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

SHETHALLI-2 (4D5B1P2e) MICROWATERSHED

Sydhapur Hobli, Yadgir Taluk and District, Karnataka

Karnataka Watershed Development Project – II

SUJALA – III

World Bank funded Project

The World Bank

ICAR – NATIONAL BUREAU OF SOIL SURVEY AND LAND USE PLANNING

ICAR - NBSS & LUP

WATERSHED DEVELOPMENT DEPARTMENT
GOVT. OF KARNATAKA, BANGALORE

About ICAR - NBSS&LUP

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

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

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PREFACE

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

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

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

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

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

ICAR-NBSS&LUP, Regional Centre, Bangalore has taken up a project sponsored by the Karnataka Watershed Development Project-II, (Sujala-III), Government of Karnataka funded by the World Bank under Component-1 Land Resource Inventry. This study was taken up to demonstrate the utility of such a database in reviewing, monitoring and evaluating all the land based watershed development programs on a scientific footing. To meet the requirements of various land use planners at grassroots level, the present study on "Land Resource Inventory and Socio-Economic Status of Farm Households for Watershed Planning and Development of Shethalli-2 Microwatershed, Yadgir Taluk and District, Karnataka" for integrated development was taken up in collaboration with the State Agricutural Universities, IISC, KSRSAC, KSNDMC as Consortia partners. The project provides detailed land resource information at cadastral level (1:7920 scale) for all the plots and Socio-Economic Status of Farm Households. The project report with the accompanying maps for the Microwatershed will provide required detailed database for evolving effective land use plan, alternative land use options and conservation plans for the planners, administrators, agricutural extention personnel, KVK officials, developmental departments and other land users to manage the land resources in a sustainable manner.

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

Nagpur
Date: 24.04.2019

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PART-A

LAND RESOURCE INVENTORY

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EXECUTIVE SUMMARY

The land resource inventory of Shethalli-2 Microwatershed was conducted using village cadastral maps and IRS satellite imagery on 1:7920 scale. The false colour composites of IRS imagery were interpreted for physiography and 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 645 ha in Yadgir taluk & district, Karnataka. The climate is semiarid and categorized as drought-prone with an average annual rainfall of 866 mm, of which about 652 mm is received during south-west monsoon, 138 mm during north-east and the remaining 76 mm during the rest of the year. An area of 610 ha (95%) in the microwatershed is covered by soils, 5 ha by railway, 7 ha by rock outcrops and about 23 ha by others (habitation and water bodies). The salient findings from the land resource inventory are summarized briefly below.

- *The soils belong to 10 soil series and 21 soil phases (management units) and 5 land use class.*
- *The length of crop growing period is about 120-150 days starting from 1st week of June to 4th week of October.*
- *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 26 major agricultural and horticultural crops was assessed and maps showing the degree of suitability along with constraints were generated.*
- *Entire area in the microwatershed is suitable for agriculture.*
- *About 70 per cent area of the microwatershed has soils that are moderately deep to very deep (75 - >150 cm) and 25 per cent soils are shallow to moderately shallow (25-75 cm).*
- *About 35 per cent area in the microwatershed has loamy soils, 56 per cent clayey soils and 4 per cent are sandy at the surface.*
- *About 90 per cent area of the microwatershed is non gravelly (<15%) and 5 per cent gravelly (15-35%) at the surface.*
- *About 11 per cent area of the microwatershed is very low (<50 mm/m) in available water capacity, 8 per cent low (51-100 mm/m), 19 per cent medium (101-150 mm/m) and 56 per cent area is very high (>200 mm/m) in available water capacity.*

- *Entire area in the microwatershed has very gently sloping (1-3% slope) lands.*
- *An area of about 71 per cent is moderately (e2) eroded, 23 per cent severely eroded (e3) and about one per cent slightly eroded.*
- *An area of about 2 per cent soils are slightly alkaline (pH 7.3-7.8), 31 per cent soils are moderately alkaline (7.8-8.4), 38 per cent soils are strongly alkaline (8.4-9.0) and 23 per cent soils are very strongly alkaline (>9.0).*
- *The Electrical Conductivity (EC) of the soils in the entire area of the microwatershed is dominantly <2 dsm^{-1}indicating that the soils are non-saline.*
- *About 5 per cent of the soils are low (<0.5%), 59 per cent are medium (0.5-0.75%) and 31 per cent soils are high (>0.75%) in organic carbon.*
- *About 69 per cent area is low in available phosphorus and 26 per area is medium (23-57 kg/ha).*
- *About 78 per cent is medium (145-337 kg/ha) in available potassium and 17 per cent is high (>337 kg/ha).*
- *Available sulphur is low (<10 ppm) in an area of about 41 per cent, medium (10 -20 ppm) in 36 per cent area and high (>20 ppm) in 18 per cent area of the microwatershed.*
- *Available boron is low (<0.5 ppm) in an area of about 27 per cent, medium (0.5-1.0 ppm) in an area of 44 per cent and high (>1.0 ppm) in 23 per cent area of the microwatershed.*
- *Available iron is deficient (<4.5 ppm) in an area about 15 per cent and sufficient (>4.5 ppm) in an area of 79 per cent.*
- *Available manganese and copper are sufficient in all the soils of the microwatershed.*
- *Available zinc is deficient (<0.6 ppm) in the entire area of the microwatershed.*
- *The land suitability for 26 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	-	*541(84)*		*Sapota*	-	-
Maize	-	*54(8)*		*Pomegranate*	-	*452(70)*
Bajra	-	*541(83)*		*Musambi*	-	*452(70)*
Groundnut	-	*40(6)*		*Lime*	-	*452(70)*
Sunflower	-	*452(70)*		*Amla*	-	*541(83)*
Redgram	-	*452(70)*		*Cashew*	-	-
Bengal gram	-	*541(84)*		*Jackfruit*	-	-
Cotton	-	*541(84)*		*Jamun*	-	*363(56)*
Chilli	-	*541(84)*		*Custard apple*	-	*541(47)*
Tomato	-	*54(9)*		*Tamarind*	-	*363(56)*
Drumstick	-	*452(70)*		*Mulberry*	-	-
Mango	-	-		*Marigold*	-	*541(84)*
Guava	-	-		*Chrysanthemum*	-	*541(84)*

- *Apart from the individual crop suitability, a proposed crop plan has been prepared for the identified LMUs by considering only the highly and moderately suitable lands for different crops and cropping systems with food, fodder, fibre and other horticulture crops.*
- *Maintaining soil-health is vital 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. This would help in not only supplementing the farm income but also provide fodder and fuel and generate lot of biomass which would help in maintaining an ecological balance and also contribute to mitigating the climate change.*

Chapter 1

INTRODUCTION

Land is a scarce resource and basic unit for any material production. It can support the needs of the growing population, provided they use the land in a rational and judicious manner. But what is happening in many areas of the state is a cause for concern to everyone involved in the management of land resources at the grassroots level. The area available for agriculture is about 51 per cent of the total 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 in more than 3.5 lakh ha in the irrigated areas of the state. Nutrient depletion and declining factor productivity is common in both rainfed and irrigated areas. The degradation is continuing at an alarming rate and there appears to be no systematic effort among the stakeholders to contain this process. In recent times, an aberration of weather due to climate change phenomenon has added another dimension leading to unpredictable situations to be tackled by the farmers.

In this critical juncture, the challenge before us is not only to increase the productivity per unit area which is steadily declining and showing a fatigue syndrome, but also to prevent or at least reduce the severity of degradation. If the situation is not reversed at the earliest, then the sustainability of the already fragile crop production system and the overall ecosystem will be badly affected in the state. The continued neglect and unscientific use of the resources for a long time has led to the situation observed at present in the state. It is a known fact and established beyond doubt by many studies in the past that the cause for all kinds of degradation is the neglect and irrational use of the land resources. Hence, there is an 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. An attempt has already been made to upscale the soil resource information from 1:250000 and 1:50000 scale to the LEU map in Goa and other states.

The land resource inventory aims to provide site specific database for Shethalli-2 microwatershed in Yadgir Taluk &District, Karnataka State for the Karnataka Watershed Development Department. The database was generated by using cadastral map of the village as a base along with high resolution IRS LISS IV and Cartosat-1 merged satellite imagery. Later, an attempt will be made to uplink this LRI data generated at 1:7920 scale under Sujala-III Project to the proposed Landscape Ecological Units (LEUs) map.

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

Chapter 2

GEOGRAPHICAL SETTING

2.1 Location and Extent

The Shethalli-2 microwatershed is located in the northern part of Karnataka in Yadgir Taluk &District, Karnataka State (Fig.2.1). It comprises Ramapura Sydhapura, Rachanalli, Shethalli, Sangavara and Munagala villages.It lies between $18^0$19' and $18^0$7' North latitudes and 74^0 5' and $74^0$9'East longitudes, covering an area of about 645ha.It is about 38 kmsouth of Yadgir town and is bounded by Ramapura and Sydhapura on the north, Rachanalli on the east, Shettilli on the south, Sangavara on the southwest and Munagala village on the western side.

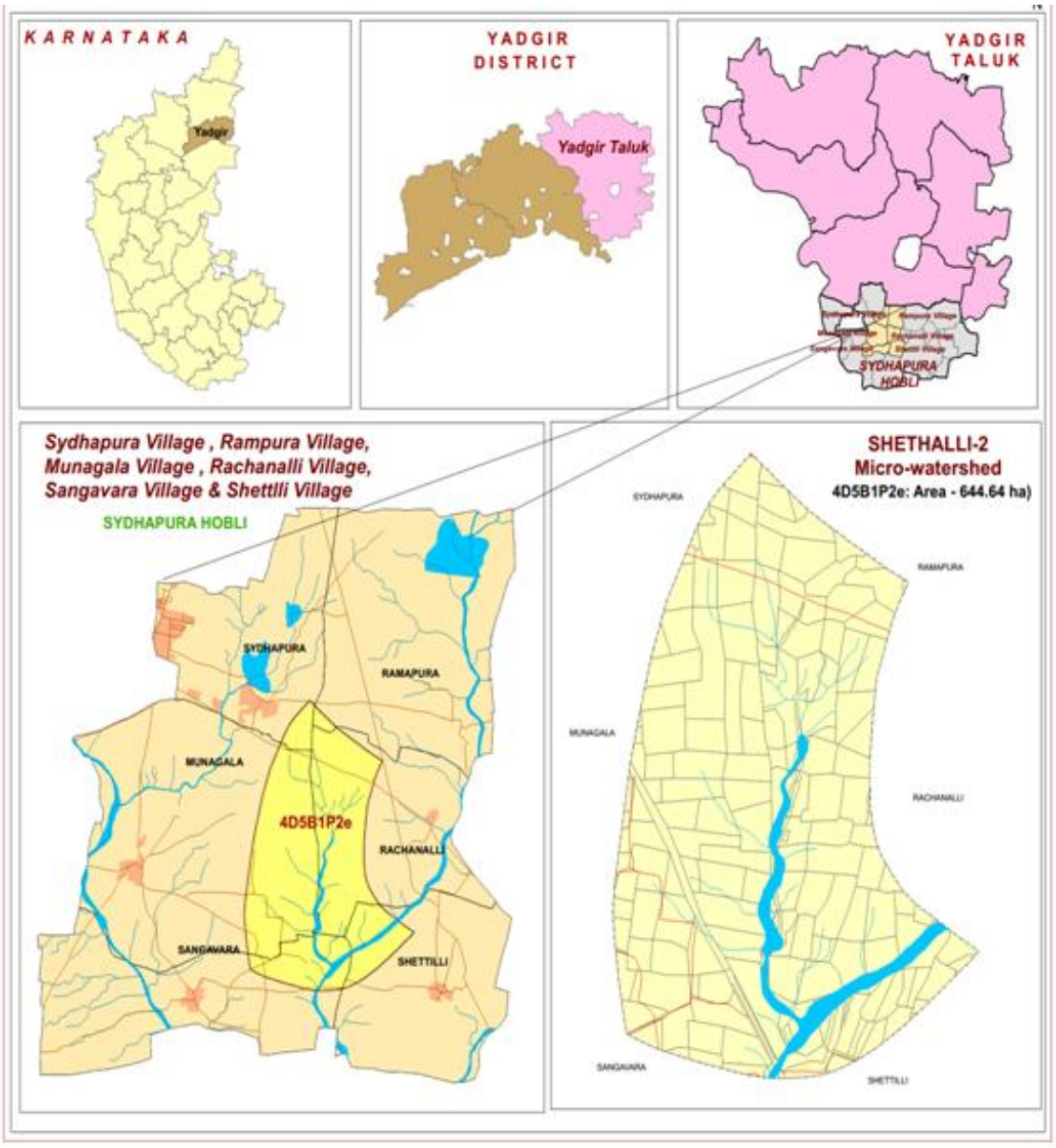


Fig.2.1 Location map of Shethalli-2 Microwatershed

2.2 Geology

Major rock formations observed in the microwatershed are granite gneiss and alluvial land landscapes(Figs.2.2aandb). Granite gneisses are essentially pink to gray and are coarse to medium grained. They consist primarily of quartz, feldspar, biotite and hornblende. The gray granite gneisses are highly weathered, fractured and fissured upto a depth of about 10 m. Dolerite dykes and quartz veins are common with variable width and found to occur in Shethalli-2microwatershed. The most widespread and characteristic development of alluvium in the watershed region lying between the rivers Krishna and Bhima is a wide belt, the underlying formation is gneiss and alluvial soils occur over gneiss, limestone and shale. The thickness of the alluvium generally is limited to less than a meter, except in river valleys where it is very deep extending to tens of meters. Such soils are transported and represent paleo black soils originally formed at higher elevation, but now occupying river valleys.

Fig.2.2a Granite and granite gneiss rocks

Fig. 2.2b Alluvium

2.3 Physiography

Physiographically, the area has been identified as granite gneiss, alluvial landscapes based on geology. The area has been further subdivided into five landforms, *viz;* mounds/ridges, summits, side slopes and very gently sloping uplands, plains and valleys based on slope and its relief features. The elevation ranges from 368-386 m above MSL. The mounds and ridges are mostly covered by rock outcrops.

2.4 Drainage

The area is drained by several parallel streams like Bori, Amerja and Kanga which finally join the river Bhima along its course. Though, they are not perennial, during rainy season they carry large quantities of rain water. The microwatershed has only few small tanks which are not capable of storing the water that flows during the rainy season. Due to this, the ground water recharge is very much affected. 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 parallel to sub parallel and dendritic.

2.5 Climate

The Yadgir district lies in the northern plains of Karnataka and falls under semiarid tract of the state and is categorized as drought- prone with total annual rainfall of 866mm (Table 2.1). Of the total rainfall, maximum of 652 mm is received during the south–west monsoon period from June to September, the north-east monsoon from October to early December contributes about 138 mm and the remaining 76 mm during the rest of the year. The summer season starts during the middle of February and continues up to the first week of June. The period from December to the middle of February is the coldest season. December is the coldest month with mean daily maximum and minimum temperatures being 29.5^0C and 10^0C respectively. During peak summer, temperature shoots up to 45^0C. Relative humidity varies from 26% in summer to 62% in winter. Rainfall distribution is shown in Figure 2.3. The average Potential Evapo-Transpiration (PET) is 141 mm and varies from a low of 81 mm in December to 199 mm in the month of May. The PET is always higher than precipitation in all the months except July, August and September. Generally, the Length of crop Growing Period (LGP) is 120-150 days and starts from 1^{st} week of June to 4^{th}week of October.

Table 2.1 Mean Monthly Rainfall, PET, 1/2 PET at Yadgir Taluk, Yadgir District

Sl.No.	Months	Rainfall	PET	1/2 PET
1	January	4.30	86.0	43.0
2	February	2.30	125.5	62.7
3	March	15.10	166.0	83.0
4	April	18.50	179.8	89.9
5	May	36.0	198.8	97.9
6	June	118.0	175.1	87.5
7	July	171.80	156.3	78.1
8	August	182.9	150.3	75.1
9	September	179.7	142.0	71.0
10	October	105.3	138.5	69.2
11	November	26.4	97.60	48.6
12	December	6.0	80.90	40.4
Total		**866.3**		

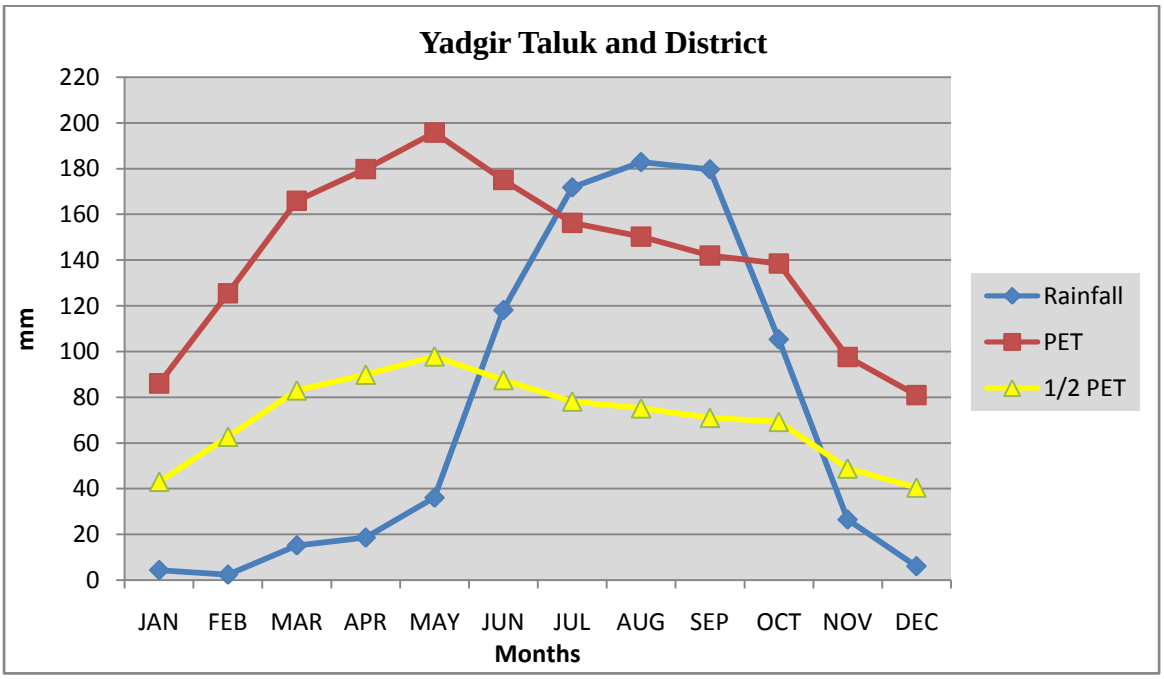


Fig 2.3 Rainfall distribution in Yadgir Taluk, Yadgir District

2.6 Natural Vegetation

The natural vegetation is sparse comprising few tree species, shrubs and herbs. The mounds, ridges and boulders occupy very sizeable area which is 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.

2.7 Land Utilization

About 72 per cent area (Table 2.2) in Yadgir district is cultivated at present. An area of about 2 per cent is permanently under pasture, 20 per cent under current fallows and 6 per cent under non-agricultural land, and 5 per cent under currently barren. Forests occupy an area of about 7 per cent and the tree cover is in a very poor state. Most of the mounds, ridges and bouldery areas have very poor vegetative cover. Major crops grown in the area are sorghum, maize, cotton, sunflower, groundnut, red gram, mango, pomegranate, marigold and sapota. The cropping intensity is 120 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 microwatershed is prepared. The current land use map prepared shows the arable and non-arable lands, other land uses and different types of crops grown in the area. The current land use map of Shethalli-2 microwatershed is presented in Fig.2.4. The different crops and cropping systems adopted in the microwatershed is presented in the Figures 2.5a & b.

Table 2.2 Land Utilization in Yadgir District

Sl. No.	Agricultural land use	Area (ha)	Per cent
1.	Total geographical area	516088	-
2.	Total cultivated area	373617	72.4
3.	Area sown more than once	74081	14.3
4.	Cropping intensity	-	119.8
5.	Trees and grooves	737	0.14
6.	Forest	33773	6.54
7.	Cultivable wasteland	2385	0.46
8.	Permanent Pasture land	11755	2.28
9.	Barren land	27954	5.41
10.	Non- Agriculture land	29623	5.73
11.	Current Fallows	105212	20.4

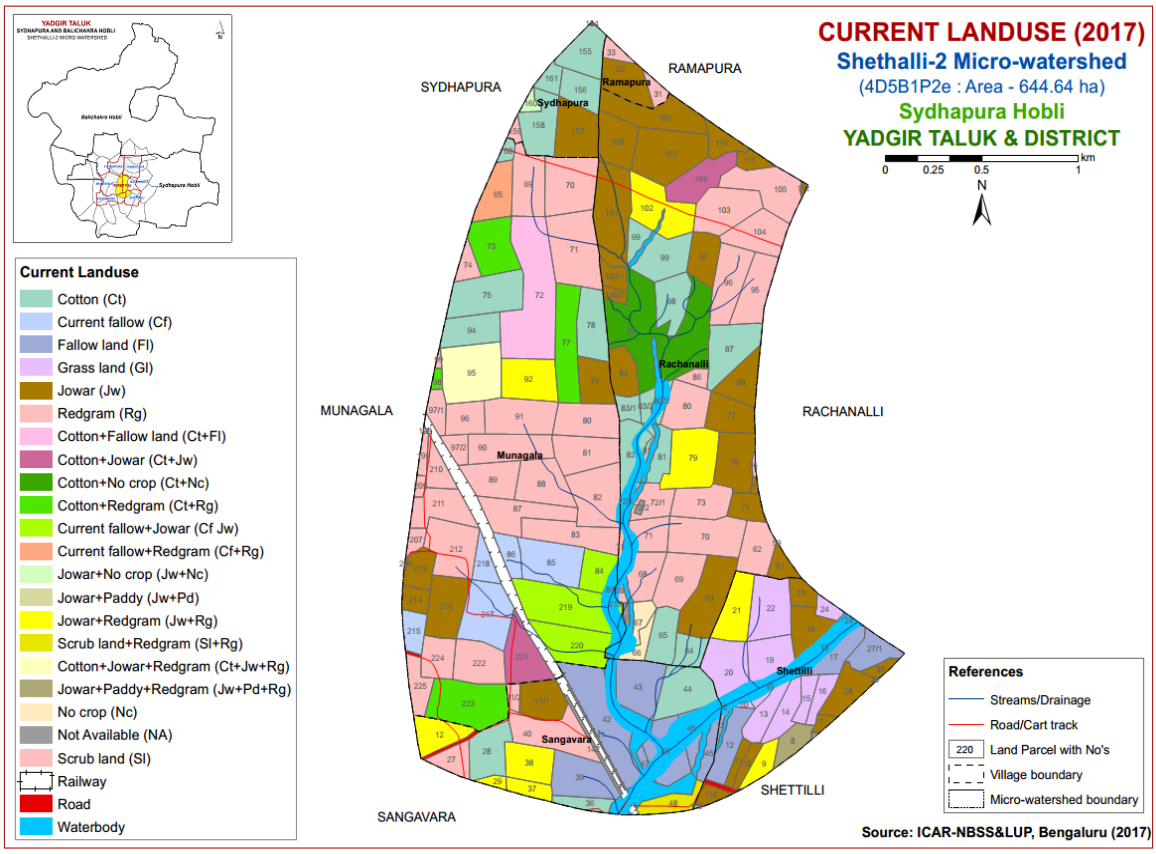


Fig.2.4 Current Land Use map of Shethalli-2 Microwatershed

Fig 2.5 a. Different Crops and Cropping Systems in Shethalli-2 Microwatershed

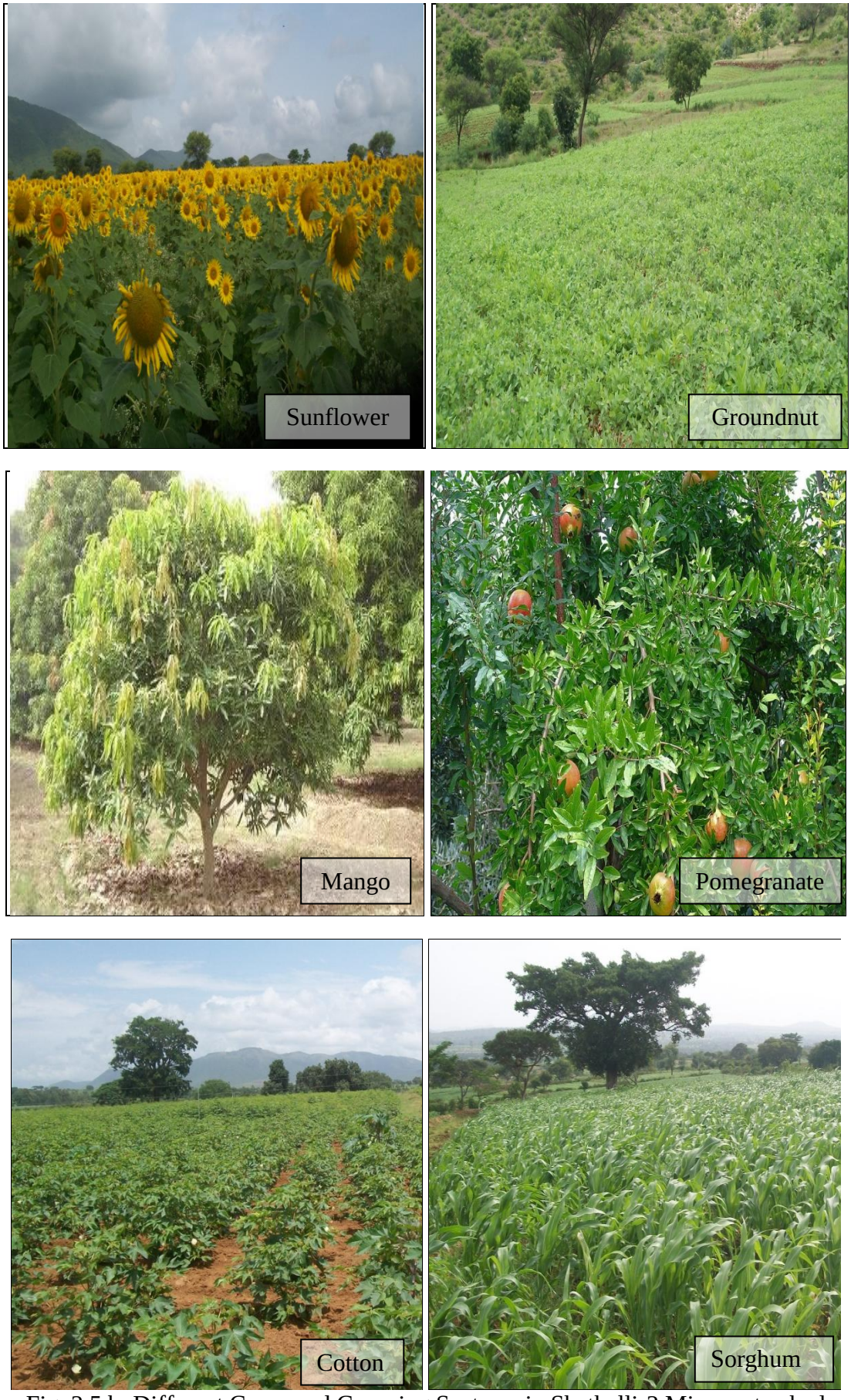


Fig. 2.5 b. Different Crops and Cropping Systems in Shethalli-2 Microwatershed

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 Shethalli-2 microwatershed by the detailed study of all the soil characteristics (depth, texture, colour, structure, consistence, coarse fragments, porosity, soil reaction, soil horizons etc.) and site characteristics (slope of the land, erosion, drainage, occurrence of rock fragments etc.) followed by grouping of similar areas based on soil-site characteristics into homogeneous (management units) units, and showing their area extent and their geographic distribution on the microwatershed cadastral map. The detailed survey at 1:7920 scale was carried out in an area of 645 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 and satellite imagery as a base supplied by KSRSAC. The cadastral map shows field boundaries with their survey numbers, location of tanks, streams and other permanent features of the area (Fig. 3.1). Apart from the cadastral map, remote sensing data products from Cartosat-1 and LISS IV merged at the scale of 1:7920 were used in conjunction with the cadastral map to identify the landscapes, landforms and other surface features. The imagery helped in the identification and delineation of boundaries between hills, uplands and lowlands, water bodies, forest and vegetated areas, roads, habitations and other cultural features of the area(Fig.3.2).The cadastral map was overlaid on the satellite imagery (Fig.3.3) that helps to identify the parcel boundaries and other permanent features. Apart from cadastral maps and images, toposheets of the area (1:50,000 scale) were also used for initial traversing, identification of geology and landforms, drainage features, present land use and also for selection of transects in the microwatershed.

3.2 Image Interpretation for Physiography

False Colour Composites (FCCs) of Cartosat-I and LISS-IV merged satellite data covering microwatershed area was visually interpreted using image interpretation elements and all the available collateral data with local knowledge. The delineated physiographic boundaries were transferred on to a cadastral map overlaid on satellite imagery. Physiographically, the area has been identified as granite and granite gneiss and alluvial landscapes. It was divided into five landforms, *viz;* ridges and mounds, gently and very gently sloping uplands and lowlands based on slope and image characteristics. They

were further subdivided into physiographic/image interpretation units based on image characteristics. The image interpretation legend for physiography is given below.

Image Interpretation Legend for Physiography

G- Granite Gneiss Landscape

G1			**Hills/ Ridges/ Mounds**
	G11		Summits
	G12		Side slopes
		G121	Side slopes with dark grey tones
G2			**Uplands**
	G21		Summits
	G22		Gently sloping uplands
		G221	Gently sloping uplands, yellowish green (eroded)
		G222	Gently sloping uplands, yellowish white (severely eroded)
	G23		Very gently sloping uplands
		G231	Very gently sloping uplands, yellowish green
		G232	Very gently sloping uplands, medium green and pink
		G233	Very gently sloping uplands, pink and green (scrub land)
		G234	Very gently sloping uplands, medium greenish grey
		G235	Very gently sloping uplands, yellowish white (eroded)
		G236	Very gently sloping uplands, dark green
		G237	Very gently sloping uplands, medium pink (coconut garden)
		G238	Very gently sloping uplands, pink and bluish white (eroded)
G3			**Valleys/ lowlands**
	G31		Valleys, pink tones
	G32		Valleys gray mixed with pink tones

DSe – Alluvial Landscape

DSe1 – Summit

DSe11 –

DSe12 –

DSe2 – Very genetly sloping

DSe21 – Very gently sloping, dark gray tone

DSe22 – Very gently sloping, medium gray tone

DSe23 – Very gently sloping, yellowish grey tone

DSe24 – Very gently sloping, whitish grey tone

DSe25 – Very gently sloping, whitish/ eroded/ calcareous tone

DSe 26- Very gently sloping, medium pink

DSe3 – Valley/ Lowland

DSe31 – Whitish gray/Calcareous

DSe32 – Gray with pink patches

DSe 33 – Medium gray tone

DSe 34 – Lightish gray tone

DSe 35 – Dark gray tone

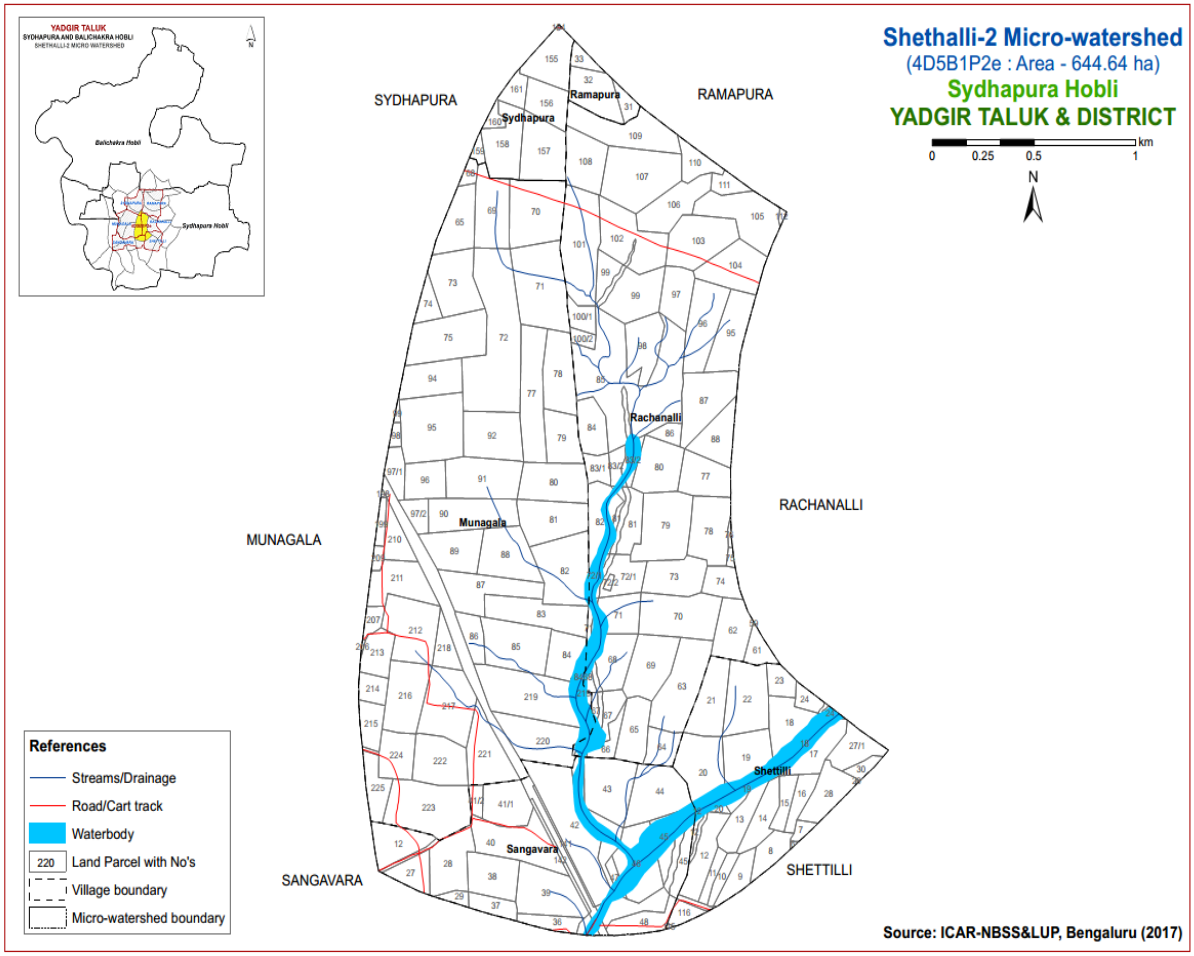


Fig 3.1 Scanned and Digitized Cadastral map of Shethalli-2 Microwatershed

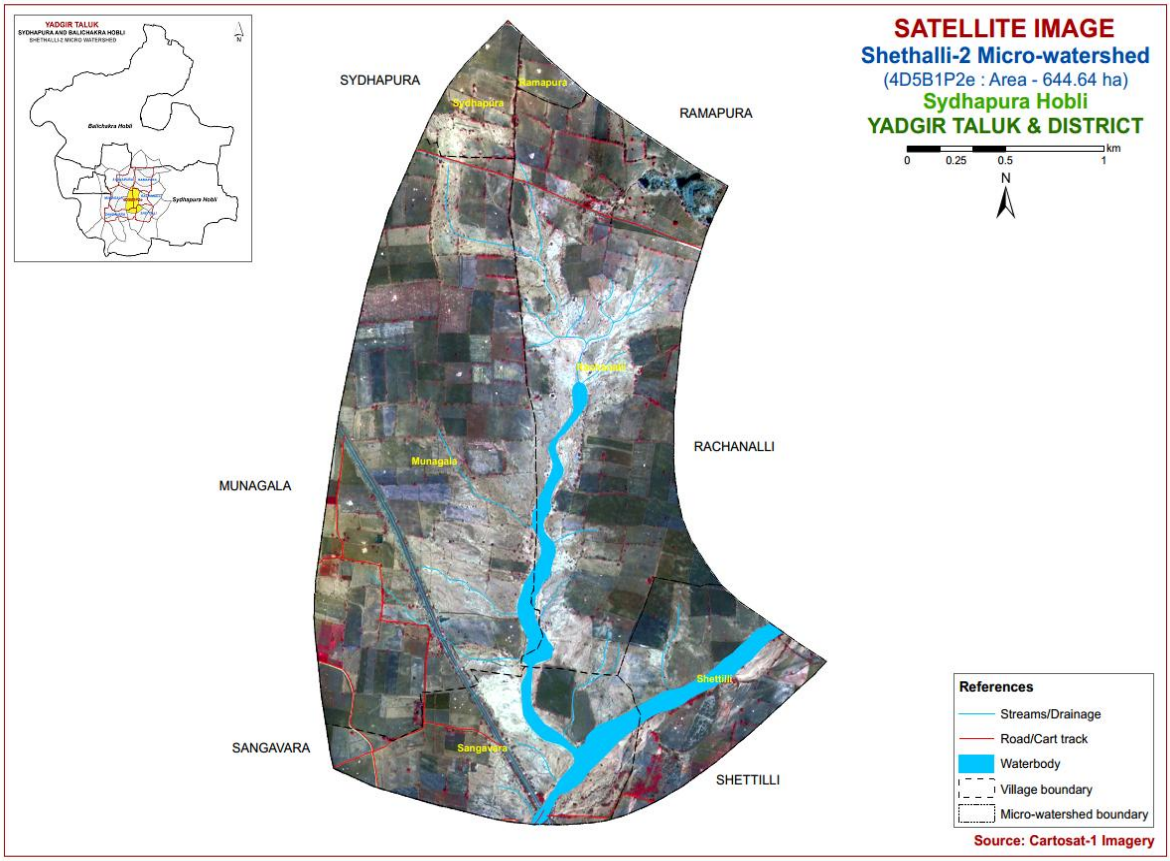


Fig.3.2 Satellite Image of Shethalli-2 Microwatershed

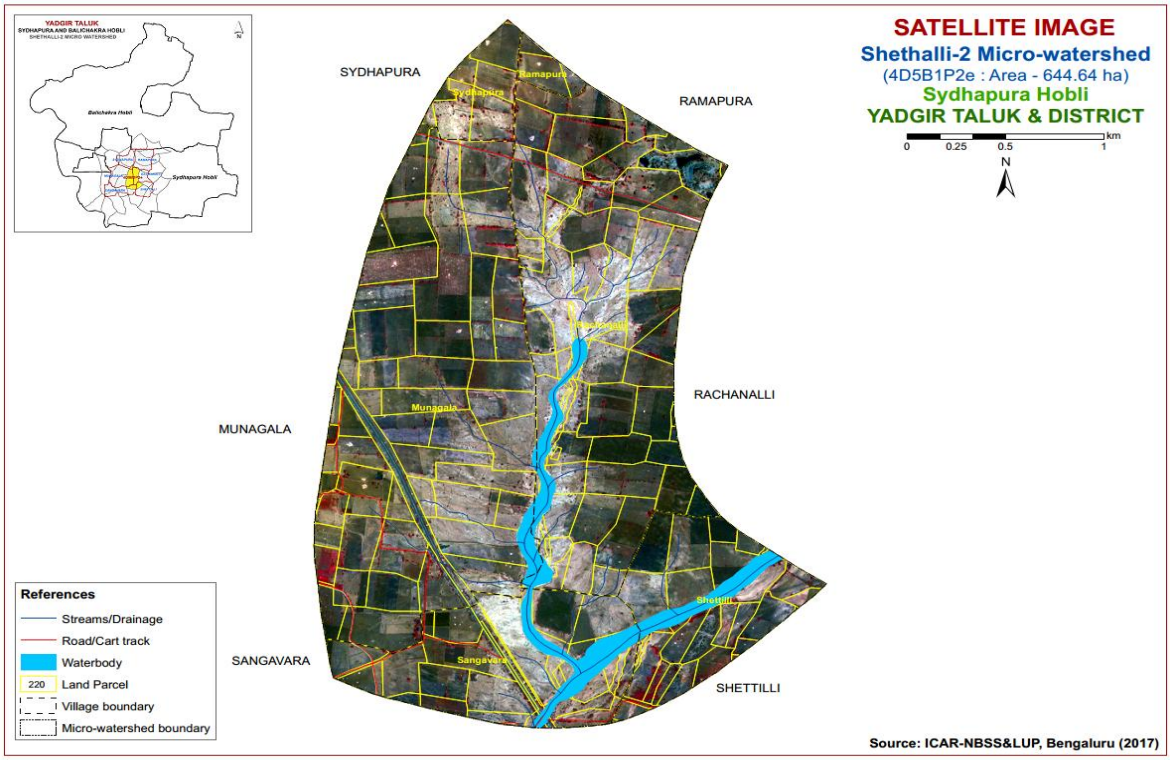


Fig.3.3 Cadastral map overlaid on IRS PAN+LISS IV merged imagery of Shethalli-2 Microwatershed-42

3.3 Field Investigation

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

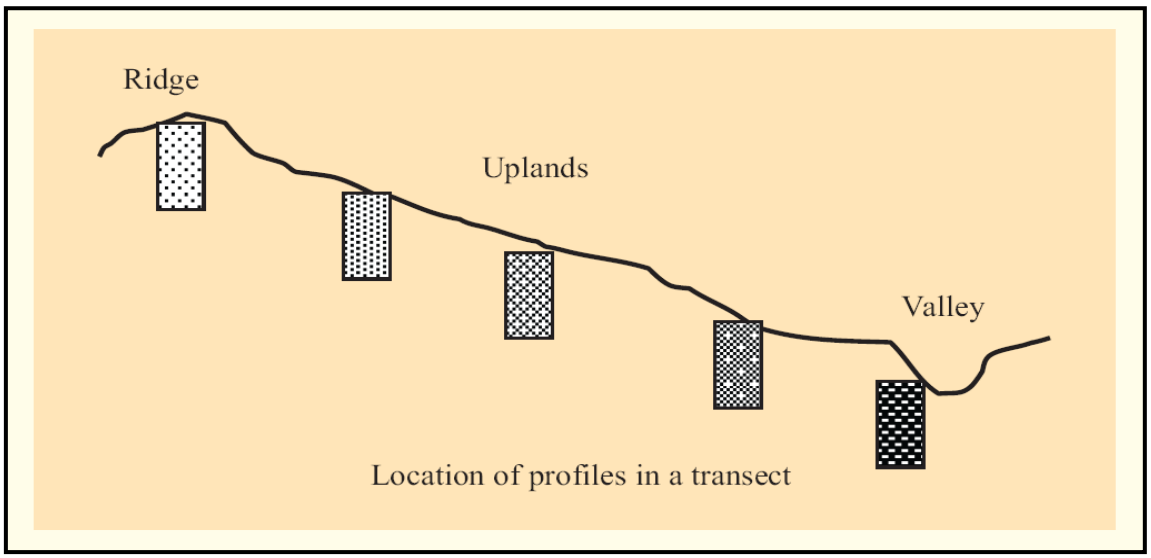


Fig: 3.4. Location of profiles in a transect

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

Based on the soil characteristics, the soils were grouped into different soil series. Soil series is the most homogeneous unit having similar horizons and properties and behaves similarly for a given level of management. Soil depth, texture, colour, kind of horizon and horizon sequence, calcareousness, 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,10soil series were identified in the Shethalli-2 microwatershed.

Table 3.1 Differentiating Characteristics used for identifying Soil Series

(Characteristics are of Series Control Section)

Sl. no.	Soil Series	Depth (cm)	Colour (moist)	Texture	Gravel (%)	Horizon sequence	Calcareous-ness
Soils of Granite and Granite Gneiss Landscape							
1	JNK (Jinkera)	50-75	10 YR 3/1, 3/2 7.5 YR 3/4	scl	-	Ap-Bw	e
2	YLR (Yalleri)	50-75	2.5 YR 3/4, 4/4 5 YR 3/4,7.5 YR 4/4	c	15-35	Ap-Bt	-
Soils of Alluvial Landscape							
3	GDL (Gudalagunta)	25-50	10 YR 3/1	c	-	Ap-A_{11}-A_{12}	es
4	KYT (Kyathanala)	25-50	7.5 YR 4/4,5/6 5YR 3/3, 4/4	scl	-	Ap-A2-C	-
5	BLD (Balched)	50-75	10 YR 3/2, 2/1	cl	-	Ap-Bw	e
6	RHN (Rachanalli)	75-100	10 YR 3/2, 4/3	scl	-	Ap-Bw	e
7	KDR (Kudlura)	100-150	10 YR 3/1, 3/2, 4/1,5/2	c	-	Ap-Bw	es
8	SWR (Sowrashtrahalli)	100-150	10 YR 4/1, 3/2, 3/1	c	-	Ap-Bss	es
9	HGN (Hegganakera)	>150	10 YR 4/2, 4/1, 3/1,4/1	c	-	Ap-BA-Bss	e
Low Land Soil							
10	TMK (Thumakur)	>150	10 YR 3/1, 3/2, 3/3,4/3	sc-c	-	Ap-Bw	e

3.4 Soil Mapping

The area under each soil series was further separated into soil phases and their boundaries delineated on the cadastral map based on the variations observed in the texture of the surface soil, slope, erosion, presence of gravel, stoniness etc. A soil phase is a subdivision of soil series based mostly on surface features that affect its use and management. The soil mapping units are shown on the map (Fig.3.5) in the form of symbols. During the survey many profile pits, few minipits and a few auger bores representing different landforms occurring in the microwatershed were studied. In addition to the profile study, spot observations in the form of minipits, road cuts, terrace cuts etc., were studied to validate the soil boundaries on the soil map. The soil map shows the geographic distribution of 21 mapping units representing 10soil 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 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 soil phase will have similar management needs and have to be treated accordingly.

3.5 Land Management Units (LMU's)

The21 soil phases identified and mapped in the microwatershed were grouped into 5Land Management Units (LMU's) for the purpose of preparing a Proposed Crop Plan for sustained development of the microwatershed. The database (soil phases) generated under LRI was utilized for identifying Land Management Units (LMU's) based on the management needs. One or more than one soil site characteristic having influence on the management have been choosen for identification and delineation of LMUs. For Shethalli-2 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 for each soil series were collected from representative master profiles for laboratory characterization by following the methods outlined in the Laboratory Manual (Sarma *et al*, 1987). Surface soil samples collected from farmer's fields (64 samples) for fertility status (major and micronutrients) at 250 m grid interval in the year 2017 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 by using Kriging method for the microwatershed.

Table 3.2 Soil map unit description of Shethalli-2 Microwatershed

Soil map unit No.	Soil Series	Soil Phase	Mapping Unit Description	Area in ha (%)
Soil of Granite and Granite Gneiss Landscape				
	JNK	Jinkera soils are moderately shallow (50-75 cm), well drained, have dark brown to very dark grayish brown, slightly calcareous sandy clay loam soils occurring on very gently sloping uplands under cultivation		**14 (2.17)**
20		JNKcB2	Sandy loam surface, slope 1-3%, moderate erosion	1(0.14)
23		JNKiB2g1	Sandy clay surface, slope 1-3%, moderate erosion, gravelly (15-35%)	13 (2.03)
	YLR	Yalleri soils are moderately shallow (50-75 cm), well drained, have brown to reddish brown and dark reddish brown, gravelly clay red soils occurring on very gently to gently sloping uplands under cultivation		**40 (6.2)**
27		YLRbB2	Loamy sand surface, slope 1-3%, moderate erosion	23(3.57)
29		YLRcB2g1	Sandy loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)	11 (1.76)
31		YLRiB2	Sandy clay surface, slope 1-3%, moderate erosion	6(0.87)
Soil of Alluvial Landscape				
	GDL	Gudalagunta soils are shallow (25-50 cm), well drained, have very dark gray, calcareous alluvial clay soils occurring on very gently sloping uplands under cultivation		**35 (5.4)**
67		GDLcB3	Sandy loam surface, slope 1-3%, severe erosion	35(5.4)

	KYT	Kyathanala soils are shallow (25-50 cm), well drained, have brown to strong brown and reddish to dark reddish brown, sandy clay loam alluvial soils occurring on very gently sloping uplands under cultivation		**35 (5.49)**
68		KYTcB2	Sandy loam surface, slope 1-3%, moderate erosion	35(5.49)
	BLD	Balched soils are moderately shallow (50-75 cm), moderately well drained, have very dark gray to very dark grayish brown, slightly calcareous clay loam alluvial soils occurring on very gently sloping uplands under cultivation		**35 (5.4)**
73		BLDcB2	Sandy loam surface, slope 1-3%, moderate erosion	19(2.88)
75		BLDiB1g1	Sandy clay surface, slope 1-3%, slight erosion, gravelly (15-35%)	9(1.38)
76		BLDmB2	Clay surface, slope 1-3%, moderate erosion	7 (1.14)
	RHN	Rachanalli soils are moderately deep (75-100 cm), moderately well drained, have brown to very dark grayish brown, slightly calcareoussandy clay loam soils occurring on very gently sloping plains under cultivation		**89 (13.83)**
77		RHNcB2	Sandy loam surface, 1-3% slope, moderate erosion	0.001 (0.001)
79		RHNmB2	Clay surface, 1-3% slope, moderate erosion	89(13.83)
	KDR	Kudlura soils are deep (100-150 cm), moderately well drained, have dark gray to very dark grayish brown, calcareous cracking clay soils occurring on nearly level to very gently sloping plains under cultivation		**184 (28.39)**
84		KDRcB2	Sandy loam surface, 1-3% slope, moderate erosion	8(1.19)
85		KDRcB3	Sandy loam surface, 1-3% slope, severe erosion	90(13.9)
87		KDRiB2	Sandy clay surface, 1-3% slope, moderate erosion	39(6.02)
89		KDRmB2	Clay surface, 1-3% slope, moderate erosion	47(7.28)
	SWR	Sowrashtrahalli soils are deep (100-150 cm), moderately well drained, have dark gray to very dark grayish brown, calcareous cracking clay black soils occurring on very gently sloping plains under cultivation		**78 (12)**
90		SWRcB2	Sandy loam surface, 1-3% slope, moderate erosion	28(4.3)
91		SWRmB2	Clay surface, 1-3% slope, moderate erosion	50(7.7)
	HGN	Hegganakera soils are very deep (>150 cm), moderately well drained, have dark gray to very dark grayish brown and brown, slightly calcareous cracking clay black soils occurring on very gently sloping plains under cultivation		**81 (12.45)**
93		HGNiB2	Sandy clay surface, 1-3% slope, moderate erosion	20(3.05)
95		HGNmB2	Clay surface, 1-3% slope, moderate erosion	61(9.4)
Low Land Soil Series				
	TMK	Thumakur soils are very deep (>150 cm), moderately well drained, have brown to very dark grayish brown, slightly calcareous sandy clay to clay black soils occurring on nearly level to very gently sloping lowlands under cultivation		**22 (3.44)**
105		TMKiB3	Sandy clay surface, 1-3% slope, severe erosion	22(3.44)

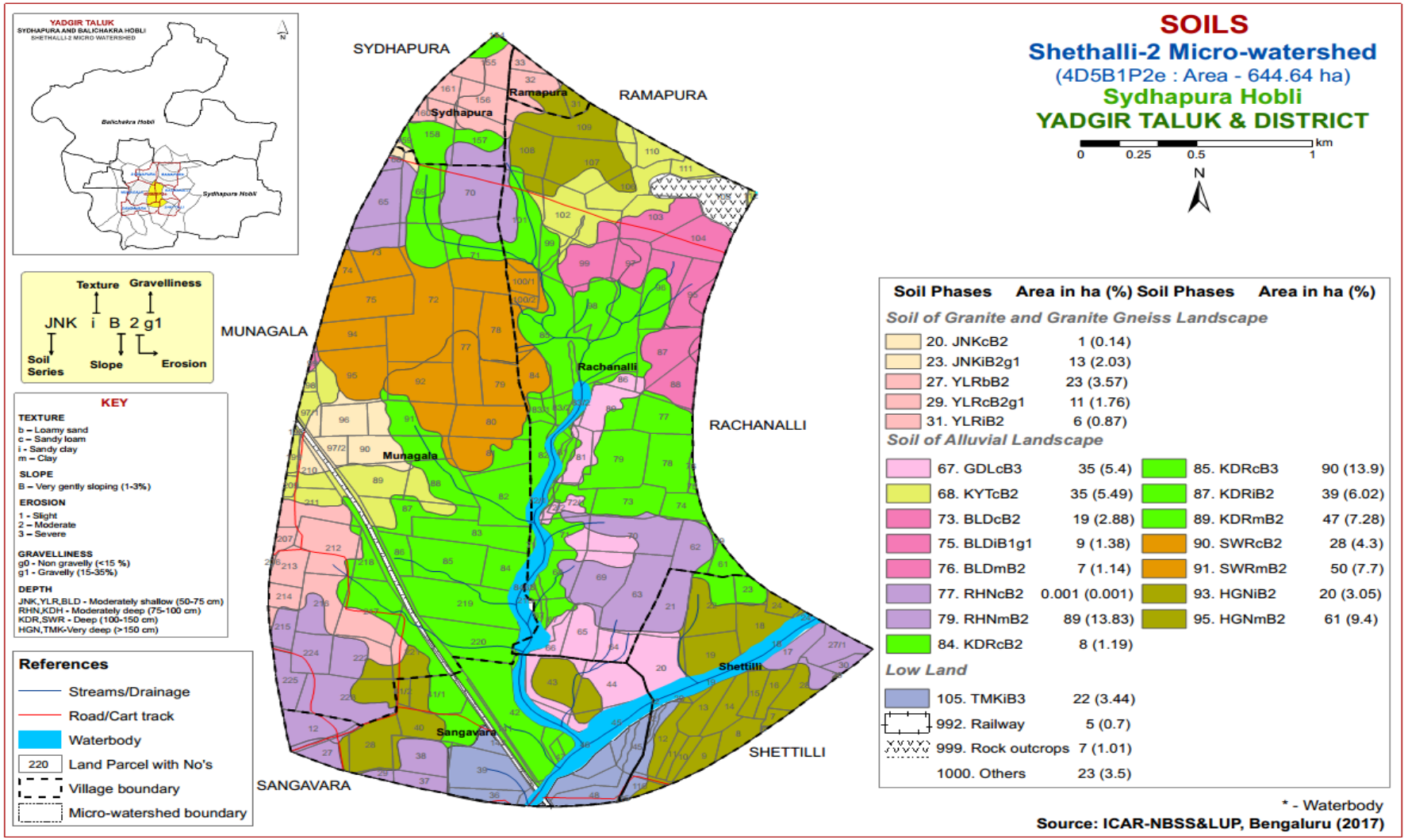


Fig 3.5 Soil Phase or Management Units of Shethalli-2 Microwatershed

Chapter 4

THE SOILS

Detailed information pertaining to the nature, extent and their distribution of different kinds of soils occurring in Shethalli-2 microwatershed is provided in this chapter. The microwatershed area has been identified as granite gneiss and alluvial landscapes based on geology. In all, 10 soil series are identified. Soil formation is the result of the combined effect of environmental and terrain factors that are reflected in soil morphology. The soil formation is dominantly influenced by the parent material, climate, time and relief.

A brief description of each of the 10 soil series identified followed by 21 soil phases (management units) mapped under each series are furnished below. The physical and chemical characteristics of soil series identified in Shethalli-2 microwatershed are given in Table 4.1. The soils in any one map unit differ from place to place in their depth, texture, slope, gravelliness, erosion or any other site characteristic that affect management. The soil phase map can be used for identifying the suitability of areas for growing specific crops or for other alternative uses and also for deciding the type of conservation structures needed. The detailed information on soil and site-characteristics like soil depth, surface soil texture, slope, erosion, gravelliness, AWC, LCC etc, with respect to each of the soil phase identified is given village/survey number wise for the microwatershed in Appendix-I.

4.1 Soils of granite gneiss landscape

In this landscape, 2 soil series are identified and mapped. Brief description of each series identified is given below. Of these, YLR series occupies maximum area of 40ha (6%) and JNK 14 ha (2%). In Low land only one soil series are identified and mapped. TMK series occupied an area of 22 ha (3%).Brief description of each series identified and number of soil phases mapped is given below.

4.1.1 Jinkera (JNK) Series: Jinkera soils are moderately shallow (50-75 cm), well drained, have very dark gray to very dark grayish brown and dark brown, sandy clay loam soils. They are developed from weathered granite gneiss and occur on very gently sloping uplands under cultivation. The Jinkera series has been classified as a member of the fine-loamy, mixed, Isohyperthermic family of Typic Haplustepts.

The thickness of the solum ranges from 51-75 cm. Thickness of A horizon ranges from 6 to 11 cm. Its colour is in hue 10 YR and 7.5 YR with value and chroma of 3 to 4. The texture varies from sandy loam and sandy clay. The thickness of B horizon ranges from 53 to 66 cm. Its colour is in 10 YR and 7.5 YR hue with value and chroma of 2 to 4. The texture varies from sandy loam to sandy clay and is slightly calcareous. The available water capacity is medium (100-150 mm/m).The two soil phases were identified and mapped.

Landscape and Soil Profile characteristics of Jinkera (JNK)Series

4.1.2 Yalleri (YLR) Series: Yalleri soils are moderately shallow (50-75 cm), well drained, have very dark reddish brown to dark brown, gravelly clay soils. They are developed from weathered granite gneiss and occur on very gently to gently sloping uplands under cultivation. The Yalleri series has been classified as a member of the fine, mixed, isohyperthermic family of Typic Haplustalfs.

The thickness of the solum ranges from 50 to 74 cm. The thickness of A horizon ranges from 10 to 13 cm. Its colour is in 7.5 YR and 5 YR hue with value and chroma 2 to 4. The texture ranges from loamy sand to sandy clay. The thickness of B horizon ranges from 45 to 64 cm. Its colour is in 7.5 YR, 5 YR and 2.5 YR hue with value 2 to 4 and chroma 2 to 4. Its texture is sandy clay with gravel content of 15-35 per cent. The available water capacity is very low (<50 mm/m). The three soil phases were identified and mapped.

Landscape and Soil Profile characteristics of Yalleri (YLR) Series

4.1.3 Thumakur (TMK) Series: Thumakur soils are very deep (>150 cm), moderately well drained, have very dark gray to dark brown, slightly calcareous clay soils. They are developed from weathered granite gneiss and occur on nearly level to very gently sloping low lands under cultivation. The Thumakur series has been classified as a member of the fine, mixed, isohyperthermic family of Typic Haplustepts.

The thickness of the solum ranges from 150-200cm. The thickness of A horizon ranges from 7 to 14 cm. Its colour is in 10 YR hue with value 3 to 5 and chroma 1 to 3. Texture varies from sandy loam to sandy clay and clay. The thickness of B horizon is>150 cm. Its colour is in 10 YR hue with value 3 to 5 and chroma 1 to 3. Texture varies from sandy clay to clay with less than 15 per cent gravel. The available water capacity is very high (>200 mm/m). Only one soil phase was identified and mapped.

Landscape and Soil Profile characteristics of Thumakur (TMK) Series

4.2 Soils of Alluvial landscape

In this landscape, 7 soil series are identified and mapped. Brief description of each series identified is given below. Of these, KDR series occupies maximum area of 184 ha (28%) followed by RHN89 ha (14%), HGN 81 ha (12%), SWR 78 ha (12%), KYT 35 ha (5%), GDL 35 ha (5%) and BLD 35 ha (5%).Brief description of each series identified and number of soil phases mapped is given below.

4.2.1Rachanalli (RHN) Series: Rachanalli soils are moderately deep (75-100 cm), well drained, very dark grayish brown to dark brown, slightly calcareous sandy clay loam soils. They have developed from alluvium and occur on very gently sloping plains under cultivation. The Rachanalli series has been classified as a member of the fine-loamy, mixed,isohyperthermic family of Typic Haplustepts.

The thickness of the solum ranges from 76 to 100 cm. The thickness of A horizon ranges from 6 to 13 cm. Its colour is in hue 10 YR with value 3 to 4 and chroma 2 to 4. Its texture varies from sandy loam to sandy clay loam soils. The thickness of B horizon

ranges from 66 to 92 cm. Its colour is in hue 10 YR with value 3 to 4 and chroma 1 to 3. Its texture is sandy loam to sandy clay loam and is slightly calcareous. The available water capacity is high (150-200 mm/m). The two soil phases were identified and mapped.

Landscape and Soil Profile characteristics of Rachanalli (RHN) Series

4.2.2 Kudlura (KDR) Series: Kudlura soils are deep (100-150 cm), moderately well drained, very dark gray to grayish brown, calcareous cracking clay soils. They have developed from alluvium and occur on nearly level to very gently sloping plains under cultivation. The Kudlura series has been classified as a member of the fine, mixed, calcareous, isohyperthermic family of Fluventic Haplustepts.

Landscape and Soil Profile characteristics of Kudlura (KDR) Series

The thickness of the solum ranges from 110 to 149 cm. The thickness of A horizon ranges from 6 to 22 cm. Its colour is in 10 YR hue with value 3 to 4 and chroma 1 to 2. The texture ranges from sandy clay to clay. The thickness of B horizon ranges from 115 to 143 cm. Its colour is in 10 YR hue with value 3 to 4 and chroma 1 to 3. Texture is sandy

clay to clay and is calcareous in nature. The available water capacity is very high (>200 mm/m). The four soil phases were identified and mapped.

4.2.3Sowrashtrahalli (SWR) Series: Sowrashtrahalli soils are deep (100-150 cm), moderately well drained very dark gray to dark gray,calcareous cracking clay soils. They have developed from alluvium and occur on very gently sloping plains under cultivation. The Sowrashtrahalli series has been classified as a member of the fine, smectitic, calcareous, isohyperthermic family of Typic Haplusterts.

The thickness of the solum is more than 150 cm. The thickness of A horizon ranges from 9 to 20 cm. Its colour is in 10 YR hue with value 3 to 5 and chroma 1 to 2. Texture is clay and calcareous in nature. The thickness of B horizon is >150 cm. Its colour is in 10 YR hue with value 3 to 5 and chroma 1 to 4. Texture varies from sandy clay to clay and is calcareous. The available water capacity is very high (>200 mm/m). The two soil phase were identified and mapped.

Landscape and Soil Profile characteristics of Sowrashtrahalli (SWR) Series

4.2.4Hegganakera (HGN) Series: Hegganakera soils are very deep (>150 cm), moderately well drained, very dark gray to dark grayish brown, slightly calcareous cracking clay soils. They have developed from alluvium and occur on very gently sloping plains under cultivation. The Hegganakera series has been classified as a member of the fine, smectitic,isohyperthermic family of Typic Haplusterts.

The thickness of the solum is more than 150 cm. The thickness of A horizon ranges from 7 to 9 cm. Its colour is in hue 10 YR with value 3 to 4 and chroma 1 to 3 with clay texture. The thickness of B horizon ranges from 152 to 175 cm. Its colour is in 10 YR hue with value 2 to 4 and chroma 1 to 3. Its texture is clay and is slightly calcareous. The available water capacity is very high (>200 mm/m).The two soil phases were identified and mapped.

Landscape and Soil Profile characteristics of Hegganakera (HGN) Series

4.2.5 Gudalagunta (GDL) Series: Gudalagunta soils are shallow (25-50 cm), well drained, have very dark gray calcareous clay soils. They have developed from alluvium and occur on very gently sloping plains under cultivation. The Gudalagunta series has been classified as a member of the clayey, mixed, calcareous, isohyperthermic family of Paralithic Ustorthents.

The thickness of the solum ranges from 26 to 49 cm. The thickness of A horizon ranges from 6 to 13 cm. Its colour is in 10YR hue with value 3 to 4 and chroma 1 to 3. The texture is sandy loam to sandy clay. The thickness of B horizon ranges from 22 to 42 cm. Its colour is in 10 YR hue with value 3 to 4 and chroma 1 to 2. Its texture is clay loam to clay and is calcareous. The available water capacity is low (51-100 mm/m). Only one soil phase was identified and mapped.

Landscape and Soil Profile characteristics of Gudalagunta (GDL) Series

4.2.6 Kyathanala (KYT) Series: Kyathanala soils are shallow (25-50 cm), well drained, have dark brown to strong brown and dark reddish brown sandy clay loam soils. They have developed from alluvium and occur on very gently sloping plains under cultivation. The Kyathanala series has been classified as a member of the loamy, mixed, isohyperthermic family of Paralithic Ustorthents.

The thickness of the solum ranges from 25 to 49 cm. The thickness of A horizon ranges from 5 to 11 cm. Its colour is in 5YR hue with value and chroma of 3 to 4. The texture is sandy loam to sandy clay. The thickness of B horizon ranges from 20 to 44 cm. Its colour is in 5 YR and 7.5 YR hue with value 3 to 4 and chroma 4 to 6. Its texture is sandy loam to sandy clay loam. The available water capacity is low (51-100 mm/m). Only one soil phase was identified and mapped.

Landscape and Soil Profile characteristics of Kyathanala (KYT) Series

4.2.7 Balched (BLD) Series: Balched soils are moderately shallow (50-75 cm), moderately well drained, have black to very dark grayish brown, slightly calcareous clay loam soils. They are developed from alluvium and occur on very gently to gently sloping plains under cultivation. The Balched series has been classified as a member of the fine, mixed,isohyperthermic family of Typic Haplustepts.

The thickness of the solum ranges from 50-75 cm. Thickness of A horizon ranges from 5 to 10 cm. Its colour is in hue 10 YR and 7.5 YR with value 3 to 4 and chroma 1to 3. The texture varies from sandy clay to clay. The thickness of B horizon ranges from 41 to 69 cm. Its colour is in 10 YR hue with value 2 to 4 and chroma 1 to 2. The texture is dominantly clay and is slightly calcareous. The available water capacity is high (150-200 mm/m). The three soil phases were identified and mapped.

Landscape and Soil Profile characteristics of Balched (BLD) Series

Table: 4.1 Physical and Chemical characteristics of soil series identified in Shethalli-2 microwatershed.

Soil Series: Jinkera **(**JNK) **Pedon:** R-1

Location: $16^0$45'13.5"N $77^0$10'59.8"E, Varkanahalli village, Yadgir hobli, Yadgir taluk and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:**Fine-loamy, mixed, isohyperthermic Typic Haplustepts

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-15	Ap	66.84	13.62	19.54	12.15	21.22	11.23	12.56	9.68	10	sl	14.42	7.70
15-38	Bw1	59.08	12.11	28.81	12.53	12.42	17.85	8.77	7.52	20	scl	18.21	12.23
38-50	Bw2	68.21	11.68	20.11	17.90	21.81	10.60	10.80	7.10	10	scl	14.54	8.96

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-15	8.42	-	-	0.148	0.70	0.65	-	-	0.15	0.03	-	14.50	0.74	100	0.18
15-38	8.38	-	-	0.226	0.31	2.21	-	-	0.09	0.23	-	21.70	0.75	100	1.05
38-50	8.40	-	-	0.195	0.25	1.17	-	-	0.07	0.19	-	15.90	0.79	100	1.23

Cont....

Soil Series: Yalleri (YLR) **Pedon:** R-16

Location: $16^0$32'54.3"N $77^0$22'71.2"E, Duppalli village, Sydhapura hobli, Yadgir taluk and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:**Fine, mixed, isohyperthermic Typic Haplustalfs

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-5	Ap	81.69	5.44	12.87	6.10	8.65	33.88	21.57	11.50	-	sl	8.60	3.37
5-34	Bt1	38.78	6.73	54.49	3.38	9.91	12.42	8.93	4.14	-	c	25.33	15.82
34-75	Bt2	40.35	2.90	56.75	12.91	6.83	10.30	7.48	2.82	35-60	c	24.49	16.20

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-5	6.91	-	-	0.069	0.70	0.00	5.29	1.37	0.28	0.03	6.96	6.90	0.54	100	0.45
5-34	7.05	-	-	0.053	0.62	0.00	16.43	3.89	0.26	0.09	20.67	21.60	0.40	96	0.42
34-75	7.25	-	-	0.058	0.59	0.00	15.22	3.46	0.25	0.14	19.06	19.90	0.35	96	0.69

Cont....

Soil Series: Gudalgunta (GDL) **Pedon:** T1/P3

Location: $16^0$54'30.8"N $77^0$28'88.3"E, Rachanala village, Sydhapur hobli, Yadgir taluk and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Clayey, mixed, calcareous, isohyperthermic Paralithic Ustorthents

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-6	Ap	52.36	18.74	28.90	7.43	9.74	12.25	15.08	7.85	-	scl	27.97	10.23
6-22	A11	42.38	18.75	38.87	8.58	8.69	10.41	9.66	5.04	-	cl	38.30	18.65
22-47	A12	27.73	21.44	50.83	5.19	5.41	7.07	6.41	3.65	-	c	61.43	35.38

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-6	9.72	-	-	1.21	0.60	7.80	-	-	0.43	27.56	-	30.39	1.05	100	90.68
6-22	9.43	-	-	2.55	0.76	8.40	-	-	0.44	40.71	-	41.09	1.06	100	99.08
22-47	9.25	-	-	3.83	0.48	9.00	-	-	0.57	40.90	-	49.76	0.98	100	82.21

Cont....

Soil Series: Kyathanala (KYT) **Pedon:** R-4

Location: $16^0$32'22.9"N $77^0$15'35.4"E, Mungala village, Sydhapura hobli, Yadgir taluk and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Loamy, mixed, isohyperthermic Paralithic Ustorthents

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-5	Ap	82.54	8.12	9.34	20.10	23.15	16.14	16.24	6.90	-	ls	13.51	4.10
5-17	A2	53.13	10.20	36.66	23.91	12.65	6.80	5.53	4.25	-	sc	26.61	13.69
17-32	C	79.51	9.41	11.08	16.63	24.04	15.42	17.24	6.19	-	sl	12.95	4.45

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-5	7.07	-	-	0.12	0.77	0.00	6.00	1.74	0.33	0.01	8.08	8.20	0.88	99	0.17
5-17	6.74	-	-	0.13	0.66	0.00	17.96	2.78	0.16	0.15	21.05	22.40	0.61	94	0.65
17-32	6.78	-	-	0.06	0.48	0.00	6.15	1.32	0.14	0.07	7.68	9.00	0.81	85	0.75

Cont....

Soil Series: Balched (BLD) **Pedon:** R-40

Location: $16^0$44'19.4"N $77^0$19'40.9"E Yaleri village, Balichakra hobli, Yadgir taluk and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Fine, mixed,isohyperthermic Typic Haplustepts

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-7	Ap	38.19	26.03	35.79	2.32	6.22	9.60	14.87	5.17	15	cl	22.13	11.07
7-28	Bw1	37.87	23.59	38.54	3.30	6.06	9.15	12.77	6.60	-	cl	23.75	14.43
28-54	Bw2	35.71	28.94	35.36	4.10	2.16	10.46	11.76	7.23	-	cl	25.47	16.56

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-7	8.19	-	-	0.22	0.54	2.32	27.16	6.43	0.38	0.31	34.28	38.20	1.07	90	0.80
7-28	8.56	-	-	0.14	0.42	3.18	29.26	6.83	0.14	0.51	36.75	39.91	1.04	92	1.27
28-54	8.70	-	-	0.16	0.38	3.92	29.79	7.14	0.08	0.91	37.92	42.91	1.21	88	2.13

Cont....

Soil Series: Rachanalli (RHN) **Pedon:** R-2

Location: 16^{0}44'40.9"N 77^{0}17'35.0"E, Gopalpura village, Gurumitkal hobli, Yadgir taluk and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Fine-loamy, mixed,isohyperthermic Typic Haplustepts

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-8	Ap	77.72	14.09	8.19	6.31	13.12	18.82	27.16	12.31	-	sl	10.76	3.53
8-43	Bw1	76.00	10.38	13.62	13.29	17.92	16.99	20.60	7.21	-	sl	21.48	7.91
43-87	Bw2	52.64	19.95	27.41	2.69	4.66	16.79	16.89	11.61	-	scl	40.80	16.55

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-8	8.16	-	-	0.22	0.38	1.20	5.43	2.49	0.16	0.79	8.87	8.99	1.10	99	8.81
8-43	9.63	-	-	0.26	0.19	0.60	6.25	4.72	0.09	4.31	15.37	14.66	1.08	105	29.43
43-87	10.09	-	-	1.01	0.15	5.76	-	-	0.21	11.77	-	24.08	0.88	100	48.87

Cont....

Soil Series: Kudlura (KDR) **Pedon:** T_1/P_2

Location: $16^0$34'03.1"N $77^0$14'71.7"E, Kyathanala village, Sydhapura Hobli, Yadgir taluk and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Fine, mixed, calcareous, isohyperthermic Fluventic Haplustepts

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-6	Ap	49.52	14.58	35.90	5.71	7.41	14.81	15.66	5.93	-	sc	26.86	12.10
6-26	BA	50.79	13.31	35.90	7.41	9.10	15.56	13.12	5.61	-	sc	25.65	12.24
26-67	Bw1	43.49	15.97	40.54	5.86	7.38	13.56	10.85	5.86	-	c	31.22	16.48
67-115	Bw2	37.42	18.93	43.66	6.51	6.83	10.95	8.68	4.45	-	c	36.13	22.34
115-144	Bw3	39.74	18.88	41.38	8.16	7.84	10.63	8.70	4.40	-	c	35.83	20.57

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-6	8.34	-	-	0.15	0.72	3.55	-	-	0.42	0.07	-	33.20	0.92	100	0.22
6-26	8.55	-	-	0.11	0.85	4.90	-	-	0.33	0.25	-	32.70	0.91	100	0.76
26-67	9.08	-	-	0.17	0.60	5.02	-	-	0.18	1.34	-	36.20	0.89	100	3.69
67-115	9.44	-	-	0.37	0.52	6.61	-	-	0.25	6.72	-	39.30	0.90	100	17.09
115-144	9.53	-	-	0.43	0.56	6.10	-	-	0.26	7.85	-	33.70	0.81	100	23.29

Cont....

Soil Series: Sowrastra (SWR) **Pedon:** R-8

Location: $16^0$38'49.0"N $77^0$16'56.1"E, Killanakera village, Balichakra hobli, Yadgir taluk and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:**Fine, smectitic, calcareous, isohyperthermic Typic Haplusterts

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-9	Ap	32.07	21.06	46.87	2.72	4.78	8.37	10.43	5.76	-	c	33.69	16.51
9_34	BA	32.29	20.37	47.35	3.90	5.20	8.56	9.10	5.53	-	c	37.43	16.65
34-67	Bss1	30.11	23.13	46.76	4.18	5.05	8.13	8.13	4.62	-	c	38.02	19.44
67-124	Bss2	19.93	23.40	56.66	2.46	3.14	5.04	5.71	3.58	-	c	42.55	23.92

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-9	8.44	-	-	0.18	0.77	7.47	-	-	0.79	0.21	-	47.70	1.02	100	0.45
9_34	8.57	-	-	0.14	0.81	6.86	-	-	0.51	0.23	-	47.80	1.01	100	0.49
34-67	8.73	-	-	0.12	0.81	6.48	-	-	0.28	0.44	-	50.60	1.08	100	0.88
67-124	8.71	-	-	0.16	0.77	7.56	-	-	0.42	0.91	-	51.20	0.90	100	1.78

Cont....

Soil Series: Hegganakera (HGN) **Pedon:** R-12

Location: $16^0$46'19.9"N $77^0$04'34.0"E, Thumakura village, Yadgir hobli, Yadgir taluk and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:**Fine, smectitic,isohyperthermic Typic Haplusterts

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-8	Ap	20.20	25.22	54.58	2.32	2.76	3.53	8.17	3.42	-	c	42.47	25.59
8-24	BA	21.18	21.70	57.12	2.07	3.28	4.69	7.31	3.82	-	c	41.88	24.67
24-50	Bss1	18.76	21.67	59.57	1.20	2.51	3.93	7.09	4.03	-	c	40.46	23.34
50-86	Bss2	16.74	22.24	61.02	0.88	1.53	4.27	6.02	4.05	-	c	42.18	24.76
86-146	Bss3	18.64	20.20	61.16	2.30	2.41	3.73	6.36	3.84	-	c	40.03	28.61
146-170	Bss4	16.08	19.33	64.59	0.88	2.75	3.41	5.95	3.08	-	c	40.28	29.90

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-8	8.77	-	-	1.33	1.16	8.19	-	-	1.10	5.21	-	36.23	0.66	100	14.38
8-24	8.93	-	-	1.11	0.64	5.46	-	-	0.87	4.23	-	35.50	0.62	100	11.93
24-50	8.85	-	-	0.984	0.32	3.38	-	-	0.71	3.78	-	36.69	0.62	100	10.30
50-86	8.54	-	-	0.562	0.24	3.38	-	-	0.58	3.07	-	39.16	0.64	100	7.84
86-146	8.45	-	-	0.526	0.24	3.38	-	-	0.62	2.82	-	38.52	0.63	100	7.31
146-170	8.64	-	-	0.517	0.20	4.29	-	-	0.60	2.99	-	36.87	0.57	100	8.12

Cont....

Soil Series: Thumakuru (TMK) **Pedon:** R-10

Location: $16^0$38'01.3"N $77^0$16'49.8"E, Kilankera village, Balichakra hobli, Yadgir taluk and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Fine, mixed, isohyperthermic Typic Haplustepts

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-12	Ap	62.92	15.76	21.32	5.56	9.37	21.83	18.33	7.83	-	scl	17.98	6.60
12-29	Bw1	45.91	18.53	35.56	6.08	8.18	15.41	11.43	4.82	-	sc	33.40	11.79
29-74	Bw2	48.47	16.24	35.29	5.93	9.84	16.40	11.75	4.55	-	sc	28.66	11.19
74-132	Bw3	38.25	20.59	41.16	3.21	8.23	14.64	8.97	3.21	-	c	38.85	14.72
132-158	Bw4	36.87	19.99	43.14	3.54	7.61	13.08	8.57	4.07	-	c	44.36	15.75

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-12	9.60	-	-	0.35	0.48	1.44	-	-	0.23	3.62	-	21.83	1.02	100	16.57
12-29	9.72	-	-	1.27	0.50	1.44	-	-	0.59	20.88	-	30.50	0.86	100	68.48
29-74	9.16	-	-	3.44	0.31	3.72	-	-	0.38	25.84	-	28.68	0.81	100	90.10
74-132	9.33	-	-	2.52	0.23	4.92	-	-	0.82	20.25	-	34.99	0.85	100	57.87
132-158	9.23	-	-	2.07	0.31	3.48	-	-	0.70	21.03	-	34.24	0.79	100	61.41

Chapter 5

INTERPRETATION FOR LAND RESOURCE MANAGEMENT

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

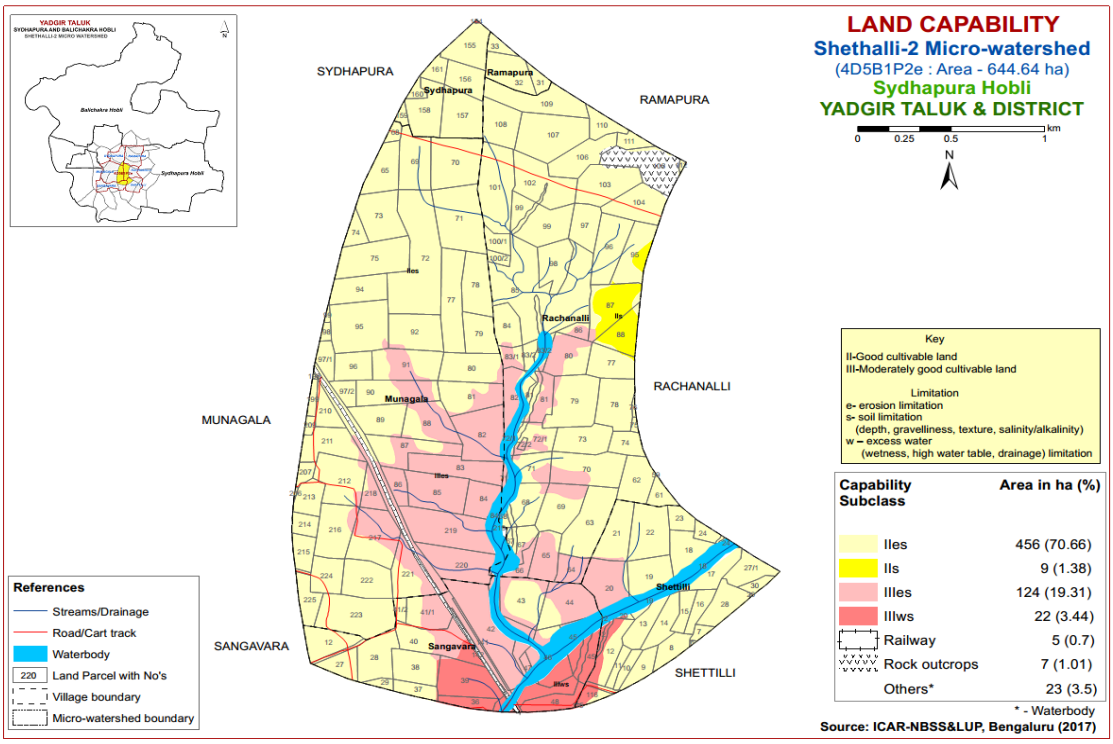


Fig. 5.1 Land Capability map of Shethalli-2 Microwatershed

The 21 soil map units identified in the Shethalli-2 microwatershed are grouped under 2 land capability classes and 4land capability subclasses. Entire area in the microwatershed is suitable for agriculture and about 35 ha (6%) is covered by railway, rock outcrops and others (habitation and water bodies) (Fig. 5.1).

Good cultivable lands (Class II) cover an area of about 72 per cent and are distributed in the major part of the microwatershed with minor problems of soil and erosion. Moderately good lands (Class III) cover an area of about 23 per cent and are distributed in the southern and central part of the microwatershed with moderate problems of soil, erosion and drainage.

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 is given in Fig. 5.2.

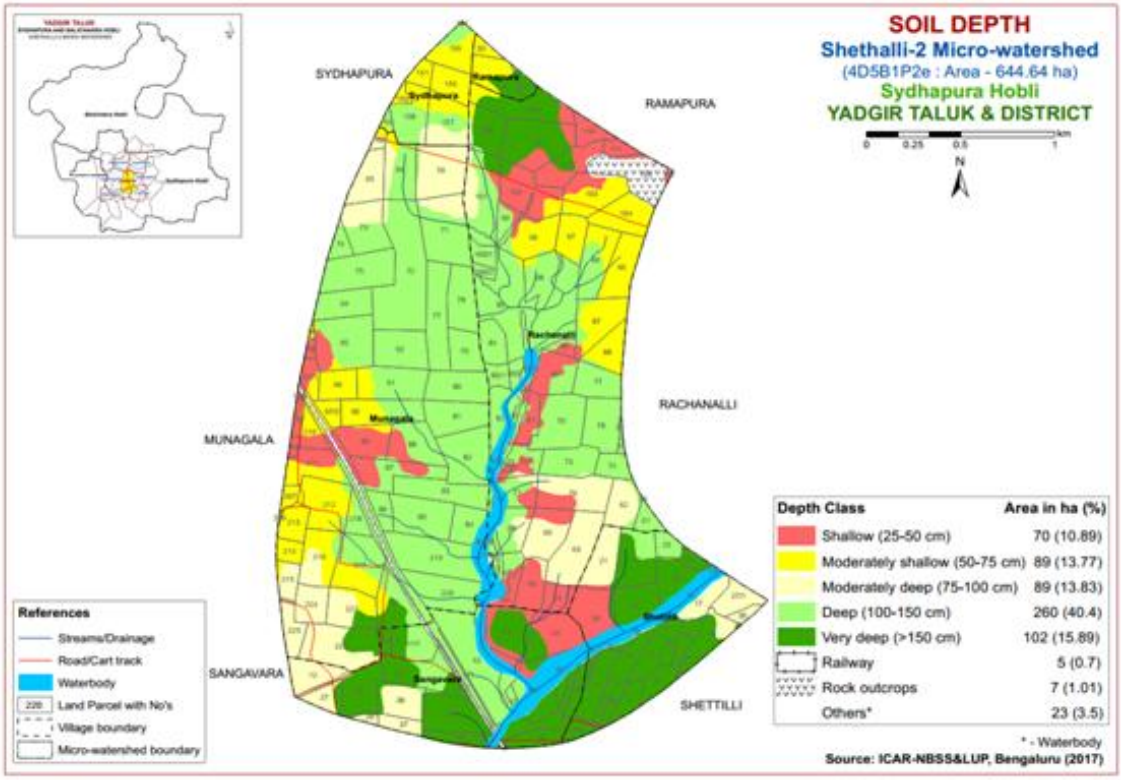


Fig. 5.2 Soil Depth map of Shethalli-2 Microwatershed

Shallow (25-50 cm) soils occur in a small area of 70 ha (11%) and are distributed in the northern, central, western and southern part of the microwatershed. Moderately shallow (50-75 cm) soils occupy an area of about 89 ha (14%) and are distributed in the northern, northeastern and western part of the microwatershed. Moderately deep (75-100

cm) soils occupy an area of about 89 ha (14%) and are distributed in the northern, eastern and southwestern part of the microwatershed. Deep (100-150 cm) soils occupy a maximum area of 260 ha (40%) and are distributed in all parts of the microwatershed. Very deep (>150 cm) soils cover an area of 102 ha (16%) and are distributed in the northern and southern part of the microwatershed.

The most productive lands 362 ha (56%) with respect to soil rooting depth where all climatically adapted annual and perennial crops can be grown are deep to very deep (100 to >150 cm depth) soils occurring in the major part of the microwatershed. The problem soils (25-50 cm depth) cover area of 70 ha (11%) where only short duration crops can be grown and the probability of crop failure is high.

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.

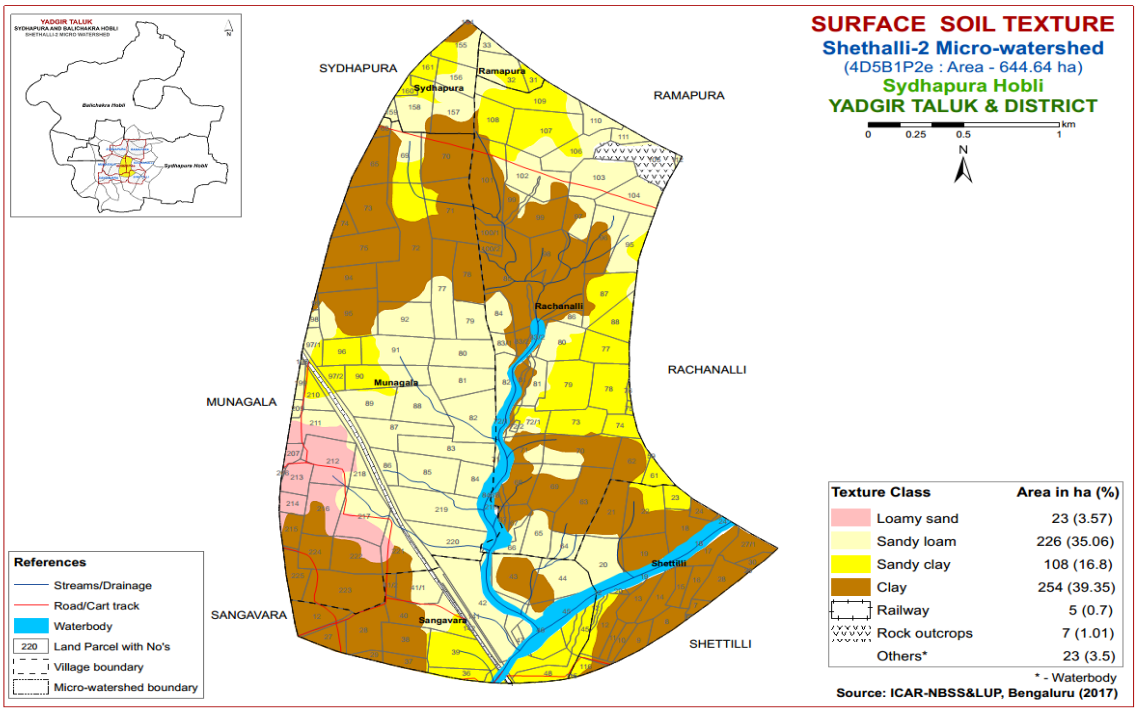


Fig. 5.3 Surface Soil Texture map of Shethalli-2 Microwatershed

An area of about 23 ha (4%) has soils that are sandy at the surface and are distributed in the western part of the microwatershed. An area of about 226 ha (35%) has

soils that are loamy at the surface and are distributed in the northern, central and southern part of the microwatershed. An area of 362 ha (56%) has soils that are clayey at the surface and occur in the major part of the microwatershed.

The most productive lands with respect to surface soil texture are clayey soils (56%) that have high potential for soil-water retention and availability, and nutrient retention and availability, but have more problems of drainage, infiltration, workability and other physical problems. The other productive lands are loamy (35%) soils which also have high potential for soil-water retention and nutrient availability but have no drainage or other physical problems. The problem soils are sandy covering 4 per cent area that have moisture and nutrient constraints.

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 are shown in Figure 5.4.

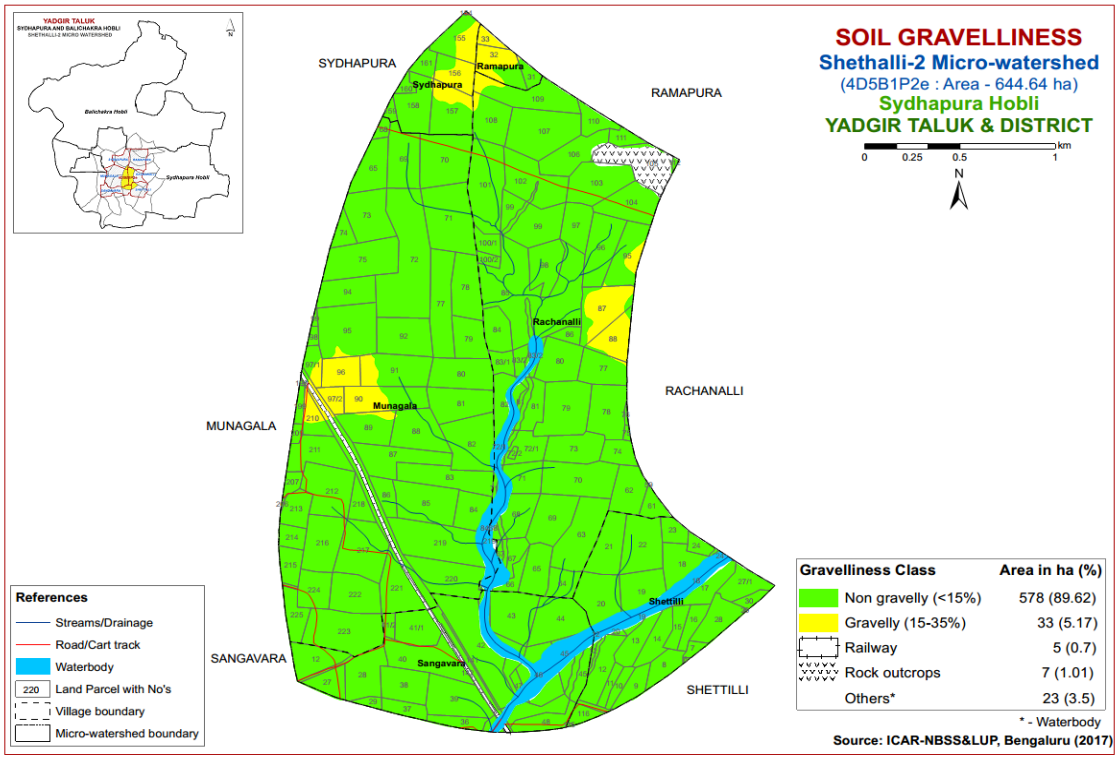


Fig. 5.4 Soil Gravelliness map of Shethalli-2 Microwatershed

Non gravelly (<15%) soils cover an area of 90 per cent of the microwatershed. These are the most productive soils, where all climatically adapted short and long

duration crops can be grown. The problem soils with 15-35 per cent gravel cover about 5 per cent and are suitable for growing medium and short duration crops.

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.

An area of about 70 ha (11%) in the microwatershed has soils that are very low (<50 mm/m) in available water capacity and are distributed in the northern, eastern, western and southern part of the microwatershed and 54ha (8%) area are low (51-100 mm/m) and are distributed in the northern and western part of the microwatershed. An area of about 124 ha (19%) is medium (101-150 mm/m) in available water capacity and are distributed in the northern, eastern and southwestern part of the microwatershed. Maximum area of about 363 ha (56%) are very high (>200 mm/m) in available water capacity and are distributed in all parts of the microwatershed.

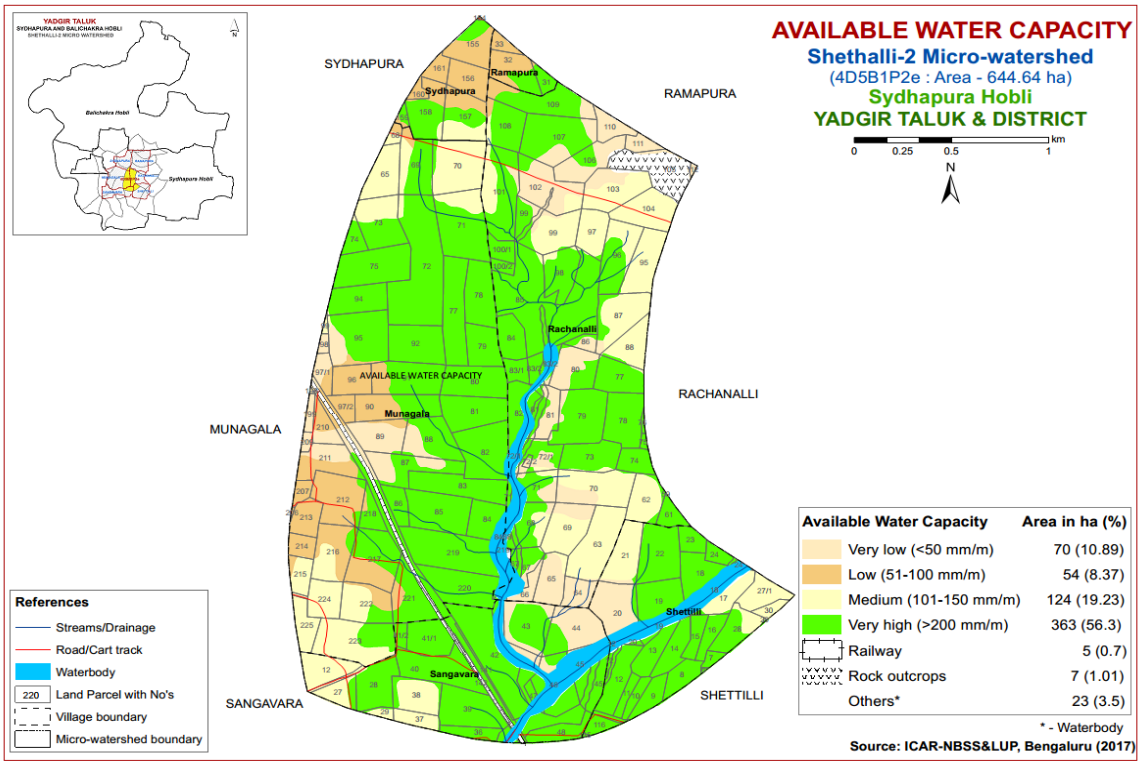


Fig. 5.5 Soil Available Water Capacity map of Shethalli-2 Microwatershed

About 70 ha (11%) area in the microwatershed has soils that are problematic with regard to available water capacity. Here, only short duration crops can be grown and the probability of crop failure is very high. These areas are best put to other alternative uses. An area of 363 ha (56%) are potential areas with regard to AWC where all climatically adapted annual and perennial crops can be grown.

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 single slope class and a slope map was generated showing the area extent and their geographic distribution in the microwatershed (Fig. 5.6).

Entire area of the microwatershed falls under very gently sloping (1-3% slope) lands and 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.

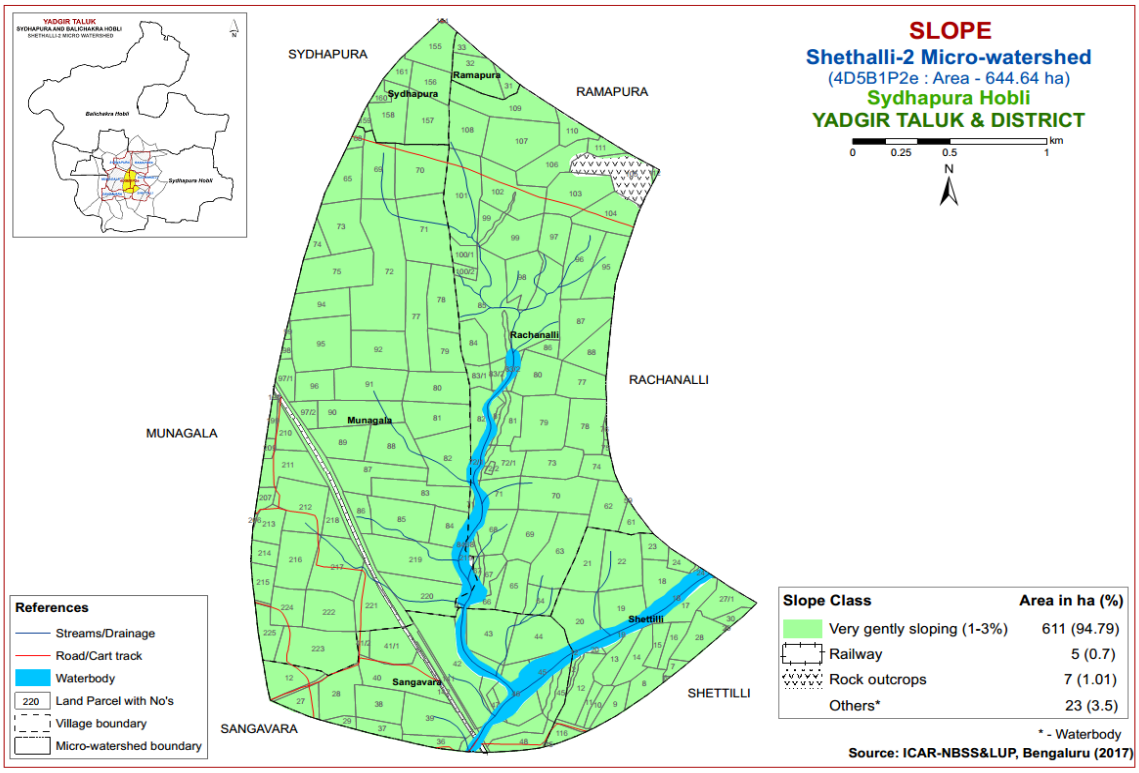


Fig. 5.6 Soil Slope map of Shethalli-2 Microwatershed

5.7 Soil Erosion

Soil erosion refers to the wearing away of the earth's surface by the forces of water, wind and ice involving detachment and transport of soil by raindrop impact. It is used for accelerated soil erosion resulting from disturbance of the natural landscape by

burning, excessive grazing and indiscriminate felling of forest trees and tillage, all usually by man. The erosion classes showing an estimate of the current erosion status as judged from field observations in the form of rills, gullies or a carpet of gravel on the surface are recorded. Four erosion classes, viz, slight erosion (e1), moderate erosion (e2), severe erosion (e3) and very severe erosion (e4) are recognized. The soil map units were grouped into different erosion classes and a soil erosion map generated. The area extent and their spatial distribution in the microwatershed is given in Figure 5.7.

A small area of about 9 ha (1%) has soils that are slightly eroded (e1). Majority of the soils that are moderately eroded (e2 class) cover an area of 456 ha (71%) and are distributed in all parts of the microwatershed. An area of about 147 ha (23%) has soils that are severely eroded (e3) and distributed in the central and southern part of the micrwatershed.

Entire area in the microwatershed is problematic because of moderate and severe erosion except a very small area of less than one per cent area. For these areas, taking up soil and water conservation and other land development measures are needed.

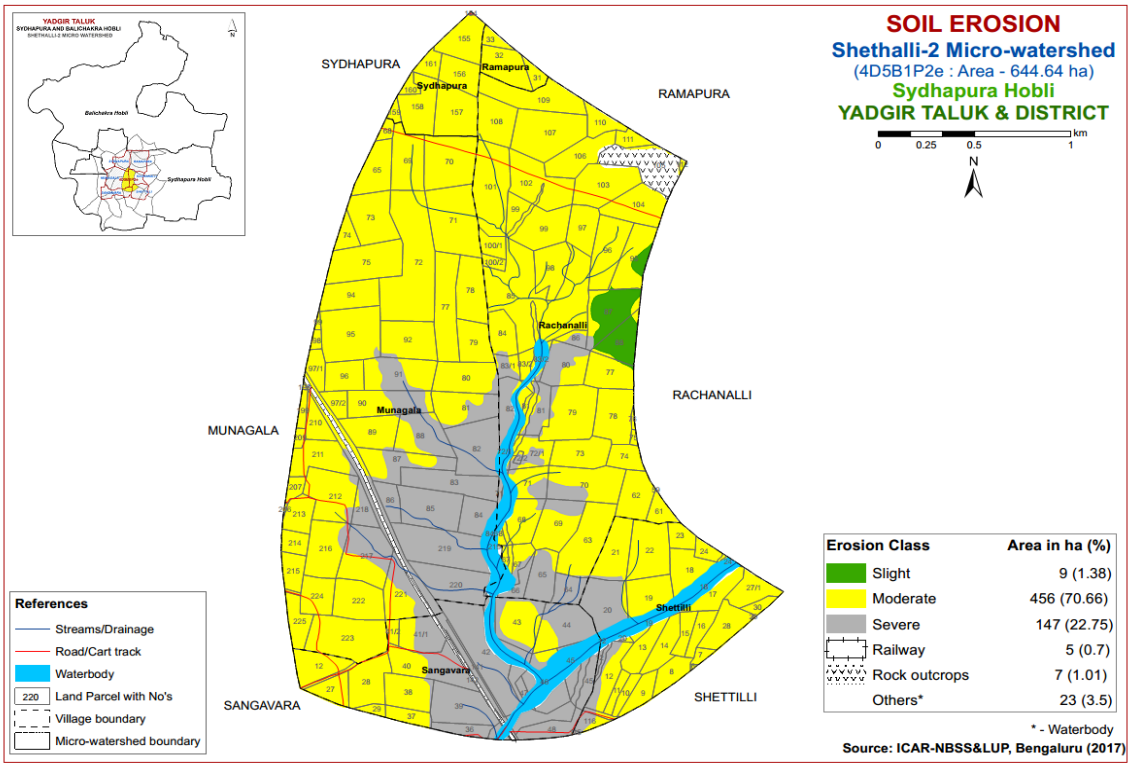


Fig. 5.7 Soil Erosion map of Shethalli-2 Microwatershed

Chapter 6

FERTILITY STATUS

Soil fertility plays an important role in increasing crop yield. The adoption of high yielding varieties that require high amounts of nutrients has resulted in deficiency symptoms in crops and plants due to imbalanced fertilization and poor inherent fertility status as these areas are characterised by low rainfall and high temperatures. Hence, it is necessary to know the fertility (macro and micro nutrients) status of the soils of the watersheds for assessing the kind and amount of fertilizers required for each of the crop intended to be grown. For this purpose, the surface soil samples collected from the grid points (one soil sample at every 250 m interval) all over the microwatershed through land resource inventory in the year 2017 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 Shethalli-2 microwatershed for soil reaction (pH) showed that an area of about 15 ha (2%) is slightly alkaline (pH 7.3-7.8) and are distributed in the western part of the microwatershed. An area of about 199 ha (31%) is moderately alkaline (pH 7.8-8.4) and are distributed in the northern, western and southwestern part of the microwatershed. Maximum area of about 246 ha (38%) is strongly alkaline (pH 8.4-9.0) and are distributed in the major part of the microwatershed. About 151 ha (23%) area is very strongly alkaline (pH >9.0) and are distributed in the northern, central and southern part of the microwatershed (Fig.6.1). Thus, all the soils in the microwatershed are alkaline in reaction.

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 are non-saline.

6.3 Organic Carbon

The soil organic carbon content (an index of available Nitrogen) in the soils of the microwatershed is low (<0.5%) in an area of about 34 ha (5%) and are distributed in the northern and southern part of the microwatershed. Maximum area of about 378 ha (59%) are medium (0.5-0.75%) in organic carbon and are distributed in all parts of the microwatershed. High (>0.75) covering an area of about199ha (31%) are distributed in the northern, southwestern and southern part of the microwatershed (Fig.6.3).

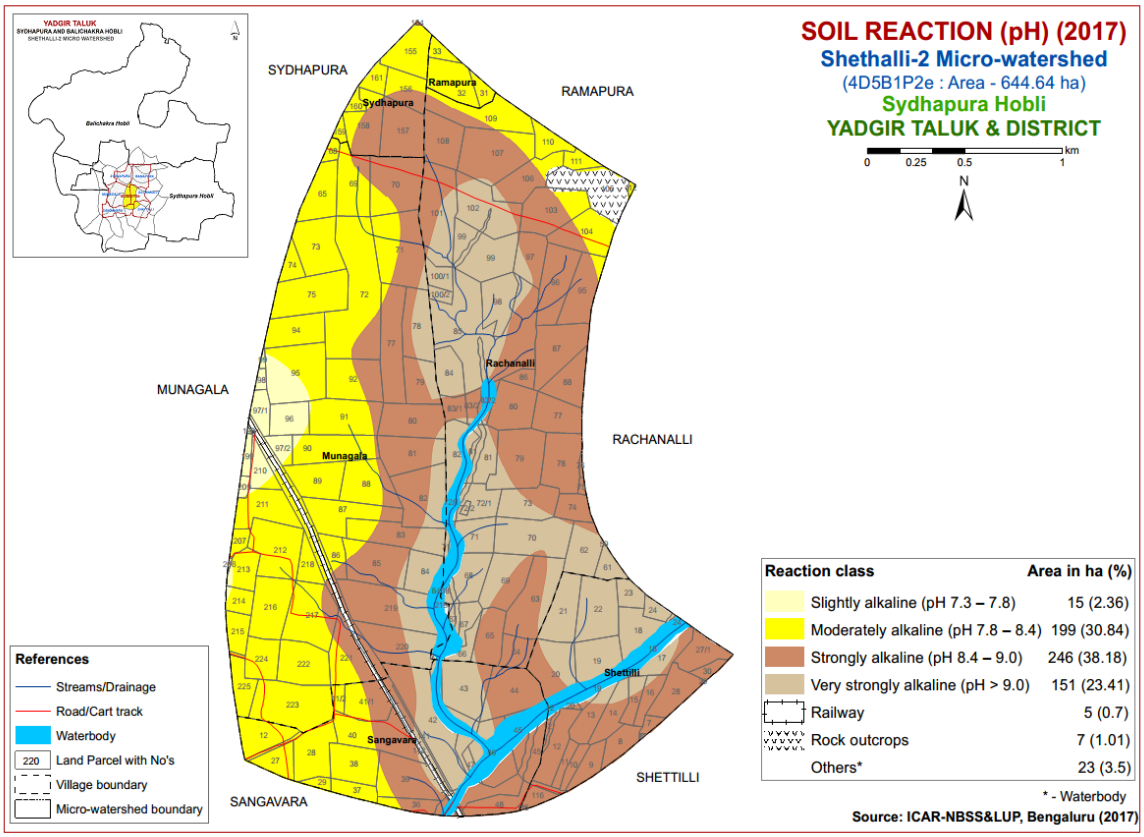


Fig.6.1 Soil Reaction (pH) map of Shethalli-2 Microwatershed

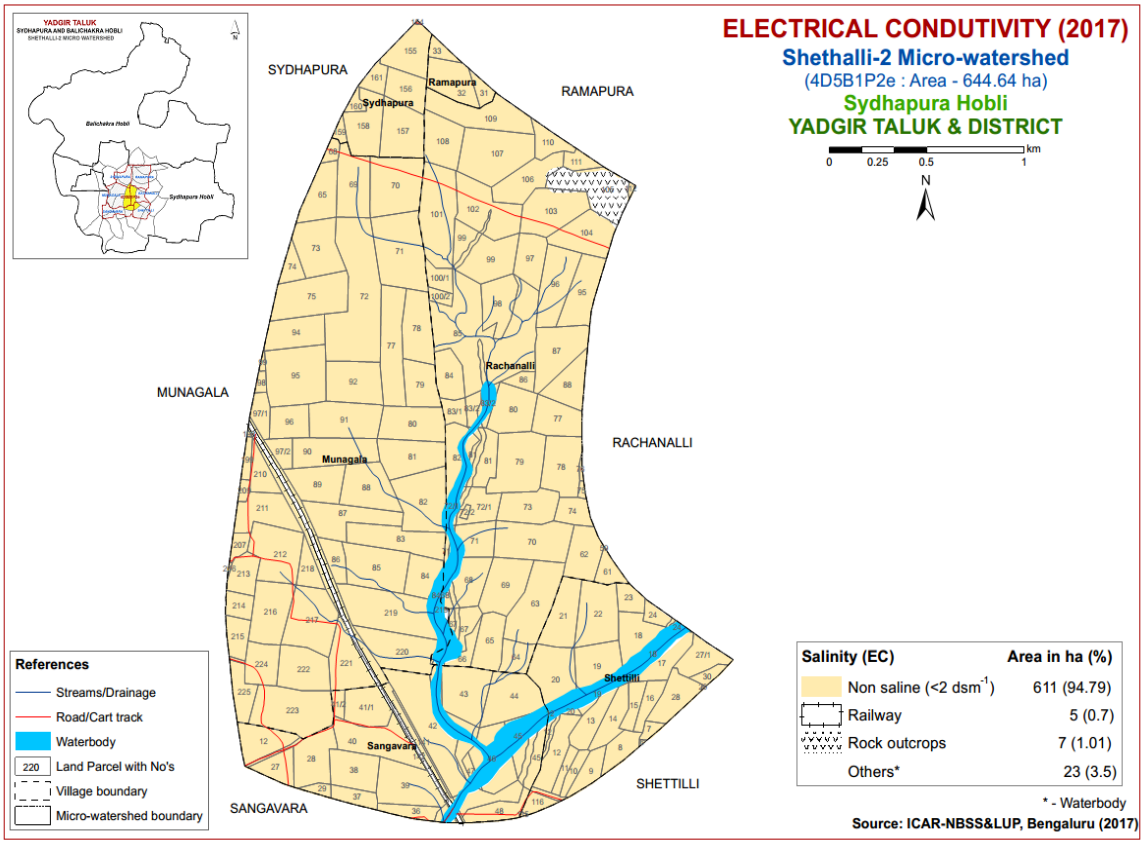


Fig.6.2 Electrical Conductivity (EC) map of Shethalli-2 Microwatershed

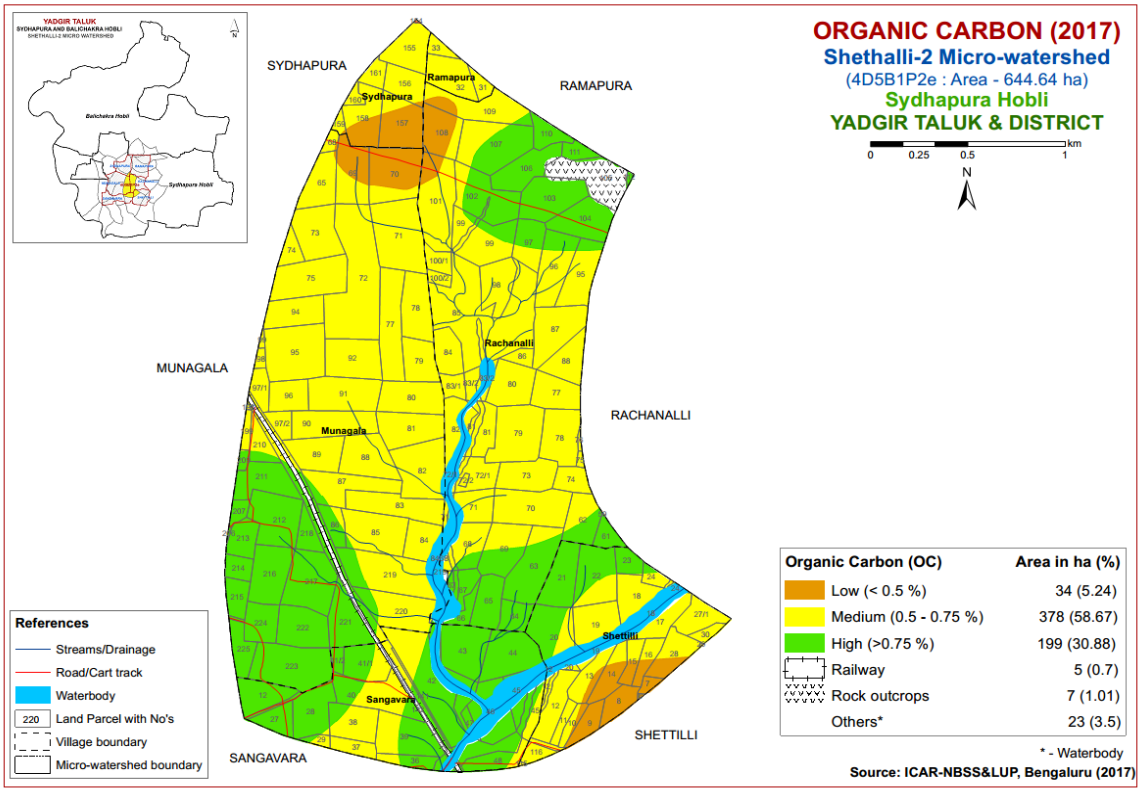


Fig.6.3 Soil Organic Carbon map of Shethalli-2 Microwatershed

6.4 Available Phosphorus

Available phosphorus content is low (<23 kg/ha) in maximum area of442 ha (69%) and are distributed in all parts of the microwatershed. Medium (23-57 kg/ha) in an area of about 169 ha (26%) and occur in the northern, northeastern and southwestern part of the microwatershed (Fig. 6.4).

6.5 Available Potassium

Available potassium content is medium (145-337 kg/ha) in a maximum area of about 502ha (78%) and are distributed in all parts of the microwatershed (Fig.6.5). High (>337 kg/ha) in an area of 109ha (17%) and are distributed in the southern and northern part of the microwatershed.

6.6 Available Sulphur

An area of about 265ha (41%) is low (<10ppm) in available sulphur content and are distributed in all parts of the microwatershed. Medium (10-20 ppm) in an area of about 233 ha (36%) and are distributed in the northern, southern and southeastern part of the microwatershed (Fig.6.6). An area of about 113 ha (18%) is high (>20 ppm) in available sulphur content and are distributed in the northern, central and eastern part of the microwatershed.

6.7 Available Boron

Available boron content is low (<0.5 ppm) in an area of about 173 ha (27%) and are distributed in the southern, western and northern part of the microwatershed. Medium (0.5-1.0 ppm) in maximum area of287 ha (44%) and are distributed in all parts of the microwatershed. An area of about 151ha (23%) is high (>1.0ppm) in available boron and are distributed in the northern, central and southern part of the microwatershed (Fig.6.7).

6.8 Available Iron

Available iron content is deficient (<4.5 ppm) in an area of about 99 ha (15%) and are distributed in the northern and southern part of the microwatershed. Sufficient (>4.5 ppm) in the maximum area of512 ha (79%) and are distributed in the major part of the microwatershed (Fig .6.8).

6.9 Available Manganese

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

6.10 Available Copper

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

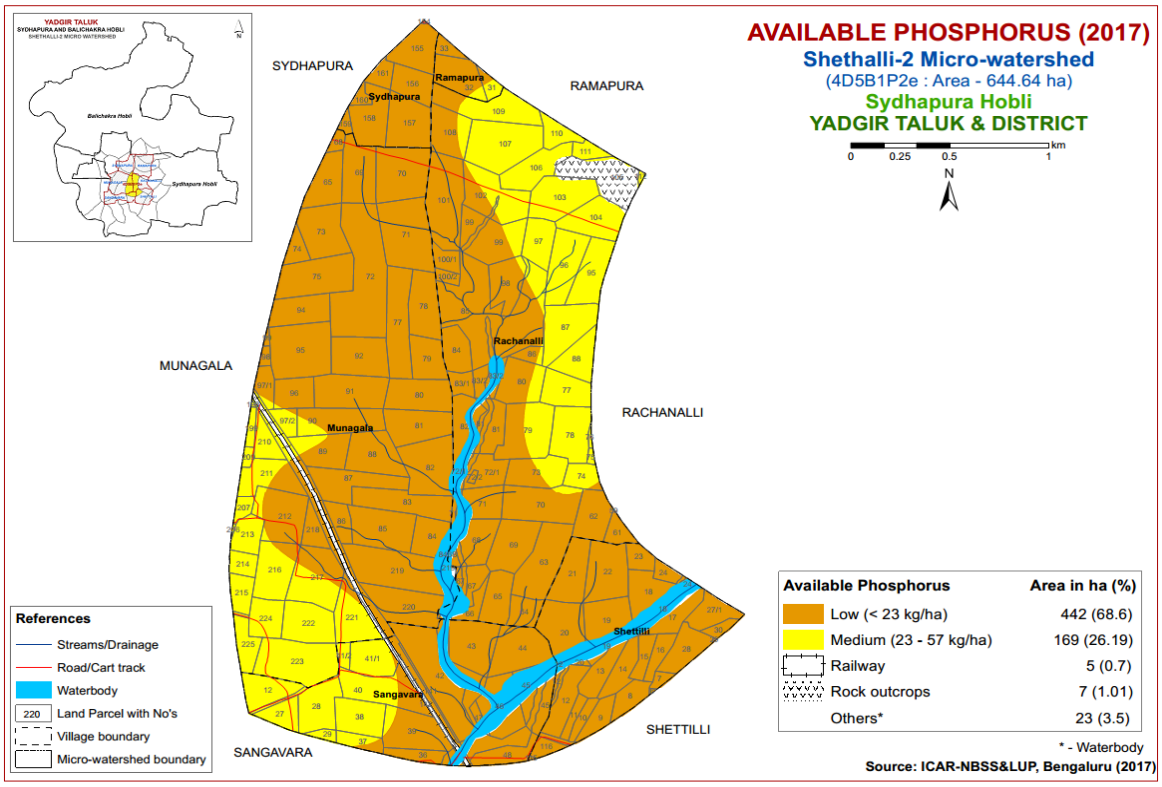


Fig.6.4 Soil Available Phosphorus map of Shethalli-2 Microwatershed

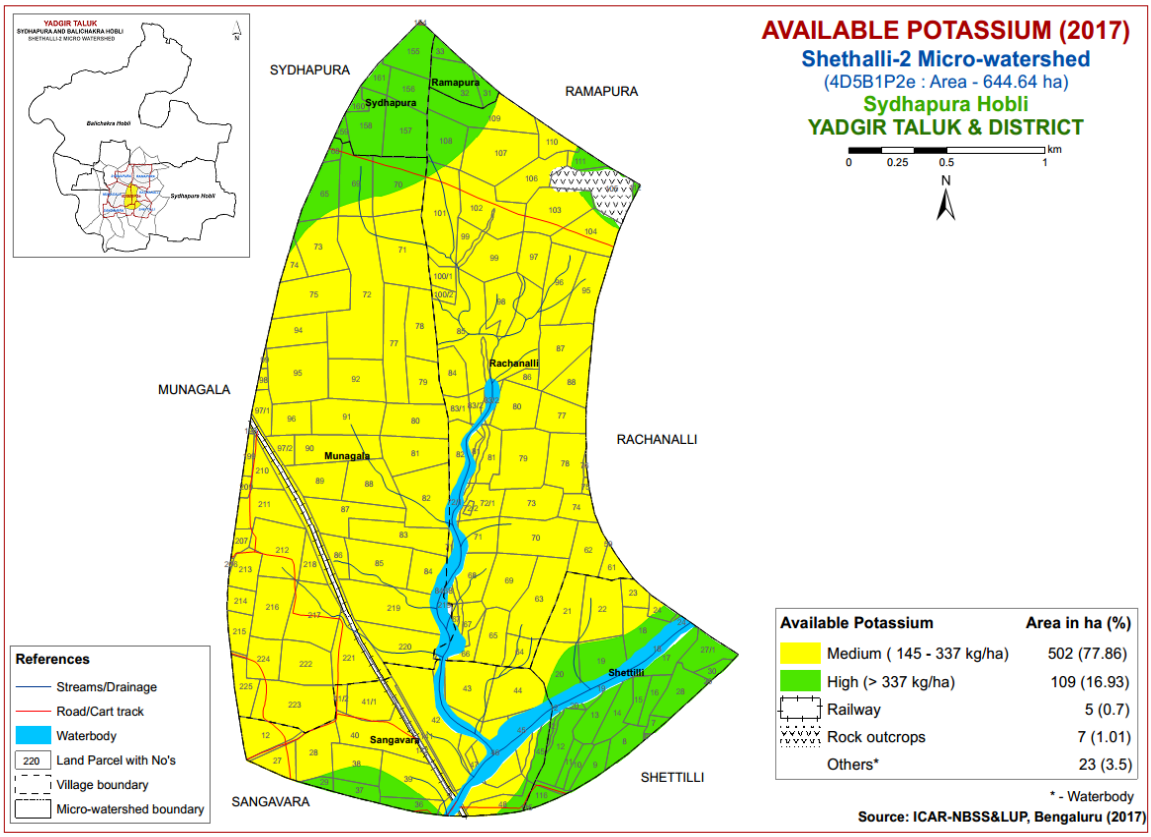


Fig.6.5 Soil Available Potassium map of Shethalli-2 Microwatershed

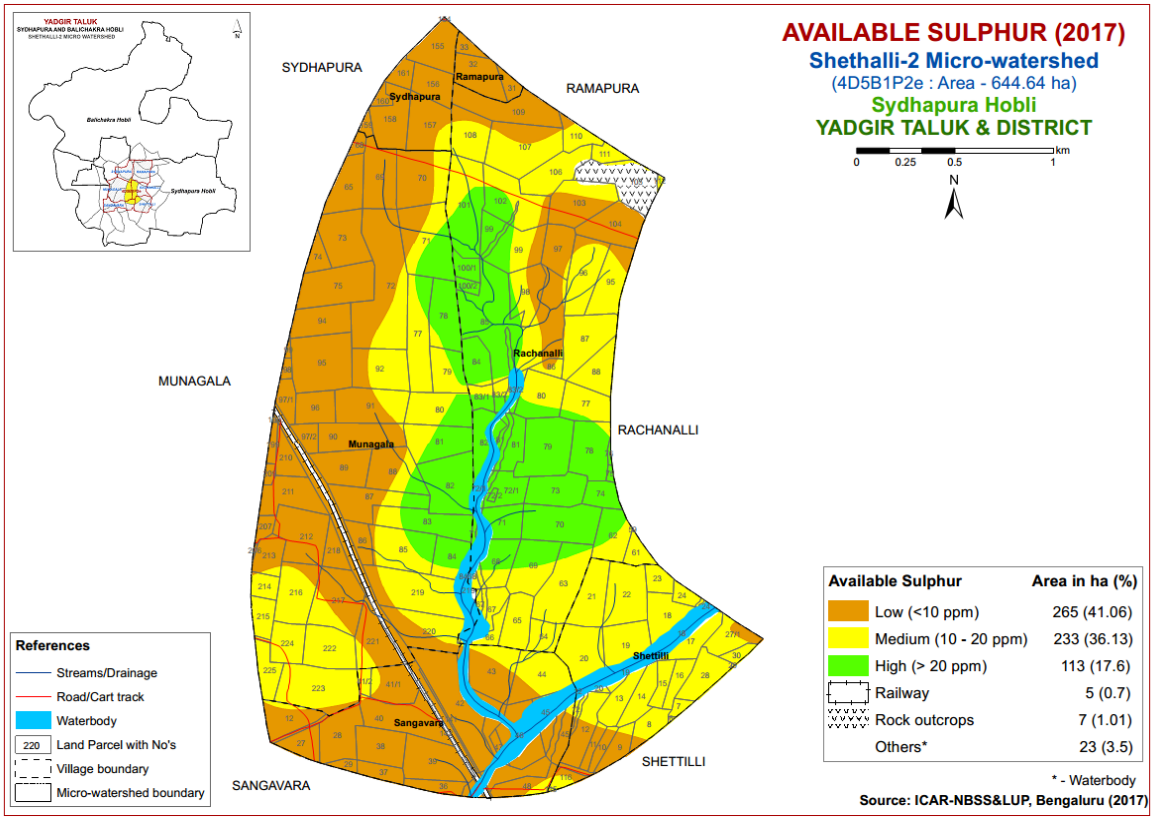


Fig.6.6 Soil Available Sulphur map of Shethalli-2 Microwatershed

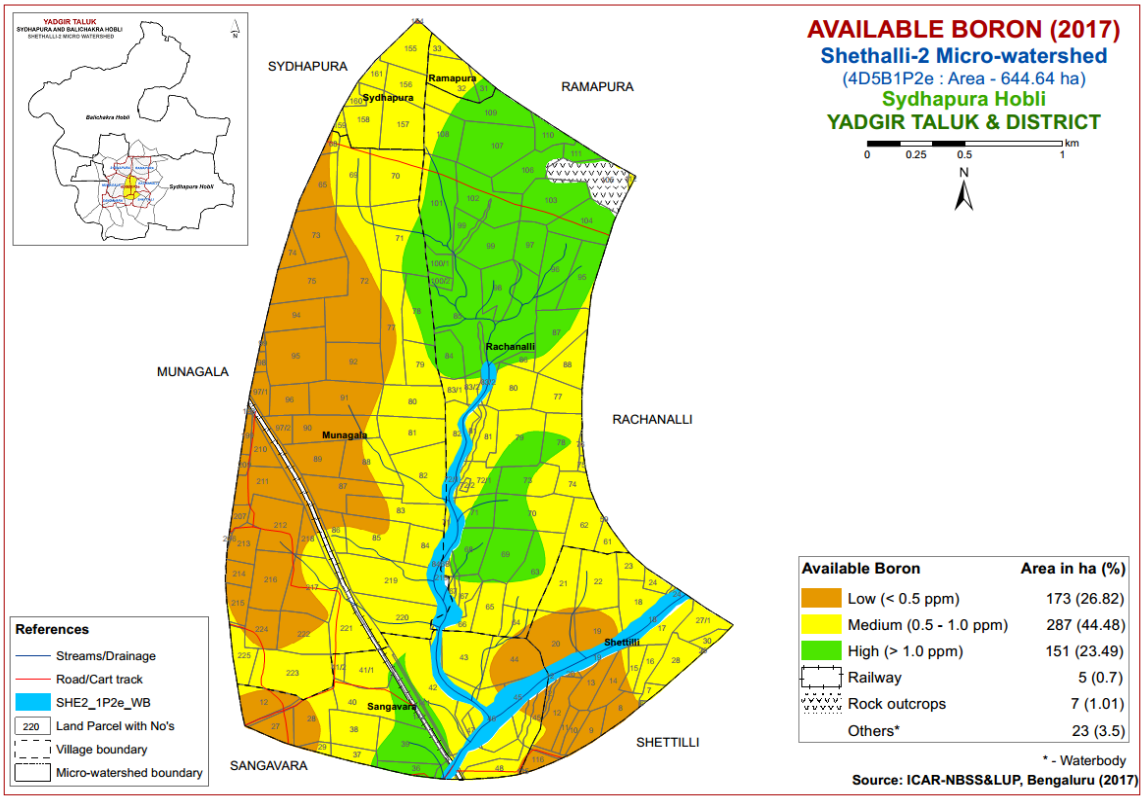


Fig.6.7 Soil Available Boron map of Shethalli-2 Microwatershed

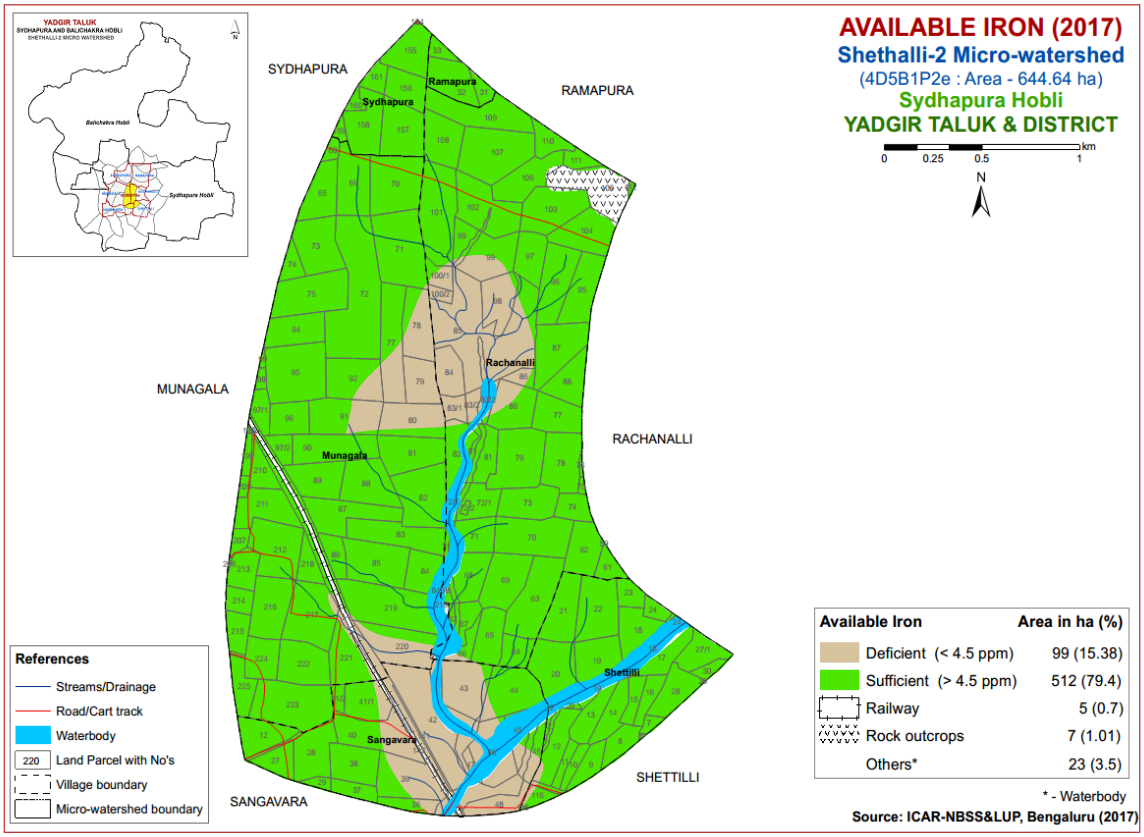


Fig.6.8 Soil Available Iron map of Shethalli-2 Microwatershed

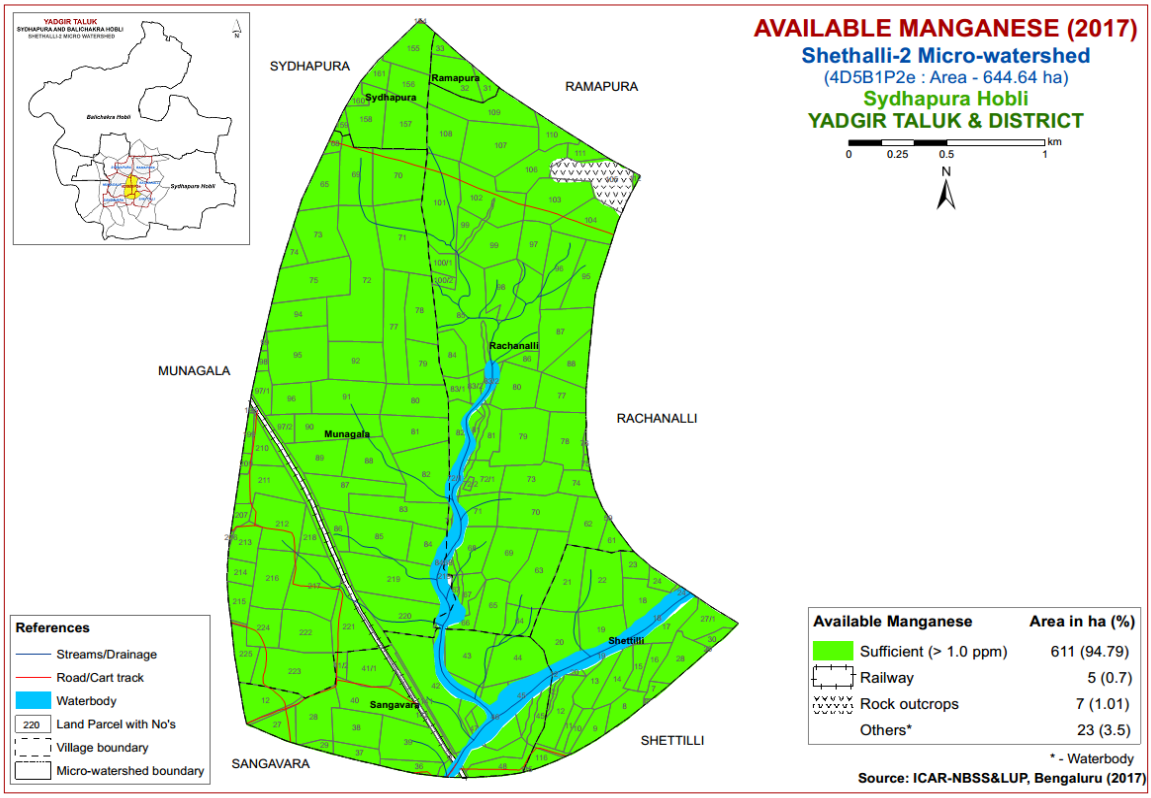


Fig.6.9 Soil Available Manganese map of Shethalli-2 Microwatershed

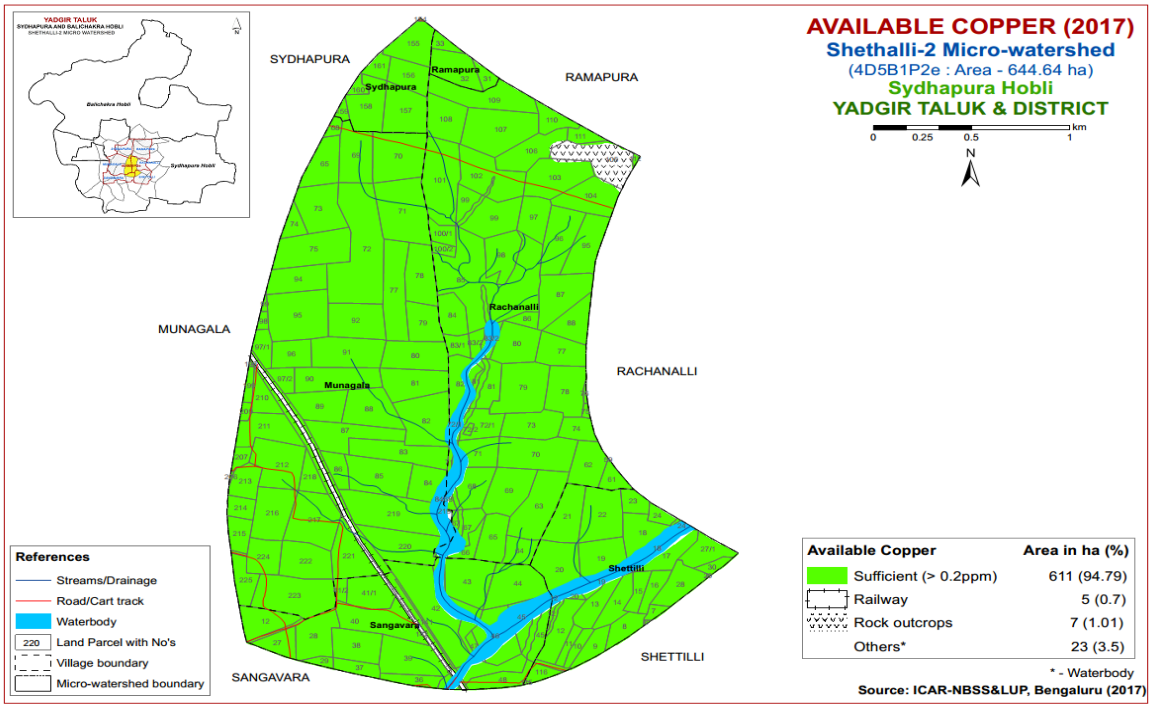


Fig.6.10 Soil Available Copper map of Shethalli-2 Microwatershed

6.11 Available Zinc

Available zinc content is deficient (<0.6 ppm) in the entire microwatershed area (Fig 6.11).

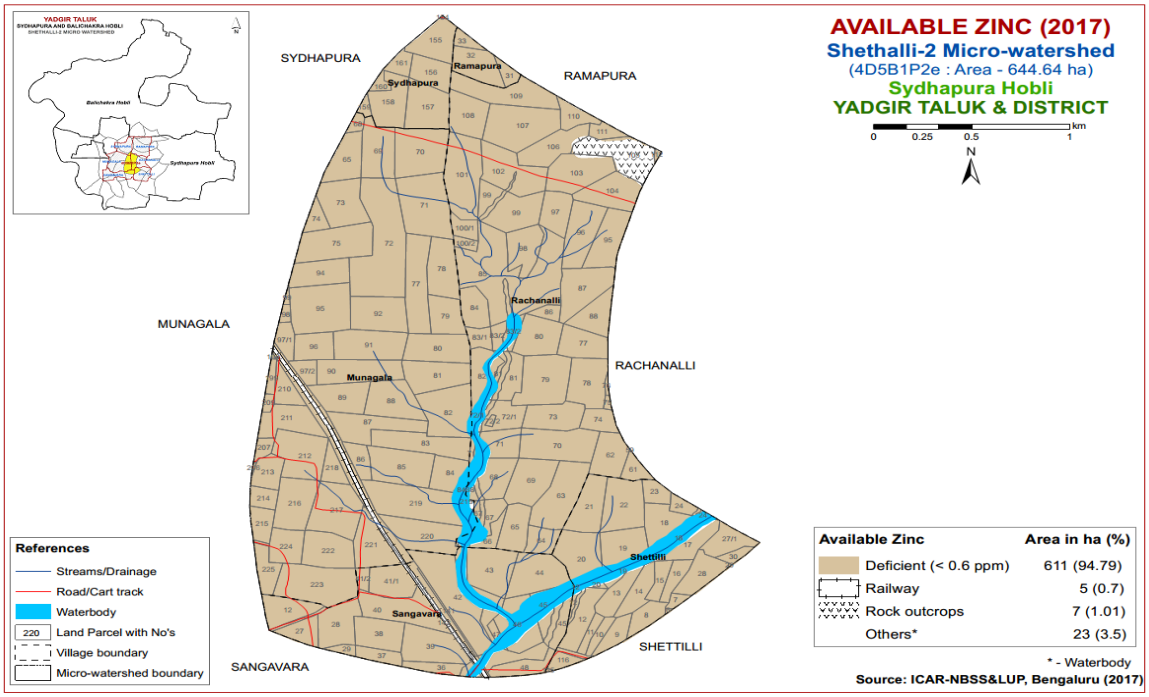


Fig.6.11 Soil Available Zinc map of Shethalli-2 Microwatershed

Chapter 7

LAND SUITABILITY FOR MAJOR CROPS

The soil and land resource units (soil phases) of Shethalli-2 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, S3 and N1are 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 lands with the limitations of soil depth and erosion are designated as S2re. For the microwatershed, the soil mapping units were evaluated and classified up to subclass level.

Using the above criteria, the soil map units of the microwatershed were evaluated and land suitability maps for26major 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.

No highly suitable (Class S1) lands are available for growing Sorghum in the microwatershed. Maximum area of about541 ha (84%) is moderately suitable (Class S2) for growing sorghum and are distributed in the major part of the microwatershed. They have minor limitations of calcareousness, graveliness, drainage and rooting depth. An area of about 70ha (10%) is marginally suitable (Class S3) for growing sorghum and are distributed in the southern, western and northern part of the microwatershed with major limitations of rooting depth and calcareousness.

Table 7.1 Soil-Site Characteristics of Shathalli-2 Microwatershed

Soil Map Units	Climate (P)(mm)	Growing period (Days)	Drain-age Class	Soil depth (cm)	Soil texture		Gravelliness		AWC (mm/m)	Slope (%)	Erosion	pH	EC (dSm^{-1})	ESP (%)	CEC [Cmol (p^{+})kg^{-1}]	BS (%)
					Sur-face	Sub-surface	Surface (%)	Sub-surface (%)								
JNKcB2	866	150	WD	50-75	sl	scl	-	-	51-100	1-3	moderate	8.42	0.15	0.18	14.5	100
JNKiB2g1	866	150	WD	50-75	sc	scl	15-35	-	51-100	1-3	moderate	8.42	0.15	0.18	14.5	100
YLRbB2	866	150	WD	50-75	ls	sc	-	15-35	51-100	1-3	moderate	6.91	0.07	0.45	6.90	100
YLRcB2g1	866	150	WD	50-75	sl	sc	15-35	15-35	51-100	1-3	moderate	6.91	0.07	0.45	6.90	100
YLRiB2	866	150	WD	50-75	sc	sc	-	15-35	51-100	1-3	moderate	6.91	0.07	0.45	6.90	100
GDLcB3	866	150	WD	25-50	sl	cl-c	-	-	<50	1-3	severe	9.72	1.21	90.68	30.40	100
KYTcB2	866	150	WD	25-50	sl	scl-sl	-	-	<50	1-3	moderate	7.07	0.12	0.17	8.20	99
BLDcB2	866	150	MWD	50-75	sl	cl	-	-	101-150	1-3	moderate	8.19	0.22	0.80	38.20	90
BLDiB1g1	866	150	MWD	50-75	sc	cl	15-35	-	101-150	1-3	slight	8.19	0.22	0.80	38.20	90
BLDmB2	866	150	MWD	50-75	c	cl	-	-	101-150	1-3	moderate	8.19	0.22	0.80	38.20	90
RHNcB2	866	150	MWD	75-100	sl	scl	-	-	101-150	1-3	moderate	8.16	0.22	8.81	8.99	99
RHNmB2	866	150	MWD	75-100	c	scl	-	-	101-150	1-3	moderate	8.16	0.22	8.81	8.99	99
KDRcB2	866	150	MWD	100-150	sl	sc-c	-	-	>200	1-3	moderate	8.34	0.15	0.22	33.20	100
KDRcB3	866	150	MWD	100-150	sl	sc-c	-	-	>200	1-3	severe	8.34	0.15	0.22	33.20	100
KDRiB2	866	150	MWD	100-150	sc	sc-c	-	-	>200	1-3	moderate	8.34	0.15	0.22	33.20	100
KDRmB2	866	150	MWD	100-150	c	sc-c	-	-	>200	1-3	moderate	8.34	0.15	0.22	33.20	100
SWRcB2	866	150	MWD	100-150	sl	c	-	-	>200	1-3	moderate	8.44	0.18	0.45	47.70	100
SWRmB2	866	150	MWD	100-150	c	c	-	-	>200	1-3	moderate	8.44	0.18	0.45	47.70	100
HGNiB2	866	150	MWD	>150	sc	c	-	-	>200	1-3	moderate	8.77	1.33	14.38	36.23	100
HGNmB2	866	150	MWD	>150	c	c	-	-	>200	1-3	moderate	8.77	1.33	14.38	36.23	100
TMKiB3	866	150	MWD	>150	sc	sc-c	-	-	>200	1-3	severe	9.60	0.35	16.57	21.83	100

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

Table 7.2 Land 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	5.5-5.9,8.1-8.5	<5.5,8.6-9.0	>9.0
Surface soil texture	Class	c, cl, sicl, sc	l, sil, sic	sl, ls	S, fragmental skeletal
Soil depth	Cm	100-75	50-75	30-50	<30
Gravel content	% vol.	5-15	15-30	30-60	>60
Salinity (EC)	dSm^{-1}	2-4	4-8	8-10	>10
Sodicity (ESP)	%	5-8	8-10	10-15	>15

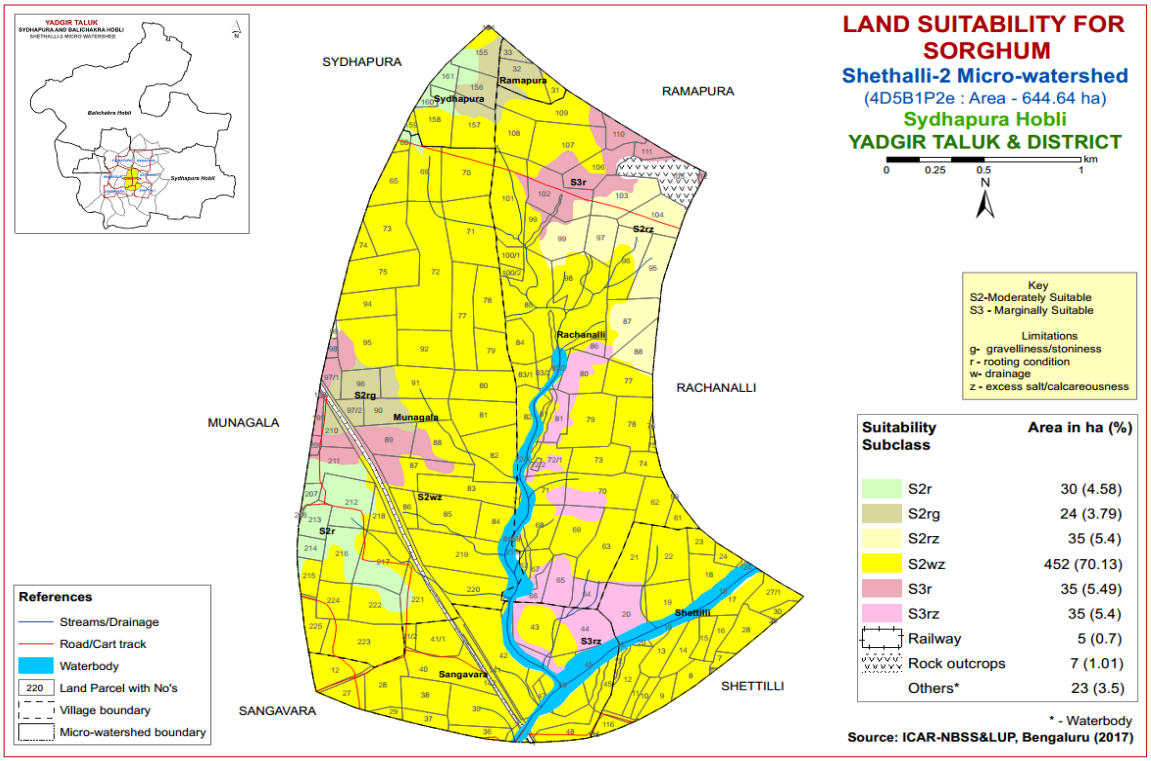


Fig. 7.1 Land Suitability map of Sorghum

7.2 Land Suitability for Maize (*Zea mays*)

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

No highly suitable (Class S1) lands are available for growing maize in the microwatershed. An area of about 54 ha (8%) is moderately suitable (Class S2) for

growing maize and are distributed in the northern and western part of the microwatershed with minor limitations of texture, graveliness and rooting depth. Marginally suitable lands (Class S3) for growing maize occupy an area of 557 ha (85%) and occur in all parts of the microwatershed. They have major limitations of texture, rooting depth, drainage and calcareousness.

Table 7.3 Land 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)	dS m^{-1}	<1.0	1.0-2.0	2.0-4.0	
Sodicity (ESP)	%	<10	10-15	>15	

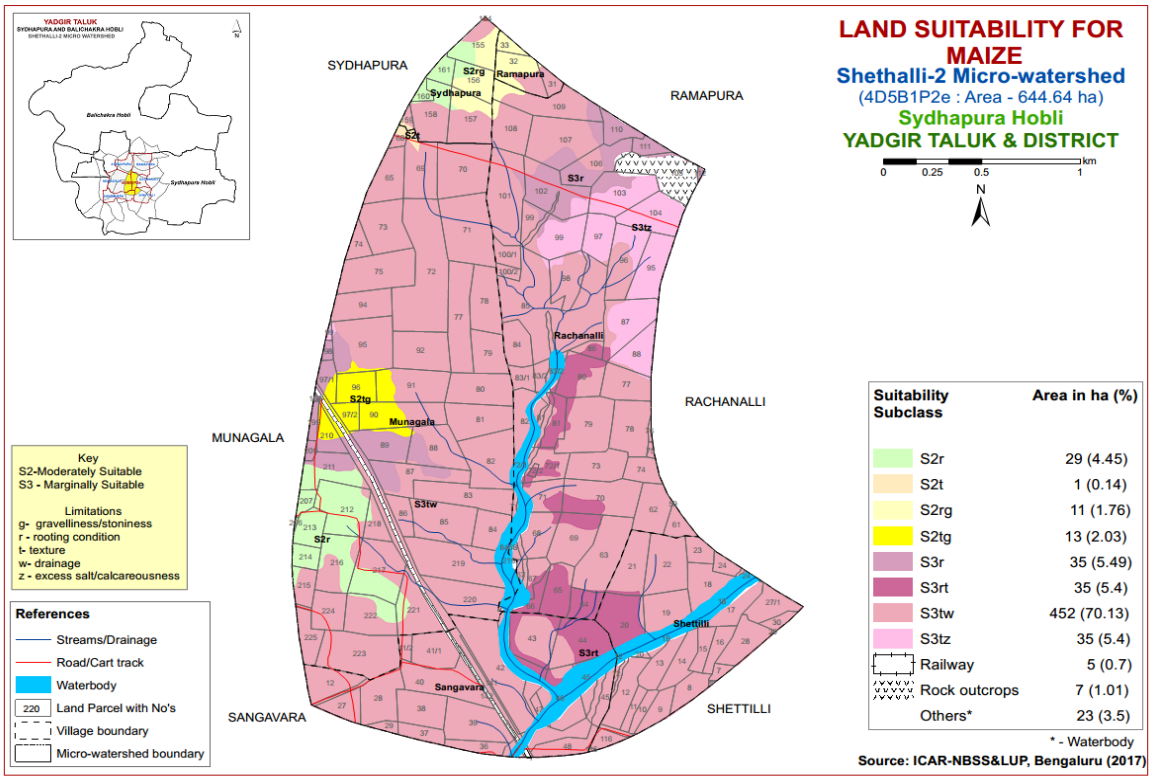


Fig. 7.2 Land Suitability map of Maize

7.3 Land Suitability for Bajra (*Pennisetum glaucum)*

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

Table 7.4 Land suitability criteria for Bajra

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	5.5-5.9,8.1-8.5	<5.5,8.6-9.0	>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

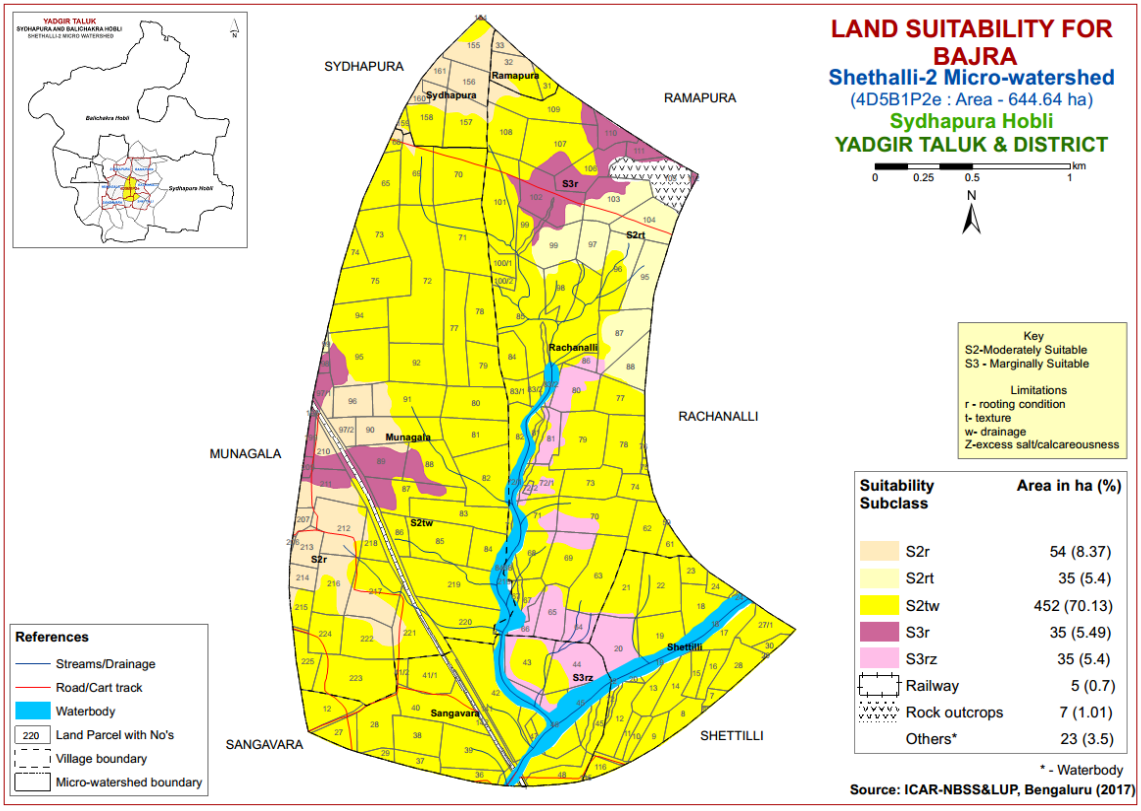


Fig. 7.3 Land Suitability map of Bajra

No highly suitable (Class S1) lands are available for growing bajra in the microwatershed. Maximum area of about 541 ha (83%) is moderately suitable (Class S2) for growing bajra and are distributed in the major part of the microwatershed. They have minor limitations of texture, drainage and rooting depth. An area of about 70 ha (10%) is marginally suitable (Class S3) for growing Bajra and is distributed in the northern, central, southern and western part of the microwatershed with major limitation of rooting depth and drainage.

7.4 Land Suitability for Groundnut (*Arachis hypogaea*)

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

No highly suitable (Class S1) lands are available for growing Groundnut in the microwatershed. A small area of about 40 ha (6%) is moderately suitable (Class S2) for groundnut and are distributed in the northern part of the microwatershed with minor limitation of rooting depth. Marginally suitable lands (Class S3) for growing groundnut occupy maximum area of about 571 ha (88%) and are distributed in the major part of the microwatershed. They have major limitations of texture, drainage and rooting depth.

Table 7.5 Land 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	

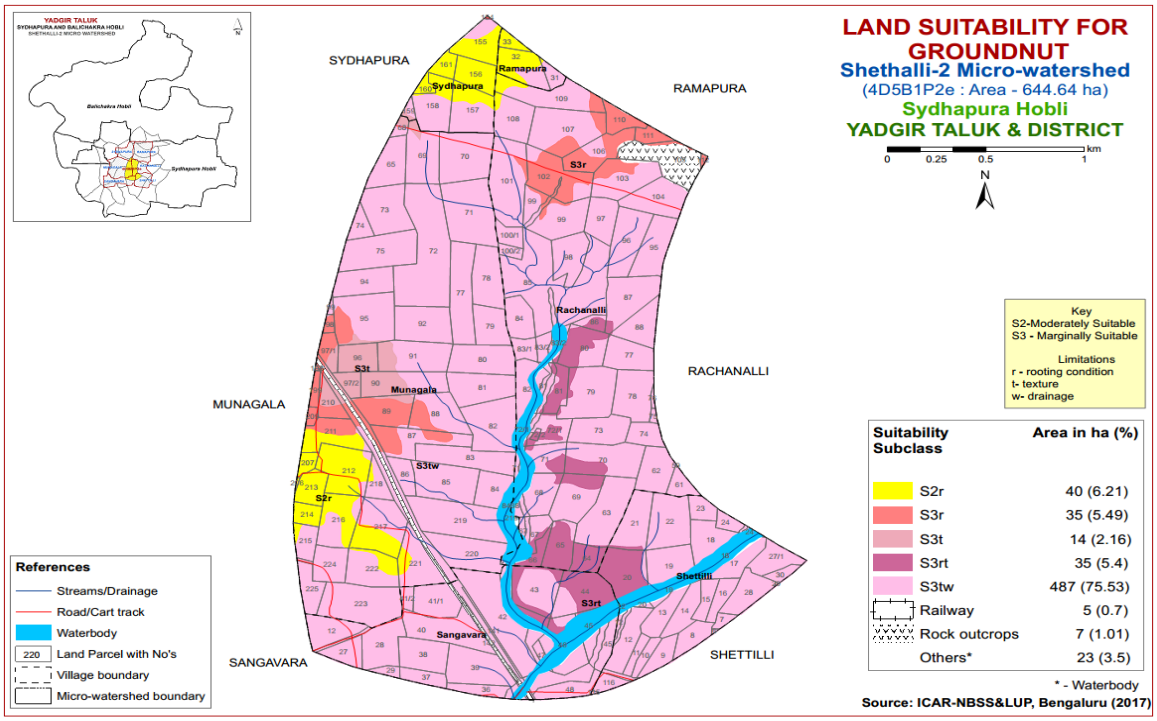


Fig. 7.4 Land Suitability map of Groundnut

7.5 Land Suitability for Sunflower (*Helianthus annus*)

Sunflower is one of the most important oilseed crop grown in an area of 4.1 lakh ha in the State in all the districts. The crop requirements for growing sunflower (Table 7.6) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing sunflower was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.5.

Table 7.6 Land 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	

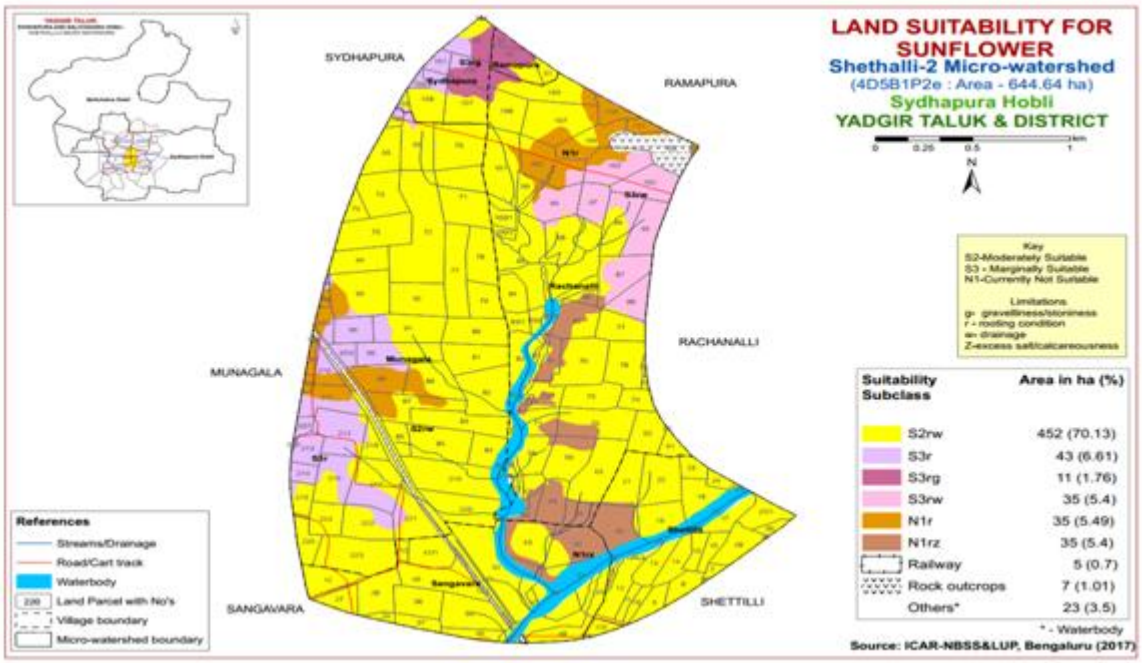


Fig. 7.5 Land Suitability map of Sunflower

No highly suitable (Class S1) lands available for growing sunflower in the microwatershed. Maximum area of about 452 ha (70%) is moderately suitable (Class S2) for sunflower and are distributed in the major part of the microwatershed with minor limitations of drainage and rooting depth. An area of about 89 ha (14%) is marginally suitable (Class S3) for sunflower and are distributed in the northern and western part of the microwatershed. They have major limitations of rooting depth, gravelliness and drainage. An area of about 70 ha (10%) is not suitable (Class N1) for sunflower and are distributed in the northern, central, western and southern part of the microwatershed with severe limitations of rooting depth and drainage.

7.6 Land suitability for Red gram (*Cajanus Cajan)*

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

No highly suitable (Class S1) lands are available for growing redgram in the microwatershed. Maximum area of about 452ha (70%) is moderately suitable (Class S2) for growing redgram and are distributed in the major part of the microwatershed with minor limitations of rooting depth, texture and drainage. An area of about 89 ha (14%) is marginally suitable (Class S3) for redgram and are distributed in the northern and western part of the microwatershed. They have major limitations of rooting depth, gravelliness and drainage. An area of about 70 ha (10%) is not suitable (Class N1) for redgram and are

distributed in the northern, central, western and southern part of the microwatershed with severe limitations of rooting depth and drainage.

Table 7.7 Land suitability criteria for Redgram

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)	ds m^{-1}	<1.0	1.0-2.0	>2.0	
Sodicity (ESP)	%	<10	10-15	>15	

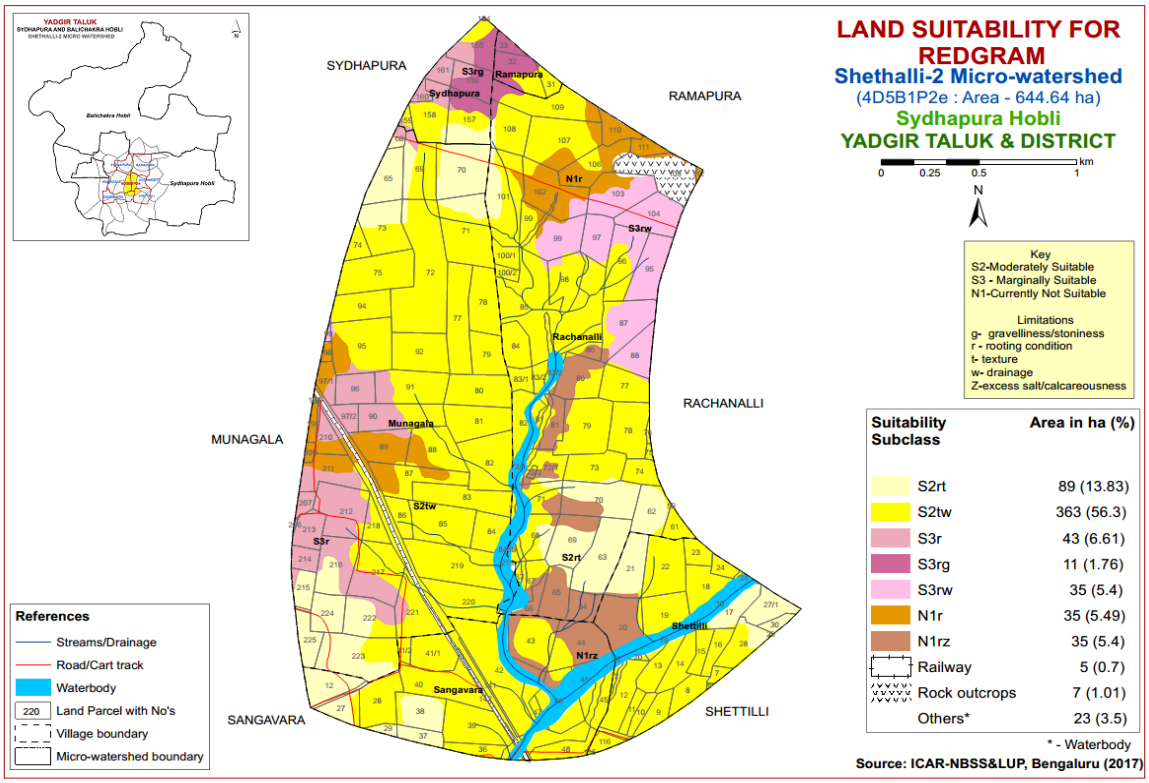


Fig. 7.6 Land Suitability map of Redgram

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

Bengal gram is one of the most important pulse crop grown in about 9.39 lakh ha area in Bijapur, Raichur, Kalaburgi, Dharwd, Belgaum and Bellary districts. The crop requirements for growing Bengal gram (Table 7.8) were matched with the soil-site characteristics (Table 7.1)and a land suitability map for growing Bengal gram was

generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.7.

No highly suitable (Class S1) lands available for growing redgram in the microwatershed. Maximum area of about 541 ha (84%) is moderately suitable (Class S2) for growing Bengal gram and are distributed in all parts of the microwatershed with minor limitations of drainage, calcareousness, gravelliness and rooting depth. Marginally suitable lands (Class S3) occupy an area of about 70 ha (10%) and are distributed in the northern, central, southern and western part of the microwatershed. They have major limitations of rooting depth and calcareousness.

Table 7.8 Land suitability criteria for Bengalgram

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

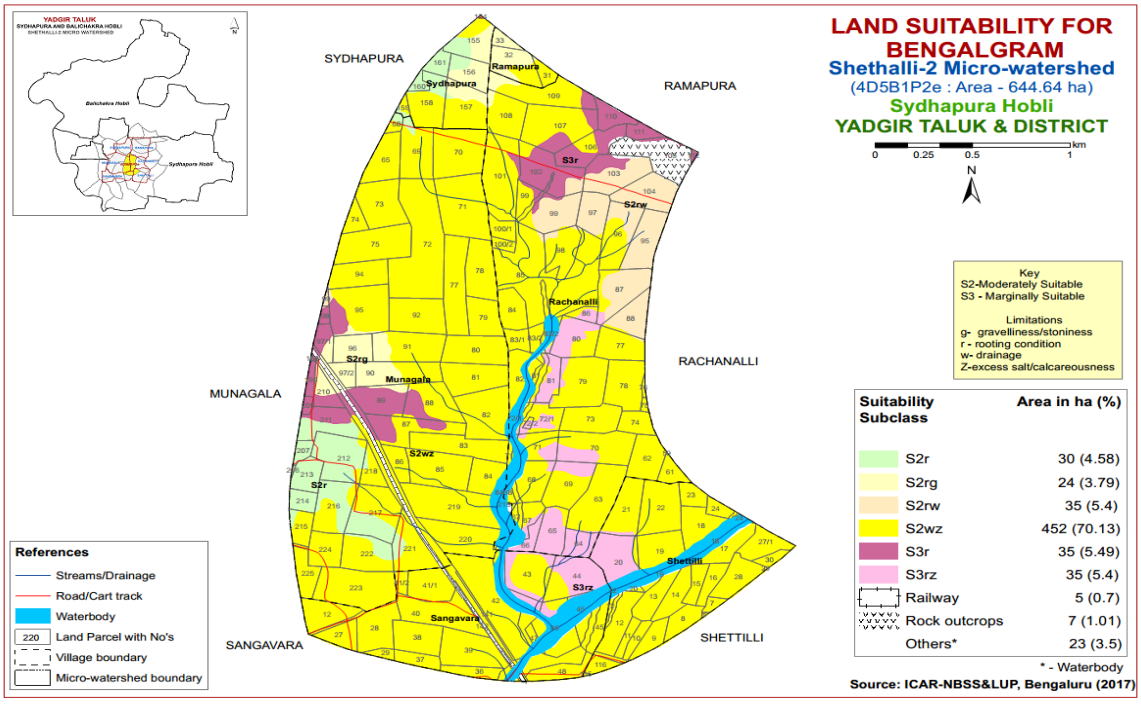


Fig. 7.7 Land Suitability map of Bengal gram

7.8 Land Suitability for Cotton (*Gossypium hirsutum*)

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

Table 7.9 Land suitability criteria for Cotton

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

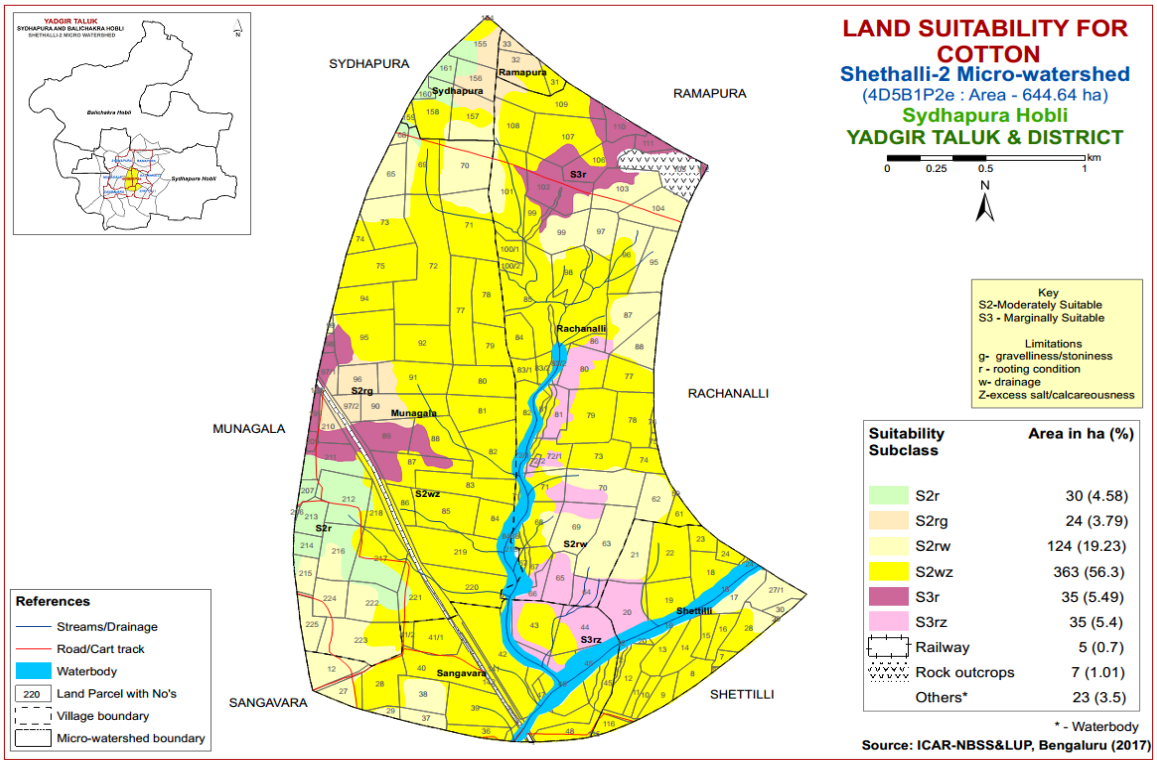


Fig. 7.8 Land Suitability map of Cotton

No highly suitable (Class S1) lands available for growing cotton in the microwatershed. Maximum area of about 541 ha (84%) is moderately suitable (Class S2) for growing cotton and are distributed in all parts of the microwatershed with minor limitations of drainage, calcareousness, gravelliness and rooting depth. Marginally suitable lands (Class S3) occupy an area of about 70 ha (10%) and are distributed in the northern, central, southern and western part of the microwatershed. They have major limitations of rooting depth and calcareousness.

7.9 Land Suitability for Chilli (*Capsicum annuum)*

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

No highly (Class S1) suitable lands available for growing chilli in the microwatershed. Maximum area of about 541 ha (85%) is moderately suitable (Class S2) for growing chilli and are distributed in all parts of the microwatershed with minor limitations of drainage, texture, gravelliness and rooting depth. Marginally suitable lands (Class S3) occupy an area of about 70 ha (10%) and are distributed in the northern, central, southern and western part of the microwatershed. They have major limitations of rooting depth and texture.

Table 7.10 Land suitability criteria for Chilli

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

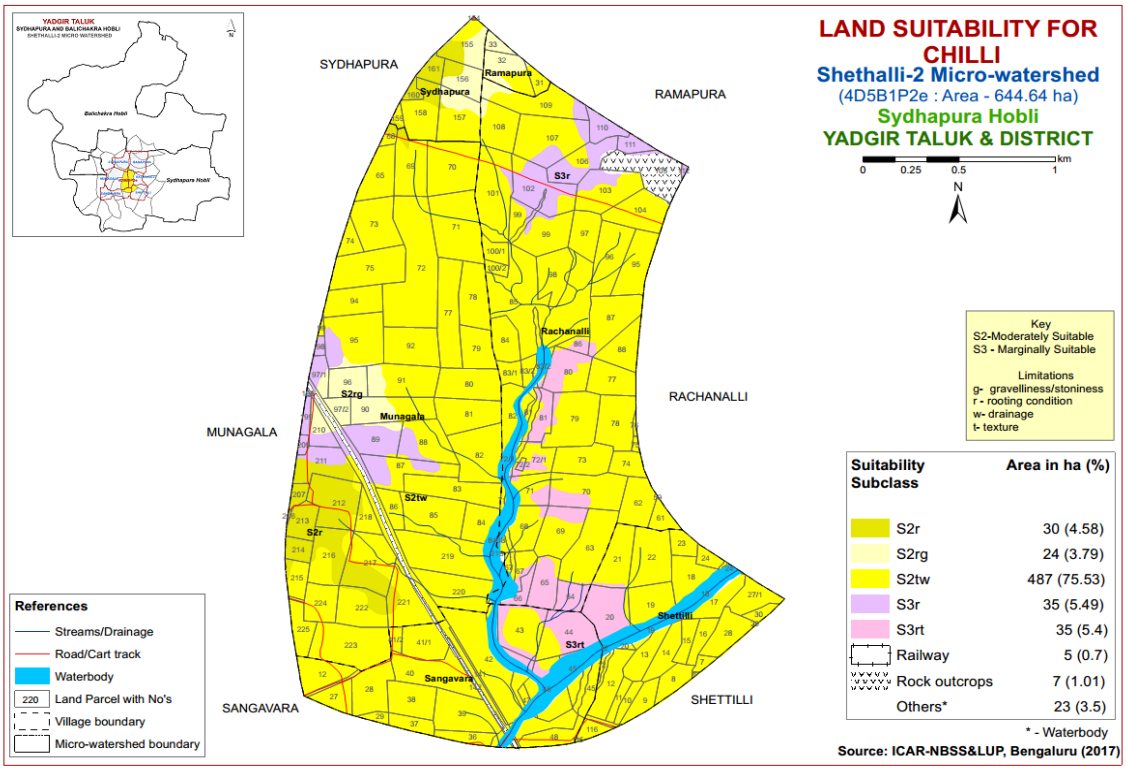


Fig 7.9 Land Suitability map of Chilli

7.10 Land Suitability for Tomato *(Lycopersicon esculentum)*

Tomato is one of the most important vegetable crop grown in about 0.61 lakh ha covering almost all the district of the State. The crop requirements for growing tomato (Table 7.11) 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 is given in Figure 7.10.

No highly (Class S1) suitable lands available for growing tomato in the microwatershed. An area of about 54 ha (9%) is moderately suitable (Class S2) for growing tomato and are distributed in the northern and western part of the microwatershed. They have minor limitations of gravelliness and rooting depth. Marginally suitable lands (Class S3) occupy major area of about 557 ha (86%) and are distributed in all parts of the microwatershed. They have moderate limitations of texture, rooting depth and drainage.

Table 7.11 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 , 20-24	15-1933-36	<15, >36
Soil moisture	Growing period	Days	>150	120-150	90-120	
Soil aeration	Soil drainage	class	Well drained	Mod. 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	5.5-6.07.3-8.4	8.4-9.0	>9.0
	$CaCO_3$ in root zone	%	Non calcareous	Slightly calcareous	Stronglycalcareous	
Roting 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

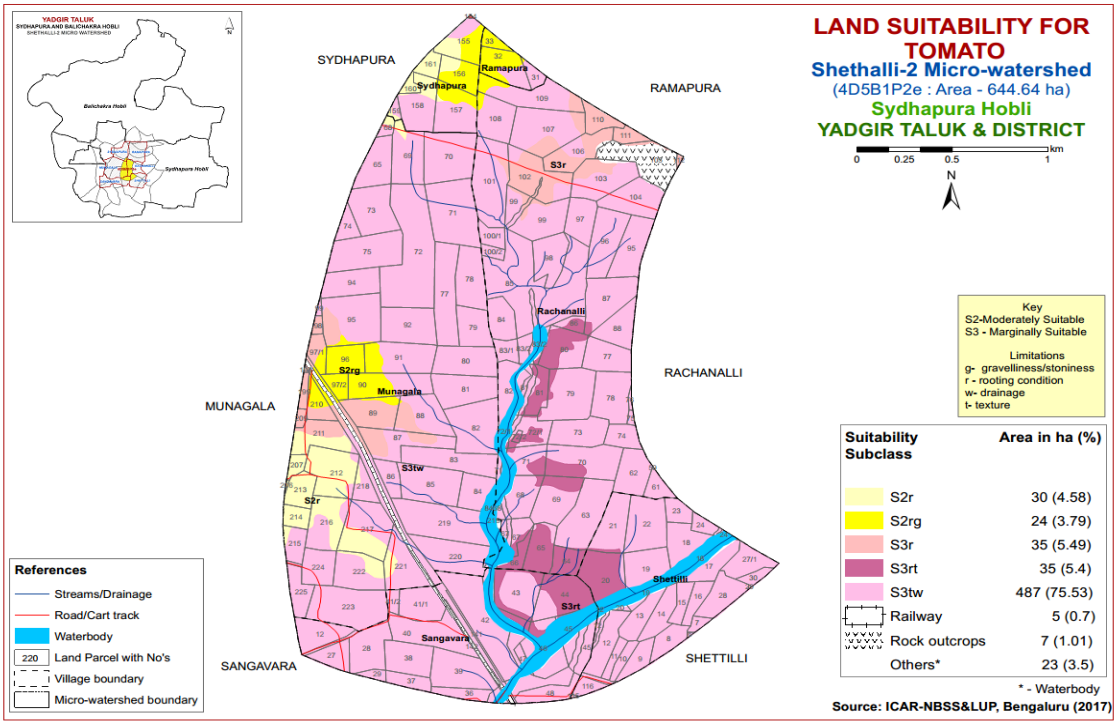


Fig 7.10 Land Suitability map of Tomato

7.11 Land Suitability for Drumstick (*Moringa oleifera*)

Drumstick is one of the most important vegetable crop grown in about 2403 ha in the State. The crop requirements for growing drumstick (Table 7.12) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing drumstick was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.11.

There are no highly (Class S1) suitable lands available for growing drumstick in the microwatershed. Major area of about 452ha (70%) is moderately suitable (Class S2) for drumstick and is distributed in the major part of the microwatershed. They have minor limitations of rooting depth, texture and drainage. An area of about 89ha (13%) is marginally suitable (Class S3) for growing drumstick and are distributed in the western and northern part of the microwatershed. They have moderate limitations of calcareousness and rooting depth. An area of about 70 ha (10%) is not suitable (Class N1) for growing drumstick and are distributed in the northern, southern, central and western part of the microwatershed. They have severe limitations of rooting depth and calcareousness.

Table 7.12 Land suitability criteria for Drumstick

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

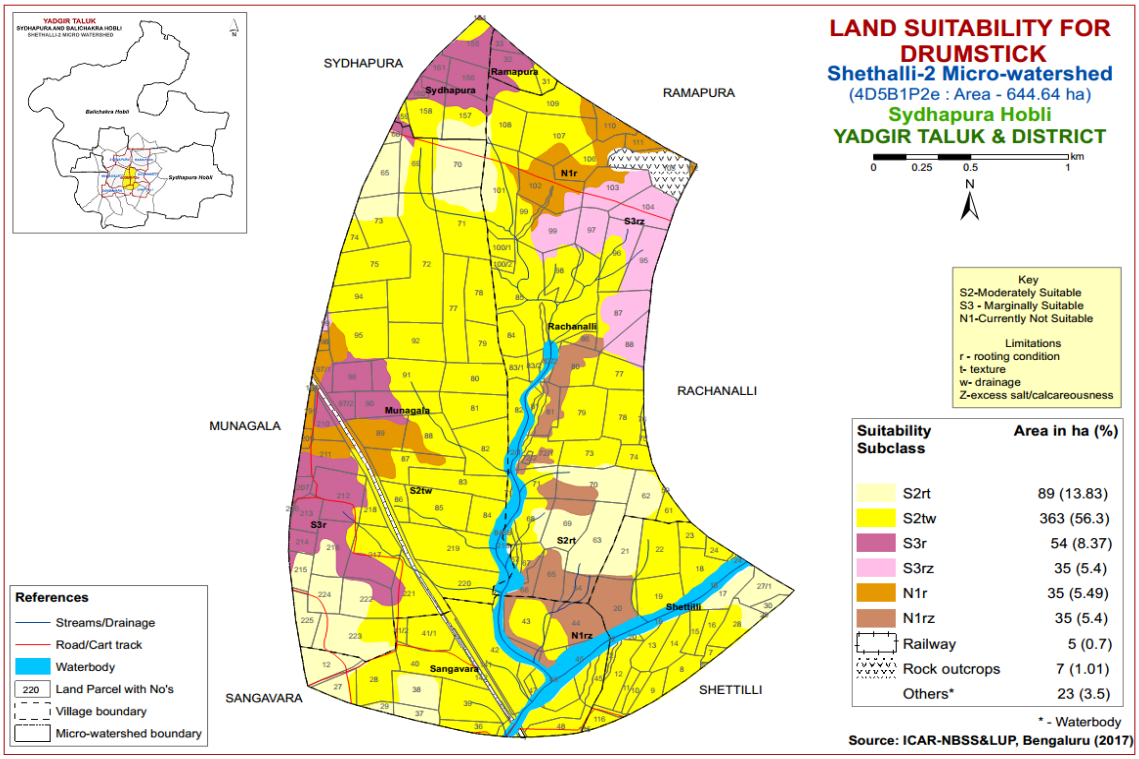


Fig 7.11 Land Suitability map of Drumstick

7.12 Land suitability for Mango (*Mangifera indica*)

Mango is one of the most important fruit crop grown in an area of 1.73 lakh ha in almost all the districts of the State. The crop requirements (Table 7.13) 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 7.12.

Table 7.13 Land 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 33-35	36-40	20-24
	Min. temp. beforeflowering	^{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 imper. 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	7.6-8.5,5.0-5.4	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	

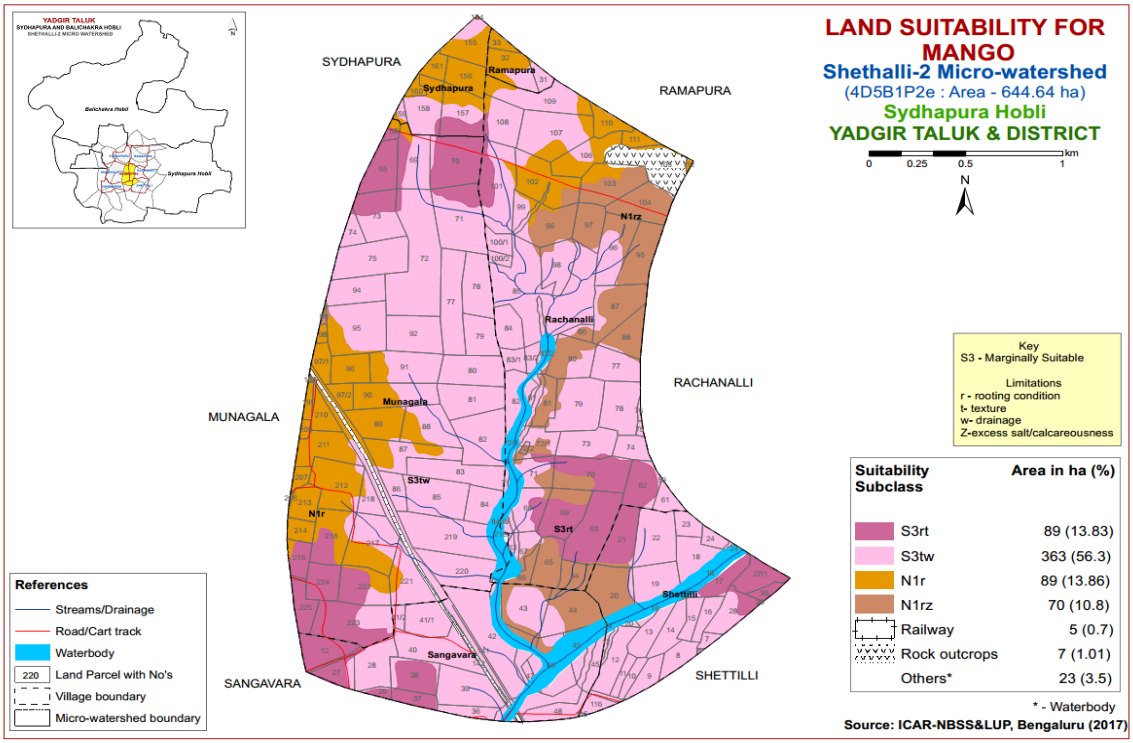


Fig. 7.12 Land Suitability map of Mango

No highly suitable (Class S1) and moderately suitable (Class S2) lands are available for growing mango in the microwatershed. Maximum area of 452 ha (70%) is marginally suitable (Class S3) for growing mango with moderate limitations of drainage, texture and rooting depth and are distributed in the major part of the microwatershed. An area of about 159 ha (25%) is not suitable (Class N1) for growing mango and occur in the northern, northeastern, central, southern and western part of the microwatershed with severe limitations of rooting depth and calcareousness.

7.13 Land suitability for Guava (*Psidium guajava*)

Guava is one of the most important fruit crop grown in an area of 0.06 lakh ha in almost all the districts of the State. The crop requirements (Table 7.14) 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 is given in Figure 7.13.

No highly suitable (Class S1) and moderately suitable (Class S2) lands are available for growing guava in the microwatershed. Maximum area of 541 ha (83%) is marginally suitable (Class S3) for growing guava with moderate limitations of drainage, texture and rooting depth and are distributed in the major part of the microwatershed. An area of about 70 ha (10%) is not suitable (Class N1) for growing guava and occur in the northern, central, southern and western part of the microwatershed with severe limitations of rooting depth and calcareousness.

Table 7.14 Land 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 24-27	37-42 20-23	
Soil moisture	Growing period	Days	>150	120-150	90-120	<90
Soil aeration	Soil drainage	Class	Well drained	Mod. to imperfectly	poor	Very poor
Nutrient availability	Texture	Class	scl, l, cl, sil	sl,sicl,sic.,sc,c	c(<60%)	c(>60%)
	pH	1:2.5	6.0-7.5	7.6-8.0:5.0-5.9	8.1-8.5:4.5-4.9	>8.5:<4.5
	$CaCO_3$ in root zone	%	Non calcareous	<10	10-15	>15
Rooting conditions	Soil depth	Cm	>100	75-100	50-75	<50
	Gravel content	% vol.	<15	15-35	>35	
Soil toxicity	Salinity	dS/m	<2.0	2.0-4.0	4.0-6.0	
	Sodicity	%	Non sodic	10-15	15-25	>25
Erosion	Slope	%	<3	3-5	5-10	>10

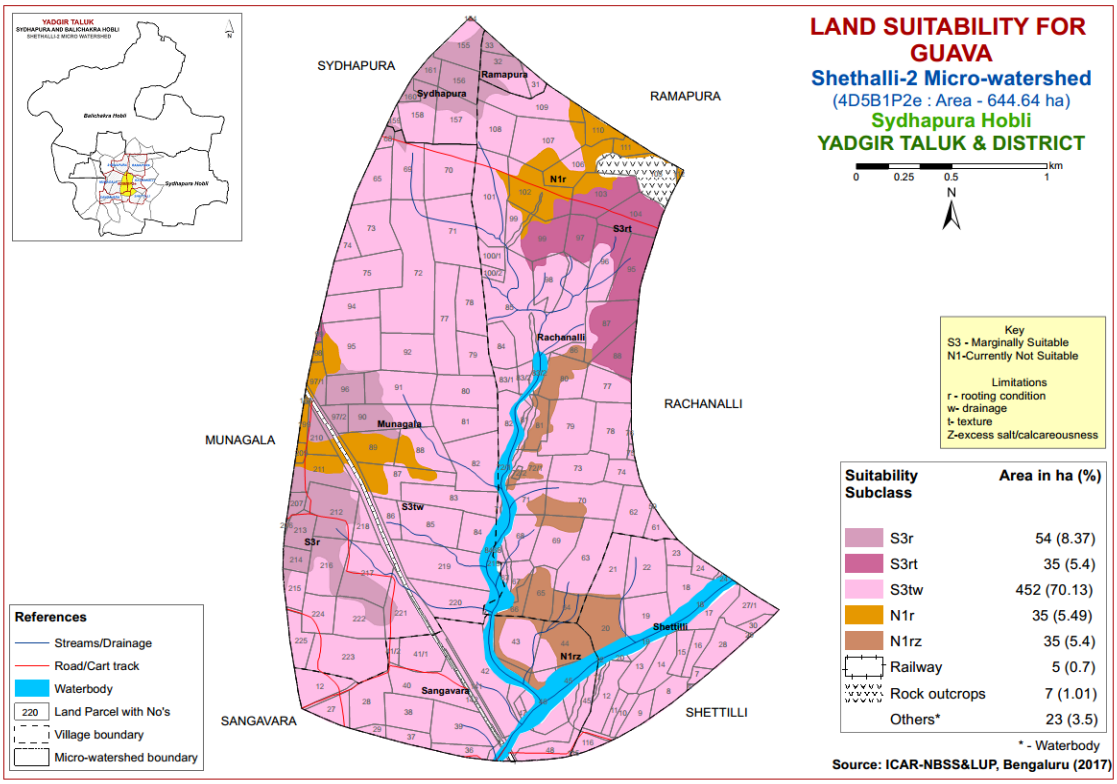


Fig. 7.13 Land Suitability map of Guava

No highly suitable (Class S1) and moderately suitable (Class S2) lands are available for growing guava in the microwatershed. Maximum area of 541 ha (83%) is marginally suitable (Class S3) for growing guava with moderate limitations of drainage, texture and rooting depth and are distributed in the major part of the microwatershed. An area of about 70 ha (10%) is not suitable (Class N1) for growing guava and occur in the northern, central, southern and western part of the microwatershed with severe limitations of rooting depth and calcareousness.

7.14 Land suitability for Sapota (*Manilkara zapota*)

Sapota is one of the most important fruit crop grown in an area of 29373 ha in almost all the districts of the State. The crop requirements (Table 7.15) for growing sapota were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing sapota was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.14.

No highly suitable (Class S1) and moderately suitable (Class S2) lands are available for growing Sapota in the microwatershed. Maximum area of about 541 ha (83%) is marginally suitable (Class S3) for growing sapota and are distributed in the major part of the microwatershed. They have moderate limitations of rooting depth, texture and drainage. An area of about 70 ha (10%) is not suitable (Class N1) for growing sapota and occur in the northern, western, central and southern part of the microwatershed with severe limitations of rooting depth and calcareousness.

Table 7.15 Land 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 24-27	37-42 20-23	>42 <18
Soilmoisture	Growing period	Days	>150	120-150	90-120	<120
Soil aeration	Soil drainage	Class	Well drained	Mod. 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

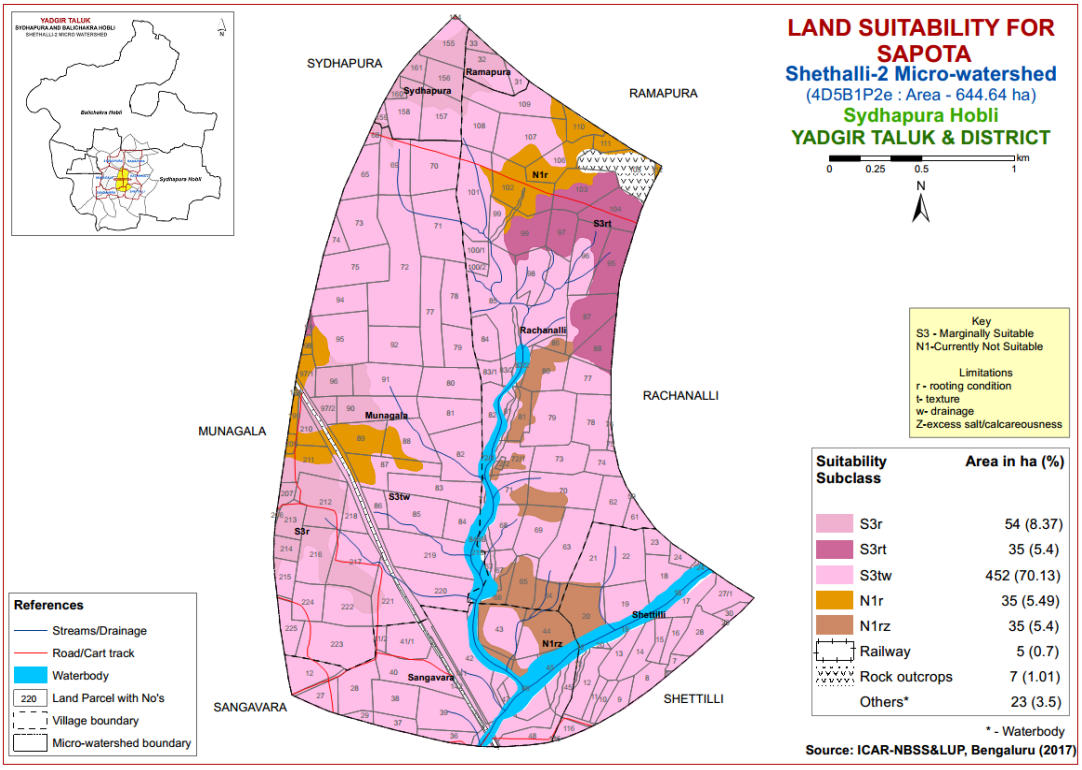


Fig. 7.14 Land Suitability map of Sapota

7.15 Land Suitability for Pomegranate (*Punica granatum*)

Pomegranate is one of the most important fruit crop commercially grown in about 18488 ha in Karnataka, mainly in Bijapur, Bagalkot, Koppal, Gadag and Chitradurga districts. The crop requirements for growing pomegranate (Table 7.16) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing

pomegranate was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.15.

Table 7.16 Land 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	35-38,25-29	39-40 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	
	pH	1:2.5	5.5-7.5	7.6-8.5	8.6-9.0	
Rooting conditions	Soil depth	Cm	>100	75-100	50-75	<50
	Gravel content	% vol.	nil	15-35	>35	
Soil toxicity	Salinity	ds/m	Nil	<9	>9	<50
	Sodicity	%	nil			
Erosion	Slope	%	<3	3-5	5-10	

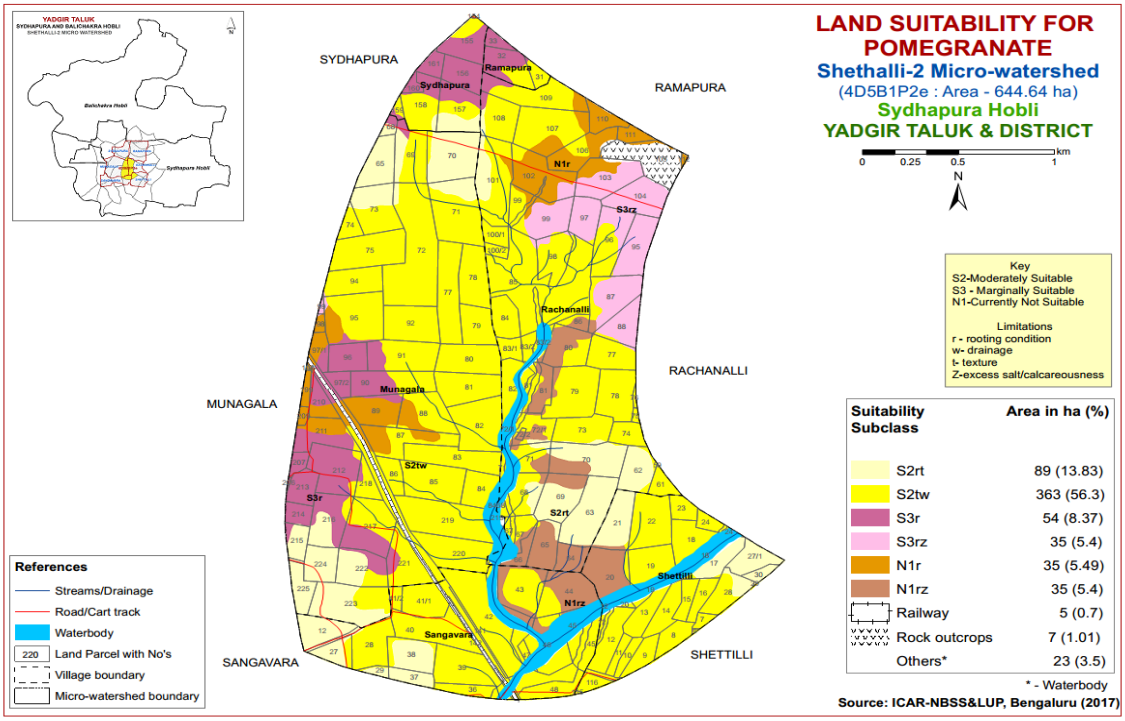


Fig 7.15 Land Suitability map of Pomegranate

No highly (Class S1) suitable lands available for growing pomegranate in the microwatershed. Major area of about 452 ha (70%) is moderately suitable (Class S2) for growing pomegranate and is distributed in all parts of the microwatershed. They have minor limitations of rooting depth, texture and drainage. An area of about 89 ha (13%) is marginally suitable (Class S3) for growing pomegranate and are distributed in the

northern, northeastern and western part of the microwatershed. They have moderate limitations of rooting depth and calcareousness. About 70 ha (10%) of area is not suitable (Class N1) for growing pomegranate and is distributed in the northern, southern and western part of the microwatershed with severe limitations of rooting depth and calcareousness.

7.16 Land Suitability for Musambi (*Citrus limetta*)

Musambi is one of the important fruit crop grown in an area of 3446 ha in almost all the districts of the State. The crop requirements for growing musambi (Table 7.17) 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 is given in Figure 7.16.

No highly suitable (Class S1) lands available for growing Musambi in the microwatershed. Major area of about452 ha (70%) is moderately suitable (Class S2) for growing Musambi and are distributed in all parts of the microwatershed. They have minor limitations of drainage, calcareousness and rooting depth. Marginally suitable (Class S3) lands occupy an area of about 89 ha (13%) and are distributed in the northern and western part of the microwatershed. They have moderate limitations of rooting depth and calcareousness. An area of about 70 ha (10%) is not suitable (Class N1) and are distributed in the northern, southern and western part of the microwatershed with severe limitations of rooting depth and calcareousness.

Table 7.17 Land 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 imperfectly drained	poorly	Very poorly
Nutrient availability	Texture	Class	scl, l, sicl, cl, s	sc, sc, c	c(>70%)	s, ls
	pH	1:2.5	6.0-7.5	5.5-6.47.6-8.0	4.0-5.4,8.1-8.5	<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	

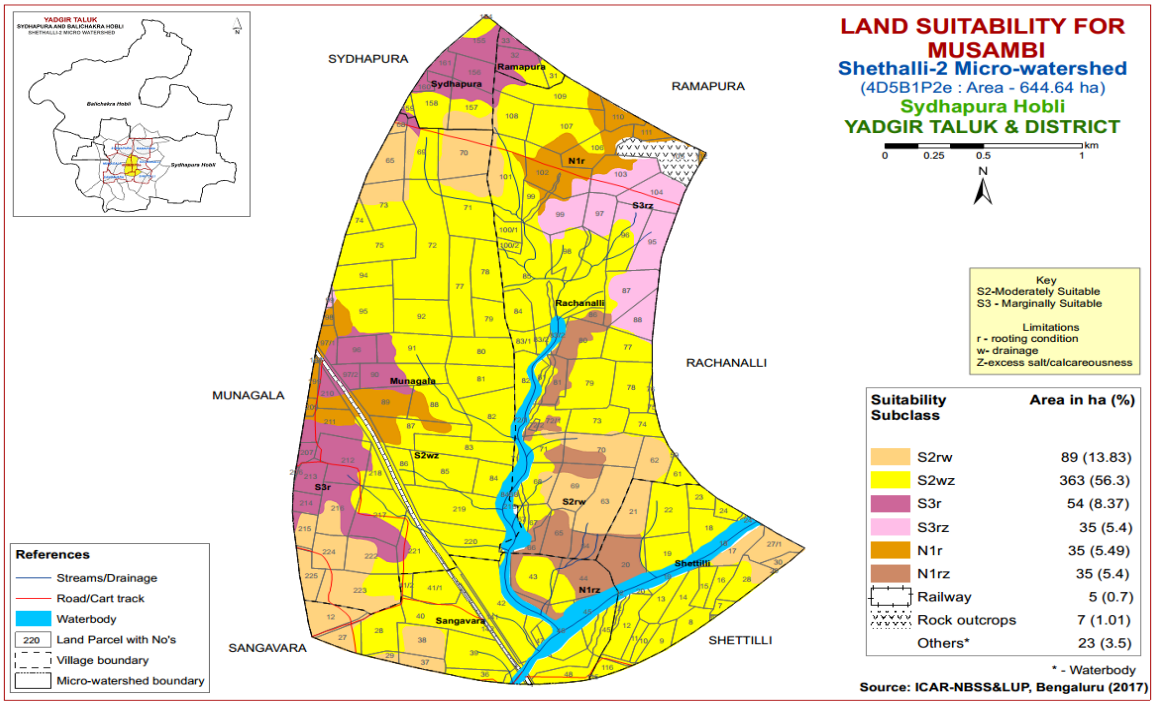


Fig. 7.16 Land Suitability map of Musambi

7.17 Land Suitability for Lime (*Citrus sp*)

Lime is one of the most important fruit crop grown in an area of 0.11 lakh ha in almost all the districts of the State. The crop requirements for growing lime (Table 7.18) 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 is given in Figure 7. 17.

Table 7.18 Land 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 24-27	36-40 20-23	>40 <20
Soil moisture	Growing period	Days	240-265	180-240	150-180	<150
Soil aeration	Soil drainage	Class	Well drained	Mod. to imper.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	5.5-6.4,7.6-8.0	4.0-5.4,8.1-8.5	<4.0,>8.5
	$CaCO_3$ in root zone	%	Non 34calcareous	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	

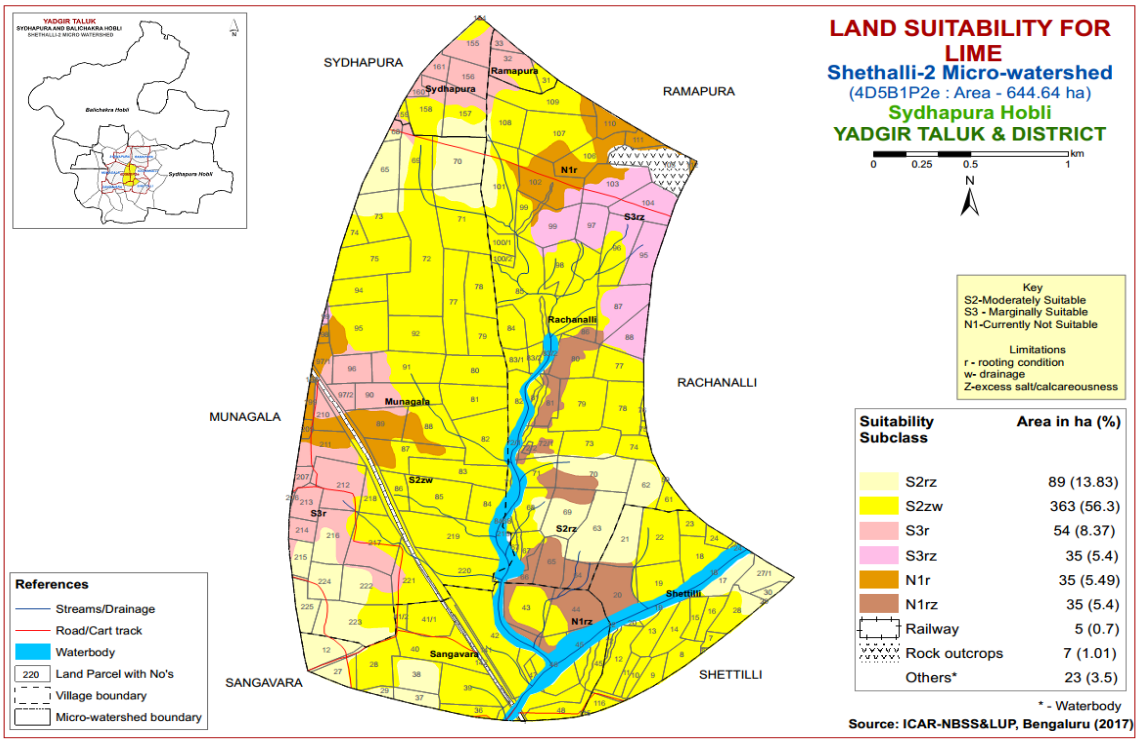


Fig. 7.17 Land Suitability map of Lime

No highly suitable (Class S1) lands available for growing Lime in the microwatershed. Major area of about 452 ha (70%) is moderately suitable (Class S2) for growing lime and are distributed in all parts of the microwatershed. They have minor limitations of drainage, calcareousness and rooting depth. Marginally suitable (Class S3) lands occupy an area of about 89 ha (13%) and are distributed in the northern and western part of the microwatershed. They have moderate limitations of rooting depth and calcareousness. An area of about 70 ha (10%) is not suitable (Class N) and are distributed in the northern, southern and western part of the microwatershed with severe limitations of rooting depth and calcareousness.

7.18 Land Suitability for Amla (*Phyllanthus emblica*)

Amla is one of the medicinal fruit crop grown in almost all the districts of the State. The crop requirements for growing amla (Table 7.19) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing amla was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.18.

No highly (Class S1) suitable lands available for growing amla in the microwatershed. Maximum area of about 541 ha (83%) is moderately suitable (Class S2) for growing amla and are distributed in all parts of the microwatershed. They have minor limitations of texture, drainage, calcareousness and rooting depth. Marginally suitable lands (Class S3) occupy an area of about 70 ha (10%) and are distributed in northern,

southern and western part of the microwatershed. They have moderate limitations of rooting depth and calcareousness.

Table 7.19 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

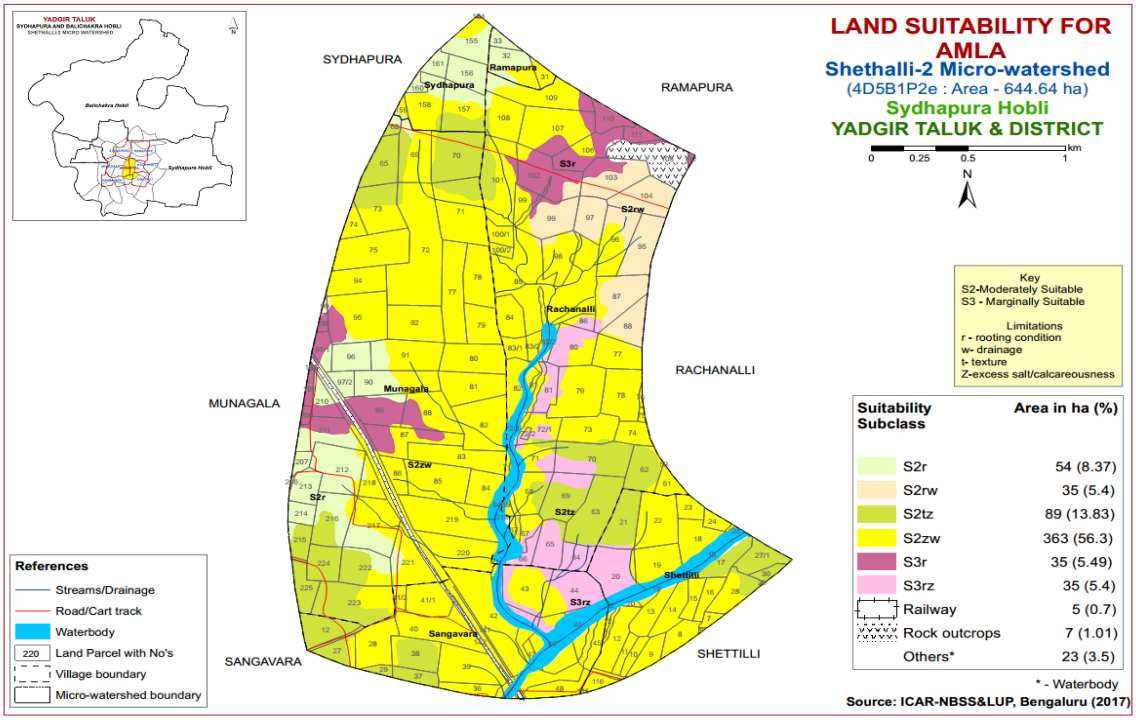


Fig. 7.18 Land Suitability map of Amla

7.19 Land Suitability for Cashew (*Anacardium occidentale)*

Cashew is one of the most important plantation nut crop grown in an area of 0.7 lakh ha in almost all the districts of the State. The crop requirements for growing cashew (Table 7.20) 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 7.19.

No highly suitable (Class S1) and moderately suitable (Class S2) lands are available for growing cashew in the microwatershed. A small area of about 40 ha (6%) is

marginally suitable (Class S3) for growing cashew and are distributed in the northern and western part of the microwatershed. They have moderate limitation of rooting depth. Maximum area of about 571 ha (89%) is not suitable (Class N1) for growing cashew and occur in the all parts of the microwatershed with severe limitations of texture, rooting depth and calcareousness.

Table 7.20 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	sc,c(red),scl, cl,	-	ls, sl	c (black)
	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	

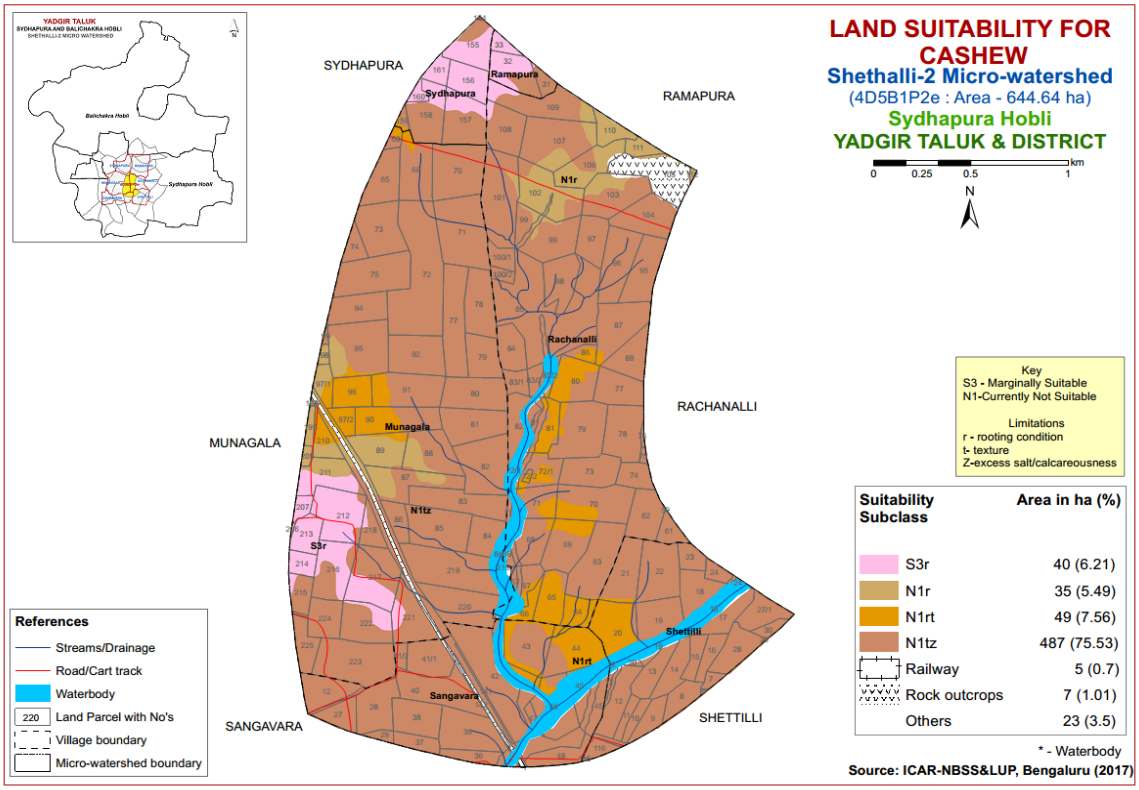


Fig. 7.19 Land Suitability map of Cashew

7. 20Land Suitability for Jackfruit (*Artocarpus heterophyllus*)

Jackfruit is one of the most important fruit crop grown in an area of 5368 ha in almost all the districts of the State. The crop requirements for growing jackfruit (Table 7.21) were matched with the soil-site characteristics (Table 7.1) and a land suitability map

for growing jackfruit was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.20.

No highly suitable (Class S1) and moderately suitable (Class S2) lands are available for growing Jackfruit in the microwatershed. Major area of about 541 ha (83%) is marginally suitable (Class S3) for growing Jackfruit and are distributed in all parts of the microwatershed. They have moderate limitations of rooting depth, texture and drainage. An area of about 70 ha (10%) is not suitable (Class N1) for growing Jackfruit and occur in the northern, central, southern and western part of the microwatershed with severe limitations of rooting depth and calcareousness.

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	-

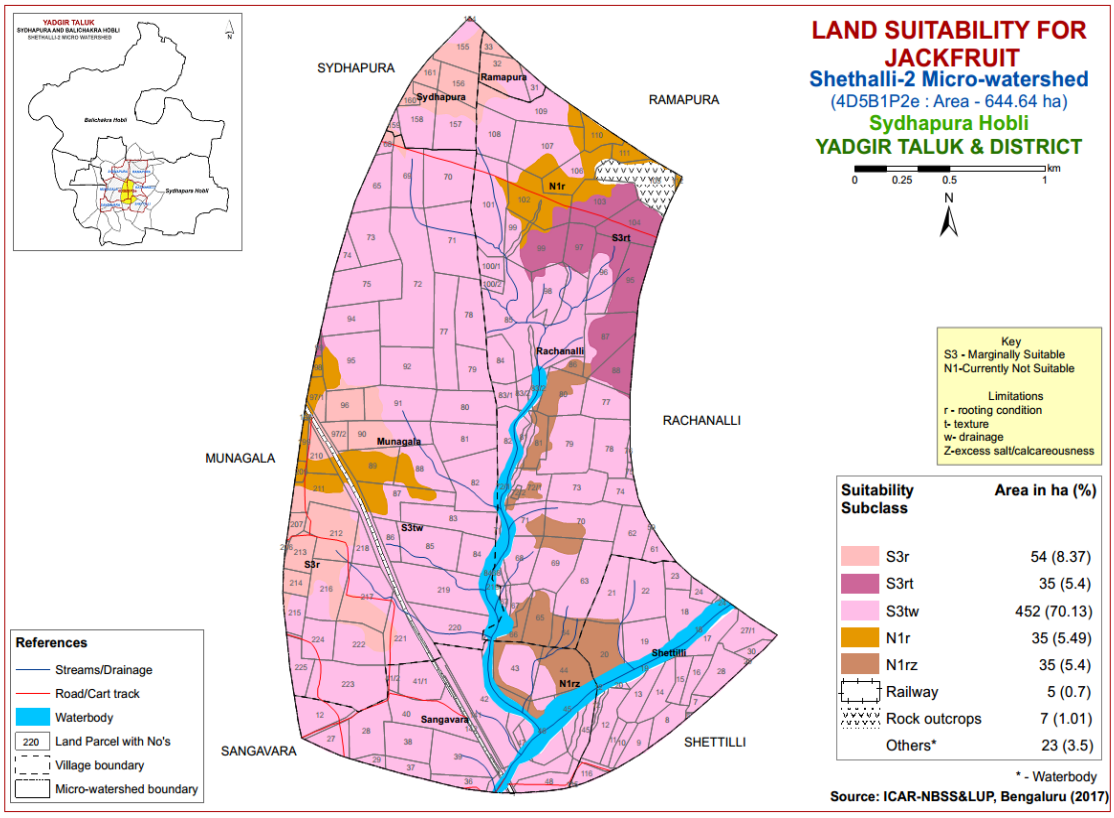


Fig. 7.20 Land Suitability map of Jackfruit

7.21 Land Suitability for Jamun (*Syzygium cumini*)

Jamun is an important fruit crop grown in almost all the districts of the State. The crop requirements for growing jamun (Table 22) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing jamun was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.21.

Table 7.22 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

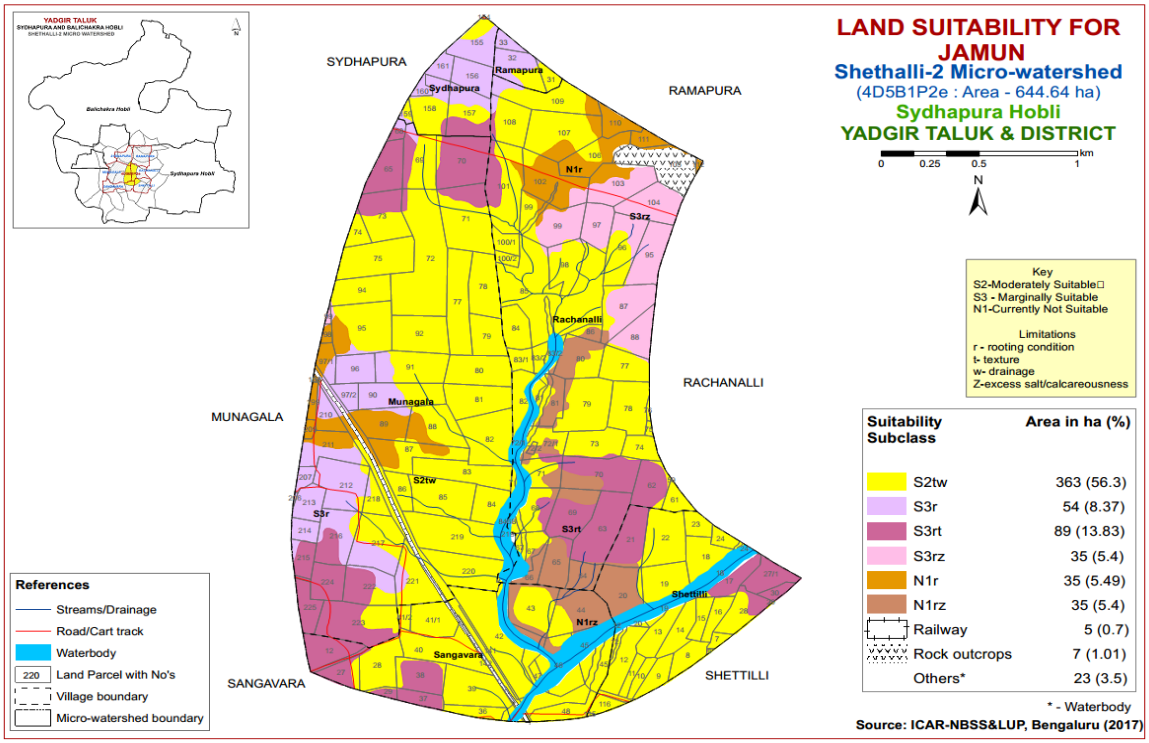


Fig. 7.21 Land Suitability map of Jamun

No highly suitable (Class S1) lands are available for growing Jamun in the microwatershed. Maximum area of about 363 ha (56%) is moderately suitable (Class S2) for growing Jamun and are distributed in all parts of the microwatershed. They have minor limitations of texture and drainage. An area of about 178 ha (27%) is marginally suitable (Class S3) for growing Jamun and are distributed in the northern, northeastern,

western, southwestern and southern part of the microwatershed. They have moderate limitations of texture, calcareousness and rooting depth. About 70 ha (10%) of area is not suitable (Class N1) for growing Jamun and are distributed in the northern, central, southern and western part of the microwatershed with severe limitations of rooting depth and calcareousness.

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

Custard apple is one of the most important fruit crop grown in almost all the districts of the State. The crop requirements for growing custard apple (Table7.23) 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 is given in Figure 7.22.

No highly (Class S1) suitable lands for growing custard apple in the microwatershed. Maximum area of about 541 ha (83%) is moderately suitable (Class S2) for growing custard apple with minor limitations of drainage, calcareousness and rooting depth and are distributed in all parts of the microwatershed. An area of about 70 ha (10%) is marginally suitable (Class S3) for growing custard apple and are distributed in the northern, southern and western part of the microwatershed with moderate limitations of rooting depth and calcareousness.

Table 7.23 Land suitability criteria for Custard apple

Crop requirement			**Rating**			
Soil –site characteristics		**Unit**	**Highly suitable (S1)**	**Moderately suitabl (S2)**	**Marginally suitabl (S3)**	**Not suitabl (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	5.0-5.5,8.4-9.0	>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	

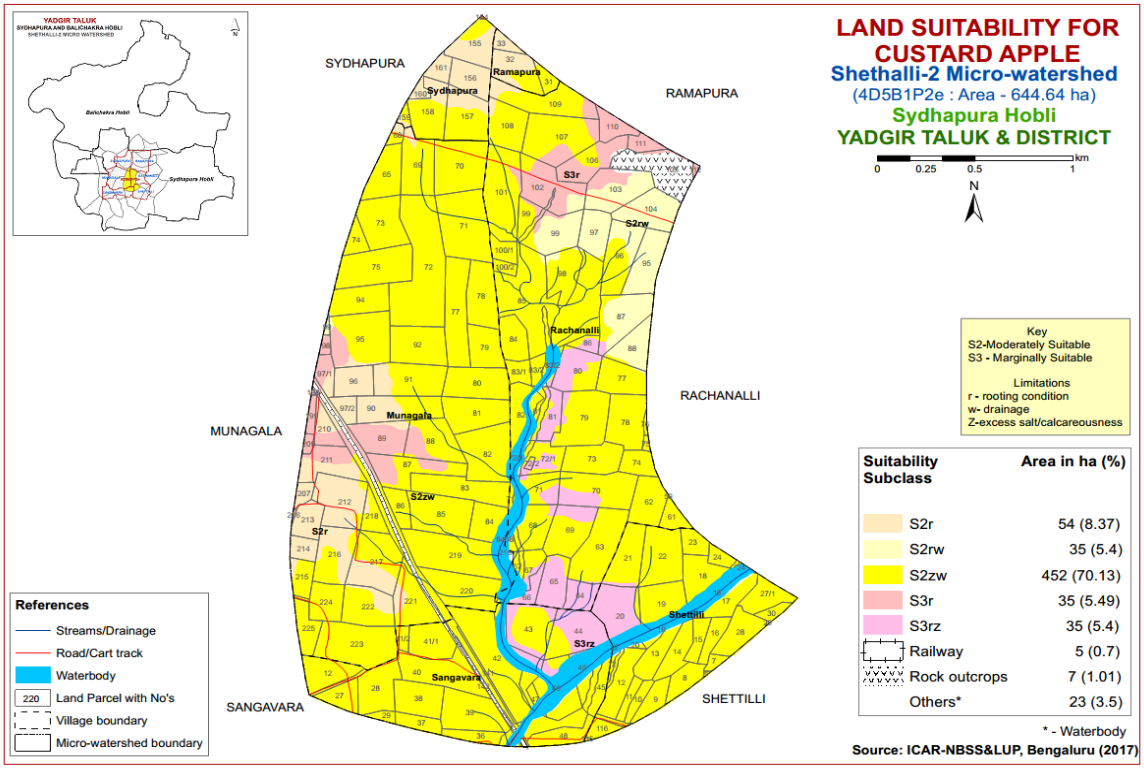


Fig. 7.22 Land Suitability map of Custard Apple

7.23 Land Suitability for Tamarind (*Tamarindus indica*)

Tamarind is the most important spice crop grown in almost all the districts of the state. The crop requirements for growing tamarind (Table 7.24) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing tamarind was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Fig. 7.23.

No highly suitable (Class S1) lands are available for growing Tamarind in the microwatershed. Maximum area of about 363 ha (56%) is moderately suitable (Class S2) for growing Tamarind and are distributed in all parts of the microwatershed. They have minor limitations of texture and drainage. Marginally suitable (Class S3) lands for growing Tamarind occupy an area of about 89 ha (14%) and are distributed in the northern and southern part of the microwatershed. They have moderate limitations of rooting depth and drainage. An area of about 159 ha (25%) is not suitable (Class N1) for growing Tamarind and occur in the northern, northeastern, central, southern and western part of the microwatershed with severe limitations of rooting depth and calcareousness.

Table 7.24 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

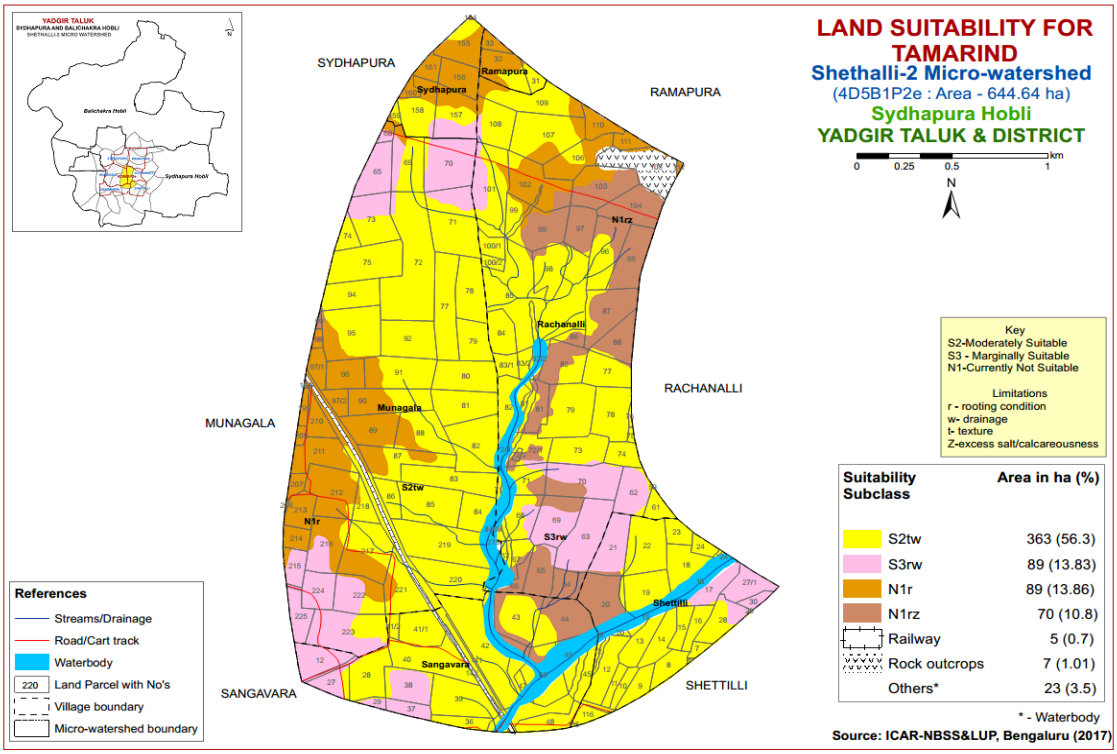


Fig. 7.23 Land Suitability map of Tamarind

7.24 Land Suitability for Mulberry (*Morus nigra*)

Mulberry is an important leaf crop grown for rearing silkworms in about 1.6 lakh ha area in all the districts of the state. The crop requirements for growing mulberry (Table 7.25) 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 7.24.

No highly suitable (Class S1) and moderately suitable (Class S2) lands are available for growing mulberry in the microwatershed. Major area of about 541ha (83%) is marginally suitable (Class S3) for growing mulberry and are distributed in all parts of the microwatershed. They have major limitations of texture, drainage and rooting depth. Not suitable lands (Class N1) occupy an area of about 70ha (10%) and distributed in the

northern, central, southern and western part of the microwatershed. They have severe limitations of rooting depth and calcareousness.

Table 7.25 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

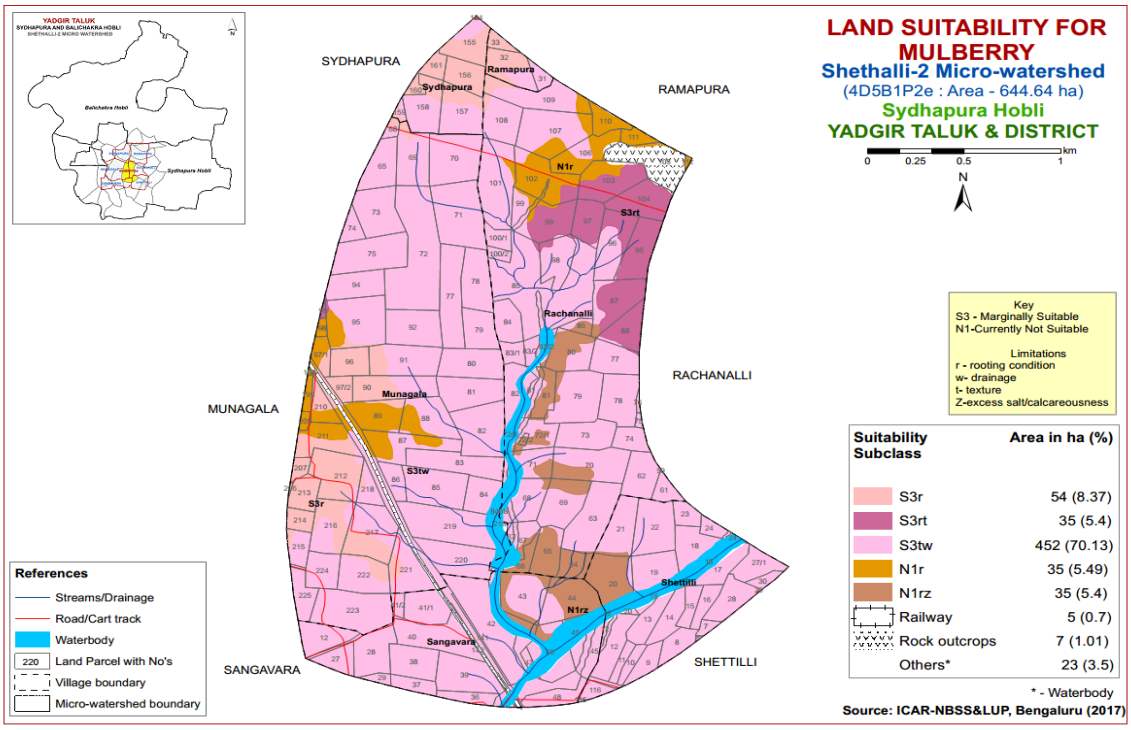


Fig 7.24 Land Suitability map of Mulberry

7.25 Land suitability for Marigold (*Tagetes sps.*)

Marigold is one of the most important flower crop grown in an area of 9108 ha in almost all the districts of the State. The crop requirements (Table 7.26) 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 7.25.

No highly suitable (Class S1) lands available for growing Marigold in the microwatershed. Maximum area of about 541 ha (84%) is moderately suitable (Class S2) for growing Marigold and are distributed in the major part of the microwatershed. They have minor limitations of texture, gravelliness, drainage and rooting depth. Marginally suitable (Class S3) lands for growing Marigold occupy an area of about 70 ha (10%) and are distributed in the northern, southern and western part of the microwatershed. They have major limitations of texture and rooting depth.

Table 7.26 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	^{0}C	18-23	17-15 24-35	35-40 10-14	>40 <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	-

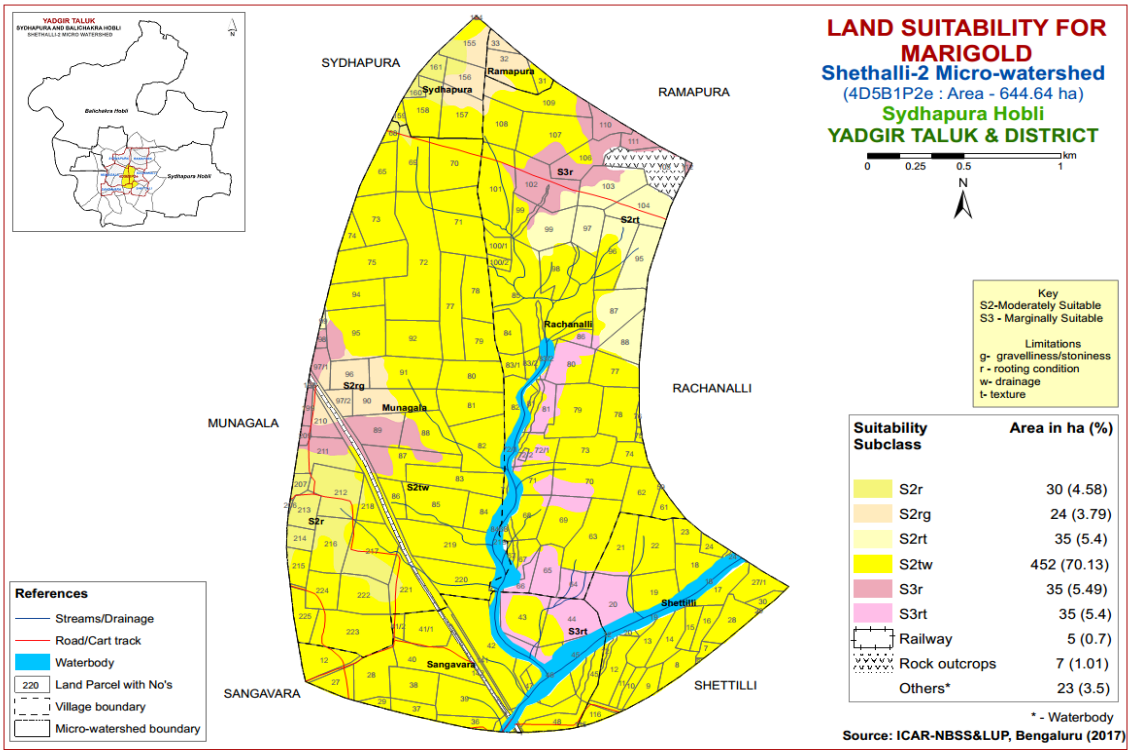


Fig. 7.25 Land Suitability map of Marigold

7.26 Land Suitability for Chrysanthemum (*Dendranthema grandiflora*)

Chrysanthemum is one of the most important flower crop grown in an area of 4978 ha in almost all the districts of the State. The crop requirements (Table 7.27) 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 7.26.

Table 7.27 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 24-35	35-40 10-14	>40 <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	

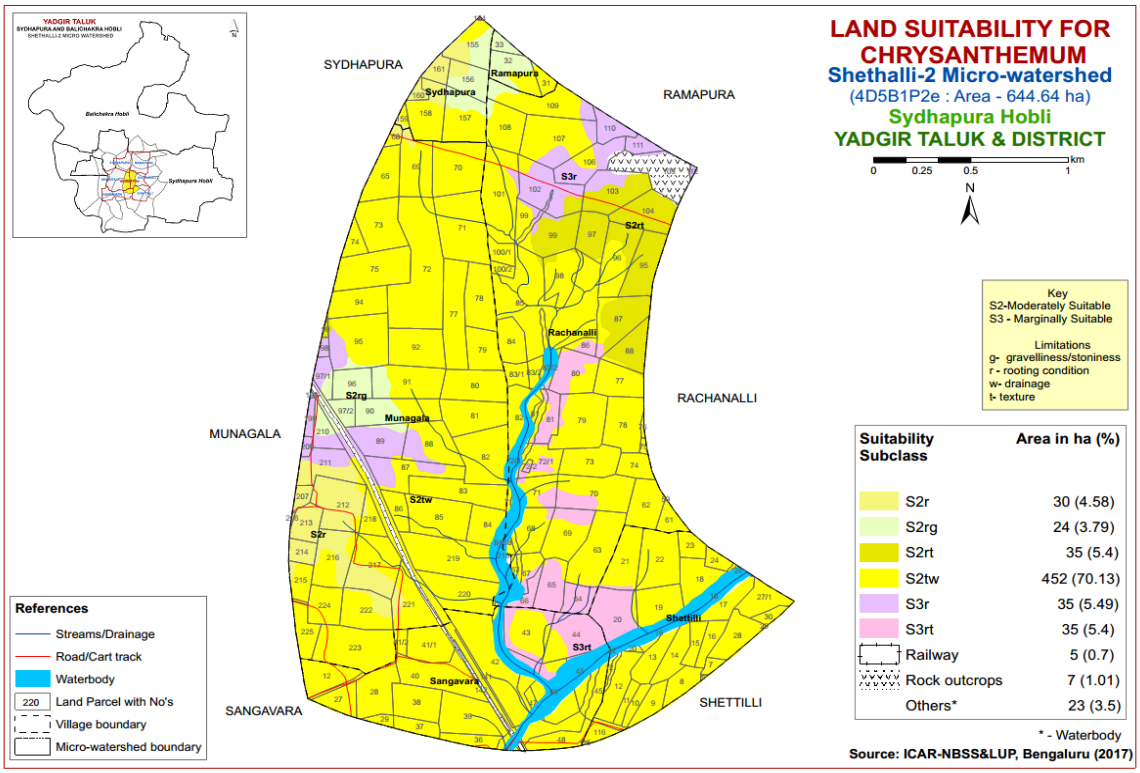


Fig. 7.26 Land Suitability map of Chrysanthemum

No highly suitable (Class S1) lands are available for growing Chrysanthemum in the microwatershed. Maximum area of about 541 ha (84%) is moderately suitable (Class S2) for growing Chrysanthemum and are distributed in the major part of the microwatershed. They have minor limitations of texture, gravelliness, drainage and rooting depth. Marginally suitable (Class S3) lands for growing Chrysanthemum occupy an area of about 70 ha (10%) and are distributed in the northern, southern and western part of the microwatershed. They have major limitations of texture and rooting depth.

7.27 Land Management Units (LMUs)

The 21 soil map units identified in Shethalli-2 microwatershed have been grouped into 5 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. 7.28) 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 5 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	TMKiB3	Very deep (>150 cm), sandy clay to clay soils, 1-3% slope, non gravelly (<15%), severe erosion.

2	HGNiB2 HGNmB2 SWRcB2 SWRmB2 KDRcB2 KDRcB3 KDRiB2 KDRmB2 RHNcB2 RHNmB2	Moderately deep to very deep (75 to >150 cm), sandy clay to clay soils,1-3 % slopes, non gravelly (<15%), moderate to severe erosion.
3	BLDcB2 BLDiB1g1 BLDmB2 JNKcB2 JNKiB2g1	Moderately shallow (50-75 cm), sandy loam to sandy clay soils, 1-3 % slopes, gravelly (15-35%), slight to moderate erosion.
4	YLRbB2 YLRcB2g1 YLRiB2	Moderately shallow (50-75 cm), sandy clay soils, 1-3 % slopes, gravelly (15-35%), moderate erosion.
5	GDLcB3 KYTcB2	Shallow (25-50 cm), sandy loam soils, 1-3 % slopes, non gravelly (<15%), moderate to severe erosion.

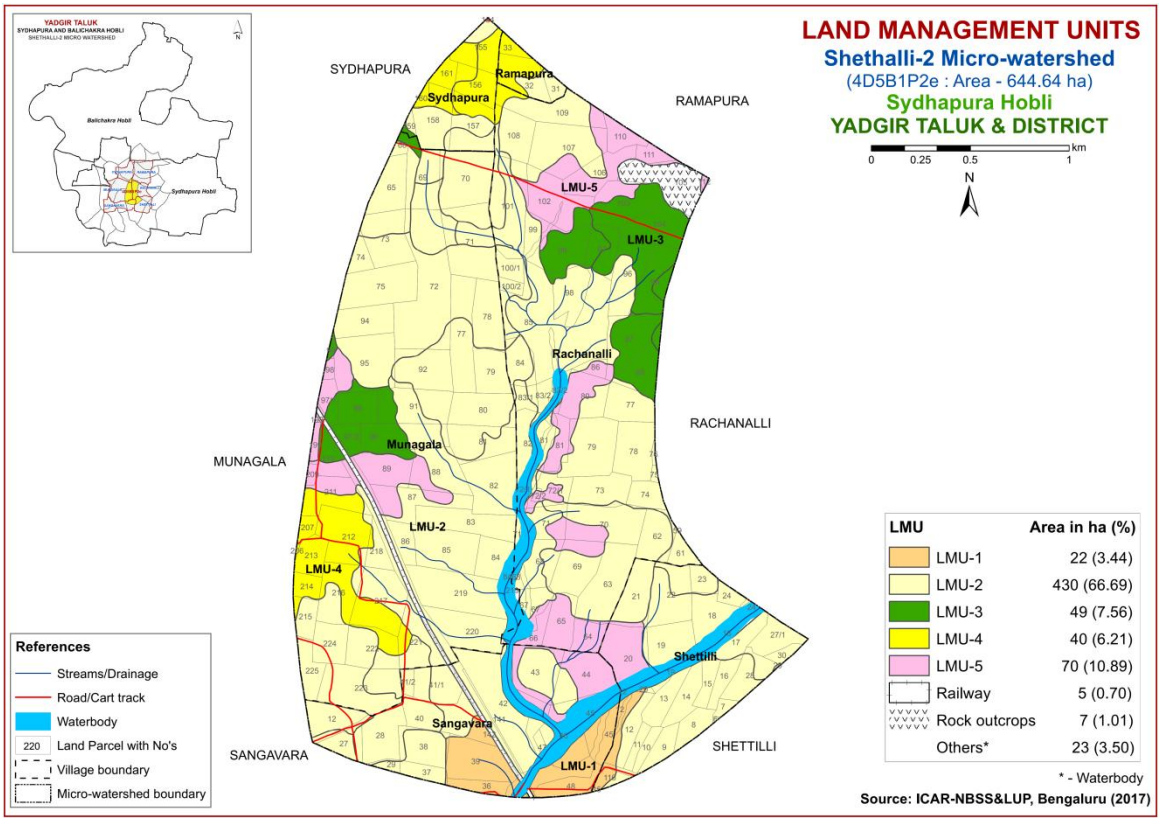


Fig. 7.27 Land Management Units Map of Shethalli-2 Microwatershed

7.28 Proposed Crop Plan for Shethalli-2 Microwatershed

After assessing the land suitability for the 26 crops, the proposed crop plan has been prepared for the 5 identified LMUs by considering only the highly (Class S1) and moderately (Class S2) suitable lands for each of the 26 crops. The resultant proposed crop plan is presented below in Table 7.28.

Table 7.28 Proposed Crop Plan for Shethalli-2 Microwatershed

Proposed Land use Class	Soil Map Units	Survey Number	Soil Characteristics	Field Crops	Horticulture Crops	Suitable Interventions
1	105. TMKiB3	**Sangavara:** 36,39,45,48 **Shettilli:** 115,116	Very deep (>150 cm), sandy clay to clay soils, 1-3% slope, non gravelly (<15%), severe erosion.	Sunflower, Cotton, Bengal gram, Bajra	**Fruit crops:** Pomegranate, Lime, Musambi, Amla, Custard apple, Tamarind, Jamun **Vegetables:** Drumstick, Chilli, Coriander **Flowers:** Marigold, Chrysanthemum	Application of FYM, Biofertilizers and micronutrients, drip irrigation, Mulching, suitable soil and water conservation practices
2	95. HGNiB2 93. HGNmB2 90. SWRcB2 91. SWRmB2 84. KDRcB2 85. KDRcB3 87. KDRiB2 89. KDRmB2 77. RHNcB2 79. RHNmB2	**Munagala:** 215,217,218,219,220, 221,222,223,224,225, 65,68,69,70,71,72,73, 74,75,77,78,79,80,81, 82,83,84,85,86,87,88, 91,92,94,95 **Rachanalli:** 100/1,100/2,101,107, 108,109,59,61,62,63, 67,68,69,70,71,72/1, 73,74,75,76,77,78,79, 82,83/1,83/2,84,85,96, 98 **Ramapura:** 31 **Sangavara:** 12,141,27,28,29,37,38, 40,41/1,41/2,42,43,47 **Shettilli:** 10,11,12,13,14,15,16, 17,18,19_GRASSLAND,	Moderately deep to very deep (75 to >150 cm), sandy clay to clay soils,1-3 % slopes, non gravelly (<15%), moderate to severe erosion.	Sunflower, Sorghum, Cotton, Bengal gram, Safflower, Linseed, Bajra	**Fruit crops:** Pomegranate, Lime, Musambi, Jamun Amla, Custard apple, Tamarind **Vegetables:** Drumstick, Chilli, Coriander **Flowers:** Marigold, Chrysanthemum	Application of FYM, Biofertilizers and micronutrients, drip irrigation, Mulching, suitable soil and water conservation practices

		21,22,23,24,27/1,28,29, 30,6,7,8,9 **Sydhapura:** 154,157,158,159				
3	73. BLDcB2 75. BLDiB1g1 76.BLDmB2 20. JNKcB2 23. JNKiB2g1	**Munagala:** 210,90,96,97/2,99 **Rachanalli:** 103,104,87,88,95,97,99	Moderately shallow (50-75 cm), sandy loam to sandy clay soils, 1-3 % slopes, gravelly (15-35%), slight to moderate erosion.	Bengalgram, Sorghum,Bajra, Safflower, Linseed	**Fruit crops:** Amla, Custard apple **Flowers:** Marigold, Jasmine Chrysanthemum	Application of FYM, Biofertilizers and micronutrients, drip irrigation, mulching, suitable soil and water conservation practices
4	27.YLRbB2 29.YLRcB2g1 31.YLRiB2	**Munagala:** 206,207,211,212,213,214 ,216 **Ramapura:** 32,33 **Sydhapura:** 155,156,160,161	Moderately shallow (50-75 cm), sandy clay soils, 1-3 % slopes, gravelly (15-35%), moderate erosion.	Maize, Sorghum, Groundnut, Bajra, Redgram	**Fruit crops:** Amla, Custard apple **Vegetables:** Tomato, Chilli **Flowers:** Marigold Chrysanthemum	Drip irrigation, mulching, suitable soil and water conservation practices (Crescent Bunding with Catch Pit etc)
5	67. GDLcB3 68. KYTcB2	**Munagala:** 198,199,209,89,97/1,98 **Rachanalli:** 102,106,110,111,112,64, 65,66,72/2,80,81,86 **Sangavara:** 44 **Shettilli:** 20	Shallow (25-50 cm), sandy loam soils, 1-3 % slopes, non gravelly (<15%), moderate erosion to severe erosion.	Bengal gram, Horsegram, Coriander	**Agri-Silvi-Pasture:** Custard apple, Amla**,** Hybrid Napier, *Styloxanthes hamata*, Glyricidia, *Styloxanthes scabra*	Use of short duration varieties, sowing across the slope, drip irrigation and mulching is recommended. suitable soil and water conservation practices

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 Shethalli-2 Microwatershed

- The soil phases identified in the microwatershed belonged to the soil series of KDR184 ha (28%), RHN 89 ha (14%), HGN 81 ha (12%), SWR78 ha (12%), YLR 40 ha (6%), GDL 35 ha (5%), KYT35 ha (5%), BLD35 ha (5%), TMK 22 ha (3%) and JNK 14 ha (2%).
- As per land capability classification entire area of the microwatershed falls under arable land category (Class II &III). The major limitations identified in the arable lands were soil, erosion and drainage.
- On the basis of soil reaction, about 15 ha (2%) is slightly alkaline (pH 7.3-7.8), 199 ha (31%) is moderately alkaline (pH 7.8 - 8.4), 246 ha (38%) is strongly alkaline (8.4-9.0)

and 151 ha (23%) is very strongly alkaline (>9.0) in reaction. Thus, all the soils in the microwatershed are alkaline in reaction.

❖ **Soil Health Management**

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

Alkaline soils

(Slightly alkaline 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. An area of about 456 ha is suffering from moderate erosion and 147 ha from severe erosion. These areas need immediate soil and water conservation and, other land development and land husbandry practices for restoring soil health. Avery small area of 9 ha is slightly eroded.

Dissemination of Information and Communication of Benefits

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

technologies such as Cellular phones and the Internet, which can be much more effective in reaching the younger farmers.

Inputs for Net Planning (Saturation Plan) and Interventions needed

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

1. Soil and Water Conservation Plan 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, raddish, potato etc) but not ideal for crops that need stagnant water like lowland paddy. Heavy textured soils are poor in water infiltration and percolation. They are prone for sheet erosion; such soils can be improved by sand mulching. The technology that is developed by the AICRP-Dryland Agriculture, Vijayapura, Karnataka can be adopted.
- **Gravelliness:** More gravel content is favorable for run-off harvesting but poor in soil moisture storage and nutrient availability. It is a significant parameter that decides the kind of crop to be raised.
- **Land Capability Classification:** The land capability map shows the areas suitable and not suitable for agriculture and the major constraints in each of the plot/survey number. Hence, one can decide what kind of enterprise is possible in each of these units. In general soil, erosion and drainage are the major constraints in Shethalli-2 microwatershed.
- **Organic Carbon:** The OC content (an index of available Nitrogen) is high (>0.75%) in 199 ha (31%), medium (0.5-0.75%) in about 378 ha (59%) and low in an area of 34 ha (5%). The areas that are medium and low in OC needs to be further improved by applying farm yard manure and rotating crops with cereals and legumes or mixed cropping.
- **Promoting green manuring:** Growing of green manur**ing** cr**ops** 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 412 ha area where OC is low to medium (<0.5-0.75%). For example, for rainfed maize, recommended level is 50 kg N per ha and an additional 12 kg /ha needs to be applied for all the crops grown in these plots.

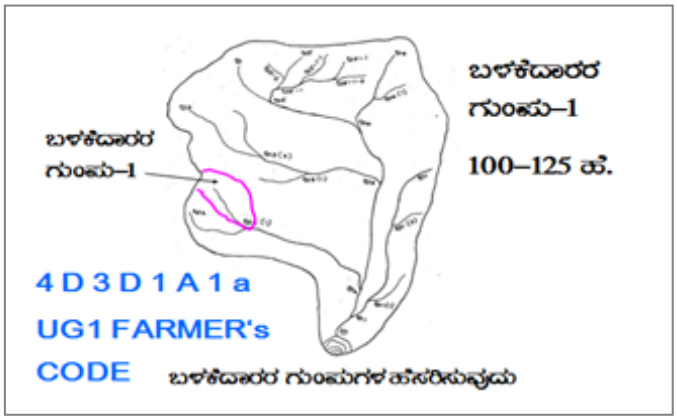
- **Available Phosphorus**: Available Phosphorus is low (<23 kg/ha) in an area of 442 ha (69%) and medium (23-57 kg/ha) in 169 ha (26%)of the microwatershed. For all the crops, 25% additional P needs to be applied where available P is low and medium.
- **Available Potassium:** Available potassium is medium (145-337 kg/ha) in maximum area of 502 ha (78%) of the microwatershed and an area of about 109 ha (17%) is high (>337 kg/ha) in available potassium. All the plots, where available potassium is medium, for all the crops, additional 25 % potassium may be applied.
- **Available Sulphur:** Available sulphur is a very critical nutrient for oilseed crops, it is low in 265 ha (41%), medium in 233 ha (36%) and high in 113 ha (18%). Low and medium 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:** An area of 173ha (27%) is low, 287ha (44%)is medium and 151 ha (23%) is high. For areas that are low and medium, application of sodium borate @ 10 kg/ha as soil application or0.2 % borax as foliar spray is recommended.
- **Available Iron:** An area of about 99 ha (15%) is deficient and 512 ha (79%) in the microwatershed is sufficient in available iron. To manage iron deficiency, iron sulphate @ 25 kg/ha needs to be applied for 2 to 3 years.
- **Available Zinc:** Almost entire area of about 611 ha (95%) of the microwatershed is deficient in available zinc content. Application of zinc sulphate @25 kg/ha is to be recommended for these areas.
- **Soil Alkalinity:** The entire area in the microwatershed has soils that are slightly to very strongly alkaline. These areas need application of gypsum and wherever calcium is in excess, iron pyrites and element sulphur can be recommended. Management practices like treating repeatedly with good quality water to drain out the excess salts and provision of subsurface drainage and growing of salt tolerant crops like Casuarina, Acasia, Neem, Ber etc, are recommended.
- **Land Suitability for various crops:** Areas that are highly, moderately, marginally suitable and currently not suitable for growing various crops are indicated. Along with the suitability, various constraints that are limiting the productivity are also indicated. For example, in case of cotton, gravel content, rooting depth and salinity/alkalinity are the major constraints in various plots. With suitable management interventions, the productivity can be enhanced. In order to increase the 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 Shethalli-2 microwatershed, the land resource inventory database generated under Sujala-III project has been transformed as information through series of interpretative (thematic) maps using soil phase map as a base. The various thematic maps (1:7920 scale) generated were

- Soil depth
- Surface soil texture
- Available water capacity
- Soil slope
- Soil gravelliness
- Land capability
- Present land use and land cover
- Crop suitability
- 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 to be collected.

Steps for Survey and Preparation of Treatment Plan

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

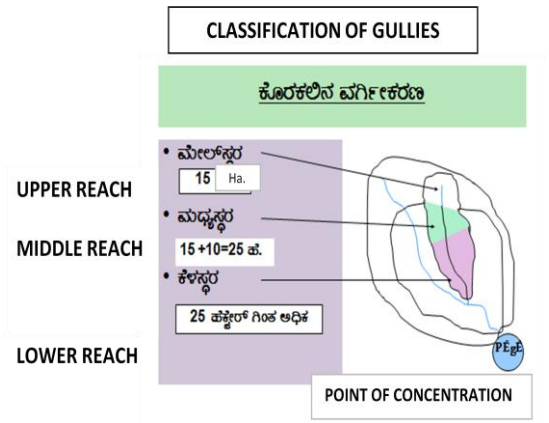
- Naming of user groups and farmers
- Identification of arable and non arable lands
- Identification of drainage lines and gullies
- Identification of non treatable areas
- Identification of priority areas in the arable lands
- Treatment plan for arable lands
- Location of water harvesting and recharge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

9.1 Treatment Plan

The treatment plan recommended for arable lands is briefly described below

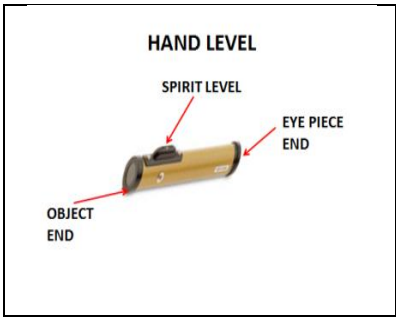
9.1.1 Arable Land Treatment

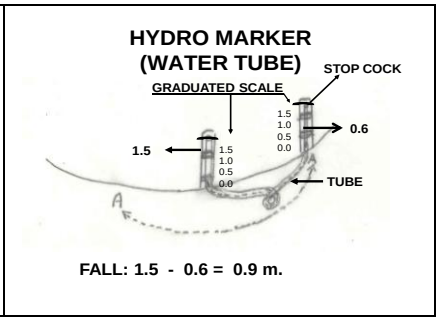
A. BUNDING

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

Measurement of Land Slope

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





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

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

Note: (i) The above intervals are maximum.

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

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

Section of the Bund

Bund section is decided considering the soil texture class and gravelliness class ($bg_{0...}$ b=loamy sand, g_0 = <15% gravel). The recommended Sections for different soils are given below.

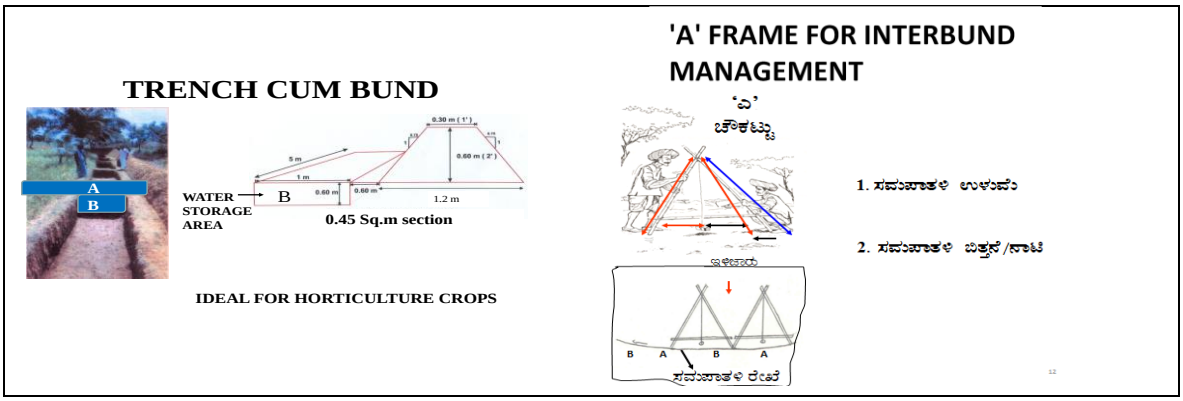
Recommended Bund Section

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

Formation of Trench cum Bund

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

Details of Borrow Pit dimensions are given below:



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

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

B. Water Ways

1. Existing waterways are marked on the cadastral map (1:7920 scale) and their dimensions are recorded.
2. Considering the contour plan of the MWS, additional waterways/ modernization of the existing ones can be thought of.
3. 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 Levelling Survey using Dumpy Level / Total Station has to be carried out to arrive at the site-specific designs as shown in the Manual.
f) The location of ground water recharge structures are decided by examining the lineaments and fracture zones from geological maps.
g) Rainfall intensity data of the nearest Rain Gauge Station is considered for Hydrologic Designs.
h) Silt load to the Storage/Recharge Structures is reduced by providing vegetative, boulder and earthern checks in the natural water course. Location and design details are given in the Manual.

9.2 Recommended Soil and Water Conservation Measures

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

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

A map (Fig. 9.1) showing soil and water conservation plan with different kinds of structures recommended has been prepared which shows the spatial distribution and extent of area. An area of about 571 ha (89%) needs Graded Bunding and 40 ha (6%) requires Trench cum Bunding.

The conservation plan prepared may be presented to all the stakeholders including farmers and after considering their suggestions, the conservation plan for the microwatershed may be finalised in a participatory approach.

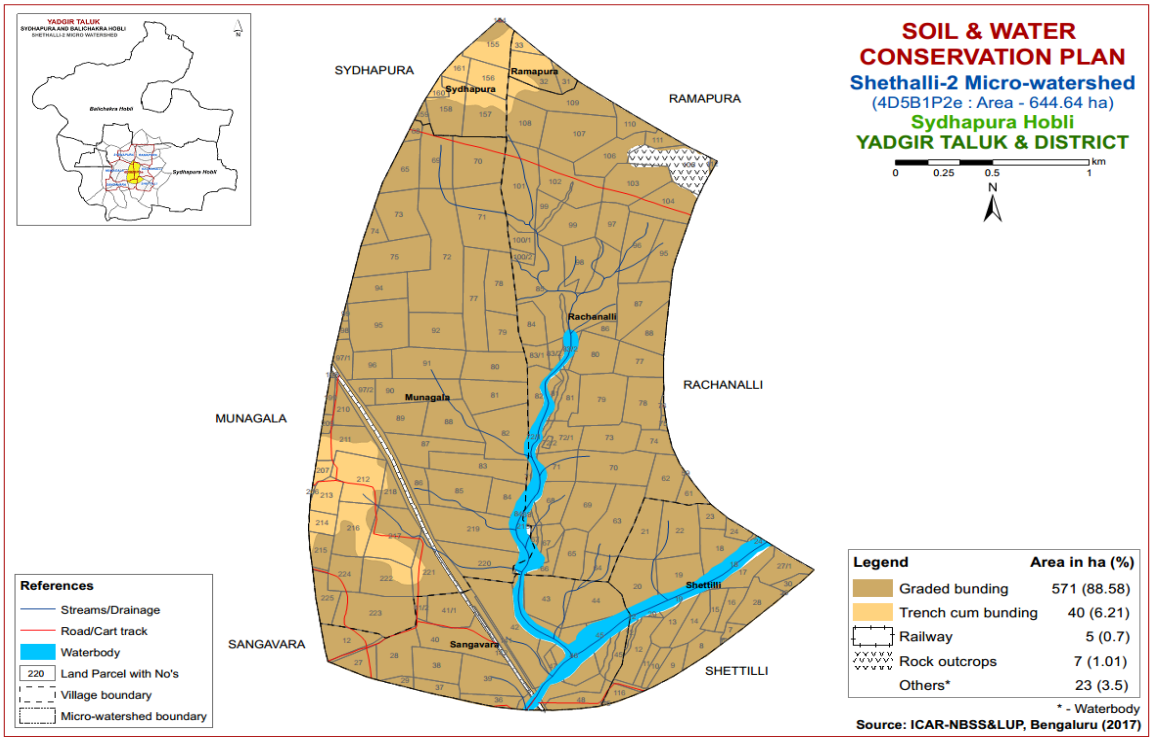


Fig. 9.1 Soil and Water Conservation Plan map of Shethalli-2 Microwatershed

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

The tree species suitable for the area considering rainfall, temperature and adaptability is listed below; waterlogged areas are recommended to be planted with species like Nerale (*Sizyziumcumini*) 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

Shethalli-2 Microwatershed

Soil Phase Information

Village	Survey 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
Baddepalli	430	1.22	HLGiB2	LMU-4	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	Graded bunding
Baddepalli	431	4.89	HLGiB2	LMU-4	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	Graded bunding
Baddepalli	432	0.59	GDGbB3g1	LMU-2	Deep (100-150 cm)	Loamy sand	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Severe	Not Available (NA)	Not Available	IIIes	Trench cum bunding
Baddepalli	435	0.09	BDPhB2	LMU-7	Very shallow (<25 cm)	Sandy clay loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IVes	Trench cum bunding
Baddepalli	436	2.29	HLGiB2	LMU-4	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	Graded bunding
Baddepalli	456	0.02	GDGbB3g1	LMU-2	Deep (100-150 cm)	Loamy sand	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Severe	Not Available (NA)	Not Available	IIIes	Trench cum bunding
Balacheda	170	0.04	GDGbB3g1	LMU-2	Deep (100-150 cm)	Loamy sand	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Severe	Redgram (Rg)	Not Available	IIIes	Trench cum bunding
Balacheda	171	0.97	GDGbB3g1	LMU-2	Deep (100-150 cm)	Loamy sand	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Severe	Redgram (Rg)	Not Available	IIIes	Trench cum bunding
Balacheda	172	5.28	KBDbB3	LMU-2	Moderately deep (75-100 cm)	Loamy sand	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Severe	No crop+Scrub land (Nc+Sl)	Not Available	IIIes	Trench cum bunding
Balacheda	195	1.32	VNKcB2	LMU-5	Shallow (25-50 cm)	Sandy loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIIes	Trench cum bunding
Balacheda	196	4.66	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Balacheda	197	2.66	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Balacheda	198	3.27	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Balacheda	199	3.95	HLGcB2	LMU-4	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Jowar (Ct+Jw)	Not Available	IIes	Graded bunding
Balacheda	200	0.45	HLGcB2	LMU-4	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Balacheda	201	1.59	KBDbB3	LMU-2	Moderately deep (75-100 cm)	Loamy sand	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Severe	No crop (Nc)	Not Available	IIIes	Trench cum bunding
Balacheda	202	4.65	HLGiB2	LMU-4	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	No crop (Nc)	Not Available	IIes	Graded bunding
Balacheda	203	4.39	HLGiB2	LMU-4	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Balacheda	204	5.92	HLGiB2	LMU-4	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Balacheda	205	3.89	HLGiB2	LMU-4	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	Graded bunding
Balacheda	206	4.42	HLGiB2	LMU-4	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Balacheda	207	3.53	HGNcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding

Village	Survey 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
Balacheda	208	5.9	HGNcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	1 Open well,1 Bore Well	IIes	Graded bunding
Balacheda	209	7.64	HGNcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Balacheda	210	7.57	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Balacheda	211	4.17	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Balacheda	212	0.08	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram+Groundnut (Rg+Gn)	Not Available	IIes	Graded bunding
Balacheda	213	1.52	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Balacheda	214	5.63	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Balacheda	215	5.71	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Balacheda	216	3.53	ANRbB3	LMU-1	Deep (100-150 cm)	Loamy sand	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Severe	Scrub land (Sl)	Not Available	IIIes	Graded bunding
Balacheda	217	7.31	ANRbB3	LMU-1	Deep (100-150 cm)	Loamy sand	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Severe	Scrub land (Sl)	Not Available	IIIes	Graded bunding
Balacheda	218	8.2	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Jowar (Ct+Jw)	Not Available	IIes	Graded bunding
Balacheda	219	7.69	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Balacheda	220	3.85	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Balacheda	221	0.98	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Balacheda	222	5.37	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Balacheda	223/1	1.35	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Balacheda	223/2	1.26	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Balacheda	224	5.24	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Balacheda	225	2.32	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Balacheda	226	2.65	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Balacheda	227	3.01	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Balacheda	228	6.43	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	Not Available	IIes	Graded bunding
Balacheda	229	3.86	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar+Redgram (Jw+Rg)	Not Available	IIes	Graded bunding
Balacheda	230	0.46	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding

Village	Survey 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
Balacheda	242	0.29	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Balacheda	243	4.37	HGNcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Balacheda	244	0.38	HGNcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Balacheda	248	2.28	BDLiB2	LMU-6	Shallow (25-50 cm)	Sandy clay	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIIes	Graded bunding
Balacheda	249	2.03	HGNcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Balacheda	250	3.47	HGNcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	No crop (Nc)	Not Available	IIes	Graded bunding
Balacheda	251	4.55	BDLiB2	LMU-6	Shallow (25-50 cm)	Sandy clay	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	No crop (Nc)	Not Available	IIIes	Graded bunding
Balacheda	252	3.42	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	No crop (Nc)	Not Available	IIes	Graded bunding
Balacheda	253	6.42	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Balacheda	254	2.53	ANRiB3g1	LMU-1	Deep (100-150 cm)	Sandy clay	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Severe	No crop (Nc)	Not Available	IIIes	Graded bunding
Balacheda	255	1.86	ANRiB3g1	LMU-1	Deep (100-150 cm)	Sandy clay	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Severe	Redgram (Rg)	Not Available	IIIes	Graded bunding
Balacheda	256	1.56	ANRiB3g1	LMU-1	Deep (100-150 cm)	Sandy clay	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Severe	No crop (Nc)	Not Available	IIIes	Graded bunding
Balacheda	257	2.95	ANRiB3g1	LMU-1	Deep (100-150 cm)	Sandy clay	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Severe	No crop (Nc)	Not Available	IIIes	Graded bunding
Balacheda	258	7.65	BDLiB2	LMU-6	Shallow (25-50 cm)	Sandy clay	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy+Redgram (Pd+Rg)	1 Bore Well	IIIes	Graded bunding
Balacheda	259	6.08	BDLiB2	LMU-6	Shallow (25-50 cm)	Sandy clay	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIIes	Graded bunding
Balacheda	260	3.32	HLGiB2g1	LMU-4	Moderately shallow (50-75 cm)	Sandy clay	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram+Groundnut (Rg+Gn)	Not Available	IIes	Graded bunding
Balacheda	264	0.06	YLRcB2g1	LMU-3	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Trench cum bunding
Kadechoora	263	0.67	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar+Redgram (Jw+Rg)	Not Available	IIes	Graded bunding
Kadechoora	264	1.8	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Kadechoora	265	0.04	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	Not Available	IIes	Graded bunding
Kadechoora	267	2.65	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Kadechoora	268	7.02	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Kadechoora	269	5.92	BDLiB2	LMU-6	Shallow (25-50 cm)	Sandy clay	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIIes	Graded bunding
Kadechoora	271	3.69	BDLiB2	LMU-6	Shallow (25-50 cm)	Sandy clay	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIIes	Graded bunding

Village	Survey 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
Kadechoora	272	4.51	BDLiB2	LMU-6	Shallow (25-50 cm)	Sandy clay	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIIes	Graded bunding
Kadechoora	273	7.35	SWRmB2	LMU-1	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Kadechoora	274	7.34	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Kadechoora	275	4.42	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Fallow land (Fl)	Not Available	IIes	Graded bunding
Kadechoora	276	2.24	SWRmB2	LMU-1	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	Graded bunding
Kadechoora	277	6.16	SWRmB2	LMU-1	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Fallow land (Fl)	Not Available	IIes	Graded bunding
Kadechoora	278	3.23	SWRmB2	LMU-1	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Waterbody	Not Available	IIes	Graded bunding
Kadechoora	279	3.05	SWRmB2	LMU-1	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	Graded bunding
Kadechoora	280	7.98	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar+Scrub land (Jw+Sl)	Not Available	IIes	Graded bunding
Kadechoora	281	6.58	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Fallow land (Fl)	Not Available	IIes	Graded bunding
Kadechoora	282	3.97	SWRmB2	LMU-1	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Fallow land (Fl)	Not Available	IIes	Graded bunding
Kadechoora	283	7.29	SWRmB2	LMU-1	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Fallow land (Fl)	Not Available	IIes	Graded bunding
Kadechoora	284	4.51	ANRiB3g1	LMU-1	Deep (100-150 cm)	Sandy clay	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Severe	Not Available (NA)	Not Available	IIIes	Graded bunding
Kadechoora	285	6.78	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Fallow land (Fl)	Not Available	IIes	Graded bunding
Kadechoora	286	0.12	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Kadechoora	287	5.59	SWRmB2	LMU-1	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Kadechoora	288	6.97	SWRmB2	LMU-1	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Fallow land+Redgram (Fl+Rg)	Not Available	IIes	Graded bunding
Kadechoora	289	3.86	SWRmB2	LMU-1	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Fallow land+Redgram (Fl+Rg)	Not Available	IIes	Graded bunding
Kadechoora	290	6.77	SWRmB2	LMU-1	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Kadechoora	291	0.88	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Kadechoora	297	1.57	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Kadechoora	298	4.9	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Fallow land (Fl)	Not Available	IIes	Graded bunding
Kadechoora	299	0.28	SWRmB2	LMU-1	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Kadechoora	321/1	4.16	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Jowar+Redgram (Ct+Jw+Rg)	Not Available	IIes	Graded bunding

Village	Survey 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
Kadechoora	321/2	0.79	SWRmB2	LMU-1	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	Graded bunding
Kadechoora	322	4.67	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Kadechoora	323	5.36	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Kadechoora	324	7.36	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	Not Available	IIes	Graded bunding
Kadechoora	325	7.33	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Kadechoora	326	2.41	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Kadechoora	327	1.36	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar+Redgram (Jw+Rg)	Not Available	IIes	Graded bunding
Kadechoora	328	2.59	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Sowrashtralli	5	0.47	BDLiB2	LMU-6	Shallow (25-50 cm)	Sandy clay	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIIes	Graded bunding
Sowrashtralli	8	2.92	BDLiB2	LMU-6	Shallow (25-50 cm)	Sandy clay	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	Not Available	IIIes	Graded bunding
Sowrashtralli	17	0.08	BDLiB2	LMU-6	Shallow (25-50 cm)	Sandy clay	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIIes	Graded bunding
Sowrashtralli	18	1.49	BDLiB2	LMU-6	Shallow (25-50 cm)	Sandy clay	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIIes	Graded bunding
Sowrashtralli	19	3.36	BDLiB2	LMU-6	Shallow (25-50 cm)	Sandy clay	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIIes	Graded bunding
Sowrashtralli	20	4.99	BDLiB2	LMU-6	Shallow (25-50 cm)	Sandy clay	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar+Cotton+Redgram (Jw+Ct+Rg)	Not Available	IIIes	Graded bunding
Sowrashtralli	22	0.02	PGPiB2	LMU-2	Moderately deep (75-100 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Trench cum bunding
Sowrashtralli	23	0.85	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Not Available (NA)	Not Available	Rock outcrops	Rock outcrops
Sowrashtralli	24	2.16	PGPiB2	LMU-2	Moderately deep (75-100 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Trench cum bunding
Sowrashtralli	25	2.94	BLCiB2	LMU-2	Moderately deep (75-100 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Trench cum bunding
Sowrashtralli	26	6.27	BDLiB2	LMU-6	Shallow (25-50 cm)	Sandy clay	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIIes	Graded bunding
Sowrashtralli	27	4.36	BDLiB2	LMU-6	Shallow (25-50 cm)	Sandy clay	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	Not Available	IIIes	Graded bunding
Sowrashtralli	28	5.45	BDLiB2	LMU-6	Shallow (25-50 cm)	Sandy clay	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar+Redgram (Jw+Rg)	Not Available	IIIes	Graded bunding
Sowrashtralli	29	5.31	BDLiB2	LMU-6	Shallow (25-50 cm)	Sandy clay	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar+Groundnut (Jw+Gn)	Not Available	IIIes	Graded bunding
Sowrashtralli	30	4.89	BDLiB2	LMU-6	Shallow (25-50 cm)	Sandy clay	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram+Groundnut (Rg+Gn)	Not Available	IIIes	Graded bunding
Sowrashtralli	31	4.95	HLGiB2	LMU-4	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar+Redgram (Jw+Rg)	Not Available	IIes	Graded bunding

Village	Survey 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
Sowrash tralli	32	3.65	PGPiB2	LMU-2	Moderately deep (75-100 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Trench cum bunding
Sowrash tralli	33	2.81	HLGiB2	LMU-4	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	1 Bore Well	IIes	Graded bunding
Sowrash tralli	34	5.76	BDLiB2	LMU-6	Shallow (25-50 cm)	Sandy clay	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram+Groundnut (Rg+Gn)	Not Available	IIIes	Graded bunding
Sowrash tralli	35	3.6	HLGiB2	LMU-4	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Sowrash tralli	36	4.43	HLGiB2	LMU-4	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar+Redgram (Jw+Rg)	Not Available	IIes	Graded bunding
Sowrash tralli	37	5.03	HLGiB2	LMU-4	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Sowrash tralli	38	3.91	HLGiB2	LMU-4	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Sowrash tralli	39	4.87	HLGiB2	LMU-4	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Sowrash tralli	40/1	2.16	HLGiB2	LMU-4	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Sowrash tralli	40/2	0.68	HLGiB2	LMU-4	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Sowrash tralli	41	6.56	HLGiB2	LMU-4	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	Not Available	IIes	Graded bunding
Sowrash tralli	42	2.91	HLGiB2	LMU-4	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Sowrash tralli	50	1.63	BLCcB2	LMU-2	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Trench cum bunding
Sowrash tralli	51	3.69	BLCcB2	LMU-2	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar+Redgram (Jw+Rg)	Not Available	IIes	Trench cum bunding

Appendix II

Shethalli-2 Microwatershed

Soil Fertility Information

Village	Survey Number	Soil Reaction	Salinity (EC)	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Baddepalli	430	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Baddepalli	431	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Baddepalli	432	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Baddepalli	435	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Baddepalli	436	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Baddepalli	456	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	170	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	171	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	172	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	195	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	196	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	197	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	198	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	199	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	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 (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	200	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	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 (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	201	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	202	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	203	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	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 (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	204	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	High (> 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	205	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	High (> 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	206	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	207	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)

Village	Survey Number	Soil Reaction	Salinity (EC)	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Balacheda	208	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	209	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	210	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	211	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	212	Strongly alkaline (pH 8.4 – 9.0)	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 (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	213	Strongly alkaline (pH 8.4 – 9.0)	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 (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	214	Strongly alkaline (pH 8.4 – 9.0)	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 (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	215	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	216	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (>0.75 %)	Low (< 23 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	217	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (>0.75 %)	Low (< 23 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	218	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	High (>0.75 %)	Low (< 23 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	219	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	220	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	221	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	222	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	223/1	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	223/2	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	224	Strongly alkaline (pH 8.4 – 9.0)	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 (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	225	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	226	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	227	Strongly alkaline (pH 8.4 – 9.0)	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 (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	228	Strongly alkaline (pH 8.4 – 9.0)	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 (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	229	Strongly alkaline (pH 8.4 – 9.0)	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 (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	230	Strongly alkaline (pH 8.4 – 9.0)	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 (> 0.2ppm)	Deficient (< 0.6 ppm)

Village	Survey Number	Soil Reaction	Salinity (EC)	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Balacheda	242	Moderately alkaline (pH 7.8 – 8.4)	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 (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	243	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	244	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	248	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	249	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	250	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	251	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	252	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	253	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	254	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	255	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	256	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	257	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	258	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	259	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	260	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Balacheda	264	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kadechoora	263	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (>0.75 %)	Low (< 23 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kadechoora	264	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kadechoora	265	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kadechoora	267	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kadechoora	268	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Low (< 23 kg/ha)	Medium (145 - 337 kg/ha)	High (> 20 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kadechoora	269	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Low (< 23 kg/ha)	Medium (145 - 337 kg/ha)	High (> 20 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kadechoora	270	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Low (< 23 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)

Village	Survey Number	Soil Reaction	Salinity (EC)	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Kadechoora	271	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Low (< 23 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kadechoora	272	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Low (< 23 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kadechoora	273	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Low (< 23 kg/ha)	Medium (145 - 337 kg/ha)	High (> 20 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kadechoora	274	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Low (< 23 kg/ha)	Medium (145 - 337 kg/ha)	High (> 20 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kadechoora	275	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	High (>0.75 %)	Low (< 23 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kadechoora	276	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Low (< 23 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kadechoora	277	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Low (< 23 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kadechoora	278	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Low (< 23 kg/ha)	Medium (145 - 337 kg/ha)	High (> 20 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kadechoora	279	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	High (> 20 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kadechoora	280	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	High (> 20 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kadechoora	281	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kadechoora	282	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Low (< 23 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	High (> 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kadechoora	283	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Low (< 23 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	High (> 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kadechoora	284	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kadechoora	285	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kadechoora	286	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kadechoora	287	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kadechoora	288	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	High (>0.75 %)	Low (< 23 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	High (> 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kadechoora	289	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	High (> 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kadechoora	290	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kadechoora	291	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kadechoora	297	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kadechoora	298	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	High (>0.75 %)	Low (< 23 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	High (> 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kadechoora	299	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	High (>0.75 %)	Low (< 23 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)

Village	Survey Number	Soil Reaction	Salinity (EC)	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Kadechoora	321/1	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	High (>0.75 %)	Low (< 23 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	High (> 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kadechoora	321/2	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	High (>0.75 %)	Low (< 23 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	High (> 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kadechoora	322	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	High (>0.75 %)	Low (< 23 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	High (> 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kadechoora	323	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (>0.75 %)	Low (< 23 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kadechoora	324	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (>0.75 %)	Low (< 23 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kadechoora	325	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (>0.75 %)	Low (< 23 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kadechoora	326	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (>0.75 %)	Low (< 23 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kadechoora	327	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (>0.75 %)	Low (< 23 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kadechoora	328	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (>0.75 %)	Low (< 23 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	High (> 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Sowrashtralli	5	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Low (< 23 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Sowrashtralli	8	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Low (< 23 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Sowrashtralli	17	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Low (< 23 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Sowrashtralli	18	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Low (< 23 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Sowrashtralli	19	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Low (< 23 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Sowrashtralli	20	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Low (< 23 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Sowrashtralli	22	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 (> 0.2ppm)	Deficient (< 0.6 ppm)
Sowrashtralli	23	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops
Sowrashtralli	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)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Sowrashtralli	25	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 (> 0.2ppm)	Deficient (< 0.6 ppm)
Sowrashtralli	26	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Low (< 23 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Sowrashtralli	27	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Low (< 23 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Sowrashtralli	28	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (>0.75 %)	Low (< 23 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Sowrashtralli	29	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (>0.75 %)	Low (< 23 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Sowrashtralli	30	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 (> 0.2ppm)	Deficient (< 0.6 ppm)

Village	Survey Number	Soil Reaction	Salinity (EC)	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Sowrashtralli	31	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)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Sowrashtralli	32	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)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Sowrashtralli	33	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)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Sowrashtralli	34	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Sowrashtralli	35	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)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Sowrashtralli	36	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Sowrashtralli	37	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	High (> 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Sowrashtralli	38	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	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 (> 0.2ppm)	Deficient (< 0.6 ppm)
Sowrashtralli	39	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Sowrashtralli	40/1	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	High (> 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Sowrashtralli	40/2	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	High (> 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Sowrashtralli	41	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>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 (> 0.2ppm)	Deficient (< 0.6 ppm)
Sowrashtralli	42	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)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Sowrashtralli	50	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>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 (> 0.2ppm)	Deficient (< 0.6 ppm)
Sowrashtralli	51	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>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 (> 0.2ppm)	Deficient (< 0.6 ppm)

Appendix III

Shethalli-2 Microwatershed

Soil Suitability Information

Village	Survey No	Mango	Maize	Sapota	Sorghum	Guava	Cotton	Tamarind	Lime	Bengalgram	Sunflower	Red gram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Drumstick	Mulberry
Baddepalli	430	N1rz	S2rz	S3rz	S2rz	S3rz	S2rz	N1rz	S3rz	S2rz	S3rz	S3rz	S2rz	S3rz	S2rz	N1tz	S3rz	S3rz	S2rz	S2rz	S2rz	S2rz	S2rz	S3rz	S2rz	S3rz	S3rz
Baddepalli	431	N1rz	S2rz	S3rz	S2rz	S3rz	S2rz	N1rz	S3rz	S2rz	S3rz	S3rz	S2rz	S3rz	S2rz	N1tz	S3rz	S3rz	S2rz	S2rz	S2rz	S2rz	S2rz	S3rz	S2rz	S3rz	S3rz
Baddepalli	432	S2rz	S2zg	S2zg	S2zg	S2tz	S2zg	S2rz	S2zg	S2tg	S2zg	S2zg	S2z	S2zg	S2z	N1tz	S2rz	S2z	S2tz	S2tg	S2zg	S2tg	S2tg	S2z	S2z	S2z	S2z
Baddepalli	435	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r
Baddepalli	436	N1rz	S2rz	S3rz	S2rz	S3rz	S2rz	N1rz	S3rz	S2rz	S3rz	S3rz	S2rz	S3rz	S2rz	N1tz	S3rz	S3rz	S2rz	S2rz	S2rz	S2rz	S2rz	S3rz	S2rz	S3rz	S3rz
Baddepalli	456	S2rz	S2zg	S2zg	S2zg	S2tz	S2zg	S2rz	S2zg	S2tg	S2zg	S2zg	S2z	S2zg	S2z	N1tz	S2rz	S2z	S2tz	S2tg	S2zg	S2tg	S2tg	S2z	S2z	S2z	S2z
Balacheda	170	S2rz	S2zg	S2zg	S2zg	S2tz	S2zg	S2rz	S2zg	S2tg	S2zg	S2zg	S2z	S2zg	S2z	N1tz	S2rz	S2z	S2tz	S2tg	S2zg	S2tg	S2tg	S2z	S2z	S2z	S2z
Balacheda	171	S2rz	S2zg	S2zg	S2zg	S2tz	S2zg	S2rz	S2zg	S2tg	S2zg	S2zg	S2z	S2zg	S2z	N1tz	S2rz	S2z	S2tz	S2tg	S2zg	S2tg	S2tg	S2z	S2z	S2z	S2z
Balacheda	172	S3rg	S3g	S3g	S3g	S3g	S3g	S3rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3rg	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S2g
Balacheda	195	N1r	S3r	N1r	S3r	N1r	S3r	N1r	N1r	S3r	N1r	S3r	S3r	N1r	S3r	N1r	N1r	N1r	S3rt	S3r	S3r	S3r	S3r	N1r	S3r	N1r	N1r
Balacheda	196	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Balacheda	197	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Balacheda	198	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Balacheda	199	N1rz	S2rz	S3rz	S2rz	S3rz	S2rz	N1rz	S3rz	S2rz	S3rz	S3rz	S2rz	S3rz	S2rz	N1tz	S3rz	S3rz	S2rz	S2rz	S2rz	S2rz	S2rz	S3rz	S2rz	S3rz	S3rz
Balacheda	200	N1rz	S2rz	S3rz	S2rz	S3rz	S2rz	N1rz	S3rz	S2rz	S3rz	S3rz	S2rz	S3rz	S2rz	N1tz	S3rz	S3rz	S2rz	S2rz	S2rz	S2rz	S2rz	S3rz	S2rz	S3rz	S3rz
Balacheda	201	S3rg	S3g	S3g	S3g	S3g	S3g	S3rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3rg	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S2g
Balacheda	202	N1rz	S2rz	S3rz	S2rz	S3rz	S2rz	N1rz	S3rz	S2rz	S3rz	S3rz	S2rz	S3rz	S2rz	N1tz	S3rz	S3rz	S2rz	S2rz	S2rz	S2rz	S2rz	S3rz	S2rz	S3rz	S3rz
Balacheda	203	N1rz	S2rz	S3rz	S2rz	S3rz	S2rz	N1rz	S3rz	S2rz	S3rz	S3rz	S2rz	S3rz	S2rz	N1tz	S3rz	S3rz	S2rz	S2rz	S2rz	S2rz	S2rz	S3rz	S2rz	S3rz	S3rz
Balacheda	204	N1rz	S2rz	S3rz	S2rz	S3rz	S2rz	N1rz	S3rz	S2rz	S3rz	S3rz	S2rz	S3rz	S2rz	N1tz	S3rz	S3rz	S2rz	S2rz	S2rz	S2rz	S2rz	S3rz	S2rz	S3rz	S3rz
Balacheda	205	N1rz	S2rz	S3rz	S2rz	S3rz	S2rz	N1rz	S3rz	S2rz	S3rz	S3rz	S2rz	S3rz	S2rz	N1tz	S3rz	S3rz	S2rz	S2rz	S2rz	S2rz	S2rz	S3rz	S2rz	S3rz	S3rz

Village	Survey No	Mango	Maize	Sapota	Sorghum	Guava	Cotton	Tamarind	Lime	Bengalgram	Sunflower	Red gram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Drumstick	Mulberry
Balacheda	206	N1rz	S2rz	S3rz	S2rz	S3rz	S2rz	N1rz	S3rz	S2rz	S3rz	S3rz	S2rz	S3rz	S2rz	N1tz	S3rz	S3rz	S2rz	S2rz	S2rz	S2rz	S2rz	S3rz	S2rz	S3rz	S3rz
Balacheda	207	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Balacheda	208	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Balacheda	209	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Balacheda	210	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Balacheda	211	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Balacheda	212	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Balacheda	213	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Balacheda	214	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Balacheda	215	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Balacheda	216	S3tz	S3tw	S3t	S2wz	S3t	S2z	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Balacheda	217	S3tz	S3tw	S3t	S2wz	S3t	S2z	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Balacheda	218	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Balacheda	219	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Balacheda	220	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Balacheda	221	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Balacheda	222	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Balacheda	223/1	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Balacheda	223/2	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Balacheda	224	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Balacheda	225	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Balacheda	226	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw

Village	Survey No	Mango	Maize	Sapota	Sorghum	Guava	Cotton	Tamarind	Lime	Bengalgram	Sunflower	Red gram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Drumstick	Mulberry
Balacheda	227	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Balacheda	228	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Balacheda	229	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Balacheda	230	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Balacheda	242	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Balacheda	243	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Balacheda	244	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Balacheda	248	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	N1rt	N1rt
Balacheda	249	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Balacheda	250	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Balacheda	251	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	N1rt	N1rt
Balacheda	252	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Balacheda	253	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Balacheda	254	S3tz	S3tw	S3t	S2wz	S3t	S2z	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Balacheda	255	S3tz	S3tw	S3t	S2wz	S3t	S2z	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Balacheda	256	S3tz	S3tw	S3t	S2wz	S3t	S2z	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Balacheda	257	S3tz	S3tw	S3t	S2wz	S3t	S2z	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Balacheda	258	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	N1rt	N1rt
Balacheda	259	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	N1rt	N1rt
Balacheda	260	N1rz	S2rz	S3rz	S2rz	S3rz	S2rz	N1rz	S3rz	S2rz	S3rz	S3rz	S2rz	S3rz	S2rz	N1tz	S3rz	S3rz	S2rz	S2rz	S2rz	S2rz	S2rz	S3rz	S2rz	S3rz	S3rz
Balacheda	264	N1r	S2rg	S3r	S2rg	S3r	S2rg	N1r	S3r	S2rg	S3rg	S3rg	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2rg	S2rg	S2rg	S2rg	S3r	S2r	S3r	S3r
Kadechoora	263	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw

Village	Survey No	Mango	Maize	Sapota	Sorghum	Guava	Cotton	Tamarind	Lime	Bengalgram	Sunflower	Red gram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Drumstick	Mulberry
Kadechoora	264	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Kadechoora	265	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Kadechoora	267	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Kadechoora	268	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Kadechoora	269	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	N1rt	N1rt
Kadechoora	270	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	N1rt	N1rt
Kadechoora	271	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	N1rt	N1rt
Kadechoora	272	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	N1rt	N1rt
Kadechoora	273	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Kadechoora	274	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Kadechoora	275	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Kadechoora	276	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Kadechoora	277	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Kadechoora	278	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Kadechoora	279	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Kadechoora	280	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Kadechoora	281	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Kadechoora	282	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Kadechoora	283	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Kadechoora	284	S3tz	S3tw	S3t	S2wz	S3t	S2z	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Kadechoora	285	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Kadechoora	286	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw

Village	Survey No	Mango	Maize	Sapota	Sorghum	Guava	Cotton	Tamarind	Lime	Bengalgram	Sunflower	Red gram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Drumstick	Mulberry
Kadechoora	287	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Kadechoora	288	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Kadechoora	289	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Kadechoora	290	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Kadechoora	291	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Kadechoora	297	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Kadechoora	298	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Kadechoora	299	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Kadechoora	321/1	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Kadechoora	321/2	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Kadechoora	322	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Kadechoora	323	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Kadechoora	324	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Kadechoora	325	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Kadechoora	326	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Kadechoora	327	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Kadechoora	328	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Sowrashtralli	5	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	N1rt	N1rt
Sowrashtralli	8	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	N1rt	N1rt
Sowrashtralli	17	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	N1rt	N1rt
Sowrashtralli	18	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	N1rt	N1rt
Sowrashtralli	19	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	N1rt	N1rt

Village	Survey No	Mango	Maize	Sapota	Sorghum	Guava	Cotton	Tamarind	Lime	Bengalgram	Sunflower	Red gram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Drumstick	Mulberry
Sowrashtralli	20	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	N1rt	N1rt
Sowrashtralli	22	S3r	S1	S2r	S1	S2rt	S2r	S3r	S2r	S2t	S2r	S2r	S1	S2r	S1	S2rt	S3r	S2r	S2t	S2t	S1	S2t	S2t	S2r	S1	S2r	S2r
Sowrashtralli	23	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops	Rock outcrops
Sowrashtralli	24	S3r	S1	S2r	S1	S2rt	S2r	S3r	S2r	S2t	S2r	S2r	S1	S2r	S1	S2rt	S3r	S2r	S2t	S2t	S1	S2t	S2t	S2r	S1	S2r	S2r
Sowrashtralli	25	S3rz	S2z	S2rz	S2z	S2rt	S2rz	S3rz	S2rz	S2tz	S2rz	S2rz	S2z	S2rz	S2z	S2rt	S3rz	S2rz	S2tz	S2tz	S2z	S2tz	S2tz	S2rz	S2z	S2rz	S2rz
Sowrashtralli	26	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	N1rt	N1rt
Sowrashtralli	27	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	N1rt	N1rt
Sowrashtralli	28	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	N1rt	N1rt
Sowrashtralli	29	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	N1rt	N1rt
Sowrashtralli	30	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	N1rt	N1rt
Sowrashtralli	31	N1rz	S2rz	S3rz	S2rz	S3rz	S2rz	N1rz	S3rz	S2rz	S3rz	S3rz	S2rz	S3rz	S2rz	N1tz	S3rz	S3rz	S2rz	S2rz	S2rz	S2rz	S2rz	S3rz	S2rz	S3rz	S3rz
Sowrashtralli	32	S3r	S1	S2r	S1	S2rt	S2r	S3r	S2r	S2t	S2r	S2r	S1	S2r	S1	S2rt	S3r	S2r	S2t	S2t	S1	S2t	S2t	S2r	S1	S2r	S2r
Sowrashtralli	33	N1rz	S2rz	S3rz	S2rz	S3rz	S2rz	N1rz	S3rz	S2rz	S3rz	S3rz	S2rz	S3rz	S2rz	N1tz	S3rz	S3rz	S2rz	S2rz	S2rz	S2rz	S2rz	S3rz	S2rz	S3rz	S3rz
Sowrashtralli	34	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	N1rt	N1rt
Sowrashtralli	35	N1rz	S2rz	S3rz	S2rz	S3rz	S2rz	N1rz	S3rz	S2rz	S3rz	S3rz	S2rz	S3rz	S2rz	N1tz	S3rz	S3rz	S2rz	S2rz	S2rz	S2rz	S2rz	S3rz	S2rz	S3rz	S3rz
Sowrashtralli	36	N1rz	S2rz	S3rz	S2rz	S3rz	S2rz	N1rz	S3rz	S2rz	S3rz	S3rz	S2rz	S3rz	S2rz	N1tz	S3rz	S3rz	S2rz	S2rz	S2rz	S2rz	S2rz	S3rz	S2rz	S3rz	S3rz
Sowrashtralli	37	N1rz	S2rz	S3rz	S2rz	S3rz	S2rz	N1rz	S3rz	S2rz	S3rz	S3rz	S2rz	S3rz	S2rz	N1tz	S3rz	S3rz	S2rz	S2rz	S2rz	S2rz	S2rz	S3rz	S2rz	S3rz	S3rz
Sowrashtralli	38	N1rz	S2rz	S3rz	S2rz	S3rz	S2rz	N1rz	S3rz	S2rz	S3rz	S3rz	S2rz	S3rz	S2rz	N1tz	S3rz	S3rz	S2rz	S2rz	S2rz	S2rz	S2rz	S3rz	S2rz	S3rz	S3rz
Sowrashtralli	39	N1rz	S2rz	S3rz	S2rz	S3rz	S2rz	N1rz	S3rz	S2rz	S3rz	S3rz	S2rz	S3rz	S2rz	N1tz	S3rz	S3rz	S2rz	S2rz	S2rz	S2rz	S2rz	S3rz	S2rz	S3rz	S3rz
Sowrashtralli	40/1	N1rz	S2rz	S3rz	S2rz	S3rz	S2rz	N1rz	S3rz	S2rz	S3rz	S3rz	S2rz	S3rz	S2rz	N1tz	S3rz	S3rz	S2rz	S2rz	S2rz	S2rz	S2rz	S3rz	S2rz	S3rz	S3rz
Sowrashtralli	40/2	N1rz	S2rz	S3rz	S2rz	S3rz	S2rz	N1rz	S3rz	S2rz	S3rz	S3rz	S2rz	S3rz	S2rz	N1tz	S3rz	S3rz	S2rz	S2rz	S2rz	S2rz	S2rz	S3rz	S2rz	S3rz	S3rz
Sowrashtralli	41	N1rz	S2rz	S3rz	S2rz	S3rz	S2rz	N1rz	S3rz	S2rz	S3rz	S3rz	S2rz	S3rz	S2rz	N1tz	S3rz	S3rz	S2rz	S2rz	S2rz	S2rz	S2rz	S3rz	S2rz	S3rz	S3rz

Village	Survey No	Mango	Maize	Sapota	Sorghum	Guava	Cotton	Tamarind	Lime	Bengalgram	Sunflower	Red gram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Drumstick	Mulberry
Sowrashtralli	42	N1rz	S2rz	S3rz	S2rz	S3rz	S2rz	N1rz	S3rz	S2rz	S3rz	S3rz	S2rz	S3rz	S2rz	N1tz	S3rz	S3rz	S2rz	S2rz	S2rz	S2rz	S2rz	S3rz	S2rz	S3rz	S3rz
Sowrashtralli	50	S3rz	S2z	S2rz	S2z	S2rt	S2rz	S3rz	S2rz	S2tz	S2rz	S2rz	S2z	S2rz	S2z	S2rt	S3rz	S2rz	S2tz	S2tz	S2z	S2tz	S2tz	S2rz	S2z	S2rz	S2rz
Sowrashtralli	51	S3rz	S2z	S2rz	S2z	S2rt	S2rz	S3rz	S2rz	S2tz	S2rz	S2rz	S2z	S2rz	S2z	S2rt	S3rz	S2rz	S2tz	S2tz	S2z	S2tz	S2tz	S2rz	S2z	S2rz	S2rz

PART-B

SOCIO-ECONOMIC STATUS OF FARM HOUSEHOLDS

CONTENTS

LIST OF TABLES

Chapter 1

SALIENT FINDINGS OF THE SURVEY

- *The data indicated that there were 75 (61.98%) men and 46 (38.02 %) were women among the sampled households. The average family size of marginal farmers was 4.19, small farmers were 5, a semi medium farmer was 4.33, medium farmers were 4 and for large farmers it was 4.22.*
- *There were 21(17.36%) people were in 0-15 years of age, 53 (43.8%) were in 16-35 years of age, 40 (33.06 %) were in 36-60 years of age and 7 (5.79 %) were above 61 years of age.*
- *The Shethalli-2 had 32.23 per cent illiterates, 14.05 per cent of them had primary school education, 5.79 per cent of them had middle school education, 21.49 per cent of them had high school education, 11.57 per cent of them had PUC education, 4.96 per cent of them had diploma, 0.83 per cent of them had ITI, 5.79 per cent of them had degree education and 3.31 per cent of them had masters education.*
- *The results indicate that, 90 per cent of households practicing agriculture and 3.33 per cent of the household heads were general labourers and 3.33 percent of the households were housewife.*
- *The results indicate that agriculture was the major occupation for 53.72 per cent of the household members, 0.83 per cent were general labourers, 4.13 per cent were private service, 23.14 per cent of them were in student ,14.88 per cent of them were housewife and 3.31 per cent of them were children . In case of landless households 33.33 per cent were general labourers. In case of marginal farmers 41.18 per cent were agriculturist, 29.41 per cent were student, and 11.76 per cent in housewife and 17.65 per cent were children. In case of small farmers, 57.14 per cent of the household members were practicing agriculture and 1.79 per cent of them were private sector. In case of semi medium farmers 46.67 per cent of the household members were practicing agriculture and 10 per cent of them were private service. In case of medium farmers, 77.78 per cent of the household members were practicing agriculture and 11.11 per cent were private sector. In case of large farmers, 83.33 per cent of the household members were practicing agriculture and 16.67 per cent were housewife.*
- *The results indicate that 26.67 per cent of the households possess Katcha house and 70.0 per cent of them possess pucca house and 3.33 per cent of them possess semi pucca house.*
- *The results shows that 3.33 per cent of the households possess radio, Cent per cent of the households possess TV, 23.33per cent of the households possess Mixer grinder, 30 per cent of the households possess motor cycle, 6.67 per cent of the households possess auto, 6.67 per cent of the households possess car/ four wheeler and Cent per cent of the households mobile phones. the average value of radio*

was Rs.2000, television was Rs.9700, mixer grinder was Rs.2142, motor cycle was Rs.56400 and mobile phone was Rs.3588, Auto was 110000 and car/ four wheeler was 550000.

- *About 50 per cent of the households possess plough, 10 per cent of them possess tractor,46.67 per cent of them posses bullocks cart, 6.67 per cent of them power tiller , 13.33 per cent of them possess weeder, 3.33 per cent of them possess harvester and 6.67 per cent of the households possess sprayer. the average value of plough was Rs.4, 692, the average value of tractor was Rs. 750000 and the average value of sprayer was Rs.6000, the average value of bullock cart Rs.18,181, the average value of power tiller Rs.35000and the average value of harvester 10,000 and the average value of weeder Rs.1,160.*
- *The results indicate that, 36.67 per cent of the households possess bullocks, 30 per cent of the households possess local cow.*
- *Average own labour men available in the micro watershed was 1.29, average own labour (women) available was 1.1, average hired labour (men) available was 8.35 and average hired labour (women) available was 21.35.*
- *The results indicate that, 53.33 per cent of the household opined that hired labour was adequate and 46.67 per cent of the households opined that hired labour was inadequate.*
- *The results indicate that, 4 (3.31%) persons were migrated from the micro watershed which includes 1.79 persons from small medium farmers' and 10 per cent of semi medium farmer category.*
- *People have migrated on average of 632.5 Kms and average duration was months 13. Small farmers have migrated 600 Kms and on an average 12 months in a year. Semi medium farmers have migrated 665 Kms and on an average 14 months in a year.*
- *Job/ work were the reason for migration for all the migrants.*
- *Improved quality of the life was the major Positive consequences of migration for 50 per cent of the better children education persons migrated from small framers households.*
- *Households of the Shethalli-2 micro watershed possess 52.52 ha (96.13%) of dry land and 2.11 ha (3.87%) of irrigated land.*
- *The average value of dry land was Rs. 267994.14 and average value of irrigated was Rs.1, 89,272.*
- *Marginal farmers had irrigated area of 2.43 hectares, and medium farmers had 6.88 hectares of irrigated land.*
- *Farmers have grown cotton (15.71 ha), jowar (2.83 ha), paddy (0.8ha), red gram (8.94ha), sorghum (5.32 ha), cotton (1.21ha). Marginal farmers have grown red gram (0.81 ha) and sorghum (5.32ha), Small farmers have grown cotton (4.21ha), jowar (2.83ha), red gram (6.11 ha), Semi medium farmers have grown cotton (4.49*

ha), red gram (1.62ha). Medium farmers have grown cotton (7 ha), red gram (0.4ha), sorghum (5.32ha).

- *The cropping intensity in Shethalli-2 micro watershed was found to be 59.67 per cent. In case of Marginal farmers it was 196.57 per cent, for small farmers it was 68.98 per cent, in case of semi medium farmers it was 42.55 per cent, medium farmers had cropping intensity of 48.54 per cent and large farmers had 10.88 per cent.*
- *The results indicate that, 96.67 per cent of the households possess bank account and 80 per cent of them have savings. With respect to category wise account, 100 per cent of land less, 100 per cent of marginal, 100 per cent of small, medium and large farmers and 83.33 per cent of semi medium, possesses bank account. With respect to savings, 80 per cent of marginal, 85.71per cent of small, 66.67 per cent of semi medium farmers and 100 per cent of large farmers had savings in the bank account.*
- *The results indicate that, 40 per cent of marginal, 42.86 per cent of small, 50 per cent semi medium, 33.33 per cent of medium farmers and 100 per cent of large farmers have borrowed credit from different sources.*
- *The results indicate that, 78.57 per cent have availed loan in commercial banks, 7.14 per cent have availed loan in cooperative bank, 100 per cent have availed loan from friends and relatives, 42.86 per cent have availed loan from grameena bank, 7.14 per cent have availed loan from money lender and 28.57 per cent have availed loan from Traders.*
- *The results indicate that, marginal, small, semi medium and large farmers have availed Rs.12500, Rs.20333.33, Rs. 115000 and Rs.25000 respectively.*
- *The results indicate that, 43.75 per cent of the households have borrowed loan for agriculture, 6.25 per cent of them have borrowed loan for education and 50 per cent of them have borrowed loan for health. 66.67 per cent of marginal farmers, 50 per cent of small farmers, 25 per cent of semi medium farmers and 100 per cent of the medium farmers availed loan for Agriculture production. About 50 per cent of small and landless have availed loan for animal husbandry.*
- *Results indicated that 90.91 per cent of the households have repaid private source of credit partially.*
- *The results indicate that, the total cost of cultivation for cotton was Rs. 48441.68. The gross income realized by the farmers was Rs. 57998.02. The net income from Cotton cultivation was Rs. 9556.34, thus the benefit cost ratio was found to be 1:1.2.*
- *The total cost of cultivation for red gram was Rs. 46729.38. The gross income realized by the farmers was Rs. 67925.00. The net income from red gram cultivation was Rs. 21195.62. Thus the benefit cost ratio was found to be 1:1.45.*

- *The results indicate that, the total cost of cultivation for red gram was Rs. 41504.09. The gross income realized by the farmers was Rs. 100035.00. The net income from red gram cultivation was Rs. 58530.91. Thus the benefit cost ratio was found to be 1:2.41.*
- *The total cost of cultivation for red gram was Rs. 18417.27. The gross income realized by the farmers was Rs. 72741.10. The net income from red gram cultivation was Rs. 54323.83. Thus the benefit cost ratio was found to be 1:3.95*
- *The results indicate that, the total cost of cultivation for sorghum was Rs. 33786.79. The gross income realized by the farmers was Rs. 44228.44. The net income from sorghum cultivation was Rs. 10441.65, thus the benefit cost ratio was found to be 1:1.31.*
- *The total cost of cultivation for paddy was Rs. 57080.03. The gross income realized by the farmers was Rs. 80440.62. The net income from paddy cultivation was Rs. 23360.58. Thus the benefit cost ratio was found to be 1:1.4.*
- *The total cost of cultivation for jowar was Rs. 43896.78. The gross income realized by the farmers was Rs. 59691.67. The net income from Jowar cultivation was Rs. 15794.89. Thus the benefit cost ratio was found to be 1:1.36.*
- *The results indicate that, 50 per cent of the households opined that dry fodder was adequate which includes 80 per cent of marginal, 28.57 per cent of small, 83.33 per cent of medium and 100 per cent of large farmers. The data revealed that only 6.67 per cent of the households have opined that the green fodder is adequate which includes 20 per cent of marginal and 16.67 per cent of semi medium farmers.*
- *sampled households have grown 2 custard apple among them marginal farmers have grown 2 and 3 mango among them small farmers and semi medium farmers.*
- *The results indicate that, households have planted 5 teak, 76 Neem trees, 4 tamarind. Marginal farmers have planted 5 Neem, 1 tamarind; Small farmers have planted 23 neem and 1tamarinds. Semi medium farmers have planted 24 Neem, 2 tamarind and 5 teak trees. Medium farmers have planted 15 neem trees and large farmers 4.*
- *Cotton, jowar, paddy, red gram, and sorghum were sold to the extent of production.*
- *The results indicated that, About 73.33 per cent of the households have sold agricultural produce to the local/village merchants includes 100 per cent of the marginal farmers, 85.71per cent of the small farmers, 66.67 per cent of the semi medium farmers and 33.33 per cent medium farmers. About 23.33 per cent of the households have sold in regulated markets includes 14.29 per cent of small farmers, 33.33per cent of semi medium farmers, 66.67per cent of the medium farmers and 100 per cent of the large farmers.*

- *The results indicated that 6.67 per cent of the households have use cart as mode of transport, 86.67 per cent have used tractor, and 3.33 per cent have used truck.*
- *The results indicated that, the results indicated that, 20 per cent of the households have experienced the soil and water erosion problems i.e. 20 per cent of marginal farmers, 21.43 per cent of small farmers, 33.33 per cent of semi medium farmers.*
- *The results indicated that, 96.67 per cent of the households have shown interest in soil testing i.e. 100 per cent of marginal farmers, 100 per cent of small farmers, 100 per cent of semi medium, 100 per cent of medium farmers and 100 per cent large farmers have shown interest in soil testing.*
- *The results indicated that, 46.67 per cent of the households have adopted field bunding. Summer ploughing was adopted by 89.90 per cent of the households. About 3.33 per cent of the households have adopted farm pond. Contour bunding was adopted by 3.33 per cent of the households.*
- *The results indicated that, 11 per cent of the households who adopted field bunding opined that bunds are good, 21.43 per cent opined that bunds are slightly damaged.*
- *Piped supply was the major source for drinking water for 93.33 per cent includes 100 per cent of landless, 100 per cent of marginal, 92.9 per cent of small farmers, 83.33 per cent of semi medium and 100 per cent of medium and large farmers.*
- *Electricity was the major source of light for all the households in micro watershed.*
- *The results indicated that,33.33 per cent of the households possess sanitary toilet i.e. 100 per cent of landless, 20 per cent of marginal, 35.7 per cent of small, 17 per cent of semi medium and 33.33 per cent of medium farmers and 100 per cent of large farmers had sanitary toilet facility.*
- *The results indicated that, Cent per cent of the households sampled possessed BPL card.*
- *The results indicated that, Lower fertility status of the soil was the constraint experienced by 96.7 per cent of the households, wild animal menace on farm field (93.3%), frequent incidence of pest and diseases (43.3%), inadequacy of irrigation water (46.7%), high cost of Fertilizers and plant protection chemicals (90%), high rate of interest on credit (80%), low price for the agricultural commodities (90 %), lack of marketing facilities in the area (96.7%), inadequate extension services (46.7%), lack of transport for safe transport of the agricultural produce to the market (83.3%). Less rainfall (90%) and source of Agri–technology information (News paper/TV/Mobile)*

Chapter 2

INTRODUCTION

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

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

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

Scope and importance of survey

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

Chapter 3

METHODOLOGY

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

Description of the study area

Yadgir District is one of the 30 districts of Karnataka state in southern India. This district was carved out from the erstwhile Gulbarga district as the 30th district of Karnataka on 10 April 2010. Yadgir town is the administrative headquarters of the district. The district comprises of 3 taluks namely, Shahapur, Yadgiri and Shorapur (There are 16 hoblies, 117 Gram Panchayats, 4 Municipalities,8 Towns/ Urban agglomeration and 487 inhabited &32 un-inhabited villages The district occupies an area of 5,160.88 km².

Yadgir district is the second smallest district in the state, area wise is very rich in cultural traditions. The vast stretch of fertile black soil of the district is known for bumper red gram and jawar crops. The district is a "Daal bowl" of the state. The district is also known for cluster of cement industries and a distinct stone popularly known as "Malakheda Stone". Two main rivers, Krishna and Bhima, and a few tributaries flow in this region. Krishna and Bhima Rivers drain the district. They constitute the two major river basins of the district. Kagna and Amarja are the two sub - basins of Bhima River, which occur within the geographical area of the district

According to the 2011 census Yadgir district has a population of 1, 172,985, roughly equal to the nation of Timor-Lesteor the US state of Rhode Island. This gives it a ranking of 404th in India (out of a total of 640). The district has a population density of 224 inhabitants per square kilometre (580/sq mi). Its population growth rate over the decade 2001-2011 was 22.67%. Yadgir has a sex ratio of 984 females for every 1000 males, and a literacy rate of 52.36%.

Description of the micro watershed

Shethalli-2 micro-watershed in Kadechur sub-watershed (Yadgir taluk and district) is located in between $18^0$19’ – $18^0$7’ North latitudes and 74^0 5’ – $74^0$9’ East longitudes, covering an area of about 502.83 ha, bounded by Baddepalli, Balacheda, Kadechoora and Sowrashtralli villages.

Methodology followed in assessing socio-economic status of households

In order to assess the socio-economic condition of the farmers in the watershed a comprehensive questionnaire was prepared. Major components such as demographic conditions, migration details, food consumption and family expenditure pattern, material possession, land holding, land use management, cropping pattern, cost of cultivation of crops, livestock management. The statistical components such as frequency and percentage were used to analyze the data. About 30 households located in the micro watershed were interviewed for the survey.

Chapter 4

SALIENT FEATURES OF THE SURVEY

This chapter deals with systematic presentation of results of the survey. Keeping in view the objectives, the salient features of the survey are presented under the following headings.

Households sampled for socio-economic survey: The data on households sampled for socio economic survey in Shethalli-2 micro watershed is presented in Table 1 and it indicated that 30 farmers were sampled in Shethalli-2 micro watershed among them 5(16.67%) were marginal farmers, 14 (46.67%) were small farmers, 6 (20%) were semi medium farmers, 3 (10%) were medium farmers and 1(3.33%) were large farmers. Apart from this one landless farmer were also interviewed for the survey.

Table 1: Households sampled for socio economic survey in Shethalli-2 micro-watershed

Sl. No.	Particulars	LL (1)		MF (5)		SF (14)		SMF (6)		MDF (3)		LF (1)		All (30)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Farmers	1	3.33	5	16.67	14	46.67	6	20	3	10	1	3.33	**30**	100

Population characteristics: The population characteristics of households sampled for socio-economic survey in Shethalli-2 micro watershed is presented in Table 2. The data indicated that there were 75 (61.98%) men and 46(38.02%) were women among the sampled households. The average family size of marginal farmers was 4.19, a small farmer was 5, a semi medium farmer was 4.33, a medium farmer was 4 and for large farmers it was 4.22.

Table 2: Population characteristics of Shethalli-2micro-watershed

Sl. No.	Particulars	LL (3)		MF (17)		SF (56)		SMF (30)		MDF (9)		LF (6)		All (121)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Male	2	66.67	11	64.71	33	58.93	18	60	6	66.67	5	83.33	**75**	61.98
2	Female	1	33.33	6	35.29	23	41.07	12	40	3	33.33	1	16.67	**46**	38.02
Total		**3**	**100**	**17**	**100**	**56**	**100**	**30**	**100**	**9**	**100**	**6**	**100**	**121**	**100**
Average Size		3.00		3.40		4.00		5.00		3.00		6.00		4.03	

Age wise classification of population: The age wise classification of household members in Shethalli-2 micro watershed is presented in Table 3. The data indicated that there were 21(17.36%) people were in 0-15 years of age, 53 (43.8%) were in 16-35 years of age, 40 (33.06 %) were in 36-60 years of age and 7 (5.79 %) were above 61 years of age.

Table 3: Age wise classification of household members in Shethalli-2 micro-watershed

Sl. No.	Particulars	LL (3)		MF (17)		SF (56)		SMF (30)		MDF (9)		LF (6)		All (121)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	0-15 years of age	1	33.33	7	41.18	8	14.29	5	16.67	0	0	0	0	**21**	17.36
2	16-35 years of age	2	66.67	7	41.18	23	41.07	14	46.67	4	44.44	3	50	**53**	43.8
3	36-60 years of age	0	0	3	17.65	22	39.29	10	33.33	3	33.33	2	33.33	**40**	33.06
4	> 61 years	0	0	0	0	3	5.36	1	3.33	2	22.22	1	16.67	**7**	5.79
Total		**3**	**100**	**17**	**100**	**56**	**100**	**30**	**100**	**9**	**100**	**6**	**100**	**121**	**100**

Education level of household members: Education level of household members in Shethalli-2 micro watershed is presented in Table 4. The results indicated that the Shethalli-2had 32.23 per cent illiterates, 14.05 per cent of them had primary school education, 5.79 per cent of them had middle school education, 21.49 per cent of them had high school education, 11.57 per cent of them had PUC education, 4.96 per cent of them had diploma, 0.83 per cent of them had ITI, 5.79 per cent of them had degree education and 3.31 per cent of them had masters education.

Table 4. Education level of household members in Shethalli-2 micro watershed

Sl. No.	Particulars	LL (3)		MF (17)		SF (56)		SMF (30)		MDF (9)		LF (6)		All (121)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Illiterate	1	33.33	7	41.18	18	32.14	8	26.67	4	44.44	1	16.67	39	32.23
2	Primary School	0	0.00	4	23.53	5	8.93	8	26.67	0	0.00	0	0.00	17	14.05
3	Middle School	0	0.00	1	5.88	6	10.71	0	0.00	0	0.00	0	0.00	7	5.79
4	High School	0	0.00	3	17.65	10	17.86	6	20.00	2	22.22	5	83.33	26	21.49
5	PUC	1	33.33	1	5.88	9	16.07	2	6.67	1	11.11	0	0.00	14	11.57
6	Diploma	0	0.00	1	5.88	3	5.36	1	3.33	1	11.11	0	0.00	6	4.96
7	ITI	0	0.00	0	0.00	1	1.79	0	0.00	0	0.00	0	0.00	1	0.83
8	Degree	1	33.33	0	0.00	3	5.36	3	10.00	0	0.00	0	0.00	7	5.79
9	Masters	0	0.00	0	0.00	1	1.79	2	6.67	1	11.11	0	0.00	4	3.31
Total		3	100	17	100	56	100	30	100	9	100	6	100	121	100

Occupation of household heads: The data regarding the occupation of the household heads in Shethalli-2 micro watershed is presented in Table 5. The results indicate that, 90 per cent of households practicing agriculture and 3.33 per cent of the household heads were general labourers and 3.33 percent of the households were housewife.

Table 5: Occupation of household heads in Shethalli-2 micro watershed

Sl. No.	Particulars	LL (1)		MF (5)		SF (14)		SMF (6)		MDF (3)		LF (1)		All (30)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Agriculture	0	0	5	100	14	100	5	83.33	2	66.67	1	100	**27**	90
2	General Labour	1	100	0	0	0	0	0	0	0	0	0	0	**1**	3.33
3	Housewife	0	0	0	0	0	0	1	16.67	0	0	0	0	**1**	3.33
Total		**1**	**100**	**5**	**100**	**14**	**100**	**6**	**100**	**2**	**100**	**1**	**100**	**29**	**100**

Occupation of the household members: The data regarding the occupation of the household members in Shethalli-2 micro watershed is presented in Table 6. The results indicate that agriculture was the major occupation for 53.72 per cent of the household members, 0.83 per cent were general labourers, 4.13 per cent were private service, 23.14 per cent of them were in student, 14.88 per cent of them were housewife and 3.31 per cent of them were children . In case of landless households 33.33 per cent were general

labourers. In case of marginal farmers 41.18 per cent were agriculturist, 29.41 per cent were student, and about 11.7 per cent in housewife and 17.65 per cent were children. In case of small farmers, 57.14 per cent of the household members were practicing agriculture and 1.79 per cent of them were private sector. In case of semi medium farmers 46.67 per cent of the household members were practicing agriculture and 10 per cent of them were private service. In case of medium farmers, 77.78 per cent of the household members were practicing agriculture and 11.11 per cent were private sector. In case of large farmers, 83.33 per cent of the household members were practicing agriculture and 16.67 per cent were housewife.

Table 6: Occupation of family members in Shethalli-2 micro watershed

Sl. No.	Particulars	LL (3)		MF (17)		SF (56)		SMF (30)		MDF (9)		LF (6)		All (121)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Agriculture	0	0	7	41.18	32	57.14	14	46.67	7	77.78	5	83.33	**65**	53.72
2	General Labour	1	33.33	0	0	0	0	0	0	0	0	0	0	**1**	0.83
3	Private Service	0	0	0	0	1	1.79	3	10	1	11.11	0	0	**5**	4.13
4	Student	0	0	5	29.41	15	26.79	8	26.67	0	0	0	0	**28**	23.14
5	Housewife	1	33.33	2	11.76	8	14.29	5	16.67	1	11.11	1	16.67	**18**	14.88
6	Children	1	33.33	3	17.65	0	0	0	0	0	0	0	0	**4**	3.31
Total		**3**	**100**	**17**	**100**	**56**	**100**	**30**	**100**	**9**	**100**	**6**	**100**	**121**	**100**

Institutional participation of the household members: The data regarding the institutional participation of the household members in Shethalli-2 micro watershed is presented in Table 7. The results shows that 4.96 per cent of them participated in self help groups, 2.48 per cent of them participated in user groups and 91.74 per cent of them have not participated in any local institutions. About 11.76 per cent of marginal farmers have participated in self help groups and 88.24 per cent have not participated in any local institutions. Small farmers participated in self help group (7.14 %) and user groups (3.57%). About 3.33 per cent of semi medium farmers have participated in self help group and among all large farmers not participated in local origination.

Table 7. Institutional Participation of household members in Shethalli-2 micro watershed

Sl. No.	Particulars	LL (3)		MF (17)		SF (56)		SMF (30)		MDF (9)		LF (6)		All (121)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Self Help Group	0	0	2	11.76	4	7.14	0	0	0	0	0	0	**6**	4.96
2	User Group	0	0	0	0	2	3.57	0	0	1	11.11	0	0	**3**	2.48
3	No Participation	3	100	15	88.24	50	89.29	29	96.67	8	88.89	6	100	**111**	91.74
4	Cooperative bank	0	0	0	0	0	0	1	3.33	0	0	0	0	**1**	0.83
Total		**3**	**100**	**17**	**100**	**56**	**100**	**30**	**100**	**9**	**100**	**6**	**100**	**121**	**100**

Type of house owned: The data regarding the type of house owned by the households in Shethalli-2 micro watershed is presented in Table 8. The results indicate that 26.67 per cent of the households possess Katcha house and 70.0 per cent of them possess pucca house and 3.33 per cent of them possess semi pucca house. With regard to landless households, 100 per cent of them possess semi pucca house. In case of marginal farmers, 100 per cent of the households possess pucca house. In case of small farmers, 35.71 per cent of the households possess Katcha house and 64.29 per cent of them possess pucca house. In case of semi medium farmers, 16.67 per cent of the households possess Katcha house and 83.33per cent of them possess pucca house. Cent per cent of medium and large farmers possess Katcha house.

Table 8. Type of house owned by households in Shethalli-2 micro watershed

Sl. No.	Particulars	LL (1)		MF (5)		SF (14)		SMF (6)		MDF (3)		LF (1)		All (30)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Katcha	0	0	0	0	5	35.71	1	16.67	1	33.33	1	100	**8**	26.67
2	Pucca/RCC	0	0	5	100	9	64.29	5	83.33	2	66.67	0	0	**21**	70
3	Semi pacca	1	100	0	0	0	0	0	0	0	0	0	0	**1**	3.33
Total		**1**	**100**	**5**	**100**	**14**	**100**	**6**	**100**	**3**	**100**	**1**	**100**	**30**	**100**

Durable Assets owned by the households: The data regarding the Durable Assets owned by the households in Shethalli-2 micro watershed is presented in Table 9. The results shows that 3.33 per cent of the households possess radio, Cent per cent of the households possess TV, 23.33per cent of the households possess Mixer grinder, 30 per cent of the households possess motor cycle, 6.67 per cent of the households possess auto, 6.67 per cent of the households possess car/ four wheeler and Cent per cent of the households mobile phones.

Table 9. Durable Assets owned by households in Shethalli-2 micro watershed

Sl. No.	Particulars	LL (1)		MF (5)		SF (14)		SMF (6)		MDF (3)		LF (1)		All (30)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Radio	0	0	0	0	0	0	1	16.67	0	0	0	0	**1**	3.33
2	Television	1	100	5	100	14	100	6	100	3	100	1	100	**30**	100
3	Mixer/Grinder	0	0	1	20	3	21.43	2	33.33	1	33.33	0	0	**7**	23.33
4	Motor Cycle	1	100	1	20	4	28.57	2	33.33	1	33.33	0	0	**9**	30
5	Auto	0	0	0	0	0	0	1	16.67	1	33.33	0	0	**2**	6.67
6	Car/Four Wheeler	0	0	0	0	0	0	2	33.33	0	0	0	0	**2**	6.67
7	Mobile Phone	1	100	5	100	14	100	6	100	3	100	1	100	**30**	100

Average value of durable assets: The data regarding the average value of durable assets owned by the households in Shethalli-2 micro watershed is presented in Table 10. The results shows that the average value of radio was Rs.2000, television was Rs.9700, mixer grinder was Rs.2142, motor cycle was Rs.56400 and mobile phone was Rs.3588, Auto was 110000 and car/ four wheeler was 550000.

Table 10. Average value of durable assets owned by households in Shethalli-2 micro watershed

Average Value (Rs.)

Sl.No.	Particulars	LL (1)	MF (5)	SF (14)	SMF (6)	MDF(3)	LF (1)	All (30)
1	Radio	0	0	0	2000	0	0	**2000**
2	Television	10000	10000	9714	9833	8666	10000	**9700**
3	Mixer/Grinder	0	2000	2000	2250	2500	0	**2142**
4	Motor Cycle	50000	50000	55000	64666	50000	0	**56400**
5	Auto	0	0	0	120000	100000	0	**110000**
6	Car/Four Wheeler	0	0	0	550000	0	0	**550000**
7	Mobile Phone	5000	2111	3000	6000	4250	2500	**3588**

Farm Implements owned: The data regarding the farm implements owned by the households in Shethalli-2 micro watershed is presented in Table 11. About 50 per cent of the households possess plough, 10 per cent of them possess tractor, 46.67 per cent of them posses bullocks cart, 6.67 per cent of them power tiller, 13.33 per cent of them possess weeder, 3.33 per cent of them possess harvester and 6.67 per cent of the households possess sprayer.

Table 11. Farm Implements owned by households in Shethalli-2 micro watershed

Sl. No.	Particulars	LL (1)		MF(5)		SF (14)		SMF (6)		MDF (3)		LF (1)		All (30)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Bullock Cart	0	0	3	60	9	64.29	1	16.67	0	0	1	100	**14**	46.67
2	Plough	1	100	3	60	7	50	2	33.33	1	33.33	1	100	**15**	50
3	Power Tiller	0	0	0	0	0	0	0	0	2	66.67	0	0	**2**	6.67
4	Tractor	0	0	0	0	0	0	1	16.67	2	66.67	0	0	**3**	10
5	Sprayer	0	0	0	0	0	0	1	16.67	0	0	1	100	**2**	6.67
6	Weeder	0	0	0	0	2	14.29	1	16.67	1	33.33	0	0	**4**	13.33
7	Harvester	0	0	0	0	0	0	0	0	1	33.33	0	0	**1**	3.33
8	**Blank**	0	0	2	40	5	35.71	3	50	1	33.33	0	0	**11**	36.67

Average value of farm implements: The data regarding the average value of farm Implements owned by the households in Shethalli-2 micro watershed is presented in Table 12. The results show that the average value of plough was Rs.4, 692, the average value of tractor was Rs. 7,50,000 and the average value of sprayer was Rs.6,000, the average value of bullock cart Rs.18, 181, the average value of power tiller Rs.35,000, the average value of harvester 10,000 and the average value of weeder Rs.1,160.

Table12.Average value of farm implements owned by households in Shethalli-2 micro watershed

Average Value (Rs.)

Sl.No.	Particulars	MF (5)	SF (14)	SMF (6)	MDF (3)	LF (1)	All (30)
1	Bullock Cart	17500	17142	25000	0	20000	**18181**
2	Plough	2000	5428	7500	2000	2000	**4692**
3	Power Tiller	0	0	0	35000	0	**35000**
4	Tractor	0	0	800000	725000	0	**750000**
5	Sprayer	0	0	10000	0	2000	**6000**
6	Weeder	0	200	200	5000	0	**1160**
7	Harvester	0	0	0	10000	0	**10000**

Livestock possession by the households: The data regarding the Livestock possession by the households in Shethalli-2 micro watershed is presented in Table 13. The results indicate that, 36.67 per cent of the households possess bullocks, 30 per cent of the households possess local cow.

In case of marginal households, 40 per cent possess bullocks, and 20 per cent possess local cow. In case of small farmers, 35.71 per cent of the households possess bullock, 21.43 per cent of the households possess local cow. In case of semi medium farmers, 50 per cent of households possess bullock, 50 per cent possess local cow. In case of medium farmers, 33.33 per cent of the households possess bullocks and 33.33 per cent of them had local cow. In case of large farmers, cent per cent of the households possess bullock.

Table 13. Livestock possession by households in Shethalli-2 micro watershed

Sl. No.	Particulars	LL (1)		MF (5)		SF (14)		SMF (6)		MDF (3)		LF (1)		All (30)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Bullock	0	0	2	40	5	35.71	3	50	1	33.33	0	0	**11**	36.67
2	Local cow	0	0	1	20	3	21.43	3	50	1	33.33	1	100	**9**	30

Average Labour availability: The data regarding the average labour availability in Shethalli-2 micro watershed is presented in Table 14. The results indicate that, average own labour men available in the micro watershed was 1.29, average own labour (women) available was 1.1, average hired labour (men) available was 8.35 and average hired labour (women) available was 21.35.

In case of marginal farmers, average own labour men available was 1.2, average own labour (women) was 1, average hired labour (men) was 3.2 and average hired labour (women) available was 8.2. In case of small farmers, average own labour men available was 1.2, average own labour (women) was 1.13, average hired labour (men) was 7.27 and average hired labour (women) available was 17.53. In case of semi medium farmers, average own labour men available was 1.5, average own labour (women) was 1.5, average hired labour (men) was 11 and average hired labour (women) available was 31.67, In case of medium farmers, average own labour men available was 1.33, average own labour (women) was 0.67, average hired labour (men) was 21and average hired labour (women) available was 41.67 and In case of large farmers, average own labour men available was 3, average own labour (women) was 1, average hired labour (men) was 5 and average hired labour (women) available was 35.

Table 14. Average Labour availability in Shethalli-2 micro watershed

Sl. No.	Particulars	LL (1)	MF (5)	SF (14)	SMF (6)	MDF (3)	LF (1)	All (30)
		N	N	N	N	N	N	N
1	Own labour Male	0	1.2	1.2	1.5	1.33	3	**1.29**
2	Own Labour Female	0	1	1.13	1.5	0.67	1	**1.1**
3	Hired labour Male	0	3.2	7.27	11	21	5	**8.35**
4	Hired labour Female	8	8.2	17.53	31.67	41.67	35	**21.35**

Adequacy of Hired Labour: The data regarding the adequacy of hired labour in Shethalli-2 micro watershed is presented in Table 15. The results indicate that, 53.33 per cent of the household opined that hired labour was adequate and 46.67 per cent of the households opined that hired labour was inadequate. About 40 per cent of the marginal farmers, 71.43 per cent of small, 33.33 per cent of semi medium and 33.33 per cent of medium farmers and Cent per cent of large farmer have opined that the hired labour was in adequate. About 60 per cent of the marginal farmers, 28.57 per cent of small, and 66.67 per cent of semi medium, 66.67 per cent of medium farmers have opined that the hired labour was in inadequate.

Table 15. Adequacy of Hired Labour in Shethalli-2 micro watershed

Sl. No.	Particulars	LL (1)		MF (5)		SF (14)		SMF (6)		MDF (3)		LF (1)		All (30)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Adequate	1	100	2	40	10	71.43	2	33.33	1	33.33	0	0	**16**	53.33
2	Inadequate	0	0	3	60	4	28.57	4	66.67	2	66.67	1	100	**14**	46.67

Migration among the households: The data regarding the migration among the households in Shethalli-2 micro watershed is presented in Table 16. The results indicate that, 4(3.31%) persons were migrated from the micro watershed which includes 1.79 persons from small medium farmers' and 10 per cent of semi medium farmer category.

Table16. Migration among the households in Shethalli-2 micro watershed

Sl. No.	Particulars	LL (3)		MF (17)		SF (56)		SMF(30)		MDF(9)		LF (6)		All(121)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Migration	0	0	0	0	1	1.79	3	10	0	0	0	0	**4**	3.31

Average distance and duration of migration: The data regarding the average distance and duration of migration in Shethalli-2 micro watershed is presented in Table 17. The results indicate that, people have migrated on average of 632.5 Kms and average duration was months 13. Small farmers have migrated 600 kms and on an average 12 months in a year. Semi medium farmers have migrated 665 kms and on an average 14 months in a year.

Table 17. Average distance and duration of migration in Shethalli-2 micro watershed

Sl.No.	Particulars	SF (1)	SMF (3)	All (4)
		N	N	N
1	Avg. Distance (kms)	600	665	632.5
2	Avg. Duration (months)	12	14	13

Purpose of migration: The data regarding the average distance and duration of migration in Shethalli-2 micro watershed is presented in Table 18. The results indicate that, job/work was the reason for migration for all the migrants.

Table 18. Purpose of migration by household members in Shethalli-2 micro watershed

Sl.No.	Particulars	SF (1)		SMF (3)		All (4)	
		N	%	N	%	N	%
1	Job/wage/work	1	100	3	100	4	100
Total		1	100	3	100	4	100

Positive consequences of migration: The data regarding the positive consequences of migration in Shethalli-2 micro watershed is presented in Table 19. The results indicate that, improved quality of the life was the major Positive consequences of migration for 50 per cent of the better children education persons migrated from small framers households.

Table 19. Positive consequences of migration by household members in Shethalli-2 micro watershed

Sl. No.	Particulars	SF (1)		SMF (3)		All (4)	
		N	%	N	%	N	%
1	Better children education	2	200	0	0	2	50
2	None	1	100	2	66.67	3	75

Negative consequences of migration: The data regarding the negative consequences of migration in Shethalli-2 micro watershed is presented in Table 20. The results indicate that, 25 per cent of the migrated persons opined that there were no negative consequences.

Table 20. Negative consequences of migration by household members in Shethalli-2 micro watershed

Sl. No.	Particulars	SF (1)		SMF (3)		All (4)	
		N	%	N	%	N	%
1	Disturbance in family life	1	100	0	0	**1**	25
2	None	2	200	2	66.67	**4**	100

Distribution of land (ha): The data regarding the distribution of land (ha) in Shethalli-2 micro watershed is presented in Table 21. The results indicate that, households of the Shethalli-2 micro watershed possess 52.52 ha (96.13%) of dry land and 2.11 ha (3.87%) of irrigated land. Marginal farmers possess 3.12 ha (100%) of dry land. Small possess 20.25 (100 %) of dry land. Semi medium possess 14.37 ha (100%) of dry land. medium farmers possess 14.79 ha (87.5%) of dry land and 2.11ha (12.5%) of irrigated land.

Table 21. Distribution of land (Ha) in Shethalli-2 micro watershed

Sl. No.	Particulars	MF (5)		SF (14)		SMF (6)		MDF (3)		All (30)	
		ha	%	ha	%	ha	%	ha	%	ha	%
1	Dry	3.12	100	20.25	100	14.37	100	14.79	87.5	**52.52**	96.13
2	Irrigated	0	0	0	0	0	0	2.11	12.5	**2.11**	3.87
Total		**3.12**	**100**	**20.25**	**100**	**14.37**	**100**	**16.9**	**100**	**54.63**	**100**

Average land value (Rs./ha): The data regarding the average land value (Rs./ha) in Shethalli-2 micro watershed is presented in Table 22. The results indicate that, the average value of dry land was Rs. 267994.14 and average value of irrigated was Rs.1, 89,272. In case of marginal famers, the average land value was Rs. 670428 for dry land. In case of small famers, the average land value was Rs. 3, 75, 214 for dry land. In case of semi medium famers, the average land value was Rs. 1, 90,642.25 for dry land. In case of medium famers, the average land value was Rs. 84,496 for dry land.

Table 22. Average land value (Rs./ha) in Shethalli-2 micro watershed

Sl. No.	Particulars	MF (5)	SF (14)	SMF (6)	MDF (3)	All (30)
1	Dry	6,70,428.56	3,75,214.87	1,90,642.25	84,496.44	2,67,994.14
2	Irrigated	0	0	0	1,89,272.04	1,89,272.04

Irrigated Area (ha): The data regarding the irrigated area (ha) in Shethalli-2 micro watershed is presented in Table 23. The results indicate that, marginal farmers had irrigated area of 9.31 hectares, marginal farmers had 2.43 hectares and medium farmers had 6.88 hectares of irrigated land.

Table 23. Irrigated Area (ha) in Shethalli-2 micro watershed

Sl. No.	Particulars	MF (5)	MDF (3)	All (30)
		Area (ha)	Area (ha)	Area (ha)
1	Kharif	0.81	0.4	**1.21**
2	Perennial Crops	0	3.24	**3.24**
3	Rabi	0.81	0	**0.81**
4	Summer	0.81	3.24	**4.05**
Total		**2.43**	**6.88**	**9.31**

Cropping pattern: The data regarding the cropping pattern in Shethalli-2 micro watershed is presented in Table 24. The results indicate that, farmers have grown cotton (15.71 ha), jowar (2.83 ha), paddy (0.8ha), red gram (8.94ha), sorghum (5.32 ha) and cotton (1.21ha). Marginal farmers have grown red gram (0.81 ha) and sorghum (5.32ha), Small farmers have grown cotton (4.21ha), jowar (2.83ha) and red gram (6.11 ha), Semi medium farmers have grown cotton (4.49 ha), red gram (1.62ha) and Medium farmers have grown cotton (7 ha), red gram (0.4ha) and sorghum (5.32ha).

Table 24. Cropping pattern in Shethalli-2 micro watershed

Sl. No.	Particulars	MF (5)	SF (14)	SMF (6)	MDF (3)	LF (1)	All (30)
		Area (ha)	Area (ha)	Area (ha)	Area (ha)	Area (ha)	Area (ha)
1	Cotton	0	4.21	4.49	7	0	**15.71**
2	Jowar	0	2.83	0	0	0	**2.83**
3	Paddy	0	0	0	0.4	0	**0.8**
4	Red gram (togari)	0.81	6.11	1.62	0.4	0	**8.94**
5	Sorghum	5.32	0	0	0	0	**5.32**
6	Cotton	0	0.81	0	0	0.4	**1.21**
Total		**6.13**	**13.96**	**6.11**	**8.22**	**0.4**	**34.83**

Cropping intensity: The data regarding the cropping intensity in Shethalli-2 micro watershed is presented in Table 25. The results indicate that, the cropping intensity in Shethalli-2 micro watershed was found to be 59.67 per cent. In case of Marginal farmers it was 196.57 per cent, for small farmers it was 68.98 per cent, in case of semi medium farmers it was 42.55 per cent, medium farmers had cropping intensity of 48.54 per cent and large farmers had 10.88 per cent.

Table 25. Cropping intensity (%) in Shethalli-2 micro watershed

Sl. No.	Particulars	LL (1)	MF (5)	SF (14)	SMF (6)	MDF (3)	LF (1)	All (30)
1	Cropping Intensity	0	196.75	68.98	42.55	48.54	10.88	59.67

Possession of Bank account: The data regarding the possession of Bank account and savings in Shethalli-2 micro watershed is presented in Table 26. The results indicate that, 96.67 per cent of the households possess bank account and 80 per cent of them have savings. With respect to category wise account, 100 per cent of land less, 100 per cent of marginal, 100 per cent of small, medium and large farmers and 83.33 per cent of semi medium, possesses bank account. With respect to savings, 80 per cent of marginal, 85.71per cent of small, 66.67 per cent of semi medium farmers and 100 per cent of large farmers had savings in the bank account.

Table 26. Possession of Bank account and savings in Shethalli-2 micro watershed

Sl. No.	Particulars	LL (1)		MF (5)		SF (14)		SMF (6)		MDF (3)		LF (1)		All (30)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	**Account**	1	100	5	100	14	100	5	83.33	3	100	1	100	**29**	96.67
2	**Savings**	0	0	4	80	12	85.71	4	66.67	3	100	1	100	**24**	80

Borrowing status: The data regarding the possession of borrowing status in Shethalli-2 micro watershed is presented in Table 27. The results indicate that, 40 per cent of marginal, 42.86 per cent of small, 50 per cent semi medium, 33.33 per cent of medium farmers and 100 per cent of large farmers have borrowed credit from different sources.

Table 27. Borrowing status in Shethalli-2 micro watershed

Sl.No.	Particulars	MF (5)		SF (14)		SMF (6)		MDF (3)		LF (1)		All (30)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Credit Availed	2	40	6	42.86	3	50	1	33.33	1	100	**13**	43.33

Source of credit: The data regarding the source of credit availed by households in Shethalli-2 micro watershed is presented in Table 28. The results indicate that, 78.57 per cent have availed loan in commercial banks, 7.14 per cent have availed loan in cooperative bank, 100 per cent have availed loan from friends and relatives, 42.86 per cent have availed loan from grameena bank, 7.14 per cent have availed loan from money lender and 28.57 per cent have availed loan from Traders.

Average credit amount: The data regarding the average credit amount availed by households in Shethalli-2 micro watershed is presented in Table 29. The results indicate

that, marginal, small, semi medium and large farmers have availed Rs.12500, Rs.20333.33, Rs. 115000 and Rs.25000 respectively.

Table 28. Source of credit availed by households in Shethalli-2 micro watershed

Sl. No.	Particulars	MF (2)		SF (6)		SMF (3)		MDF (2)		LF (1)		All (14)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Commercial Bank	2	100	4	66.67	2	66.67	2	100	1	100	**11**	78.57
3	Friends/Relatives	2	100	5	83.33	4	133.33	1	50	1	100	**14**	100
4	Grameena Bank	1	50	2	33.33	3	100	0	0	0	0	**6**	42.86
6	Money Lender	0	0	0	0	0	0	1	50	0	0	**1**	7.14
8	Traders	2	100	1	16.67	1	33.33	0	0	0	0	**4**	28.57

Table 29. Average Credit amount availed by households in Shethalli-2 micro watershed

Sl. No.	Particulars	LL (0)	MF (2)	SF (6)	SMF (3)	MDF (2)	LF (1)	All (14)
		N	N	N	N	N	N	N
1	Average Credit	0	12,500	20,333	1,15,000	0	25,000	**36,928**

Purpose of credit borrowed (institutional Source): The data regarding the purpose of credit borrowed from institutional sources by households in Shethalli-2 micro watershed is presented in Table 30. The results indicate that, 43.75 per cent of the households have borrowed loan for agriculture, 6.25 per cent of them have borrowed loan for education and 50 per cent of them have borrowed loan for health. 66.67 per cent of marginal farmers, 50 per cent of small farmers, 25 per cent of semi medium farmers and 100 per cent of the medium farmers availed loan for Agriculture production. About 50 per cent of small and landless have availed loan for animal husbandry.

Table 30. Purpose of credit borrowed (institutional Source) by households in Shethalli-2 micro watershed

Sl. No.	Particulars	MF (3)		SF (6)		SMF (4)		MDF (2)		LF (1)		All (16)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Agriculture production	1	33.33	3	50	2	50	0	0	1	100	**7**	43.75
2	Education	0	0	0	0	1	25	0	0	0	0	**1**	6.25
3	Other	2	66.67	3	50	1	25	2	100	0	0	**8**	50

Purpose of credit borrowed (Private Credit): The data regarding the purpose of credit borrowed from private sources by households in Shethalli-2 micro watershed is presented in Table 31. The results indicate that, the main propose of borrowing credit was other than those listed for about 76.92 per cent of the households which includes cent per cent of the landless farmers, small farmers, medium farmers and large farmers, 33.33 per cent of the marginal farmers and 66.67 per cent of semi medium farmers. Around 7.69 per cent of the households borrowed credit for animal husbandry purpose, 7.69 per cent borrowed for purchasing vehicle and another 7.69 per cent borrowed for health care purposes.

Table 31. Purpose of credit borrowed (Private Credit) by households in Shethalli-2 micro watershed

Sl. No.	Particulars	LL (1)		MF (3)		SF (3)		SMF (3)		MDF (2)		LF (1)		All (13)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
2	Animal husbandry	0	0	1	33.33	0	0	0	0	0	0	0	0	**1**	7.69
3	Purchase-vehicle	0	0	0	0	0	0	1	33.33	0	0	0	0	**1**	7.69
4	Healthcare	0	0	1	33.33	0	0	0	0	0	0	0	0	**1**	7.69
5	Other	1	100	1	33.33	3	100	2	66.67	2	100	1	100	**10**	76.92

Repayment status of households (Private): The data regarding the repayment status of credit borrowed from private sources by households in Shethalli-2 micro watershed is presented in Table 32. Results indicated that 5.26 per cent of the households have paid partially which includes 20 per cent of small farmer. About 10.53 per cent of the households have not paid which includes 25 per cent of marginal farmers, 16.67 per cent of small farmer and About 73.68 per cent of the households have fully paid which includes 100 per cent of land less farmers, 50 per cent of marginal farmers, 83.33 per cent of small farmers, 60 per cent of semi medium farmers, 100 per cent of medium and large farmers.

Table 32. Repayment status of households (Private) in Shethalli-2 micro watershed

Sl. No.	Particulars	LL (1)		MF (4)		SF (6)		SMF (5)		MDF (2)		LF (1)		All (19)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Partially paid	0	0	0	0	0	0	1	20	0	0	0	0	**1**	5.26
2	Un paid	0	0	1	25	1	16.67	0	0	0	0	0	0	**2**	10.53
3	Fully paid	1	100	2	50	5	83.33	3	60	2	100	1	100	**14**	73.68

Opinion on institutional sources of credit: The data regarding the opinion on institutional sources of credit in Shethalli-2 micro watershed is presented in Table 33. The results indicate that, 16.7 per cent of the households opined that credit helped to perform timely agricultural operations and 5.56 per cent of them opined that credit has higher rate of interest, 72.2 per cent opined that credit was none and 5.56 per cent of the households opined that credit has forced to sell the produce at low price to repay loan in time.

Table 33. Opinion on institutional sources of credit in Shethalli-2 micro watershed

Sl. No.	Particulars	LL (1)		MF (3)		SF (6)		SMF (5)		MDF (2)		LF (1)		All (18)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Helped to perform timely agricultural operations	0	0	1	33.3	1	16.7	0	0	0	0	1	100	**3**	16.7
2	Higher rate of interest	0	0	0	0	1	16.7	0	0	0	0	0	0	**1**	5.56
3	None	1	100	2	66.7	4	66.7	4	80	2	100	0	0	**13**	72.2
4	Forced to sell the produce at low price to repay loan in time	0	0	0	0	0	0	1	20	0	0	0	0	**1**	5.56

Cost of Cultivation of cotton: The data regarding the cost of cultivation of cotton in Shethalli-2 micro watershed is presented in Table 34. The results indicate that, the total cost of cultivation for cotton was Rs. 48441.68. The gross income realized by the farmers was Rs. 57998.02. The net income from Cotton cultivation was Rs. 9556.34, thus the benefit cost ratio was found to be 1:1.2.

Table 34. Cost of Cultivation of cotton in Shethalli-2 micro watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	45.17	9042.29	18.67
2	Bullock		Pairs/day	0.09	91.48	0.19
3	Tractor		Hours	8.62	5173.63	10.68
4	Machinery		Hours	8.13	1874.28	3.87
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	11.11	2662.30	5.50
6	Seed Inter Crop		Kgs.	0.00	0.00	0.00
7	FYM		Quintal	1.72	1968.40	4.06
8	Fertilizer + micronutrients		Quintal	2.44	2454.32	5.07
9	Pesticides (PPC)		Kgs / liters	2.05	2590.75	5.35
10	Irrigation		Number	0.00	0.00	0.00
11	Repairs			0.00	1400.00	2.89
12	Msc. Charges (Marketing costs etc)			0.00	150.00	0.31
13	Depreciation charges			0.00	300.88	0.62
14	Land revenue and Taxes			0.00	11.77	0.02
II	**Cost B1**					
16	Interest on working capital				2481.09	5.12
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**				30201.19	62.35
III	**Cost B2**					
18	Rental Value of Land				283.33	0.58
19	**Cost B2 = (Cost B1 + Rental value)**				30484.52	62.93
IV	**Cost C1**					
20	Family Human Labour			11.15	2553.37	5.27
21	**Cost C1 = (Cost B2 + Family Labour)**				33037.89	68.20
V	**Cost C2**					
22	Risk Premium				11000.00	22.71
23	**Cost C2 = (Cost C1 + Risk Premium)**				44037.89	90.91
VI	**Cost C3**					
24	Managerial Cost				4403.79	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**				48441.68	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		13.98	57998.01	
		b) Main Crop Sales Price (Rs.)			4150.00	
		c) Intercrop (q)		0.05	0.00	
		d) Intercrop Sales Price (Rs.)			0.10	
		h) Intercrop Sales Price (Rs.)			0.10	
b.	Gross Income (Rs.)				57998.02	
c.	Net Income (Rs.)				9556.34	
d.	Cost per Quintal (Rs./q.)				3454.90	
e.	Benefit Cost Ratio (BC Ratio)				1:1.2	

Cost of cultivation of red gram with green gram (intercrop): The data regarding the cost of cultivation of red gram + green gram in Shethalli-2 micro watershed is presented in Table 35. The results indicate that, the total cost of cultivation for red gram was Rs. 46729.38. The gross income realized by the farmers was Rs. 67925.00. The net income from red gram cultivation was Rs. 21195.62. Thus the benefit cost ratio was found to be 1:1.45.

Table 35. Cost of Cultivation of red gram+ green gram in Shethalli-2 micro watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	73.28	14943.50	31.98
2	Bullock		Pairs/day	0.00	0.00	0.00
3	Tractor		Hours	12.35	7410.00	15.86
4	Machinery		Hours	12.35	2470.00	5.29
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	16.47	988.00	2.11
6	Seed Inter Crop		Kgs.	4.12	329.33	0.70
7	FYM		Quintal	2.47	3705.00	7.93
8	Fertilizer + micronutrients		Quintal	2.47	2717.00	5.81
9	Pesticides (PPC)		Kgs / liters	2.47	3705.00	7.93
10	Irrigation		Number	0.00	0.00	0.00
11	Repairs			0.00	0.00	0.00
12	Msc. Charges (Marketing costs etc)			0.00	0.00	0.00
13	Depreciation charges			0.00	0.02	0.00
14	Land revenue and Taxes			0.00	6.59	0.01
II	**Cost B1**					
16	Interest on working capital				1613.32	3.45
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**				37887.76	81.08
III	**Cost B2**					
18	Rental Value of Land				0.00	0.00
19	**Cost B2 = (Cost B1 + Rental value)**				37887.76	81.08
IV	**Cost C1**					
20	Family Human Labour			11.53	2593.50	5.55
21	**Cost C1 = (Cost B2 + Family Labour)**				40481.26	86.63
V	**Cost C2**					
22	Risk Premium				2000.00	4.28
23	**Cost C2 = (Cost C1 + Risk Premium)**				42481.26	90.91
VI	**Cost C3**					
24	Managerial Cost				4248.13	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**				46729.38	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		12.35	49400.00	
		b) Main Crop Sales Price (Rs.)			4000.00	
		c) Intercrop (q)		4.12	18525.00	
		d) Intercrop Sales Price (Rs.)			4500.00	
b.	Gross Income (Rs.)				67925.00	
c.	Net Income (Rs.)				21195.62	
d.	Cost per Quintal (Rs./q.)				2837.82	
e.	Benefit Cost Ratio (BC Ratio)				1:1.45	

Cost of cultivation of red gram with red gram+bengal gram: The data regarding the cost of cultivation of red gram + bengalgram in Shethalli-2 micro watershed is presented in Table 36. The results indicate that, the total cost of cultivation for red gram was Rs. 41504.09. The gross income realized by the farmers was Rs. 100035.00. The net income from red gram cultivation was Rs. 58530.91. Thus the benefit cost ratio was found to be 1:2.41.

Table 36. Cost of Cultivation of redgram+ bengalgram in Shethalli-2 micro watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	%to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	58.05	11670.75	28.12
2	Bullock		Pairs/day	0.00	0.00	0.00
3	Tractor		Hours	12.35	7410.00	17.85
4	Machinery		Hours	0.00	0.00	0.00
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	15.44	926.25	2.23
6	Seed Inter Crop		Kgs.	6.18	494.00	1.19
7	FYM		Quintal	1.24	1852.50	4.46
8	Fertilizer + micronutrients		Quintal	2.47	2717.00	6.55
9	Pesticides (PPC)		Kgs/liters	2.47	3705.00	8.93
10	Irrigation		Number	0.00	0.00	0.00
11	Repairs			0.00	0.00	0.00
12	Msc. Charges (Marketing costs etc)			0.00	0.00	0.00
13	Depreciation charges			0.00	247.00	0.60
14	Land revenue and Taxes			0.00	0.00	0.00
II	**Cost B1**					
16	Interest on working capital				1763.37	4.25
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**				30785.87	74.18
III	**Cost B2**					
18	Rental Value of Land				0.00	0.00
19	**Cost B2 = (Cost B1 + Rental value)**				30785.87	74.18
IV	**Cost C1**					
20	Family Human Labour			8.65	1945.13	4.69
21	**Cost C1 = (Cost B2 + Family Labour)**				32731.00	78.86
V	**Cost C2**					
22	Risk Premium				5000.00	12.05
23	**Cost C2 = (Cost C1 + Risk Premium)**				37730.99	90.91
VI	**Cost C3**					
24	Managerial Cost				3773.10	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**				41504.09	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		18.53	74100.00	
		b) Main Crop Sales Price (Rs.)			4000.00	
		c) Intercrop (q)		6.18	25935.00	
		d) Intercrop Sales Price (Rs.)			4200.00	
b.	Gross Income (Rs.)				100035.00	
c.	Net Income (Rs.)				58530.91	
d.	Cost per Quintal (Rs./q.)				1680.33	
e.	Benefit Cost Ratio (BC Ratio)				1:2.41	

Cost of cultivation of red gram with red gram+black gram: The data regarding the cost of cultivation of red gram + black gram in Shethalli-2 micro watershed is presented in Table 37. The results indicate that, the total cost of cultivation for red gram was Rs. 18417.27. The gross income realized by the farmers was Rs. 72741.10. The net income from red gram cultivation was Rs. 54323.83. Thus the benefit cost ratio was found to be 1:3.95

Table 37. Cost of Cultivation of redgram + black gram in Shethalli-2 micro watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	27.18	4796.12	26.04
2	Bullock		Pairs/day	4.00	3197.41	17.36
3	Tractor		Hours	0.00	0.00	0.00
4	Machinery		Hours	0.00	0.00	0.00
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	4.80	239.81	1.30
6	Seed Inter Crop		Kgs.	1.60	127.90	0.69
7	FYM		Quintal	0.00	0.00	0.00
8	Fertilizer + micronutrients		Quintal	3.20	2637.86	14.32
9	Pesticides (PPC)		Kgs / ltrs	1.60	1598.71	8.68
10	Irrigation		Number	0.00	0.00	0.00
11	Repairs			0.00	0.00	0.00
12	Msc. Charges (Marketing costs etc)			0.00	0.00	0.00
13	Depreciation charges			0.00	271.78	1.48
14	Land revenue and Taxes			0.00	9.88	0.05
II	**Cost B1**					
16	Interest on working capital				552.51	3.00
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**				13431.97	72.93
III	**Cost B2**					
18	Rental Value of Land				433.33	2.35
19	**Cost B2 = (Cost B1 + Rental value)**				13865.31	75.28
IV	**Cost C1**					
20	Family Human Labour			12.79	2877.67	15.62
21	**Cost C1 = (Cost B2 + Family Labour)**				16742.98	90.91
V	**Cost C2**					
22	Risk Premium				0.00	0.00
23	**Cost C2 = (Cost C1 + Risk Premium)**				16742.98	90.91
VI	**Cost C3**					
24	Managerial Cost				1674.30	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**				18417.27	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		15.99	63948.22	
		b) Main Crop Sales Price (Rs.)			4000.00	
		c) Intercrop (q)		0.80	4796.12	
		d) Intercrop Sales Price (Rs.)			6000.00	
	By Product	e) Main Product (q)		7.99	3996.76	
		f) Main Crop Sales Price (Rs.)			500.00	
b.	Gross Income (Rs.)				72741.10	
c.	Net Income (Rs.)				54323.83	
d.	Cost per Quintal (Rs./q.)				1097.15	
e.	Benefit Cost Ratio (BC Ratio)				1:3.95	

Cost of Cultivation of sorghum: The data regarding the cost of cultivation of sorghum in Shethalli-2 micro watershed is presented in Table 38. The results indicate that, the total cost of cultivation for sorghum was Rs. 33786.79. The gross income realized by the farmers was Rs. 44228.44. The net income from sorghum cultivation was Rs. 10441.65, thus the benefit cost ratio was found to be 1:1.31.

Table 38. Cost of Cultivation of Sorghum in Shethalli-2 micro watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	50.02	7724.92	22.86
2	Bullock		Pairs/day	0.93	926.25	2.74
3	Tractor		Hours	6.17	3705.00	10.97
4	Machinery		Hours	10.19	2037.75	6.03
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	13.64	868.36	2.57
6	Seed Inter Crop		Kgs.	0.00	0.00	0.00
7	FYM		Quintal	2.06	2470.00	7.31
8	Fertilizer + micronutrients		Quintal	2.73	2745.30	8.13
9	Pesticides (PPC)		Kgs/liters	0.00	0.00	0.00
10	Irrigation		Number	0.00	0.00	0.00
11	Repairs			0.00	500.00	1.48
12	Msc. Charges (Marketing costs etc)			0.00	375.00	1.11
13	Depreciation charges			0.00	111.16	0.33
14	Land revenue and Taxes			0.00	0.00	0.00
II	**Cost B1**					
16	Interest on working capital				1078.04	3.19
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**				22541.78	66.72
III	**Cost B2**					
18	Rental Value of Land				0.00	0.00
19	**Cost B2 = (Cost B1 + Rental value)**				22541.78	66.72
IV	**Cost C1**					
20	Family Human Labour			23.98	5273.45	15.61
21	**Cost C1 = (Cost B2 + Family Labour)**				27815.23	82.33
V	**Cost C2**					
22	Risk Premium				2900.03	8.58
23	**Cost C2 = (Cost C1 + Risk Premium)**				30715.26	90.91
VI	**Cost C3**					
24	Managerial Cost				3071.53	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**				33786.79	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		13.84	41526.87	
		b) Main Crop Sales Price (Rs.)			3000.00	
	By Product	e) Main Product (q)		6.17	2701.56	
		f) Main Crop Sales Price (Rs.)			437.50	
b.	Gross Income (Rs.)				44228.44	
c.	Net Income (Rs.)				10441.65	
d.	Cost per Quintal (Rs./q.)				2440.84	
e.	Benefit Cost Ratio (BC Ratio)				1:1.31	

Cost of Cultivation of paddy: The data regarding the cost of cultivation of cotton in Shethalli-2 micro watershed is presented in Table 39. The results indicate that, the total cost of cultivation for cotton was Rs. 57080.03. The gross income realized by the farmers was Rs. 80440.62. The net income from cotton cultivation was Rs. 23360.58. Thus the benefit cost ratio was found to be 1:1.4.

Table 39. Cost of Cultivation of paddy in Shethalli-2 micro watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	31.70	6529.89	11.44
2	Bullock		Pairs/day	0.00	0.00	0.00
3	Tractor		Hours	5.68	3406.90	5.97
4	Machinery		Hours	9.46	6624.52	11.61
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	23.66	1182.95	2.07
6	Seed Inter Crop		Kgs.	0.00	0.00	0.00
7	FYM		Quintal	0.00	0.00	0.00
8	Fertilizer + micronutrients		Quintal	23.66	18927.20	33.16
9	Pesticides (PPC)		Kgs/ liters	0.95	1419.54	2.49
10	Irrigation		Number	0.00	0.00	0.00
11	Repairs			0.00	5000.00	8.76
12	Msc. Charges (Marketing costs etc)			0.00	1500.00	2.63
13	Depreciation charges			0.00	0.00	0.00
14	Land revenue and Taxes			0.00	0.00	0.00
II	**Cost B1**					
16	Interest on working capital				2883.56	5.05
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**				47474.56	83.17
III	**Cost B2**					
18	Rental Value of Land				0.00	0.00
19	**Cost B2 = (Cost B1 + Rental value)**				47474.56	83.17
IV	**Cost C1**					
20	Family Human Labour			8.52	1916.38	3.36
21	**Cost C1 = (Cost B2 + Family Labour)**				49390.94	86.53
V	**Cost C2**					
22	Risk Premium				2500.00	4.38
23	**Cost C2 = (Cost C1 + Risk Premium)**				51890.94	90.91
VI	**Cost C3**					
24	Managerial Cost				5189.09	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**				57080.03	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		56.78	79494.26	
		b) Main Crop Sales Price (Rs.)			1400.00	
	By Product	e) Main Product (q)		4.73	946.36	
		f) Main Crop Sales Price (Rs.)			200.00	
b.	Gross Income (Rs.)				80440.62	
c.	Net Income (Rs.)				23360.58	
d.	Cost per Quintal (Rs./q.)				1005.26	
e.	Benefit Cost Ratio (BC Ratio)				1:1.4	

Cost of Cultivation of Jowar: The data regarding the cost of cultivation of cotton in Shethalli-2 micro watershed is presented in Table 40. The results indicate that, the total cost of cultivation for cotton was Rs. 47444. The gross income realized by the farmers was Rs. 20430. The net income from cotton cultivation was Rs. -27013. Thus the benefit cost ratio was found to be 1:0.6.

Table 40. Cost of Cultivation of Jowar in Shethalli-2 micro watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	56.81	12597.00	28.70
2	Bullock		Pairs/day	0.00	0.00	0.00
3	Tractor		Hours	6.59	3952.00	9.00
4	Machinery		Hours	6.59	1317.33	3.00
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	12.35	802.75	1.83
6	Seed Inter Crop		Kgs.	0.00	0.00	0.00
7	FYM		Quintal	1.65	2470.00	5.63
8	Fertilizer + micronutrients		Quintal	2.47	2717.00	6.19
9	Pesticides (PPC)		Kgs/ liters	3.29	4940.00	11.25
10	Irrigation		Number	0.00	0.00	0.00
11	Repairs			0.00	0.00	0.00
12	Msc. Charges (Marketing costs etc)			0.00	0.00	0.00
13	Depreciation charges			0.00	197.60	0.45
14	Land revenue and Taxes			0.00	7.41	0.02
II	**Cost B1**					
16	Interest on working capital				1911.57	4.35
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**				30912.66	70.42
III	**Cost B2**					
18	Rental Value of Land				1400.00	3.19
19	**Cost B2 = (Cost B1 + Rental value)**				32312.66	73.61
IV	**Cost C1**					
20	Family Human Labour			11.53	2593.50	5.91
21	**Cost C1 = (Cost B2 + Family Labour)**				34906.16	79.52
V	**Cost C2**					
22	Risk Premium				5000.00	11.39
23	**Cost C2 = (Cost C1 + Risk Premium)**				39906.16	90.91
VI	**Cost C3**					
24	Managerial Cost				3990.62	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**				43896.78	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		16.47	57633.33	
		b) Main Crop Sales Price (Rs.)			3500.00	
	By Product	e) Main Product (q)		8.23	2058.33	
		f) Main Crop Sales Price (Rs.)			250.00	
b.	Gross Income (Rs.)				59691.67	
c.	Net Income (Rs.)				15794.89	
d.	Cost per Quintal (Rs./q.)				2665.80	
e.	Benefit Cost Ratio (BC Ratio)				1:1.36	

Adequacy of fodder: The data regarding the adequacy of fodder in Shethalli-2 micro watershed is presented in Table 41. The results indicate that, 50 per cent of the households opined that dry fodder was adequate which includes 80 per cent of marginal, 28.57 per cent of small, 83.33 per cent of medium and 100 per cent of large farmers. The data revealed that only 6.67 per cent of the households have opined that the green fodder is adequate which includes 20 per cent of marginal and 16.67 per cent of semi medium farmers.

Table 41. Adequacy of fodder in Shethalli-2 micro watershed

Sl. No.	Particulars	MF (5)		SF (14)		SMF (6)		MDF (3)		LF (1)		All (30)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Adequate-Dry Fodder	4	80	4	28.57	5	83.33	2	66.67	0	0	**15**	50
2	Inadequate-Dry Fodder	0	0	2	14.29	0	0	0	0	1	100	**3**	10
3	Adequate-Green Fodder	1	20	0	0	1	16.67	0	0	0	0	**2**	6.67

Horticulture species grown: The data regarding horticulture species grown in Shethalli-2 micro watershed is presented in Table 42. The results indicate that, sampled households have grown 2 custard apple and 3 mango trees in their field. Among those 2 custard apple tree belonged to marginal farmers, and 3 mango trees belonged to small and semi medium farmers.

Table 42. Horticulture species grown in Shethalli-2 micro watershed

Sl. No.	Particulars	MF (5)		SF (14)		SMF (6)		All (30)	
		F	B	F	B	F	B	F	B
1	Custard apple	2	0	0	0	0	0	**2**	0
2	Mango	0	0	1	0	2	0	**3**	0

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

Forest species grown: The data regarding forest species grown in Shethalli-2 micro watershed is presented in Table 43. The results indicate that, households have planted 5 teak, 76 Neem trees, 4 tamarind. Marginal farmers have planted 5 Neem, 1 tamarind; Small farmers have planted 23 neem and 1tamarinds. Semi medium farmers have planted 24 Neem, 2 tamarind and 5 teak trees. Medium farmers have planted 15 neem trees and large farmers 4.

Table 43: Forest species grown in Shethalli-2 micro watershed

Sl. No.	Particulars	MF (5)		SF (14)		SMF (6)		MDF (3)		LF (1)		All (30)	
		F	B	F	B	F	B	F	B	F	B	F	B
1	Teak	0	0	0	0	5	0	0	0	0	0	**5**	0
2	Neem	5	0	23	5	24	0	15	0	4	0	**71**	5
3	Tamarind	1	0	1	0	2	0	0	0	0	0	**4**	0

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

Average additional investment capacity: The data regarding average additional investment capacity in Shethalli-2 micro watershed is presented in Table 44. The results indicate that, households have an average investment capacity of Rs. 9216 for land development, Rs. 3833 in irrigation facility and Rs.666 in improved crop production.

Marginal households have an average investment capacity of Rs.5700 for land development. Small farm households have an average investment capacity of Rs. 9142 for land development, Rs.7142 in irrigation facility, Rs.1428 in improved crop production. Semi medium households have an average investment capacity of Rs.12500 for land development, Rs. 2500 in irrigation facility. Medium farm households have Rs. 13000 and larger farmers have Rs. 6000 additional average investment capacity for land development.

Table 44. Average additional investment capacity of households in Shethalli-2 micro watershed

Sl. No.	Particulars	MF (5)	SF (14)	SMF (6)	MDF (3)	LF (1)	All (30)
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1	Land development	5,700	9,142	12,500	13,000	6,000	**9,216**
2	Irrigation facility	0	7,142	2,500	0	0	**3,833**
3	Improved crop production	0	1,428	0	0	0	**666**

Marketing of the agricultural produce: The data regarding marketing of the agricultural produce in Shethalli-2 micro watershed is presented in Table 45. The results indicated that, cotton, jowar, paddy, red gram, and sorghum were sold to the extent of production.

Table 45. Marketing of the agricultural produce in Shethalli-2 micro watershed

Sl. No	Crops	Output obtained (q)	Output retained (q)	Output sold (q)	Output sold (%)	Avg. Price obtained (Rs/q)
1	Cotton	335	65	270	80.6	4150
2	Jowar	20	0	20	100	3500
3	Paddy	120	0	120	100	1400
4	Red Gram	245	-2	247	100.82	4461
5	Sorghum	54	0	54	100	3000

Marketing Channels used for sale of agricultural produce: The data regarding marketing channels used for sale of agricultural produce in Shethalli-2 micro watershed is presented in Table 46. The results indicated that, About 73.33 per cent of the households have sold agricultural produce to the local/village merchants includes 100 per cent of the marginal farmers, 85.71 per cent of the small farmers, 66.67 per cent of the semi medium farmers and 33.33 per cent medium farmers. About 23.33 per cent of the households have sold in regulated markets includes 14.29 per cent of small farmers, 33.33 per cent of semi

medium farmers, 66.67 per cent of the medium farmers and 100 per cent of the large farmers.

Table 46. Marketing Channels used for sale of agricultural produce in Shethalli-2 micro watershed

Sl. No.	Particulars	MF (5)		SF (14)		SMF (6)		MDF (3)		LF (1)		All (30)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Local/village Merchant	5	100	12	85.71	4	66.67	1	33.33	0	0	**22**	73.33
2	Regulated Market	0	0	2	14.29	2	33.33	2	66.67	1	100	**7**	23.33

Mode of transport of agricultural produce: The data regarding incidence of soil and water erosion problems in Shethalli-2 micro watershed is presented in Table 47. The results indicated that 6.67 per cent of the households have use cart as mode of transport, 86.67 per cent have used tractor, and 3.33 per cent have used truck.

Table 47. Mode of transport of agricultural produce in Shethalli-2 micro watershed

Sl. No.	Particulars	MF (5)		SF (14)		SMF (6)		MDF (3)		LF (1)		All (30)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Cart	2	40	0	0	0	0	0	0	0	0	**2**	6.67
2	Tractor	3	60	14	100	6	100	2	66.67	1	100	**26**	86.67
3	Truck	0	0	0	0	0	0	1	33.33	0	0	**1**	3.33

Incidence of soil and water erosion problems: The data regarding incidence of soil and water erosion problems in Shethalli-2 micro watershed is presented in Table 48. The results indicated that, the results indicated that, 20 per cent of the households have experienced the soil and water erosion problems i.e. 20 per cent of marginal farmers, 21.43 per cent of small farmers, 33.33 per cent of semi medium farmers.

Table 48. Incidence of soil and water erosion problems in Shethalli-2 micro watershed

Sl. No.	Particulars	MF (5)		SF (14)		SMF (6)		All (30)	
		N	%	N	%	N	%	N	%
1	Soil and water erosion problems in the farm	1	20.00	3	21.43	2	33.33	6	20.00

Interest towards soil testing: The data regarding interest shown towards soil testing in Shethalli-2 micro watershed is presented in Table 49. The results indicated that, 96.67 per cent of the households have shown interest in soil testing i.e. 100 per cent of marginal farmers, 100 per cent of small farmers, 100 per cent of semi medium, 100 per cent of medium farmers and 100 per cent large farmers have shown interest in soil testing.

Table 49. Interest shown towards soil testing in Shethalli-2 micro watershed

Sl. No.	Particulars	LL (1)		MF (5)		SF (14)		SMF (6)		MDF (3)		LF (1)		All (30)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Interest in soil test	0	0.00	5	100.00	14	100.00	6	100.00	3	100.00	1	100.00	29	96.67

Soil and water conservation practices and structures adopted: The data regarding soil and water conservation practices and structures adopted in Shethalli-2 micro watershed is presented in Table 50. The results indicated that, 46.67 per cent of the households have adopted field bunding includes 40 per cent of marginal, 42.9 per cent of small farmers, 50 per cent of semi medium farmers, 66.67 per cent of medium and 100 per cent of large farmers. Contour bunding was adopted by 3.33 per cent of the households i.e. 7.14 per cent of the small farmers. About 3.33 per cent of the households have adopted farm pond which includes 16.67 per cent of medium farmers

Table 50. Soil and water conservation practices and structures adopted in Shethalli-2 micro watershed

Sl. No.	Particulars	LL (1)		MF (5)		SF (14)		SMF (6)		MDF (3)		LF (1)		All (30)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Field Bunding	0	0	2	40	6	42.9	3	50	2	66.67	1	100	**14**	46.67
2	Contour Bund	0	0	0	0	1	7.14	0	0	0	0	0	0	**1**	3.33
3	Farm Pond	0	0	0	0	0	0	1	16.67	0	0	0	0	**1**	3.33

Status of soil and water conservation structures adopted: The data regarding status of soil and water conservation structures adopted in Shethalli-2 micro watershed is presented in Table 51. The results indicated that, 11 per cent of the households who adopted field bunding opined that bunds are good, 21.43 per cent opined that bunds are slightly damaged.

Table 51. Status of soil and water conservation structures adopted in Shethalli-2 micro watershed

Sl. No	Item	Good		Slightly Damaged	
		N	%	N	%
1	Field Bunding	11	78.6	3	21.43

Source of drinking water: The data regarding source of drinking water in Shethalli-2 micro watershed is presented in Table 52. The results indicated that, piped supply was the major source for drinking water for 93.33 per cent includes 100 per cent of landless, 100 per cent of marginal, 92.9 per cent of small farmers, 83.33 per cent of semi medium and 100 per cent of medium and large farmers.

Table 52. Source of drinking water in Shethalli-2 micro watershed

Sl. No.	Particulars	LL (1)		MF (5)		SF (14)		SMF (6)		MDF (3)		LF (1)		All (30)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Piped supply	1	100	5	100	13	92.9	5	83.33	3	100	1	100	28	93.33

Source of light: The data regarding source of light in Shethalli-2 micro watershed is presented in Table 53. The results indicated that, Electricity was the major source of light for all the households in micro watershed.

Table 53. Source of light in Shethalli-2 micro watershed

Sl. No.	Particulars	LL (1)		MF (5)		SF (14)		SMF (6)		MDF (3)		LF (1)		All (30)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Electricity	1	100	5	100	14	100	6	100	3	100	1	100	**30**	100

Existence of Sanitary toilet facility: The data regarding existence of sanitary toilet facilit**y** in Shethalli-2 micro watershed is presented in Table 54. The results indicated that, 33.33 per cent of the households possess sanitary toilet i.e. 100 per cent of landless, 20 per cent of marginal, 35.7 per cent of small, 17 per cent of semi medium, 33.33 per cent of medium farmers and 100 per cent of large farmers had sanitary toilet facility.

Table 54. Existence of Sanitary toilet facility in Shethalli-2 micro watershed

Sl. No.	Particulars	LL (1)		MF (5)		SF (14)		SMF (6)		MDF (3)		LF (1)		All (30)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Sanitary toilet facility	1	100	1	20	5	35.7	1	17	1	33.33	1	100	10	33.33

Possession of PDS card: The data regarding possession of PDS card in Shethalli-2 micro watershed is presented in Table 55. The results indicated that, Cent per cent of the households sampled possessed BPL card.

Table 55. Possession of PDS card in Shethalli-2 micro watershed

Sl. No.	Particulars	LL (1)		MF (5)		SF (14)		SMF (6)		MDF (3)		LF (1)		All (30)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	APL	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0
2	BPL	1	100	5	100	14	100	6	100	3	100	1	100	**30**	100

Adequacy of food items: The data regarding adequacy of food items in Shethalli-2 micro watershed is presented in Table 56. The results indicated that, cereals were adequate for 43.33 per cent of the households, pulses were adequate for 80 per cent, oilseeds were adequate for 43.33 per cent, vegetables were adequate for 46.67 per cent, fruits were adequate for 3.33 per cent, milk was adequate for 43.33per cent, egg were adequate for 43.33 per cent and meat was adequate for 43.33 per cent of the households.

Table 56. Adequacy of food items in Shethalli-2 micro watershed

Sl. No.	Particulars	MF (5)		SF (14)		SMF (6)		MDF (3)		All (30)	
		N	%	N	%	N	%	N	%	N	%
1	Cereals	2	40	8	57	2	33.3	1	33	**13**	43.33
2	Pulses	4	80	12	86	6	100	2	67	**24**	80
3	Oilseed	2	40	8	57	2	33.3	1	33	**13**	43.33
4	Vegetables	3	60	8	57	2	33.3	1	33	**14**	46.67
5	Fruits	0	0	1	7	0	0	0	0	**1**	3.33
6	Milk	2	40	8	57	2	33.3	1	33	**13**	43.33
7	Egg	2	40	8	57	2	33.3	1	33	**13**	43.33
8	Meat	2	40	8	57	2	33.3	1	33	**13**	43.33

Response on Inadequacy of food items: The data regarding inadequacy of food items in Shethalli-2 micro watershed is presented in Table 57. The results indicated that, cereals were inadequate for 56.67 per cent of the households, pulses were inadequate for 20 per cent, oilseeds were inadequate for 56.67 per cent, vegetables were inadequate for 56.67 per cent, fruits were inadequate for 100 per cent, milk was inadequate for 56.67 per cent, egg were inadequate for 53.33 per cent and meat was inadequate for 56.67 per cent of the households.

Table 57. Response on Inadequacy of food items in Shethalli-2 micro watershed

Sl. No.	Particulars	LL (1)		MF (5)		SF (14)		SMF (6)		MDF (3)		LF (1)		All (30)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Cereals	1	100	3	60	6	43	4	67	2	66.7	1	100	**17**	56.67
2	Pulses	1	100	1	20	2	14	0	0	1	33.3	1	100	**6**	20
3	Oilseed	1	100	3	60	6	43	4	67	2	66.7	1	100	**17**	56.67
4	Vegetables	1	100	3	60	6	43	4	67	2	66.7	1	100	**17**	56.67
5	Fruits	1	100	5	100	13	93	6	100	4	133	1	100	**30**	100
6	Milk	1	100	3	60	6	43	4	67	2	66.7	1	100	**17**	56.67
7	Egg	0	0	3	60	6	43	4	67	2	66.7	1	100	**16**	53.33
8	Meat	1	100	3	60	6	43	4	67	2	66.7	1	100	**17**	56.67

Farming constraints: The data regarding farming constraints experienced by households in Shethalli-2 micro watershed is presented in Table 58. The results indicated that, Lower fertility status of the soil was the constraint experienced by 96.7 per cent of the households, wild animal menace on farm field (93.3%), frequent incidence of pest and diseases (43.3%), inadequacy of irrigation water (46.7%), high cost of Fertilizers and plant protection chemicals (90%), high rate of interest on credit (80%), low price for the agricultural commodities (90 %), lack of marketing facilities in the area (96.7%), inadequate extension services (46.7%), lack of transport for safe transport of the agricultural produce to the market (83.3%). Less rainfall (90%) and source of Agri–technology information (News paper/TV/Mobile)

Table 58. Farming constraints Experienced in Shethalli-2 micro watershed

Sl. No.	Particulars	MF (5)		SF (14)		SMF (6)		MDF (3)		LF (1)		All (30)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Lower fertility status of the soil	5	100	14	100	6	100	3	100	1	100	**29**	96.7
2	Wild animal menace on farm field	6	120	12	85.7	6	100	3	100	1	100	**28**	93.3
3	Frequent incidence of pest and diseases	3	60	7	50	3	50	0	0	0	0	**13**	43.3
4	Inadequacy of irrigation water	2	40	9	64.3	2	33.3	1	33	0	0	**14**	46.7
5	High cost of Fertilizers and plant protection chemicals	5	100	14	100	5	83.3	3	100	0	0	**27**	90
6	High rate of interest on credit	5	100	11	78.6	5	83.3	2	67	1	100	**24**	80
7	Low price for the agricultural commodities	5	100	12	85.7	6	100	3	100	1	100	**27**	90

8	Lack of marketing facilities in the area	4	80	14	100	6	100	4	133	1	100	**29**	96.7
9	Inadequate extension services	2	40	8	57.1	2	33.3	1	33	1	100	**14**	46.7
10	Lack of transport for safe transport of the Agril produce to the market.	5	100	12	85.7	5	83.3	2	67	1	100	**25**	83.3
11	Less rainfall	5	100	12	85.7	6	100	3	100	1	100	**27**	90
12	Source of Agri-technology information(Newspaper/TV/Mobile)	3	60	10	71.4	2	33.3	1	33	1	100	**17**	56.6

Chapter 5

SUMMARY

In order to assess the socio-economic condition of the farmers in the watershed a comprehensive questionnaire was prepared. Major components such as demographic conditions, migration details, food consumption and family expenditure pattern, material possession, land holding, land use management, cropping pattern, cost of cultivation of crops, livestock management. The statistical components such as frequency and percentage were used to analyze the data. About 49 households located in the micro watershed were interviewed for the survey.

The data indicated that there were 113 (54.59%) men and 94 (45.4%) were women among the sampled households. The data indicated that there were 75 (61.98%) men and 46(38.02%) were women among the sampled households. The average family size of marginal farmers was 4.19, a small farmer was 5, a semi medium farmer was 4.33, medium farmers were 4 and for large farmers it was 4.22. there were 21(17.36%) people were in 0-15 years of age, 53 (43.8%) were in 16-35 years of age, 40 (33.06 %) were in 36-60 years of age and 7 (5.79 %) were above 61 years of age. the Shethalli-2had 32.23 per cent illiterates, 14.05 per cent of them had primary school education, 5.79 per cent of them had middle school education, 21.49 per cent of them had high school education, 11.57 per cent of them had PUC education, 4.96 per cent of them had diploma, 0.83 per cent of them had ITI, 5.79 per cent of them had degree education and 3.31 per cent of them had masters education.

The results indicate that, 90 per cent of households practicing agriculture and 3.33 per cent of the household heads were general labourers and 3.33 percent of the households were housewife. The results indicate that agriculture was the major occupation for 53.72 per cent of the household members, 0.83 per cent were general labourers, 4.13 per cent were private service, 23.14 per cent of them were in student, 14.88 per cent of them were housewife and 3.31 per cent of them were children. In case of landless households 33.33 per cent were general labourers. In case of marginal farmers 41.18 per cent were agriculturist, 29.41 per cent were student, and 11.76 per cent in housewife and 17.65 per cent were children. In case of small farmers, 57.14 per cent of the household members were practicing agriculture and 1.79 per cent of them were private sector. In case of semi medium farmers 46.67 per cent of the household members were practicing agriculture and 10 per cent of them were private service. In case of medium farmers, 77.78 per cent of the household members were practicing agriculture and 11.11 per cent were private sector. In case of large farmers, 83.33 per cent of the household members were practicing agriculture and 16.67 per cent were housewife.

The results indicate that 26.67 per cent of the households possess Katcha house and 70.0 per cent of them possess pucca house and 3.33 per cent of them possess semi pucca house. The results shows that 3.33 per cent of the households possess radio, Cent

per cent of the households possess TV, 23.33per cent of the households possess Mixer grinder, 30 per cent of the households possess motor cycle, 6.67 per cent of the households possess auto, 6.67 per cent of the households possess car/ four wheeler and 100 per cent of the households mobile phones. The average value of radio was Rs.2000, television was Rs.9700, mixer grinder was Rs.2142, motor cycle was Rs.56400 and mobile phone was Rs.3588, Auto was Rs.110000 and car/ four wheeler was Rs.550000. About 50 per cent of the households possess plough, 10 per cent of them possess tractor,46.67 per cent of them posses bullocks cart, 6.67 per cent of them power tiller , 13.33 per cent of them possess weeder, 3.33 per cent of them possess harvester and 6.67 per cent of the households possess sprayer the average value of plough was Rs.4, 692, the average value of tractor was Rs. 750000 and the average value of sprayer was Rs.6000, the average value of bullock cart Rs.18,181, the average value of power tiller Rs.35000and the average value of harvester 10,000 and the average value of weeder Rs.1

The results indicate that, 36.67 per cent of the households possess bullocks, 30 per cent of the households possess local cow. Average own labour men available in the micro watershed was 1.29, average own labour (women) available was 1.1, average hired labour (men) available was 8.35 and average hired labour (women) available was 21.35.

The results indicate that, 53.33 per cent of the household opined that hired labour was adequate and 46.67 per cent of the households opined that hired labour was inadequate.. The results indicate that, 4 (3.31%) persons were migrated from the micro watershed which includes 1.79 persons from small medium farmers' and 10 per cent of semi medium farmer category The results indicate that, 4 (3.31%) persons were migrated from the micro watershed which includes 1.79 persons from small medium farmers' and 10 per cent of semi medium farmer category. job/work was the reason for migration for all the migrants. improved quality of the life was the major Positive consequences of migration for 50 per cent of the better children education persons migrated from small framers households.

Households of the households of the Shethalli-2 micro watershed possess 52.52 ha (96.13%) of dry land and 2.11 ha (3.87%) of irrigated land the average value of dry land was Rs. 267994.14 and average value of irrigated was Rs.1, 89,272.There were 16 live bore wells and 11 dry bore wells among the sampled households in Shethalli-2 micro watershed and one defunct open well reported among the sampled households in the micro watershed. Bore well was the major irrigation source for 4.55 per cent of the marginal farmers, 30 per cent of the small farmers, 100 per cent of the semi medium farmers, 100 per cent of medium farmers. The results revealed that bore well was major irrigation source for 32.65 per cent of the households. Marginal farmers had irrigated area of 0.88 hectares, small farmers had 2.51 hectares, semi medium farmers had 20.39 hectares of irrigated land and medium farmers had 5.22 hectares of irrigated land. Farmers have grown cotton (15.71 ha), jowar (2.83 ha), paddy (0.8ha), redgram (8.94ha),

sorghum (5.32 ha), cotton (1.21ha). Marginal farmers have grown redgram (0.81 ha) and sorghum (5.32ha), Small farmers have grown cotton (4.21ha), jowar (2.83ha), redgram (6.11 ha), Semi medium farmers have grown cotton (4.49 ha), redgram (1.62ha). Medium farmers have grown cotton (7 ha), redgram (0.4ha), sorghum (5.32ha).. the cropping intensity in Shethalli-2 micro watershed was found to be 59.67 per cent. In case of Marginal farmers it was 196.57 per cent, for small farmers it was 68.98 per cent, in case of semi medium farmers it was 42.55 per cent, medium farmers had cropping intensity of 48.54 per cent and large farmers had 10.88 per cent.

The results indicate that, 96.67 per cent of the households possess bank account and 80 per cent of them have savings. With respect to category wise account, 100 per cent of land less, 100 per cent of marginal, 100 per cent of small, medium and large farmers and 83.33 per cent of semi medium, possesses bank account. With respect to savings, 80 per cent of marginal, 85.71per cent of small, 66.67 per cent of semi medium farmers and 100 per cent of large farmers had savings in the bank account The results indicate that, 40 per cent of marginal, 42.86 per cent of small, 50 per cent semi medium, 33.33 per cent of medium farmers and 100 per cent of large farmers have borrowed credit from different sources. The results indicate that, 78.57 per cent have availed loan in commercial banks, 7.14 per cent have availed loan in cooperative bank, 100 per cent have availed loan from friends and relatives, 42.86 per cent have availed loan from grameena bank, 7.14 per cent have availed loan from money lender and 28.57 per cent have availed loan from Traders. marginal, small, semi medium and large farmers have availed Rs.12500, Rs.20333.33, Rs. 115000 and Rs.25000 respectively.

The results indicate that, the total cost of cultivation for groundnut was Rs. 18902. The gross income realized by the farmers was Rs. 11699.64. The net income from ground nut cultivation was Rs. -7203.0, thus the benefit cost ratio was found to be 1:0.62. The total cost of cultivation for redgram was Rs. 12205. The gross income realized by the farmers was Rs. 18965. The net income from redgram cultivation was Rs. 6760. Thus the benefit cost ratio was found to be 1:1.55. The results indicate that, the total cost of cultivation for ragi was Rs. 13661. The gross income realized by the farmers was Rs. 15882. The net income from ragi cultivation was Rs. 2221, thus the benefit cost ratio was found to be 1:1.16. The total cost of cultivation for cotton was Rs. 47444. The gross income realized by the farmers was Rs. 20430. The net income from cotton cultivation was Rs. -27013. Thus the benefit cost ratio was found to be 1:0.6.

The results indicate that, 50 per cent of the households opined that dry fodder was adequate which includes 80 per cent of marginal, 28.57 per cent of small, 83.33 per cent of medium and 100 per cent of large farmers. The data revealed that only 6.67 per cent of the households have opined that the green fodder is adequate which includes 20 per cent of marginal and 16.67 per cent of semi medium farmers.

The results indicate that, households have planted 5 teak, 76 Neem trees, 4 tamarind. Marginal farmers have planted 5 Neem, 1 tamarind; Small farmers have planted 23 neem and 1tamarinds. Semi medium farmers have planted 24 Neem, 2 tamarind and 5 teak trees. Medium farmers have planted 15 neem trees and large farmers 4.

The results indicate that, households have an average investment capacity of Rs. 9216 for land development, Rs. 3833 in irrigation facility and Rs.666 in improved crop production. Marginal households have an average investment capacity of Rs.5700 for land development. Small farm households have an average investment capacity of Rs. 9142 for land development, Rs.7142 in irrigation facility, Rs.1428 in improved crop production. Semi medium households have an average investment capacity of Rs.12500 for land development, Rs. 2500 in irrigation facility. Medium farm households have Rs. 13000 and larger farmers have Rs. 6000 additional average investment capacity for land development.

The results indicated that, About 73.33 per cent of the households have sold agricultural produce to the local/village merchants includes 100 per cent of the marginal farmers, 85.71per cent of the small farmers, 66.67 per cent of the semi medium farmers and 33.33 per cent medium farmers. About 23.33 per cent of the households have sold in regulated markets includes 14.29 per cent of small farmers, 33.33 per cent of semi medium farmers, 66.67 per cent of the medium farmers and 100 per cent of the large farmers. The results indicated that 6.67 per cent of the households have use cart as mode of transport, 86.67 per cent have used tractor, and 3.33 per cent have used truck.

The results indicated that, the results indicated that, 20 per cent of the households have experienced the soil and water erosion problems i.e. 20 per cent of marginal farmers, 21.43 per cent of small farmers, 33.33 per cent of semi medium farmers have faced soil and water erosion problem. The results indicated that, 96.67 per cent of the households have shown interest in soil testing i.e. 100 per cent of marginal farmers, 100 per cent of small farmers, 100 per cent of semi medium, 100 per cent of medium farmers and 100 per cent large farmers have shown interest in soil testing.

The results indicated that, 46.67 per cent of the households have adopted field bunding. Summer ploughing was adopted by 89.90 per cent of the households. About 3.33 per cent of the households have adopted farm pond. Contour bunding was adopted by 3.33 per cent of the households. The results indicated that, 11 per cent of the households who adopted field bunding opined that bunds are good, 21.43 per cent opined that bunds are slightly damaged.

Piped supply was the major source for drinking water for 93.33 per cent includes 100 per cent of landless, 100 per cent of marginal, 92.9 per cent of small farmers, 83.33 per cent of semi medium and 100 per cent of medium and large farmers. Electricity was the major source of light for all the households in micro watershed. The results indicated

that,33.33 per cent of the households possess sanitary toilet i.e. 100 per cent of landless, 20 per cent of marginal, 35.7 per cent of small, 17 per cent of semi medium and 33.33 per cent of medium farmers and 100 per cent of large farmers had sanitary toilet facility. The results indicated that, Cent per cent of the households sampled possessed BPL card.

The results indicated that, Lower fertility status of the soil was the constraint experienced by 96.7 per cent of the households, wild animal menace on farm field (93.3%), frequent incidence of pest and diseases (43.3%), inadequacy of irrigation water (46.7%), high cost of Fertilizers and plant protection chemicals (90%), high rate of interest on credit (80%), low price for the agricultural commodities (90 %), lack of marketing facilities in the area (96.7%), inadequate extension services (46.7%), lack of transport for safe transport of the agricultural produce to the market (83.3%), Less rainfall (90%) and source of Agri–technology information (News paper/TV/Mobile).