%), Mukhadahalli (MKH) 22 ha (5%), Niduvalalu (NDL) 10 ha (2%), Chikkamegheri (CKM) 9 ha (2%), Kumchahalli (KMH) 8 ha (2%), Bisarahalli (BSR) 3 ha (1%) and Kethanapura (KTP) occupy minor area of about 0.12 ha (<1%) in the microwatershed.

- ❖ As per land capability classification, entire area in the microwatershed falls under arable land category (Class II & III). The major limitations identified in the arable lands were soil, drainage and erosion.
- ❖ On the basis of soil reaction, an area of 92 ha (20%) is moderately acid (pH 5.5-6.0), 93 ha (20%) is slightly acid (pH 6.0-6.5), 247 ha (53%) is neutral (pH 6.5-7.3) and about 22 ha (5%) is slightly alkaline (pH 7.3-7.8) in the microwatershed. Entire area in the microwatershed is acid, neutral and alkaline in reaction.

**Soil Health Management**

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

**Alkaline soils**

Slightly alkaline soils cover an area of 22 ha.

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

**Acid soils**

Moderately to slightly acid soils cover an area of 185 ha.

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

Liming materials:

1. $CaCO_3$ (Calcium Carbonate). More than 90% use in India.
2. Dolomite [Ca Mg $(Co_3)_2$ ]
3. Quick lime (Cao)
4. Slaked lime [Ca $(OH)_2$]

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

**Neutral soils**

Neutral soils cover about 247 ha area in the microwatershed.

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

4. Need based micronutrient applications.

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

**Soil Degradation**

Soil erosion is one of the major factor affecting the soil health in the microwatershed. Out of total 469 ha area in the microwatershed, an area of about 139 ha (30%) is suffering from slight erosion and 314 ha (67%) is suffering from moderate erosion. The areas suffering from moderate erosion need immediate soil and water conservation and, other land development and land husbandry practices for restoring soil health.

**Dissemination of Information and Communication of Benefits**

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

**Inputs for Net Planning (Saturation Plan) and Interventions needed**

Net planning (Saturation plan) in IWMP is focusing on preparation of

1. Soil and Water Conservation Treatment Plans for each plot or farm.
2. Productivity enhancement measures/ interventions for existing crops/livestock/other farm enterprises.
3. Diversification of farming mainly with perennial horticultural crops and livestock.
4. Improving livelihood opportunities and income generating activities.

In this connection, how various outputs of Sujala-III are of use in addressing these objectives of Net Planning are briefly presented below.

- **Soil Depth:** The depth of a soil decides the amount of moisture and nutrients it can hold, what crops can be taken up or not, depending on the rooting depth and the length of growing period available for raising any crop. Deeper the soil, better for a wide variety of crops. If sufficient depth is not available for growing deep rooted crops, either choose medium or short duration crops or deeper planting pits need to be opened and additional good quality soil brought from outside has to be filled into the planting pits.
- **Surface Soil Texture:** Lighter soil texture in the top soil means, better rain water infiltration, less run-off and soil moisture conservation, less capillary rise and less evaporation losses. Lighter surface textured soils are amenable to good soil tilth and

are highly suitable for crops like groundnut, root vegetables (carrot, raddish, potato etc) but not ideal for crops that need stagnant water like lowland paddy. Heavy textured soils are poor in water infiltration and percolation. They are prone for sheet erosion; such soils can be improved by sand mulching. The technology that is developed by the AICRP-Dryland Agriculture, Vijayapura, Karnataka can be adopted.

- **Gravelliness:** More gravel content is favorable for run-off harvesting but poor in soil moisture storage and nutrient availability. It is a significant parameter that decides the kind of crop to be raised.
- **Land Capability Classification:** The land capability map shows the areas suitable and not suitable for agriculture and the major constraints in each of the plot/survey number. Hence, one can decide what kind of enterprise is possible in each of these units. In general, erosion and soil are the major constraints in Hanumanahatti Microwatershed.
- **Organic Carbon:** The OC content (an index of available Nitrogen) is medium (0.5-0.75%) in 37 ha (8%). The areas that are medium in OC needs to be further improved by applying farmyard manure and rotating crops with cereals and legumes or mixed cropping. It is high (>0.75%) in 416 ha (89%).
- **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 the area where OC is medium. For example, for rainfed maize, recommended level is 50 kg N per ha and an additional 12 kg /ha needs to be applied for all the crops grown in these plots.
- **Available Phosphorus:** Entire area of about 453 ha (97%) is high (>57 kg/ha) in available phosphorus.
- **Available Potassium:** Available potassium is medium (145-337 kg/ha) in 452 ha (96%) and high (>337 kg/ha) in 1 (<1%) in the microwatershed. Additional 25% potassium needs to be applied in areas where it is medium.
- **Available Sulphur:** Available sulphur is a very critical nutrient for oilseed crops. Available sulphur is low (<10 ppm) in 422 ha (90%), medium (10-20 ppm) in 6 ha (1%) and high (>20 ppm) in about 25 ha (5%) in the microwatershed. The areas that are low and medium need to be applied with magnesium sulphate or gypsum or Factamphos (p) fertitilizer (13% sulphur) for 2-3 years for the deficiency to be corrected.
- **Available Boron:** An area of about 445 ha (95%) is low (<0.5 ppm) and 8 ha (2%) is medium (0.5-1.0 ppm) in available boron content. The areas that are low and medium need to be applied with sodium borate @ 10 kg/ha as soil application or 0.2% borax

as foliar spray to correct the deficiency. It is high (>1.0ppm) in 28 ha (5%) in the microwatershed.

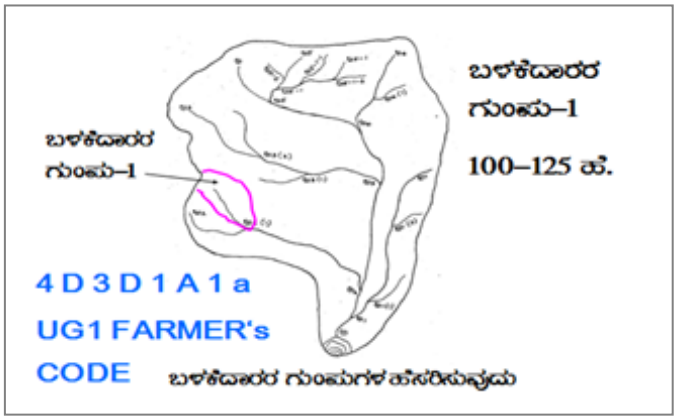
- **Available Iron:** Entire area of 453 ha (97%) is sufficient (>4.5 ppm) in available iron in the microwatershed. To manage iron deficiency, iron sulphate@25 kg/ha needs to be applied for 2-3 years in the deficient areas.
- **Available Manganese:** Entire area in the microwatershed is sufficient (>1.0 ppm) in available manganese.
- **Available Copper:** Entire area is sufficient (>0.2 ppm) in available copper in the microwatershed.
- **Available Zinc:** It is deficient (<0.6 ppm) in 15 ha (3%) in the microwatershed. Application of zinc sulphate @ 25 kg/ha is to be followed in areas that are deficient in available zinc. It is sufficient (>0.6 ppm) in 438 ha (93%) in the microwatershed.
- **Soil Acidity:** The microwatershed has 185 ha (39%) area with soils that are moderately to slightly acid. These areas need application of lime (Calcium Carbonate).
- **Soil Alkalinity:** An area of the microwatershed has 22 ha (5%) soils that are slightly alkaline. These areas need application of gypsum and wherever calcium is in excess, iron pyrites and element sulphur can be recommended. Management practices like treating repeatedly with good quality water to drain out the excess salts and provision of subsurface drainage and growing of salt tolerant crops like Casuarina, Acasia, Neem, Ber etc, are recommended.
- **Land suitability for various crops:** Areas that are highly, moderately and marginally suitable and not suitable for growing various crops are indicated. Along with the suitability, various constraints that are limiting the productivity are also indicated. For example, in case of cotton, gravel content, rooting depth and salinity/alkalinity are the major constraints in various plots. With suitable management interventions, the productivity can be enhanced. In order to increase water holding capacity of light textured soils, growing of green manure crops and application of organic manure is recommended.

*Chapter 9*

# SOIL AND WATER CONSERVATION TREATMENT PLAN

For preparing soil and water conservation treatment plan for Hanumanahatti Microwatershed, the land resource inventory database generated under Sujala-III project has been transformed as information through series of interpretative (thematic) maps using soil phase map as a base. The various thematic maps (1:7920 scale) generated were

- Soil depth
- Surface soil texture
- Available water capacity
- Soil slope
- Soil gravelliness
- Land capability
- Present land use and land cover
- Crop suitability maps
- Rainfall map
- Hydrology
- Water Resources
- Socio-economic data




- Contour plan with existing features- network of waterways, pothissa boundaries, cut up/ minor terraces etc.
- Cadastral map (1:7920 scale)
- Satellite imagery (1:7920 scale)

  Apart from these, Hand Level/ Hydro Marker/ Dumpy Level/ Total Station and Kathedars' List to be collected.

**Steps for Survey and Preparation of Treatment Plan**

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

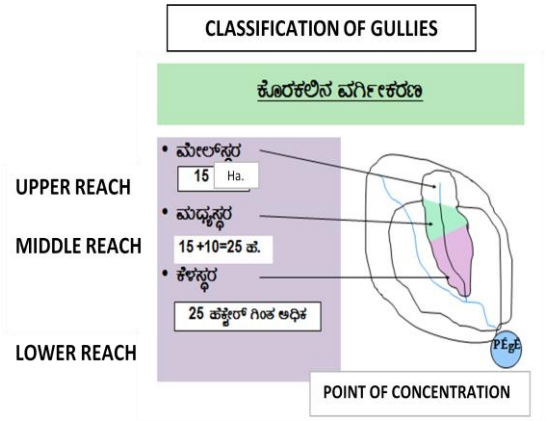
- Naming of user groups and farmers
- Identification of arable and non arable lands
- Identification of drainage lines and gullies
- Identification of non treatable areas
- Identification of priority areas in the arable lands
- Treatment plan for arable lands
- Location of water harvesting and recharge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

## 9.1 Treatment Plan

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

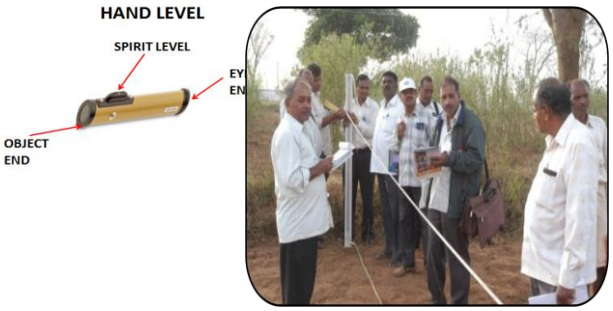
### 9.1.1 Arable Land Treatment

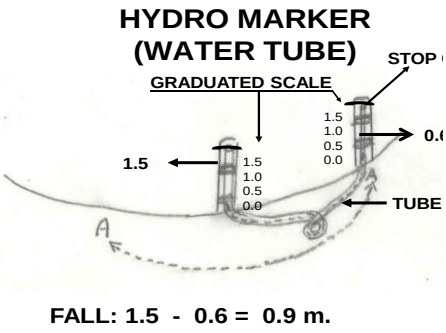
### A. BUNDING

| Steps for Survey and Preparation of Treatment Plan | | USER GROUP-1 |
|---|---|---|
| Cadastral map (1:7920 scale) is enlarged to a scale of 1:2500 scale<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 (A1… A= 0-1% slope, 1= slight erosion) the intervals have to be decided.

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

**Section of the Bund**

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

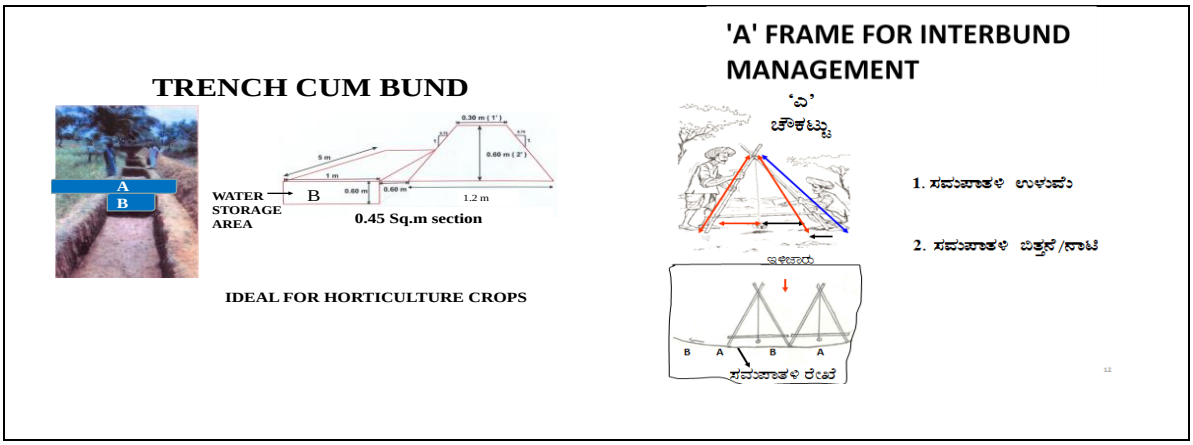
**Recommended Bund Section**

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

**Formation of Trench cum Bund**

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

Details of Borrow Pit dimensions are given below




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

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

**B. Waterways**

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

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

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

**C. Farm Ponds**

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

**D. Diversion channel**

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

**9.1.2 Non-Arable Land Treatment**

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

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

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

### 9.2 Recommended Soil and Water Conservation Measures

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

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

A map (Fig. 9.1) showing soil and water conservation plan with different kinds of structures recommended has been prepared which shows the spatial distribution and extent of area. Maximum area of about 362 ha (77%) requires Trench cum Bunding, an area of about 53 ha (11%) requires Graded Bunding and 38 ha (8%) requires Strengthening of existing bunds in the microwatershed. The conservation plan prepared may be presented to all the stakeholders including farmers and after including their suggestions, the conservation plan for the microwatershed may be finalised in a participatory approach.

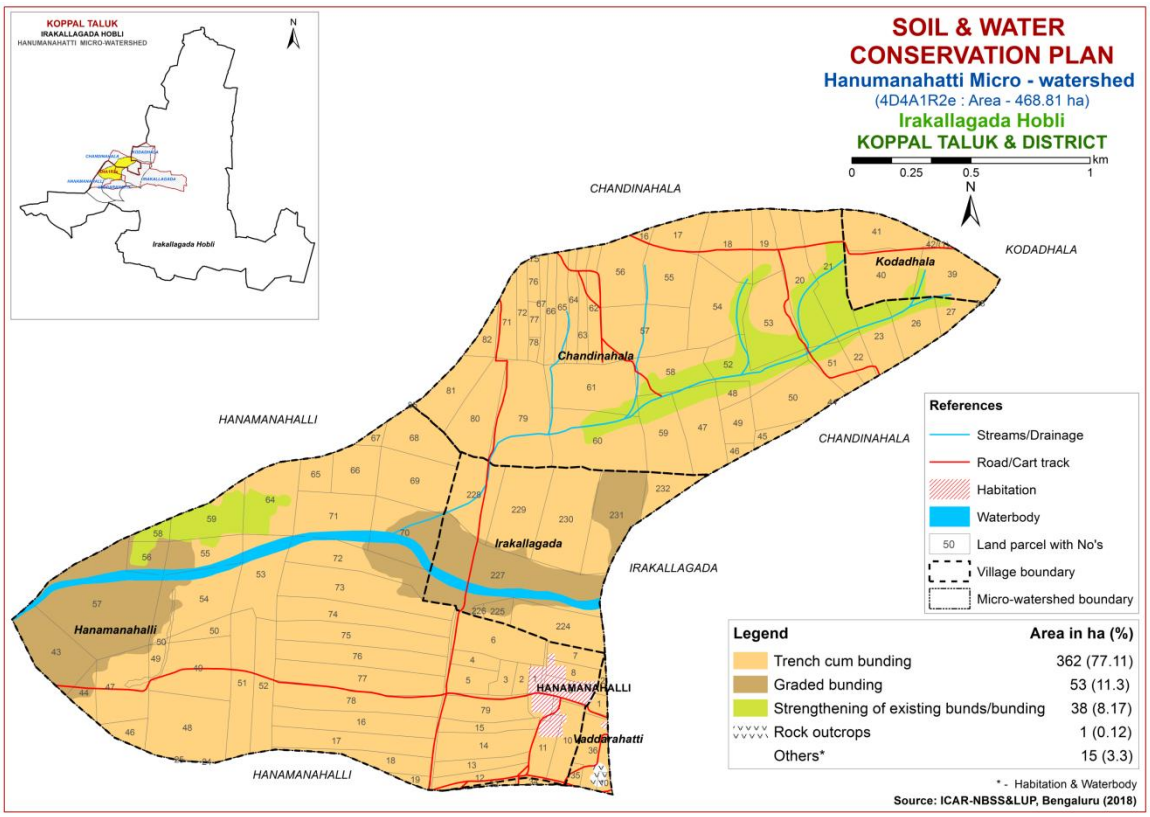



Fig. 9.1 Soil and Water Conservation Plan map of Hanumanahatti Microwatershed

### 9.3 Greening of Microwatershed

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

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

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# Appendix I

## Hanumanahatti (1R2e) Microwatershed

### Soil Phase Information

| Village | SY NO. | Area (ha) | Soil Phase | LMU | Soil Depth | Surface Soil Texture | Soil Gravelliness | Available Water Capacity | Slope | Soil Erosion | Current Land Use | WELLS | Land Capability | Conservation Plan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hanamanahalli | 1 | 0.62 | Habitation | Others | Others | Others | Others | Others | Others | Others | Habitation (Hb) | Not Available | Others | Others |
| Hanamanahalli | 2 | 0.79 | BPRcB2 | LMU-1 | Deep (100-150 cm) | Sandy loam | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Pearl millet+Redgram (Pm+Rg) | Not Available | IIIes | Trench cum bunding |
| Hanamanahalli | 3 | 1.21 | BPRcB2 | LMU-1 | Deep (100-150 cm) | Sandy loam | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Chilli (Ch) | Not Available | IIIes | Trench cum bunding |
| Hanamanahalli | 4 | 1.27 | BPRbB2g1 | LMU-1 | Deep (100-150 cm) | Loamy sand | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Horsegram+Maize (Hg+Mz) | Not Available | IIIes | Trench cum bunding |
| Hanamanahalli | 5 | 2.16 | BPRbB2g1 | LMU-1 | Deep (100-150 cm) | Loamy sand | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Groundnut+Maize (Gn+Mz) | 2 Borewell | IIIes | Trench cum bunding |
| Hanamanahalli | 6 | 5.61 | BPRcB2 | LMU-1 | Deep (100-150 cm) | Sandy loam | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Groundnut+Maize+Redgram (Gn+Mz+Rg) | Not Available | IIIes | Trench cum bunding |
| Hanamanahalli | 7 | 1.7 | BPRcB2 | LMU-1 | Deep (100-150 cm) | Sandy loam | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Pearl millet (Pm) | Not Available | IIIes | Trench cum bunding |
| Hanamanahalli | 8 | 1.59 | BPRcB2 | LMU-1 | Deep (100-150 cm) | Sandy loam | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Habitation (Hb) | Not Available | IIIes | Trench cum bunding |
| Hanamanahalli | 9 | 1.64 | Habitation | Others | Others | Others | Others | Others | Others | Others | Pearl millet (Pm) | Not Available | Others | Others |
| Hanamanahalli | 10 | 3.34 | GHTcB1g1 | LMU-4 | Moderately deep (75-100 cm) | Sandy loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Redgram (Rg) | Not Available | IIs | Trench cum bunding |
| Hanamanahalli | 11 | 2.37 | GHTcB1g1 | LMU-4 | Moderately deep (75-100 cm) | Sandy loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Redgram (Rg) | Not Available | IIs | Trench cum bunding |
| Hanamanahalli | 12 | 2.34 | GHTcB1g1 | LMU-4 | Moderately deep (75-100 cm) | Sandy loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize (Mz) | Not Available | IIs | Trench cum bunding |
| Hanamanahalli | 13 | 2.1 | GHTcB1g1 | LMU-4 | Moderately deep (75-100 cm) | Sandy loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Current fallow+Maize+Redgram (Cf+Mz+Rg) | Not Available | IIs | Trench cum bunding |
| Hanamanahalli | 14 | 4.45 | GHTcB1g1 | LMU-4 | Moderately deep (75-100 cm) | Sandy 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 |
| Hanamanahalli | 15 | 1.94 | GHTcB1g1 | LMU-4 | Moderately deep (75-100 cm) | Sandy 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 |
| Hanamanahalli | 16 | 5.98 | BPRiB2 | LMU-1 | Deep (100-150 cm) | Sandy clay | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Maize (Mz) | Not Available | IIIes | Trench cum bunding |
| Hanamanahalli | 17 | 5.38 | BPRiB2 | LMU-1 | Deep (100-150 cm) | Sandy clay | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Lady's finger (Lf) | Not Available | IIIes | Trench cum bunding |
| Hanamanahalli | 18 | 2.87 | BPRhB2g2 | LMU-1 | Deep (100-150 cm) | Sandy clay loam | Very gravelly (35-60%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Chilli+Redgram (Ch+Rg) | Not Available | IIIes | Trench cum bunding |
| Hanamanahalli | 19 | 0.59 | GHTcB1g1 | LMU-4 | Moderately deep (75-100 cm) | Sandy loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Chilli+Maize+Redgram (Ch+Mz+Rg) | Not Available | IIs | Trench cum bunding |
| Hanamanahalli | 24 | 0.05 | BPRcB2g1 | LMU-1 | Deep (100-150 cm) | Sandy loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Maize+Pearl millet (Mz+Pm) | Not Available | IIIes | Trench cum bunding |
| Hanamanahalli | 25 | 0.07 | BPRcB2g1 | LMU-1 | Deep (100-150 cm) | Sandy loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Maize+Redgram (Mz+Rg) | Not Available | IIIes | Trench cum bunding |
| Hanamanahalli | 43 | 6.35 | RNKmB1 | LMU-5 | Moderately shallow (50-75 cm) | Clay | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Eucalyptus+Fallow Land (Eu+Fl) | Not Available | IIs | Graded bunding |

| Village | SY NO. | Area (ha) | Soil Phase | LMU | Soil Depth | Surface Soil Texture | Soil Gravelliness | Available Water Capacity | Slope | Soil Erosion | Current Land Use | WELLS | Land Capability | Conservation Plan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hanamanahalli | 44 | 1.63 | RNKmB1 | LMU-5 | Moderately shallow (50-75 cm) | Clay | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Pearl millet (Pm) | Not Available | IIs | Graded bunding |
| Hanamanahalli | 46 | 1.55 | KMHiB1 | LMU-4 | Deep (100-150 cm) | Sandy clay | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Chilli (Ch) | Not Available | IIs | Trench cum bunding |
| Hanamanahalli | 47 | 6.13 | KMHiB1 | LMU-4 | Deep (100-150 cm) | Sandy clay | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Redgram+Fallow land (Rg+Fl) | Not Available | IIs | Trench cum bunding |
| Hanamanahalli | 48 | 8.98 | BPRiB2 | LMU-1 | Deep (100-150 cm) | Sandy clay | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Fallow land+Maize+Redgram (Fl+Mz+Rg) | Not Available | IIIes | Trench cum bunding |
| Hanamanahalli | 49 | 7.81 | BPRhB1g1 | LMU-1 | 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 |
| Hanamanahalli | 50 | 1.55 | BPRcB2g2 | LMU-1 | Deep (100-150 cm) | Sandy loam | Very gravelly (35-60%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Pearl millet (Pm) | Not Available | IIIes | Trench cum bunding |
| Hanamanahalli | 51 | 6.09 | BPRcB2g2 | LMU-1 | Deep (100-150 cm) | Sandy loam | Very gravelly (35-60%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Maize+Redgram+Tomato (Mz+Rg+Tm) | Not Available | IIIes | Trench cum bunding |
| Hanamanahalli | 52 | 4.78 | BPRcB2g2 | LMU-1 | Deep (100-150 cm) | Sandy loam | Very gravelly (35-60%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Redgram+Watermelon (Rg+Wm) | Not Available | IIIes | Trench cum bunding |
| Hanamanahalli | 53 | 6.18 | JDGhB1g1 | LMU-4 | Deep (100-150 cm) | Sandy clay loam | Gravelly (15-35%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Maize+Fallow land (Mz+Fl) | Not Available | IIs | Trench cum bunding |
| Hanamanahalli | 54 | 7.88 | JDGhB1g1 | LMU-4 | Deep (100-150 cm) | Sandy clay loam | Gravelly (15-35%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Current fallow (Cf) | Not Available | IIs | Trench cum bunding |
| Hanamanahalli | 55 | 4.14 | JDGhB1g1 | LMU-4 | Deep (100-150 cm) | Sandy clay loam | Gravelly (15-35%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Maize (Mz) | Not Available | IIs | Trench cum bunding |
| Hanamanahalli | 56 | 2.17 | RNKmB1 | LMU-5 | Moderately shallow (50-75 cm) | Clay | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize (Mz) | Not Available | IIs | Graded bunding |
| Hanamanahalli | 57 | 16.44 | RNKmB1 | LMU-5 | Moderately shallow (50-75 cm) | Clay | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize+Eucalyptus (Mz+Eu) | Not Available | IIs | Graded bunding |
| Hanamanahalli | 58 | 1.04 | GRHmA1 | LMU-2 | 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 |
| Hanamanahalli | 59 | 4.75 | GRHmA1 | LMU-2 | Deep (100-150 cm) | Clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | Maize+Watermelon (Mz+Wm) | Not Available | IIs | Graded bunding |
| Hanamanahalli | 64 | 6.38 | GRHmA1 | LMU-2 | 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 |
| Hanamanahalli | 65 | 2.02 | BPRcB2g1 | LMU-1 | Deep (100-150 cm) | Sandy loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Maize (Mz) | Not Available | IIIes | Trench cum bunding |
| Hanamanahalli | 66 | 3.87 | NDLcB2g1 | LMU-1 | Very deep (>150 cm) | Sandy loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Chilli+Maize (Ch+Mz) | 2 Borewell | IIes | Trench cum bunding |
| Hanamanahalli | 67 | 0.63 | NDLcB2g1 | LMU-1 | Very deep (>150 cm) | Sandy loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Crossandra+Maize+Redgram (Crd+Mz+Rg) | Not Available | IIes | Trench cum bunding |
| Hanamanahalli | 68 | 4.69 | NDLcB2g1 | LMU-1 | Very deep (>150 cm) | Sandy loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Current fallow+Watermelon (Cf+Wm) | Not Available | IIes | Trench cum bunding |
| Hanamanahalli | 69 | 6.51 | BPRcB2g1 | LMU-1 | Deep (100-150 cm) | Sandy loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Currentfallow+Marigold (Cf+Mg) | 1 Borewell | IIIes | Trench cum bunding |
| Hanamanahalli | 70 | 6.82 | GRHmB2 | LMU-2 | Deep (100-150 cm) | Clay | Non gravelly (<15%) | Very high (>200 mm/m) | Very gently sloping (1-3%) | Moderate | Paddy (Pd) | Not Available | IIes | Graded bunding |
| Hanamanahalli | 71 | 6.48 | JDGhB1g1 | LMU-4 | Deep (100-150 cm) | Sandy clay loam | Gravelly (15-35%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Fallow land (Fl) | Not Available | IIs | Trench cum bunding |

| Village | SY NO. | Area (ha) | Soil Phase | LMU | Soil Depth | Surface Soil Texture | Soil Gravelliness | Available Water Capacity | Slope | Soil Erosion | Current Land Use | WELLS | Land Capability | Conservation Plan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hanamanahalli | 72 | 6.14 | JDGhB1g1 | LMU-4 | Deep (100-150 cm) | Sandy clay loam | Gravelly (15-35%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Castor+Maize (Ca+Mz) | Not Available | IIs | Trench cum bunding |
| Hanamanahalli | 73 | 8.58 | BPRiB1 | LMU-1 | Deep (100-150 cm) | Sandy clay | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Maize+Redgram (Mz+Rg) | Not Available | IIIs | Trench cum bunding |
| Hanamanahalli | 74 | 6.25 | BPRiB1 | LMU-1 | Deep (100-150 cm) | Sandy clay | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Currentfallow+Redgram (Cf+Rg) | Not Available | IIIs | Trench cum bunding |
| Hanamanahalli | 75 | 6.27 | BPRiB1 | LMU-1 | Deep (100-150 cm) | Sandy clay | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Castor+Maize+Redgram (Ca+Mz+Rg) | Not Available | IIIs | Trench cum bunding |
| Hanamanahalli | 76 | 6.14 | BPRiB2 | LMU-1 | Deep (100-150 cm) | Sandy clay | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Chilli+Maize+Redgram (Ch+Mz+Rg) | Not Available | IIIes | Trench cum bunding |
| Hanamanahalli | 77 | 6.92 | BPRiB2 | LMU-1 | Deep (100-150 cm) | Sandy clay | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Chilli+Groundnut (Ch+Gn) | 1 Borewell | IIIes | Trench cum bunding |
| Hanamanahalli | 78 | 6.45 | BPRiB2 | LMU-1 | Deep (100-150 cm) | Sandy clay | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Chilli+Redgram (Ch+Rg) | Not Available | IIIes | Trench cum bunding |
| Hanamanahalli | 79 | 3.6 | GHTcB1g1 | LMU-4 | Moderately deep (75-100 cm) | Sandy loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Chilli+Groundnut+Redgram (Ch+Gn+Rg) | 2 Borewell | IIs | Trench cum bunding |
| Irakallagada | 224 | 5.42 | BPRcB2 | LMU-1 | Deep (100-150 cm) | Sandy loam | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Maize (Mz) | Not Available | IIIes | Trench cum bunding |
| Irakallagada | 225 | 1.05 | GRHmB2 | LMU-2 | 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 |
| Irakallagada | 226 | 0.22 | GRHmB2 | LMU-2 | 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 |
| Irakallagada | 227 | 16.44 | GRHmB2 | LMU-2 | Deep (100-150 cm) | Clay | Non gravelly (<15%) | Very high (>200 mm/m) | Very gently sloping (1-3%) | Moderate | Fallow land+Paddy (Fl+Pd) | Not Available | IIes | Graded bunding |
| Irakallagada | 228 | 5.87 | JDGiB2g1 | LMU-4 | Deep (100-150 cm) | Sandy clay | Gravelly (15-35%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Maize+Redgram (Mz+Rg) | 1 Borewell | IIes | Trench cum bunding |
| Irakallagada | 229 | 7.35 | JDGiB2g1 | LMU-4 | Deep (100-150 cm) | Sandy clay | Gravelly (15-35%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Currentfallow+Redgram+Paddy (Cf+Rg+Pd) | Not Available | IIes | Trench cum bunding |
| Irakallagada | 230 | 8.79 | JDGiB2g1 | LMU-4 | Deep (100-150 cm) | Sandy clay | Gravelly (15-35%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Redgram+Vegetables+Paddy (Rg+Vg+Pd) | Not Available | IIes | Trench cum bunding |
| Irakallagada | 231 | 7.4 | GRHmB2 | LMU-2 | Deep (100-150 cm) | Clay | Non gravelly (<15%) | Very high (>200 mm/m) | Very gently sloping (1-3%) | Moderate | Maize+Redgram+Fallow land (Mz+Rg+Fl) | 1 Borewell | IIes | Graded bunding |
| Irakallagada | 232 | 2.56 | LKRiB2g1 | LMU-6 | Moderately shallow (50-75 cm) | Sandy clay | Gravelly (15-35%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Redgram+Vegetables+Paddy (Rg+Vg+Pd) | Not Available | IIes | Trench cum bunding |
| Kodadhala | 39 | 5.92 | ABRbB2g2 | LMU-8 | Shallow (25-50 cm) | Loamy sand | Very gravelly (35-60%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Redgram+Pearl millet+Mango+Current fallow+Tomato (Rg+Pm+Mn+Cf+Tm) | Not Available | IIIes | Trench cum bunding |
| Kodadhala | 40 | 6.66 | BPRbB2g1 | LMU-1 | Deep (100-150 cm) | Loamy sand | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Redgram+Maize+Horsegram+Eucalyptus (Rg+Mz+Hg+Eu) | Not Available | IIIes | Trench cum bunding |
| Kodadhala | 41 | 4.67 | BPRbB2g1 | LMU-1 | Deep (100-150 cm) | Loamy sand | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Redgram+Maize+Groundnut+Castor (Rg+Mz+Gn+Ca) | 1 Borewell | IIIes | Trench cum bunding |
| Kodadhala | 42/(1) | 0.31 | BPRbB2g1 | LMU-1 | Deep (100-150 cm) | Loamy sand | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Redgram+Maize+Jasmine (Rg+Mz+Js) | Not Available | IIIes | Trench cum bunding |
| Vaddarahatti | 1 | 0.58 | GHTcB2 | LMU-4 | Moderately deep (75-100 cm) | Sandy loam | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Redgram (Rg) | Not Available | IIes | Trench cum bunding |

| Village | SY NO. | Area (ha) | Soil Phase | LMU | Soil Depth | Surface Soil Texture | Soil Gravelliness | Available Water Capacity | Slope | Soil Erosion | Current Land Use | WELLS | Land Capability | Conservation Plan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vaddara hatti | 2 | 0.45 | GHTcB2 | LMU-4 | Moderately deep (75-100 cm) | Sandy loam | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Tomato+Pearl millet (Tm+Pm) | Not Available | IIes | Trench cum bunding |
| Vaddara hatti | 10 | 0.49 | GHTbB2 g1 | LMU-4 | Moderately deep (75-100 cm) | Loamy sand | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Redgram+Fallow land (Rg+Fl) | Not Available | IIes | Trench cum bunding |
| Vaddara hatti | 32 | 0.29 | GHTbB2 g1 | LMU-4 | Moderately deep (75-100 cm) | Loamy sand | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Current fallow+Redgram+Pearl millet (Cf+Rg+Pm) | Not Available | IIes | Trench cum bunding |
| Vaddara hatti | 34 | 0.36 | GHTbB2 g1 | LMU-4 | Moderately deep (75-100 cm) | Loamy sand | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Redgram+Current fallow (Rg+Cf) | Not Available | IIes | Trench cum bunding |
| Vaddara hatti | 35 | 0.53 | GHTbB2 g1 | LMU-4 | Moderately deep (75-100 cm) | Loamy sand | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Redgram+Current fallow (Rg+Cf) | Not Available | IIes | Trench cum bunding |
| Vaddara hatti | 36 | 3.36 | GHThB2 g1 | LMU-4 | Moderately deep (75-100 cm) | Sandy clay loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Redgram+Neiger (Rg+Ng) | Not Available | IIes | Trench cum bunding |
| Chandin ahala | 16 | 0.36 | LKRhB2 g1 | LMU-6 | Moderately shallow (50-75 cm) | Sandy clay loam | Gravelly (15-35%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Not Available (NA) | Not Available | IIIes | Trench cum bunding |
| Chandin ahala | 17 | 2.83 | LKRhB2 g1 | LMU-6 | Moderately shallow (50-75 cm) | Sandy clay loam | Gravelly (15-35%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Not Available (NA) | Not Available | IIIes | Trench cum bunding |
| Chandin ahala | 18 | 5.45 | LKRhB2 g1 | LMU-6 | Moderately shallow (50-75 cm) | Sandy clay loam | Gravelly (15-35%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Current fallow (Cf) | 1 Borewell | IIIes | Trench cum bunding |
| Chandin ahala | 19 | 2.9 | LKRhB2 g2 | LMU-6 | Moderately shallow (50-75 cm) | Sandy clay loam | Very gravelly (35-60%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Maize+Fallow land (Mz+Fl) | Not Available | IIIes | Trench cum bunding |
| Chandin ahala | 20 | 7.18 | SRRmA 1 | LMU-3 | Deep (100-150 cm) | Clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | Not Available (NA) | Not Available | IIw | Graded bunding |
| Chandin ahala | 21 | 7.61 | SRRmA 1 | LMU-3 | Deep (100-150 cm) | Clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | Maize+Eucalyptus (Mz+Eu) | 3 Borewell | IIw | Graded bunding |
| Chandin ahala | 22 | 1.68 | MKHcB 2g1 | LMU-6 | Moderately shallow (50-75 cm) | Sandy loam | Gravelly (15-35%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Current fallow (Cf) | Not Available | IIIes | Trench cum bunding |
| Chandin ahala | 23 | 3.95 | MKHcB 2g1 | LMU-6 | Moderately shallow (50-75 cm) | Sandy loam | Gravelly (15-35%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Maize (Mz) | Not Available | IIIes | Trench cum bunding |
| Chandin ahala | 26 | 4.04 | MKHcB 2g1 | LMU-6 | Moderately shallow (50-75 cm) | Sandy loam | Gravelly (15-35%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Current fallow (Cf) | Not Available | IIIes | Trench cum bunding |
| Chandin ahala | 27 | 1.65 | MKHcB 2g1 | LMU-6 | Moderately shallow (50-75 cm) | Sandy loam | Gravelly (15-35%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Pearl millet (Pm) | Not Available | IIIes | Trench cum bunding |
| Chandin ahala | 28 | 0.01 | BPRbB2 g1 | LMU-1 | Deep (100-150 cm) | Loamy sand | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Pearl millet (Pm) | Not Available | IIIes | Trench cum bunding |
| Chandin ahala | 44 | 0.04 | HDHcB2 g2 | LMU-1 | Moderately deep (75-100 cm) | Sandy loam | Very gravelly (35-60%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Not Available (NA) | Not Available | IIes | Trench cum bunding |
| Chandin ahala | 45 | 0.95 | HDHcB2 g2 | LMU-1 | Moderately deep (75-100 cm) | Sandy loam | Very gravelly (35-60%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Not Available (NA) | Not Available | IIes | Trench cum bunding |
| Chandin ahala | 46 | 0.67 | HDHcB2 g2 | LMU-1 | Moderately deep (75-100 cm) | Sandy loam | Very gravelly (35-60%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Maize (Mz) | Not Available | IIes | Trench cum bunding |
| Chandin ahala | 47 | 6.02 | BPRbB2 g2 | LMU-1 | Deep (100-150 cm) | Loamy sand | Very gravelly (35-60%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Maize (Mz) | Not Available | IIIes | Trench cum bunding |
| Chandin ahala | 48 | 1.32 | BPRbB2 g2 | LMU-1 | Deep (100-150 cm) | Loamy sand | Very gravelly (35-60%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Maize (Mz) | Not Available | IIIes | Trench cum bunding |
| Chandin ahala | 49 | 2.23 | BPRbB2 g2 | LMU-1 | Deep (100-150 cm) | Loamy sand | Very gravelly (35-60%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Maize (Mz) | Not Available | IIIes | Trench cum bunding |
| Chandin ahala | 50 | 6.6 | BPRbB2 g2 | LMU-1 | Deep (100-150 cm) | Loamy sand | Very gravelly (35-60%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Maize (Mz) | Not Available | IIIes | Trench cum bunding |

| Village | SY NO. | Area (ha) | Soil Phase | LMU | Soil Depth | Surface Soil Texture | Soil Gravelliness | Available Water Capacity | Slope | Soil Erosion | Current Land Use | WELLS | Land Capability | Conservation Plan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chandinahala | 51 | 2.71 | MKHcB2g1 | LMU-6 | Moderately shallow (50-75 cm) | Sandy loam | Gravelly (15-35%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Current fallow (Cf) | 2 Borewell | IIIes | Trench cum bunding |
| Chandinahala | 52 | 4.98 | SRRmA1 | LMU-3 | Deep (100-150 cm) | Clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | Not Available (NA) | Not Available | IIw | Graded bunding |
| Chandinahala | 53 | 7 | LKRhB2g2 | LMU-6 | Moderately shallow (50-75 cm) | Sandy clay loam | Very gravelly (35-60%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Fallow land (Fl) | 1 Borewell | IIIes | Trench cum bunding |
| Chandinahala | 54 | 7 | ABRbB2g2 | LMU-8 | Shallow (25-50 cm) | Loamy sand | Very gravelly (35-60%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Maize (Mz) | 1 Borewell | IIIes | Trench cum bunding |
| Chandinahala | 55 | 4.94 | LKRhB2g2 | LMU-6 | Moderately shallow (50-75 cm) | Sandy clay loam | Very gravelly (35-60%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Maize+Current fallow (Mz+Cf) | 1 Borewell | IIIes | Trench cum bunding |
| Chandinahala | 56 | 5.32 | ABRbB2g2 | LMU-8 | Shallow (25-50 cm) | Loamy sand | Very gravelly (35-60%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Maize (Mz) | Not Available | IIIes | Trench cum bunding |
| Chandinahala | 57 | 7.78 | MKHcB2g1 | LMU-6 | Moderately shallow (50-75 cm) | Sandy loam | Gravelly (15-35%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Maize (Mz) | Not Available | IIIes | Trench cum bunding |
| Chandinahala | 58 | 4.93 | SRRmA1 | LMU-3 | Deep (100-150 cm) | Clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | Maize+Current fallow (Mz+Cf) | 1 Borewell | IIw | Graded bunding |
| Chandinahala | 59 | 5.71 | CKMbB2g1 | LMU-4 | Moderately deep (75-100 cm) | Loamy sand | Gravelly (15-35%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Maize (Mz) | Not Available | IIes | Trench cum bunding |
| Chandinahala | 60 | 9.51 | CKMbB2g1 | LMU-4 | Moderately deep (75-100 cm) | Loamy sand | Gravelly (15-35%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Maize (Mz) | 1 Borewell | IIes | Trench cum bunding |
| Chandinahala | 61 | 7.59 | MKHcB2g1 | LMU-6 | Moderately shallow (50-75 cm) | Sandy loam | Gravelly (15-35%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Maize (Mz) | 1 Borewell | IIIes | Trench cum bunding |
| Chandinahala | 62 | 2.68 | ABRbB2g2 | LMU-8 | Shallow (25-50 cm) | Loamy sand | Very gravelly (35-60%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Current fallow (Cf) | Not Available | IIIes | Trench cum bunding |
| Chandinahala | 63 | 2.02 | ABRbB2g2 | LMU-8 | Shallow (25-50 cm) | Loamy sand | Very gravelly (35-60%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Current fallow (Cf) | Not Available | IIIes | Trench cum bunding |
| Chandinahala | 64 | 2.03 | HDHcB2g2 | LMU-1 | Moderately deep (75-100 cm) | Sandy loam | Very gravelly (35-60%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Maize (Mz) | Not Available | IIes | Trench cum bunding |
| Chandinahala | 65 | 2.31 | HDHcB2g2 | LMU-1 | Moderately deep (75-100 cm) | Sandy loam | Very gravelly (35-60%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Maize (Mz) | 1 Borewell | IIes | Trench cum bunding |
| Chandinahala | 66 | 1.96 | HDHcB2g2 | LMU-1 | Moderately deep (75-100 cm) | Sandy loam | Very gravelly (35-60%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Maize (Mz) | Not Available | IIes | Trench cum bunding |
| Chandinahala | 67 | 1.21 | HDHcB2g2 | LMU-1 | Moderately deep (75-100 cm) | Sandy loam | Very gravelly (35-60%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Not Available (NA) | Not Available | IIes | Trench cum bunding |
| Chandinahala | 71 | 2.62 | HDHcB2g1 | LMU-1 | Moderately deep (75-100 cm) | Sandy loam | Gravelly (15-35%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Fallow land (Fl) | Not Available | IIes | Trench cum bunding |
| Chandinahala | 72 | 1.91 | HDHcB2g1 | LMU-1 | Moderately deep (75-100 cm) | Sandy loam | Gravelly (15-35%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Fallow land (Fl) | Not Available | IIes | Trench cum bunding |
| Chandinahala | 75 | 0.08 | BSRhB2g1 | LMU-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 |
| Chandinahala | 76 | 0.89 | BSRhB2g1 | LMU-4 | Moderately deep (75-100 cm) | Sandy clay loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Maize (Mz) | Not Available | IIes | Trench cum bunding |
| Chandinahala | 77 | 0.75 | HDHcB2g2 | LMU-1 | Moderately deep (75-100 cm) | Sandy loam | Very gravelly (35-60%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Maize (Mz) | Not Available | IIes | Trench cum bunding |
| Chandinahala | 78 | 0.44 | HDHcB2g2 | LMU-1 | Moderately deep (75-100 cm) | Sandy loam | Very gravelly (35-60%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Not Available (NA) | Not Available | IIes | Trench cum bunding |
| Chandinahala | 79 | 9.69 | HDHcB2g1 | LMU-1 | Moderately deep (75-100 cm) | Sandy loam | Gravelly (15-35%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Maize (Mz) | Not Available | IIes | Trench cum bunding |

| Village | SY NO. | Area (ha) | Soil Phase | LMU | Soil Depth | Surface Soil Texture | Soil Gravelliness | Available Water Capacity | Slope | Soil Erosion | Current Land Use | WELLS | Land Capability | Conservation Plan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chandinahala | 80 | 5.74 | HDHcB2g1 | LMU-1 | Moderately deep (75-100 cm) | Sandy loam | Gravelly (15-35%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Maize (Mz) | Not Available | IIes | Trench cum bunding |
| Chandinahala | 81 | 4.51 | HDHcB2g1 | LMU-1 | Moderately deep (75-100 cm) | Sandy loam | Gravelly (15-35%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Maize (Mz) | 3 Borewell | IIes | Trench cum bunding |
| Chandinahala | 82 | 1.48 | HDHcB2g1 | LMU-1 | Moderately deep (75-100 cm) | Sandy loam | Gravelly (15-35%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Maize (Mz) | Not Available | IIes | Trench cum bunding |
| Chandinahala | 85 | 0.001 | HDHcB2g1 | LMU-1 | Moderately deep (75-100 cm) | Sandy loam | Gravelly (15-35%) | Very Low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Maize (Mz) | Not Available | IIes | Trench cum bunding |

# Appendix II

## Hanumanahatti (1R2e) Microwatershed

## Soil Fertility Information

| Village | Survey Number | Soil Reaction | Salinity | Organic Carbon | Available Phosphorus | Available Potassium | Available Sulphur | Available Boron | Available Iron | Available Manganese | Available Copper | Available Zinc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hanama nahalli | 1 | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others |
| Hanama nahalli | 2 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 3 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 4 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 5 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 6 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 7 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 8 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 9 | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others |
| Hanama nahalli | 10 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 11 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 12 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 13 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 14 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 15 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 16 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 17 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 18 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 19 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 24 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5 – 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 25 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5 – 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 43 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5 – 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | High (> 20 ppm) | Medium (0.5 – 1.0 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Deficient (< 0.6 ppm) |

| Village | Survey Number | Soil Reaction | Salinity | Organic Carbon | Available Phosphorus | Available Potassium | Available Sulphur | Available Boron | Available Iron | Available Manganese | Available Copper | Available Zinc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hanama nahalli | 44 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5 – 0.75 %) | High (> 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) |
| Hanama nahalli | 46 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5 – 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 47 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5 – 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 48 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 49 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 50 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 51 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 52 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 53 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 54 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 55 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 56 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Medium (10 – 20 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 57 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 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) |
| Hanama nahalli | 58 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | High (> 337 kg/ha) | Medium (10 – 20 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 59 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 64 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 65 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 66 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 67 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 68 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 69 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 70 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 71 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 72 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |

| Village | Survey Number | Soil Reaction | Salinity | Organic Carbon | Available Phosphorus | Available Potassium | Available Sulphur | Available Boron | Available Iron | Available Manganese | Available Copper | Available Zinc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hanama nahalli | 73 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 74 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 75 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 76 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 77 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 78 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Hanama nahalli | 79 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Irakallagada | 224 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Irakallagada | 225 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Irakallagada | 226 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Irakallagada | 227 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Irakallagada | 228 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Irakallagada | 229 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Irakallagada | 230 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Irakallagada | 231 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Irakallagada | 232 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Kodadhala | 39 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Kodadhala | 40 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Kodadhala | 41 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Kodadhala | 42/(1) | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Vaddarahatti | 1 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Vaddarahatti | 2 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Vaddarahatti | 10 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Vaddarahatti | 32 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |

| Village | Survey Number | Soil Reaction | Salinity | Organic Carbon | Available Phosphorus | Available Potassium | Available Sulphur | Available Boron | Available Iron | Available Manganese | Available Copper | Available Zinc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vaddara hatti | 34 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Vaddara hatti | 35 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Vaddara hatti | 36 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandin ahala | 16 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandin ahala | 17 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandin ahala | 18 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandin ahala | 19 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandin ahala | 20 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandin ahala | 21 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandin ahala | 22 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandin ahala | 23 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandin ahala | 26 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandin ahala | 27 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandin ahala | 28 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandin ahala | 44 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandin ahala | 45 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandin ahala | 46 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandin ahala | 47 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandin ahala | 48 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandin ahala | 49 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandin ahala | 50 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandin ahala | 51 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandin ahala | 52 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandin ahala | 53 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |

| Village | Survey Number | Soil Reaction | Salinity | Organic Carbon | Available Phosphorus | Available Potassium | Available Sulphur | Available Boron | Available Iron | Available Manganese | Available Copper | Available Zinc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chandinahala | 54 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandinahala | 55 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandinahala | 56 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandinahala | 57 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandinahala | 58 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandinahala | 59 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandinahala | 60 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandinahala | 61 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandinahala | 62 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandinahala | 63 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandinahala | 64 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Medium (0.5 – 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandinahala | 65 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Medium (0.5 – 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandinahala | 66 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Medium (0.5 – 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandinahala | 67 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Medium (0.5 – 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandinahala | 71 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Medium (0.5 – 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandinahala | 72 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Medium (0.5 – 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandinahala | 75 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | Medium (0.5 – 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandinahala | 76 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | Medium (0.5 – 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandinahala | 77 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Medium (0.5 – 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandinahala | 78 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Medium (0.5 – 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandinahala | 79 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandinahala | 80 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandinahala | 81 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |
| Chandinahala | 82 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Medium (0.5 – 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |

| Village | Survey Number | Soil Reaction | Salinity | Organic Carbon | Available Phosphorus | Available Potassium | Available Sulphur | Available Boron | Available Iron | Available Manganese | Available Copper | Available Zinc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chandin ahala | 85 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (> 0.75 %) | High (> 57 kg/ha) | Medium (145 – 337 kg/ha) | Low (<10 ppm) | Low (< 0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient (> 1.0 ppm) | Sufficient (> 0.2 ppm) | Sufficient (> 0.6 ppm) |

# Appendix III

## Hanumanahatti (1R2e) Microwatershed

## Soil Suitability Information

| Village | Survey Number | Mango | Maize | Sapota | Sorghum | Guava | Cotton | Tamarind | Lime | Bengal gram | Sunflower | Red gram | Amla | Jackfruit | Custard-apple | Cashew | Jamun | Musambi | Groundnut | Chilly | Tomato | Marigold | Chrysanthemum | Pomegranate | Bajra | Jasmine | Bhendi | Brinjal | Crossandra | Drumstick | Mulberry | Onion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hanamanahalli | 1 | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others |
| Hanamanahalli | 2 | S3rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3g | S2g | S2g | S2g |
| Hanamanahalli | 3 | S3rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3g | S2g | S2g | S2g |
| Hanamanahalli | 4 | S3rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3g | S2g | S2gt | S2g |
| Hanamanahalli | 5 | S3rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3g | S2g | S2gt | S2g |
| Hanamanahalli | 6 | S3rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3g | S2g | S2g | S2g |
| Hanamanahalli | 7 | S3rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3g | S2g | S2g | S2g |
| Hanamanahalli | 8 | S3rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3g | S2g | S2g | S2g |
| Hanamanahalli | 9 | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others |
| Hanamanahalli | 10 | S3r | S2g | S2r | S2g | S2r | S2rg | S3r | S2r | S2g | S2rg | S2rg | S1 | S2r | S1 | S2r | S2r | S2r | S1 | S2g | S2g | S2g | S2g | S2r | S1 | S2g | S1 | S1 | S2g | S2rg | S2r | S1 |
| Hanamanahalli | 11 | S3r | S2g | S2r | S2g | S2r | S2rg | S3r | S2r | S2g | S2rg | S2rg | S1 | S2r | S1 | S2r | S2r | S2r | S1 | S2g | S2g | S2g | S2g | S2r | S1 | S2g | S1 | S1 | S2g | S2rg | S2r | S1 |
| Hanamanahalli | 12 | S3r | S2g | S2r | S2g | S2r | S2rg | S3r | S2r | S2g | S2rg | S2rg | S1 | S2r | S1 | S2r | S2r | S2r | S1 | S2g | S2g | S2g | S2g | S2r | S1 | S2g | S1 | S1 | S2g | S2rg | S2r | S1 |
| Hanamanahalli | 13 | S3r | S2g | S2r | S2g | S2r | S2rg | S3r | S2r | S2g | S2rg | S2rg | S1 | S2r | S1 | S2r | S2r | S2r | S1 | S2g | S2g | S2g | S2g | S2r | S1 | S2g | S1 | S1 | S2g | S2rg | S2r | S1 |
| Hanamanahalli | 14 | S3r | S2g | S2r | S2g | S2r | S2rg | S3r | S2r | S2g | S2rg | S2rg | S1 | S2r | S1 | S2r | S2r | S2r | S1 | S2g | S2g | S2g | S2g | S2r | S1 | S2g | S1 | S1 | S2g | S2rg | S2r | S1 |
| Hanamanahalli | 15 | S3r | S2g | S2r | S2g | S2r | S2rg | S3r | S2r | S2g | S2rg | S2rg | S1 | S2r | S1 | S2r | S2r | S2r | S1 | S2g | S2g | S2g | S2g | S2r | S1 | S2g | S1 | S1 | S2g | S2rg | S2r | S1 |
| Hanamanahalli | 16 | S3rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2gt | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3g | S2g | S2g | S2g |
| Hanamanahalli | 17 | S3rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2gt | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3g | S2g | S2g | S2g |
| Hanamanahalli | 18 | S3rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3g | S2g | S2g | S2g |
| Hanamanahalli | 19 | S3r | S2g | S2r | S2g | S2r | S2rg | S3r | S2r | S2g | S2rg | S2rg | S1 | S2r | S1 | S2r | S2r | S2r | S1 | S2g | S2g | S2g | S2g | S2r | S1 | S2g | S1 | S1 | S2g | S2rg | S2r | S1 |

| Village | Survey Number | Mango | Maize | Sapota | Sorghum | Guava | Cotton | Tamarind | Lime | Bengal gram | Sunflower | Red gram | Amla | Jackfruit | Custard-apple | Cashew | Jamun | Musambi | Groundnut | Chilly | Tomato | Marigold | Chrysanthemum | Pomegranate | Bajra | Jasmine | Bhendi | Brinjal | Crossandra | Drumstick | Mulberry | Onion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hanaman ahalli | 24 | S3rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3g | S2g | S2g | S2g |
| Hanaman ahalli | 25 | S3rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3g | S2g | S2g | S2g |
| Hanaman ahalli | 43 | N1rz | S2tz | S3rz | S2rz | S3tz | S2rz | N1rz | S3rz | S2rz | S3rz | S3rz | S2rz | S3tz | S2rz | N1tz | S3tz | S3rz | S3tz | S3tz | S3tz | S2rz | S2rz | S3rz | S2tz | S2rz | S2rt | S2rt | S3rz | S3rz | S3rz | S3tz |
| Hanaman ahalli | 44 | N1rz | S2tz | S3rz | S2rz | S3tz | S2rz | N1rz | S3rz | S2rz | S3rz | S3rz | S2rz | S3tz | S2rz | N1tz | S3tz | S3rz | S3tz | S3tz | S3tz | S2rz | S2rz | S3rz | S2tz | S2rz | S2rt | S2rt | S3rz | S3rz | S3rz | S3tz |
| Hanaman ahalli | 46 | S2r | S1 | S1 | S1 | S1 | S2t | S2r | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 |
| Hanaman ahalli | 47 | S2r | S1 | S1 | S1 | S1 | S2t | S2r | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 |
| Hanaman ahalli | 48 | S3rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2gt | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3g | S2g | S2g | S2g |
| Hanaman ahalli | 49 | S3rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3g | S2g | S2g | S2g |
| Hanaman ahalli | 50 | S3rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3g | S2g | S2g | S2g |
| Hanaman ahalli | 51 | S3rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3g | S2g | S2g | S2g |
| Hanaman ahalli | 52 | S3rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3g | S2g | S2g | S2g |
| Hanaman ahalli | 53 | S2r | S2tg | S1 | S2tg | S2t | S2g | S2r | S1 | S2gt | S2g | S2g | S1 | S1 | S1 | S2t | S2r | S1 | S2t | S2g | S2g | S2g | S2g | S1 | S1 | S2g | S2t | S1 | S2g | S1 | S1 | S2t |
| Hanaman ahalli | 54 | S2r | S2tg | S1 | S2tg | S2t | S2g | S2r | S1 | S2gt | S2g | S2g | S1 | S1 | S1 | S2t | S2r | S1 | S2t | S2g | S2g | S2g | S2g | S1 | S1 | S2g | S2t | S1 | S2g | S1 | S1 | S2t |
| Hanaman ahalli | 55 | S2r | S2tg | S1 | S2tg | S2t | S2g | S2r | S1 | S2gt | S2g | S2g | S1 | S1 | S1 | S2t | S2r | S1 | S2t | S2g | S2g | S2g | S2g | S1 | S1 | S2g | S2t | S1 | S2g | S1 | S1 | S2t |
| Hanaman ahalli | 56 | N1rz | S2tz | S3rz | S2rz | S3tz | S2rz | N1rz | S3rz | S2rz | S3rz | S3rz | S2rz | S3tz | S2rz | N1tz | S3tz | S3rz | S3tz | S3tz | S3tz | S2rz | S2rz | S3rz | S2tz | S2rz | S2rt | S2rt | S3rz | S3rz | S3rz | S3tz |
| Hanaman ahalli | 57 | N1rz | S2tz | S3rz | S2rz | S3tz | S2rz | N1rz | S3rz | S2rz | S3rz | S3rz | S2rz | S3tz | S2rz | N1tz | S3tz | S3rz | S3tz | S3tz | S3tz | S2rz | S2rz | S3rz | S2tz | S2rz | S2rt | S2rt | S3rz | S3rz | S3rz | S3tz |
| Hanaman ahalli | 58 | S3t | S2t | S3t | S1 | S3t | S1 | S2r | S1 | S1 | S1 | S2t | S2t | S3t | S1 | N1t | S2rt | S1 | S3t | S3t | S3t | S2t | S2t | S2t | S2t | S3t | S2t | S2t | S3t | S2t | S2t | S3t |
| Hanaman ahalli | 59 | S3t | S2t | S3t | S1 | S3t | S1 | S2r | S1 | S1 | S1 | S2t | S2t | S3t | S1 | N1t | S2rt | S1 | S3t | S3t | S3t | S2t | S2t | S2t | S2t | S3t | S2t | S2t | S3t | S2t | S2t | S3t |
| Hanaman ahalli | 64 | S3t | S2t | S3t | S1 | S3t | S1 | S2r | S1 | S1 | S1 | S2t | S2t | S3t | S1 | N1t | S2rt | S1 | S3t | S3t | S3t | S2t | S2t | S2t | S2t | S3t | S2t | S2t | S3t | S2t | S2t | S3t |
| Hanaman ahalli | 65 | S3rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3g | S2g | S2g | S2g |
| Hanaman ahalli | 66 | S2g | S2tg | S2g | S2g | S2tg | S2g | S2g | S2g | S2gt | S2g | S2g | S2g | S2g | S2g | S2tg | S2g | S2g | S3tg | S2tg | S2tg | S2tg | S2tg | S2g | S2g | S2tg | S1 | S1 | S2g | S2g | S2g | S1 |

| Village | Survey Number | Mango | Maize | Sapota | Sorghum | Guava | Cotton | Tamarind | Lime | Bengal gram | Sunflower | Red gram | Amla | Jackfruit | Custard-apple | Cashew | Jamun | Musambi | Groundnut | Chilly | Tomato | Marigold | Chrysanthemum | Pomegranate | Bajra | Jasmine | Bhendi | Brinjal | Crossandra | Drumstick | Mulberry | Onion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hanamanahalli | 67 | S2g | S2tg | S2g | S2g | S2tg | S2g | S2g | S2g | S2gt | S2g | S2g | S2g | S2g | S2g | S2tg | S2g | S2g | S3tg | S2tg | S2tg | S2tg | S2tg | S2g | S2g | S2tg | S1 | S1 | S2g | S2g | S2g | S1 |
| Hanamanahalli | 68 | S2g | S2tg | S2g | S2g | S2tg | S2g | S2g | S2g | S2gt | S2g | S2g | S2g | S2g | S2g | S2tg | S2g | S2g | S3tg | S2tg | S2tg | S2tg | S2tg | S2g | S2g | S2tg | S1 | S1 | S2g | S2g | S2g | S1 |
| Hanamanahalli | 69 | S3rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3g | S2g | S2g | S2g |
| Hanamanahalli | 70 | S3t | S2t | S3t | S1 | S3t | S1 | S2r | S1 | S1 | S1 | S2t | S2t | S3t | S1 | N1t | S2rt | S1 | S3t | S3t | S3t | S2t | S2t | S2t | S2t | S3t | S2t | S2t | S3t | S2t | S2t | S3t |
| Hanamanahalli | 71 | S2r | S2tg | S1 | S2tg | S2t | S2g | S2r | S1 | S2gt | S2g | S2g | S1 | S1 | S1 | S2t | S2r | S1 | S2t | S2g | S2g | S2g | S2g | S1 | S1 | S2g | S2t | S1 | S2g | S1 | S1 | S2t |
| Hanamanahalli | 72 | S2r | S2tg | S1 | S2tg | S2t | S2g | S2r | S1 | S2gt | S2g | S2g | S1 | S1 | S1 | S2t | S2r | S1 | S2t | S2g | S2g | S2g | S2g | S1 | S1 | S2g | S2t | S1 | S2g | S1 | S1 | S2t |
| Hanamanahalli | 73 | S3rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2gt | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3g | S2g | S2g | S2g |
| Hanamanahalli | 74 | S3rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2gt | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3g | S2g | S2g | S2g |
| Hanamanahalli | 75 | S3rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2gt | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3g | S2g | S2g | S2g |
| Hanamanahalli | 76 | S3rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2gt | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3g | S2g | S2g | S2g |
| Hanamanahalli | 77 | S3rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2gt | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3g | S2g | S2g | S2g |
| Hanamanahalli | 78 | S3rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2gt | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3g | S2g | S2g | S2g |
| Hanamanahalli | 79 | S3r | S2g | S2r | S2g | S2r | S2rg | S3r | S2r | S2g | S2rg | S2rg | S1 | S2r | S1 | S2r | S2r | S2r | S1 | S2g | S2g | S2g | S2g | S2r | S1 | S2g | S1 | S1 | S2g | S2rg | S2r | S1 |
| Irakallagada | 224 | S3rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3g | S2g | S2g | S2g |
| Irakallagada | 225 | S3t | S2t | S3t | S1 | S3t | S1 | S2r | S1 | S1 | S1 | S2t | S2t | S3t | S1 | N1t | S2rt | S1 | S3t | S3t | S3t | S2t | S2t | S2t | S2t | S3t | S2t | S2t | S3t | S2t | S2t | S3t |
| Irakallagada | 226 | S3t | S2t | S3t | S1 | S3t | S1 | S2r | S1 | S1 | S1 | S2t | S2t | S3t | S1 | N1t | S2rt | S1 | S3t | S3t | S3t | S2t | S2t | S2t | S2t | S3t | S2t | S2t | S3t | S2t | S2t | S3t |
| Irakallagada | 227 | S3t | S2t | S3t | S1 | S3t | S1 | S2r | S1 | S1 | S1 | S2t | S2t | S3t | S1 | N1t | S2rt | S1 | S3t | S3t | S3t | S2t | S2t | S2t | S2t | S3t | S2t | S2t | S3t | S2t | S2t | S3t |
| Irakallagada | 228 | S2rg | S2tg | S2g | S2tg | S2tg | S2g | S2rg | S2g | S2gt | S2g | S2g | S1 | S2g | S1 | S2t | S2rg | S2g | S2t | S2g | S2g | S2g | S2g | S2g | S1 | S2g | S2t | S1 | S2g | S1 | S1 | S2t |
| Irakallagada | 229 | S2rg | S2tg | S2g | S2tg | S2tg | S2g | S2rg | S2g | S2gt | S2g | S2g | S1 | S2g | S1 | S2t | S2rg | S2g | S2t | S2g | S2g | S2g | S2g | S2g | S1 | S2g | S2t | S1 | S2g | S1 | S1 | S2t |
| Irakallagada | 230 | S2rg | S2tg | S2g | S2tg | S2tg | S2g | S2rg | S2g | S2gt | S2g | S2g | S1 | S2g | S1 | S2t | S2rg | S2g | S2t | S2g | S2g | S2g | S2g | S2g | S1 | S2g | S2t | S1 | S2g | S1 | S1 | S2t |
| Irakallagada | 231 | S3t | S2t | S3t | S1 | S3t | S1 | S2r | S1 | S1 | S1 | S2t | S2t | S3t | S1 | N1t | S2rt | S1 | S3t | S3t | S3t | S2t | S2t | S2t | S2t | S3t | S2t | S2t | S3t | S2t | S2t | S3t |

| Village | Survey Number | Mango | Maize | Sapota | Sorghum | Guava | Cotton | Tamarind | Lime | Bengal gram | Sunflower | Red gram | Amla | Jackfruit | Custard-apple | Cashew | Jamun | Musambi | Groundnut | Chilly | Tomato | Marigold | Chrysanthemum | Pomegranate | Bajra | Jasmine | Bhendi | Brinjal | Crossandra | Drumstick | Mulberry | Onion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Irakallagada | 232 | N1rg | S3rg | S3rg | S3rg | S3rg | S3g | N1rg | S3rg | S2rt | S3rg | S3rg | S2rg | S3rg | S2rg | S3rg | S3rg | S3rg | S3rg | S3g | S3g | S3g | S3g | S3rg | S2rg | S3g | S3g | S3g | S3g | S3rg | S3rg | S3g |
| Kodadhala | 39 | N1r | S3rg | N1r | S3rg | N1r | S3rt | N1r | N1r | S3rt | N1r | N1r | S3rg | N1r | S3rg | N1r | N1r | N1r | S3rg | S3rg | S3rg | S3rg | S3rg | N1r | S3rg | S3rg | S3rg | S3rg | S3rg | N1r | N1r | S3rg |
| Kodadhala | 40 | S3rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3g | S2g | S2gt | S2g |
| Kodadhala | 41 | S3rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3g | S2g | S2gt | S2g |
| Kodadhala | 42/(1) | S3rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3g | S2g | S2gt | S2g |
| Vaddarahatti | 1 | S3r | S2g | S2r | S2g | S2r | S2rg | S3r | S2r | S2g | S2rg | S2rg | S1 | S2r | S1 | S2r | S2r | S2r | S1 | S2g | S2g | S2g | S2g | S2r | S1 | S2g | S1 | S1 | S2g | S2rg | S2r | S1 |
| Vaddarahatti | 2 | S3r | S2g | S2r | S2g | S2r | S2rg | S3r | S2r | S2g | S2rg | S2rg | S1 | S2r | S1 | S2r | S2r | S2r | S1 | S2g | S2g | S2g | S2g | S2r | S1 | S2g | S1 | S1 | S2g | S2rg | S2r | S1 |
| Vaddarahatti | 10 | S3r | S2g | S2r | S2g | S2r | S2rg | S3r | S2r | S2g | S2rg | S2rg | S1 | S2r | S1 | S2r | S2r | S2r | S1 | S2g | S2g | S2g | S2g | S2r | S1 | S2g | S1 | S1 | S2g | S2rg | S2r | S1 |
| Vaddarahatti | 32 | S3r | S2g | S2r | S2g | S2r | S2rg | S3r | S2r | S2g | S2rg | S2rg | S1 | S2r | S1 | S2r | S2r | S2r | S1 | S2g | S2g | S2g | S2g | S2r | S1 | S2g | S1 | S1 | S2g | S2rg | S2r | S1 |
| Vaddarahatti | 34 | S3r | S2g | S2r | S2g | S2r | S2rg | S3r | S2r | S2g | S2rg | S2rg | S1 | S2r | S1 | S2r | S2r | S2r | S1 | S2g | S2g | S2g | S2g | S2r | S1 | S2g | S1 | S1 | S2g | S2rg | S2r | S1 |
| Vaddarahatti | 35 | S3r | S2g | S2r | S2g | S2r | S2rg | S3r | S2r | S2g | S2rg | S2rg | S1 | S2r | S1 | S2r | S2r | S2r | S1 | S2g | S2g | S2g | S2g | S2r | S1 | S2g | S1 | S1 | S2g | S2rg | S2r | S1 |
| Vaddarahatti | 36 | S3r | S2g | S2r | S2g | S2r | S2rg | S3r | S2r | S2g | S2rg | S2rg | S1 | S2r | S1 | S2r | S2r | S2r | S1 | S2g | S2g | S2g | S2g | S2r | S1 | S2g | S1 | S1 | S2g | S2rg | S2r | S1 |
| Chandinahala | 16 | N1rg | S3rg | S3rg | S3rg | S3rg | S3rg | N1rg | S3rg | S2rt | S3rg | S3rg | S2rg | S3rg | S2rg | S3rg | S3rg | S3rg | S2rg | S3rg | S3rg | S3rg | S3rg | S3rg | S2rg | S3rg | S3g | S3g | S3rg | S3rg | S3rg | S3g |
| Chandinahala | 17 | N1rg | S3rg | S3rg | S3rg | S3rg | S3rg | N1rg | S3rg | S2rt | S3rg | S3rg | S2rg | S3rg | S2rg | S3rg | S3rg | S3rg | S2rg | S3rg | S3rg | S3rg | S3rg | S3rg | S2rg | S3rg | S3g | S3g | S3rg | S3rg | S3rg | S3g |
| Chandinahala | 18 | N1rg | S3rg | S3rg | S3rg | S3rg | S3rg | N1rg | S3rg | S2rt | S3rg | S3rg | S2rg | S3rg | S2rg | S3rg | S3rg | S3rg | S2rg | S3rg | S3rg | S3rg | S3rg | S3rg | S2rg | S3rg | S3g | S3g | S3rg | S3rg | S3rg | S3g |
| Chandinahala | 19 | N1rg | S3rg | S3rg | S3rg | S3rg | S3g | N1rg | S3rg | S2rt | S3rg | S3rg | S2rg | S3rg | S2rg | S3rg | S3rg | S3rg | S3rg | S3g | S3g | S3g | S3g | S3rg | S2rg | S3g | S3g | S3g | S3g | S3rg | S3rg | S3g |
| Chandinahala | 20 | S3tz | S2tz | S3tz | S1 | S3tz | S1 | S2tz | S1 | S1 | S1 | S2tz | S1 | S3tz | S1 | N1t | S2rt | S1 | S3t | S2tz | S2tz | S2tz | S2tz | S2tz | S2tz | S3tz | S2tz | S2tz | S3tz | S2tz | S3tz | S3tz |
| Chandinahala | 21 | S3tz | S2tz | S3tz | S1 | S3tz | S1 | S2tz | S1 | S1 | S1 | S2tz | S1 | S3tz | S1 | N1t | S2rt | S1 | S3t | S2tz | S2tz | S2tz | S2tz | S2tz | S2tz | S3tz | S2tz | S2tz | S3tz | S2tz | S3tz | S3tz |
| Chandinahala | 22 | N1r | S2rg | S3rg | S2rg | S3rg | S2rg | N1r | S3rg | S2rt | S3rg | S3rg | S2rg | S3rg | S2rg | S3rg | S3rg | S3rg | S2rg | S2rg | S2rg | S2rg | S2rg | S3rg | S2rg | S2rg | S3g | S3g | S2rg | S3rg | S3rg | S3g |
| Chandinahala | 23 | N1r | S2rg | S3rg | S2rg | S3rg | S2rg | N1r | S3rg | S2rt | S3rg | S3rg | S2rg | S3rg | S2rg | S3rg | S3rg | S3rg | S2rg | S2rg | S2rg | S2rg | S2rg | S3rg | S2rg | S2rg | S3g | S3g | S2rg | S3rg | S3rg | S3g |
| Chandinahala | 26 | N1r | S2rg | S3rg | S2rg | S3rg | S2rg | N1r | S3rg | S2rt | S3rg | S3rg | S2rg | S3rg | S2rg | S3rg | S3rg | S3rg | S2rg | S2rg | S2rg | S2rg | S2rg | S3rg | S2rg | S2rg | S3g | S3g | S2rg | S3rg | S3rg | S3g |

| Village | Survey Number | Mango | Maize | Sapota | Sorghum | Guava | Cotton | Tamarind | Lime | Bengal gram | Sunflower | Red gram | Amla | Jackfruit | Custard-apple | Cashew | Jamun | Musambi | Groundnut | Chilly | Tomato | Marigold | Chrysanthemum | Pomegranate | Bajra | Jasmine | Bhendi | Brinjal | Crossandra | Drumstick | Mulberry | Onion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chandinahala | 27 | N1r | S2rg | S3rg | S2rg | S3rg | S2rg | N1r | S3rg | S2rt | S3rg | S3rg | S2rg | S3rg | S2rg | S3rg | S3rg | S3rg | S2rg | S2rg | S2rg | S2rg | S2rg | S3rg | S2rg | S2rg | S3g | S3g | S2rg | S3rg | S3rg | S3g |
| Chandinahala | 28 | S3rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3g | S2g | S2gt | S2g |
| Chandinahala | 44 | S3rg | S3g | S2rg | S3g | S2rg | S3rg | S3rg | S2rg | S3g | S3rg | S3g | S2rg | S2rg | S2rg | S2rg | S2rg | S2rg | S2g | S3g | S3g | S3g | S3g | S2rg | S2g | S3g | S3g | S3g | S3g | S3g | S2g | S3g |
| Chandinahala | 45 | S3rg | S3g | S2rg | S3g | S2rg | S3rg | S3rg | S2rg | S3g | S3rg | S3g | S2rg | S2rg | S2rg | S2rg | S2rg | S2rg | S2g | S3g | S3g | S3g | S3g | S2rg | S2g | S3g | S3g | S3g | S3g | S3g | S2g | S3g |
| Chandinahala | 46 | S3rg | S3g | S2rg | S3g | S2rg | S3rg | S3rg | S2rg | S3g | S3rg | S3g | S2rg | S2rg | S2rg | S2rg | S2rg | S2rg | S2g | S3g | S3g | S3g | S3g | S2rg | S2g | S3g | S3g | S3g | S3g | S3g | S2g | S3g |
| Chandinahala | 47 | S3rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3g | S2g | S2gt | S2g |
| Chandinahala | 48 | S3rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3g | S2g | S2gt | S2g |
| Chandinahala | 49 | S3rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3g | S2g | S2gt | S2g |
| Chandinahala | 50 | S3rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S2g | S3g | S2g | S2gt | S2g |
| Chandinahala | 51 | N1r | S2rg | S3rg | S2rg | S3rg | S2rg | N1r | S3rg | S2rt | S3rg | S3rg | S2rg | S3rg | S2rg | S3rg | S3rg | S3rg | S2rg | S2rg | S2rg | S2rg | S2rg | S3rg | S2rg | S2rg | S3g | S3g | S2rg | S3rg | S3rg | S3g |
| Chandinahala | 52 | S3tz | S2tz | S3tz | S1 | S3tz | S1 | S2tz | S1 | S1 | S1 | S2tz | S1 | S3tz | S1 | N1t | S2rt | S1 | S3t | S2tz | S2tz | S2tz | S2tz | S2tz | S2tz | S3tz | S2tz | S2tz | S3tz | S2tz | S3tz | S3tz |
| Chandinahala | 53 | N1rg | S3rg | S3rg | S3rg | S3rg | S3g | N1rg | S3rg | S2rt | S3rg | S3rg | S2rg | S3rg | S2rg | S3rg | S3rg | S3rg | S3rg | S3g | S3g | S3g | S3g | S3rg | S2rg | S3g | S3g | S3g | S3g | S3rg | S3rg | S3g |
| Chandinahala | 54 | N1r | S3rg | N1r | S3rg | N1r | S3rt | N1r | N1r | S3rt | N1r | N1r | S3rg | N1r | S3rg | N1r | N1r | N1r | S3rg | S3rg | S3rg | S3rg | S3rg | N1r | S3rg | S3rg | S3rg | S3rg | S3rg | N1r | N1r | S3rg |
| Chandinahala | 55 | N1rg | S3rg | S3rg | S3rg | S3rg | S3g | N1rg | S3rg | S2rt | S3rg | S3rg | S2rg | S3rg | S2rg | S3rg | S3rg | S3rg | S3rg | S3g | S3g | S3g | S3g | S3rg | S2rg | S3g | S3g | S3g | S3g | S3rg | S3rg | S3g |
| Chandinahala | 56 | N1r | S3rg | N1r | S3rg | N1r | S3rt | N1r | N1r | S3rt | N1r | N1r | S3rg | N1r | S3rg | N1r | N1r | N1r | S3rg | S3rg | S3rg | S3rg | S3rg | N1r | S3rg | S3rg | S3rg | S3rg | S3rg | N1r | N1r | S3rg |
| Chandinahala | 57 | N1r | S2rg | S3rg | S2rg | S3rg | S2rg | N1r | S3rg | S2rt | S3rg | S3rg | S2rg | S3rg | S2rg | S3rg | S3rg | S3rg | S2rg | S2rg | S2rg | S2rg | S2rg | S3rg | S2rg | S2rg | S3g | S3g | S2rg | S3rg | S3rg | S3g |
| Chandinahala | 58 | S3tz | S2tz | S3tz | S1 | S3tz | S1 | S2tz | S1 | S1 | S1 | S2tz | S1 | S3tz | S1 | N1t | S2rt | S1 | S3t | S2tz | S2tz | S2tz | S2tz | S2tz | S2tz | S3tz | S2tz | S2tz | S3tz | S2tz | S3tz | S3tz |
| Chandinahala | 59 | S3rg | S2tg | S2rg | S2tg | S2rt | S2rg | S3rg | S2rg | S2gt | S2rg | S2gt | S1 | S2rg | S1 | S2rt | S2rg | S2rg | S2gt | S2tg | S2tg | S2tg | S2tg | S2rg | S3t | S2tg | S2t | S1 | S2gt | S2rt | S2rt | S2t |
| Chandinahala | 60 | S3rg | S2tg | S2rg | S2tg | S2rt | S2rg | S3rg | S2rg | S2gt | S2rg | S2gt | S1 | S2rg | S1 | S2rt | S2rg | S2rg | S2gt | S2tg | S2tg | S2tg | S2tg | S2rg | S3t | S2tg | S2t | S1 | S2gt | S2rt | S2rt | S2t |
| Chandinahala | 61 | N1r | S2rg | S3rg | S2rg | S3rg | S2rg | N1r | S3rg | S2rt | S3rg | S3rg | S2rg | S3rg | S2rg | S3rg | S3rg | S3rg | S2rg | S2rg | S2rg | S2rg | S2rg | S3rg | S2rg | S2rg | S3g | S3g | S2rg | S3rg | S3rg | S3g |
| Chandinahala | 62 | N1r | S3rg | N1r | S3rg | N1r | S3rt | N1r | N1r | S3rt | N1r | N1r | S3rg | N1r | S3rg | N1r | N1r | N1r | S3rg | S3rg | S3rg | S3rg | S3rg | N1r | S3rg | S3rg | S3rg | S3rg | S3rg | N1r | N1r | S3rg |

| Village | Survey Number | Mango | Maize | Sapota | Sorghum | Guava | Cotton | Tamarind | Lime | Bengal gram | Sunflower | Red gram | Amla | Jackfruit | Custard-apple | Cashew | Jamun | Musambi | Groundnut | Chilly | Tomato | Marigold | Chrysanthemum | Pomegranate | Bajra | Jasmine | Bhendi | Brinjal | Crossandra | Drumstick | Mulberry | Onion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chandinahala | 63 | N1r | S3rg | N1r | S3rg | N1r | S3rt | N1r | N1r | S3rt | N1r | N1r | S3rg | N1r | S3rg | N1r | N1r | N1r | S3rg | S3rg | S3rg | S3rg | S3rg | N1r | S3rg | S3rg | S3rg | S3rg | S3rg | N1r | N1r | S3rg |
| Chandinahala | 64 | S3rg | S3g | S2rg | S3g | S2rg | S3rg | S3rg | S2rg | S3g | S3rg | S3g | S2rg | S2rg | S2rg | S2rg | S2rg | S2rg | S2g | S3g | S3g | S3g | S3g | S2rg | S2g | S3g | S3g | S3g | S3g | S3g | S2g | S3g |
| Chandinahala | 65 | S3rg | S3g | S2rg | S3g | S2rg | S3rg | S3rg | S2rg | S3g | S3rg | S3g | S2rg | S2rg | S2rg | S2rg | S2rg | S2rg | S2g | S3g | S3g | S3g | S3g | S2rg | S2g | S3g | S3g | S3g | S3g | S3g | S2g | S3g |
| Chandinahala | 66 | S3rg | S3g | S2rg | S3g | S2rg | S3rg | S3rg | S2rg | S3g | S3rg | S3g | S2rg | S2rg | S2rg | S2rg | S2rg | S2rg | S2g | S3g | S3g | S3g | S3g | S2rg | S2g | S3g | S3g | S3g | S3g | S3g | S2g | S3g |
| Chandinahala | 67 | S3rg | S3g | S2rg | S3g | S2rg | S3rg | S3rg | S2rg | S3g | S3rg | S3g | S2rg | S2rg | S2rg | S2rg | S2rg | S2rg | S2g | S3g | S3g | S3g | S3g | S2rg | S2g | S3g | S3g | S3g | S3g | S3g | S2g | S3g |
| Chandinahala | 71 | S3rg | S3g | S2rg | S3g | S2rg | S3rg | S3rg | S2rg | S3g | S3rg | S3g | S2rg | S2rg | S2rg | S2rg | S2rg | S2rg | S2g | S3g | S3g | S3g | S3g | S2rg | S2g | S3g | S3g | S3g | S3g | S3g | S2g | S3g |
| Chandinahala | 72 | S3rg | S3g | S2rg | S3g | S2rg | S3rg | S3rg | S2rg | S3g | S3rg | S3g | S2rg | S2rg | S2rg | S2rg | S2rg | S2rg | S2g | S3g | S3g | S3g | S3g | S2rg | S2g | S3g | S3g | S3g | S3g | S3g | S2g | S3g |
| Chandinahala | 75 | S3r | S2tg | S2rg | S2g | S2rt | S2rg | S3r | S2rg | S2gt | S2r | S2gt | S1 | S2rg | S1 | S2rt | S2rg | S2rg | S2t | S1 | S1 | S2tg | S2tg | S2rg | S1 | S2tg | S2t | S1 | S2gt | S2r | S2r | S2t |
| Chandinahala | 76 | S3r | S2tg | S2rg | S2g | S2rt | S2rg | S3r | S2rg | S2gt | S2r | S2gt | S1 | S2rg | S1 | S2rt | S2rg | S2rg | S2t | S1 | S1 | S2tg | S2tg | S2rg | S1 | S2tg | S2t | S1 | S2gt | S2r | S2r | S2t |
| Chandinahala | 77 | S3rg | S3g | S2rg | S3g | S2rg | S3rg | S3rg | S2rg | S3g | S3rg | S3g | S2rg | S2rg | S2rg | S2rg | S2rg | S2rg | S2g | S3g | S3g | S3g | S3g | S2rg | S2g | S3g | S3g | S3g | S3g | S3g | S2g | S3g |
| Chandinahala | 78 | S3rg | S3g | S2rg | S3g | S2rg | S3rg | S3rg | S2rg | S3g | S3rg | S3g | S2rg | S2rg | S2rg | S2rg | S2rg | S2rg | S2g | S3g | S3g | S3g | S3g | S2rg | S2g | S3g | S3g | S3g | S3g | S3g | S2g | S3g |
| Chandinahala | 79 | S3rg | S3g | S2rg | S3g | S2rg | S3rg | S3rg | S2rg | S3g | S3rg | S3g | S2rg | S2rg | S2rg | S2rg | S2rg | S2rg | S2g | S3g | S3g | S3g | S3g | S2rg | S2g | S3g | S3g | S3g | S3g | S3g | S2g | S3g |
| Chandinahala | 80 | S3rg | S3g | S2rg | S3g | S2rg | S3rg | S3rg | S2rg | S3g | S3rg | S3g | S2rg | S2rg | S2rg | S2rg | S2rg | S2rg | S2g | S3g | S3g | S3g | S3g | S2rg | S2g | S3g | S3g | S3g | S3g | S3g | S2g | S3g |
| Chandinahala | 81 | S3rg | S3g | S2rg | S3g | S2rg | S3rg | S3rg | S2rg | S3g | S3rg | S3g | S2rg | S2rg | S2rg | S2rg | S2rg | S2rg | S2g | S3g | S3g | S3g | S3g | S2rg | S2g | S3g | S3g | S3g | S3g | S3g | S2g | S3g |
| Chandinahala | 82 | S3rg | S3g | S2rg | S3g | S2rg | S3rg | S3rg | S2rg | S3g | S3rg | S3g | S2rg | S2rg | S2rg | S2rg | S2rg | S2rg | S2g | S3g | S3g | S3g | S3g | S2rg | S2g | S3g | S3g | S3g | S3g | S3g | S2g | S3g |
| Chandinahala | 85 | S3rg | S3g | S2rg | S3g | S2rg | S3rg | S3rg | S2rg | S3g | S3rg | S3g | S2rg | S2rg | S2rg | S2rg | S2rg | S2rg | S2g | S3g | S3g | S3g | S3g | S2rg | S2g | S3g | S3g | S3g | S3g | S3g | S2g | S3g |

# PART-B

## SOCIO-ECONOMIC STATUS OF FARM HOUSEHOLDS

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***Chapter 1***

## *SALIENT FINDINGS OF THE SURVEY*

- *The data indicated that there were 90 (52.94%) men and 80 (47.06%) women among the sampled households.*
- *The average family size of landless farmers' was 3, marginal farmers' was 5.85, small farmers' was 4.8, semi medium farmers' was 5.25, medium farmers' was 6 and large farmers' was 5.*
- *The data indicated that, 52 (30.59%) people were in 0-15 years of age, 54 (31.76%) were in 16-35 years of age, 49 (28.82%) were in 36-60 years of age and 15 (8.82%) were above 61 years of age.*
- *The results indicated that Hanumanahatti had 37.06 per cent illiterates, 25.88 per cent of them had primary school education, 4.71 per cent of them had middle school education, 20 per cent of them had high school education, 2.35 per cent of them had PUC education, 0.59 per cent had diploma, 1.18 per cent of them did ITI and 2.94 per cent of them had degree education.*
- *The results indicate that, 66.67 per cent of households were practicing agriculture, 19.44 per cent of the households were agricultural labourers, 13.89 per cent were general labour and 2.78 per cent of them were students.*
- *The results indicate that agriculture was the major occupation for 48.24 per cent of the household members, 5.88 per cent were agricultural laborers, 0.59 per cent were in private service, 30.59 per cent were students and 5.29 per cent were children.*
- *The results show that 100 per cent of the population in the micro watershed has not participated in any local institutions.*
- *The results indicate that 13.89 per cent of the households possess thatched house and 86.11 per cent of the households possess Katcha house.*
- *The results show that 2.78 per cent of the households possess radio, 25 per cent of the households possess TV, 8.33 per cent of the households possess Mixer grinder, 5.56 per cent of the households possess bicycle, 41.67 per cent of the households possess motor cycle and 91.67 per cent of the households possess mobile phones.*
- *The results show that the average value of radio was Rs.500, television was Rs.8555, mixer grinder was Rs.2000, bicycle was Rs. 2500, motor cycle was Rs.37000 and mobile phone was Rs.2281.*
- *About 13.89 per cent of the households possess plough and 8.33 per cent of them possess weeder.*
- *The results show that the average value of plough was Rs.1500 and the average value of weeder was Rs.80.*
- *The results indicate that, 5.56 per cent of the households possess bullocks, 19.44 per cent of the households possess local cow and 5.88 per cent of them possess buffalo.*

- *The results indicate that, average own labour men available in the micro watershed was 1.56, average own labour (women) available was 1.35, average hired labour (men) available was 7.65 and average hired labour (women) available was 6.26.*
- *The results indicate that, 88.89 per cent of the households opined that the hired labour was adequate.*
- *The results indicate that, households of the Hanumanahatti micro-watershed possess 13.17 ha (35.54%) of dry land and 23.89 ha (64.46%) of irrigated land. Marginal farmers possess 5.03 ha (100%) of dry land and 0.40 ha (7.44%) of irrigated land. Small farmers possess 8.13 ha (47.21%) of dry land and 9.10 ha (52.79%) of irrigated land. Semi medium farmers possess 6.29 ha (100%) of irrigated land. Medium farmers possess 2.83 ha (100%) of irrigated land and large farmers possess 5.26 ha (100%) of irrigated land.*
- *The results indicate that, the average value of dry land was Rs. 500,983.41 and average value of irrigated land was Rs. 464,458.75. In case of marginal famers, the average land value was Rs. 675,080.38 for dry land and Rs. 1,482,000 for irrigated land. In case of small famers, the average land value was Rs. 393,233.83 for dry land and Rs. 725,177.93 for irrigated land. In case of semi medium famers, the average land value was Rs. 397,106.11 for irrigated land. In case of medium famers, the average land value was Rs. 211,714.29 for irrigated land and in case of large farmers it was Rs. 152,000 for irrigated land.*
- *The results indicate that, there were 18 functioning bore wells in the micro watershed.*
- *The results indicate that, bore well was the major irrigation source in the micro water shed for 50 per cent of the farmers.*
- *The results indicate that, the depth of bore well was found to be 48.26 meters.*
- *The results indicate that, marginal, small, semi medium, medium and large farmers had irrigated area of 0.40 ha, 9.10 ha, 6.30 ha, 2.83 ha and 5.26 ha respectively.*
- *The results indicate that, farmers have grown bajra (4.86 ha), chilly (0.81 ha), green gram (0.81 ha), red gram (0.81 ha) and maize (27.66 ha).*
- *Marginal farmers have grown bajra, chilly and maize. Small farmers have grown bajra, green gram, maize and red gram. Semi medium farmers have grown chilly and maize. Medium farmers have grown maize. Large farmers have grown bajra and maize.*
- *The results indicate that, the cropping intensity in Hanumanahatti micro-watershed was found to be 82.62 per cent. In case of marginal farmers it was 100 per cent, small farmers it was 100.09 per cent, in case of semi medium farmers it was 85.85, medium farmers it was 100 per cent and in case of large farmers it was 38.46 per cent.*
- *The results indicate that, 36.11 per cent of the households have bank account and 22.22 per cent have savings.*

- *The results indicate that, 36.11 per cent of the households have availed credit from different sources.*
- *The results indicate that, 84.62 per cent of the households availed loan from loan from grameena bank, 7.69 per cent of the households obtained loan from friends/relatives and another 7.69 per cent borrowed from cooperative bank.*
- *The results indicate that the average credit borrowed was Rs.162692.31.*
- *The results indicate that, 100 per cent of the households have borrowed loan from institutional sources for the purpose of agricultural production.*
- *The results indicate that, the main purpose of borrowing credit from private sources was also agricultural production.*
- *The results indicated that 91.67 per cent of the households did not repay their loan and 8.33 per cent of the households partially paid the loan that they borrowed from institutional sources.*
- *Results indicated that 100 per cent of the households did not repay their loan borrowed from private sources.*
- *The results indicate that, around 91.67 per cent opined that the loan amount borrowed from institutional sources helped to perform timely agricultural operations and 8.33 per cent opined that the loan amount was adequate to fulfil the requirements.*
- *The results indicate that, around 100 per cent of the households opined that the credit borrowed from private sources helped to perform timely agricultural operations.*
- *The results indicate that, the total cost of cultivation for maize was Rs. 25583.39. The gross income realized by the farmers was Rs. 38552.82. The net income from Maize cultivation was Rs. 12969.43, thus the benefit cost ratio was found to be 1:1.51.*
- *The total cost of cultivation for redgram was Rs. 33089.66. The gross income realized by the farmers was Rs. 167466. The net income from redgram cultivation was Rs. 134376.34. Thus the benefit cost ratio was found to be 1:5.06.*
- *The total cost of cultivation for bajra was Rs. 18570. The gross income realized by the farmers was Rs. 28775.50. The net income from bajra cultivation was Rs. 10205.50. Thus the benefit cost ratio was found to be 1:1.55.*
- *The total cost of cultivation for Green gram was Rs. 19969.24. The gross income realized by the farmers was Rs. 123500. The net income from Green gram cultivation was Rs. 808.47. Thus the benefit cost ratio was found to be 1:6.18.*
- *the total cost of cultivation for chilly was Rs. 56285.23. The gross income realized by the farmers was Rs. 93860. The net income from chilly cultivation was Rs. 37574.77. Thus the benefit cost ratio was found to be 1:1.67.*
- *The results indicate that, 13.89 per cent of the households opined that dry fodder was adequate and 13.89 per cent opined that green fodder is adequate.*

- *The results indicate that the average annual gross income was Rs. 63,333.33 for landless farmers, for marginal farmers it was Rs. 100,000, for small farmers it was Rs. 112,941.18, for semi medium farmers it was Rs. 118,500, for medium farmers it was Rs. 120,000 and for large farmers it was Rs. 135,000.*
- *The results indicate that the average annual expenditure is Rs. 14,982.43. For landless households it was Rs. 7,583.33, for marginal farmers it was Rs. 7,836.73, for small farmers it was Rs. 9,603.56, for semi medium farmers it was Rs. 21,437.50, for medium farmers it was Rs. 80,000 and for large farmers it was Rs. 110,000.*
- *The results indicate that, sampled households have grown 31 coconut and 5 mango tree in their fields. They have also planted 6 coconut trees in their backyard.*
- *The results indicate that, households have planted 69 neem trees, 2 tamarind trees, 2 acacia and 5 banyan trees in their backyard.*
- *The results indicated that, all crops were sold to the extent of 100 per cent.*
- *The results indicated that, about 16.67 per cent of the famers have sold their produce in regulated markets, 66.67 per cent of the farmers have sold to local/village merchants and 2.78 per cent have sold their produce to agent/traders.*
- *The results indicated that, 86.11 per cent of the households have used tractor as a mode of transportation for their agricultural produce.*
- *The results indicated that, 50 per cent of the households have experienced soil and water erosion problems in the farm i.e., 28.57 per cent of the marginal farmers, 58.82 per cent of the small farmers, 100 per cent of semi medium, 100 per cent of medium and large farmers have experienced soil and water erosion problems.*
- *The results indicated that, 83.33 per cent have shown interest in soil test which accounts for 100 per cent of marginal, small, semi medium, medium and large farmers.*
- *The results indicated that, 94.44 per cent of the households used firewood and 5.56 per cent used LPG as a source of fuel.*
- *The results indicated that, bore well was the major source of drinking water for 5.56 per cent of the households, piped supply was the source of drinking water for 47.22 per cent of the households and lake/tank was the major source of drinking water for 47.22 per cent of the households in the micro watershed.*
- *Electricity was the major source of light for 100 per cent of the households in micro watershed.*
- *The results indicated that, 47.22 per cent of the households possess sanitary toilet i.e. 50 per cent of the landless, 42.86 per cent of the marginal, 47.06 per cent of the small, 25 per cent of the semi medium, 100 per cent of the medium farmers and 100 per cent of the large farmers.*
- *The results indicated that, 91.67 per cent of the sampled households possessed BPL card and 11.11 per cent of the households did not possess PDS card.*

- *The results indicated that, 33.33 per cent of the households participated in NREGA programme.*
- *The results indicated that, cereals were adequate for 100 per cent of the households, pulses were adequate for 97.22 per cent, oilseeds were adequate for 11.11 per cent, vegetables were adequate for 19.44 per cent, fruits were adequate for 8.33 per cent, milk was adequate for 94.44 per cent, eggs were adequate for 100 per cent and meat was adequate for 16.67 per cent.*
- *The results indicated that, pulses were inadequate for 5.56 per cent of the households, oilseeds were inadequate for 88.89 per cent, vegetables were inadequate for 80.56 per cent, fruits were inadequate for 91.67 per cent, milk was inadequate for 2.78 per cent and meat was inadequate for 83.33 per cent of the households.*
- *The results indicated that, lower fertility status of the soil was the constraint experienced by 80.56 per cent of the households, wild animal menace on farm field (33.33%), frequent incidence of pest and diseases (80.56%), inadequacy of irrigation water (80.56%), high cost of fertilizers and plant protection chemicals (80.56%), high rate of interest on credit (80.56%), low price for the agricultural commodities (83.33%), lack of marketing facilities in the area (83.33%), lack of transport for safe transport of the agricultural produce to the market (77.78%) and inadequate extension services (83.33%).*

*Chapter 2*

# INTRODUCTION

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

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

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

**Scope and importance of survey**

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

*Chapter 3*

# METHODOLOGY

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

**Description of the study area**

Koppal district is an administrative district in the state of Karnataka in India. In the past Koppal was referred to as 'Kopana Nagara'. Koppal, now a district headquarters is ancient Kopana a major holy place of the Jainas. The district occupies an area of 7,190 km² and has a population of 1,196,089, which 16.58% were urban as of 2001. The Koppal district was formed after split of Raichur district.

Geographers are very particular about the physiography or relief of a region. It plays a very important role in the spatial analysis of agricultural situation of the study area. The undulating topography with black cotton soil shrips, cut across by numerous nalas or streams is the major characteristic feature of the study region. Three physiographic divisions have made considering the local conditions of landforms and crops grown in the district. On the basis of physiography, Koppal district can be divided into three major divisions.3 They are (a) Koppal & Yelburga plateau, (b) Maidan division, (c) Tungabhadra valley. The district is part of Krishna basin the main streams draining the area are Maskinala, Ilkal-nadi and Hirenala. These are Ephemaral in nature, these come under Tungabhadra sub-basin. The drainage exhibit dentritic to subdentric with drainage density varies from 1.4 to7.0kms/sq.km.

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

**Description of the micro watershed**

Hanumanahatti micro-watershed (Irakallaguda sub-watershed, Koppal Taluk and District) is located at North latitude$15^0$ 28’56.173’’ to $15^0$ 28’35.262’’ and East longitude $76^0$ 13’ 4.539’’ to $76^0$ 10’ 34.48’’ E covering an area of 304.16 ha and spread across Kodadahala, Chennahalu, Hanumanahatti, Oddarahatti and Irakallagada villages.

**Methodology followed in assessing socio-economic status of households**

In order to assess the socio-economic condition of the farmers in the watershed a comprehensive questionnaire was prepared. Major components such as demographic conditions, migration details, food consumption and family expenditure pattern, material possession, land holding, land use management, cropping pattern, cost of cultivation of crops, livestock management. The statistical components such as frequency and percentage were used to analyze the data. About 36 households located in the micro watershed were interviewed for the survey.

*Chapter 4*

## SALIENT FEATURES OF THE SURVEY

**Households sampled for socio-economic survey:** The data on households sampled for socio economic survey in Hanumanahatti micro-watershed is presented in Table 1 and it indicated that 36 farmers were sampled in Hanumanahatti micro-watershed among them 6 (16.67%) were landless, 7 (19.44%) were marginal farmers, 17 (47.22%) were small farmers, 4 (11.11%) were semi medium farmers, 1 (2.78%) was medium farmer and 1 (2.78%) was large farmer.

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

| Sl.No. | Particulars | LL (6) | | MF (7) | | SF (17) | | SMF (4) | | MDF (1) | | LF (1) | | All (36) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | N | % | N | % | N | % | N | % |
| 1 | Farmers | 6 | 16.67 | 7 | 19.44 | 17 | 47.22 | 4 | 11.11 | 1 | 2.78 | 1 | 2.78 | 36 | 100.00 |

**Population characteristics:** The population characteristics of households sampled for socio-economic survey in Hanumanahatti micro-watershed is presented in Table 2. The data indicated that there were 90 (52.94%) men and 80 (47.06%) women among the sampled households. The average family size of landless farmers' was 3, marginal farmers' was 5.85, small farmers' was 4.8, semi medium farmers' was 5.25, medium farmers' was 6 and large farmers' was 5.

**Table 2: Population characteristics of Hanumanahatti micro-watershed**

| Sl. No. | Particulars | LL (18) | | MF (41) | | SF (82) | | SMF (21) | | MDF (3) | | LF (5) | | All (170) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | N | % | N | % | N | % | N | % |
| 1 | Male | 11 | 61.11 | 16 | 39.02 | 48 | 58.54 | 12 | 57.14 | 1 | 33.33 | 2 | 40.00 | 90 | 52.94 |
| 2 | Female | 7 | 38.89 | 25 | 60.98 | 34 | 41.46 | 9 | 42.86 | 2 | 66.67 | 3 | 60.00 | 80 | 47.06 |
| Total | | 18 | 100.00 | 41 | 100.00 | 82 | 100.00 | 21 | 100.00 | 3 | 100.00 | 5 | 100.00 | 170 | 100.00 |
| Average | | 3 | | 5.85 | | 4.8 | | 5.25 | | 3 | | 5 | | 4.7 | |

**Age wise classification of population:** The age wise classification of household members in Hanumanahatti micro-watershed is presented in Table 3. The data indicated that, 52 (30.59%) people were in 0-15 years of age, 54 (31.76%) were in 16-35 years of age, 49 (28.82%) were in 36-60 years of age and 15 (8.82%) were above 61 years of age.

**Table 3: Age wise classification of household members in Hanumanahatti micro-watershed**

| Sl. No. | Particulars | LL (18) | | MF (41) | | SF (82) | | SMF(21) | | MDF (3) | | LF (5) | | All (170) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | N | % | N | % | N | % | N | % |
| 1 | 0-15 years of age | 5 | 27.78 | 15 | 36.59 | 28 | 34.15 | 4 | 19.05 | 0 | 0 | 0 | 0 | 52 | 30.59 |
| 2 | 16-35 years of age | 6 | 33.33 | 8 | 19.51 | 28 | 34.15 | 8 | 38.10 | 2 | 66.67 | 2 | 40 | 54 | 31.76 |
| 3 | 36-60 years of age | 5 | 27.78 | 12 | 29.27 | 23 | 28.05 | 8 | 38.10 | 0 | 0 | 1 | 20 | 49 | 28.82 |
| 4 | > 61 years | 2 | 11.11 | 6 | 14.63 | 3 | 3.66 | 1 | 4.76 | 1 | 33.33 | 2 | 40 | 15 | 8.82 |
| Total | | 18 | 100 | 41 | 100 | 82 | 100 | 21 | 100 | 3 | 100 | 5 | 100 | 170 | 100 |

**Education level of household members:** Education level of household members in Hanumanahatti micro-watershed is presented in Table 4. The results indicated that Hanumanahatti had 37.06 per cent illiterates, 25.88 per cent of them had primary school

education, 4.71 per cent of them had middle school education, 20 per cent of them had high school education, 2.35 per cent of them had PUC education, 0.59 per cent had diploma, 1.18 per cent of them did ITI and 2.94 per cent of them had degree education.

**Table 4. Education level of household members in Hanumanahatti micro-watershed**

| Sl. No. | Particulars | LL (18) | | MF (41) | | SF (82) | | SMF(21) | | MDF(3) | | LF (5) | | All (170) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | N | % | N | % | N | % | N | % |
| 1 | Illiterate | 9 | 50.00 | 16 | 39.02 | 27 | 32.93 | 5 | 23.81 | 1 | 33.33 | 5 | 100.00 | 63 | 37.06 |
| 3 | Primary School | 5 | 27.78 | 10 | 24.39 | 23 | 28.05 | 6 | 28.57 | 0 | 0.00 | 0 | 0.00 | 44 | 25.88 |
| 4 | Middle School | 1 | 5.56 | 0 | 0.00 | 5 | 6.10 | 2 | 9.52 | 0 | 0.00 | 0 | 0.00 | 8 | 4.71 |
| 5 | High School | 1 | 5.56 | 5 | 12.20 | 21 | 25.61 | 6 | 28.57 | 1 | 33.33 | 0 | 0.00 | 34 | 20.00 |
| 6 | PUC | 0 | 0.00 | 3 | 7.32 | 0 | 0.00 | 0 | 0.00 | 1 | 33.33 | 0 | 0.00 | 4 | 2.35 |
| 7 | Diploma | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 1 | 4.76 | 0 | 0.00 | 0 | 0.00 | 1 | 0.59 |
| 8 | ITI | 0 | 0.00 | 1 | 2.44 | 1 | 1.22 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 2 | 1.18 |
| 9 | Degree | 2 | 11.11 | 1 | 2.44 | 1 | 1.22 | 1 | 4.76 | 0 | 0.00 | 0 | 0.00 | 5 | 2.94 |
| 12 | Others | 0 | 0.00 | 5 | 12.20 | 4 | 4.88 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 9 | 5.29 |
| Total | | 18 | 100.00 | 41 | 100.00 | 82 | 100.00 | 21 | 100.00 | 3 | 100.00 | 5 | 100.00 | 170 | 100.00 |

**Occupation of household heads:** The data regarding the occupation of the household heads in Hanumanahatti micro-watershed is presented in Table 5. The results indicate that, 66.67 per cent of households were practicing agriculture, 19.44 per cent of the households were agricultural labourers, 13.89 per cent were general labour and 2.78 per cent of them were students.

**Table 5: Occupation of household heads in Hanumanahatti micro-watershed**

| Sl.No. | Particulars | LL (6) | | MF (7) | | SF (17) | | SMF (4) | | MDF (1) | | LF (1) | | All (36) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | N | % | N | % | N | % | N | % |
| 1 | Agriculture | 0 | 0 | 5 | 71.43 | 14 | 82.35 | 3 | 75 | 1 | 100 | 1 | 100 | 24 | 66.67 |
| 2 | Agricultural Labour | 1 | 16.67 | 2 | 28.57 | 3 | 17.65 | 1 | 25 | 0 | 0 | 0 | 0 | 7 | 19.44 |
| 3 | General Labour | 5 | 83.33 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 13.89 |
| 4 | Student | 0 | 0 | 1 | 14.29 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2.78 |
| Total | | 6 | 100 | 8 | 100 | 17 | 100 | 4 | 100 | 1 | 100 | 1 | 100 | 37 | 100 |

**Table 6: Occupation of family members in Hanumanahatti micro-watershed**

| Sl. No. | Particulars | LL (18) | | MF (41) | | SF (82) | | SMF (21) | | MDF (3) | | LF (5) | | All (170) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | N | % | N | % | N | % | N | % |
| 1 | Agriculture | 4 | 22.22 | 18 | 43.90 | 42 | 51.22 | 10 | 47.62 | 3 | 100 | 5 | 100 | 82 | 48.24 |
| 2 | Agricultural Labour | 1 | 5.56 | 3 | 7.32 | 7 | 8.54 | 5 | 23.81 | 0 | 0 | 0 | 0 | 16 | 9.41 |
| 3 | General Labour | 10 | 55.56 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 5.88 |
| 4 | Private Service | 0 | 0 | 0 | 0 | 1 | 1.22 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.59 |
| 5 | Student | 3 | 16.67 | 15 | 36.59 | 28 | 34.15 | 6 | 28.57 | 0 | 0 | 0 | 0 | 52 | 30.59 |
| 6 | Children | 0 | 0 | 5 | 12.20 | 4 | 4.88 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 5.29 |
| Total | | 18 | 100 | 41 | 100 | 82 | 100 | 21 | 100 | 3 | 100 | 5 | 100 | 170 | 100 |

**Occupation of the household members:** The data regarding the occupation of the household members in Hanumanahatti micro-watershed is presented in Table 6. The results indicate that agriculture was the major occupation for 48.24 per cent of the household members, 5.88 per cent were agricultural laborers, 0.59 per cent were in private service, 30.59 per cent were students and 5.29 per cent were children.

**Institutional participation of the household members:** The data regarding the institutional participation of the household members in Hanumanahatti micro-watershed is presented in Table 7. The results show that 100 per cent of the population in the micro watershed has not participated in any local institutions.

**Table 7. Institutional Participation of household members in Hanumanahatti micro-watershed**

| Sl.No. | Particulars | LL (18) | | MF (41) | | SF (82) | | SMF (21) | | MDF (3) | | LF (5) | | All (170) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | N | % | N | % | N | % | N | % |
| 1 | No Participation | 18 | 100 | 41 | 100 | 82 | 100 | 21 | 100 | 3 | 100 | 5 | 100 | 170 | 100 |
| Total | | 18 | 100 | 41 | 100 | 82 | 100 | 21 | 100 | 3 | 100 | 5 | 100 | 170 | 100 |

**Type of house owned:** The data regarding the type of house owned by the households in Hanumanahatti micro-watershed is presented in Table 8. The results indicate that 13.89 per cent of the households possess thatched house and 86.11 per cent of the households possess Katcha house.

**Table 8. Type of house owned by households in Hanumanahatti micro-watershed**

| Sl.No. | Particulars | LL (6) | | MF (7) | | SF (17) | | SMF (4) | | MDF (1) | | LF (1) | | All (36) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | N | % | N | % | N | % | N | % |
| 1 | Thatched | 1 | 16.67 | 3 | 42.86 | 1 | 5.88 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 5 | 13.89 |
| 2 | Katcha | 5 | 83.33 | 4 | 57.14 | 16 | 94.12 | 4 | 100.00 | 1 | 100.00 | 1 | 100.00 | 31 | 86.11 |
| Total | | 6 | 100.00 | 7 | 100.00 | 17 | 100.00 | 4 | 100.00 | 1 | 100.00 | 1 | 100.00 | 36 | 100.00 |

**Durable Assets owned by the households:** The data regarding the Durable Assets owned by the households in Hanumanahatti micro-watershed is presented in Table 9. The results show that 2.78 per cent of the households possess radio, 25 per cent of the households possess TV, 8.33 per cent of the households possess Mixer grinder, 5.56 per cent of the households possess bicycle, 41.67 per cent of the households possess motor cycle and 91.67 per cent of the households possess mobile phones.

**Table 9. Durable Assets owned by households in Hanumanahatti micro-watershed**

| Sl.No. | Particulars | LL (6) | | MF (7) | | SF (17) | | SMF (4) | | MDF (1) | | LF (1) | | All (36) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | N | % | N | % | N | % | N | % |
| 1 | Radio | 1 | 16.67 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 1 | 2.78 |
| 2 | Television | 1 | 16.67 | 1 | 14.29 | 5 | 29.41 | 2 | 50.00 | 0 | 0.00 | 0 | 0.00 | 9 | 25.00 |
| 3 | Mixer/Grinder | 0 | 0.00 | 0 | 0.00 | 1 | 5.88 | 2 | 50.00 | 0 | 0.00 | 0 | 0.00 | 3 | 8.33 |
| 4 | Bicycle | 0 | 0.00 | 0 | 0.00 | 2 | 11.76 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 2 | 5.56 |
| 5 | Motor Cycle | 2 | 33.33 | 0 | 0.00 | 8 | 47.06 | 3 | 75.00 | 1 | 100.00 | 1 | 100.00 | 15 | 41.67 |
| 6 | Mobile Phone | 6 | 100.00 | 6 | 85.71 | 15 | 88.24 | 4 | 100.00 | 1 | 100.00 | 1 | 100.00 | 33 | 91.67 |
| 7 | Blank | 0 | 0.00 | 1 | 14.29 | 1 | 5.88 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 2 | 5.56 |

**Average value of durable assets:** The data regarding the average value of durable assets owned by the households in Hanumanahatti micro-watershed is presented in Table 10. The results show that the average value of radio was Rs.500, television was Rs.8555, mixer grinder was Rs.2000, bicycle was Rs. 2500, motor cycle was Rs.37000 and mobile phone was Rs.2281.

**Table 10. Average value of durable assets owned by households in Hanumanahatti micro-watershed** **Average value (Rs.)**

| S.N. | Particulars | LL (6) | MF (7) | SF (17) | SMF (4) | MDF (1) | LF (1) | All (36) |
|---|---|---|---|---|---|---|---|---|
| 1 | Radio | 500.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 500.00 |
| 2 | Television | 9,000.00 | 5,000.00 | 9,000.00 | 9,000.00 | 0.00 | 0.00 | 8,555.00 |
| 3 | Mixer/Grinder | 0.00 | 0.00 | 2,000.00 | 2,000.00 | 0.00 | 0.00 | 2,000.00 |
| 4 | Bicycle | 0.00 | 0.00 | 2,500.00 | 0.00 | 0.00 | 0.00 | 2,500.00 |
| 5 | Motor Cycle | 40,000.00 | 0.00 | 38,125.00 | 35,000.00 | 35,000.00 | 30,000.00 | 37,000.00 |
| 6 | Mobile Phone | 2,250.00 | 2,000.00 | 2,453.00 | 2,250.00 | 2,000.00 | 2,000.00 | 2,281.00 |

**Farm Implements owned:** The data regarding the farm implements owned by the households in Hanumanahatti micro-watershed is presented in Table 11. About 13.89 per cent of the households possess plough and 8.33 per cent of them possess weeder.

**Table 11. Farm Implements owned by households in Hanumanahatti micro-watershed**

| Sl.No. | Particulars | LL (6) | | MF (7) | | SF (17) | | SMF (4) | | MDF (1) | | LF (1) | | All (36) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | N | % | N | % | N | % | N | % |
| 1 | Plough | 0 | 0.00 | 1 | 14.29 | 1 | 5.88 | 2 | 50.00 | 1 | 100.00 | 0 | 0.00 | 0 | 13.89 |
| 2 | Weeder | 0 | 0.00 | 0 | 0.00 | 2 | 11.76 | 0 | 0.00 | 0 | 0.00 | 1 | 100.00 | 0 | 8.33 |
| 3 | Blank | 6 | 100.00 | 6 | 85.71 | 14 | 82.35 | 2 | 50.00 | 0 | 0.00 | 0 | 0.00 | 0 | 77.78 |

**Average value of farm implements:** The data regarding the average value of farm Implements owned by the households in Hanumanahatti micro-watershed is presented in Table 12. The results show that the average value of plough was Rs.1500 and the average value of weeder was Rs.80.

**Table 12. Average value of farm implements owned by households in Hanumanahatti micro-watershed** Average Value (Rs.)

| Sl.No. | Particulars | LL (6) | MF (7) | SF (17) | SMF (4) | MDF (1) | LF (1) | All (36) |
|---|---|---|---|---|---|---|---|---|
| 1 | Plough | 0.00 | 1,500.00 | 1,500.00 | 1,500.00 | 1,500.00 | 0.00 | 1,500.00 |
| 2 | Weeder | 0.00 | 0.00 | 75.00 | 0.00 | 0.00 | 100.00 | 80.00 |

**Livestock possession by the households:** The data regarding the Livestock possession by the households in Hanumanahatti micro-watershed is presented in Table 13. The results indicate that, 5.56 per cent of the households possess bullocks, 19.44 per cent of the households possess local cow and 5.88 per cent of them possess buffalo.

**Table 13. Livestock possession by households in Hanumanahatti micro-watershed**

| Sl.No. | Particulars | LL (6) | | MF (7) | | SF (17) | | SMF (4) | | MDF (1) | | LF (1) | | All (36) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | N | % | N | % | N | % | N | % |
| 1 | Bullock | 0 | 0.00 | 0 | 0.00 | 2 | 11.76 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 2 | 5.56 |
| 2 | Local cow | 0 | 0.00 | 0 | 0.00 | 5 | 29.41 | 1 | 25.00 | 0 | 0.00 | 1 | 100.00 | 7 | 19.44 |
| 3 | Buffalo | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 1 | 25.00 | 0 | 0.00 | 0 | 0.00 | 1 | 2.78 |
| 4 | blank | 6 | 100.00 | 7 | 100.00 | 10 | 58.82 | 2 | 50.00 | 1 | 100.00 | 0 | 0.00 | 26 | 72.22 |

**Average Labour availability:** The data regarding the average labour availability in Hanumanahatti micro-watershed is presented in Table 14. The results indicate that, average own labour men available in the micro watershed was 1.56, average own labour

(women) available was 1.35, average hired labour (men) available was 7.65 and average hired labour (women) available was 6.26.

**Table 14. Average Labour availability in Hanumanahatti micro-watershed**

| Sl.No. | Particulars | LL (6) | MF (7) | SF (17) | SMF (4) | MDF (1) | LF (1) | All (36) |
|---|---|---|---|---|---|---|---|---|
| | | N | N | N | N | N | N | N |
| 1 | Hired labour Female | 10.00 | 5.14 | 5.71 | 6.50 | 20.00 | 5.00 | 6.26 |
| 2 | Hired labour Male | 15.00 | 6.29 | 6.59 | 10.25 | 20.00 | 5.00 | 7.65 |
| 3 | Own Labour Female | 1.00 | 1.29 | 1.29 | 1.50 | 2.00 | 2.00 | 1.35 |
| 4 | Own labour Male | 1.00 | 1.57 | 1.50 | 2.00 | 1.00 | 2.00 | 1.56 |

**Adequacy of Hired Labour:** The data regarding the adequacy of hired labour in Hanumanahatti micro-watershed is presented in Table 15. The results indicate that, 88.89 per cent of the households opined that the hired labour was adequate.

**Table 15. Adequacy of Hired Labour in Hanumanahatti micro-watershed**

| Sl.No. | Particulars | LL (6) | | MF (7) | | SF (17) | | SMF (4) | | MDF (1) | | LF (1) | | All (36) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | N | % | N | % | N | % | N | % |
| 1 | Adequate | 1 | 16.67 | 7 | 100.00 | 18 | 105.88 | 4 | 100.00 | 1 | 100.00 | 1 | 100.00 | 32 | 88.89 |

**Distribution of land (ha):** The data regarding the distribution of land (ha) in Hanumanahatti micro-watershed is presented in Table 16. The results indicate that, households of the Hanumanahatti micro-watershed possess 13.17 ha (35.54%) of dry land and 23.89 ha (64.46%) of irrigated land. Marginal farmers possess 5.03 ha (100%) of dry land and 0.40 ha (7.44%) of irrigated land. Small farmers possess 8.13 ha (47.21%) of dry land and 9.10 ha (52.79%) of irrigated land. Semi medium farmers possess 6.29 ha (100%) of irrigated land. Medium farmers possess 2.83 ha (100%) of irrigated land and large farmers possess 5.26 ha (100%) of irrigated land.

**Table 16. Distribution of land (Ha) in Hanumanahatti micro-watershed**

| Sl.No. | Particulars | LL (6) | | MF (7) | | SF (17) | | SMF (4) | | MDF (1) | | LF (1) | | All (36) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ha | % | ha | % | ha | % | ha | % | ha | % | ha | % | ha | % |
| 1 | Dry | 0 | 0 | 5.03 | 92.56 | 8.13 | 47.21 | 0 | 0 | 0 | 0 | 0 | 0 | 13.17 | 35.54 |
| 2 | Irrigated | 0 | 0 | 0.40 | 7.44 | 9.10 | 52.79 | 6.29 | 100 | 2.83 | 100 | 5.26 | 100 | 23.89 | 64.46 |
| Total | | 0 | 100 | 5.44 | 100 | 17.23 | 100 | 6.29 | 100 | 2.83 | 100 | 5.26 | 100 | 37.06 | 100 |

**Table 17. Average land value (Rs./ha) in Hanumanahatti micro-watershed**

| Sl.No. | Particulars | MF (7) | SF (17) | SMF (4) | MDF (1) | LF (1) | All (36) |
|---|---|---|---|---|---|---|---|
| 1 | Dry | 675,080.38 | 393,233.83 | 0.00 | 0.00 | 0.00 | 500,983.41 |
| 2 | Irrigated | 1,482,000.00 | 725,177.93 | 397,106.11 | 211,714.29 | 152,000.00 | 464,458.75 |

**Average land value (Rs./ha):** The data regarding the average land value (Rs./ha) in Hanumanahatti micro-watershed is presented in Table 17. The results indicate that, the average value of dry land was Rs. 500,983.41 and average value of irrigated land was Rs. 464,458.75. In case of marginal famers, the average land value was Rs. 675,080.38 for dry land and Rs. 1,482,000 for irrigated land. In case of small famers, the average land value was Rs. 393,233.83 for dry land and Rs. 725,177.93 for irrigated land. In case of semi medium famers, the average land value was Rs. 397,106.11 for irrigated land. In

case of medium famers, the average land value was Rs. 211,714.29 for irrigated land and in case of large farmers it was Rs. 152,000 for irrigated land.

**Status of bore wells:** The data regarding the status of bore wells in Hanumanahatti micro-watershed is presented in Table 18. The results indicate that, there were 18 functioning bore wells in the micro watershed.

**Table 18. Status of bore wells in Hanumanahatti micro-watershed**

| Sl.No. | Particulars | LL (6) | MF (7) | SF (17) | SMF (4) | MDF (1) | LF (1) | All (36) |
|---|---|---|---|---|---|---|---|---|
| | | N | N | N | N | N | N | N |
| 1 | Functioning | 0 | 1 | 11 | 4 | 1 | 1 | 18 |

**Source of irrigation:** The data regarding the source of irrigation in Hanumanahatti micro-watershed is presented in Table 19. The results indicate that, bore well was the major irrigation source in the micro water shed for 50 per cent of the farmers.

**Table 19. Source of irrigation in Hanumanahatti micro-watershed**

| Sl.No. | Particulars | LL (6) | | MF (7) | | SF (17) | | SMF (4) | | MDF (1) | | LF (1) | | All (36) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | N | % | N | % | N | % | N | % |
| 1 | Bore Well | 0 | 0.00 | 1 | 14.29 | 11 | 64.71 | 4 | 100.00 | 1 | 100.00 | 1 | 100.00 | 18 | 50.00 |

**Depth of water (Avg in meters):** The data regarding the depth of water in Hanumanahatti micro-watershed is presented in Table 20. The results indicate that, the depth of bore well was found to be 48.26 meters.

**Table 20. Depth of water (Avg in meters) in Hanumanahatti micro-watershed**

| Sl.No. | Particulars | LL (6) | MF (7) | SF (17) | SMF (4) | MDF (1) | LF (1) | All (36) |
|---|---|---|---|---|---|---|---|---|
| 1 | Bore Well | 0.00 | 13.06 | 63.65 | 91.44 | 106.68 | 91.44 | 48.26 |

**Irrigated Area (ha):** The data regarding the irrigated area (ha) in Hanumanahatti micro-watershed is presented in Table 21. The results indicate that, marginal, small, semi medium, medium and large farmers had irrigated area of 0.40 ha, 9.10 ha, 6.30 ha, 2.83 ha and 5.26 ha respectively.

**Table 21. Irrigated Area (ha) in Hanumanahatti micro-watershed**

| Sl.No. | Particulars | LL (6) | MF (7) | SF (17) | SMF (4) | MDF (1) | LF (1) | All (36) |
|---|---|---|---|---|---|---|---|---|
| 1 | Kharif | 0.00 | 0.40 | 9.10 | 6.30 | 2.83 | 5.26 | 23.90 |
| Total | | 0.00 | 0.40 | 9.10 | 6.30 | 2.83 | 5.26 | 23.90 |

**Cropping pattern:** The data regarding the cropping pattern in Hanumanahatti micro-watershed is presented in Table 22. The results indicate that, farmers have grown bajra (4.86 ha), chilly (0.81 ha), green gram (0.81 ha), red gram (0.81 ha) and maize (27.66 ha). Marginal farmers have grown bajra, chilly and maize. Small farmers have grown bajra, green gram, maize and red gram. Semi medium farmers have grown chilly and maize. Medium farmers have grown maize. Large farmers have grown bajra and maize.

**Table 22. Cropping pattern in Hanumanahatti micro-watershed (Area in ha)**

| Sl.No. | Particulars | LL (6) | MF (7) | SF (17) | SMF (4) | MDF (1) | LF (1) | All (36) |
|---|---|---|---|---|---|---|---|---|
| 1 | Kharif - Bajra | 0.00 | 0.81 | 1.62 | 0.00 | 0.00 | 2.43 | 4.86 |
| 2 | Kharif - Chilly | 0.00 | 0.40 | 0.00 | 0.40 | 0.00 | 0.00 | 0.81 |
| 3 | Kharif - Greengram | 0.00 | 0.00 | 0.81 | 0.00 | 0.00 | 0.00 | 0.81 |
| 4 | Kharif - Maize | 0.00 | 4.23 | 13.98 | 5.00 | 2.83 | 1.62 | 27.66 |
| 5 | Kharif - Red gram | 0.00 | 0.00 | 0.81 | 0.00 | 0.00 | 0.00 | 0.81 |
| Total | | 0.00 | 5.44 | 17.22 | 5.40 | 2.83 | 4.05 | 34.95 |

**Cropping intensity:** The data regarding the cropping intensity in Hanumanahatti micro-watershed is presented in Table 23. The results indicate that, the cropping intensity in Hanumanahatti micro-watershed was found to be 82.62 per cent. In case of marginal farmers it was 100 per cent, small farmers it was 100.09 per cent, in case of semi medium farmers it was 85.85, medium farmers it was 100 per cent and in case of large farmers it was 38.46 per cent.

**Table 23. Cropping intensity (%) in Hanumanahatti micro-watershed**

| Sl.No. | Particulars | LL (6) | MF (7) | SF (17) | SMF (4) | MDF (1) | LF (1) | All (36) |
|---|---|---|---|---|---|---|---|---|
| 1 | Cropping Intensity | 0.00 | 100.00 | 100.09 | 85.85 | 100.00 | 38.46 | 82.62 |

**Possession of Bank account and savings:** The data regarding the cropping intensity in Hanumanahatti micro-watershed is presented in Table 24. The results indicate that, 36.11 per cent of the households have bank account and 22.22 per cent have savings.

**Table 24. Possession of Bank account and savings in Hanumanahatti micro-watershed**

| Sl.No. | Particulars | LL (6) | | MF (7) | | SF (17) | | SMF (4) | | MDF (1) | | LF (1) | | All (36) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | N | % | N | % | N | % | N | % |
| 1 | Account | 0 | 0.00 | 1 | 14.29 | 9 | 52.94 | 2 | 50.00 | 0 | 0.00 | 1 | 100.00 | 13 | 36.11 |
| 2 | Savings | 0 | 0.00 | 1 | 14.29 | 4 | 23.53 | 2 | 50.00 | 0 | 0.00 | 1 | 100.00 | 8 | 22.22 |

**Borrowing status:** The data regarding the cropping intensity in Hanumanahatti micro-watershed is presented in Table 25. The results indicate that, 36.11 per cent of the households have availed credit from different sources.

**Table 25. Borrowing status in Hanumanahatti micro-watershed**

| Sl.No. | Particulars | LL (6) | | MF (7) | | SF (17) | | SMF (4) | | MDF (1) | | LF (1) | | All (36) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | N | % | N | % | N | % | N | % |
| 1 | Credit Availed | 0 | 0.00 | 1 | 14.29 | 9 | 52.94 | 2 | 50.00 | 0 | 0.00 | 1 | 100.00 | 13 | 36.11 |

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

| Sl.No. | Particulars | LL (0) | | MF (1) | | SF (9) | | SMF (2) | | MDF (0) | | LF (1) | | All (13) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | N | % | N | % | N | % | N | % |
| 1 | Cooperative Bank | 0 | 0.00 | 0 | 0.00 | 1 | 11.11 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 1 | 7.69 |
| 2 | Friends/Relatives | 0 | 0.00 | 0 | 0.00 | 1 | 11.11 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 1 | 7.69 |
| 3 | Grameena Bank | 0 | 0.00 | 1 | 100.00 | 7 | 77.78 | 2 | 100.00 | 0 | 0.00 | 1 | 100.00 | 11 | 84.62 |

**Source of credit availed by households:** The data regarding the source of credit in Hanumanahatti micro watershed is presented in Table 26. The results indicate that, 84.62

per cent of the households availed loan from loan from grameena bank, 7.69 per cent of the households obtained loan from friends/relatives and another 7.69 per cent borrowed from cooperative bank.

**Average Credit amount:** The data regarding the average credit amount availed by households in Hanumanahatti micro watershed is presented in Table 27. The results indicate that the average credit borrowed was Rs.162692.31.

**Table 27. Average Credit amount availed by households in Hanumanahatti micro watershed**

| Sl.No. | Particulars | MF (1) | SF (9) | SMF (2) | MDF (0) | LF (1) | All (13) |
|---|---|---|---|---|---|---|---|
| 1 | Average Credit | 70,000.00 | 93,888.89 | 100,000.00 | 0.00 | 1,000,000.00 | 162,692.31 |

**Purpose of credit borrowed - Institutional Credit:** The data regarding the purpose of credit borrowed from institutional sources by households in Hanumanahatti micro watershed is presented in Table 28. The results indicate that, 100 per cent of the households have borrowed loan from institutional sources for the purpose of agricultural production.

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

| Sl.No. | Particulars | MF (1) | | SF (9) | | SMF (2) | | MDF (0) | | LF (1) | | All (13) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | N | % | N | % | N | % |
| 1 | Agriculture production | 1 | 100.00 | 8 | 100.00 | 2 | 100.00 | 0 | 0.00 | 1 | 100.00 | 12 | 100.00 |

**Purpose of credit borrowed - Private Credit:** The data regarding the purpose of credit borrowed from private sources by households in Hanumanahatti micro watershed is presented in Table 29. The results indicate that, the main purpose of borrowing credit from private sources was also agricultural production.

**Table 29. Purpose of credit borrowed (Private Credit) by households in Hanumanahatti micro watershed**

| Sl.No. | Particulars | LL (0) | | MF (0) | | SF (1) | | SMF (0) | | MDF (0) | | LF (0) | | All (1) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | N | % | N | % | N | % | N | % |
| 1 | Agriculture production | 0 | 0.00 | 0 | 0.00 | 1 | 100.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 1 | 100.00 |

**Repayment status of households – Institutional:** The data regarding the repayment status of credit borrowed from institutional sources by households in Hanumanahatti micro watershed is presented in Table 30. The results indicated that 91.67 per cent of the households did not repay their loan and 8.33 per cent of the households partially paid the loan that they borrowed from institutional sources.

**Table 30. Repayment status of households (institutional sources) in Hanumanahatti micro watershed**

| Sl.No. | Particulars | MF (1) | | SF (8) | | SMF (2) | | MDF (0) | | LF (1) | | All (12) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | N | % | N | % | N | % |
| 1 | Partially paid | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 1 | 100.00 | 1 | 8.33 |
| 2 | Un paid | 1 | 100.00 | 8 | 100.00 | 2 | 100.00 | 0 | 0.00 | 0 | 0.00 | 11 | 91.67 |

**Repayment status of households – Private:** The data regarding the repayment status of credit borrowed from private sources by households in Hanumanahatti micro watershed is presented in Table 31. Results indicated that 100 per cent of the households did not repay their loan borrowed from private sources.

**Table 31. Repayment status of households (private sources) in Hanumanahatti micro watershed**

| Sl.No. | Particulars | LL (0) | | MF (0) | | SF (1) | | SMF (0) | | MDF (0) | | LF (0) | | All (1) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | N | % | N | % | N | % | N | % |
| 1 | Un paid | 0 | 0.00 | 0 | 0.00 | 1 | 100.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 1 | 100.00 |

**Table 32. Opinion on institutional sources of credit in Hanumanahatti micro watershed**

| Sl.No. | Particulars | MF (1) | | SF (8) | | SMF (2) | | MDF (0) | | LF (1) | | All (12) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | N | % | N | % | N | % |
| 1 | Helped to perform timely agricultural operations | 1 | 100 | 8 | 100 | 2 | 100 | 0 | 0 | 0 | 0 | 11 | 91.67 |
| 2 | Loan amount was adequate to fulfil the requirement | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 100 | 1 | 8.33 |

**Opinion on institutional sources of credit:** The data regarding the opinion on institutional sources of credit in Hanumanahatti micro watershed is presented in Table 32. The results indicate that, around 91.67 per cent opined that the loan amount borrowed from institutional sources helped to perform timely agricultural operations and 8.33 per cent opined that the loan amount was adequate to fulfil the requirements.

**Opinion on non-institutional sources of credit:** The data regarding the opinion on non-institutional sources of credit in Hanumanahatti micro watershed is presented in Table 33. The results indicate that, around 100 per cent of the households opined that the credit borrowed from private sources helped to perform timely agricultural operations.

**Table 33. Opinion on non-institutional sources of credit in Hanumanahatti micro watershed**

| Sl.No. | Particulars | MF (0) | | SF (1) | | SMF (0) | | MDF (0) | | LF (0) | | All (1) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | N | % | N | % | N | % |
| 1 | Helped to perform timely agricultural operations | 0 | 0.00 | 1 | 100.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 1 | 100.00 |

**Cost of Cultivation of Maize:** The data regarding the cost of cultivation of maize in Hanumanahatti micro-watershed is presented in Table 34. The results indicate that, the total cost of cultivation for maize was Rs. 25583.39. The gross income realized by the farmers was Rs. 38552.82. The net income from Maize cultivation was Rs. 12969.43, thus the benefit cost ratio was found to be 1:1.51.

**Table 34. Cost of Cultivation of maize in Hanumanahatti micro-watershed**

| Sl.No | Particulars | | Units | Phy Units | Value(Rs.) | % to C3 |
|---|---|---|---|---|---|---|
| **I** | **Cost A1** | | | | | |
| 1 | Hired Human Labour | | Man days | 34.10 | 5287.36 | 20.67 |
| 2 | Bullock | | Pairs/day | 1.69 | 937.88 | 3.67 |
| 3 | Tractor | | Hours | 1.76 | 1246.31 | 4.87 |
| 4 | Machinery | | Hours | 0.31 | 227.37 | 0.89 |
| 5 | Seed Main Crop (Establishment and Maintenance) | | Kgs (Rs.) | 20.12 | 2414.47 | 9.44 |
| 6 | Seed Inter Crop | | Kgs. | 0.00 | 0.00 | 0.00 |
| 7 | FYM | | Quintal | 4.35 | 869.10 | 3.40 |
| 8 | Fertilizer + micronutrients | | Quintal | 8.57 | 7002.78 | 27.37 |
| 9 | Pesticides (PPC) | | Kgs / liters | 0.00 | 0.00 | 0.00 |
| 10 | Irrigation | | Number | 3.11 | 0.00 | 0.00 |
| 12 | Msc. Charges (Marketing costs etc) | | | 0.00 | 0.00 | 0.00 |
| 13 | Depreciation charges | | | 0.00 | 4.81 | 0.02 |
| 14 | Land revenue and Taxes | | | 0.00 | 3.29 | 0.01 |
| **II** | **Cost B1** | | | | | |
| 16 | Interest on working capital | | | | 1234.48 | 4.83 |
| 17 | **Cost B1 = (Cost A1 + sum of 15 and 16)** | | | | 19227.86 | 75.16 |
| **III** | **Cost B2** | | | | | |
| 18 | Rental Value of Land | | | | 368.42 | 1.44 |
| 19 | **Cost B2 = (Cost B1 + Rental value)** | | | | 19596.29 | 76.60 |
| **IV** | **Cost C1** | | | | | |
| 20 | Family Human Labour | | | 25.54 | 3660.34 | 14.31 |
| 21 | **Cost C1 = (Cost B2 + Family Labour)** | | | | 23256.63 | 90.91 |
| **V** | **Cost C2** | | | | | |
| 22 | Risk Premium | | | | 1.00 | 0.00 |
| 23 | **Cost C2 = (Cost C1 + Risk Premium)** | | | | 23257.63 | 90.91 |
| **VI** | **Cost C3** | | | | | |
| 24 | Managerial Cost | | | | 2325.76 | 9.09 |
| 25 | **Cost C3 = (Cost C2 + Managerial Cost)** | | | | 25583.39 | 100.00 |
| **VII** | **Economics of the Crop** | | | | | |
| a. | Main Product | a) Main Product (q) | | 31.03 | 35927.76 | |
| | | b) Main Crop Sales Price (Rs.) | | | 1157.89 | |
| | By Product | e) Main Product (q) | | 3.08 | 2625.06 | |
| | | f) Main Crop Sales Price (Rs.) | | | 852.63 | |
| b. | Gross Income (Rs.) | | | | 38552.82 | |
| c. | Net Income (Rs.) | | | | 12969.43 | |
| d. | Cost per Quintal (Rs./q.) | | | | 824.51 | |
| e. | Benefit Cost Ratio (BC Ratio) | | | | 1:1.51 | |

**Cost of Cultivation of Redgram:** The data regarding the cost of cultivation of redgram in Hanumanahatti micro-watershed is presented in Table 35. The results indicate that, the total cost of cultivation for redgram was Rs. 33089.66. The gross income realized by the farmers was Rs. 167466. The net income from redgram cultivation was Rs. 134376.34. Thus the benefit cost ratio was found to be 1:5.06.

**Table 35. Cost of Cultivation of Redgram in Hanumanahatti micro-watershed**

| Sl.No | Particulars | | Units | Phy Units | Value(Rs.) | % to C3 |
|---|---|---|---|---|---|---|
| **I** | **Cost A1** | | | | | |
| 1 | Hired Human Labour | | Man days | 44.46 | 3902.60 | 11.79 |
| 2 | Bullock | | Pairs/day | 0.00 | 0.00 | 0.00 |
| 3 | Tractor | | Hours | 0.00 | 0.00 | 0.00 |
| 4 | Machinery | | Hours | 0.00 | 0.00 | 0.00 |
| 5 | Seed Main Crop (Establishment and Maintenance) | | Kgs (Rs.) | 3.71 | 444.60 | 1.34 |
| 6 | Seed Inter Crop | | Kgs. | 0.00 | 0.00 | 0.00 |
| 7 | FYM | | Quintal | 0.00 | 0.00 | 0.00 |
| 8 | Fertilizer + micronutrients | | Quintal | 22.23 | 18327.40 | 55.39 |
| 9 | Pesticides (PPC) | | Kgs / liters | 1.24 | 1235.00 | 3.73 |
| 10 | Irrigation | | Number | 0.00 | 0.00 | 0.00 |
| 13 | Depreciation charges | | | 0.00 | 0.02 | 0.00 |
| 14 | Land revenue and Taxes | | | 0.00 | 3.29 | 0.01 |
| **II** | **Cost B1** | | | | | |
| 16 | Interest on working capital | | | | 2400.96 | 7.26 |
| 17 | **Cost B1 = (Cost A1 + sum of 15 and 16)** | | | | 26313.88 | 79.52 |
| **III** | **Cost B2** | | | | | |
| 18 | Rental Value of Land | | | | 333.33 | 1.01 |
| 19 | **Cost B2 = (Cost B1 + Rental value)** | | | | 26647.21 | 80.53 |
| **IV** | **Cost C1** | | | | | |
| 20 | Family Human Labour | | | 38.29 | 3433.30 | 10.38 |
| 21 | **Cost C1 = (Cost B2 + Family Labour)** | | | | 30080.51 | 90.91 |
| **V** | **Cost C2** | | | | | |
| 22 | Risk Premium | | | | 1.00 | 0.00 |
| 23 | **Cost C2 = (Cost C1 + Risk Premium)** | | | | 30081.51 | 90.91 |
| **VI** | **Cost C3** | | | | | |
| 24 | Managerial Cost | | | | 3008.15 | 9.09 |
| 25 | **Cost C3 = (Cost C2 + Managerial Cost)** | | | | 33089.66 | 100.00 |
| **VII** | **Economics of the Crop** | | | | | |
| a. | Main Product | a) Main Product (q) | | 37.05 | 166725.00 | |
| | | b) Main Crop Sales Price (Rs.) | | | 4500.00 | |
| | By Product | e) Main Product (q) | | 1.24 | 741.00 | |
| | | f) Main Crop Sales Price (Rs.) | | | 600.00 | |
| b. | Gross Income (Rs.) | | | | 167466.00 | |
| c. | Net Income (Rs.) | | | | 134376.34 | |
| d. | Cost per Quintal (Rs./q.) | | | | 893.11 | |
| e. | Benefit Cost Ratio (BC Ratio) | | | | 1:5.06 | |

**Cost of Cultivation of Bajra:** The data regarding the cost of cultivation of bajra in Hanumanahatti micro-watershed is presented in Table 36. The results indicate that, the total cost of cultivation for bajra was Rs. 18570. The gross income realized by the farmers was Rs. 28775.50. The net income from bajra cultivation was Rs. 10205.50. Thus the benefit cost ratio was found to be 1:1.55.

**Table 36. Cost of Cultivation of Bajra in Hanumanahatti micro-watershed**

| Sl.No | Particulars | | Units | Phy Units | Value(Rs.) | % to C3 |
|---|---|---|---|---|---|---|
| **I** | **Cost A1** | | | | | |
| 1 | Hired Human Labour | | Man days | 31.80 | 5082.03 | 27.37 |
| 2 | Bullock | | Pairs/day | 0.00 | 0.00 | 0.00 |
| 3 | Tractor | | Hours | 2.16 | 1420.25 | 7.65 |
| 4 | Machinery | | Hours | 0.00 | 0.00 | 0.00 |
| 5 | Seed Main Crop (Establishment and Maintenance) | | Kgs (Rs.) | 12.35 | 1729.00 | 9.31 |
| 6 | Seed Inter Crop | | Kgs. | 0.00 | 0.00 | 0.00 |
| 7 | FYM | | Quintal | 0.00 | 0.00 | 0.00 |
| 8 | Fertilizer + micronutrients | | Quintal | 6.48 | 5217.88 | 28.10 |
| 9 | Pesticides (PPC) | | Kgs / liters | 0.00 | 0.00 | 0.00 |
| 10 | Irrigation | | Number | 0.00 | 0.00 | 0.00 |
| 12 | Msc. Charges (Marketing costs etc) | | | 0.00 | 0.00 | 0.00 |
| 13 | Depreciation charges | | | 0.00 | 1.25 | 0.01 |
| 14 | Land revenue and Taxes | | | 0.00 | 3.29 | 0.02 |
| **II** | **Cost B1** | | | | | |
| 16 | Interest on working capital | | | | 833.75 | 4.49 |
| 17 | **Cost B1 = (Cost A1 + sum of 15 and 16)** | | | | 14287.44 | 76.94 |
| **III** | **Cost B2** | | | | | |
| 18 | Rental Value of Land | | | | 333.33 | 1.80 |
| 19 | **Cost B2 = (Cost B1 + Rental value)** | | | | 14620.77 | 78.73 |
| **IV** | **Cost C1** | | | | | |
| 20 | Family Human Labour | | | 16.06 | 2260.05 | 12.17 |
| 21 | **Cost C1 = (Cost B2 + Family Labour)** | | | | 16880.82 | 90.90 |
| **V** | **Cost C2** | | | | | |
| 22 | Risk Premium | | | | 1.00 | 0.01 |
| 23 | **Cost C2 = (Cost C1 + Risk Premium)** | | | | 16881.82 | 90.91 |
| **VI** | **Cost C3** | | | | | |
| 24 | Managerial Cost | | | | 1688.18 | 9.09 |
| 25 | **Cost C3 = (Cost C2 + Managerial Cost)** | | | | 18570.00 | 100.00 |
| **VII** | **Economics of the Crop** | | | | | |
| a. | Main Product | a) Main Product (q) | | 24.70 | 26552.50 | |
| | | b) Main Crop Sales Price (Rs.) | | | 1075.00 | |
| | By Product | e) Main Product (q) | | 2.47 | 2223.00 | |
| | | f) Main Crop Sales Price (Rs.) | | | 900.00 | |
| b. | Gross Income (Rs.) | | | | 28775.50 | |
| c. | Net Income (Rs.) | | | | 10205.50 | |
| d. | Cost per Quintal (Rs./q.) | | | | 751.82 | |
| e. | Benefit Cost Ratio (BC Ratio) | | | | 1:1.55 | |

**Cost of cultivation of Green gram:** The data regarding the cost of cultivation of Green gram in Hanumanahatti micro-watershed is presented in Table 37. The results indicate that, the total cost of cultivation for Green gram was Rs. 19969.24. The gross income realized by the farmers was Rs. 123500. The net income from Green gram cultivation was Rs. 808.47. Thus the benefit cost ratio was found to be 1:6.18.

**Table 37. Cost of Cultivation of Green gram in Hanumanahatti micro-watershed**

| Sl.No | Particulars | Units | Phy Units | Value(Rs.) | % to C3 |
|---|---|---|---|---|---|
| **I** | **Cost A1** | | | | |
| 1 | Hired Human Labour | Man days | 51.87 | 4693.00 | 23.50 |
| 2 | Bullock | Pairs/day | 2.47 | 988.00 | 4.95 |
| 3 | Tractor | Hours | 0.00 | 0.00 | 0.00 |
| 4 | Machinery | Hours | 0.00 | 0.00 | 0.00 |
| 5 | Seed Main Crop (Establishment and Maintenance) | Kgs (Rs.) | 3.71 | 666.90 | 3.34 |
| 6 | Seed Inter Crop | Kgs. | 0.00 | 0.00 | 0.00 |
| 7 | FYM | Quintal | 6.18 | 1235.00 | 6.18 |
| 8 | Fertilizer + micronutrients | Quintal | 4.94 | 3902.60 | 19.54 |
| 9 | Pesticides (PPC) | Kgs / liters | 1.24 | 1235.00 | 6.18 |
| 10 | Irrigation | Number | 2.47 | 0.00 | 0.00 |
| 12 | Msc. Charges (Marketing costs etc) | | 0.00 | 0.00 | 0.00 |
| 13 | Depreciation charges | | 0.00 | 2.47 | 0.01 |
| 14 | Land revenue and Taxes | | 0.00 | 3.29 | 0.02 |
| **II** | **Cost B1** | | | | |
| 16 | Interest on working capital | | | 844.86 | 4.23 |
| 17 | **Cost B1 = (Cost A1 + sum of 15 and 16)** | | | 13571.12 | 67.96 |
| **III** | **Cost B2** | | | | |
| 18 | Rental Value of Land | | | 333.33 | 1.67 |
| 19 | **Cost B2 = (Cost B1 + Rental value)** | | | 13904.46 | 69.63 |
| **IV** | **Cost C1** | | | | |
| 20 | Family Human Labour | | 46.93 | 4248.40 | 21.27 |
| 21 | **Cost C1 = (Cost B2 + Family Labour)** | | | 18152.86 | 90.90 |
| **V** | **Cost C2** | | | | |
| 22 | Risk Premium | | | 1.00 | 0.01 |
| 23 | **Cost C2 = (Cost C1 + Risk Premium)** | | | 18153.86 | 90.91 |
| **VI** | **Cost C3** | | | | |
| 24 | Managerial Cost | | | 1815.39 | 9.09 |
| 25 | **Cost C3 = (Cost C2 + Managerial Cost)** | | | 19969.24 | 100.00 |
| **VII** | **Economics of the Crop** | | | | |
| a. | Main Product | a) Main Product (q) | 24.70 | 123500.00 | |
| | | b) Main Crop Sales Price (Rs.) | | 5000.00 | |
| b. | Gross Income (Rs.) | | | 123500.00 | |
| c. | Net Income (Rs.) | | | 103530.76 | |
| d. | Cost per Quintal (Rs./q.) | | | 808.47 | |
| e. | Benefit Cost Ratio (BC Ratio) | | | 1:6.18 | |

**Cost of Cultivation of Chilly:** The data regarding the cost of cultivation of chilly in Hanumanahatti micro-watershed is presented in Table 38. The results indicate that, the total cost of cultivation for chilly was Rs. 56285.23. The gross income realized by the farmers was Rs. 93860. The net income from chilly cultivation was Rs. 37574.77. Thus the benefit cost ratio was found to be 1:1.67.

**Table 38. Cost of Cultivation of Chilly in Hanumanahatti micro-watershed**

| Sl.No | Particulars | | Units | Phy Units | Value(Rs.) | % to C3 |
|---|---|---|---|---|---|---|
| **I** | **Cost A1** | | | | | |
| 1 | Hired Human Labour | | Man days | 41.99 | 8151.00 | 14.48 |
| 2 | Bullock | | Pairs/day | 7.41 | 4446.00 | 7.90 |
| 3 | Tractor | | Hours | 2.47 | 1729.00 | 3.07 |
| 4 | Machinery | | Hours | 0.00 | 0.00 | 0.00 |
| 5 | Seed Main Crop (Establishment and Maintenance) | | Kgs (Rs.) | 1.54 | 1265.88 | 2.25 |
| 6 | Seed Inter Crop | | Kgs. | 0.00 | 0.00 | 0.00 |
| 7 | FYM | | Quintal | 4.94 | 988.00 | 1.76 |
| 8 | Fertilizer + micronutrients | | Quintal | 14.82 | 13115.70 | 23.30 |
| 9 | Pesticides (PPC) | | Kgs / liters | 2.47 | 2470.00 | 4.39 |
| 10 | Irrigation | | Number | 9.88 | 0.00 | 0.00 |
| 11 | Repairs | | | 0.00 | 0.00 | 0.00 |
| 12 | Msc. Charges (Marketing costs etc) | | | 0.00 | 0.00 | 0.00 |
| 13 | Depreciation charges | | | 0.00 | 37.07 | 0.07 |
| 14 | Land revenue and Taxes | | | 0.00 | 3.29 | 0.01 |
| **II** | **Cost B1** | | | | | |
| 16 | Interest on working capital | | | | 2140.87 | 3.80 |
| 17 | **Cost B1 = (Cost A1 + sum of 15 and 16)** | | | | 34346.81 | 61.02 |
| **III** | **Cost B2** | | | | | |
| 18 | Rental Value of Land | | | | 333.33 | 0.59 |
| 19 | **Cost B2 = (Cost B1 + Rental value)** | | | | 34680.15 | 61.61 |
| **IV** | **Cost C1** | | | | | |
| 20 | Family Human Labour | | | 72.87 | 16487.25 | 29.29 |
| 21 | **Cost C1 = (Cost B2 + Family Labour)** | | | | 51167.40 | 90.91 |
| **V** | **Cost C2** | | | | | |
| 22 | Risk Premium | | | | 1.00 | 0.00 |
| 23 | **Cost C2 = (Cost C1 + Risk Premium)** | | | | 51168.40 | 90.91 |
| **VI** | **Cost C3** | | | | | |
| 24 | Managerial Cost | | | | 5116.84 | 9.09 |
| 25 | **Cost C3 = (Cost C2 + Managerial Cost)** | | | | 56285.23 | 100.00 |
| **VII** | **Economics of the Crop** | | | | | |
| a. | Main Product | a) Main Product (q) | | 46.93 | 93860.00 | |
| | | b) Main Crop Sales Price (Rs.) | | | 2000.00 | |
| b. | Gross Income (Rs.) | | | | 93860.00 | |
| c. | Net Income (Rs.) | | | | 37574.77 | |
| d. | Cost per Quintal (Rs./q.) | | | | 1199.34 | |
| e. | Benefit Cost Ratio (BC Ratio) | | | | 1:1.67 | |

**Adequacy of fodder:** The data regarding the adequacy of fodder in Hanumanahatti micro-watershed is presented in Table 39. The results indicate that, 13.89 per cent of the households opined that dry fodder was adequate and 13.89 per cent opined that green fodder is adequate.

**Table 39. Adequacy of fodder in Hanumanahatti micro-watershed**

| Sl.No. | Particulars | LL (6) | | MF (7) | | SF (17) | | SMF (4) | | MDF (1) | | LF (1) | | All (36) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | N | % | N | % | N | % | N | % |
| 1 | Adequate-Dry Fodder | 0 | 0.00 | 0 | 0.00 | 3 | 17.65 | 2 | 50.00 | 0 | 0.00 | 0 | 0.00 | 5 | 13.89 |
| 2 | Adequate-Green Fodder | 0 | 0.00 | 0 | 0.00 | 3 | 17.65 | 2 | 50.00 | 0 | 0.00 | 0 | 0.00 | 5 | 13.89 |

**Average annual gross income:** The data regarding the average annual gross income in Hanumanahatti micro-watershed is presented in Table 40. The results indicate that the average annual gross income was Rs. 63,333.33 for landless farmers, for marginal farmers it was Rs. 100,000, for small farmers it was Rs. 112,941.18, for semi medium farmers it was Rs. 118,500, for medium farmers it was Rs. 120,000 and for large farmers it was Rs. 135,000.

**Table 40. Average annual gross income in Hanumanahatti micro-watershed**

**(Avg value in Rs.)**

| Sl.No. | Particulars | LL (6) | MF (7) | SF (17) | SMF (4) | MDF (1) | LF (1) | All (36) |
|---|---|---|---|---|---|---|---|---|
| 1 | Service/salary | 0 | 0 | 5,000 | 0 | 0 | 0 | 2,361.11 |
| 2 | Wage | 63,333.33 | 0 | 25,588.24 | 60,000 | 60,000 | 60,000 | 32,638.89 |
| 3 | Agriculture | 0 | 100,000 | 80,588.24 | 42,000 | 60,000 | 75,000 | 65,916.67 |
| 4 | Dairy Farm | 0 | 0 | 1,764.71 | 16,500 | 0 | 0 | 2,666.67 |
| Income(Rs.) | | 63,333.33 | 100,000 | 112,941.18 | 118,500 | 120,000 | 135,000 | 103,583.33 |

**Average annual expenditure:** The data regarding the average annual expenditure in Hanumanahatti micro-watershed is presented in Table 41. The results indicate that the average annual expenditure is Rs. 14,982.43. For landless households it was Rs. 7,583.33, for marginal farmers it was Rs. 7,836.73, for small farmers it was Rs. 9,603.56, for semi medium farmers it was Rs. 21,437.50, for medium farmers it was Rs. 80,000 and for large farmers it was Rs. 110,000.

**Table 41. Average annual expenditure in Hanumanahatti micro-watershed**

**(Avg value in Rs.)**

| Sl.No. | Particulars | LL (6) | MF (7) | SF (17) | SMF (4) | MDF (1) | LF (1) | All (36) |
|---|---|---|---|---|---|---|---|---|
| 1 | Service/salary | 0 | 0 | 45,000 | 0 | 0 | 0 | 1,250 |
| 2 | Wage | 45,500 | 0 | 47,142.86 | 38,250 | 45,000 | 45,000 | 23,500 |
| 3 | Agriculture | 0 | 54,857.14 | 46,117.65 | 29,000 | 35,000 | 65,000 | 38,444.44 |
| 4 | Dairy Farm | 0 | 0 | 25,000 | 18,500 | 0 | 0 | 1,722.22 |
| Total | | 45,500 | 54,857.14 | 163,260.50 | 85,750 | 80,000 | 110,000 | 539,367.65 |
| Average | | 7,583.33 | 7,836.73 | 9,603.56 | 21,437.50 | 80,000 | 110,000 | 14,982.43 |

**Horticulture species grown:** The data regarding horticulture species grown in Hanumanahatti micro-watershed is presented in Table 42. The results indicate that,

sampled households have grown 31 coconut and 5 mango tree in their fields. They have also planted 6 coconut trees in their backyard.

**Table 42. Horticulture species grown in Hanumanahatti micro-watershed**

| Sl.No. | Particulars | LL (6) | | MF (7) | | SF (17) | | SMF (4) | | MDF (1) | | LF (1) | | All (36) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | F | B | F | B | F | B | F | B | F | B | F | B | F | B |
| 1 | Coconut | 0 | 0 | 0 | 0 | 8 | 4 | 14 | 2 | 5 | 0 | 4 | 0 | 31 | 6 |
| 2 | Mango | 0 | 0 | 0 | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 1 | 0 | 5 | 0 |

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

**Forest species grown:** The data regarding forest species grown in Hanumanahatti micro-watershed is presented in Table 43. The results indicate that, households have planted 69 neem trees, 2 tamarind trees, 2 acacia and 5 banyan trees in their backyard.

**Table 43. Forest species grown in Hanumanahatti micro-watershed**

| Sl. No. | Particulars | LL (6) | | MF (7) | | SF (17) | | SMF (4) | | MDF (1) | | LF (1) | | All (36) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | F | B | F | B | F | B | F | B | F | B | F | B | F | B |
| 1 | Neem | 0 | 0 | 4 | 0 | 32 | 2 | 9 | 0 | 4 | 0 | 20 | 0 | 69 | 2 |
| 2 | Tamarind | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| 3 | Acacia | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| 4 | Banyan | 0 | 0 | 0 | 0 | 3 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 5 | 0 |

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

**Marketing of the agricultural produce:** The data regarding marketing of the agricultural produce in Hanumanahatti micro-watershed is presented in Table 44. The results indicated that, all crops were sold to the extent of 100 per cent.

**Table 44. Marketing of the agricultural produce in Hanumanahatti micro-watershed**

| Sl.No | Crops | Output obtained (q) | Output retained (q) | Output sold (q) | Output sold (%) | Avg. Price obtained (Rs/q) |
|---|---|---|---|---|---|---|
| 1 | Bajra | 95.0 | 0.0 | 95.0 | 100.0 | 1083.33 |
| 2 | Chilly | 38.0 | 0.0 | 38.0 | 100.0 | 2000.0 |
| 3 | Greengram | 20.0 | 0.0 | 20.0 | 100.0 | 5000.0 |
| 4 | Maize | 815.0 | 0.0 | 815.0 | 100.0 | 1154.17 |
| 5 | Redgram | 30.0 | 0.0 | 30.0 | 100.0 | 4500.0 |

**Table 45. Marketing Channels used for sale of agricultural produce in Hanumanahatti micro-watershed**

| Sl.No. | Particulars | LL (6) | | MF (7) | | SF (17) | | SMF (4) | | MDF (1) | | LF (1) | | All (36) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | N | % | N | % | N | % | N | % |
| 1 | Agent/Traders | 0 | 0.00 | 0 | 0.00 | 1 | 5.88 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 1 | 2.78 |
| 2 | Local/village Merchant | 0 | 0.00 | 5 | 71.43 | 12 | 70.59 | 4 | 100.00 | 1 | 100.00 | 2 | 200.00 | 24 | 66.67 |
| 3 | Regulated Market | 0 | 0.00 | 2 | 28.57 | 4 | 23.53 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 6 | 16.67 |

**Marketing Channels used for sale of agricultural produce:** The data regarding marketing channels used for sale of agricultural produce in Hanumanahatti micro-

watershed is presented in Table 45. The results indicated that, about 16.67 per cent of the famers have sold their produce in regulated markets, 66.67 per cent of the farmers have sold to local/village merchants and 2.78 per cent have sold their produce to agent/traders.

**Mode of transport of agricultural produce:** The data regarding mode of transport of agricultural produce in Hanumanahatti micro-watershed is presented in Table 46. The results indicated that, 86.11 per cent of the households have used tractor as a mode of transportation for their agricultural produce.

**Table 46. Mode of transport of agricultural produce in Hanumanahatti micro-watershed**

| Sl.No. | Particulars | LL (6) | | MF (7) | | SF (17) | | SMF (4) | | MDF (1) | | LF (1) | | All (36) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | N | % | N | % | N | % | N | % |
| 1 | Tractor | 0 | 0.00 | 7 | 100.00 | 17 | 100.00 | 4 | 100.00 | 1 | 100.00 | 2 | 200.00 | 31 | 86.11 |

**Incidence of soil and water erosion problems:** The data regarding incidence of soil and water erosion problems in Hanumanahatti micro-watershed is presented in Table 47. The results indicated that, 50 per cent of the households have experienced soil and water erosion problems in the farm i.e., 28.57 per cent of the marginal farmers, 58.82 per cent of the small farmers, 100 per cent of semi medium, 100 per cent of medium and large farmers have experienced soil and water erosion problems.

**Table 47. Incidence of soil and water erosion problems in Hanumanahatti micro-watershed**

| Sl.No. | Particulars | LL (6) | | MF (7) | | SF (17) | | SMF (4) | | MDF (1) | | LF (1) | | All (36) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | N | % | N | % | N | % | N | % |
| 1 | Soil and water erosion problems in the farm | 0 | 0 | 2 | 28.57 | 10 | 58.82 | 4 | 100 | 1 | 100 | 1 | 100 | 18 | 50 |

**Interest shown towards soil testing:** The data regarding incidence of soil and water erosion problems in Hanumanahatti micro-watershed is presented in Table 48. The results indicated that, 83.33 per cent have shown interest in soil test which accounts for 100 per cent of marginal, small, semi medium, medium and large farmers.

**Table 48. Interest shown towards soil testing in Hanumanahatti micro-watershed**

| Sl.No. | Particulars | LL (6) | | MF (7) | | SF (17) | | SMF (4) | | MDF (1) | | LF (1) | | All (36) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | N | % | N | % | N | % | N | % |
| 1 | Interest in soil test | 0 | 0 | 7 | 100 | 17 | 100 | 4 | 100 | 1 | 100 | 1 | 100 | 30 | 83.33 |

**Table 49. Usage pattern of fuel for domestic use in Hanumanahatti micro-watershed**

| Sl.No. | Particulars | LL (6) | | MF (7) | | SF (17) | | SMF (4) | | MDF (1) | | LF (1) | | All (36) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | N | % | N | % | N | % | N | % |
| 1 | Fire Wood | 5 | 83.33 | 7 | 100.00 | 16 | 94.12 | 4 | 100.00 | 1 | 100.00 | 1 | 100.00 | 34 | 94.44 |
| 2 | LPG | 1 | 16.67 | 0 | 0.00 | 1 | 5.88 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 2 | 5.56 |

**Usage pattern of fuel for domestic use:** The data regarding usage pattern of fuel for domestic use in Hanumanahatti micro-watershed is presented in Table 49. The results

indicated that, 94.44 per cent of the households used firewood and 5.56 per cent used LPG as a source of fuel.

**Source of drinking water:** The data regarding source of drinking water in Hanumanahatti micro-watershed is presented in Table 50. The results indicated that, bore well was the major source of drinking water for 5.56 per cent of the households, piped supply was the source of drinking water for 47.22 per cent of the households and lake/tank was the major source of drinking water for 47.22 per cent of the households in the micro watershed.

**Table 50. Source of drinking water in Hanumanahatti micro-watershed**

| Sl.No. | Particulars | LL (6) | | MF (7) | | SF (17) | | SMF (4) | | MDF (1) | | LF (1) | | All (36) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | N | % | N | % | N | % | N | % |
| 1 | Piped supply | 2 | 33.33 | 6 | 85.71 | 8 | 47.06 | 1 | 25.00 | 0 | 0.00 | 0 | 0.00 | 17 | 47.22 |
| 2 | Bore Well | 1 | 16.67 | 0 | 0.00 | 0 | 0.00 | 1 | 25.00 | 0 | 0.00 | 0 | 0.00 | 2 | 5.56 |
| 3 | Lake/ Tank | 3 | 50.00 | 1 | 14.29 | 9 | 52.94 | 2 | 50.00 | 1 | 100.00 | 1 | 100.00 | 17 | 47.22 |

**Source of light:** The data regarding source of light in Hanumanahatti micro-watershed is presented in Table 51. The results indicated that, Electricity was the major source of light for 100 per cent of the households in micro watershed.

**Table 51. Source of light in Hanumanahatti micro-watershed**

| Sl.No. | Particulars | LL (6) | | MF (7) | | SF (17) | | SMF (4) | | MDF (1) | | LF (1) | | All (36) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | N | % | N | % | N | % | N | % |
| 1 | Electricity | 6 | 100.00 | 7 | 100.00 | 18 | 105.88 | 4 | 100.00 | 1 | 100.00 | 1 | 100.00 | 37 | 100.00 |

**Existence of Sanitary toilet facility:** The data regarding existence of sanitary toilet facility in Hanumanahatti micro-watershed is presented in Table 52. The results indicated that, 47.22 per cent of the households possess sanitary toilet i.e. 50 per cent of the landless, 42.86 per cent of the marginal, 47.06 per cent of the small, 25 per cent of the semi medium, 100 per cent of the medium farmers and 100 per cent of the large farmers.

**Table 52. Existence of Sanitary toilet facility in Hanumanahatti micro-watershed**

| Sl.No. | Particulars | LL (6) | | MF (7) | | SF (17) | | SMF (4) | | MDF (1) | | LF (1) | | All (36) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | N | % | N | % | N | % | N | % |
| 1 | Sanitary toilet facility | 3 | 50.00 | 3 | 42.86 | 8 | 47.06 | 1 | 25.00 | 1 | 100.00 | 1 | 100.00 | 17 | 47.22 |

**Possession of PDS card:** The data regarding possession of PDS card in Hanumanahatti micro-watershed is presented in Table 53. The results indicated that, 91.67 per cent of the sampled households possessed BPL card and 11.11 per cent of the households did not possess PDS card.

**Table 53. Possession of PDS card in Hanumanahatti micro-watershed**

| Sl.No. | Particulars | LL (6) | | MF (7) | | SF (17) | | SMF (4) | | MDF (1) | | LF (1) | | All (36) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | N | % | N | % | N | % | N | % |
| 1 | BPL | 5 | 83.33 | 6 | 85.71 | 16 | 94.12 | 4 | 100.00 | 1 | 100.00 | 1 | 100.00 | 33 | 91.67 |
| 2 | Not Possessed | 1 | 16.67 | 1 | 14.29 | 2 | 11.76 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 4 | 11.11 |

**Participation in NREGA program:** The data regarding participation in NREGA programme in Hanumanahatti micro-watershed is presented in Table 54. The results indicated that, 33.33 per cent of the households participated in NREGA programme.

**Table 54. Participation in NREGA programme in Hanumanahatti micro-watershed**

| Sl.No. | Particulars | LL (6) | | MF (7) | | SF (17) | | SMF (4) | | MDF(1) | | LF (1) | | All (36) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | N | % | N | % | N | % | N | % |
| 1 | Participation in NREGA programme | 1 | 16.67 | 1 | 14.29 | 4 | 23.53 | 4 | 100.00 | 1 | 100.00 | 1 | 100.00 | 12 | 33.33 |

**Adequacy of food items:** The data regarding adequacy of food items in Hanumanahatti micro-watershed is presented in Table 55. The results indicated that, cereals were adequate for 100 per cent of the households, pulses were adequate for 97.22 per cent, oilseeds were adequate for 11.11 per cent, vegetables were adequate for 19.44 per cent, fruits were adequate for 8.33 per cent, milk was adequate for 94.44 per cent, eggs were adequate for 100 per cent and meat was adequate for 16.67 per cent.

**Table 55. Adequacy of food items in Hanumanahatti micro-watershed**

| Sl.No. | Particulars | LL (6) | | MF (7) | | SF (17) | | SMF (4) | | MDF (1) | | LF (1) | | All (36) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | N | % | N | % | N | % | N | % |
| 1 | Cereals | 6 | 100.00 | 7 | 100.00 | 17 | 100.00 | 4 | 100.00 | 1 | 100.00 | 1 | 100.00 | 36 | 100.00 |
| 2 | Pulses | 7 | 116.67 | 7 | 100.00 | 15 | 88.24 | 4 | 100.00 | 1 | 100.00 | 1 | 100.00 | 35 | 97.22 |
| 3 | Oilseed | 0 | 0.00 | 1 | 14.29 | 3 | 17.65 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 4 | 11.11 |
| 4 | Vegetables | 2 | 33.33 | 0 | 0.00 | 5 | 29.41 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 7 | 19.44 |
| 5 | Fruits | 2 | 33.33 | 0 | 0.00 | 1 | 5.88 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 3 | 8.33 |
| 6 | Milk | 5 | 83.33 | 7 | 100.00 | 16 | 94.12 | 4 | 100.00 | 1 | 100.00 | 1 | 100.00 | 34 | 94.44 |
| 7 | Egg | 7 | 116.67 | 7 | 100.00 | 17 | 100.00 | 4 | 100.00 | 1 | 100.00 | 1 | 100.00 | 37 | 100.00 |
| 8 | Meat | 1 | 16.67 | 0 | 0.00 | 4 | 23.53 | 0 | 0.00 | 1 | 100.00 | 0 | 0.00 | 6 | 16.67 |

**Response on Inadequacy of food items:** The data regarding inadequacy of food items in Hanumanahatti micro-watershed is presented in Table 56. The results indicated that, pulses were inadequate for 5.56 per cent of the households, oilseeds were inadequate for 88.89 per cent, vegetables were inadequate for 80.56 per cent, fruits were inadequate for 91.67 per cent, milk was inadequate for 2.78 per cent and meat was inadequate for 83.33 per cent of the households.

**Table 56. Response on Inadequacy of food items in Hanumanahatti micro-watershed**

| Sl.No. | Particulars | LL (6) | | MF (7) | | SF (17) | | SMF (4) | | MDF (1) | | LF (1) | | All (36) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | N | % | N | % | N | % | N | % |
| 1 | Pulses | 0 | 0.00 | 0 | 0.00 | 2 | 11.76 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 2 | 5.56 |
| 2 | Oilseed | 6 | 100.00 | 6 | 85.71 | 14 | 82.35 | 4 | 100.00 | 1 | 100.00 | 1 | 100.00 | 32 | 88.89 |
| 3 | Vegetables | 4 | 66.67 | 7 | 100.00 | 12 | 70.59 | 4 | 100.00 | 1 | 100.00 | 1 | 100.00 | 29 | 80.56 |
| 4 | Fruits | 4 | 66.67 | 7 | 100.00 | 16 | 94.12 | 4 | 100.00 | 1 | 100.00 | 1 | 100.00 | 33 | 91.67 |
| 5 | Milk | 1 | 16.67 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 1 | 2.78 |
| 6 | Meat | 5 | 83.33 | 7 | 100.00 | 13 | 76.47 | 4 | 100.00 | 0 | 0.00 | 1 | 100.00 | 30 | 83.33 |

**Farming constraints:** The data regarding farming constraints experienced by households in Hanumanahatti micro-watershed is presented in Table 57. The results indicated that,

lower fertility status of the soil was the constraint experienced by 80.56 per cent of the households, wild animal menace on farm field (33.33%), frequent incidence of pest and diseases (80.56%), inadequacy of irrigation water (80.56%), high cost of fertilizers and plant protection chemicals (80.56%), high rate of interest on credit (80.56%), low price for the agricultural commodities (83.33%), lack of marketing facilities in the area (83.33%), lack of transport for safe transport of the agricultural produce to the market (77.78%) and inadequate extension services (83.33%).

**Table 57. Farming constraints Experienced in Hanumanahatti micro-watershed**

| Sl. No. | Particulars | MF (7) | | SF (17) | | SMF (4) | | MDF (1) | | LF (1) | | All (36) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | N | % | N | % | N | % |
| 1 | Lower fertility status of the soil | 7 | 100 | 17 | 100 | 3 | 75 | 1 | 100 | 1 | 100 | 29 | 80.56 |
| 2 | Wild animal menace on farm field | 2 | 28.57 | 6 | 35.29 | 2 | 50 | 1 | 100 | 1 | 100 | 12 | 33.33 |
| 3 | Frequent incidence of pest and diseases | 7 | 100 | 17 | 100 | 4 | 100 | 1 | 100 | 0 | 0 | 29 | 80.56 |
| 4 | Inadequacy of irrigation water | 7 | 100 | 17 | 100 | 4 | 100 | 1 | 100 | 0 | 0 | 29 | 80.56 |
| 5 | High cost of Fertilizers and plant protection chemicals | 7 | 100 | 17 | 100 | 4 | 100 | 1 | 100 | 0 | 0 | 29 | 80.56 |
| 6 | High rate of interest on credit | 7 | 100 | 17 | 100 | 4 | 100 | 1 | 100 | 0 | 0 | 29 | 80.56 |
| 7 | Low price for the agricultural commodities | 7 | 100 | 17 | 100 | 4 | 100 | 1 | 100 | 1 | 100 | 30 | 83.33 |
| 8 | Lack of marketing facilities in the area | 7 | 100 | 17 | 100 | 4 | 100 | 1 | 100 | 1 | 100 | 30 | 83.33 |
| 9 | Inadequate extension services | 7 | 100 | 17 | 100 | 4 | 100 | 1 | 100 | 1 | 100 | 30 | 83.33 |
| 10 | Lack of transport for safe transport of the Agril produce to the market. | 6 | 85.71 | 16 | 94.12 | 4 | 100 | 1 | 100 | 1 | 100 | 28 | 77.78 |

*Chapter 5*

# SUMMARY

In order to assess the socio-economic condition of the farmers in the watershed a comprehensive questionnaire was prepared. Major components such as demographic conditions, migration details, food consumption and family expenditure pattern, material possession, land holding, land use management, cropping pattern, cost of cultivation of crops, livestock management. The statistical components such as frequency and percentage were used to analyze the data. About 36 households located in the micro watershed were interviewed for the survey.

The data indicated that there were 90 (52.94%) men and 80 (47.06%) women among the sampled households. The average family size of landless farmers' was 3, marginal farmers' was 5.85, small farmers' was 4.8, semi medium farmers' was 5.25, medium farmers' was 6 and large farmers' was 5.

The data indicated that, 52 (30.59%) people were in 0-15 years of age, 54 (31.76%) were in 16-35 years of age, 49 (28.82%) were in 36-60 years of age and 15 (8.82%) were above 61 years of age.

The results indicated that Hanumanahatti had 37.06 per cent illiterates, 25.88 per cent of them had primary school education, 4.71 per cent of them had middle school education, 20 per cent of them had high school education, 2.35 per cent of them had PUC education, 0.59 per cent had diploma, 1.18 per cent of them did ITI and 2.94 per cent of them had degree education.

The results indicate that, 66.67 per cent of households were practicing agriculture, 19.44 per cent of the households were agricultural labourers, 13.89 per cent were general labour and 2.78 per cent of them were students.

The results indicate that agriculture was the major occupation for 48.24 per cent of the household members, 5.88 per cent were agricultural laborers, 0.59 per cent were in private service, 30.59 per cent were students and 5.29 per cent were children.

The results show that 100 per cent of the population in the micro watershed has not participated in any local institutions.

The results indicate that 13.89 per cent of the households possess thatched house and 86.11 per cent of the households possess Katcha house.

The results show that 2.78 per cent of the households possess radio, 25 per cent of the households possess TV, 8.33 per cent of the households possess Mixer grinder, 5.56 per cent of the households possess bicycle, 41.67 per cent of the households possess motor cycle and 91.67 per cent of the households possess mobile phones. The results show that the average value of radio was Rs.500, television was Rs.8555, mixer grinder

was Rs.2000, bicycle was Rs. 2500, motor cycle was Rs.37000 and mobile phone was Rs.2281.

About 13.89 per cent of the households possess plough and 8.33 per cent of them possess weeder. The results show that the average value of plough was Rs.1500 and the average value of weeder was Rs.80.

The results indicate that, 5.56 per cent of the households possess bullocks, 19.44 per cent of the households possess local cow and 5.88 per cent of them possess buffalo.

The results indicate that, average own labour men available in the micro watershed was 1.56, average own labour (women) available was 1.35, average hired labour (men) available was 7.65 and average hired labour (women) available was 6.26. The results indicate that, 88.89 per cent of the households opined that the hired labour was adequate.

The results indicate that, households of the Hanumanahatti micro-watershed possess 13.17 ha (35.54%) of dry land and 23.89 ha (64.46%) of irrigated land. Marginal farmers possess 5.03 ha (100%) of dry land and 0.40 ha (7.44%) of irrigated land. Small farmers possess 8.13 ha (47.21%) of dry land and 9.10 ha (52.79%) of irrigated land. Semi medium farmers possess 6.29 ha (100%) of irrigated land. Medium farmers possess 2.83 ha (100%) of irrigated land and large farmers possess 5.26 ha (100%) of irrigated land.

The results indicate that, the average value of dry land was Rs. 500,983.41 and average value of irrigated land was Rs. 464,458.75. In case of marginal famers, the average land value was Rs. 675,080.38 for dry land and Rs. 1,482,000 for irrigated land. In case of small famers, the average land value was Rs. 393,233.83 for dry land and Rs. 725,177.93 for irrigated land. In case of semi medium famers, the average land value was Rs. 397,106.11 for irrigated land. In case of medium famers, the average land value was Rs. 211,714.29 for irrigated land and in case of large farmers it was Rs. 152,000 for irrigated land.

The results indicate that, there were 18 functioning bore wells in the micro watershed.

The results indicate that, bore well was the major irrigation source in the micro water shed for 50 per cent of the farmers. The results indicate that, the depth of bore well was found to be 48.26 meters.

The results indicate that, marginal, small, semi medium, medium and large farmers had irrigated area of 0.40 ha, 9.10 ha, 6.30 ha, 2.83 ha and 5.26 ha respectively. The results indicate that, farmers have grown bajra (4.86 ha), chilly (0.81 ha), green gram (0.81 ha), red gram (0.81 ha) and maize (27.66 ha). Marginal farmers have grown bajra, chilly and maize. Small farmers have grown bajra, green gram, maize and red gram. Semi

medium farmers have grown chilly and maize. Medium farmers have grown maize. Large farmers have grown bajra and maize.

The results indicate that, the cropping intensity in Hanumanahatti micro-watershed was found to be 82.62 per cent. In case of marginal farmers it was 100 per cent, small farmers it was 100.09 per cent, in case of semi medium farmers it was 85.85, medium farmers it was 100 per cent and in case of large farmers it was 38.46 per cent.

The results indicate that, 36.11 per cent of the households have bank account and 22.22 per cent have savings. The results indicate that, 36.11 per cent of the households have availed credit from different sources. The results indicate that, 84.62 per cent of the households availed loan from loan from grameena bank, 7.69 per cent of the households obtained loan from friends/relatives and another 7.69 per cent borrowed from cooperative bank. The results indicate that the average credit borrowed was Rs.162692.31.

The results indicate that, 100 per cent of the households have borrowed loan from institutional sources for the purpose of agricultural production. The results indicate that, the main purpose of borrowing credit from private sources was also agricultural production. The results indicated that 91.67 per cent of the households did not repay their loan and 8.33 per cent of the households partially paid the loan that they borrowed from institutional sources. Results indicated that 100 per cent of the households did not repay their loan borrowed from private sources.

The results indicate that, around 91.67 per cent opined that the loan amount borrowed from institutional sources helped to perform timely agricultural operations and 8.33 per cent opined that the loan amount was adequate to fulfil the requirements. The results indicate that, around 100 per cent of the households opined that the credit borrowed from private sources helped to perform timely agricultural operations.

The results indicate that, the total cost of cultivation for maize was Rs. 25583.39. The gross income realized by the farmers was Rs. 38552.82. The net income from Maize cultivation was Rs. 12969.43, thus the benefit cost ratio was found to be 1:1.51. The total cost of cultivation for redgram was Rs. 33089.66. The gross income realized by the farmers was Rs. 167466. The net income from redgram cultivation was Rs. 134376.34. Thus the benefit cost ratio was found to be 1:5.06. The total cost of cultivation for bajra was Rs. 18570. The gross income realized by the farmers was Rs. 28775.50. The net income from bajra cultivation was Rs. 10205.50. Thus the benefit cost ratio was found to be 1:1.55. The total cost of cultivation for Green gram was Rs. 19969.24. The gross income realized by the farmers was Rs. 123500. The net income from Green gram cultivation was Rs. 808.47. Thus the benefit cost ratio was found to be 1:6.18. The total cost of cultivation for chilly was Rs. 56285.23. The gross income realized by the farmers was Rs. 93860. The net income from chilly cultivation was Rs. 37574.77. Thus the benefit cost ratio was found to be 1:1.67.

The results indicate that, 13.89 per cent of the households opined that dry fodder was adequate and 13.89 per cent opined that green fodder is adequate.

The results indicate that the average annual gross income was Rs. 63,333.33 for landless farmers, for marginal farmers it was Rs. 100,000, for small farmers it was Rs. 112,941.18, for semi medium farmers it was Rs. 118,500, for medium farmers it was Rs. 120,000 and for large farmers it was Rs. 135,000.

The results indicate that the average annual expenditure is Rs. 14,982.43. For landless households it was Rs. 7,583.33, for marginal farmers it was Rs. 7,836.73, for small farmers it was Rs. 9,603.56, for semi medium farmers it was Rs. 21,437.50, for medium farmers it was Rs. 80,000 and for large farmers it was Rs. 110,000.

The results indicate that, sampled households have grown 31 coconut and 5 mango tree in their fields. They have also planted 6 coconut trees in their backyard. The results indicate that, households have planted 69 neem trees, 2 tamarind trees, 2 acacia and 5 banyan trees in their backyard.

The results indicated that, all crops were sold to the extent of 100 per cent. The results indicated that, about 16.67 per cent of the famers have sold their produce in regulated markets, 66.67 per cent of the farmers have sold to local/village merchants and 2.78 per cent have sold their produce to agent/traders. The results indicated that, 86.11 per cent of the households have used tractor as a mode of transportation for their agricultural produce.

The results indicated that, 50 per cent of the households have experienced soil and water erosion problems in the farm i.e., 28.57 per cent of the marginal farmers, 58.82 per cent of the small farmers, 100 per cent of semi medium, 100 per cent of medium and large farmers have experienced soil and water erosion problems. The results indicated that, 83.33 per cent have shown interest in soil test which accounts for 100 per cent of marginal, small, semi medium, medium and large farmers.

The results indicated that, 94.44 per cent of the households used firewood and 5.56 per cent used LPG as a source of fuel. The results indicated that, bore well was the major source of drinking water for 5.56 per cent of the households, piped supply was the source of drinking water for 47.22 per cent of the households and lake/tank was the major source of drinking water for 47.22 per cent of the households in the micro watershed.

Electricity was the major source of light for 100 per cent of the households in micro watershed. The results indicated that, 47.22 per cent of the households possess sanitary toilet i.e. 50 per cent of the landless, 42.86 per cent of the marginal, 47.06 per cent of the small, 25 per cent of the semi medium, 100 per cent of the medium farmers and 100 per cent of the large farmers.

The results indicated that, 91.67 per cent of the sampled households possessed BPL card and 11.11 per cent of the households did not possess PDS card. The results indicated that, 33.33 per cent of the households participated in NREGA programme.

The results indicated that, cereals were adequate for 100 per cent of the households, pulses were adequate for 97.22 per cent, oilseeds were adequate for 11.11 per cent, vegetables were adequate for 19.44 per cent, fruits were adequate for 8.33 per cent, milk was adequate for 94.44 per cent, eggs were adequate for 100 per cent and meat was adequate for 16.67 per cent.

The results indicated that, pulses were inadequate for 5.56 per cent of the households, oilseeds were inadequate for 88.89 per cent, vegetables were inadequate for 80.56 per cent, fruits were inadequate for 91.67 per cent, milk was inadequate for 2.78 per cent and meat was inadequate for 83.33 per cent of the households.

The results indicated that, lower fertility status of the soil was the constraint experienced by 80.56 per cent of the households, wild animal menace on farm field (33.33%), frequent incidence of pest and diseases (80.56%), inadequacy of irrigation water (80.56%), high cost of fertilizers and plant protection chemicals (80.56%), high rate of interest on credit (80.56%), low price for the agricultural commodities (83.33%), lack of marketing facilities in the area (83.33%), lack of transport for safe transport of the agricultural produce to the market (77.78%) and inadequate extension services (83.33%).