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

## RANGANAHALLI (4D3D7B3a) MICROWATERSHED

### Gubbi Taluk, Tumkur 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

WATERSHED DEVELOPMENT DEPARTMENT
GOVT. OF KARNATAKA, BANGALORE

## About ICAR - NBSS&LUP

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

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

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# PREFACE

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

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

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

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

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

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

Nagpur **S.K. SINGH**

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# PART-A

## LAND RESOURCE INVENTORY

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## *EXECUTIVE SUMMARY*

*The land resource inventory of Ranganahalli 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 physiographic and the 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 354 ha in Gubbi taluk of Tumakuru district, Karnataka. The climate is semiarid and categorized as drought-prone with an average annual rainfall of 813 mm, of which about 466 mm is received during south –west monsoon, 196 mm during north-east and the remaining 151 mm during the rest of the year. An area of about 95 per cent is covered by soils and 5 per cent by others. The salient findings from the land resource inventory are summarized briefly below.*

- *The soils belong to 11 soil series and 18 soil phases (management units) and 6 land use classes (LUCs).*
- *The length of crop growing period is about 150 days starting from 3rd week of June to third week of November.*
- *From the master soil map, several interpretative and thematic maps like land capability, soil depth, surface soil texture, soil gravelliness, available water capacity, soil slope and soil erosion were generated.*
- *Soil fertility status maps for macro and micronutrients were generated based on the surface soil samples collected at every 250 m grid interval.*
- *Land suitability for growing 34 major agricultural and horticultural crops were assessed and maps showing the degree of suitability along with constraints were generated.*
- *About 95 per cent area is suitable for agriculture and 5 per cent is not suitable for agriculture*
- *About 88 per cent of the soils are moderately deep (75-100 cm) to very deep (>150 cm) and 7 per cent of the soils are shallow to moderately shallow.*
- *About 18 per cent of the area has clayey soils at the surface and 77 per cent loamy soils.*
- *About 73 per cent of the soils are non gravelly, 16 per cent of the soils are gravelly (<15-35%) and 6 per cent of area has very gravelly soils (35-60%).*
- *An area of about 11 per cent are very low (<50 mm/m), 26 per cent are low (51-100 mm/m, 43 per cent medium (101-150 mm/m) and an area of 15 per cent has very high (>200 mm/m) available water capacity.*
- *About 93 per cent of the area has nearly level (0-1%) to very gently sloping (1-3% slope) lands and about 2 per cent of the area is gently sloping (3-5%).*

- *An area of about 43 per cent has soils that are slightly eroded (e1) and 52 per cent moderately eroded (e2).*
- *Maximum area of about 44 per cent has soils that are slightly acidic to strongly acid (pH 5.0-6.5), 44 per cent area has neutral (pH 6.5-7.3) and 7 per cent of the soils are slightly alkaline (pH 7.3-7.8).*
- *The Electrical Conductivity (EC) of the soils are dominantly <2 $dsm^{-1}$indicating that the soils are non-saline.*
- *About 67 per cent of the soils are low (<0.5%), 28 per cent area of the soils are medium (0.5-0.75%) and <1 per cent of the area are high in organic carbon.*
- *About 30 per cent of the area is high (>57 kg/ha) in available phosphorus and 65 per cent area is medium (23-57 kg/ha).*
- *About 8 per cent of the soils are low (<145 kg/ha), medium (145-337 kg/ha) in 51 per cent area and 36 per cent of the soils are high (>337 kg/ha) in available potassium.*
- *Available sulphur is medium (10 -20 ppm) in an area of about 95 per cent.*
- *Available boron is low (0.5 ppm) in maximum area about 76 per cent area and medium (0.5-1.0 ppm) in 19 per cent area.*
- *Available iron is sufficient (>4.5 ppm) in an area of about 95 per cent.*
- *Available manganese and copper are sufficient in all the soils of the microwatershed.*
- *Available zinc is deficient (<0.6 ppm) in 62 per cent and sufficient (>0.6 ppm) in 33 per cent of soils of the microwatershed.*
- *The land suitability for 34 major crops grown in the microwatershed were assessed and the areas that are highly suitable (S1) and moderately suitable (S2) are given below. It is however to be noted that a given soil may be suitable for various crops but what specific crop to be grown may be decided by the farmer looking to his capacity to invest on various inputs, marketing infrastructure, market price and finally the demand and supply position.*

*Land suitability for various crops in the Microwatershed*

| Crop | Suitability Area in ha (%) | | | Crop | Suitability Area in ha (%) | |
|---|---|---|---|---|---|---|
| | Highly suitable (S1) | Moderately suitable (S2) | | | Highly suitable (S1) | Moderately suitable (S2) |
| Sorghum | 314 (61) | 30(6) | | Guava | 250(49) | 95(18) |
| Fodder Sorghum | 314 (61) | 30(6) | | Pomegranate | 296 (58) | 18(3) |
| Maize | 190(37) | 153(30) | | Banana | 296 (58) | 18(3) |
| Upland paddy | 314(61) | 79(16) | | Jackfruit | 296 (58) | 18(3) |
| Finger millet | 314 (61) | 85(16) | | Jamun | 246 (48) | 51(10) |
| Redgram | 314 (61) | 30(6) | | Musambi | 296 (58) | 18(3) |
| Horse gram | 334(65) | 147 (29) | | Lime | 296 (58) | 18(3) |
| Field bean | 314 (61) | 30(6) | | Cashew | 250(64) | 64(12) |
| Cowpea | 314 (61) | 30(6) | | Custard apple | 314 (61) | 167 (33) |
| Groundnut | 107(21) | 327 (64) | | Amla | 314 (61) | 167 (33) |
| Sunflower | 296 (58) | 18(3) | | Tamarind | 246 (48) | 51(10) |
| Onion | 236 (46) | 108(21) | | Marigold | 314 (61) | 87(17) |
| Chilli | 314 (61) | 30(6) | | Chrysanthemum | 314 (61) | 87(17) |
| Brinjal | 314 (61) | 30(6) | | Jasmine | 314 (61) | 87(17) |
| Tomato | 314 (61) | 30(6) | | Coconut | 250(49) | 64(12) |
| Mango | 246 (48) | 51(10) | | Arecanut | 250(49) | 64(12) |
| Sapota | 296 (58) | 18(3) | | | | |

*Apart from the individual crop suitability, a proposed crop plan has been prepared for the 6 identified LUCs by considering only the highly and moderately suitable lands for different crops and cropping systems with food, fodder, fibre and horticulture crops.*

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

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

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

*Chapter 2*

# GEOGRAPHICAL SETTING

## 2.1 Location and Extent

Tumakuru District popularly known as *Kalpataru Nadu* (famous for production of Coconuts) is located in the south-eastern part of Karnataka State. The Ranganahalli microwatershed (Pillahalli Subwatershed) is located in the southern part of Karnataka in Gubbi Taluk, Tumakuru District, Karnataka State (Fig.2.1). It comprises parts of Malamachanakunte, Kallugudi, Thalekoppa, Ranganahalli and Ankasandra villages. It lies between 13$^{o}$ 28' and 13$^{o}$ 29' North latitudes and 76$^{o}$ 52' and 76$^{o}$ 54' East longitudes and covers an area of 511 ha. It is about 71 km south of Tumakuru and is surrounded by Malamachanakunte on the south-eastern, Ranganahalli on the north, Ankasandra on south, Kallugudi on northeastern and Thalekoppa on the western.

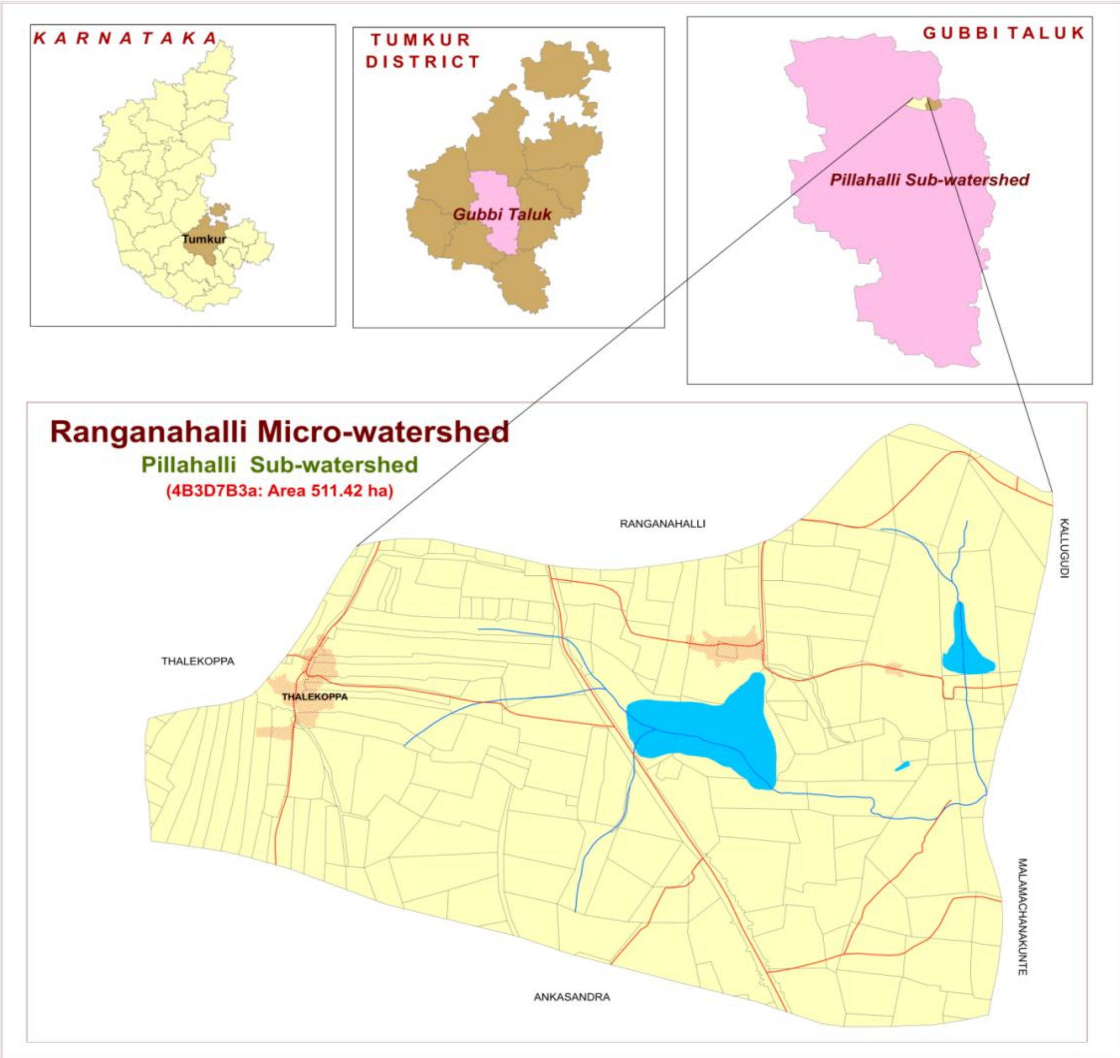



Fig.2.1 Location map of Ranganahalli Microwatershed

**2.2 Geology**

Major rock formations observed in the microwatershed are granite gneiss and alluvium (Figs.2.2 and 2.3). Granite and 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. The most widespread and characteristic development of alluvium in the watershed region lying in the Suvarnamukhi is a wide belt, the underlying formation is gneiss and alluvial soils occur over gneiss. 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.

Fig.2.2 Granite and granite gneiss rocks

Fig. 2.3 Alluvium

**2.3 Physiography**

Physiographically, the area has been identified as granite gneiss and alluvial landscape based on geology. It has been further divided into three landforms *viz*; mounds/ ridges, uplands and lowlands based on slope and other relief features. They have been further subdivided into four physiographic units, *viz;* summits, side slopes, very gently sloping uplands and lowlands/valleys. The elevation ranges from 835-851 m. The mounds and ridges are mostly covered by rock outcrops.

### 2.4 Drainage

There are no perennial rivers flowing in Gubbi taluk. However, the area is drained by several small seasonal streams like Hosa *kaluve* which joins river Shimsha along its course. Though, they are not perennial, during rainy season, it carries large quantities of rain water. The microwatershed area has only few small tanks which are not capable of storing water that flows 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 new 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 and is categorized as drought - prone with average annual rainfall of 813 mm (Table 2.1). Of the total rainfall, a maximum of 466 mm is received during south–west monsoon period from June to September, north-east monsoon from October to early December contributes maximum of about 196 mm and the remaining 151 mm is received during the rest of the year. The winter season is from December to February. During April and May, the temperatures reach up to 35°C and in December and January, the temperatures will go down to 20°C. Rainfall distribution is shown in Figure 2.4. The average Potential Evapo-Transpiration (PET) is 110 mm and varies from a low of 73 mm in December to 152 mm in the month of April. The PET is always higher than precipitation in all the months except in the last week of August, September and October. Generally, the Length of crop Growing Period (LGP) is 150 days and starts from 3$^{rd}$ week of June to third week of November.

**Table 2.1 Mean Monthly Rainfall, PET, 1/2 PET in Gubbi Taluk, Tumakuru District**

| Sl. no. | Months | Rainfall | PET | 1/2 PET |
|---|---|---|---|---|
| 1 | JAN | 6.50 | 78.30 | 39.15 |
| 2 | FEB | 7.00 | 102.70 | 51.35 |
| 3 | MAR | 24.40 | 142.60 | 71.30 |
| 4 | APR | 40.50 | 151.60 | 75.80 |
| 5 | MAY | 72.50 | 149.70 | 74.85 |
| 6 | JUN | 78.50 | 121.10 | 60.55 |
| 7 | JUL | 99.20 | 107.60 | 53.80 |
| 8 | AUG | 119.70 | 105.80 | 52.90 |
| 9 | SEP | 168.30 | 101.20 | 50.60 |
| 10 | OCT | 141.90 | 100.20 | 50.10 |
| 11 | NOV | 47.00 | 85.00 | 42.50 |
| 12 | DEC | 7.30 | 73.00 | 36.50 |
| Total | | 812.80 | 109.90 | |

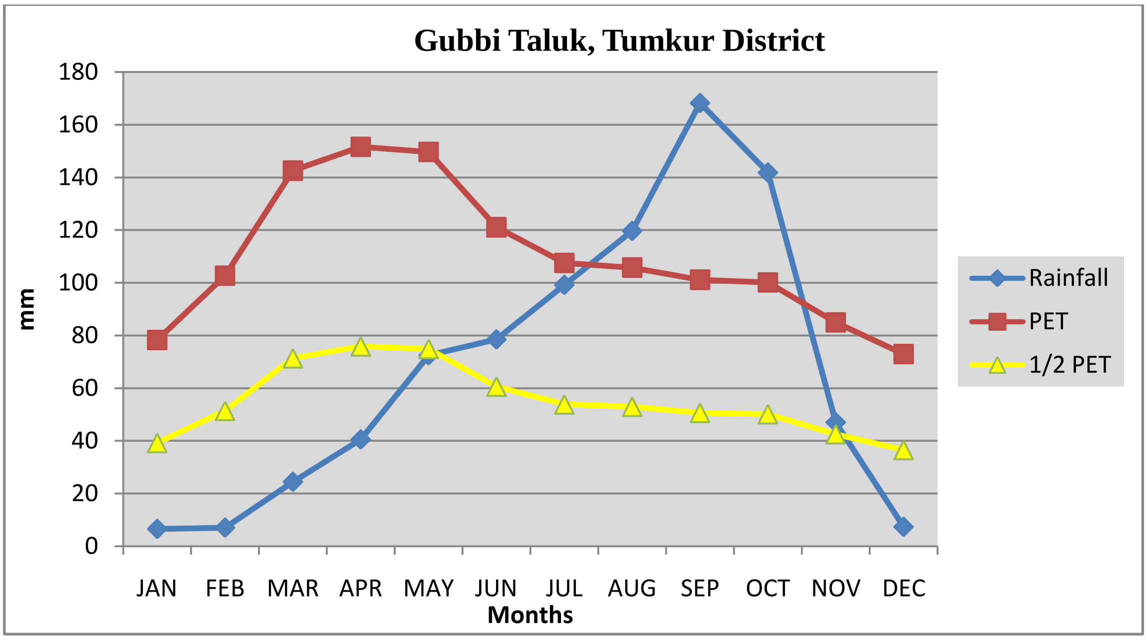



Fig 2.4 Rainfall distribution in Gubbi Taluk, Tumakuru District

## 2.6 Natural Vegetation

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

Apart from the continuing deforestation, the presence of large population of goats, sheep and other cattle in the 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 that eventually result in the heavy siltation of tanks and reservoirs in the microwatershed.

Fig. 2.5 Natural vegetation of Ranganahalli Microwatershed

### 2.7 Land Utilization

About 64 per cent area (Table 2.2) in Gubbi taluk is cultivated at present. An area of about 4 per cent is currently barren. Forests occupy an area of about 8 per cent. Most of the mounds, ridges and bouldery areas have very poor vegetative cover. Major crops grown in the area are Ragi, Groundnut, Maize, Sorghum, Sunflower, Red gram, Horse gram, Field bean, Cowpea, Mango, Banana, Mulberry and Plantation crops like, Coconut and Arecanut. The cropping intensity is 116 per cent in the taluk. 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 Ranganahalli microwatershed is prepared. The current land use map generated shows the arable and non-arable lands, other land uses and different types of crops grown in the area Fig (2.6). The different crops and cropping systems adopted in the microwatershed is presented in Figures 2.8.a &b. Simultaneously, enumeration of wells (bore wells and open wells) and existing conservation structures in the microwatershed are made and their location in different survey numbers is located on the cadastral map. Map showing the location of wells and other water bodies in Ranganahalli microwatershed is given in Fig.2.7.

**Table 2.2 Land Utilization in Gubbi Taluk**

| Sl. No. | Agricultural land use | Area ( ha) | Per cent |
|---|---|---|---|
| 1. | Total geographical area | 122057 | - |
| 2. | Total cultivated area | 78418 | 64.24 |
| 3. | Area sown more than once | 12934 | - |
| 4. | Cropping intensity | - | 116.49 |
| 5. | Trees and grooves | 2811 | 2.30 |
| 6. | Forest | 10090 | 8.26 |
| 7. | Cultivable wasteland | 2731 | 2.23 |
| 8. | Permanent Pasture land | 3850 | 3.15 |
| 9. | Barren land | 4971 | 4.07 |
| 10. | Non- Agriculture land | 17390 | 14.24 |

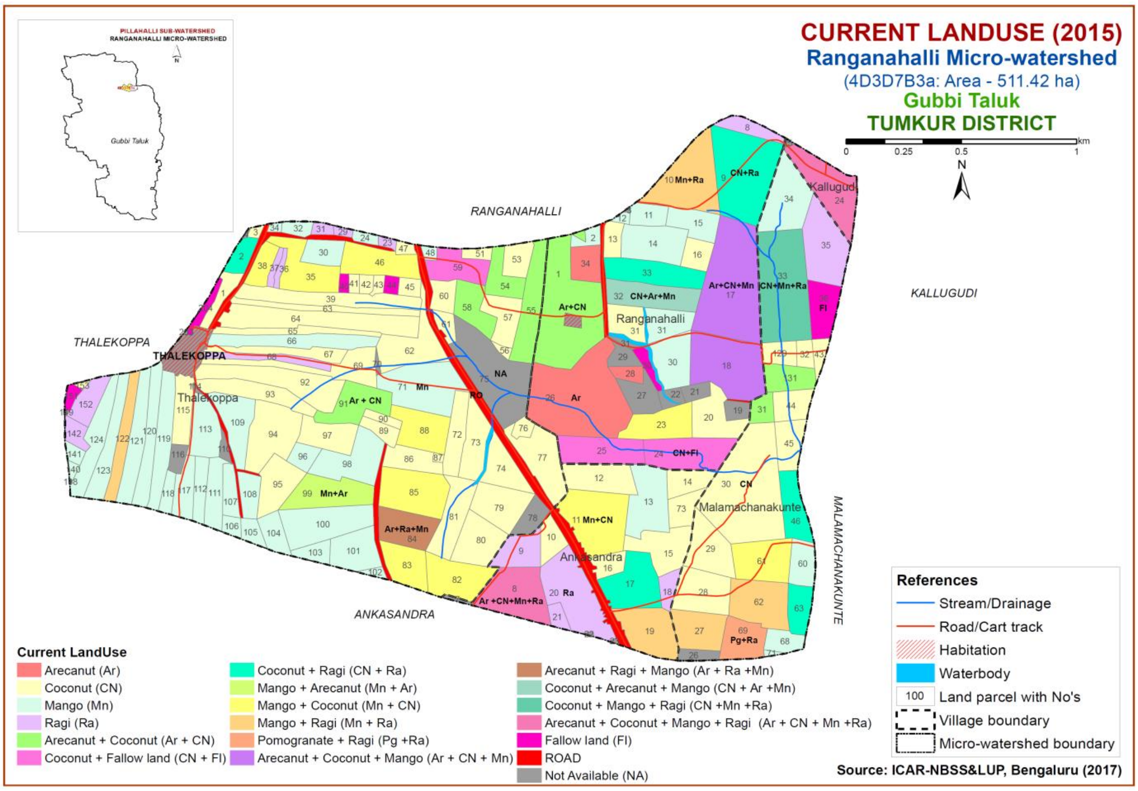



Fig.2.6 Current Land Use – Ranganahalli Microwatershed

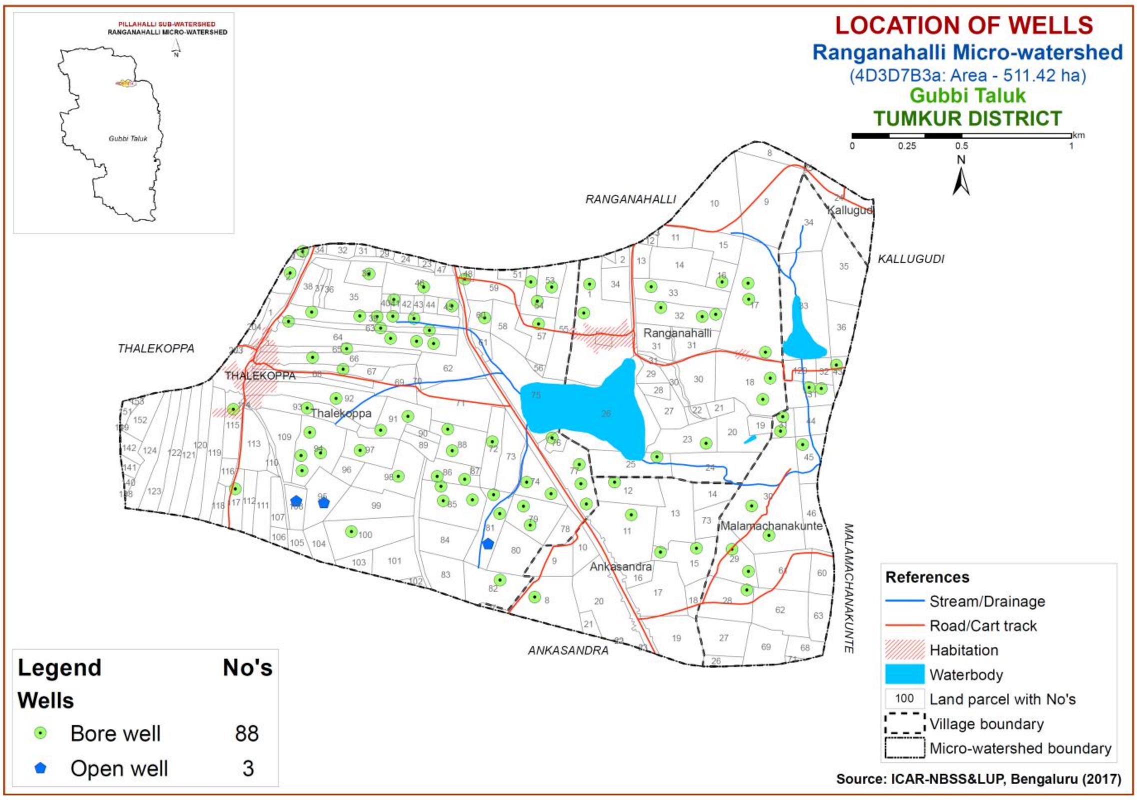



Fig.2.7 Location of Wells and Conservation Structures - Ranganahalli Microwatershed


Fig.2.8a Different crops and cropping systems in Ranganahalli Microwatershed


Fig.2.8.b Different crops and cropping systems in Nandihalli Microwatershed

*Chapter 3*

# SURVEY METHODOLOGY

The purpose of land resource inventory is to delineate similar areas (soil series and phases), which respond or expected to respond similarly to a given level of management. This was achieved in Ranganahalli microwatershed by the detailed study of all the soil characteristics (depth, texture, color, structure, consistence, coarse fragments, porosity, soil reaction, soil horizons etc.) and site characteristics (slope of the land, erosion, drainage, occurrence of rock fragments etc.) and followed by grouping of similar areas based on soil-site characteristics into homogeneous (management units) units, and showing their extent and geographic distribution on the microwatershed cadastral map. The detailed survey at 1:7920 scales was carried out in an area of 511 ha. The methodology followed for carrying out land resource inventory was as per the guidelines given in Soil Survey Manual (IARI, 1971; Soil Survey Staff, 2006; Natarajan *et al.,* 2015) which is briefly described below.

## 3.1 Base Maps

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

## 3.2 Image Interpretation for Physiography

False Color Composites (FCCs) of Cartosat-I and LISS-IV merged satellite data covering the microwatershed area was visually interpreted using image interpretation elements along with the geology map 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 landscape and is divided into land forms such as ridges, mounds, uplands and valleys based on slope and other relief features. 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) |
| | G24 | | Valleys/ lowlands |
| | | G241 | Valleys, pink tones |
| | | G242 | Valleys gray mixed with pink tones |

**DSe – Alluvial landscape**

DSe 1 – Summit

DSe 11 –

DSe 12 –

DSe 2 – Very gently sloping

DSe 21 – Very gently sloping, dark gray tone

DSe 22 – Very gently sloping, medium gray tone

DSe 23 – Very gently sloping, yellowish grey tone

DSe 24 – Very gently sloping, whitish grey tone

DSe 25 – Very gently sloping, whitish/ eroded/ calcareous tone

DSe 26- Very gently sloping, medium pink

DSe 3 – Valley/ Lowland

DSe 31 – Whitish gray/Calcareous
DSe 32 – Gray with pink patches
DSe 33 – Medium gray tone
DSe 34 – Lightish gray tone
DSe 35 – Dark gray tone

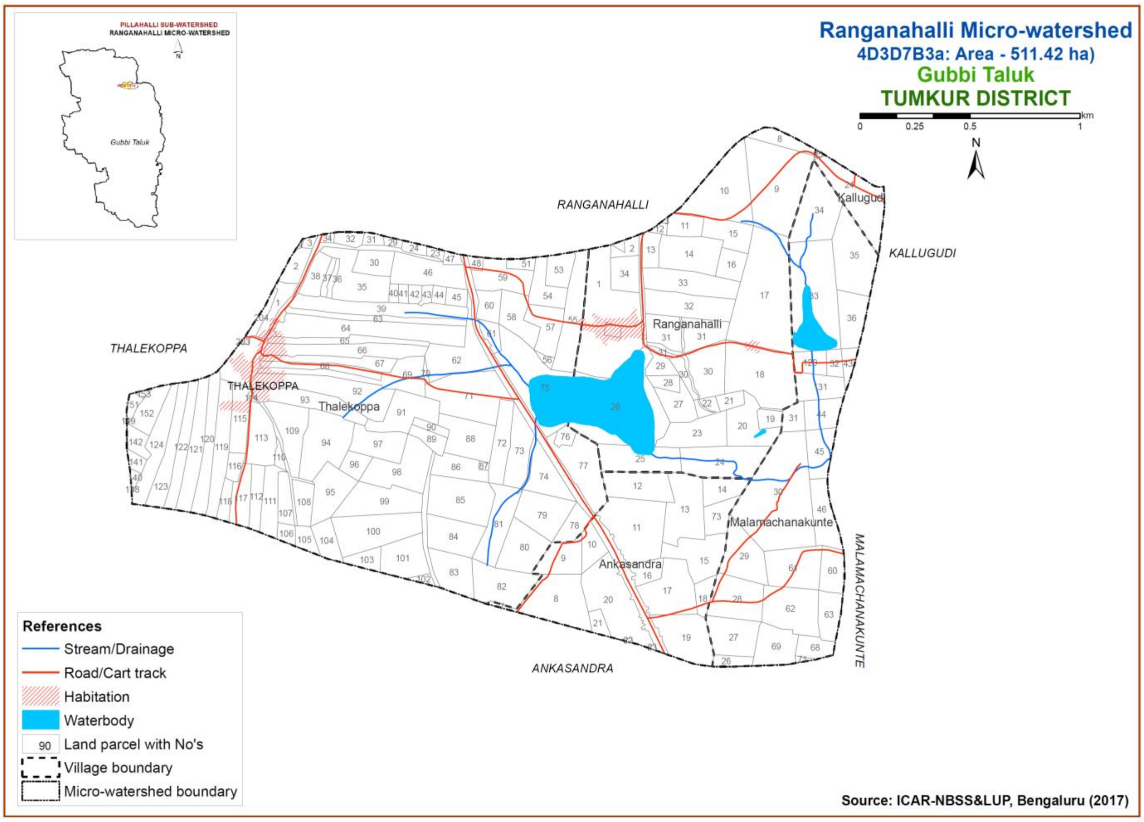



Fig 3.1 Scanned and Digitized Cadastral map of Ranganahalli Microwatershed

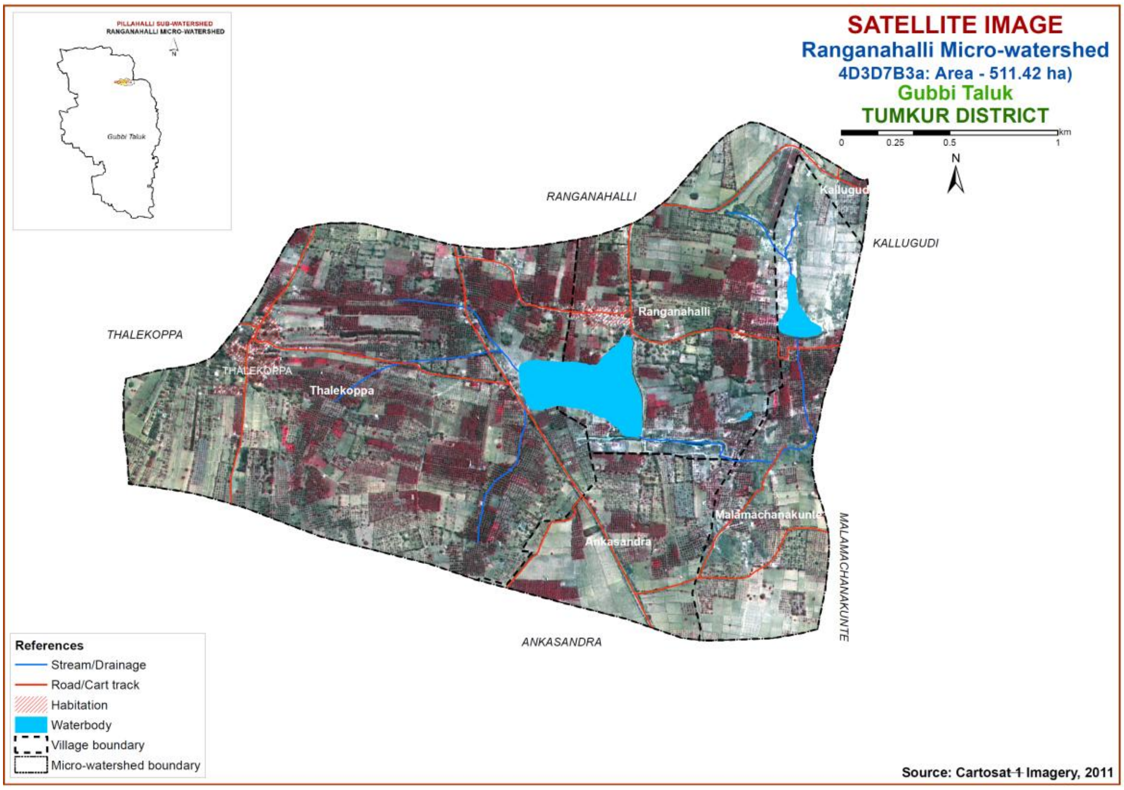



Fig.3.2 Satellite Image of Ranganahalli Microwatershed

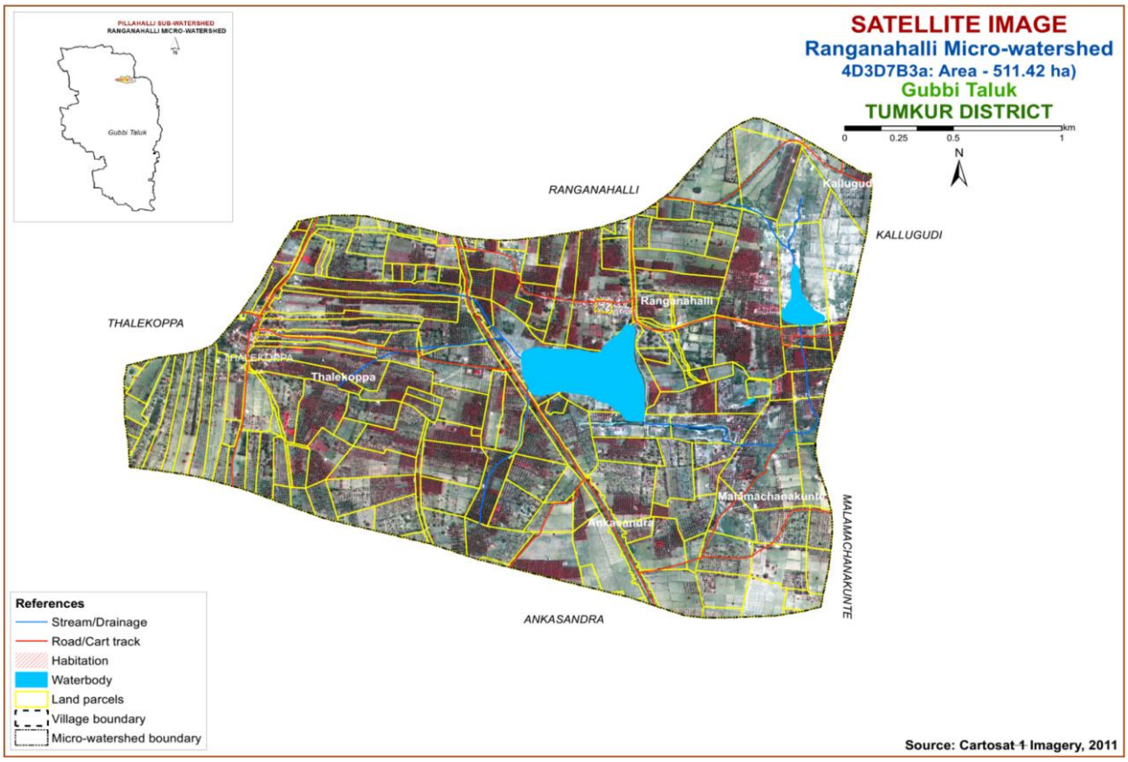



Fig.3.3 Cadastral map overlaid on IRS PAN+LISS IV merged imagery of Ranganahalli Microwatershed

### 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 toposheet. 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 valleys was carried out. Based on the variability observed on the surface, transects (Fig. 3.4) were selected across the slope covering all the landform units in the microwatershed (Natarajan and Dipak Sarkar, 2010).

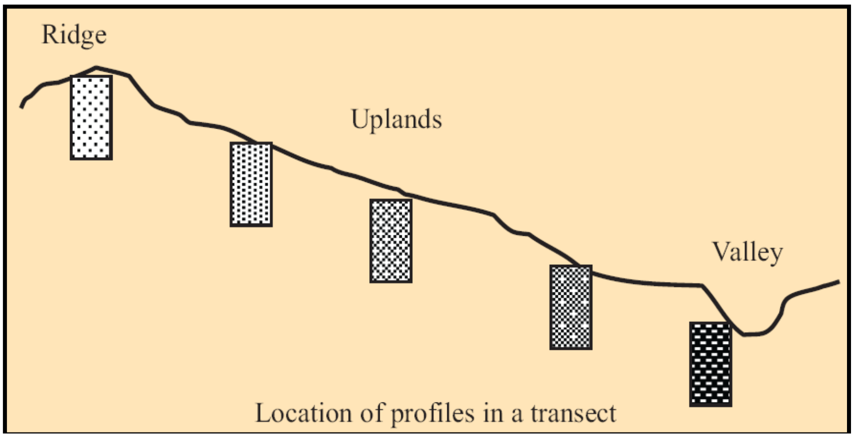



Fig: 3.4. Location of profiles in a transect

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

Based on soil characteristics, the soils were grouped into different soil series. Soil series is the most homogeneous unit having similar horizons and properties and behaves similarly for a given level of management. Soil depth, texture, colour, kind of horizon and horizon sequence, amount and nature of gravel present, nature of substratum etc, were used as the major differentiating characteristics for identifying soil series occurring in the area. The differentiating characteristics used for identifying the soil series are given in Table 3.1. Based on the above characteristics, 11 soil series were identified in the Ranganahalli 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)** | **Color (moist)** | **Texture (control section)** | **Gravel (%) (control section)** | **Horizon & Horizon sequence** | **Calcareo-usness** |
| 1. | Chikkasavanur (CSR) | 50-75 | 7.5YR 3/2,3/3,3/4 | scl | <15 | Ap-Bw-Cr | - |
| 2. | Kutegoudana Hundi (KGH) | 50-75 | 7.5YR3/2,3/3,3\4 | scl | 15-35 | Ap-Bt-Cr | - |
| 3. | Chikkamegheri (CKM) | 75-100 | 2.5YR 2.5/3, 3/4,3/6 | sc | <15 | Ap-Bt-Cr | - |
| 4. | Bidanagere (BDG) | 75-100 | 5YR3/3,3/4,4/3,5/4 2.5YR3/4 | gc | 35-60 | Ap-Bt-Cr | - |
| 5. | Mornal (MNL) | 100-150 | 5YR3/4 2.5YR3/4,4/6 | gsc-scl | 15-35 | Ap-Bt-Cr | e |
| 6. | Jedigere (JDG) | 100-150 | 5 YR4/6,3/4 7.5YR 3/4,4/6 | sc-c | <15 | Ap-Bt-Bc-Cr | - |
| 7. | Balapur (BPR) | 100-150 | 2.5YR 2.5/4,3/4 | gsc-c | >35 | Ap-Bt-Cr | - |
| 8. | Hallikere (HLK) | >150 | 5YR3/3,3/4 7.5YR3/3,3/4 | c | <15 | Ap-Bt | - |
| 9. | Ranatur (RTR) | >150 | 2.5YR2.5/3,2.5/4, 3/3,4/6 | c | <15 | Ap-Bt | - |
| 10. | Niduvalalu (NDL) | >150 | 2.5YR2.5/3,2.5/4, 3/3,4/6 | gsc | >35 | Ap-Bt | - |
| **Soils of Alluvial Landscape** | | | | | | | |
| 11. | Kadagathur (KDT) | >150 | 10 YR 3/1, 3/2, 3/3, 7.5YR 3/3, 3/4 | sc-c | - | Ap-Bw | - |

### 3.4 Soil Mapping

The area under each soil series was further separated into 11 soil phases and their boundaries delineated on the cadastral map based on the variations observed in the texture of the surface soil, slope, erosion, presence of gravel, stoniness etc. A soil phase is a subdivision of soil series based mostly on surface features that affect its use and management.

The soil mapping units are shown on the map (Fig.3.5) in the form of symbols. During the survey about 8 profile pits, few minipits and a few auger bores representing different landforms occurring in the microwatershed were studied. All the profile locations are indicated on the village cadastral map in the form of a triangle. In addition to the profile study, spot observations in the form of minipits, road cuts, terrace cuts etc., were studied to validate the soil boundaries on the soil map.

The soil map shows the geographic distribution of 18 mapping units representing 11 soil series occurring in the microwatershed. The soil map unit (soil legend) description is presented in Table 3.2. The soil phase map (management units) shows the distribution of 18 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 they have to be treated accordingly.

The 18 soil phases identified and mapped in the microwatershed were regrouped into 6 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 (LMUs) based on the management needs. One or more than one soil site characteristic having influence on the management have been chosen for identification and delineation of LMUs. For Ranganahalli 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.

### 3.5 Laboratory Characterization

Soil samples were collected from representative master profiles for laboratory characterization by following the methods outlined in the Laboratory Manual (Sarma *et al*, 1987). Surface soil samples collected in the year 2015 from farmer's fields (80 samples) for fertility status (major and micronutrients) at 250 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 Ranganahalli Microwatershed (Soil Legend)**

| Soil No | Soil Series | Soil Phase | Mapping Unit Description | Area in ha (%) |
|---|---|---|---|---|
| **SOILS OF GRANITE GNEISS LANDSCAPE** | | | | |
| | CSR | Chikkasavanur soils are shallow (25-50 cm), well drained, have dark brown to light yellowish brown sandy clay loam soils occurring on very gently sloping uplands under cultivation | | **6 (1.12)** |
| 1 | | CSRhB2g1 | Sandy clay loam surface, slope 1-3%, moderate erosion, gravelly (15-35%) | 6 (1.12) |
| | KGH | Kutegoudanahundi soils are moderately shallow (50-75 cm), well drained, have brown to dark brown gravelly sandy clay loam soils occurring on very gently to gently sloping uplands under cultivation | | **30 (5.79)** |
| 2 | | KGHcB2g2 | Sandy loam surface, slope 1-3%, moderate erosion, very gravelly (35-60%) | 20 (3.89) |
| 3 | | KGHcC2g2 | Sandy loam surface, slope 3-5%, moderate erosion, very gravelly (35-60%) | 10 (1.90) |
| | CKM | Chikkamegheri soils are moderately deep (75-100 cm), well drained, have dark brown to dark reddish brown sandy clay soils occurring on very gently sloping uplands under cultivation | | **18 (3.43)** |
| 4 | | CKMhB2g1 | Sandy clay loam surface, slope 1-3%, moderate erosion, gravelly (15-35%) | 18 (3.43) |
| | BDG | Bidanagere soils are moderately deep (75-100 cm), well drained, have dark reddish brown gravelly sandy clay loam to sandy clay soils occurring on very gently sloping uplands under cultivation | | **49 (9.53)** |
| 5 | | BDGhB2 | Sandy clay loam surface, slope 1-3%, moderate erosion | 43 (8.44) |
| 6 | | BDGhB2g1 | Sandy clay loam surface, slope 1-3%, moderate erosion, gravelly (15-35%) | 6 (1.09) |
| | MNL | Mornal soils are deep (100-150 cm), well drained, have dark reddish brown to red sandy clay soils occurring on very gently sloping uplands under cultivation | | **51 (9.90)** |
| 7 | | MNLhB2 | Sandy clay loam surface, slope 1-3%, moderate erosion | 51 (9.90) |
| | JDG | Jedigere soils are deep (100-150 cm), well drained, have dark brown to dark reddish brown sandy clay to clay soils occurring on very gently sloping uplands under cultivation | | **39 (7.63)** |
| 8 | | JDGhB1 | Sandy clay loam surface, slope 1-3%, slight erosion | 39 (7.63) |
| | BPR | Balapur soils are deep (100-150 cm), well drained, have dark reddish brown to dark red gravelly sandy clay to clay soils occurring on very gently sloping uplands under cultivation | | **31 (6.04)** |
| 9 | | BPRhB2 | Sandy loam surface, slope 1-3%, moderate erosion | 31 (6.04) |
| | HLK | Hallikere soils are very deep (>150 cm), well drained, have dark brown to dark reddish brown clayey soils occurring on very gently sloping uplands under cultivation | | **83 (16.14)** |

| | | | | |
|---|---|---|---|---|
| 10 | | HLKcB2 | Sandy loam surface, slope 1-3%, moderate erosion | 66(12.88) |
| 11 | | HLKhB2g1 | Sandy clay loam surface, slope 1-3%, moderate erosion, gravelly (15-35%) | 17 (3.26) |
| | RTR | Ranatur soils are very deep (>150 cm), well drained, have dark reddish brown to dark red clay soils occurring on very gently sloping uplands under cultivation | | **46 (9.04)** |
| 12 | | RTRcB1 | Sandy loam surface, slope 1-3%, slight erosion | 8 (1.66) |
| 13 | | RTRhB1 | Sandy clay loam surface, slope 1-3%, slight erosion | 24 (4.67) |
| 14 | | RTRiB1 | Sandy clay surface, slope 1-3%, slight erosion | 14 (2.71) |
| | NDL | Niduvalalu soils are very deep (>150 cm), well drained, have red to dark reddish brown gravelly sandy clay soils occurring on very gently sloping uplands under cultivation | | **57 (11.2)** |
| 15 | | NDLcB1 | Sandy loam surface, slope 1-3%, slight erosion | 20 (3.98) |
| 16 | | NDLiB1g1 | Sandy clay surface, slope 1-3%, slight erosion, gravelly (15-35%) | 37 (7.22) |
| **SOILS OF ALLUVIAL LANDSCAPE** | | | | |
| | KDT | Kadagathur soils are very deep (>150 cm), moderately well drained, have dark brown to very dark grayish brown sandy clay to clay soils occurring on very gently sloping uplands under cultivation | | **77 (15.21)** |
| 17 | | KDThB1 | Sandy clay loam surface, slope 1-3%, slight erosion | 35 (6.93) |
| 18 | | KDTiA1 | Sandy clay surface, slope 0-1%, slight erosion | 42 (8.28) |
| | Others | Habitation & Waterbody | | **25 (4.95)** |

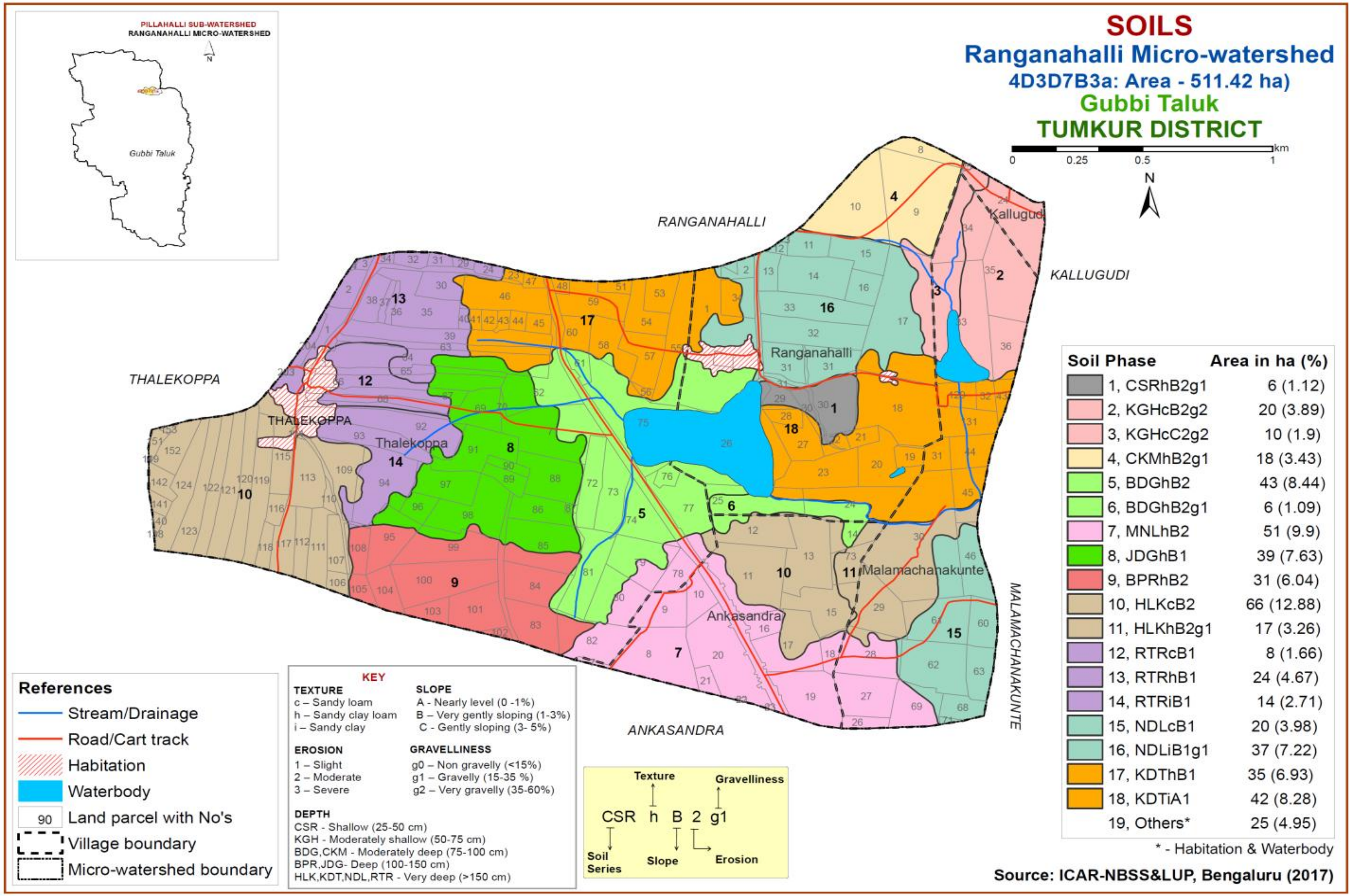



Fig 3.5 Soil Phase or Management Units Map - Ranganahalli Microwatershed

*Chapter 4*

# THE SOILS

Detailed information pertaining to the nature, extent and their distribution of different kinds of soils occurring in Ranganahalli microwatershed is provided in this chapter. The microwatershed area has been identifies as granite gneiss and alluvial landscape based on geology. In all, 11 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 parent material, relief and climate.

A brief description of each of the 11 soil series identified followed by 18 soil phases (management units) mapped under each series (Fig. 3.5) are furnished below. The soils in any one map unit differ from place to place in their depth, texture, slope, gravelliness, erosion or any other site characteristics that affect management. The soil phase map can be used for identifying the suitability of areas for growing specific crops or for other alternative uses and also for deciding the type of conservation structures needed. The detailed information on soil and site-characteristics like soil depth, surface soil texture, slope, erosion, gravelliness, AWC, LCC etc, with respect to each of the soil phase identified is given village/survey number wise for the microwatershed in Appendix-I.

## 4.1 Soils of Granite gneiss Landscape

In this landscape, 10 soil series are identified and mapped. Of these, Hallikere (HLK) soil series occupies maximum area of about 83 ha (16%) and Niduvalalu (NDL) 57 ha (15%) area. The brief description of each soil series and number of phases identified in the microwatershed are given below. The mapping unit description (Soil Legend) of the phases identified and mapped under each series is given in Table 3.2.

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

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


Landscape and soil profile characteristics of Chikkasavanur (CSR) Series

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

The thickness of the solum ranges from 50 to 74 cm. The thickness of A horizon ranges from 12 to 22 cm. Its colour is in 7.5 YR and 10 YR hue with value and chroma 3 to 4. The texture varies from loamy sand to sandy loam with 15 to 30 per cent gravel. The thickness of B horizon ranges from 40 to 62 cm. Its colour is in 7.5 YR hue with value and chroma 3 to 4. Its texture is sandy clay loam with gravel content of 15 to 35 per cent. The available water capacity is medium (100-150 mm/m). Two Phases were identified and mapped.

Landscape and soil profile characteristics of Kutegoudanahundi (KGH) Series

**4.1.3 Chikkamegheri (CKM) Series:** Chikkamegheri soils are moderately deep (75-100 cm), well drained, have dark brown to dark reddish brown and red sandy clay to clay soils. They have developed from granite gneiss and occur on nearly level to very gently sloping uplands. The Chikkamegheri series has been classified as 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

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

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


Landscape Soil Profile Characteristics of Bidanagere (BDG) Series

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

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

Landscape and soil profile characteristics of Mornal (MNL) Series

**4.1.6 Jedigere (JDG) Series:** Jedigere soils are deep (100-150 cm) well drained, have yellowish red to strong brown soils. They have developed from granite gneiss and occur on nearly level to very gently sloping uplands under cultivation.

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 10 YR and 7.5 YR with value 2 to 4 and chroma 3 to 6. Its texture is dominantly clay. The available water capacity is very high (>200mm/m). Only one phase was identified and mapped.

Landscape and Soil Profile Characteristics of Jedigere (JDG) Series

**4.1.7 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 soil series has been classified as clayey-skeletal, mixed, isohyperthermic family of Typic Rhodustalfs

Landscape and soil profile characteristics of Balapur (BPR) Series

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). Only one phase was identified and mapped.

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

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

Landscape Soil Profile Characteristics of Hallikere (HLK) Series

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

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

Landscape and soil profile characteristics of Ranatur (RTR) Series

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

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

Landscape Soil Profile Characteristics of Niduvalalu (NDL) Series

**4.2 Soils of Alluvial Landscape**

In this landscape, only one soil series (Kadagathur) are identified and mapped. It covers about 77 ha in the microwatershed. The brief description of Kadagathur (KDT) series identified and mapped as one soil phase is given below.

**4.2.1 Kadagathur (KDT) Series:** Kadagathur soils are very deep (>150 cm), moderately well drained, have dark brown to very dark grayish 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 thickness of the solum is more than 150 cm. The thickness of A horizon ranges from 8 to 14 cm. Its colour is in 10 YR hue with value 3 and chroma 4. The texture varies is sandy loam. The thickness of B horizon is more than 150 cm. Its colour is in 10 YR and 7.5 YR hue with value 3 and chroma 1 to 4. Its texture is sandy clay to clay. The available water capacity is very high (>200 mm/m).nTwo phases were identified and mapped.


Landscape and soil profile characteristics of Kadagathur (KDT) Series

***Chapter 5***

# INTERPRETATION FOR LAND RESOURCE MANAGEMENT

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

*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 moderate 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 18 soil map units identified in the Ranganahalli microwatershed are grouped under 2 land capability classes and 5 land capability subclasses. About 95 per cent in the microwatershed is suitable for agriculture and an area of about 5 percent is not suitable for agriculture (Fig. 5.1).

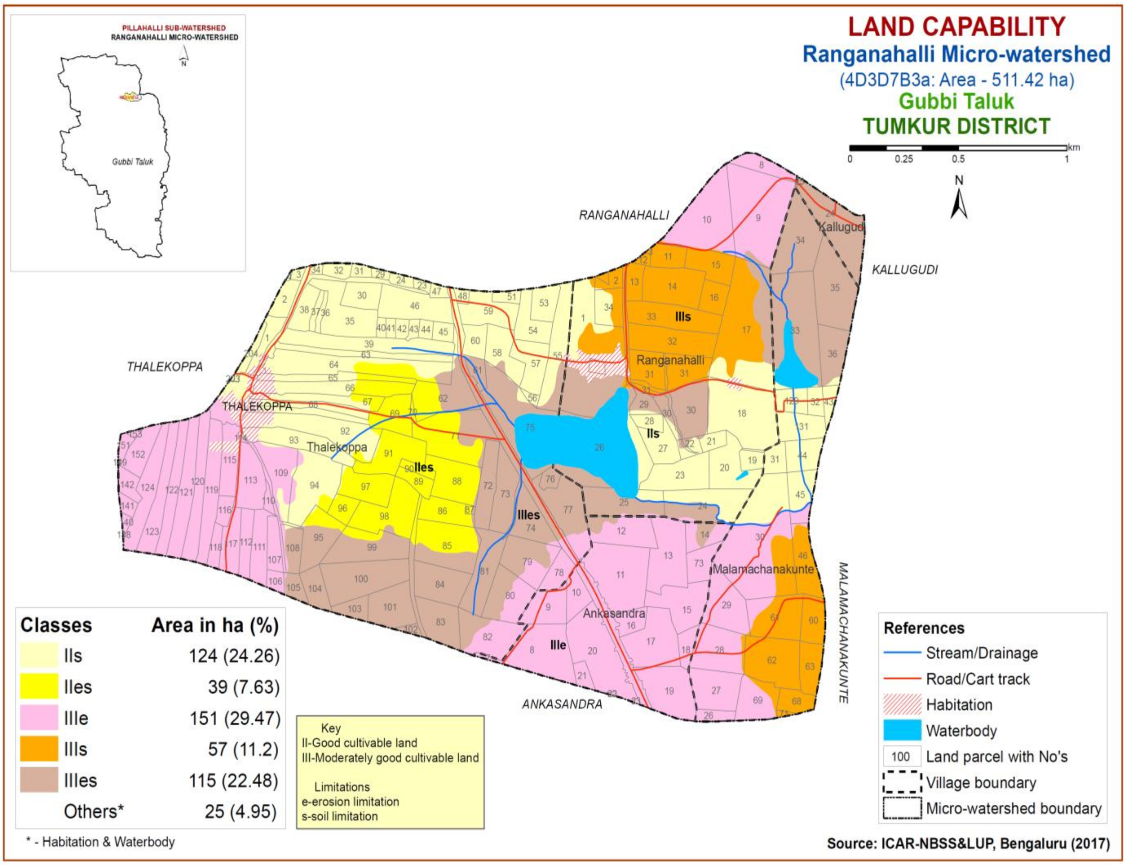



Fig. 5.1 Land Capability map of Ranganahalli Microwatershed

Good cultivable lands (Class II) cover maximum area of about 163 ha (32%) and are distributed in the northwestern, central and eastern part of the microwatershed with minor problem of soil and erosion. Moderately good cultivable lands (Class III) cover an area of about 323 ha (63%) and are distributed in major parts of the microwatershed with moderate problems of erosion and soil.

**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. The area extent and their geographical distribution in the microwatershed are given in Fig. 5.2.

A very small area of about 6 ha (1%) is shallow (25-50 cm) and are distributed in the central part of the microwatershed. An area of about 30 ha (6%) is moderately shallow (50-75 cm) soils and occur in the northwestern part of the microwatershed. Moderately deep (75-100 cm) soils occupy an area of about 66 ha (13%) and are distributed in the northeastern and central part of the microwatershed. Deep (100-150 cm) soils occupy an area of 121 ha (24%) and are distributed in the southern part of the microwatershed. Very deep (>150 cm) soils cover maximum area of about 264 ha (52%) and are distributed in the western, northern and eastern part of the microwatershed.

The most productive lands 385 ha (75%) with respect to soil rooting depth where all climatically adapted annual and perennial crops can be grown are very deep (>150 cm depth) and deep (100-150 cm) occurring in the major part of the microwatershed.

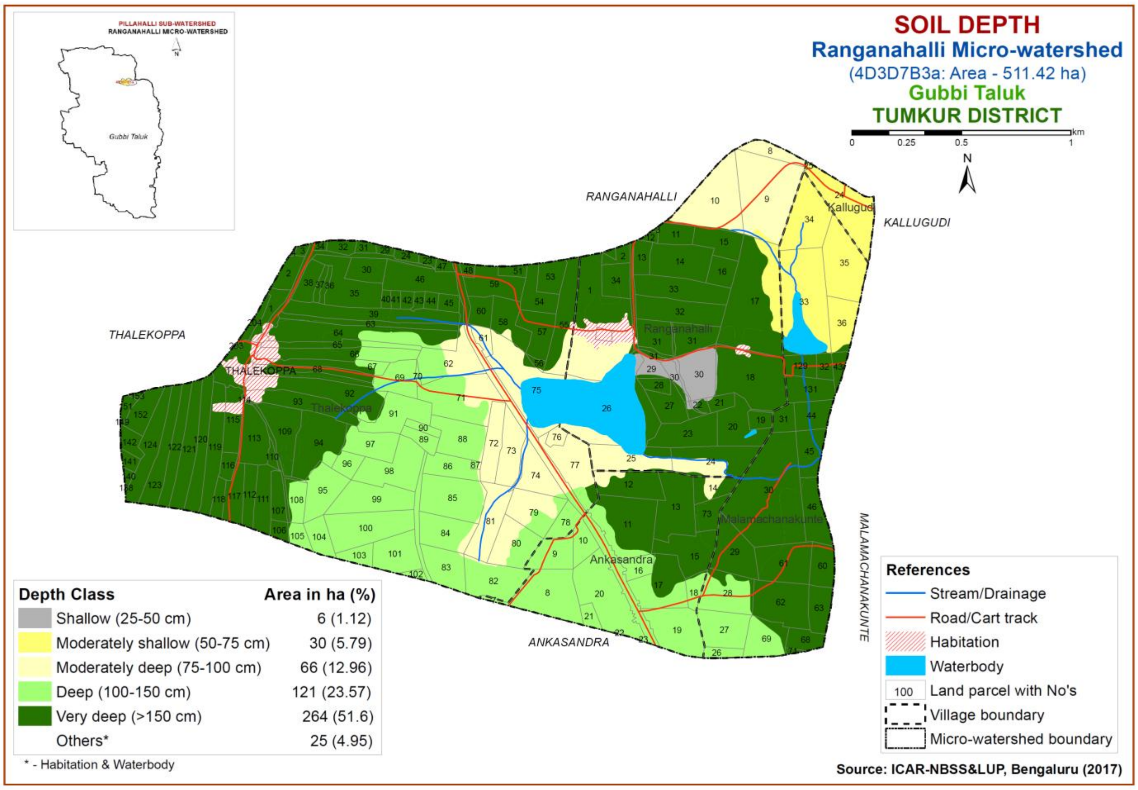



Fig. 5.2 Soil Depth map of Ranganahalli Microwatershed

### 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. The area extent and their geographical distribution in the microwatershed is shown in Figure 5.3.

Maximum area of about 393 ha (77%) has soils that are loamy soils. They are distributed in major parts of the microwatershed and an area of 93 ha (18%) has soils that are clayey at the surface and are distributed in the central and eastern part of the microwatershed (Fig. 5.3).

The most productive lands (18%) 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 problems of drainage, infiltration, workability and other physical problems. The other most productive lands (77%) are loamy soils which also have high potential for AWC, nutrient availability but have no drainage or other physical problems.

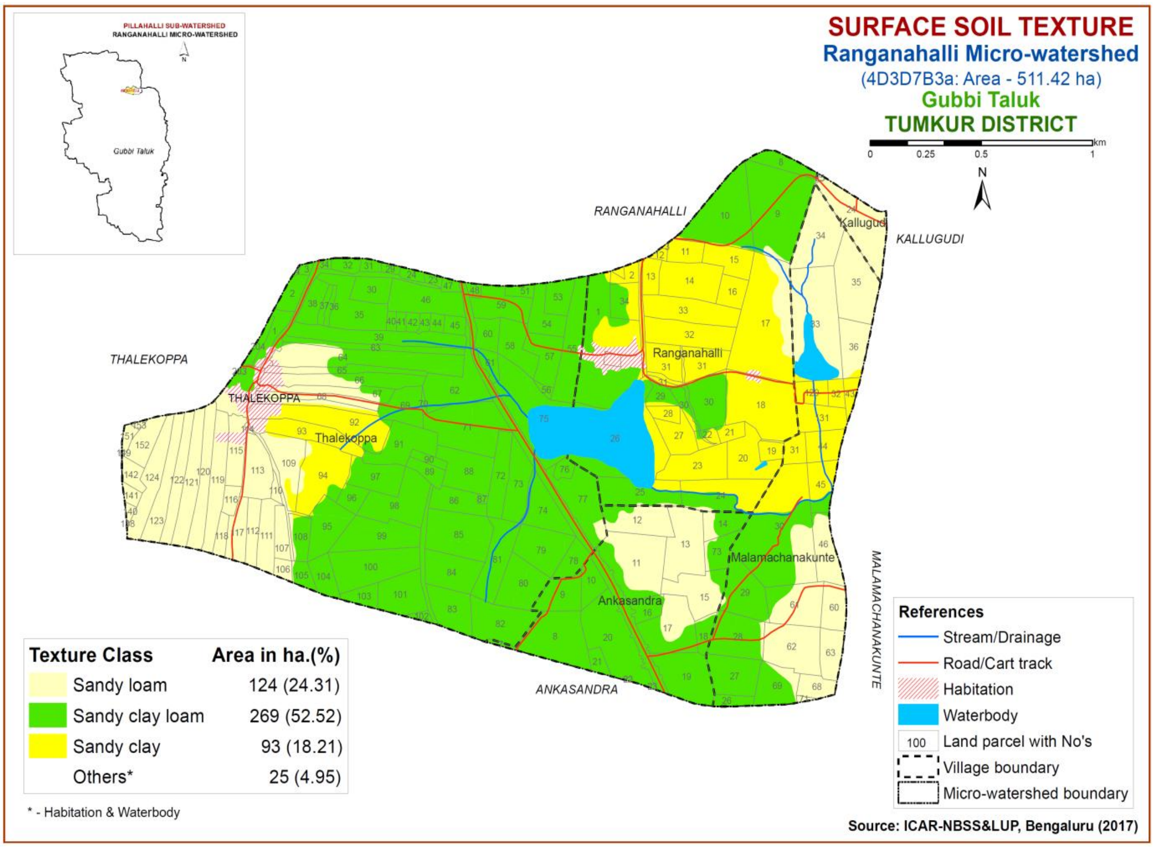



Fig. 5.3 Surface Soil Texture map of Ranganahalli Microwatershed

### 5.4 Soil Gravelliness

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

Maximum area of about 374 ha (73%) land covered with non gravelly (<15%) soils and occur in all parts of the microwatershed. An area of about 82 ha (16%) is gravelly (15-35%) and occur in the northeastern and eastern part of the microwatershed. An area of about 30 ha (6%) is covered with very gravelly (35-60%) and is distributed in the northeastern part of the microwatershed (Fig 5.4).

The problem soils (22%) that are gravelly to very gravelly (15-60%) where only short duration crops can be grown and are distributed in the northwestern part of the microwatershed.

The most productive soils (73%) that are non gravelly (<15%) and are distributed in all parts of the microwatershed where all climatically adopted crops can be grown.

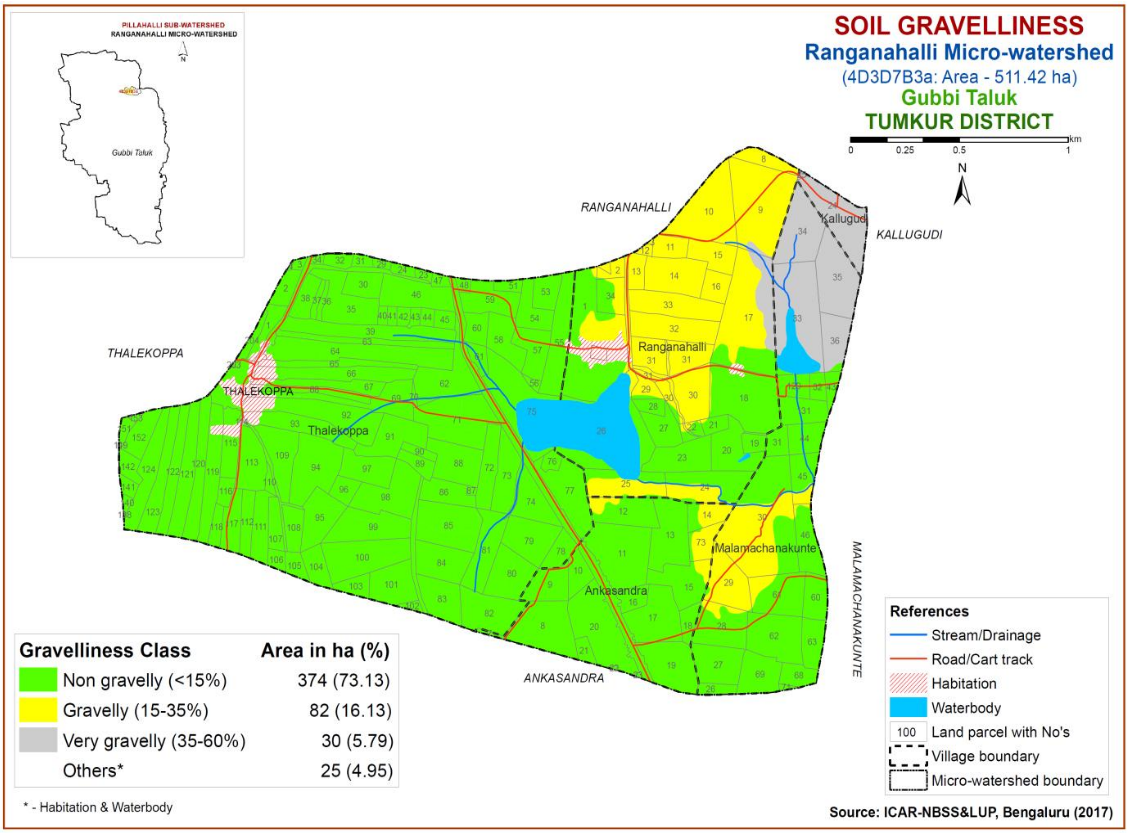



Fig. 5.4 Soil Gravelliness map of Ranganahalli Microwatershed

### 5.5 Available Water Capacity

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

Very low (<50 mm/m) in available water capacity occupy an area of about 54 ha (11%) and are occur in the central part of the microwatershed. An area of about 135 ha (26%) that are low (51-100 mm/m) in available water capacity and are distributed in the northeastern, south-eastern and southwestern part of the microwatershed. An area of about 218 ha (43%) is medium (101-150 mm/m) in available water capacity and are distributed in the western, southern and northwestern part of the microwatershed. An area of 78 ha (15%) is very high (>200 mm/m) and are distributed in the northern and eastern part of the microwatershed.

About 189 ha (37%) area in the microwatershed has soils that are problematic with regard to available water capacity. Here, only short or medium duration crops can be grown and the probability of crop failure is very high. These areas are best put to other alternative uses.

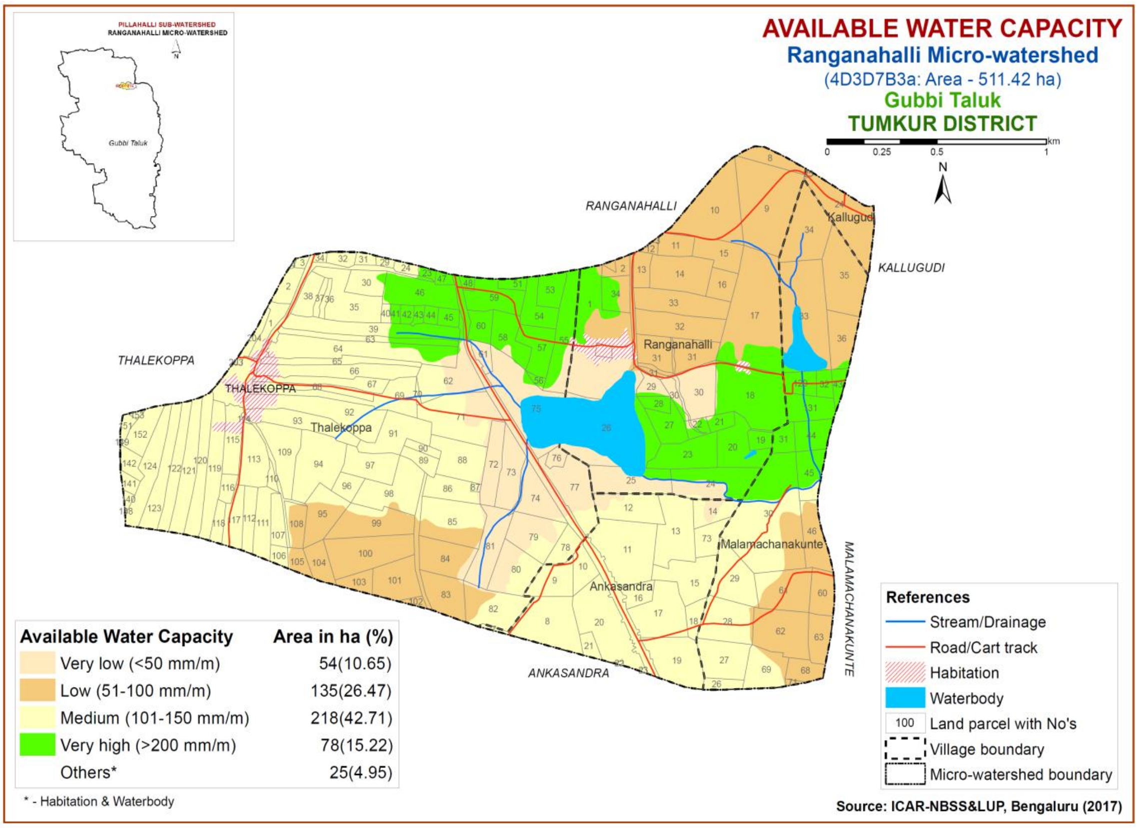



Fig. 5.5 Soil Available Water Capacity map of Ranganahalli Microwatershed

### 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 in the microwatershed (Fig. 5.6).

Major area of about 434 ha (85%) falls under very gently sloping (1-3% slope) lands and is distributed in major parts of the microwatershed and an area of about 42 ha (8%) is under nearly level (0-1%) and distributed in the eastern part of the microwatershed. A very small area of about 10 ha (2%) is gently sloping (3-5%) and occur in the northeastern part of the microwatershed.

About 93 per cent area in the microwatershed has soils that have high potential in respect of soil slopes. In these areas, all climatically adapted annual and perennial crops can be grown without much soil and water conservation and other land development measures.

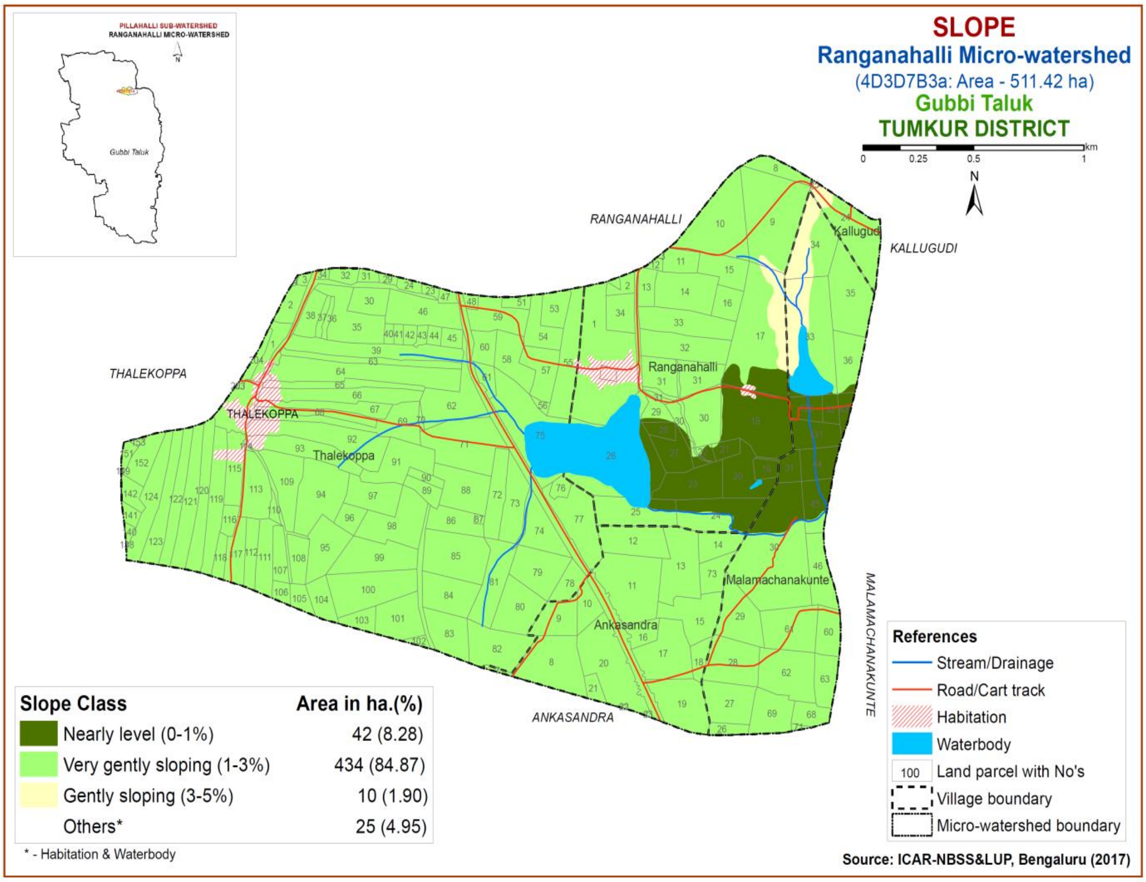



Fig. 5.6 Soil Slope map of Ranganahalli Microwatershed

## 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 soil erosion map generated. The area extent and their spatial distribution in the microwatershed is given in Figure 5.7.

Soils that are moderately eroded (e2 class) cover maximum area of about 266 ha (52%) in the microwatershed. They are distributed in the western, southern, central and northeastern part of the microwatershed. Slightly eroded (e1 class) soils cover a maximum area of about 220 ha (43%) and are distributed in the northern, central and eastern part of the microwatershed.

An area of about 266 ha (52%) in the microwatershed is problematic because of moderate erosion. For these areas taking up soil and water conservation and other land development measures is needed.

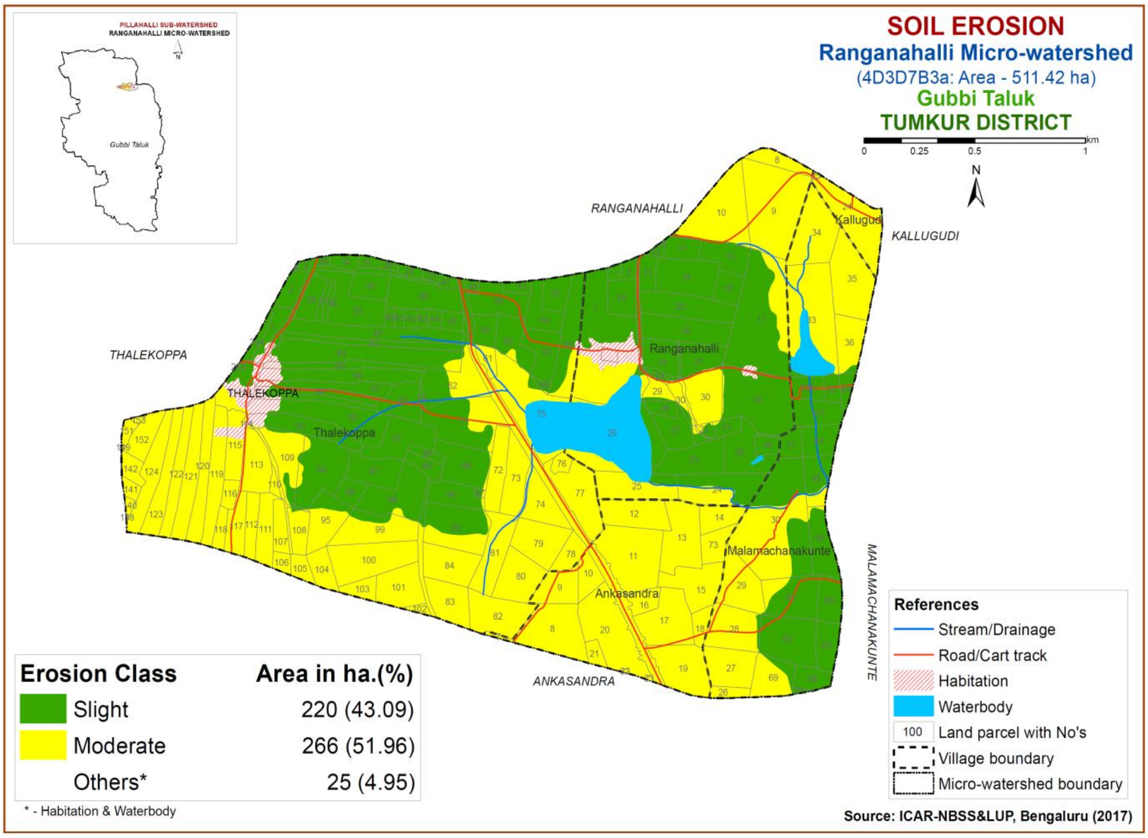



Fig. 5.7 Soil Erosion map of Ranganahalli Microwatershed

# FERTILITY STATUS

Soil fertility plays an important role in increasing crop yield. The adoption of high yielding varieties that require high amounts of nutrients has resulted in deficiency symptoms in crops and plants due to imbalanced fertilization and poor inherent fertility status as the area is 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 250 m interval) all over the microwatershed through land resource inventory in the year 2015 were analysed for pH, EC, organic carbon, available phosphorus and potassium, and for micronutrients like zinc, boron, copper, iron and manganese, and secondary nutrient sulphur.

Soil fertility data generated has been assessed and individual maps for all the nutrients for the microwatershed have been generated using 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 Ranganahalli microwatershed for soil reaction (pH) showed that an area of about 79 ha (15%) is moderately acidic (pH 5.5-6.0) and are distributed in the south-eastern, western and northeastern part of the microwatershed. An area of 44 ha (8%) is strongly acid (pH 5.0-5.5) and are distributed in the south-eastern part of microwatershed. An area of 103 ha (20%) is slightly acid (pH 6.0-6.5) and are distributed in the southwestern, northeastern and south-eastern part of the microwatershed and neutral (pH 6.5-7.3) occupy maximum area of about 225 ha (44%) and are distributed in the western, northern, central and eastern part of the microwatershed (Fig.6.1).

## 6.2 Electrical Conductivity (EC)

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

## 6.3 Organic Carbon

The soil organic carbon (an index of available Nitrogen) content in the microwatershed is low (<0.5%) covering a maximum area of about 341 ha (67%) and is distributed in all parts of the microwatershed and medium (0.5-0.75%) in an area of about 142 ha (28%) area and are distributed in the northern and southern part of the microwatershed. A very small area of about 3 ha (<1%) is high in organic carbon and occurring in the northern part of the microwatershed (Fig.6.3).

## 6.4 Available Phosphorus

Available phosphorus content is high (>57 kg/ha) in an area of about 154 ha (30%) and are distributed in the southwestern, central and eastern part of the microwatershed. Maximum area of about 333 ha (65%) is medium (23-57 kg/ha) in available phosphorous and occurs in the major part of the microwatershed (Fig 6.4).

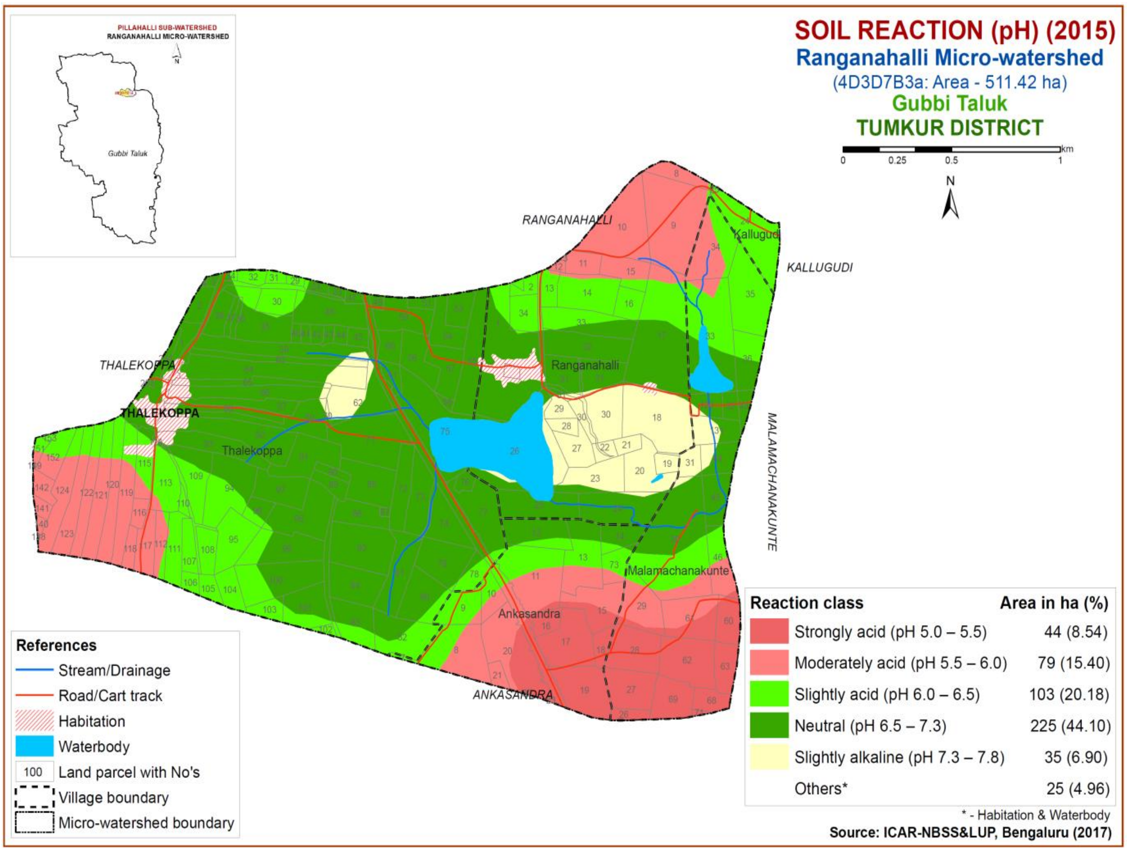



Fig.6.1 Soil Reaction (pH) map of Ranganahalli Microwatershed

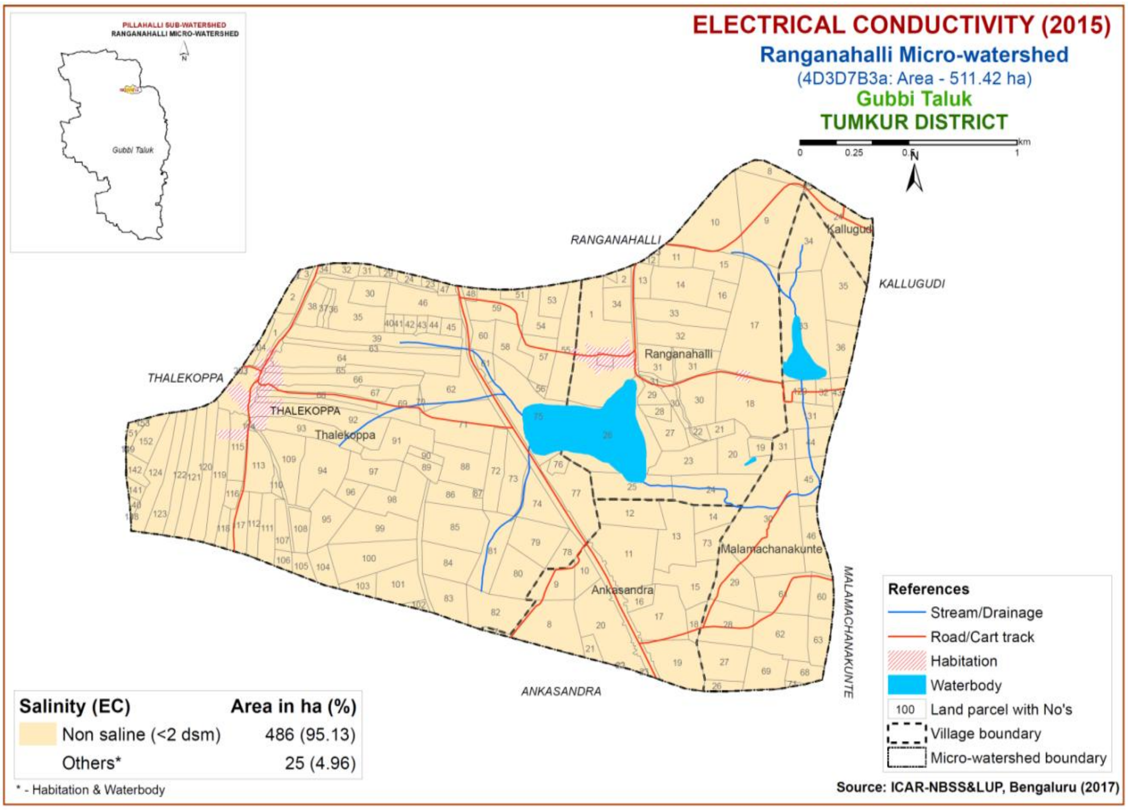



Fig.6.2 Electrical Conductivity (EC) map of Ranganahalli Microwatershed

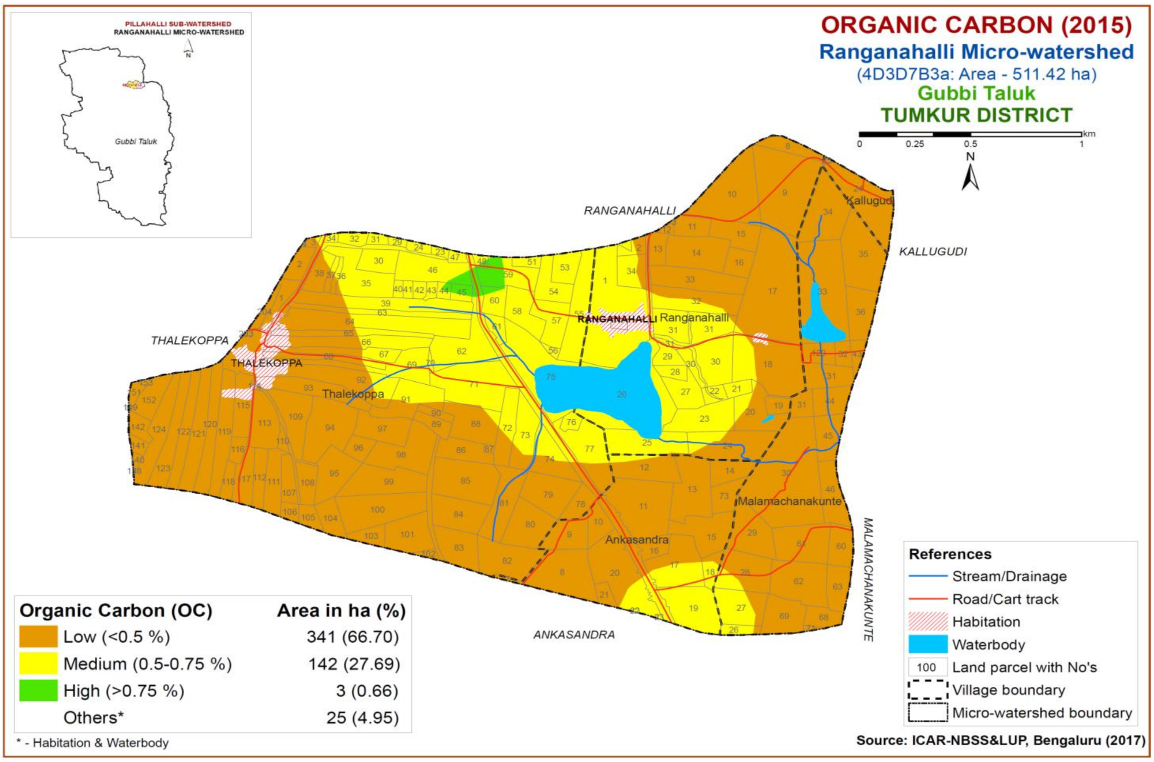



Fig.6.3 Soil Organic Carbon map of Ranganahalli Microwatershed

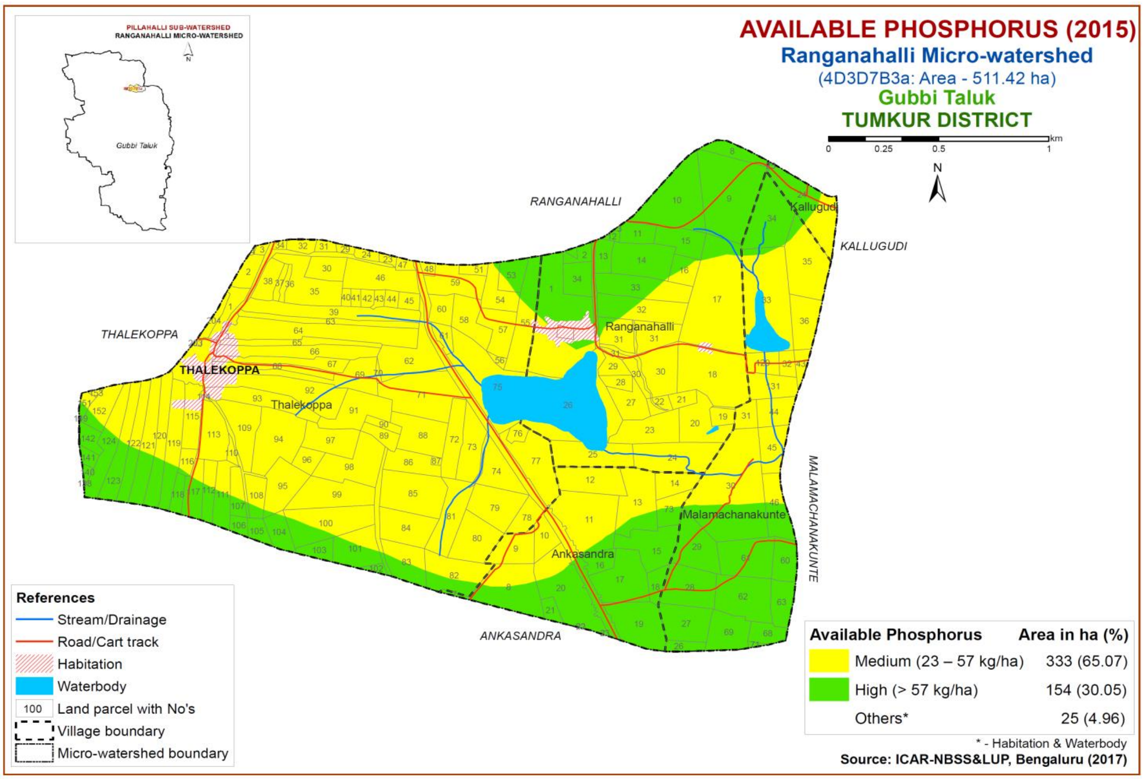



Fig.6.4 Soil Available Phosphorus map of Ranganahalli Microwatershed

## 6.5 Available Potassium

Available potassium content is medium (145-337 kg/ha) in maximum area of about 262 ha (51%) and is distributed in the southwestern, northeastern and eastern part of the microwatershed (Fig.6.5). An area of about 41 ha (8%) is low in available potassium (< 145 kg/ha) and is distributed in the western and south-eastern part of the microwatershed. High available potassium (>337 kg/ ha) occupy an area of about 183 ha (36%) and is distributed in the northwestern and central part of the microwatershed.

### 6.6 Available Sulphur

Available sulphur content is medium (10-20 ppm) in the entire area of the microwatershed (Fig.6.6).

### 6.7 Available Boron

Available boron content is medium (0.5-1.0 ppm) in an area of 96 ha (19%) and is distributed in the northwestern and eastern part of the microwatershed. Maximum area of about 390 ha (76%) is low (<0.5 ppm) in available boron and is distributed in all parts of the microwatershed (Fig.6.7).

### 6.8 Available Iron

Available iron content is sufficient (>4.5 ppm) in entire area in the microwatershed (Fig 6.8).

### 6.9 Available Manganese

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

### 6.10 Available Copper

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

### 6.11 Available Zinc

Available zinc content is deficient (<0.6 ppm) in maximum area of 315 ha (61%) and are distributed in the major part of the microwatershed and an area of 171 ha (33%) is sufficient (>0.6 ppm) and are distributed in the northern and central part of the microwatershed (Fig 6.11).

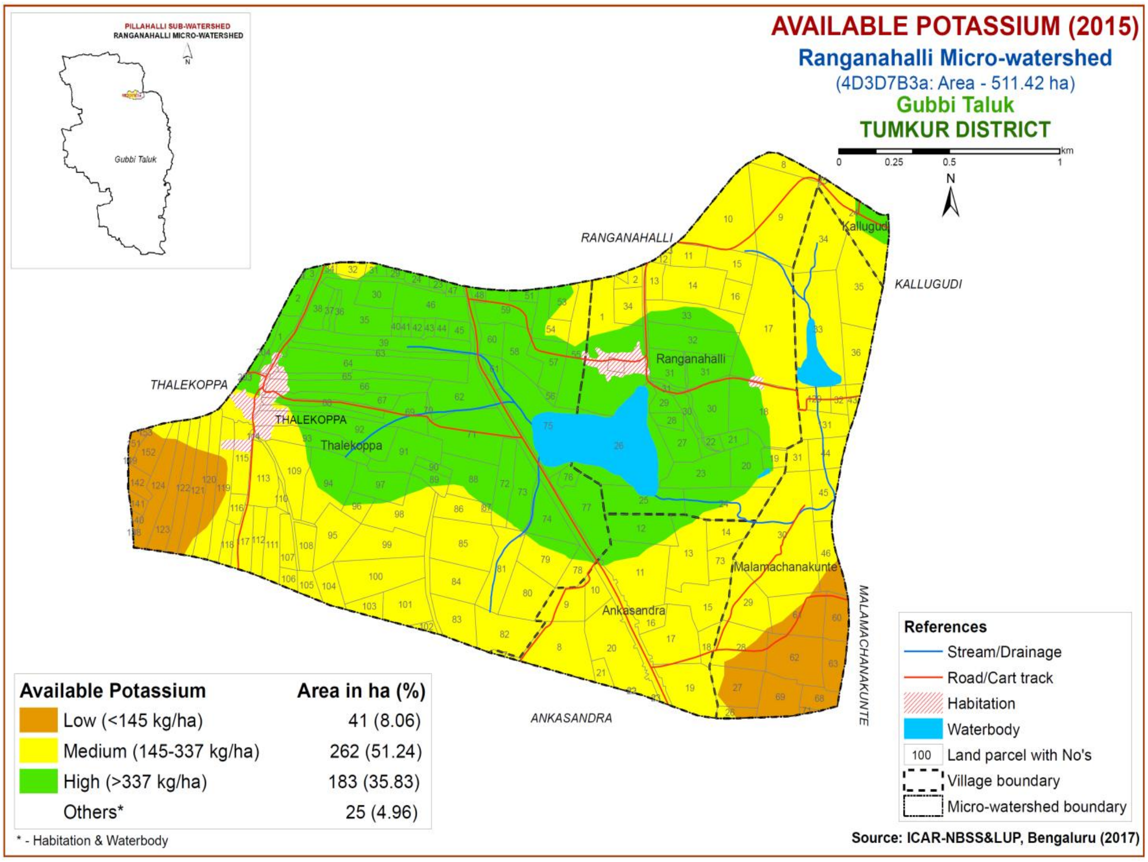



Fig.6.5 Soil Available Potassium map of Ranganahalli Microwatershed

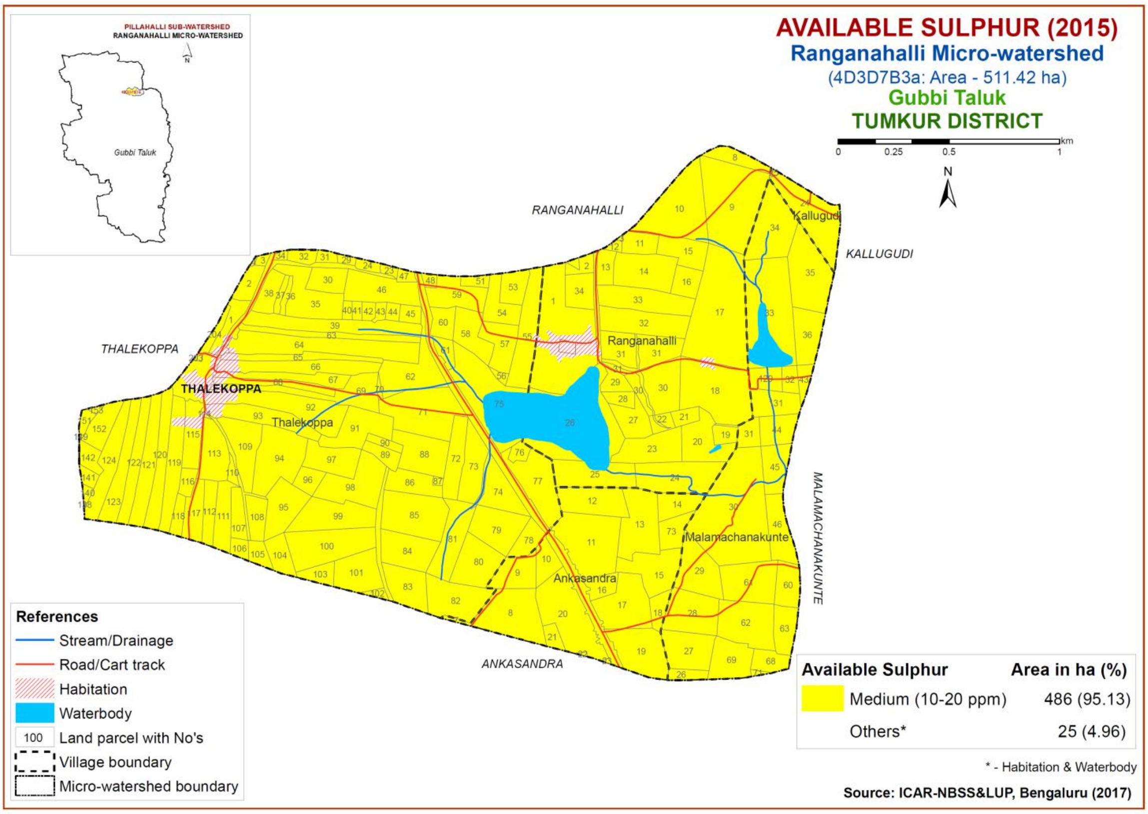



Fig.6.6 Soil Available Sulphur map of Ranganahalli Microwatershed

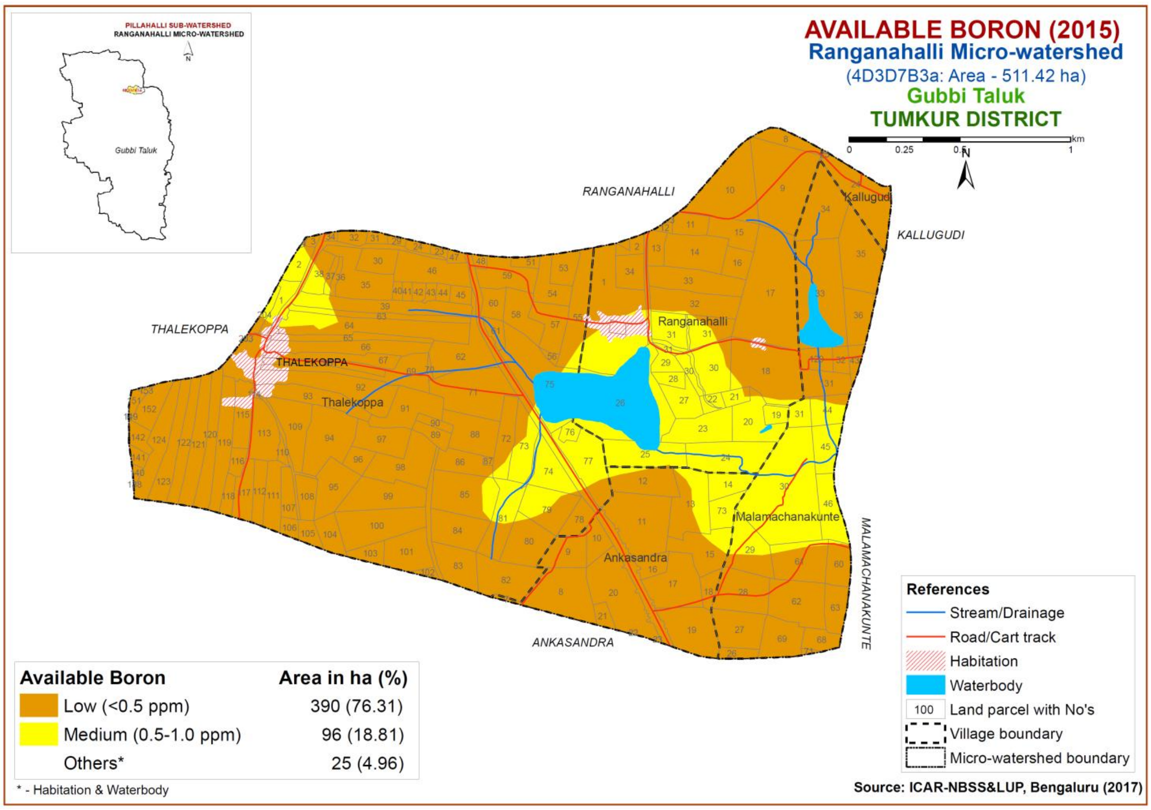



Fig.6.7 Soil Available Boron map of Ranganahalli Microwatershed

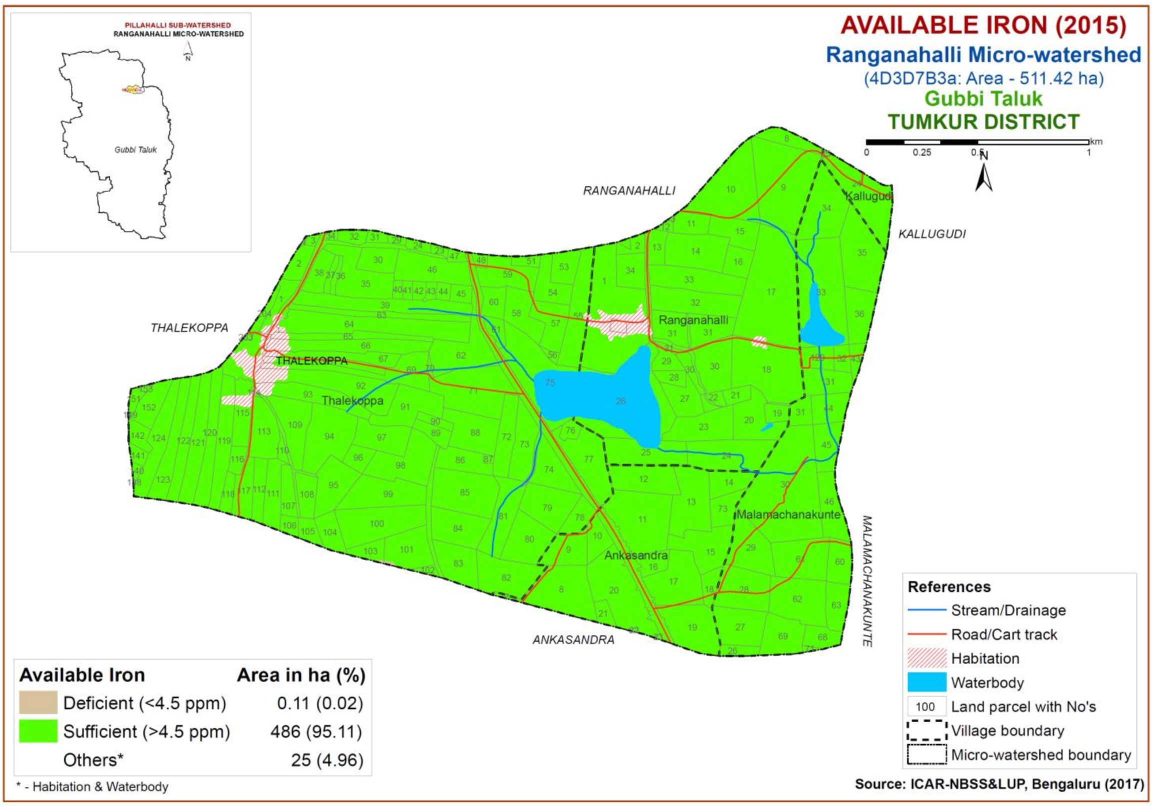



Fig.6.8 Soil Available Iron map of Ranganahalli Microwatershed

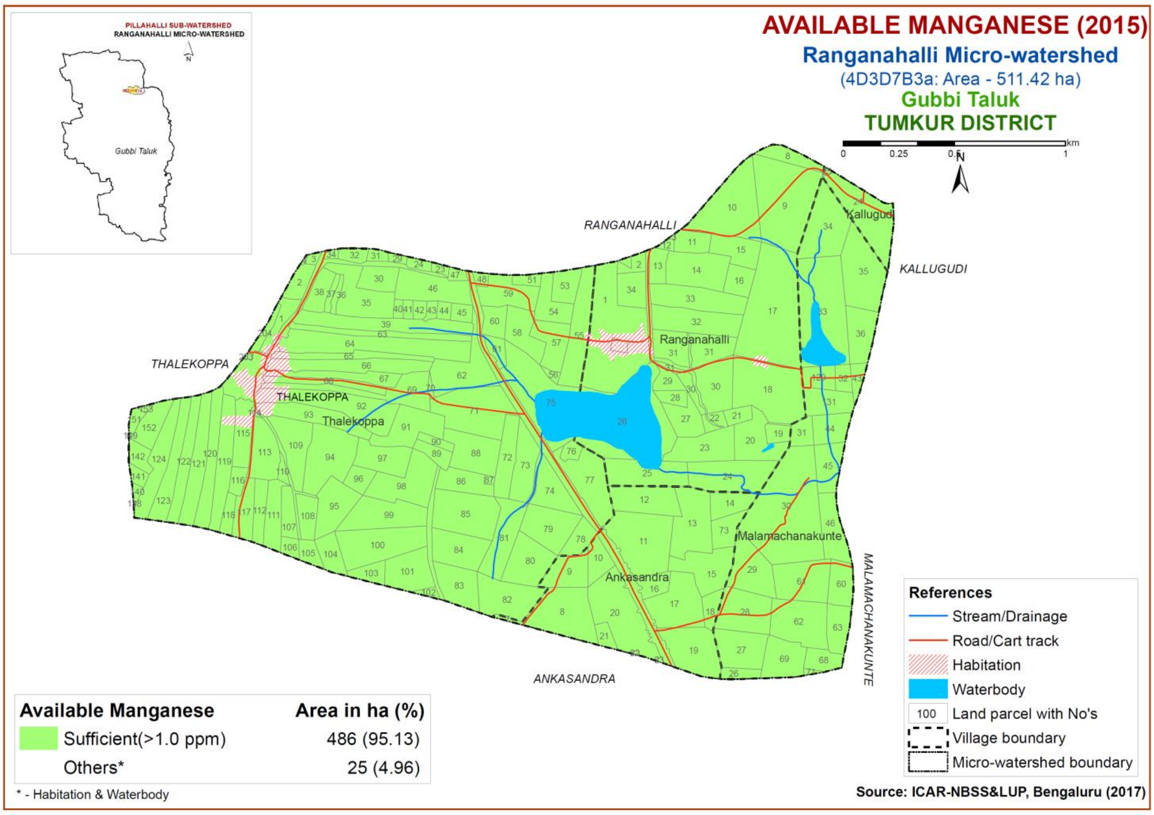



Fig.6.9 Soil Available Manganese map of Ranganahalli Microwatershed

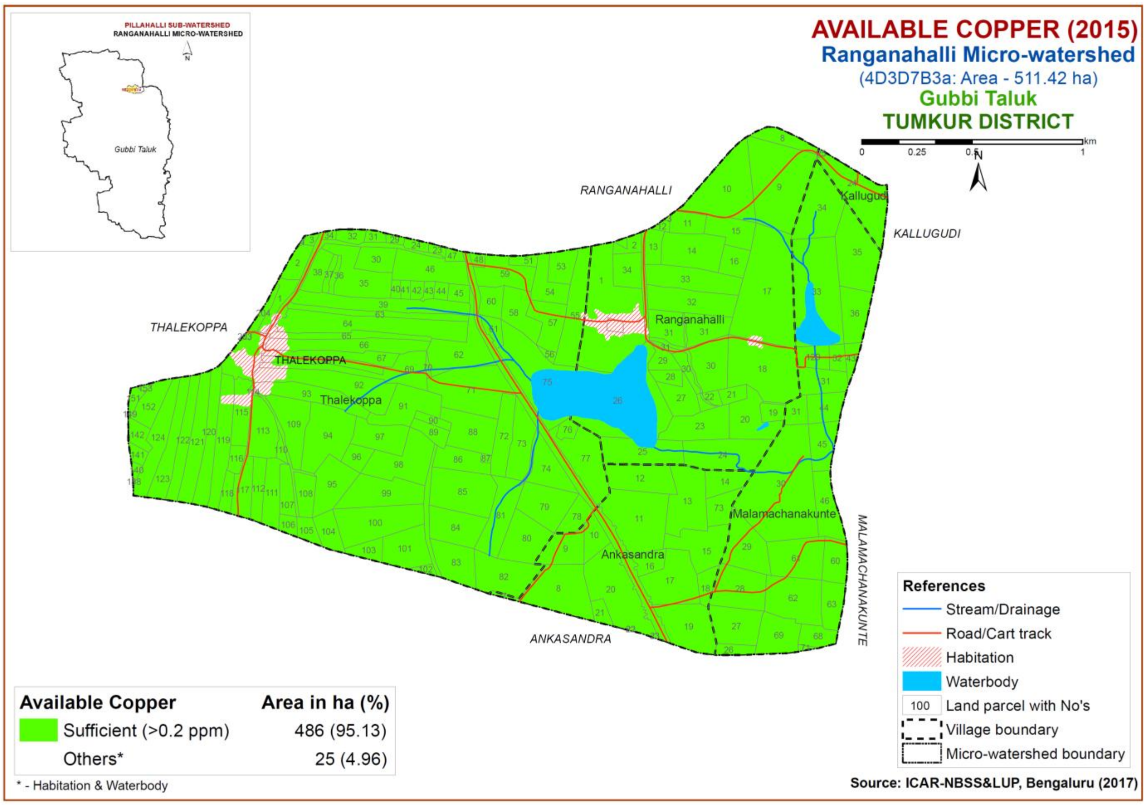



Fig.6.10 Soil Available Copper map of Ranganahalli Microwatershed

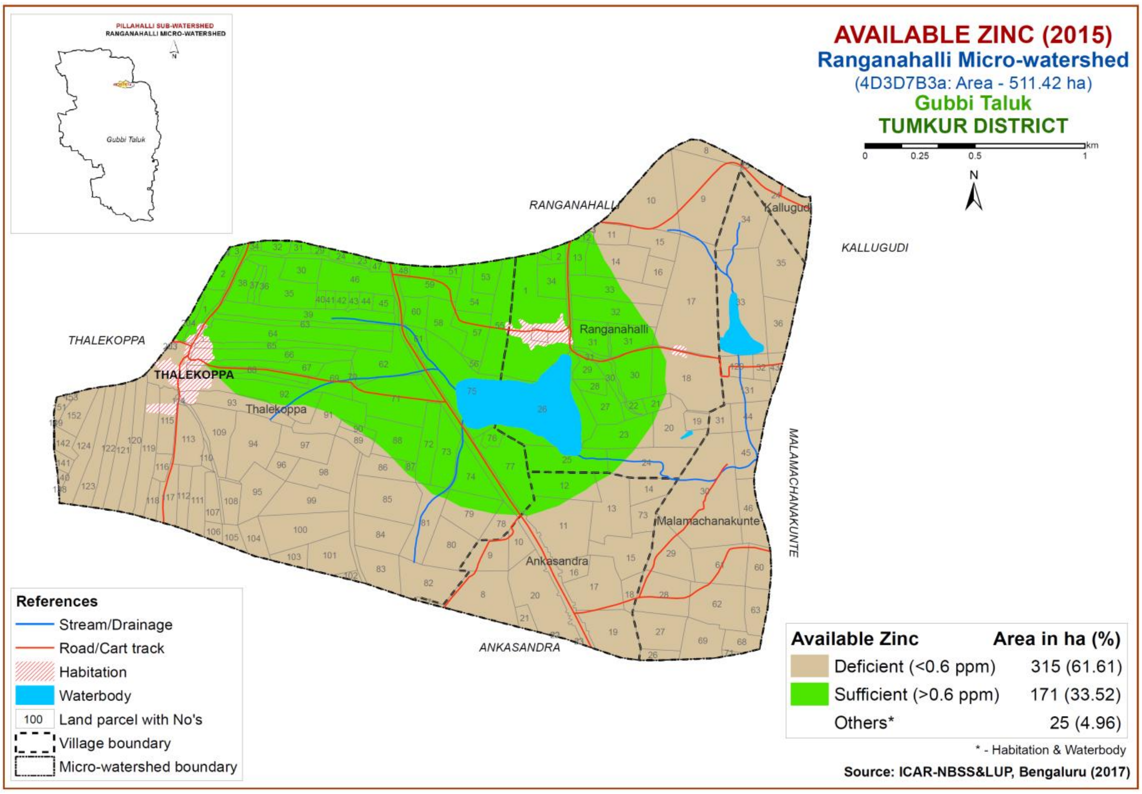



Fig.6.11 Soil Available Zinc map of Ranganahalli Microwatershed

*Chapter 7*

# LAND SUITABILITY FOR MAJOR CROPS

The soil and land resource units (soil phases) of Ranganahalli microwatershed were assessed for their suitability for growing food, fodder, fibre and other horticulture crops by following the procedure as outlined in FAO, 1976 and 1983. Crop requirements were developed for each of the crop from the available research data and also by referring to Naidu *et. al.* (2006) and Natarajan *et. al* (2015). The crop requirements were matched with the soil and land characteristics (Table 7.1) to arrive at the crop suitability. In FAO land suitability classification, two orders are recognized. Order S- Suitable and Order N- Not suitable. The orders have Classes, subclasses and units. Order-S has three classes, Class S1- Highly Suitable, Class S2- Moderately Suitable and Class S3- Marginally Suitable. Order N has two classes, N1- Currently not Suitable and N2- Permanently not Suitable. There are no subclasses within the Class S1 as they will have very minor or no limitations for crop growth. Classes S2 and S3 are divided into subclasses based on the kinds of limitations encountered. The limitations that affect crop production are 'c' for erratic rainfall and its distribution and length of growing period (LGP), 'e' for erosion hazard, 'r' for rooting condition, 't' for lighter or heavy texture, 'g' for gravelliness or stoniness, 'n' for nutrient availability, 'l' for topography, 'm' for moisture availability, 'w' for drainage and 'z' for calcareousness. These limitations are indicated as lower case letters to the class symbol. For example, moderately suitable land with the limitations of soil depth and erosion is designated as 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 34 major annual and perennial crops were generated. The detailed information on the kind of suitability of each of the soil phase for the crops assessed are given village/ survey number wise for the microwatershed in Appendix-III.

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

Sorghum is one of the major crops grown in Karnataka in an area of 10.47 lakh ha in Bijapur, Gulbarga, Raichur, Bidar, Belgaum, Dharwad, Bellary, Chitradurga, Mysore and Tumakuru 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 about 314 ha (61%) is highly suitable (Class S1) for growing sorghum and are distributed in all parts of the microwatershed. Moderately suitable (Class S2) lands occupy an area of about 30 ha (6%) for growing sorghum and are distributed in the northeastern part the microwatershed.

**Table 7.1 Soil-Site Characteristics of Ranganahalli 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 (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Sur-face | Sub-surface | Surface (%) | Subsurface (%) | | | | | | | | |
| CSRhB2g1 | 813 | 150 | WD | 25-50 | scl | scl | 15-35 | <15 | 50-100 | 1-3 | moderate | | | | | |
| KGHcB2g2 | 813 | 150 | WD | 50-75 | sl | scl | 35-60 | 15-35 | 100-150 | 1-3 | moderate | | | | | |
| KGHcC2g2 | 813 | 150 | WD | 50-75 | sl | scl | 35-60 | 15-35 | 100-150 | 3-5 | moderate | | | | | |
| CKMhB2g1 | 813 | 150 | WD | 75-100 | scl | sc | 15-35 | - | 100-150 | 1-3 | moderate | | | | | |
| BDGhB2 | 813 | 150 | WD | 75-100 | scl | scl-sc | - | 35-60 | <50 | 1-3 | moderate | | | | | |
| BDGhB2g1 | 813 | 150 | WD | 75-100 | scl | scl-sc | 15-35 | 35-60 | <50 | 1-3 | moderate | | | | | |
| MNLhB2 | 813 | 150 | WD | 100-150 | scl | sc-scl | - | 15-35 | 100-150 | 1-3 | moderate | | | | | |
| JDGhB1 | 813 | 150 | WD | 100-150 | scl | sc-c | - | <15 | >200 | 1-3 | slight | | | | | |
| BPRhB2 | 813 | 150 | WD | 100-150 | sl | sc-c | - | >35 | 100-150 | 1-3 | moderate | | | | | |
| HLKcB2 | 813 | 150 | WD | >150 | sl | c | - | <15 | 150-200 | 1-3 | moderate | | | | | |
| HLKhB2g1 | 813 | 150 | WD | >150 | scl | c | 15-35 | <15 | 150-200 | 1-3 | moderate | | | | | |
| RTRcB1 | 813 | 150 | WD | >150 | sl | c | - | - | 150-200 | 1-3 | slight | | | | | |
| RTRhB1 | 813 | 150 | WD | >150 | scl | c | - | - | 150-200 | 1-3 | slight | | | | | |
| RTRiB1 | 813 | 150 | WD | >150 | sc | c | - | - | 150-200 | 1-3 | slight | | | | | |
| NDLcB1 | 813 | 150 | WD | >150 | sl | sc | - | >35 | | 1-3 | slight | | | | | |
| NDLiB1g1 | 813 | 150 | WD | >150 | sc | sc | 15-35 | >35 | | 1-3 | slight | | | | | |
| KDThB1 | 813 | 150 | MWD | >150 | scl | sc-c | - | - | >200 | 1-3 | slight | | | | | |
| KDTiA1 | 813 | 150 | MWD | >150 | sc | sc-c | - | - | >200 | 0-1 | slight | | | | | |

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

They have minor limitations of gravelliness, topography and rooting depth. Marginally suitable lands (Class S3) for growing sorghum occupy an area of about 143 ha (28%) and occur in the northern, southwestern, central and south-eastern part of the microwatershed with moderate limitations of gravelliness and rooting depth.

**Table 7.2 Crop suitability criteria for Sorghum**

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

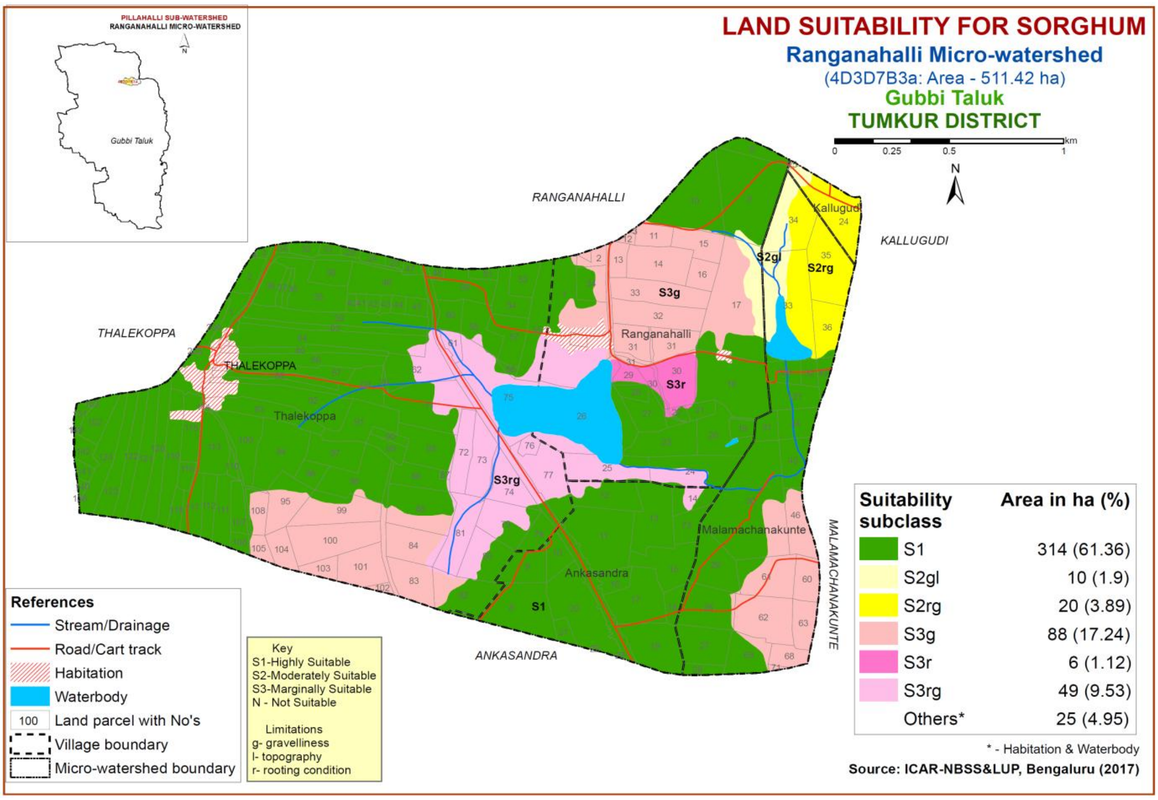



Fig. 7.1 Land Suitability map of Sorghum

### 7.2 Land Suitability for Fodder (*Sorghum bicolor*)

Fodder Sorghum is one of the major fodder crops grown in Southern Karnataka in Tumakuru, Chikkaballapur, Mysore, Mandya, Bengaluru Rural and Kolar districts. The crop requirements for growing Fodder sorghum (Table 7.3) 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 7.2.

Highly suitable (Class S1) lands for growing fodder sorghum occupies an area of about 314 ha (61%) is and are distributed in all parts of the microwatershed. Moderately suitable (Class S2) lands occupy an area of about 30 ha (6%) is for growing fodder sorghum and are distributed in the northeastern part the microwatershed. They have minor limitations of gravelliness, topography and rooting depth. Marginally suitable lands (Class S3) for growing fodder sorghum occupy an area of about 143 ha (28%) and occur in the northern, southwestern, central and south-eastern part of the microwatershed with moderate limitations of gravelliness and rooting depth.

**Table 7.3 Crop suitability criteria for Fodder Sorghum**

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

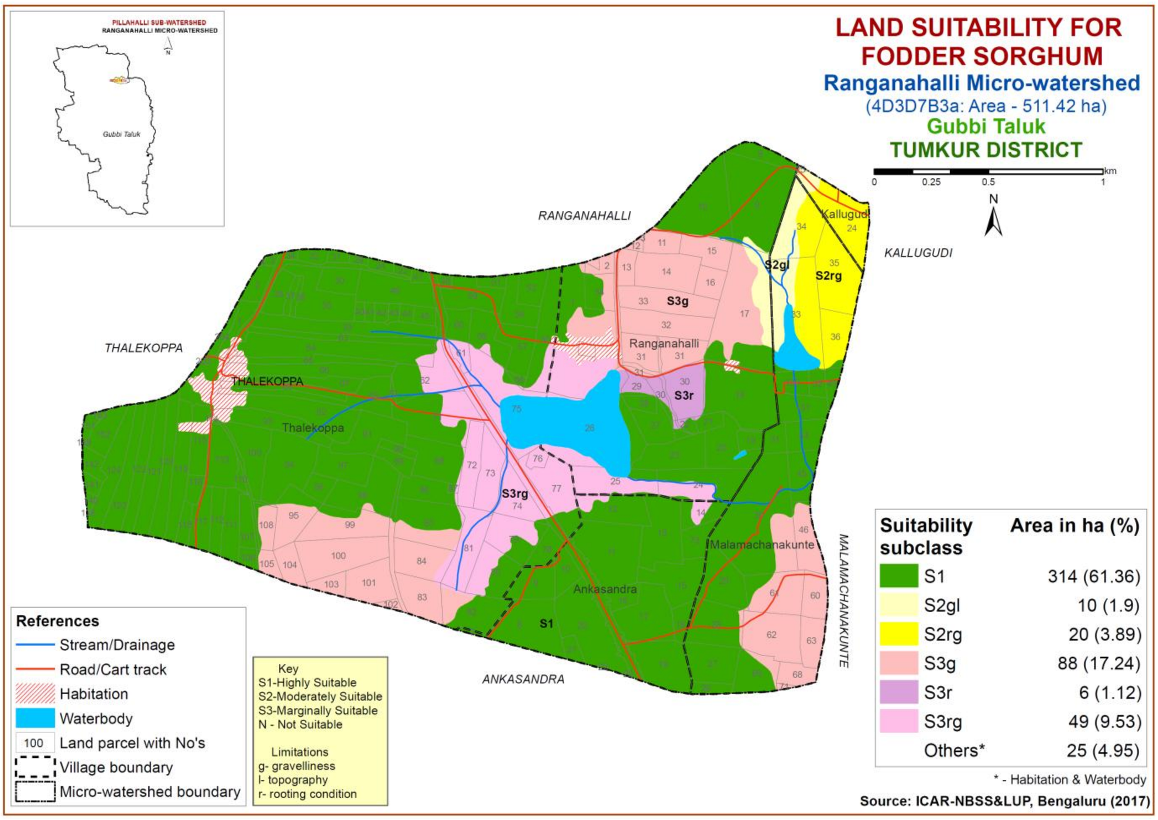



Fig. 7.2 Land Suitability map of Fodder Sorghum

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

Maize is the most important food crop grown in an area of 13.37 lakh ha in almost all the districts of the State. The crop requirements for growing maize (Table 7.4) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing maize was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.3.

**Table 7.4 Crop suitability criteria for Maize**

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

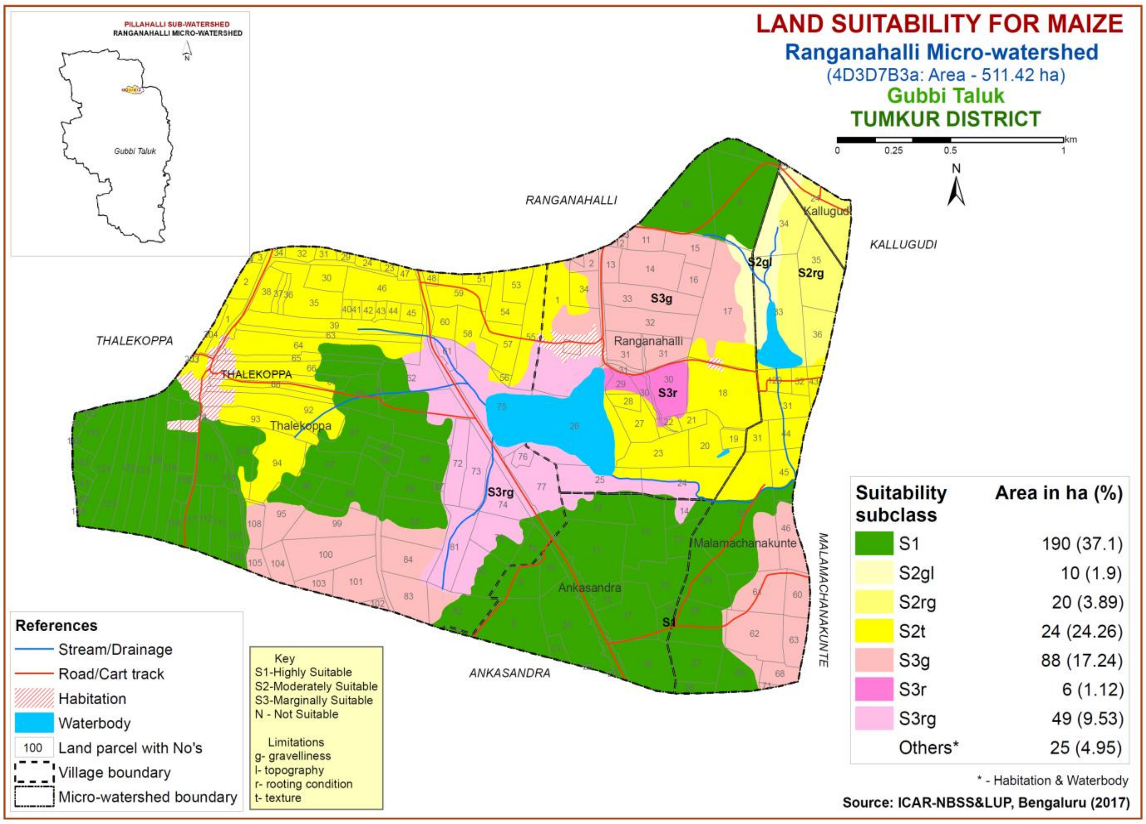



Fig. 7.3 Land Suitability map of Maize

Highly suitable lands occupy maximum area of about 190 ha (37%) and are distributed in the northern, western, central and south-eastern part of the microwatershed. An area of about 153 ha (30%) is moderately suitable (Class S2) for growing maize and are distributed in the northwestern and northeastern part the microwatershed. They have minor limitations gravelliness, topography, rooting depth and texture. Marginally suitable (Class S3) for growing maize occupy an area of about 143 ha (28%) and occurs in the southwestern, central and northern parts of the microwatershed with moderate limitations of gravelliness and rooting depth.

### 7.4 Land Suitability for Upland Paddy (*Oryaza Sativa*)

Upland paddy is the most important food crop grown in many district of the State under rain fed conditions. The crop requirements for growing Upland paddy (Table 7.5) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing Upland paddy was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.4.

Highly suitable (Class S1) for growing upland paddy occupy major area of about 314 ha (61%) is and are distributed in all parts of the microwatershed. Moderately suitable (Class S2) lands occupy an area of about 79 ha (11%) and are distributed in the northeastern and central part the microwatershed. They have minor limitations of gravelliness, topography and rooting depth. Marginally suitable (Class S3) lands occupy an area of about 94 ha (18%) and occur in the northern, southwestern and south-eastern part of the microwatershed with moderate limitations of gravelliness and rooting depth.

**Table 7.5 Land suitability criteria for Upland paddy**

| Crop requirement | | Rating | | | |
|---|---|---|---|---|---|
| **Soil –site characteristics** | **Unit** | **Highly suitable(S1)** | **Moderately Suitable(S2)** | **Marginally suitable(S3)** | **Not suitable(N)** |
| Slope | % | 1-3 | 1-3 | 3-5 | >5 |
| Soil drainage | class | Well to mod. | poorly | Very poorly | |
| Soil reaction | pH | 5.5-6.5 | 6.5-7.3,4.5-5.4 | 7.3-8.4 | >8.4 |
| Surface soil texture | Class | C, sic, cl, sicl, sc | Scl, sil, l | Sl, ls | S |
| Soil depth | Cm | >75 | 50-75 | 25-50 | <25 |
| Gravel content | % vol. | <15 | 15-35 | 35-60 | 60-80 |

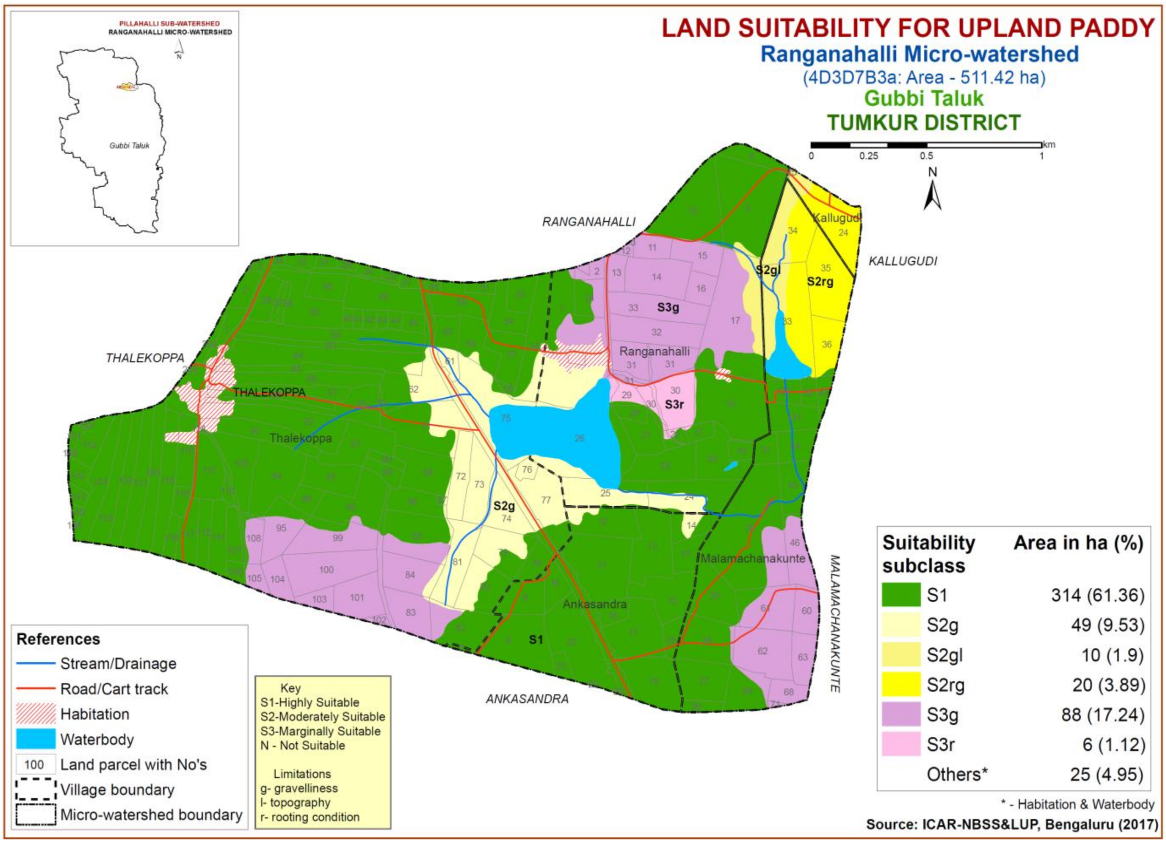



Fig. 7.4 Land Suitability map of Upland paddy

## 7.5 Land Suitability for Finger millet (*Eleusine Coracana*)

Finger millet is the most important food crop grown in an area of 7.08 lakh ha in almost all the districts of south Karnataka. The crop requirements for growing Finger millet (Table 7.6) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing Finger millet was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.5.

**Table 7.6 Land suitability criteria for Finger millet**

| Crop requirement | | Rating | | | |
|---|---|---|---|---|---|
| Soil –site characteristics | Unit | Highly suitable(S1) | Moderately Suitable(S2) | Marginally suitable(S3) | Not suitable(N) |
| Slope | % | <3 | 3-5 | 5-10 | >10 |
| LGP | Days | >110 | 90-110 | 60-90 | <60 |
| Soil drainage | class | Well to mod. drained | Imperfectly drained | Poorly/excessively | V.poorly |
| Soil reaction | pH | 5.5-7.3 | 7.3-8.4 | 8.4-9.0 | >9.0 |
| Surface soil texture | Class | l, sil, sl, cl, sicl, scl | sic, c, sc | ls, s,c >60% | |
| Soil depth | Cm | >75 | 50-75 | 25-50 | <25 |
| Gravel content | % vol. | <15 | 15-35 | 35-60 | >60 |
| Salinity (ECe) | $dsm^{-1}$ | <1.0 | 1.0-2.0 | 2.0-4.0 | |
| Sodicity (ESP) | % | <10 | 10-15 | 15-25 | >25 |

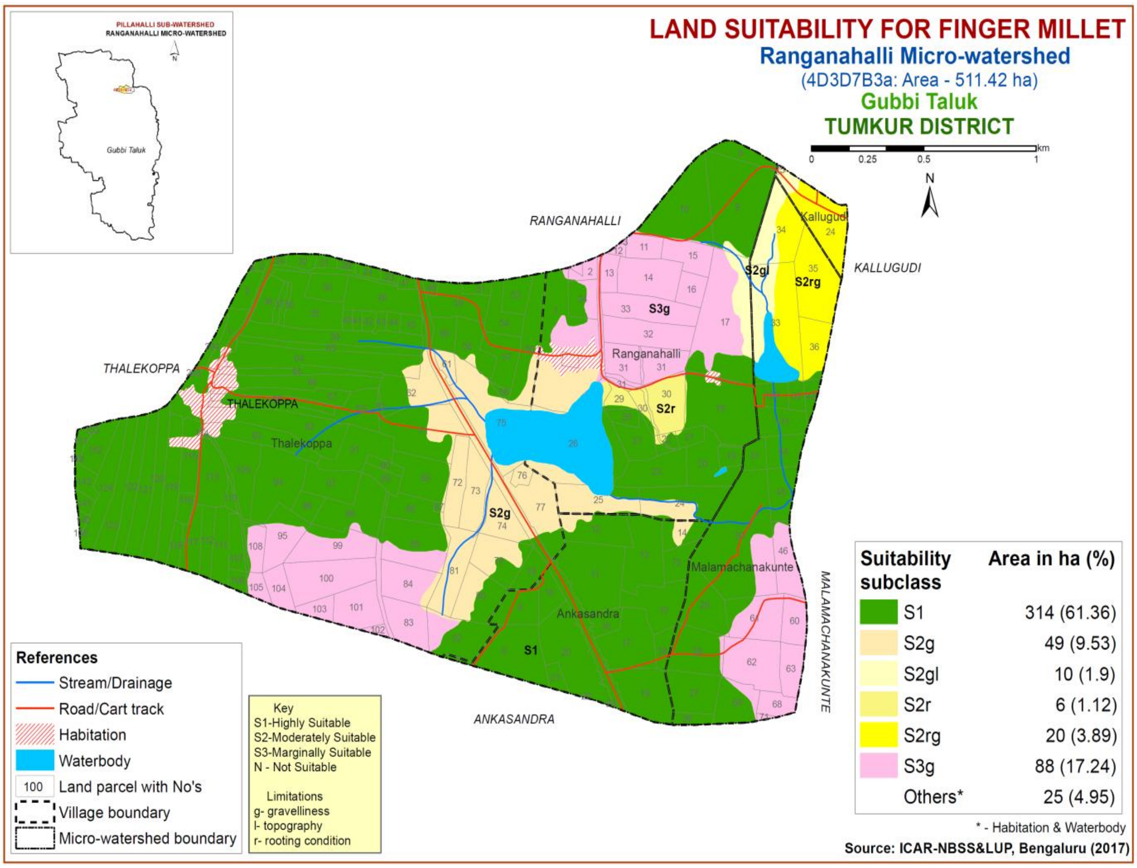



Fig. 7.5 Land Suitability map of Finger millet

An area of about 314 ha (61%) is highly suitable (Class S1) for growing finger millet and are distributed in all parts of the microwatershed. Moderately suitable (Class S2) lands occupy an area of about 85 ha (16%) and are distributed in the northeastern and central part the microwatershed. They have minor limitations of gravelliness, topography and rooting depth. Marginally suitable (Class S3) lands occupy an area of about 88 ha (17%) and occur in the northern, southwestern and south-eastern part of the microwatershed with moderate limitations of gravelliness and rooting depth.

### 7.6 Land suitability criteria for Red gram (*Cajanus cajan)*

Red gram is the most important food crop grown in an area of 8.23 lakh ha in almost all the districts of the State. The crop requirements for growing red gram (Table 7.7) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing red gram was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.6.

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

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

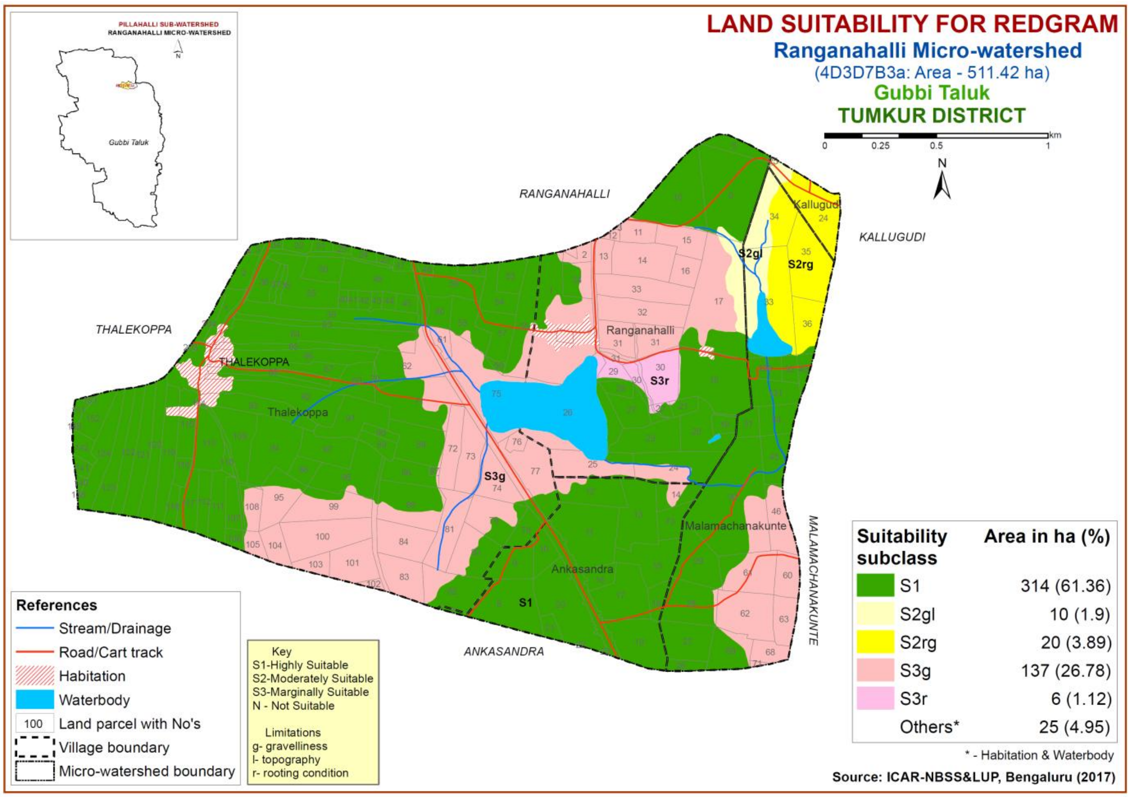



Fig. 7.6 Land Suitability map of Red gram

An area of about 314 ha (61%) is highly suitable (Class S1) for growing red gram and are distributed in all parts of the microwatershed. Moderately suitable (Class S2) lands occupy an area of about 30 ha (6%) is for growing red gram and are distributed in the northeastern part of the microwatershed. They have minor limitations of gravelliness, topography and rooting depth. Marginally suitable (Class S3) lands occupy an area of about 143 ha (28%) and occur in the northern, southwestern, central and south-eastern part of the microwatershed with moderate limitations of gravelliness and rooting depth.

### 7.7 Land suitability for Horse gram (*Macrotyloma uniflorum*)

Horse gram is the most important pulse crop grown in an area of 1.8 lakh ha in almost all the districts of the State. The crop requirements for growing horse gram were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing horse gram (Table 7.8) was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.7.

Major area of about 334 ha (65%) is highly suitable (Class S1) for growing horse gram and are distributed in all parts of the microwatershed. Moderately suitable (Class S2) lands occupy an area of about 147 ha (29%) for growing horse gram and are distributed in the southwestern, south-eastern and northern part of the microwatershed with minor limitations of gravelliness and topography. A very small area of about 6 ha (1%) is marginally suitable (Class S3) and is distributed in the small patches in central and western part of the microwatershed and moderate limitation of rooting depth.

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

| Crop requirement | | Rating | | | |
|---|---|---|---|---|---|
| **Soil –site characteristics** | **Unit** | **Highly suitable(S1)** | **Moderately Suitable(S2)** | **Marginally suitable(S3)** | **Not suitable(N)** |
| Slope | % | <3 | 3-5 | 5-10 | >10 |
| LGP | Days | | | | |
| Soil drainage | Class | Well drained/ mod.welldrained | imperfectly drained | Poorly drained | V.Poorly drained |
| Soil reaction | pH | 6.0-8.5 | 8.5-9.0,5.5-5.9 | 9.1-9.5,5.0-5.4 | >9.5 |
| Surface soil texture | Class | l, sl, scl, cl, sc | Ls, sic, sicl, c, ls | Heavy clays (>60%) | - |
| Soil depth | Cm | 50-75 | 25-50 | <25 | - |
| $CaCO_3$ in root zone | % vol. | <15 | 15-25 | 25-30 | >30 |
| Salinity (ECe) | $dsm^{-1}$ | <1.0 | 1.0-2.0 | >2.0 | |
| Sodicity (ESP) | % | <10 | 10-15 | >15 | - |

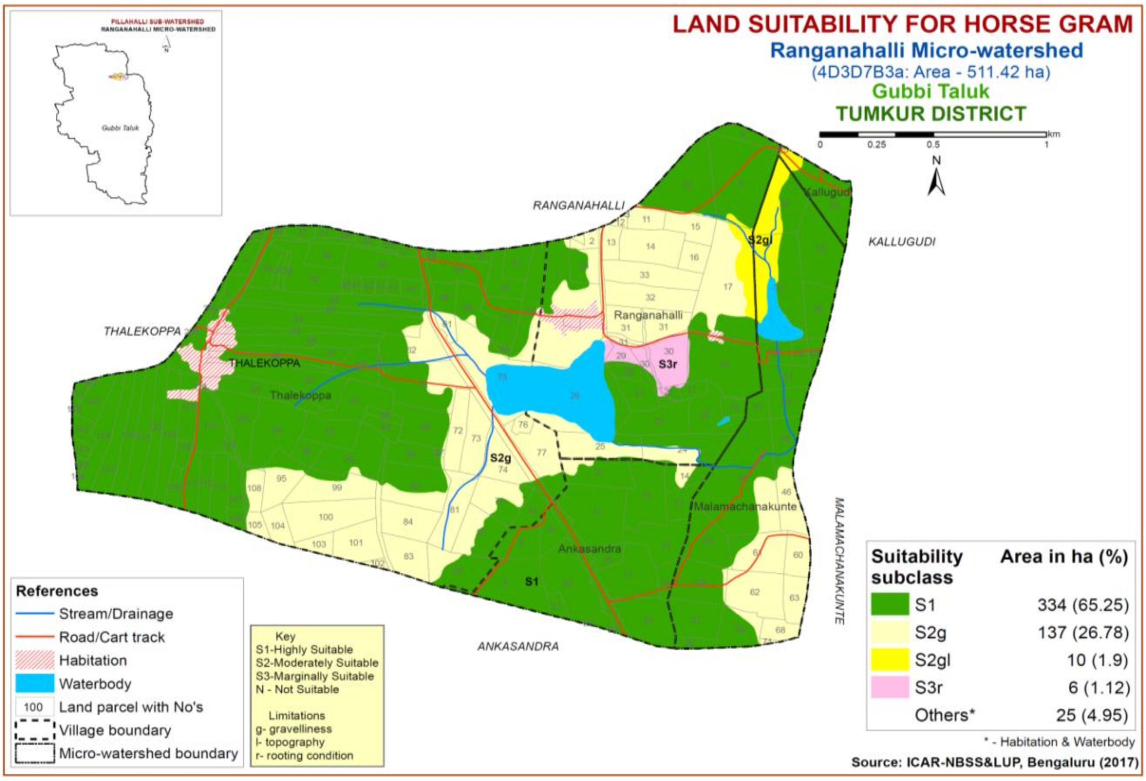



Fig. 7.7 Land Suitability map of Horse gram

### 7.8 Land suitability for Field Bean (*Dolichos lablab*)

Field Bean is the most important pulse crop grown in an area of 0.68 lakh ha in almost all the districts of the State. The crop requirements (Table 7.9) for growing field bean were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing field bean was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Fig. 7.8.

**Table 7.9 Land suitability criteria for Field Bean**

| Crop requirement | | Rating | | | |
|---|---|---|---|---|---|
| **Soil –site characteristics** | **Unit** | **Highly suitable(S1)** | **Moderately Suitable(S2)** | **Marginally suitable(S3)** | **Not suitable(N)** |
| Slope | % | <3 | 3-5 | 5-10 | >10 |
| LGP | Days | >120 | 90-120 | 70-90 | <70 |
| Soil drainage | Class | Well drained/ mod.Well drained | imperfectly drained | Poorly drained | V.Poorly drained |
| Soil reaction | pH | 6.0-8.5 | 8.5-9.0<br>5.5-5.9 | 9.1-9.5<br>5.0-5.4 | >9.5 |
| Sub Surface soil texture | Class | l, sl, scl, cl, sc | sic, sicl, c | Heavy clays (>60%), ls | s |
| Soil depth | Cm | >75 | 50-75 | 25-50 | <25 |
| $CaCO_3$ in root zone | % vol. | <15 | 15-35 | 35-50 | >50 |
| Salinity (EC) | $dsm^{-1}$ | <1.0 | 1.0-2.0 | >2.0 | |
| Sodicity (ESP) | % | <10 | 10-15 | 15-20 | >20 |

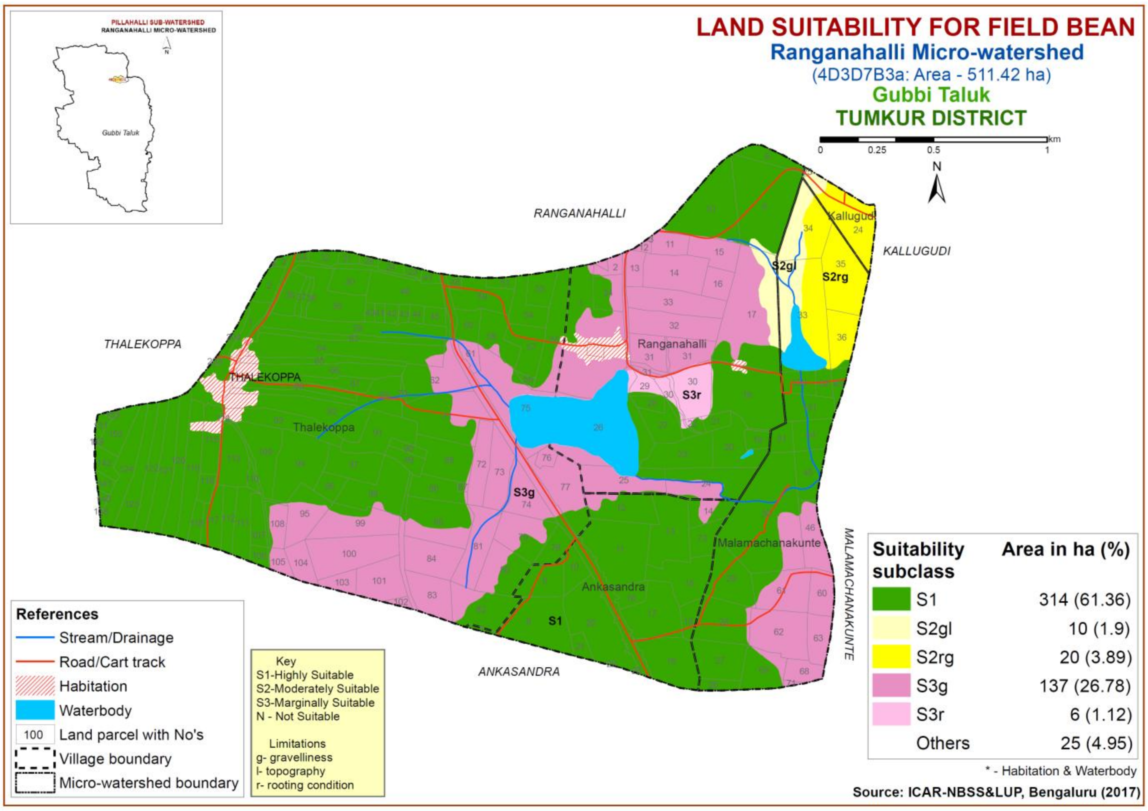



Fig. 7.8 Land Suitability map of Field bean

An area of about 314 ha (61%) is highly suitable (Class S1) for growing field bean and are distributed in all parts of the microwatershed. Moderately suitable (Class S2) lands occupy an area of about 30 ha (6%) is for growing field bean and are distributed in the northeastern part of the microwatershed. They have minor limitations of gravelliness, topography and rooting depth. Marginally suitable (Class S3) lands occupy an area of about 143 ha (28%) and occur in the northern, southwestern, central and south-eastern part of the microwatershed with moderate limitations of gravelliness and rooting depth.

### 7. 9 Land Suitability for Cowpea (*Vigna radiata*)

Cowpea is the most important pulse crop grown in an area of 0.80 lakh ha in almost all the districts of the State. The crop requirements for growing field bean were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing cowpea was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Fig. 7.9.

An area of about 314 ha (61%) is highly suitable (Class S1) for growing cowpea and are distributed in all parts of the microwatershed. Moderately suitable (Class S2) lands occupy an area of about 30 ha (6%) and are distributed in the northeastern part the microwatershed. They have minor limitations of gravelliness, topography and rooting depth. Marginally suitable (Class S3) lands occupy an area of about 143 ha (28%) and occur in the northern, southwestern, central and south-eastern part of the microwatershed with moderate limitations of gravelliness and rooting depth.

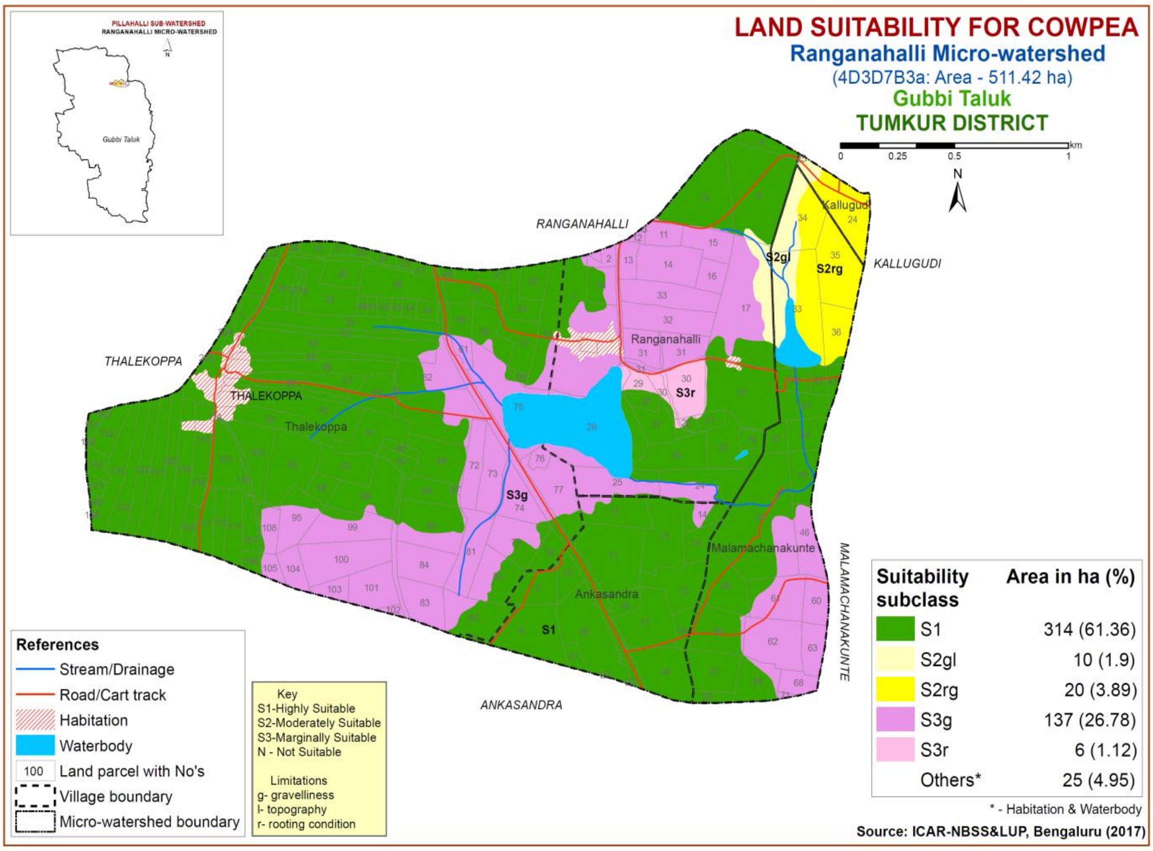



Fig. 7.9 Land Suitability map of Cowpea

## 7.10 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 rain fed or irrigated crop. The crop requirements for growing groundnut (Table 7.10) were matched with the soil-site characteristics (Table 7.1) of the soils of the microwatershed and 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 7.10.

An area of about 107 ha (21%) is highly suitable (Class S1) for growing Groundnut and are distributed in the northeastern, southern and central part of the microwatershed. Maximum area of about 327 ha (67%) is moderately suitable (Class S2) for groundnut and are distributed in all parts of the microwatershed. They have minor limitations of gravelliness, topography and rooting depth and texture. Marginally suitable (Class S3) lands occupy an area of about 52 ha (10%) and are distributed in the northwestern and central part of the microwatershed with moderate limitations of rooting depth and texture.

**Table 7.10 Crop suitability criteria for Groundnut**

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

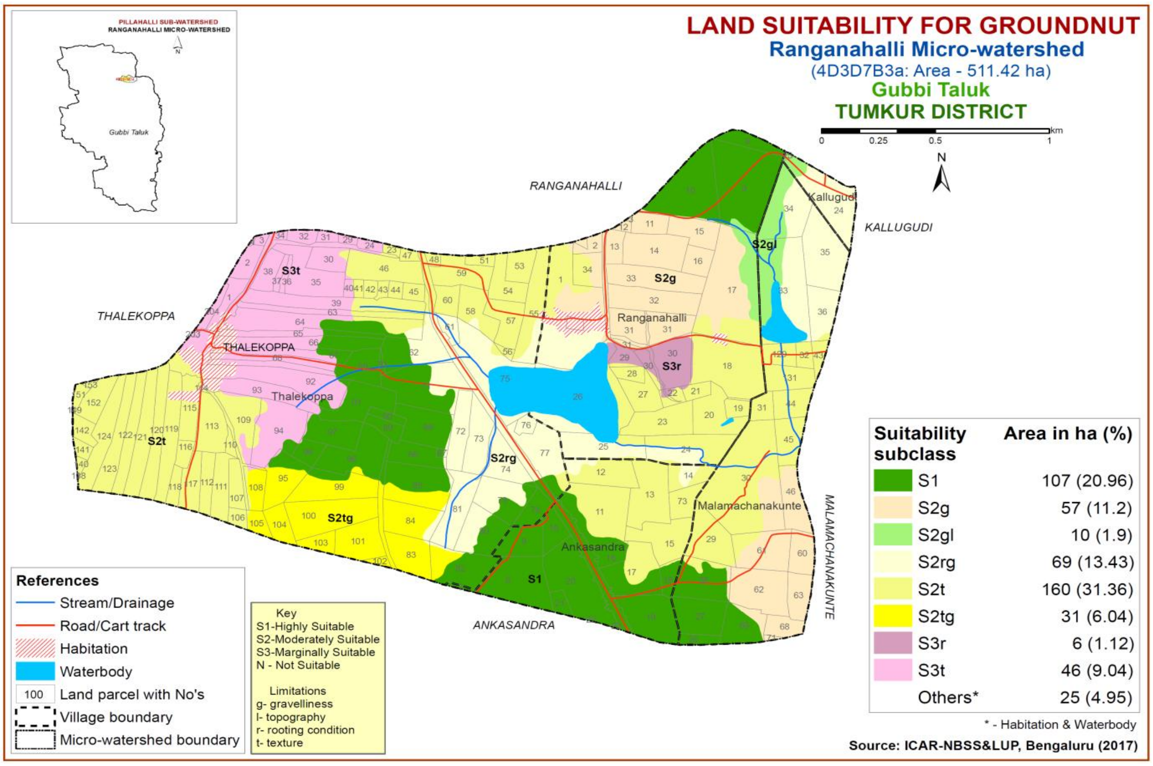



Fig. 7.10 Land Suitability map of Groundnut

**7.11 Land Suitability for Sunflower (*Helianthus annus*)**

Sunflower is 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 7.11) 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 are given in Figure 7.11.

**Table 7.11 Crop suitability criteria for Sunflower**

| Crop requirement | | Rating | | | |
|---|---|---|---|---|---|
| Soil–site characteristics | Unit | Highly suitable(S1) | Moderately suitable(S2) | Marginally suitable(S3) | Not suitable(N) |
| Slope | % | <3 | 3-5 | 5-10 | >10 |
| LGP | Days | >90 | 80-90 | 70-80 | <70 |
| Soil drainage | Class | Well drained | Mod. well rained | Imperfectly drained | Poorly drained |
| Soil reaction | pH | 6.5-8.0 | 8.1-8.55.5-6.4 | 8.6-9.0 4.5-5.4 | >9.0<4.5 |
| Surface soil texture | Class | l, cl, sil, sc | Scl, sic, c, | c (>60%), sl | ls, s |
| Soil depth | Cm | >100 | 75-100 | 50-75 | <50 |
| Gravel content | % vol. | <15 | 15-35 | 35-60 | >60 |
| Salinity (EC) | $dSm^{-1}$ | <1.0 | 1.0-2.0 | >2.0 | |
| Sodicity (ESP) | % | <10 | 10-15 | >15 | |

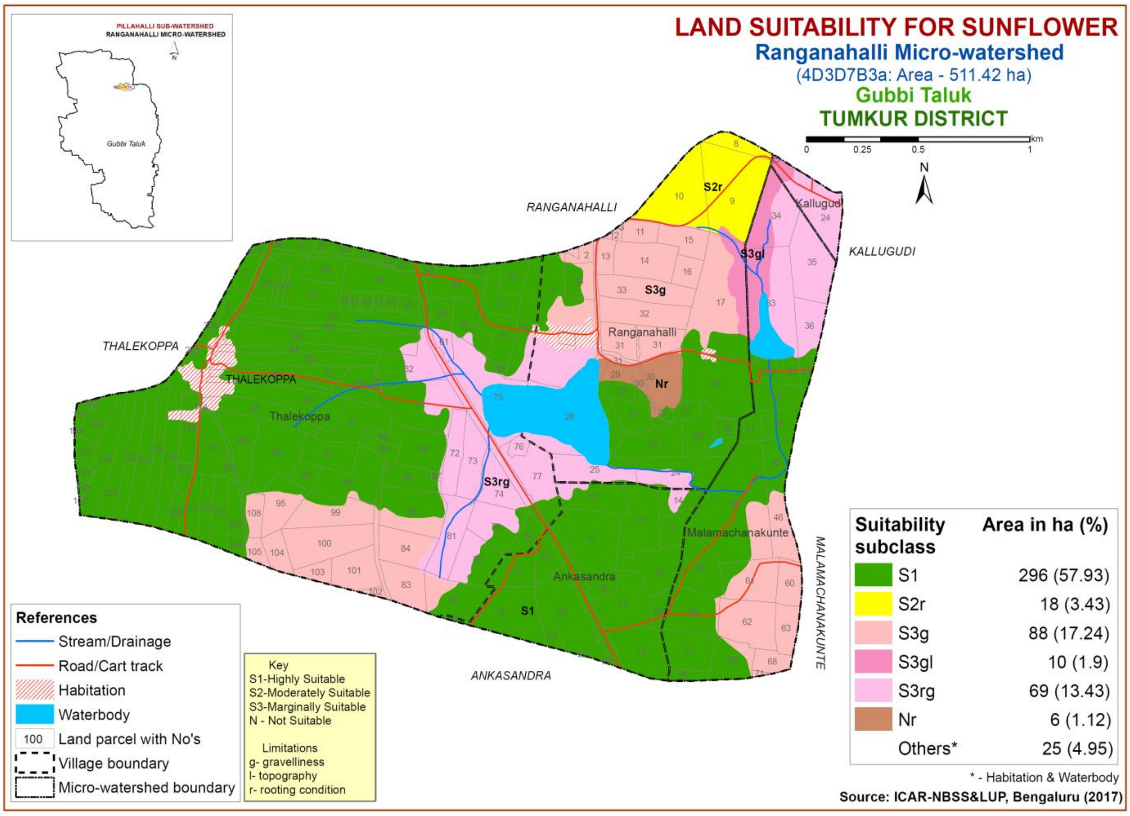



Fig. 7.11 Land Suitability map of Sunflower

Maximum area of about 296 ha (58%) is highly suitable (Class S1) for growing sunflower and are distributed in major part of the microwatershed. An area of about 18 ha (3%) is moderately suitable (Class S2) and are distributed in the northern part the microwatershed with minor limitation of rooting depth. Marginally suitable lands (Class S3) for growing sunflower occupy an area of about 167 ha (33%) and occur in the southwestern, central, northeastern and south-eastern part of the microwatershed with moderate limitations of rooting depth, gravelliness and topography. A very small area of about 6 ha (1%) is not suitable (Class N) and is distributed in the central part of the microwatershed. They have severe limitation of rooting depth.

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

Onion is 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 7.12) 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.

Highly suitable (Class S1) lands occupy maximum area of about 236 ha (58%) and are distributed in the western, northern and southern part of the microwatershed. An area of about 108 ha (21%) has soils that are moderately suitable (Class S2) with minor limitations of gravelliness, rooting depth, texture and topography. They are distributed in the northern and northeastern part of the microwatershed. The marginally suitable (Class S3) lands cover an area of about 143 ha (28%) and occur in the southwestern, south-eastern and northern part of the microwatershed with moderate limitations of gravelliness and rooting depth.

**Table 7.12 Land suitability criteria for Onion**

| Crop requirement | | Rating | | | |
|---|---|---|---|---|---|
| **Soil –site characteristics** | **Unit** | **Highly suitable(S1)** | **Moderately Suitable(S2)** | **Marginally suitable(S3)** | **Not suitable (N)** |
| Mean temperature in growing season | $^0$c | 20-30 | 30-35 | 35-40 | >40 |
| Slope | % | <3 | 3-5 | 5-10 | >10 |
| Soil drainage | Class | Well drained | Moderately /imperfectly | Poor drained | Very poorly drained |
| Soil reaction | pH | 6.5-7.3 | 7.3-7.8,5.0-5.4 | 7.8-8.4,<5.0 | >8.4 |
| Surface soil texture | Class | Scl, sil, sl | sc,sicl,c(red soil) | sc,c(blacksoil) | ls |
| Soil depth | Cm | >75 | 50-75 | 25-50 | <25 |
| Gravel content | % vol. | <15 | 15-35 | 35-60 | 60-80 |
| Salinity (ECe) | $dsm^{-1}$ | <1.0 | 1.0-2.0 | 2.0-4.0 | <4 |
| Sodicity (ESP) | % | <5 | 5-10 | 10-15 | >15 |

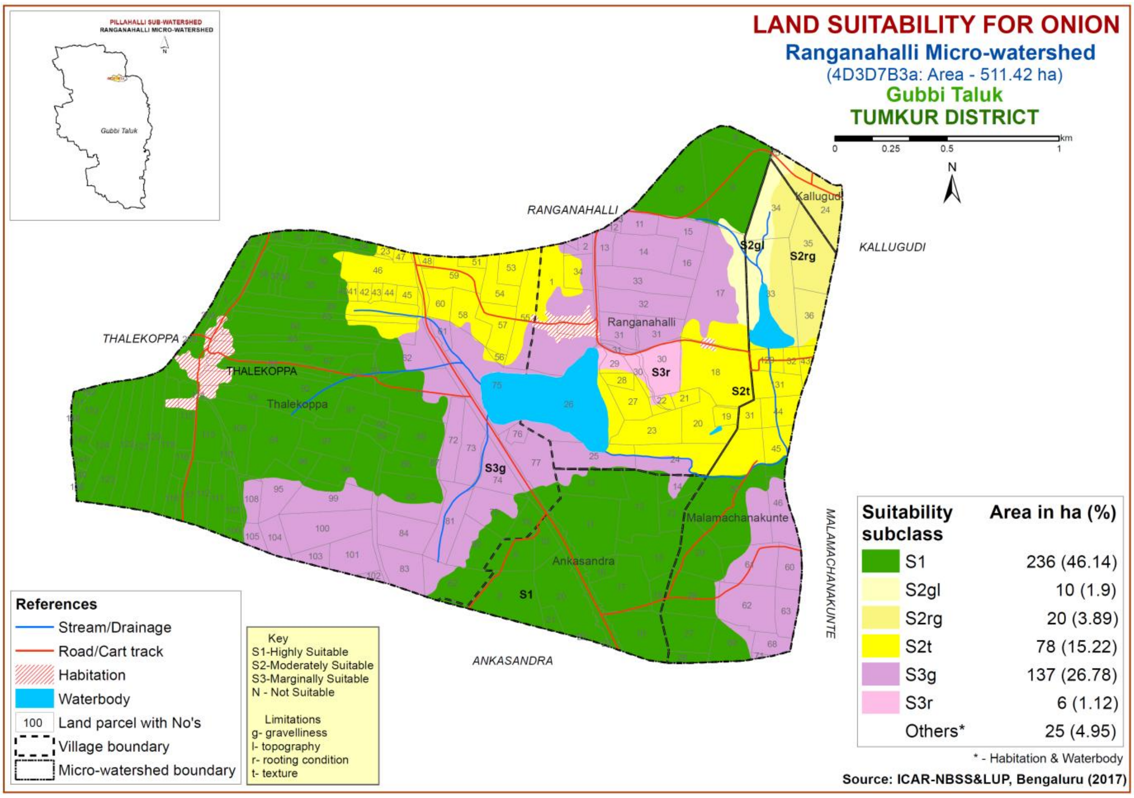



Fig. 7.12 Land Suitability map of Onion

## 7.13 Land Suitability for Chilli (*Capscicum annuum L.*)

Chilli is the most important commercial crop grown in an area of 0.42 lakh ha in the State in all the districts. The crop requirements for growing chilli (Table 7.13) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing chilli was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.13.

**Table 7.13 Land suitability criteria for chillies**

| Crop requirement | | Rating | | | |
|---|---|---|---|---|---|
| **Soil –site characteristics** | **Unit** | **Highly suitable(S1)** | **Moderately Suitable(S2)** | **Marginally suitable(S3)** | **Not suitable(N)** |
| Slope | % | <3 | 3-5 | 5-10 | |
| LGP | Days | >150 | 120-150 | 90-120 | <90 |
| Soil drainage | class | Well drained | Mod. to imperf. drained | Poor drained/excessively | V.poorly drained |
| Soil reaction | pH | 6.0-7.0 | 7.1-8.0 | 8.1-9.0,5.0-5.9 | >9.0 |
| Surface soil texture | Class | L, scl, cl, sil | sl, sc, sic,c(m/k) | C(ss), ls, s | |
| Soil depth | Cm | >75 | 50-75 | 25-50 | <25 |
| Gravel content | % vol. | <15 | 15-35 | >35 | |
| Salinity (ECe) | $dsm^{-1}$ | <1.0 | 1.0-2.0 | 2.0-4.0 | <4 |
| Sodicity (ESP) | % | <5 | 5-10 | 10-15 | |

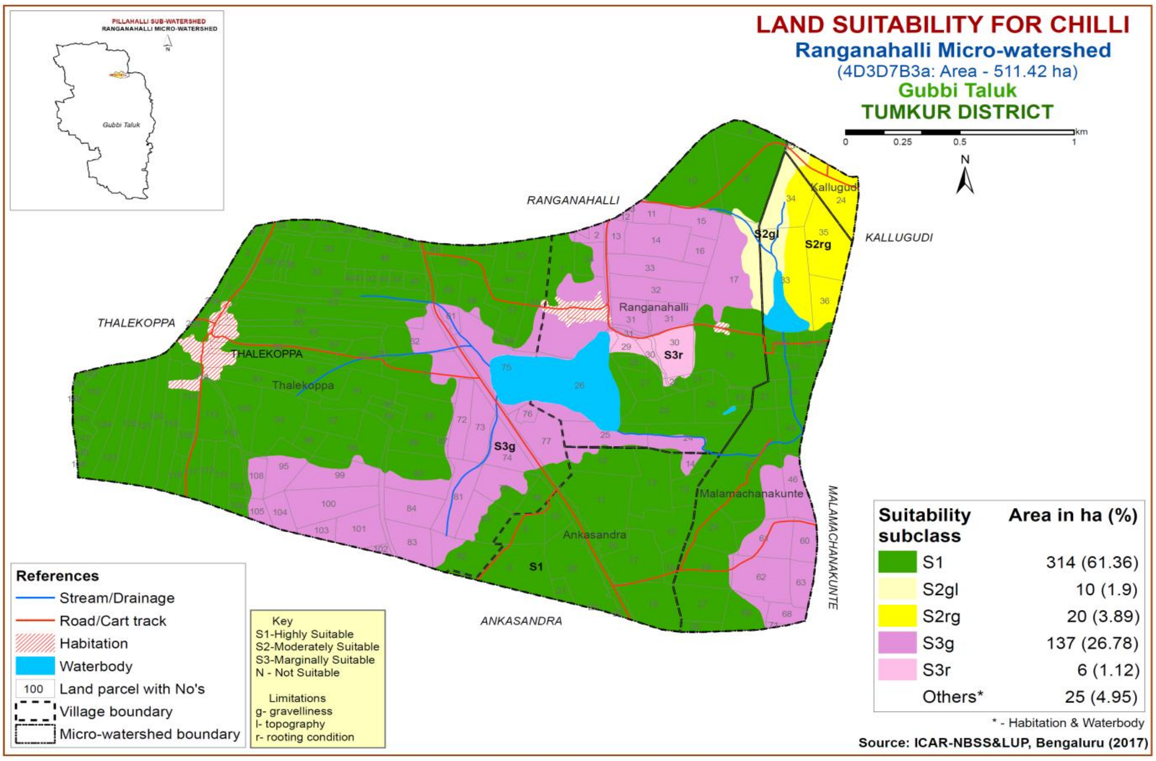



Fig. 7.13 Land Suitability map of Chilli

An area of about 314 ha (61%) is highly suitable (Class S1) for growing chilli and are distributed in all parts of the microwatershed. Moderately suitable (Class S2) lands occupy an area of about 30 ha (6%) is for growing chilli and are distributed in the northeastern part the microwatershed. They have minor limitations of gravelliness, topography and rooting depth. Marginally suitable (Class S3) lands occupy an area of about 143 ha (28%) and occur in the northern, southwestern, central and south-eastern part of the microwatershed with moderate limitations of gravelliness and rooting depth.

### 7.14 Land suitability for Brinjal (*Solanum melongena*)

Brinjal is the most important vegetable crop grown in all the districts. The crop requirements for growing Brinjal (Table 7.14) 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 7.14.

An area of about 314 ha (61%) is highly suitable (Class S1) for growing brinjal and are distributed in all parts of the microwatershed. Moderately suitable (Class S2) lands occupy an area of about 30 ha (6%) and are distributed in the northeastern part the microwatershed. They have minor limitations of gravelliness, topography and rooting depth. Marginally suitable (Class S3) lands occupy an area of about 143 ha (28%) and occur in the northern, southwestern, central and south-eastern part of the microwatershed with moderate limitations of gravelliness and rooting depth.

Table 7.14 Land suitability criteria for Brinjal

| Crop requirement | | | Rating | | | |
|---|---|---|---|---|---|---|
| Soil –site characteristics | | Unit | Highly suitable(S1) | Moderately Suitable(S2) | Marginally suitable(S3) | Not suitable(N) |
| Soil aeration | Soil drainage | Class | Well drained | Moderately well drained | Poorly drained | V. Poorly drained |
| Nutrient availability | Texture | Class | Sl, scl, cl, sc | C (red) | Ls, c (black) | - |
| | pH | 1:2.5 | 6.0-7.3 | 7.3-8.4,5.5-6.0 | 8.4-9.0 | >9.0 |
| Rooting conditions | Soil depth | Cm | >75 | 50-75 | 25-50 | <25 |
| | Gravel content | % vol. | <15 | 15-35 | 35-60 | >60 |
| Erosion | Slope | % | 0-3 | 3-5 | 5-10 | >10 |

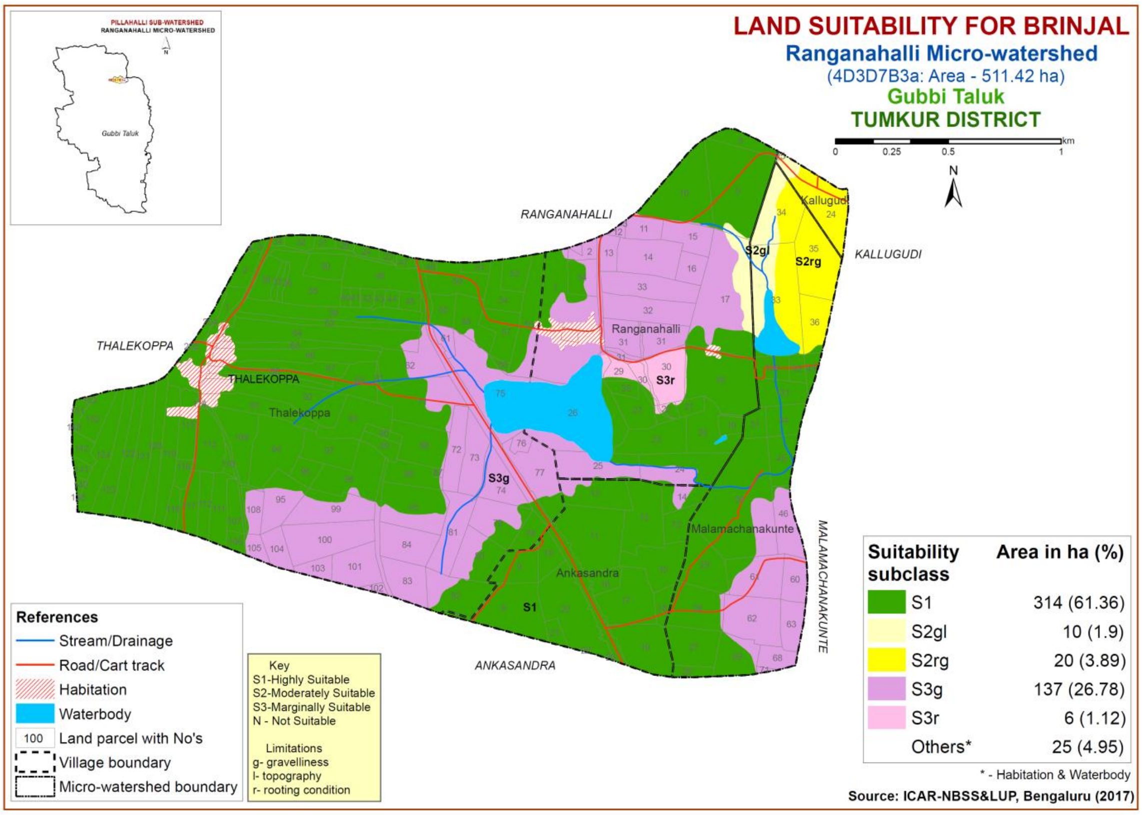



Fig. 7.14 Land Suitability map of Brinjal

## 7.15 Land suitability for Tomato (*Lycopersicon esculentum*)

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

## Table 7.15 Land suitability criteria for Tomato

| Crop requirement | | | Rating | | | |
|---|---|---|---|---|---|---|
| Soil –site characteristics | | Unit | Highly suitable(S1) | Moderately Suitable(S2) | Marginally suitable(S3) | Not suitable(N) |
| climate | Temperature in growing season | $^{0}c$ | 25-28 | 29-32<br>20-24 | 15-19<br>33-36 | <15<br>>36 |
| Soil moisture | Growing period | Days | >150 | 120-150 | 90-120 | |
| Soil aeration | Soil drainage | class | Well drained | Moderately well drained | Poorly drained | V. poorly drained |
| Nutrient availability | Texture | Class | l, sl, cl, scl | Sic, sicl, sc, c(m/k) | C (ss), ls | s |
| | pH | 1:2.5 | 6.0-7.3 | 5.5-6.0,7.3-8.4 | 8.4-9.0 | >9.0 |
| | $CaCO_3$ in root zone | % | Non calcareous | Slightly calcareous | Strongly calcareous | |
| Rooting conditions | Soil depth | Cm | >75 | 50-75 | 25-50 | <25 |
| | Gravel content | % vol. | <15 | 15-35 | >35 | |
| Soil toxicity | Salinity | ds/m | Non saline | slight | strongly | |
| | Sodicity (ESP) | % | <10 | 10-15 | >15 | - |
| Erosion | Slope | % | 1-3 | 3-5 | 5-10 | >10 |

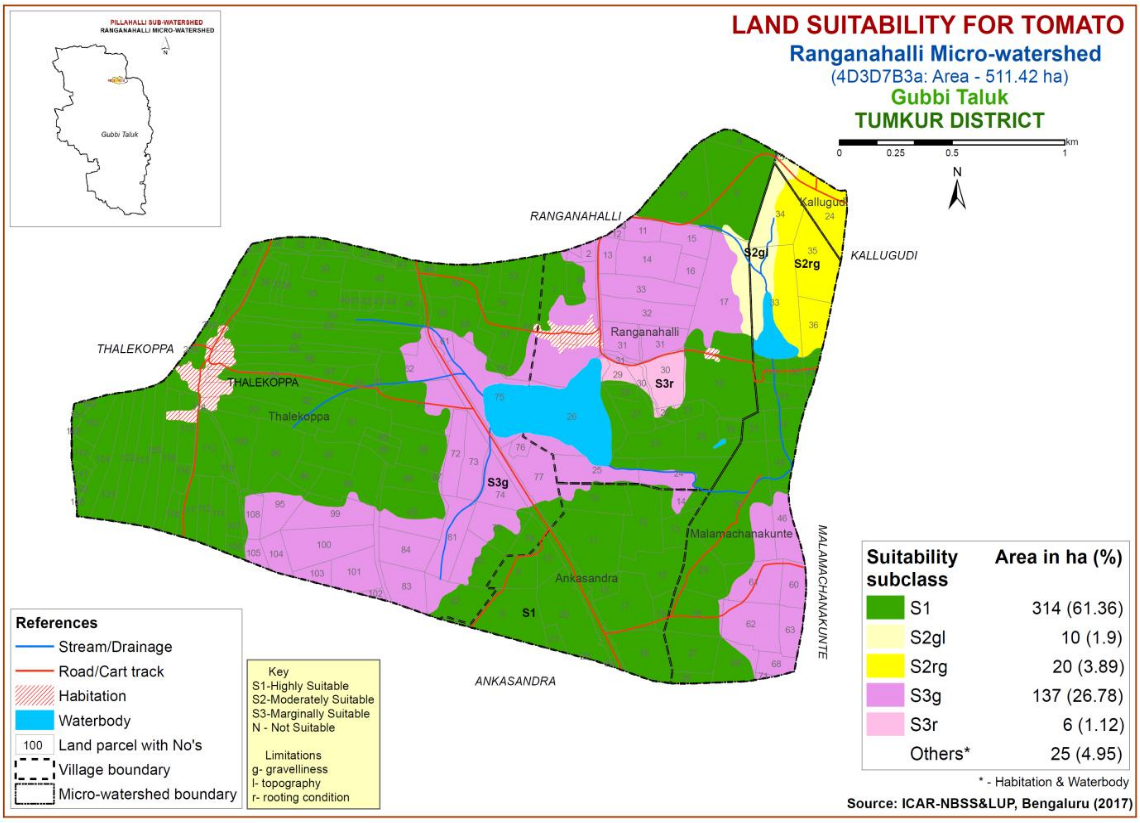



Fig. 7.15 Land Suitability map of Tomato

Highly suitable (Class S1) lands occupy an area of about 314 ha (61%) for growing tomato and are distributed in all parts of the microwatershed. Moderately suitable (Class S2) lands occupy an area of about 30 ha (6%) and are distributed in the northeastern part the microwatershed. They have minor limitations of gravelliness, topography and rooting depth. Marginally suitable (Class S3) lands occupy an area of about 143 ha (28%) and occur in the northern, southwestern, central and south-eastern part of the microwatershed with moderate limitations of gravelliness and rooting depth.

**7.16 Land suitability for Mango (*Mangifera indica*)**

Mango is the most important fruit crop grown in about 1.73 lakh ha area 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 is given in Figure 7.16.

**Table 7.16 Crop suitability criteria for Mango**

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

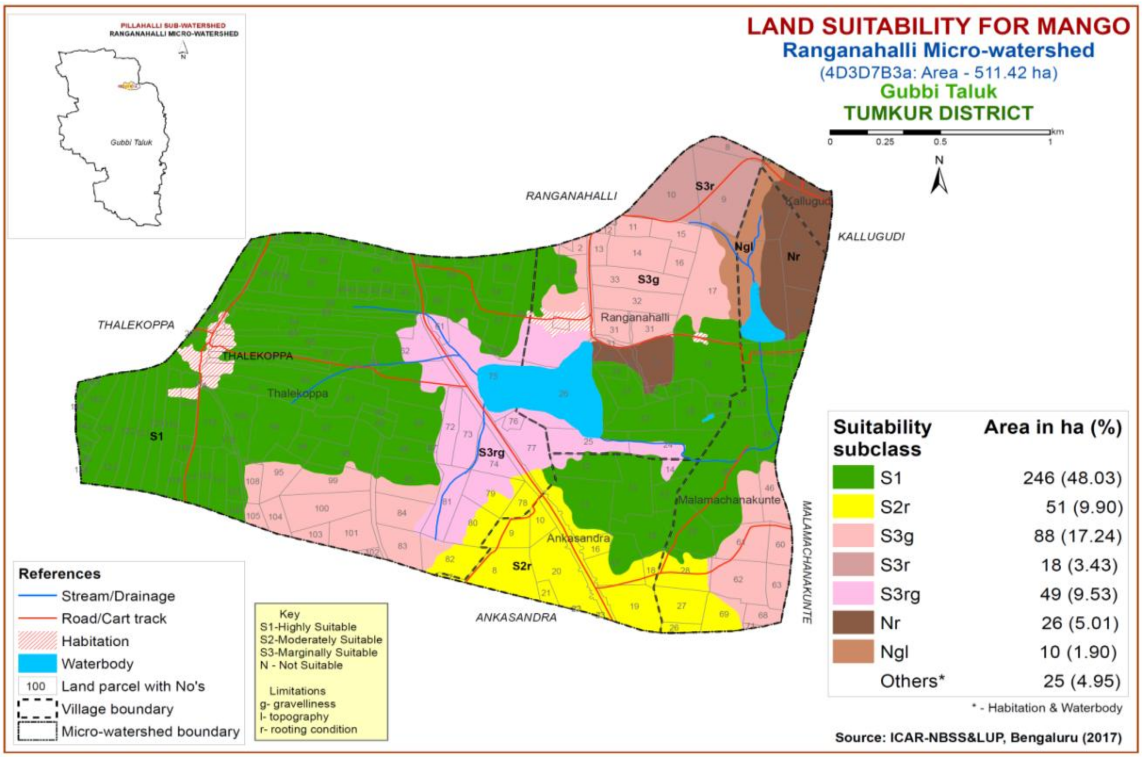



Fig. 7.16 Land Suitability map of Mango

Major area of about 246 ha (48%) in the microwatershed is highly suitable (Class S1) for growing mango and are distributed in the western, northwestern and eastern part of the microwatershed. Moderately suitable (Class S2) lands occupy an area of about 51 ha (10%) and are distributed in the southern part the microwatershed. They have minor limitation of rooting depth. The marginally suitable (Class S3) lands occupy an area of about 155 ha (30%) and are distributed in the south-eastern, northern, northeastern and southwestern part of the microwatershed and they have moderate limitations of gravelliness and rooting depth. An area of about 36 ha (7%) is not suitable (Class N) and is distributed in the central and northeastern part of the microwatershed with severe limitations of rooting depth, gravelliness and topography.

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

Sapota is the most important fruit crop grown in an area of 29373 ha in almost all the districts of the State. The crop requirements (Table 7.17) 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 geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.17.

Maximum area of about 296 ha (58%) is highly suitable (Class S1) for growing sapota and are distributed in major part of the microwatershed. An area of about 18 ha (3%) is moderately suitable (Class S2) and are distributed in the northern part the microwatershed with minor limitation of rooting depth.

## Table 7.17 Crop suitability criteria for Sapota

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

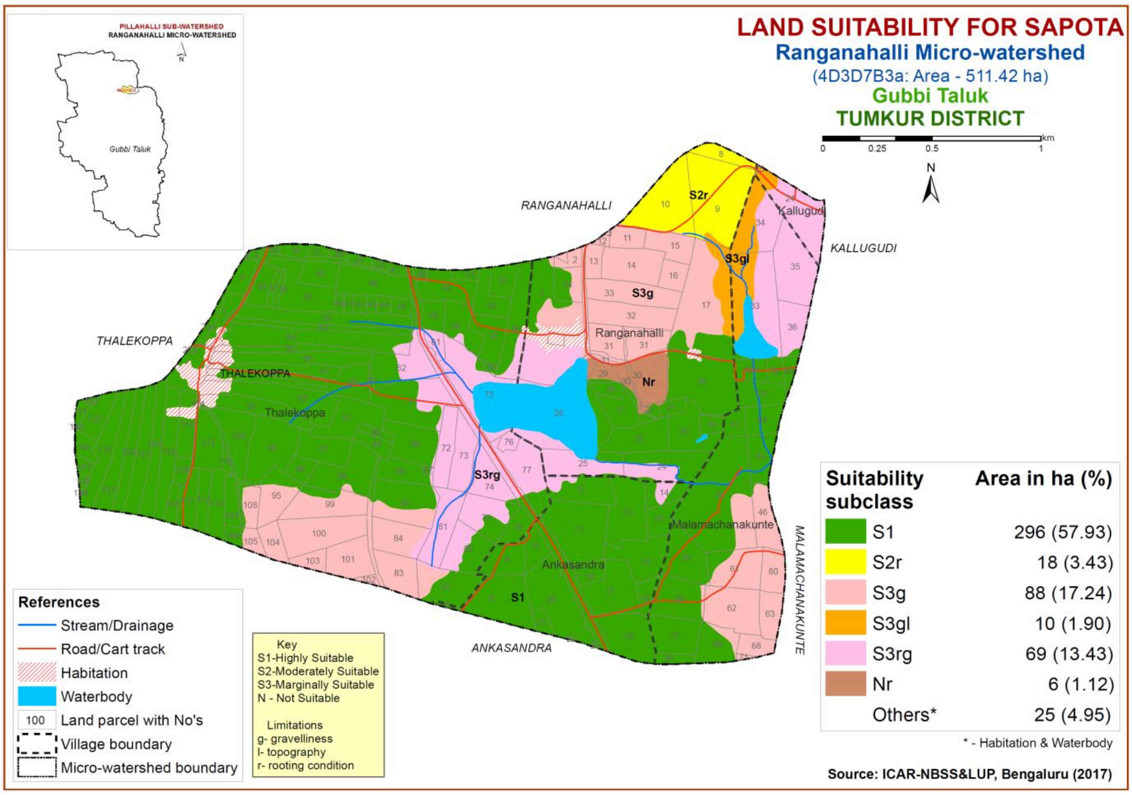



Fig. 7.18 Land Suitability map of Sapota

Marginally suitable lands (Class S3) for growing sapota occupy an area of about 167 ha (33%) and occur in the southwestern, central, northeastern and south-eastern part of the microwatershed with moderate limitations of rooting depth, gravelliness and topography.

A very small area of about 6 ha (1%) is not suitable (Class N) and is distributed in the central part of the microwatershed. They have severe limitations of rooting depth.

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

Guava is the most important fruit crop grown in an area of 0.64 lakh ha in almost all the districts of the State. The crop requirements (Table 7.18) for growing guava were matched with the soil-site characteristics (7.1) and a land suitability map for growing guava was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.18.

An area of about 250 ha (49%) in the microwatershed is highly suitable (Class S1) for growing guava and are distributed in the western, northern, eastern and southern part of the microwatershed. Moderately suitable (Class S2) lands occupy an area of about 95 ha (18%) and are distributed in the northwestern and southwestern part of the microwatershed and have minor limitations of gravelliness, rooting depth and texture. The marginally suitable (Class S3) lands cover an area of about 136 ha (26%) and are distributed in the south-eastern, northeastern and central part of the microwatershed with moderate limitations of gravelliness, rooting depth and topography. A very small area of about 6 ha (1%) is not suitable (Class N) and is distributed in the central part of the microwatershed with severe limitation of rooting depth.

**Table 7.18 Crop suitability criteria for Guava**

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

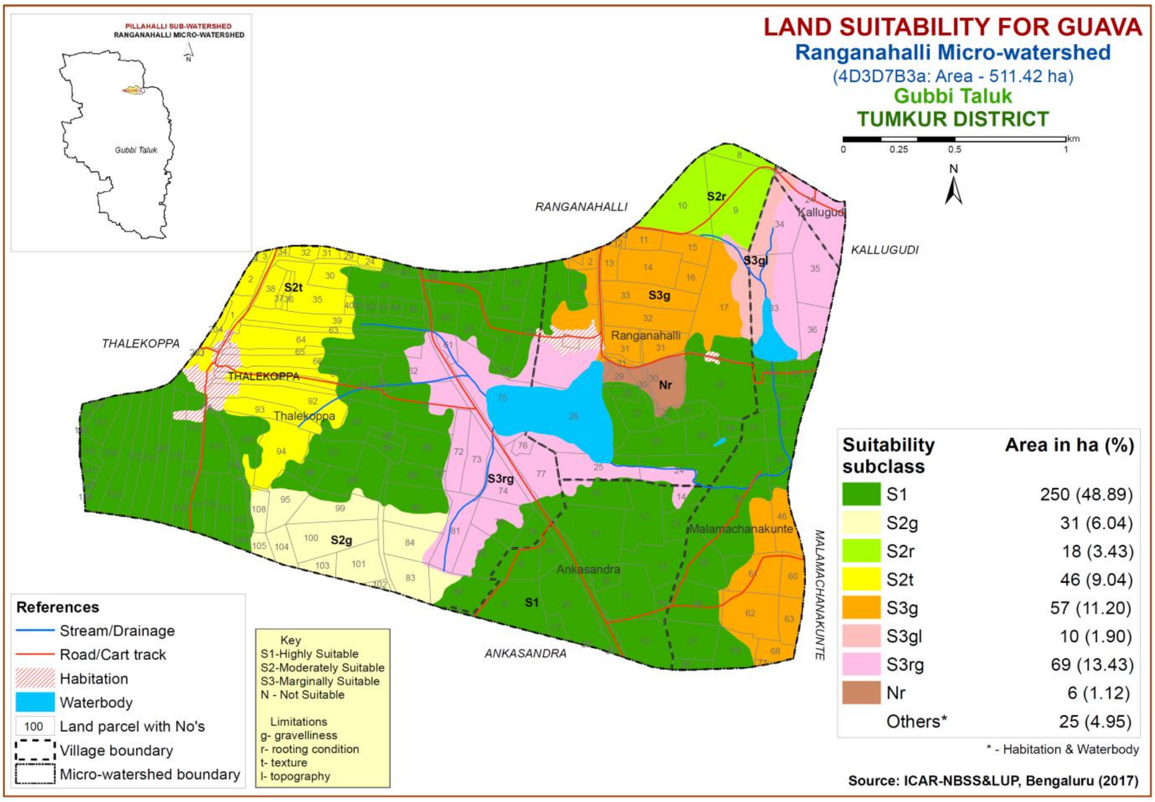



Fig. 7.18 Land Suitability map of Guava

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

Pomegranate is one of the commercially grown fruit crop in Karnataka in an area of 0.18 lakh ha 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 7.19.

Maximum area of about 296 ha (58%) is highly suitable (Class S1) for growing pomegranate and are distributed in major part of the microwatershed. An area of about 18 ha (3%) is moderately suitable (Class S2) and are distributed in the northern part the microwatershed with minor limitation of rooting depth. Marginally suitable lands (Class S3) for growing pomegranate occupy an area of about 167 ha (33%) and occur in the southwestern, central, northeastern and south-eastern part of the microwatershed with moderate limitations of rooting depth, gravelliness and topography. A very small area of about 6 ha (1%) is not suitable (Class N) and is distributed in the central part of the microwatershed. They have severe limitation of rooting depth.

**Table 7.19 Crop suitability criteria for Pomegranate**

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

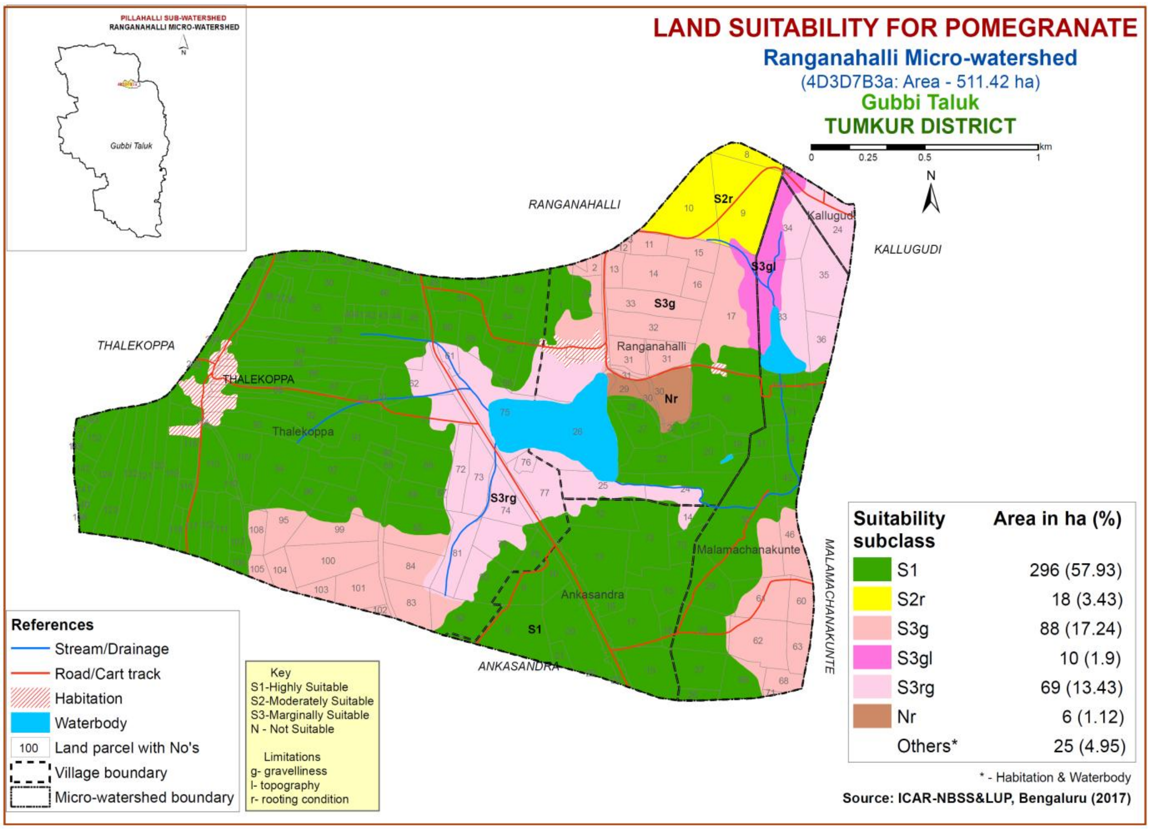



Fig. 7.19 Land Suitability map of Pomegranate

### 7.20 Land Suitability for Banana (*Musa paradisiaca*)

Banana is one of the major fruit crop grown in an area of 1.02 lakh ha in Karnataka State. The crop requirements for growing banana (Table 7.20) were matched with the soil-site characteristics (Table 7.1) of the soils of the microwatershed and a land suitability map for growing banana was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.20.

**Table 7.20 Crop suitability criteria for Banana**

| Crop requirement | | | Rating | | | |
|---|---|---|---|---|---|---|
| Soil –site characteristics | | Unit | Highly suitable(S1) | Moderately suitable(S2) | Marginally suitable(S3) | Not suitable(N) |
| Climate | Temperature in growing season | $^{0}C$ | 26-33 | 34-36<br>24-25 | 37-38 | >38 |
| Soil aeration | Soil drainage | Class | Well drained | Moderately to imper.drained | Poorly drained | V.poorly drained |
| Nutrient availability | Texture | Class | l,cl, scl,sil | Sicl, sc, c(<45%) | C (>45%), sic, sl | ls, s |
| | pH | 1:2.5 | 6.5-7.0 | 7.1-8.5,5.5-6.4 | >8.5,<5.5 | |
| Rooting conditions | Soil depth | Cm | >125 | 76-125 | 50-75 | <50 |
| | Stoniness | % | <10 | 10-15 | 15-35 | >35 |
| Soil toxicity | Salinity | dS/m | <1.0 | 1-2 | >2 | |
| | Sodicity | % | <5 | 5-10 | 10-15 | >15 |
| Erosion | Slope | % | <3 | 3-5 | 5-15 | >15 |

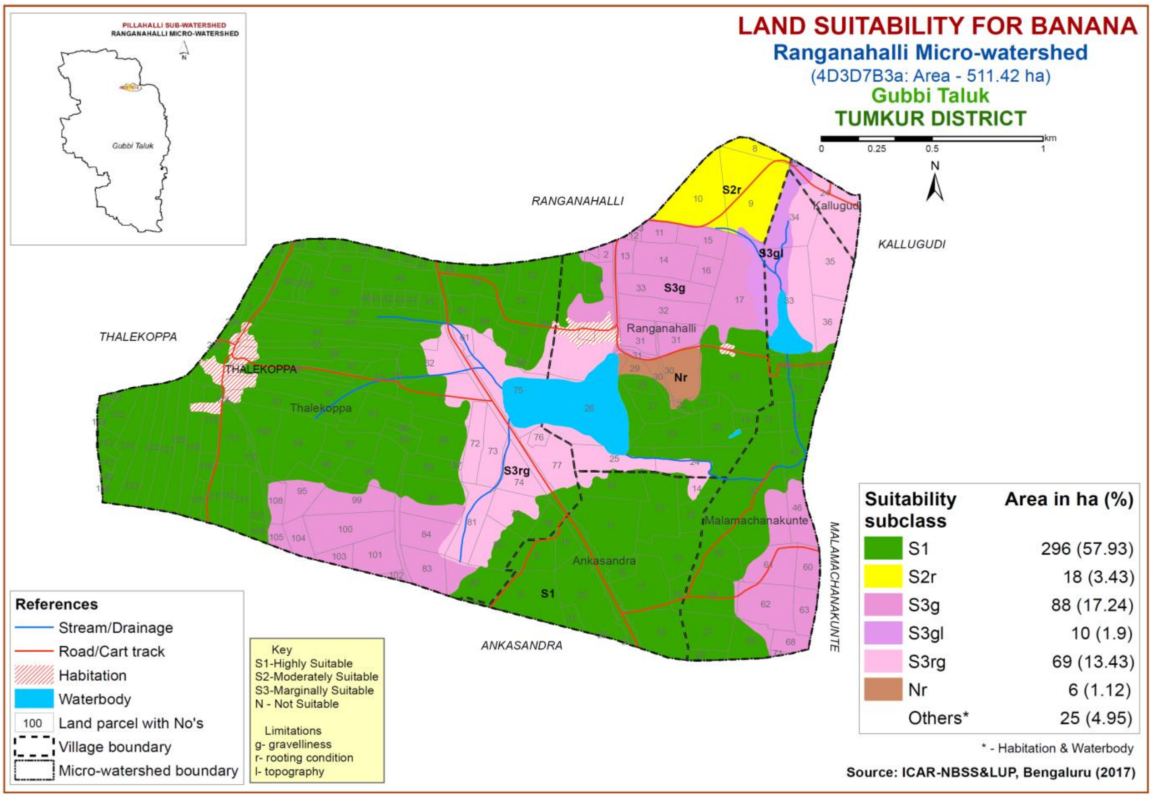



Fig. 7.20 Land Suitability map of Banana

Highly suitable (Class S1) lands occupy maximum area of about 296 ha (58%) for growing banana and are distributed in major part of the microwatershed. An area of about 18 ha (3%) is moderately suitable (Class S2) and are distributed in the northern part the microwatershed with minor limitation of rooting depth. Marginally suitable lands (Class

S3) for growing banana occupy an area of about 167 ha (33%) and occur in the southwestern, central, northeastern and south-eastern part of the microwatershed with moderate limitations of rooting depth, gravelliness and topography. A very small area of about 6 ha (1%) is not suitable (Class N) and is distributed in the central part of the microwatershed. They have severe limitation of rooting depth.

### 7.21 Land Suitability for Jack fruit (*Artocarpus heterophyllus*)

Jackfruit is the most important fruit crop grown in 5368 ha in all the districts of the state. The crop requirements for growing jackfruit were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing jackfruit (Table 7.21) was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.21.

Maximum area of about 296 ha (58%) is highly suitable (Class S1) for growing jack fruit and are distributed in major part of the microwatershed. An area of about 18 ha (3%) is moderately suitable (Class S2) and are distributed in the northern part the microwatershed with minor limitation of rooting depth. Marginally suitable lands (Class S3) for growing jackfruit occupy an area of about 167 ha (33%) and occur in the southwestern, central, northeastern and south-eastern part of the microwatershed with moderate limitations of rooting depth, gravelliness and topography. A very small area of about 6 ha (1%) is not suitable (Class N) and is distributed in the central part of the microwatershed. They have severe limitation of rooting depth.

**Table 7.21 Land suitability criteria for Jackfruit**

| Crop requirement | | | Rating | | | |
|---|---|---|---|---|---|---|
| Soil –site characteristics | | Unit | Highly suitable(S1) | Moderately suitable(S2) | Marginally suitable(S3) | Not suitable(N) |
| Soil aeration | Soil drainage | class | well | Mod. well | Poorly | V. Poorly |
| 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 |
| Rooting conditions | Soil depth | Cm | >100 | 75-100 | 50-75 | <50 |
| | Gravel content | % vol. | <15 | 15-35 | 35-60 | >60 |
| Erosion | Slope | % | 0-3 | 3-5 | >5 | - |

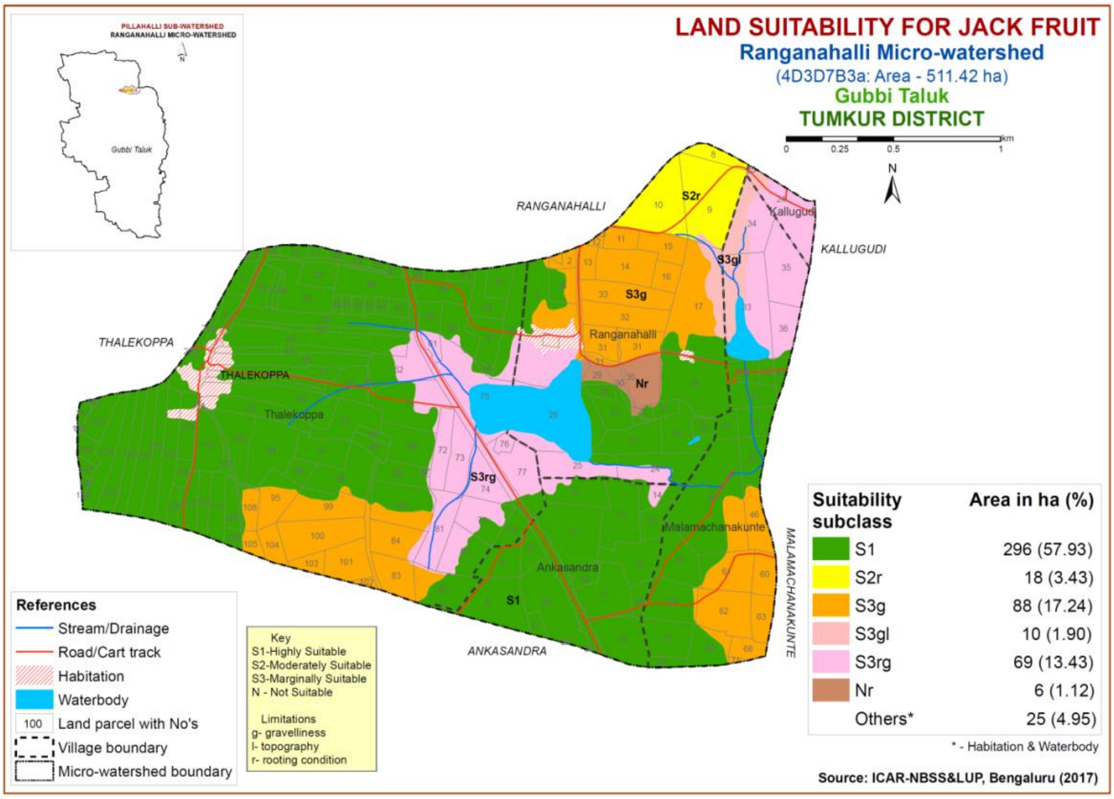



Fig. 7.21 Land Suitability map of Jackfruit

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

Jamun is an important fruit crop grown in almost all the districts of the State. The crop requirements for growing jamun were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing jamun (Table .22) was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.22.

**Table .22 Land suitability criteria for jamun**

| **Crop requirement** | | | **Rating** | | | |
|---|---|---|---|---|---|---|
| **Soil –site characteristics** | | **Unit** | **Highly suitable(S1)** | **Moderately Suitable(S2)** | **Marginally suitable(S3)** | **Not suitable(N)** |
| Soil aeration | Soil drainage | Class | Well | Mod. well | Poorly | V.Poorly |
| 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 |
| Rooting conditions | Soil depth | Cm | >150 | 100-150 | 50-100 | <50 |
| | Gravel content | % vol. | <15 | 15-35 | 35-60 | >60 |
| Erosion | Slope | % | 0-3 | 3-5 | 5-10 | >10 |

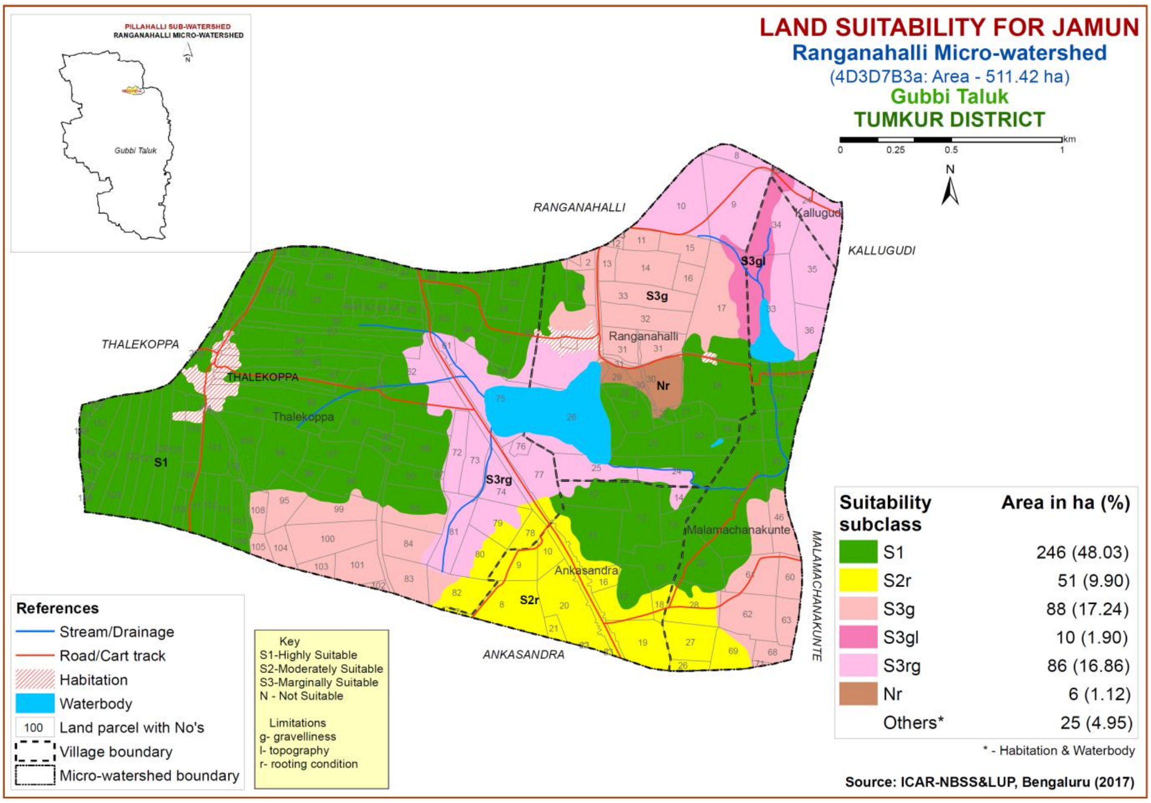



Fig. 7.22 Land Suitability map of Jamun

Major area of about 246 ha (48%) in the microwatershed is highly suitable (Class S1) for growing jamun and are distributed in the western, northwestern and eastern part of the microwatershed. Moderately suitable (Class S2) lands occupy an area of about 51 ha (10%) and are distributed in the southern part the microwatershed. They have minor limitation of rooting depth. The marginally suitable (Class S3) lands for growing jamun occupy an area of about 184 ha (33%) and are distributed in the south-eastern, northeastern, central and south-eastern part of the microwatershed and have moderate limitations of gravelliness, topography and rooting depth. A very small area of about 6 ha (1%) is not suitable (Class N) and is distributed in the central part of the microwatershed with severe limitation of rooting depth. They have severe limitation of rooting depth.

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

Musambi is the most important fruit crop grown in an area of 5446 ha in almost all the districts of the state. The crop requirements (Table 7.23) for growing musambi were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing musambi was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.23.

Maximum area of about 296 ha (58%) is highly suitable (Class S1) for growing musambi and are distributed in major part of the microwatershed. An area of about 18 ha (3%) is moderately suitable (Class S2) and are distributed in the northern part the microwatershed with minor limitation of rooting depth. Marginally suitable lands (Class

S3) for growing musambi occupy an area of about 167 ha (33%) and occur in the southwestern, central, northeastern and south-eastern part of the microwatershed with moderate limitations of rooting depth, gravelliness and topography. A very small area of about 6 ha (1%) is not suitable (Class N) and is distributed in the central part of the microwatershed. They have severe limitation of rooting depth.

**Table 7.23 Crop suitability criteria for Musambi**

| Crop requirement | | | Rating | | | |
|---|---|---|---|---|---|---|
| **Soil –site characteristics** | | **Unit** | **Highly suitable(S1)** | **Moderately suitable(S2)** | **Marginally suitable(S3)** | **Not suitable(N)** |
| Soil aeration | Soil drainage | Class | Well drained | Mod.to imperf.drained | poorly | Very poorly |
| Nutrient availability | Texture | Class | Scl,l,sicl,cl,s | Sc, sc, c | C(>70%) | S, ls |
| | pH | 1:2.5 | 6.0-7.5 | 5.5-6.47.6-8.0 | 4.0-5.4 8.1-8.5 | <4.0 >8.5 |
| Rooting conditions | Soil depth | Cm | >150 | 100-150 | 50-100 | <50 |
| | Gravel content | % vol. | Non gravelly | 15-35 | 35-55 | >55 |
| Erosion | Slope | % | <3 | 3-5 | 5-10 | |

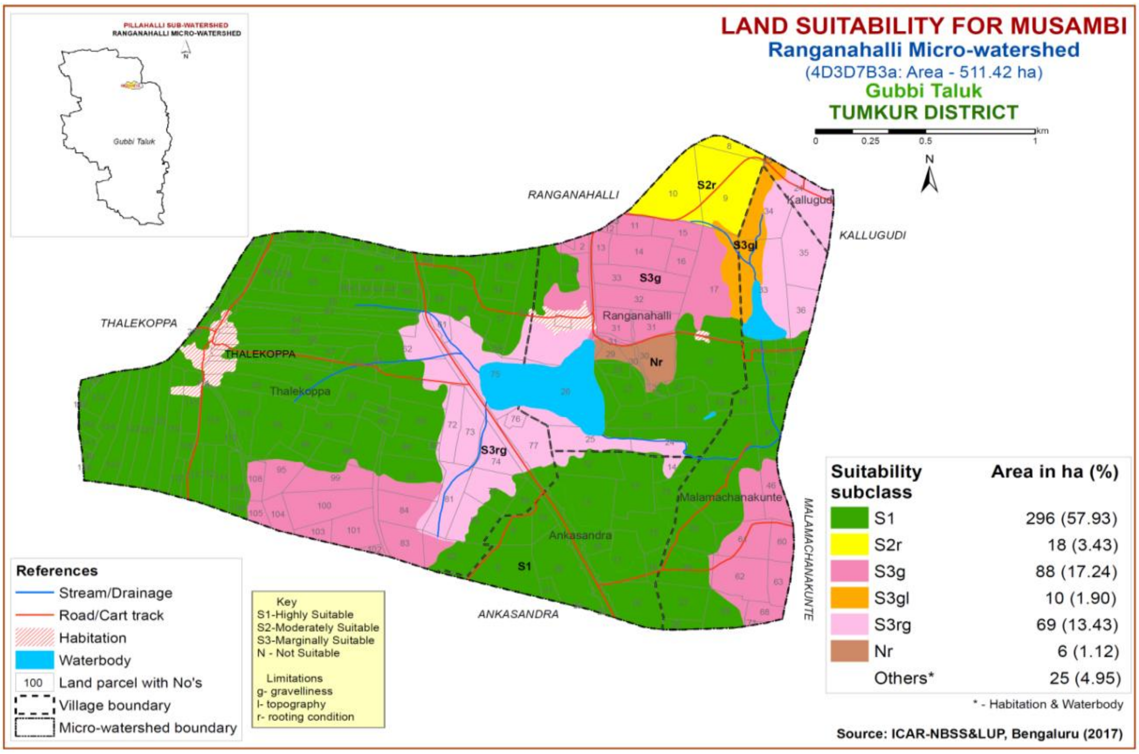



Fig. 7.23 Land Suitability map of Musambi

**7.24 Land Suitability for Lime (*Citrus sp*)**

Lime is one of the most important fruit crop grown in an area of 11752 ha in almost all the districts of the State. The crop requirements for growing lime (Table 7.24) 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 geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7. 24.

**Table 7.24 Crop suitability criteria for Lime**

| Crop requirement | | | Rating | | | |
|---|---|---|---|---|---|---|
| Soil –site characteristics | | Unit | Highly suitable(S1) | Moderately suitable(S2) | Marginally suitable(S3) | Not suitable(N) |
| Climate | Temperature in growing season | $^0$C | 28-30 | 31-35<br>24-27 | 36-40<br>20-23 | >40<br><20 |
| Soil moisture | Growing period | Days | 240-265 | 180-240 | 150-180 | <150 |
| Soil aeration | Soil drainage | Class | Well drained | Mod.to imperf.drained | poorly | Very poorly |
| Nutrient availability | Texture | Class | Scl,l,sicl,cl,s | Sc, sc, c | C(>70%) | S, ls |
| | pH | 1:2.5 | 6.0-7.5 | 5.5-6.4,<br>7.6-8.0 | 4.0-5.4<br>8.1-8.5 | <4.0<br>>8.5 |
| | $CaCO_3$ in root zone | % | Non - calcareous | Upto 5 | 5-10 | >10 |
| Rooting conditions | Soil depth | Cm | >150 | 100-150 | 50-100 | <50 |
| | Gravel content | % vol. | Non gravelly | 15-35 | 35-55 | >55 |
| Soil toxicity | Salinity | dS/m | Non saline | Upto 1.0 | 1.0-2.5 | >2.5 |
| | Sodicity | % | Non sodic | 5-10 | 10-15 | >15 |
| Erosion | Slope | % | <3 | 3-5 | 5-10 | |

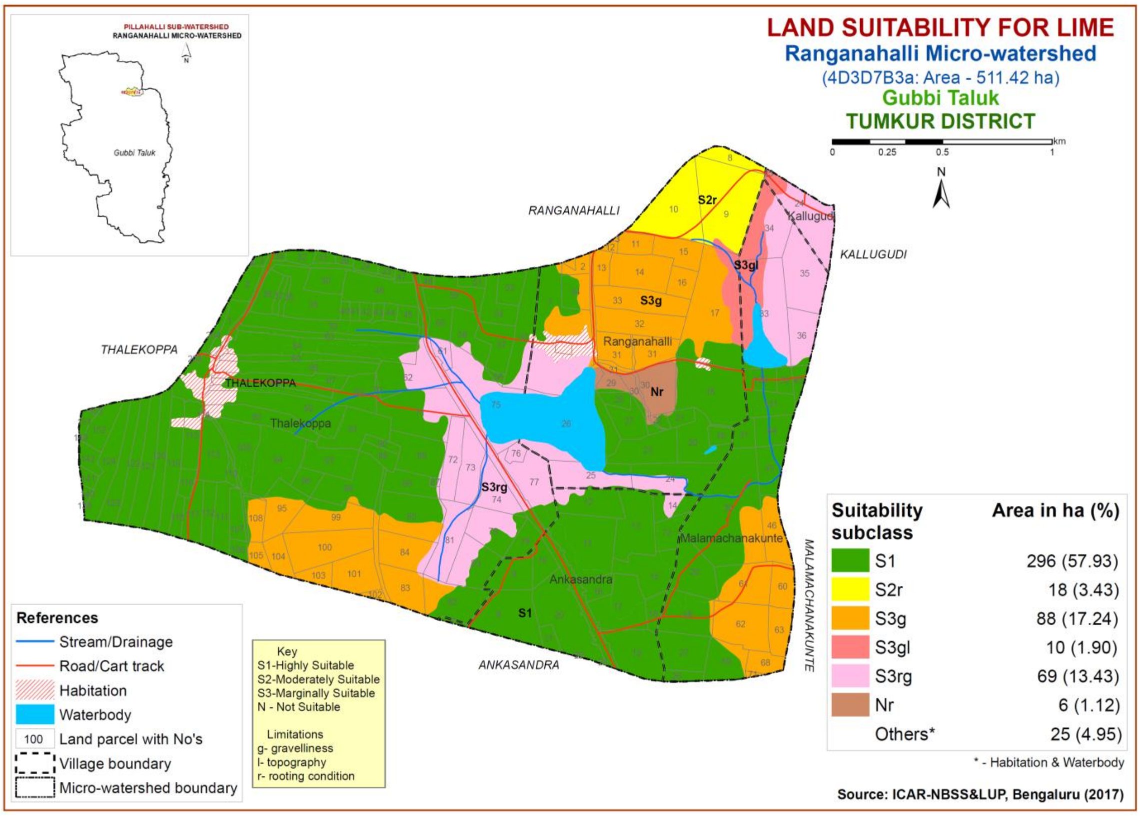



Fig. 7.24 Land Suitability map of Lime

Maximum area of about 296 ha (58%) is highly suitable (Class S1) for growing lime and are distributed in major part of the microwatershed. An area of about 18 ha (3%) is moderately suitable (Class S2) and are distributed in the northern part the microwatershed with minor limitation of rooting depth. Marginally suitable lands (Class

S3) for growing lime occupy an area of about 167 ha (33%) and occur in the southwestern, central, northeastern and south-eastern part of the microwatershed with moderate limitations of gravelliness, topography and rooting depth. A very small area of about 6 ha (1%) is not suitable (Class N) and is distributed in the central part of the microwatershed. They have severe limitations of rooting depth.

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

Cashew is one of the most important nut and fruit crop grown in an area of 7052 ha in almost all the districts of the State. The crop requirements (Table 7.25) for growing cashew were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing cashew was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.25.

**Table 7.25 Land suitability criteria for Cashew**

| Crop requirement | | | Rating | | | |
|---|---|---|---|---|---|---|
| Soil –site characteristics | | Unit | Highly suitable(S1) | Moderately Suitable(S2) | Marginally suitable(S3) | Not suitable(N) |
| Soil aeration | Soil drainage | Class | Well drained | Mod. well drained | Poorly drained | V.Poorly drainage |
| Nutrient availability | Texture | Class | | | | |
| | pH | 1:2.5 | 5.5-6.5 | 5.0-5.5,6.5-7.3 | 7.3-7.8 | >7.8 |
| Rooting conditions | Soil depth | Cm | >100 | 75-100 | 50-75 | <50 |
| | Gravel content | % vol. | <15 | 15-35 | 35-60 | >60 |
| Erosion | Slope | % | 0-3 | 3-10 | >10 | |

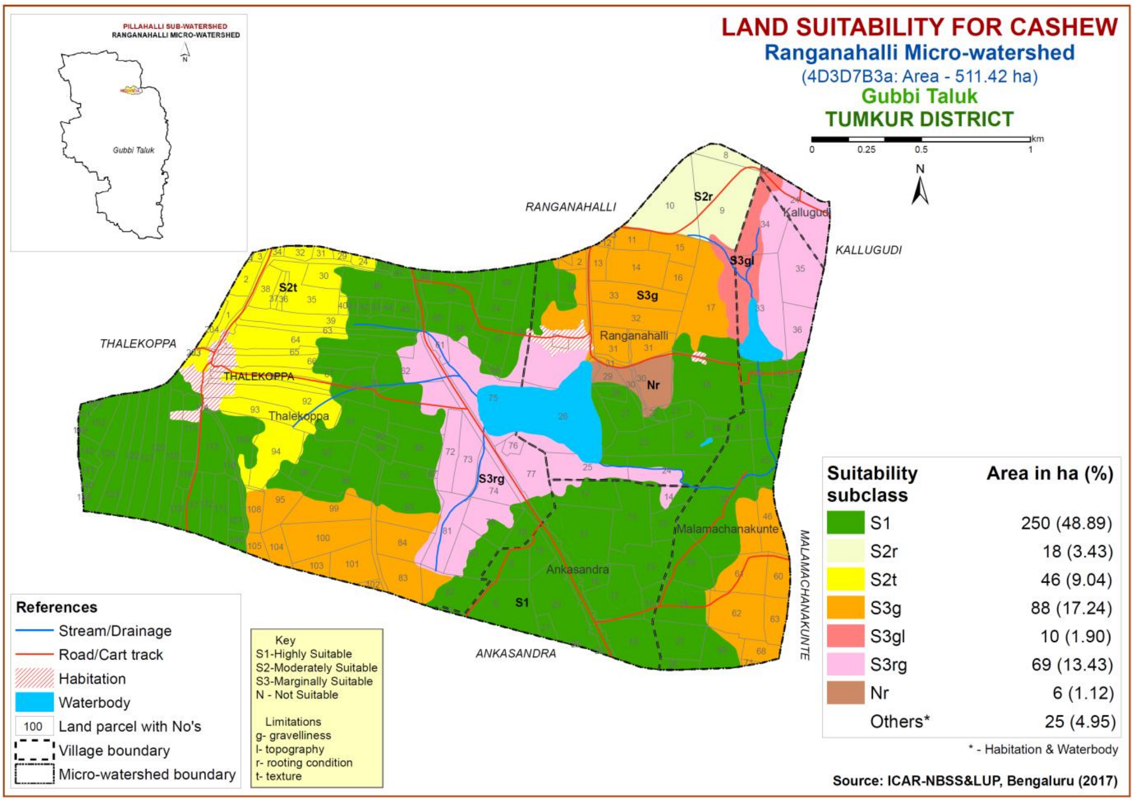



Fig. 7.25 Land Suitability map of Cashew

Maximum area of about 250 ha (49%) has soils that are highly suitable (Class S1) for growing cashew and are distributed in the western, northern, south-eastern and eastern part of the microwatershed. An area of about 64 ha (12%) has soils that are moderately suitable (Class S2) with minor limitations of rooting depth and texture. They are distributed in the northwestern and northern part of the microwatershed. The marginally suitable (Class S3) lands cover an area of about 167 ha (33%) and occur in the southwestern, northern, central and south-eastern part of the microwatershed with moderate limitations of gravelliness, rooting depth and topography. A very small area of about 6 ha (1%) is not suitable (Class N) and is distributed in the central part of the microwatershed. They have severe limitation of rooting depth.

### 7.26 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 (Table 26) for growing custard apple were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing custard apple was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.26.

Major area of about 314 ha (611%) is highly suitable (Class S1) lands for growing custard apple and are distributed in all parts of the microwatershed. Moderately suitable (Class S2) lands occupy an area of about 167 ha (33%) and occur in the southwestern, central, northeastern and south-eastern part of the microwatershed with moderate limitations of rooting depth, gravelliness and topography. A very small area of about 6 ha (1%) is not suitable (Class N) and is distributed in the central part of the microwatershed. They have severe limitation of rooting depth.

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

| **Crop requirement** | | | **Rating** | | | |
|---|---|---|---|---|---|---|
| **Soil –site characteristics** | | **Unit** | **Highly suitable(S1)** | **Moderately Suitable(S2)** | **Marginally suitable(S3)** | **Not suitable(N)** |
| Soil aeration | Soil drainage | Class | Well drained | Mod. well drained | Poorly drained | V.Poorly drained |
| Nutrient availability | Texture | Class | Scl,cl,sc,c(red), c (black) | - | Sl, ls | - |
| | pH | 1:2.5 | 6.0-7.3 | 7.3-8.4 | 5.0-5.5<br>8.4-9.0 | >9.0 |
| Rooting conditions | Soil depth | Cm | >75 | 50-75 | 25-50 | <25 |
| | Gravel content | % vol. | <15-35 | 35-60 | 60-80 | - |
| Erosion | Slope | % | 0-3 | 3-5 | >5 | |

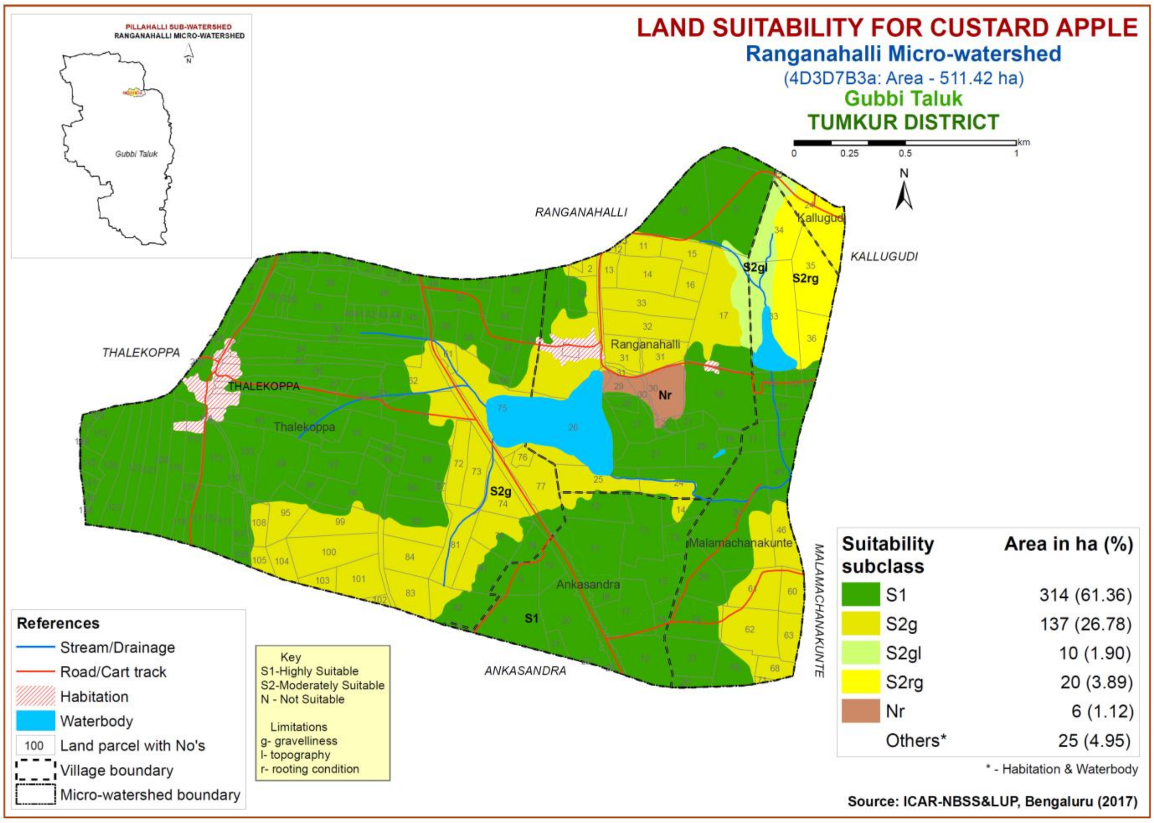



Fig. 7.26 Land Suitability map of Custard Apple

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

Amla is one of the fruit crop grown in almost all the districts of the State. The crop requirements for growing amla were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing amla (Table 7.27) was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.27.

**Table 7.27 Land suitability criteria for Amla**

| **Crop requirement** | | | **Rating** | | | |
|---|---|---|---|---|---|---|
| **Soil –site characteristics** | | **Unit** | **Highly suitable(S1)** | **Moderately Suitable(S2)** | **Marginally suitable(S3)** | **Not suitable(N)** |
| Soil aeration | Soil drainage | Class | Well drained | Mod.well drained | Poorly drained | V.Poorly drained |
| 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 | 7.8-8.4 | >8.4 |
| Rooting conditions | Soil depth | Cm | >75 | 50-75 | 25-50 | <25 |
| | Gravel content | % vol. | <15-35 | 35-60 | 60-80 | |
| Erosion | Slope | % | 0-3 | 3-5 | 5-10 | >10 |

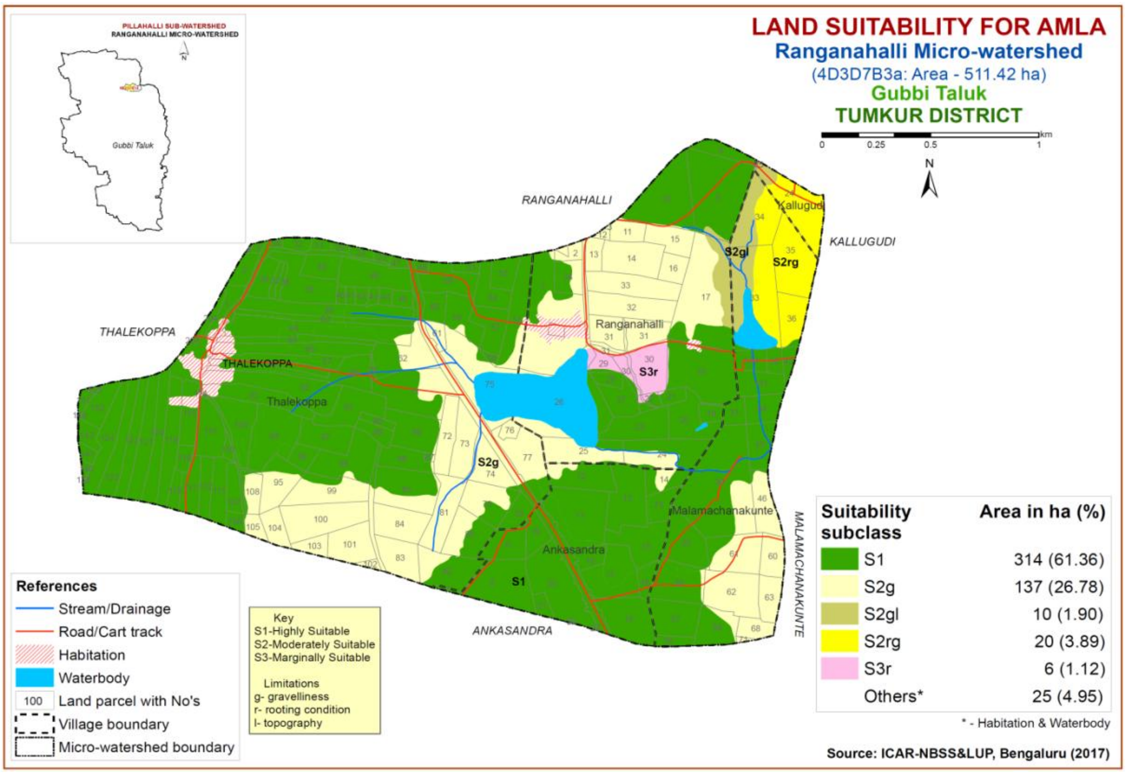



Fig. 7.27 Land Suitability map of Amla

Highly suitable (Class S1) lands occupy major area of about 314 ha (611%) for growing amla and are distributed in all parts of the microwatershed. Moderately suitable (Class S2) lands occupy an area of about 167 ha (33%) and occur in the southwestern, central, northeastern and south-eastern part of the microwatershed with moderate limitations of rooting depth, gravelliness and topography. A very small area of about 6 ha (1%) is not suitable (Class N) and is distributed in the central part of the microwatershed. They have severe limitation of rooting depth.

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

Tamarind is the most important spice crop grown in 14897 ha in all the districts of the state. The crop requirements (Table 7.28) for growing tamarind were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing tamarind was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Fig. 7.28.

Major area of about 246 ha (48%) in the microwatershed is highly suitable (Class S1) for growing tamarind and are distributed in the western, northwestern and eastern part of the microwatershed. Moderately suitable (Class S2) lands occupy an area of about 51 ha (10%) and are distributed in the southern part the microwatershed. They have minor limitation of rooting depth. The marginally suitable (Class S3) lands for growing tamarind occupy an area of about 155 ha (30%) and are distributed in the south-eastern, northern, central and southwestern part of the microwatershed and they have moderate limitations of gravelliness and rooting depth. An area of about 36 ha (7%) is not suitable

(Class N) and is distributed in the central and northeastern part of the microwatershed with severe limitations of rooting depth, gravelliness and topography.

**Table 7.28 Land suitability criteria for Tamarind**

| Crop requirement | | | Rating | | | |
|---|---|---|---|---|---|---|
| Soil –site characteristics | | Unit | Highly suitable(S1) | Moderately Suitable(S2) | Marginally suitable(S3) | Not suitable(N) |
| Soil aeration | Soil drainage | Class | Well drained | Mod.well drained | Poorly drained | V.Poorly drained |
| 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 |
| Rooting conditions | Soil depth | Cm | >150 | 100-150 | 75-100 | <50 |
| | Gravel content | % vol. | <15 | 15-35 | 35-60 | 60-80 |
| Erosion | Slope | % | 0-3 | 3-5 | 5-10 | >10 |

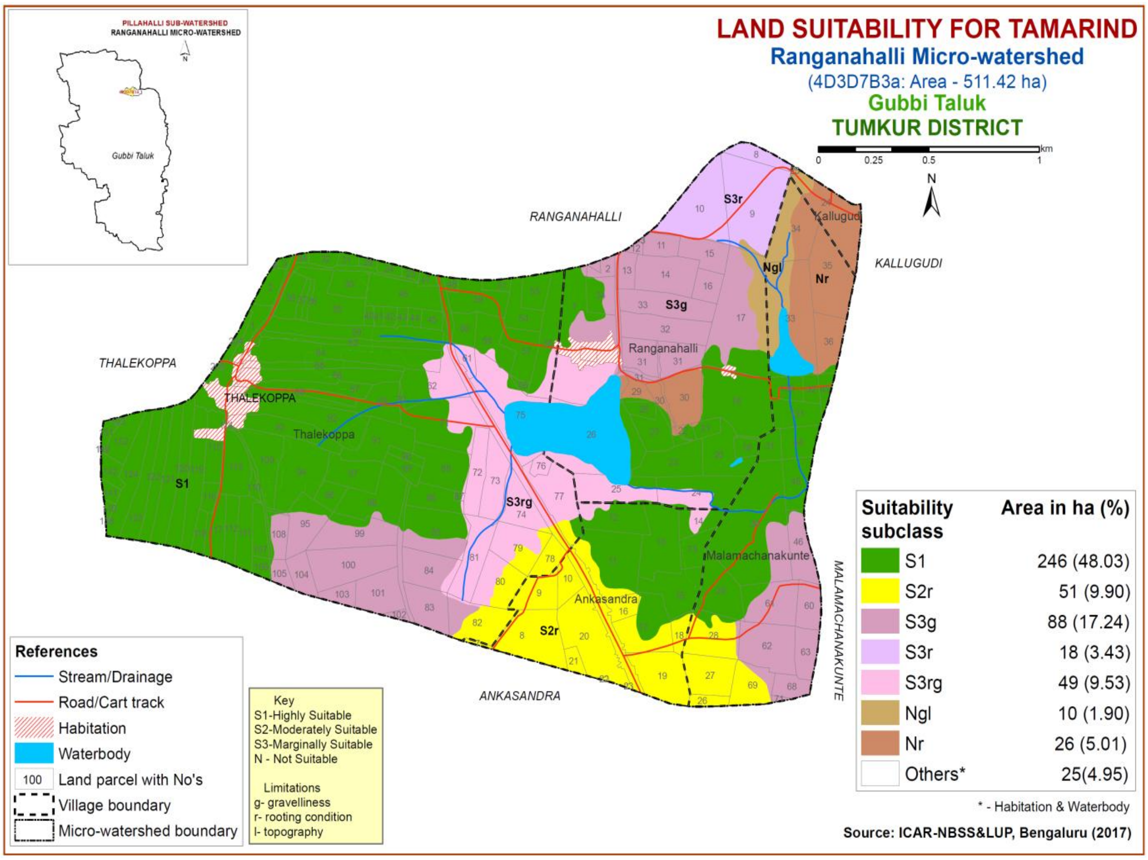



Fig. 7.28 Land Suitability map of Tamarind

## 7.29 Land suitability for Marigold (*Tagetes sps.*)

Marigold is the most important flower crop grown in an area of 9108 ha in almost all the districts of the state. The crop requirements (Table 7.29) for growing marigold were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing marigold was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.29.

Maximum area of about 314 ha (61%) is highly suitable (Class S1) for growing marigold and are distributed in all parts of the microwatershed. Moderately suitable (Class S2) lands occupy an area of about 87 ha (25%) and occur in the northeastern and south-eastern part of the microwatershed with moderate limitations of gravelliness, rooting depth and topography. The marginally suitable (Class S3) lands for growing marigold occupy an area of about 86 ha (17%) and are distributed in the central and southwestern part of the microwatershed and they have moderate limitations of gravelliness and rooting depth.

**Table 7.29 Land suitability criteria for Marigold**

| **Crop requirement** | | | **Rating** | | | |
|---|---|---|---|---|---|---|
| **Soil –site characteristics** | | **Unit** | **Highly suitable(S1)** | **Moderately Suitable(S2)** | **Marginally suitable(S3)** | **Not suitable (N)** |
| Climate | Temperature in growing season | | 18-23 | 17-15<br>24-35 | 35-40<br>10-14 | >40<br><10 |
| Soil aeration | Soil drainage | Class | Well drained | Mod. well drained | Imperfectly drained | Poorly drained |
| Nutrient availability | Texture | Class | l,sl,scl,cl,sil | sicl,sc,sic,c | C | ls, s |
| | pH | 1:2.5 | 7.0-7.5 | 5.5-5.9,7.6-8.5 | <5,>8.5 | - |
| | $CaCO_3$ in root zone | % | Non calcareous | Slightly calcareous | Strongly calcareous | - |
| Rooting conditions | Soil depth | Cm | >75 | 50-75 | 25-50 | <25 |
| | Gravel content | % vol. | <15 | 15-35 | >35 | - |
| Soil toxicity | Salinity | ds/m | Non saline | Slightly | Strongly | - |
| | Sodicity (ESP) | % | <10 | 10-15 | >15 | - |
| Erosion | Slope | % | 1-3 | 3-5 | 5-10 | - |

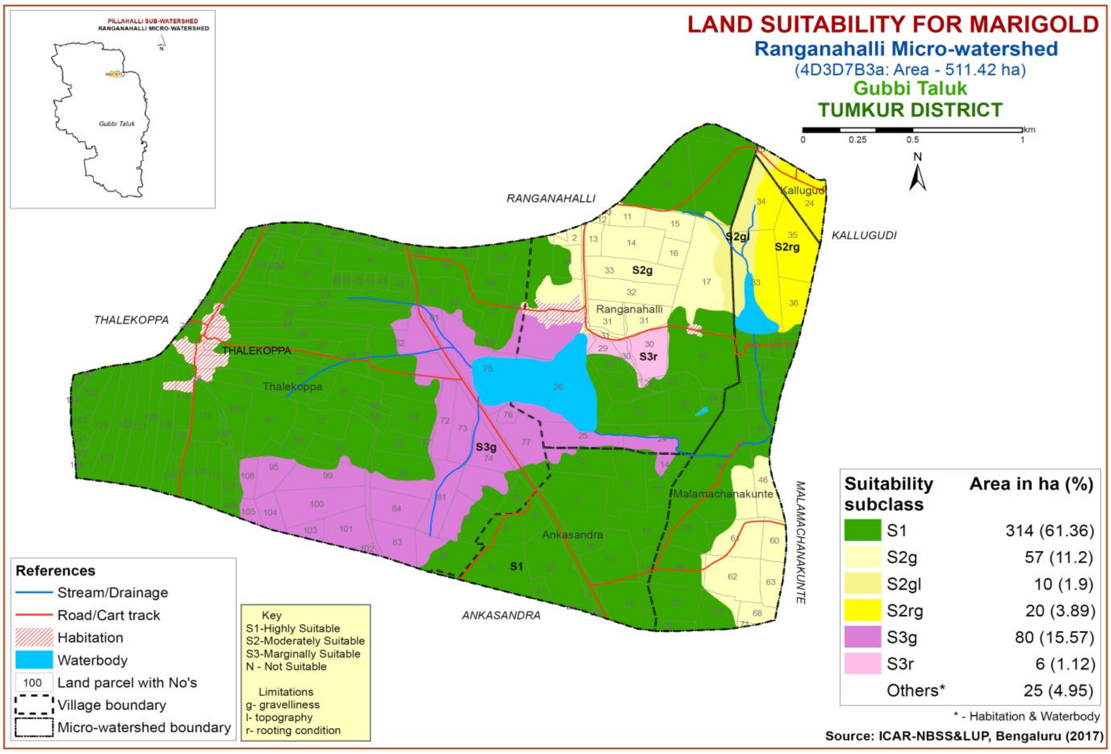


Fig. 7.29 Land Suitability map of Marigold

## 7.30 Land Suitability for Chrysanthemum (*Dendranthema grandiflora*)

Chrysanthemum is the most important flower crop grown in an area of 803 ha in almost all the districts of the State. The crop requirements (Table 7.30) for growing chrysanthemum were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing chrysanthemum was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.30.

**Table 7.30 Land suitability criteria for Chrysanthemum**

| Crop requirement | | | Rating | | | |
|---|---|---|---|---|---|---|
| Soil –site characteristics | | Unit | Highly suitable(S1) | Moderately Suitable(S2) | Marginally suitable(S3) | Not suitable(N) |
| Climate | Temperature in growing season | | 18-23 | 17-15<br>24-35 | 35-40<br>10-14 | >40<br><10 |
| Soil aeration | Soil drainage | Class | Well drained | Moderately well drained | Imperfectly drained | Poorly drained |
| Nutrient availability | Texture | Class | l,sl,scl,cl,sil | sicl,sc,sic,c | C | ls, s |
| | pH | 1:2.5 | 7.0-7.5 | 5.5-5.9,7.6-8.5 | <5,>8.5 | |
| | $CaCO_3$ in root zone | % | Non calcareous | Slightly calcareous | Strongly calcareous | |
| Rooting conditions | Soil depth | Cm | >75 | 50-75 | 25-50 | <25 |
| | Gravel content | % vol. | <15 | 15-35 | >35 | |
| Soil toxicity | Salinity | ds/m | Non saline | slightly | strongly | |
| | Sodicity (ESP) | % | <10 | 10-15 | >15 | - |
| Erosion | Slope | % | 1-3 | 3-5 | 5-10 | |

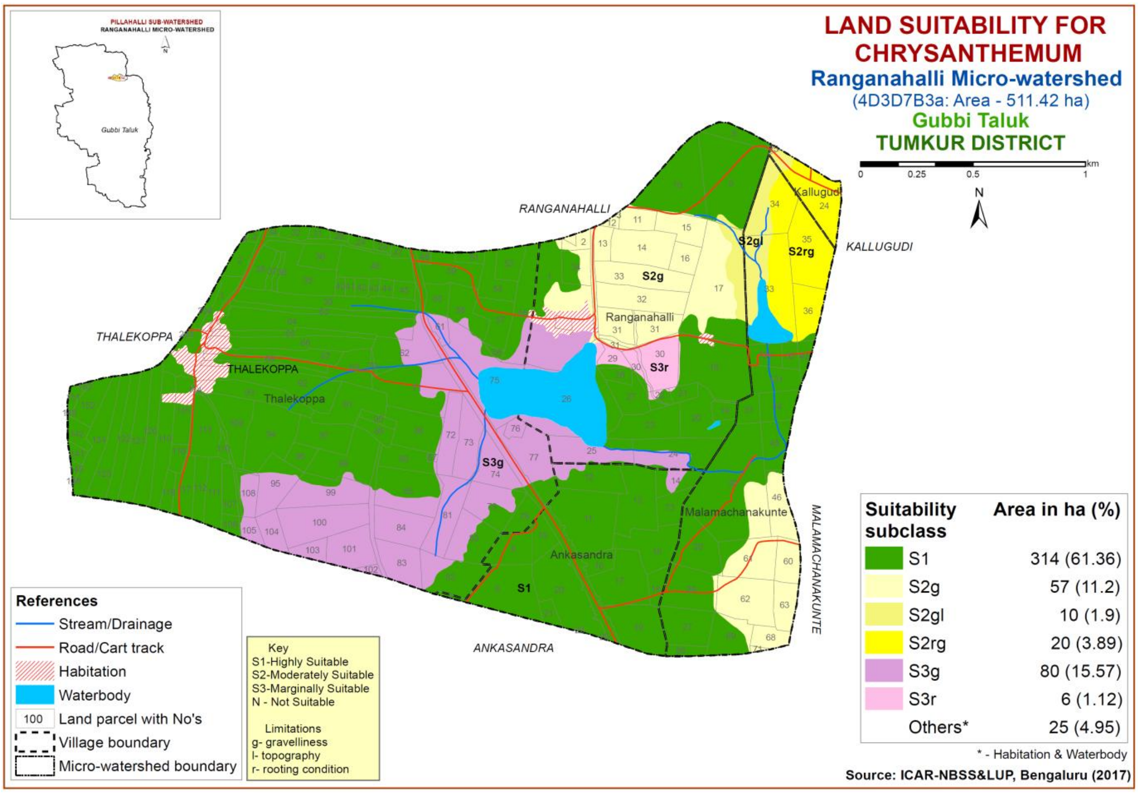



Fig. 7.30 Land Suitability map of Chrysanthemum

Highly suitable (Class S1) lands occupy major area of about 314 ha (61%) is for growing chrysanthemum and are distributed in all parts of the microwatershed. Moderately suitable (Class S2) lands occupy an area of about 87 ha (25%) and occur in the northeastern and south-eastern part of the microwatershed with moderate limitations of gravelliness, rooting depth and topography. The marginally suitable (Class S3) lands occupy an area of about 86 ha (17%) and are distributed in the central and southwestern part of the microwatershed and they have moderate limitations of gravelliness and rooting depth.

**7. 31 Land Suitability for Jasmine *(Jasminum sp.)***

Jasmine is the most important flower crop grown in an area of 803 ha in almost all the districts of the State. The crop requirements (Table 7.31) 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 7.31.

Maximum area of about 314 ha (61%) is highly suitable (Class S1) for growing jasmine and are distributed in all parts of the microwatershed. Moderately suitable (Class S2) lands occupy an area of about 87 ha (25%) and occur in the northeastern and south-eastern part of the microwatershed with moderate limitations of gravelliness, rooting depth and topography. The marginally suitable (Class S3) for growing jasmine occupy an area of about 86 ha (17%) and are distributed in the central and southwestern part of the microwatershed and they have moderate limitations of gravelliness and rooting depth.

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

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

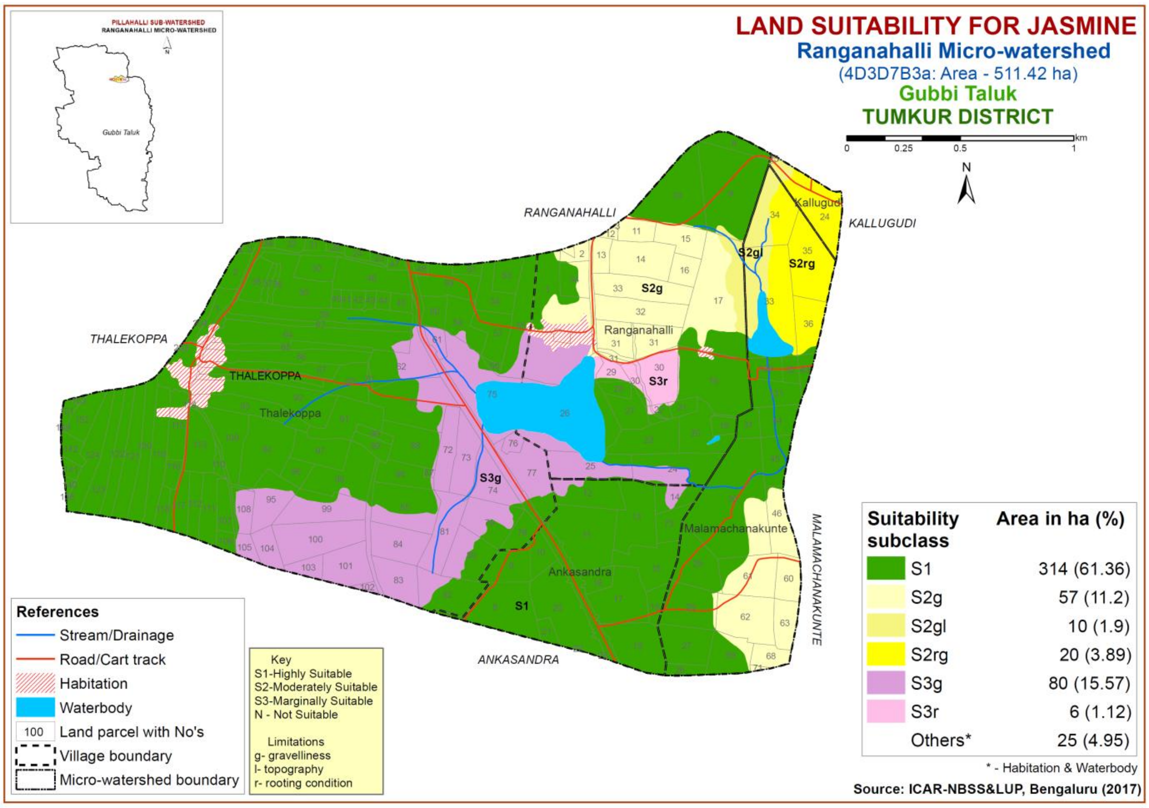



Fig. 7.31 Land Suitability map of Jasmine

## 7.32 Land Suitability for Coconut (*Cocos nucifera*)

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

**Table 7. 32 Land suitability criteria for Coconut**

| Crop requirement | | Rating | | | |
|---|---|---|---|---|---|
| **Soil –site characteristics** | **Unit** | **Highly suitable(S1)** | **Moderately Suitable(S2)** | **Marginally suitable(S3)** | **Not suitable (N)** |
| Slope | % | 0-3 | 3-5 | 5-10 | >10 |
| Soil drainage | class | Well drained | Mod. drained | Poorly | Very poorly |
| Soil reaction | pH | 5.1-6.5 | 6.6-7.5 | 7.6-8.5 | - |
| Surface soil texture | Class | Sc, cl, scl | C (red), sl | C(black),ls | - |
| Soil depth | Cm | >100 | 75-100 | 50-75 | <50 |
| Gravel content | %vol. | <15 | 15-35 | 35-60 | >60 |

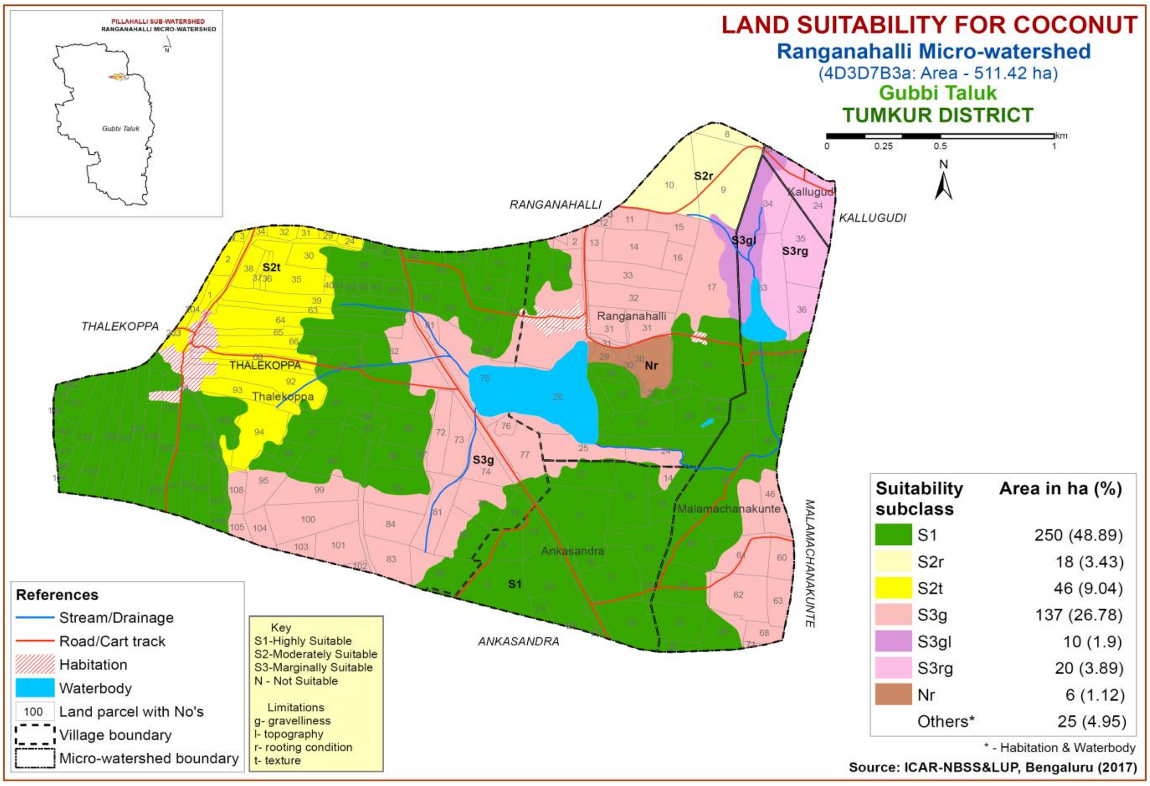



Fig. 7.32 Land Suitability map of Coconut

Maximum area of about 250 ha (49%) has soils that are highly suitable (Class S1) for growing coconut and are distributed in the western, northern, south-eastern and eastern part of the microwatershed. An area of about 64 ha (12%) has soils that are moderately suitable (Class S2) with minor limitations of rooting depth and texture. They are distributed in the northwestern and northern part of the microwatershed. The marginally suitable (Class S3) lands cover an area of about 167 ha (33%) and occur in the southwestern, northern, central and south-eastern part of the microwatershed with moderate limitations of gravelliness, rooting depth and topography. A very small area of about 6 ha (1%) is not suitable (Class N) and is distributed in central part of the microwatershed. They have severe limitation of rooting depth.

### 7.33 Land Suitability for Arecanut (*Areca catechu*)

Areca nut is the most important nut crop grown in few districts of the districts of the State. The crop requirements (7.33) for growing Areca nut were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing Areca nut was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.33.

Maximum area of about 250 ha (49%) has soils that are highly suitable (Class S1) for growing areca nut and are distributed in the western, northern, south-eastern and eastern part of the microwatershed. An area of about 64 ha (12%) has soils that are moderately suitable (Class S2) with minor limitations of rooting depth and texture. They are distributed in the northwestern and northern part of the microwatershed. The marginally suitable (Class S3) lands cover an area of about 167 ha (33%) and occur in the southwestern, northern, central and south-eastern part of the microwatershed with moderate limitations of gravelliness, rooting depth and topography. A very small area of about 6 ha (1%) is not suitable (Class N) and is distributed in the central part of the microwatershed. They have severe limitation of rooting depth.

**Table 7.33 Land suitability criteria for Areca nut**

| Crop requirement | | Rating | | | |
|---|---|---|---|---|---|
| **Soil –site characteristics** | **Unit** | **Highly suitable(S1)** | **Moderately Suitable(S2)** | **Marginally suitable(S3)** | **Not suitable (N)** |
| Slope | % | 0-3 | 3-5 | 5-10 | >10 |
| Soil drainage | class | Well drained | Mod. to poorly drained | - | Very poorly |
| Soil reaction | pH | 5.0-6.5 | 6.6-7.5 | 7.6-8.5 | |
| Surface soil texture | Class | Sc, cl, scl | C (red), sl | C (black), ls | - |
| Soil depth | Cm | >100 | 75-100 | 50-75 | <50 |
| Gravel content | %vol. | <15 | 15-35 | 35-60 | >60 |

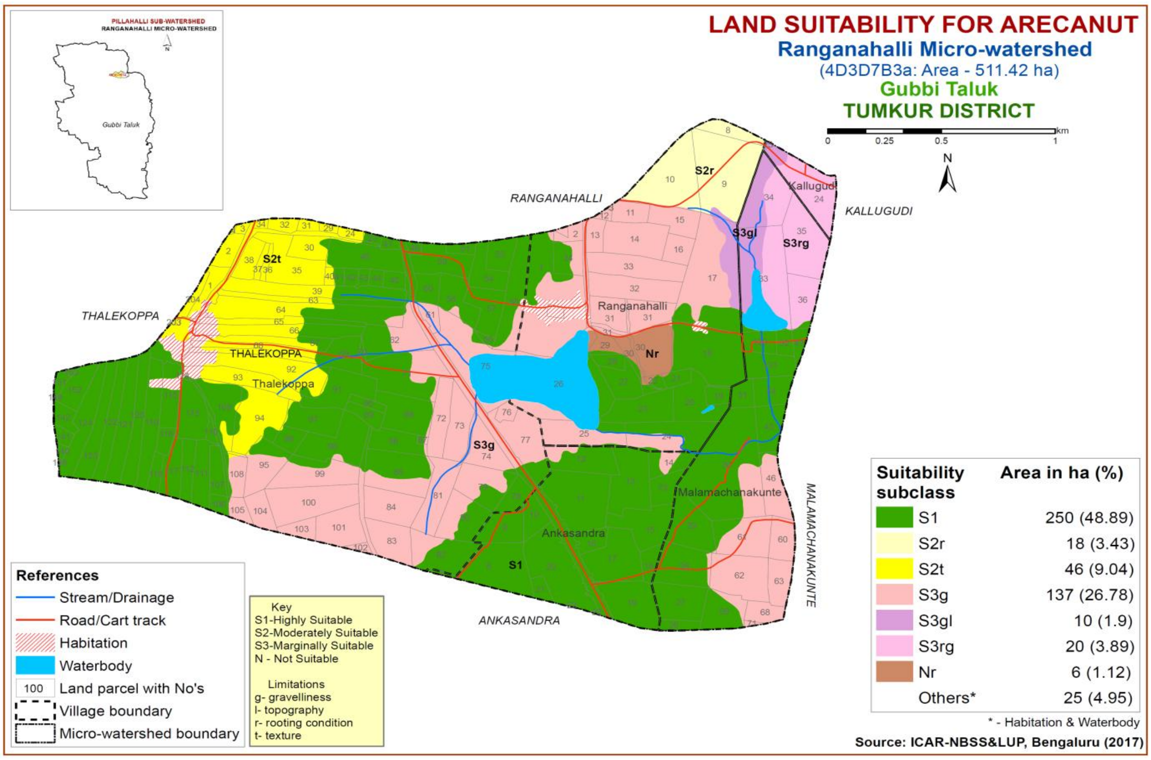



Fig. 7.33 Land Suitability map of Areca nut

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

Mulberry is the most important leaf crop grown in about 1.66 lakh ha in all the districts of the state for feeding silkworms. The crop requirements for growing mulberry (Table 7.34) 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 7.11.

**Table 7.34 Land suitability criteria for Mulberry**

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

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

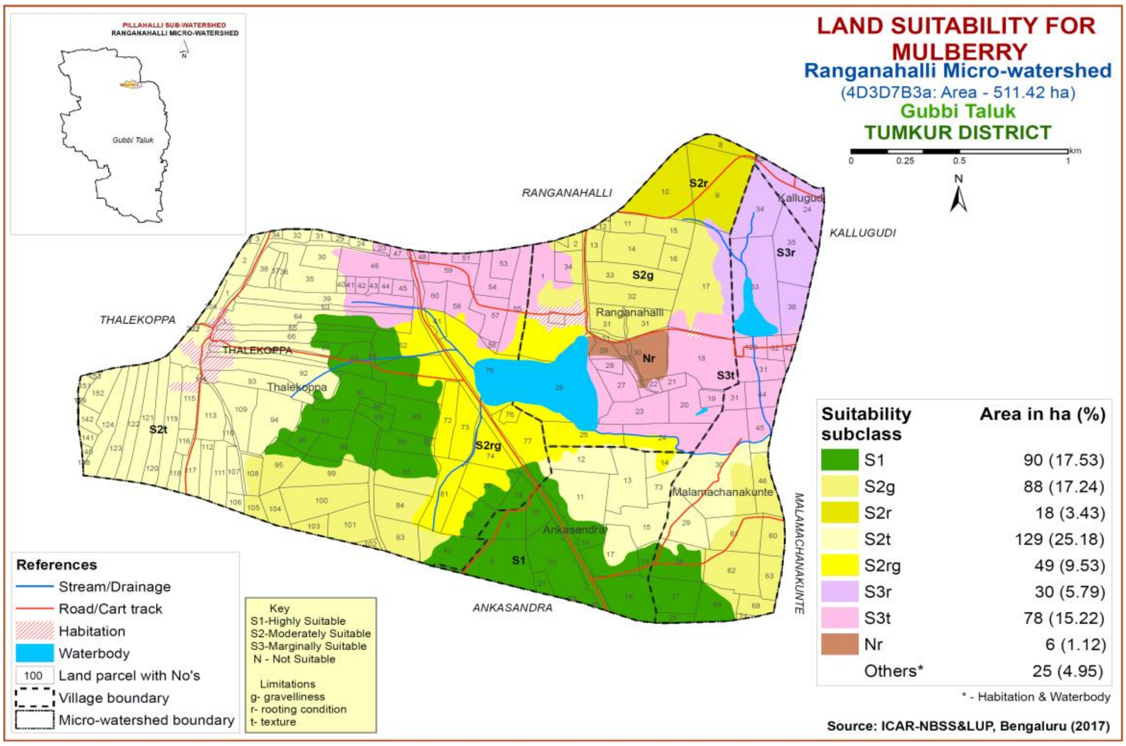



Fig. 7.34 Land Suitability map of Mulberry

Highly suitable (Class S1) lands occupy an area of about 90 ha (18%) for growing mulberry and occur in the southern and central part of the microwatershed. Moderately suitable (Class S2) lands occupy maximum area of about 284 ha (58%) and occur in all parts of the microwatershed. They have minor limitations of gravelliness, rooting depth and texture. Marginally suitable lands cover an area of about 108 ha (21%) and occur in the northeastern and northern part of the microwatershed. They have moderate limitation of rooting depth. A very small area of about 6 ha (1%) is not suitable (Class N) and occur in the central part of the microwatershed and have severe limitation of rooting depth.

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

The 18 soil map units identified in Ranganahalli microwatershed have been regrouped into 6 Land Management Units (LMU's) 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.7.35) 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 6 Land Management Units along with brief description of soil and site characteristics are given below.

| LMU NO. | Soil map units | Soil and site characteristics |
|---|---|---|
| 1 | HLKcB2<br>HLKhB2g1<br>RTRcB1<br>RTRhB1<br>RTRiB1 | Very deep (>150 cm), red sandy clay to sandy clay loam soils with slopes of 1-3 %, gravelly (15-35%) and slight to moderate erosion |
| 2 | NDLcB1<br>NDLiB1g1 | Very deep (>150cm), red sandy clay to clay loam soils with slopes of 1-3%, gravelly (15-35%) and slight erosion |
| 3 | KDThB1<br>KDTiA1 | Very deep (>150 cm), sandy clay loam to sandy clay soils with slopes of 0-3% and slight erosion |
| 4 | MNLhB2<br>MNLhB2<br>CKMhB2g1 | Moderately deep to deep (75-150 cm), red sandy clay loam soils with slopes of 1-3%, gravelly (15-35%) and moderate erosion |
| 5 | BDGhB2<br>BDGhB2g1<br>BPRhB2 | Moderately deep to deep (75-150 cm), red gravelly sandy clay loam soils with slope of 1-3%, gravelly (15-35%) and moderate erosion |
| 6 | CSRhB2g1<br>KGHcB2g2<br>KGHcC2g2 | Shallow to moderately shallow (25-75 cm), red sandy loam to sandy clay loam soils with slope of 1-5%, gravelly to very gravelly (15-60%) and moderate erosion |

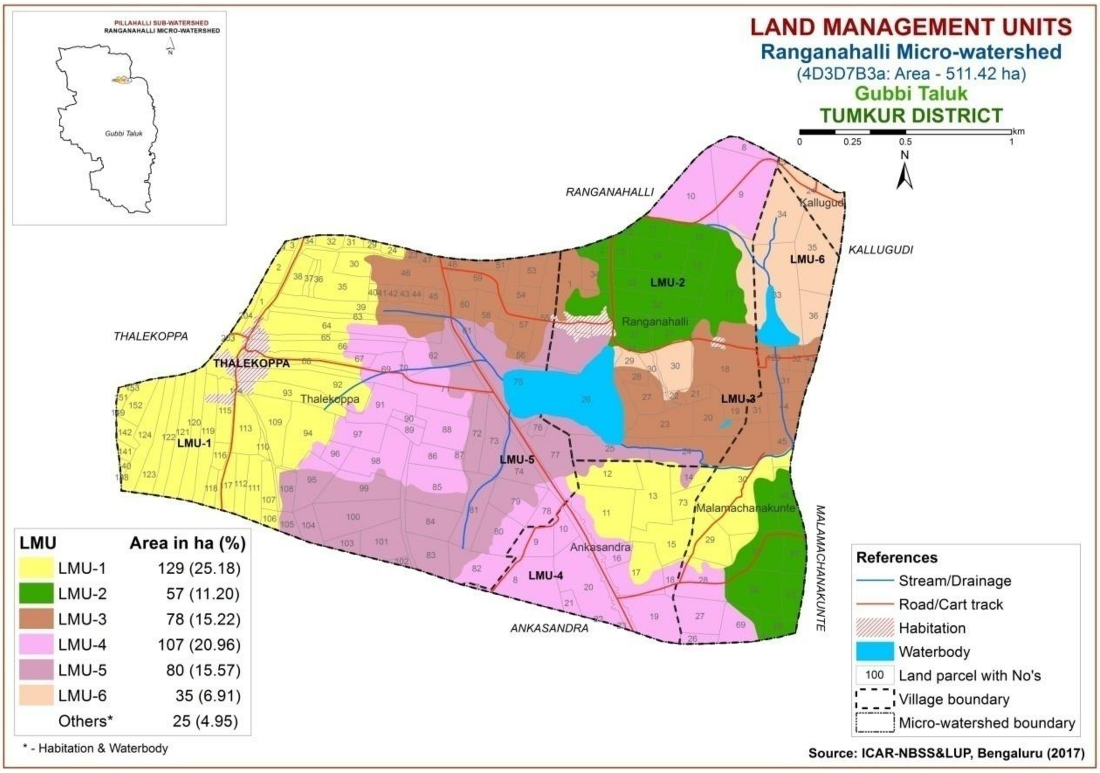



Fig. 7.35 Land Management Units Map- Ranganahalli Microwatershed

### 7.36 Proposed Crop Plan for Ranganahalli Microwatershed

After assessing the land suitability for the 34 crops, the proposed crop plan has been prepared or the 6 identified LMUs by considering only the highly (Class S1) and moderately (Class S2) suitable lands for each of the 34 crops. The resultant proposed crop plan is presented below in Table 7.35.

**Table 7.35 Proposed Crop Plan for Ranganahalli Microwatershed**

| LMU No | Mapping Units | Survey Number | Field Crops | Forestry/ Grasses | Horticulture Crops with suitable interventions | Suitable Interventions |
|---|---|---|---|---|---|---|
| LMU1 (129 ha.) | 10,11,12, 13, 14 Very deep (>150 cm), red clayey soils | Ankasandra:11,12,13,14,15,73 Malamachanakunte:29, 30 Thalekoppa:1,2,3,4,24,29, 30,31,32,34,35,36,37,38, 39,40, 63,64,67,68,92,93,94, 106,107,109,110,111,112, 113,114,115,116,117,118, 119,120,121,122,123,124, 138,140,141,142,149,151, 152,153, 203,204 | **Sole crops:** Ragi, Upland paddy, Maize, Sorghum, Fodder sorghum, Sunflower, Groundnut, Redgram, Fieldbean, Cowpea **Intercropping:** Redgram+Fodder sorghum Ragi+Cowpea Ragi+Redgram Ragi+Fieldbean | Neem, Silver Oak **Grasses** *Styloxanthes hamata*, *Styloxanthes Scabra*, Hybrid Napier, Sesbania, | **Vegetables**: Onion, Tomato, Brinjal Chillies, Coriander, Drumstick **Flower crops:** Chrysanthemum, Jasmine, China aster, Marigold, Crossandra **Fruit crops/ Plantation crops:** Mango, Sapota, Guava, Cashew, Jackfruit, Pomegranate, Musambi, Arecanut, Coconut | Summer ploughing, cultivation on raised beds with mulches, Drip irrigation and suitable conservation practices (Crescent Bunding with Catch Pit etc) |
| LMU 2 (57 ha.) | 15, 16 Very deep (>150 cm), gravelly red clayey soils | Malamachanakunte:46,60, 61,62,63,68,71 Ranganahalli:2,3,11,12,13, 14,15,16,17,31,32,33 | **Sole crops:** Ragi, Upland paddy, Maize, Sorghum, Field bean, Fodder sorghum, Redgram, Cowpea **Intercropping:** Redgram+Fodder sorghum Ragi+Cowpea Ragi+Redgram Ragi+Fieldbean | Neem, Silver Oak **Grasses** *Styloxanthes hamata*, *Styloxanthes Scabra*, Hybrid Napier, Sesbania, | **Vegetables**: Onion, Tomato, Brinjal, Coriander, Drumstick, Chillies, **Flowercrops:** Chrysanthemum, Jasmine, China aster, Marigold **Fruit crops/ Plantation crops:** Mango, Cashew, Sapota, Guava, Amla, Custardapple, Pomegranate Jackfruit, Musambi, Arecanut, Coconut | Drip irrigation, Mulching, suitable conservation practises (Crescent Bunding with Catch Pit etc) |
| LMU 3 (78 ha.) | 17,18 Very deep (>150 cm), black clayey soils | Malamachanakunte:31,32, 43,44,45,129,131 Ranganahalli:18,19,20,21, 22,23,24,27,28,34 | **Sole crops**: Sorghum, Sunflower, Fodder sorghum, Redgram, Field bean, Horse gram | Hebbevu, Silveroak **Grasses:** *Styloxanthes hamata*, | **Vegetables:** Brinjal, Tomato, chillies, Cucurbits **Flower crops:** Marigold, Chrysanthemum | Application of FYM and micronutrients, drip irrigation, |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | Thalekoppa:23,41,42,43,44,45,46,47,48,51,53,54,55,56,57,58,59,60 | **Intercropping:** Redgram+Fodder sorghum | *Styloxanthes scabra*, Hybrid napier | **Fruit crops:** Pomegranate, Tamarind, Custard Apple, Amla, Lime, Musambi Arecanut, Coconut | Mulching, suitable conservation practises |
| LMU 4 (107 ha.) | 7, 8, 4 Moderately deep to deep (75-150 cm), red clay to loamy soils | Ankasandra:7,8,9,10,16,17,18,19,20,21,22,23 Malamachanakunte:26,27,28,69 Ranganahalli:8,9,10 Thalekoppa:65,66,69,70,71,78,82,85,86,87,88,89,90,91,96,97,98 | **Sole crops**: Upland paddy, Ragi, Maize, Sorghum, Groundnut, Sunflower, Fieldbean, Cowpea, Fodder sorghum **Intercropping:** Redgram+Fodder sorghum Ragi+Cowpea Ragi+Redgram | Glyricidia, Subabul, Hebbevu **Grasses:** *Styloxanthes hamata*, *Styloxanthes scabra*, Hybrid napier | **Vegetables:** Onion, Tomato, chillies Brinjal, Cucurbits **Flower crops:** Chrysanthemum, Jasmine, Crossandra, China aster **Fruit crops/ Plantation crops:** Musambi, Sapota, Pomegranate, Banana, Amla, Lime, Arecanut, Coconut | Drip irrigation, Mulching, suitable conservation practises (Crescent Bunding with Catch Pit etc) |
| LMU 5 (80 ha.) | 5,6,9 Moderately deep to deep (75-150 cm), red gravelly clayey soils | Ranganahalli:1,25 Thalekoppa:61,62,72,73,74,75,76,77,79,80,81,83,84,95,99,100,101,102, 103, 104,105,108 | **Sole crops**: Upland paddy, Ragi, Maize, Sorghum, Groundnut, Fieldbean, Cowpea, Fodder sorghum, Horsegram | Glyricidia, **Grasses:** *Styloxanthes hamata*, *Styloxanthes scabra*, Hybrid Napier | **Vegetables:** Tomato, Brinjal, Drumstick, Chillies, Curry leaf **Flowercrops:** Crossandra Marigold, Chrysanthemum, **Fruitcrops/Plantation crops:**Tamarind, CustardApple, Amla, Lime, Musambi | Drip irrigation, Mulching, suitable conservation practises (Crescent Bunding with Catch Pit etc) |
| LMU 6 (35 ha.) | 1, 2, 3 Shallow to moderately shallow (25-75 cm), red loamy soils | Kallugudi: 24,25 Malamachanakunte:33,34,35,36 Ranganahalli:29,30 | **Sole crops:** Maize, Ragi, Groundnut, Fodder sorghum, Cowpea, Horsegram | Glyricidia, **Grasses** *Styloxanthes hamata*, *Styloxanthes scabra* | **Vegetables:** Tomato, Onion, Chillies, Curryleaf, **Fruit crops:** Custard apple, Amla, Bael | Use of medium duration varieties, and deep rooted crops, sowing across the slope, drip irrigation and mulching is recommended |

*Chapter 8*

# SOIL HEALTH MANAGEMENT

## 8.1 Soil Health

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

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

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

**The most important 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 unfavorable conditions occur

**Characteristics of Ranganahalli Microwatershed**

- The soil phases identified in the microwatershed belonged to the soil series of HLK 83 ha (16%), KDT 77 ha (15%), NDL 57 ha (11%), MNL 51 ha (10%), BDG 49 ha (9%), RTR 46 ha (9%), JDG 39 ha (8%), BPR 31 ha (6%), KGH 30 ha (6%), CKM 18 ha (3%) and CSR 6 ha (1%).
- As per land capability classification, About 95 per cent area in the microwatershed falls under arable land category (Class II & III). The major limitations identified in the arable lands were soil and erosion.

- On the basis of soil reaction, an area of about 226 ha (44%) is strongly acid to slightly acid (pH 5.0 -6.5), about 225 ha (44%) is under neutral (pH 6.5-7.3) and 35 ha (7%) is under slightly alkaline.
- **Soil Health Management**

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

**Acid soils**

(Slightly acid to strongly acid soils)

1. Application of lime in the form of calcium carbonate or limestone ($CaCO_3$)
2. 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.
3. Use of rock phosphate (30-50 % of CaO, which helps in improving soil pH).
4. Application of basic fertilizers (Sodium nitrate, basic slag etc, reduces acidity in acid soils)

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

**Alkaline soils**

(Slightly alkaline to moderately alkaline soils)

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

**Neutral soils**

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

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

**Soil Degradation**

Soil erosion is one of the major factors affecting the soil health in the microwatershed. Out of total 511 ha area in the microwatershed, an area of about 266 ha is suffering from moderate erosion. These areas need immediate soil and water conservation and, other land development and land husbandry practices for restoring soil health.

**Dissemination of information and communication of benefits**

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

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

Net planning in IWMP is focusing on preparation of

1. Soil and Water Conservation 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 (Saturation Plan) 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, radish, 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, and Karnataka can be adopted.

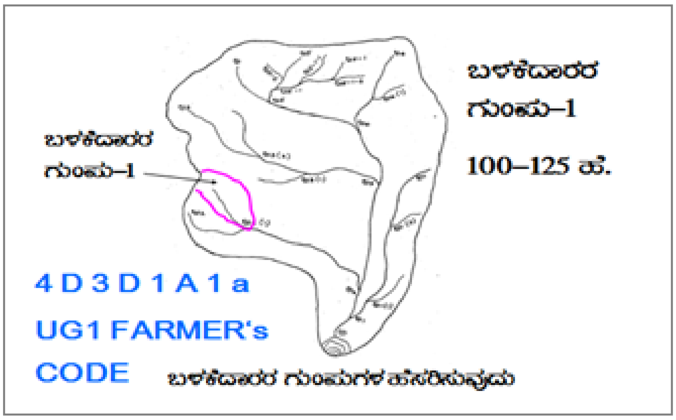
- **Gravelliness:** More gravel content is favorable for run-off harvesting but poor in soil moisture storage and nutrient availability. It is a significant parameter that decides the kind of crop to be raised.
- **Land Capability Classification:** The land capability map shows the areas suitable and 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 Ranganahalli microwatershed.
- **Organic Carbon:** The OC content is medium (0.5-0.75%) in about 142 ha (28%) area and low (<0.5%) in about 341 ha (67%). The areas that are low and medium in OC needs to be further improved by applying farmyard manure and rotating crops with cereals and legumes or mixed cropping. A very small area of about 3 ha (<1%) is high in organic carbon.
- **Promoting green manuring:** Growing of green manuring crops costs Rs. 1250/ha (green manuring seeds) and about Rs. 2000/ha towards cultivation that totals to Rs. 3250/- per ha. On the other hand, application of organic manure @ 10 tons/ha costs Rs. 5000/ha. The practice needs to be continued for 2-3 years or more. Nitrogen fertilizer needs to be supplemented by 25% in addition to the recommended level in 483 ha area where OC is medium (0.5-0.75%) and low (<0.5%). For example, for rainfed maize, recommended level is 50 kg N per ha and an additional 12 kg /ha needs to be applied for all the crops grown in these plots.
- **Available Phosphorus**: In 154 ha (30%) area, the available phosphorus is high (>57 kg/ha) and an area of 333 ha (65%) is medium (23-57 kg/ha).
- **Available Potassium:** Available potassium is low (<145 kg/ha) in an area of 41 ha (8%) in the microwatershed and an area of about 183 ha (36%) is high (>337 kg/ha) in available potassium. Maximum area of about 262 ha (51%) is medium in available potassium (145-337 kg/ha). Hence, in all these plots, where available potassium is low and medium, for all the crops, additional 25 % potassium may be applied.
- **Available Sulphur:** Available sulphur is a very critical nutrient for oilseed crops. Medium in an area of about 486 ha (95%). These areas need to be applied with magnesium sulphate or gypsum or Factamphos (p) fertilizer (13% sulphur) for 2-3 years for the deficiency to be corrected.
- **Available Boron:** Available boron is medium in an area of 96 ha (19%) and low in 390 ha (76%) in the microwatershed. These areas need to be applied with sodium borate @ 10 kg/ha as soil application or 0.2% borax as foliar application to correct the boron deficiency.
- **Available Iron:** An area of about 486 ha (95%) is sufficient (>4.5 ppm) in available iron in the microwatershed.

- **Available Manganese and Available Copper:** Entire area in the microwatershed is sufficient for both available manganese and copper.
- **Available Zinc:** It is deficient (<0.6 ppm) in 315 ha (62%) area of the microwatershed. Application of zinc sulphate @ 25 kg/ha is to be recommended and about 171 ha (33%) area is sufficient (>0.6 ppm) in available Zinc.
- **Soil acidity:** The microwatershed has 226 ha (44%) area with soils that are slightly to strongly acid. These areas need application of lime (Calcium Carbonate). About 225 ha (44%) is neutral (pH 6.5-7.8).
- **Land Suitability for various crops:** Areas that are highly, moderately and marginally suitable for growing various crops are indicated. Along with the suitability, various constraints that are limiting the productivity are also indicated. For example, in case of cotton, gravel content, rooting depth and salinity/alkalinity are the major constraints in various plots. With suitable management interventions, the productivity can be enhanced. In order to increase water holding capacity of light textured soils, growing of green manure crops and application of organic manure is recommended.

*Chapter 9*

## SOIL AND WATER CONSERVATION TREATMENT PLAN

For preparing soil and water conservation treatment plan for Ranganahalli microwatershed, the land resource inventory database prepared 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) prepared were




- Soil depth
- Surface soil texture
- Soil gravelliness
- Available water capacity
- Soil slope
- Soil erosion
- Land capability
- Present land use and land cover
- Crop suitability
- Rainfall
- Hydrology
- Water Resources
- Socio-economic data
- Contour plan with existing features- network of waterways, pothissa boundaries, cut up/ minor terraces etc.
- Cadastral map (1:7920 scale)
- Satellite imagery (1:7920 scale)

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

### Steps for Survey and Preparation of Treatment Plan

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

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

### 9.1 Treatment Plan

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

### 9.1.1 Arable Land Treatment

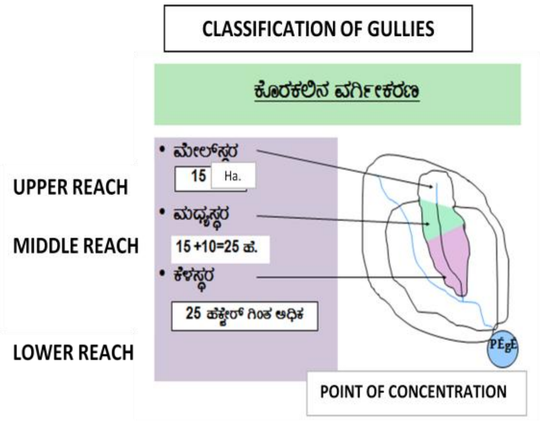
#### A. BUNDING

Steps for Survey and Preparation of Treatment Plan

- Cadastral map (1:7920 scale) is enlarged to a scale of 1:2500 scale
- Existing network of waterways, pothissa boundaries, grass belts, natural drainage lines/ watercourse, cut ups/ terraces are marked on the cadastral map to the scale
- Drainage lines are demarcated into

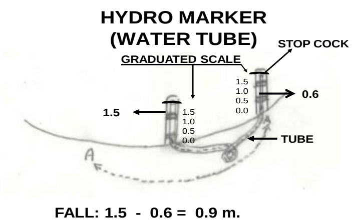
| | |
|---|---|
| Small gullies | (up to 5 ha catchment) |
| Medium gullies | (5-15 ha catchment) |
| Ravines | (15-25 ha catchment) and |
| Halla/Nala | (more than 25ha catchment) |

**USER GROUP-1**




**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.

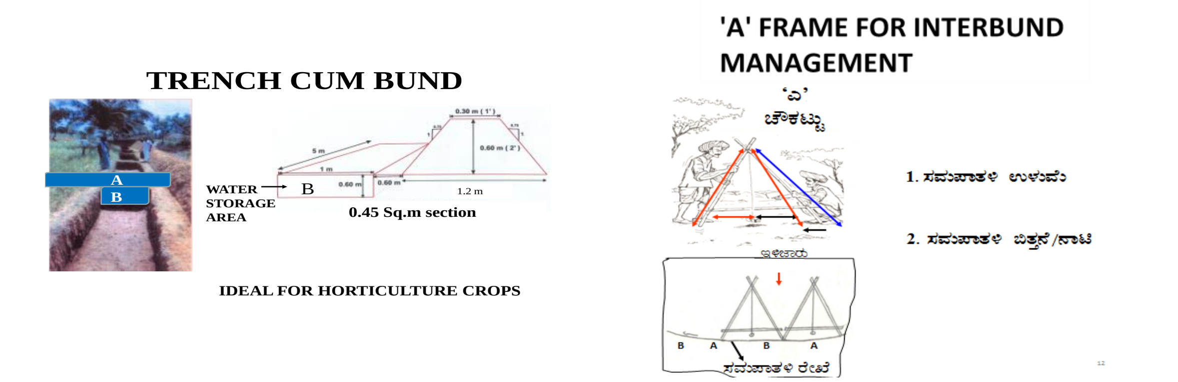
**Recommended Bund Section**

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

**Formation of Trench cum Bund**

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

Details of Borrow Pit dimensions are given below



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

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

**B. Waterways**

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

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

c) The design details are given in the Manual.

**C. Farm Ponds**

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

**D. Diversion channel**

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

**9.1.2 Non-Arable Land Treatment**

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

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

a) The cadastral map has to be updated as regards the network of 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 from 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 generated which shows the spatial distribution and extent of area. A maximum area of about 444 ha (87%) requires Trench cum Bunding and an area of about 42 ha (8%) area is Bunding / Strengthening of existing bunds. The conservation plan generated 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.

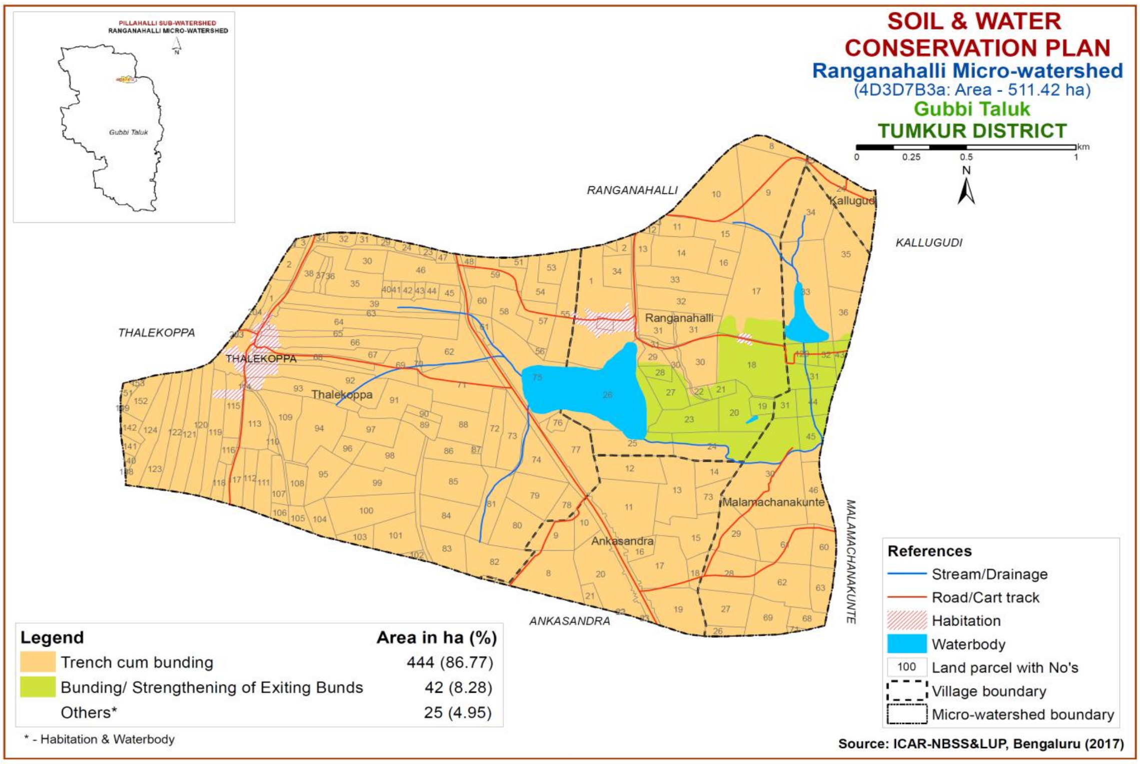



Fig. 9.1 Soil and Water Conservation Plan map of Ranganahalli Microwatershed

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

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

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

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# Appendix I

## Ranganahalli 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 Cap ability | Conservation Plan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ankasandra | 7 | 0.2 | MNLhB2 | LMU-4 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Not Available (NA) | Not Available | IIIe | TCB |
| Ankasandra | 8 | 5.69 | MNLhB2 | LMU-4 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Arecanut+Coconut +Mango+Ragi (Ar + CN + Mn +Ra) | 1 Bore well | IIIe | TCB |
| Ankasandra | 9 | 2.68 | MNLhB2 | LMU-4 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Ragi (Ra) | Not Available | IIIe | TCB |
| Ankasandra | 10 | 1.62 | MNLhB2 | LMU-4 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Coconut (CN) | Not Available | IIIe | TCB |
| Ankasandra | 11 | 6.74 | HLKcB2 | LMU-1 | Very deep (>150 cm) | Sandy loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Mango + Coconut (Mn + CN) | 1 Bore well | IIIe | TCB |
| Ankasandra | 12 | 3.71 | HLKcB2 | LMU-1 | Very deep (>150 cm) | Sandy loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Coconut (CN) | 1 Bore well | IIIe | TCB |
| Ankasandra | 13 | 4.87 | HLKcB2 | LMU-1 | Very deep (>150 cm) | Sandy loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Mango (Mn) | Not Available | IIIe | TCB |
| Ankasandra | 14 | 1.97 | HLKhB2g1 | LMU-1 | Very deep (>150 cm) | Sandy clay loam | Gravelly (15-35%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Coconut (CN) | Not Available | IIIe | TCB |
| Ankasandra | 15 | 3.86 | HLKcB2 | LMU-1 | Very deep (>150 cm) | Sandy loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Coconut (CN) | 2 Bore well | IIIe | TCB |
| Ankasandra | 16 | 1.31 | MNLhB2 | LMU-4 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Coconut (CN) | Not Available | IIIe | TCB |
| Ankasandra | 17 | 4.8 | MNLhB2 | LMU-4 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Coconut + Ragi (CN + Ra) | Not Available | IIIe | TCB |
| Ankasandra | 18 | 1.11 | MNLhB2 | LMU-4 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Ragi (Ra) | Not Available | IIIe | TCB |
| Ankasandra | 19 | 4.66 | MNLhB2 | LMU-4 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Mango + Ragi (Mn + Ra) | Not Available | IIIe | TCB |
| Ankasandra | 20 | 6.63 | MNLhB2 | LMU-4 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Ragi (Ra) | Not Available | IIIe | TCB |
| Ankasandra | 21 | 0.77 | MNLhB2 | LMU-4 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Ragi (Ra) | Not Available | IIIe | TCB |
| Ankasandra | 22 | 0.06 | MNLhB2 | LMU-4 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Not Available (NA) | Not Available | IIIe | TCB |
| Ankasandra | 23 | 0.06 | MNLhB2 | LMU-4 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Not Available (NA) | Not Available | IIIe | TCB |
| Ankasandra | 73 | 1.73 | HLKhB2g1 | LMU-1 | Very deep (>150 cm) | Sandy clay loam | Gravelly (15-35%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Coconut (CN) | Not Available | IIIe | TCB |
| Kallugudi | 24 | 5.55 | KGHcB2g2 | LMU-6 | Moderately shallow (50-75 cm) | Sandy loam | Very gravelly (35-60%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Arecanut+Coconut +Mango+Ragi (Ar+ CN + Mn +Ra) | Not Available | IIIes | TCB |
| Kallugudi | 25 | 0.11 | KGHcC2g2 | LMU-6 | Moderately shallow (50-75 cm) | Sandy loam | Very gravelly (35-60%) | Low (51-100 mm/m) | Gently sloping (3-5%) | Moderate | Not Available (NA) | Not Available | IIIes | TCB |

| 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 Cap ability | Conservation Plan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Malamachana kunte | 26 | 0.86 | MNLhB2 | LMU-4 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Not Available (NA) | Not Available | IIIe | TCB |
| Malamachana kunte | 27 | 3.58 | MNLhB2 | LMU-4 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Mango + Ragi (Mn + Ra) | Not Available | IIIe | TCB |
| Malamachana kunte | 28 | 4.26 | MNLhB2 | LMU-4 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Coconut (CN) | 1 Bore well | IIIe | TCB |
| Malamachana kunte | 29 | 3.99 | HLKhB2g1 | LMU-1 | Very deep (>150 cm) | Sandy clay loam | Gravelly (15-35%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Coconut (CN) | 2 Bore well | IIIe | TCB |
| Malamachana kunte | 30 | 13.77 | HLKhB2g1 | LMU-1 | Very deep (>150 cm) | Sandy clay loam | Gravelly (15-35%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Coconut (CN) | 2 Bore well | IIIe | TCB |
| Malamachana kunte | 31 | 1.21 | KDTiA1 | LMU-3 | Very deep (>150 cm) | Sandy clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | Arecanut + Coconut (Ar + CN) | 2 Bore well | IIs | Bunding/ Field Bunds |
| Malamachana kunte | 32 | 0.87 | KDTiA1 | LMU-3 | Very deep (>150 cm) | Sandy clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | Coconut (CN) | Not Available | IIs | Bunding/ Field Bunds |
| Malamachana kunte | 33 | 10.25 | KGHcB2g2 | LMU-6 | Moderately shallow (50-75 cm) | Sandy loam | Very gravelly (35-60%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Coconut + Mango + Ragi (CN +Mn +Ra) | Not Available | IIIes | TCB |
| Malamachana kunte | 34 | 5.19 | KGHcC2g2 | LMU-6 | Moderately shallow (50-75 cm) | Sandy loam | Very gravelly (35-60%) | Low (51-100 mm/m) | Gently sloping (3-5%) | Moderate | Mango (Mn) | Not Available | IIIes | TCB |
| Malamachana kunte | 35 | 5.59 | KGHcB2g2 | LMU-6 | Moderately shallow (50-75 cm) | Sandy loam | Very gravelly (35-60%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Ragi (Ra) | Not Available | IIIes | TCB |
| Malamachana kunte | 36 | 2.86 | KGHcB2g2 | LMU-6 | Moderately shallow (50-75 cm) | Sandy loam | Very gravelly (35-60%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Fallow land (Fl) | Not Available | IIIes | TCB |
| Malamachana kunte | 43 | 0.83 | KDTiA1 | LMU-3 | Very deep (>150 cm) | Sandy clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | Coconut (CN) | 1 Bore well | IIs | Bunding/ Field Bunds |
| Malamachana kunte | 44 | 2.11 | KDTiA1 | LMU-3 | Very deep (>150 cm) | Sandy clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | Coconut (CN) | Not Available | IIs | Bunding/ Field Bunds |
| Malamachana kunte | 45 | 2.42 | KDTiA1 | LMU-3 | Very deep (>150 cm) | Sandy clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | Coconut (CN) | 1 Bore well | IIs | Bunding/ Field Bunds |
| Malamachana kunte | 46 | 2.92 | NDLcB1 | LMU-2 | Very deep (>150 cm) | Sandy loam | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Coconut + Ragi (CN + Ra) | Not Available | IIIs | TCB |
| Malamachana kunte | 60 | 2.13 | NDLcB1 | LMU-2 | Very deep (>150 cm) | Sandy loam | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Mango (Mn) | Not Available | IIIs | TCB |
| Malamachana kunte | 61 | 4.34 | NDLcB1 | LMU-2 | Very deep (>150 cm) | Sandy loam | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Mango + Coconut (Mn + CN) | Not Available | IIIs | TCB |
| Malamachana kunte | 62 | 4.88 | NDLcB1 | LMU-2 | Very deep (>150 cm) | Sandy loam | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Mango + Ragi (Mn + Ra) | Not Available | IIIs | TCB |
| Malamachana kunte | 63 | 2.07 | NDLcB1 | LMU-2 | Very deep (>150 cm) | Sandy loam | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Coconut + Ragi (CN + Ra) | Not Available | IIIs | TCB |
| Malamachana kunte | 68 | 1.48 | NDLcB1 | LMU-2 | Very deep (>150 cm) | Sandy loam | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Mango (Mn) | Not Available | IIIs | TCB |
| Malamachana kunte | 69 | 3.08 | MNLhB2 | LMU-4 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Pomogranate + Ragi (Pg +Ra) | Not Available | IIIe | TCB |
| Malamachana kunte | 71 | 0.16 | NDLcB1 | LMU-2 | Very deep (>150 cm) | Sandy loam | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Mango (Mn) | Not Available | IIIs | TCB |
| Malamachana kunte | 129 | 1.5 | KDTiA1 | LMU-3 | Very deep (>150 cm) | Sandy clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | Coconut (CN) | Not Available | IIs | Bunding/ Field Bunds |

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Malamachanakunte | 131 | 2.42 | KDTiA1 | LMU-3 | Very deep (>150 cm) | Sandy clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | Arecanut + Coconut (Ar + CN) | 2 Bore well | IIs | Bunding/ Field Bunds |
| Ranganahalli | 1 | 11.42 | BDGhB2 | LMU-5 | Moderately deep (75-100 cm) | Sandy clay loam | Non gravelly (<15%) | Very low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Arecanut + Coconut (Ar + CN) | 2 Bore well | IIIes | TCB |
| Ranganahalli | 2 | 0.77 | NDLiB1g1 | LMU-2 | Very deep (>150 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Mango (Mn) | Not Available | IIIs | TCB |
| Ranganahalli | 3 | 0.04 | NDLiB1g1 | LMU-2 | Very deep (>150 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Not Available (NA) | Not Available | IIIs | TCB |
| Ranganahalli | 8 | 1.58 | CKMhB2g1 | LMU-4 | Moderately deep (75-100 cm) | Sandy clay loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Ragi (Ra) | Not Available | IIIe | TCB |
| Ranganahalli | 9 | 9.41 | CKMhB2g1 | LMU-4 | Moderately deep (75-100 cm) | Sandy clay loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Coconut + Ragi (CN + Ra) | Not Available | IIIe | TCB |
| Ranganahalli | 10 | 7.03 | CKMhB2g1 | LMU-4 | Moderately deep (75-100 cm) | Sandy clay loam | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Mango + Ragi (Mn + Ra) | Not Available | IIIe | TCB |
| Ranganahalli | 11 | 1.51 | NDLiB1g1 | LMU-2 | Very deep (>150 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Mango (Mn) | Not Available | IIIs | TCB |
| Ranganahalli | 12 | 0.3 | NDLiB1g1 | LMU-2 | Very deep (>150 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Mango (Mn) | Not Available | IIIs | TCB |
| Ranganahalli | 13 | 1.21 | NDLiB1g1 | LMU-2 | Very deep (>150 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Coconut (CN) | Not Available | IIIs | TCB |
| Ranganahalli | 14 | 4.25 | NDLiB1g1 | LMU-2 | Very deep (>150 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Mango (Mn) | Not Available | IIIs | TCB |
| Ranganahalli | 15 | 2.45 | NDLiB1g1 | LMU-2 | Very deep (>150 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Mango (Mn) | Not Available | IIIs | TCB |
| Ranganahalli | 16 | 1.57 | NDLiB1g1 | LMU-2 | Very deep (>150 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Coconut (CN) | 1 Bore well | IIIs | TCB |
| Ranganahalli | 17 | 12.04 | NDLiB1g1 | LMU-2 | Very deep (>150 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Arecanut + Coconut + Mango (Ar + CN + Mn) | 3 Bore well | IIIs | TCB |
| Ranganahalli | 18 | 7.65 | KDTiA1 | LMU-3 | Very deep (>150 cm) | Sandy clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | Arecanut + Coconut + Mango (Ar + CN + Mn) | 2 Bore well | IIs | Bunding/ Field Bunds |
| Ranganahalli | 19 | 0.87 | KDTiA1 | LMU-3 | Very deep (>150 cm) | Sandy clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | Not Available (NA) | Not Available | IIs | Bunding/ Field Bunds |
| Ranganahalli | 20 | 3.54 | KDTiA1 | LMU-3 | Very deep (>150 cm) | Sandy clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | Coconut (CN) | Not Available | IIs | Bunding/ Field Bunds |
| Ranganahalli | 21 | 0.83 | KDTiA1 | LMU-3 | Very deep (>150 cm) | Sandy clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | Not Available (NA) | Not Available | IIs | Bunding/ Field Bunds |
| Ranganahalli | 22 | 0.73 | KDTiA1 | LMU-3 | Very deep (>150 cm) | Sandy clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | Not Available (NA) | Not Available | IIs | Bunding/ Field Bunds |
| Ranganahalli | 23 | 3.65 | KDTiA1 | LMU-3 | Very deep (>150 cm) | Sandy clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | Mango + Coconut (Mn + CN) | 1 Bore well | IIs | Bunding/ Field Bunds |
| Ranganahalli | 24 | 5 | KDTiA1 | LMU-3 | Very deep (>150 cm) | Sandy clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | Coconut + Fallow land (CN + Fl) | Not Available | IIs | Bunding/ Field Bunds |
| Ranganahalli | 25 | 4.32 | BDGhB2g1 | LMU-5 | Moderately deep (75-100 cm) | Sandy clay loam | Gravelly (15-35%) | Very low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Coconut + Fallow land (CN + Fl) | 1 Bore well | IIIes | TCB |
| Ranganahalli | 26 | 13.35 | Waterbody | Oters | Others | Others | Others | Others | Others | Oters | Arecanut (Ar) | Not Available | Others | Others |

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ranganahalli | 27 | 2.19 | KDTiA1 | LMU-3 | Very deep (>150 cm) | Sandy clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | Not Available (NA) | Not Available | IIs | Bunding/ Field Bunds |
| Ranganahalli | 28 | 0.86 | KDTiA1 | LMU-3 | Very deep (>150 cm) | Sandy clay | Non gravelly (<15%) | Very high (>200 mm/m) | Nearly level (0-1%) | Slight | Arecanut (Ar) | Not Available | IIs | Bunding/ Field Bunds |
| Ranganahalli | 29 | 1.09 | CSRhB2g1 | LMU-6 | Shallow (25-50 cm) | Sandy clay loam | Gravelly (15-35%) | Very low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Not Available (NA) | Not Available | IIIes | TCB |
| Ranganahalli | 30 | 4.23 | CSRhB2g1 | LMU-6 | Shallow (25-50 cm) | Sandy clay loam | Gravelly (15-35%) | Very low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Mango (Mn) | Not Available | IIIes | TCB |
| Ranganahalli | 31 | 4.84 | NDLiB1g1 | LMU-2 | Very deep (>150 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Mango (Mn) | Not Available | IIIs | TCB |
| Ranganahalli | 32 | 4.22 | NDLiB1g1 | LMU-2 | Very deep (>150 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Coconut + Arecanut + Mango (CN + Ar +Mn) | 3 Bore well | IIIs | TCB |
| Ranganahalli | 33 | 4.16 | NDLiB1g1 | LMU-2 | Very deep (>150 cm) | Sandy clay | Gravelly (15-35%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Slight | Coconut + Ragi (CN + Ra) | 1 Bore well | IIIs | TCB |
| Ranganahalli | 34 | 1.98 | KDThB1 | LMU-3 | Very deep (>150 cm) | Sandy clay loam | Non gravelly (<15%) | Very high (>200 mm/m) | Very gently sloping (1-3%) | Slight | Arecanut (Ar) | Not Available | IIs | TCB |
| Thalekoppa | 1 | 1.37 | RTRhB1 | LMU-1 | Very deep (>150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Coconut (CN) | Not Available | IIs | TCB |
| Thalekoppa | 2 | 1.35 | RTRhB1 | LMU-1 | Very deep (>150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Coconut + Ragi (CN + Ra) | 1 Bore well | IIs | TCB |
| Thalekoppa | 3 | 0.27 | RTRhB1 | LMU-1 | Very deep (>150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Coconut (CN) | 1 Bore well | IIs | TCB |
| Thalekoppa | 4 | 0.06 | RTRhB1 | LMU-1 | Very deep (>150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Not Available (NA) | Not Available | IIs | TCB |
| Thalekoppa | 23 | 0.34 | KDThB1 | LMU-3 | Very deep (>150 cm) | Sandy clay loam | Non gravelly (<15%) | Very high (>200 mm/m) | Very gently sloping (1-3%) | Slight | Ragi (Ra) | Not Available | IIs | TCB |
| Thalekoppa | 24 | 0.52 | RTRhB1 | LMU-1 | Very deep (>150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Mango (Mn) | Not Available | IIs | TCB |
| Thalekoppa | 29 | 0.32 | RTRhB1 | LMU-1 | Very deep (>150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Ragi (Ra) | Not Available | IIs | TCB |
| Thalekoppa | 30 | 1.84 | RTRhB1 | LMU-1 | Very deep (>150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Mango (Mn) | 1 Bore well | IIs | TCB |
| Thalekoppa | 31 | 0.48 | RTRhB1 | LMU-1 | Very deep (>150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Ragi (Ra) | Not Available | IIs | TCB |
| Thalekoppa | 32 | 0.78 | RTRhB1 | LMU-1 | Very deep (>150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Mango (Mn) | Not Available | IIs | TCB |
| Thalekoppa | 34 | 0.24 | RTRhB1 | LMU-1 | Very deep (>150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Mango (Mn) | Not Available | IIs | TCB |
| Thalekoppa | 35 | 4.2 | RTRhB1 | LMU-1 | Very deep (>150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Mango + Coconut (Mn + CN) | Not Available | IIs | TCB |
| Thalekoppa | 36 | 0.41 | RTRhB1 | LMU-1 | Very deep (>150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Ragi (Ra) | Not Available | IIs | TCB |
| Thalekoppa | 37 | 0.46 | RTRhB1 | LMU-1 | Very deep (>150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Ragi (Ra) | Not Available | IIs | TCB |
| Thalekoppa | 38 | 1.61 | RTRhB1 | LMU-1 | Very deep (>150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Mango + Coconut (Mn + CN) | Not Available | IIs | TCB |

| 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 Cap ability | Conservation Plan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Thalekoppa | 39 | 4.83 | RTRhB1 | LMU-1 | Very deep (>150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Coconut (CN) | 5 Bore well | IIs | TCB |
| Thalekoppa | 40 | 0.36 | RTRhB1 | LMU-1 | Very deep (>150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Fallow land (Fl) | Not Available | IIs | TCB |
| Thalekoppa | 41 | 0.37 | KDThB1 | LMU-3 | Very deep (>150 cm) | Sandy clay loam | Non gravelly (<15%) | Very high (>200 mm/m) | Very gently sloping (1-3%) | Slight | Coconut (CN) | 1 Bore well | IIs | TCB |
| Thalekoppa | 42 | 0.5 | KDThB1 | LMU-3 | Very deep (>150 cm) | Sandy clay loam | Non gravelly (<15%) | Very high (>200 mm/m) | Very gently sloping (1-3%) | Slight | Coconut (CN) | Not Available | IIs | TCB |
| Thalekoppa | 43 | 0.41 | KDThB1 | LMU-3 | Very deep (>150 cm) | Sandy clay loam | Non gravelly (<15%) | Very high (>200 mm/m) | Very gently sloping (1-3%) | Slight | Coconut (CN) | Not Available | IIs | TCB |
| Thalekoppa | 44 | 0.49 | KDThB1 | LMU-3 | Very deep (>150 cm) | Sandy clay loam | Non gravelly (<15%) | Very high (>200 mm/m) | Very gently sloping (1-3%) | Slight | Fallow land (Fl) | Not Available | IIs | TCB |
| Thalekoppa | 45 | 0.76 | KDThB1 | LMU-3 | Very deep (>150 cm) | Sandy clay loam | Non gravelly (<15%) | Very high (>200 mm/m) | Very gently sloping (1-3%) | Slight | Coconut (CN) | 1 Bore well | IIs | TCB |
| Thalekoppa | 46 | 3.95 | KDThB1 | LMU-3 | Very deep (>150 cm) | Sandy clay loam | Non gravelly (<15%) | Very high (>200 mm/m) | Very gently sloping (1-3%) | Slight | Mango + Coconut (Mn + CN) | 1 Bore well | IIs | TCB |
| Thalekoppa | 47 | 0.44 | KDThB1 | LMU-3 | Very deep (>150 cm) | Sandy clay loam | Non gravelly (<15%) | Very high (>200 mm/m) | Very gently sloping (1-3%) | Slight | Coconut (CN) | Not Available | IIs | TCB |
| Thalekoppa | 48 | 0.38 | KDThB1 | LMU-3 | Very deep (>150 cm) | Sandy clay loam | Non gravelly (<15%) | Very high (>200 mm/m) | Very gently sloping (1-3%) | Slight | Mango (Mn) | 1 Bore well | IIs | TCB |
| Thalekoppa | 51 | 0.63 | KDThB1 | LMU-3 | Very deep (>150 cm) | Sandy clay loam | Non gravelly (<15%) | Very high (>200 mm/m) | Very gently sloping (1-3%) | Slight | Coconut (CN) | Not Available | IIs | TCB |
| Thalekoppa | 53 | 1.71 | KDThB1 | LMU-3 | Very deep (>150 cm) | Sandy clay loam | Non gravelly (<15%) | Very high (>200 mm/m) | Very gently sloping (1-3%) | Slight | Coconut (CN) | 1 Bore well | IIs | TCB |
| Thalekoppa | 54 | 2.24 | KDThB1 | LMU-3 | Very deep (>150 cm) | Sandy clay loam | Non gravelly (<15%) | Very high (>200 mm/m) | Very gently sloping (1-3%) | Slight | Arecanut + Coconut (Ar + CN) | 2 Bore well | IIs | TCB |
| Thalekoppa | 55 | 4.54 | KDThB1 | LMU-3 | Very deep (>150 cm) | Sandy clay loam | Non gravelly (<15%) | Very high (>200 mm/m) | Very gently sloping (1-3%) | Slight | Arecanut + Coconut (Ar + CN) | Not Available | IIs | TCB |
| Thalekoppa | 56 | 0.29 | KDThB1 | LMU-3 | Very deep (>150 cm) | Sandy clay loam | Non gravelly (<15%) | Very high (>200 mm/m) | Very gently sloping (1-3%) | Slight | Coconut (CN) | Not Available | IIs | TCB |
| Thalekoppa | 57 | 2.7 | KDThB1 | LMU-3 | Very deep (>150 cm) | Sandy clay loam | Non gravelly (<15%) | Very high (>200 mm/m) | Very gently sloping (1-3%) | Slight | Coconut (CN) | 1 Bore well | IIs | TCB |
| Thalekoppa | 58 | 2.74 | KDThB1 | LMU-3 | Very deep (>150 cm) | Sandy clay loam | Non gravelly (<15%) | Very high (>200 mm/m) | Very gently sloping (1-3%) | Slight | Arecanut + Coconut (Ar + CN) | Not Available | IIs | TCB |
| Thalekoppa | 59 | 3.13 | KDThB1 | LMU-3 | Very deep (>150 cm) | Sandy clay loam | Non gravelly (<15%) | Very high (>200 mm/m) | Very gently sloping (1-3%) | Slight | Coconut + Fallow land (CN + Fl) | Not Available | IIs | TCB |
| Thalekoppa | 60 | 1.42 | KDThB1 | LMU-3 | Very deep (>150 cm) | Sandy clay loam | Non gravelly (<15%) | Very high (>200 mm/m) | Very gently sloping (1-3%) | Slight | Coconut (CN) | 1 Bore well | IIs | TCB |
| Thalekoppa | 61 | 0.93 | BDGhB2 | LMU-5 | Moderately deep (75-100 cm) | Sandy clay loam | Non gravelly (<15%) | Very low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Coconut (CN) | Not Available | IIIes | TCB |
| Thalekoppa | 62 | 4.43 | BDGhB2 | LMU-5 | Moderately deep (75-100 cm) | Sandy clay loam | Non gravelly (<15%) | Very low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Coconut (CN) | Not Available | IIIes | TCB |
| Thalekoppa | 63 | 2.16 | RTRhB1 | LMU-1 | Very deep (>150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Coconut (CN) | 3 Bore well | IIs | TCB |
| Thalekoppa | 64 | 7.1 | RTRcB1 | LMU-1 | Very deep (>150 cm) | Sandy loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Coconut (CN) | 3 Bore well | IIs | TCB |
| Thalekoppa | 65 | 2.04 | JDGhB1 | LMU-4 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Coconut (CN) | 1 Bore well | IIes | TCB |

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Thalekoppa | 66 | 4.08 | JDGhB1 | LMU-4 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Mango (Mn) | 1 Bore well | IIes | TCB |
| Thalekoppa | 67 | 2.33 | RTRcB1 | LMU-1 | Very deep (>150 cm) | Sandy loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Coconut (CN) | 1 Bore well | IIs | TCB |
| Thalekoppa | 68 | 1.73 | RTRcB1 | LMU-1 | Very deep (>150 cm) | Sandy loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Ragi (Ra) | Not Available | IIs | TCB |
| Thalekoppa | 69 | 4.03 | JDGhB1 | LMU-4 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Coconut (CN) | Not Available | IIes | TCB |
| Thalekoppa | 70 | 0.18 | JDGhB1 | LMU-4 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Not Available (NA) | Not Available | IIes | TCB |
| Thalekoppa | 71 | 6.38 | JDGhB1 | LMU-4 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Mango (Mn) | Not Available | IIes | TCB |
| Thalekoppa | 72 | 2.68 | BDGhB2 | LMU-5 | Moderately deep (75-100 cm) | Sandy clay loam | Non gravelly (<15%) | Very low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Coconut (CN) | 1 Bore well | IIIes | TCB |
| Thalekoppa | 73 | 3.12 | BDGhB2 | LMU-5 | Moderately deep (75-100 cm) | Sandy clay loam | Non gravelly (<15%) | Very low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Coconut (CN) | Not Available | IIIes | TCB |
| Thalekoppa | 74 | 2.84 | BDGhB2 | LMU-5 | Moderately deep (75-100 cm) | Sandy clay loam | Non gravelly (<15%) | Very low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Coconut (CN) | 2 Bore well | IIIes | TCB |
| Thalekoppa | 75 | 8.58 | BDGhB2 | LMU-5 | Moderately deep (75-100 cm) | Sandy clay loam | Non gravelly (<15%) | Very low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Not Available (NA) | Not Available | IIIes | TCB |
| Thalekoppa | 76 | 0.67 | BDGhB2 | LMU-5 | Moderately deep (75-100 cm) | Sandy clay loam | Non gravelly (<15%) | Very low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Coconut (CN) | 1 Bore well | IIIes | TCB |
| Thalekoppa | 77 | 4.6 | BDGhB2 | LMU-5 | Moderately deep (75-100 cm) | Sandy clay loam | Non gravelly (<15%) | Very low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Coconut (CN) | 3 Bore well | IIIes | TCB |
| Thalekoppa | 78 | 1.55 | MNLhB2 | LMU-4 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Not Available (NA) | Not Available | IIIe | TCB |
| Thalekoppa | 79 | 3.82 | BDGhB2 | LMU-5 | Moderately deep (75-100 cm) | Sandy clay loam | Non gravelly (<15%) | Very low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Coconut (CN) | 2 Bore well | IIIes | TCB |
| Thalekoppa | 80 | 3.74 | BDGhB2 | LMU-5 | Moderately deep (75-100 cm) | Sandy clay loam | Non gravelly (<15%) | Very low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Coconut (CN) | Not Available | IIIes | TCB |
| Thalekoppa | 81 | 3.88 | BDGhB2 | LMU-5 | Moderately deep (75-100 cm) | Sandy clay loam | Non gravelly (<15%) | Very low (<50 mm/m) | Very gently sloping (1-3%) | Moderate | Coconut (CN) | 1 Open well,2 Bore well | IIIes | TCB |
| Thalekoppa | 82 | 4.26 | MNLhB2 | LMU-4 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Mango + Coconut (Mn + CN) | 1 Bore well | IIIe | TCB |
| Thalekoppa | 83 | 3.12 | BPRhB2 | LMU-5 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Mango + Coconut (Mn + CN) | Not Available | IIIes | TCB |
| Thalekoppa | 84 | 3.58 | BPRhB2 | LMU-5 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Arecanut+Ragi+Mango (Ar+Ra+Mn) | Not Available | IIIes | TCB |
| Thalekoppa | 85 | 5.36 | JDGhB1 | LMU-4 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Mango + Coconut (Mn + CN) | 3 Bore well | IIes | TCB |
| Thalekoppa | 86 | 2.3 | JDGhB1 | LMU-4 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Coconut (CN) | 2 Bore well | IIes | TCB |
| Thalekoppa | 87 | 0.17 | JDGhB1 | LMU-4 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Coconut (CN) | Not Available | IIes | TCB |
| Thalekoppa | 88 | 3.78 | JDGhB1 | LMU-4 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Mango + Coconut (Mn + CN) | 2 Bore well | IIes | TCB |

| 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 Cap ability | Conservation Plan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Thalekoppa | 89 | 1.1 | JDGhB1 | LMU-4 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Coconut (CN) | Not Available | IIes | TCB |
| Thalekoppa | 90 | 0.62 | JDGhB1 | LMU-4 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Coconut (CN) | Not Available | IIes | TCB |
| Thalekoppa | 91 | 3.7 | JDGhB1 | LMU-4 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Arecanut + Coconut (Ar + CN) | 2 Bore well | IIes | TCB |
| Thalekoppa | 92 | 5.88 | RTRiB1 | LMU-1 | Very deep (>150 cm) | Sandy clay | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Coconut (CN) | 1 Bore well | IIs | TCB |
| Thalekoppa | 93 | 3.48 | RTRiB1 | LMU-1 | Very deep (>150 cm) | Sandy clay | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Coconut (CN) | 1 Bore well | IIs | TCB |
| Thalekoppa | 94 | 5.35 | RTRiB1 | LMU-1 | Very deep (>150 cm) | Sandy clay | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Coconut (CN) | 4 Bore well | IIs | TCB |
| Thalekoppa | 95 | 3.39 | BPRhB2 | LMU-5 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Coconut (CN) | 1 Open well | IIIes | TCB |
| Thalekoppa | 96 | 1.19 | JDGhB1 | LMU-4 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Mango (Mn) | Not Available | IIes | TCB |
| Thalekoppa | 97 | 2.97 | JDGhB1 | LMU-4 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Coconut (CN) | 1 Bore well | IIes | TCB |
| Thalekoppa | 98 | 4.63 | JDGhB1 | LMU-4 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Mango (Mn) | 1 Bore well | IIes | TCB |
| Thalekoppa | 99 | 4.44 | BPRhB2 | LMU-5 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Mango + Arecanut (Mn+Ar) | Not Available | IIIes | TCB |
| Thalekoppa | 100 | 5.48 | BPRhB2 | LMU-5 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Mango (Mn) | 1 Bore well | IIIes | TCB |
| Thalekoppa | 101 | 3.35 | BPRhB2 | LMU-5 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Mango (Mn) | Not Available | IIIes | TCB |
| Thalekoppa | 102 | 0.36 | BPRhB2 | LMU-5 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Mango (Mn) | Not Available | IIIes | TCB |
| Thalekoppa | 103 | 1.17 | BPRhB2 | LMU-5 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Mango (Mn) | Not Available | IIIes | TCB |
| Thalekoppa | 104 | 1.68 | BPRhB2 | LMU-5 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Mango (Mn) | Not Available | IIIes | TCB |
| Thalekoppa | 105 | 0.97 | BPRhB2 | LMU-5 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Mango (Mn) | Not Available | IIIes | TCB |
| Thalekoppa | 106 | 0.68 | HLKcB2 | LMU-1 | Very deep (>150 cm) | Sandy loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Mango (Mn) | Not Available | IIIe | TCB |
| Thalekoppa | 107 | 1.42 | HLKcB2 | LMU-1 | Very deep (>150 cm) | Sandy loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Mango (Mn) | Not Available | IIIe | TCB |
| Thalekoppa | 108 | 1.61 | BPRhB2 | LMU-5 | Deep (100-150 cm) | Sandy clay loam | Non gravelly (<15%) | Low (51-100 mm/m) | Very gently sloping (1-3%) | Moderate | Mango (Mn) | 1 Open well | IIIes | TCB |
| Thalekoppa | 109 | 3.5 | HLKcB2 | LMU-1 | Very deep (>150 cm) | Sandy loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Mango (Mn) | Not Available | IIIe | TCB |
| Thalekoppa | 110 | 0.4 | HLKcB2 | LMU-1 | Very deep (>150 cm) | Sandy loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Not Available (NA) | Not Available | IIIe | TCB |
| Thalekoppa | 111 | 2.27 | HLKcB2 | LMU-1 | Very deep (>150 cm) | Sandy loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Mango (Mn) | Not Available | IIIe | TCB |
| Thalekoppa | 112 | 1.59 | HLKcB2 | LMU-1 | Very deep (>150 cm) | Sandy loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Mango (Mn) | Not Available | IIIe | TCB |

| 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 Cap ability | Conservation Plan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Thalekoppa | 113 | 3.17 | HLKcB2 | LMU-1 | Very deep (>150 cm) | Sandy loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Mango (Mn) | Not Available | IIIe | TCB |
| Thalekoppa | 114 | 0.09 | HLKcB2 | LMU-1 | Very deep (>150 cm) | Sandy loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Not Available (NA) | Not Available | IIIe | TCB |
| Thalekoppa | 115 | 2.35 | HLKcB2 | LMU-1 | Very deep (>150 cm) | Sandy loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Coconut (CN) | 1 Bore well | IIIe | TCB |
| Thalekoppa | 116 | 0.84 | HLKcB2 | LMU-1 | Very deep (>150 cm) | Sandy loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Not Available (NA) | Not Available | IIIe | TCB |
| Thalekoppa | 117 | 2.1 | HLKcB2 | LMU-1 | Very deep (>150 cm) | Sandy loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Mango (Mn) | 1 Bore well | IIIe | TCB |
| Thalekoppa | 118 | 0.9 | HLKcB2 | LMU-1 | Very deep (>150 cm) | Sandy loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Mango (Mn) | Not Available | IIIe | TCB |
| Thalekoppa | 119 | 3.83 | HLKcB2 | LMU-1 | Very deep (>150 cm) | Sandy loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Mango (Mn) | Not Available | IIIe | TCB |
| Thalekoppa | 120 | 3.34 | HLKcB2 | LMU-1 | Very deep (>150 cm) | Sandy loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Mango (Mn) | Not Available | IIIe | TCB |
| Thalekoppa | 121 | 3.76 | HLKcB2 | LMU-1 | Very deep (>150 cm) | Sandy loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Mango (Mn) | Not Available | IIIe | TCB |
| Thalekoppa | 122 | 2.81 | HLKcB2 | LMU-1 | Very deep (>150 cm) | Sandy loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Mango + Ragi (Mn + Ra) | Not Available | IIIe | TCB |
| Thalekoppa | 123 | 3.31 | HLKcB2 | LMU-1 | Very deep (>150 cm) | Sandy loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Mango (Mn) | Not Available | IIIe | TCB |
| Thalekoppa | 124 | 3.66 | HLKcB2 | LMU-1 | Very deep (>150 cm) | Sandy loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Mango (Mn) | Not Available | IIIe | TCB |
| Thalekoppa | 138 | 0.02 | HLKcB2 | LMU-1 | Very deep (>150 cm) | Sandy loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Not Available (NA) | Not Available | IIIe | TCB |
| Thalekoppa | 140 | 0.26 | HLKcB2 | LMU-1 | Very deep (>150 cm) | Sandy loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Mango (Mn) | Not Available | IIIe | TCB |
| Thalekoppa | 141 | 0.57 | HLKcB2 | LMU-1 | Very deep (>150 cm) | Sandy loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Mango (Mn) | Not Available | IIIe | TCB |
| Thalekoppa | 142 | 1.06 | HLKcB2 | LMU-1 | Very deep (>150 cm) | Sandy loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Ragi (Ra) | Not Available | IIIe | TCB |
| Thalekoppa | 149 | 0.04 | HLKcB2 | LMU-1 | Very deep (>150 cm) | Sandy loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Not Available (NA) | Not Available | IIIe | TCB |
| Thalekoppa | 151 | 0.51 | HLKcB2 | LMU-1 | Very deep (>150 cm) | Sandy loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Fallow land (Fl) | Not Available | IIIe | TCB |
| Thalekoppa | 152 | 2.05 | HLKcB2 | LMU-1 | Very deep (>150 cm) | Sandy loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Ragi (Ra) | Not Available | IIIe | TCB |
| Thalekoppa | 153 | 0.15 | HLKcB2 | LMU-1 | Very deep (>150 cm) | Sandy loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Moderate | Coconut (CN) | Not Available | IIIe | TCB |
| Thalekoppa | 203 | 0.03 | RTRhB1 | LMU-1 | Very deep (>150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Not Available (NA) | Not Available | IIs | TCB |
| Thalekoppa | 204 | 0.8 | RTRhB1 | LMU-1 | Very deep (>150 cm) | Sandy clay loam | Non gravelly (<15%) | Medium (101-150 mm/m) | Very gently sloping (1-3%) | Slight | Fallow land (Fl) | Not Available | IIs | TCB |

# Appendix II

## Ranganahalli Microwatershed
## Soil Fertility Information

| Village | Sy No. | Soil Reaction | Salinity | Organic Carbon | Available Phosphorus | Available Potassium | Available Sulphur | Available Boron | Available Iron | Available Manganese | Available Copper | Available Zinc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ankasandra | 7 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Low (<0.5 %) | 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) | Deficient (<0.6 ppm) |
| Ankasandra | 8 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | Low (<0.5 %) | 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) | Deficient (<0.6 ppm) |
| Ankasandra | 9 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Ankasandra | 10 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Ankasandra | 11 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Ankasandra | 12 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Ankasandra | 13 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Ankasandra | 14 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Medium (0.5-1.0 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Ankasandra | 15 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | Low (<0.5 %) | 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) | Deficient (<0.6 ppm) |
| Ankasandra | 16 | Strongly acid (pH 5.0 – 5.5) | Non saline (<2 dsm) | Low (<0.5 %) | 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) | Deficient (<0.6 ppm) |
| Ankasandra | 17 | Strongly acid (pH 5.0 – 5.5) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | High (> 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Ankasandra | 18 | Strongly acid (pH 5.0 – 5.5) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | High (> 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Ankasandra | 19 | Strongly acid (pH 5.0 – 5.5) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | High (> 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Ankasandra | 20 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | Low (<0.5 %) | 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) | Deficient (<0.6 ppm) |
| Ankasandra | 21 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | Low (<0.5 %) | 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) | Deficient (<0.6 ppm) |
| Ankasandra | 22 | Strongly acid (pH 5.0 – 5.5) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | High (> 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Ankasandra | 23 | Strongly acid (pH 5.0 – 5.5) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | High (> 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Ankasandra | 73 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Low (<0.5 %) | High (> 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Medium (0.5-1.0 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Kallugudi | 24 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Low (<0.5 %) | 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) | Deficient (<0.6 ppm) |
| Kallugudi | 25 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Low (<0.5 %) | 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) | Deficient (<0.6 ppm) |
| Malamacha nakunte | 26 | Strongly acid (pH 5.0 – 5.5) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | High (> 57 kg/ha) | Low (<145 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Malamacha nakunte | 27 | Strongly acid (pH 5.0 – 5.5) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | High (> 57 kg/ha) | Low (<145 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |

| Village | Sy No. | Soil Reaction | Salinity | Organic Carbon | Available Phosphorus | Available Potassium | Available Sulphur | Available Boron | Available Iron | Available Manganese | Available Copper | Available Zinc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Malamacha nakunte | 28 | Strongly acid (pH 5.0 – 5.5) | Non saline (<2 dsm) | Low (<0.5 %) | 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) | Deficient (<0.6 ppm) |
| Malamacha nakunte | 29 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | Low (<0.5 %) | High (> 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Medium (0.5-1.0 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Malamacha nakunte | 30 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Medium (0.5-1.0 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Malamacha nakunte | 31 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Medium (0.5-1.0 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Malamacha nakunte | 32 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Malamacha nakunte | 33 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Malamacha nakunte | 34 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | Low (<0.5 %) | 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) | Deficient (<0.6 ppm) |
| Malamacha nakunte | 35 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Malamacha nakunte | 36 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Malamacha nakunte | 43 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Malamacha nakunte | 44 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Medium (0.5-1.0 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Malamacha nakunte | 45 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Medium (0.5-1.0 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Malamacha nakunte | 46 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | Low (<0.5 %) | High (> 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Medium (0.5-1.0 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Malamacha nakunte | 60 | Strongly acid (pH 5.0 – 5.5) | Non saline (<2 dsm) | Low (<0.5 %) | High (> 57 kg/ha) | Low (<145 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Malamacha nakunte | 61 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | Low (<0.5 %) | High (> 57 kg/ha) | Low (<145 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Malamacha nakunte | 62 | Strongly acid (pH 5.0 – 5.5) | Non saline (<2 dsm) | Low (<0.5 %) | High (> 57 kg/ha) | Low (<145 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Malamacha nakunte | 63 | Strongly acid (pH 5.0 – 5.5) | Non saline (<2 dsm) | Low (<0.5 %) | High (> 57 kg/ha) | Low (<145 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Malamacha nakunte | 68 | Strongly acid (pH 5.0 – 5.5) | Non saline (<2 dsm) | Low (<0.5 %) | High (> 57 kg/ha) | Low (<145 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Malamacha nakunte | 69 | Strongly acid (pH 5.0 – 5.5) | Non saline (<2 dsm) | Low (<0.5 %) | High (> 57 kg/ha) | Low (<145 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Malamacha nakunte | 71 | Strongly acid (pH 5.0 – 5.5) | Non saline (<2 dsm) | Low (<0.5 %) | High (> 57 kg/ha) | Low (<145 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Malamacha nakunte | 129 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Malamacha nakunte | 131 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Ranganahalli | 1 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | High (> 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Ranganahalli | 2 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Low (<0.5 %) | 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) |

| Village | Sy No. | Soil Reaction | Salinity | Organic Carbon | Available Phosphorus | Available Potassium | Available Sulphur | Available Boron | Available Iron | Available Manganese | Available Copper | Available Zinc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ranganahalli | 3 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | Low (<0.5 %) | 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) | Deficient (<0.6 ppm) |
| Ranganahalli | 8 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | Low (<0.5 %) | 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) | Deficient (<0.6 ppm) |
| Ranganahalli | 9 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | Low (<0.5 %) | 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) | Deficient (<0.6 ppm) |
| Ranganahalli | 10 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | Low (<0.5 %) | 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) | Deficient (<0.6 ppm) |
| Ranganahalli | 11 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | Low (<0.5 %) | 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) | Deficient (<0.6 ppm) |
| Ranganahalli | 12 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | Low (<0.5 %) | 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) |
| Ranganahalli | 13 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Low (<0.5 %) | 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) |
| Ranganahalli | 14 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Low (<0.5 %) | 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) | Deficient (<0.6 ppm) |
| Ranganahalli | 15 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | Low (<0.5 %) | 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) | Deficient (<0.6 ppm) |
| Ranganahalli | 16 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Ranganahalli | 17 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Ranganahalli | 18 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Ranganahalli | 19 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Medium (0.5-1.0 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Ranganahalli | 20 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Medium (0.5-1.0 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Ranganahalli | 21 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Medium (0.5-1.0 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Ranganahalli | 22 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Medium (0.5-1.0 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Ranganahalli | 23 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Medium (0.5-1.0 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Ranganahalli | 24 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Medium (0.5-1.0 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Ranganahalli | 25 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Medium (0.5-1.0 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Ranganahalli | 26 | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others | Others |
| Ranganahalli | 27 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Medium (0.5-1.0 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Ranganahalli | 28 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Medium (0.5-1.0 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Ranganahalli | 29 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Medium (0.5-1.0 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Ranganahalli | 30 | Slightly alkaline (pH 7.3 – 7.8) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Medium (0.5-1.0 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Ranganahalli | 31 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Medium (0.5-1.0 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |

| Village | Sy No. | Soil Reaction | Salinity | Organic Carbon | Available Phosphorus | Available Potassium | Available Sulphur | Available Boron | Available Iron | Available Manganese | Available Copper | Available Zinc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ranganahalli | 32 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Ranganahalli | 33 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Low (<0.5 %) | 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) |
| Ranganahalli | 34 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | High (> 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 1 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Medium (0.5-1.0 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 2 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Medium (0.5-1.0 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 3 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 4 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 23 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 24 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 29 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 30 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 31 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 32 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 34 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 35 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 36 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 37 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 38 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Medium (0.5-1.0 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 39 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 40 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 41 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 42 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 43 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 44 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |

| Village | Sy No. | Soil Reaction | Salinity | Organic Carbon | Available Phosphorus | Available Potassium | Available Sulphur | Available Boron | Available Iron | Available Manganese | Available Copper | Available Zinc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Thalekoppa | 45 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | High (>0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 46 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 47 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 48 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 51 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 53 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | High (> 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 54 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 55 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 56 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 57 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 58 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 59 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 60 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 61 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 62 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 63 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 64 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 65 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 66 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 67 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 68 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 69 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 70 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 71 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |

| Village | Sy No. | Soil Reaction | Salinity | Organic Carbon | Available Phosphorus | Available Potassium | Available Sulphur | Available Boron | Available Iron | Available Manganese | Available Copper | Available Zinc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Thalekoppa | 72 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 73 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Medium (0.5-1.0 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 74 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Medium (0.5-1.0 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 75 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 76 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Medium (0.5-1.0 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 77 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Medium (0.5-1.0 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 78 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Thalekoppa | 79 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Thalekoppa | 80 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Thalekoppa | 81 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Medium (0.5-1.0 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Thalekoppa | 82 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Thalekoppa | 83 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Thalekoppa | 84 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Thalekoppa | 85 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Thalekoppa | 86 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Thalekoppa | 87 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 88 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 89 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Thalekoppa | 90 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 91 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Medium (0.5-0.75 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 92 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |
| Thalekoppa | 93 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Thalekoppa | 94 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Thalekoppa | 95 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |

| Village | Sy No. | Soil Reaction | Salinity | Organic Carbon | Available Phosphorus | Available Potassium | Available Sulphur | Available Boron | Available Iron | Available Manganese | Available Copper | Available Zinc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Thalekoppa | 96 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Thalekoppa | 97 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Thalekoppa | 98 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Thalekoppa | 99 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Thalekoppa | 100 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Thalekoppa | 101 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Low (<0.5 %) | 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) | Deficient (<0.6 ppm) |
| Thalekoppa | 102 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Low (<0.5 %) | 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) | Deficient (<0.6 ppm) |
| Thalekoppa | 103 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Low (<0.5 %) | 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) | Deficient (<0.6 ppm) |
| Thalekoppa | 104 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Low (<0.5 %) | 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) | Deficient (<0.6 ppm) |
| Thalekoppa | 105 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Low (<0.5 %) | 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) | Deficient (<0.6 ppm) |
| Thalekoppa | 106 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Low (<0.5 %) | 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) | Deficient (<0.6 ppm) |
| Thalekoppa | 107 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Thalekoppa | 108 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Thalekoppa | 109 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Thalekoppa | 110 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Thalekoppa | 111 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Low (<0.5 %) | 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) | Deficient (<0.6 ppm) |
| Thalekoppa | 112 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | Low (<0.5 %) | 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) | Deficient (<0.6 ppm) |
| Thalekoppa | 113 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Thalekoppa | 114 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Thalekoppa | 115 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Thalekoppa | 116 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Thalekoppa | 117 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | Low (<0.5 %) | 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) | Deficient (<0.6 ppm) |
| Thalekoppa | 118 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | Low (<0.5 %) | 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) | Deficient (<0.6 ppm) |
| Thalekoppa | 119 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |

| Village | Sy No. | Soil Reaction | Salinity | Organic Carbon | Available Phosphorus | Available Potassium | Available Sulphur | Available Boron | Available Iron | Available Manganese | Available Copper | Available Zinc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Thalekoppa | 120 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Medium (145-337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Thalekoppa | 121 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Low (<145 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Thalekoppa | 122 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Low (<145 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Thalekoppa | 123 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | Low (<0.5 %) | High (> 57 kg/ha) | Low (<145 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Thalekoppa | 124 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | Low (<0.5 %) | High (> 57 kg/ha) | Low (<145 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Thalekoppa | 138 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | Low (<0.5 %) | High (> 57 kg/ha) | Low (<145 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Thalekoppa | 140 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | Low (<0.5 %) | High (> 57 kg/ha) | Low (<145 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Thalekoppa | 141 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | Low (<0.5 %) | High (> 57 kg/ha) | Low (<145 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Thalekoppa | 142 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | Low (<0.5 %) | High (> 57 kg/ha) | Low (<145 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Thalekoppa | 149 | Moderately acid (pH 5.5 – 6.0) | Non saline (<2 dsm) | Low (<0.5 %) | High (> 57 kg/ha) | Low (<145 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Thalekoppa | 151 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Low (<145 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Thalekoppa | 152 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Low (<145 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Thalekoppa | 153 | Slightly acid (pH 6.0 – 6.5) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | Low (<145 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Thalekoppa | 203 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Low (<0.5 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Deficient (<0.6 ppm) |
| Thalekoppa | 204 | Neutral (pH 6.5 – 7.3) | Non saline (<2 dsm) | Low (<0.5 %) | Medium (23 – 57 kg/ha) | High (>337 kg/ha) | Medium (10-20 ppm) | Medium (0.5-1.0 ppm) | Sufficient (>4.5 ppm) | Sufficient(>1.0 ppm) | Sufficient (>0.2 ppm) | Sufficient (>0.6 ppm) |

# Appendix III

## Ranganahalli Microwatershed
## Soil Suitability Information

| Village | Sy No. | Mango | Maize | Sapota | Sorghum | Coconut | Guava | Tamarind | Lime | Sunflower | Red gram | Amla | Jackfruit | Custard apple | Cashew | Jamun | Musambi | Groundnut | Onion | Chilly | Tomato | Marigold | Chrysanthemum | Pomegranate | Banana | Horsegram | Field-bean | Arecanut | Finger-Millet | Brinjal | Fodder Sorghum | UplandPaddy | Jasmine | Cowpea | Mulberry |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ankasandra | 7 | S2r | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 |
| Ankasandra | 8 | S2r | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 |
| Ankasandra | 9 | S2r | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 |
| Ankasandra | 10 | S2r | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 |
| Ankasandra | 11 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Ankasandra | 12 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Ankasandra | 13 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Ankasandra | 14 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Ankasandra | 15 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Ankasandra | 16 | S2r | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 |
| Ankasandra | 17 | S2r | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 |
| Ankasandra | 18 | S2r | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 |
| Ankasandra | 19 | S2r | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 |
| Ankasandra | 20 | S2r | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 |
| Ankasandra | 21 | S2r | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 |
| Ankasandra | 22 | S2r | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 |
| Ankasandra | 23 | S2r | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 |
| Ankasandra | 73 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Kallugudi | 24 | Nr | S2rg | S3rg | S2rg | S3rg | S3rg | Nr | S3rg | S3rg | S2rg | S2rg | S3rg | S2rg | S3rg | S3rg | S3rg | S2rg | S2rg | S2rg | S2rg | S2rg | S2rg | S3rg | S3rg | S1 | S2rg | S3rg | S2rg | S2rg | S2rg | S2rg | S2rg | S2rg | S3r |
| Kallugudi | 25 | Ngl | S2gl | S3gl | S2gl | S3gl | S3gl | Ngl | S3gl | S3gl | S2gl | S2gl | S3gl | S2gl | S3gl | S3gl | S3gl | S2gl | S2gl | S2gl | S2gl | S2gl | S2gl | S3gl | S3gl | S2gl | S2gl | S3gl | S2gl | S2gl | S2gl | S2gl | S2gl | S2gl | S3r |

| Village | Sy No. | Mango | Maize | Sapota | Sorghum | Coconut | Guava | Tamarind | Lime | Sunflower | Redgram | Amla | Jackfruit | Custard apple | Cashew | Jamun | Musambi | Groundnut | Onion | Chilly | Tomato | Marigold | Chrysanthemum | Pomegranate | Banana | Horsegram | Field-bean | Arecanut | Finger-Millet | Brinjal | Fodder Sorghum | UplandPaddy | Jasmine | Cowpea | Mulberry |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Malamachanakunte | 26 | S2r | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 |
| Malamachanakunte | 27 | S2r | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 |
| Malamachanakunte | 28 | S2r | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 |
| Malamachanakunte | 29 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Malamachanakunte | 30 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Malamachanakunte | 31 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S3t |
| Malamachanakunte | 32 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S3t |
| Malamachanakunte | 33 | Nr | S2rg | S3rg | S2rg | S3rg | S3rg | Nr | S3rg | S3rg | S2rg | S2rg | S3rg | S2rg | S3rg | S3rg | S3rg | S2rg | S2rg | S2rg | S2rg | S2rg | S2rg | S3rg | S3rg | S1 | S2rg | S3rg | S2rg | S2rg | S2rg | S2rg | S2rg | S2rg | S3r |
| Malamachanakunte | 34 | Ngl | S2gl | S3gl | S2gl | S3gl | S3gl | Ngl | S3gl | S3gl | S2gl | S2gl | S3gl | S2gl | S3gl | S3gl | S3gl | S2gl | S2gl | S2gl | S2gl | S2gl | S2gl | S3gl | S3gl | S2gl | S2gl | S3gl | S2gl | S2gl | S2gl | S2gl | S2gl | S2gl | S3r |
| Malamachanakunte | 35 | Nr | S2rg | S3rg | S2rg | S3rg | S3rg | Nr | S3rg | S3rg | S2rg | S2rg | S3rg | S2rg | S3rg | S3rg | S3rg | S2rg | S2rg | S2rg | S2rg | S2rg | S2rg | S3rg | S3rg | S1 | S2rg | S3rg | S2rg | S2rg | S2rg | S2rg | S2rg | S2rg | S3r |
| Malamachanakunte | 36 | Nr | S2rg | S3rg | S2rg | S3rg | S3rg | Nr | S3rg | S3rg | S2rg | S2rg | S3rg | S2rg | S3rg | S3rg | S3rg | S2rg | S2rg | S2rg | S2rg | S2rg | S2rg | S3rg | S3rg | S1 | S2rg | S3rg | S2rg | S2rg | S2rg | S2rg | S2rg | S2rg | S3r |
| Malamachanakunte | 43 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S3t |
| Malamachanakunte | 44 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S3t |
| Malamachanakunte | 45 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S3t |
| Malamachanakunte | 46 | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S2g | S2g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S2g |
| Malamachanakunte | 60 | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S2g | S2g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S2g |

| Village | Sy No. | Mango | Maize | Sapota | Sorghum | Coconut | Guava | Tamarind | Lime | Sunflower | Red gram | Amla | Jack fruit | Custard apple | Cashew | Jamun | Musambi | Groundnut | Onion | Chilly | Tomato | Marigold | Chrysanthemum | Pomegranate | Banana | Horsegram | Field-bean | Arecanut | Finger-Millet | Brinjal | Fodder Sorghum | UplandPaddy | Jasmine | Cowpea | Mulberry |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Malamachanakunte | 61 | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S2g | S2g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S2g |
| Malamachanakunte | 62 | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S2g | S2g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S2g |
| Malamachanakunte | 63 | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S2g | S2g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S2g |
| Malamachanakunte | 68 | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S2g | S2g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S2g |
| Malamachanakunte | 69 | S2r | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 |
| Malamachanakunte | 71 | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S2g | S2g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S2g |
| Malamachanakunte | 129 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S3t |
| Malamachanakunte | 131 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S3t |
| Ranganahalli | 1 | S3rg | S3rg | S3rg | S3rg | S3g | S3rg | S3rg | S3rg | S3rg | S3g | S2g | S3rg | S2g | S3rg | S3rg | S3rg | S2rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3rg | S2g | S3g | S3g | S2g | S3g | S3rg | S2g | S3g | S3g | S2rg |
| Ranganahalli | 2 | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S2g | S2g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S2g |
| Ranganahalli | 3 | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S2g | S2g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S2g |
| Ranganahalli | 8 | S3r | S1 | S2r | S1 | S2r | S2r | S3r | S2r | S2r | S1 | S1 | S2r | S1 | S2r | S3rg | S2r | S1 | S1 | S1 | S1 | S1 | S1 | S2r | S2r | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S1 | S2r |
| Ranganahalli | 9 | S3r | S1 | S2r | S1 | S2r | S2r | S3r | S2r | S2r | S1 | S1 | S2r | S1 | S2r | S3rg | S2r | S1 | S1 | S1 | S1 | S1 | S1 | S2r | S2r | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S1 | S2r |
| Ranganahalli | 10 | S3r | S1 | S2r | S1 | S2r | S2r | S3r | S2r | S2r | S1 | S1 | S2r | S1 | S2r | S3rg | S2r | S1 | S1 | S1 | S1 | S1 | S1 | S2r | S2r | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S1 | S2r |
| Ranganahalli | 11 | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S2g | S2g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S2g |
| Ranganahalli | 12 | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S2g | S2g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S2g |
| Ranganahalli | 13 | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S2g | S2g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S2g |
| Ranganahalli | 14 | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S2g | S2g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S2g |
| Ranganahalli | 15 | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S2g | S2g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S2g |

| Village | Sy No. | Mango | Maize | Sapota | Sorgham | Coconut | Guava | Tamarind | Lime | Sunflower | Red gram | Amla | Jack fruit | Custard apple | Cashew | Jamun | Musambi | Groundnut | Onion | Chilly | Tomato | Marigold | Chrysanthemum | Pomegranate | Banana | Horsegram | Field-bean | Arecanut | Finger-Millet | Brinjal | Fodder Sorghum | UplandPaddy | Jasmine | Cowpea | Mulberry |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ranganahalli | 16 | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S2g | S2g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S2g |
| Ranganahalli | 17 | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S2g | S2g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S2g |
| Ranganahalli | 18 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S3t |
| Ranganahalli | 19 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S3t |
| Ranganahalli | 20 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S3t |
| Ranganahalli | 21 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S3t |
| Ranganahalli | 22 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S3t |
| Ranganahalli | 23 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S3t |
| Ranganahalli | 24 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S3t |
| Ranganahalli | 25 | S3rg | S3rg | S3rg | S3rg | S3g | S3rg | S3rg | S3rg | S3rg | S3g | S2g | S3rg | S2g | S3rg | S3rg | S3rg | S2rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3rg | S2g | S3g | S3g | S2g | S3g | S3rg | S2g | S3g | S3g | S2rg |
| Ranganahalli | 26 | 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 | Others | Others | Others |
| Ranganahalli | 27 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S3t |
| Ranganahalli | 28 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S3t |
| Ranganahalli | 29 | Nr | S3r | Nr | S3r | Nr | Nr | Nr | Nr | Nr | S3r | S3r | Nr | Nr | Nr | Nr | Nr | S3r | S3r | S3r | S3r | S3r | S3r | Nr | Nr | S3r | S3r | Nr | S2r | S3r | S3r | S3r | S3r | S3r | Nr |
| Ranganahalli | 30 | Nr | S3r | Nr | S3r | Nr | Nr | Nr | Nr | Nr | S3r | S3r | Nr | Nr | Nr | Nr | Nr | S3r | S3r | S3r | S3r | S3r | S3r | Nr | Nr | S3r | S3r | Nr | S2r | S3r | S3r | S3r | S3r | S3r | Nr |
| Ranganahalli | 31 | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S2g | S2g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S2g |
| Ranganahalli | 32 | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S2g | S2g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S2g |
| Ranganahalli | 33 | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S2g | S2g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S2g |
| Ranganahalli | 34 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S3t |
| Thalekoppa | 1 | S1 | S2t | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S3t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 2 | S1 | S2t | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S3t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 3 | S1 | S2t | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S3t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 4 | S1 | S2t | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S3t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S2t |

| Village | Sy No. | Mango | Maize | Sapota | Sorgham | Coconut | Guava | Tamarind | Lime | Sunflower | Red gram | Amla | Jack fruit | Custard apple | Cashew | Jamun | Musambi | Ground nut | Onion | Chilly | Tomato | Marigold | Chrysanthemum | Pomegranate | Banana | Horsegram | Field-bean | Arecanut | Finger-Millet | Brinjal | Fodder Sorghum | UplandPaddy | Jasmine | Cowpea | Mulberry |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Thalekoppa | 23 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S3t |
| Thalekoppa | 24 | S1 | S2t | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S3t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 29 | S1 | S2t | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S3t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 30 | S1 | S2t | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S3t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 31 | S1 | S2t | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S3t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 32 | S1 | S2t | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S3t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 34 | S1 | S2t | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S3t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 35 | S1 | S2t | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S3t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 36 | S1 | S2t | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S3t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 37 | S1 | S2t | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S3t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 38 | S1 | S2t | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S3t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 39 | S1 | S2t | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S3t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 40 | S1 | S2t | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S3t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 41 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S3t |
| Thalekoppa | 42 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S3t |
| Thalekoppa | 43 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S3t |
| Thalekoppa | 44 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S3t |
| Thalekoppa | 45 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S3t |
| Thalekoppa | 46 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S3t |
| Thalekoppa | 47 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S3t |
| Thalekoppa | 48 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S3t |
| Thalekoppa | 51 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S3t |
| Thalekoppa | 53 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S3t |

| Village | Sy No. | Mango | Maize | Sapota | Sorgham | Coconut | Guava | Tamarind | Lime | Sunflower | Redgram | Amla | Jackfruit | Custardapple | Cashew | Jamun | Musambi | Groundnut | Onion | Chilly | Tomato | Marigold | Chrysanthemum | Pomegranate | Banana | Horsegram | Field-bean | Arecanut | Finger-Millet | Brinjal | Fodder Sorghum | UplandPaddy | Jasmine | Cowpea | Mulberry |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Thalekoppa | 54 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S3t |
| Thalekoppa | 55 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S3t |
| Thalekoppa | 56 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S3t |
| Thalekoppa | 57 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S3t |
| Thalekoppa | 58 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S3t |
| Thalekoppa | 59 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S3t |
| Thalekoppa | 60 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S3t |
| Thalekoppa | 61 | S3rg | S3rg | S3rg | S3rg | S3g | S3rg | S3rg | S3rg | S3rg | S3g | S2g | S3rg | S2g | S3rg | S3rg | S3rg | S2rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3rg | S2g | S3g | S3g | S2g | S3g | S3rg | S2g | S3g | S3g | S2rg |
| Thalekoppa | 62 | S3rg | S3rg | S3rg | S3rg | S3g | S3rg | S3rg | S3rg | S3rg | S3g | S2g | S3rg | S2g | S3rg | S3rg | S3rg | S2rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3rg | S2g | S3g | S3g | S2g | S3g | S3rg | S2g | S3g | S3g | S2rg |
| Thalekoppa | 63 | S1 | S2t | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S3t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 64 | S1 | S2t | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S3t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 65 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 |
| Thalekoppa | 66 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 |
| Thalekoppa | 67 | S1 | S2t | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S3t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 68 | S1 | S2t | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S3t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 69 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 |
| Thalekoppa | 70 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 |
| Thalekoppa | 71 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 |
| Thalekoppa | 72 | S3rg | S3rg | S3rg | S3rg | S3g | S3rg | S3rg | S3rg | S3rg | S3g | S2g | S3rg | S2g | S3rg | S3rg | S3rg | S2rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3rg | S2g | S3g | S3g | S2g | S3g | S3rg | S2g | S3g | S3g | S2rg |
| Thalekoppa | 73 | S3rg | S3rg | S3rg | S3rg | S3g | S3rg | S3rg | S3rg | S3rg | S3g | S2g | S3rg | S2g | S3rg | S3rg | S3rg | S2rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3rg | S2g | S3g | S3g | S2g | S3g | S3rg | S2g | S3g | S3g | S2rg |
| Thalekoppa | 74 | S3rg | S3rg | S3rg | S3rg | S3g | S3rg | S3rg | S3rg | S3rg | S3g | S2g | S3rg | S2g | S3rg | S3rg | S3rg | S2rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3rg | S2g | S3g | S3g | S2g | S3g | S3rg | S2g | S3g | S3g | S2rg |
| Thalekoppa | 75 | S3rg | S3rg | S3rg | S3rg | S3g | S3rg | S3rg | S3rg | S3rg | S3g | S2g | S3rg | S2g | S3rg | S3rg | S3rg | S2rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3rg | S2g | S3g | S3g | S2g | S3g | S3rg | S2g | S3g | S3g | S2rg |
| Thalekoppa | 76 | S3rg | S3rg | S3rg | S3rg | S3g | S3rg | S3rg | S3rg | S3rg | S3g | S2g | S3rg | S2g | S3rg | S3rg | S3rg | S2rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3rg | S2g | S3g | S3g | S2g | S3g | S3rg | S2g | S3g | S3g | S2rg |

| Village | Sy No. | Mango | Maize | Sapota | Sorgham | Coconut | Guava | Tamarind | Lime | Sunflower | Redgram | Amla | Jackfruit | Custardapple | Cashew | Jamun | Musambi | Groundnut | Onion | Chilly | Tomato | Marigold | Chrysanthemum | Pomegranate | Banana | Horsegram | Field-bean | Arecanut | Finger-Millet | Brinjal | Fodder Sorghum | UplandPaddy | Jasmine | Cowpea | Mulberry |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Thalekoppa | 77 | S3rg | S3rg | S3rg | S3rg | S3g | S3rg | S3rg | S3rg | S3rg | S3g | S2g | S3rg | S2g | S3rg | S3rg | S3rg | S2rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3rg | S2g | S3g | S3g | S2g | S3g | S3rg | S2g | S3g | S3g | S2rg |
| Thalekoppa | 78 | S2r | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 |
| Thalekoppa | 79 | S3rg | S3rg | S3rg | S3rg | S3g | S3rg | S3rg | S3rg | S3rg | S3g | S2g | S3rg | S2g | S3rg | S3rg | S3rg | S2rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3rg | S2g | S3g | S3g | S2g | S3g | S3rg | S2g | S3g | S3g | S2rg |
| Thalekoppa | 80 | S3rg | S3rg | S3rg | S3rg | S3g | S3rg | S3rg | S3rg | S3rg | S3g | S2g | S3rg | S2g | S3rg | S3rg | S3rg | S2rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3rg | S2g | S3g | S3g | S2g | S3g | S3rg | S2g | S3g | S3g | S2rg |
| Thalekoppa | 81 | S3rg | S3rg | S3rg | S3rg | S3g | S3rg | S3rg | S3rg | S3rg | S3g | S2g | S3rg | S2g | S3rg | S3rg | S3rg | S2rg | S3g | S3g | S3g | S3g | S3g | S3rg | S3rg | S2g | S3g | S3g | S2g | S3g | S3rg | S2g | S3g | S3g | S2rg |
| Thalekoppa | 82 | S2r | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2r | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 |
| Thalekoppa | 83 | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2tg | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g |
| Thalekoppa | 84 | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2tg | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g |
| Thalekoppa | 85 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 |
| Thalekoppa | 86 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 |
| Thalekoppa | 87 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 |
| Thalekoppa | 88 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 |
| Thalekoppa | 89 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 |
| Thalekoppa | 90 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 |
| Thalekoppa | 91 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 |
| Thalekoppa | 92 | S1 | S2t | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S3t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 93 | S1 | S2t | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S3t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 94 | S1 | S2t | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S3t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 95 | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2tg | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g |
| Thalekoppa | 96 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 |
| Thalekoppa | 97 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 |
| Thalekoppa | 98 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 |
| Thalekoppa | 99 | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2tg | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g |

| Village | Sy No. | Mango | Maize | Sapota | Sorghum | Coconut | Guava | Tamarind | Lime | Sunflower | Redgram | Amla | Jackfruit | Custard apple | Cashew | Jamun | Musambi | Groundnut | Onion | Chilly | Tomato | Marigold | Chrysanthemum | Pomegranate | Banana | Horsegram | Field-bean | Arecanut | Finger-Millet | Brinjal | Fodder Sorghum | UplandPaddy | Jasmine | Cowpea | Mulberry |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Thalekoppa | 100 | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2tg | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g |
| Thalekoppa | 101 | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2tg | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g |
| Thalekoppa | 102 | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2tg | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g |
| Thalekoppa | 103 | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2tg | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g |
| Thalekoppa | 104 | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2tg | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g |
| Thalekoppa | 105 | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2tg | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g |
| Thalekoppa | 106 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 107 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 108 | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S2g | S3g | S2g | S3g | S3g | S3g | S2tg | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S3g | S2g |
| Thalekoppa | 109 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 110 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 111 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 112 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 113 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 114 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 115 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 116 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 117 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 118 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 119 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 120 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 121 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 122 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t |

| Village | Sy No. | Mango | Maize | Sapota | Sorgham | Coconut | Guava | Tamarind | Lime | Sunflower | Redgram | Amla | Jackfruit | Custard apple | Cashew | Jamun | Musambi | Groundnut | Onion | Chilly | Tomato | Marigold | Chrysanthemum | Pomegranate | Banana | Horsegram | Field-bean | Arecanut | Finger-Millet | Brinjal | Fodder Sorghum | UplandPaddy | Jasmine | Cowpea | Mulberry |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Thalekoppa | 123 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 124 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 138 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 140 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 141 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 142 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 149 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 151 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 152 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 153 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 203 | S1 | S2t | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S3t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S2t |
| Thalekoppa | 204 | S1 | S2t | S1 | S1 | S2t | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S3t | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S2t | S1 | S1 | S1 | S1 | S1 | S1 | S2t |

# PART-B

## SOCIO-ECONOMIC STATUS OF FARM HOUSEHOLDS

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***Chapter 1***

## *EXECUTIVE SUMMARY*

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

***Methodology:*** *Ranganahalli micro-watershed (Pillahalli sub-watershed, Gubbi taluk, Tumkur district) is located in between $13^0 28'$ – $13^0 29'$ North latitudes and $76^0 52'$ – $76^0 54'$ East longitudes, covering an area of about 353.56 ha, bounded by Malamachanakunte, Kallugudi, Thalekoppa, Ranganahalli an Ankasandra villages with length of growing period (LGP) 120-150 days. We used soil resource map as basis for sampling farm households to test the hypothesis that soil quality influence crop selection, and conservation investment of farm households. The level of technology adoption and productivity gaps and livelihood patterns were analyses. The cost of soil degradation and ecosystem services were quantified.*

***Results:*** *The socio-economic outputs for the Ranganahalli micro-watershed (Pillahalli sub-watershed, Gubbi taluk, Thumkur district) are presented here.*

***Social Indicators;***

- *Male and female ratio is 51.1 to 48.9 Per cent to the total sample population.*
- *Younger age 18 to 50 years group of population is 64.4 around per cent to the total population.*
- *Literacy population is around 73.4 per cent.*
- *Social groups belong to other backward caste (OBC) 80 percent and general caste 20 percent.*
- *Liquefied petroleum gas (LPG) is the source of energy for a cooking among all the sample households.*
- *About 20.0 per cent of households have a yashaswini health card.*
- *Farm households are having MGNREGA card only 40 per cent for rural employment.*
- *Dependence on ration cards for food grains through public distribution system is around 90 per cent.*
- *Swach bharath program providing closed toilet facilities among all sample households.*
- *Institutional participation is only 8.9 per cent of sample households.*
- *Women participation in decisions making are around 90 per cent of households were found.*

***Economic Indicators;***

- *The average land holding is 1.01 ha indicates that majority of farm households are belong to marginal and small farmers. The dry land of 73.4 per cent and irrigated land 26.5 per cent of total cultivated land area among the sample households.*
- *Agriculture is the main occupation among 84.4 per cent and agriculture is the main and agriculture labour is subsidiary occupation for 8.9 per cent of sample households.*
- *The average value of domestic assets is around Rs.14771. per household. Mobile and television are popular media mass communication.*
- *The average value of farm assets is around Rs. 2472 per household. Among all sample farmers having weeder and plough (30 %).*
- *The average value of livestock is around Rs. 26687 per household; about 66.6 per cent of household are having livestock.*
- *The average per capita food consumption is around 612.2 grams (1374.7 kilo calories) against national institute of nutrition (NIN) recommendation at 827 gram. Among the all sample households are consuming less than the NIN recommendation.*
- *The annual average income is around Rs.67122 per household. About 50.0 per cent of farm households are below poverty line.*
- *The per capita average monthly expenditure is around Rs. 946.*

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

- *The value of ecosystem service helps to support investment to decision on soil and water conservation and in promoting sustainable land use.*
- *The onsite cost of different soil nutrients lost due to soil erosion is around Rs. 637 per ha/year. The total cost of annual soil nutrients is around Rs. 309674 per year for the total area of 535.5 ha.*
- *The average value of ecosystem service for food grain production is around Rs. 53002/ha/year. Per hectare food grain production services is maximum in ragi (Rs. 3371) followed by coconut (Rs. 66505) and areca nut (Rs. 142384).*
- *The average value of ecosystem service for fodder production is around Rs. 1883/ ha/year. Per hectare fodder production services is maximum in horse gram (Rs. 2779) and ragi (Rs. 988).*
- *The data on water requirement for producing one quintal of grain is considered for estimating the total value of water required for crop production. The per hectare value of water used and value of water was maximum in turmeric (Rs.69577) followed by coconut (Rs. 246668), horse gram (Rs. 20907), ragi (Rs. 12073) and areca nut (Rs. 7058).*

***Economic Land Evaluation;***

- *The major cropping pattern is coconut (62.5 %) followed by ragi (17.3 %) areca nut (15.6 %) and horse gram (4.5 %).*
- *In Ragenahalli micro-watershed, major soil series are Kutegoudanahundi series are having moderately shallow soil depth cover around 15.2 % of area. On this soil farmer are presently growing horse gram (50 %) and ragi (50 %). Bidanagere series having moderately soils depth cover around 9.5 % of areas; the major crops are coconut. Balapur and Jedigere series are having deep soil depth cover around 6.0 % and 7.6 % of areas respectively, crops are coconut, areca nut and ragi grown. Hallikere, Niduvalalu and Ranatur series having very deep soil depth covers around 16.1 per cent, 11.2 per cent and 9.0 per cent of areas, respectively; the major crops are coconut, areca nut and horse gram can grow.*
- *The total cost of cultivation and benefit cost ratio (BCR) in study area for horse gram ranges between Rs.34886/ha in KGH soil (with BCR of 1.13) and Rs.19954/ha in NDL soil (with BCR of 1.12).*
- *In ragi the cost of cultivation range between Rs 25530/ha in KGH soil (with of 1.32) and Rs. 22068/ha in HLK soil (with BCR of 1.39).*
- *In coconut the cost of cultivation range between Rs. 136691/ha in RTR soil (with BCR of 1.69) and Rs. 54014/ha in BPR soil (with BCR of 2.0).*
- *In areca nut the cost of cultivation range between is Rs.109416ha in RTR soil (with BCR of 3.24) and Rs.48323/ha JDG soil (with BCR of 3.79).*
- *The land management practices reported by the farmers are crop rotation, tillage practices, fertilizer application and use of farm yard manure (FYM). Due to higher wages farmer are following labour saving strategies is not prating soil and water conservation measures. Less ownership of livestock limiting application of FYM.*
- *It was observed soil quality influences on the type and intensity of land use. More fertilizer applications in deeper soil to maximize returns.*

***Suggestions;***

- *Involving farmers is watershed planning helps in strengthing institutional participation.*
- *The per capita food consumption and monthly income is very low. Diversifying income generation activities from crop and livestock production in order to reduce risk related to drought and market prices.*
- *Majority of farmers reported that they are not getting timely support/extension services from the concerned development departments.*

- *By strengthing agricultural extension for providing timely advice improved technology there is scope to increase in net income of farm households.*
- *By adopting recommended package of practices by following the soil test fertiliser recommendation, there is scope to increase yield in horse gram (24.1 to 36.7 %), ragi (67.6 %), coconut (57.7 to 30.7 %) and areca nut (88.2 to 83.3 %).*

*Chapter 2*

# INTRODUCTION

Watershed Development program aim to restore degraded watersheds in rainfed regions to increase their capacity to capture and store rain water, reduce soil erosion, and improved soil nutrients and carbon contents so they can produce greater agricultural yields and other benefits. As majority of rural poor live in these regions and dependent on natural resources for their livelihood and sustenance, improvements in agricultural yields improve human welfare and simultaneously improve national food security.

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

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

Economic evaluations can better guide in watershed planning and implementation, as well as raise awareness of benefits of ecosystem restoration for food security and poverty alleviation program. The present study aims to characterize socio-economic status of farm households, assess the land and water use status, evaluate the economic viability of land use, prioritize farming constraints and suggest the measures for soil and water conservation for sustainable agriculture.

**Objectives of the study**

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

*Chapter 3*

# METHODOLOGY

***Study area***

Ranganahalli micro-watershed is located in Southern Dry Zone in Karnataka (Figure 1) the total geographical area of 1.56 M ha with 0.74 M ha under cultivation of which 0.22 M ha is irrigated. The mean elevation ranges from 450 to 900 m MSL; most part of the zone is situated at 800-900m. The major soils are red loams with pockets of black soils in Kollegal, Yalandur and T.N. Pura taluks of Mysore district. The average annual rainfall ranges from 670 to 890 mm, of which about 55 to 75 per cent is received during the kharif season. The major crops of the zone are rice, ragi, sugarcane, pulses and minor millets. It's represented Agro Ecological Region (AER)-3 having LGP 120-150 days.

Ranganahalli micro-watershed (Pillahalli sub-watershed, Gubbi taluk, Tumkur district) is located in between $13^{0}28'$ – $13^{0}29'$ North latitudes and $76^{0}52'$ – $76^{0}54'$ East longitudes, covering an area of about 353.56 ha, bounded by Malamachanakunte, Kallugudi, Thalekoppa, Ranganahalli and Ankasandra villages.

**Sampling Procedure:**

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

**Sources of data and analysis:**

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

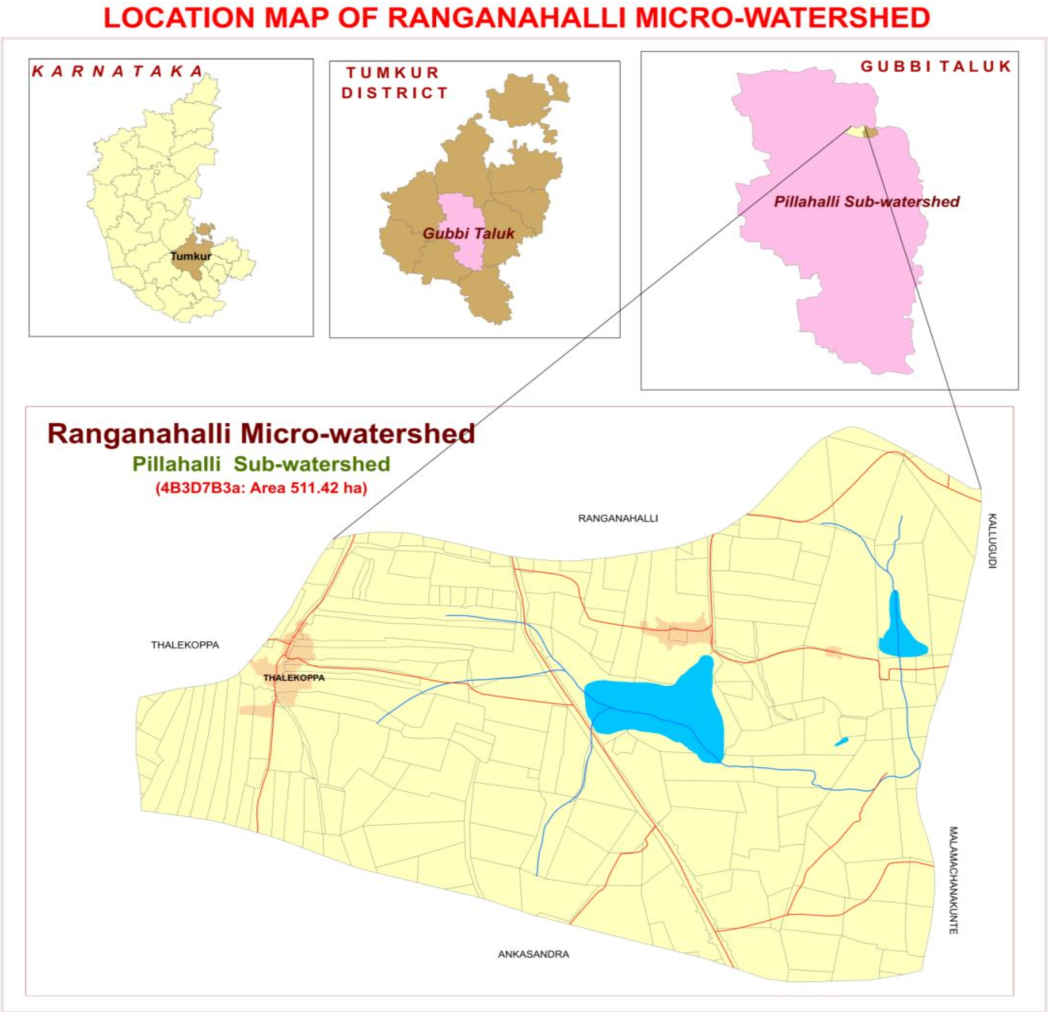


Figure 1: Location of study area

**Steps followed in socio-economic assessment**

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


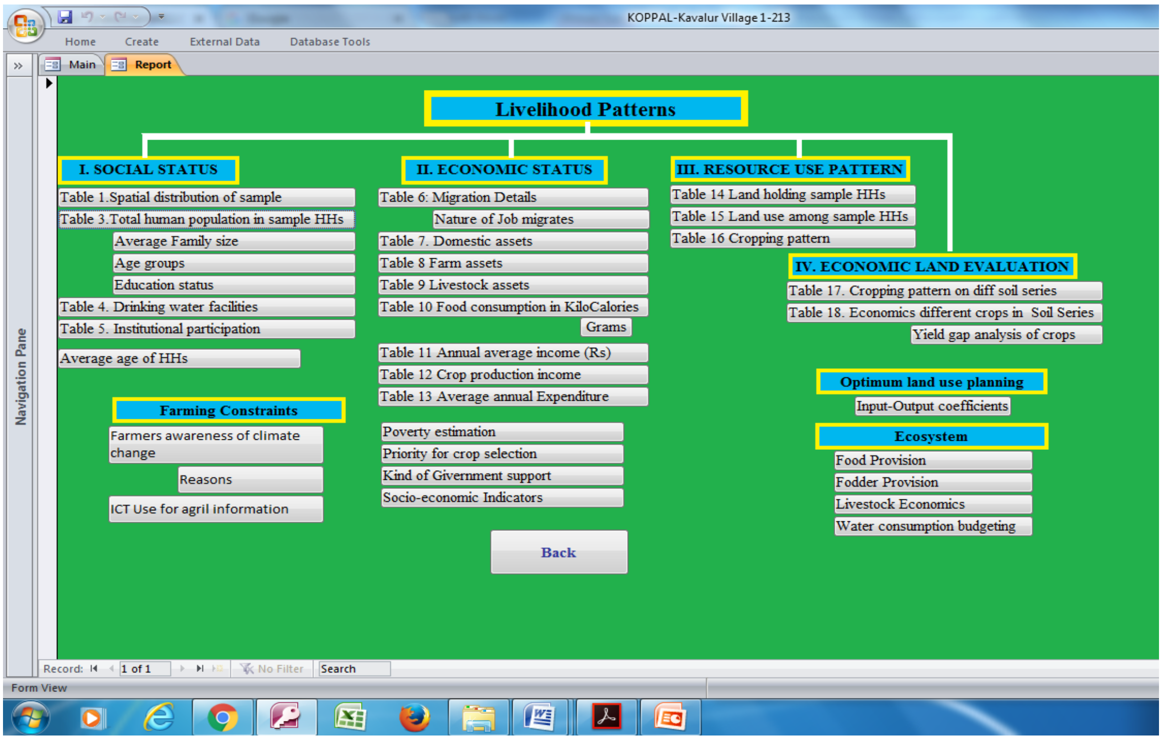


Figure 2: ALPES FRAMEWORK

The sample farmers were post classified in to marginal and small (0.0 to <=2 ha), medium and semi medium (>2 to <=10 ha) and large (>10 ha). The steps involved in estimation of soil potential involve estimation of total cost of cultivation, the yield/gross returns and net income per hectare. The cost of inputs such seed, manure and fertilizer, plant protection chemicals, payment towards human and bullock labour and interest on working capita are included under operational costs. In the case of perennial crops, the cost of establishment was estimated by using actual physical requirements and prevailing market prices. Estimation cost included maintenance cost up to bearing period. The value of main product and by product from the crop enterprise at the market rates were the gross returns of the crop. Net returns were worked out by deducting establishment and maintained cost from gross returns.

Operational Cost = cost of seeds, fertilizers, pesticides. Cost of human and bullock labour, cost of machinery, cost of irrigation water + interest on working capital.

Gross returns = Yield (Quintals/hectare)*Price (Rs/Quintal)

Net returns = Gross returns-Operational cost.

Benefit Cost Ratio = Net returns/Total cost.

Economic suitability classes: once each land use –land area combination has been assigned an economic value by the land evaluation, the question arises as to its 'suitability', that is, the degree to which it satisfies the land user. The FAO framework defines two suitability orders: 'S'(suitable if benefit cost ratio (BCR)>1) and 'N'(not suitable if (BCR<1), which are dived into five economic suitability classes:'S1'(highly suitable if BCR>3), 'S2'(suitable if BCR>2 and <3),'S3'(Marginally suitable if BCR >1 and <2), 'N1'(Not suitable for economic reasons but physically suitable) and 'N2'(not suitable for physical reasons). The limit between 'S3' and 'N1'must be at least at the point of financial feasibility (i.e. net returns, NPV, or IRR>0 and BCR>1). The other limits depend on social factors such as farm size, family size, alternative employment or investment possibilities and wealth expectations; these need to be specified for the Soil series.

**Economic Valuation of Soil ecosystem services:**

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

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

1. Collect the Soil Map Units (SMU) / Land Use Type (LUT) with soil fertility analysis.
2. Integrate the erosion rates per SMU/LUT.
3. Estimate the nutrients lost per tone of soil erosion for each SMU/LUT.
4. Estimate the value of soil nutrients lost per ton of soil erosion for each SMU/LUT by taking  the market price of soil nutrients.

*Chapter 4*

# RESULTS AND DISCUSSIONS

The demographic information shows that the household population dynamics encompasses the socioeconomic status of the farmer. For a rural family, the household size should be optimal to earn a comfortable livelihood through farm and non-farm wage earning. The total number of population in watershed area was 45, out of which 51 per cent were males and 49 per cent females. Average family size of the households is 4.5. Age is an important factor, which affects the potential employment and mobility status of respondents. The data on age wise distribution of farmers in the sample households indicated that majority of the farmers are coming under the age group of 30 to 50 years (42.2 %) followed by more than 50 years (24.4 %), 18 to 30 years (22.2 %) and 0 to18 years (11.1 %). Hence, in the study area in general, the respondents were of young and middle age, indicating thereby that the households had almost settled with whatever livelihood options they were practicing and sample respondents were young by age who could venture into various options of livelihood sources. Data on literacy indicated that 26.6 per cent of respondents were illiterate and 73.4 per cent literate (Table 1).

Table 1: Human population among sample households in Ranganahalli Microwatershed

| **Particulars** | **Units** | **Value** |
|---|---|---|
| Total human population in sample HHs | Number | 45.0 |
| Male | % to total Population | 51.0 |
| Female | % to total Population | 49.0 |
| Average family size | Number | 4.5 |
| **Age group** | | |
| 0 to 18 years | % to total Population | 11.1 |
| 18 to 30 years | % to total Population | 22.2 |
| 30 to 50 years | % to total Population | 42.2 |
| >50 years | % to total Population | 24.4 |
| Average age | Age in years | 40.3 |
| **Education Status** | | |
| Illiterates | % to total Population | 26.6 |
| Literates | % to total Population | 73.4 |
| Primary School (<5 class) | % to total Population | 22.2 |
| Middle School (6- 8 class) | % to total Population | 8.8 |
| High School (9- 10 class) | % to total Population | 13.3 |
| Others | % to total Population | 28.8 |

The ethnic groups among the sample farm households found to be 80.0 per cent belonging to other backward caste (OBC) followed by 20.0 per cent belonging to general castes (Table 2 and Figure 3). All the sample households are using liquefied petroleum gas as source of fuel for cooking. All the sample farmers are having electricity connection. About 20.0 per cent are sample households having health cards. About 40 per cent of farm households are having MNREGA job cards for employment generation. About 90.0 per cent of farm households are having ration cards for taking food grains from public distribution system. Among all farm households are having toilet facilities.

Table 2: Basic needs of sample households in Ranganahalli Micro watershed

| **Particulars** | **Units** | **Value** |
|---|---|---|
| **Social groups** | | |
| OBC | % of Households | 80.0 |
| General | % of Households | 20.0 |
| **Types of fuel use for cooking** | | |
| Gas | % of Households | 100.0 |
| **Energy supply for home** | | |
| Electricity | % of Households | 100.0 |
| **Number of households having Health card** | | |
| Yes | % of Households | 20.0 |
| No | % of Households | 80.0 |
| **MGNREGA Card** | | |
| Yes | % of Households | 40.0 |
| No | % of Households | 60.0 |
| **Ration Card** | | |
| Yes | % of Households | 90.0 |
| No | % of Households | 10.0 |
| **Households with toilet** | | |
| Yes | % of Households | 100.0 |
| **Drinking water facilities** | | |
| Tube well | % of Households | 100.0 |

The data collected on the source of drinking water in the study area is presented in Table 2. All the sample respondents are having tube well source for water supply for domestic purpose (100 %).

Only 8.9 percent of the farmers are participating in community based organizations (Table 3). Among them majority were participating in self help group organization (2.2 %) and co-operative societies-credit (6.6 %).

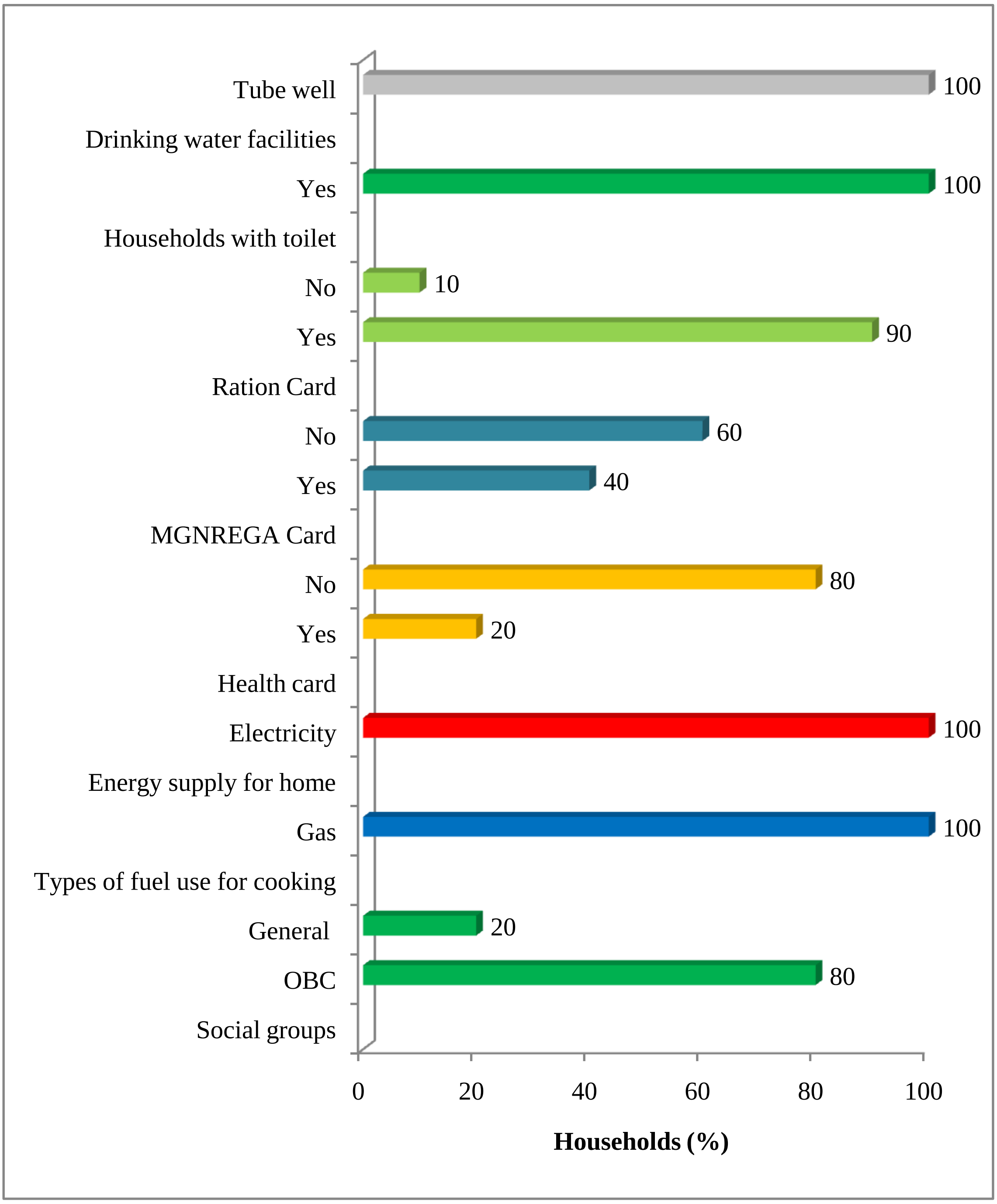


Figure 3: Basic needs of sample households in Ranganahalli Microwatershed

Table 3: Institutional participation among the sample population in Ranganahalli Microwatershed

| Particulars | Units | Value |
|---|---|---|
| No. of people participating | % to total | 8.9 |
| Co-operative societies-credit | % to total | 6.67 |
| Self help groups(SHG's) | % to total | 2.22 |
| No. of people not participating | % to total | 91.11 |

The occupational pattern (Table 4) among sample households shows that agriculture is the main occupation around 84.4 per cent of farmers followed by subsidiary occupations like agricultural labour (8.9%) and private service (2.2 %), government services 2.2 per cent as a main occupation each.

Table 4: Occupational pattern in sample population in Ranganahalli Microwatershed

<table>
<tr><th colspan="2">Occupation</th><th rowspan="2">% to total</th></tr>
<tr><th>Main</th><th>Subsidiary</th></tr>
<tr><td rowspan="2">Agriculture</td><td>Agriculture</td><td>84.4</td></tr>
<tr><td>Agriculture Labour</td><td>8.9</td></tr>
<tr><td colspan="2">Private service</td><td>2.2</td></tr>
<tr><td colspan="2">Govt service</td><td>2.2</td></tr>
<tr><td colspan="2">Grand Total</td><td>100.0</td></tr>
<tr><td colspan="2">Family labour availability</td><td>Man days/month</td></tr>
<tr><td colspan="2">Male</td><td>37.5</td></tr>
<tr><td colspan="2">Female</td><td>24.0</td></tr>
<tr><td colspan="2">Total</td><td>61.5</td></tr>
</table>

The important assets especially with reference to domestic assets were analyzed and are given in Table 5 and Figure 4. The important domestic assets possessed by all categories of farmers are television (100.0 %) followed by mobile phone (100.0 %), mixer/grinder (60.0 %), motor cycle (30.0 %) and computer/laptop (10.0 %).The average value of domestic assets is around Rs 14771 per households.

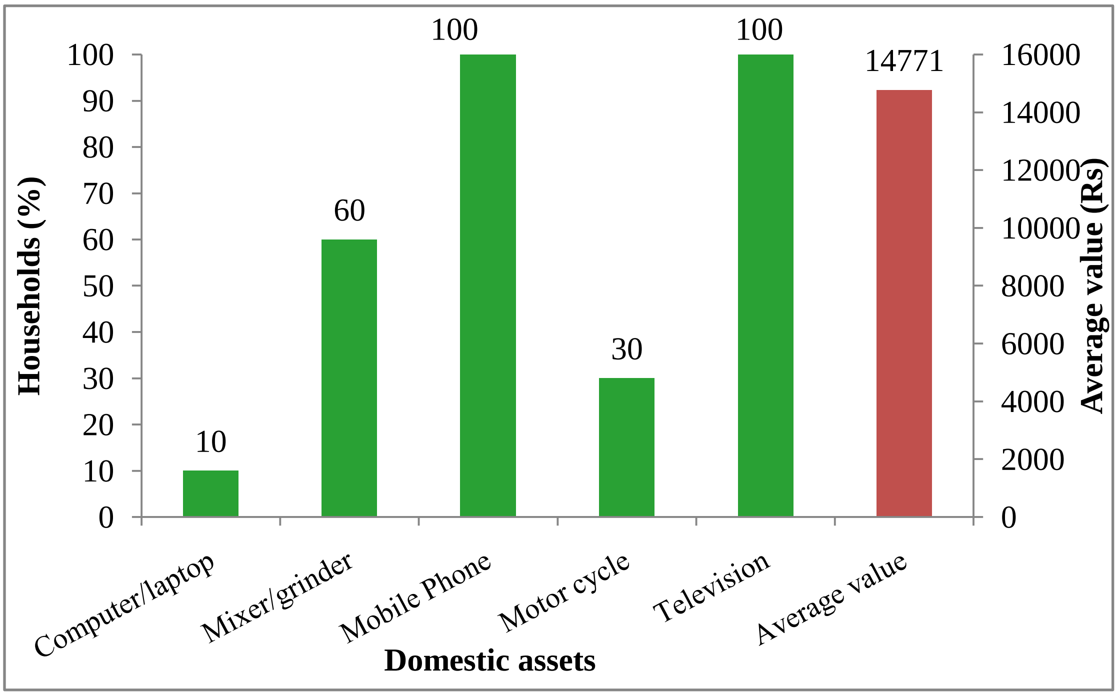


Figure 4: Domestic assets among the sample households in Ranganahalli Microwatershed

Table 5: Domestic assets among the sample households in Ranganahalli Microwatershed

| Particulars | % of households | Average value in Rs |
|---|---|---|
| Computer/laptop | 10.0 | 30000 |
| Mixer/grinder | 60.0 | 3000 |
| Mobile Phone | 100.0 | 3010 |
| Motor cycle | 30.0 | 31166 |
| Television | 100.0 | 6680 |
| Average value | 14771 | |

The most popularly owned farm equipments were sickles, plough, cattle shed; pump sets, chaff cutter, bullock cart, sprayer and thresher. Plough and sickle were commonly present in all the sampled farmers; these were primary implements in agriculture. The per cent of households owned weeder (80 %), plough (30 %) and sprayer (10 %).The average value of farm assets is around Rs 2472 per households (Table 6 and Figure 5).

Table 6: Farm assets among samples households in Ranganahalli Microwatershed

| Particulars | % of households | Average value in Rs |
|---|---|---|
| Plough | 30 | 2333 |
| Sprayer | 10 | 5000 |
| Weeder | 80 | 85 |
| Average value | 2472 | |

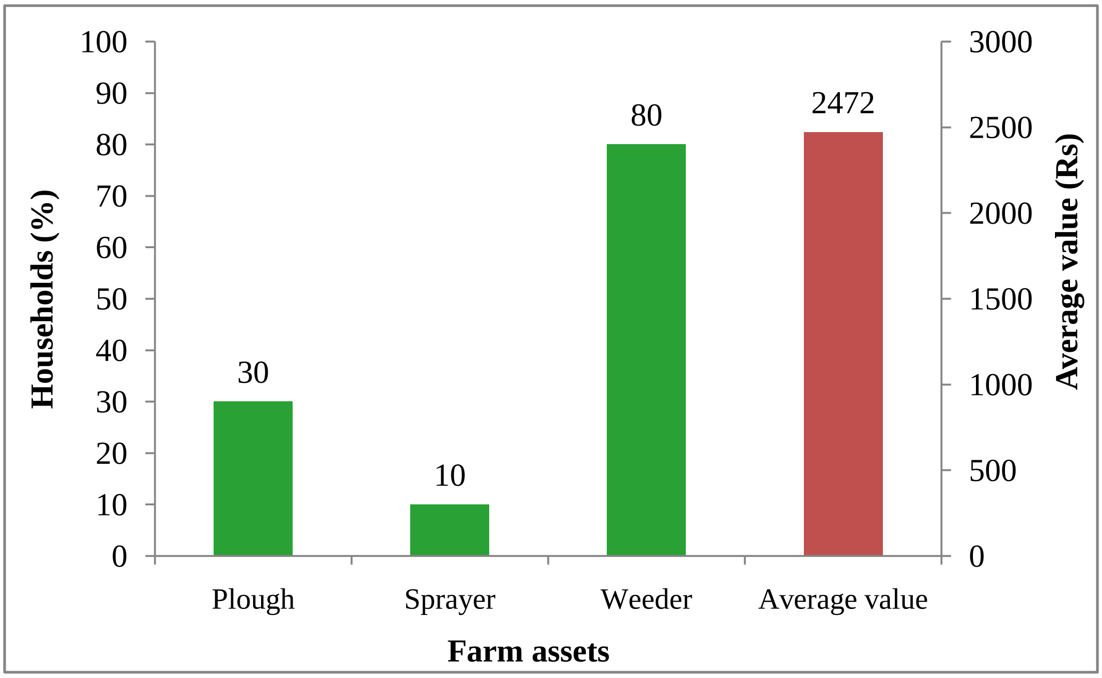


Figure5: Farm assets among samples households in Ranganahalli Microwatershed

Livestock is an integral component of the conventional farming systems (Table 7 and Figure 6). The highest livestock population is crossbred milching cow were around 50 per cent followed milching buffalos (25.5 %) and dry buffalos (12.5 %). The average livestock value was Rs 26687 per household.

Table 7: Livestock assets among sample households in Ranganahalli Micro-watershed

| Particulars | % of livestock population | Average value in Rs |
|---|---|---|
| Crossbred Dry Cow | 12.5 | 18000 |
| Crossbred Milching Cow | 50.0 | 28750 |
| Dry Buffalos | 12.5 | 30000 |
| Milching Buffalos | 25.5 | 30000 |
| Average value | 26687 | |

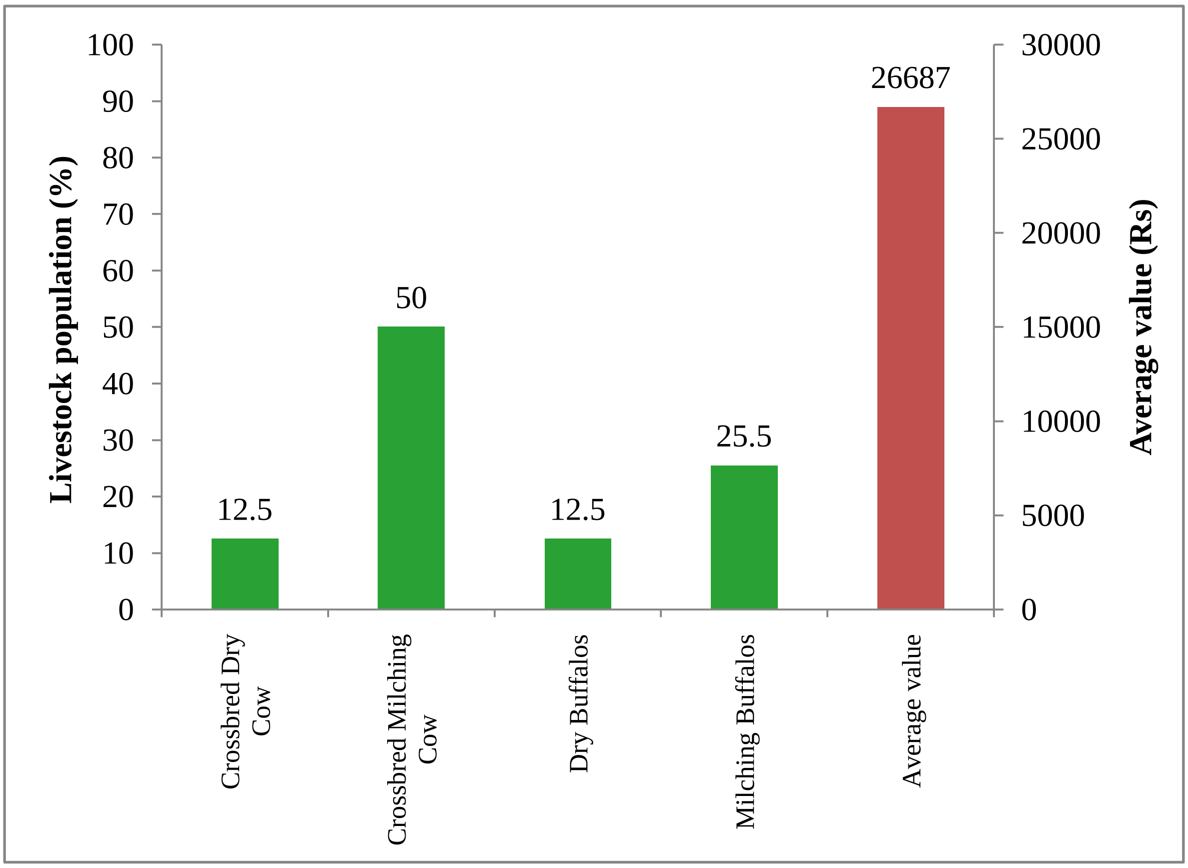


Figure 6: Livestock assets among sample households in Ranganahalli micro-watershed

Average milk produced in sample households is 855 litters / annum. Among the farm households, horse gram, and ragi are the main crops for domestic food and fodder for animals. About 1458 kg /ha of average fodder is available per season for the livestock feeding (Table 8).

Table 8: Milk produced and fodder availability of sample households in Ranganahalli Microwatershed

| **Particulars** | |
|---|---|
| **Name of the Livestock** | **Ltr./Lactation/animal** |
| Crossbred Milching Cow | 108<br>0 |
| Milching Buffalos | 630 |
| Average Milk produced | 855 |
| **Fodder produces** | **Fodder yield (kg/ha.)** |
| Horse gram | 1666 |
| Ragi | 1250 |
| Average fodder availability | 1458 |
| Livestock having households (%) | 66.6 |
| Livestock population (Numbers) | 12 |

A woman participation in decision making is in this micro-watershed is presented in Table 9. About 30.0 per cent of women participation in local organisation activates, and 90.0 per cent of women taking decision in her family and agriculture related activities.

Table 9: Women empowerment of sample households in Ranganahalli Microwatershed

% to Grand Total

| **Particulars** | **Yes** | **No** |
|---|---|---|
| Women participation in local organization activities | 30.0 | 70.0 |
| Women elected as panchayat member | 0.0 | 100.0 |
| Women earning for her family requirement | 0.0 | 100.0 |
| Women taking decision in her family and agriculture related activities | 90.0 | 10.0 |

The food intake in terms of kilo calorie (kcal) per person per day was calculated and presented in the Table 10 and Figure 7. More quantity of cereals is consumed by sample farmers which accounted for 928.3 kcal per person. The other important food items consumed was pulses 111.2 kcal followed by milk 177 kcal, vegetables 19.1 kcal and cooking oil 190 kcal. In the sampled households, farmers were consuming less (1374.7 kcal) than NIN- recommended food requirement (2250 kcal).

Table 10: Per capita daily consumption of food among the sample households in Ranganahalli Microwatershed

| Particulars | NIN recommendation (gram/ per day/ person) | Present level of consumption (gram/ per day/ person) | Kilo Calories /day/person |
|---|---|---|---|
| Cereals | 396.0 | 273.6 | 928.3 |
| Pulses | 43.0 | 32.4 | 111.2 |
| Milk | 200.0 | 193.6 | 125.8 |
| Vegetables | 143.0 | 79.7 | 19.1 |
| Cooking Oil | 31.0 | 33.3 | 190 |
| Egg | 0.5 | 0.0 | 0.0 |
| Meat | 14.2 | 0.0 | 0.0 |
| Total | **827.7** | **612.2** | **1374.7** |
| Threshold of NIN recommendation | | 827 gram* | 2250 Kcal* |
| % Below NIN | | 100 | 100 |
| % Above NIN | | 0.0 | 0.0 |

Note: * day/person

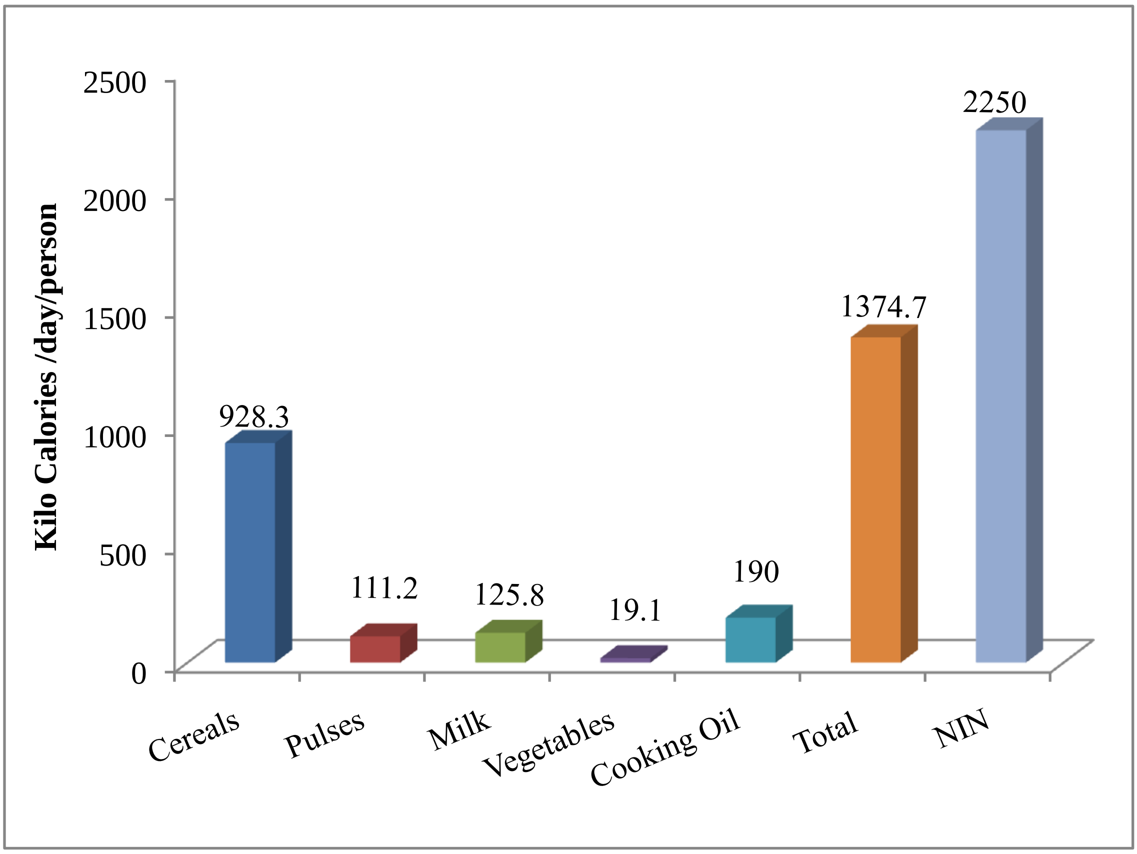


Figure 7: Per capita daily consumption of food among the sample households in Ranganahalli Microwatershed

**Annual income of the sample HHs:** The average annual household income is around Rs 67122. Major source of income to the farmers in the study area is from crop production (Rs 53232) followed by livestock (Rs. 13890). The monthly per capita income is Rs.1243, which is above than the threshold monthly income of Rs 975 for considering above poverty line. Due to the fact that erratic rainfall and shortage of water, farmers are diverting from crop production activities to enable the household for a comfortable livelihood. The incomes from the other aforesaid sources are very meagre (Table 11).

Table 11: Annual average income of HHs from various sources in Ranganahalli Microwatershed

| Particulars | Income * |
|---|---|
| Nonfarm income | 0 (0) |
| Livestock income (Rs) | 13890 (60) |
| Crop Production (Rs) | 53232(100) |
| ***Total Annual Income (Rs)*** | ***67122*** |
| Average monthly per capita income (Rs) | 1243 |
| **Threshold for Poverty level (Rs 975 per month/person)** | |
| % of households below poverty line | 50 |
| % of households above poverty line | 50 |

* Figure in the parenthesis indicates % of Households

The average annual expenditure of farm households indicated that farmers in the study area spend highest on food (Rs. 31884) followed by education, clothing, social function and health. Now a day's education is most important among all of us. In today's competitive world, education is a necessity for man after food, clothing, and shelter. It is the only fundamental way by which a desired change in the society can happen. The average per capita monthly expenditure is around Rs 946 and about 70 per cent of farm households are below poverty line (Table 12 and Figure 8).

Table 12: Average annual expenditure of sample HHs in Ranganahalli Microwatershed

| Particulars | Value in Rupees | Per cent |
|---|---|---|
| Food | 31884 | 62.4 |
| Education | 4250 | 8.3 |
| Clothing | 4250 | 8.3 |
| Social functions | 3700 | 7.2 |
| Health | 7000 | 13.7 |
| Total Expenditure (Rs/year) | 51084 | 100 |
| Monthly per capita expenditure (Rs) | 946 | |

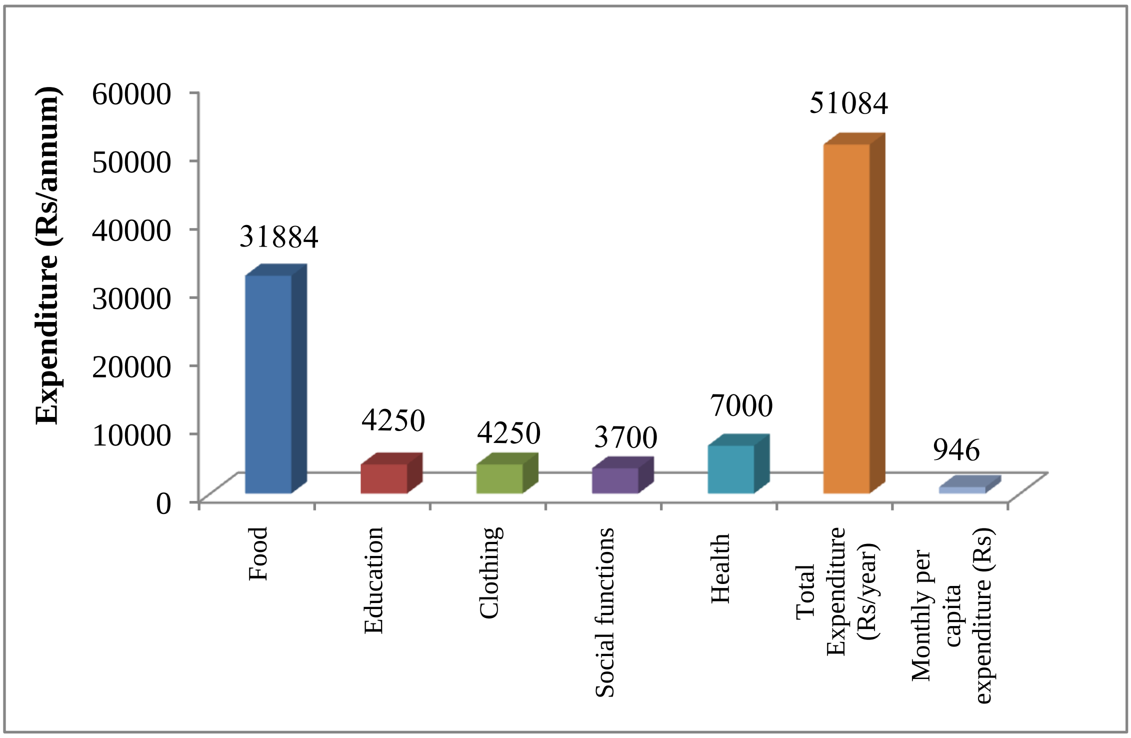


Figure 8: Average annual expenditure of sample HHs in Ranganahalli Microwatershed

**Land holding:** A total area cultivated by them is 10.13 ha. The average land holding of sample HHs is 1.01 ha. The large number of households (90 %) is small size groups with an average land holding size of 0.84 ha followed by medium size (10 %) groups with the average land holding is 2.54 ha (Table 13).

Table 13: Distribution of land holding among the sample households in Ragenahalli micro-watershed

| **Particulars** | **Units** | **Values** |
|---|---|---|
| **Small farmers** | | |
| Total land | ha | 7.5 |
| Sample size | Percent | 90 |
| Average land holding | ha | 0.84 |
| **Medium farmers** | | |
| Total land | ha | 2.54 |
| Sample size | Percent | 10.0 |
| Average land holding | ha | 2.54 |
| **Total sample households** | | |
| Total land | ha | 10.13 |
| Sample size | Percent | 100.0 |
| Average land holding | ha | 1.01 |

**Land use**: The total land holding in the Ranganahalli micro-watershed is 10.0 ha (Table 14). Of which 7.4 ha is rain fed land and 2.6 ha is irrigated land. The average land holding per household is worked out to be 1.01 ha.

Table 14: Land use among samples households in Ranganahalli Microwatershed

| Particulars | Per cent | Area in ha |
|---|---|---|
| Irrigated land | 26.5 | 2.6 |
| Rainfed Land | 73.4 | 7.4 |
| Fallow Land | 0.0 | 0.0 |
| Total land holding | 100 | 10.0 |
| Average land holding | 1.01 | |

In the micro-watershed, the prevalent present land uses under perennial plants are coconut (85.2 %) followed by neem trees (12.5 %) and teak (2.2 %) (Table 15).

Table 15: Number of trees/plants covered in sample farm households in Ranganahalli Microwatershed

| Particulars | Number of Plants/trees | Per cent |
|---|---|---|
| Coconut | 150 | 85.2 |
| Neem trees | 22 | 12.5 |
| Teak | 4 | 2.2 |
| Grand Total | 176 | 100.0 |

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

The present dominant crops grown in dry lands in the study area were by areca nut (15.6 %) followed by coconut (62.5 %), horse gram (4.5 %) and ragi (8.9 %). which are taken during kharif and ragi (8.9 %) during Rabi season respectively ragi (8.9 %). The cropping intensity was 109.8 per cent (Table 16 and Figure 9).

Table 16: Present cropping pattern and cropping intensity in Ranganahalli Microwatershed

% to Grand Total

| Crops | Kharif | Rabi | Grand Total |
|---|---|---|---|
| Areca nut | 15.6 | 0.0 | 15.6 |
| Coconut | 62.5 | 0.0 | 62.5 |
| Horse gram | 4.5 | 0.0 | 4.5 |
| Ragi | 8.9 | 8.9 | 17.3 |
| ***Grand Total*** | 91.1 | 8.9 | 100 |
| Cropping intensity (%) | 109.8 | | |

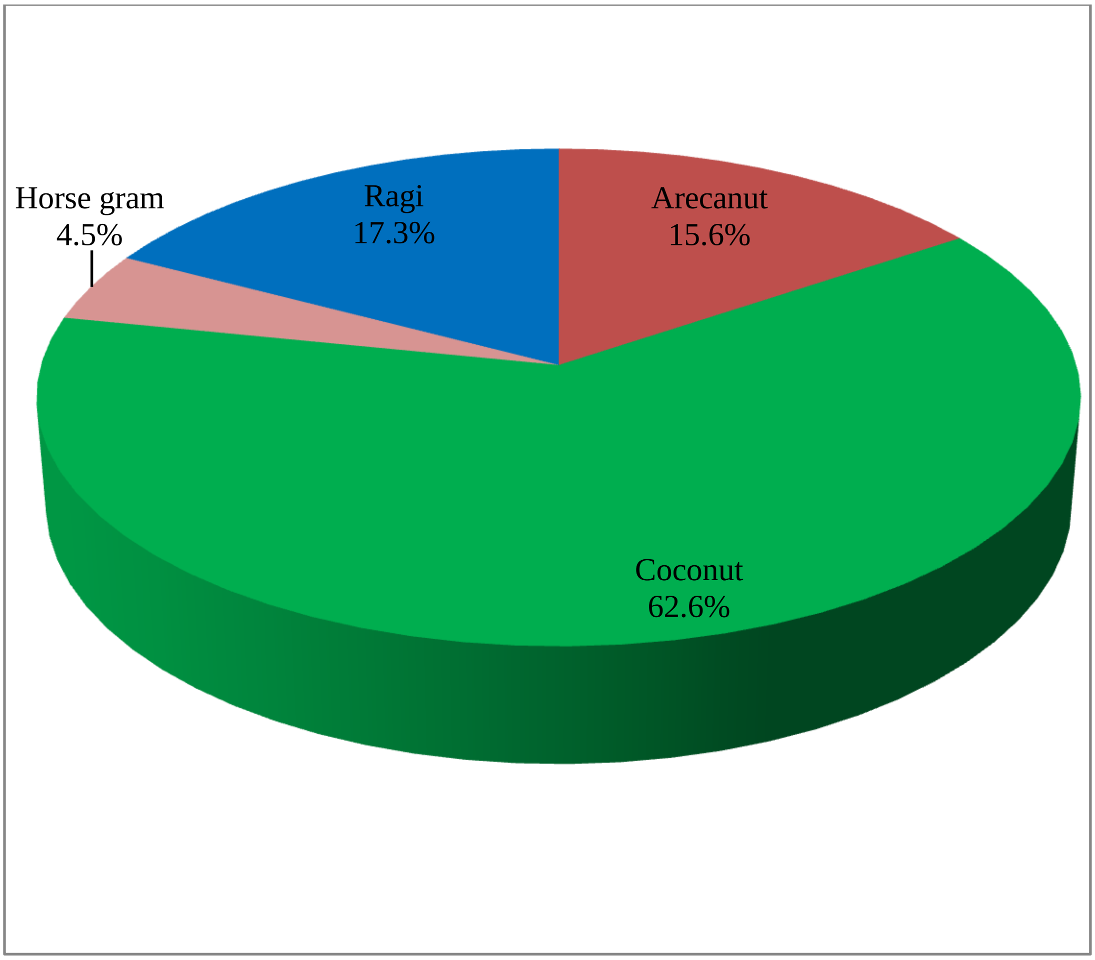


Figure 9: Present cropping pattern in Ranganahalli Microwatershed

**Economic land evaluation**

The main purpose to characterise the socio-economic systems in the watershed is to identify the existing production constraints and propose the potential/alternate options for agro-technology transfer and for bridging the adoption and yield gap.

In Ranganahalli micro-watershed, 11 soil series are identified and mapped (Table 17). The distribution of major soil series are Chikkasavanur covering an area around 6.0 ha (1.12 %) followed by Kutegoudanahundi 30 ha (5.79 %), Chikkamegheri 18 ha (3.43 %), Bidanagere 49 ha (9.53 %), Mornal 51 ha (9.90 %), Jedigere 39 ha (7.63 %), Balapur 31 ha (6.04 %), Hallikere 83 ha (16.14 %), Ranatur 46 ha (9.04 %), Niduvalalu 57 ha (11.2 %) and Kadagathur 77 ha (15.21 %).

Table 17: Distribution of soil series in Ranganahalli Microwatershed

| Soil No | Soil Series | Mapping Unit Description | Area in ha % |
|---|---|---|---|
| 1 | CSR | Chikkasavanur soils are shallow (25-50 cm), well drained, have dark brown to light yellowish brown sandy clay loam soils occurring on very gently sloping uplands under cultivation. | 6(1.12) |
| 2 | KGH | Kutegoudanahundi soils are moderately shallow (50-75 cm), well drained, have brown to dark brown gravelly sandy clay loam soils occurring on very gently to gently sloping uplands under cultivation. | 30(5.79) |
| 3 | CKM | Chikkamegheri soils are moderately deep (75-100 cm), well drained, have dark brown to dark reddish brown sandy clay soils occurring on very gently sloping uplands under cultivation. | 18(3.43) |
| 4 | BDG | Bidanagere soils are moderately deep (75-100 cm), well drained, have dark reddish brown gravelly sandy clay loam to sandy clay soils occurring on very gently sloping uplands under cultivation. | 49(9.53) |
| 5 | MNL | Mornal soils are deep (100-150 cm), well drained, have dark reddish brown to red gravelly sandy clay loam to sandy clay soils occurring on very gently sloping uplands under cultivation . | 51(9.90) |
| 6 | JDG | Jedigere soils are deep (100-150 cm), well drained, have dark brown to dark reddish brown sandy clay to clay soils occurring on very gently sloping uplands under cultivation. | 39(7.63) |
| 7 | BPR | Balapur soils are deep (100-150 cm), well drained, have dark reddish brown to dark red gravelly sandy clay to clay soils occurring on very gently sloping uplands under cultivation. | 31 (6.04) |
| 8 | HLK | Hallikere soils are very deep (>150 cm), well drained, have dark brown to dark reddish brown clayey soils occurring on very gently sloping uplands under cultivation. | 83 (16.14) |
| 9 | RTR | Ranatur soils are very deep (>150 cm), well drained, have dark reddish brown to dark red clay soils occurring on very gently sloping uplands under cultivation | 46 (9.04) |
| 10 | NDL | Niduvalalu soils are very deep (>150 cm), well drained, have red to dark reddish brown gravelly sandy clay soils occurring on very gently sloping uplands under cultivation. | 57 (11.2) |
| 11 | KDT | Kadagathur soils are very deep (>150 cm), moderately well drained, have dark brown to very dark greyish brown sandy clay to clay soils occurring on very gently sloping uplands under cultivation. | 77 (15.21) |

Present cropping pattern on different soil series are given in Table 18. Crops grown on Kutegoudanahundi soils are horse gram and ragi. Coconut on Bidanagere soils is grown. A coconut and ragi on Balapur soil is grown. Coconut on Hallikere soil is grown. Areca nuts on Jedigere soils are grown. Coconut and horse gram on Niduvalalu soil is grown. Areca nut and coconut on Ranatur soil is grow.

Table 18: Cropping pattern on major soil series in Ranganahalli micro-watershed

(Area in per cent)

| Soil Series | Soil Depth | Crops | Kharif | | Grand Total |
|---|---|---|---|---|---|
| | | | Dry | Irrigated | |
| KGH | Moderately shallow (50-75 cm) | Horse gram | 50.0 | 0.0 | 50.0 |
| | | Ragi | 50.0 | 0.0 | 50.0 |
| BDG | Moderately deep (75-100 cm) | Coconut | 66.6 | 33.3 | 100.0 |
| BPR | Deep (100-150 cm) | Coconut | 25.0 | 50.0 | 75.0 |
| | | Ragi | 25.0 | 0.0 | 25.0 |
| JDG | Deep (100-150 cm) | Areca nut | 0.0 | 100.0 | 100.0 |
| HLK | Very deep (>150 cm) | Coconut | 100.0 | 0.0 | 100.0 |
| NDL | Very deep (>150 cm) | Coconut | 50.0 | 0.0 | 50.0 |
| | | Horse gram | 50.0 | 0.0 | 50.0 |
| RTR | Very deep (>150 cm) | Areca nut | 0.0 | 43.4 | 43.4 |
| | | Coconut | 13.4 | 43.4 | 56.5 |

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

Table 19: Alternative land use options for different size group of farmers (Benefit Cost Ratio) in Ranganahalli Micro watershed.

| Soil Series | Small farmers | Medium farmers |
|---|---|---|
| KGH | Horse gram (1.13) & ragi (1.32). | |
| BDG | Coconut (2.08). | Coconut (3.74). |
| BPR | Coconut (2.0) & ragi (1.39). | |
| HLK | Coconut (2.24). | |
| JDG | Areca nut (3.79). | |
| NDL | Coconut (2.56) & horse gram (1.12). | |
| RTR | Areca nut (2.37)& coconut (1.69) | |

The productivity of different crops grown in Ranganahalli Microwatershed under potential yield of the crops is given in Table 20.

The data on cost of cultivation and benefit cost ratio (BCR) of different crops is given in Table 20. The total cost of cultivation in study area for horse gram ranges between Rs.34886/ha in KGH soil (with BCR of 1.13) and Rs.19954/ha in NDL soil (with BCR of 1.12), ragi range between Rs 25530/ha in KGH soil (with BCR of 1.32) and Rs.22068/ha in HLK soil (with BCR of 1.39), coconut range between Rs. 136691/ha in RTR soil (with BCR of 1.69) and Rs.54014/ha in BPR soil (with BCR of 2.0), arecanut range between is Rs.109416/ha in RTR soil (with BCR of 3.24) and Rs.48323/ha JDG soil (with BCR of 3.79).

Table 20: Economic land evaluation and bridging yield gap for different crops in Ranganahalli Microwatershed

| Particulars | KGH (50-75 cm) | | BDG (75100cm) | JDG (100-150 cm) | BPR (100-150 cm) | | HLK (>150cm) | RTR (>150 cm) | | NDL (>150 cm) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Horse gram | Ragi | Coconut | Areca nut | Coconut | Ragi | Coconut | Areca nut | Coco nut | Coco nut | Horse gram |
| Total cost (Rs/ha) | 34886 | 25530 | 34259 | 48323 | 54014 | 22068 | 48228 | 109416 | 136691 | 34688 | 19954 |
| Gross Return (Rs/ha) | 39273 | 33592 | 92625 | 183157 | 111150 | 30628 | 108175 | 259350 | 220653 | 88920 | 22354 |
| Net returns (Rs/ha) | 4387 | 8062 | 58366 | 134834 | 57136 | 8560 | 59947 | 149934 | 83963 | 54232 | 2400 |
| BCR | 1.13 | 1.32 | 2.91 | 3.79 | 2.00 | 1.39 | 2.24 | 2.37 | 1.69 | 2.56 | 1.12 |
| **Farmers Practices (FP)** | | | | | | | | | | | |
| FYM (t/ha) | 2.5 | 2.5 | 2.5 | 1.1 | 4.2 | 2.5 | 3.6 | 5.0 | 8.9 | 1.3 | 2.5 |
| Nitrogen (kg/ha) | 21.9 | 21.9 | 31.3 | 37.1 | 59.2 | 72.5 | 32.8 | 112.5 | 125.0 | 36.3 | 36.3 |
| Phosphorus (kg/ha) | 39.4 | 39.4 | 43.1 | 66.7 | 77.1 | 78.8 | 83.9 | 182.5 | 249.4 | 51.3 | 51.3 |
| Potash (kg/ha) | 10.6 | 10.6 | 0.0 | 18.0 | 39.2 | 21.3 | 164.2 | 67.5 | 128.3 | 37.5 | 37.5 |
| Grain (Qtl/ha) | 7.5 | 10.0 | 78.1 | 5.3 | 104.2 | 10.0 | 91.2 | 7.5 | 127.8 | 75.0 | 6.3 |
| Price of Yield (Rs/Qtl) | 4500 | 3000 | 1200 | 35000 | 1200 | 2500 | 1200 | 35000 | 1867 | 1200 | 3500 |
| **Soil test based fertilizer Recommendation (STBR)** | | | | | | | | | | | |
| FYM (t/ha) | 0.0 | 8.6 | 10.0 | 6.8 | 10.0 | 8.6 | 10.0 | 6.8 | 10.0 | 10.0 | 0.0 |
| Nitrogen (kg/ha) | 30.9 | 92.6 | 115.3 | 100.0 | 128.1 | 92.6 | 128.1 | 125.0 | 128.1 | 128.1 | 30.9 |
| Phosphorus (kg/ha) | 37.1 | 43.2 | 56.9 | 75.0 | 54.2 | 32.4 | 65.0 | 75.0 | 65.0 | 48.8 | 27.8 |
| Potash (kg/ha) | 24.7 | 44.5 | 183.8 | 30.0 | 245.0 | 44.5 | 245.0 | 30.0 | 183.8 | 245.0 | 24.7 |
| Grain (Qtl/ha) | 9.9 | 30.9 | 184.5 | 45.0 | 184.5 | 30.9 | 184.5 | 45.0 | 184.5 | 184.5 | 9.9 |
| **% of Adoption/yield gap (STBR-FP) / (STBR)** | | | | | | | | | | | |
| FYM (%) | 0.0 | 71.1 | 75.0 | 84.3 | 58.3 | 71.1 | 63.5 | 25.9 | 11.1 | 87.5 | 0.0 |
| Nitrogen (%) | 29.1 | 76.4 | 72.9 | 62.9 | 53.8 | 21.7 | 74.4 | 10.0 | 2.4 | 71.7 | -17.4 |
| Phosphorus (%) | -6.3 | 8.9 | 24.2 | 11.0 | -42.3 | -142.9 | -29.1 | -143.3 | -283.8 | -5.1 | -84.4 |
| Potash (%) | 57.0 | 76.1 | 100.0 | 40.0 | 84.0 | 52.2 | 33.0 | -125.0 | 0.0 | 84.7 | -51.8 |
| Grain (%) | 24.1 | 67.6 | 57.7 | 88.2 | 43.5 | 67.6 | 50.5 | 83.3 | 30.7 | 59.3 | 36.7 |
| **Value of yield and Fertilizer (Rs)** | | | | | | | | | | | |
| Additional Cost (Rs/ha) | -2213 | 7840 | 12789 | 7049 | 9769 | 4812 | 8276 | -3580 | -5859 | 13893 | -3853 |
| Additional Benefits(Rs/ha) | 10710 | 62625 | 127650 | 1389619 | 96400 | 52188 | 111911 | 1312500 | 105881 | 131400 | 12705 |
| Net change Income(Rs/ha) | 12923 | 54785 | 114861 | 1382569 | 86631 | 47375 | 103635 | 1316080 | 111740 | 117508 | 16558 |

The data on FYM, Nitrogen, Phosphorus and Potash application by the farmers to different crops and recommended FYM for different crops is given in Table 20. There is a huge gap between FYM application by farmers and recommended FYM in all the crops across the soils. There is a larger yield gap in crops grown across different soil series. Adequate knowledge about recommended package of practices is the pre-requisite for their use in cultivation of crops. It is a fact that, recommended practices are major contributing factors to yield. Inadequate knowledge about recommended practices leads to their improper adoption. Strengthening of extension services by concerned agency is required to increase adoption of recommended cultivation practices and ultimately reducing the gap. By adopting soil-test fertiliser recommendation, there is scope to increase yield and income to a maximum of Rs 1382569 in areca nut and a minimum of Rs 12923 in horse gram cultivation.

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

The onsite cost of different soil nutrients lost due to soil erosion is given in Table 21 and Figure 10. The average value of soil nutrient loss is around Rs 637.1 per ha/year. The total cost of annual soil nutrients is around Rs 309674 per year for the total area of 353.5 ha.

Table 21: Estimation of onsite cost of soil erosion in Ranganahalli micro-watershed

| **Particulars** | **Quantity(kg)** | | **Value (Rs)** | |
|---|---|---|---|---|
| | **Per ha** | **Total** | **Per ha** | **Total** |
| Organic matter | 85.59 | 41597 | 539.22 | 262059 |
| Phosphorus | 0.24 | 116 | 10.51 | 5107 |
| Potash | 1.26 | 611 | 25.14 | 12216 |
| Iron | 0.15 | 73 | 7.22 | 3509 |
| Manganese | 0.16 | 78 | 44.39 | 21571 |
| Cupper | 0.01 | 5 | 5.57 | 2706 |
| Zinc | 0.00 | 2 | 0.19 | 94 |
| Sulphur | 0.12 | 58 | 4.78 | 2324 |
| Boron | 0.00 | 2 | 0.18 | 87 |
| Total | 87.54 | 42543 | 637.19 | 309674 |

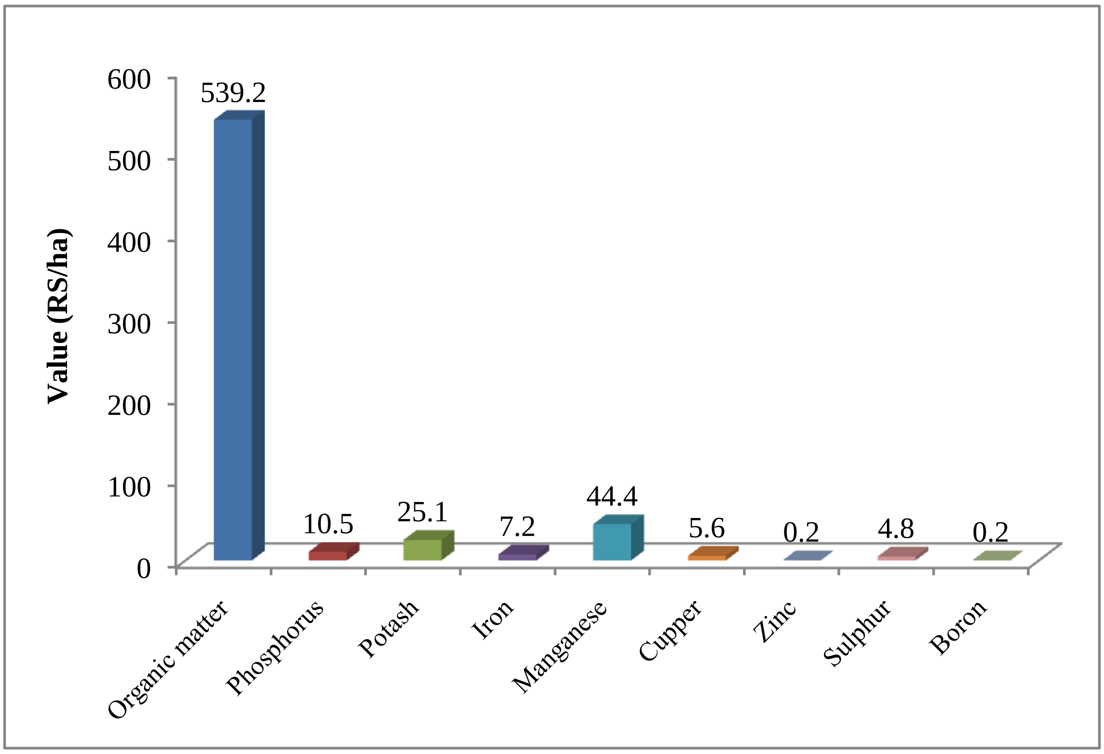


Figure 10: Estimation of onsite cost of soil erosion in Ranganahalli micro-watershed

The average value of ecosystem service for food grain production is around Rs 53002/ ha/year (Table 22 and Figure 11). Per hectare food grain production service is maximum in ragi (Rs 3371) followed by coconut (Rs.66505), areca nut (Rs 142384) and horse gram is negative

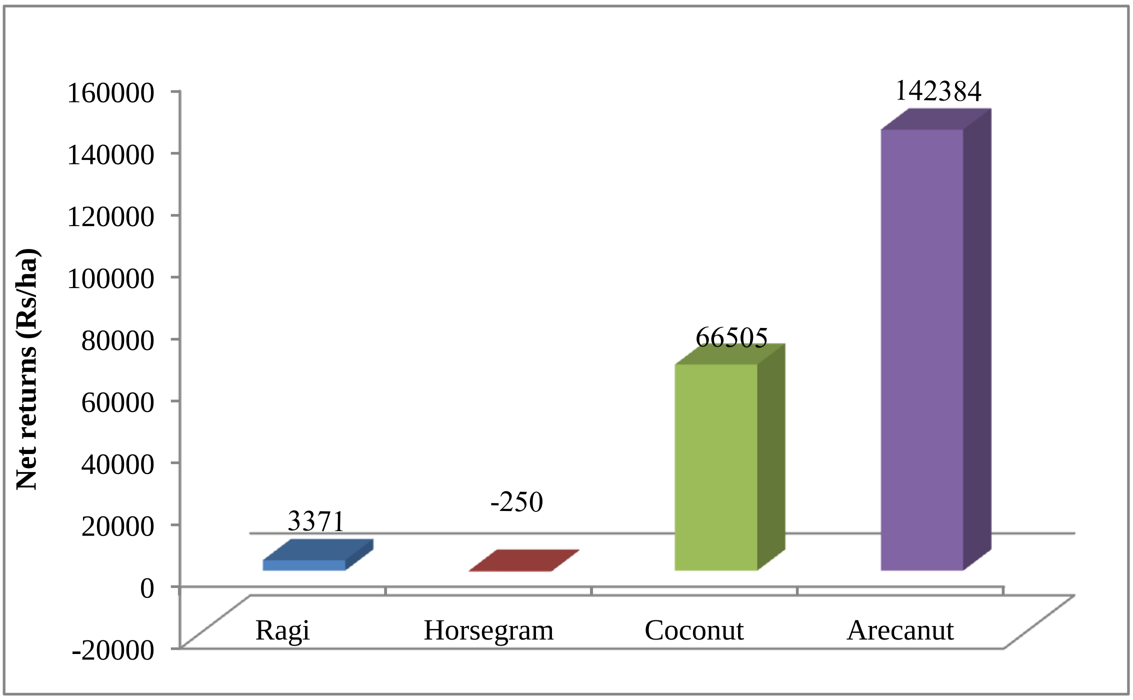


Figure 11: Ecosystem services of food grains production in Ranganahalli Microwatershed

Table 22: Ecosystem services of food grain production in Ranganahalli Microwatershed

| Production items | Crops | Area in ha | Yield (Qtl/ha) | Price (Rs/Qtl) | Gross Returns (Rs/ha) | Cost of Cultivation (Rs/ha) | Net Returns (Rs/ha) |
|---|---|---|---|---|---|---|---|
| Cereals | Ragi | 0.8 | 10 | 2750 | 27170 | 23799 | 3371 |
| Pulses | Horsegram | 1.2 | 7 | 4000 | 27170 | 27420 | -250 |
| Oil seeds | Coconut | 5.5 | 92 | 1450 | 133111 | 66605 | 66505 |
| Commercial Crops | Areca nut | 1.4 | 6 | 35000 | 221253 | 78869 | 142384 |
| Average value | | 8.9 | 28.7 | 10800 | 102176 | 49173 | 53002 |

The average value of ecosystem service for fodder production is around Rs 1883/ ha/year (Table 23). Per hectare fodder production service is maximum in horse gram (Rs 2779) and ragi (Rs 988).

Table 23: Ecosystem services of fodder production in Ranganahalli Micro watershed

| Production items | Crops | Area in ha | Yield (Qtl/ha) | Price (Rs/Qtl) | Net Returns (Rs/ha) |
|---|---|---|---|---|---|
| Cereals | Ragi | 0.8 | 2.5 | 400 | 988 |
| Pulses | Horse gram | 1.2 | 3.1 | 900 | 2779 |
| Average value | | 2 | 2.8 | 650 | 1883 |

The water demand for production of different crops was worked out in arriving at the ecosystem services of water support to crop growth. The data on water requirement for producing one quintal of grain is considered for estimating the total value of water required for crop production. The per hectare value of water used and value of water was maximum (Table 24 and Figure 12) in coconut (Rs 24668) followed by horse gram (Rs 20907), ragi (12073) and areca nut (Rs 7058).

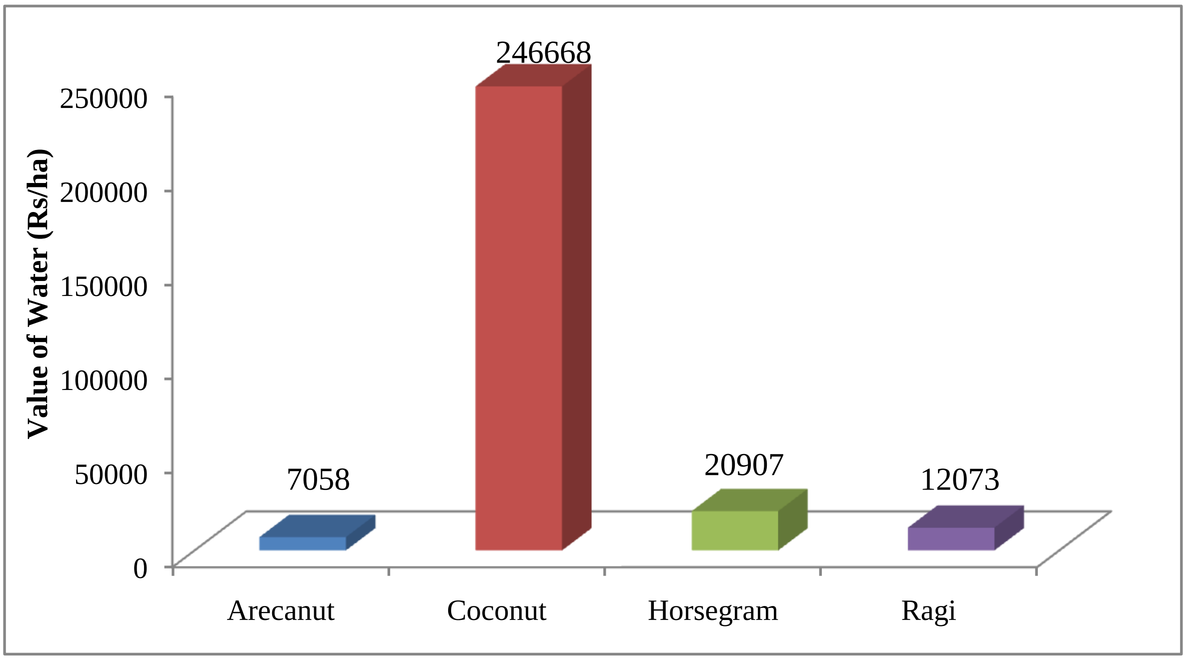


Figure 12: Ecosystem services of water supply in Ranganahalli Microwatershed

Table 24: Ecosystem services of water supply in Ranganahalli Micro watershed

| Crops | Yield (Qtl/ha) | Virtual water (cubic meter) per ha | Value of Water (Rs/ha) | Water consumption (Cubic meters/Qtl) |
|---|---|---|---|---|
| Arecanut | 6.3 | 706 | 7058 | 112 |
| Coconut | 91.8 | 24667 | 246668 | 269 |
| Horse gram | 6.8 | 2091 | 20907 | 308 |
| Ragi | 9.9 | 1207 | 12073 | 122 |
| Average value | 28.7 | 7167 | 71676 | 202 |

The main farming constraints in Ranganahalli micro-watershed to be found are less rainfall, damage of crops by wild animals, non availability of plant protection chemicals, non availability fertilizers, lack of transportation, lack of good quality seeds and high crop pests & diseases. Majority of farmers depend up on money lender of the sources of loan for purpose of crop production. Farmers to sell the agriculture produce through village market and the farmers getting the agriculture related information on newspaper and television. Farmers reported that they are not getting timely support/extension services from the concerned development department (Table 25).

Table 25: Farming constraints related land resources of sample households in Ranganahalli Microwatershed

| Sl. No | Particulars | Per cent |
|---|---|---|
| 1 | Less Rainfall | 100.0 |
| 2 | Damage of crops by Wild Animals | 100.0 |
| 3 | Non availability of Plant Protection Chemicals | 30.0 |
| 4 | **Source of loan** | |
| | Money Leander | 100.0 |
| 5 | **Market for selling** | |
| | Village market | 100.0 |
| 6 | **Sources of Agri-Technology information** | |
| | Newspaper | 100.0 |
| | Television | 10.0 |

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