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

BANDEHALLI-2 (4D2D6O2a) 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

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

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PREFACE

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

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

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

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

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

ICAR-NBSS&LUP, Regional Centre, Bangalore has taken up a project sponsored by the Karnataka Watershed Development Project-II, (Sujala-III), Government of Karnataka funded by the World Bank under Component-1 Land Resource Inventry. This study was taken up to demonstrate the utility of such a database in reviewing, monitoring and evaluating all the land based watershed development programs on a scientific footing. To meet the requirements of various land use planners at grassroots level, the present study on "Land Resource inventory and socio-economic status of farm households for Watershed Planning and Development of Bandehalli-2 Microwatershed, Yadgir Taluk, Yadgir District, Karnataka" for integrated development was taken up in collaboration with the State Agricutural Universities, IISC, KSRSAC, KSNDMC as Consortia partners. The project provides detailed land resource information at cadastral level (1:7920 scale) for all the plots and socio-economic status of farm households covering thirty per cent farmers randomely selected representing landed and landless class of farmers in the micro-watershed. The project report with the accompanying maps for the micro-watershed 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:03.05.2019

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PART-A

LAND RESOURCE INVENTORY

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EXECUTIVE SUMMARY

The land resource inventory of Bandehalli-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 these physiographic delineations were used as base for mapping soils. The soils were studied in several transects and a soil map was prepared with phases of soil series as mapping units. Random checks were made all over the area outside the transects to confirm and validate the soil map unit boundaries. The soil map shows the geographic distribution and extent, characteristics, classification, behaviour and use potentials of the soils in the microwatershed.

The present study covers an area of 669 ha in Bandehalli-2 microwatershed in Yadgir taluk and 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 about 85 per cent is covered by soils, 15 per cent by habitation and water bodies. The salient findings from the land resource inventory are summarized briefly below.

- *The soils belong to 15 soil series and 18 soil phases (management units) and 7 land use classes.*
- *The length of crop growing period is 120-150 days starting from the 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 320 m grid interval.*
- *Land suitability for growing 26 major agricultural and horticultural crops were assessed and maps showing the degree of suitability along with constraints were generated.*
- *Entire cultivated area of the microwatershed is suitable for agriculture.*
- *About <1 per cent soils are very shallow (<25 cm), 5 per cent soils are shallow (25-50 cm), 14 per cent soils are moderately shallow (50-75 cm), 30 per cent soils are moderately deep (75-100 cm), 36 per cent soils are deep (100-150 cm) and about <1 per cent soils are very deep (>150 cm) soils.*
- *About 30 per cent of the area has clayey soils, 43 per cent loamy soils and 12 per cent sandy at the surface.*
- *An area of about 85 per cent has non-gravelly and <1 per cent has gravelly (15-35%) lands.*
- *About 27 per cent of the area has soils are very high (>200 mm/m) in available water capacity, 32 per cent medium (101-150 mm/m), 21 per cent*

low (51-100 mm/m) and about 6 per cent very low (<50 mm/m) in available water capacity.

- *Entire cultivated area of 85 per cent of the microwatershed has very gently sloping (1-3%) lands.*
- *About 85 per cent has soils that are moderately eroded (e2) and <1 per cent has slightly eroded (e1) soils.*
- *An area of about 24 per cent is neutral (ph 6.5-7.3), 28 per cent is slightly alkaline (pH 7.3-7.8) and 33 per cent soils are moderately alkaline (pH 7.8 to 8.4) in soil reaction.*
- *The Electrical Conductivity (EC) of the soils are <2 dS m^{-1} indicating that the soils are non-saline.*
- *About 28 per cent is low (<0.5%), 29 per cent medium (0.5-0.75%) and 28 per cent high (>0.75%) in organic carbon.*
- *An area of 46 per cent has soils that are low (<23 kg/ha), 33 per cent medium (23-57 kg/ha) and 6 per cent high (>57 kg/ha) in available phosphorus.*
- *About 35 per cent low (<145 kg/ha) and 50 per cent medium (145-337 kg/ha) in available potassium.*
- *Available sulphur is low (<10 ppm) in about 44 per cent, medium (10-20 ppm) in 30 per cent and high (>20 ppm) in about 11 per cent area of the microwatershed.*
- *Available boron is low (<0.5 ppm) in 16 per cent, 61 per cent medium (0.5-1.0 ppm) and high (>1.0 ppm) in about 8 per cent area of the microwatershed.*
- *About 10 per cent area has soils that are deficient (<4.5 ppm) in available iron and 75 per cent sufficient (>4.5 ppm).*
- *Available manganese is sufficient in all the soils of the microwatershed.*
- *About <1 per cent area has soils that are deficient (<0.2 ppm) in available copper and 85 per cent sufficient (>0.2 ppm).*
- *About 85 per cent area has soils that are deficient (<0.6 ppm) in available zinc and <1 per cent sufficient (>0.6 ppm).*
- *The land suitability for 26 major agricultural and horticultural crops grown in the microwatershed was 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 Bandehalli-2 microwatershed

Crop	Suitability Area in ha (%)		Crop	Suitability Area in ha (%)	
	Highly suitable (S1)	Moderately suitable (S2)		Highly suitable (S1)	Moderately suitable (S2)
Sorghum	*16 (2)*	*448 (67)*	*Sapota*	*-*	*51 (8)*
Maize	*-*	*189 (28)*	*Guava*	*-*	*51 (8)*
Red gram	*-*	*189 (28)*	*Pomegranate*	*-*	*417 (62)*
Bajra	*-*	*527 (79)*	*Jackfruit*	*-*	*10 (1)*
Ground nut	*-*	*139 (21)*	*Jamun*	*-*	*219 (33)*
Sunflower	*9 (1)*	*367 (55)*	*Musambi*	*0.38 (<1)*	*417 (62)*
Cotton	*67 (10)*	*386 (58)*	*Lime*	*0.38 (<1)*	*417 (62)*
Bengalgram	*67 (10)*	*387 (58)*	*Cashew*	*-*	*-*
Chilli	*-*	*454 (68)*	*Custard apple*	*87 (13)*	*377 (56)*
Tomato	*-*	*138 (21)*	*Amla*	*-*	*464 (69)*
Drumstick	*-*	*417 (62)*	*Tamarind*	*-*	*219 (33)*
Mulberry	*-*	*10 (1)*	*Marigold*	*-*	*504 (75)*
Mango	*-*	*8 (1)*	*Chrysanthemum*	*-*	*504 (75)*

Apart from the individual crop suitability, a proposed crop plan has been prepared for the 7 identified LMUs by considering only the highly and moderately suitable lands for different crops and cropping systems with food, fodder, fibre and other horticulture crops that helps in maintaining the ecological balance in the microwatershed.

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

Chapter 1

INTRODUCTION

Soil being a vital natural resource on whose proper use depends the life supporting systems of a country and the socioeconomic development of its people. Soils provide food, fodder, fibre and fuel for meeting the basic human and animal needs. With the ever increasing growth in human and animal population, the demand on soil for more food and fodder production is on the increase. 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. However, the capacity of a soil to produce is limited and the limits to the production are set by its intrinsic characteristics, agro-climatic setting, and, use and management. There is, therefore, tremendous pressure on land and water resources, which is causing decline in soil-health and stagnation in productivity. The soils have been degrading at an estimated rate of one million hectares per year and ground water levels have been receding at an alarming rate resulting in decline in the ground water resource. 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 situation 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. Added to this, every year there is a significant diversion of farm lands and water resources for non-agricultural purposes. Thus, developing strategies to slow down the degradation process or reclaim the soils to normal condition and ensure sustainability of production system are the major issues today. These, demand a systematic appraisal of our soil and land resources with respect to their extent, geographic distribution, characteristics, behaviour and use potential, which is very important for developing an effective land use and cropping systems for augmenting agricultural production on a sustainable basis.

The soil and land resource inventories made so far in Karnataka had limited utility because the surveys were of different types, scales and intensities carried out at different times with specific objectives. Hence, there is an urgent need to generate 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 all the parameters which are critical for productivity *viz.*, soils, site characteristics like slope, erosion, gravelliness and stoniness, climate, water, topography, geology, hydrology, vegetation, crops, land use pattern, animal population, socio-economic conditions, infrastructure, marketing facilities and various schemes and developmental works of the government etc. From the data collected at farm level, the specific problems and potentials of the area can be identified and highlighted, conservation measures required for the area can be planned on a scientific footing, suitability of the area for various uses can be worked out and finally viable and sustainable land use options suitable for each and every land holding can be prescribed.

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

The land resource inventory aims to provide site-specific database for Bandehalli-2 microwatershed in Yadgir Taluk and Yadgir 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 Bandehalli-2 micro-watershed is located in the northeastern part of Karnataka in Yadgir Taluk and District, Karnataka State (Fig. 2.1). It comprises parts of Sambara, Vankasambara and Baddepalli villages. It lies between 16^0 34' and 16^0 37' north latitudes and 77^0 19' and 77^0 23' east longitudes and covers an area of 669 ha. It is about 36 km from Yadgir town and is surrounded by Sambara village on the west, Vankasambara on the north and east, Baddepalli on the southern side.

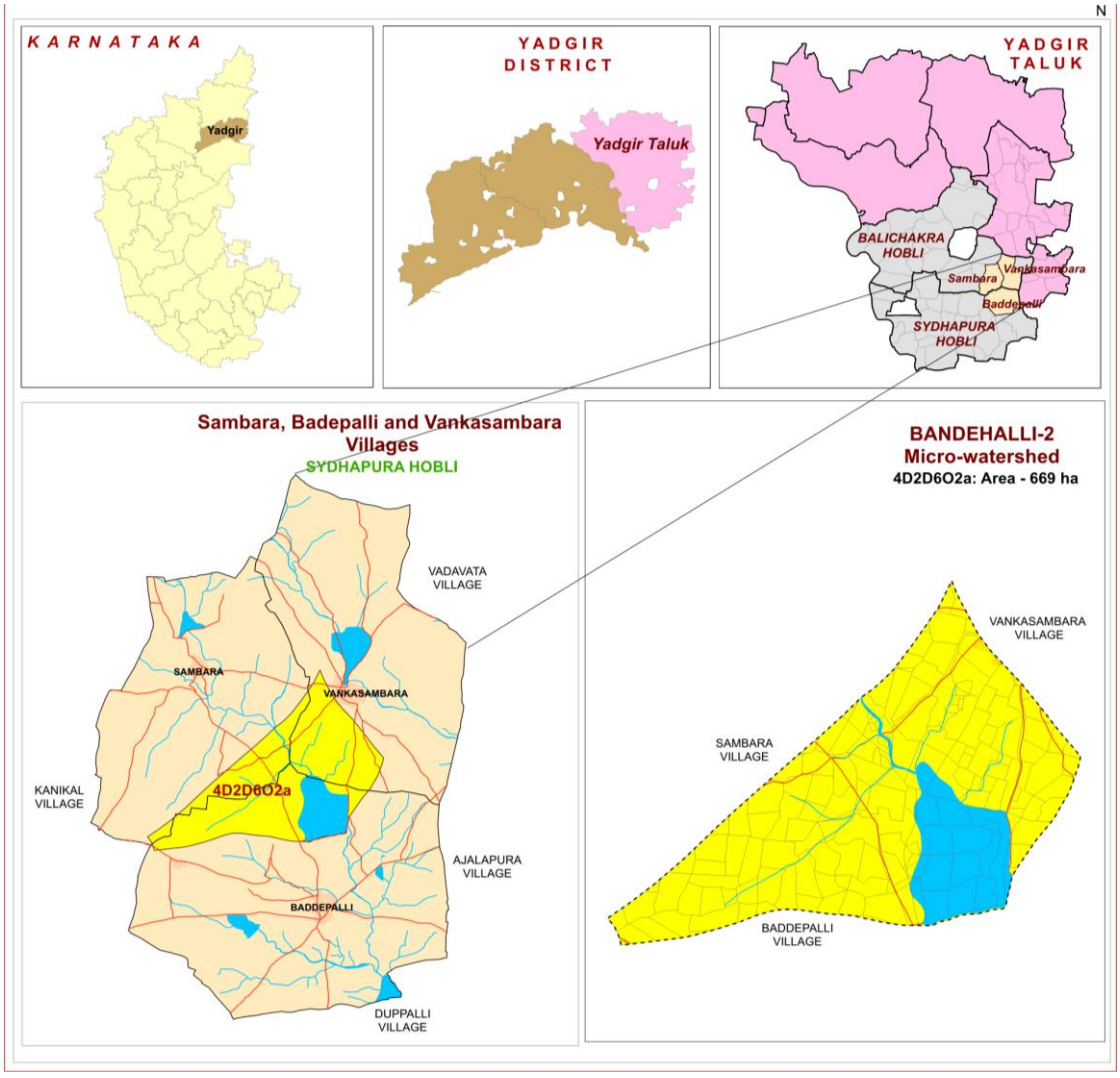

Fig. 2.1 Location map of Bandehalli-2 microwatershed

2.2 Geology

Major rock formations observed in the microwatershed are granite gneiss (Fig. 2.2). Granite gneisses are essentially pink to gray and are coarse to medium grained. They consist primarily of quartz, feldspar, biotite and hornblende. The gray granite gneisses are

highly weathered, fractured and fissured upto a depth of about 10 m. Dolerite dykes and quartz veins are common with variable width and found to occur in the village.

Fig. 2.2 Granite and granite gneiss rocks

2.3 Physiography

Physiographically, the area has been identified as granite gneiss landscape based on geology. The microwatershed area has been further divided into mounds/ridges, summits, very gently sloping uplands, plains and valleys based on slope and its relief features. The elevation ranges from 385-389 m above MSL.

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 866 mm (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 cold season. December is the coldest month with mean daily maximum and minimum temperatures being 29.5^{0}C and 10^{0}C respectively. During peak summer, temperature shoots up to 45^{0}C. 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 to end of September. Generally, the Length of crop Growing Period (LGP) is 120-150 days and starts from 1st week of June to 4th week of October.

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

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**	**141.4**	

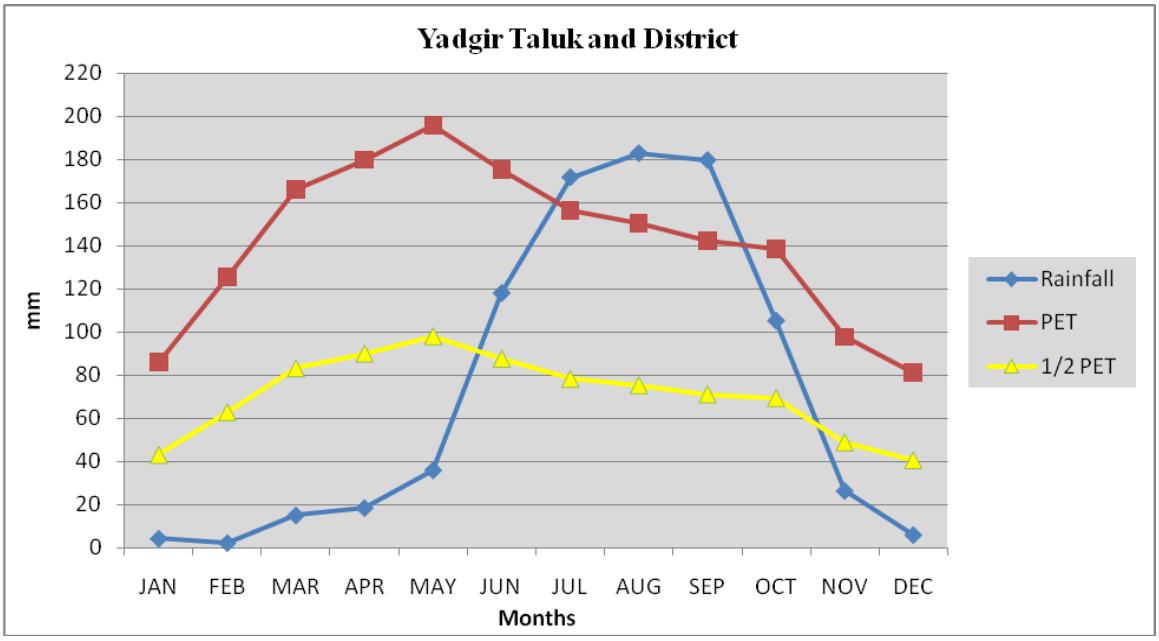

Fig 2.3 Rainfall distribution in Yadgir Taluk

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 taluk 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, mango, pomegranate and marigold. The different crops and cropping systems adopted in the microwatershed is presented in the Figures 2.4 a & b. 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 Bandehalli-2 microwatershed is presented in Fig. 2.5. Simultaneously, enumeration of wells (bore wells and open wells) and other conservation structures in the microwatershed was made and their location in different survey numbers is marked on the cadastral map. Map showing the location of wells and other water bodies in the Bandehalli-2 microwatershed is given in Fig. 2.6.

Table 2.2 Land Utilization in Yadgir Taluk

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.	Trees and grooves	737	0.14
5.	Forest	33773	6.54
6.	Cultivable wasteland	2385	0.46
7.	Permanent Pasture land	11755	2.28
8.	Barren land	27954	5.41
9.	Non- Agriculture land	29623	5.73
10.	Current Fallows	105212	20.4

Fig. 2.4 a. Different Crops and Cropping Systems in Bandehalli-2 microwatershed

Fig. 2.4 b. Different Crops and Cropping Systems in Bandehalli-2 microwatershed

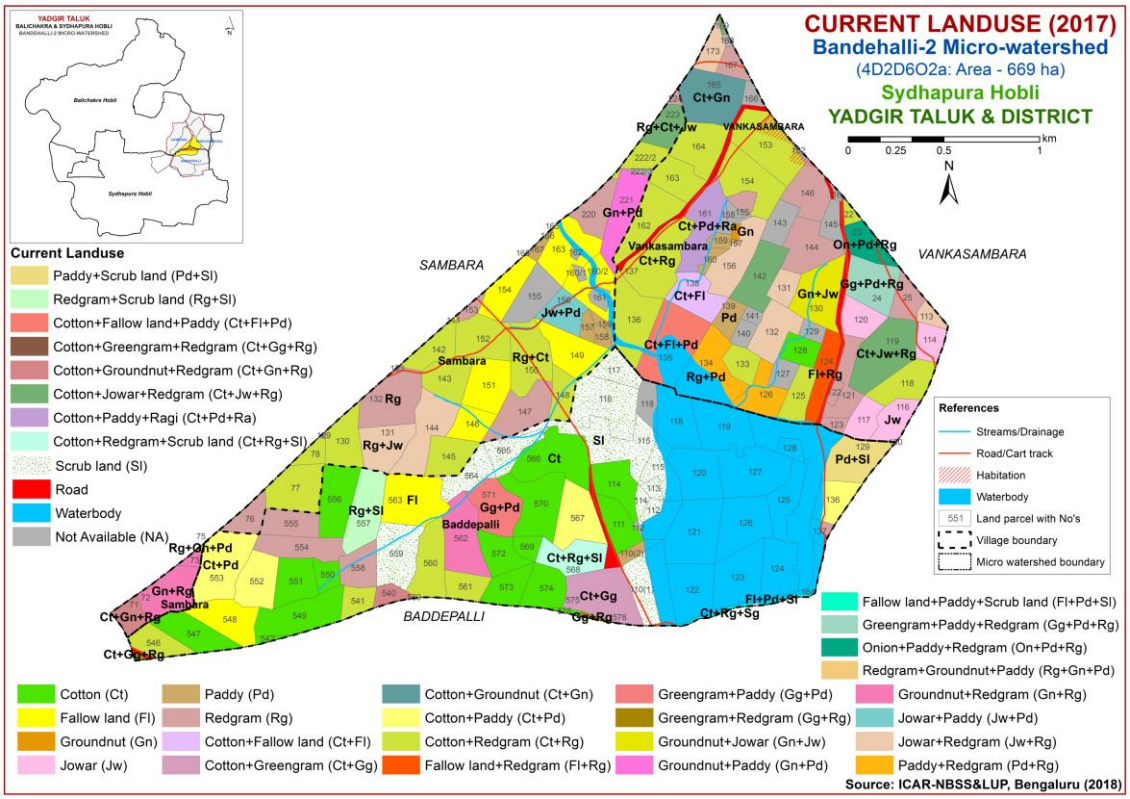

Fig. 2.5 Current Land Use map of Bandehalli-2 microwatershed

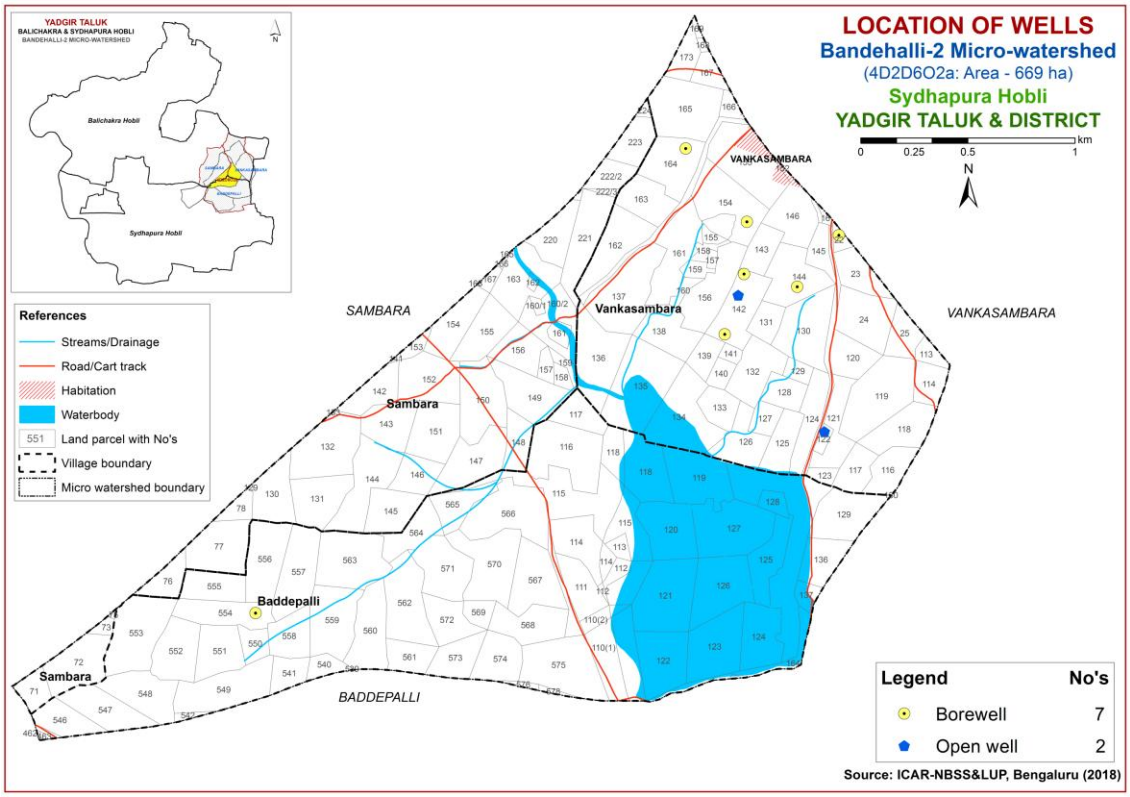

Fig. 2.6 Location of wells - Bandehalli-2 microwatershed

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 for a given level of management. This was achieved in Bandehalli-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 area extent and their geographic distribution on the microwatershed cadastral map. The detailed survey at 1:7920 scale was carried out in 669 ha area. The methodology followed for carrying out land resource inventory was as per the guidelines given in Soil Survey Manual (IARI, 1971; Soil Survey Staff, 2006; Natarajan et al., 2015) which is briefly described below.

3.1 Base Maps

The detailed survey of the land resources occurring in the microwatershed was carried out by using digitized cadastral map and satellite imagery as base supplied by the KSRSAC. The cadastral map shows field boundaries with their survey numbers, location of tanks, streams and other permanent features of the area (Fig. 3.1). Apart from the cadastral map, remote sensing data products from Cartosat-1 and LISS-IV merged at the scale of 1:7920 were used in conjunction with the cadastral map to identify the rock types, 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 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 gneiss landscape. 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

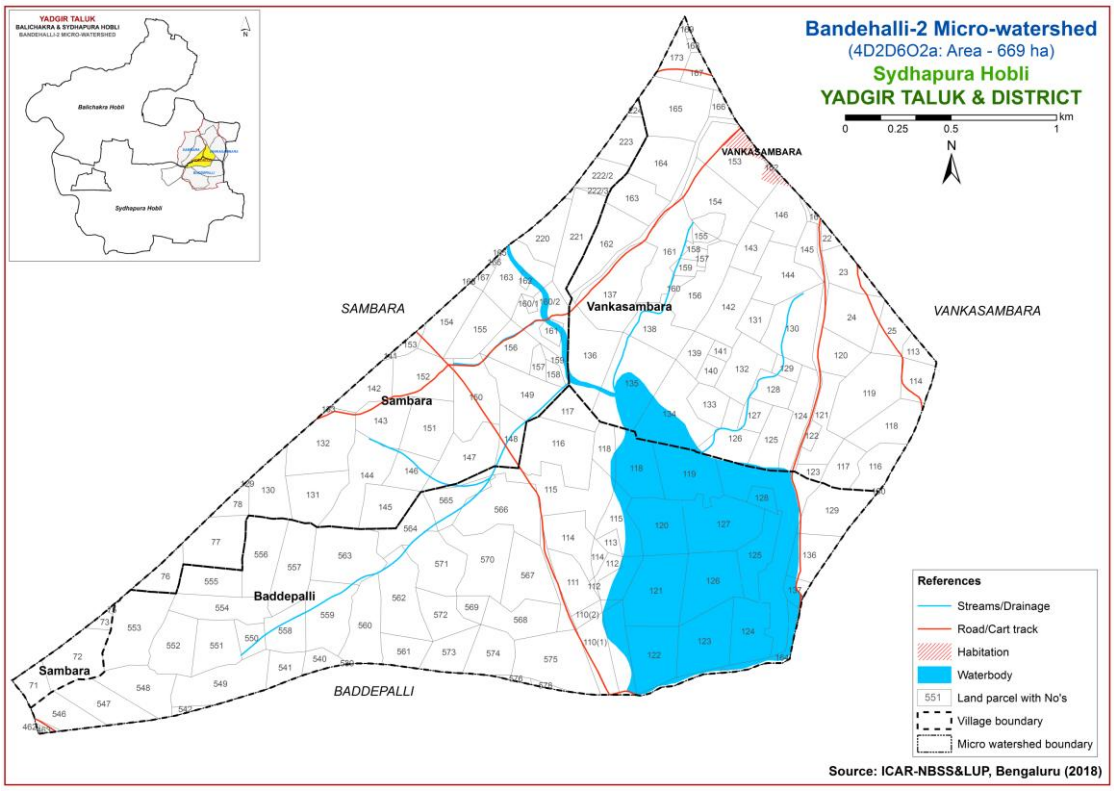

Fig 3.1 Scanned and Digitized Cadastral map of Bandehalli-2 microwatershed

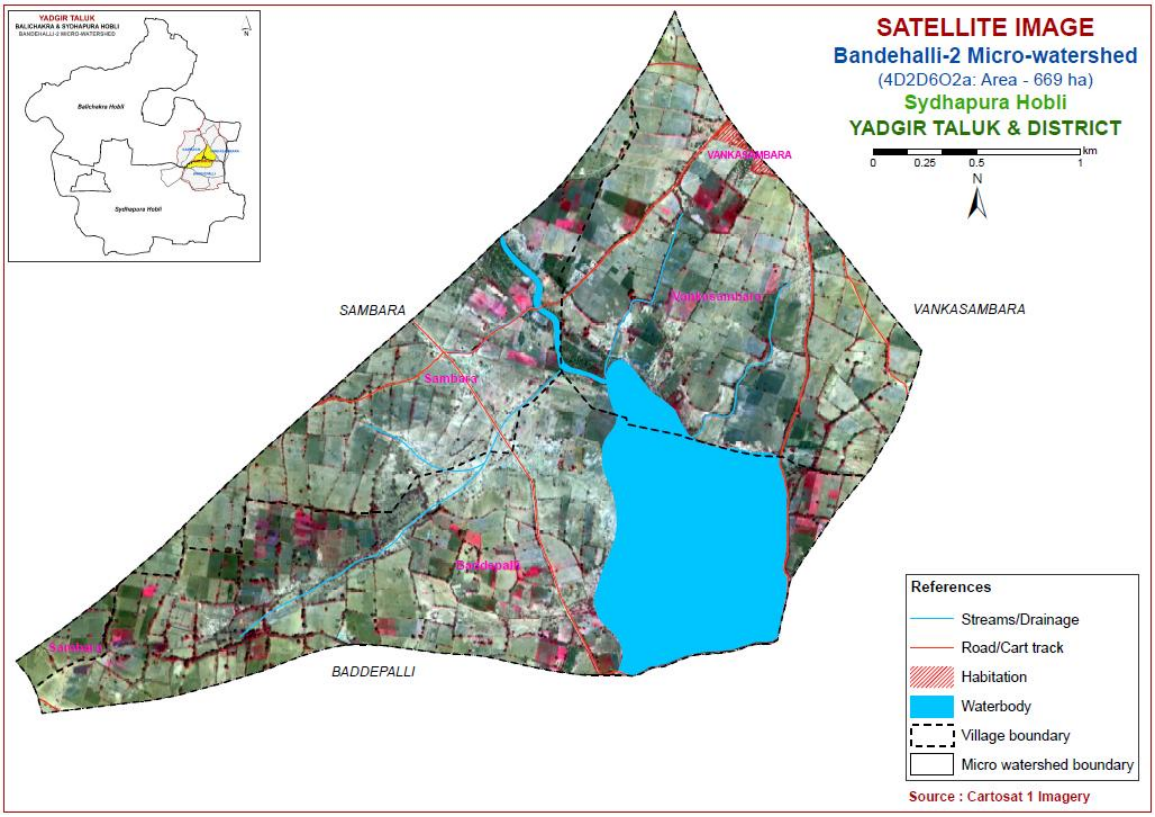

Fig. 3.2 Satellite Image of Bandehalli-2 microwatershed

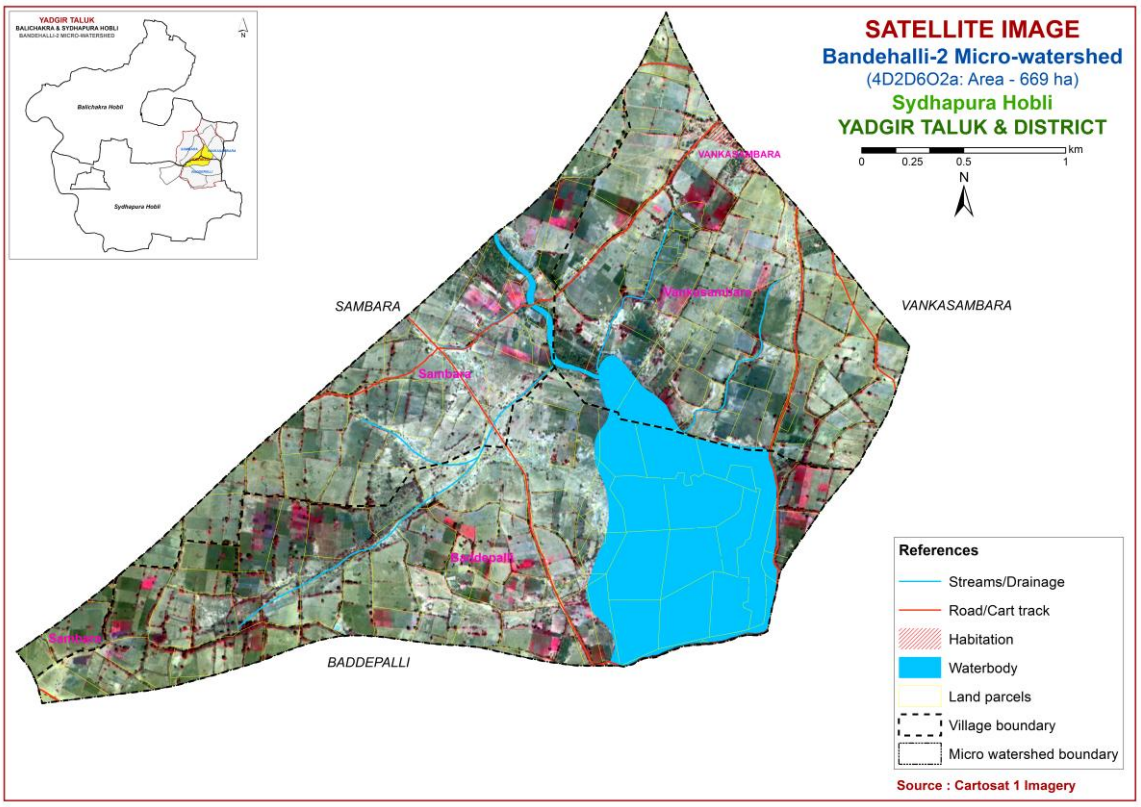

Fig. 3.3 Cadastral map overlaid on IRS PAN+LISS IV merged imagery of Bandehalli-2 microwatershed

3.3 Field Investigation

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

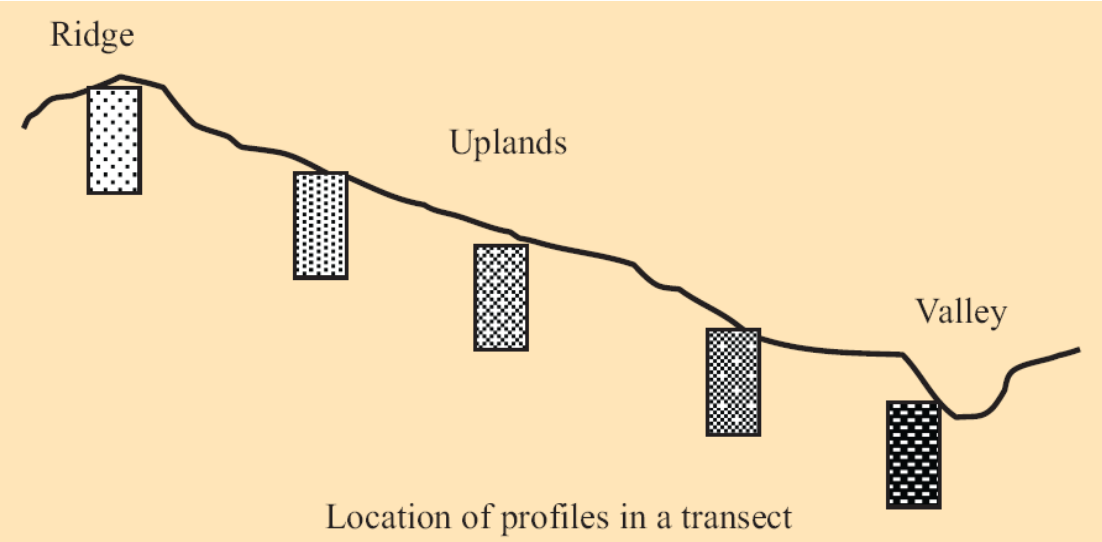

Fig: 3.4. Location of profiles in a transect

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, soil profiles (vertical cut showing the soil layers from surface to the rock) were opened upto 200 cm or to the depth limited by rock or hard substratum and studied in detail for all their morphological and physical characteristics. The soil and site characteristics were recorded for all profile sites on a standard proforma as per the guidelines given in USDA Soil Survey Manual (Soil Survey Staff, 2012). Apart from the transect study, profiles were also studied at random, almost like in a grid pattern, outside the transect areas.

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

series are given in Table 3.1. Based on the above characteristics, 15 soil series were identified in the Bandehalli-2 microwatershed.

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

SOILS OF GRANITE GNEISS LANDSCAPE							
Sl. No.	**Soil Series**	**Depth (cm)**	**Colour(moist)**	**Texture**	**Gravel (%)**	**Horizon sequence**	**Calcare ousness**
1	Baddeppalli (BDP)	<25	7.5YR 3/2,3/4, 5YR 3/4	scl	-	Ap-Ac	es
2	Badiyala (BDL)	25-50	7.5YR 2.5/3, 2.5/2,3/3 10YR 3/4,4/3	sl	-	Ap-Bw	e
3	Duppali (DPL)	50-75	7.5YR 3/3 5YR 3/4	sc	-	Ap-Bt	-
4	Sambra (SBR)	50-75	10YR 7/1 7.5YR 7/4	ls	-	Ap-AC	-
5	Yalleri (YLR)	50-75	2.5YR 3/4,4/4 5YR3/4,7.5YR4/4	c	15-35	Ap-Bt	-
6	Gowdagera (GWD)	75-100	10YR 3/1,3/2,4/2	scl	-	Ap-Bw	es
7	Hosalli (HSL)	75-100	10YR 5/4,4/4,4/6	sc	-	Ap-Bw	e
8	Anur(ANR)	100-150	10YR 4/3,4/1	c	-	Ap-Bw	es
9	Belagundi (BGD)	100-150	10 YR 5/4,4/4 7.5YR 4/4	c	-	Ap-Bw	-
10	Mundargi (MDG)	100-150	10YR 4/4,3/3 7.5YR 4/4	scl	-	Ap-Bw	-
11	Nagalapur (NGP)	100-150	10YR 3/2, 3/1, 2/1	c	-	Ap-Bss	es
12	Yadgir (YDR)	100-150	10YR 4/3,4/4 2.5Y 4/3,5/3	sl	-	Ap-Ac	-
13	Madhwara (MDR)	>150	10YR 3/1, 3/2, 2/1,2/2	scl	-	Ap-Bw	e
14	Neelahalli (NHL)	100-150	10YR 5/3,4/2	sl	-	Ap-Bw	-
15	Vankasambar (VKS)	100-150	10YR 5/3, 4/2, 2/1,2/2,3/2,4/3	scl	-	Ap-Bw	es

3.4 Soil Mapping

The area under each soil series was further separated into 18 soil phases and their boundaries delineated on the cadastral map based on the variations observed in the texture of the surface soil, slope, erosion, presence of gravel, stoniness etc. A soil phase is a subdivision of soil series based mostly on surface features that affect its use and management. The soil mapping units are shown on the soil map (Fig. 3.5) in the form of symbols. During the survey many soil profile pits, few minipits and a few auger bores representing different landforms occurring in the microwatershed were studied. In

addition to the profile study, spot observations in the form of minipits, road cuts, terrace cuts etc., were studied to validate the soil boundaries on the soil map.

The soil map shows the geographic distribution of 18 soil mapping units representing 15 soil series occurring in the microwatershed. The soil map unit (soil legend) description is presented in Table 3.2. The soil phase map (management units) shows the distribution of 18 soil phases mapped in the microwatershed. Each mapping unit (soil phase) delineated on the map has similar soil and site characteristics. In other words, all the farms or survey numbers included in one phase will have similar management needs and have to be treated accordingly.

3.5 Laboratory Characterization

Soil samples for each soil series were collected from representative master profiles for laboratory characterization by following the methods outlined in the Laboratory Manual (Sarma *et al*, 1987). Surface soil samples collected in the year 2017 from farmer's fields (68 samples) for fertility status (major and micronutrients) at 320 m grid interval were analyzed in the laboratory (Katyal and Rattan, 2003). By linking the soil fertility data to the survey numbers through GIS, soil fertility maps were generated using Kriging method for the microwatershed.

Table 3.2 Soil Map Unit description of Bandehalli-2 microwatershed

Soil Map unit No.	Soil Series	Soil phase	Soil Map Unit	Mapping Unit Description	Area in ha (%)
	Soil of Granite gneiss Landscape				
	BDP	Baddeppalli soils are very shallow (<25 cm), well drained, have dark brown to dark reddish brown, calcareous sandy clay loam red soils occurring on very gently sloping uplands under cultivation			**0.0009 (0.0001)**
1		BDPiB2	Sandy clay surface, slope 1-3%, moderate erosion		0.0009 (0.0001)
	BDL	Badiyala soils are shallow (25-50 cm), well drained, have dark brown to very dark brown and dark yellowish brown, slightly calcareous, sandy loam soils occurring on very gently to gently sloping uplands under cultivation			**36 (5.41)**
2		BDLbB2	Loamy sand surface, slope 1-3%, moderate erosion		20 (3.0)
4		BDLhB2	Sandy clay loam surface, slope 1-3%, moderate erosion		16 (2.41)
	DPL	Duppali soils are moderately shallow (50-75 cm), well drained, have dark brown to dark reddish brown, sandy clay red soils occurring on very gently sloping uplands under cultivation			**19 (2.77)**
25		DPLcB2	Sandy loam surface, slope 1-3%, moderate erosion		19 (2.77)
	SBR	Sambra soils are moderately shallow (50-75 cm), well drained, have light gray to pink, loamy sand soils occurring on very gently to gently sloping uplands under cultivation			**5 (0.72)**
11		SBRcB2	Sandy loam surface, slope 1-3%, moderate erosion		5(0.72)

	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		**69 (10.28)**
31		YLRiB2	Sandy clay surface, slope 1-3%, moderate erosion	69 (10.28)
	GWD	Gowdagera soils are moderately deep (75-100 cm), moderately well drained, have dark grayish brown to very dark grayish brown, calcareous sandy clay loam black soils occurring on very gently sloping uplands under cultivation		**188 (28.08)**
34		GWDcB2	Sandy loam surface, slope 1-3%, moderate erosion	188 (28.08)
35		GWDiB2	Sandy clay surface, slope 1-3%, moderate erosion	0 .11 (0.02)
	HSL	Hosalli soils are moderately deep (75-100 cm), well drained, have yellowish brown to dark yellowish brown, slightly calcareous sandy clay soils occurring on very gently sloping uplands under cultivation		**10 (1.44)**
126		HSLhB2	Sandy clay loam surface, slope 1-3%, moderate erosion	10 (1.44)
	ANR	Anur soils are deep (100-150 cm), moderately well drained, have dark gray to brown, calcareous clay soils occurring on very gently sloping uplands under cultivation		**0.02 (0.004)**
51		ANRbB2g1	Loamy sand surface, slope 1-3%, moderate erosion, gravelly (15-35%)	0.02 (0.004)
	BGD	Belagundi soils are deep (100-150 cm), well drained, have brown to dark yellowish brown, clayey soils occurring on very gently sloping uplands under cultivation		**24 (3.53)**
50		BGDbB2	Loamy sand surface, slope 1-3%, moderate erosion	24 (3.53)
	MDG	Mundargi soils are deep (100-150 cm), moderately well drained, have brown to dark yellowish brown, sandy clay loam soils occurring on very gently sloping uplands under cultivation		**8 (1.2)**
148		MDGhB2	Sandy clay loam surface, slope 1-3%, moderate erosion	8 (1.2)
	NGP	Nagalapur soils are deep (100-150 cm), moderately well drained, have very dark gray to very dark grayish brown, black calcareous cracking clay soils occurring on very gently sloping uplands under cultivation		**51 (7.64)**
47		NGPbB2	Loamy sand surface, slope 1-3%, moderate erosion	40 (5.94)
49		NGPmB2	Clay surface, slope 1-3%, moderate erosion	11 (1.7)
	YDR	Yadgir soils are deep (100-150 cm), well drained, have brown to dark yellowish brown and olive brown, sandy loam soils occurring on very gently sloping uplands under cultivation		**41 (6.09)**
42		YDRcB2	Sandy loam surface, slope 1-3%, moderate erosion	41 (6.09)

	MDR	Madhwara soils are very deep (>150 cm), moderately well drained, have very dark gray to very dark brown, slightly calcareous sandy clay loam soils occurring on nearly level to very gently sloping uplands under cultivation		**0 .11 (0.02)**
59		MDRcB2	Sandy loam surface, slope 1-3%, moderate erosion	0 .11 (0.02)
	NHL	Neelahalli soils are deep (100-150 cm), moderately well drained, have brown to dark grayish brown, sandy clay loam black soils occurring on very gently sloping lowlands under cultivation		**1 (0.09)**
101		NHLmB1	Clay surface, slope 1-3%, slight erosion	1 (0.09)
	VKS	Vankasambar soils are deep (100-150 cm), moderately well drained, have brown to very dark grayish brown and very dark brown, calcareous sandy clay loam black soils occurring on very gently sloping lowlands under cultivation		**118 (17.66)**
117		VKSiB2	Sandy clay surface, slope 1-3%, moderate erosion	118 (17.66)
1000	Other	Habitation and Water bodies		**101 (15.06)**

3.6 Land Management Units (LMU's)

The 18 soil phases identified and mapped in the microwatershed were grouped into 7 Land Management Units (LMU's) for the purpose of preparing a Proposed Crop Plan for sustained development of the microwatershed. The database (soil phases) generated under LRI was utilized for identifying Land Management Units (LMU's) based on the management needs. One or more than one soil site characteristic having influence on the management have been chosen for identification and delineation of LMUs. For Bandehalli-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.

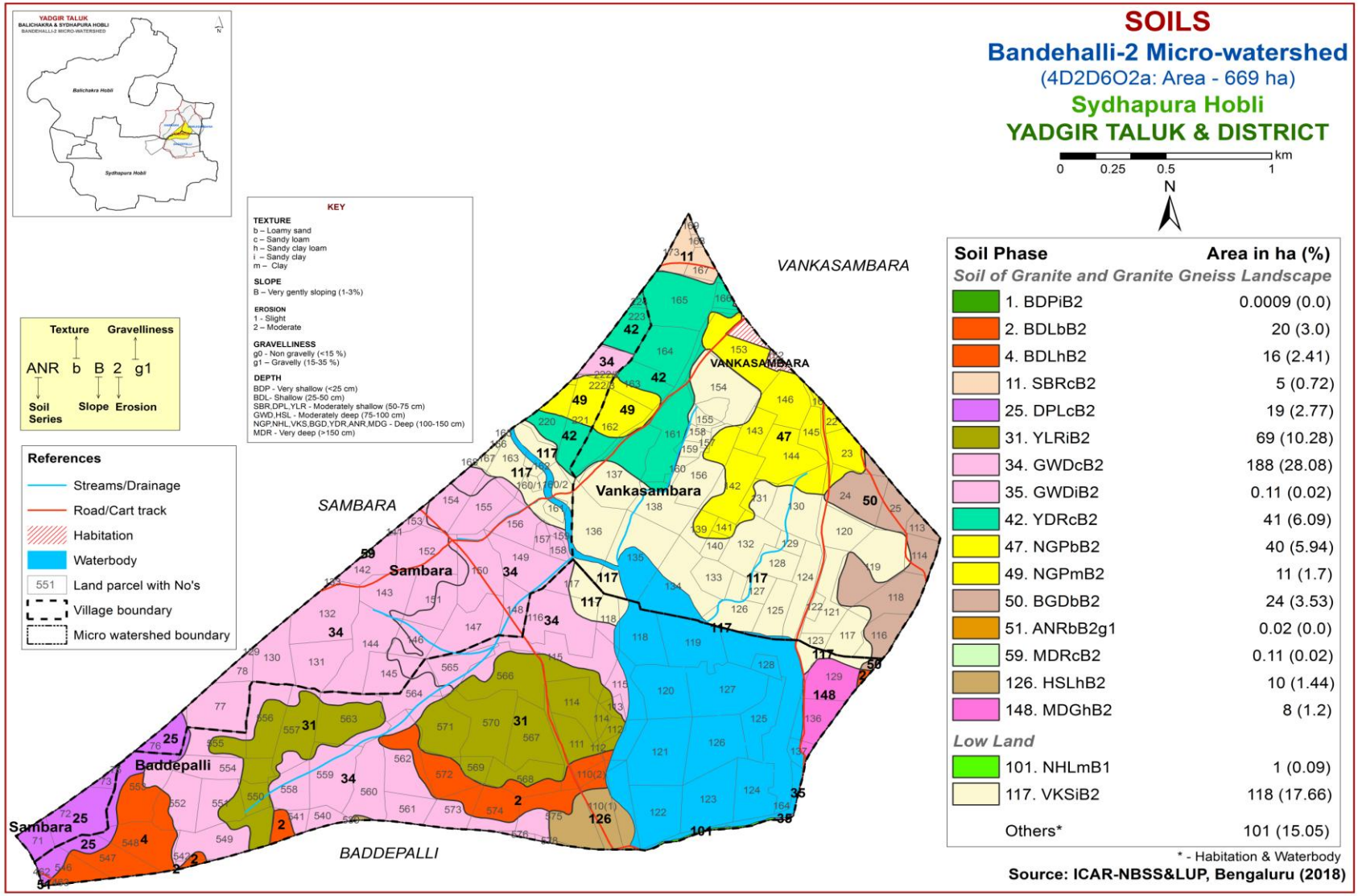

Fig 3.5 Soil phase or management units map of Bandehalli-2 microwatershed

Chapter 4

THE SOILS

Detailed information pertaining to the nature, extent and distribution of different kinds of soils occurring in Bandehalli-2 microwatershed is provided in this chapter. The microwatershed area has been identified as granite gneiss landscape based on geology. In all, 15 soil series were identified in this landscape. Soil formation is the result of the combined effect of environmental and terrain factors that are reflected in soil morphology. In the granite gneiss landscape, it is by parent material, relief, time and climate.

A brief description of each of the 15 soil series identified followed by 18 soil phases (management units) mapped (Fig. 3.4) are furnished below. The physical and chemical characteristics of soil series identified in Bandehalli-2 microwatershed are given in Table 4.1 along with soil classification. The soils in any one map unit differ from place to place in their depth, texture, slope, gravelliness, erosion or any other site characteristics that affect management. The soil phase map can be used for identifying the suitability of areas for growing specific crops or for other alternative uses and also for deciding the type of conservation structures needed. The detailed information on soil and site-characteristics like soil depth, surface soil texture, slope, erosion, gravelliness, AWC, LCC etc, with respect to each of the soil phase identified is given village/survey number wise for the microwatershed in Appendix-I.

4.1 Soils of granite gneiss Landscape

In this landscape, fifteen soil series are identified and mapped. Of these, the Gowdagera (GWD) series cover maximum area of 188 ha (28%) followed by Vankasambar (VKS) 118 ha (18%), Yalleri (YLR) 69 ha (10%), Nagalapur (NGP) 51 ha (8%), Yadgir (YDR) 41 ha (6%), Badiyala (BDL) 36 ha (5%), Belagundi (BGD) 24 ha (4%), Duppali (DPL) 19 ha (3%), Hosalli (HSL) 10 ha (1%) and other series with minor area in the microwatershed. The brief description of soil series along with the soil phases identified and mapped is given below.

4.1.1 Baddeppalli (BDP) Series: Baddeppalli soils are very shallow (<25 cm), well drained, have dark brown to dark reddish brown, calcareous sandy clay loam soils. They are developed from weathered granite gneiss and occur on very gently to gently sloping uplands under cultivation. The Baddepalli series has been classified as a member of the loamy, mixed, (calcareous), isohyperthermic family of Lithic Ustorthents.

The thickness of the soil is less than 25 cm. Its colour is in 7.5 YR and 5 YR hue with value 3 and chroma 2 to 4. The texture varies from sandy clay loam to sandy clay and is calcareous. The available water capacity is very low (<50 mm/m). Only one phase was identified and mapped.

Landscape and soil Profile characteristics of Baddeppalli (BDP) Series

4.1.2 Badiyala (BDL) Series: Badiyala soils are shallow (25-50 cm), well drained, have very dark brown, dark yellow brown and dark brown, slightly calcareous sandy loam soils. They are developed from weathered granite gneiss and occur on very gently to gently sloping uplands under cultivation. The Badiyala series has been classified as a member of the coarse-loamy, mixed, isohyperthermic family of Fluventic Haplustepts.

The thickness of the solum ranges from 28 to 50 cm. The thickness of A horizon ranges from 4 to 12 cm. Its colour is in 10YR hue with value 3 to 4 and chroma 3 to 4. The texture is loamy sand, sandy clay loam and sandy clay. The thickness of B horizon ranges from 27 to 45 cm. Its colour is in 10 YR and 7.5 YR hue with value 2 to 4 and chroma 3 to 4. Its texture is sandy loam to sandy clay loam and sandy clay and is slightly calacreous. The available water capacity is very low (<50 mm/m). Two phases were identified and mapped.

Landscape and soil profile characteristics of Badiyala (BDL) Series

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

The thickness of the solum ranges from 51-75 cm. Thickness of A horizon ranges from 8 to 15 cm. Its colour is in hue 10 YR with value 4 and chroma 3 to 6. The texture varies from loamy sand to sandy clay. The thickness of B horizon ranges from 55 to 65 cm. Its colour is in 7.5 YR and 5 YR hue with value 3 to 4 and chroma 2 to 4. The texture is sandy clay. The available water capacity is low (51-100 mm/m). Only one phase was identified and mapped.

Landscape and soil Profile characteristics of Duppali (DPL) Series

4.1.4 Sambra (SBR) Series: Sambra soils are moderately shallow (50-75 cm), somewhat excessively drained, have light grey to reddish yellow, loamy sand soils. They are developed from weathered granite gneiss and occur on very gently to gently sloping uplands under cultivation. The Sambra series has been classified as a member of the sandy, mixed, isohyperthermic family of Typic Ustorthents.

The thickness of the soil ranges from 52-75 cm. Thickness of A horizon ranges from 8 to 23 cm. Its colour is in hue 10 YR and 7.5 YR with value 3 and chroma 1 to 4. The texture varies from loamy sand to sandy loam. The thickness of subsurface horizons ranges from 41 to 66 cm. Its colour is in 10 YR and 7.5 YR hue with value 3 to 5 and chroma 1 to 4. The texture is loamy sand. The available water capacity is very low (<50 mm/m). Only one phase was identified and mapped.

Landscape and soil Profile characteristics of Sambara (SBR) Series

4.1.5 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 is sandy loam, loamy sand, and sandy clay loam. The thickness of B horizon ranges from 45 to 64 cm. Its colour is in 10 YR, 7.5 YR and 5 YR hue with value 2 to 4 and chroma 2 to 4. Its texture is clay with gravel content of 15-35 per cent. The available water capacity is low (51-100 mm/m). Only one phase was identified and mapped.

Landscape and soil Profile characteristics of Yalleri (YLR) Series

4.1.6 Gowdagera (GWD) Series: Gowdagera soils are moderately deep (75-100 cm), moderately well drained, very dark gray to dark grayish brown, calcareous sandy clay loam soils. They are developed from weathered granite gneiss and occur on very gently sloping uplands under cultivation. The Gowdagera series has been classified as a member of the fine-loamy, mixed, (calcareous), isohyperthermic family of Typic Haplustepts.

The thickness of the solum ranges from 76 to 100 cm. The thickness of A horizon ranges from 8 to 16 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. The thickness of B horizon ranges from 61 to 91 cm. Its colour is in hue 10 YR with value 2 to 4 and chroma 1 to 4. Its texture is sandy clay loam to sandy clay and is calcareous. The available water capacity is medium (101-150 mm/m). Two phases were identified and mapped.

Landscape and soil Profile characteristics of Gowdagera (GWD) Series

4.1.7 Hosalli (HSL) Series: Hosalli soils are moderately deep (75-100 cm), moderately well drained, have dark yellowish brown to yellowish brown, slightly calcareous sandy clay soils. They are developed from weathered granite gneiss and occur on very gently to gently sloping uplands under cultivation. The Hosalli series has been classified as a member of the fine, 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 15 cm. Its colour is in hue 10 YR and 7.5 YR with value 3 to 5 and chroma 2 to 4. Its texture varies from loamy sand to sandy loam and sandy clay loam. The thickness of B horizon ranges from 62 to 93 cm. Its colour is in hue 10 YR with value 3 to 4 and chroma 2 to 4. Its texture varies from sandy clay loam to sandy clay and clay and is slightly calcareous. The available water capacity is medium (101-150 mm/m). Only one phase was identified and mapped.

Landscape and soil Profile characteristics of Hosalli (HSL) Series

4.1.8 Anur (ANR) Series: Anur soils are deep (100-150 cm), moderately well drained, have dark gray to dark brown, calcareous clay soils. They are developed from weathered granite gneiss and occur on very gently to gently sloping uplands under cultivation. The Anur series has been classified as a member of the fine, mixed, (calcareous), isohyperthermic family of Typic Haplustepts.

The thickness of the solum ranges from 102 to 148 cm. The thickness of A-horizon ranges from 9 to 17 cm. Its colour is in 10 YR hue with value 3 to 4 and chroma 2 to 4. The texture ranges from loamy sand to sandy clay loam and sandy clay and are calcareous. The thickness of B horizon ranges from 102 to 135 cm. Its colour is in 10 YR hue with value 3 to 5 and chroma 1 to 6. Texture is sandy clay loam to sandy clay and clay and is calcareous. The available water capacity is very high (>200 mm/m). Only one phase was identified and mapped.

Landscape and soil Profile characteristics of Anur (ANR) Series

4.1.9 Belagundi (BGD) Series: Belagundi soils are deep (100-150 cm), moderately well drained, have dark yellowish brown to yellowish brown and dark brown cracking clay soils. They are developed from weathered granite gneiss and occur on very gently to gently sloping uplands under cultivation. The Belagundi series has been classified as a member of the very fine, mixed, (calcareous), isohyperthermic family of Typic Haplustepts.

The thickness of the solum ranges from 100 to 145 cm. The thickness of A horizon ranges from 5 to 12 cm. Its colour is in 10 YR and 5 YR hue with value 5 and chroma 2 to 4. The texture varies from sandy to loamy sand. The thickness of B horizon ranges from 95 to 135 cm. Its colour is in 10 YR and 7.5 YR hue with value 4 to 5 and chroma 4. Texture is sandy clay to clay. The available water capacity is very high (>200 mm/m). Only one phase was identified and mapped.

Landscape and soil Profile characteristics of Belagundi (BGD) Series

4.1.10 Mundargi (MDG) Series: Mundargi soils are deep (100-150 cm), moderately well drained, dark brown to dark yellowish brown, sandy clay loam soils. They are developed from weathered granite gneiss and occur on very gently to gently sloping uplands under cultivation. The Mundargi series has been classified as a member of the fine-loamy, mixed, isohyperthermic family of Fluventic Haplustepts.

The thickness of the solum ranges from 100 to 149 cm. The thickness of A horizon ranges from 8 to 20 cm. Its colour is in 10 YR hue with value 3 and chroma 1 to 4. The texture ranges from sandy loam to sandy clay loam and sandy clay. The thickness of B horizon ranges from 105 to 140 cm. Its colour is in 10 YR hue with value 3 to 4 and chroma 2 to 4. The texture varies from sandy loam to sandy clay loam and sandy clay. The available water capacity is very high (>200 mm/m). Only one phase was identified and mapped.

Landscape and soil Profile characteristics of Mundargi (MDG) Series

4.1.11 Naglapur (NGP) Series: Naglapur soils are deep (100-150 cm), moderately well drained, have black to very dark grayish brown, calcareous cracking clay soils. They are developed from weathered granite gneiss and occur on very gently to gently sloping uplands under cultivation. The Naglapur series has been classified as a member of the very fine, smectitic, (calcareous), isohyperthermic family of Typic Haplusterts.

The thickness of the solum ranges from 110 to 150 cm. The thickness of A horizon ranges from 6 to 25 cm. Its colour is in 10 YR hue with value 3 to 5 and chroma 1 to 3. The texture varies from sandy loam to sandy clay and clay. The thickness of B horizon ranges from 110 to 141 cm. Its colour is in 10 YR hue with value 2 to 3 and chroma 1 to 2. Texture is clay and is calcareous. The available water capacity is very high (>200 mm/m). Two phases were identified and mapped.

Landscape and soil Profile characteristics of Naglapur (NGP) Series

4.1.12 Yadgir (YDR) Series: Yadgir soils are deep (100-150 cm), well drained, have very dark yellowish brown to light olive brown, sandy loam soils. They are developed from weathered granite gneiss and occur on very gently to gently sloping uplands under cultivation. The Yadgir series has been classified as a member of the coarse-loamy, mixed, isohyperthermic family of Typic Ustorthents.

The thickness of the solum ranges from 105 to 145 cm. The thickness of A horizon ranges from 6 to 10 cm. Its colour is in 10 YR hue with value 4 and chroma 3. The texture is loamy sand. The thickness of subsurface horizons ranges from 95 to 130 cm. Its colour is in 10 YR and 2.5 Y hue with value 4 to 5 and chroma 3 to 4. Texture is loamy sand to sandy loam and sandy clay loam. The available water capacity is low (51-100 mm/m). Only one phase was identified and mapped.

Landscape and soil Profile characteristics of Yadgir (YDR) Series

4.1.13 Madhwara (MDR) Series: Madhwara soils are very deep (>150 cm), well drained, have black to very dark brown and very dark gray to very dark grayish brown, slightly calcareous sandy clay loam soils. They are developed from weathered granite gneiss and occur on nearly level to very gently sloping uplands under cultivation. The Madhwara series has been classified as a member of the fine-loamy, mixed, isohyperthermic family of Fluventic Haplustepts.

The thickness of the solum is more than150 cm. The thickness of A horizon ranges from 10 to 16 cm. Its colour is in 10 YR hue with value 3 to 5 and chroma 2 to 3. Texture varies from 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 loam to sandy clay and is slightly calcareous. The available water capacity is very high (>200 mm/m). Only one phase was identified and mapped.

Landscape and soil Profile characteristics of Madhwara (MDR) Series

4.1.14 Neelahalli (NHL) Series: Neelahalli soils are deep (100-150 cm), well drained, have dark grayish brown to brown sandy loam soils. They are developed from weathered granite gneiss and occur on nearly level to very gently sloping lowlands under cultivation. The Neelahalli series has been classified as a member of the coarse-loamy, mixed, isohyperthermic family of Typic Haplustepts.

The thickness of the solum ranges from 105 to 144 cm. The thickness of A horizon ranges from 8 to 16 cm. Its colour is in 10 YR hue with value 4 to 5 and chroma 2 to 3. The texture ranges from sandy clay loam to sandy clay. The thickness of B horizon ranges from 125 to 134 cm. Its colour is in 10 YR hue with value 4 to 5 and chroma 1 to 3. The texture is dominantly sandy loam. The available water capacity is very high (>200 mm/m). Only one phase was identified and mapped.

Landscape and soil Profile characteristics of Neelahalli (NHL) Series

4.1.15 Vankasambar (VKS) Series: Vankasambar soils are deep (100-150 cm), moderately well drained, have very dark brown to brown, sodic calcareous sandy clay loam soils. They are developed from weathered granite gneiss and occur on very gently to gently sloping lowlands under cultivation. The Vankasambar series has been classified as a member of the fine-loamy, mixed, (calcareous), isohyperthermic family of Typic Haplustepts.

The thickness of the solum ranges from 120 to 150 cm. The thickness of A horizon ranges from 9 to 22 cm. Its colour is in 10 YR hue with value 4 to 5 and chroma 2 to 5. The texture varies from loamy sand, sandy clay loam and sandy clay. The thickness of B horizon ranges from 102 to 138 cm. Its colour is in 10 YR hue with value 2 to 5 and chroma 2 to 4. Texture is sandy clay loam to sandy clay and is calcareous. The available water capacity is very high (>200 mm/m). Only one phase was identified and mapped.

Landscape and soil Profile characteristics of Vankasambaar (VKS) Series

Table: 4.1 Physical and Chemical Characteristics of Soil Series identified in Bandehalli-2 microwatershed

Soil Series: Baddeppalli **(**BDP) **Pedon:** R-11

Location: $16^0$43'84.4"N $77^0$14'06.4"E, Halagera village, Yadgir hobli, Yadgir taluk and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Loamy, mixed, (calcareous), isohyperthermic Lithic 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
0-16	Ap	58.67	17.02	24.31	19.03	13.74	9.62	10.57	5.71	<15	scl	16.19	8.18

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-16	8.58	-	-	0.262	1.60	7.67	-	-	0.24	0.06	-	18.10	0.74	100	0.35

Contd...

Soil Series: Badiyala **(**BDL) **Pedon:** R-5

Location: $16^0$37'10.0"N $77^0$20'21.5", Gudalagunta village, Balichakra hobli, Yadgir taluk and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Coarse-loamy, mixed, 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
0-12	Ap	87.13	7.04	5.83	10.03	24.32	23.61	23.51	5.67	<15	ls	6.27	2.44
12-28	Bw1	64.63	13.30	22.07	6.74	13.07	22.30	17.01	5.50	<15	scl	16.34	7.83
28-52	BC	73.11	12.02	14.87	3.93	16.03	26.89	18.41	7.86	<15	sl	12.94	5.47

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-12	6.20	-	-	0.074	1.00	0.00	2.80	0.98	0.14	0.01	3.92	4.20	0.72	93	0.20
12-28	9.04	-	-	0.253	0.80	3.20	-	-	0.16	0.69	-	16.90	0.77	100	4.09
28-52	9.41	-	-	0.364	1.10	3.60	-	-	0.16	1.39	-	11.10	0.75	100	12.52

Contd...

Soil Series: Duppali (DPL) **Pedon:** R-4

Location: $16^0$37'45.8"N $77^0$18'93.2"E, Neelahalli village, Balichakra 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
0-7	Ap	85.28	5.38	9.34	13.40	26.09	19.90	20.51	5.38	-	ls	9.30	4.92
7-39	Bt1	48.50	7.08	44.42	16.85	10.41	10.94	6.97	3.33	-	sc	21.31	16.82
39-65	Bt2	50.95	5.29	43.76	23.57	10.36	8.77	5.50	2.75	-	sc	21.99	17.50

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	6.92	-	-	0.122	0.92	0.00	4.73	1.61	0.19	0.01	6.54	7.10	0.76	92	0.09
7-39	7.00	-	-	0.060	0.62	0.00	13.57	4.78	0.12	0.40	18.87	19.30	0.43	98	2.06
39-65	6.87	-	-	0.072	0.41	0.00	13.69	4.57	0.19	0.65	19.10	19.90	0.45	96	3.25

Contd...

Soil Series: Sambara (SBR) **Pedon:** R-10

Location: $16^0$42'04.5"N $77^0$14'35.3"E, Jinatera village, Balichakra hobli, Yadgir taluk and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Sandy, mixed, isohyperthermic Typic 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
0-9	Ap	81.90	8.22	9.88	23.76	14.05	23.76	10.62	9.71	-	ls	9.45	2.69
9-17	C1	84.08	6.59	9.33	21.30	20.69	17.65	17.65	6.80	-	ls	7.84	2.65
17-60	C2	86.86	6.17	6.98	11.53	21.54	25.08	23.46	5.26	-	ls	5.48	2.62
60-78	C3	87.27	6.92	5.81	15.05	20.91	26.36	19.29	5.66	-	ls	5.19	2.81

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	8.24	-	-	0.145	0.61	0.91	-	-	0.12	0.09	-	7.50	0.76	100	1.15
9-17	8.21	-	-	0.068	0.57	0.39	-	-	0.06	0.12	-	6.70	0.72	100	1.82
17-60	8.47	-	-	0.080	0.38	0.48	-	-	0.03	0.17	-	2.70	0.39	100	6.34
60-78	8.50	-	-	0.081	0.30	0.52	-	-	0.03	0.17	-	2.70	0.46	100	6.43

Contd...

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

Contd...

Soil Series: Gowdagera (GWD) **Pedon:** R-13

Location: $16^0$38'24.4"N $77^0$21'24.0"E, Madhawara village, Balichakara hobli, Yadgir taluk and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Fine-loamy, mixed, (calcareous), 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
0-18	Ap	79.61	13.94	6.45	14.17	17.53	23.65	17.02	7.24	-	ls	11.36	3.86
18-42	BW1	69.09	10.58	21.06	10.54	16.58	22.01	14.43	5.53	-	scl	31.62	12.30
42-81	Bw2	51.37	13.51	35.60	7.59	10.55	16.24	11.60	5.38	-	sc	67.57	26.89

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-18	9.89	-	-	0.74	0.66	1.20	-	-	0.18	3.63	-	8.35	1.29	100	43.51
18-42	10.82	-	-	1.60	0.27	5.76	-	-	0.19	19.23	-	15.84	0.75	100	121.42
42-81	10.83	-	-	2.30	0.27	7.80	-	-	0.40	26.71	-	26.54	0.75	100	100.67

Contd...

Soil Series: Hosalli (HSL) **Pedon:** R-3

Location: $16^0$46'60.3"N $77^0$05'47.6"E, Mudhanala village, Yadgir 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
0-10	Ap	88.43	5.15	6.42	5.69	6.40	36.04	27.31	12.99	-	s	7.40	2.74
10-30	Bw1	58.47	7.24	34.29	4.26	9.37	19.91	19.28	5.64	-	scl	19.07	11.57
30-50	Bw2	51.43	12.67	35.90	3.49	8.89	16.72	15.87	6.46	<15	sc	21.64	12.44
50-90	Bw3	49.89	13.64	36.47	2.43	2.96	20.61	16.17	7.72	<15	sc	21.12	12.95

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-10	7.16	-	-	0.117	0.48	0.00	2.83	1.50	0.15	0.29	4.76	4.90	0.76	97	5.94
10-30	6.91	-	-	0.040	0.36	0.00	10.64	5.43	0.10	0.26	16.43	17.80	0.52	92	1.47
30-50	8.17	-	-	0.182	0.24	1.43	-	-	0.12	0.22	-	19.90	0.55	100	1.08
50-90	8.60	-	-	0.148	0.20	4.29	-	-	0.13	0.16	-	19.70	0.54	100	0.81

Contd...

Soil Series: Anur (ANR) **Pedon:** R-15

Location: $16^0$32’45.0”N $77^0$23’57.4”E, Duppalli village, Sydhapura hobli, Yadgir taluk and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Fine, mixed, (calcareous), 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
0-18	Ap	64.60	13.44	21.96	7.33	10.42	18.68	20.12	8.05	<15	scl	16.59	7.96
18-49	Bw1	56.66	12.19	31.15	4.73	9.80	18.66	17.02	6.45	-	scl	33.38	13.51
49-95	Bw2	39.94	17.81	42.25	3.09	3.30	15.44	10.65	7.45	<15	c	44.68	25.23
95-123	Bw3	30.65	17.58	51.77	1.50	5.57	10.18	9.65	3.75	<15	c	54.94	32.07

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-18	10.17	-	-	0.365	0.48	6.11	-	-	0.25	3.52	-	19.90	0.91	100	17.70
18-49	10.32	-	-	1.38	0.30	6.76	-	-	0.21	16.03	-	24.60	0.79	100	65.17
49-95	10.08	-	-	2.55	0.17	6.11	-	-	0.33	21.49	-	32.60	0.77	100	65.91
95-123	9.92	-	-	2.56	0.12	7.93	-	-	0.51	26.03	-	36.00	0.70	100	72.30

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Soil Series: Belagundi **(**BGD) **Pedon:** T_1/P_2

Location: $16^0$31'65.3"N $77^0$20'84.9"E, Kadechoora village, Sydhapura hobli, Yadgir taluk and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Very fine, mixed, (calcareous), 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
0-13	Ap	14.90	17.83	67.27	0.77	2.10	2.65	5.96	3.42	-	c	43.97	29.27
13-40	Bw1	13.07	18.32	68.61	0.80	2.05	2.61	4.20	3.41	-	c	41.23	30.48
40-80	Bw2	11.68	17.18	71.13	0.80	2.06	2.29	3.32	3.21	-	c	46.72	32.41
80-113	Bw3	12.17	16.53	71.30	1.95	1.61	3.21	2.41	2.99	-	c	46.87	35.13

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-13	7.85	-	-	0.253	0.87	5.20	-	-	0.67	0.17	-	65.90	0.98	100	0.26
13-40	8.11	-	-	0.172	0.74	4.29	-	-	0.31	0.16	-	66.70	0.97	100	0.23
40-80	8.44	-	-	0.205	0.58	5.59	-	-	0.20	0.27	-	66.30	0.93	100	0.40
80-113	8.82	-	-	0.201	0.39	10.14	-	-	0.19	0.17	-	63.80	0.89	100	0.27

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Soil Series: Mundargi **(**MDG) **Pedon:** R-2

Location: $16^0$46'82.4"N $77^0$04'85.2"E, Thumakura village, Yadgir hobli, Yadgir taluk and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Fine-loamy, mixed, 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
0-9	Ap	81.23	12.97	5.80	4.84	10.19	14.83	37.94	13.42	<15	ls	11.75	3.31
9-20	A2	76.82	16.19	6.98	4.96	10.12	20.75	27.53	13.46	-	ls	14.52	3.99
20-46	Bw1	42.43	17.43	40.15	2.26	5.59	11.49	14.93	8.16	-	c	34.90	21.14
46-90	Bw2	54.51	16.56	28.93	4.72	5.03	19.92	16.67	8.18	-	scl	36.73	18.88
90-110	Bw3	53.69	11.00	35.30	9.57	9.89	16.23	13.01	4.99	-	sc	38.72	20.53

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	8.2	-	-	0.399	0.44	0.78	-	-	0.16	0.38	-	4.90	0.84	100	7.69
9-20	8.44	-	-	0.075	0.29	1.82	-	-	0.05	0.35	-	4.90	0.70	100	7.20
20-46	9.39	-	-	0.451	0.32	2.73	-	-	0.12	5.22	-	20.77	0.52	100	25.15
46-90	9.75	-	-	0.616	0.24	3.25	-	-	0.12	5.72	-	16.56	0.57	100	34.55
90-110	9.72	-	-	0.725	0.24	3.64	-	-	0.14	6.84	-	19.76	0.56	100	34.59

Contd...

Soil Series: Naglapur (NGP) **Pedon:** R-8

Location: $16^0$52'84.1"N $77^0$22'99.4"E, Gurumitkal village, Gurumitkal hobli, Yadgir taluk and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Very 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
0-10	Ap	7.53	19.88	72.59	1.00	0.78	0.89	2.10	2.77	-	c	44.31	32.79
10-35	Bss1	6.55	18.76	74.68	0.80	0.92	0.80	1.72	2.30	-	c	43.09	31.62
35-60	Bss2	6.58	21.05	72.37	0.69	0.46	1.04	1.50	2.89	-	c	46.52	32.52
60-102	Bss3	7.48	19.74	72.78	1.61	1.38	0.69	1.61	2.19	-	c	51.12	35.62

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-10	7.42	-	-	0.24	0.84	1.30	-	-	0.84	0.15	-	67.10	0.92	100	0.22
10-35	8.52	-	-	0.291	0.64	2.86	-	-	0.17	0.29	-	65.20	0.87	100	0.45
35-60	7.89	-	-	0.134	0.62	4.55	-	-	0.15	0.20	-	65.00	0.90	100	0.30
60-102	8.68	-	-	0.213	0.54	8.32	-	-	0.17	0.15	-	64.10	0.88	100	0.24

Contd...

Soil Series: Yadgir **(**YDR) **Pedon:** R-5

Location: $16^0$35'43.6"N $77^0$17'06.4"E, Kanikal village, Balichakra hobli, Yadgir taluk and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Coarse-loamy, mixed, isohyperthermic Typic 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 coars (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-14	Ap	73.39	11.31	15.30	6.76	20.27	24.87	15.66	5.83	-	sl	12.14	7.22
14-43	C1	86.59	8.77	4.64	23.19	26.92	14.11	15.22	7.16	-	ls	6.97	2.68
43-89	C2	80.41	3.75	15.84	8.06	13.47	36.73	15.71	6.43	-	sl	22.84	10.18
89-110	C3	63.55	5.40	31.05	8.10	23.05	19.00	9.87	3.53	15-35	scl	38.46	17.70

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-14	9.47	-	-	0.371	0.32	1.30	14.71	4.28	0.38	1.54	20.91	12.70	0.83	165	12.14
14-43	7.25	-	-	0.114	0.56	0.00	2.29	0.86	0.07	0.03	3.25	3.40	0.73	96	0.78
43-89	10.30	-	-	0.820	0.16	0.52	1.70	0.98	0.15	6.62	9.45	8.61	0.54	110	76.93
89-110	10.80	-	-	1.440	0.12	0.91	1.02	2.00	0.29	14.43	17.74	16.17	0.52	110	89.22

Contd...

Soil Series: Madhawara (MDR) **Pedon:** T_2 P_2

Location: $16^0$43'48.9"N $77^0$18'38.3"E, Yaleri village, Balichakra hobli, Yadgir taluk and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Fine-loamy, mixed, 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 coars (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
0-11	Ap	58.94	20.74	20.32	5.41	7.28	13.31	20.89	12.06	-	scl	16.47	8.85
11-30	Bw1	55.52	19.32	25.16	5.00	7.19	13.12	19.69	10.52	-	scl	18.25	10.18
30-53	Bw2	53.95	19.15	26.90	4.68	7.48	12.58	19.65	9.56	-	scl	26.99	14.02
53-117	Bw3	52.68	19.51	27.81	2.84	5.47	14.72	20.82	8.83	-	scl	37.86	17.40
117-160	Bw4	49.95	17.27	32.79	2.11	5.07	14.15	20.49	8.13	-	scl	44.15	20.38

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}							%	%
0-11	8.31	-	-	0.33	0.46	2.76	-	-	0.45	0.47	-	20.57	1.01	100	2.26
11-30	9.25	-	-	0.20	0.31	4.20	-	-	0.19	1.40	-	23.98	0.95	100	5.84
30-53	9.78	-	-	0.40	0.19	5.76	-	-	0.16	1.53	-	24.53	0.91	100	6.22
53-117	9.94	-	-	0.88	0.23	4.80	-	-	0.18	9.09	-	24.31	0.87	100	37.40
117-160	9.98	-	-	0.93	0.15	3.00	-	-	0.24	11.09	-	28.27	0.86	100	39.23

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Soil Series: Neelahalli (NHL) **Pedon:** R-17

Location: $16^0$41'38.9"N $77^0$12'20.2"E, Jinatera village, Balichakra hobli, Yadgir taluka and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Coarse-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	54.59	17.20	28.21	1.57	2.51	20.35	19.42	10.75	-	scl	21.01	12.13
15-45	Bw1	75.66	10.87	13.47	6.72	14.15	23.12	22.40	9.27	-	sl	10.80	5.85
45-93	Bw2	70.73	13.38	15.89	3.58	14.33	22.93	22.42	7.47	-	sl	13.76	7.93
93-125	Bw3	71.60	10.65	17.75	4.42	5.97	30.35	20.99	9.88	-	sl	14.72	8.60

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	5.41	-	-	0.121	1.24	0.00	7.10	2.90	0.25	0.48	10.73	14.28	0.51	75	3.36
15-45	7.72	-	-	0.051	0.24	0.91	-	-	0.11	0.27	-	7.23	0.54	100	3.69
45-93	7.66	-	-	0.047	0.08	1.04	-	-	0.12	0.35	-	8.78	0.55	100	3.96
93-125	8.86	-	-	0.11	0.08	2.08	-	-	0.11	0.28	-	9.88	0.56	100	2.83

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Soil Series: Vankasambar (VKS) **Pedon:** R-11

Location: $16^0$34'49.4"N $77^0$22'46.5"N, Baddepalli village, Sydhapura hobli, Yadgir taluk and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Fine-loamy, mixed, (calcareous), 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
0-14	Ap	61.32	10.31	28.37	7.14	12.07	16.04	19.03	7.05	-	scl	20.65	11.25
14-37	Bw1	62.63	8.72	28.65	9.88	14.50	16.19	15.57	6.49	-	scl	24.37	11.33
37-80	Bw2	61.43	9.14	29.43	4.84	15.45	18.01	16.73	6.40	-	scl	41.96	13.39
80-108	Bw3	55.39	11.75	32.86	4.06	5.99	23.87	15.39	6.08	-	scl	45.20	15.45

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}							%	%
0-14	9.1	-	-	0.586	0.96	5.72	-	-	0.54	1.74	-	17.57	0.62	100	9.92
14-37	10.35	-	-	0.595	0.52	7.80	-	-	0.50	4.24	-	16.65	0.58	100	25.48
37-80	10.39	-	-	2.14	0.28	12.35	-	-	0.64	15.89	-	13.45	0.46	100	118.11
80-108	11.15	-	-	3	0.32	11.70	-	-	0.74	20.69	-	22.58	0.69	100	91.64

Chapter 5

INTERPRETATION FOR LAND RESOURCE MANAGEMENT

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

5.1 Land Capability Classification

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

Soil characteristics: Depth, texture, gravel content, calcareousness.

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

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

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

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

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

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

Class IV: They are fairly good lands that have 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.

The 18 soil map units identified in the Bandehalli-2 microwatershed are grouped under three land capability classes and five land capability subclasses. (Fig. 5.1)

Entire area of the microwatershed is suitable for agriculture. Maximum area of 532 ha (80%) is good cultivable lands (Class II) that have minor limitations and require moderate conservation practices and are distributed in the major part of the microwatershed. Moderately good cultivable lands (Class III) cover an area of 36 ha (5%) and are distributed in the southern and southwestern part of the microwatershed with moderate problems of erosion and soil that require special conservation practices. Fairly good lands (Class IV) cover minor area of <1 per cent and are distributed in the central part of the microwatershed with very severe limitations of soil. An area of about 101 ha (15%) is under miscellaneous lands, habitation and water bodies.

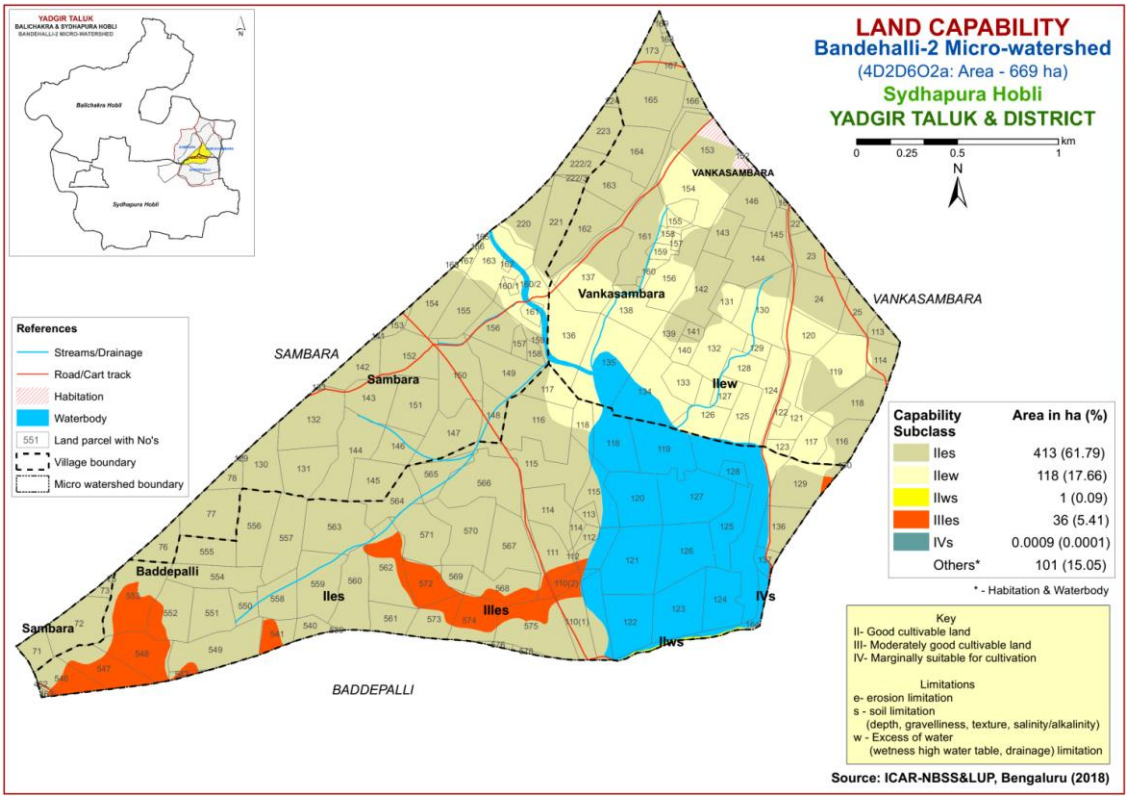


Fig. 5.1 Land Capability map of Bandehalli-2 microwatershed

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 shown in Figure 5.2.

Shallow (25-50 cm) soils occur a minor area of <1 ha (<1%) in the microwatershed. An area of 36 ha (5%) is shallow (25-50 cm) and are distributed in the southern and southwestern part of the microwatershed. Moderately shallow (50-75 cm) cover an area of about 92 ha (14%) and are distributed in the northern, southwestern and southern part of the microwatershed. An area of 198 ha (30%) is moderately deep (75-100 cm) and are distributed in the northern, western, southern and southwestern part of the microwatershed. Deep soils (100->150 cm) occur in an area of 242 ha (36%) and are distributed in the major part of the microwatershed.

The most problem lands with a small area of about .0009 ha (<1%) having very shallow (<25 cm) rooting depth. They are suitable for growing short duration agricultural

crops but well suited for pasture, forestry or other recreational purposes. The most productive lands covering about 242 ha (36%) with respect to soil rooting depth where all climatically adapted annual and perennial crops can be grown are deep (100-150 cm) to very deep (>150 cm) occurring in the major part of the microwatershed.

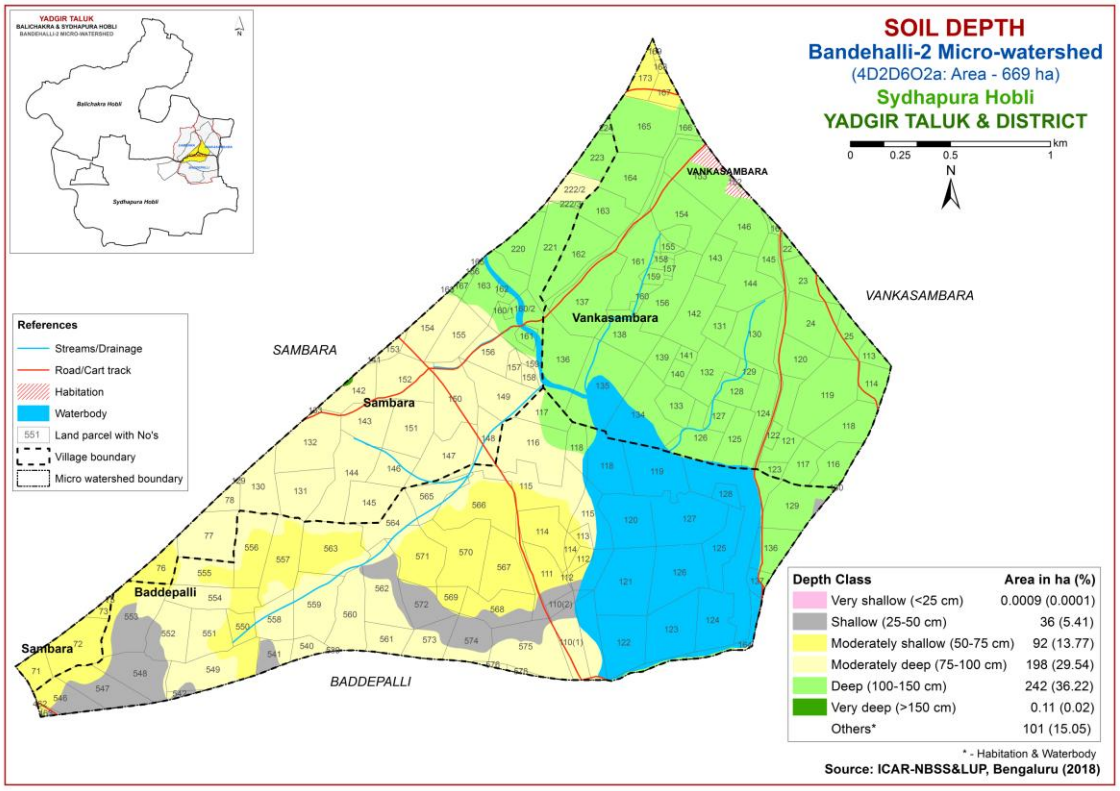


Fig. 5.2 Soil Depth map of Bandehalli-2 microwatershed

5.3 Surface Soil Texture

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

An area of about 199 ha (30%) has clayey soils at the surface and are distributed in the central, eastern, northern, southern and southwestern of the microwatershed. Loamy soils occur in an area of about 286 ha (43%) and are distributed in the major part of the microwatershed. An area of 83 ha (12%) has sandy soils and are distributed in the eastern and southern part of the microwatershed.

The most productive lands 199 ha (30%) with respect to surface soil texture are the clayey that have high potential for soil-water retention and availability, and nutrient

retention and availability, but have problems of drainage, infiltration, workability and other physical problems. The other productive lands (43%) are loamy soils which also have high potential for soil-water retention and nutrient availability but have no drainage or other physical problems as compared to clayey soils. The problem soils cover about 83 ha (12%) that have sandy soils at the surface having problems of poor soil water retention, nutrient retention and availability, but have better rain water retention, less run off and soil moisture conservation, less capillary rise and less evaporation losses.

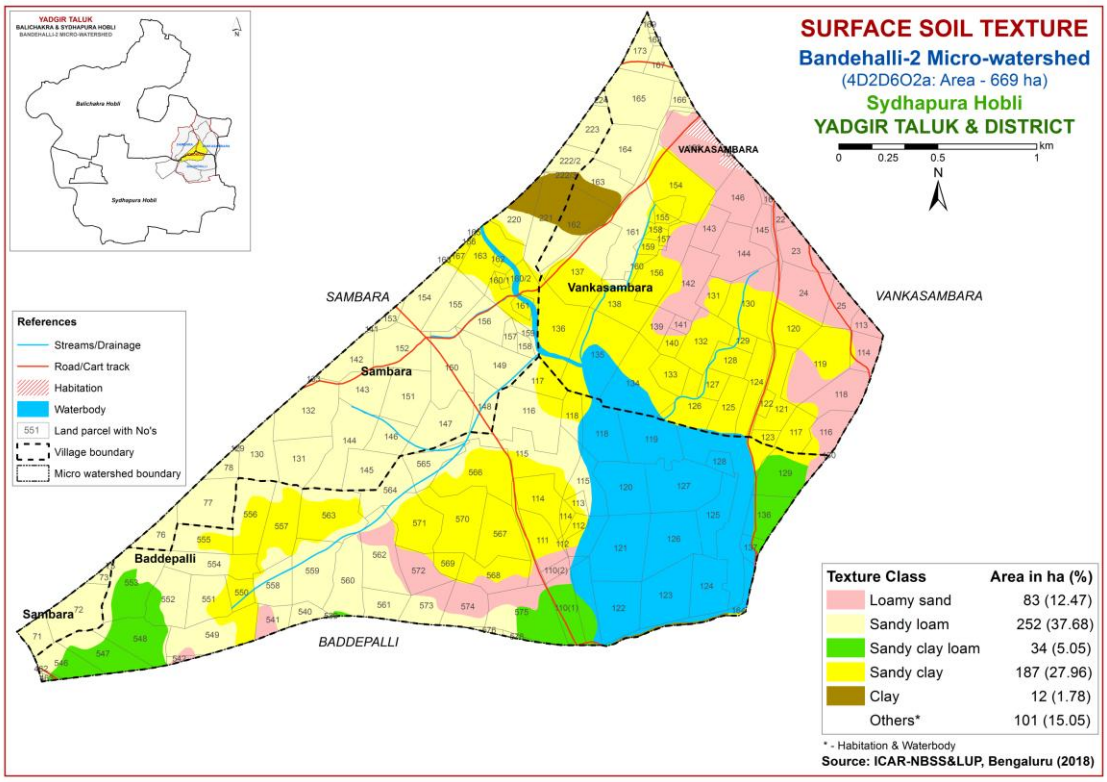


Fig. 5.3 Surface Soil Texture map of Bandehalli-2 microwatershed

5.4 Soil Gravelliness

Gravel is the term used for describing coarse fragments between 2 mm and 7.5 cm diameter and stones for those between 7.5 cm and 25 cm. The presence of gravel and stones in the 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 geographical distribution in the microwatershed is shown in Figure 5.4.

The soils that are non-gravelly (<15% gravel) cover a maximum area of 568 ha (85%) and are distributed in the major part of the microwatershed. An area of 0.02 ha (<1%) is covered by gravelly (15-35% gravel) soils in the microwatershed (Fig. 5.4).

The most productive lands with respect to gravelliness are found to be 85 per cent. They are non gravelly (<15%) and have potential for growing all annual and perennial

crops. The problem soils that are gravelly (15-35%) cover <1 ha where only short or medium duration crops can be grown

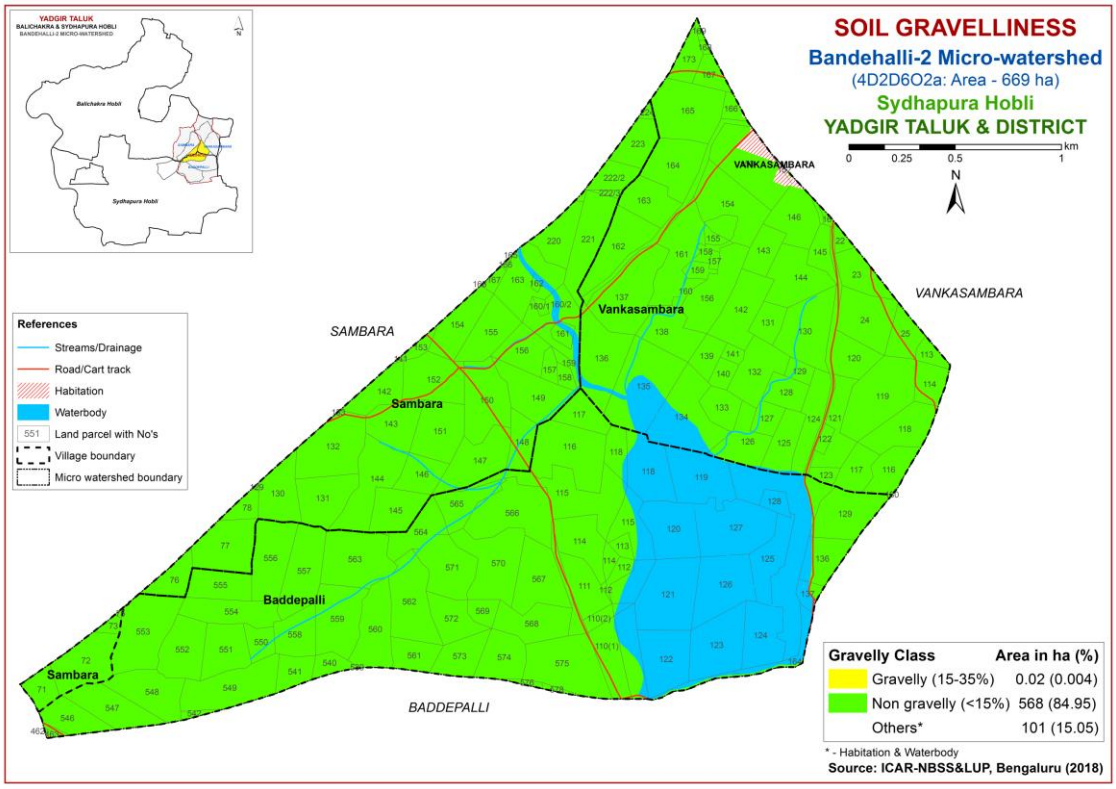


Fig. 5.4 Soil Gravelliness map of Bandehalli-2 microwatershed

5.5 Available Water Capacity

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

An area of 41 ha (6%) has soils that are very low (<50 mm/m) in available water capacity and are distributed in the northern, southern and southwestern part of the microwatershed. An area of about 138 ha (21%) has soils that are low (51-100 mm/m) in available water capacity and are distributed in the northern, southern and southwestern part of the microwatershed. Major area of 212 ha (32%) has soils that are medium (101-150 mm/m) and are distributed in all parts of the microwatershed. An area of 178 ha (27%) are very high (>200 mm/m) in available water capacity and are distributed in the northern, central and eastern part of the microwatershed.

An area of 41 ha (6%) in the microwatershed has soils that are problematic with regard to available water capacity. Here, only the short or medium duration crops can be grown and the probability of crop failure is very high. These areas are best put to other alternative uses. The potential soils with respect to AWC cover about 178 ha (27%) that has very high AWC, where all climatically adapted long duration crops can be grown.

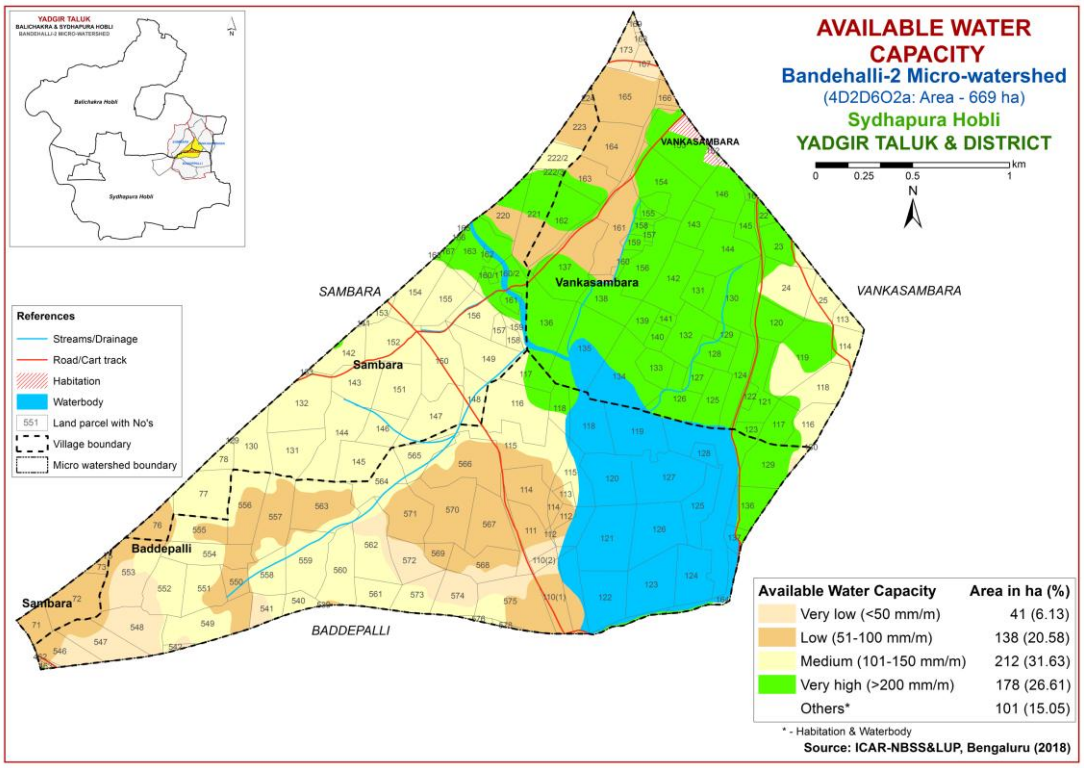


Fig. 5.5 Soil Available Water Capacity map of Bandehalli-2 microwatershed

5.6 Soil Slope

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

Entire cultivated area in the microwatershed falls under very gently sloping (1-3%) slope lands. It covers an area of about 568 ha (85%) and is distributed in all parts of the microwatershed.

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

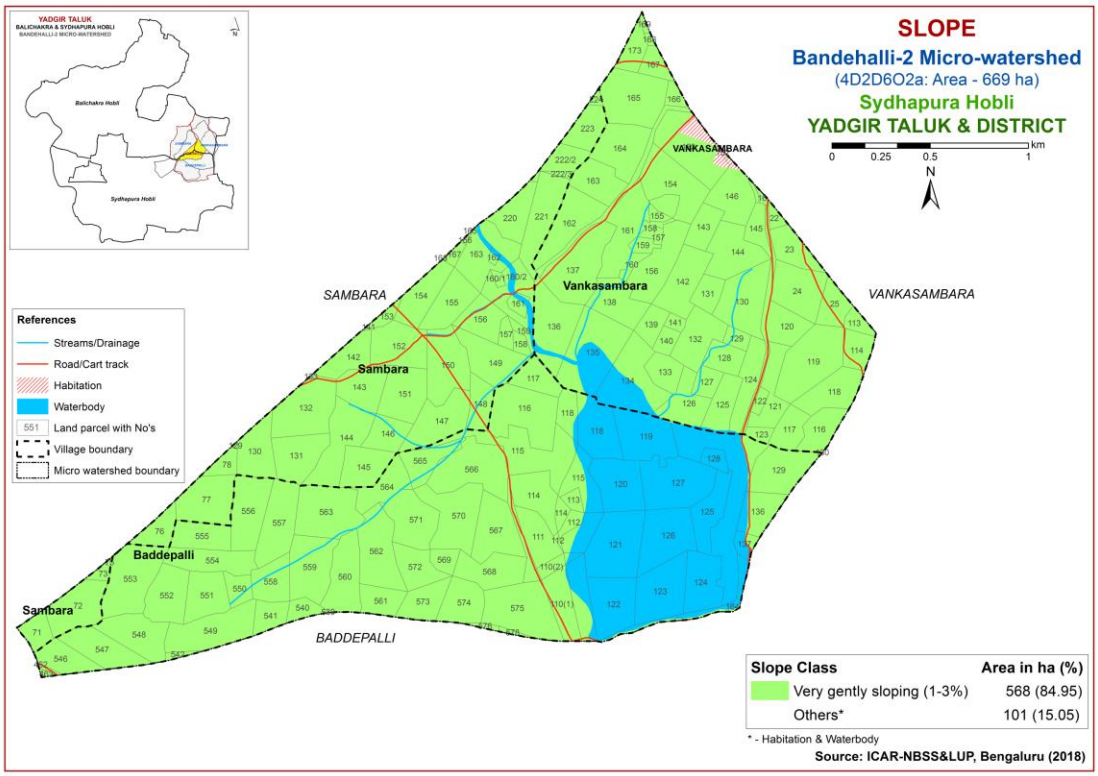


Fig. 5.6 Soil Slope map of Bandehalli-2 microwatershed

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 was generated. The area extent and their spatial distribution in the microwatershed is given in Figure 5.7.

Soils that are slight eroded (e1 class) cover negligible area of 1 ha (< 1%) and are distributed in the southern and central part of the microwatershed. An area of about 568 ha (85%) is problematic because of moderate erosion and occur in the entire part of the microwatershed. Entire are of the microwatershed need soil and water conservation and other land development measures for restoring the soil health.

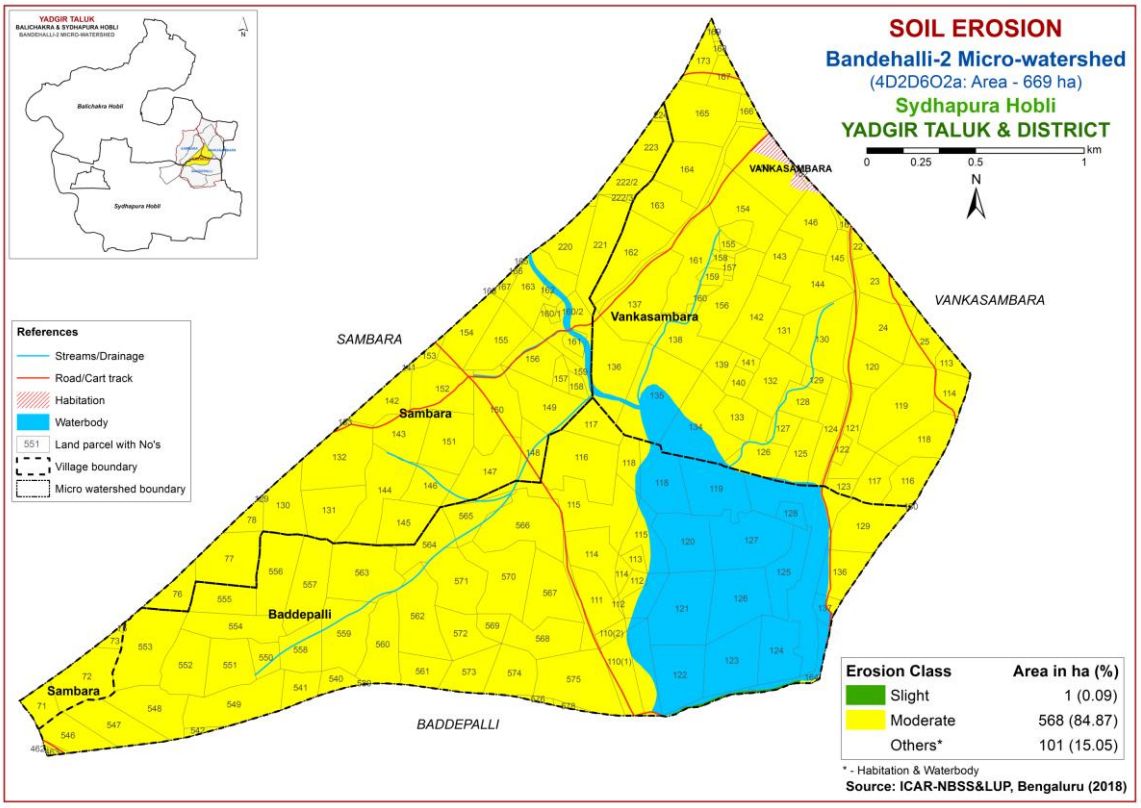


Fig. 5.7 Soil Erosion map of Bandehalli-2 microwatershed

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 320 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, 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 fertility analysis of the Bandehalli-2 microwatershed for soil reaction (pH) showed that an area of 158 ha (24%) is neutral (ph 6.5-7.3) and is distributed in the southern and southwestern part of the microwatershed. An area of 190 ha (28%) is slightly alkaline (pH 7.3-7.8) and is distributed in the northern, eastern, southern and western part of the microwatershed. Major area of 220 ha (33%) is moderately alkaline (pH 7.8-8.4) in reaction and is distributed in the central part of the microwatershed. Thus, major soils in the microwatershed are alkaline in reaction.

6.2 Electrical Conductivity (EC)

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

6.3 Organic Carbon

The soil organic carbon content (Fig. 6.3) of the soils in the microwatershed is low (<0.5%) in an area of 186 ha (28%) and are distributed in the northern, eastern, southern and southwestern part of the microwatershed. Medium (0.5-0.75%) in organic carbon content cover an area of 196 ha (29%) and is distributed in all parts of the microwatershed. An area of 186 ha (28%) is high (>0.75%) and are distributed in the northern, eastern, northeastern, western and southwestern part of the microwatershed.

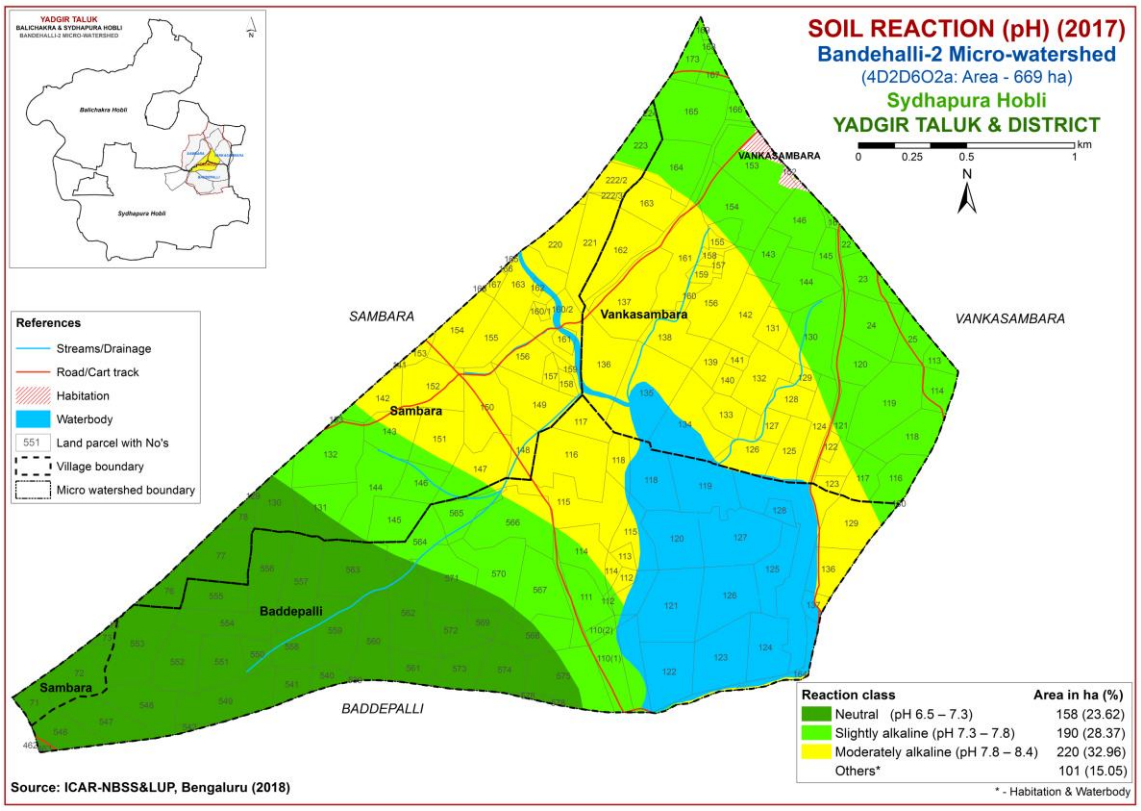


Fig.6.1 Soil Reaction (pH) map of Bandehalli-2 microwatershed

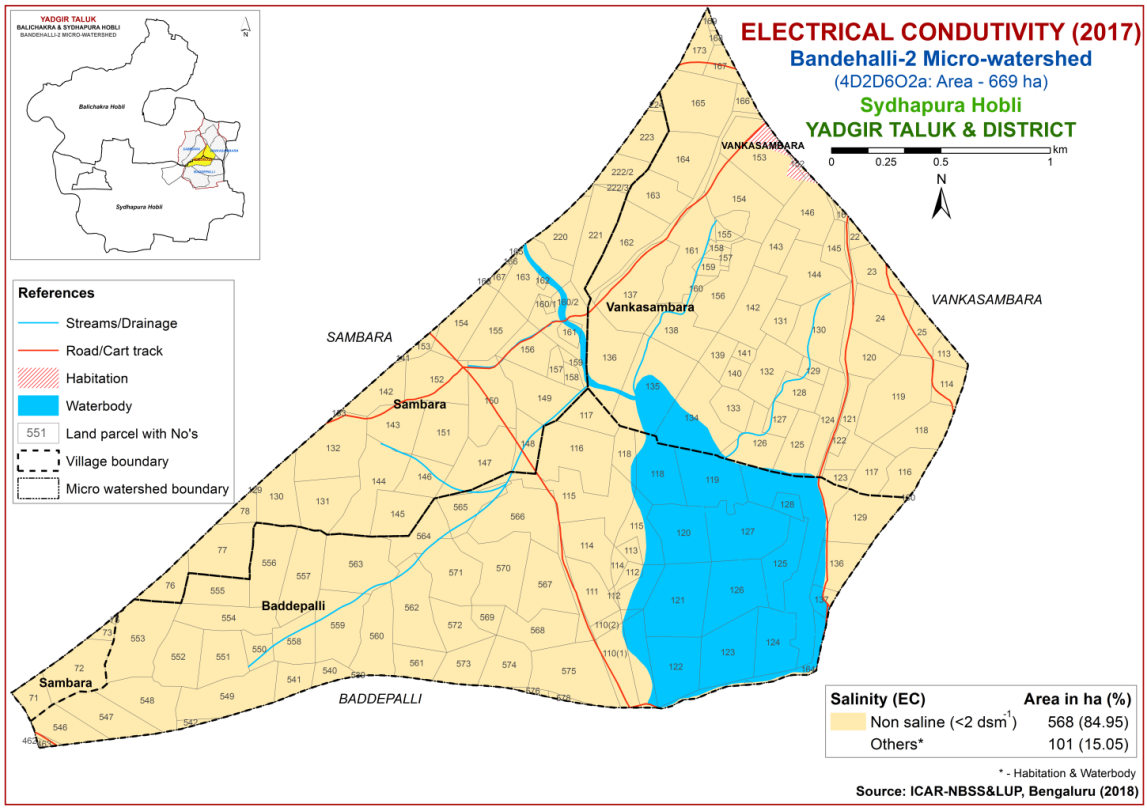


Fig.6.2 Electrical Conductivity (EC) map of Bandehalli-2 microwatershed

6.4 Available Phosphorus

The soil fertility analysis revealed that available phosphorus (Fig. 6.4) is low (<23 kg/ha) in a maximum area of 305 ha (46%) and is distributed in the major part of the microwatershed. Medium (23-57 kg/ha) in available phosphorous cover an area of 221 ha (33%) and is distributed in the eastern, western, southern and southwestern part of the microwatershed. An area of 42 ha (6%) is high (>57 kg/ha) in available phosphorus and is distributed in the southern and eastern part of the microwatershed. There is an urgent need to increase the dose of phosphorous in soils that are low and medium for all the crops by 25 per cent over the recommended dose to realize better crop performance.

6.5 Available Potassium

Available potassium content (Fig. 6.5) is low (<145 kg/ha) in an area of 236 ha (35%) is and is distributed in the southern, central, western and southwestern part of the microwatershed. Medium available potassium (145-337 kg/ha) content cover a maximum area of 333 ha (50%) and is distributed in the major part of the microwatershed.

6.6 Available Sulphur

Soils that are low in available sulphur content (<10 ppm) cover an area of 295 (44%) and is distributed in the major part of the microwatershed. Medium (10-20 ppm) in an area of about 202 ha (30%) and is distributed in the northern, eastern, central and western part of the microwatershed. Available sulphur is high (>20 ppm) in an area of 71 ha (11%) and is distributed in the central and eastern part of the microwatershed (Fig. 6.6). The areas that are low and medium in available sulphur need to be applied with magnesium sulphate or gypsum or factomphos (p) fertilizer (13% sulphur) for 2-3 years for the deficiency to be corrected.

6.7 Available Boron

Available boron content (Fig. 6.7) is low (<0.5 ppm) in an area of 108 ha (16%) and is distributed in the eastern, central and southwestern part of the microwatershed. An area of about 406 ha (61%) is medium (0.5-1.0 ppm) and is distributed in the major part of microwatershed. A small area of about 54 ha (8%) is high (>1.0 ppm) in available boron and are distributed in the northeastern and western part of microwatershed.

6.8 Available Iron

Available iron content is sufficient (>4.5 ppm) in a maximum area of 498 ha (75%) and is distributed in the major part of the microwatershed. It is deficient (<4.5 ppm) in an area of about 70 ha (10%) and is distributed in the northern and central 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).

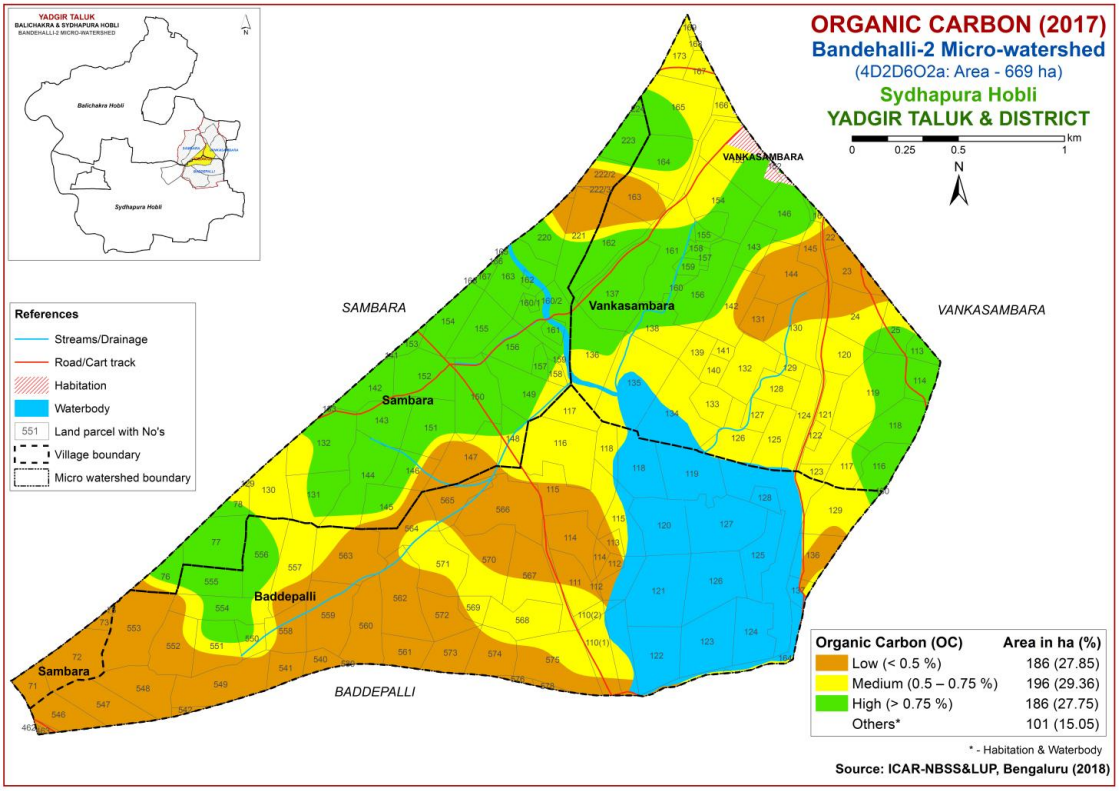


Fig.6.3 Soil Organic Carbon map of Bandehalli-2 microwatershed

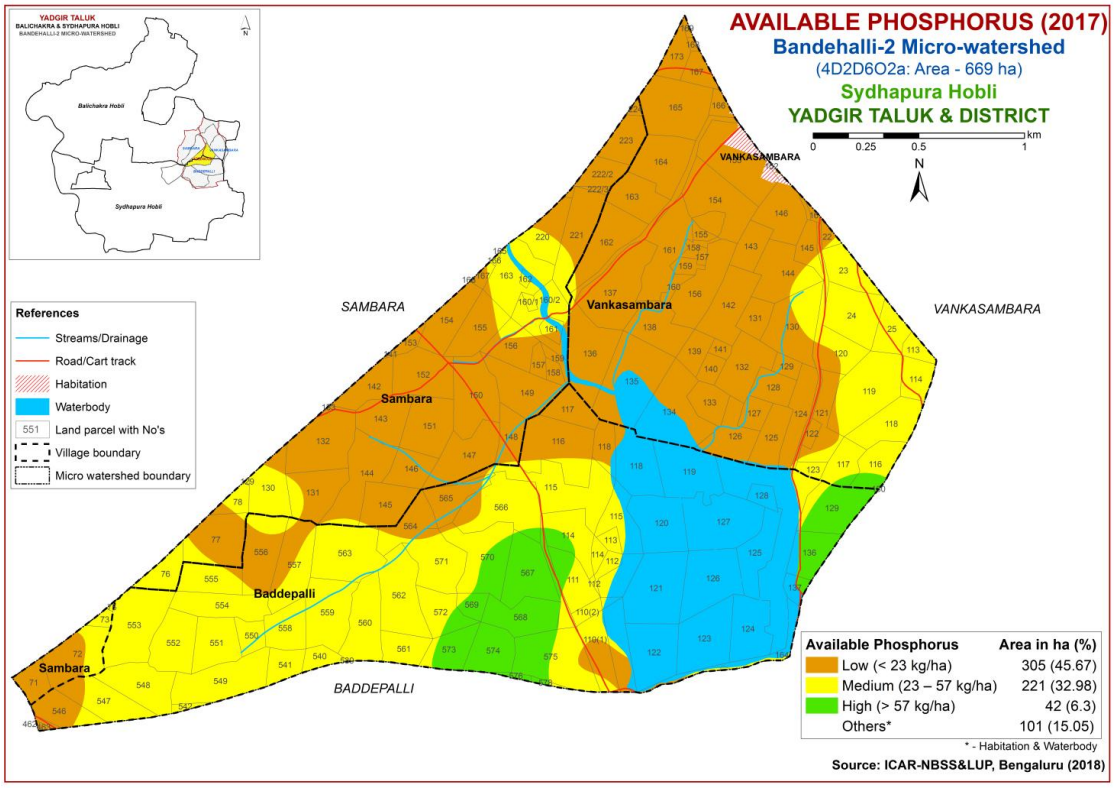


Fig.6.4 Soil available Phosphorus map of Bandehalli-2 microwatershed

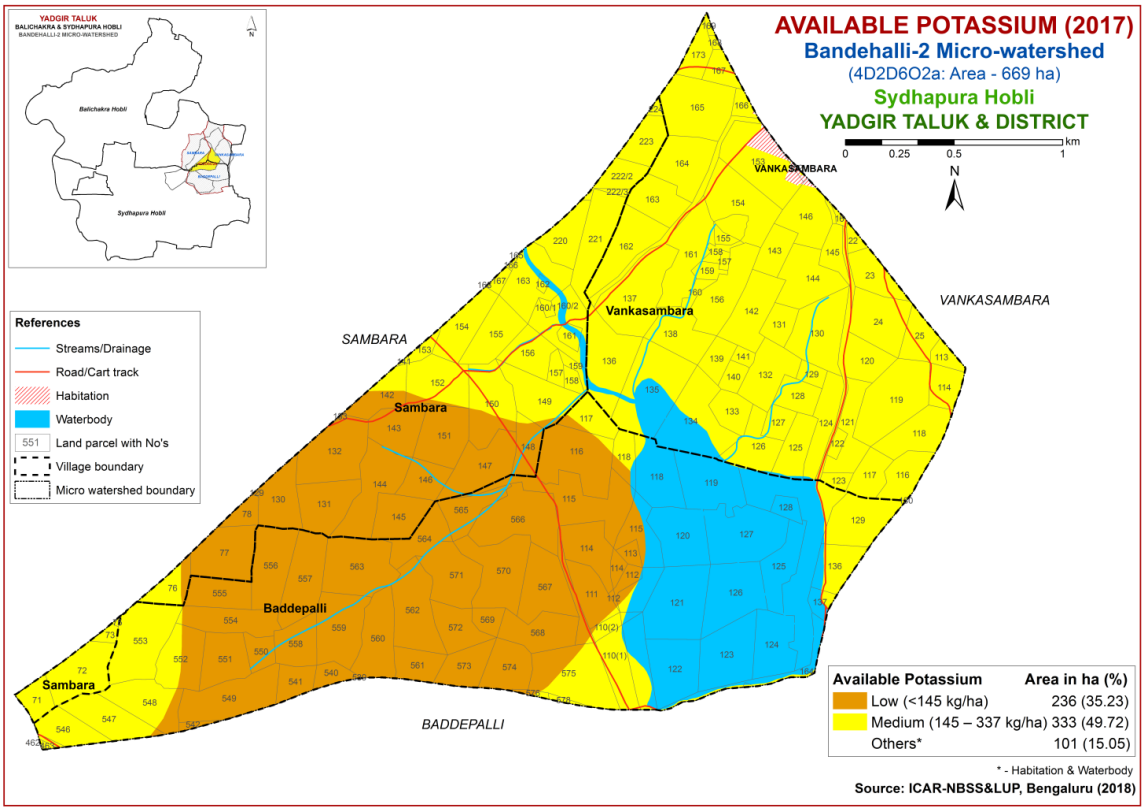


Fig. 6.5 Soil available Potassium map of Bandehalli-2 microwatershed

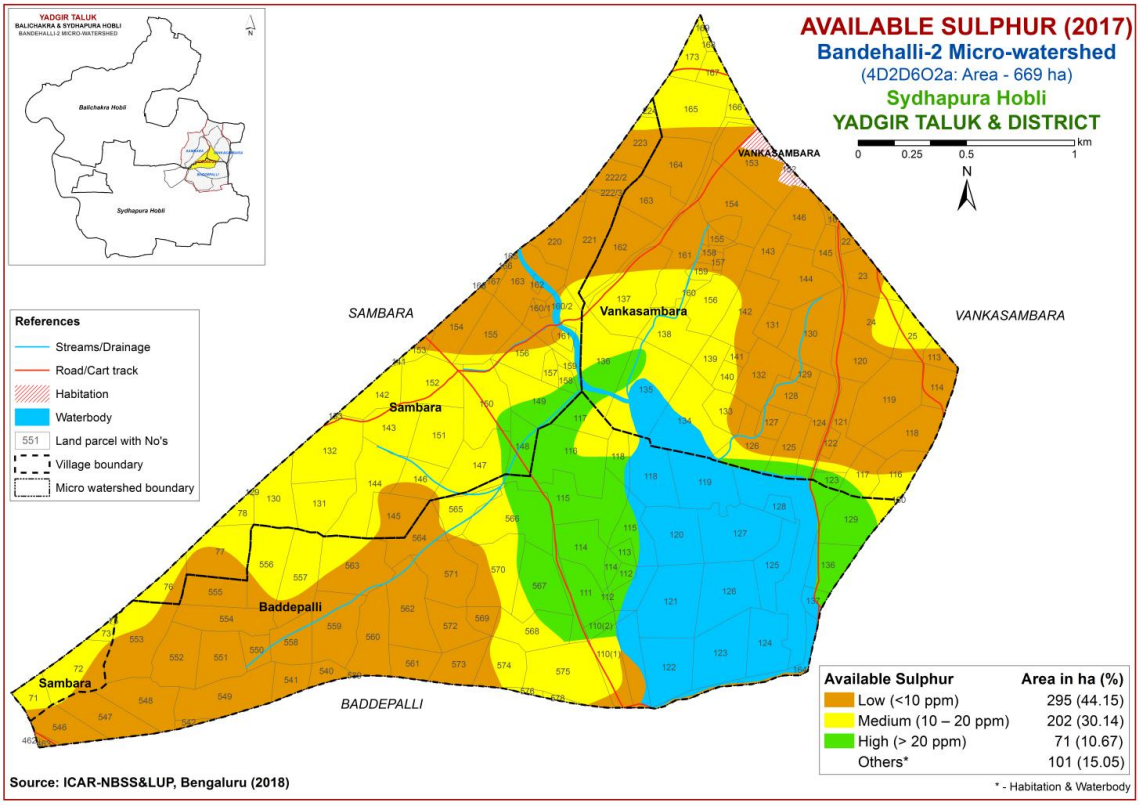


Fig. 6.6 Soil available Sulphur map of Bandehalli-2 microwatershed

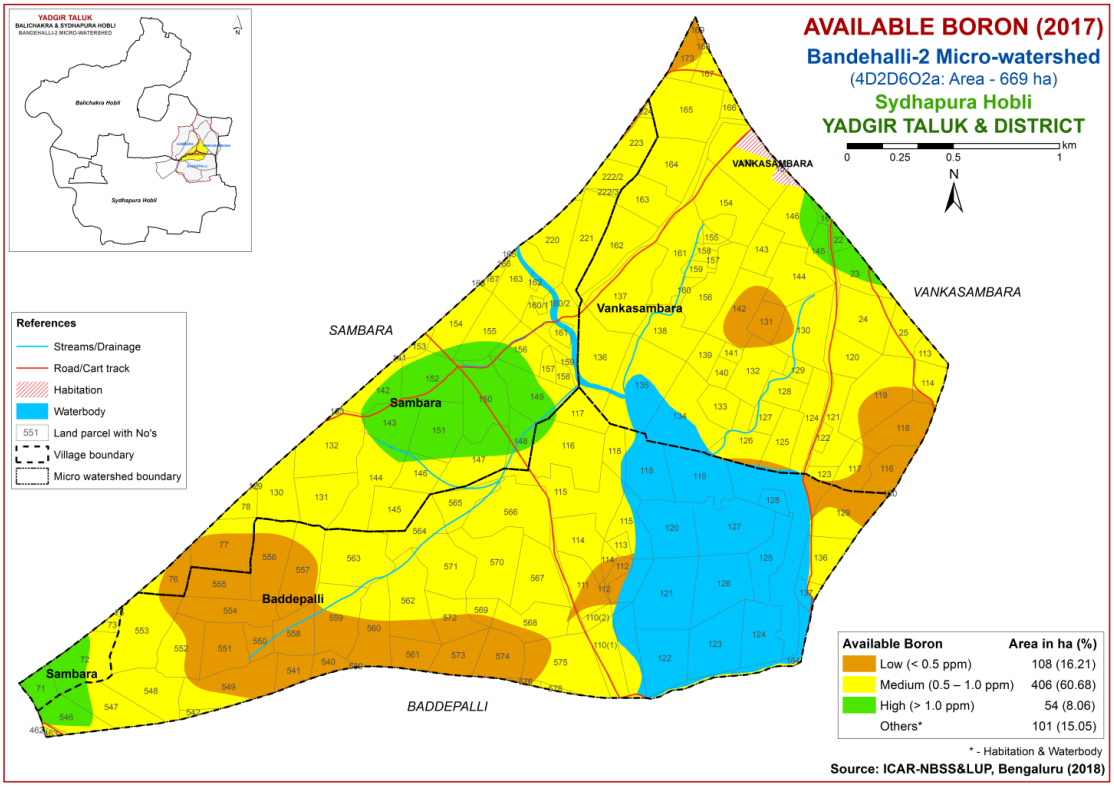


Fig. 6.7 Soil available Boron map of Bandehalli-2 microwatershed

6.10 Available Copper

Available copper content is sufficient (>0.2 ppm) in a maximum area of 565 ha (85%) and is distributed in all parts of the microwatershed. It is deficient (<0.2 ppm) in a small area of about 3 ha (<1%) and is distributed in the southwestern part of the microwatershed (Fig 6.10).

6.11 Available Zinc

Available zinc content is deficient (<0.6 ppm) in an area of 567 ha (85%) and is distributed in all parts of the microwatershed. It is sufficient (>0.6 ppm) in an area of 2 ha and is distributed in the southwestern part of the microwatershed (Fig 6.11).

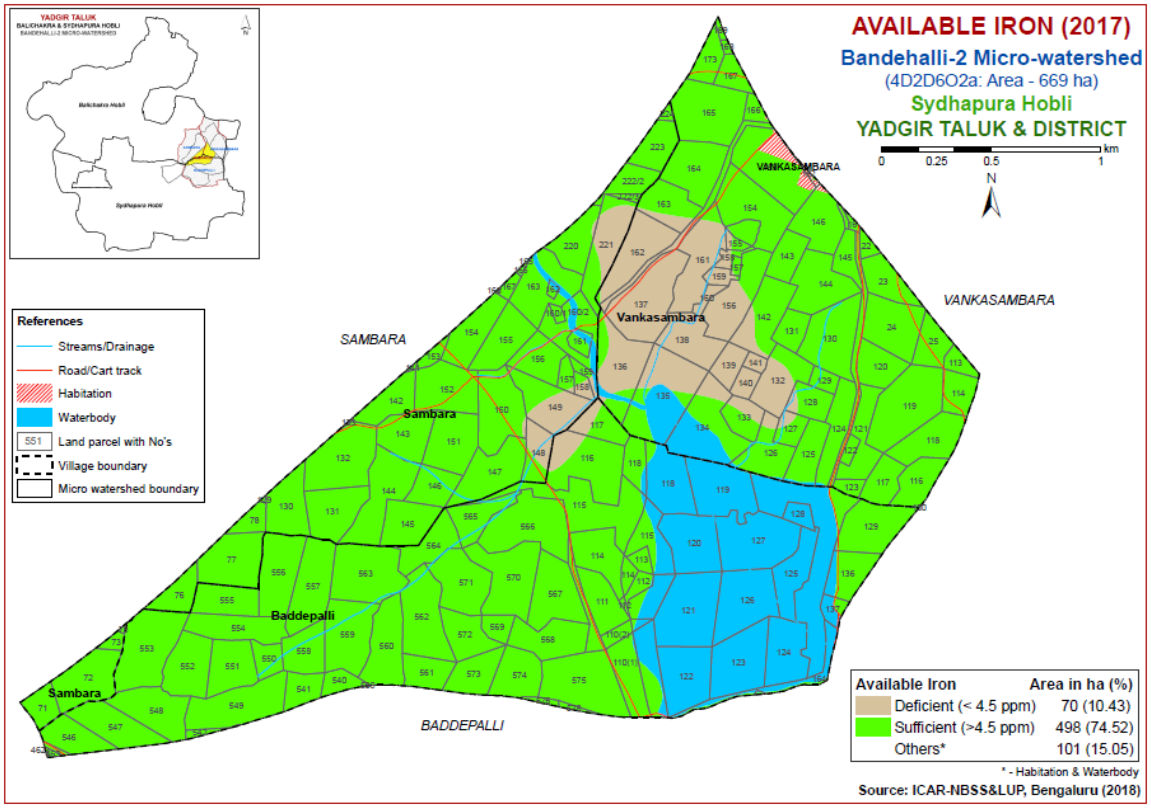


Fig. 6.8 Soil available Iron map of Bandehalli-2 microwatershed

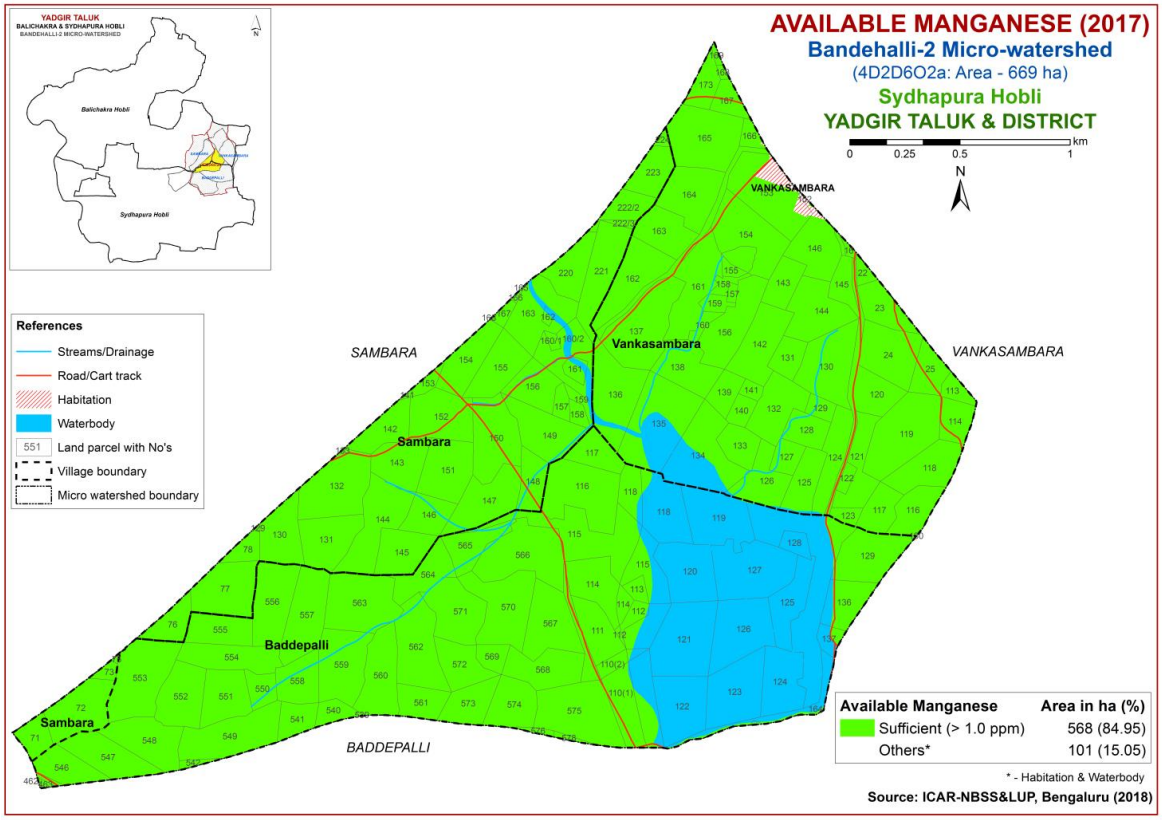


Fig. 6.9 Soil available Manganese map of Bandehalli-2 microwatershed

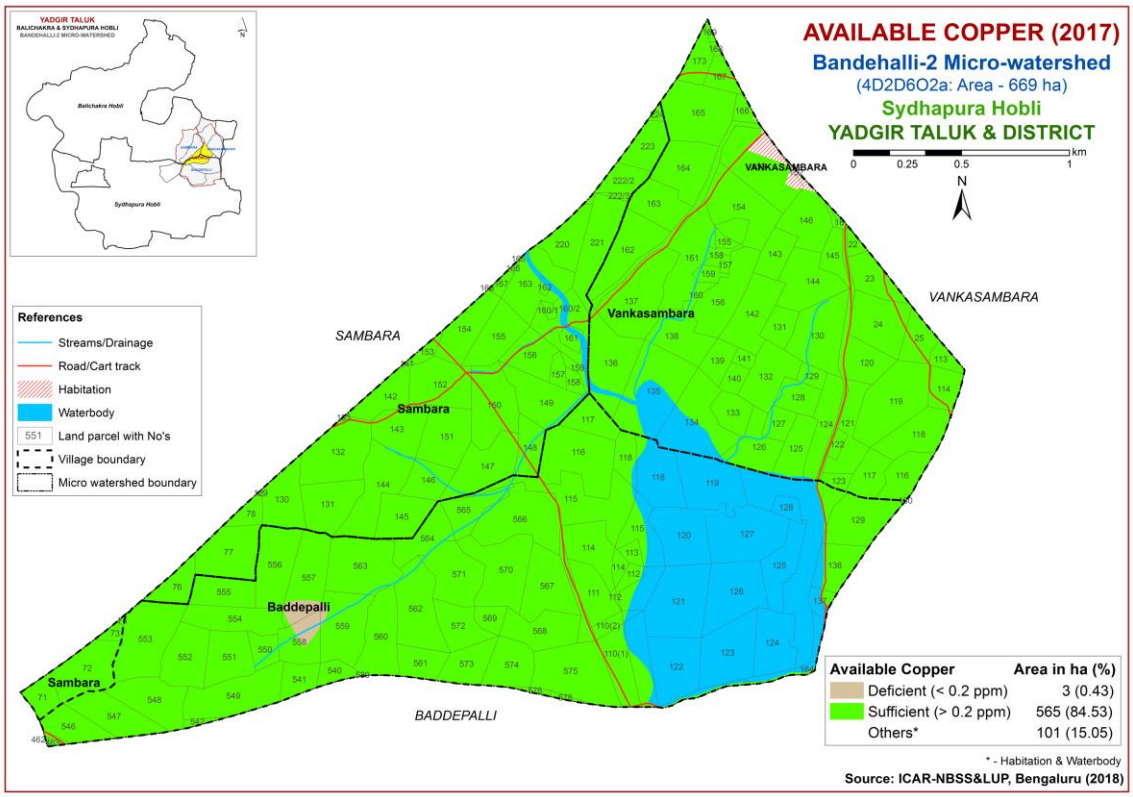


Fig. 6.10 Soil available Copper map of Bandehalli-2 microwatershed

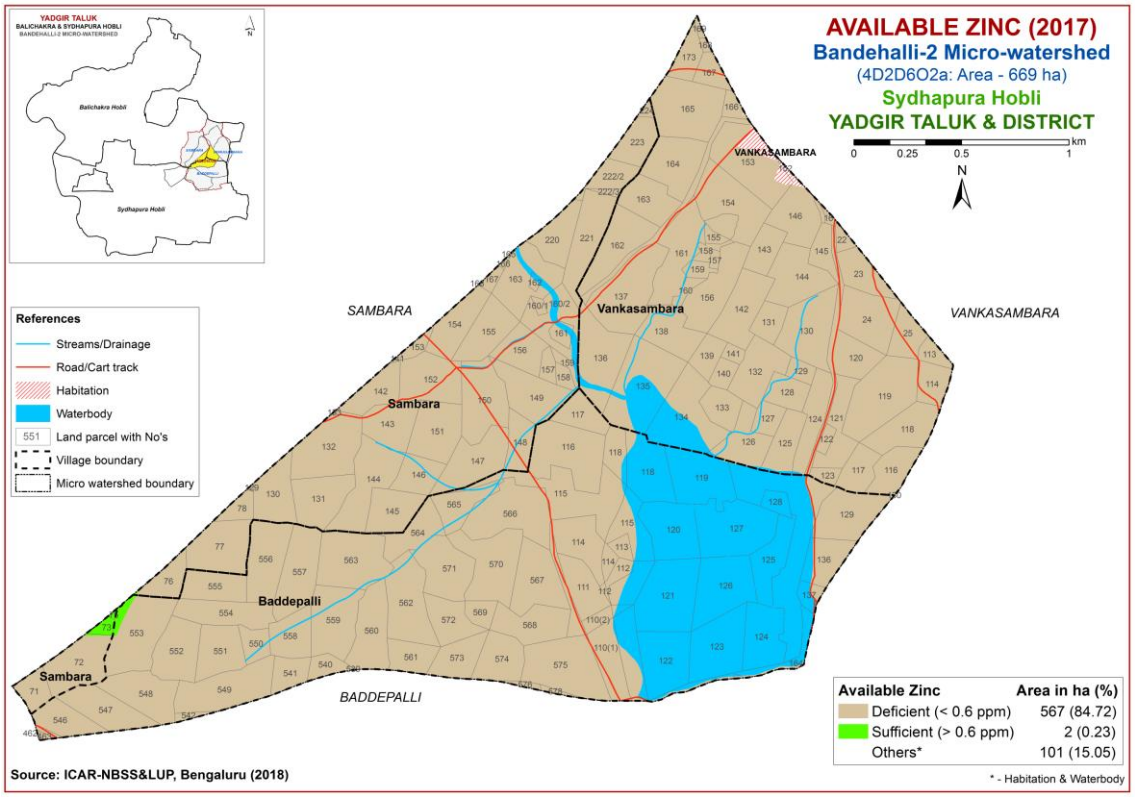


Fig. 6.11 Soil available Zinc map of Bandehalli-2 microwatershed

Chapter 7

LAND SUITABILITY FOR MAJOR CROPS

The soil and land resource units (soil phases) of Bandehalli-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 N1 are divided into subclasses based on the kinds of limitations encountered. The limitations that affect crop production are 'c' for erratic rainfall and its distribution and length of growing period (LGP), 'e' for erosion hazard, 'r' for rooting condition, 't' for lighter or heavy texture, 'g' for gravelliness or stoniness, 'n' for nutrient availability, 'l' for topography, 'm' for moisture availability, 'z' for calcareousness 's' for sodium and 'w' for drainage. These limitations are indicated as lower case letters to the class symbol. For example, moderately suitable land with the limitations of soil depth and erosion is designated as S2re. For the microwatershed, the soil mapping units were evaluated and classified up to subclass level.

Using the above criteria, the soil map units of the microwatershed were evaluated and land suitability maps for 26 major agricultural and horticultural crops grown in the state 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 crop grown in an area of 10.47 lakh ha in northern Karnataka in Bijapur, Kalaburgi, Raichur, Bidar, Belgaum, Dharwad and Bellary districts. The crop requirements for growing sorghum (Table 7.2) were matched with the soil-site characteristics (Table 7.1) of the soils of the microwatershed and a land suitability map for growing sorghum was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.1.

Highly suitable (Class S1) lands occur in an area of 16 ha (2%) for growing sorghum and are distributed in the central and eastern part of the microwatershed. Maximum area of about 448 ha (67%) is moderately suitable (Class S2) and are distributed in all parts of the microwatershed.

Table 7.1 Soil-Site Characteristics of Bandehalli-2 microwatershed

Soil Map Units	Climate (P) (mm)	Growing period (Days)	Drainage class	Soil depth (cm)	Soil texture		Gravelliness		AWC (mm/m)	Slope (%)	Erosion	pH	EC	ESP	CEC [Cmol (p^+) kg^{-1}]	BS (%)
					Surf-ace	Sub-surface	Sur-face (%)	Sub-surface (%)								
BDPiB2	866	120-150	WD	<25	sc	scl	-	-	<50	1-3	moderate	8.58	0.26	0.35	18.10	100
BDLbB2	866	120-150	WD	25-50	ls	sl	-	-	<50	1-3	moderate	6.20	0.07	0.20	4.20	93
BDLhB2	866	120-150	WD	25-50	scl	sl	-	-	<50	1-3	moderate	6.20	0.07	0.20	4.20	93
DPLcB2	866	120-150	WD	50-75	sl	sc	-	-	51-100	1-3	moderate	6.92	0.12	0.09	7.10	92
SBRcB2	866	120-150	WD	50-75	sl	ls	-	-	<50	1-3	moderate	8.24	0.14	1.15	7.50	100
YLRiB2	866	120-150	WD	50-75	sc	c	-	15-35	51-100	1-3	moderate	6.91	0.06	0.45	6.90	100
GWDcB2	866	120-150	MWD	75-100	sl	scl	-	-	101-150	1-3	moderate	9.89	0.74	43.5	8.35	100
GWDiB2	866	120-150	MWD	75-100	sc	scl	-	-	101-150	1-3	moderate	9.89	0.74	43.5	8.35	100
HSLhB2	866	120-150	WD	75-100	scl	sc	-	-	101-150	1-3	moderate	7.16	0.11	5.94	4.90	97
ANRbB2g1	866	120-150	MWD	100-150	ls	c	15-35	-	>200	1-3	moderate	10.1	0.36	17.7	19.9	100
BGDbB2	866	120-150	WD	100-150	ls	c	-	-	>200	1-3	moderate	7.85	0.25	0.26	65.9	100
MDGhB2	866	120-150	MWD	100-150	scl	scl	-	-	>200	1-3	moderate	8.2	0.39	7.69	4.90	100
NGPbB2	866	120-150	MWD	100-150	ls	c	-		>200	1-3	moderate	7.42	0.24	0.22	67.1	100
NGPmB2	866	120-150	MWD	100-150	c	c	-		>200	1-3	moderate	7.42	0.24	0.22	67.1	100
YDRcB2	866	120-150	WD	100-150	sl	sl	-		51-100	1-3	moderate	9.47	0.37	12.1	12.7	165
MDRcB2	866	120-150	MWD	>150	sl	scl	-		>200	1-3	moderate	8.31	0.33	2.26	20.5	100
NHLmB1	866	120-150	MWD	100-150	c	sl	-		>200	1-3	Slight	5.41	0.12	3.36	14.2	100
VKSiB2	866	120-150	MWD	100-150	sc	scl	-		>200	1-3	moderate	9.1	0.58	9.92	17.5	100

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

They have minor limitations of drainage, calcareousness, texture and rooting condition. Marginally suitable lands (Class S3) occupy an area of 105 ha (16%) and are distributed in the northern, eastern, southwestern and southern part of the microwatershed. They have moderate limitations of rooting condition, texture and calcareousness. A minor area of <1 ha (<1%) is currently not suitable (Class N1) and are distributed in the southeastern part of the microwatershed with severe limitation of rooting condition.

Table 7.2 Crop suitability criteria for Sorghum

Crop requirement		Rating			
Soil –site characteristics	**Unit**	**Highly suitable (S1)**	**Moderately suitable (S2)**	**Marginally suitable(S3)**	**Not suitable(N)**
Slope	%	2-3	3-8	8-15	>15
LGP	Days	120-150	120-90	<90	
Soil drainage	class	Well to mod. 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)	dS m^{-1}	2-4	4-8	8-10	>10
Sodicity (ESP)	%	5-8	8-10	10-15	>15

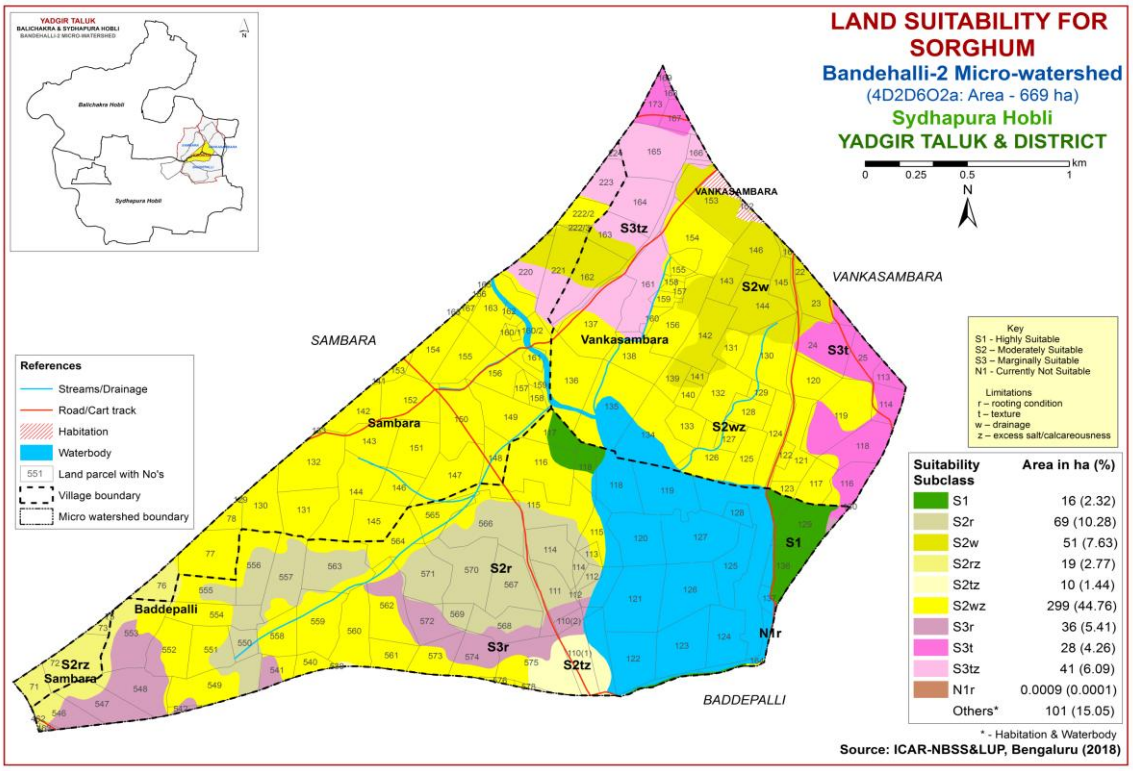


Fig. 7.1 Land Suitability map of Sorghum

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 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.

Table 7.3 Crop suitability criteria for Maize

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

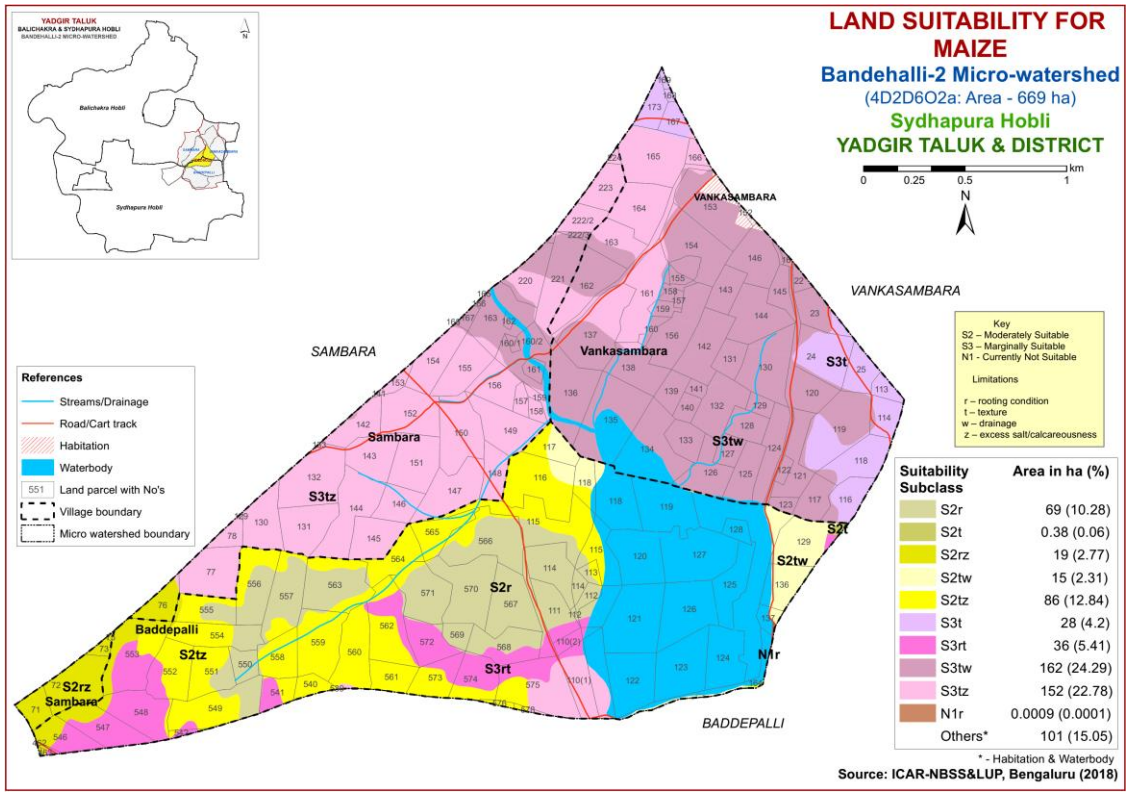


Fig. 7.2 Land Suitability map of Maize

In Bandehalli-2 microwatershed, there are no highly (Class S1) lands for growing maize in the microwatershed. An area of about 189 ha (28%) is moderately suitable (Class S2) and are distributed in the eastern, central and southwestern part of the

microwatershed. They have minor limitations of calcareousness, texture, drainage and rooting depth. Maximum area of about 378 ha (57%) is marginally suitable (Class S3) and are distributed in the major part of the microwatershed. They have moderate limitations of texture, rooting condition, drainage and calcareousness. Currently not suitable (Class N1) occur in an area of <1 ha (<1%) and are distributed in the southeastern part of the microwatershed with severe limitation of rooting condition.

7.3 Land Suitability for Red gram (*Cajanus cajan*)

Red gram is one of the major pulse crop grown in an area of 7.28 lakh ha mainly in northern Karnataka in Bijapur, Kalaburgi, Raichur, Bidar, Belgaum, Dharwad and Bellary districts. The crop requirements for growing red gram (Table 7.4) were matched with the soil-site characteristics (Table 7.1) of the soils of the microwatershed and a land suitability map for growing red gram was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed is given in Figure 7.3.

There are no lands that are highly (Class S1) suitable for growing red gram in Bandehalli-2 microwatershed. Maximum area of about 189 ha (28%) is moderately suitable (Class S2) and are distributed in all parts of the microwatershed. They have minor limitations of texture, rooting condition and calcareousness. An area of about 378 ha (57%) is marginally suitable (Class S3) and are distributed in the northern, eastern, southern and southwestern part of the microwatershed. They have moderate limitations of rooting condition, texture and calcareousness. Currently not suitable (Class N1) occur in an area of <1 ha (<1%) and are distributed in the southeastern part of the microwatershed with severe limitation of rooting condition.

Table 7.4 Crop suitability criteria for Red gram

Crop requirement		**Rating**			
Soil–site characteristics	**Unit**	**Highly suitable(S1)**	**Moderately suitable(S2)**	**Marginally suitable(S3)**	**Not suitable(N)**
Slope	%	<3	3-5	5-10	>10
LGP	Days	>210	180-210	150-180	<150
Soil drainage	class	Well drained	Mod. to 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
Surface soil texture	Class	l,scl,sil,cl,sl	sicl,sic, c(m)	ls	s,fragmental
Soil depth	cm	>100	85-100	40-85	<40
Gravel content	% vol.	<20	20-35	35-60	>60
Salinity (EC)	dSm^{-1}	<1.0	1.0-2.0	>2.0	
Sodicity (ESP)	%	<10	10-15	>15	

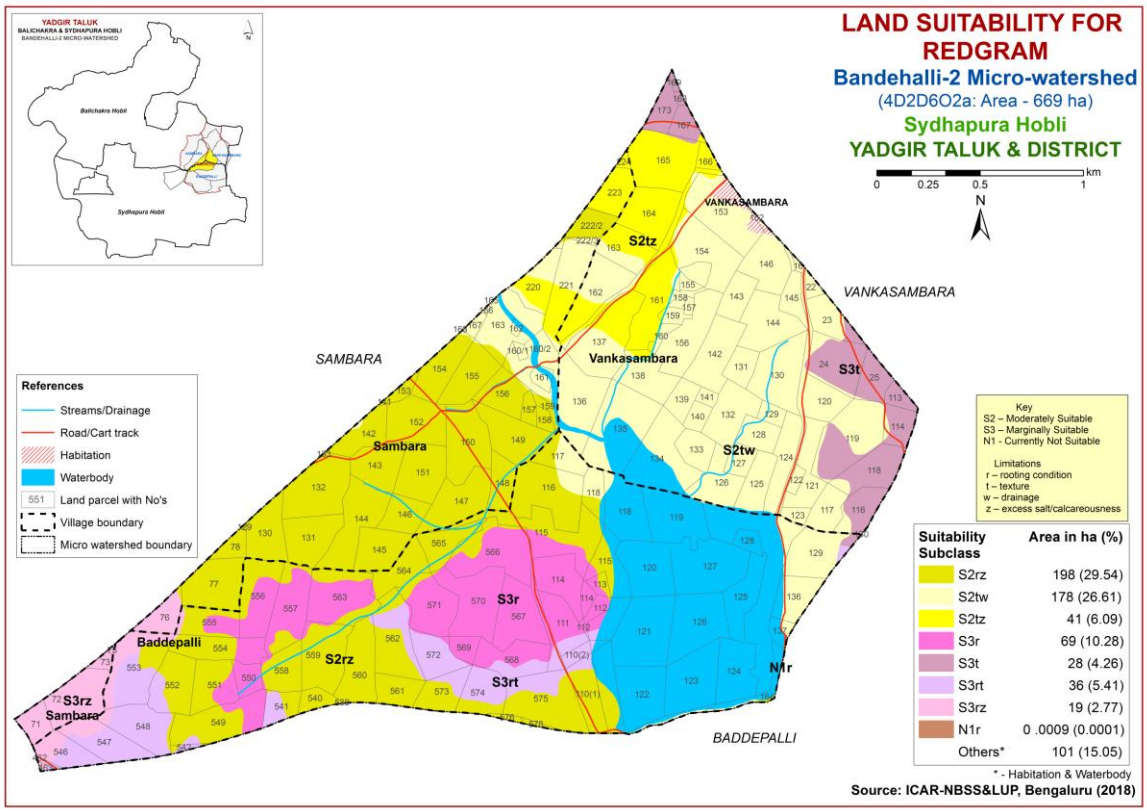


Fig. 7.3 Land Suitability map of Red gram

7.4 Land Suitability for Bajra (*Pennisetum glaucum)*

Bajra is one of the 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 7.5) 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 7.4.

In Bandehalli-2 microwatershed, there are no highly (Class S1) suitable lands for growing bajra in the microwatershed. Maximum area of about 527 ha (79%) is moderately suitable (Class S2) and are distributed in all parts of the microwatershed. They have minor limitations of drainage, texture, rooting condition and calcareousness. Marginally suitable lands (Class S3) occupy an area of 41 ha (6%) and are distributed in the northern, southern, eastern and southwestern part of the microwatershed. They have moderate limitations of texture and rooting condition. A minor area of <1 ha (<1%) is currently not suitable (Class N1) and are distributed in the southeastern part of the microwatershed with severe limitation of rooting condition.

Table 7.5 Crop 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. 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

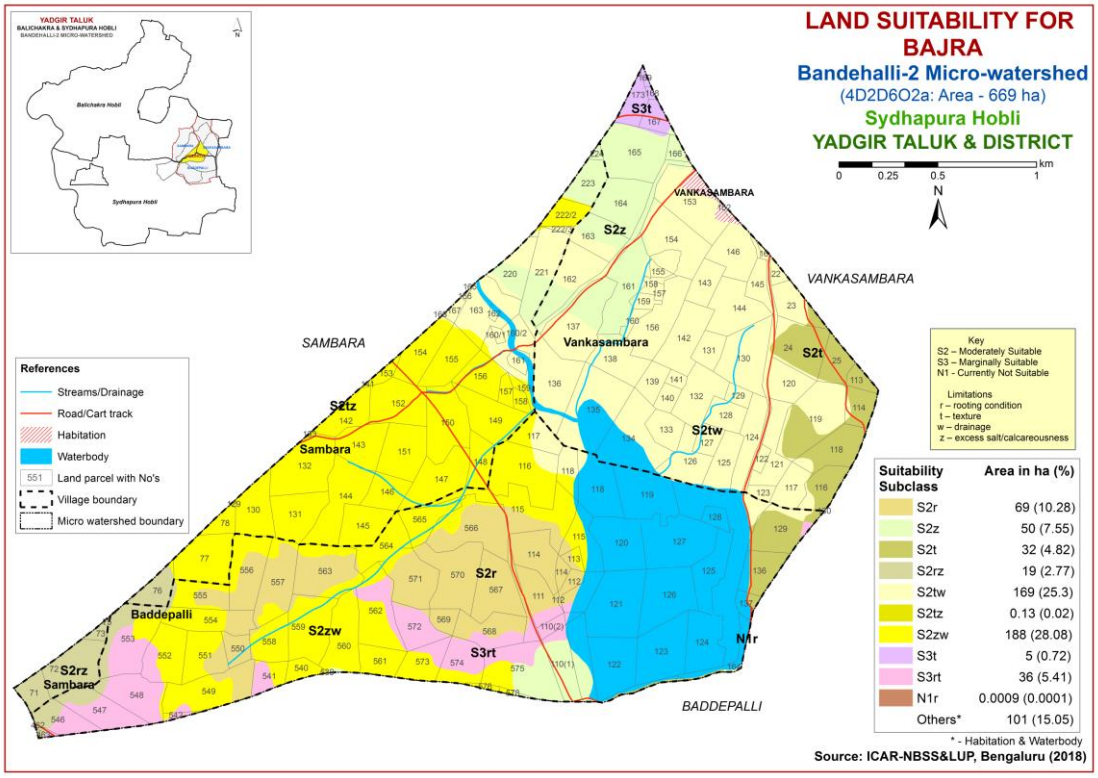


Fig. 7.4 Land Suitability map of Bajra

7.5 Land suitability for Groundnut (*Arachis hypogaea*)

Groundnut is one of the major oilseed crop grown in an area of 6.54 lakh ha in almost all the districts of the State. The crop requirements for growing groundnut (Table 7.6) were matched with the soil-site characteristics (Table 7.1) of soils of the microwatershed and a land suitability map for growing groundnut 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 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 rained	imperfectly drained	Poorly drained
Soil reaction	pH	6.0-8.0	8.1-8.5, 5.5-5.9	>8.5, <5.5	
Sub Surface soil texture	Class	l, cl, sil, scl, sicl	sc, sic, c,sl	s, ls,c (>60%)	
Soil depth	cm	>75	50-75	25-50	<25
Gravel content	% vol.	<35	35-50	>50	
$CaCO_3$ in root zone	%	low	Medium	high	
Salinity (EC)	dSm^{-1}	<2.0	2.0-4.0	4.0-8.0	
Sodicity (ESP)	%	<5	5-10	>10	

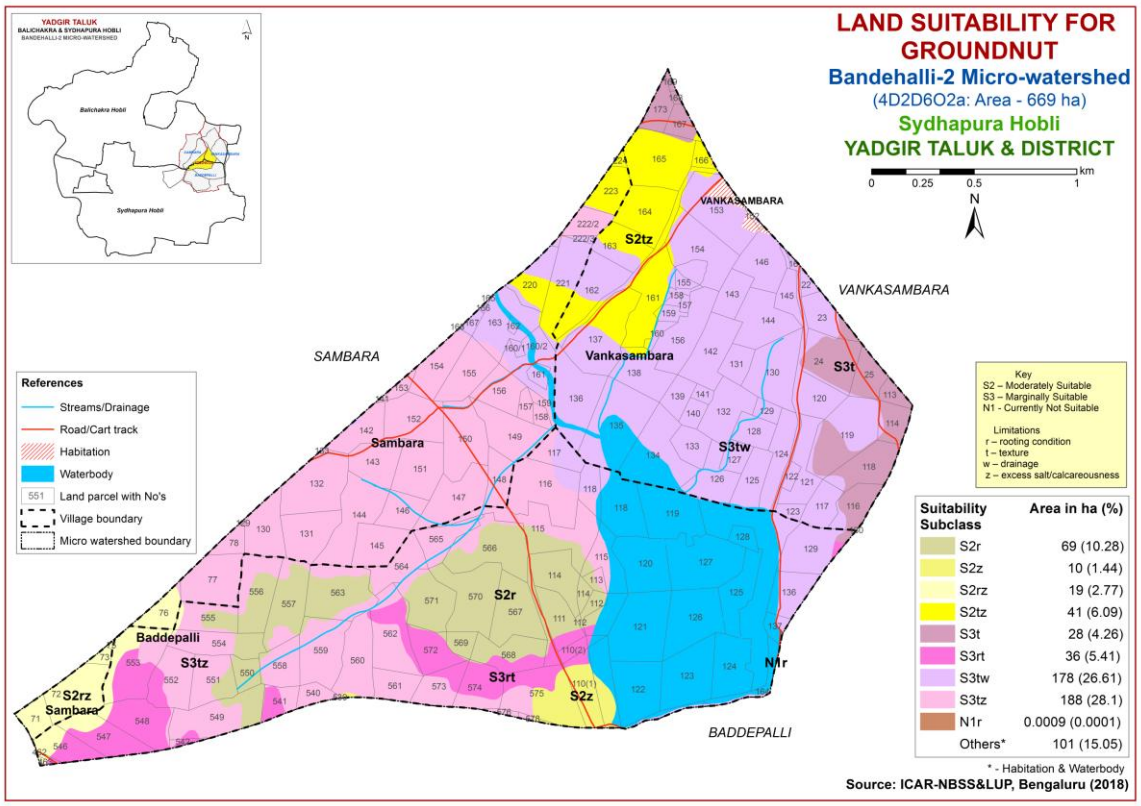


Fig. 7.5 Land Suitability map of Groundnut

There are no highly (Class S1) suitable lands for growing groundnut in the microwatershed. Moderately suitable (Class S2) lands occur in an area of 139 ha (21%) and are distributed in the northern, southern and southwestern part of the microwatershed. They have minor limitations of rooting condition, calcareousness and texture. The marginally suitable (Class S3) lands cover maximum area of about 430 ha (64%) and occur in the major part of the microwatershed. They have moderate limitations of texture,

rooting condition, calcareousness and drainage. A minor area of about <1 ha (<1%) is currently not suitable (Class N1) and are distributed in the southeastern part of the microwatershed with severe limitation of rooting condition.

7.6 Land Suitability for Sunflower (*Helianthus annus*)

Sunflower is one of the most important oilseed crop grown in an area of 3.56 lakh ha in the State in all the districts. The crop requirements for growing sunflower (Table 7.7) 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 7.6.

A small area of 9 ha (1%) is highly (Class S1) suitable for growing sunflower in the microwatershed. Maximum area of about 367 ha (55%) is moderately suitable (Class S2) and are distributed in all parts of the microwatershed. They have minor limitations of rooting condition, calcareousness and drainage. An area of about 134 ha (20%) is marginally suitable (Class S3) and are distributed in the northern, southern and southwestern part of the microwatershed. They have moderate limitations of rooting condition, texture and calcareousness. An area of 60 ha (9%) is currently not suitable (Class N1) for growing sunflower and are distributed in the eastern, southern and southwestern part of the microwatershed with severe limitations of rooting condition and texture.

Table 7.7 Crop suitability criteria for Sunflower

Crop requirement		Rating			
Soil –site characteristics	**Unit**	**Highly suitable(S1)**	**Moderately suitable(S2)**	**Marginally suitable(S3)**	**Not suitable(N)**
Slope	%	<3	3-5	5-10	>10
LGP	Days	>90	80-90	70-80	<70
Soil drainage	class	Well drained	mod. Well drained	imperfectly drained	Poorly drained
Soil reaction	pH	6.5-8.0	8.1-8.5,5.5-6.4	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	

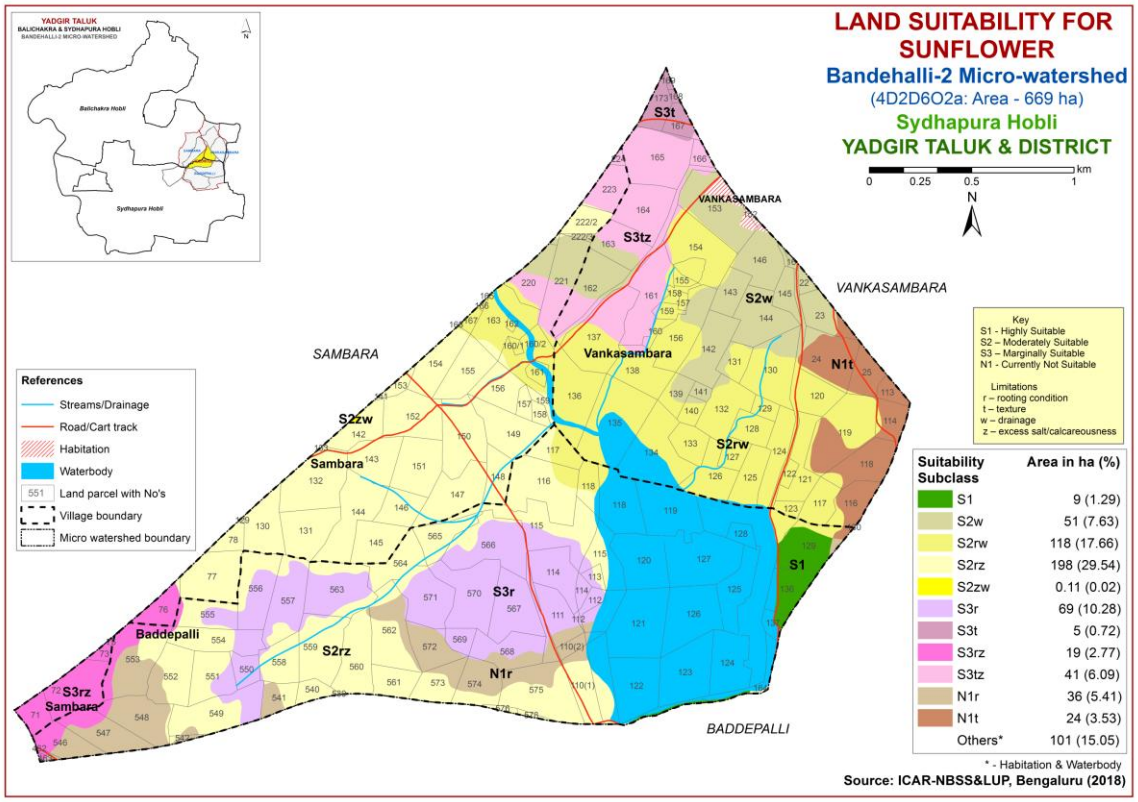


Fig. 7.6 Land Suitability map of Sunflower

7.7 Land Suitability for Cotton (*Gossypium hirsutum*)

Cotton is one of the most important fibre crop grown in the state in about 8.75 lakh ha area in Raichur, Dharwad, Belgaum, Kalaburgi, Bijapur, Bidar, Bellary, Chitradurga and Chamarajnagar districts. The crop requirements for growing cotton (Table 7.8) 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 7.7.

An area of 67 ha (10%) is highly (Class S1) suitable for growing cotton in the microwatershed. Maximum area of about 386 ha (58%) is moderately suitable (Class S2) and are distributed in the major part of the microwatershed. They have minor limitations of drainage, calcareousness and rooting condition. Marginally suitable (Class S3) lands occur in an area of 46 ha (7%) and are distributed in the southern and southwestern part of the microwatershed with moderate limitations of rooting condition, texture and calcareousness. Currently not suitable (Class N1) lands cover an area of 69 ha (10%) and are distributed in the northern and eastern part of the microwatershed with severe limitations of rooting condition, texture and calcareousness.

Table 7.8 Crop suitability criteria for Cotton

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

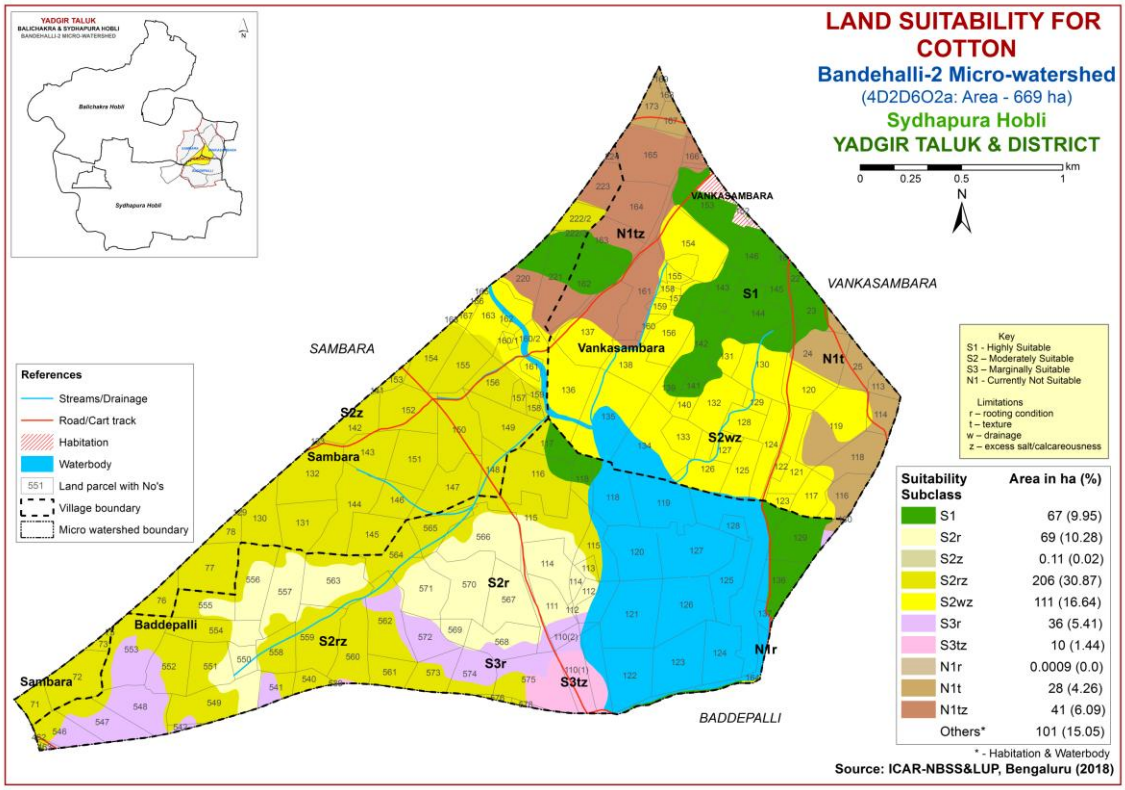


Fig. 7.7 Land Suitability map of Cotton

7.8 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, Dharwad, Belgaum and Bellary districts. The crop requirements for growing Bengal gram (Table 7.9) 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 is given in Figure 7.8.

Table 7.9 Crop suitability criteria for Bengal gram

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

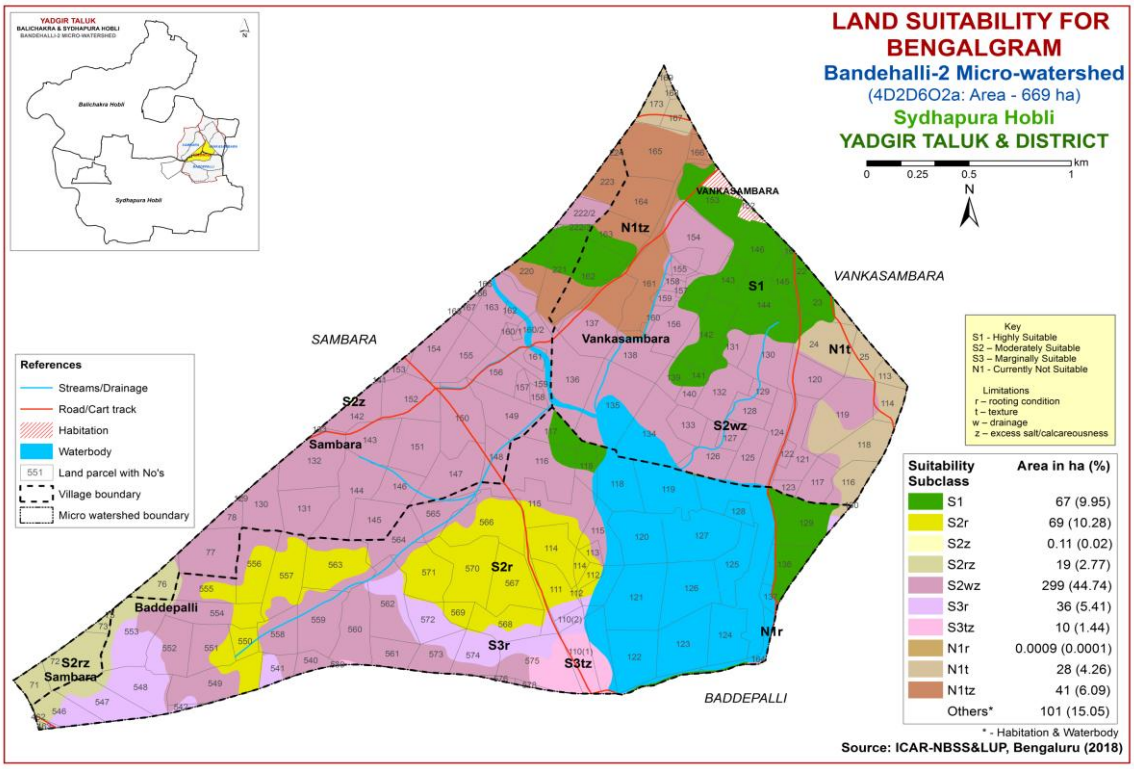


Fig. 7.8 Land Suitability map of Bengal gram

An area of 67 ha (10%) is highly (Class S1) suitable for growing bengal gram and are distributed in the northern, eastern and central part of the microwatershed. An area of about 387 ha (58%) is moderately suitable (Class S2) and are distributed in the southern and southwestern part of the microwatershed. They have minor limitations of calcareousness and rooting condition. Marginally suitable (Class S3) lands occur in an area of 46 ha (7%) and are distributed in the major part of the microwatershed with moderate limitations of rooting condition, drainage, texture and calcareousness. Currently not suitable (Class N1) lands occur in an area of 69 ha (10%) and are distributed in the

northern, eastern and southeastern part of the microwatershed with severe limitations of rooting condition, texture and calcareousness.

7.9 Land Suitability for Chilli (*Capsicum annuum)*

Chilli is one of the most important fruit 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.

In Bandehalli-2 microwatershed, there are no highly (Class S1) suitable lands available for growing chilli in the microwatershed. Maximum area of about 454 ha (68%) is moderately suitable (Class S2) and are distributed in the major part of the microwatershed. They have minor limitations of texture, calcareousness, drainage and rooting condition. Marginally suitable lands (Class S3) occupy an area of about 115 ha (17%) and are distributed in the northern, eastern, southern and southwestern part of the microwatershed. They have moderate limitations of rooting condition, drainage and texture. A minor area of about <1 ha (<1%) is currently not suitable (Class N1) and are distributed in the southeastern part of the microwatershed with severe limitation of rooting condition.

Table 7.10 Crop suitability criteria for Chilli

Crop requirement		**Rating**			
Soil –site characteristics	**Unit**	**Highly suitable(S1)**	**Moderately Suitable(S2)**	**Marginally suitable (S3)**	**Not suitable(N)**
Mean temperature in growing season	^{0}C	20-30	30-35, 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	

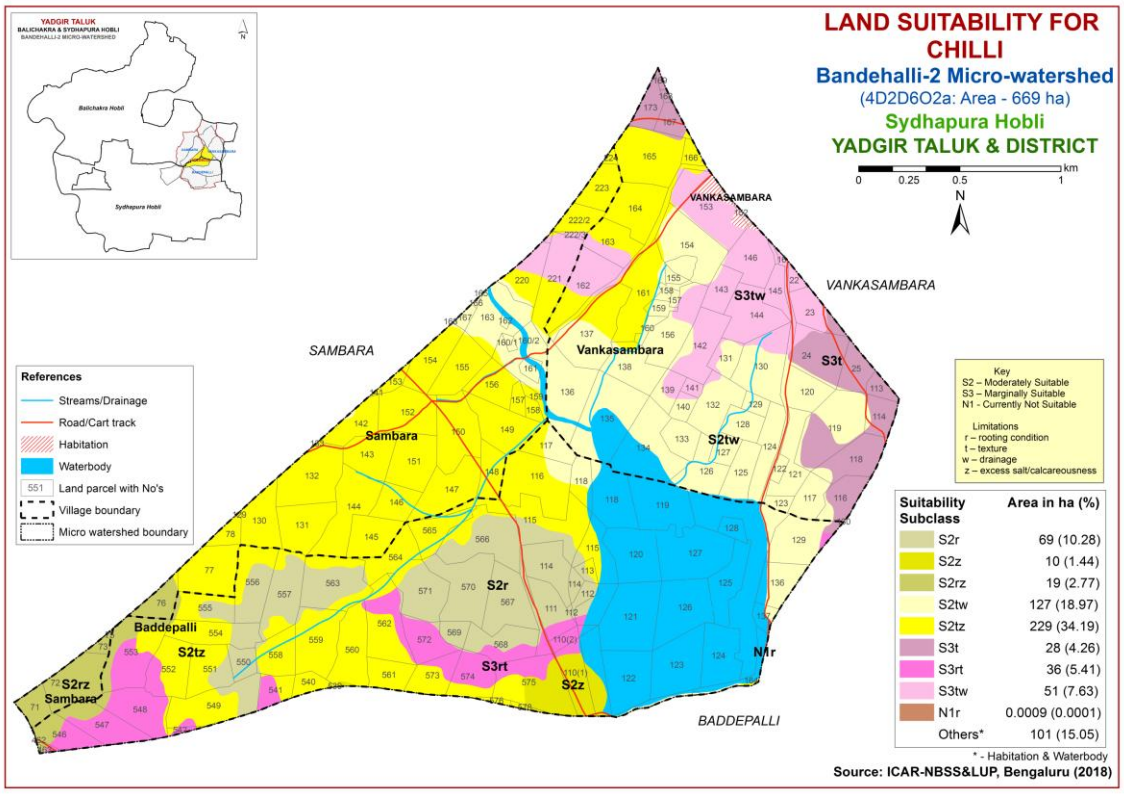


Fig 7.9 Land Suitability map of Chilli

7.10 Land Suitability for Tomato *(Lycopersicon esculentum)*

Tomato is one of the most important fruit 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.

In Bandehalli-2 microwatershed, there are no highly suitable (Class S1) lands for growing tomato in the microwatershed. The moderately suitable (Class S2) lands cover a maximum area of 138 ha (21%) and occur in the northern, southern and southwestern part of the microwatershed. They have moderate limitations of texture, rooting condition, calcareousness and drainage. Maximum area of 430 ha (64%) is marginally suitable (Class S3) and are distributed in the major part of the microwatershed. They have moderate limitations of texture, rooting condition, drainage and calcareousness. An area of about <1 ha (<1%) is currently not suitable (Class N1) and are distributed in the southeastern part of the microwatershed with severe limitation of rooting condition.

Table 7.11 Crop suitability criteria for Tomato

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

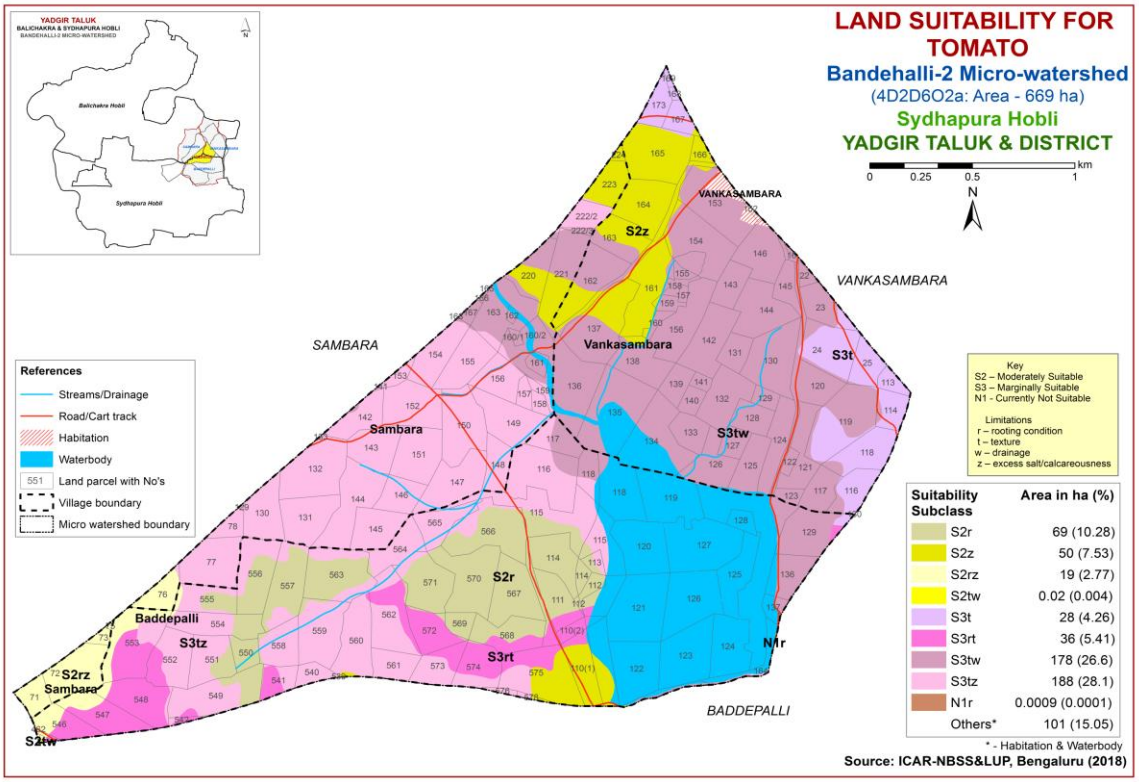


Fig 7.10 Land Suitability map of Tomato

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 for growing drumstick in the microwatershed. An area of about 417 ha (62%) is moderately suitable (Class S2) and are distributed in the major part of the microwatershed. They have minor limitations of texture, rooting condition, calcareousness and drainage. An area of about 116 ha (17%) is marginally suitable (Class S3) and are distributed in the northern, eastern, southern and southwestern part of the microwatershed. They have moderate limitations of rooting condition, texture and calcareousness. Currently not suitable (Class N1) lands occupy an area of about 36 ha (5%) for drumstick and are distributed in the southern and southwestern part of the microwatershed with severe limitations of rooting condition and texture.

Table 7.12 Crop 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

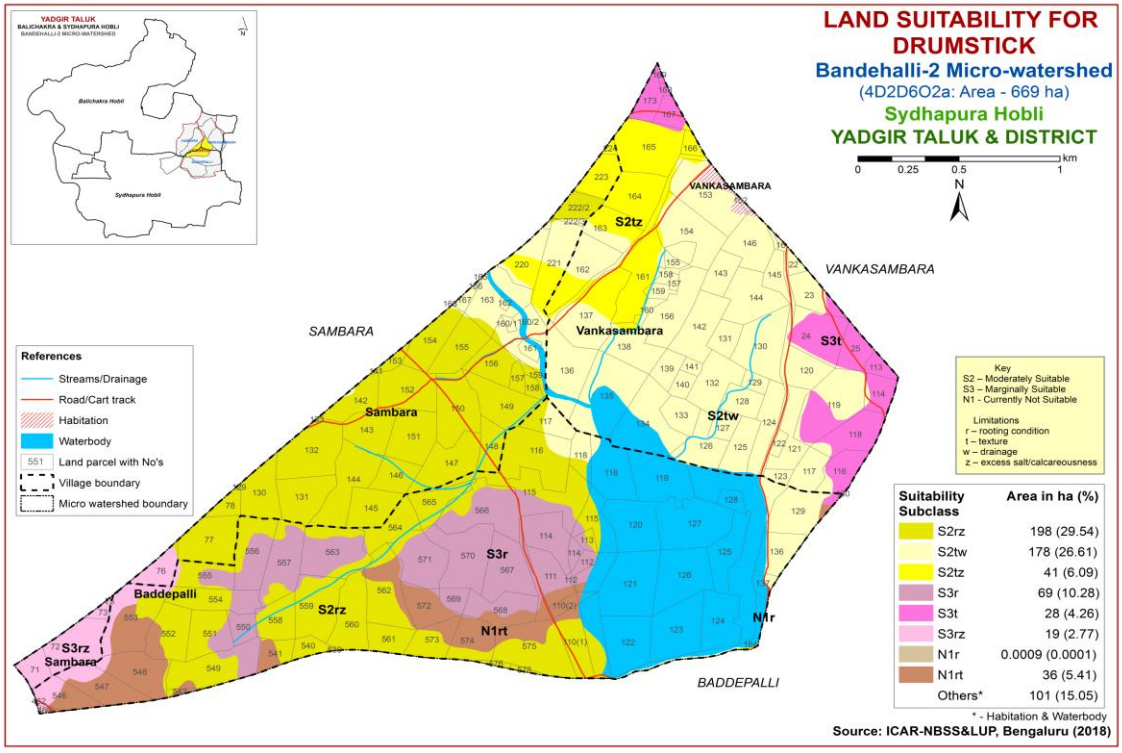


Fig 7.11 Land Suitability map of Drumstick

7.12 Land Suitability for Mulberry (*Morus nigra*)

Mulberry is the important leaf crop grown for rearing silk worms in about 1,66,000 ha area in all the districts of the state. The crop requirements for growing mulberry (Table 7.13) 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 7.12.

Table 7.13 Crop 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

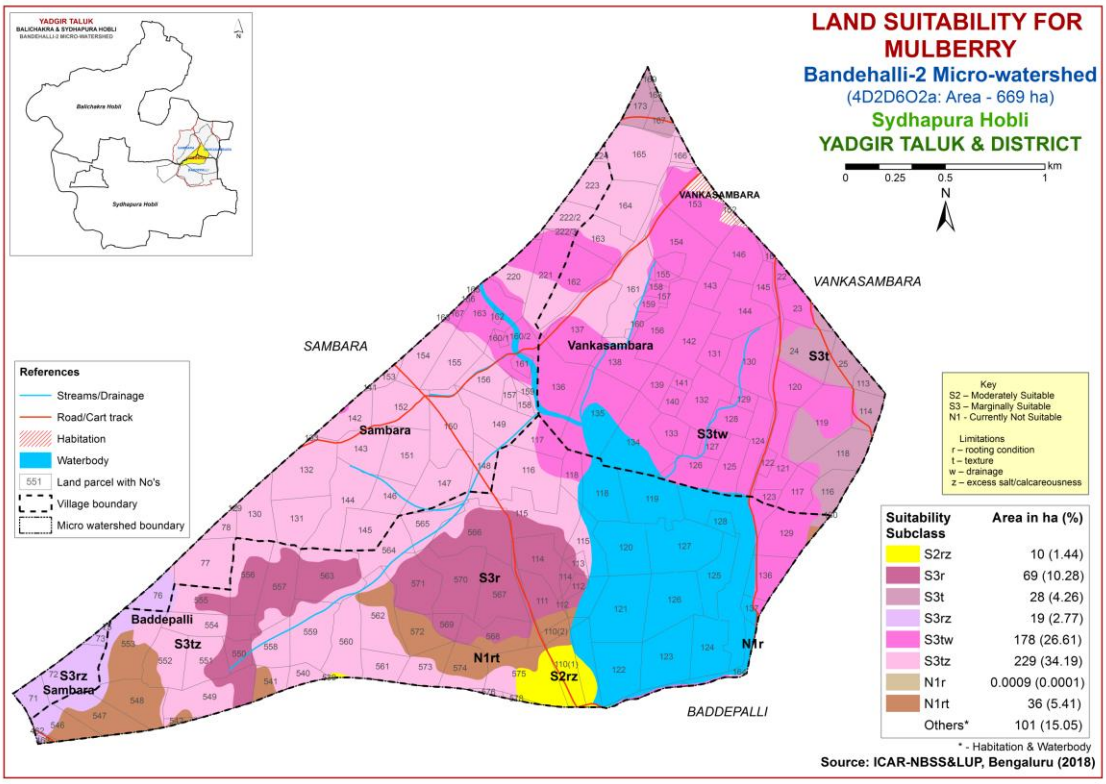


Fig 7.12 Land Suitability map of Mulberry

There are no highly (Class S1) suitable lands for growing mulberry in the microwatershed. An area of 10 ha (1%) is moderately suitable (Class S2) and are distributed in the southern part of the microwatershed. They have minor limitations of rooting condition and calcareousness. Maximum area of about 523 ha (78%) is

marginally suitable (Class S3) and are distributed in all parts of the microwatershed. They have moderate limitations of rooting condition, texture, calcareousness and drainage. Currently not suitable (Class N1) lands occupy an area of about 36 ha (5%) for mulberry and are distributed in the southern and southwestern part of the microwatershed with severe limitations of rooting condition and texture.

7.13 Land Suitability for Mango (*Mangifera indica*)

Mango is one of the most important fruit crop grown in about 173080 ha in all the districts of the State. The crop requirements for growing mango (Table 7.14) 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 geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.13.

In Bandehalli-2 microwatershed, there are no highly (Class S1) suitable lands for growing mango in the microwatershed. A small area of about 8 ha (1%) is moderately suitable (Class S2) and are distributed in the eastern part of the microwatershed with minor limitation of rooting condition. Maximum area of about 433 ha (65%) is marginally suitable (Class S3) and are distributed in the major part of the microwatershed. They have moderate limitations of texture, drainage, calcareousness and rooting condition. Currently not suitable lands (Class N1) occupy an area of 129 ha (19%) and are distributed in the northern, southern and southwestern part of the microwatershed. They have severe limitations of rooting condition and calcareousness.

Table 7.14 Crop suitability criteria for Mango

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

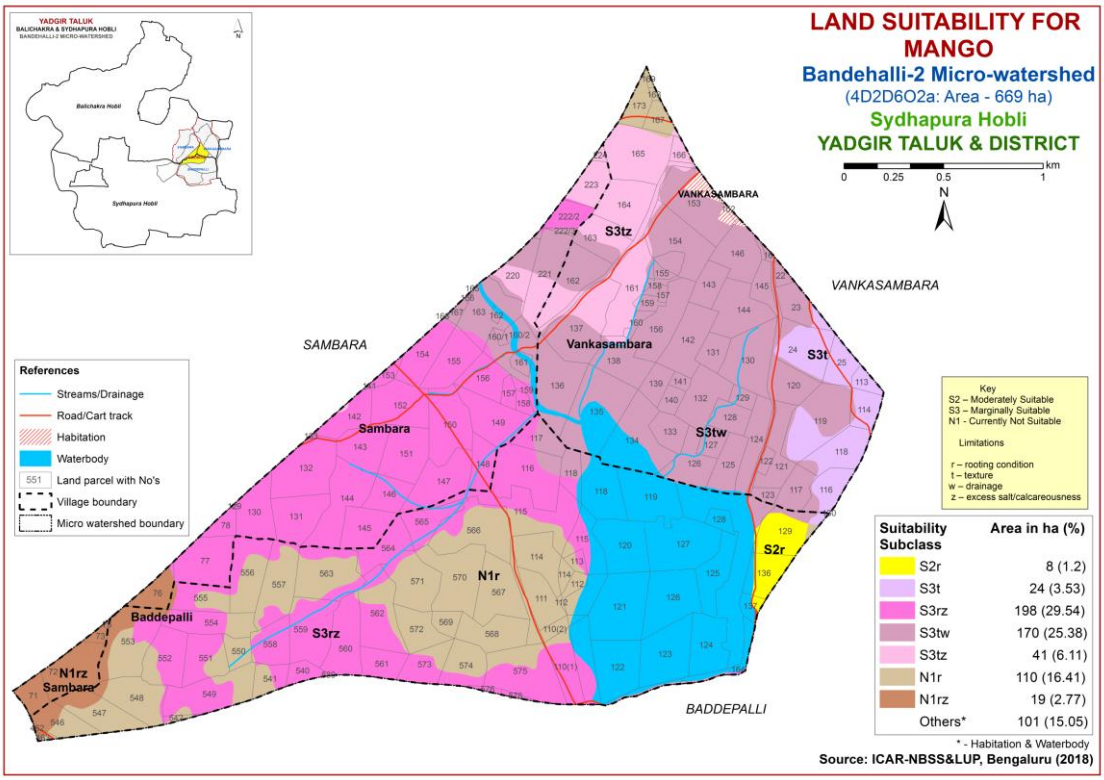


Fig. 7.13 Land Suitability map of Mango

7.14 Land Suitability for Sapota (*Manilkara zapota*)

Sapota is one of the most important fruit crop grown in about 29373 ha in almost all the districts of the state. The crop requirements for growing sapota (Table 7.15) 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 is given in Figure 7.14.

In Bandehalli-2 microwatershed, there are no highly suitable (Class S1) lands for growing sapota in the microwatershed. An area of 51 ha (8%) is moderately suitable (Class S2) and are distributed in the northern and southern part of the microwatershed with minor limitations of rooting condition, texture and calcareousness. Maximum area of about 483 ha (72%) is marginally suitable (Class S3) and are distributed in the major part of the microwatershed. They have moderate limitations of texture, rooting condition, calcareousness and drainage. An area of about 36 ha (5%) is currently not suitable (Class N1) and are distributed in the southern and southwestern part of the microwatershed with limitation of rooting condition.

Table 7.15 Crop suitability criteria for Sapota

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

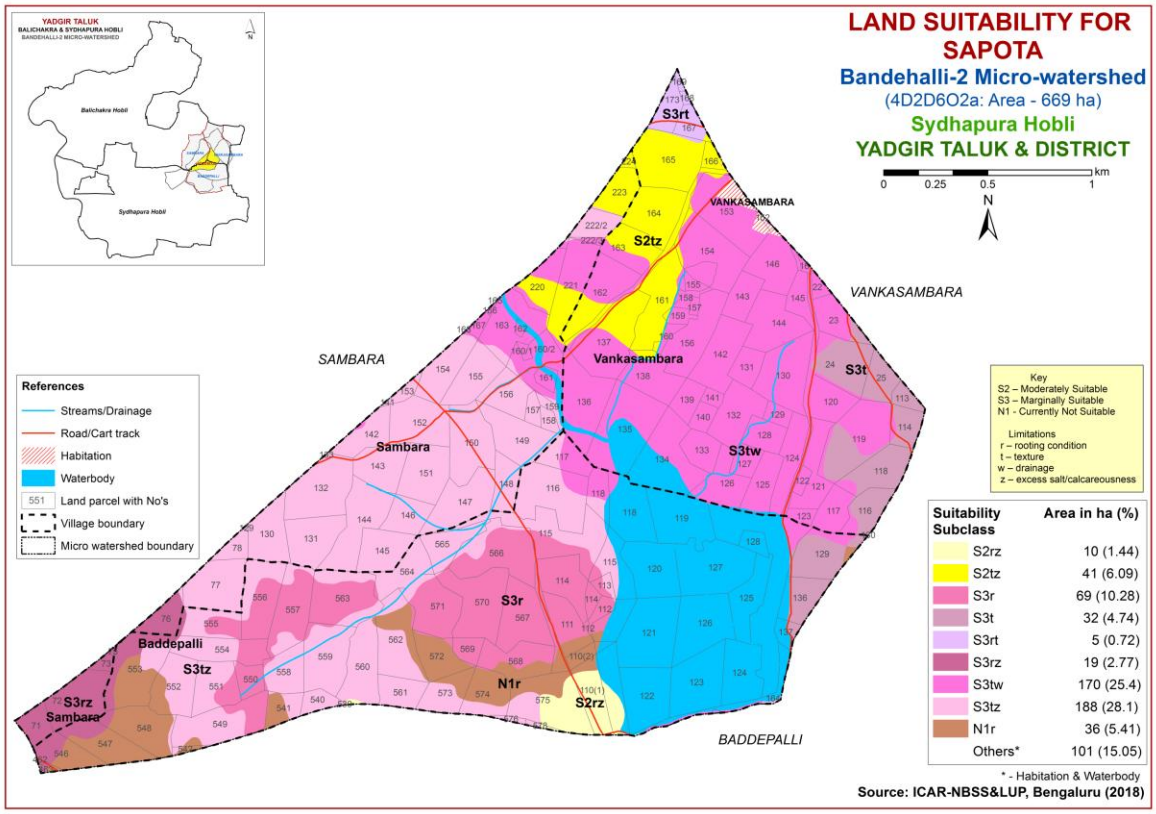


Fig. 7.14 Land Suitability map of Sapota

7.15 Land Suitability for Guava (*Psidium guajava*)

Guava is one of the most important fruit crop grown in about 6558 ha in the State of Raichur, Dharwad, Belgaum, Kalaburgi, Bijapur, Bidar, Bellary, Chitradurga, Bangalore, Kolar, Chikkaballapur and Chamarajnagar districts. The crop requirements for

growing guava (Table 7.16) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing guava was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.15.

Table 7.16 Crop suitability criteria for Guava

Crop requirement			Rating			
Soil –site characteristics		**Unit**	**Highly suitable(S1)**	**Moderately suitable (S2)**	**Marginally suitable(S3)**	**Not suitable(N)**
Climate	Temperature in growing season	^{0}C	28-32	33-36 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

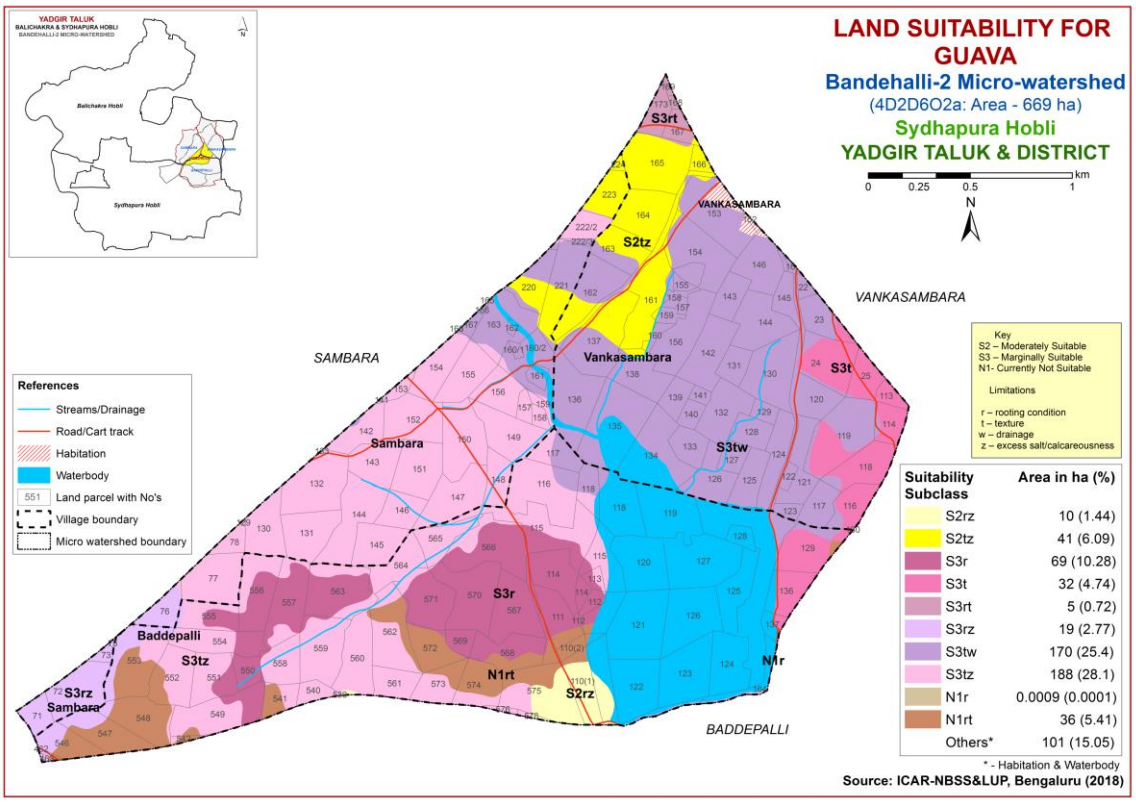


Fig 7.15 Land Suitability map of Guava

There are no highly (Class S1) suitable lands for growing guava in the microwatershed. An area of 51 ha (8%) is moderately (Class S2) and are distributed in the northern and southern part of the microwatershed. They have minor limitations of rooting condition, calcareousness and texture. Maximum area of about 483 ha (72%) is marginally suitable (Class S3) for growing guava and are distributed in the major part of the microwatershed. They have moderate limitations of texture, drainage, calcareousness and rooting condition. Currently not suitable (Class N1) lands occur in an area of about 36 ha (5%) and are distributed in the southern and southwestern part of the microwaterhsed. They have severe limitations of rooting condition and texture.

7.16 Land Suitability for Pomegranate (*Punica granatum*)

Pomegranate is one of the most important fruit crop commercially grown in about 18488 ha in Karnataka in an area of about 0.16 lakh ha mainly in Bijapur, Bagalkot, Koppal, Gadag and Chitradurga districts. The crop requirements for growing pomegranate (Table 7.17) 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 7.16.

Table 7.17 Crop suitability criteria for Pomegranate

Crop requirement			**Rating**			
Soil –site characteristics		**Unit**	**Highly suitable(S1)**	**Moderately suitable(S2)**	**Marginally suitable(S3)**	**Not suitable(N)**
Climate	Temperature in growing season	^{0}C	30-34	35-38,25-29	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	

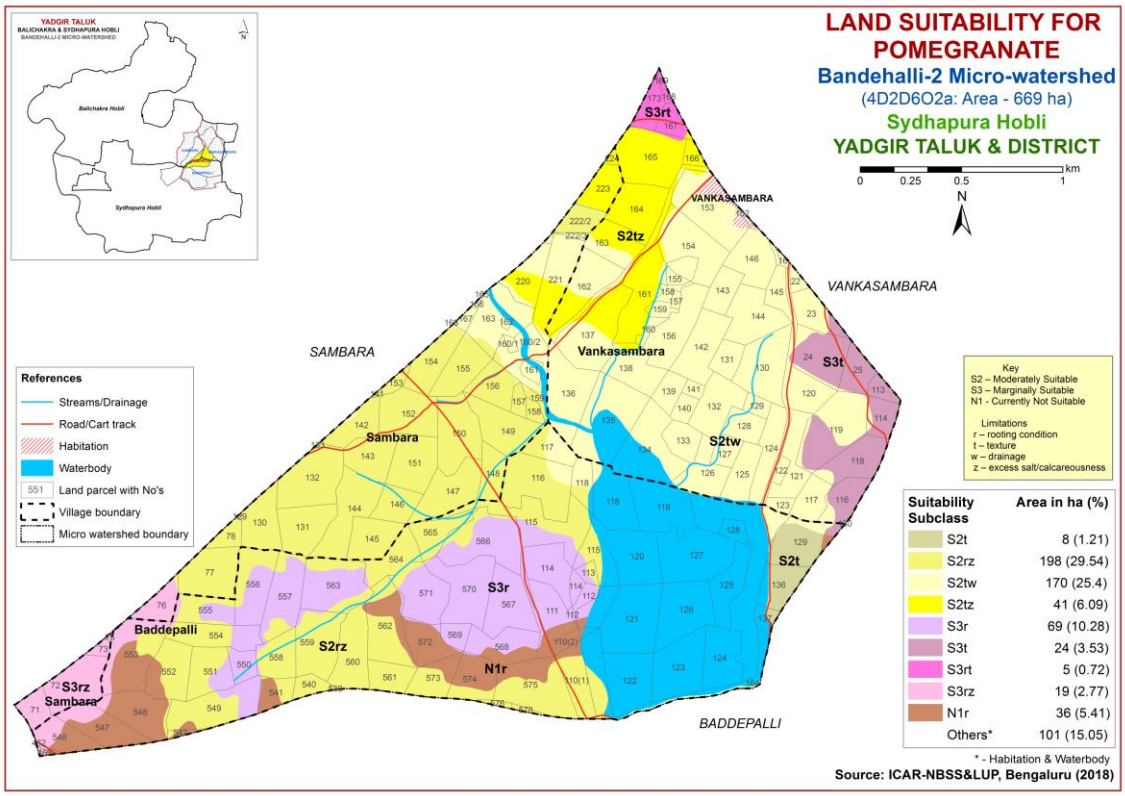


Fig 7.16 Land Suitability map of Pomegranate

In Bandehalli-2 microwatershed, there are no highly suitable (Class S1) lands for growing pomegranate in the microwatershed. Maximum area of about 417 ha (62%) is moderately suitable (Class S2) for pomegranate and are distributed in the major part of the microwatershed. They have minor limitations of texture, rooting condition, calcareousness and drainage. An area of about 117 ha (17%) is marginally suitable (Class S3) and are distributed in the eastern, northern, central and southwestern part of the microwatershed. They have moderate limitations of rooting condition, texture and calcareousness. Currently not suitable lands (Class N1) occur in an area of 36 ha (5%) and are distributed in the southern and southwestern part of the microwatershed. They have severe limitation of rooting condition.

7.17 Land Suitability for Jackfruit (*Artocarpus heterophyllus*)

Jackfruit is one of the most important fruit crop grown in 5368 ha in almost all the districts of the State. The crop requirements for growing jackfruit (Table 7.18) 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 is given in Figure 7.17.

In Bandehalli-2 microwatershed, there are no highly suitable (Class S1) lands for growing jackfruit in the microwatershed. An area of 10 ha (1%) is moderately suitable (Class S2) for growing jackfruit in the microwatershed. Maximum area of about 524 ha (78%) is marginally suitable (Class S3) and are distributed in all parts of the

microwatershed. They have moderate limitations of texture, drainage, calcareousness and rooting condition. Currently not suitable lands (Class N1) occur in an area of about 36 ha (5%) and are distributed in the southern and southwestern part of the microwatershed with severe limitations of rooting condition and texture.

Table 7.18 Crop 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	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	-

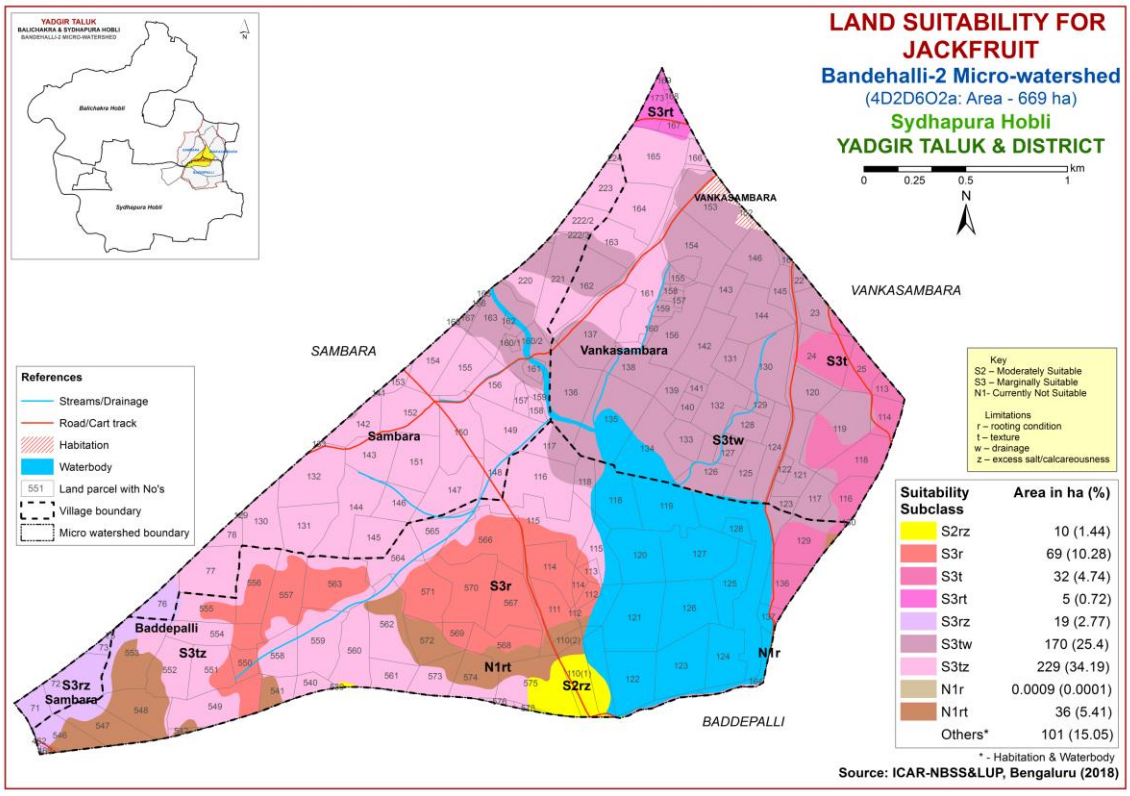


Fig 7.17 Land Suitability map of Jackfruit

7.18 Land Suitability for Jamun (*Syzygium cumini*)

Jamun is one of the most important fruit crop grown in almost all the districts of the state. The crop requirements for growing jamun (Table 7.19) 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 is given in Figure 7.18.

There are no highly suitable (Class S1) lands for growing jamun in the microwatershed. An area of about 219 ha (33%) is moderately suitable (Class S2) and are distributed in the northern, eastern and central part of the microwatershed. They have minor limitations of texture, rooting condition, calcareousness and drainage. Maximum area of about 314 ha (47%) is marginally suitable (Class S3) and are distributed in the major part of the microwatershed. They have moderate limitations of rooting condition, texture and calcareousness. Currently not suitable lands (Class N1) occur in an area of about 36 ha (5%) and are distributed in the southern and southwestern part of the microwatershed with severe limitations of rooting condition and texture.

Table 7.19 Crop 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

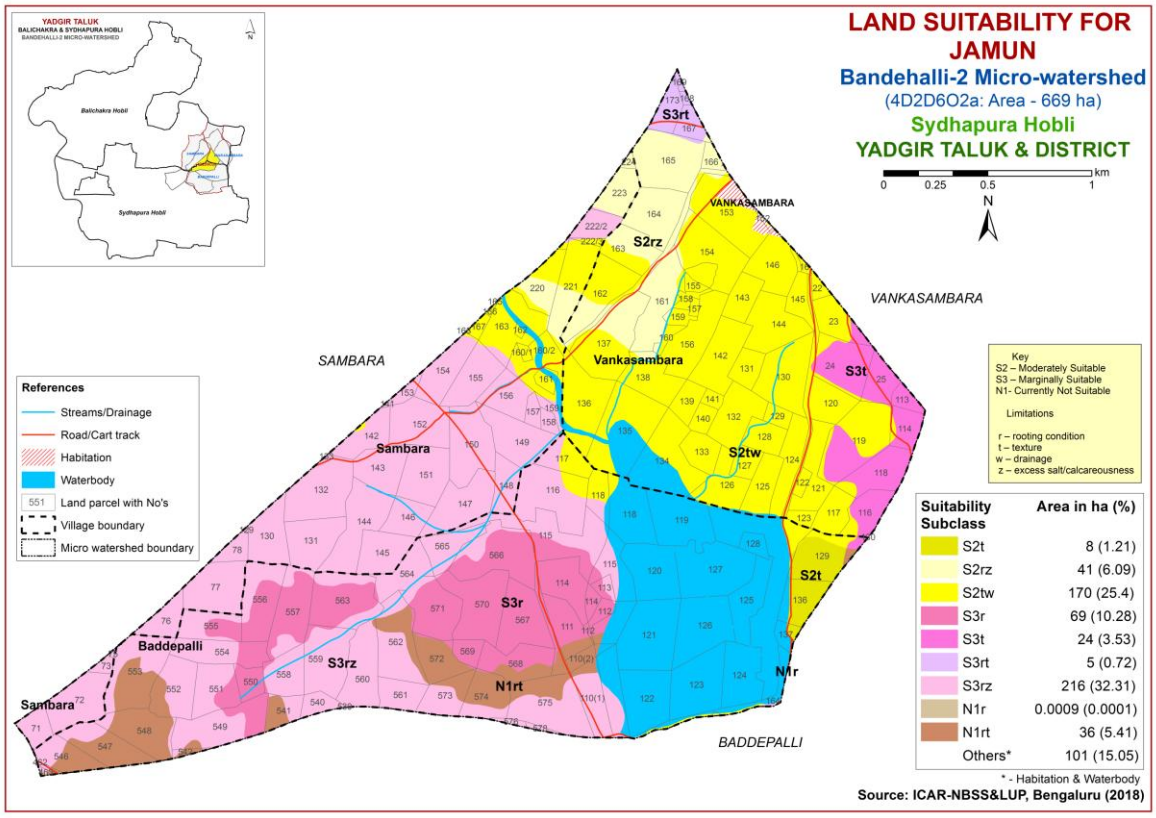


Fig 7.18 Land Suitability map of Jamun

7.19 Land Suitability for Musambi (*Citrus limetta*)

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

In Bandehalli-2 microwatershed, a very minor area of 0.38 ha (<1%) is highly (Class S1) suitable for growing musambi in the microwatershed. Maximum area of about 417 ha (62%) is moderately suitable (Class S2) and are distributed in the major part of the microwatershed. They have minor limitations of calcareousness, rooting condition, texture and drainage. An area of about 116 ha (17%) is marginally suitable (Class S3) and are distributed in the eastern, northern, southern and southwestern part of the microwatershed. They have moderate limitations of rooting condition, texture and calcareousness. Currently not suitable (Class N1) lands occur in an area of about 36 ha (5%) and are distributed in the southern and southwestern part of the microwatershed with the severe limitation of rooting condition.

Table 7.20 Crop suitability criteria for Musambi

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	28-30	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 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	5.5-6.4/ 7.6-8.0	4.0-5.4 8.1-8.5	<4.0 >8.5
	$CaCO_3$ in root zone	%	Non calcareous	Upto 5	5-10	>10
Rooting condition	Soil depth	cm	>150	100-150	50-100	<50
	Gravel content	%vol.	Non gravelly	15-35	35-55	>55
Soil toxicity	Salinity	dS/m	Non saline	Upto 1.0	1.0-2.5	>2.5
	Sodicity	%	Non sodic	5-10	10-15	>15
Erosion	Slope	%	<3	3-5	5-10	

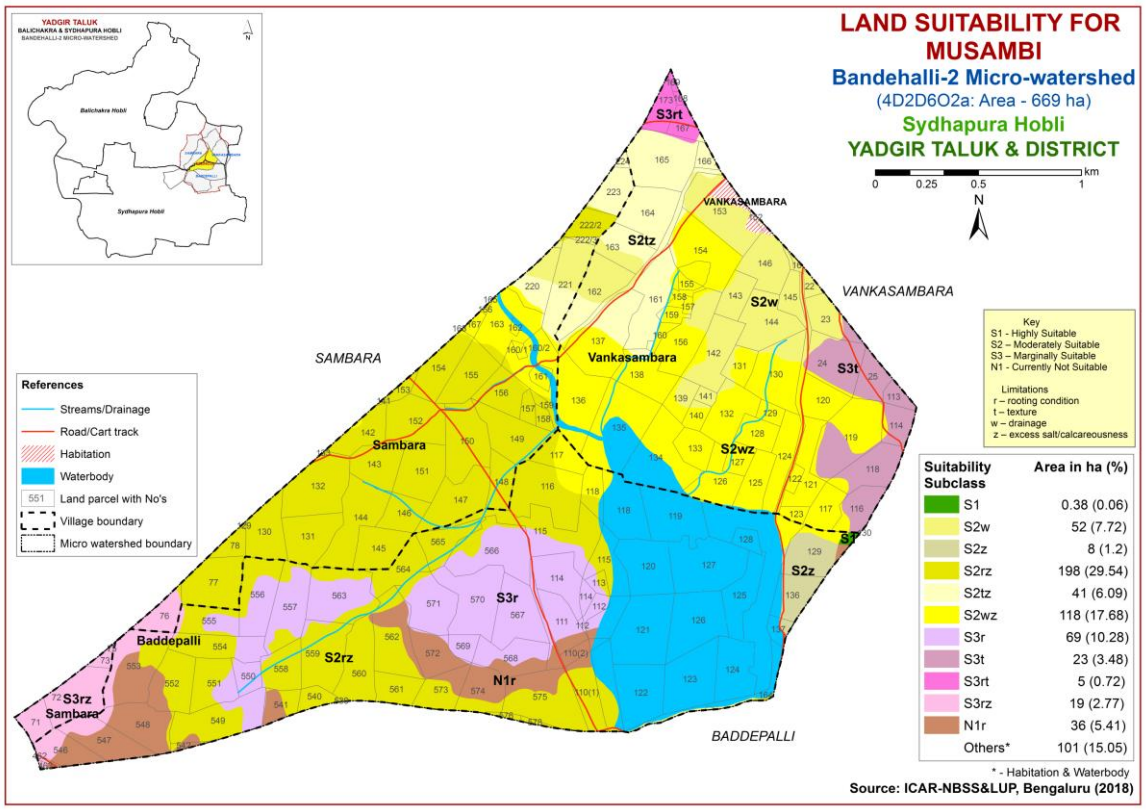


Fig 7.19 Land Suitability map of Musambi

7.20 Land Suitability for Lime (*Citrus sp*)

Lime is one of the most important fruit crop grown in 11752 ha in almost all the districts of the State. The crop requirements for growing lime (Table 7.21) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing lime was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed is given in Figure 7.20.

In Bandehalli-2 microwatershed, an area of 0.38 ha (<1%) is highly (Class S1) suitable for growing lime. Maximum area of about 417 ha (62%) is moderately suitable (Class S2) and are distributed in the major part of the microwatershed. They have minor limitations of calcareousness, rooting condition and drainage. An area of about 116 ha (17%) is marginally suitable (Class S3) and are distributed in the eastern, northern, southern and southwestern part of the microwatershed. They have moderate limitations of rooting condition, texture and calcareousness. Currently not suitable (Class N1) lands occur in an area of about 36 ha (5%) and are distributed in the southern and southwestern part of the microwatershed with the severe limitation of rooting condition.

Table 7.21 Crop suitability criteria for Lime

Crop requirement			Rating			
Soil –site characteristics		Unit	Highly suitable(S1)	Moderately suitable(S2)	Marginally suitable(S3)	Not suitable(N)
Climate	Temp 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 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	5.5-6.4/ 7.6-8.0	4.0-5.4 8.1-8.5	<4.0 >8.5
	$CaCO_3$ in root zone	%	Non calcareous	Upto 5	5-10	>10
Rooting condition	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	

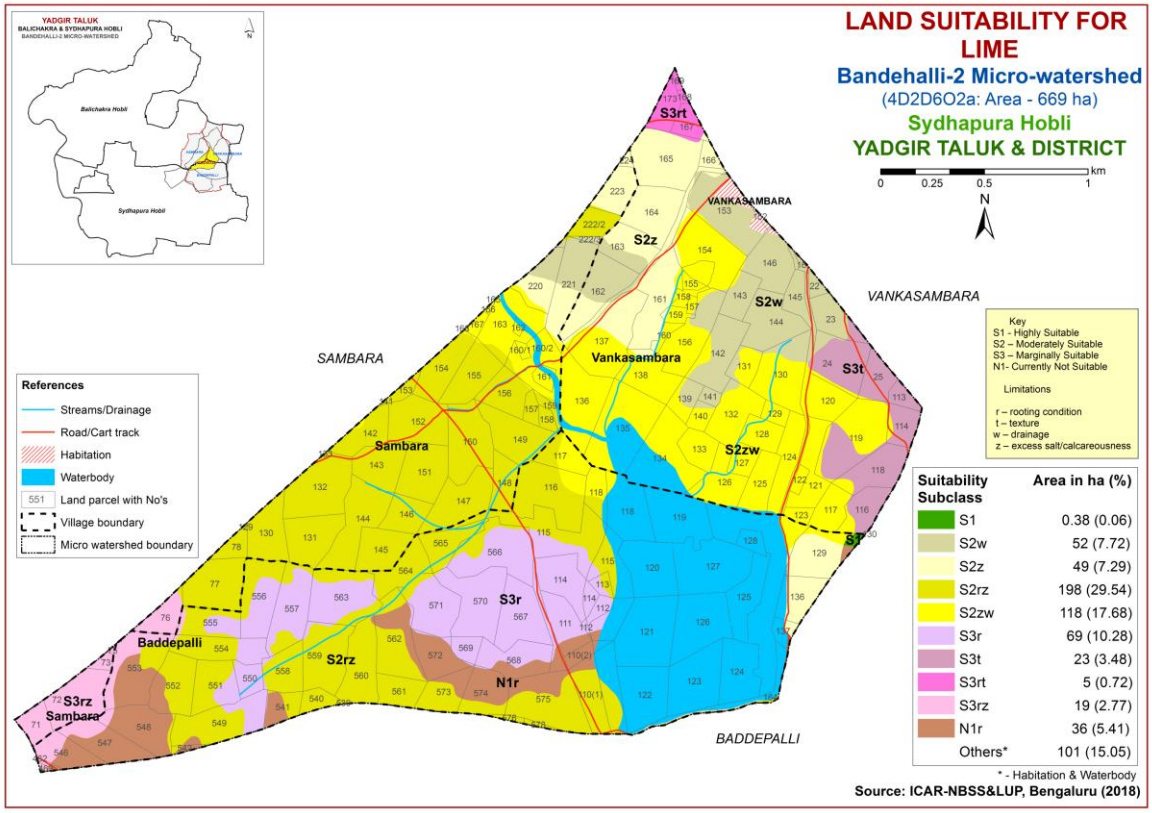


Fig 7.20 Land Suitability map of Lime

7.21 Land Suitability for Cashew (*Anacardium occidentale)*

Cashew is one of the most important plantation nut crop grown in an area of about 70552 ha in almost all the districts. The crop requirements for growing Cashew (Table 7.22) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing Cashew was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed is given in Figure 7.21.

Table 7.22 Crop suitability criteria for Cashew

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

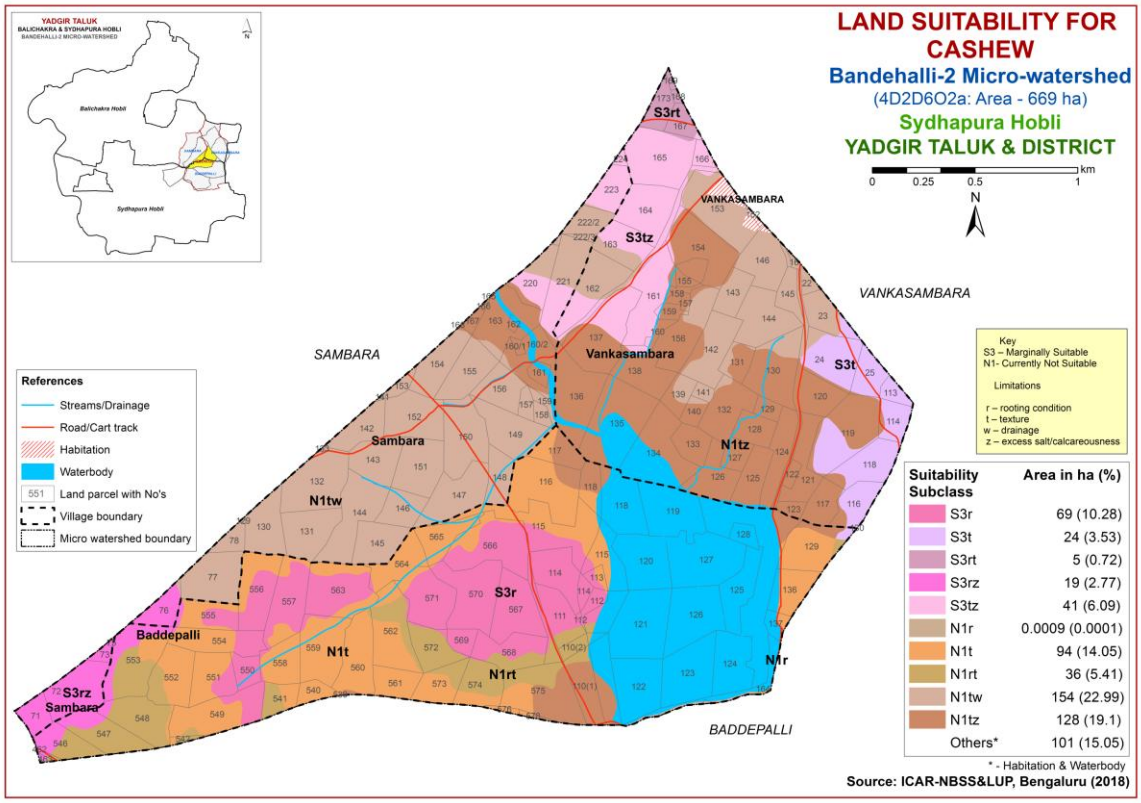


Fig 7.21 Land Suitability map of Cashew

There are no highly (Class S1) and moderately (Class S2) suitable lands for growing cashew in the microwatershed. An area of 158 ha (23%) is marginally suitable (Class S3) and are distributed in the northern, eastern, southern and southwestern part of the microwatershed. They have minor limitations of rooting condition, texture and

calcareousness. Currently not suitable (Class N1) lands for growing cashew occur in the major area of 412 ha (62%) and are distributed in all parts of the microwatershed. They have severe limitations of rooting condition, texture, drainage and calcareousness.

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

Custard apple is one of the most important fruit crop grown in 1426 ha in almost all the districts of the state. The crop requirements for growing custard apple (Table 7.23) 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 geographic distribution of different suitability subclasses in the microwatershed is given in Figure 7.22.

Table 7.23 Crop suitability criteria for Custard Apple

Crop requirement			Rating			
Soil –site characteristics		Unit	Highly suitable(S1)	Moderately Suitable(S2)	Marginally suitable(S3)	Not suitable(N)
Soil aeration	Soil drainage	Class	Well drained	Mod. well drained	Poorly drained	V. Poorly drained
Nutrient availability	Texture	Class	scl, cl, sc, c (red), c (black)	-	sl, ls	-
	pH	1:2.5	6.0-7.3	7.3-8.4	5.0-5.5,8.4-9.0	>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	

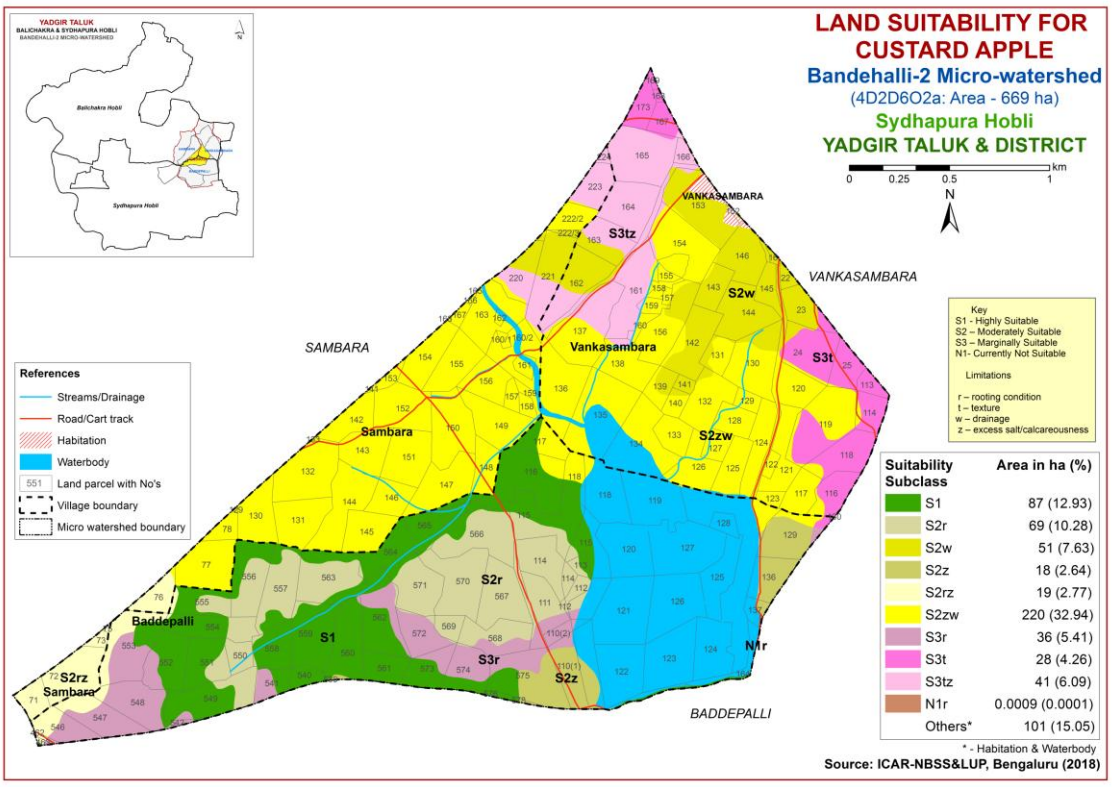


Fig 7.22 Land Suitability map of Custard Apple

An area of 87 ha (13%) is highly suitable (Class S1) for growing custard apple in the microwatershed. Maximum area of about 377 ha (56%) is moderately suitable (Class S2) and are distributed in all parts of the microwatershed. They have minor limitations of drainage, calcareousness and rooting condition. Marginally suitable lands (Class S3) occur in an area of 105 ha (16%) and are distributed in the northern, eastern, southern and southwestern part of the microwatershed. They have moderate limitations of rooting condition, texture and calcareousness. A minor area of <1 ha (<1%) is currently not suitable (Class N1) and are distributed in the southeastern part of the microwatershed with severe limitation of rooting condition.

7.23 Land Suitability for Amla (*Phyllanthus emblica*)

Amla is one of the most important medicinal and fruit plant grown in 151 ha in almost all the districts of the state. The crop requirements for growing amla (Table 7.24) 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 7.23.

In Bandehalli-2 microwatershed, there are no highly (Class S1) suitable lands for growing amla in the microwatershed. Moderately suitable (Class S2) lands occur in a maximum area of 464 ha (69%) and are distributed in the major part of the microwatershed. They have minor limitations of drainage, texture, calcareousness and rooting condition. An area of about 105 ha (16%) is marginally suitable (Class S3) and are distributed in the northern, eastern, southern and southwestern part of the microwatershed. They have moderate limitations of rooting condition, calcareousness and texture. A minor area of <1 ha (<1%) is currently not suitable (Class N1) and are distributed in the southeastern part of the microwatershed with severe limitation of rooting condition.

Table 7.24 Crop 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

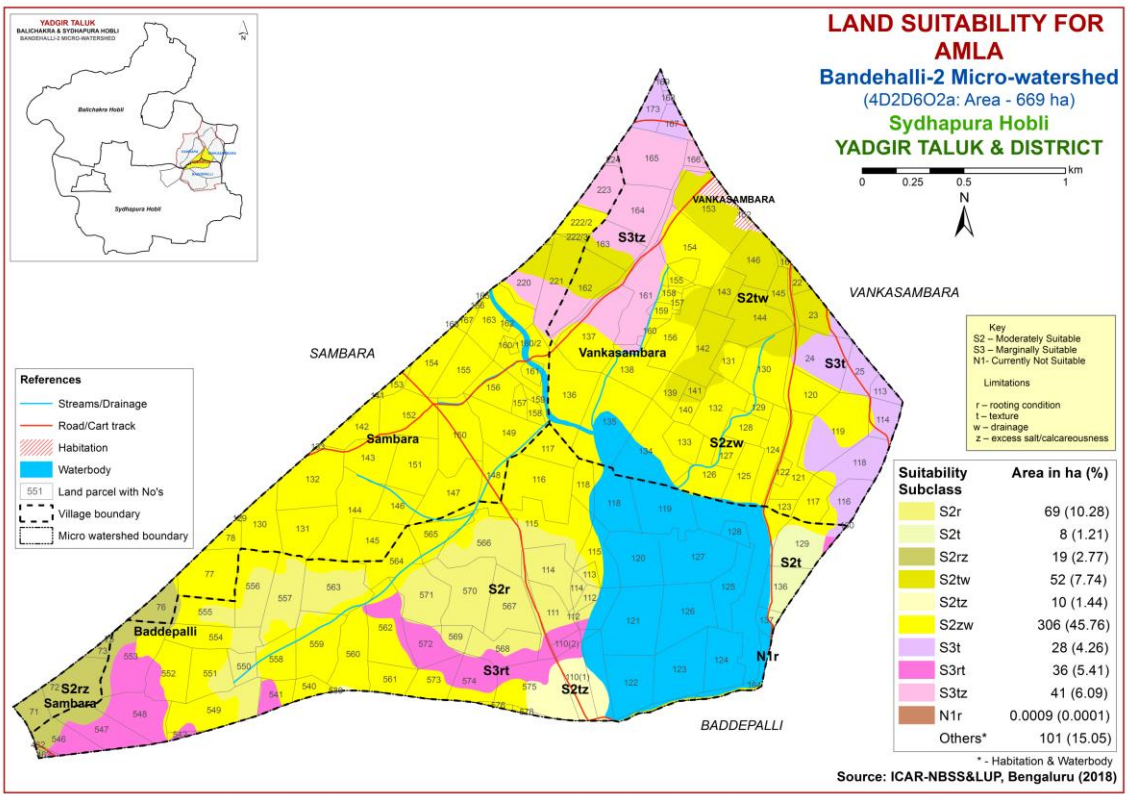


Fig 7.23 Land Suitability map of Amla

7.24 Land Suitability for Tamarind (*Tamarindus indica*)

Tamarind is one of the most important spice crop raised in 14897 ha in all the districts of the state. The crop requirements for growing tamarind (Table 7.25) 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 geographic distribution of different suitability subclasses in the microwatershed is given in Figure 7.24.

There are no highly suitable (Class S1) lands for growing tamarind in the microwatershed. Moderately suitable (Class S2) lands occur in an area of 219 ha (33%) and are distributed in the northern, central and eastern part of the microwatershed. They have minor limitations of texture, rooting condition and drainage. An area of 222 ha (33%) is marginally suitable (Class S3) and are distributed in the eastern, northern, central and western part of the microwatershed with moderate limitations of rooting condition, texture and calcareousness. Currently not suitable lands (Class N1) occur in an area of 129 ha (19%) and are distributed in the northern, southern and southwestern part of the microwatershed. They have severe limitations of rooting condition, texture, and calcareousness.

Table 7.25 Crop 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

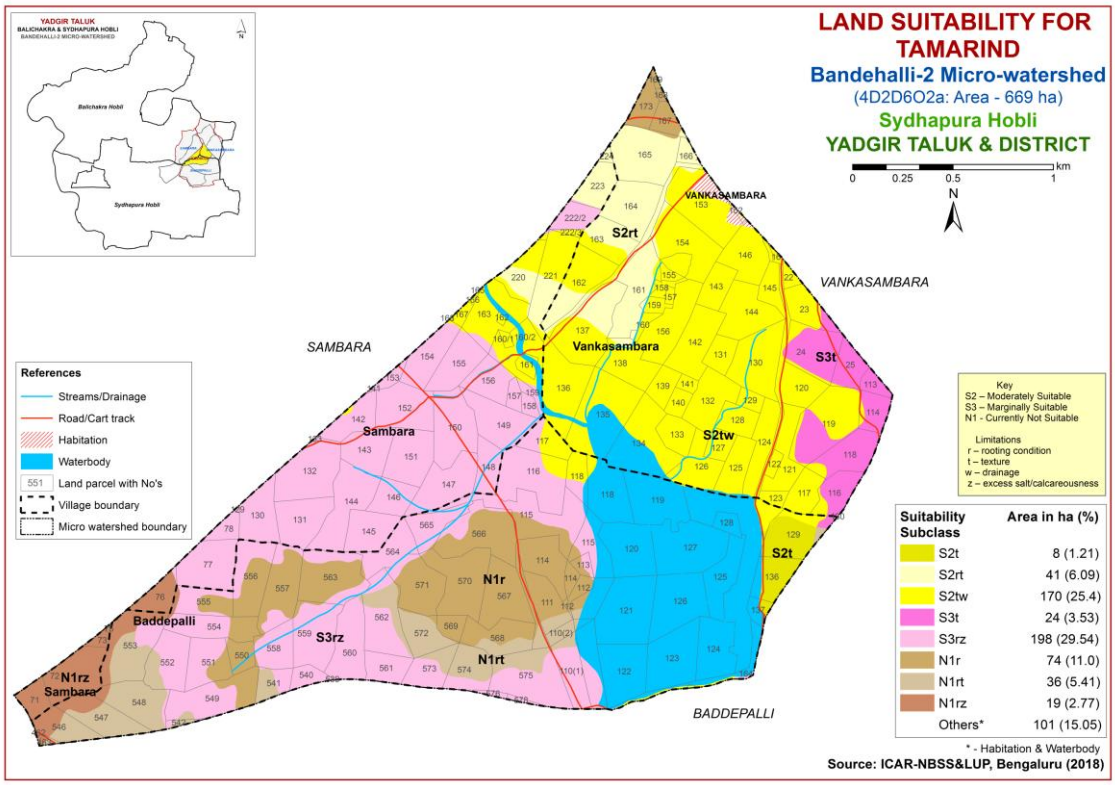


Fig 7.24 Land Suitability map of Tamarind

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 for growing marigold (Table 7.26) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing marigold was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.25.

There are no highly (Class S1) suitable lands for growing marigold in the microwatershed. Maximum area of about 504 ha (75%) is moderately suitable (Class S2) and are distributed in the major part of the microwatershed. They have minor limitations of drainage, texture, calcareousness and rooting condition. Marginally suitable lands (Class S3) occur in an area of 64 ha (10%) and are distributed in the northern, eastern,

southern and southwestern part of the microwatershed. They have moderate limitations of texture and rooting condition. A minor area of <1 ha (<1%) is currently not suitable (Class N1) and are distributed in the southeastern part of the microwatershed with severe limitation of rooting condition.

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	-

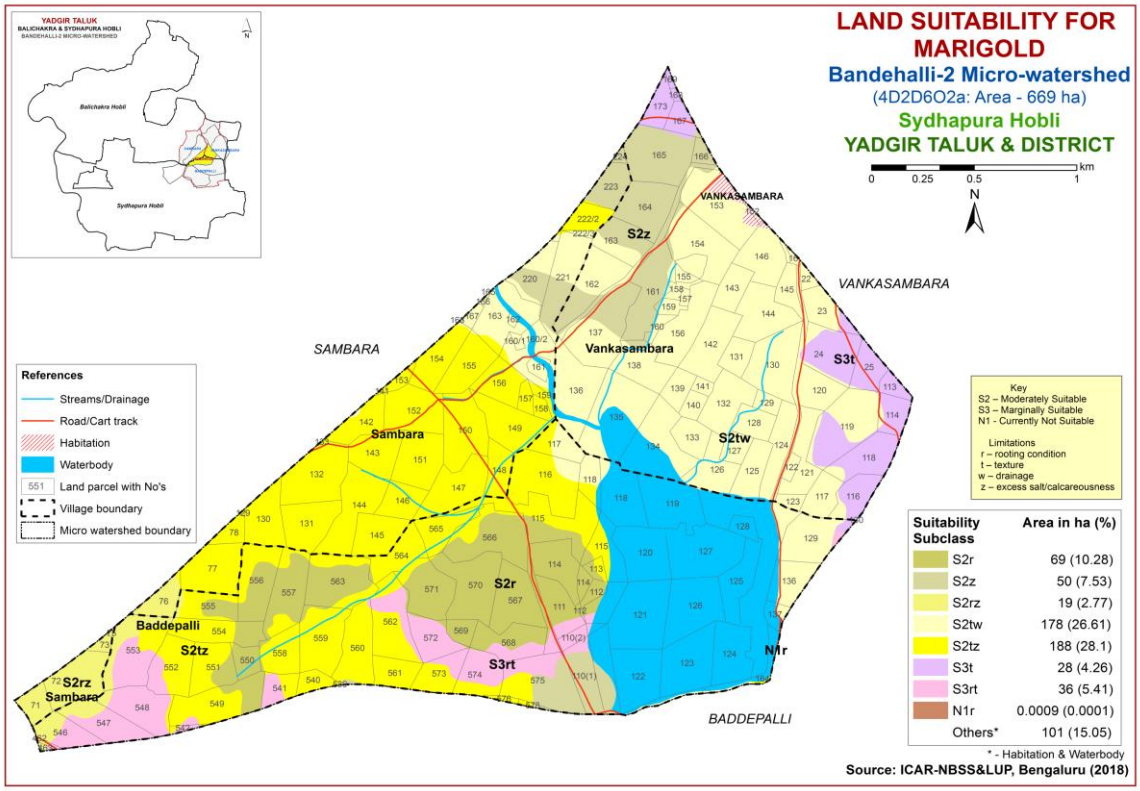


Fig. 7.25 Land Suitability map of Marigold

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 for growing chrysanthemum (Table 7.27) 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 is 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	^{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	

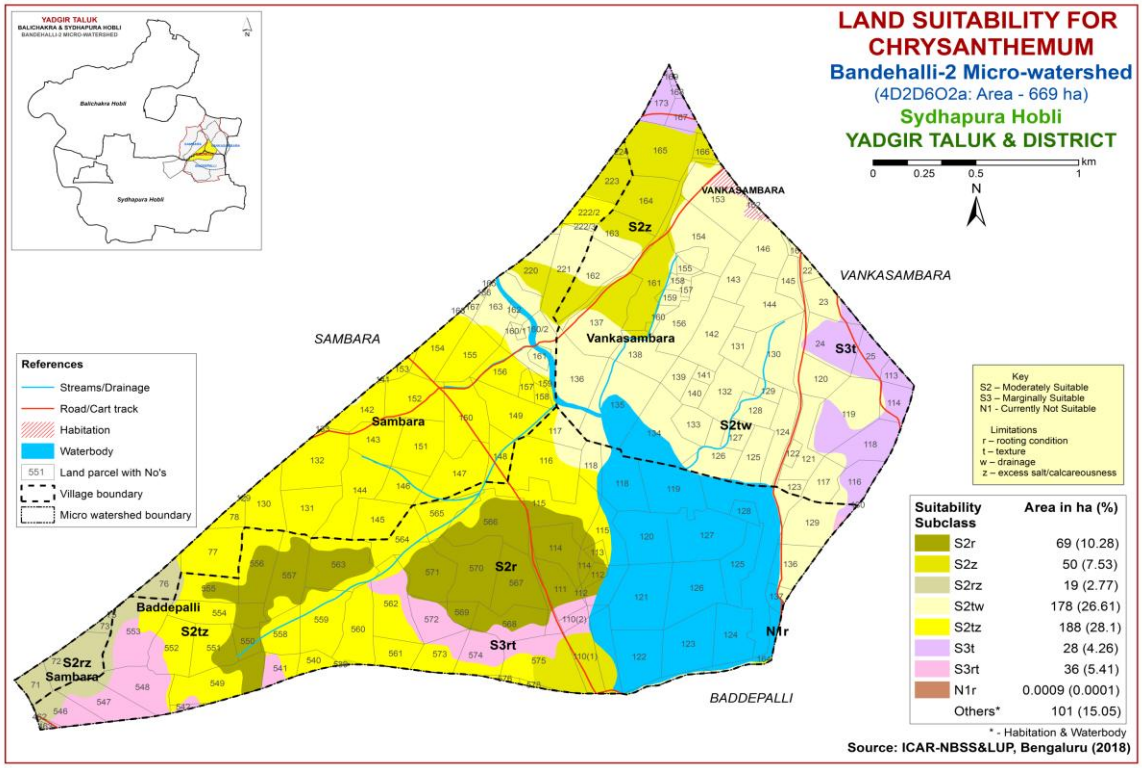


Fig. 7.26 Land Suitability map of Chrysanthemum

There are no highly (Class S1) suitable lands for growing chrysanthemum in the microwatershed. Maximum area of about 504 ha (75%) is moderately suitable (Class S2) and are distributed in the major part of the microwatershed. They have minor limitations of drainage, texture, calcareousness and rooting condition. Marginally suitable lands (Class S3) cover an area of 64 ha (10%) and are distributed in the eastern, northern, southern and southwestern part of the microwatershed. They have moderate limitations of rooting condition and texture. A minor area of <1 ha (<1%) is currently not (Class N1) suitable and are distributed in the southeastern part of the microwatershed with severe limitation of rooting condition.

7.27 Land Management Units (LMUs)

The 18 soil map units identified in Bandehalli-2 microwatershed have been grouped into 7 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. 7.27) has been generated. These Land Management Units are expected to behave similarly for a given level of management.

The 12 soil map units that have been grouped into seven Land Management Units along with brief description of soil and site characteristics are given below.

LMU NO.	Soil Map Unit number	Soil Map Units	Soil and site characteristics
1	34, 35, 126, 148,59, 51, 50	GWDcB2, GWDiB2, HSLhB2, MDGhB2, MDRcB2, ANRbB2g1, BGDbB2	Moderately deep to very deep black calcareous to non calcareous sandy clay to sandy clay loam soils
2	101, 117	NHLmB1, VKSiB2	Deep black calcareous to non calcareous lowland soils
3	42, 47, 49	YDRcB2, NGPbB2, NGPmB2	Deep black sandy loam to loamy sand soils
4	25, 31	DPLcB2, YLRiB2	Moderately shallow red calcareous to non calcareous sandy clay soils
5	11	SBRcB2	Moderately shallow black loamy sand soils
6	2, 4	BDLbB2, BDLhB2	Shallow black clay soils
7	1	BDPiB2	very shallow, black sandy clay soils

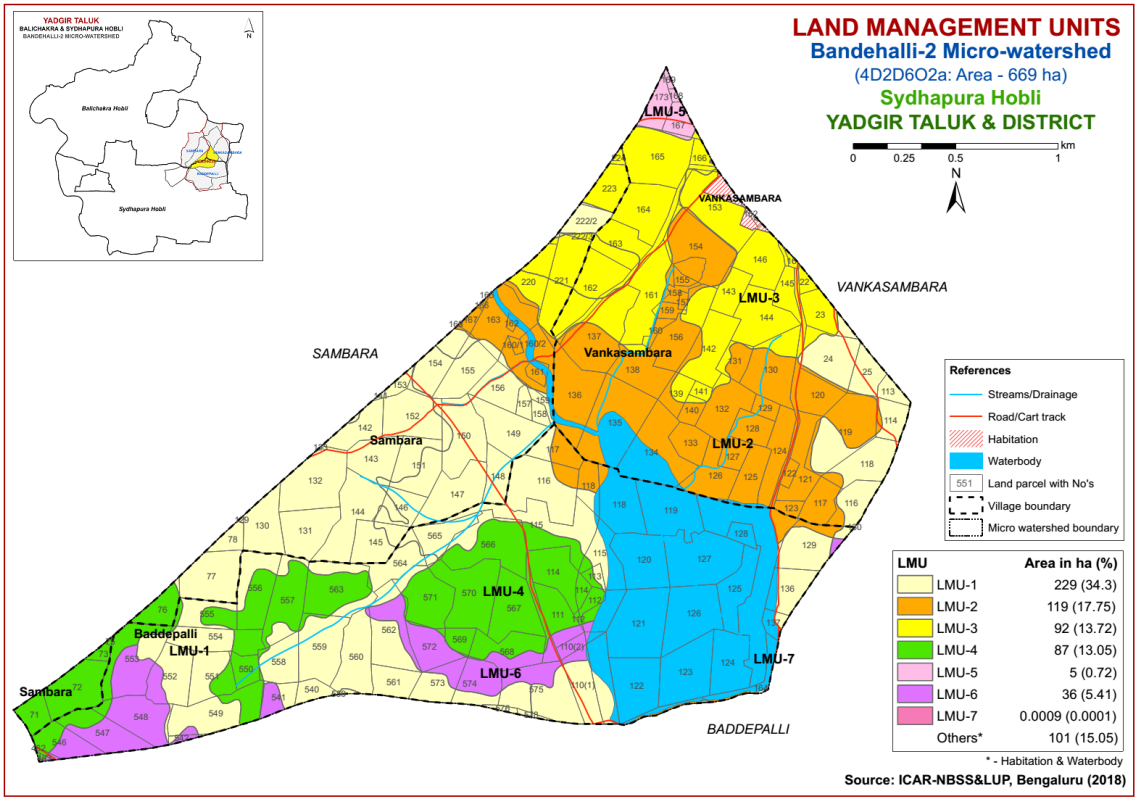


Fig. 7.27 Land Management Units (LMU's) map of Bandehalli-2 microwatershed

7.28 Proposed Crop Plan for Bandehalli-2 microwatershed

After assessing the land suitability for the 26 crops, a proposed crop plan has been prepared for the 7 identified LMUs by considering only the highly (Class S1) and moderately (Class S2) suitable lands for each of the 26 crops. The resultant proposed crop plan is presented in Table 7.28.

Table 7.28 Proposed Crop Plan for Bandehalli-2Micro watershed

Proposed LMU	Soil Map Units	Survey Number	Soil characters	Field Crops	Horticulture Crops	Suitable Interventions
LMU 1 229 ha (34%)	34.GWDcB2 35.GWDiB2 126.HSLhB2 148.MDGhB2 59.MDRcB2 51.ANRbB2g1 50.BGDbB2	**Baddepalli:**110(1),113,115,116, 129,130,136,539,540,549,551,5 52,554,555,558,559,560,561,56 2,564,565, 573,575,576,578 **Sambara:**77,78,129,130,131,13 2,133,141,142,143,144,145,146, 147,148,149,150,151,152,153,1 54,155,156,157,158,159,222/2 **Vankasambara:**24,25,113,114, 116,118	Moderately deep to very deep black calcareous to non calcareous sandy clay to sandy clay loam soils	Sunflower, Sorghum, Maize, Cotton, Bengal gram, Soybean, Safflower, Linseed, Bajra	**Fruit crops:** Lime, Pomegranate, Jamun, Musambi, Tamarind, Amla, Custard apple **Vegetables:** Bhendi, Drumstick, Chilli, Coriander **Flowers:** Marigold, Chrysanthemum	Application of FYM, Biofertilizers and micronutrients, drip irrigation, Mulching, suitable soil and water conservation practices
LMU 2 119 ha (18%)	101.NHLmB1 117.VKSiB2	**Baddepalli :** 117,118 **Sambara:**160/1,160/2,161,162, 163,165,166, 167,168 **Vankasambara:**117,119,120,12 1,122,123,124,125,126,127,128, 129,130,131,132,133,134,135,1 36,137,138,140,154,155,156,15 7,158,159,160	Deep black calcareous to non calcareous lowland soils	Sunflower, Cotton, Bengal gram, Bajra	**Fruit crops:** Lime, Musambi, Amla, Jamun **Vegetables:** Coriander, Drumstick, Chilli **Flowers:** Marigold, Chrysanthemum	Application of FYM, Biofertilizers and micronutrients, suitable soil and water conservation practices
LMU 3 92 ha (14%)	42. YDRcB2 47.NGPbB2 49.NGPmB2	**Sambara:**220,221,222/3,223,22 4 **Vankasambara:**22,23,139,141, 142,143,144,145,146,153,16,16 1,162,163, 164,165,166	Deep black sandy loam to loamy sand soils	Bajra	**Fruit crops:** Amla, Jamun, Custard apple, Tamarind **Vegetables:** Drumstick	Application of FYM, Biofertilizers and micronutrients, drip irrigation, mulching, suitable soil and water conservation practices
LMU 4 87 ha (13%)	25.DPLcB2 31.YLRiB2	**Baddepalli:**111,112,114,462,46 3,550,556,557,563,566,567,568, 569,570, 571	Moderately shallow red calcareous to non	Maize, Sorghum, Groundnut,	**Fruit crops:** Amla, Custard apple **Vegetables:** Tomato,	Drip irrigation, mulching, suitable soil and water

		Sambara : 71,72,73,75,76	calcareous sandy clay soils	Bajra, Red gram	Chilli **Flowers:** Marigold Chrysanthemum	conservation practices (Crescent Bunding with Catch Pit etc)
LMU 5 5 ha (<1%)	11.SBRcB2	**Vankasambara :** 167,168,169,173	Moderately shallow black loamy sand soils	Bajra	**Vegetables:** Onion **Agri-Silvi-Pasture:** Custard apple, Amla**,** Hybrid Napier, *Styloxanthes hamata,* Glyricidia, *Styloxanthes scabra*	Application of FYM, Biofertilizers and micronutrients, drip irrigation, Mulching, suitable soil and water conservation practices
LMU 6 36 ha (5%)	2.BDLbB2 4.BDLhB2	**Baddepalli:**110(2),541,542,546, 547,548, 553,572,574	Shallow black clay soils	Bengal gram, Linseed, Safflower, Coriander	**Agri-Silvi-Pasture:** Hybrid Napier, *Styloxanthes hamata, Styloxanthes scabra*	Use of short duration varieties, sowing across the slope, drip irrigation and mulching is recommended
LMU 7 <1 ha (<1%)	1.BDPiB2	**Baddepalli:** 164	Very shallow, black sandy clay soils	-	Glyricidia, *Styloxanthes hamata, Styloxanthes scabra*	Sowing across the slope, drip irrigation and mulching is recommended

Chapter 8

SOIL HEALTH MANAGEMENT

8.1 Soil Health

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

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

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

The most important characteristics of a healthy soil are

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

Characteristics of Bandehalli-2 microwatershed

- The soil phases with sizeable area identified in the microwatershed belonged to the soil series of Gowdagera (GWD) 188 ha (28%), Vankasambar (VKS) 118 ha (18%), Yalleri (YLR) 69 ha (10%), Nagalapur (NGP) 51 ha (8%), Yadgir (YDR) 41 ha (6%), Badiyala (BDL) 36 ha (5%), Belagundi (BGD) 24 ha (4%), Duppali (DPL) 19 ha (3%), Hosalli (HSL) 10 ha (1%), Mundargi (MDG) 8 ha (1%) Sambra (SBR) 5 ha (1%) and other minor areas in the microwatershed.

- As per land capability classification, entire area comes under arable land category (Class II, III and IV). The major limitations identified in the arable lands were soil and erosion.
- On the basis of soil reaction, about 158 ha (24%) area is neutral (pH 6.5-7.3) followed by slightly alkaline (pH 7.3-7.8) soils of 190 ha (28%). An area of about 220 ha (33%) is moderately alkaline (pH 7.8-8.4) in reaction. Entire area in the microwatershed is 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 cover about 410 ha (61%) area in the microwatershed.

1. Regular addition of organic manure, green manuring, green leaf manuring, crop residue incorporation and mulching needs to be taken up to improve the soil organic matter status.
2. Application of biofertilizers (Azospirullum, 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

Neutral soils occur in about 158 ha (24%) in the microwatershed.

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

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

Soil Degradation

Soil erosion is one of the major factor affecting the soil health in the microwatershed. Out of total 669 ha area in the microwatershed, an area of about 568 ha (85%) is suffering from moderate and 1 ha (<1%) is suffering from slight erosion. The areas with moderate erosion need immediate soil and water conservation and, other land development and land husbandry practices for restoring soil health.

Dissemination of Information and Communication of Benefits

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

Inputs for Net Planning (Saturation Plan) and Interventions needed

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

1. Soil and Water Conservation Treatment 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, radish, potato etc) but not ideal for crops that need stagnant water like lowland paddy. Heavy textured soils are poor in water infiltration and percolation. They are prone for sheet erosion; such soils can be improved by sand mulching. The technology that is developed by the AICRP-Dryland Agriculture, Vijayapura, Karnataka may be adopted.
- **Gravelliness:** More gravel content is favourable for run-off harvesting but poor in soil moisture storage and nutrient availability. It is a significant parameter that decides the kind of crop to be raised.
- **Land Capability Classification:** The land capability map shows the areas suitable and not suitable for agriculture and the major constraints in each of the plot/survey number. Hence, one can decide what kind of enterprise is possible in each of these units. In general, erosion and soil are the major constraints in Bandehalli-2 microwatershed.

- **Organic Carbon:** The OC content (an index of available Nitrogen) is low (<0.5%) in an area of 186 ha (28%), medium (0.5-0.75%) in 196 ha (29%) and about 186 ha (28%) area is high (>0.75%). In the areas of low and medium OC, it needs to be further improved by applying farmyard manure and rotating crops with cereals and legumes or mixed cropping.
- **Promoting green manuring:** Growing of green manuring crops cost 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 382 ha area where OC is less than 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**: In 305 ha (46%) area, the available phosphorus is low and about 221 ha (33%) is medium. Hence for all the crops, 25% additional P-needs to be applied, where it is low or medium in available phosphorus. Available phosphorous is high in 42 ha (6%) in the microwatershed.
- **Available Potassium:** Available potassium is low in 236 ha (35%) and medium in 333 ha (50%) area of the microwatershed. In the low and medium plots, for all crops, additional 25% potassium may be applied.
- **Available Sulphur:** Available sulphur is a very critical nutrient for oilseed crops. It is low in 295 ha (44%) area of the microwatershed and medium in 202 ha (30%). These areas need to be applied with magnesium sulphate or gypsum or Factamphos (p) fertilizer (13% sulphur) for 2-3 years for the deficiency to be corrected. Available sulphur is high in 71 ha (11%) in the microwatershed**.**
- **Available Boron:** It is low in 108 ha (16%) area of the microwatershed and medium in 406 ha (61%). The areas that are low and medium need to be applied with sodium borate @ 10 kg/ha as soil application or 0.2% borax as foliar spray to correct the deficiency. High in area of about 54 ha (8%) in the microwatershed.
- **Available Iron:** It is deficient in 70 ha (10%) area and it is sufficient in 498 ha (75%) area in the microwatershed. To manage iron deficiency, iron sulphate @ 25 ka/ha needs to be applied for 2-3 years.
- **Available Manganese:** Entire area in the microwatershed is sufficient.
- **Available Copper:** It is deficient in 3 ha (<1%) and sufficient in 565 ha (85%) in copper.
- **Available Zinc:** It is deficient in 567 ha (85%) and sufficient in 2 ha (<1%) in available zinc. Application of zinc sulphate @25kg/ha is to be followed.

Soil Alkalinity: The microwatershed has 410 ha area with soils that are alkaline in reaction. 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.

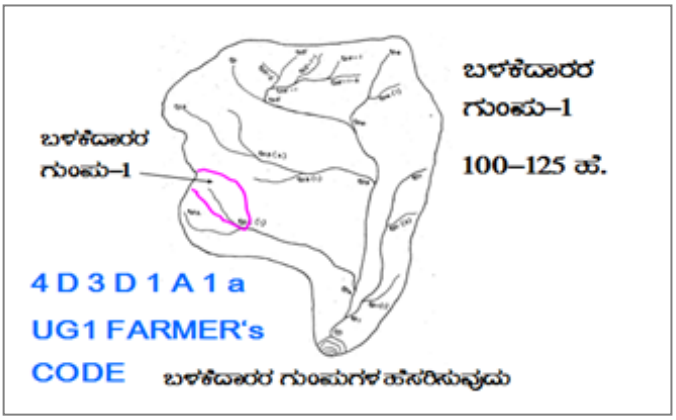
Land Suitability for various crops: Areas that are highly, moderately, marginally suitable and not suitable for growing various crops are indicated. Along with the suitability, various constraints that are limiting the productivity are also indicated. For example, in case of cotton, gravel content, rooting depth and salinity/alkalinity are the major constraints in various plots. With suitable management interventions, the productivity can be enhanced. In order to increase water holding capacity of light textured soils, growing of green manure crops and application of organic manure is recommended.

Chapter 9

SOIL AND WATER CONSERVATION TREATMENT PLAN

For preparing soil and water conservation treatment plan for Bandehalli-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 maps
- Rainfall map
- Hydrology
- Water Resources
- Socio-economic data
- Contour plan with existing features- network of waterways, pothissa boundaries, cut up/ minor terraces etc.
- Cadastral map (1:7920 scale)
- Satellite imagery (1:7920 scale)



Apart from these, Hand Level/ Hydro Marker/ Dumpy Level/ Total Station and *Kathedars'* List needs 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.

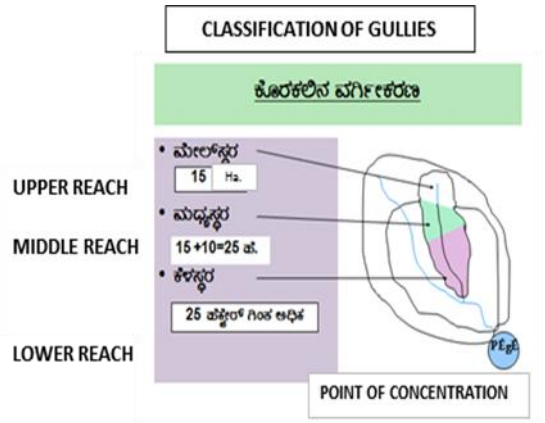
- Naming of user groups and farmers
- Identification of arable and non arable lands
- Identification of drainage lines and gullies
- Identification of non treatable areas
- Identification of priority areas in the arable lands
- Treatment plan for arable lands
- Location of water harvesting and recharge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

9.1 Treatment Plan

The treatment plan recommended for arable lands is briefly described below

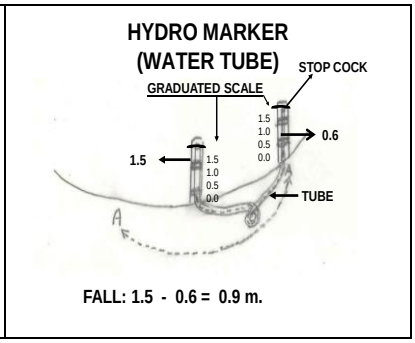
9.1.1 Arable Land Treatment

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.

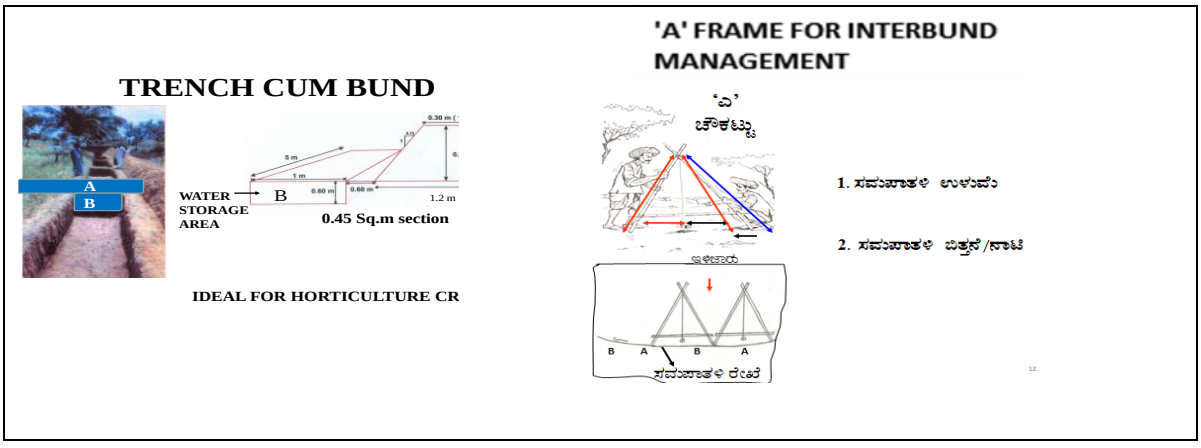
Recommended Bund Section

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 soil	
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

- Existing waterways are marked on the cadastral map (1:7920 scale) and their dimensions are recorded.
- Considering the contour plan of the MWS, additional waterways/ modernization of the existing ones can be thought of.
- The design details are given in the Manual.

C. Farm Ponds

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

D. Diversion Channel

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

9.1.2 Non-Arable Land Treatment

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

9.1.3 Treatment of Natural Water Course/ Drainage Lines

a) The cadastral map has to be updated as regards the network of drainage lines (gullies/ *nalas/ hallas*) and existing structures are marked to the scale and storage capacity of the existing water bodies are documented. (Fig. 9.1)

b) The drainage line will be demarcated into Upper Reach, Middle Reach and Lower Reach.

c) Considering the Catchment, *Nala* bed and bank conditions, suitable structures are decided.

d) Number of storage structures (Check dam/ *Nala* bund/ Percolation tank) will be decided considering the commitments and available runoff in water budgeting and quality of water in the wells and site suitability.

e) Detailed Levelling Survey using Dumpy Level / Total Station has to be carried out to arrive at the site-specific designs as shown in the Manual.

f) The location of ground water recharge structures are decided by examining the lineaments and fracture zones from geological maps.

g) Rainfall intensity data of the nearest Rain Gauge Station is considered for Hydrologic Designs.

h) Silt load to the Storage/Recharge Structures is reduced by providing vegetative, boulder and earthen checks in the natural water course. Location and design details are given in the Manual.

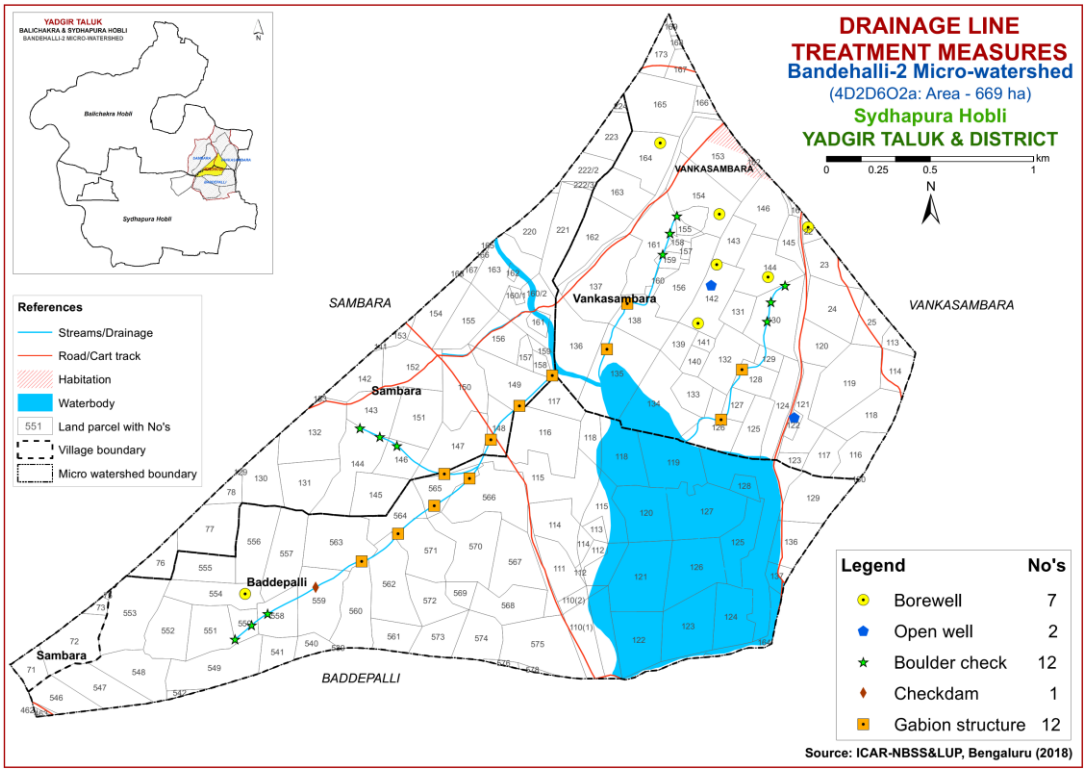


Fig. 9.1 Drainage line treatment map of Bandehalli-2 microwatershed

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. 9.2) showing soil and water conservation plan with the kind of conservation structures recommended has been prepared, which shows the spatial distribution and extent of area. Major area of about 481 ha (72%) requires Graded Bunding and 87 ha (13%) requires Trench cum Bunding. The conservation plan prepared may be presented to all the stakeholders including farmers and after including their suggestions, the conservation plan for the microwatershed may be finalised in a participatory approach.

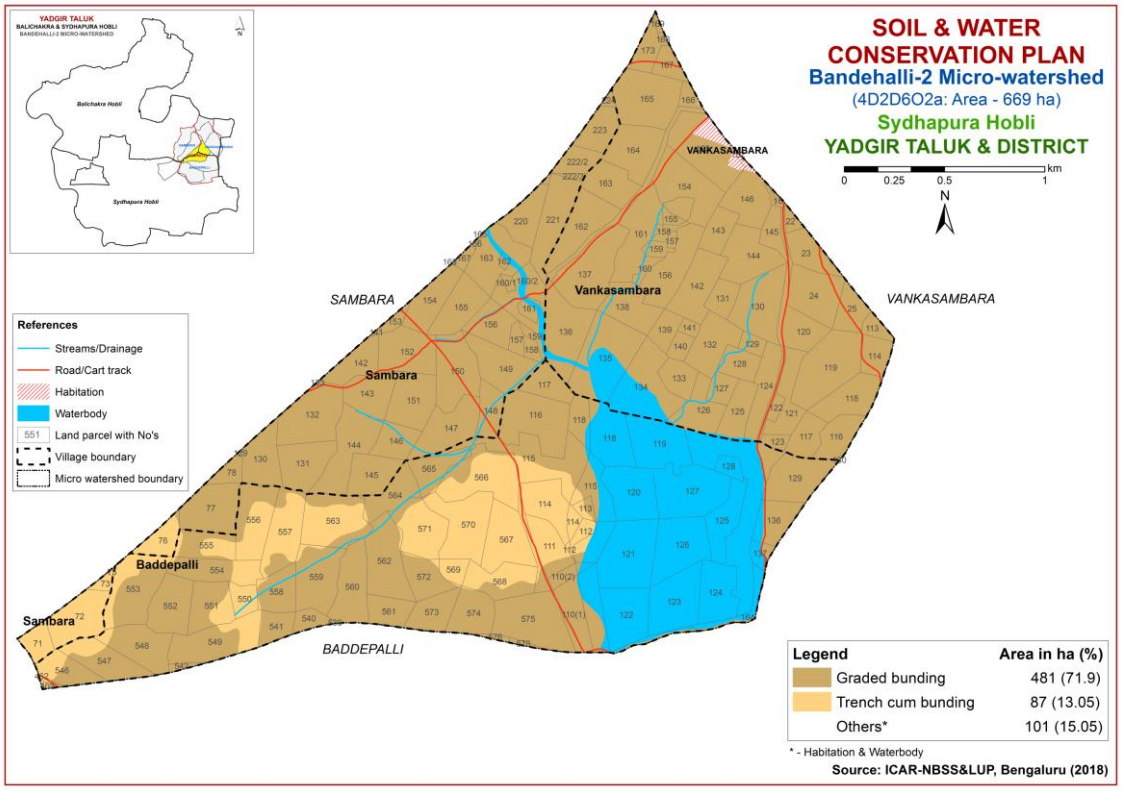


Fig. 9.2 Soil and Water Conservation Plan map of Bandehalli-2 microwatershed

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 Neral (*Sizyzium cumini*) and Bamboo. Dry areas are to be planted with species like Honge, Bevu, Seetaphal *etc*.

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

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Appendix I

Bandehalli-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	110(1)	4.03	HSLhB2	LMU-1	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Scrub land (Sl)	Not Available	IIes	Graded bunding
Baddepalli	110(2)	0.91	BDLbB2	LMU-6	Shallow (25-50 cm)	Loamy sand	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIIes	Graded bunding
Baddepalli	111	3.9	YLRiB2	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)	Not Available	IIes	TCB
Baddepalli	112	0.15	YLRiB2	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	TCB
Baddepalli	112	0.94	YLRiB2	LMU-4	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Scrub land (Sl)	Not Available	IIes	TCB
Baddepalli	113	0.87	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Scrub land (Sl)	Not Available	IIes	Graded bunding
Baddepalli	114	4.66	YLRiB2	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)	Not Available	IIes	TCB
Baddepalli	115	12.42	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Scrub land (Sl)	Not Available	IIes	Graded bunding
Baddepalli	116	8.35	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Scrub land (Sl)	Not Available	IIes	Graded bunding
Baddepalli	117	3.07	VKSiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Scrub land (Sl)	Not Available	IIew	Graded bunding
Baddepalli	118	5.76	Waterbody	Others	Others	Others	Others	Others	Others	Others	Waterbody	Not Available	Others	Others
Baddepalli	119	6.78	Waterbody	Others	Others	Others	Others	Others	Others	Others	Waterbody	Not Available	Others	Others
Baddepalli	120	6.2	Waterbody	Others	Others	Others	Others	Others	Others	Others	Waterbody	Not Available	Others	Others
Baddepalli	121	8.57	Waterbody	Others	Others	Others	Others	Others	Others	Others	Waterbody	Not Available	Others	Others
Baddepalli	122	6.34	Waterbody	Others	Others	Others	Others	Others	Others	Others	Waterbody	Not Available	Others	Others
Baddepalli	123	7.02	Waterbody	Others	Others	Others	Others	Others	Others	Others	Waterbody	Not Available	Others	Others
Baddepalli	124	5.27	Waterbody	Others	Others	Others	Others	Others	Others	Others	Waterbody	Not Available	Others	Others
Baddepalli	125	4.41	Waterbody	Others	Others	Others	Others	Others	Others	Others	Waterbody	Not Available	Others	Others
Baddepalli	126	7.16	Waterbody	Others	Others	Others	Others	Others	Others	Others	Waterbody	Not Available	Others	Others
Baddepalli	127	8.4	Waterbody	Others	Others	Others	Others	Others	Others	Others	Waterbody	Not Available	Others	Others
Baddepalli	128	1.23	Waterbody	Others	Others	Others	Others	Others	Others	Others	Waterbody	Not Available	Others	Others
Baddepalli	129	6.04	MDGhB2	LMU-1	Deep (100-150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy+Scrub land (Pd+Sl)	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
Baddepalli	130	0	BGDbB2	LMU-1	Deep (100-150 cm)	Loamy sand	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Baddepalli	136	3.8	MDGhB2	LMU-1	Deep (100-150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Paddy (Ct+Pd)	Not Available	IIes	Graded bunding
Baddepalli	137	1.22	Waterbody	Others	Others	Others	Others	Others	Others	Others	Redgram (Rg)	Not Available	Others	Others
Baddepalli	164	2.79	Waterbody	Others	Others	Others	Others	Others	Others	Others	Fallow land+Paddy+Scrub land (Fl+Pd+Sl)	Not Available	Others	Others
Baddepalli	462	0.04	DPLcB2	LMU-4	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Greengram+Redgram (Ct+Gg+Rg)	Not Available	IIes	TCB
Baddepalli	463	0.15	DPLcB2	LMU-4	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram+Redgram (Gg+Rg)	Not Available	IIes	TCB
Baddepalli	539	0.01	HSLhB2	LMU-1	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Baddepalli	540	1.58	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Groundnut+Redgram (Ct+Gn+Rg)	Not Available	IIes	Graded bunding
Baddepalli	541	2.4	BDLbB2	LMU-6	Shallow (25-50 cm)	Loamy sand	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	Not Available	IIIes	Graded bunding
Baddepalli	542	0.48	BDLbB2	LMU-6	Shallow (25-50 cm)	Loamy sand	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIIes	Graded bunding
Baddepalli	546	3.54	BDLhB2	LMU-6	Shallow (25-50 cm)	Sandy clay loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	Not Available	IIIes	Graded bunding
Baddepalli	547	5.2	BDLhB2	LMU-6	Shallow (25-50 cm)	Sandy clay loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIIes	Graded bunding
Baddepalli	548	5.76	BDLhB2	LMU-6	Shallow (25-50 cm)	Sandy clay loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Fallow land (Fl)	Not Available	IIIes	Graded bunding
Baddepalli	549	7.46	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Baddepalli	550	1.93	YLRiB2	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)	Not Available	IIes	TCB
Baddepalli	551	4.73	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Baddepalli	552	5.42	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Paddy (Ct+Pd)	Not Available	IIes	Graded bunding
Baddepalli	553	8.3	BDLhB2	LMU-6	Shallow (25-50 cm)	Sandy clay loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Paddy (Ct+Pd)	Not Available	IIIes	Graded bunding
Baddepalli	554	5.08	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	1 Borewell	IIes	Graded bunding
Baddepalli	555	3.97	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Baddepalli	556	6.32	YLRiB2	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)	Not Available	IIes	TCB
Baddepalli	557	6.57	YLRiB2	LMU-4	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram+Scrub land (Rg+Sl)	Not Available	IIes	TCB

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	558	3.87	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Baddepalli	559	6.8	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Scrub land (Sl)	Not Available	IIes	Graded bunding
Baddepalli	560	5.97	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	Not Available	IIes	Graded bunding
Baddepalli	561	2.99	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	Not Available	IIes	Graded bunding
Baddepalli	562	7.27	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut+Redgram (Gn+Rg)	Not Available	IIes	Graded bunding
Baddepalli	563	7.87	YLRiB2	LMU-4	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Fallow land (Fl)	Not Available	IIes	TCB
Baddepalli	564	3.89	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Scrub land (Sl)	Not Available	IIes	Graded bunding
Baddepalli	565	3.51	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Scrub land (Sl)	Not Available	IIes	Graded bunding
Baddepalli	566	8.38	YLRiB2	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)	Not Available	IIes	TCB
Baddepalli	567	6.25	YLRiB2	LMU-4	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Paddy (Ct+Pd)	Not Available	IIes	TCB
Baddepalli	568	5.15	YLRiB2	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 +Scrub land (Ct+Rg+Sl)	Not Available	IIes	TCB
Baddepalli	569	1.52	YLRiB2	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)	Not Available	IIes	TCB
Baddepalli	570	7.67	YLRiB2	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)	Not Available	IIes	TCB
Baddepalli	571	5.97	YLRiB2	LMU-4	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram+Paddy (Gg+Pd)	Not Available	IIes	TCB
Baddepalli	572	3.87	BDLbB2	LMU-6	Shallow (25-50 cm)	Loamy sand	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIIes	Graded bunding
Baddepalli	573	3.7	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Baddepalli	574	4.39	BDLbB2	LMU-6	Shallow (25-50 cm)	Loamy sand	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIIes	Graded bunding
Baddepalli	575	8.62	HSLhB2	LMU-1	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Greengram (Ct+Gg)	Not Available	IIes	Graded bunding
Baddepalli	576	0.36	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Baddepalli	578	0.31	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram+Redgram (Gg+Rg)	Not Available	IIes	Graded bunding
Sambara	71	2.19	DPLcB2	LMU-4	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Groundnut+Redgram (Ct+Gn+Rg)	Not Available	Iies	TCB
Sambara	72	5.87	DPLcB2	LMU-4	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut+Redgram (Gn+Rg)	Not Available	IIes	TCB
Sambara	73	0.66	DPLcB2	LMU-4	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut+Redgram (Gn+Rg)	Not Available	IIes	TCB

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
Sambara	75	0.1	DPLcB2	LMU-4	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram+Groundnut+Paddy (Rg+Gn+Pd)	Not Available	IIes	TCB
Sambara	76	2.74	DPLcB2	LMU-4	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	TCB
Sambara	77	6.24	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	Not Available	IIes	Graded bunding
Sambara	78	1.55	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	Not Available	IIes	Graded bunding
Sambara	129	0.06	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Sambara	130	4.83	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	Not Available	IIes	Graded bunding
Sambara	131	5.43	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar+Redgram (Jw+Rg)	Not Available	IIes	Graded bunding
Sambara	132	7.7	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Sambara	133	0.04	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Groundnut+Redgram (Ct+Gn+Rg)	Not Available	IIes	Graded bunding
Sambara	141	0.1	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Fallow land (Fl)	Not Available	IIes	Graded bunding
Sambara	142	3.66	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	Not Available	IIes	Graded bunding
Sambara	143	4.63	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	Not Available	IIes	Graded bunding
Sambara	144	7.09	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar+Redgram (Jw+Rg)	Not Available	IIes	Graded bunding
Sambara	145	4.4	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	Not Available	IIes	Graded bunding
Sambara	146	3.22	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Fallow land (Fl)	Not Available	IIes	Graded bunding
Sambara	147	6.16	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Sambara	148	3	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	Not Available	IIes	Graded bunding
Sambara	149	5.69	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Fallow land (Fl)	Not Available	IIes	Graded bunding
Sambara	150	6.9	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	Not Available	IIes	Graded bunding
Sambara	151	5.74	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Fallow land (Fl)	Not Available	IIes	Graded bunding
Sambara	152	6	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	Not Available	IIes	Graded bunding
Sambara	153	0.9	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Sambara	154	4.62	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Fallow land (Fl)	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
Sambara	155	4.75	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	Graded bunding
Sambara	156	3.76	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar+Paddy (Jw+Pd)	Not Available	IIes	Graded bunding
Sambara	157	0.99	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIes	Graded bunding
Sambara	158	0.81	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIes	Graded bunding
Sambara	159	0.76	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIes	Graded bunding
Sambara	160/1	0.39	VKSiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIew	Graded bunding
Sambara	160/2	4.73	VKSiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Fallow land (Fl)	Not Available	IIew	Graded bunding
Sambara	161	0.98	VKSiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIew	Graded bunding
Sambara	162	0.31	VKSiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIew	Graded bunding
Sambara	163	6.23	VKSiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Fallow land (Fl)	Not Available	IIew	Graded bunding
Sambara	165	0.04	VKSiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIew	Graded bunding
Sambara	166	0.11	VKSiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIew	Graded bunding
Sambara	167	0.64	VKSiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIew	Graded bunding
Sambara	168	0.03	VKSiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIew	Graded bunding
Sambara	220	3.94	YDRcB2	LMU-3	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Sambara	221	6.11	NGPmB2	LMU-3	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut+Paddy (Gn+Pd)	Not Available	IIes	Graded bunding
Sambara	222/2	2.51	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	Not Available	IIes	Graded bunding
Sambara	222/3	0.35	NGPmB2	LMU-3	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
Sambara	223	3.33	YDRcB2	LMU-3	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram+Cotton +Jowar (Rg+Ct+Jw)	Not Available	IIes	Graded bunding
Sambara	224	0.36	YDRcB2	LMU-3	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Vankasambara	16	0.3	NGPbB2	LMU-3	Deep (100-150 cm)	Loamy sand	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	Graded bunding
Vankasambara	22	0.73	NGPbB2	LMU-3	Deep (100-150 cm)	Loamy sand	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	1 Borewell	IIes	Graded bunding
Vankasambara	23	3.44	NGPbB2	LMU-3	Deep (100-150 cm)	Loamy sand	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Onion+Paddy+Redgram (On+Pd+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
Vankasambara	24	6.08	BGDbB2	LMU-1	Deep (100-150 cm)	Loamy sand	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram+Paddy+Redgram (Gg+Pd+Rg)	Not Available	IIes	Graded bunding
Vankasambara	25	2.86	BGDbB2	LMU-1	Deep (100-150 cm)	Loamy sand	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Vankasambara	113	1.26	BGDbB2	LMU-1	Deep (100-150 cm)	Loamy sand	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar+Redgram (Jw+Rg)	Not Available	IIes	Graded bunding
Vankasambara	114	2.66	BGDbB2	LMU-1	Deep (100-150 cm)	Loamy sand	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Vankasambara	116	3.52	BGDbB2	LMU-1	Deep (100-150 cm)	Loamy sand	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Vankasambara	117	2.99	VKSiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIew	Graded bunding
Vankasambara	118	4.98	BGDbB2	LMU-1	Deep (100-150 cm)	Loamy sand	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	Not Available	IIes	Graded bunding
Vankasambara	119	8.83	VKSiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Jowar+Redgram (Ct+Jw+Rg)	Not Available	IIew	Graded bunding
Vankasambara	120	3.48	VKSiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIew	Graded bunding
Vankasambara	121	4.13	VKSiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIew	Graded bunding
Vankasambara	122	0.69	VKSiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	1 Open well	IIew	Graded bunding
Vankasambara	123	0.89	VKSiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIew	Graded bunding
Vankasambara	124	4.22	VKSiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Fallow land+Redgram (Fl+Rg)	Not Available	IIew	Graded bunding
Vankasambara	125	3.63	VKSiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	Not Available	IIew	Graded bunding
Vankasambara	126	4.44	VKSiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy+Redgram (Pd+Rg)	Not Available	IIew	Graded bunding
Vankasambara	127	1.8	VKSiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIew	Graded bunding
Vankasambara	128	2.67	VKSiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIew	Graded bunding
Vankasambara	129	1.15	VKSiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIew	Graded bunding
Vankasambara	130	7.06	VKSiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut+Jowar (Gn+Jw)	Not Available	IIew	Graded bunding
Vankasambara	131	2.23	VKSiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar+Redgram (Jw+Rg)	Not Available	IIew	Graded bunding
Vankasambara	132	5.19	VKSiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar+Redgram (Jw+Rg)	Not Available	IIew	Graded bunding
Vankasambara	133	2.74	VKSiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	Not Available	IIew	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
Vankasambara	134	8.57	VKSiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy+Redgram (Pd+Rg)	Not Available	IIew	Graded bunding
Vankasambara	135	10.14	VKSiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Fallow land+Paddy (Ct+Fl+Pd)	Not Available	IIew	Graded bunding
Vankasambara	136	7.54	VKSiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	Not Available	IIew	Graded bunding
Vankasambara	137	8.66	VKSiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	Not Available	IIew	Graded bunding
Vankasambara	138	4.9	VKSiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Fallow land (Ct+Fl)	Not Available	IIew	Graded bunding
Vankasambara	139	2.13	NGPbB2	LMU-3	Deep (100-150 cm)	Loamy sand	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIes	Graded bunding
Vankasambara	140	1.31	VKSiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIew	Graded bunding
Vankasambara	141	0.7	NGPbB2	LMU-3	Deep (100-150 cm)	Loamy sand	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	Graded bunding
Vankasambara	142	5.81	NGPbB2	LMU-3	Deep (100-150 cm)	Loamy sand	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Jowar+Redgram (Ct+Jw+Rg)	2 Borewell,1 Open well	IIes	Graded bunding
Vankasambara	143	2.83	NGPbB2	LMU-3	Deep (100-150 cm)	Loamy sand	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	Graded bunding
Vankasambara	144	5.96	NGPbB2	LMU-3	Deep (100-150 cm)	Loamy sand	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	1 Borewell	IIes	Graded bunding
Vankasambara	145	2.03	NGPbB2	LMU-3	Deep (100-150 cm)	Loamy sand	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	Graded bunding
Vankasambara	146	5	NGPbB2	LMU-3	Deep (100-150 cm)	Loamy sand	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Vankasambara	152	0.25	Habitation	Others	Others	Others	Others	Others	Others	Others	Not Available (NA)	Not Available	Others	Others
Vankasambara	153	8.46	NGPbB2	LMU-3	Deep (100-150 cm)	Loamy sand	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	Not Available	IIes	Graded bunding
Vankasambara	154	7.1	VKSiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	1 Borewell	IIew	Graded bunding
Vankasambara	155	0.58	VKSiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIew	Graded bunding
Vankasambara	156	6.23	VKSiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar+Redgram (Jw+Rg)	Not Available	IIew	Graded bunding
Vankasambara	157	0.36	VKSiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut (Gn)	Not Available	IIew	Graded bunding
Vankasambara	158	0.75	VKSiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIew	Graded bunding
Vankasambara	159	0.95	VKSiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIew	Graded bunding
Vankasambara	160	0.76	VKSiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIew	Graded bunding
Vankasambara	161	6.66	YDRcB2	LMU-3	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Paddy+Ragi (Ct+Pd+Ra)	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
Vankasambara	162	6.04	NGPmB2	LMU-3	Deep (100-150 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
Vankasambara	163	4.24	YDRcB2	LMU-3	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	Not Available	IIes	Graded bunding
Vankasambara	164	5.93	YDRcB2	LMU-3	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	1 Borewell	IIes	Graded bunding
Vankasambara	165	8.08	YDRcB2	LMU-3	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Groundnut (Ct+Gn)	Not Available	IIes	Graded bunding
Vankasambara	166	0.99	YDRcB2	LMU-3	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	Graded bunding
Vankasambara	167	1.83	SBRcB2	LMU-5	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Vankasambara	168	0.24	SBRcB2	LMU-5	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	Graded bunding
Vankasambara	169	0.25	SBRcB2	LMU-5	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Jowar+Redgram (Ct+Jw+Rg)	Not Available	IIes	Graded bunding
Vankasambara	173	2.38	SBRcB2	LMU-5	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar+Redgram (Jw+Rg)	Not Available	IIes	Graded bunding

Appendix II

Bandehalli-2 Microwatershed

Soil Fertility Information

Village	Survey NO	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Baddepalli	110(1)	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	110(2)	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	111	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	112	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	112	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	113	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	114	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	115	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	116	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	117	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)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	118	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Baddepalli	119	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Baddepalli	120	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Baddepalli	121	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Baddepalli	122	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Baddepalli	123	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Baddepalli	124	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Baddepalli	125	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Baddepalli	126	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Baddepalli	127	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Baddepalli	128	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Baddepalli	129	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	130	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)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	136	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (< 0.5 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	137	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Baddepalli	164	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Baddepalli	462	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Low (< 23 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 (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	463	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Low (< 23 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 (> 0.2 ppm)	Deficient (< 0.6 ppm)

Village	Survey NO	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Baddepalli	539	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	540	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	541	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	542	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	546	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	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 (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	547	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	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 (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	548	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	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 (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	549	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	550	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	551	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	552	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	553	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	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 (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	554	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	555	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	556	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	557	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	558	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	559	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	560	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	561	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	562	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	563	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	564	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	565	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)

Village	Survey NO	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Baddepalli	566	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	567	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	568	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	569	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	570	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	571	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	572	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	573	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	574	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	575	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	576	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	578	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sambara	71	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	High (> 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sambara	72	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	High (> 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sambara	73	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Sambara	75	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Sambara	76	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)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sambara	77	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sambara	78	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sambara	129	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sambara	130	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sambara	131	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sambara	132	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sambara	133	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)

Village	Survey NO	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Sambara	141	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 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 (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sambara	142	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sambara	143	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	High (> 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sambara	144	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sambara	145	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sambara	146	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sambara	147	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (< 0.5 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sambara	148	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	High (> 20 ppm)	High (> 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sambara	149	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	High (> 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sambara	150	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	High (> 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sambara	151	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	High (> 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sambara	152	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	High (> 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sambara	153	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 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 (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sambara	154	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)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sambara	155	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)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sambara	156	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 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 (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sambara	157	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 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 (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sambara	158	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)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sambara	159	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 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 (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sambara	160/1	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)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sambara	160/2	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)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sambara	161	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 (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sambara	162	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)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sambara	163	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)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)

Village	Survey NO	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Sambara	165	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)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sambara	166	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)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sambara	167	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)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sambara	168	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)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sambara	220	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)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sambara	221	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (< 0.5 %)	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 (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sambara	222/2	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (< 0.5 %)	Low (< 23 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 (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sambara	222/3	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (< 0.5 %)	Low (< 23 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 (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sambara	223	Slightly alkaline (pH 7.3 – 7.8)	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)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sambara	224	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 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 (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	16	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	High (> 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	22	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	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 (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	23	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	High (> 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	24	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	25	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 (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	113	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 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 (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	114	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 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 (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	116	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)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	117	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	118	Slightly alkaline (pH 7.3 – 7.8)	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 (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	119	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	120	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	121	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	122	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)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)

Village	Survey NO	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Vankasambara	123	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	124	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)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	125	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)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	126	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)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	127	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)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	128	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)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	129	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)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	130	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	131	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (< 0.5 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	132	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)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	133	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 (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	134	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)	Others	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	135	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)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	136	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)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	137	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	138	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)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	139	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)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	140	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)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	141	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)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	142	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)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	143	Slightly alkaline (pH 7.3 – 7.8)	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)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	144	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Low (< 23 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 (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	145	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	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 (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	146	Slightly alkaline (pH 7.3 – 7.8)	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)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)

Village	Survey NO	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Vankasambara	152	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Vankasambara	153	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	154	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	155	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)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	156	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	157	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)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	158	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)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	159	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	160	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	161	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)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	162	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)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	163	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (< 0.5 %)	Low (< 23 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 (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	164	Slightly alkaline (pH 7.3 – 7.8)	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)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	165	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	166	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	167	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	168	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	169	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Vankasambara	173	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)

Appendix III

Bandehalli-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	110(1)	S3rz	S3tz	S2rz	S2tz	S2rz	S3tz	S3rz	S2rz	S3tz	S2rz	S2rz	S2tz	S2rz	S2z	N1tz	S3rz	S2rz	S2z	S2z	S2z	S2z	S2z	S2rz	S2z	S2rz	S2rz
Baddepalli	110(2)	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
Baddepalli	111	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Baddepalli	112	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Baddepalli	112	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Baddepalli	113	S3rz	S2tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Baddepalli	114	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Baddepalli	115	S3rz	S2tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Baddepalli	116	S3rz	S2tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Baddepalli	117	S3tw	S2tw	S3tw	S1	S3tw	S1	S2tw	S2zw	S1	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Baddepalli	118	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Baddepalli	119	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Baddepalli	120	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Baddepalli	121	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Baddepalli	122	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Baddepalli	123	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Baddepalli	124	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Baddepalli	125	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Baddepalli	126	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Baddepalli	127	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Baddepalli	128	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Baddepalli	129	S2r	S2tw	S3t	S1	S3t	S1	S2t	S2z	S1	S1	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2t	S2tw	S3tw
Baddepalli	130	S3t	S2t	S3t	S3t	S3t	N1t	S3t	S1	N1t	N1t	S3t	S3t	S3t	S3t	S3t	S3t	S1	S3t	S3t	S3t	S3t	S3t	S3t	S2t	S3t	S3t
Baddepalli	136	S2r	S2tw	S3t	S1	S3t	S1	S2t	S2z	S1	S1	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2t	S2tw	S3tw
Baddepalli	137	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others

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	164	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Baddepalli	462	N1rz	S2rz	S3rz	S2rz	S3rz	S2rz	N1rz	S3rz	S2rz	S3rz	S3rz	S2rz	S3rz	S2rz	S3rz	S3rz	S3rz	S2rz	S2rz	S2rz	S2rz	S2rz	S3rz	S2rz	S3rz	S3rz
Baddepalli	463	N1rz	S2rz	S3rz	S2rz	S3rz	S2rz	N1rz	S3rz	S2rz	S3rz	S3rz	S2rz	S3rz	S2rz	S3rz	S3rz	S3rz	S2rz	S2rz	S2rz	S2rz	S2rz	S3rz	S2rz	S3rz	S3rz
Baddepalli	539	S3rz	S3tz	S2rz	S2tz	S2rz	S3tz	S3rz	S2rz	S3tz	S2rz	S2rz	S2tz	S2rz	S2z	N1tz	S3rz	S2rz	S2z	S2z	S2z	S2z	S2z	S2rz	S2z	S2rz	S2rz
Baddepalli	540	S3rz	S2tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Baddepalli	541	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
Baddepalli	542	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
Baddepalli	546	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
Baddepalli	547	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
Baddepalli	548	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
Baddepalli	549	S3rz	S2tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Baddepalli	550	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Baddepalli	551	S3rz	S2tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Baddepalli	552	S3rz	S2tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Baddepalli	553	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
Baddepalli	554	S3rz	S2tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Baddepalli	555	S3rz	S2tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Baddepalli	556	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Baddepalli	557	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Baddepalli	558	S3rz	S2tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Baddepalli	559	S3rz	S2tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Baddepalli	560	S3rz	S2tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Baddepalli	561	S3rz	S2tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Baddepalli	562	S3rz	S2tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Baddepalli	563	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Baddepalli	564	S3rz	S2tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Baddepalli	565	S3rz	S2tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Baddepalli	566	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r

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	567	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Baddepalli	568	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Baddepalli	569	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Baddepalli	570	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Baddepalli	571	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Baddepalli	572	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
Baddepalli	573	S3rz	S2tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Baddepalli	574	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
Baddepalli	575	S3rz	S3tz	S2rz	S2tz	S2rz	S3tz	S3rz	S2rz	S3tz	S2rz	S2rz	S2tz	S2rz	S2z	N1tz	S3rz	S2rz	S2z	S2z	S2z	S2z	S2z	S2rz	S2z	S2rz	S2rz
Baddepalli	576	S3rz	S2tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Baddepalli	578	S3rz	S2tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Sambara	71	N1rz	S2rz	S3rz	S2rz	S3rz	S2rz	N1rz	S3rz	S2rz	S3rz	S3rz	S2rz	S3rz	S2rz	S3rz	S3rz	S3rz	S2rz	S2rz	S2rz	S2rz	S2rz	S3rz	S2rz	S3rz	S3rz
Sambara	72	N1rz	S2rz	S3rz	S2rz	S3rz	S2rz	N1rz	S3rz	S2rz	S3rz	S3rz	S2rz	S3rz	S2rz	S3rz	S3rz	S3rz	S2rz	S2rz	S2rz	S2rz	S2rz	S3rz	S2rz	S3rz	S3rz
Sambara	73	N1rz	S2rz	S3rz	S2rz	S3rz	S2rz	N1rz	S3rz	S2rz	S3rz	S3rz	S2rz	S3rz	S2rz	S3rz	S3rz	S3rz	S2rz	S2rz	S2rz	S2rz	S2rz	S3rz	S2rz	S3rz	S3rz
Sambara	75	N1rz	S2rz	S3rz	S2rz	S3rz	S2rz	N1rz	S3rz	S2rz	S3rz	S3rz	S2rz	S3rz	S2rz	S3rz	S3rz	S3rz	S2rz	S2rz	S2rz	S2rz	S2rz	S3rz	S2rz	S3rz	S3rz
Sambara	76	N1rz	S2rz	S3rz	S2rz	S3rz	S2rz	N1rz	S3rz	S2rz	S3rz	S3rz	S2rz	S3rz	S2rz	S3rz	S3rz	S3rz	S2rz	S2rz	S2rz	S2rz	S2rz	S3rz	S2rz	S3rz	S3rz
Sambara	77	S3rz	S3tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S2zw	N1tw	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Sambara	78	S3rz	S3tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S2zw	N1tw	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Sambara	129	S3rz	S3tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S2zw	N1tw	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Sambara	130	S3rz	S3tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S2zw	N1tw	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Sambara	131	S3rz	S3tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S2zw	N1tw	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Sambara	132	S3rz	S3tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S2zw	N1tw	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Sambara	133	S3rz	S3tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S2zw	N1tw	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Sambara	141	S3rz	S3tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S2zw	N1tw	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Sambara	142	S3rz	S3tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S2zw	N1tw	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Sambara	143	S3rz	S3tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S2zw	N1tw	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Sambara	144	S3rz	S3tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S2zw	N1tw	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Sambara	145	S3rz	S3tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S2zw	N1tw	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz

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
Sambara	146	S3rz	S3tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S2zw	N1tw	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Sambara	147	S3rz	S3tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S2zw	N1tw	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Sambara	148	S3rz	S3tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S2zw	N1tw	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Sambara	149	S3rz	S3tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S2zw	N1tw	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Sambara	150	S3rz	S3tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S2zw	N1tw	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Sambara	151	S3rz	S3tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S2zw	N1tw	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Sambara	152	S3rz	S3tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S2zw	N1tw	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Sambara	153	S3rz	S3tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S2zw	N1tw	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Sambara	154	S3rz	S3tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S2zw	N1tw	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Sambara	155	S3rz	S3tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S2zw	N1tw	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Sambara	156	S3rz	S3tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S2zw	N1tw	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Sambara	157	S3rz	S3tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S2zw	N1tw	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Sambara	158	S3rz	S3tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S2zw	N1tw	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Sambara	159	S3rz	S3tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S2zw	N1tw	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Sambara	160/1	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Sambara	160/2	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Sambara	161	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Sambara	162	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Sambara	163	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Sambara	165	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Sambara	166	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Sambara	167	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Sambara	168	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Sambara	220	S3tz	S3tz	S2tz	S3tz	S2tz	N1tz	S2rt	S2z	N1tz	S3tz	S2tz	S3tz	S3tz	S3tz	S3tz	S2rz	S2tz	S2tz	S2tz	S2z	S2z	S2z	S2tz	S2z	S2tz	S3tz
Sambara	221	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S2tw	S2tw	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S3tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Sambara	222/2	S3rz	S3tz	S3tz	S2wz	S3tz	S2rz	S3rz	S2rz	S2wz	S2rz	S2rz	S2zw	S3tz	S2zw	N1tw	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Sambara	222/3	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S2tw	S2tw	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S3tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Sambara	223	S3tz	S3tz	S2tz	S3tz	S2tz	N1tz	S2rt	S2z	N1tz	S3tz	S2tz	S3tz	S3tz	S3tz	S3tz	S2rz	S2tz	S2tz	S2tz	S2z	S2z	S2z	S2tz	S2z	S2tz	S3tz

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
Sambara	224	S3tz	S3tz	S2tz	S3tz	S2tz	N1tz	S2rt	S2z	N1tz	S3tz	S2tz	S3tz	S3tz	S3tz	S3tz	S2rz	S2tz	S2tz	S2tz	S2z	S2z	S2z	S2tz	S2z	S2tz	S3tz
Vankasambara	16	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S2tw	S2tw	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S3tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Vankasambara	22	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S2tw	S2tw	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S3tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Vankasambara	23	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S2tw	S2tw	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S3tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Vankasambara	24	S3t	S3t	S3t	S3t	S3t	N1t	S3t	S3t	N1t	N1t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S2t	S3t	S3t
Vankasambara	25	S3t	S3t	S3t	S3t	S3t	N1t	S3t	S3t	N1t	N1t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S2t	S3t	S3t
Vankasambara	113	S3t	S3t	S3t	S3t	S3t	N1t	S3t	S3t	N1t	N1t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S2t	S3t	S3t
Vankasambara	114	S3t	S3t	S3t	S3t	S3t	N1t	S3t	S3t	N1t	N1t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S2t	S3t	S3t
Vankasambara	116	S3t	S3t	S3t	S3t	S3t	N1t	S3t	S3t	N1t	N1t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S2t	S3t	S3t
Vankasambara	117	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Vankasambara	118	S3t	S3t	S3t	S3t	S3t	N1t	S3t	S3t	N1t	N1t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S3t	S2t	S3t	S3t
Vankasambara	119	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Vankasambara	120	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Vankasambara	121	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Vankasambara	122	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Vankasambara	123	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Vankasambara	124	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Vankasambara	125	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Vankasambara	126	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Vankasambara	127	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Vankasambara	128	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Vankasambara	129	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Vankasambara	130	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Vankasambara	131	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Vankasambara	132	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Vankasambara	133	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Vankasambara	134	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Vankasambara	135	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	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
Vankasambara	136	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Vankasambara	137	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Vankasambara	138	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Vankasambara	139	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S2tw	S2tw	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S3tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Vankasambara	140	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Vankasambara	141	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S2tw	S2tw	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S3tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Vankasambara	142	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S2tw	S2tw	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S3tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Vankasambara	143	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S2tw	S2tw	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S3tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Vankasambara	144	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S2tw	S2tw	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S3tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Vankasambara	145	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S2tw	S2tw	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S3tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Vankasambara	146	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S2tw	S2tw	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S3tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Vankasambara	152	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Vankasambara	153	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S2tw	S2tw	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S3tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Vankasambara	154	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Vankasambara	155	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Vankasambara	156	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Vankasambara	157	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Vankasambara	158	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Vankasambara	159	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Vankasambara	160	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Vankasambara	161	S3tz	S3tz	S2tz	S3tz	S2tz	N1tz	S2rt	S2z	N1tz	S3tz	S2tz	S3tz	S3tz	S3tz	S3tz	S2rz	S2tz	S2tz	S2tz	S2z	S2z	S2z	S2tz	S2z	S2tz	S3tz
Vankasambara	162	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S2tw	S2tw	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S3tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Vankasambara	163	S3tz	S3tz	S2tz	S3tz	S2tz	N1tz	S2rt	S2z	N1tz	S3tz	S2tz	S3tz	S3tz	S3tz	S3tz	S2rz	S2tz	S2tz	S2tz	S2z	S2z	S2z	S2tz	S2z	S2tz	S3tz
Vankasambara	164	S3tz	S3tz	S2tz	S3tz	S2tz	N1tz	S2rt	S2z	N1tz	S3tz	S2tz	S3tz	S3tz	S3tz	S3tz	S2rz	S2tz	S2tz	S2tz	S2z	S2z	S2z	S2tz	S2z	S2tz	S3tz
Vankasambara	165	S3tz	S3tz	S2tz	S3tz	S2tz	N1tz	S2rt	S2z	N1tz	S3tz	S2tz	S3tz	S3tz	S3tz	S3tz	S2rz	S2tz	S2tz	S2tz	S2z	S2z	S2z	S2tz	S2z	S2tz	S3tz
Vankasambara	166	S3tz	S3tz	S2tz	S3tz	S2tz	N1tz	S2rt	S2z	N1tz	S3tz	S2tz	S3tz	S3tz	S3tz	S3tz	S2rz	S2tz	S2tz	S2tz	S2z	S2z	S2z	S2tz	S2z	S2tz	S3tz
Vankasambara	167	N1r	S3t	S3rt	S3t	S3rt	N1t	N1r	S3rt	N1t	S3t	S3t	S3t	S3rt	S3t	S3rt	S3rt	S3rt	S3t	S3t	S3t	S3t	S3t	S3rt	S3t	S3t	S3t
Vankasambara	168	N1r	S3t	S3rt	S3t	S3rt	N1t	N1r	S3rt	N1t	S3t	S3t	S3t	S3rt	S3t	S3rt	S3rt	S3rt	S3t	S3t	S3t	S3t	S3t	S3rt	S3t	S3t	S3t

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
Vankasambara	169	N1r	S3t	S3rt	S3t	S3rt	N1t	N1r	S3rt	N1t	S3t	S3t	S3t	S3rt	S3t	S3rt	S3rt	S3rt	S3t	S3t	S3t	S3t	S3t	S3rt	S3t	S3t	S3t
Vankasambara	173	N1r	S3t	S3rt	S3t	S3rt	N1t	N1r	S3rt	N1t	S3t	S3t	S3t	S3rt	S3t	S3rt	S3rt	S3rt	S3t	S3t	S3t	S3t	S3t	S3rt	S3t	S3t	S3t

PART-B

SOCIO-ECONOMIC STATUS OF FARM HOUSEHOLDS

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Chapter 1

SALIENT FINDINGS OF THE SURVEY

- *The data on households sampled for socio economic survey indicated that 35 farmers were sampled in Bandehalli-2 micro-watershed among them 5 (14.29 %) were landless, 8 (22.86 %) were marginal farmers, 18 (51.43 %) were small farmers and 4 (11.43 %) were semi medium farmers.*
- *The data indicated that there were 94 (53.71 %) men and 81 (46.29 %) women among the sampled households. The average family size of landless farmers' was 4.6, marginal farmers' was 4.62, small farmers' was 5.16 and semi medium farmers' was 5.5.*
- *The data indicated that, 44 (25.14 %) people were in 0-15 years of age, 78 (44.57 %) were in 16-35 years of age, 41 (23.43 %) were in 36-60 years of age and 12 (6.86 %) were above 61 years of age.*
- *The results indicated that Bandehalli-2 had 54.86 per cent illiterates, 20.57 per cent of them had primary school, 4 per cent of them had middle school, 8.57 per cent of them had high school education, 4 per cent of them had PUC, 0.57 per cent of them had Diploma and ITI and 3.43 per cent of them had Degree education and 1.14 per cent of them had masters.*
- *The results indicate that, 94.29 per cent of household heads were practicing agriculture and 8.57 per cent of the household heads were agricultural labourers.*
- *The results indicate that agriculture was the major occupation for 20 per cent of the household members, 49.71 per cent were agricultural labourers, 1.14 per cent were Housewives, 0.57 per cent were in Private Service, 25.71 per cent were students and 2.86 per cent were children.*
- *The results show that, 0.57 per cent of the population in the micro watershed has participated in NGOs.*
- *The results indicate that 2.86 per cent of the households possess Thatched house, 80 per cent of the households possess katcha house and 17.14 per cent of them possess pucca/RCC.*
- *The results show that 51.43 per cent of the households possess TV, 17.14 per cent of the households possess mixer/grinder, 2.86 per cent of the households possess Refrigerator, 8.57 per cent of the households possess bicycle, 31.43 per cent of the households possess motor cycle and 85.71 per cent of the households possess mobile phones.*
- *The results show that the average value of television was Rs. 4,083, mixer/grinder was Rs. 1,466, Refrigerator was Rs. 6,000, bicycle was Rs. 1,500, motor cycle was Rs. 41,818 and mobile phone was Rs. 1,872.*
- *About 14.29 per cent of the households possess bullock cart, 28.57 per cent of them possess plough, 11.43 per cent of them possess Seed/Fertilizer Drill and sprayer and 28.57 per cent of them possess weeder.*

- *The results show that the average value of bullock cart was Rs. 26,000, plough was Rs. 5,050, seed/fertilizer drill was Rs. 6,625, tractor was Rs. 450,000, sprayer was Rs. 2,600, and the average value of weeder was Rs. 39.*
- *The results indicate that, 28.57 per cent of the households possess bullocks, 5.71 per cent of the households possess Local cow, 2.86 per cent of the households possess Buffalo and 5.71 per cent of the households possess Poultry birds.*
- *The results indicate that, average own labour men available in the micro watershed was 1.46 and average own labour (women) available was 1.51, average hired labour (men) available was 9.40 and average hired labour (women) available was 11.40.*
- *In case of marginal farmers, average own labour men available was 1.38, average own labour (women) was 1.25, average hired labour (men) was 8.38 and average hired labour (women) available was 10.38. In case of small farmers, average own labour men available was 1.67 and average own labour (women) was 1.72, average hired labour (men) was 11.72 and average hired labour (women) available was 14.33. In case of semi medium farmers, average own labour men available was 1.75, average own labour (women) was 2, average hired labour (men) was 12.25 and average hired labour (women) available was 14.*
- *The results indicate that, 2.86 per cent of the households opined that the hired labour was adequate and 97.14 per cent of the households opined that the hired labour was inadequate.*
- *The results indicate that, households of the Bandehalli-2 micro-watershed possess 33.02 ha (88.12 %) of dry land and 4.45 ha (11.88 %) of irrigated land. Marginal farmers possess 5.54 ha (100%) of dry land. Small farmers possess 19.39 ha (85.69 %) of dry land and 3.24 ha (14.31 %) of irrigated land. Semi medium farmers possess 8.09 ha (86.96 %) of dry land and 1.21 ha (13.04 %) of irrigated land.*
- *The results indicate that, the average value of dry land was Rs. 311,853.40 and the average value of irrigated land was Rs. 583,818.18. In case of marginal famers, the average land value was Rs. 577,777.77 for dry land. In case of small famers, the average land value was Rs. 304,238 for dry land and Rs. 617,500 for irrigated land. In case of semi medium famers, the average land value was Rs. 148,200 for dry land and Rs. 494,000 for irrigated land.*
- *The results indicate that, there were 2 de-functioning and 3 functioning bore wells in the micro watershed.*
- *The results indicate that, bore well was the major irrigation source in the micro water shed for 5.88 per cent of the farmers.*
- *The results indicate that, the depth of bore well was found to be 3.92 meters.*

- *The results indicate that small farmers had an irrigated area of 4.13 ha respectively.*
- *The results indicate that, farmers have grown red gram (11.56 ha), cotton (22.3 ha) and Paddy (3.64 ha). Marginal farmers have grown red gram and cotton. Small farmers have grown red gram, cotton and paddy. Semi medium farmers have grown cotton and paddy.*
- *The results indicate that, the cropping intensity in Bandehalli-2 micro-watershed was found to be 100 per cent.*
- *The results indicate that, 85.71 per cent of the households have bank account and savings.*
- *The results indicate that, 85.71 per cent of the households have availed credit from different sources.*
- *The results indicate that, 6.67 per cent of the households have borrowed from grameena bank and Commercial Bank.*
- *The results indicate that, the average credit amount borrowed by households in micro-watershed was Rs, 9,000.*
- *The results indicate that, 100 per cent of the households borrowed from institutional sources for the purpose of agricultural production.*
- *The results indicated that 100 per cent of the households did not repay their loan borrowed from institutional sources.*
- *The results indicate that, around 100 per cent opined that the loan amount borrowed from helped to perform timely agricultural operations.*
- *The results indicate that, the total cost of cultivation for Cotton was Rs. 34387.52. The gross income realized by the farmers was Rs. 52014.28. The net income from Cotton cultivation was Rs. 17626.76. Thus the benefit cost ratio was found to be 1: 1.51.*
- *The results indicate that, the total cost of cultivation for Red gram was Rs. 22963.71. The gross income realized by the farmers was Rs. 41329.76. The net income from Red gram cultivation was Rs. 18366.05. Thus the benefit cost ratio was found to be 1: 1.8.*
- *The results indicate that, the total cost of cultivation for Paddy was Rs. 40081.91. The gross income realized by the farmers was Rs. 65866.67. The net income from Paddy cultivation was Rs. 25784.76. Thus the benefit cost ratio was found to be 1: 1.64.*
- *The results indicate that, 14.29 per cent of the households opined that dry fodder was adequate*
- *The results indicate that the annual gross income was Rs. 91,000 for landless farmers, for marginal farmers it was Rs. 81,743.75, for small farmers it was Rs. 115,472.22 and semi medium farmers it was Rs. 115,750.*

- *The results indicate that the average annual expenditure is Rs. 9,244.17. For landless households it was Rs. 10,480, for marginal farmers it was Rs. 4,968.75, for small farmers it was Rs. 9,827.55 and for semi medium farmers it was Rs. 13,625.*
- *The results indicate that, households have planted 10 teak, 50 Neem, 2 Banyan and 7 tamarind trees in their field and also 5 neem trees in their backyard.*
- *The results indicated that, households have an average investment capacity of Rs. 571.43 for land development and households have an average investment capacity of Rs. 2,285.71 for irrigation facility.*
- *The results indicated that government subsidy was the source of additional investment for 2.86 per cent each for irrigation facility. Own funds was the source of additional investment for 2.86 per cent each for land development.*
- *The results indicated that, cotton was sold to the extent of 100 per cent, paddy was sold to the extent of 46.67 per cent and red gram to the extent of 78.02 per cent.*
- *The results indicated that, about 8.57 per cent of the farmers sold their produce to local/village merchants, 77.14 per cent of the farmers sold their produce to regulated market and 2.86 per cent of the farmers sold their produce to Cooperative marketing Society.*
- *The results indicated that, 88.57 per cent of the households have used tractor as a mode of transportation.*
- *The results indicated that, 85.71 per cent of the households have experienced soil and water erosion problems in the farm.*
- *The results indicated that, 85.71 per cent have shown interest in soil test.*
- *The results indicated that, 97.14 per cent of the households used firewood as a source of fuel and 2.86 per cent of the households used LPG as a source of fuel.*
- *The results indicated that, piped supply was the major source of drinking water for 68.57 per cent of the households in the micro watershed and 31.43 per cent of the households used bore well.*
- *The results indicated that, Electricity was the major source of light for 100 per cent of the households in micro watershed.*
- *The results indicated that, 37.14 per cent of the households possess sanitary toilet facility.*
- *The results indicated that, 100 per cent of the sampled households possessed BPL cards.*
- *The results indicated that, 80 per cent of the households participated in NREGA programme.*
- *The results indicated that, cereals were adequate for 97.14 per cent of the households, pulses were adequate for 94.29 per cent of the households, oilseed were adequate for 31.43 per cent of the households, vegetables were adequate for 28.57 per cent, fruits were adequate for 48.57 per cent, Milk were adequate for 20*

per cent, Eggs were adequate for 22.86 per cent and meat were adequate for 22.86 per cent.

- *The results indicated that, pulses were inadequate for 2.86 per cent, oilseeds were inadequate for 65.71 per cent, vegetables were inadequate for 68.57 per cent, fruits were inadequate for 42.86 per cent, Egg were inadequate for 68.57 per cent, meat were inadequate for 71.43 per cent of the households and milk were inadequate for 57.14 per cent of the households.*
- *The results indicated that, lower fertility status of the was the constraint experienced by 88.57 per cent of the households, wild animal menace on farm field (85.71 %), frequent incidence of pest and diseases (57.14 %), Inadequacy of irrigation water (11.43 %), High rate of interest on credit, Lack of marketing facilities in the area and Inadequate extension services (8.57 %), High cost of Fertilizers and plant protection chemicals (40 %), Low price for the agricultural commodities (22.86 %), lack of transport for safe transport of the Agril produce to the market (37.14 %), less rainfall (31.43 %) and Source of Agri-technology information (40 %).*

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

Yadgiri 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. Yadgiri town is the administrative headquarters of the district. The district comprises of 3 taluks namely, Shahapur, Yadgirii 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.

Yadgiri 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 jowar 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 Yadgiri 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%. Yadgiri has a sex ratio of 984 females for every 1000 males, and a literacy rate of 52.36%.

Description of the micro watershed

Bandehalli-2 micro-watershed in Bandehalli sub-watershed (Yadgiri taluk and district) is located in between $16^0$36’43.81’’ to 16^0 34’54.135’’ North latitudes and 77^0 22’54.467’’ to $77^0$20’24.875’’ East longitudes, covering an area of about 668.55 ha, bounded by Vankasambara, Sambara and Baddepalli villages.

Methodology followed in assessing socio-economic status of households

In order to assess the socio-economic condition of the farmers in the watershed a comprehensive questionnaire was prepared. Major components such as demographic conditions, migration details, food consumption and family expenditure pattern, material possession, land holding, land use management, cropping pattern, cost of cultivation of crops, livestock management. The statistical components such as frequency and percentage were used to analyze the data. About 35 households located in the micro-watershed were interviewed for the survey.

Chapter 4

SALIENT FEATURES OF THE SURVEY

Households sampled for socio-economic survey: The data on households sampled for socio economic survey in Bandehalli-2 micro-watershed is presented in Table 1 and it indicated that 35 farmers were sampled in Bandehalli-2 micro-watershed among them 5 (14.29 %) were landless, 8 (22.86 %) were marginal farmers, 18 (51.43 %) were small farmers and 4 (11.43 %) were semi medium farmers.

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

Sl.No.	Particulars	LL (5)		MF (8)		SF (18)		SMF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Farmers	5	14.29	8	22.86	18	51.43	4	11.43	35	100

Population characteristics: The population characteristics of households sampled for socio-economic survey in Bandehalli-2 micro-watershed is presented in Table 2. The data indicated that there were 94 (53.71 %) men and 81 (46.29 %) women among the sampled households. The average family size of landless farmers' was 4.6, marginal farmers' was 4.62, small farmers' was 5.16 and semi medium farmers' was 5.5.

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

Sl.No.	Particulars	LL (23)		MF (37)		SF (93)		SMF (22)		All (175)	
		N	%	N	%	N	%	N	%	N	%
1	Men	13	56.52	21	56.76	48	51.61	12	54.55	94	53.71
2	Women	10	43.48	16	43.24	45	48.39	10	45.45	81	46.29
Total		23	100	37	100	93	100	22	100	175	100
Average		4.6		4.62		5.16		5.5		5	

Age wise classification of population: The age wise classification of household members in Bandehalli-2 micro-watershed is presented in Table 3. The data indicated that, 44 (25.14 %) people were in 0-15 years of age, 78 (44.57 %) were in 16-35 years of age, 41 (23.43 %) were in 36-60 years of age and 12 (6.86 %) were above 61 years of age.

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

Sl.No.	Particulars	LL (23)		MF (37)		SF (93)		SMF (22)		All (175)	
		N	%	N	%	N	%	N	%	N	%
1	0-15 years of age	5	21.74	11	29.73	25	26.88	3	13.64	44	25.14
2	16-35 years of age	11	47.83	12	32.43	44	47.31	11	50	78	44.57
3	36-60 years of age	7	30.43	11	29.73	16	17.20	7	31.82	41	23.43
4	> 61 years	0	0	3	8.11	8	8.60	1	4.55	12	6.86
Total		23	100	37	100	93	100	22	100	175	100

Education level of household members: Education level of household members in Bandehalli-2 micro-watershed is presented in Table 4. The results indicated that Bandehalli-2 had 54.86 per cent illiterates, 20.57 per cent of them had primary school, 4 per cent of them had middle school, 8.57 per cent of them had high school education, 4

per cent of them had PUC, 0.57 per cent of them had Diploma and ITI and 3.43 per cent of them had Degree education and 1.14 per cent of them had masters.

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

Sl.No.	Particulars	LL (23)		MF (37)		SF (93)		SMF (22)		All (175)	
		N	%	N	%	N	%	N	%	N	%
1	Illiterate	15	65.22	13	35.14	55	59.14	13	59.09	96	54.86
2	Primary School	2	8.70	12	32.43	20	21.51	2	9.09	36	20.57
3	Middle School	0	0	5	13.51	1	1.08	1	4.55	7	4
4	High School	5	21.74	1	2.70	8	8.60	1	4.55	15	8.57
5	PUC	1	4.35	2	5.41	2	2.15	2	9.09	7	4
6	Diploma	0	0	0	0	0	0	1	4.55	1	0.57
7	ITI	0	0	0	0	1	1.08	0	0	1	0.57
8	Degree	0	0	3	8.11	1	1.08	2	9.09	6	3.43
9	Masters	0	0	0	0	2	2.15	0	0	2	1.14
10	Others	0	0	1	2.70	3	3.23	0	0	4	2.29
Total		23	100	37	100	93	100	22	100	175	100

Occupation of household heads: The data regarding the occupation of the household heads in Bandehalli-2 micro-watershed is presented in Table 5. The results indicate that, 94.29 per cent of household heads were practicing agriculture and 8.57 per cent of the household heads were agricultural labourers.

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

Sl.No.	Particulars	LL (5)		MF (8)		SF (18)		SMF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Agriculture	3	60	8	100	18	100	4	100	33	94.29
2	Agricultural Labour	3	60	0	0	0	0	0	0	3	8.57
Total		6	100	8	100	18	100	4	100	36	100

Occupation of the household members: The data regarding the occupation of the household members in Bandehalli-2 micro-watershed is presented in Table 6. The results indicate that agriculture was the major occupation for 20 per cent of the household members, 49.71 per cent were agricultural labourers, 1.14 per cent were Housewives, 0.57 per cent were in Private Service, 25.71 per cent were students and 2.86 per cent were children.

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

Sl.No.	Particulars	LL (23)		MF (37)		SF (93)		SMF (22)		All (175)	
		N	%	N	%	N	%	N	%	N	%
1	Agriculture	3	13.04	8	21.62	20	21.51	4	18.18	35	20
2	Agricultural Labour	13	56.52	15	40.54	47	50.54	12	54.55	87	49.71
3	Private Service	0	0	0	0	1	1.08	0	0	1	0.57
4	Student	7	30.43	12	32.43	20	21.51	6	27.27	45	25.71
5	Housewife	0	0	1	2.70	1	1.08	0	0	2	1.14
6	Children	0	0	1	2.70	4	4.30	0	0	5	2.86
Total		23	100	37	100	93	100	22	100	175	100

Institutional participation of the household members: The data regarding the institutional participation of the household members in Bandehalli-2 micro-watershed is presented in Table 7. The results show that, 0.57 per cent of the population in the micro watershed has participated in NGOs.

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

Sl.No.	Particulars	LL (23)		MF (37)		SF (93)		SMF (22)		All (175)	
		N	%	N	%	N	%	N	%	N	%
1	NGOs	0	0	0	0	1	1.08	0	0	1	0.57
2	No Participation	23	100	37	100	92	98.92	22	100	174	99.43
Total		23	100	37	100	93	100	22	100	175	100

Type of house owned: The data regarding the type of house owned by the households in Bandehalli-2 micro-watershed is presented in Table 8. The results indicate that 2.86 per cent of the households possess Thatched house, 80 per cent of the households possess katcha house and 17.14 per cent of them possess pucca/RCC.

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

Sl.No.	Particulars	LL (5)		MF (8)		SF (18)		SMF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Thatched	0	0	1	12.50	0	0	0	0	1	2.86
2	Katcha	4	80	7	87.50	13	72.22	4	100	28	80
3	Pucca/RCC	1	20	0	0	5	27.78	0	0	6	17.14
Total		5	100	8	100	18	100	4	100	35	100

Durable Assets owned by the households: The data regarding the Durable Assets owned by the households in Bandehalli-2 micro-watershed is presented in Table 9. The results show that 51.43 per cent of the households possess TV, 17.14 per cent of the households possess mixer/grinder, 2.86 per cent of the households possess Refrigerator, 8.57 per cent of the households possess bicycle, 31.43 per cent of the households possess motor cycle and 85.71 per cent of the households possess mobile phones.

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

Sl.No.	Particulars	LL (5)		MF (8)		SF (18)		SMF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Television	4	80	2	25	9	50	3	75	18	51.43
2	Mixer/Grinder	1	20	0	0	4	22.22	1	25	6	17.14
3	Refrigerator	0	0	0	0	1	5.56	0	0	1	2.86
4	Bicycle	1	20	0	0	1	5.56	1	25	3	8.57
5	Motor Cycle	2	40	1	12.50	7	38.89	1	25	11	31.43
6	Mobile Phone	5	100	5	62.50	16	88.89	4	100	30	85.71
7	Blank	0	0	3	37.50	1	5.56	0	0	4	11.43

Average value of durable assets: The data regarding the average value of durable assets owned by the households in Bandehalli-2 micro-watershed is presented in Table 10. The results show that the average value of television was Rs. 4,083, mixer/grinder was Rs.

1,466, Refrigerator was Rs. 6,000, bicycle was Rs. 1,500, motor cycle was Rs. 41,818 and mobile phone was Rs. 1,872.

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

Average value (Rs.)

Sl.No.	Particulars	LL (5)	MF (8)	SF (18)	SMF (4)	All (35)
1	Television	3,500	5,500	4,055	4,000	4,083
2	Mixer/Grinder	1,000	0	1,625	1,300	1,466
3	Refrigerator	0	0	6,000	0	6,000
4	Bicycle	1,500	0	1,500	1,500	1,500
5	Motor Cycle	40,000	60,000	38,571	50,000	41,818
6	Mobile Phone	2,571	2,100	1,446	3,000	1,872

Farm Implements owned: The data regarding the farm implements owned by the households in Bandehalli-2 micro-watershed is presented in Table 11. About 14.29 per cent of the households possess bullock cart, 28.57 per cent of them possess plough, 11.43 per cent of them possess Seed/Fertilizer Drill and sprayer and 28.57 per cent of them possess weeder.

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

Sl.No.	Particulars	LL (5)		MF (8)		SF (18)		SMF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Bullock Cart	0	0	1	12.50	3	16.67	1	25	5	14.29
2	Plough	0	0	1	12.50	7	38.89	2	50	10	28.57
3	Seed/Fertilizer Drill	0	0	0	0	4	22.22	0	0	4	11.43
4	Tractor	1	20	1	12.50	0	0	0	0	2	5.71
5	Sprayer	0	0	1	12.50	3	16.67	0	0	4	11.43
6	Weeder	0	0	3	37.50	6	33.33	1	25	10	28.57
7	Blank	4	80	5	62.50	8	44.44	2	50	19	54.29

Average value of farm implements: The data regarding the average value of farm Implements owned by the households in Bandehalli-2 micro-watershed is presented in Table 12. The results show that the average value of bullock cart was Rs. 26,000, plough was Rs. 5,050, seed/fertilizer drill was Rs. 6,625, tractor was Rs. 450,000, sprayer was Rs. 2,600, and the average value of weeder was Rs. 39.

Table 12. Average value of farm implements owned by households in Bandehalli-2 micro-watershed

Average Value (Rs.)

Sl.No.	Particulars	LL (5)	MF (8)	SF (18)	SMF (4)	All (35)
1	Bullock Cart	0	25,000	28,333	20,000	26,000
2	Plough	0	3,000	5,285	5,250	5,050
3	Seed/Fertilizer Drill	0	0	6,625	0	6,625
4	Tractor	400,000	500,000	0	0	450,000
5	Sprayer	0	2,800	2,533	0	2,600
6	Weeder	0	55	33	32	39

Livestock possession by the households: The data regarding the Livestock possession by the households in Bandehalli-2 micro-watershed is presented in Table 13. The results indicate that, 28.57 per cent of the households possess bullocks, 5.71 per cent of the

households possess Local cow, 2.86 per cent of the households possess Buffalo and 5.71 per cent of the households possess Poultry birds.

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

Sl.No.	Particulars	LL (5)		MF (8)		SF (18)		SMF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Bullock	1	20	1	12.50	6	33.33	2	50	10	28.57
2	Local cow	0	0	1	12.50	1	5.56	0	0	2	5.71
3	Buffalo	0	0	1	12.50	0	0	0	0	1	2.86
4	Poultry birds	0	0	0	0	2	11.11	0	0	2	5.71
5	blank	4	80	6	75	10	55.56	2	50	22	62.86

Average Labour availability: The data regarding the average labour availability in Bandehalli-2 micro-watershed is presented in Table 14. The results indicate that, average own labour men available in the micro watershed was 1.46 and average own labour (women) available was 1.51, average hired labour (men) available was 9.40 and average hired labour (women) available was 11.40.

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

Sl.No.	Particulars	LL (5)	MF (8)	SF (18)	SMF (4)	All (35)
		N	N	N	N	N
1	Hired labour Female	0.40	10.38	14.33	14	11.40
2	Own Labour Female	0.80	1.25	1.72	2	1.51
3	Own labour Male	0.60	1.38	1.67	1.75	1.46
4	Hired labour Male	0.40	8.38	11.72	12.25	9.40

Adequacy of Hired Labour: The data regarding the adequacy of hired labour in Bandehalli-2 micro-watershed is presented in Table 15. The results indicate that, 2.86 per cent of the households opined that the hired labour was adequate and 97.14 per cent of the households opined that the hired labour was inadequate.

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

Sl.No.	Particulars	LL (5)		MF (8)		SF (18)		SMF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Adequate	1	20	0	0	0	0	0	0	1	2.86
2	Inadequate	4	80	8	100	18	100	4	100	34	97.14

Table 16. Distribution of land (Ha) in Bandehalli-2 micro-watershed

Sl.No.	Particulars	LL (5)		MF (8)		SF (18)		SMF (4)		All (35)	
		ha	%	ha	%	ha	%	ha	%	ha	%
1	Dry	0	0	5.54	100	19.39	85.69	8.09	86.96	33.02	88.12
2	Irrigated	0	0	0	0	3.24	14.31	1.21	13.04	4.45	11.88
Total		0	100	5.54	100	22.62	100	9.31	100	37.47	100

Distribution of land (ha): The data regarding the distribution of land (ha) in Bandehalli-2 micro-watershed is presented in Table 16. The results indicate that, households of the Bandehalli-2 micro-watershed possess 33.02 ha (88.12 %) of dry land and 4.45 ha (11.88 %) of irrigated land. Marginal farmers possess 5.54 ha (100%) of dry land. Small farmers

possess 19.39 ha (85.69 %) of dry land and 3.24 ha (14.31 %) of irrigated land. Semi medium farmers possess 8.09 ha (86.96 %) of dry land and 1.21 ha (13.04 %) of irrigated land.

Average land value (Rs./ha): The data regarding the average land value (Rs./ha) in Bandehalli-2 micro-watershed is presented in Table 17. The results indicate that, the average value of dry land was Rs. 311,853.40 and the average value of irrigated land was Rs. 583,818.18. In case of marginal famers, the average land value was Rs. 577,777.77 for dry land. In case of small famers, the average land value was Rs. 304,238 for dry land and Rs. 617,500 for irrigated land. In case of semi medium famers, the average land value was Rs. 148,200 for dry land and Rs. 494,000 for irrigated land.

Table 17. Average land value (Rs./ha) in Bandehalli-2 micro-watershed

Sl.No.	Particulars	LL (5)	MF (8)	SF (18)	SMF (4)	All (35)
		N	N	N	N	N
1	Dry	0	577,777.77	304,238	148,200	311,853.40
2	Irrigated	0	0	617,500	494,000	583,818.18

Status of bore wells: The data regarding the status of bore wells in Bandehalli-2 micro-watershed is presented in Table 18. The results indicate that, there were 2 de-functioning and 3 functioning bore wells in the micro watershed.

Table 18. Status of bore wells in Bandehalli-2 micro-watershed

Sl.No.	Particulars	LL (5)	MF (8)	SF (18)	SMF (4)	All (35)
		N	N	N	N	N
1	De-functioning	0	0	2	0	2
2	Functioning	0	0	2	1	3

Source of irrigation: The data regarding the source of irrigation in Bandehalli-2 micro-watershed is presented in Table 19. The results indicate that, bore well was the major irrigation source in the micro water shed for 5.88 per cent of the farmers.

Table 19. Source of irrigation in Bandehalli-2 micro-watershed

Sl.No.	Particulars	LL (5)		MF (8)		SF (18)		SMF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Bore Well	0	0	0	0	2	11.11	1	25	3	8.57

Depth of water (Avg in meters): The data regarding the depth of water in Bandehalli-2 micro-watershed is presented in Table 20. The results indicate that, the depth of bore well was found to be 3.92 meters.

Table 20. Depth of water (Avg in meters) in Bandehalli-2 micro-watershed

Sl.No.	Particulars	LL (5)	MF (8)	SF (18)	SMF (4)	All (35)
		N	N	N	N	N
1	Bore Well	0	0	5.59	9.14	3.92

Irrigated Area (ha): The data regarding the irrigated area (ha) in Bandehalli-2 micro-watershed is presented in Table 21. The results indicate that small farmers had an irrigated area of 4.13 ha respectively.

Table 21. Irrigated Area (ha) in Bandehalli-2 micro-watershed

Sl.No.	Particulars	LL (5)	MF (8)	SF (18)	SMF (4)	All (35)
1	Kharif	0	0	4.13	0	4.13

Cropping pattern: The data regarding the cropping pattern in Bandehalli-2 micro-watershed is presented in Table 22. The results indicate that, farmers have grown red gram (11.56 ha), cotton (22.3 ha) and Paddy (3.64 ha). Marginal farmers have grown red gram and cotton. Small farmers have grown red gram, cotton and paddy. Semi medium farmers have grown cotton and paddy.

Table 22. Cropping pattern in Bandehalli-2 micro-watershed (Area in ha)

Sl.No.	Particulars	LL (5)	MF (8)	SF (18)	SMF (4)	All (35)
1	Kharif - Cotton	0	3.92	10.28	8.1	22.3
2	Kharif - Red gram (togari)	0	1.62	9.94	0	11.56
3	Kharif - Paddy	0	0	2.43	1.21	3.64
Total		0	5.54	22.65	9.31	37.5

Cropping intensity: The data regarding the cropping intensity in Bandehalli-2 micro-watershed is presented in Table 23. The results indicate that, the cropping intensity in Bandehalli-2 micro-watershed was found to be 100 per cent.

Table 23. Cropping intensity (%) in Bandehalli-2 micro-watershed

Sl.No.	Particulars	LL (5)	MF (8)	SF (18)	SMF (4)	All (35)
1	Cropping Intensity	0	100	100	100	100

Possession of Bank account and savings: The data regarding the possession of bank account and saving in Bandehalli-2 micro-watershed is presented in Table 24. The results indicate that, 85.71 per cent of the households have bank account and savings.

Table 24. Possession of bank account and savings in Bandehalli-2 micro-watershed

Sl.No.	Particulars	LL (5)		MF (8)		SF (18)		SMF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Account	0	0	8	100	18	100	4	100	30	85.71
2	Savings	0	0	8	100	18	100	4	100	30	85.71

Borrowing status: The data regarding the borrowing status in Bandehalli-2 micro-watershed is presented in Table 25. The results indicate that, 85.71 per cent of the households have availed credit from different sources.

Table 25. Borrowing status in Bandehalli-2 micro-watershed

Sl.No.	Particulars	LL (5)		MF (8)		SF (18)		SMF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Credit Availed	0	0	8	100	18	100	4	100	30	85.71

Table 26. Source of credit availed by households in Bandehalli-2 micro-watershed

Sl.No.	Particulars	LL (0)		MF (8)		SF (18)		SMF (4)		All (30)	
		N	%	N	%	N	%	N	%	N	%
1	Commercial Bank	0	0	0	0	0	0	2	50	2	6.67
2	Grameena Bank	0	0	1	12.50	0	0	1	25	2	6.67

Source of credit availed by households: The data regarding the borrowing status in Bandehalli-2 micro-watershed is presented in Table 26. The results indicate that, 6.67 per cent of the households have borrowed from grameena bank and Commercial Bank.

Avg. Credit amount: The data regarding the avg. Credit amount in Bandehalli-2 micro-watershed is presented in Table 27. The results indicate that, the average credit amount borrowed by households in micro-watershed was Rs, 9,000.

Table 27. Avg. credit amount by household in Bandehalli-2 micro-watershed

Sl.No.	Particulars	MF (8)	SF (18)	SMF (4)	All (30)
		N	N	N	N
1	Average Credit	6,250	0	55,000	9,000

Purpose of credit borrowed - Institutional Credit: The data regarding the purpose of credit borrowed - Institutional Credit in Bandehalli-2 micro-watershed is presented in Table 28. The results indicate that, 100 per cent of the households borrowed from institutional sources for the purpose of agricultural production.

Table 28. Purpose of credit borrowed - Institutional Credit by household in Bandehalli-2 micro-watershed

Sl.No.	Particulars	MF (1)		SMF (3)		All (4)	
		N	%	N	%	N	%
1	Agriculture production	1	100	3	100	4	100

Table 29. Repayment status of households – Institutional Credit in Bandehalli-2 micro-watershed

Sl.No.	Particulars	MF (1)		SMF (3)		All (4)	
		N	%	N	%	N	%
1	Un paid	1	100	3	100	4	100

Repayment status of households – Institutional: The data regarding the repayment status of credit borrowed from institutional sources by households in Bandehalli-2 micro watershed is presented in Table 29. The results indicated that 100 per cent of the households did not repay their loan borrowed from institutional sources.

Opinion on institutional sources of credit: The data regarding the opinion on institutional sources of credit in Bandehalli-2 micro watershed is presented in Table 30. The results indicate that, around 100 per cent opined that the loan amount borrowed from helped to perform timely agricultural operations.

Table 30. Opinion on institutional sources of credit in Bandehalli-2 micro watershed

Sl.No.	Particulars	MF (1)		SMF (3)		All (4)	
		N	%	N	%	N	%
1	Helped to perform timely agricultural operations	1	100	3	100	4	100

Cost of cultivation of Cotton: The data regarding the cost of cultivation of Cotton in Bandehalli-2 micro-watershed is presented in Table 31. The results indicate that, the total cost of cultivation for Cotton was Rs. 34387.52. The gross income realized by the farmers was Rs. 52014.28. The net income from Cotton cultivation was Rs. 17626.76. Thus the benefit cost ratio was found to be 1: 1.51.

Table 31. Cost of Cultivation of Cotton in Bandehalli-2 micro-watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	43.83	9336.50	27.15
2	Bullock		Pairs/day	3.18	1750.82	5.09
3	Tractor		Hours	2.64	2970.70	8.64
4	Machinery		Hours	0.12	69.74	0.20
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	2.73	1567.71	4.56
6	Seed Inter Crop		Kgs.	0	0	0
7	FYM		Quintal	17.19	3438.35	10
8	Fertilizer + micronutrients		Quintal	4.08	2894.90	8.42
9	Pesticides (PPC)		Kgs / liters	1.90	2492.78	7.25
10	Irrigation		Number	2.94	0	0
11	Repairs			0	0	0
12	Msc. Charges (Marketing costs etc)			0	0	0
13	Depreciation charges			0	116.94	0.34
14	Land revenue and Taxes			0	0	0
II	**Cost B1**					
16	Interest on working capital				1248.45	3.63
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**				25886.89	75.28
III	**Cost B2**					
18	Rental Value of Land				176.47	0.51
19	**Cost B2 = (Cost B1 + Rental value)**				26063.36	75.79
IV	**Cost C1**					
20	Family Human Labour			20.35	5188.02	15.09
21	**Cost C1 = (Cost B2 + Family Labour)**				31251.38	90.88
V	**Cost C2**					
22	Risk Premium				10	0.03
23	**Cost C2 = (Cost C1 + Risk Premium)**				31261.38	90.91
VI	**Cost C3**					
24	Managerial Cost				3126.14	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**				34387.52	100
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		10.78	52014.28	
		b) Main Crop Sales Price (Rs.)			4826.47	
b.	Gross Income (Rs.)				52014.28	
c.	Net Income (Rs.)				17626.76	
d.	Cost per Quintal (Rs./q.)				3190.86	
e.	Benefit Cost Ratio (BC Ratio)				1:1.51	

Cost of cultivation of Red gram: The data regarding the cost of cultivation of Red gram in Bandehalli-2 micro-watershed is presented in Table 32. The results indicate that, the total cost of cultivation for Red gram was Rs. 22963.71. The gross income realized by the farmers was Rs. 41329.76. The net income from Red gram cultivation was Rs. 18366.05. Thus the benefit cost ratio was found to be 1: 1.8.

Table 32. Cost of Cultivation of Red gram in Bandehalli-2 micro-watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	27.60	5952.40	25.92
2	Bullock		Pairs/day	3.19	1755.18	7.64
3	Tractor		Hours	2.91	2184.53	9.51
4	Machinery		Hours	0.34	205.83	0.90
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	8.05	966.53	4.21
6	Seed Inter Crop		Kgs.	0	0	0
7	FYM		Quintal	0	0	0
8	Fertilizer + micronutrients		Quintal	3.13	2298.85	10.01
9	Pesticides (PPC)		Kgs / liters	1.84	2382.28	10.37
10	Depreciation charges			0	1451.59	6.32
II	**Cost B1**					
11	Interest on working capital				678.92	2.96
12	**Cost B1 = (Cost A1 + sum of 15 and 16)**				17876.11	77.85
III	**Cost B2**					
13	Rental Value of Land				166.67	0.73
14	**Cost B2 = (Cost B1 + Rental value)**				18042.78	78.57
IV	**Cost C1**					
15	Family Human Labour			11.04	2823.32	12.29
16	**Cost C1 = (Cost B2 + Family Labour)**				20866.10	90.87
V	**Cost C2**					
17	Risk Premium				10	0.04
18	**Cost C2 = (Cost C1 + Risk Premium)**				20876.10	90.91
VI	**Cost C3**					
19	Managerial Cost				2087.61	9.09
20	**Cost C3 = (Cost C2 + Managerial Cost)**				22963.71	100
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		8.21	41248.44	
		b) Main Crop Sales Price (Rs.)			5022.22	
	By Product	e) Main Product (q)		3.66	81.32	
		f) Main Crop Sales Price (Rs.)			22.22	
b.	Gross Income (Rs.)				41329.76	
c.	Net Income (Rs.)				18366.05	
d.	Cost per Quintal (Rs./q.)				2795.96	
e.	Benefit Cost Ratio (BC Ratio)				1:1.8	

Cost of Cultivation of Paddy: The data regarding the cost of cultivation of Paddy in Bandehalli-2 micro-watershed is presented in Table 33. The results indicate that, the total cost of cultivation for Paddy was Rs. 40081.91. The gross income realized by the farmers was Rs. 65866.67. The net income from Paddy cultivation was Rs. 25784.76. Thus the benefit cost ratio was found to be 1: 1.64.

Table 33. Cost of Cultivation of Paddy in Bandehalli-2 micro-watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	61.85	13008.67	32.46
2	Bullock		Pairs/day	1.34	735.85	1.84
3	Tractor		Hours	2.88	2161.25	5.39
4	Machinery		Hours	0	0	0
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	62.26	3113.23	7.77
6	Fertilizer + micronutrients		Quintal	4.53	3169.83	7.91
7	Pesticides (PPC)		Kgs / liters	2.57	4219.58	10.53
8	Irrigation		Number	7.20	0	0
9	Depreciation charges			0	296.42	0.74
II	**Cost B1**					
10	Interest on working capital				1261.52	3.15
11	**Cost B1 = (Cost A1 + sum of 15 and 16)**				27966.35	69.77
III	**Cost B2**					
12	Rental Value of Land				166.67	0.42
13	**Cost B2 = (Cost B1 + Rental value)**				28133.02	70.19
IV	**Cost C1**					
14	Family Human Labour			31.18	8295.08	20.70
15	**Cost C1 = (Cost B2 + Family Labour)**				36428.10	90.88
V	**Cost C2**					
16	Risk Premium				10	0.02
17	**Cost C2 = (Cost C1 + Risk Premium)**				36438.10	90.91
VI	**Cost C3**					
18	Managerial Cost				3643.81	9.09
19	**Cost C3 = (Cost C2 + Managerial Cost)**				40081.91	100
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		43.23	63396.67	
		b) Main Crop Sales Price (Rs.)			1466.67	
	By Product	e) Main Product (q)		24.70	2470	
		f) Main Crop Sales Price (Rs.)			100	
b.	Gross Income (Rs.)				65866.67	
c.	Net Income (Rs.)				25784.76	
d.	Cost per Quintal (Rs./q.)				927.29	
e.	Benefit Cost Ratio (BC Ratio)				1:1.64	

Adequacy of fodder: The data regarding the adequacy of fodder in Bandehalli-2 micro-watershed is presented in Table 34. The results indicate that, 14.29 per cent of the households opined that dry fodder was adequate

Table 34. Adequacy of fodder in Bandehalli-2 micro-watershed

Sl.No.	Particulars	LL (5)		MF (8)		SF (18)		SMF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Adequate-Dry Fodder	0	0	2	25	2	11.11	1	25	5	14.29

Annual gross income: The data regarding the annual gross income in Bandehalli-2 micro-watershed is presented in Table 35. The results indicate that the annual gross income was Rs. 91,000 for landless farmers, for marginal farmers it was Rs. 81,743.75, for small farmers it was Rs. 115,472.22 and semi medium farmers it was Rs. 115,750.

Table 35. Annual gross income in Bandehalli-2 micro-watershed

(Avg. value in Rs.)

Sl.No.	Particulars	LL (5)	MF (8)	SF (18)	SMF (4)	All (35)
1	Service/salary	0	0	13,888.89	0	7,142.86
2	Business	0	0	5,555.56	0	2,857.14
3	Wage	91,000	40,875	36,666.67	20,000	43,485.71
4	Agriculture	0	40,868.75	59,361.11	95,750	50,812.86
Income(Rs.)		91,000	81,743.75	115,472.22	115,750	104,298.57

Average annual expenditure: The data regarding the average annual expenditure in Bandehalli-2 micro-watershed is presented in Table 36. The results indicate that the average annual expenditure is Rs. 9,244.17. For landless households it was Rs. 10,480, for marginal farmers it was Rs. 4,968.75, for small farmers it was Rs. 9,827.55 and for semi medium farmers it was Rs. 13,625.

Table 36. Average annual expenditure in Bandehalli-2 micro-watershed

(Avg value in Rs.)

Sl.No.	Particulars	LL (5)	MF (8)	SF (18)	SMF (4)	All (35)
1	Service/salary	0	0	65,000	0	3,714.29
2	Business	0	0	60,000	0	1,714.29
3	Wage	52,400	17,750	22,562.50	20,000	23,000
4	Agriculture	0	22,000	29,333.33	34,500	24,057.14
Total		52,400	39,750	176,895.83	54,500	323,545.83
Average		10,480	4,968.75	9,827.55	13,625	9,244.17

Table 37: Forest species grown in Bandehalli-2 micro-watershed

Sl.No.	Particulars	LL (5)		MF (8)		SF (18)		SMF (4)		All (35)	
		F	B	F	B	F	B	F	B	F	B
1	Teak	0	0	0	0	10	0	0	0	10	0
2	Neem	0	0	8	3	35	2	7	0	50	5
3	Tamarind	0	0	2	0	5	0	0	0	7	0
4	Banyan	0	0	0	0	2	0	0	0	2	0

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

Forest species grown: The data regarding forest species grown in Bandehalli-2 micro-watershed is presented in Table 37. The results indicate that, households have planted 10 teak, 50 Neem, 2 Banyan and 7 tamarind trees in their field and also 5 neem trees in their backyard.

Average Additional investment capacity: The data regarding average additional investment capacity in Bandehalli-2 micro-watershed is presented in Table 38. The results indicated that, households have an average investment capacity of Rs. 571.43 for land development and households have an average investment capacity of Rs. 2,285.71 for irrigation facility.

Table 38: Average Additional investment capacity in Bandehalli-2 micro-watershed

Sl.No.	Particulars	LL (5)	MF (8)	SF (18)	SMF (4)	All (35)
		Rs.	Rs.	Rs.	Rs.	Rs.
1	Land development	0	0	0	5,000	571.43
2	Irrigation facility	0	0	4,444.44	0	2,285.71

Source of additional investment: The data regarding source of funds for additional investment in Bandehalli-2 micro-watershed is presented in Table 39. The results indicated that government subsidy was the source of additional investment for 2.86 per cent each for irrigation facility. Own funds was the source of additional investment for 2.86 per cent each for land development.

Table 39: Source of funds for additional investment capacity in Bandehalli-2 micro – watershed

Sl.No	Item	Land development		Irrigation facility	
		N	%	N	%
1	Government subsidy	0	0.0	1	2.86
2	Own funds	1	2.86	0	0.0

Marketing of the agricultural produce: The data regarding marketing of the agricultural produce in Bandehalli-2 micro-watershed is presented in Table 40. The results indicated that, cotton was sold to the extent of 100 per cent, paddy was sold to the extent of 46.67 per cent and red gram to the extent of 78.02 per cent.

Table 40. Marketing of the agricultural produce in Bandehalli-2 micro-watershed

Sl.No	Crops	Output obtained (q)	Output retained (q)	Output sold (q)	Output sold (%)	Avg. Price obtained (Rs/q)
1	Cotton	217	0	217	100	4826.47
2	Paddy	105	56	49	46.67	1100.0
3	Redgram	91	20	71	78.02	4520.0

Marketing Channels used for sale of agricultural produce: The data regarding marketing channels used for sale of agricultural produce in Bandehalli-2 micro-watershed is presented in Table 41. The results indicated that, about 8.57 per cent of the farmers sold their produce to local/village merchants, 77.14 per cent of the farmers sold their produce

to regulated market and 2.86 per cent of the farmers sold their produce to Cooperative marketing Society.

Table 41. Marketing Channels used for sale of agricultural produce in Bandehalli-2 micro-watershed

Sl.No.	Particulars	LL (5)		MF (8)		SF (18)		SMF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Local/village Merchant	0	0	1	12.50	1	5.56	1	25	3	8.57
2	Regulated Market	0	0	7	87.50	17	94.44	3	75	27	77.14
3	Cooperative marketing Society	0	0	0	0	1	5.56	0	0	1	2.86

Mode of transport of agricultural produce: The data regarding mode of transport of agricultural produce in Bandehalli-2 micro-watershed is presented in Table 42. The results indicated that, 88.57 per cent of the households have used tractor as a mode of transportation.

Table 42. Mode of transport of agricultural produce in Bandehalli-2 micro-watershed

Sl.No.	Particulars	LL (5)		MF (8)		SF (18)		SMF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Tractor	0	0	8	100	19	105.56	4	100	31	88.57

Incidence of soil and water erosion problems: The data regarding incidence of soil and water erosion problems in Bandehalli-2 micro-watershed is presented in Table 43. The results indicated that, 85.71 per cent of the households have experienced soil and water erosion problems in the farm.

Table 43. Incidence of soil and water erosion problems in Bandehalli-2 micro-watershed

Sl.No.	Particulars	LL (5)		MF (8)		SF (18)		SMF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Soil and water erosion problems in the farm	1	20	8	100	17	94.44	4	100	30	85.71

Interest shown towards soil testing: The data regarding Interest shown towards soil testing in Bandehalli-2 micro-watershed is presented in Table 44. The results indicated that, 85.71 per cent have shown interest in soil test.

Table 44. Interest shown towards soil testing in Bandehalli-2 micro-watershed

Sl.No.	Particulars	LL (5)		MF (8)		SF (18)		SMF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Interest in soil test	0	0	8	100	18	100	4	100	30	85.71

Usage pattern of fuel for domestic use: The data regarding usage pattern of fuel for domestic use in Bandehalli-2 micro-watershed is presented in Table 45. The results indicated that, 97.14 per cent of the households used firewood as a source of fuel and 2.86 per cent of the households used LPG as a source of fuel.

Table 45. Usage pattern of fuel for domestic use in Bandehalli-2 micro-watershed

Sl.No.	Particulars	LL (5)		MF (8)		SF (18)		SMF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Fire Wood	5	100	8	100	18	100	3	75	34	97.14
2	LPG	0	0	0	0	0	0	1	25	1	2.86

Source of drinking water: The data regarding source of drinking water in Bandehalli-2 micro-watershed is presented in Table 46. The results indicated that, piped supply was the major source of drinking water for 68.57 per cent of the households in the micro watershed and 31.43 per cent of the households used bore well.

Table 46. Source of drinking water in Bandehalli-2 micro-watershed

Sl.No.	Particulars	LL (5)		MF (8)		SF (18)		SMF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Piped supply	4	80	6	75	11	61.11	3	75	24	68.57
2	Bore Well	1	20	2	25	7	38.89	1	25	11	31.43

Source of light: The data regarding source of light in Bandehalli-2 micro-watershed is presented in Table 47. The results indicated that, Electricity was the major source of light for 100 per cent of the households in micro watershed.

Table 47. Source of light in Bandehalli-2 micro-watershed

Sl.No.	Particulars	LL (5)		MF (8)		SF (18)		SMF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Electricity	5	100	8	100	18	100	4	100	35	100

Existence of Sanitary toilet facility: The data regarding existence of sanitary toilet facilit**y** in Bandehalli-2 micro-watershed is presented in Table 48. The results indicated that, 37.14 per cent of the households possess sanitary toilet facility.

Table 48. Existence of Sanitary toilet facility in Bandehalli-2 micro-watershed

Sl.No.	Particulars	LL (5)		MF (8)		SF (18)		SMF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Sanitary toilet facility	5	100	3	37.50	4	22.22	1	25	13	37.14

Possession of PDS card: The data regarding possession of PDS card in Bandehalli-2 micro-watershed is presented in Table 49. The results indicated that, 100 per cent of the sampled households possessed BPL cards.

Table 49. Possession of PDS card in Bandehalli-2 micro-watershed

Sl.No.	Particulars	LL (5)		MF (8)		SF (18)		SMF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	APL	0	0	0	0	0	0	0	0	0	0
2	BPL	5	100	8	100	18	100	4	100	35	100

Participation in NREGA program: The data regarding participation in NREGA programme in Bandehalli-2 micro-watershed is presented in Table 50. The results indicated that, 80 per cent of the households participated in NREGA programme.

Table 50. Participation in NREGA programme in Bandehalli-2 micro-watershed

Sl.No.	Particulars	LL (5)		MF (8)		SF (18)		SMF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Participation in NREGA programme	5	100	6	75	13	72.22	4	100	28	80

Adequacy of food items: The data regarding adequacy of food items in Bandehalli-2 micro-watershed is presented in Table 51. The results indicated that, cereals were adequate for 97.14 per cent of the households, pulses were adequate for 94.29 per cent of the households, oilseed were adequate for 31.43 per cent of the households, vegetables were adequate for 28.57 per cent, fruits were adequate for 48.57 per cent, Milk were adequate for 20 per cent, Eggs were adequate for 22.86 per cent and meat were adequate for 22.86 per cent.

Table 51. Adequacy of food items in Bandehalli-2 micro-watershed

Sl.No.	Particulars	LL (5)		MF (8)		SF (18)		SMF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Cereals	5	100	8	100	17	94.44	4	100	34	97.14
2	Pulses	5	100	8	100	16	88.89	4	100	33	94.29
3	Oilseed	2	40	3	37.50	6	33.33	0	0	11	31.43
4	Vegetables	3	60	2	25	4	22.22	1	25	10	28.57
5	Fruits	4	80	3	37.50	8	44.44	2	50	17	48.57
6	Milk	1	20	1	12.50	4	22.22	1	25	7	20
7	Egg	2	40	1	12.50	4	22.22	1	25	8	22.86
8	Meat	1	20	1	12.50	4	22.22	2	50	8	22.86

Response on Inadequacy of food items: The data regarding inadequacy of food items in Bandehalli-2 micro-watershed is presented in Table 52. The results indicated that, pulses were inadequate for 2.86 per cent, oilseeds were inadequate for 65.71 per cent, vegetables were inadequate for 68.57 per cent, fruits were inadequate for 42.86 per cent, Egg were inadequate for 68.57 per cent, meat were inadequate for 71.43 per cent of the households and milk were inadequate for 57.14 per cent of the households.

Table 52. Response on Inadequacy of food items in Bandehalli-2 micro-watershed

Sl.No.	Particulars	LL (5)		MF (8)		SF (18)		SMF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Pulses	0	0	0	0	1	5.56	0	0	1	2.86
2	Oilseed	3	60	5	62.50	11	61.11	4	100	23	65.71
3	Vegetables	2	40	6	75	13	72.22	3	75	24	68.57
4	Fruits	1	20	3	37.50	9	50	2	50	15	42.86
5	Milk	3	60	6	75	9	50	2	50	20	57.14
6	Egg	3	60	6	75	12	66.67	3	75	24	68.57
7	Meat	4	80	7	87.50	12	66.67	2	50	25	71.43

Farming constraints: The data regarding farming constraints experienced by households in Bandehalli-2 micro-watershed is presented in Table 53. The results indicated that, lower fertility status of the was the constraint experienced by 88.57 per cent of the households, wild animal menace on farm field (85.71 %), frequent incidence of pest and

diseases (57.14 %), Inadequacy of irrigation water (11.43 %), High rate of interest on credit, Lack of marketing facilities in the area and Inadequate extension services (8.57 %), High cost of Fertilizers and plant protection chemicals (40 %), Low price for the agricultural commodities (22.86 %), lack of transport for safe transport of the Agril produce to the market (37.14 %), less rainfall (31.43 %) and Source of Agri-technology information (40 %).

Table 53. Farming constraints Experienced in Bandehalli-2 micro-watershed

Sl.No.	Particulars	LL (5)		MF (8)		SF (18)		SMF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Lower fertility status of the soil	1	20	8	100	18	100	4	100	31	88.57
2	Wild animal menace on farm field	0	0	8	100	18	100	4	100	30	85.71
3	Frequent incidence of pest and diseases	0	0	7	87.50	10	55.56	3	75	20	57.14
4	Inadequacy of irrigation water	1	20	1	12.50	1	5.56	1	25	4	11.43
5	High cost of Fertilizers and plant protection chemicals	1	20	6	75	6	33.33	1	25	14	40
6	High rate of interest on credit	0	0	1	12.50	2	11.11	0	0	3	8.57
7	Low price for the agricultural commodities	1	20	2	25	4	22.22	1	25	8	22.86
8	Lack of marketing facilities in the area	0	0	0	0	2	11.11	1	25	3	8.57
9	Inadequate extension services	1	20	1	12.50	1	5.56	0	0	3	8.57
10	Lack of transport for safe transport of the Agril produce to the market.	0	0	3	37.50	9	50	1	25	13	37.14
11	Less rainfall	0	0	1	12.50	7	38.89	3	75	11	31.43
12	Source of Agri-technology information(Newspaper/TV/Mobile)	1	20	4	50	7	38.89	2	50	14	40

Chapter 5

SUMMARY

In order to assess the socio-economic condition of the farmers in the watershed a comprehensive questionnaire was prepared. Major components such as demographic conditions, migration details, food consumption and family expenditure pattern, material possession, land holding, land use management, cropping pattern, cost of cultivation of crops, livestock management. The statistical components such as frequency and percentage were used to analyze the data. About 35 households located in the micro watershed were interviewed for the survey.

The data on households sampled for socio economic survey indicated that 35 farmers were sampled in Bandehalli-2 micro-watershed among them 5 (14.29 %) were landless, 8 (22.86 %) were marginal farmers, 18 (51.43 %) were small farmers and 4 (11.43 %) were semi medium farmers.

The data indicated that there were 94 (53.71 %) men and 81 (46.29 %) women among the sampled households. The average family size of landless farmers' was 4.6, marginal farmers' was 4.62, small farmers' was 5.16 and semi medium farmers' was 5.5.

The data indicated that, 44 (25.14 %) people were in 0-15 years of age, 78 (44.57 %) were in 16-35 years of age, 41 (23.43 %) were in 36-60 years of age and 12 (6.86 %) were above 61 years of age.

The results indicated that Bandehalli-2 had 54.86 per cent illiterates, 20.57 per cent of them had primary school, 4 per cent of them had middle school, 8.57 per cent of them had high school education, 4 per cent of them had PUC, 0.57 per cent of them had Diploma and ITI and 3.43 per cent of them had Degree education and 1.14 per cent of them had masters.

The results indicate that, 94.29 per cent of household heads were practicing agriculture and 8.57 per cent of the household heads were agricultural labourers. The results indicate that agriculture was the major occupation for 20 per cent of the household members, 49.71 per cent were agricultural labourers, 1.14 per cent were Housewives, 0.57 per cent were in Private Service, 25.71 per cent were students and 2.86 per cent were children.

The results show that, 0.57 per cent of the population in the micro watershed has participated in NGOs. The results indicate that 2.86 per cent of the households possess Thatched house, 80 per cent of the households possess katcha house and 17.14 per cent of them possess pucca/RCC.

The results show that 51.43 per cent of the households possess TV, 17.14 per cent of the households possess mixer/grinder, 2.86 per cent of the households possess Refrigerator, 8.57 per cent of the households possess bicycle, 31.43 per cent of the

households possess motor cycle and 85.71 per cent of the households possess mobile phones.

The results show that the average value of television was Rs. 4,083, mixer/grinder was Rs. 1,466, Refrigerator was Rs. 6,000, bicycle was Rs. 1,500, motor cycle was Rs. 41,818 and mobile phone was Rs. 1,872.

About 14.29 per cent of the households possess bullock cart, 28.57 per cent of them possess plough, 11.43 per cent of them possess Seed/Fertilizer Drill and sprayer and 28.57 per cent of them possess weeder.

The results show that the average value of bullock cart was Rs. 26,000, plough was Rs. 5,050, seed/fertilizer drill was Rs. 6,625, tractor was Rs. 450,000, sprayer was Rs. 2,600, and the average value of weeder was Rs. 39.

The results indicate that, 28.57 per cent of the households possess bullocks, 5.71 per cent of the households possess Local cow, 2.86 per cent of the households possess Buffalo and 5.71 per cent of the households possess Poultry birds.

The results indicate that, average own labour men available in the micro watershed was 1.46 and average own labour (women) available was 1.51, average hired labour (men) available was 9.40 and average hired labour (women) available was 11.40.

In case of marginal farmers, average own labour men available was 1.38, average own labour (women) was 1.25, average hired labour (men) was 8.38 and average hired labour (women) available was 10.38. In case of small farmers, average own labour men available was 1.67 and average own labour (women) was 1.72, average hired labour (men) was 11.72 and average hired labour (women) available was 14.33. In case of semi medium farmers, average own labour men available was 1.75, average own labour (women) was 2, average hired labour (men) was 12.25 and average hired labour (women) available was 14.

The results indicate that, 2.86 per cent of the households opined that the hired labour was adequate and 97.14 per cent of the households opined that the hired labour was inadequate.

The results indicate that, households of the Bandehalli-2 micro-watershed possess 33.02 ha (88.12 %) of dry land and 4.45 ha (11.88 %) of irrigated land. Marginal farmers possess 5.54 ha (100%) of dry land. Small farmers possess 19.39 ha (85.69 %) of dry land and 3.24 ha (14.31 %) of irrigated land. Semi medium farmers possess 8.09 ha (86.96 %) of dry land and 1.21 ha (13.04 %) of irrigated land.

The results indicate that, the average value of dry land was Rs. 311,853.40 and the average value of irrigated land was Rs. 583,818.18. In case of marginal famers, the average land value was Rs. 577,777.77 for dry land. In case of small famers, the average land value was Rs. 304,238 for dry land and Rs. 617,500 for irrigated land. In case of

semi medium famers, the average land value was Rs. 148,200 for dry land and Rs. 494,000 for irrigated land.

The results indicate that, there were 2 de-functioning and 3 functioning bore wells in the micro watershed. The results indicate that, bore well was the major irrigation source in the micro water shed for 5.88 per cent of the farmers.The results indicate that, the depth of bore well was found to be 3.92 meters.The results indicate that small farmers had an irrigated area of 4.13 ha respectively.

The results indicate that, farmers have grown red gram (11.56 ha), cotton (22.3 ha) and Paddy (3.64 ha). Marginal farmers have grown red gram and cotton. Small farmers have grown red gram, cotton and paddy. Semi medium farmers have grown cotton and paddy. The results indicate that, the cropping intensity in Bandehalli-2 micro-watershed was found to be 100 per cent.The results indicate that, 85.71 per cent of the households have bank account and savings.

The results indicate that, 85.71 per cent of the households have availed credit from different sources. The results indicate that, 6.67 per cent of the households have borrowed from grameena bank and Commercial Bank. The results indicate that, the average credit amount borrowed by households in micro-watershed was Rs, 9,000.

The results indicate that, 100 per cent of the households borrowed from institutional sources for the purpose of agricultural production. The results indicated that 100 per cent of the households did not repay their loan borrowed from institutional sources.

The results indicate that, around 100 per cent opined that the loan amount borrowed from helped to perform timely agricultural operations. The results indicate that, the total cost of cultivation for Cotton was Rs. 34387.52. The gross income realized by the farmers was Rs. 52014.28. The net income from Cotton cultivation was Rs. 17626.76. Thus the benefit cost ratio was found to be 1: 1.51.

The results indicate that, the total cost of cultivation for Red gram was Rs. 22963.71. The gross income realized by the farmers was Rs. 41329.76. The net income from Red gram cultivation was Rs. 18366.05. Thus the benefit cost ratio was found to be 1: 1.8.

The results indicate that, the total cost of cultivation for Paddy was Rs. 40081.91. The gross income realized by the farmers was Rs. 65866.67. The net income from Paddy cultivation was Rs. 25784.76. Thus the benefit cost ratio was found to be 1: 1.64.

The results indicate that, 14.29 per cent of the households opined that dry fodder was adequate. The results indicate that the annual gross income was Rs. 91,000 for landless farmers, for marginal farmers it was Rs. 81,743.75, for small farmers it was Rs. 115,472.22 and semi medium farmers it was Rs. 115,750.

The results indicate that the average annual expenditure is Rs. 9,244.17. For landless households it was Rs. 10,480, for marginal farmers it was Rs. 4,968.75, for small farmers it was Rs. 9,827.55 and for semi medium farmers it was Rs. 13,625. The results indicate that, households have planted 10 teak, 50 Neem, 2 Banyan and 7 tamarind trees in their field and also 5 neem trees in their backyard.

The results indicated that, households have an average investment capacity of Rs. 571.43 for land development and households have an average investment capacity of Rs. 2,285.71 for irrigation facility.

The results indicated that government subsidy was the source of additional investment for 2.86 per cent each for irrigation facility. Own funds was the source of additional investment for 2.86 per cent each for land development.

The results indicated that, cotton was sold to the extent of 100 per cent, paddy was sold to the extent of 46.67 per cent and red gram to the extent of 78.02 per cent. The results indicated that, about 8.57 per cent of the farmers sold their produce to local/village merchants, 77.14 per cent of the farmers sold their produce to regulated market and 2.86 per cent of the farmers sold their produce to Cooperative marketing Society.

The results indicated that, 88.57 per cent of the households have used tractor as a mode of transportation. The results indicated that, 85.71 per cent of the households have experienced soil and water erosion problems in the farm. The results indicated that, 85.71 per cent have shown interest in soil test.

The results indicated that, 97.14 per cent of the households used firewood as a source of fuel and 2.86 per cent of the households used LPG as a source of fuel. The results indicated that, piped supply was the major source of drinking water for 68.57 per cent of the households in the micro watershed and 31.43 per cent of the households used bore well.

The results indicated that, Electricity was the major source of light for 100 per cent of the households in micro watershed. The results indicated that, 37.14 per cent of the households possess sanitary toilet facility. The results indicated that, 100 per cent of the sampled households possessed BPL cards.

The results indicated that, 80 per cent of the households participated in NREGA programme. The results indicated that, cereals were adequate for 97.14 per cent of the households, pulses were adequate for 94.29 per cent of the households, oilseed were adequate for 31.43 per cent of the households, vegetables were adequate for 28.57 per cent, fruits were adequate for 48.57 per cent, Milk were adequate for 20 per cent, Eggs were adequate for 22.86 per cent and meat were adequate for 22.86 per cent.

The results indicated that, pulses were inadequate for 2.86 per cent, oilseeds were inadequate for 65.71 per cent, vegetables were inadequate for 68.57 per cent, fruits were

inadequate for 42.86 per cent, Egg were inadequate for 68.57 per cent, meat were inadequate for 71.43 per cent of the households and milk were inadequate for 57.14 per cent of the households.

The results indicated that, lower fertility status of the was the constraint experienced by 88.57 per cent of the households, wild animal menace on farm field (85.71 %), frequent incidence of pest and diseases (57.14 %), Inadequacy of irrigation water (11.43 %), High rate of interest on credit, Lack of marketing facilities in the area and Inadequate extension services (8.57 %), High cost of Fertilizers and plant protection chemicals (40 %), Low price for the agricultural commodities (22.86 %), lack of transport for safe transport of the Agril produce to the market (37.14 %), less rainfall (31.43 %) and Source of Agri-technology information (40 %).