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

MASKANAHALLI-2 (4D5B1J2a) MICROWATERSHED

Hatthakuni & Yadgir Hobli, Yadgir Taluk and District, Karnataka

Karnataka Watershed Development Project – II

SUJALA – III

World Bank funded Project

The World Bank

ICAR – NATIONAL BUREAU OF SOIL SURVEY AND LAND USE PLANNING

ICAR - NBSS & LUP

WATERSHED DEVELOPMENT DEPARTMENT
GOVT. OF KARNATAKA, BANGALORE

About ICAR - NBSS&LUP

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

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

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PREFACE

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

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

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

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

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

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

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

Nagpur
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PART-A

LAND RESOURCE INVENTORY

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EXECUTIVE SUMMARY

The land resource inventory of Maskanahalli-2 Microwatershed was conducted using village cadastral maps and IRS satellite imagery on 1:7920 scale. The false colour composites of IRS imagery were interpreted for physiography and the physiographic delineations were used as base for mapping soils. The soils were studied in several transects and a soil map was prepared with phases of soil series as mapping units. Random checks were made all over the area outside the transects to confirm and validate the soil map unit boundaries. The soil map shows the geographic distribution and extent, characteristics, classification, behavior and use potentials of the soils in the microwatershed.

The present study covers an area of 668 ha in Yadgir taluk & district, Karnataka. The climate is semiarid and categorized as drought-prone with an average annual rainfall of 866 mm, of which about 652 mm is received during south-west monsoon, 138 mm during north-east and the remaining 76 mm during the rest of the year. An area of 506 ha in the microwatershed is covered by soils, 138 ha by rock outcrops and about 24 ha by others (habitation and water bodies). The salient findings from the land resource inventory are summarized briefly below.

- *The soils belong to 9 soil series and 14 soil phases (management units) and 8 land management units.*
- *The length of crop growing period is about 120-150 days starting from 1st week of June to 4th week of October.*
- *From the master soil map, several interpretative and thematic maps like land capability, soil depth, surface soil texture, soil gravelliness, available water capacity, soil slope and soil erosion were generated.*
- *Soil fertility status maps for macro and micronutrients were generated based on the surface soil samples collected at every 320 m grid interval.*
- *Land suitability for growing 29 major agricultural and horticultural crops was assessed and maps showing the degree of suitability along with constraints were generated.*
- *Entire area in the microwatershed is suitable for agriculture.*
- *About 30 per cent area of the microwatershed has soils that are moderately deep to very deep (75 - >150 cm) and 46 per cent soils are shallow to moderately shallow (25 - 75 cm).*
- *About 3 per cent area in the microwatershed has sandy soils, 60 per cent soils are loamy and 12 per cent clayey soils at the surface.*
- *About 55 per cent of the microwatershed area is non gravelly (<15%) and 21 per cent of the microwatershed area is gravelly (15 – 35%).*
- *About 16 per cent area of the microwatershed is very high (>200 mm/m) in available water capacity,11 per cent is medium(101-150 mm/m), 19 per cent is low (51- 100 mm/m) and 30 per cent is very low (<50 mm/m).*
- *Entire area of the microwatershed falls under very gently sloping (1-3% slope) lands.*

- *Entire area of the microwatershed has moderately (e2) eroded lands.*
- *An area of about 14 per cent soils are slightly acid (pH 6.0-6.5) in soil reaction, an area of 58 per cent is neutral (pH 6.5-7.3) and 4 per cent soils are slightly alkaline (pH 7.3-7.8).*
- *The Electrical Conductivity (EC) of the soils in the entire area of the microwatershed is dominantly <2 dsm^{-1} indicating that the soils are non-saline.*
- *Available organic carbon is high (>0.75) in an area of 3 per cent and medium (0.5-0.75%) in an area of 72 per cent.*
- *About 2 per cent is low (<23 kg/ha) in available phosphorus, 73 per cent is medium (23-57 kg/ha) and high (>57 kg/ha) in an area of one per cent.*
- *About 42 per cent is low (145 kg/ha) in available potassium and 33 per cent is medium (145-337 kg/ha).*
- *Available sulphur is low (<10 ppm) in an area of about 36 per cent and medium (10 -20 ppm) in 40 per cent.*
- *Available boron content is low (<0.5 ppm) in the entire area of the microwatershed.*
- *Available iron is sufficient (>4.5 ppm) in the entire area of the microwatershed.*
- *Available manganese and copper are sufficient in all the soils of the microwatershed.*
- *Available zinc is deficient (<0.6 ppm) in an area of about 65 per cent and sufficient (>0.6 ppm) in an area of about 11 per cent.*
- *The land suitability for 29 major crops grown in the microwatershed were assessed and the areas that are highly suitable (S1) and moderately suitable (S2) are given below. It is however to be noted that a given soil may be suitable for various crops but what specific crop to be grown may be decided by the farmer looking to his capacity to invest on various inputs, marketing infrastructure, market price and finally the demand and supply position.*

Land suitability for various crops in the Microwatershed

Crop	Suitability Area in ha (%)			Crop	Suitability Area in ha (%)	
	Highly suitable (S1)	Moderately suitable (S2)			Highly suitable (S1)	Moderately suitable (S2)
Sorghum	*109(16)*	*197(29)*		*Guava*	-	*89(13)*
Maize	-	*306(46)*		*Sapota*	-	*89(13)*
Bajra	-	*305(46)*		*Pomegranate*	-	*198(30)*
Groundnut	-	*117(18)*		*Musambi*	-	*198(30)*
Sunflower	*109(16)*	*89(13)*		*Lime*	-	*198(30)*
Red gram	-	*89(13)*		*Amla*	*128(19)*	*177(26)*
Bengal gram	*109(16)*	*127(19)*		*Cashew*	-	*19(3)*
Cotton	*109(16)*	*127(19)*		*Jackfruit*	-	*89(13)*
Chilli	-	*306(46)*		*Jamun*	-	*109(16)*
Tomato	-	*197(29)*		*Custard apple*	*198(30)*	*107(16)*
Brinjal	*19(3)*	*286(43)*		*Tamarind*	-	*109(16)*
Onion	*89(13)*	*216(32)*		*Mulberry*	-	*89(13)*
Bhendi	*89(13)*	*216(32)*		*Marigold*	-	*306(46)*
Drumstick	-	*198(30)*		*Chrysanthemum*	-	*306(46)*
Mango	-	-				

- *Apart from the individual crop suitability, a proposed crop plan has been prepared for the identified LMUs by considering only the highly and moderately suitable lands for different crops and cropping systems with food, fodder, fibre and horticulture crops.*
- *Maintaining soil-health is vital to crop production and conserve soil and land resource base for maintaining ecological balance and to mitigate climate change. For this, several ameliorative measures have been suggested to these problematic soils like saline/alkali, highly eroded, sandy soils etc.,*
- *Soil and water conservation treatment plan has been prepared that would help in identifying the sites to be treated and also the type of structures required.*
- *As part of the greening programme, several tree species have been suggested to be planted in marginal and sub marginal lands, field bunds and also in the hillocks, mounds and ridges. This would help in not only supplementing the farm income but also provide fodder and fuel and generate lot of biomass which would help in maintaining an ecological balance and also contribute to mitigating the climate change.*

Chapter 1

INTRODUCTION

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. This demands 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 Maskanahalli-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 Maskanahalli-2 microwatershed is located in the northern part of Karnataka in Yadgir Taluk & District, Karnataka State (Fig.2.1). It comprises parts of Ashinala, Halagera, Varkanahalli, Ramasamudra and Mylapur villages. It lies between $16^0$44' - $16^0$46' North latitudes and $77^0$12' - $77^0$14' East longitudes, covering an area of about 668 ha. It is about 14 km southeast of Yadgir town and is surrounded by Ashinala on the north, northwest and west. Halagera on the south, Varkanahalli village on the west, Ashinala village on the northwest and north, Ramasamudra village on the northeast and east and Mylapur village on the southeastern side.

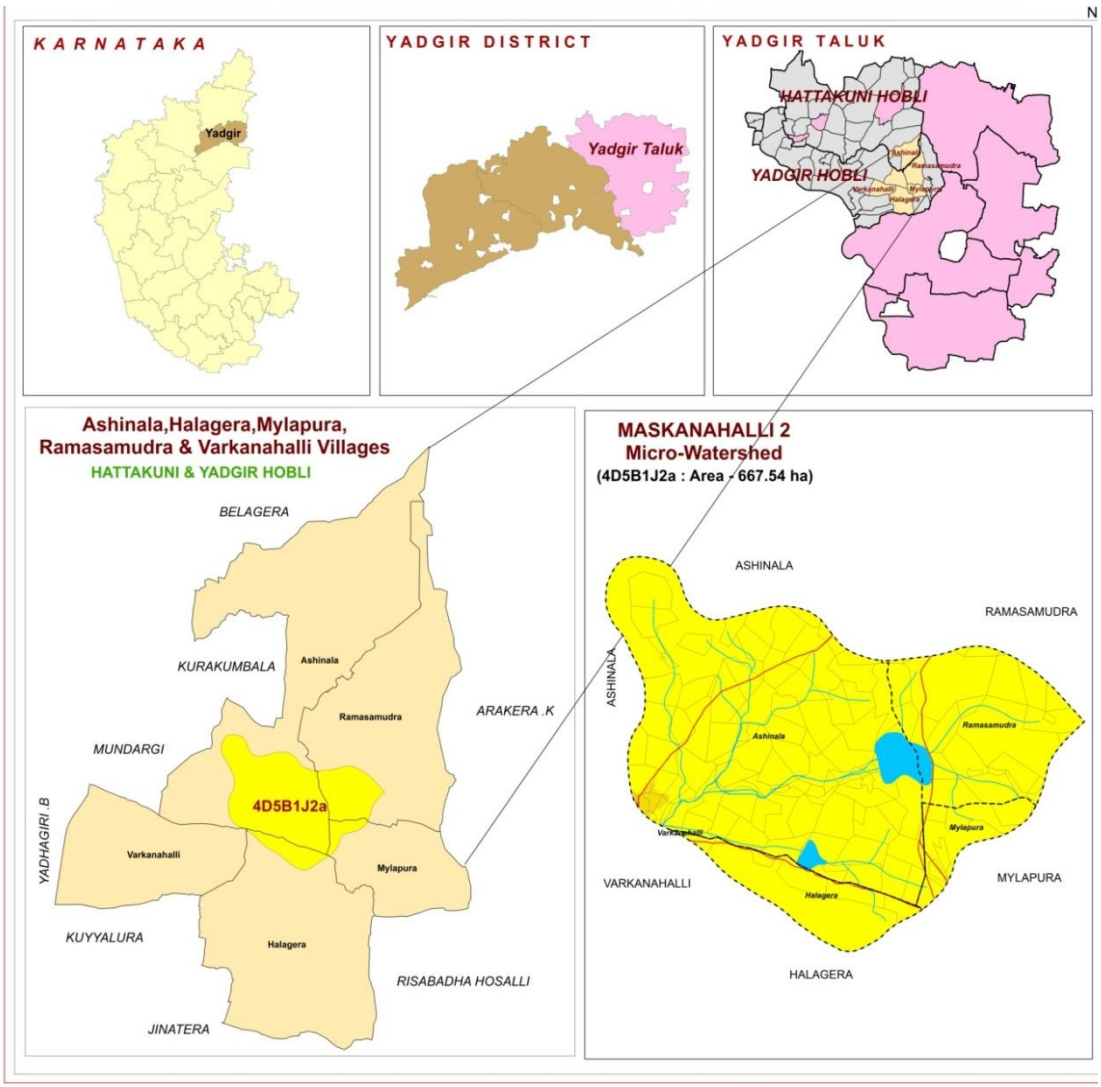


Fig.2.1 Location map of Maskanahalli-2 Microwatershed

2.2 Geology

Major rock formations observed in the microwatershed are granite gneiss (Figs.2.2). They 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 Maskanahalli-2 microwatershed.

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 area has been further subdivided into five landforms, *viz;* mounds/ridges, summits, side slopes and very gently sloping uplands, plains and valleys based on slope and its relief features. The elevation ranges from 300-450 m above MSL. The mounds and ridges are mostly covered by rock outcrops.

2.4 Drainage

The area is drained by several parallel streams like Bori, Amerja and Kanga which finally join the river Bhima along its course. Though, they are not perennial, during rainy season they carry large quantities of rain water. The microwatershed has only few small tanks which are not capable of storing the water that flows during the rainy season. Due to this, the ground water recharge is very much affected. This is reflected in the failure of many bore wells in the villages. If the available rain water is properly harnessed by constructing new tanks and recharge structures at appropriate places in the villages, then the drinking and irrigation needs of the area can be easily met. The drainage network is parallel to sub parallel and dendritic.

2.5 Climate

The Yadgir district lies in the northern plains of Karnataka and falls under semiarid tract of the state and is categorized as drought- prone with total annual rainfall of 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 coldest 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, August and 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, Yadgir District

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

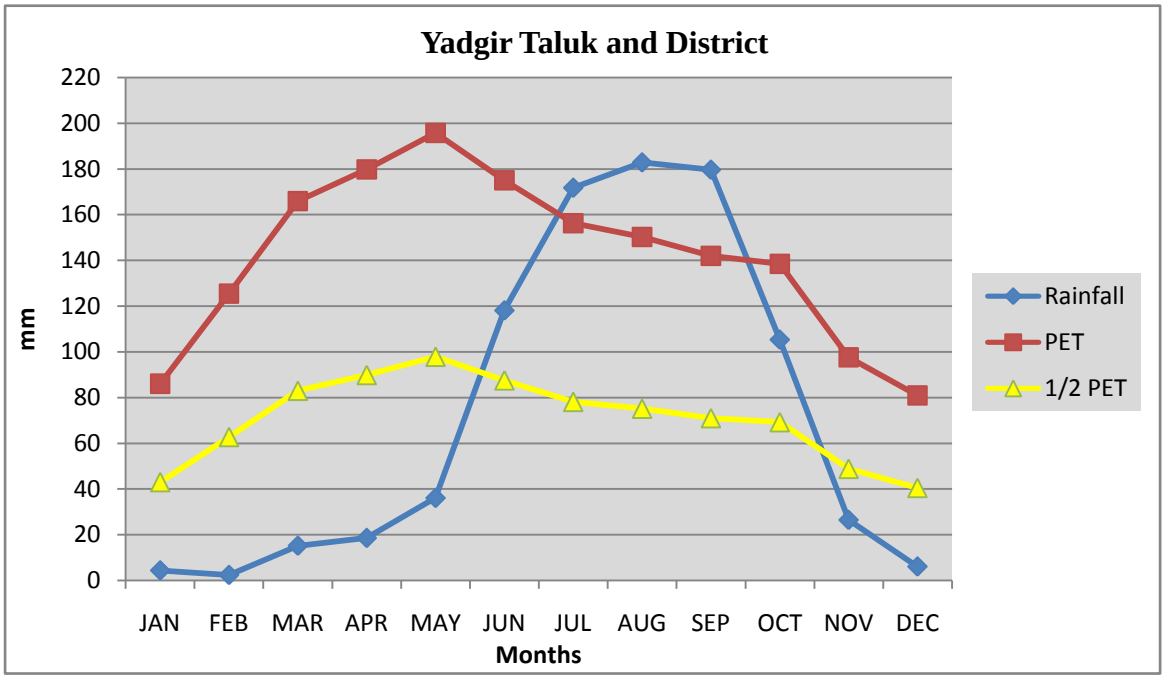


Fig 2.3 Rainfall distribution in Yadgir Taluk, Yadgir District

2.6 Natural Vegetation

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

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

Fig 2.4 Natural vegetation of maskanahalli-2 microwatershed

2.7 Land Utilization

About 72 per cent area (Table 2.2) in Yadgir district is cultivated at present. An area of about 2 per cent is permanently under pasture, 20 per cent under current fallows and 6 per cent under non-agricultural land, and 5 per cent under currently barren. Forests occupy an area of about 7 per cent and the tree cover is in a very poor state. Most of the mounds, ridges and bouldery areas have very poor vegetative cover. Major crops grown in the area are sorghum, maize, cotton, sunflower, groundnut, red gram and paddy. The cropping intensity is 120 per cent in the taluk. While carrying out land resource inventory, the land use/land cover particulars are collected from all the survey numbers and a current land use map of the microwatershed is prepared. The current land use map prepared shows the arable and non-arable lands, other land uses and different types of crops grown in the area. The current land use map of Maskanahalli-2 microwatershed is presented in Fig.2.5. The different crops and cropping systems adopted in the microwatershed is presented in the Figures 2.6 a. The occurrence and distribution of wells and bore wells in Maskanahalli-2 microwatershed is shown in figure 2.7.

Table 2.2 Land Utilization in Yadgir District

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

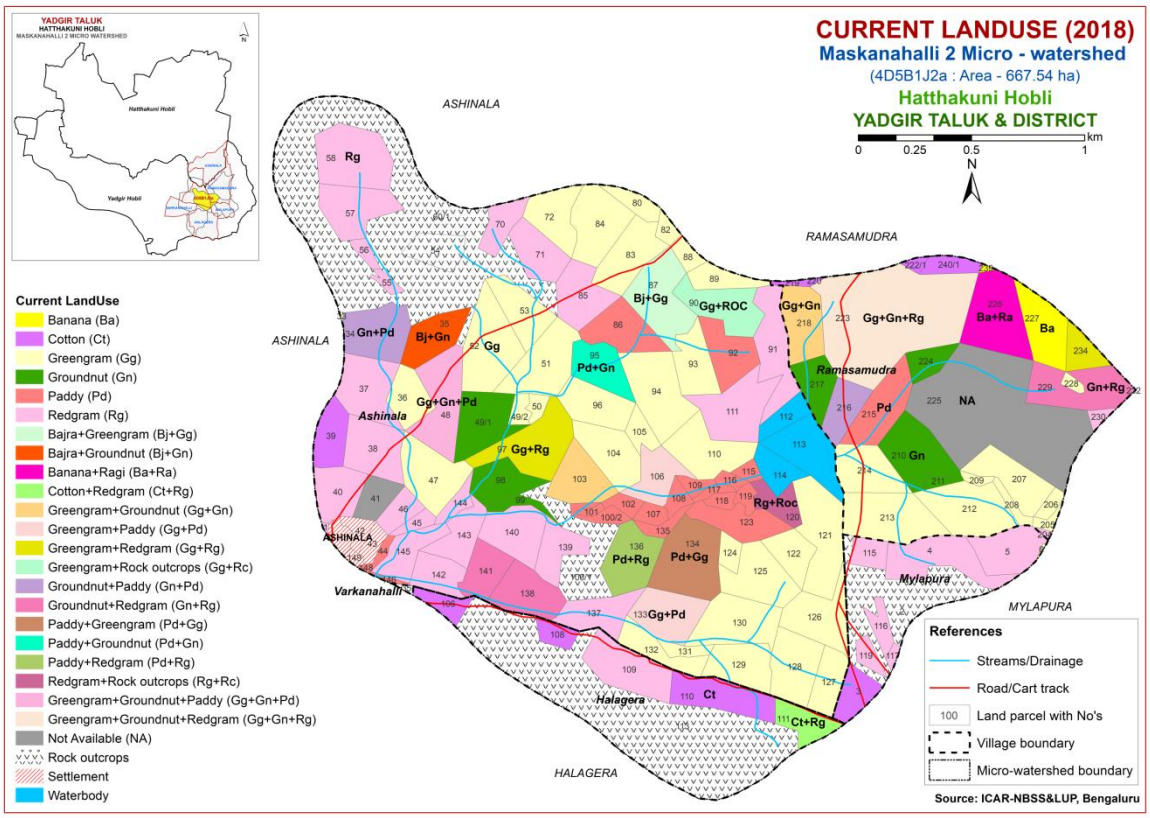


Fig.2.5 Current Land Use map of Maskanahalli-2 Microwatershed

Fig 2.6 . Different Crops and Cropping Systems in Maskanahalli-2 Microwatershed

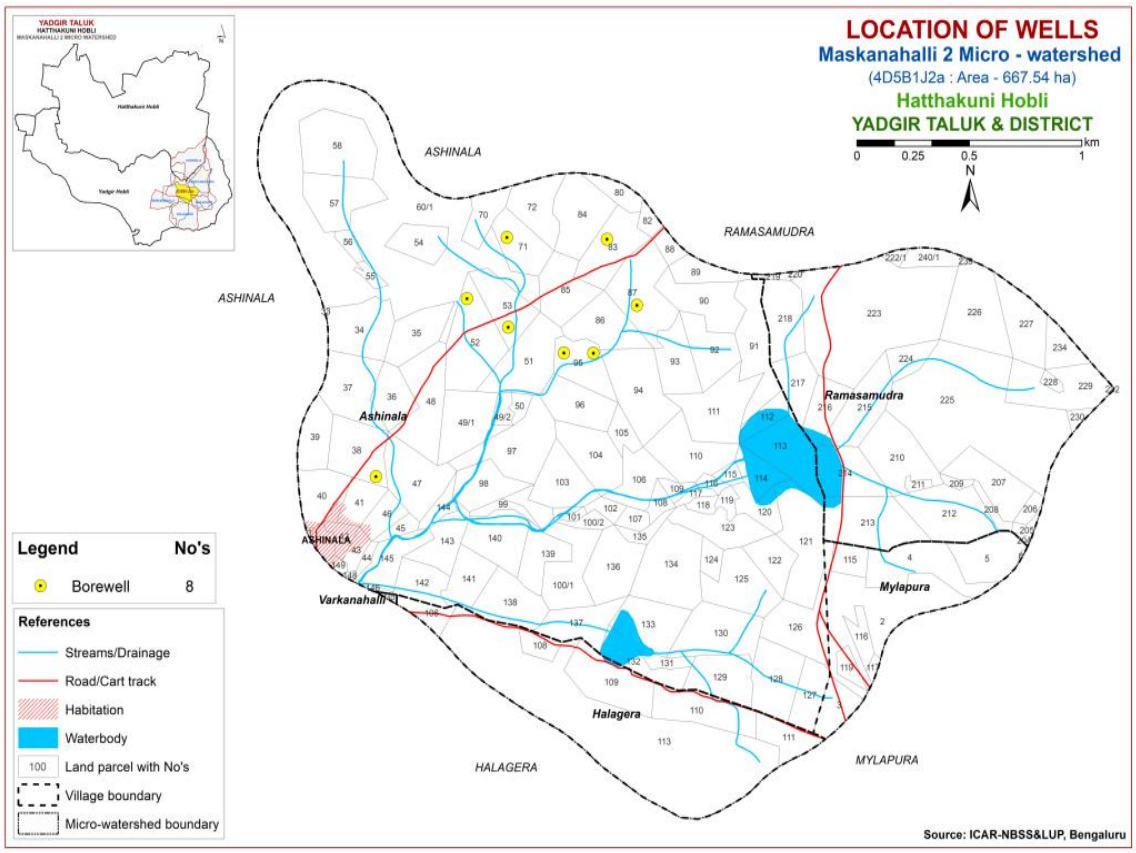


Fig 2.7 Location of wells-maskanahalli-2 microwatershed

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 Maskanahalli-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 the area extent and their geographic distribution on the microwatershed cadastral map. The detailed survey at 1:7920 scale was carried out in an area of 668 ha. The methodology followed for carrying out land resource inventory was as per the guidelines given in Soil Survey Manual (IARI, 1971; Soil Survey Staff, 2006; Natarajan *et al.,* 2015) which is briefly described below.

3.1 Base Maps

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

3.2 Image Interpretation for Physiography

False Colour Composites (FCCs) of Cartosat-I and LISS-IV merged satellite data covering microwatershed area was visually interpreted using image interpretation elements and all the available collateral data with local knowledge. The delineated physiographic boundaries were transferred on to a cadastral map overlaid on satellite imagery. Physiographically, the area has been identified as granite 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)
	G24		Valleys/ lowlands
		G241	Valleys, pink tones
		G242	Valleys gray mixed with pink tones

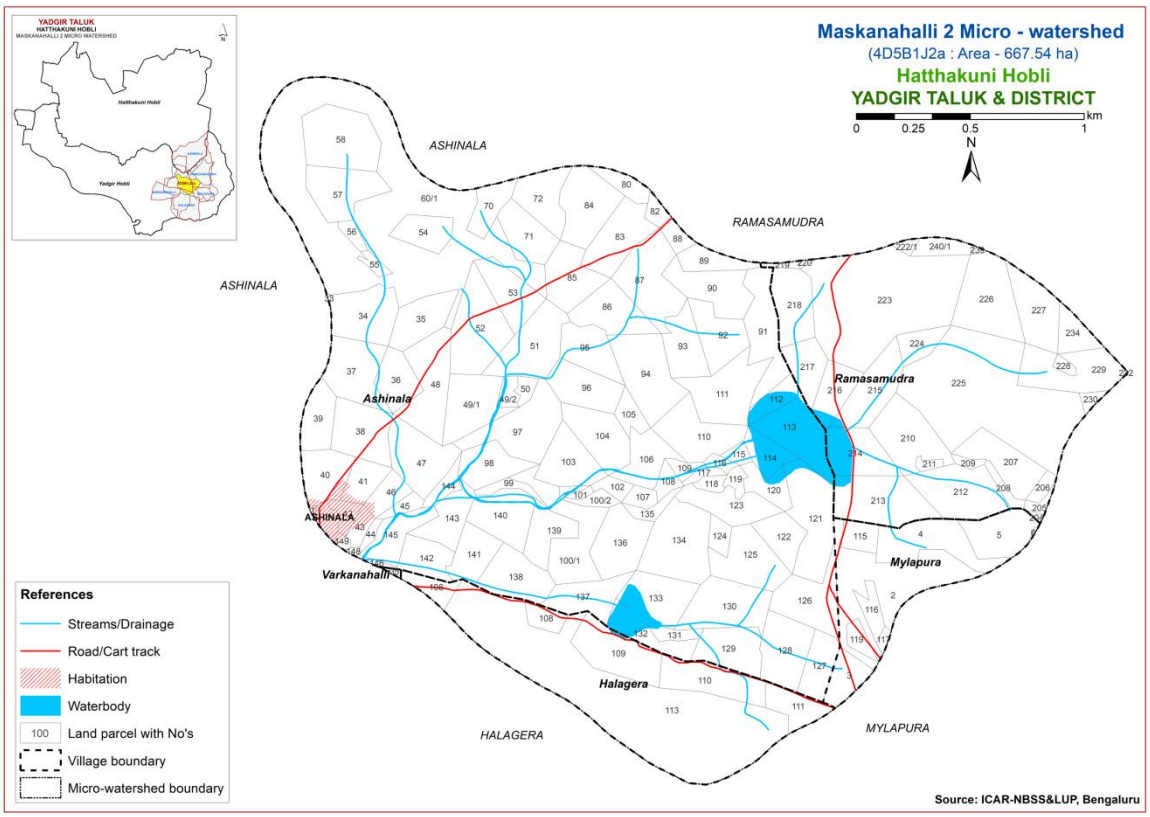


Fig 3.1 Scanned and Digitized Cadastral map of Maskanahalli-2 Microwatershed

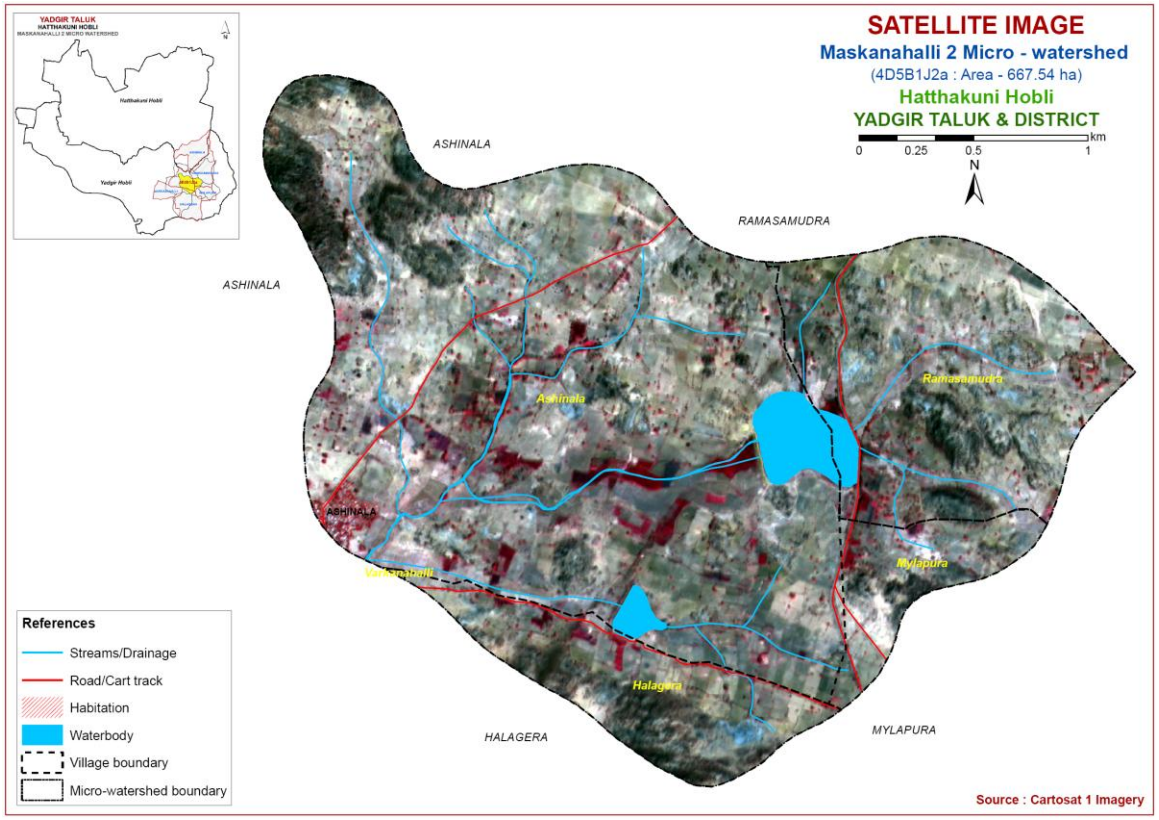


Fig.3.2 Satellite Image of Maskanahalli-2 Microwatershed

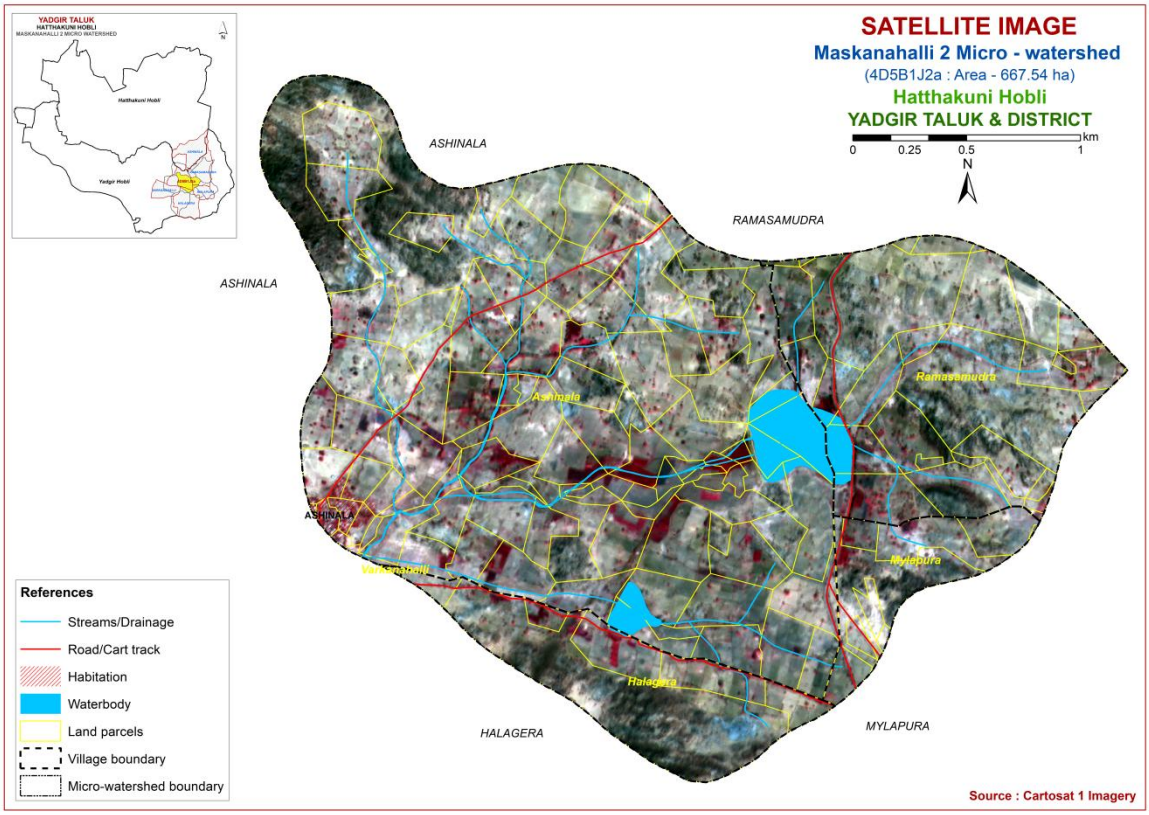


Fig.3.3 Cadastral map overlaid on IRS PAN+LISS IV merged imagery of Maskanahalli-2 Microwatershed

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).

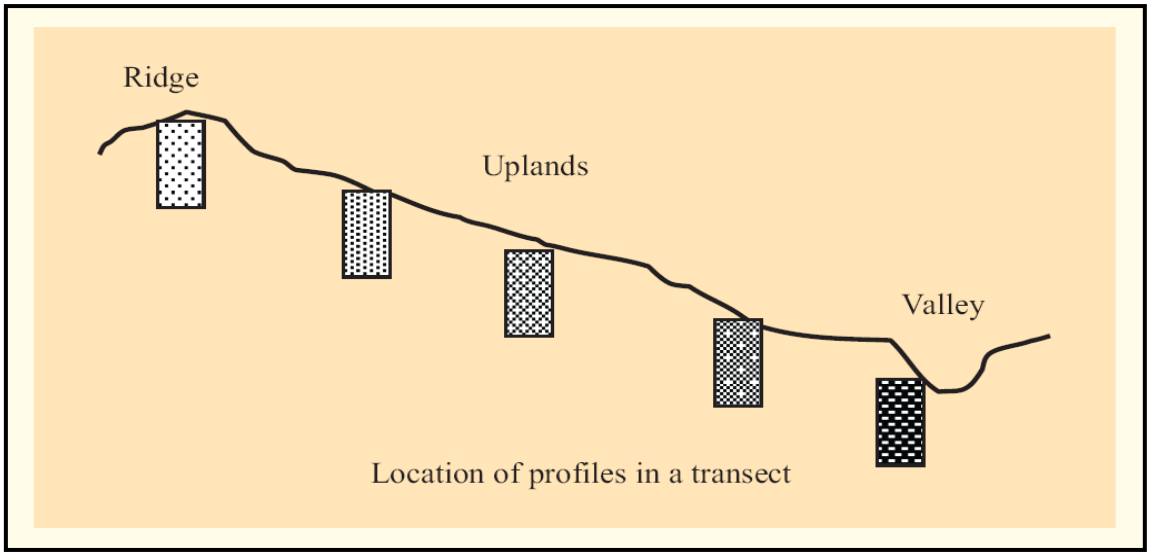


Fig: 3.4. Location of profiles in a transect

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 characteristics, the soils were grouped into different soil series. Soil series is the most homogeneous unit having similar horizons and properties and behaves similarly for a given level of management. Soil depth, texture, colour, kind of horizon and horizon sequence, calcareousness, amount and nature of gravel present, nature of substratum etc, were used as the major differentiating characteristics for identifying soil series occurring in the area. The differentiating characteristics used for identifying the soil series are given in Table 3.1. Based on the above characteristics, 9 soil series were identified in the Maskanahalli-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	BDL (Badiyala)	25-50	7.5 YR 2.5/3, 2.5/2, 3/3 10YR 3/4, 4/3	sl	-	Ap-Bw	e
2	VNK (Vanakanahalli)	25-50	2.5YR 3/4	sc	-	Ap-Bt-Cr	-
3	SBR (Sambara)	50-75	10YR 7/1, 7.5YR 7/4	ls	-	Ap-Ac	-
4	JNK (Jinkera)	50-75	10YR 3/1,3/2 7.5YR 3/4	scl	-	Ap-Bw	e
5	YLR (Yalleri)	50-75	2.5YR 3/4, 4/4, 5YR 3/4, 7.5YR 4/4	c	15-35	Ap-Bt	-
6	BLC (Balichakra)	75-100	2.5YR 5/3, 2.5/4, 5YR 4/3, 3/3	scl	-	Ap-Bt	-
7	HSL (Hosalli)	75-100	10YR 5/4, 4/4, 4/6,	sc	-	Ap-Bw	e
8	HTK (Hattikuni)	25-50	10YR 4/6, 4/4, 7.5YR 4/4, 3/3	sl	10-25	Ap-Ac	-
9	SGR (Sangawar)	>150	10YR 3/1,4/1	c	-	Ap-Bss	es

3.4 Soil Mapping

The area under each soil series was further separated into soil phases and their boundaries delineated on the cadastral map based on the variations observed in the texture of the surface soil, slope, erosion, presence of gravel, stoniness etc. A soil phase is a subdivision of soil series based mostly on surface features that affect its use and management. The soil mapping units are shown on the map (Fig.3.5) in the form of symbols. During the survey many 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 14 mapping units representing 9 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 14 soil phases mapped in the microwatershed. Each mapping unit (soil phase) delineated on the map has similar soil and site characteristics. In other words, all the farms or survey numbers included in one soil phase will have similar management needs and have to be treated accordingly.

3.5 Land Management Units (LMU's)

The 14 soil phases identified and mapped in the microwatershed were grouped into 8 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 Maskanahalli-2 microwatershed, five soil and site characteristics, namely soil depth, soil texture, slope, erosion and gravel content have been considered for defining LMUs. The Land Management Units are expected to behave similarly for a given level of management.

3.6 Laboratory Characterization

Soil samples for each soil series were collected from representative master profiles for laboratory characterization by following the methods outlined in the Laboratory Manual (Sarma *et al*, 1987). Surface soil samples collected from farmer's fields (63 samples) for fertility status (major and micronutrients) at 320 m grid interval in the year 2018 were analyzed in the laboratory (Katyal and Rattan, 2003). By linking the soil fertility data to the survey numbers through GIS, soil fertility maps were generated by using Kriging method for the microwatershed.

Table 3.2 Soil map unit description of Maskanahalli-2 Microwatershed

Soil Map unit No.	Soil Series	Soil Phase	Mapping Unit Description	Area in ha (%)
	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		**33 (4.99)**
4		BDLhB2	Sandy clay loam surface, slope 1-3%, moderate erosion	33 (4.99)
	VNK	Vanakanahalli soils are shallow (25-50 cm), well drained, have dark reddish brown, sandy clay red soils occurring on very gently to moderately sloping uplands under cultivation		**75 (11.23)**
9		VNKcB2	Sandy loam surface, slope 1-3%, moderate erosion	4 (0.61)
10		VNKiB2	Sandy clay surface, slope 1-3, moderate erosion	71 (10.62)
	SBR	Sambara soils are moderately shallow (50-75 cm), somewhat excessively drained, have light gray to pink, loamy sand soils occurring on very gently to gently sloping uplands under cultivation		**71 (10.64)**
11		SBRcB2	Sandy loam surface, slope 1-3%, moderate erosion	71 (10.64)

	JNK	Jinkera soils are moderately shallow (50-75 cm), well drained, have dark brown to very dark grayish brown, slightly calcareous sandy clay loam soils occurring on very gently sloping uplands under cultivation		**80 (11.87)**
20		JNKcB2	Sandy loam surface, slope 1-3%, moderate erosion	42 (6.24)
21		JNKhB2g1	Sandy clay loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)	19 (2.77)
110		JNKhB2	Sandy clay loam surface, slope 1-3%, moderate erosion	19 (2.86)
	YLR	Yalleri soils are moderately shallow (50-75 cm), well drained, have brown to reddish brown and dark reddish brown, clay red soils occurring on very gently to gently sloping uplands under cultivation		**80 (11.87)**
29		YLRcB2g1	Sandy loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)	80 (11.87)
	BLC	Balichakra soils are moderately deep (75-100 cm), well drained, have reddish brown to dark reddish brown, sandy clay loam red soils occurring on very gently sloping uplands under cultivation		**19 (2.88)**
37		BLCcB2	Sandy loam surface, slope 1-3%, moderate erosion	7 (1.02)
38		BLCiB2	Sandy clay surface, slope 1-3, moderate erosion	10 (1.5)
155		BLCcB2g1	Sandy loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)	2 (0.36)
	HSL	Hosalli soils are moderately deep (75-100 cm), moderately well drained, have yellowish brown to dark yellowish brown, slightly calcareous sandy clay soils occurring on very gently sloping uplands under cultivation		**70 (10.45)**
160		HSLcB2g1	Sandy loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)	70 (10.45)
	HTK	Hattikuni soils are shallow (25-50 cm), well drained, have dark yellowish brown sandy loam soils occurring on very gently sloping uplands under cultivation		**21 (3.15)**
161		HTKbB2g1	Loamy sand surface, slope 1-3%, moderate erosion, gravelly (15-35%)	21 (3.15)
	SGR	Sangwar soils are very deep (>150 cm), moderately well drained, have dark gray to very dark gray, calcareous, sodic cracking clay black soils occurring on very gently sloping lowlands under cultivation		**109 (16.34)**
142		SGRhB2	Sandy clay loam surface, slope 1-3%, moderate erosion	109 (16.34)
999	Rock outcrops	Rock lands, both massive and bouldery with little or no soil		**138 (20.69)**
1000		Habitation and Water body		**24 (3.55)**

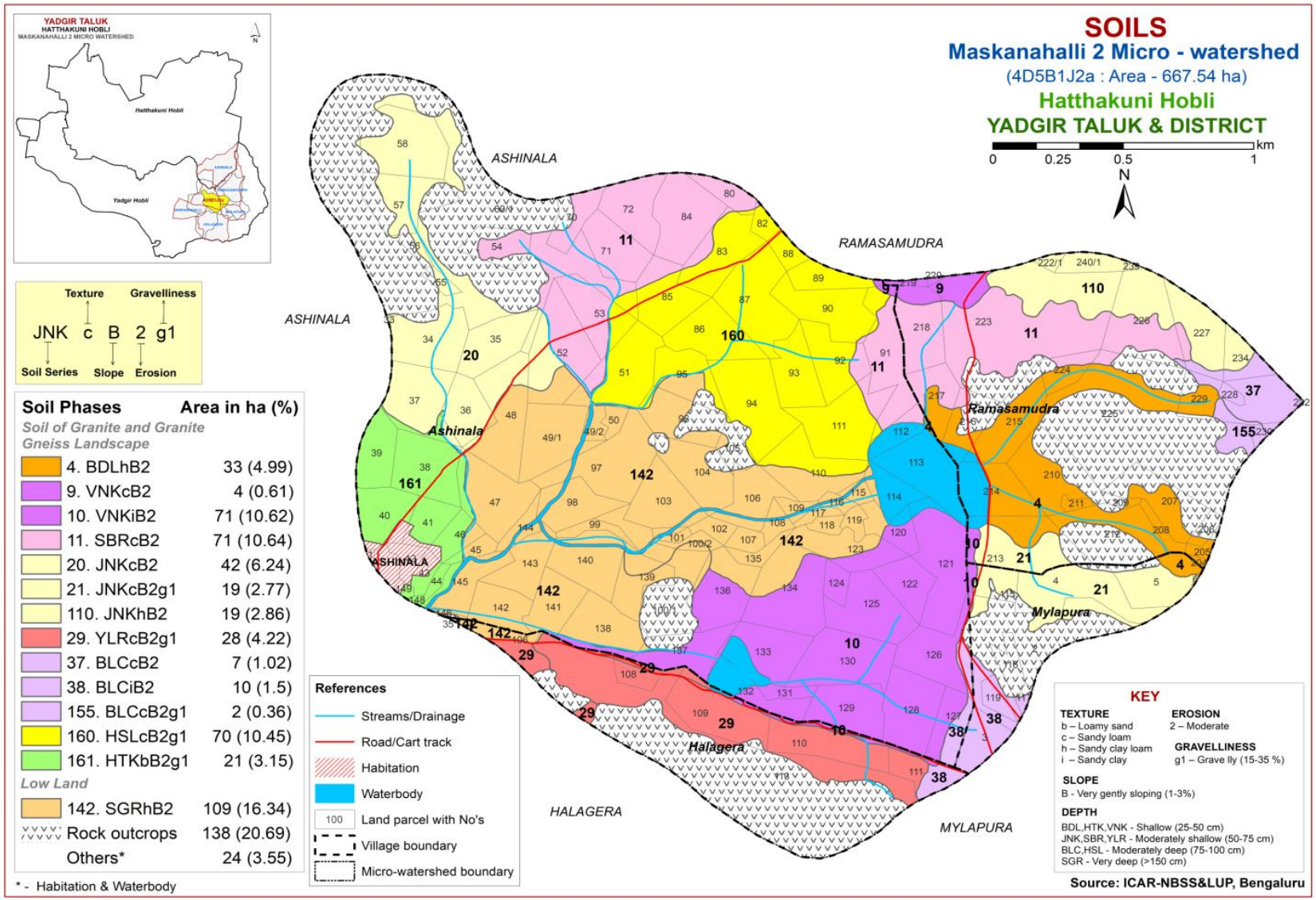


Fig 3.5 Soil Phase or Management Units - Maskanahalli-2 Microwatershed

Chapter 4

THE SOILS

Detailed information pertaining to the nature, extent and their distribution of different kinds of soils occurring in Maskanahalli-2 microwatershed is provided in this chapter. The microwatershed area has been identified as granite gneiss landscape based on geology. In all, 9 soil series are identified. 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 and climate.

A brief description of each of the 9 soil series identified followed by 14 soil phases (management units) mapped are furnished below. The physical and chemical characteristics of soil series identified in Maskanahalli-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 characteristic that affect management. The soil phase map can be used for identifying the suitability of areas for growing specific crops or for other alternative uses and also for deciding the type of conservation structures needed. The detailed information on soil and site-characteristics like soil depth, surface soil texture, slope, erosion, gravelliness, AWC, LCC etc, with respect to each of the soil phase identified is given village/survey number wise for the microwatershed in Appendix-I.

4.1 Soils of granite gneiss landscape

In this landscape, 9 soil series are identified and mapped. Of these, SGR series occupies maximum area of 109 ha (16%) followed by JNK 80 ha (12%), VNK 75 ha (11%), SBR 71 ha (11%), HSL 70 ha (10%), BDL 33 ha (5%), YLR 80 ha (4%), HTK 21 ha (3%) and BLC 19 ha (3%). The rock outcrops and others (habitation and water body) occupy an area of 138 ha (21%) and 24 ha (4%) respectively. Brief description of each series identified and number of soil phases mapped is given below.

4.1.1 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 is slightly calcareous. The available water capacity is very low (<50mm/m). Only one phase was identified and mapped.

Landscape and Soil Profile characteristics of Badiyala (BDL) Series

4.1.2 Vanakanahalli (VNK) Series: Vanakanahalli soils are shallow (25-50 cm), well drained, have dark reddish brown sandy clay red soils. They have developed from weathered granite gneiss and occur on very gently sloping uplands under cultivation. The Vanakanahalli series has been classified as a member of the fine, mixed, isohyperthermic family of Typic Haplustalfs.

The thickness of the solum ranges from 25 to 49 cm. The thickness of A horizon ranges from 7 to 16 cm. Its colour is in 2.5 YR and 5 YR with value 3 and chroma 2 to 4. The texture is sandy loam to sandy clay loam and sandy clay. The thickness of B horizon ranges from 20 to 40 cm. Its colour is in 2.5 YR and 5 YR hue with value 3 to 4 and chroma 3 to 4. Its texture is sandy clay. The available water capacity is very low (<50 mm/m). Two phases were identified and mapped.

Landscape and Soil Profile characteristics of Vanakanahalli (VNK) Series

4.2.3 Sambara (SBR) Series: Sambara 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 Sambara 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

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

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

Landscape and Soil Profile characteristics of Jinkera (JNK) 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

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

The thickness of the solum ranges from 80 to 100 cm. The thickness of A horizon ranges from 10 to 16 cm. Its colour is in hue 5 YR with value and chroma of 3 to 4. Its texture varies from sandy clay loam and sandy clay. The thickness of B horizon ranges from 70 to 88 cm. Its colour is in hue 2.5 YR and 5 YR with value 3 to 5 and chroma 3 to 4. Its texture is sandy clay loam to sandy clay and is slightly calcareous. The available water capacity is medium (101-150 mm/m). Three phases were identified and mapped.

Landscape and Soil Profile characteristics of Balichakra (BLC) Series

4.2.7 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 Hattikuni (HTK) Series: Hattikuni soils are shallow (25-50 cm), well drained, have dark brown to dark yellowish brown sandy loam soils. They are developed from weathered granite gneiss and occur on very gently to gently sloping uplands under cultivation. The Hattikuni series has been classified as a member of the mixed, isohyperthermic family of Lithic Ustipsamments.

The thickness of the soil ranges from 36 to 50 cm. The thickness of A horizon ranges from 8 to 12 cm. Its colour is in 10YR and 7.5 YR hue with value 3 to 4 and chroma 4 to 6. The texture varies from loamy sand to sandy loam. The thickness of subsurface horizon ranges from 28 to 42 cm. Its colour is in 10 YR and 7.5 YR hue with value 3 to 4 and chroma 4 to 6. Its texture varies from loamy sand to sand and sandy loam. The available water capacity is very low (<50 mm/m). Only one phase was identified and mapped.

Landscape and Soil Profile characteristics of Hattikuni (HTK) Series

4.1.9 Sangwar (SGR) Series: Sangwar soils are very deep (>150 cm), moderately well drained, have very dark gray to dark gray, sodic calcareous cracking clay soils. They are developed from weathered granite gneiss and occur on very gently to gently sloping lowlands under cultivation. The Sangwar series has been classified as a member of the fine, mixed, calcareous, isohyperthermic family of Sodic Haplusterts.

The thickness of the solum is more than 150 cm. The thickness of A horizon ranges from 9 to 20 cm. Its colour is in 10 YR hue with value 3 to 5 and chroma 1 to 2 with sandy clay loam to sandy clay and clay texture. The thickness of B horizon ranges from 157 to 174 cm. Its colour is in 10 YR hue with value 3 to 4 and chroma 1 to 2. Its texture varies from sandy clay to clay and is calcareous. They are sodic with ESP ranging from 29 - 65%. The available water capacity is very high (>200 mm/m). Only one phase was identified and mapped.

Landscape and Soil Profile characteristics of Sangwar (SGR) Series

Table: 4.1 Physical and chemical characteristics of soil series identified in Maskanahalli-2 microwatershed

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: Vanakanahalli (VNK) **Pedon:** R-15

Location: $16^0$43'49.5"N $77^0$17'17.9"E, Yaleri village, Balichakra hobli, Yadgiri taluk and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Clayey 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
0-18	Ap	82.61	8.09	9.30	6.77	8.59	21.13	34.58	11.53	-	ls	8.85	3.53
18-50	Bt	54.51	8.73	36.77	4.93	6.18	14.15	20.75	8.49	-	sc	18.88	11.63

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	5.37	-	-	0.11	0.60	0.00	2.96	1.45	0.13	0.14	4.68	6.27	0.67	75	2.22
18-50	4.71	-	-	0.05	0.81	0.00	5.56	2.24	0.10	0.05	7.95	13.31	0.36	60	0.38

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:** Mixed, isohyperthermic Typic Ustipsamments

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

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

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

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

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

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 Paleustalfs

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-5	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: Balichakra (BLC) **Pedon:** T1/P2

Location: $16^0$33'25.0"N $77^0$20'52.3"E, Sowrashtralli village, Sydhapura hobli, Yadgir taluk and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Fine-loamy, 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
0-8	Ap	65.46	8.38	26.16	12.51	18.72	18.82	10.44	4.96	-	scl	15.15	8.63
8-19	Bt1	63.48	8.16	28.36	12.80	15.84	17.21	12.49	5.14	-	scl	16.45	8.81
19-40	Bt2	52.64	11.58	35.79	13.19	13.19	14.35	8.23	3.69	-	sc	21.49	10.36
40-75	BC	55.14	10.71	34.15	14.10	14.42	14.63	7.53	4.45	-	scl	17.77	8.99

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-8	6.75	-	-	0.19	0.72	0.00	12.18	3.10	0.43	0.22	15.92	16.80	0.64	95	1.31
8-19	7.23	-	-	0.12	0.68	0.84	11.37	2.50	0.23	0.18	14.28	14.77	0.52	97	1.24
19-40	7.13	-	-	0.08	0.50	0.48	13.80	2.82	0.18	0.09	16.89	17.66	0.49	96	0.51
40-75	7.07	-	-	0.07	0.35	0.84	13.00	2.90	0.17	0.10	16.16	17.55	0.51	92	0.57

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: Hattikuni (HTK), Pedon: R-7

Location: $16^0$50'46.5"N $77^0$10'16.4"E, Yaddalli village, Hattikuni hobli, Yadgir taluk and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Mixed, isohyperthermic, Lithic Ustipsamments

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	90.89	5.62	3.49	8.50	13.46	29.86	29.55	9.51	20	s	7.73	3.16
12-22	A1	89.97	6.53	3.50	7.19	13.48	29.48	29.79	10.03	20	s	8.00	3.05
22-45	A2	87.20	6.43	6.38	11.09	14.42	31.55	7.16	22.98	40	ls	7.67	3.96

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-12	6.81	-	-	0.062	0.07	-	2.35	0.50	0.16	0.01	3.02	3.0	0.86	100	0.38
12.0-22	6.80	-	-	0.050	0.21	-	1.67	0.30	0.09	0.01	2.07	2.4	0.69	86.30	0.45
22-45	6.85	-	-	0.044	0.19	-	1.82	0.42	0.10	0.06	2.40	2.6	0.41	92.41	2.17

Contd…

Soil Series: Sangwar **(**SGR) **Pedon:** R-4

Location: $16^0$32'25.9"N $77^0$12'52.6"E, Bheemanahalli village, Sydhapura hobli, Yadgir taluka and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Fine, mixed (calcareous), isohyperthermic Sodic Haplusterts

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-8	Ap	37.30	18.18	44.52	4.91	6.76	12.10	4.80	8.72	-	c	32.36	23.18
8-30	BA	42.04	17.77	40.19	8.28	16.34	7.42	6.13	3.87	-	c	29.89	20.87
30-70	Bss1	33.77	18.63	47.60	5.45	11.66	6.21	6.75	3.70	-	c	37.04	26.13
70-100	Bss2	26.95	18.65	54.40	5.39	9.79	4.95	4.07	2.75	-	c	43.07	32.05
100-150	Bss3	14.35	17.32	68.33	2.69	4.15	2.35	2.69	2.47	-	c	55.74	38.19

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-8	8.3	-	-	6.49	1.48	6.69	-	-	1.32	10.09	-	34.77	0.78	100	11.61
8-30	9.09	-	-	2.54	0.64	6.76	-	-	0.75	10.00	-	33.76	0.84	100	11.85
30-70	9.23	-	-	2.6	0.28	6.63	-	-	0.42	11.55	-	38.98	0.82	100	11.86
70-100	9.39	-	-	3.01	0.36	6.89	-	-	0.73	27.73	-	42.46	0.78	100	26.132
100-150	9.28	-	-	4	0.24	7.15	-	-	0.80	27.78	-	47.67	0.70	100	23.308

Chapter 5

INTERPRETATION FOR LAND RESOURCE MANAGEMENT

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

5.1 Land Capability Classification

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

Soil Characteristics: Depth, texture, gravelliness, calcareousness.

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

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

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

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

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

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

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

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

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

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

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

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

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

The 14 soil map units identified in Maskanahalli-2 microwatershed are grouped under 2 land capability classes and 3 land capability subclasses. An entire area of 505 ha (76%) in the microwatershed is suitable for agriculture. About 138 ha (21%) area is having rock outcrops and about 24 ha (4%) is covered by others (water body & habitation) (Fig. 5.1).

Good cultivable lands (Class II) cover an area of about 56 per cent and are distributed in the major part of the microwatershed with minor problems of soil, drainage and erosion. Moderately good cultivable lands (Class III) cover an area of about 19 per cent and are distributed in the western, southern, southeastern, eastern and northeastern part of the microwatershed with moderate problems of soil and erosion.

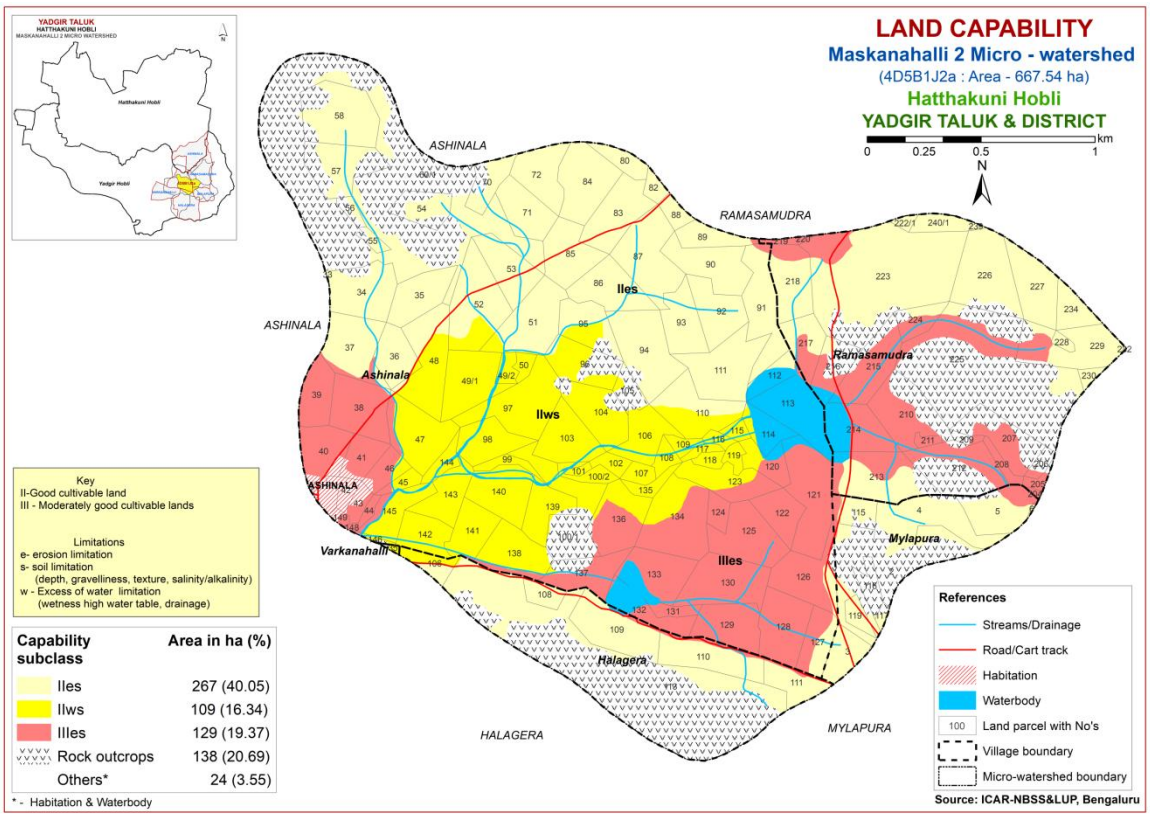


Fig. 5.1 Land Capability map of Maskanahalli-2 Microwatershed

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 given in Fig. 5.2.

Shallow (25-50 cm) soils occur in an area of 129 ha (19%) and are distributed in the western, southern, southeastern, eastern and northeastern part of the microwatershed. Moderately shallow (50-75 cm) soils occur in an area of 178 ha (27%) and are distributed in all parts of the microwatershed. Moderately deep (75-100 cm) soils occur in an area of 89 ha (13%) and are distributed in the central, northern, eastern and southeastern part of the microwatershed. Very deep (>150 cm) soils cover an area of 109 ha (16%) and are distributed in the central, western and southwestern part of the microwatershed.

The most productive lands covering 109 ha (16%) with respect to soil rooting depth where all climatically adapted annual and perennial crops can be grown are very

deep (>150 cm depth) soils. The problem soils occupy an area of 129 ha (19%) where only short duration crops can be grown occasionally and the probability of crop failure is very high.

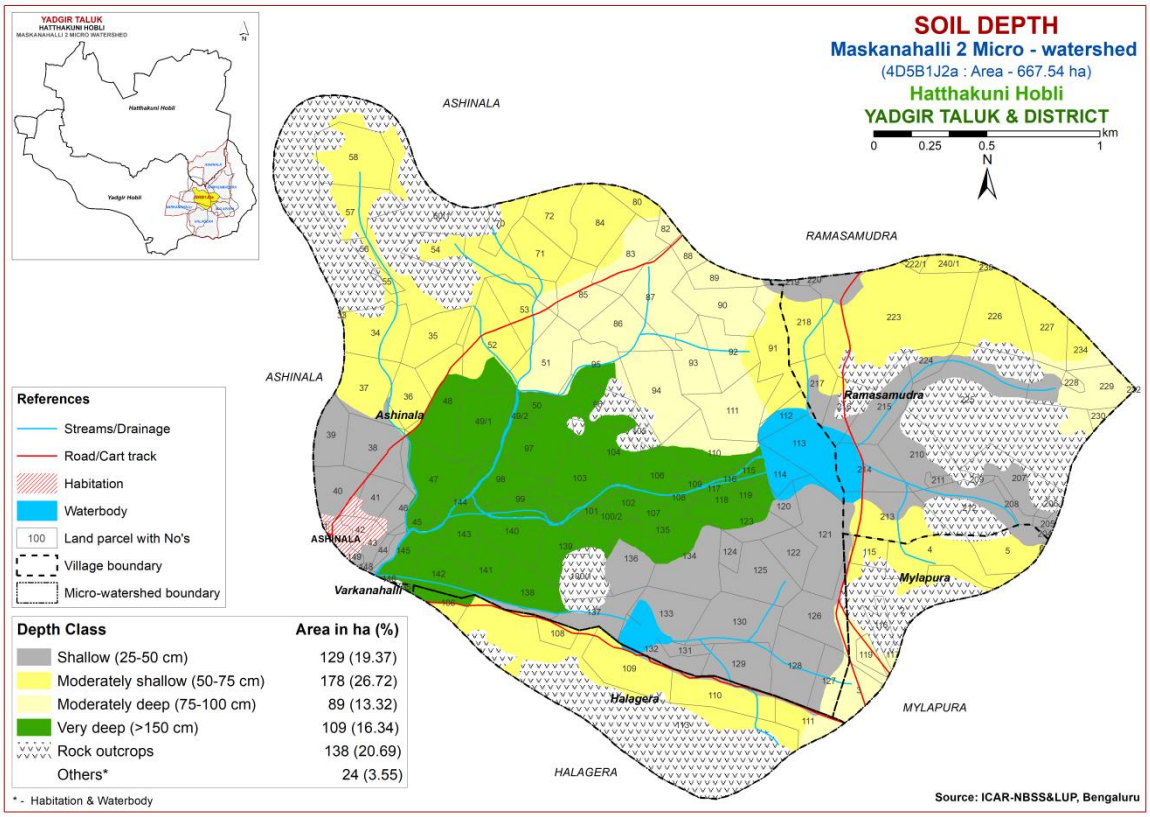


Fig. 5.2 Soil Depth map of Maskanahalli-2 Microwatershed

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 21 ha (3%) is sandy at the surface and are distributed in the western part of the microwatershed. Maximum area of about 403 ha (60%) of the microwatershed has loamy soils at the surface and are distributed in all parts of the microwatershed. An area of 81 ha (12%) of the microwatershed has soils that are clayey and are distributed in the southern and southeastern part of the microwatershed. Loamy and clayey soils have high potential for soil-water retention and availability, and nutrient retention and availability, but clay soils have more problems of drainage, infiltration,

workability and other physical problems. Sandy soils are problematic with respect to nutrient availability and moisture but well suited for tuber crops with suitable intervention.

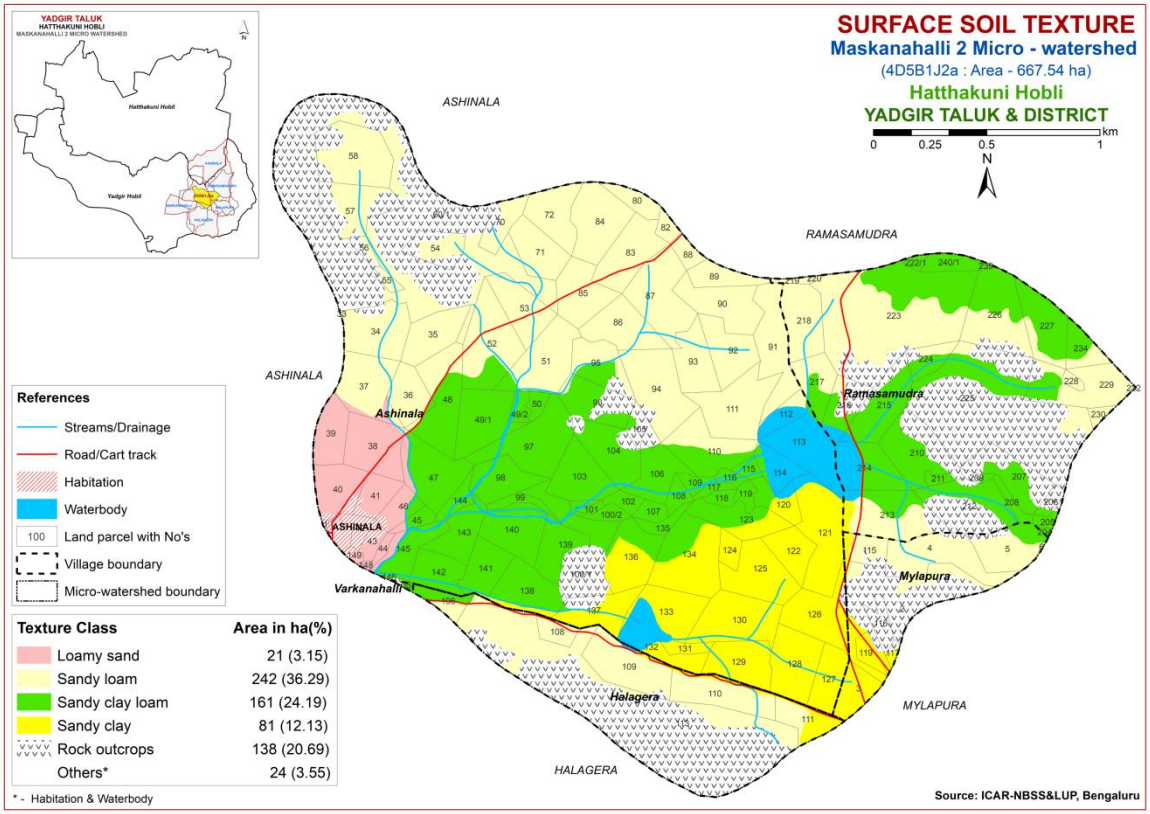


Fig. 5.3 Surface Soil Texture map of Maskanahalli-2 Microwatershed

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 soil reduces the volume of soil responsible for moisture and nutrient storage, drainage, infiltration and runoff, and hinders plant growth by impeding root growth and seedling emergence, intercultural operations and farm mechanization. The gravelliness classes used in LRI were used to classify the soils and using these classes a gravelliness map was generated. The area extent and their geographic distribution in the microwatershed is shown in Figure 5.4.

Non gravelly (<15%) soils cover a maximum area of 366 ha (55%) and distributed in the major part of the microwatershed. These are the most productive soils, where all climatically adapted short and long duration crops can be grown. Gravelly (15-35%) soils occur in an area of 140 ha (21%) and distributed in all parts of the microwatershed except northwest and northeast; these lands are low in moisture holding capacity and hence growing of short duration crops is ideal with best management practice.

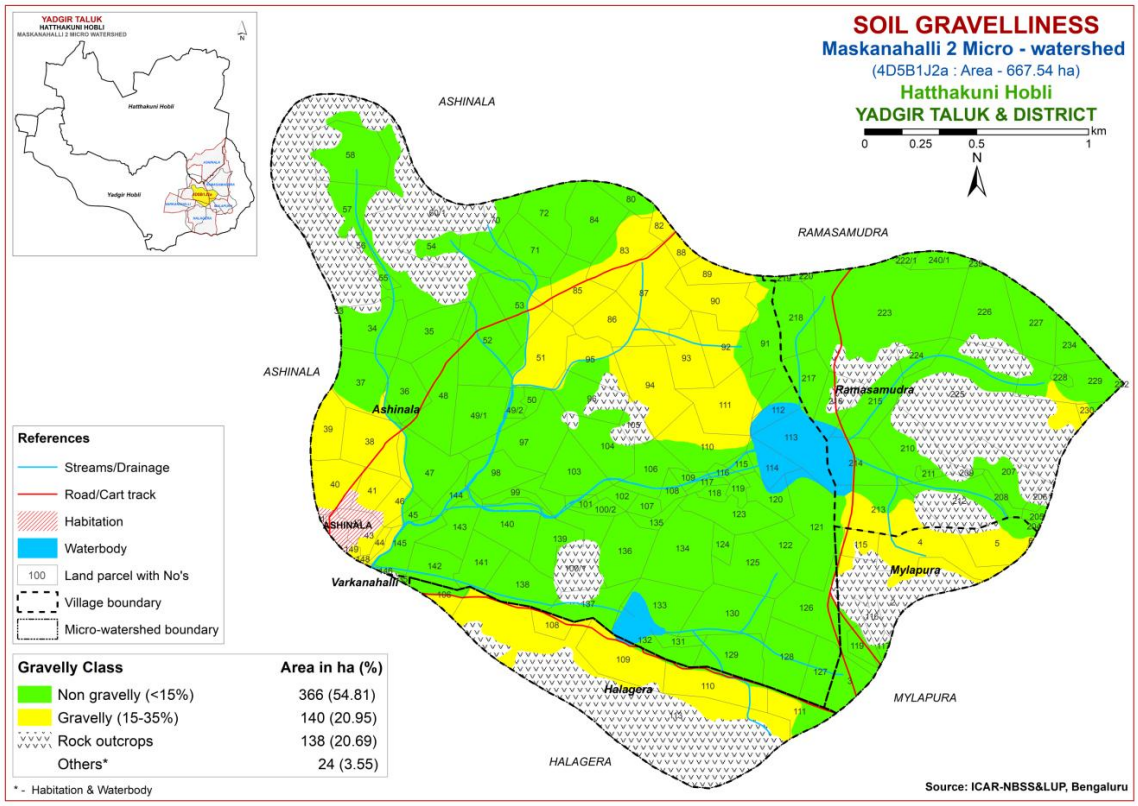


Fig. 5.4 Soil Gravelliness map of Maskanahalli-2 Microwatershed

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 values, an AWC map was generated. The area extent and their geographic distribution of different AWC classes in the microwatershed is given in Figure 5.5.

Maximum area of about 200 ha (30%) in the microwatershed has soils that are very low (<50 mm/m) in available water capacity and is distributed in all parts of the microwatershed. An area of about 124 ha (19%) is low (51-100 mm/m) in available water capacity and are distributed in all parts of the microwatershed except north. An area of about 72 ha (11%) is medium (101-150 mm/m) in available water capacity and are distributed in the central, northern and eastern part of the microwatershed. Very high (>200 mm/m) in 109 ha (16%) and are distributed in the central, eastern and southwestern part of the microwatershed.

An area of about 324 ha (49%) in the microwatershed has soils that are problematic with regard to available water capacity. Here, only short duration crops can be grown and probability of the crop failure is very high. These areas are best put to other

alternative uses. An area of 109 ha (16%) are potential areas with regard to AWC where all climatically adapted annual and perennial crops can be grown.

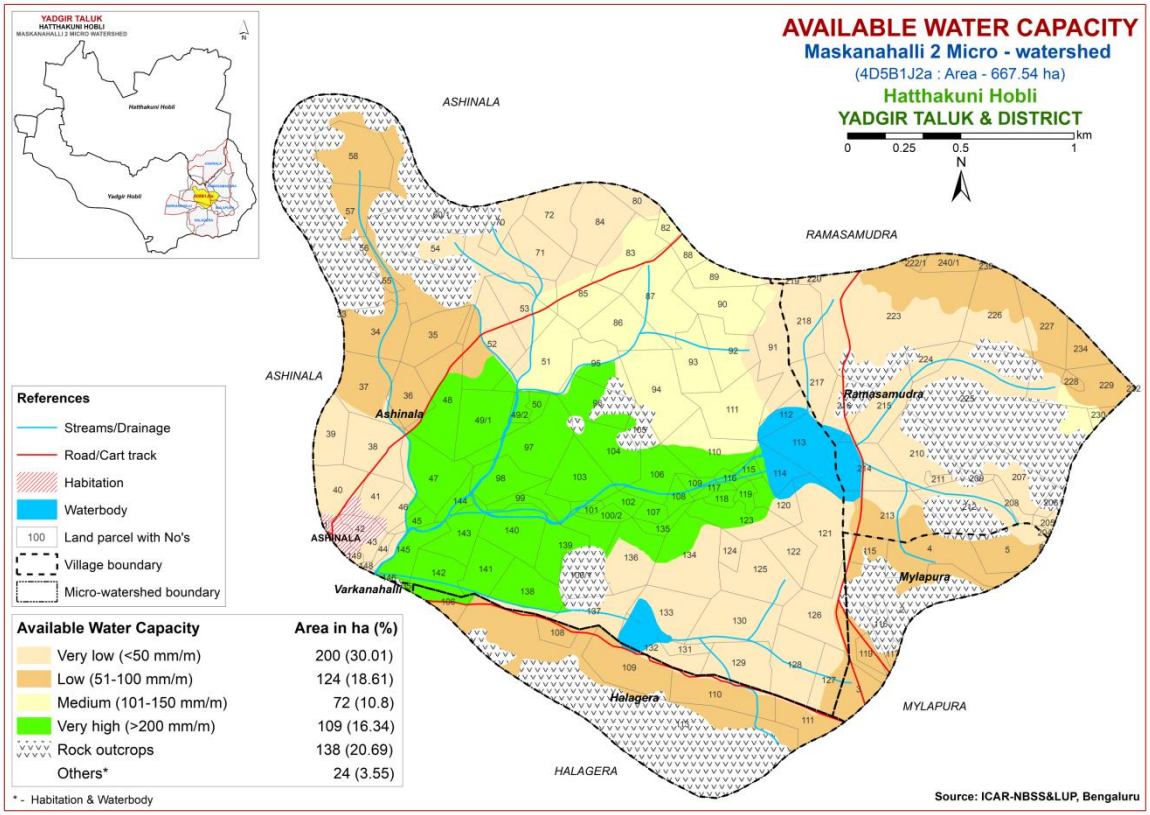


Fig. 5.5 Soil Available Water Capacity map of Maskanahalli-2 Microwatershed

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

Entire area of microwatershed falls under very gently sloping (1-3% slope) lands. These areas have high potential in respect of soil slopes. In these areas, all climatically adapted annual and perennial crops can be grown without much soil and water conservation and other land development measures.

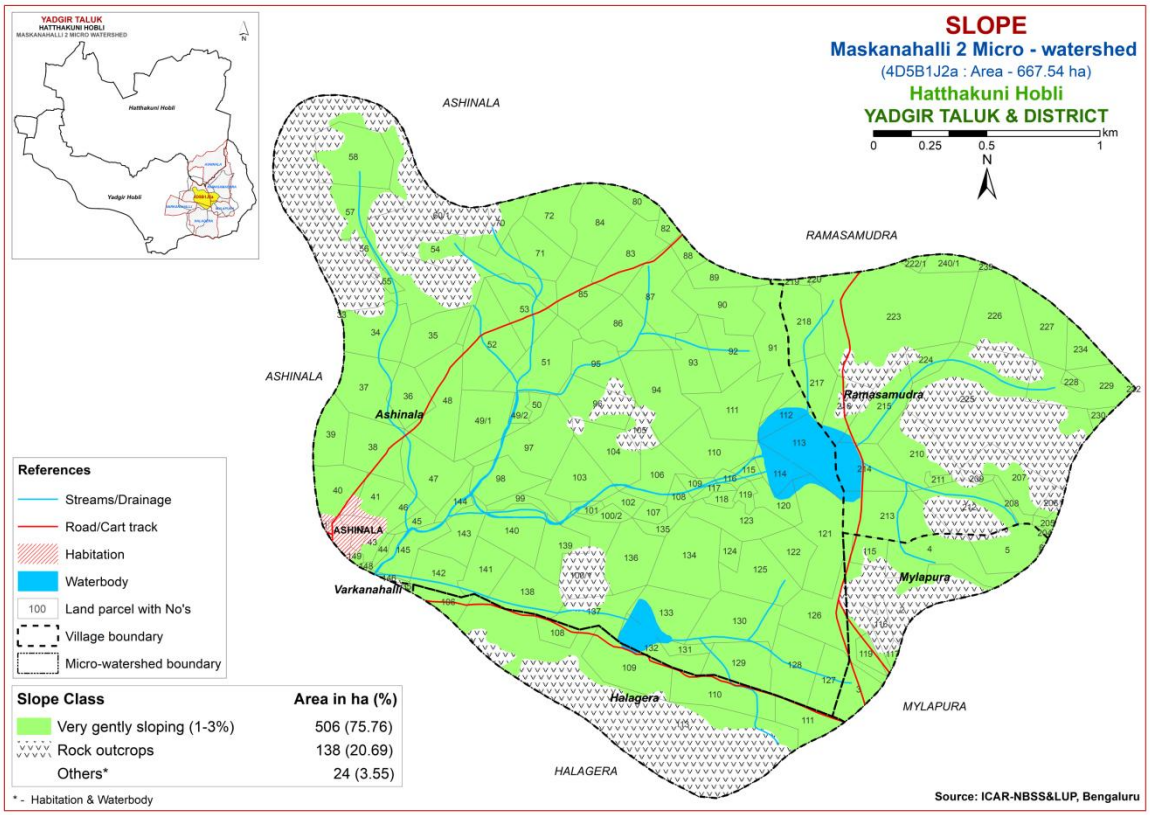


Fig. 5.6 Soil Slope map of Maskanahalli-2 Microwatershed

5.7 Soil Erosion

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

Entire area of the microwatershed has moderately eroded (e2 class) soils. For these soils, taking up of soil and water conservation and other land development measures are needed.

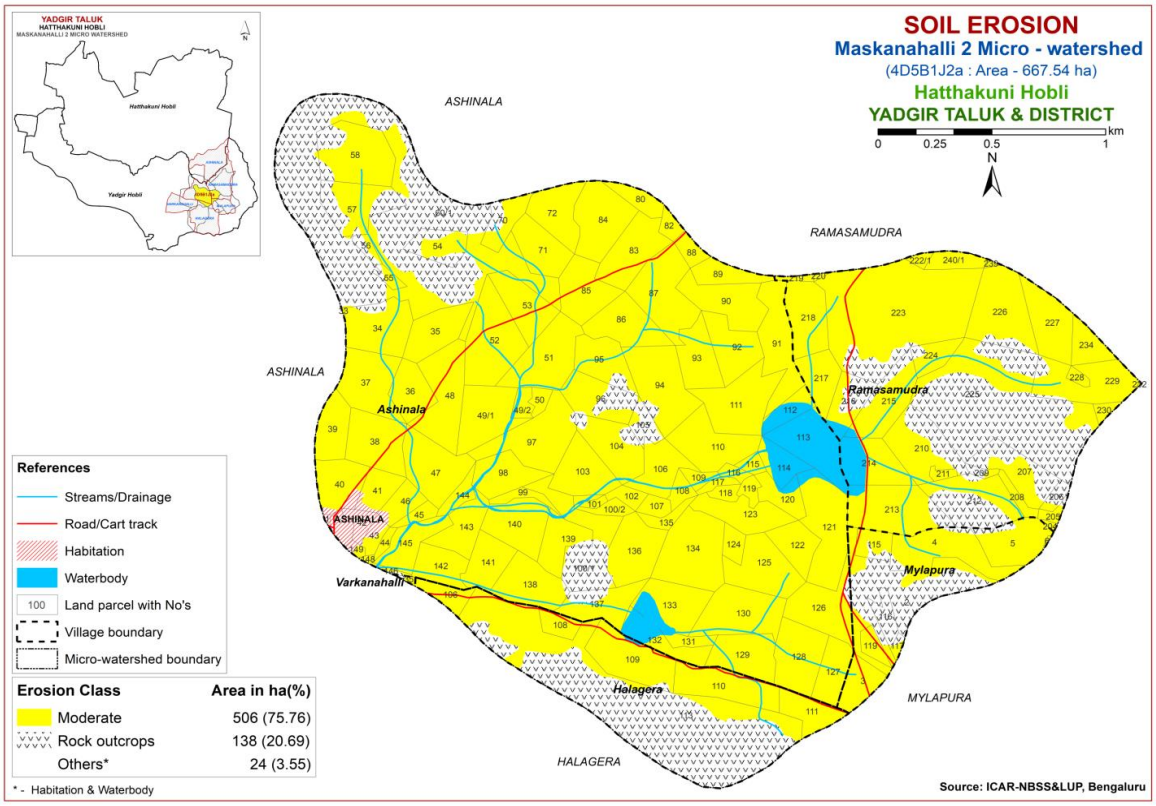


Fig. 5.7 Soil Erosion map of Maskanahalli-2 Microwatershed

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 2018 were analysed for pH, EC, organic carbon, available phosphorus and potassium, and for micronutrients like zinc, boron, copper, iron and manganese, and secondary nutrient sulphur.

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

6.1 Soil Reaction (pH)

The soil analysis of the Maskanahalli-2 microwatershed for soil reaction (pH) showed that an area of 92 ha (14%) is slightly acid (pH 6.0-6.5) and are distributed in the eastern and northeastern part of the microwatershed. An area of 389 ha (58%) is neutral (pH 6.5-7.3) and are distributed in the major part of the microwatershed. Slightly alkaline (pH 7.3-7.8) occur in an area of 25 ha (4%) and are distributed in the western, southern and southwestern part of the microwatershed (Fig. 6.1).

6.2 Electrical Conductivity (EC)

The Electrical Conductivity in the entire area of the microwatershed is non saline (<2 dS/m) (Fig. 6.2) and as such the soils are nonsaline.

6.3 Organic Carbon

The soils organic carbon content (an index of available Nitrogen) in the soils of the microwatershed is high (>0.75) in an area of about 22 ha (3%) and are distributed in the northeastern and southeastern part of the microwatershed. Medium (0.5-0.75%) covering a maximum area of about 484 ha (72%) and are distributed in all parts of the microwatershed (Fig.6.3).

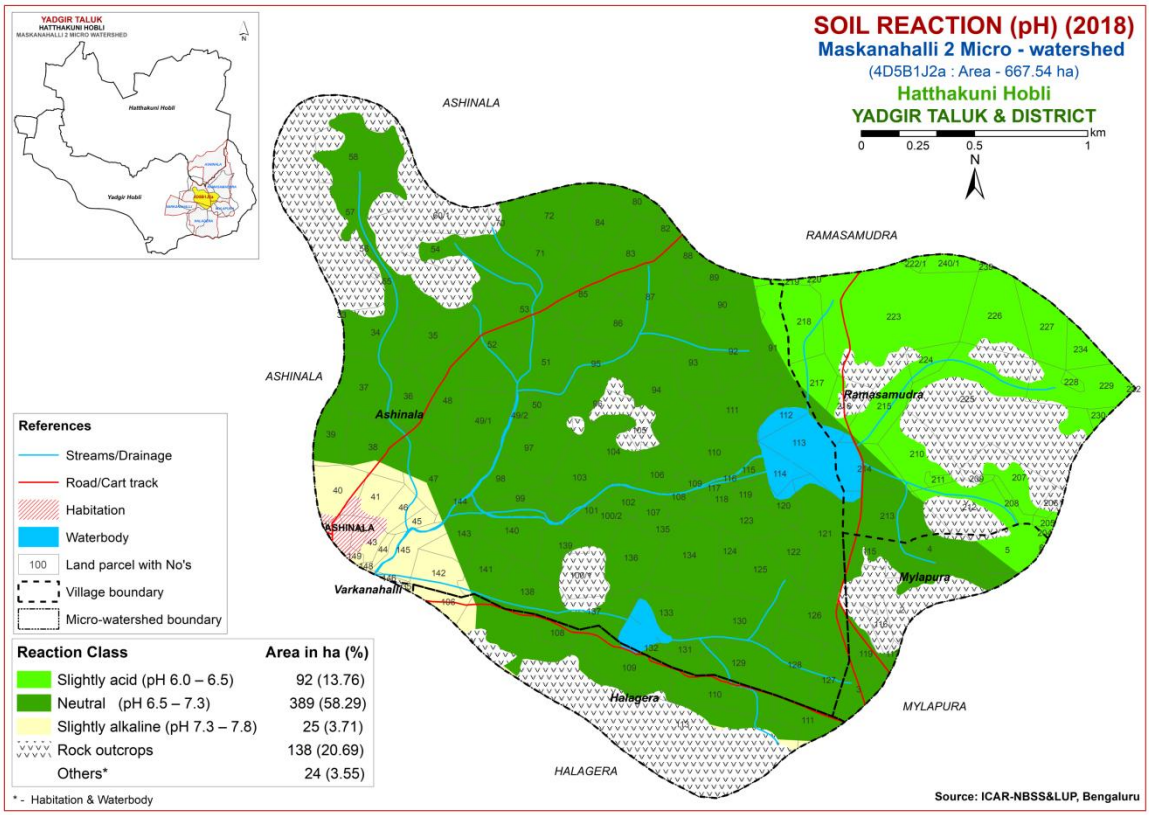


Fig.6.1 Soil Reaction (pH) map of Maskanahalli-2 Microwatershed

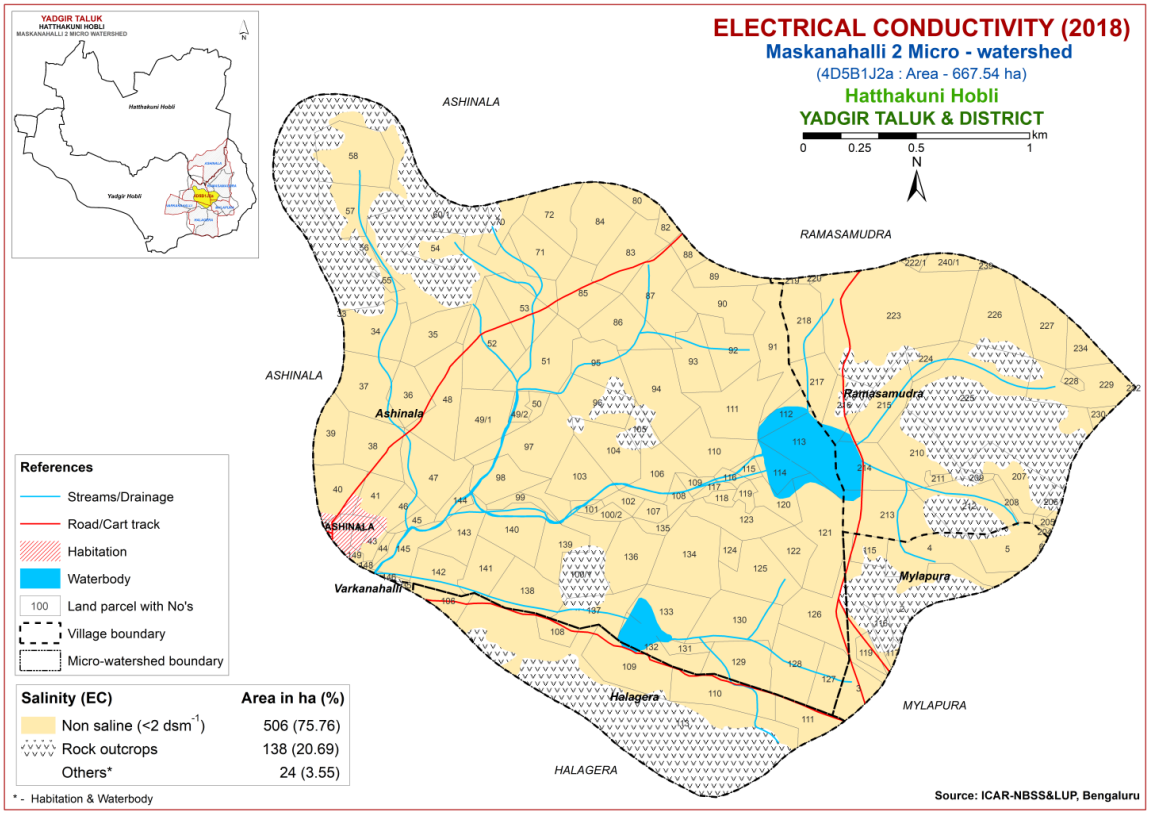


Fig.6.2 Electrical Conductivity (EC) map of Maskanahalli-2 Microwatershed

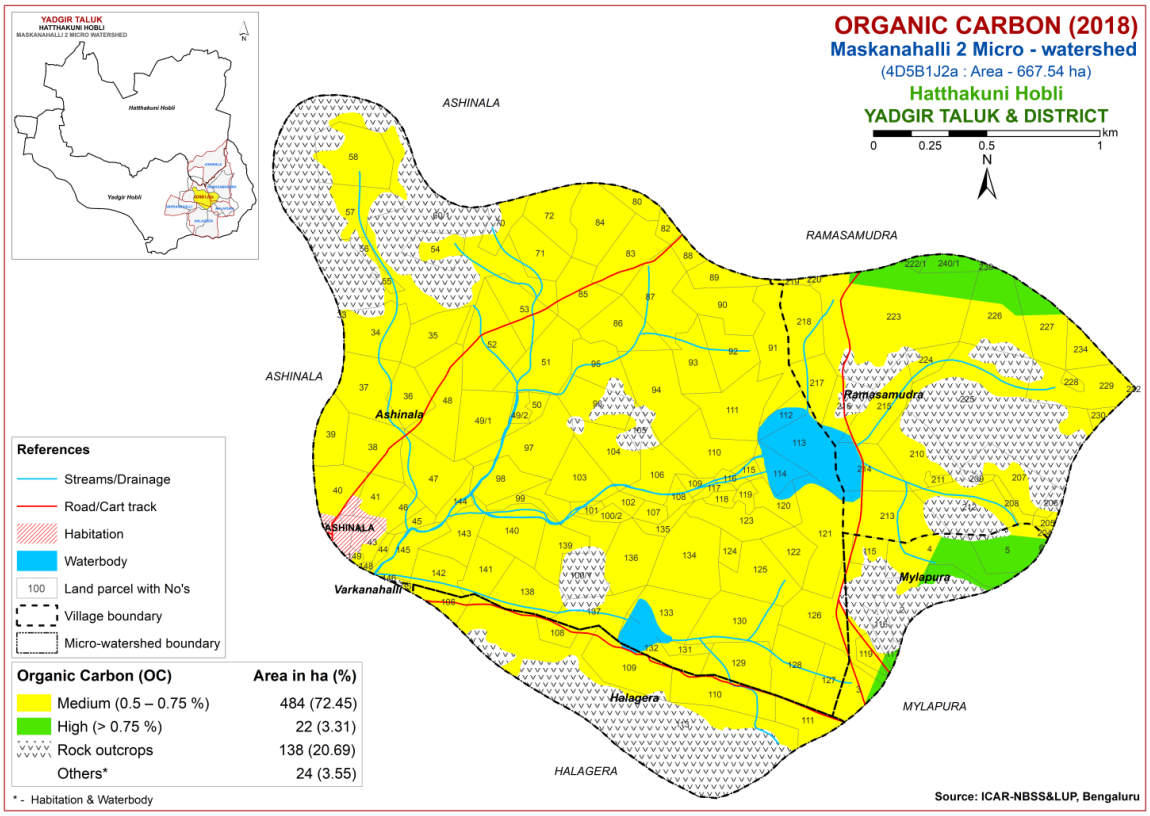


Fig.6.3 Soil Organic Carbon map of Maskanahalli-2 Microwatershed

6.4 Available Phosphorus

Available phosphorus content is low (<23 kg/ha) in an area of about 14 ha (2%) and distributed in the southern and northern part of the microwatershed. Available phosphorus content is medium (23-57 kg/ha) in a maximum area of about 484 ha (73%) and occur in the major part of the microwatershed and available phosphorus content is high (>57 kg/ha) in an area of 7 ha (1%) and distributed in the eastern part of the microwatershed (Fig. 6.4).

6.5 Available Potassium

Available potassium content is medium (145-337 kg/ha) in an area of about 223 ha (33%) and are distributed in all parts of the microwatershed except north and southeast (Fig. 6.5). Low (<145 kg/ha) occur in an area of 283 ha (42%) and are distributed in the central, northern, northeastern and southeastern part of the microwatershed.

6.6 Available Sulphur

An area of about 238 ha (36%) is low (<10 ppm) in available sulphur content and are distributed in the northern, eastern, northwestern and northeastern part of the microwatershed. Medium (10-20 ppm) in maximum area of about 267 ha (40%) and is distributed in the central, western, southwestern, southern, southeastern and eastern part of the microwatershed (Fig. 6.6).

6.7 Available Boron

Available boron content is low (<0.5 ppm) in the entire area of the microwatershed (Fig. 6.7).

6.8 Available Iron

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

6.9 Available Manganese

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

6.10 Available Copper

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

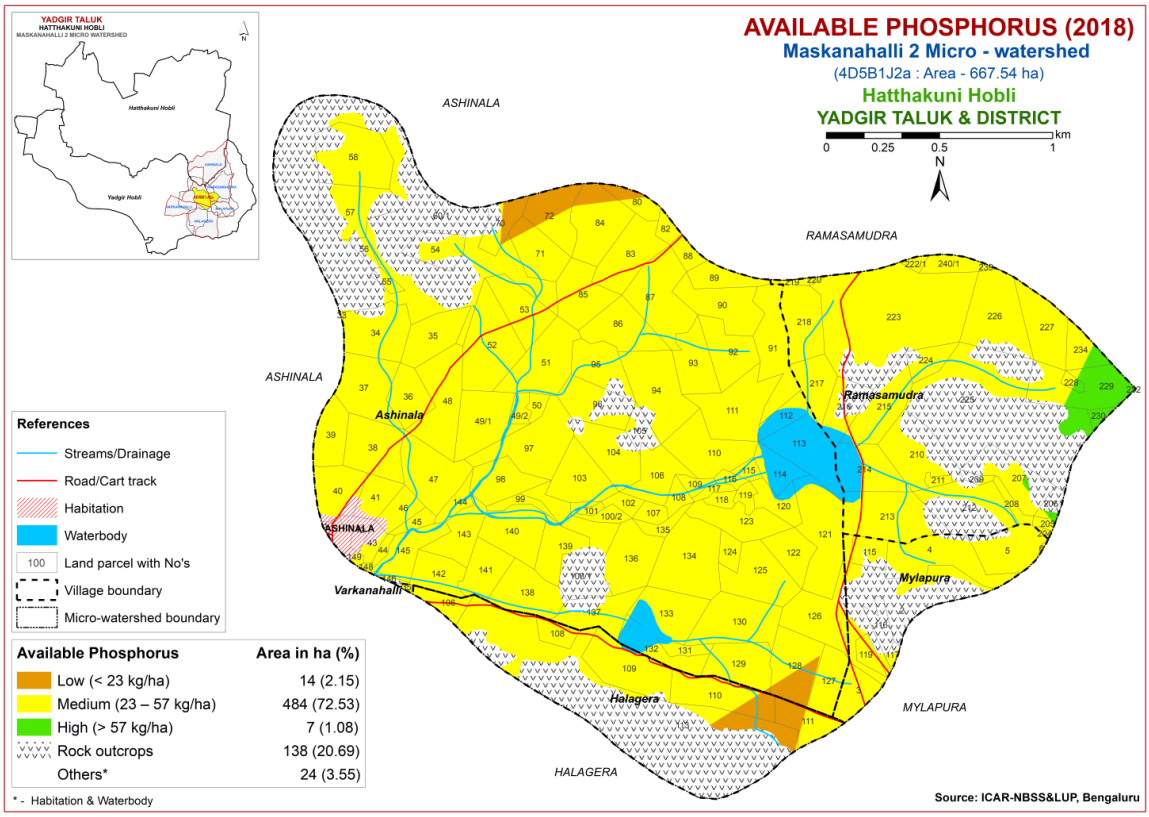


Fig.6.4 Soil Available Phosphorus map of Maskanahalli-2 Microwatershed

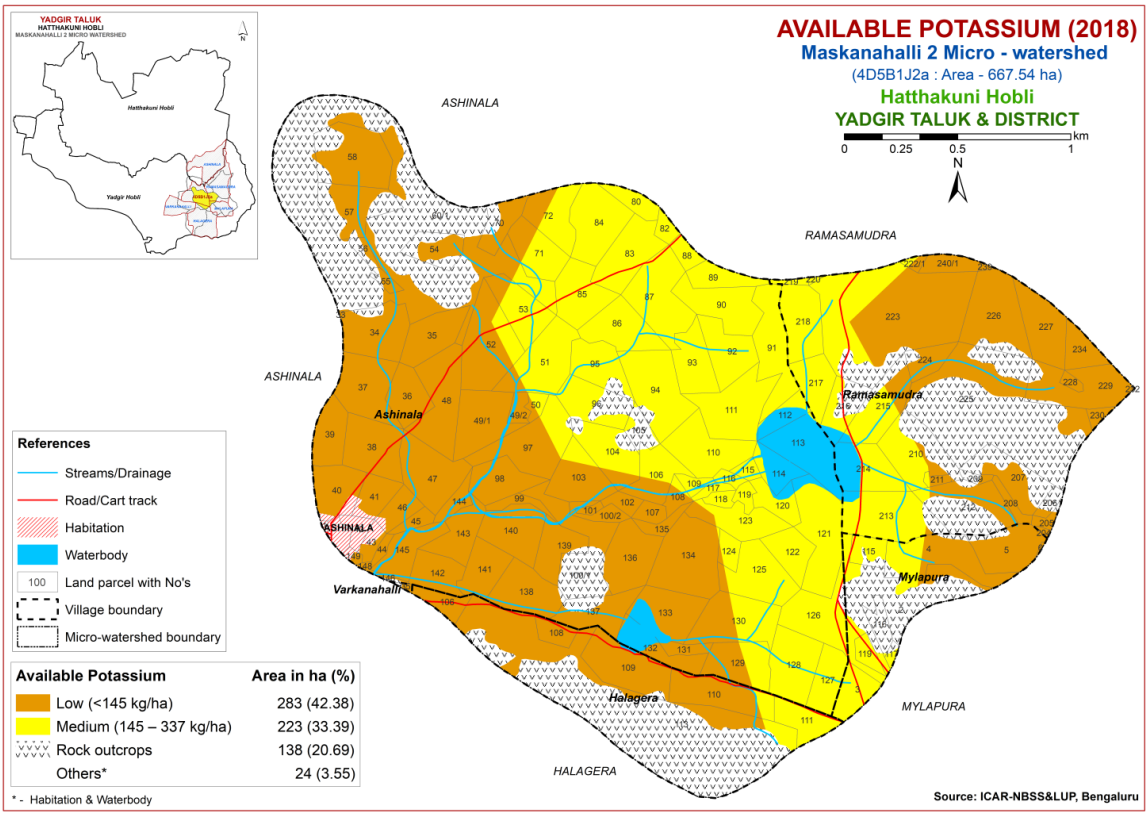


Fig.6.5 Soil Available Potassium map of Maskanahalli-2 Microwatershed

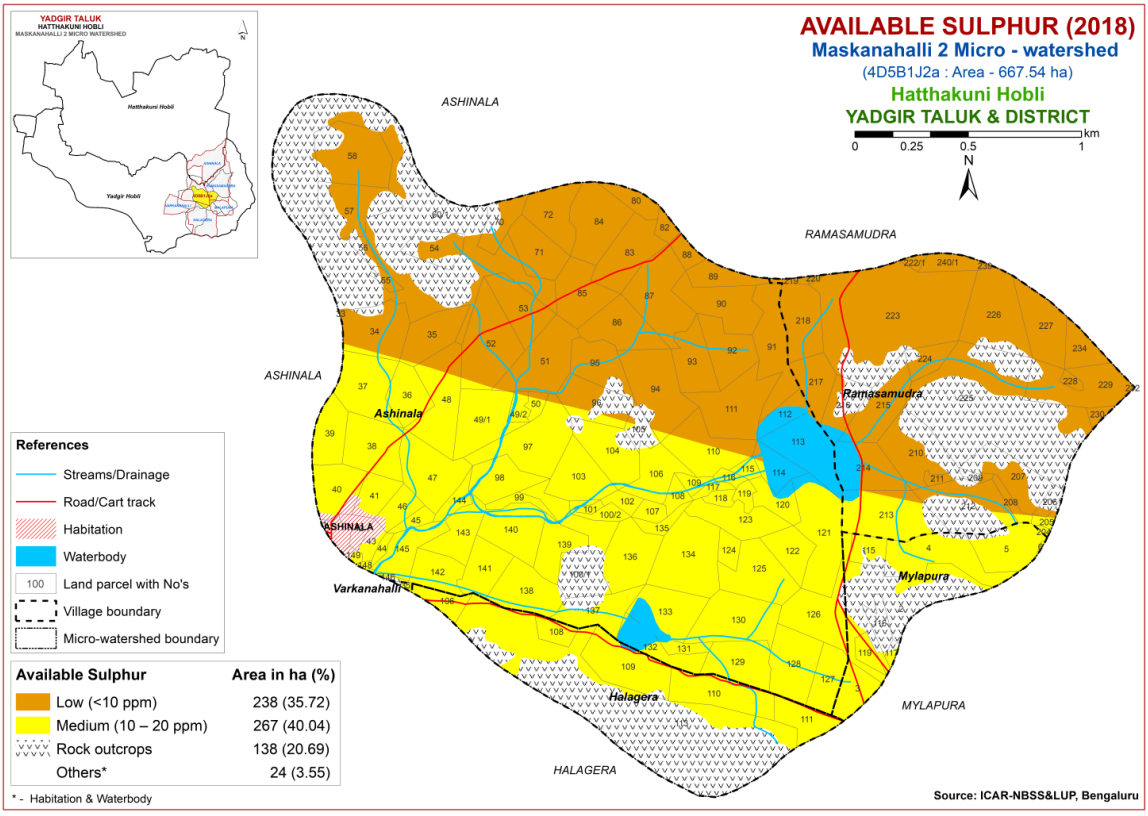


Fig.6.6 Soil Available Sulphur map of Maskanahalli-2 Microwatershed

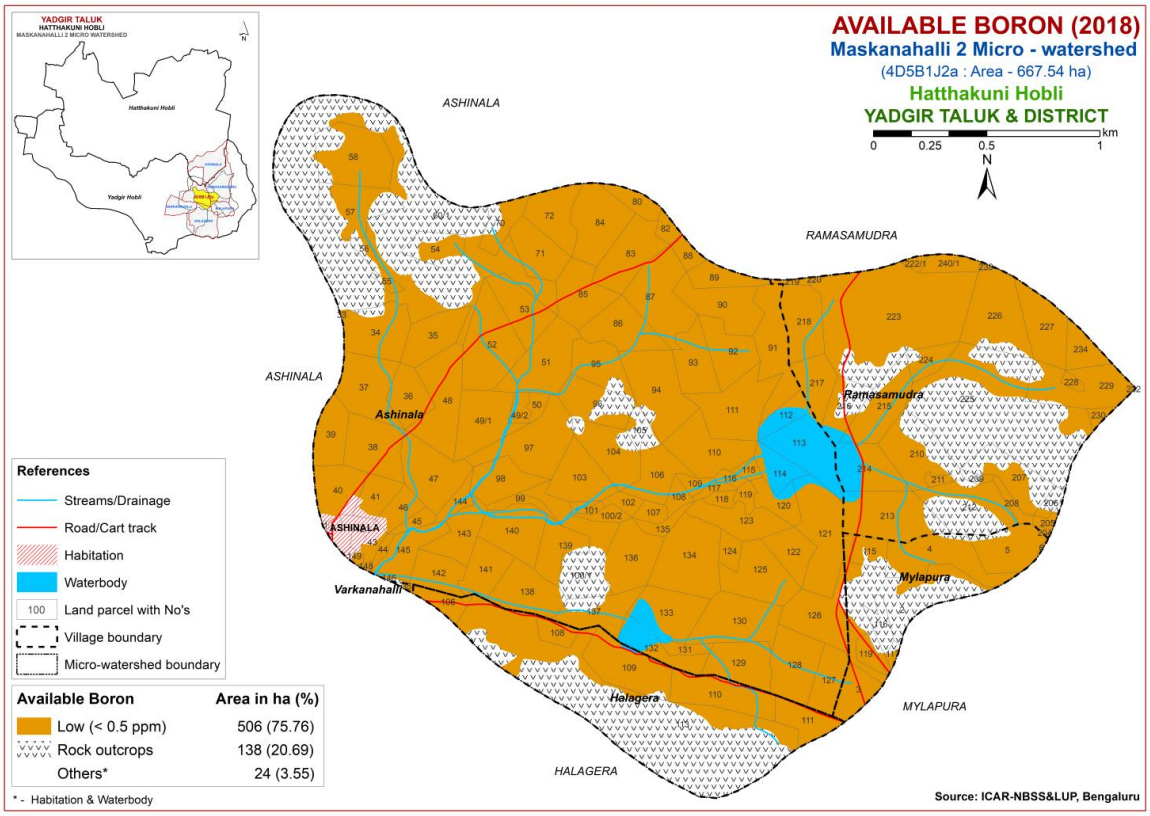


Fig.6.7 Soil Available Boron map of Maskanahalli-2 Microwatershed

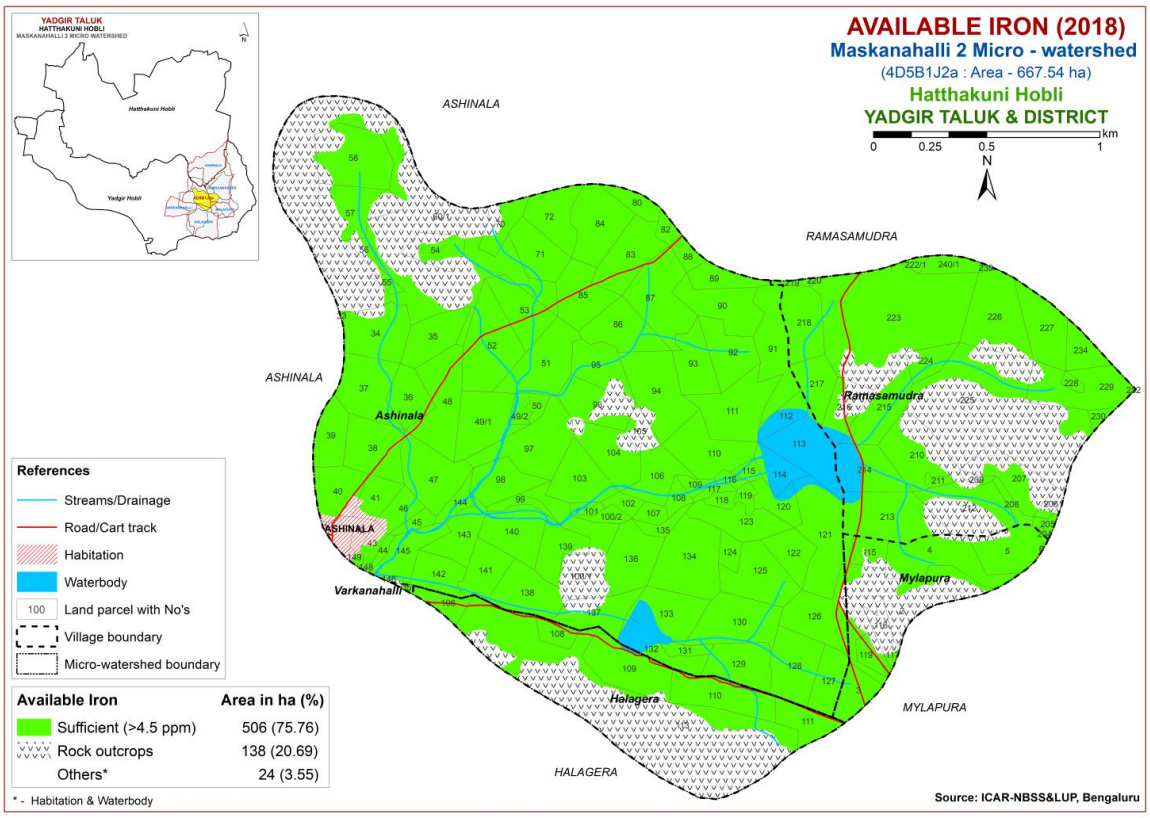


Fig.6.8 Soil Available Iron map of Maskanahalli-2 Microwatershed

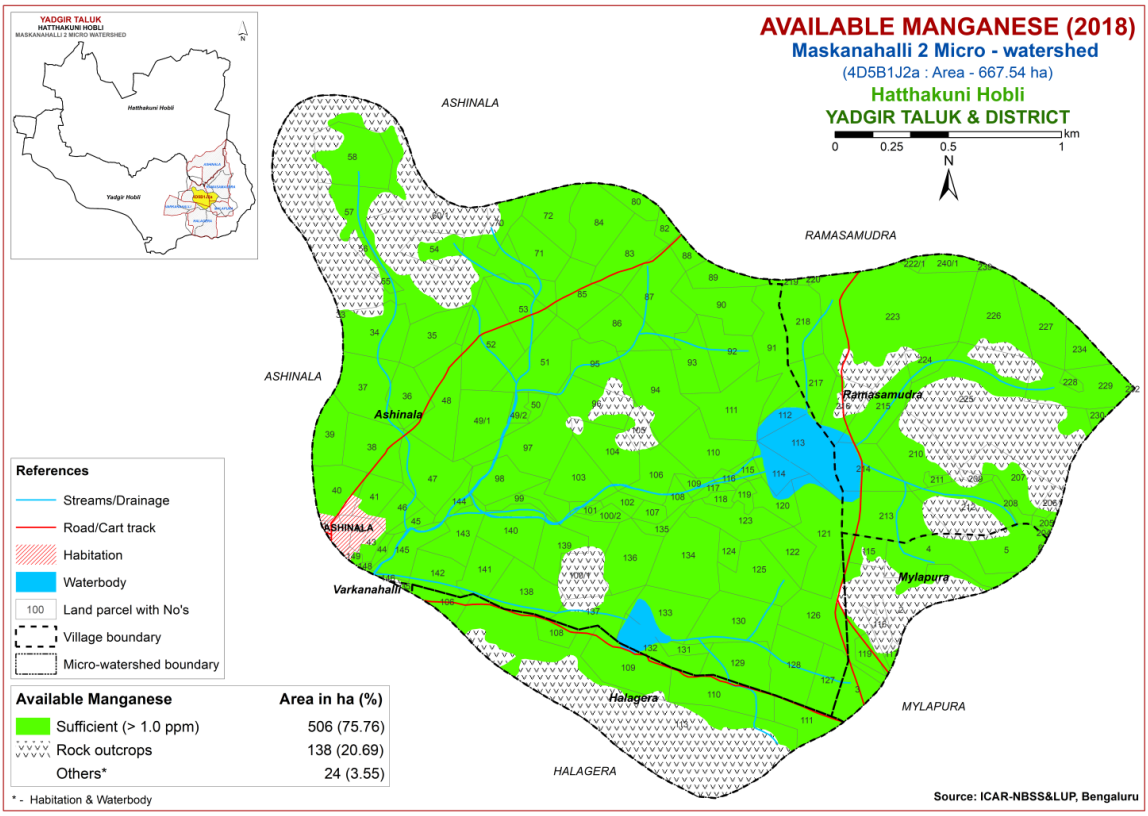


Fig.6.9 Soil Available Manganese map of Maskanahalli-2 Microwatershed

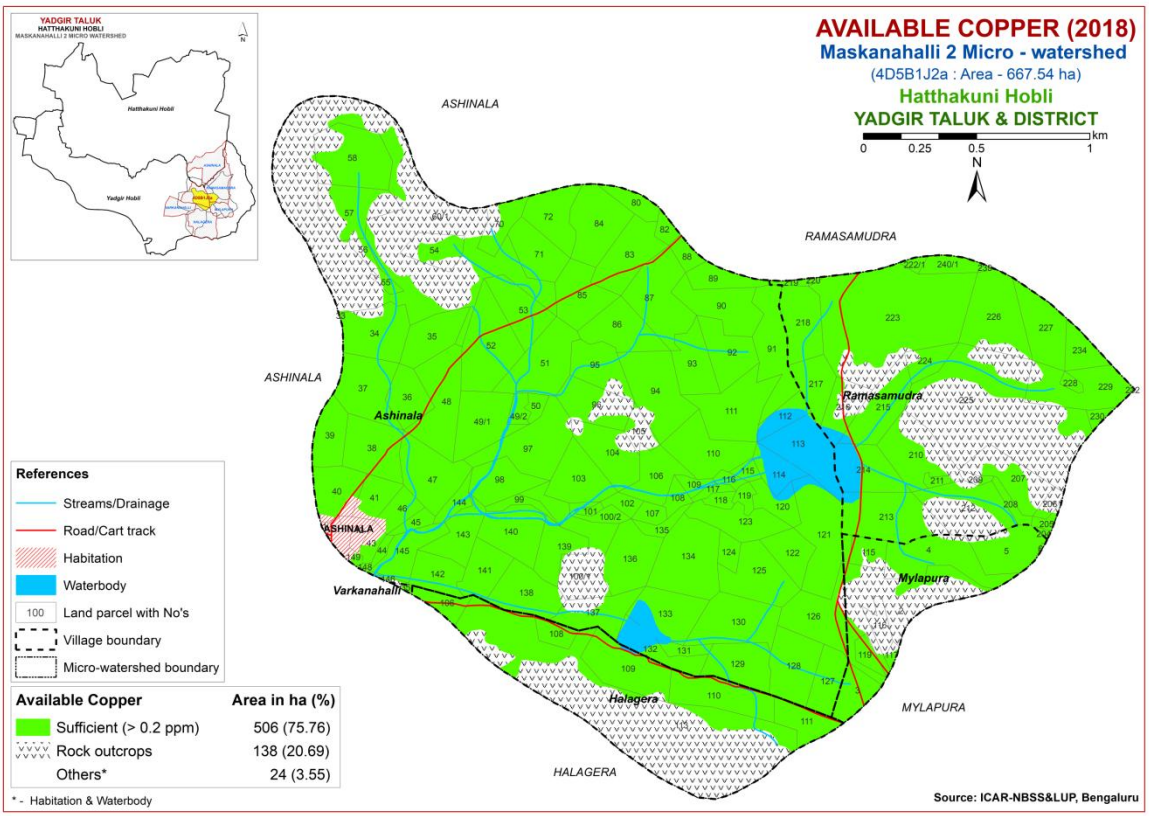


Fig.6.10 Soil Available Copper map of Maskanahalli-2 Microwatershed

6.11 Available Zinc

Available zinc content is deficient (<0.6 ppm) in a maximum area of 434 ha (65%) and is distributed in the major part of the microwatershed. About 72 ha (11%) is sufficient (>0.6 ppm) and is distributed in the northeastern part of the microwatershed (Fig 6.11).

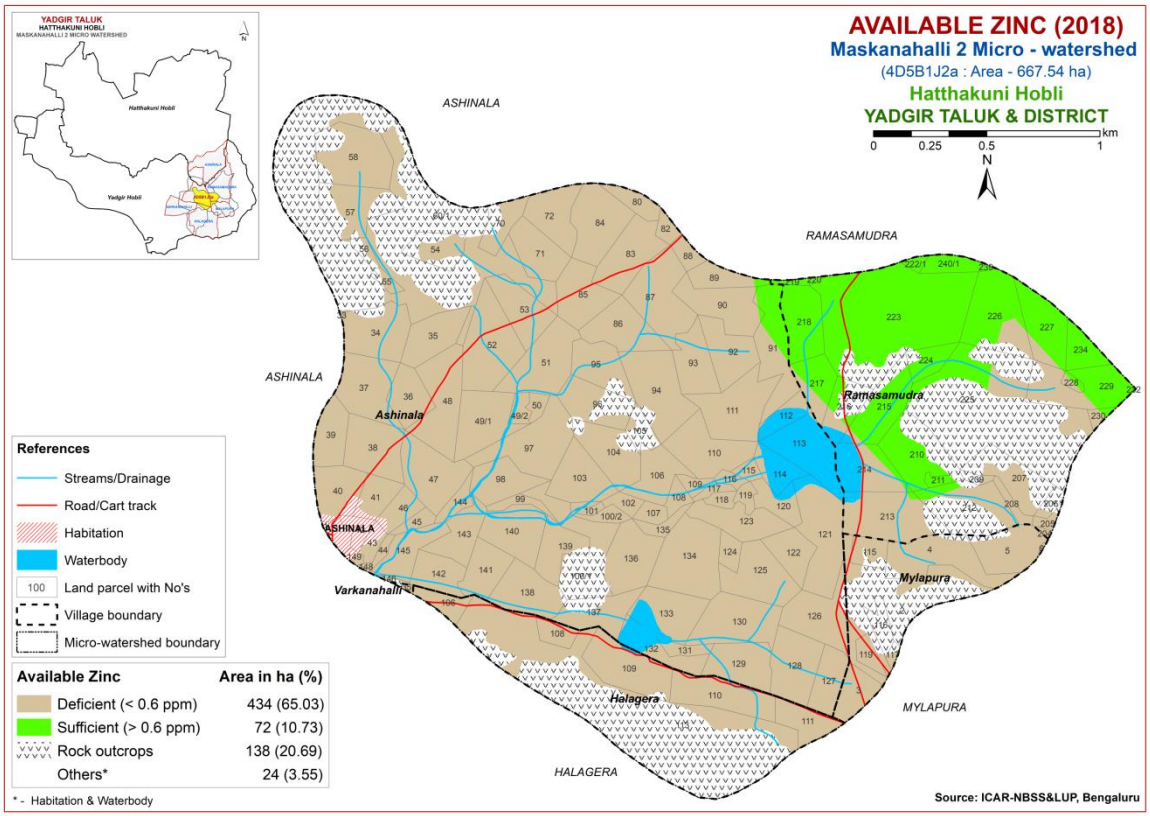


Fig.6.11 Soil Available Zinc map of Maskanahalli-2 Microwatershed

Chapter 7

LAND SUITABILITY FOR MAJOR CROPS

The soil and land resource units (soil phases) of Maskanahalli-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 soil and land characteristics were matched with the crop requirement to arrive at the crop suitability. The soil and land characteristics table (table 7.1) and crop requirement tables (tables 7.2 to 7.30) are given in the end. In FAO land suitability classification, two orders are recognized. Order S-Suitable and Order N-Not suitable. The orders have classes, subclasses and units. Order-S has three classes, Class S1-Highly Suitable, Class S2-Moderately Suitable and Class S3- Marginally Suitable. Order N has two classes, N1-Currently not Suitable and N2-Permanently not Suitable. There are no subclasses within the Class S1 as they will have very minor or no limitations for crop growth. Classes S2, S3, N1 and N2 are divided into subclasses based on the kinds of limitations encountered. The limitations that affect crop production are 'c' for erratic rainfall and its distribution and length of growing period (LGP), 'e' for erosion hazard, 'r' for rooting condition, 't' for lighter or heavy texture, 'g' for gravelliness or stoniness, 'n' for nutrient availability, 'l' for topography, 'm' for moisture availability, 'w' for drainage, 's' for sodium and 'z' for calcareousness. These limitations are indicated as lower case letters to the Class symbol. For example, moderately suitable lands with the limitations of soil depth and erosion are designated as S2re. For the microwatershed, the soil mapping units were evaluated and classified up to subclass level.

Using the above criteria, the soil map units of the microwatershed were evaluated and land suitability maps for 29 major agricultural and horticultural crops were generated. The detailed information on the kind of suitability of each of the soil phase for the crops assessed are given village/ survey number wise for the microwatershed in Appendix-IV.

7.1 Land Suitability for Sorghum (*Sorghum bicolor*)

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

Highly suitable (Class S1) lands for growing sorghum occur in an area of 109 ha (16%) and are distributed in the central, western and southwestern part of the

microwatershed. An area of about 197 ha (29%) is moderately suitable (Class S2) for growing sorghum and are distributed in all parts of the microwatershed. They have minor limitations of rooting depth texture, calcareousness and gravelliness. An area of about 200 ha (30%) is marginally suitable (Class S3) for growing sorghum and is distributed in all parts of the microwatershed with moderate limitations rooting depth and texture.

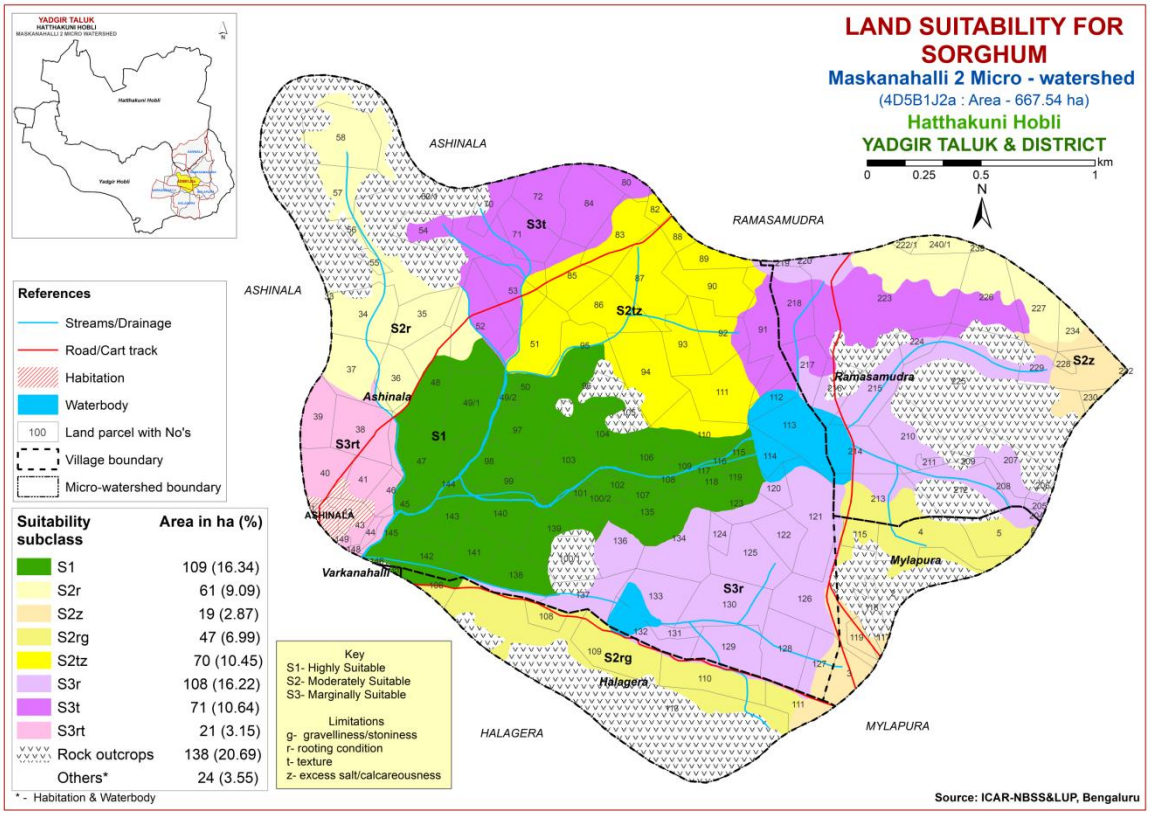


Fig. 7.1 Land Suitability map of Sorghum

7.2 Land Suitability for Maize (*Zea mays*)

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

There are no highly suitable (Class S1) lands available for growing maize in the microwatershed. Moderately suitable (Class S2) lands occur in a maximum area of 306 ha (46%) and are distributed in the major part of the microwatershed with minor limitations of rooting depth, gravelliness, texture, calcareousness and drainage. Marginally suitable lands (Class S3) for growing maize occupy an area of 200 ha (30%) and occur in all parts of the microwatershed except central. They have moderate limitations of rooting depth and texture.

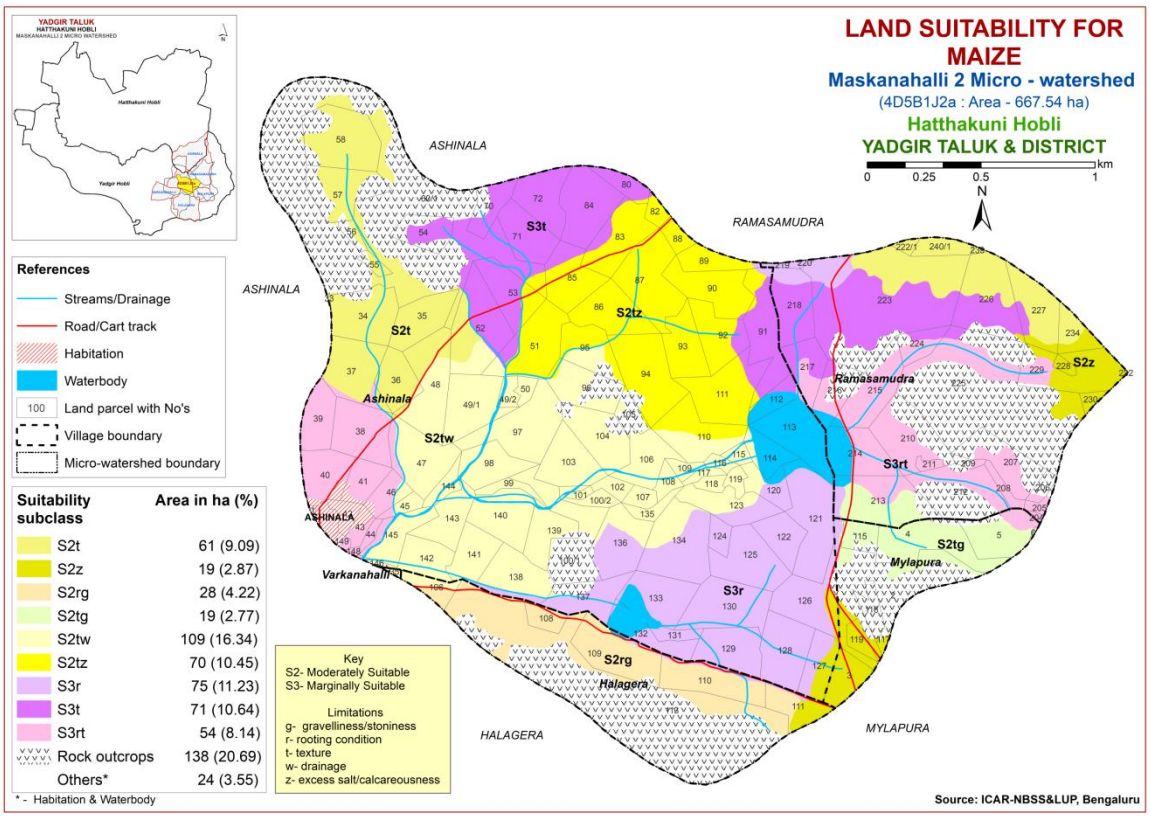


Fig. 7.2 Land Suitability map of Maize

7.3 Land Suitability for Bajra (*Pennisetum glaucum)*

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

There are no highly suitable (Class S1) lands available for growing bajra in the microwatershed. Maximum area of about 305 ha (46%) is moderately suitable (Class S2) for growing bajra and are distributed in the major part of the microwatershed. They have minor limitations of texture, rooting depth and calcareousness. Marginally suitable lands (Class S3) occupy an area of 200 ha (30%) and are distributed in all parts of the microwatershed except central. They have moderate limitations of rooting depth and texture.

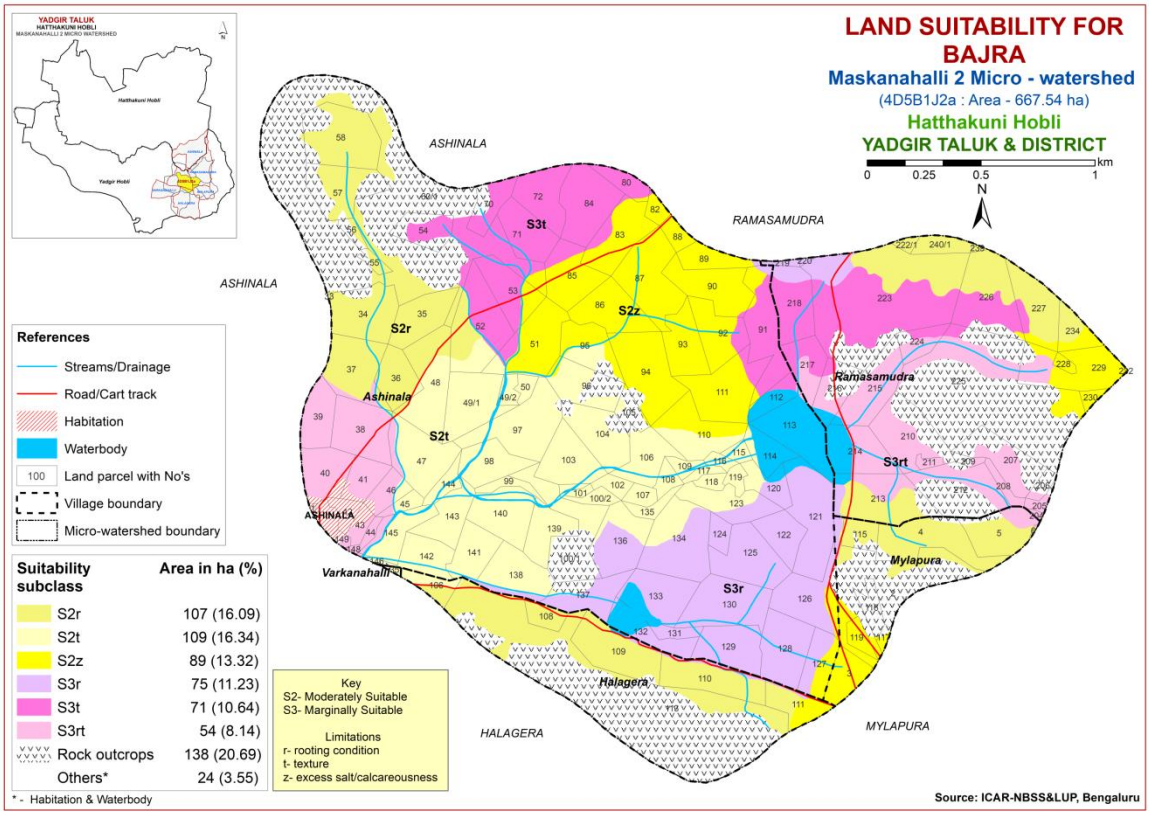


Fig. 7.3 Land Suitability map of Bajra

7.4 Land Suitability for Groundnut (*Arachis hypogaea*)

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

There are no highly suitable (Class S1) lands available for growing groundnut in the microwatershed. Moderately suitable (Class S2) lands occur in an area of 117 ha (18%) and are distributed in the southwestern, southern, southeastern, eastern and northern part of the microwatershed. They have minor limitations of rooting depth, texture and calcareousness. Marginally suitable lands (Class S3) for growing groundnut occupy a maximum area of about 388 ha (58%) with moderate limitations of texture, drainage and rooting depth. They are distributed in all parts of the microwatershed.

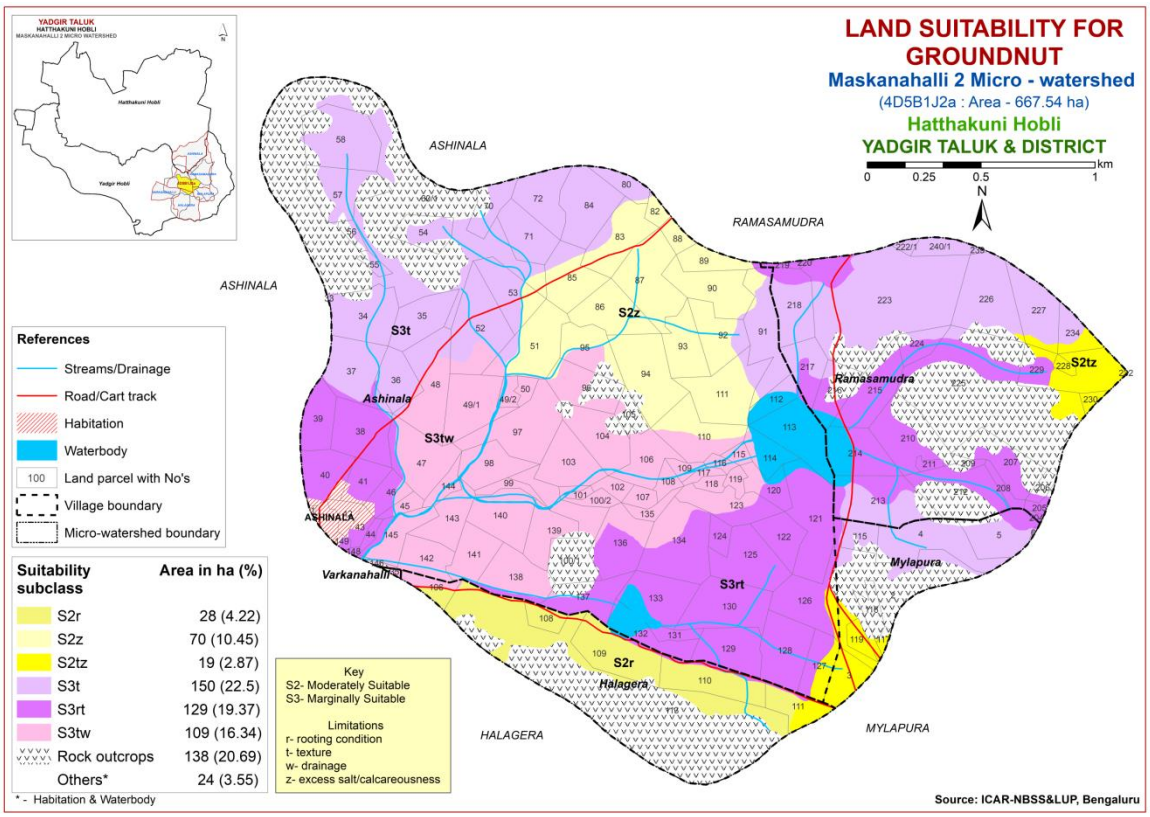


Fig. 7.4 Land Suitability map of Groundnut

7.5 Land Suitability for Sunflower (*Helianthus annus*)

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

Highly suitable (Class S1) lands for growing sunflower occupy an area of 109 ha (16%) and are distributed in the central, western and southwestern part of the microwatershed. An area of about 89 ha (13%) is moderately suitable (Class S2) for sunflower and is distributed in the northern, southeastern and eastern part of the microwatershed. They have minor limitations of rooting depth and calcareousness. An area of about 178 ha (27%) is marginally suitable (Class S3) and is distributed in all parts of the microwatershed except central. They have moderate limitations of rooting depth, texture and gravelliness. Currently not suitable (Class N1) lands occur in an area of 129 ha (19%) and are distributed in the western, southern, southeastern, eastern and northeastern part of the microwatershed with severe limitation of rooting depth.

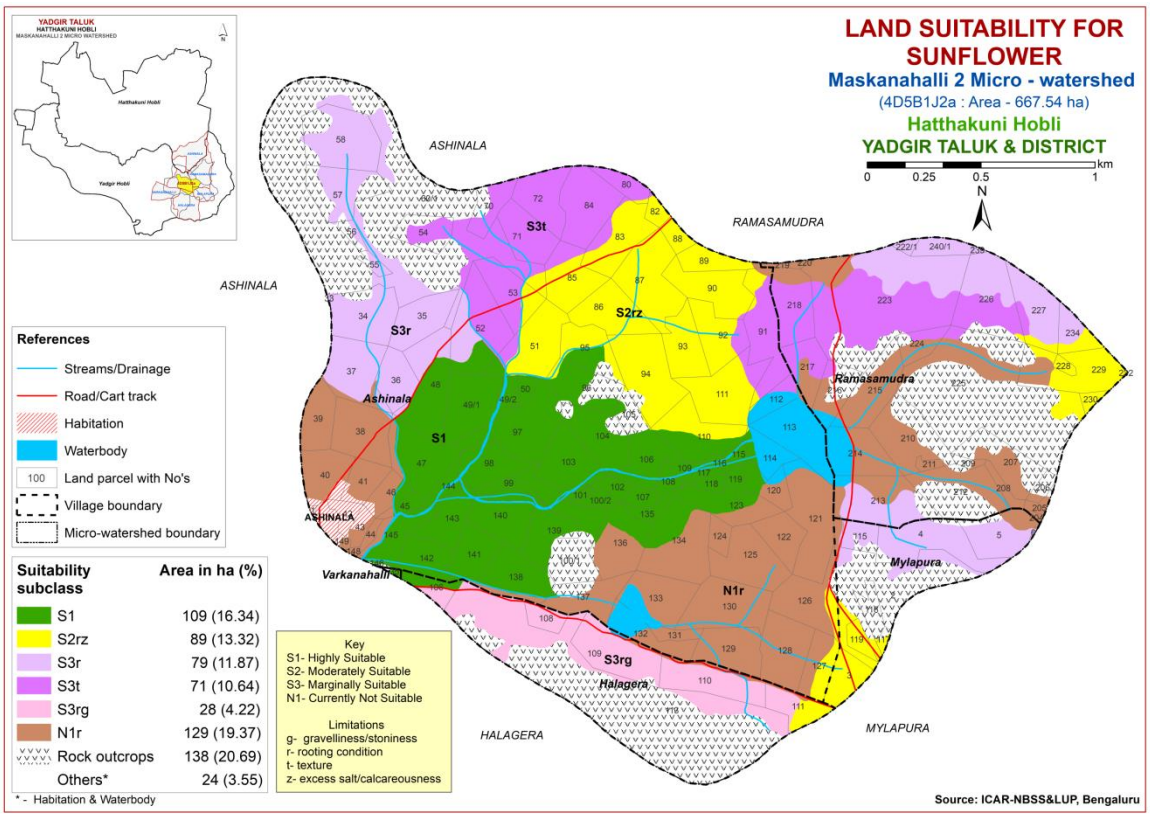


Fig. 7.5 Land Suitability map of Sunflower

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

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

No highly suitable (Class S1) lands are available for growing redgram in the microwatershed. An area of about 89 ha (13%) is moderately suitable (Class S2) for growing redgram and are distributed in the southeastern, eastern and northern part of the microwatershed. They have minor limitations of rooting depth and calcareousness. Marginally suitable lands (Class S3) for growing redgram occupy an area of about 395 ha (59%) and occur in all parts part of the microwatershed. They have moderate limitations of rooting depth, gravelliness, texture and drainage. Currently not suitable (Class N1) lands occur in an area of 21 ha (3%) and are distributed in the western part of the microwatershed with severe limitation of rooting depth.

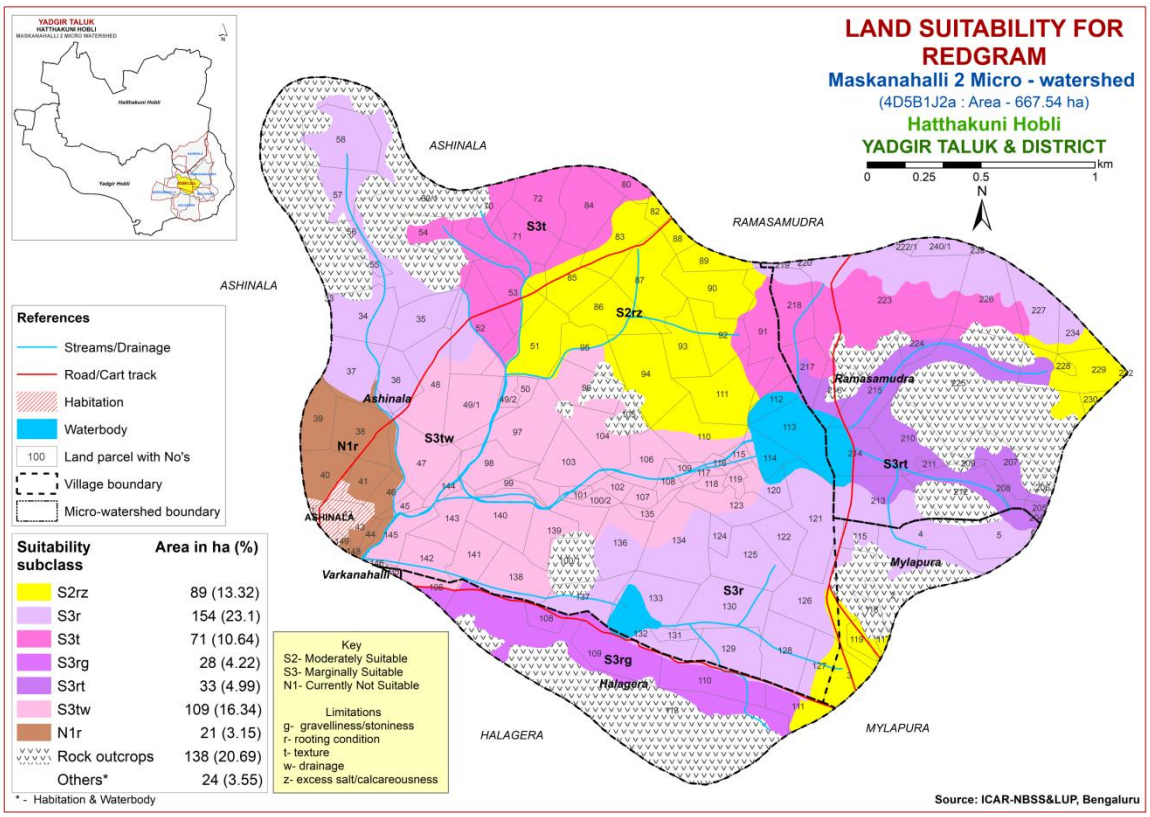


Fig. 7.6 Land Suitability map of Redgram

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

Bengal gram is one of the most important pulse crop grown in about 9.39 lakh ha area in Bijapur, Raichur, Kalaburgi, Dharwad, Belgaum and Bellary districts. The crop requirements for growing Bengal gram (Table 7.8) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing Bengal gram was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.7.

Highly suitable (Class S1) lands for growing bengalgram occupy an area of 109 ha (16%) and are distributed in the central, western and southwestern part of the microwatershed. An area of about 127 ha (19%) is moderately suitable (Class S2) for growing bengalgram and are distributed in all parts of the microwatershed except north and central. They have minor limitations of rooting depth, texture, calcareousness and gravelliness. Marginally suitable lands (Class S3) for growing bengalgram occupy an area of about 178 ha (27%) and occur in all parts of the microwatershed except northwest, east and southwest. They have moderate limitations of rooting depth, texture and calcareousness. Currently not suitable (Class N1) lands occur in an area of 92 ha (14%) and are distributed in the western, northwestern and northeastern part of the microwatershed with severe limitation of texture.

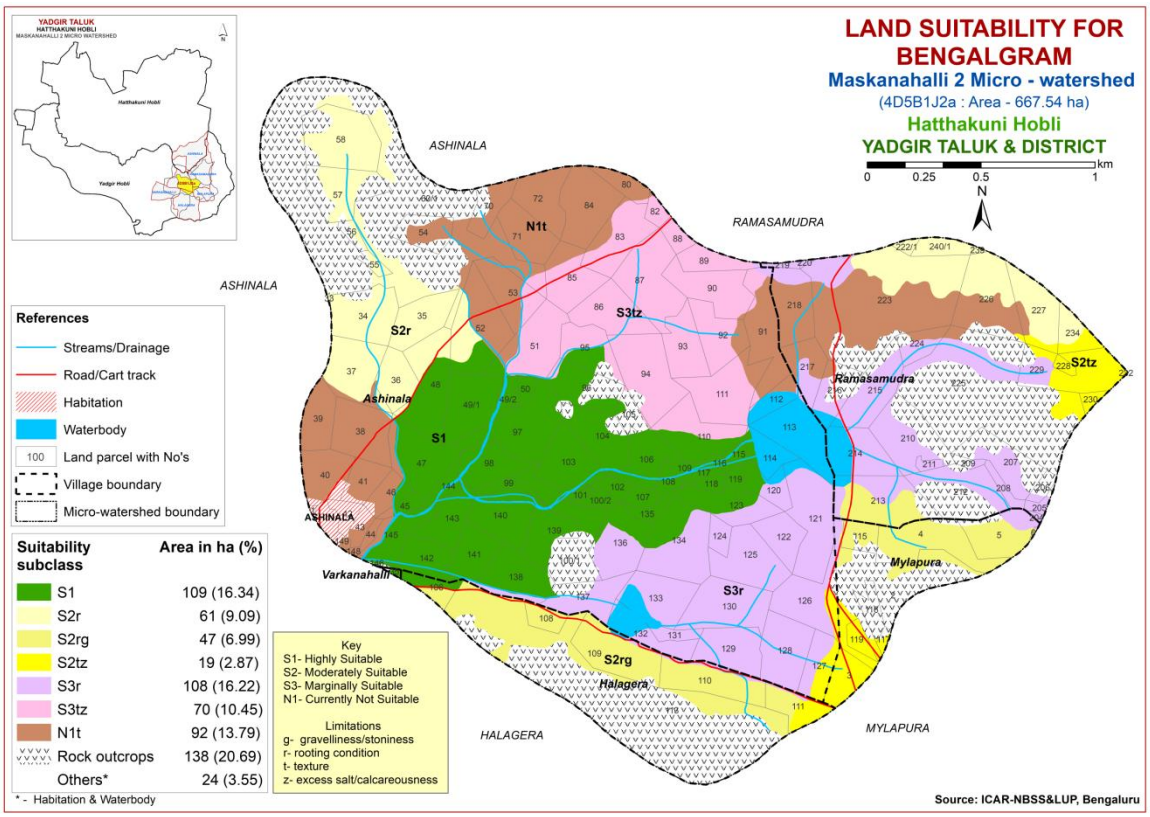


Fig. 7.7 Land Suitability map of Bengal gram

7.8 Land Suitability for Cotton (*Gossypium hirsutum*)

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

Highly suitable (Class S1) lands for growing cotton occur in an area of 109 ha (16%) and are distributed in the central, western and southwestern part of the microwatershed. Moderately suitable (Class S2) lands are found to occur in an area of 127 ha (19%). These soils have minor limitations of rooting depth, calcareousness and gravelliness. They are distributed in all parts of the microwatershed except central and north. Marginally suitable (Class S3) lands for cotton occur in an area of 178 ha (27%) with moderate limitations of rooting depth, texture and calcareousness. They are distributed in the central, northern, northeastern, eastern, southeastern and southern part the microwatershed. Currently not suitable (Class N1) lands occur in an area of 92 ha (14%) and are distributed in the western, northwestern and northeastern part of the microwatershed with severe limitation of texture.

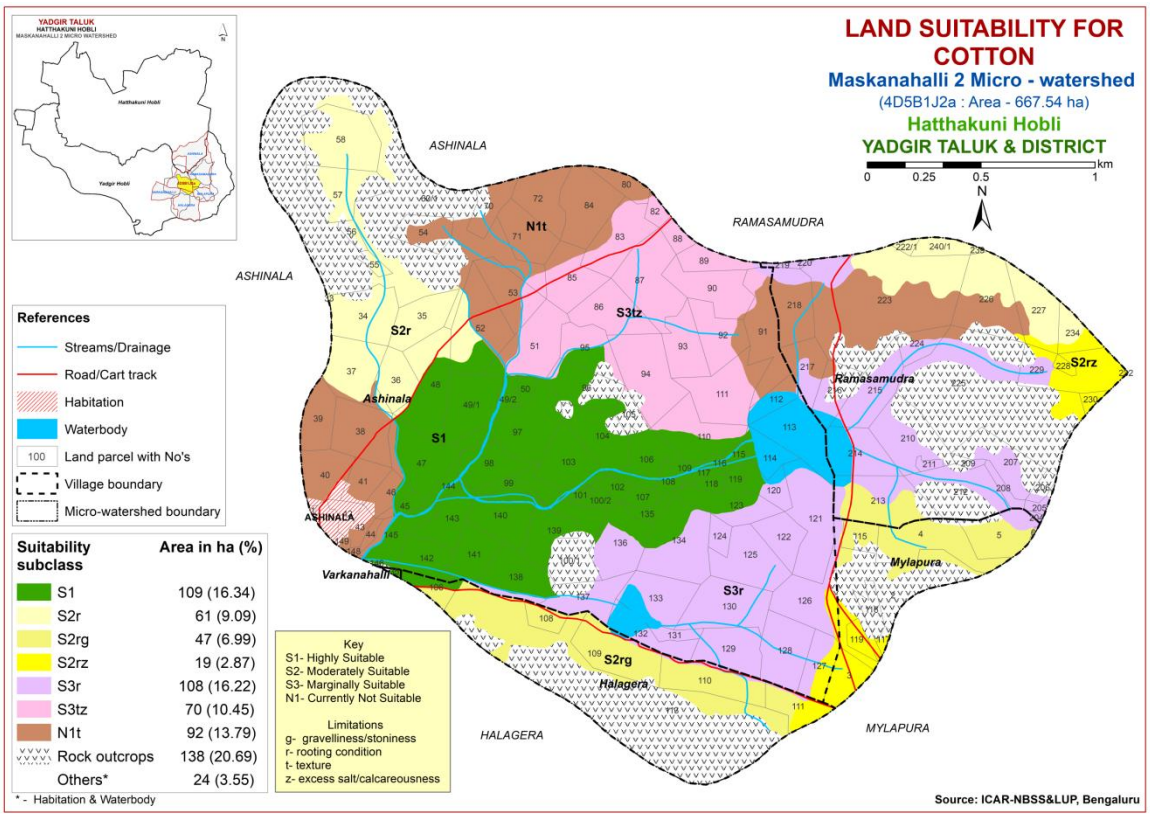


Fig. 7.8 Land Suitability map of Cotton

7.9 Land Suitability for Chilli (*Capsicum annuum)*

Chilli is one of the most important 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.

There are no highly (Class S1) suitable lands available for growing chilli crop in the microwatershed. Maximum area of about 306 ha (46%) is moderately suitable (Class S2) for growing chilli and are distributed in the major part of the microwatershed. They have minor limitations of texture, drainage, calcareousness, gravelliness and rooting depth. Marginally suitable lands (Class S3) occupy an area of 200 ha (30%) and are distributed in all parts of the microwatershed except north and central. They have moderate limitations of rooting depth and texture.

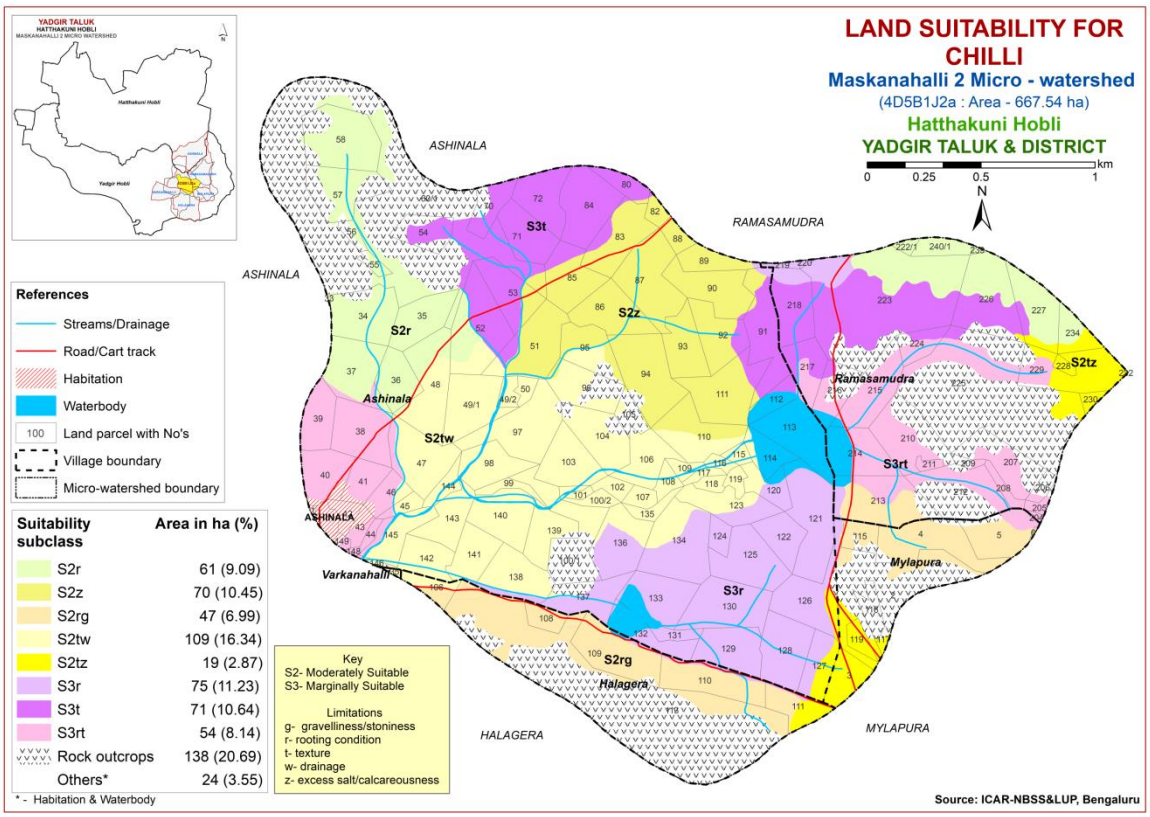


Fig 7.9 Land Suitability map of Chilli

7.10 Land Suitability for Tomato *(Lycopersicon esculentum)*

Tomato is one of the most important vegetable crop grown in about 0.61 lakh ha covering almost all the district of the state. The crop requirements for growing tomato (Table 7.11) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing tomato was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.10.

There are no highly (Class S1) suitable lands available for growing tomato crop in the microwatershed. An area of 197 ha (29%) is moderately suitable (Class S2) and is distributed in all parts of the microwatershed except central. They have minor limitations of calcareousness, gravelliness and rooting depth. An area of 309 ha (46%) is marginally suitable for tomato (Class S3) and is distributed in all parts of the microwatershed except north. They have moderate limitations of rooting depth and texture.

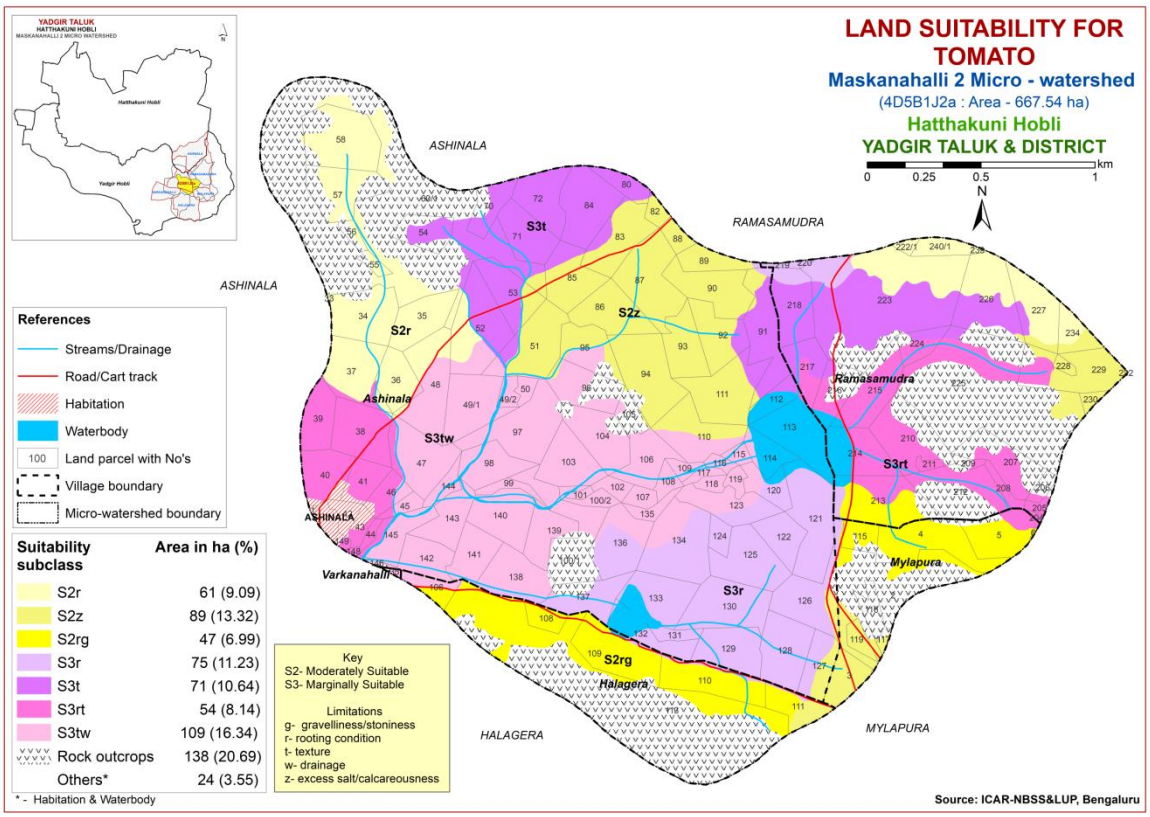


Fig 7.10 Land Suitability map of Tomato

7.11 Land Suitability for Brinjal (*Solanum melongena*)

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

Highly (Class S1) suitable lands for growing brinjal occur in an area of 19 ha (3%) and are distributed in the eastern and southeastern part of the microwatershed. Maximum area of about 286 ha (43%) is moderately suitable (Class S2) for brinjal and is distributed in the major part of the microwatershed with minor limitations of texture and rooting depth. An area of 200 ha (30%) is marginally suitable (Class S3) and is distributed in all parts of the microwatershed except north and central. They have moderate limitations of rooting depth and texture.

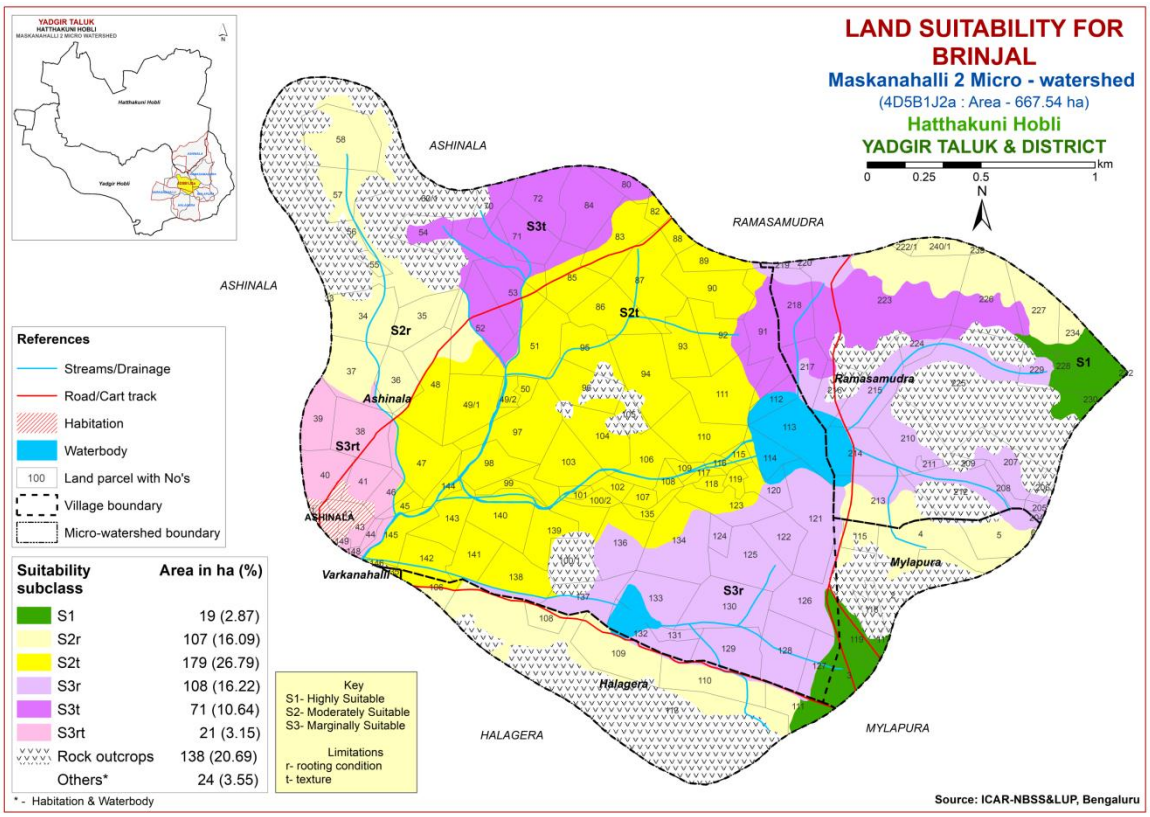


Fig 7.11 Land Suitability map of Brinjal

7.12 Land Suitability for Onion (*Allium cepa L.*,)

Onion is one of the most important vegetable crop grown in the state. The crop requirements for growing onion (Table 7.13) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing onion was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.12.

Highly (Class S1) suitable lands for growing onion occur in an area of 89 ha (13%) and are distributed in the northern, eastern and southeastern part of the microwatershed. An area of about 216 ha (32%) is moderately suitable (Class S2) for onion and is distributed in all parts of the microwatershed except north. They have minor limitations of texture and rooting depth. An area of 200 ha (30%) is marginally suitable (Class S3) and is distributed in all parts of the microwatershed except north and central. They have moderate limitations of rooting depth and texture.

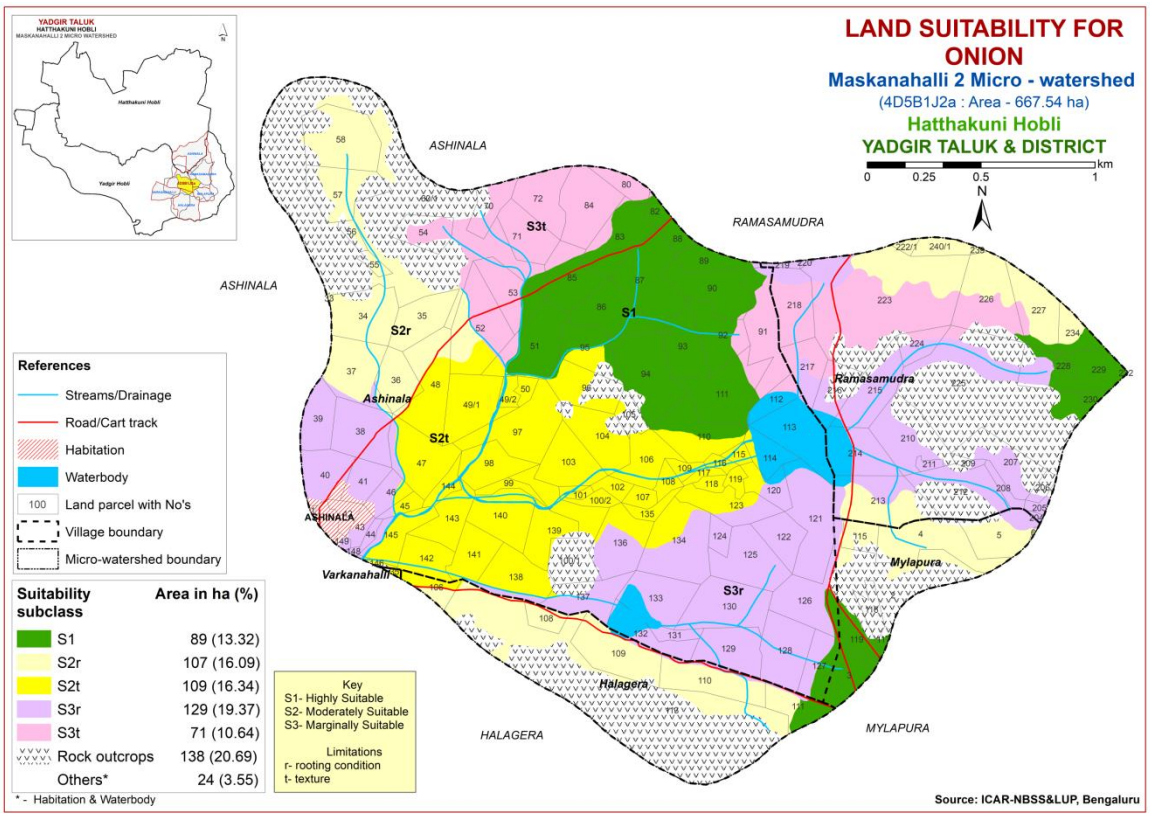


Fig 7.12 Land Suitability map of Onion

7.13 Land Suitability for Bhendi (*Abelmoschus esculentus*)

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

Highly (Class S1) suitable lands for growing bhendi occur in an area of 89 ha (13%) and are distributed in the northern, eastern and southeastern part of the microwatershed. An area of about 216 ha (32%) is moderately suitable (Class S2) for bhendi and is distributed in all parts of the microwatershed except north. They have minor limitations of texture and rooting depth. An area of 200 ha (30%) is marginally suitable (Class S3) and is distributed in all parts of the microwatershed except north and central. They have moderate limitations of rooting depth and texture.

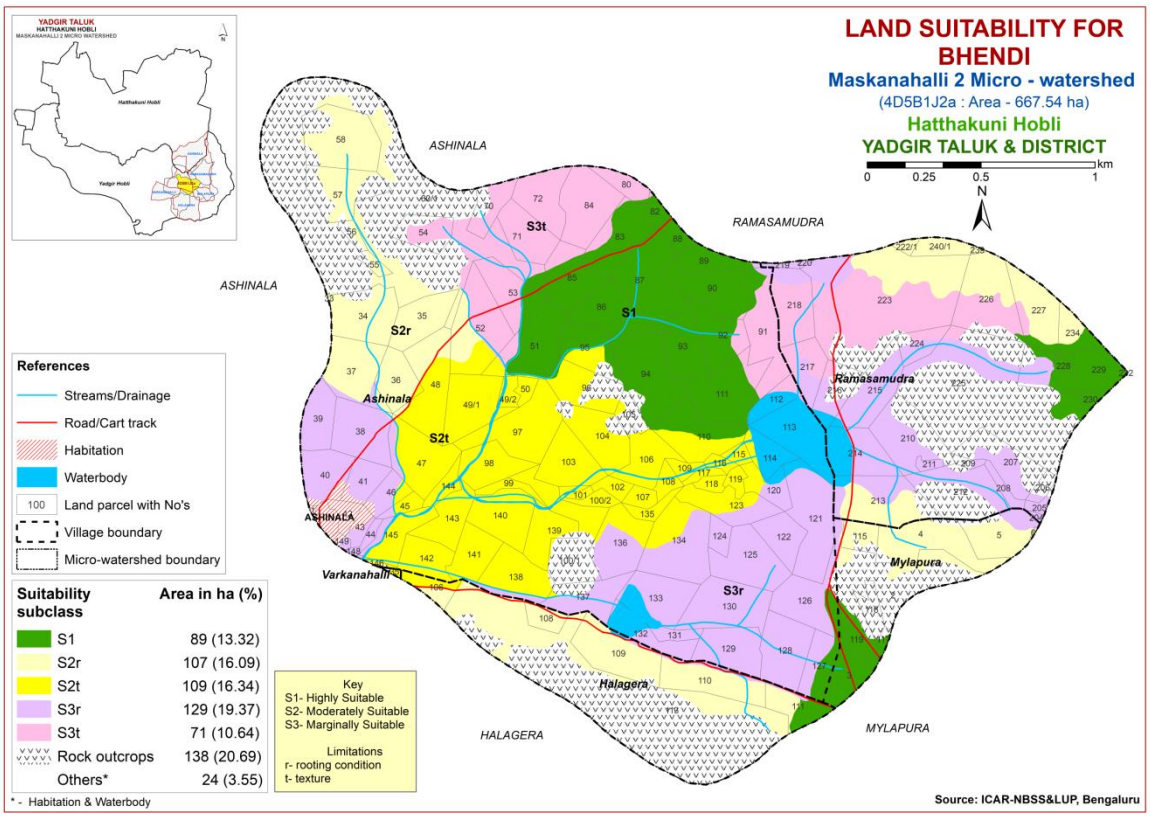


Fig 7.13 Land Suitability map of Bhendi

7.14 Land Suitability for Drumstick (*Moringa oleifera*)

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

There are no highly (Class S1) suitable lands available for growing drumstick in the microwatershed. An area of about 198 ha (30%) is moderately suitable (Class S2) for drumstick and is distributed in the central, northern, western, eastern and southwestern part of the microwatershed. They have minor limitations of rooting depth, texture, calcareousness and drainage. Marginally suitable lands (Class S3) for growing drumstick occupy an area of about 178 ha (27%) and occur in all parts of the microwatershed except north, central and west. They have moderate limitations of rooting depth and texture. Currently not suitable (Class N1) lands for growing drumstick occur in an area of 129 ha (19%) and are distributed in the western, southern, eastern, northeastern and southeastern part of the microwatershed. They have severe limitations of rooting depth and texture.

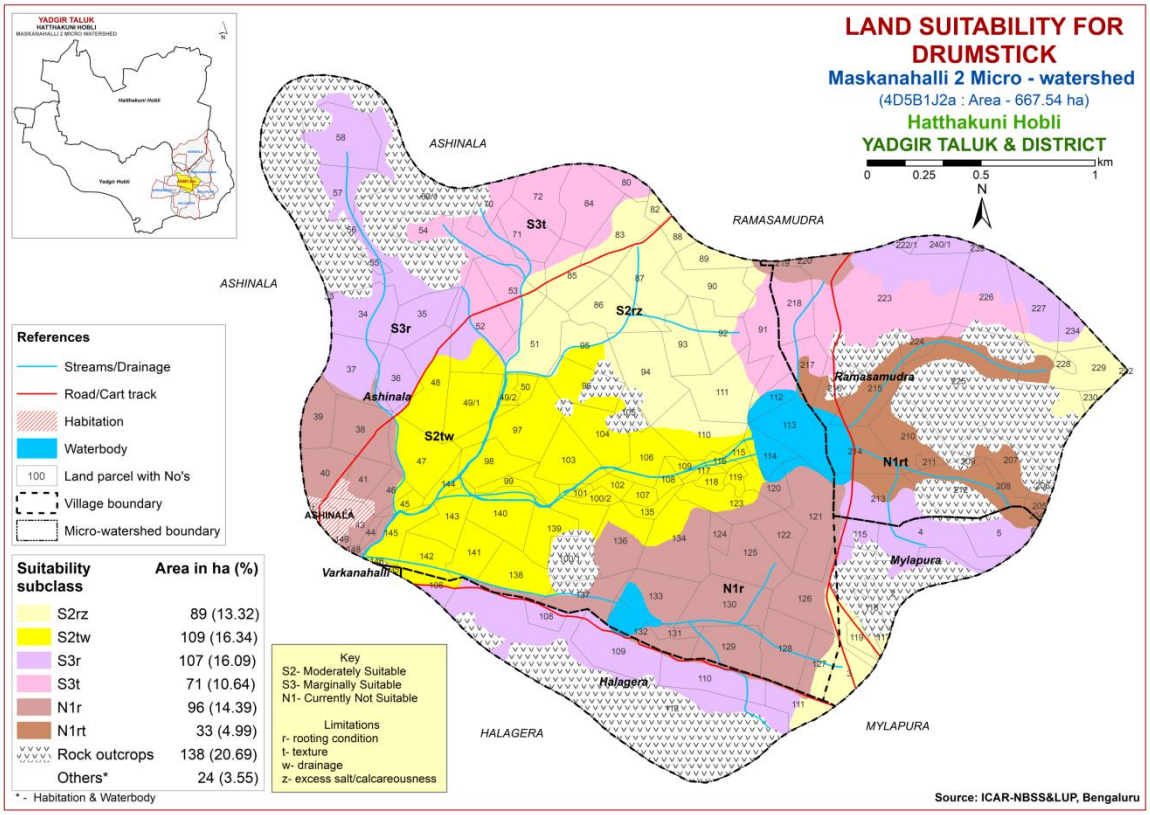


Fig 7.14 Land Suitability map of Drumstick

7.15 Land suitability for Mango (*Mangifera indica*)

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

There are no highly suitable (Class S1) and moderate suitable (Class S2) lands available for growing mango in the microwatershed. An area of 198 ha (30%) is marginally suitable (Class S3) for growing mango with moderate limitations of texture, calcareousness, drainage and rooting depth. They are distributed in the central, northern western, eastern and southeastern part of the microwatershed. Maximum area of about 308 ha (46%) is currently not suitable (Class N1) for growing mango and are distributed in all parts of the microwatershed except northern and central, they have severe limitation of rooting depth.

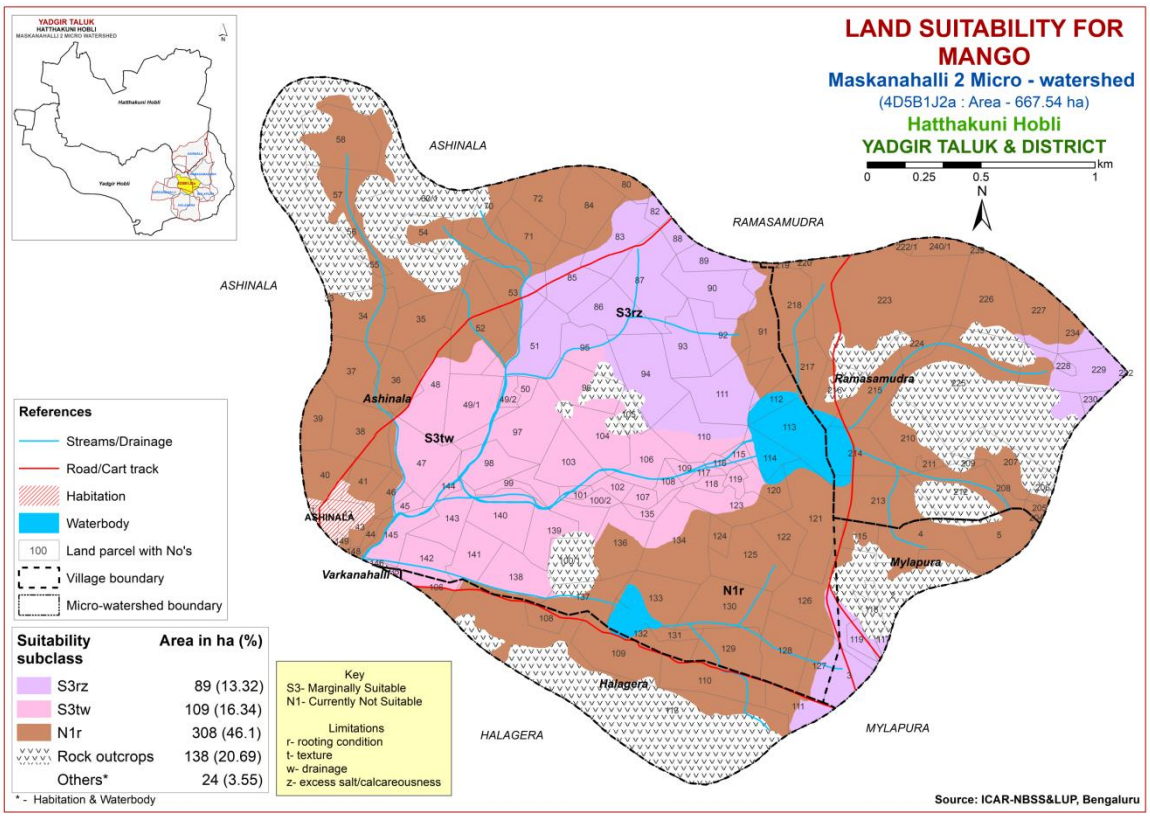


Fig. 7.15 Land Suitability map of Mango

7.16 Land suitability for Guava (*Psidium guajava*)

Guava is one of the most important fruit crop grown in an area of 6558 ha in almost all the districts of the State. The crop requirements (Table 7.17) for growing guava were matched with the soil-site characteristics (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 7.16.

No highly (Class S1) suitable lands available for growing guava in the microwatershed. Moderately suitable (Class S2) lands occur in an area of 89 ha (13%) and are distributed in the northern, southeastern and eatern part of the microwatershed with minor limitations of rooting depth, calcareousness and texture. Marginally suitable (Class S3) lands cover an area of about 287 ha (43%) and are distributed in all parts of the microwatershed except north. They have moderate limitations of rooting depth, texture and drainage. An area of about 129 ha (19%) is currently not suitable (Class N1) for growing guava and occur in the western, southern, southeastern, northern, eastern and northeastern part of the microwatershed. They have severe limitations of rooting depth and texture.

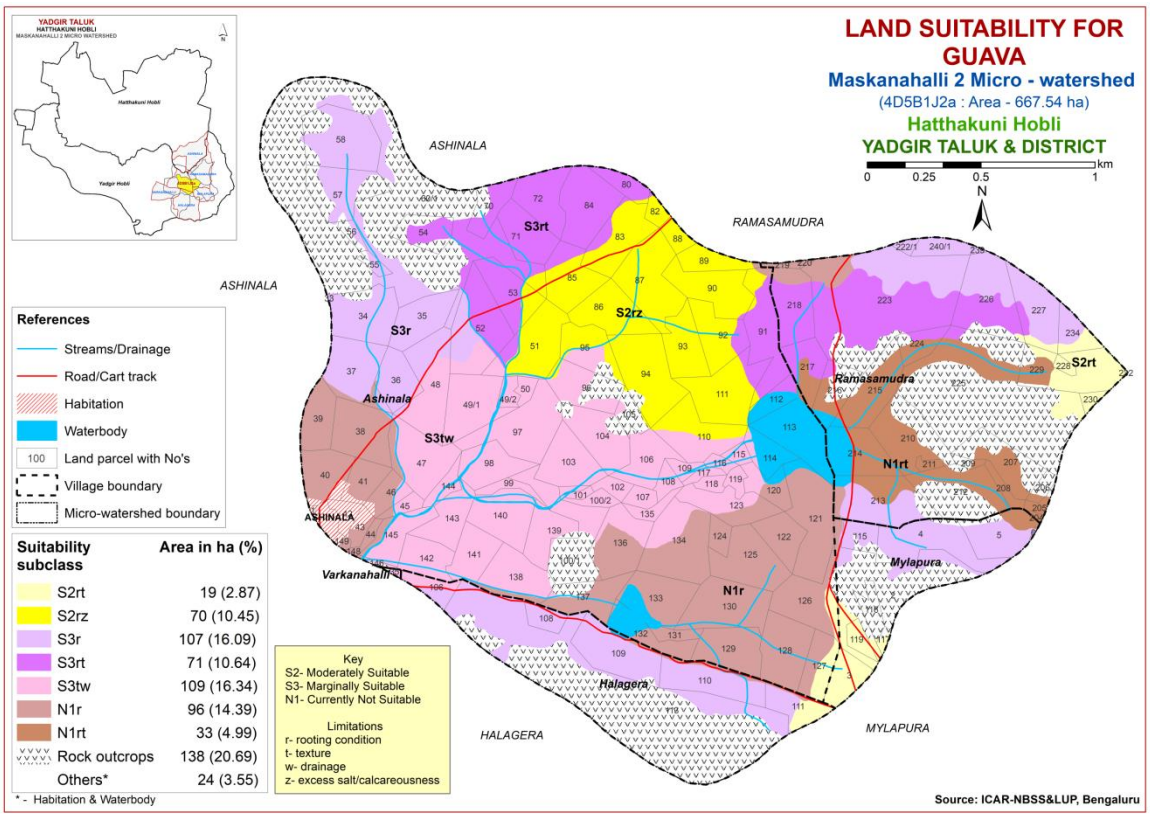


Fig. 7.16 Land Suitability map of Guava

7.17 Land suitability for Sapota (*Manilkara zapota*)

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

No highly (Class S1) suitable lands available for growing sapota in the microwatershed. Moderately suitable (Class S2) lands occur in an area of 89 ha (13%) and are distributed in the northern, southeastern and eastern part of the microwatershed with minor limitations of rooting depth and calcareousness. An area of about 287 ha (43%) is marginally suitable (Class S3) for growing sapota and are distributed in all parts of the microwatershed except north. They have moderate limitations of rooting depth, texture and drainage. An area of about 129 ha (19%) is currently not suitable (Class N1) for growing sapota and occur in the western, southern, southeastern, northern, eastern and northeastern part of the microwatershed. They have severe limitation of rooting depth.

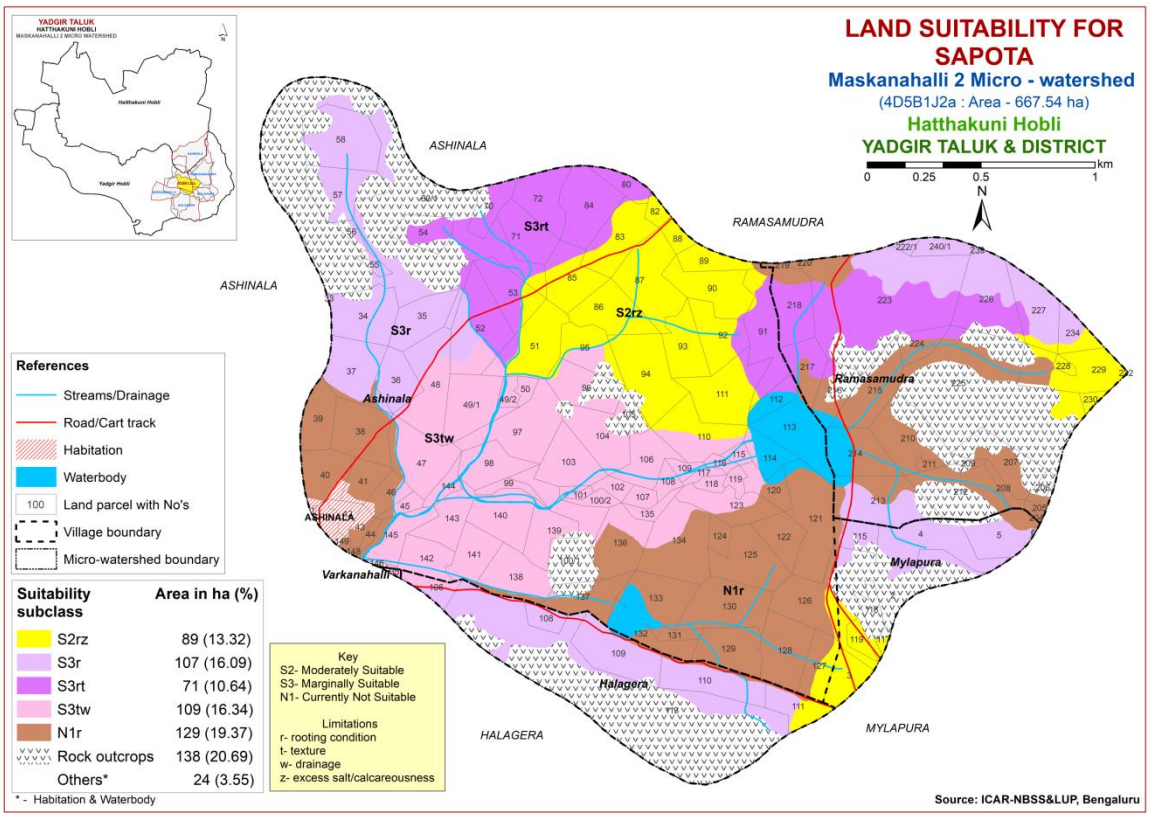


Fig. 7.17 Land Suitability map of Sapota

7.18 Land Suitability for Pomegranate (*Punica granatum*)

Pomegranate is one of the most important fruit crop commercially grown in about 18488 ha in Karnataka, mainly in Bijapur, Bagalkot, Koppal, Gadag and Chitradurga districts. The crop requirements for growing pomegranate (Table 7.19) 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 are given in Figure 7.18.

No highly (Class S1) suitable lands available for growing pomegranate in the microwatershed. Moderately suitable (Class S2) lands occur in an area of 198 ha (30%) and are distributed in the northern, central, western, southeastern and eastern part of the microwatershed with minor limitations of rooting depth, texture, calcareousness and drainage. An area of about 178 ha (27%) is marginally suitable (Class S3) for growing pomegranate and are distributed in all parts of the microwatershed except north and central. They have moderate limitations of rooting depth and texture. An area of about 129 ha (19%) is currently not suitable (Class N1) for growing pomegranate and occur in the western, southern, southeastern, northern, eastern and northeastern part of the microwatershed. They have severe limitation of rooting depth.

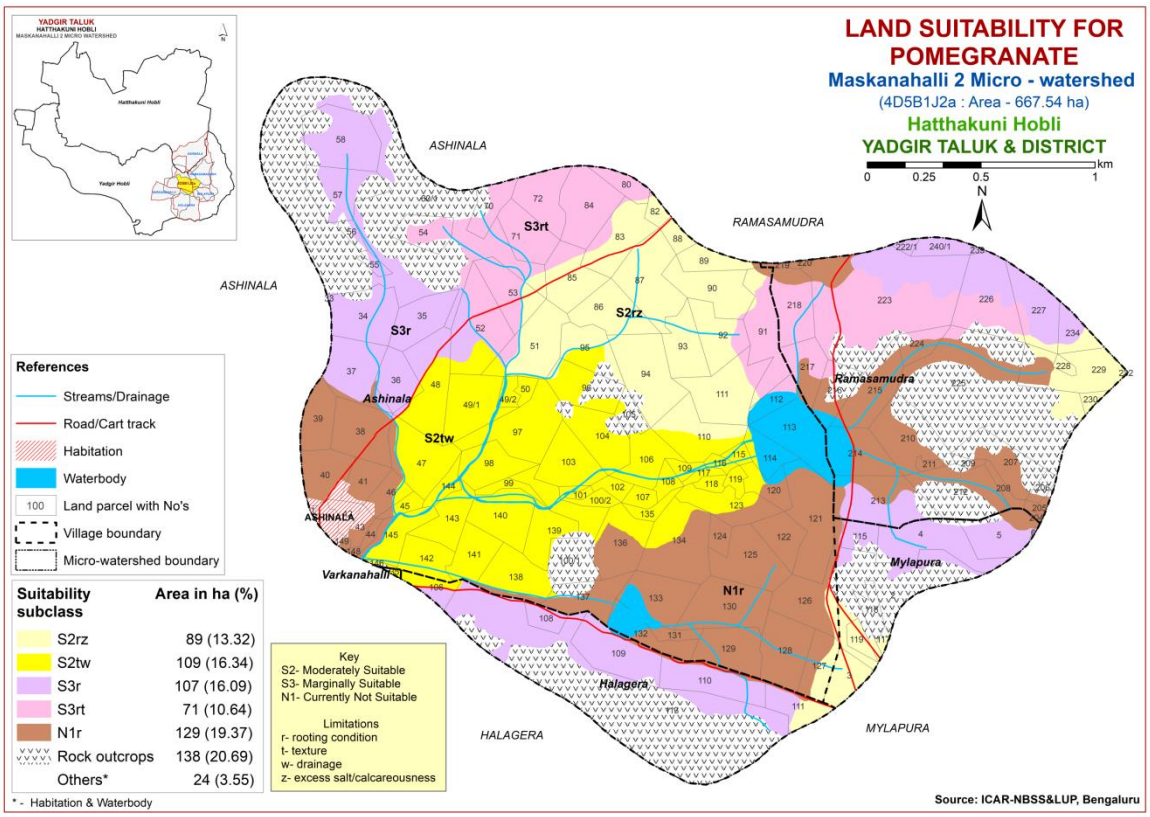


Fig 7.18 Land Suitability map of Pomegranate

7.19 Land Suitability for Musambi (*Citrus limetta*)

Musambi is one of the important fruit crop grown in an area of 3446 ha in almost all the districts of the State. The crop requirements for growing musambi (Table 7.20) 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.

No highly (Class S1) suitable lands available for growing musambi in the microwatershed. An area of about 198 ha (30%) is moderately suitable (Class S2) for growing musambi and are distributed in the northern, central, western, southeastern and eastern part of the microwatershed. They have minor limitations of drainage and rooting depth and calcareousness. An area of about 178 ha (27%) is marginally suitable (Class S3) and is distributed in all parts of the microwatershed except north and central. They have moderate limitations of rooting depth and texture. An area of about 129 ha (19%) is currently not suitable (Class N1) for growing musambi and occur in the western, southern, southeastern, northern, eastern and northeastern part of the microwatershed. They have severe limitation of rooting depth.

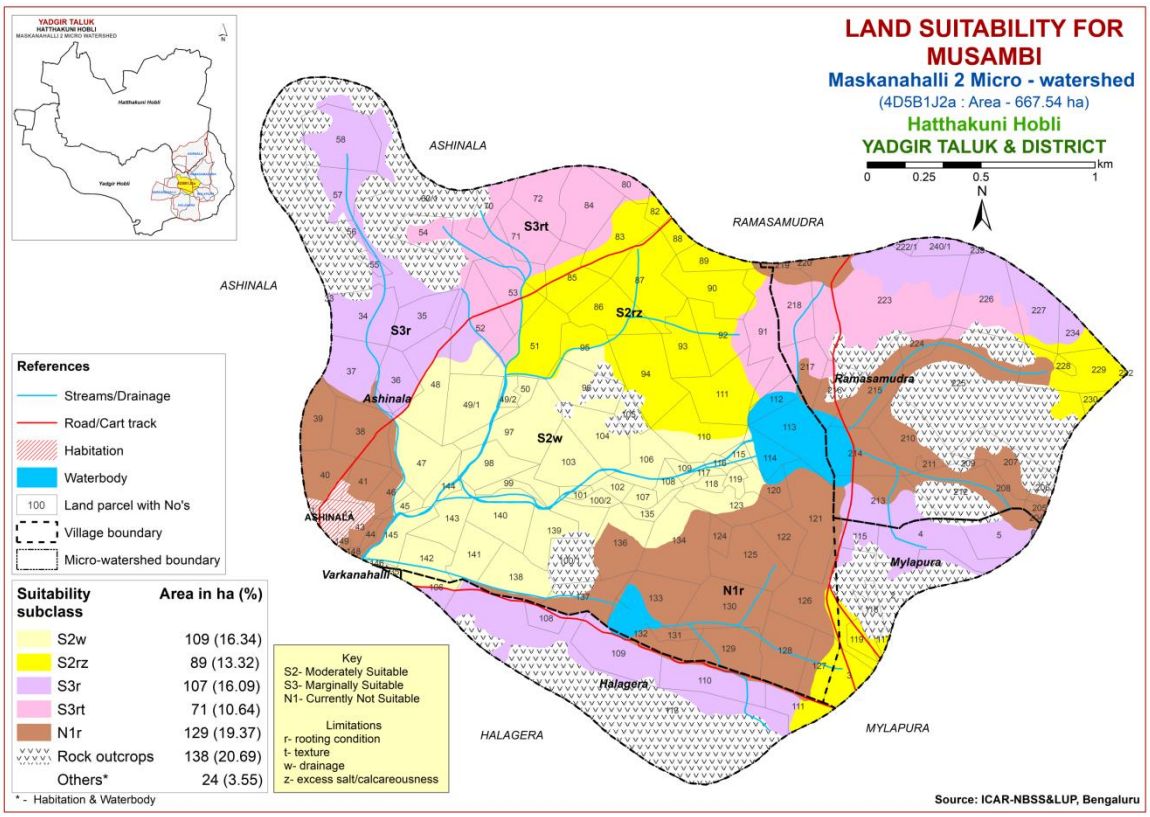


Fig. 7.19 Land Suitability map of Musambi

7.20 Land Suitability for Lime (*Citrus sp*)

Lime is one of the most important fruit crop grown in an area of 0.11 lakh ha in almost all the districts of the State. The crop requirements for growing lime (Table 7.21) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing lime was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7. 20.

No highly (Class S1) suitable lands available for growing lime in the microwatershed. An area of about 198 ha (30%) is moderately suitable (Class S2) for growing lime and are distributed in the northern, central, western, southeastern and eastern part of the microwatershed. They have minor limitations of drainage and rooting depth and calcareousness. An area of about 178 ha (27%) is marginally suitable (Class S3) and is distributed in all parts of the microwatershed except north and central. They have moderate limitations of rooting depth and texture. An area of about 129 ha (19%) is currently not suitable (Class N1) for growing lime and occur in the western, southern, southeastern, northern, eastern and northeastern part of the microwatershed. They have severe limitation of rooting depth.

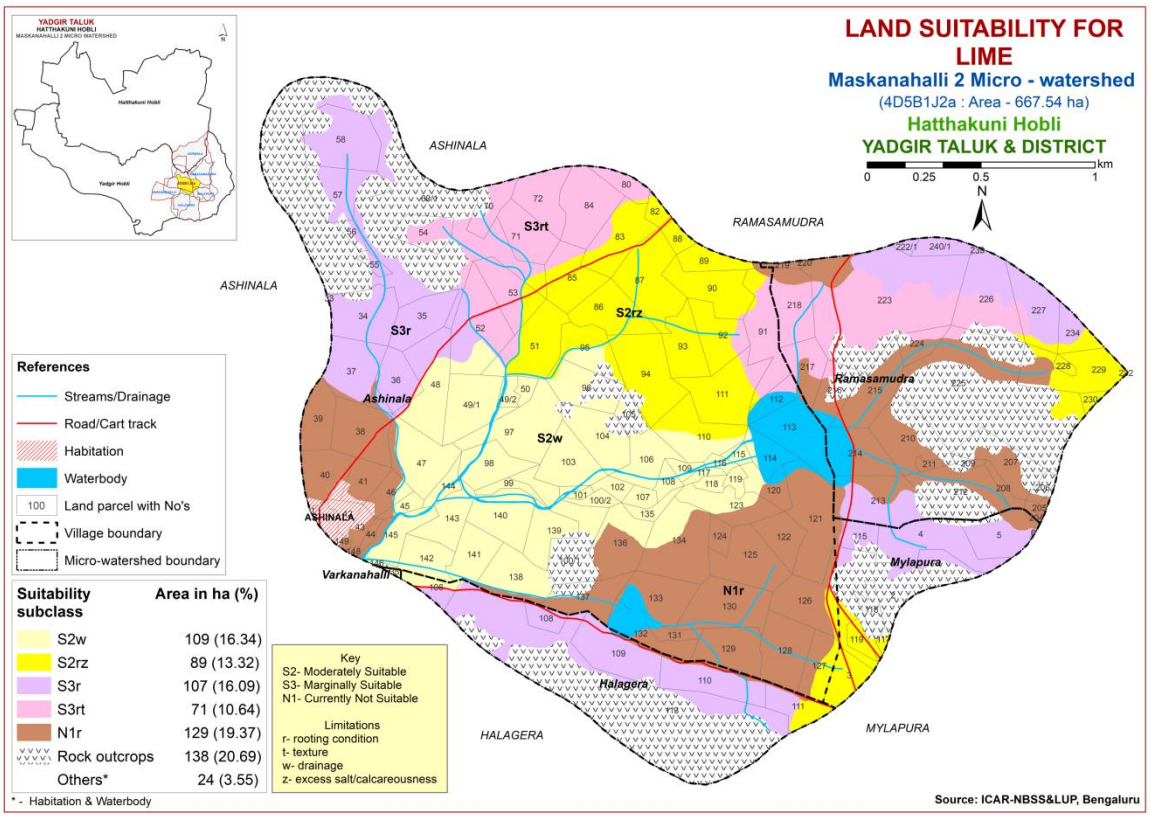


Fig. 7.20 Land Suitability map of Lime

7.21 Land Suitability for Amla (*Phyllanthus emblica*)

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

Highly (Class S1) suitable lands for growing amla occur in an area of 128 ha (19%) and are distributed in the central, western, southeastern and eastern part of the microwatershed. An area of about 177 ha (26%) is moderately suitable (Class S2) for amla and is distributed in all parts of the microwatershed with minor limitations of texture, calcareousness and rooting depth. An area of 200 ha (30%) is marginally suitable (Class S3) and is distributed in all parts of the microwatershed except north and central. They have moderate limitations of rooting depth and texture.

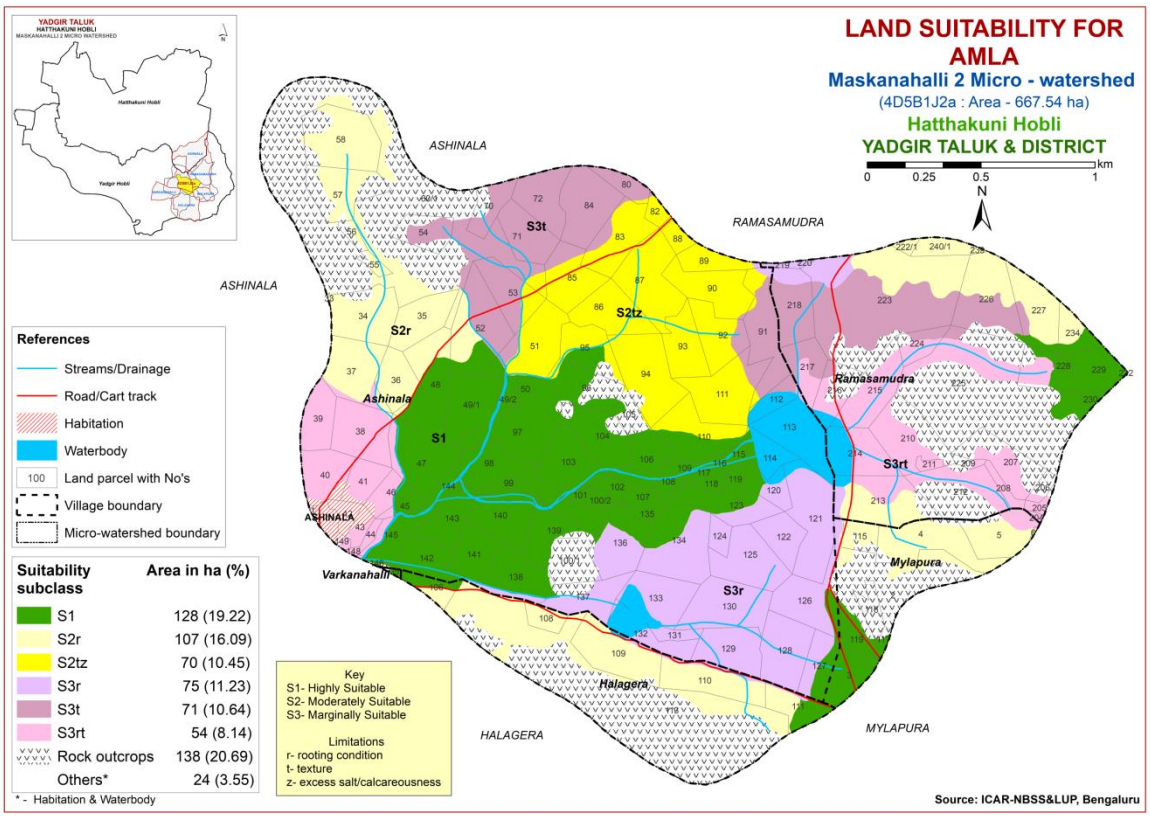


Fig. 7.21 Land Suitability map of Amla

7.22 Land Suitability for Cashew (*Anacardium occidentale)*

Cashew is one of the most important plantation nut crop grown in an area of 0.7 lakh ha in almost all the districts of the State. The crop requirements for growing cashew (Table 7.23) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing cashew was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.22.

No highly (Class S1) suitable lands available for growing cashew in the microwatershed. An area of 19 ha (3%) is moderately suitable (Class S2) for cashew and are distributed in the eastern and southeastern part of the microwatershed with minor limitations of rooting depth and texture. About 99 ha (15%) area is marginally suitable (Class S3) for cashew and is distributed in the southern, southwestern, northeastern and northwestern part of the microwatershed with moderate limitations of rooting depth and texture. Maximum area of 388 ha (58%) is currently not suitable (Class N1) for cashew and is distributed in the major part of the microwatershed with severe limitations of rooting depth, texture, calcareousness and drainage.

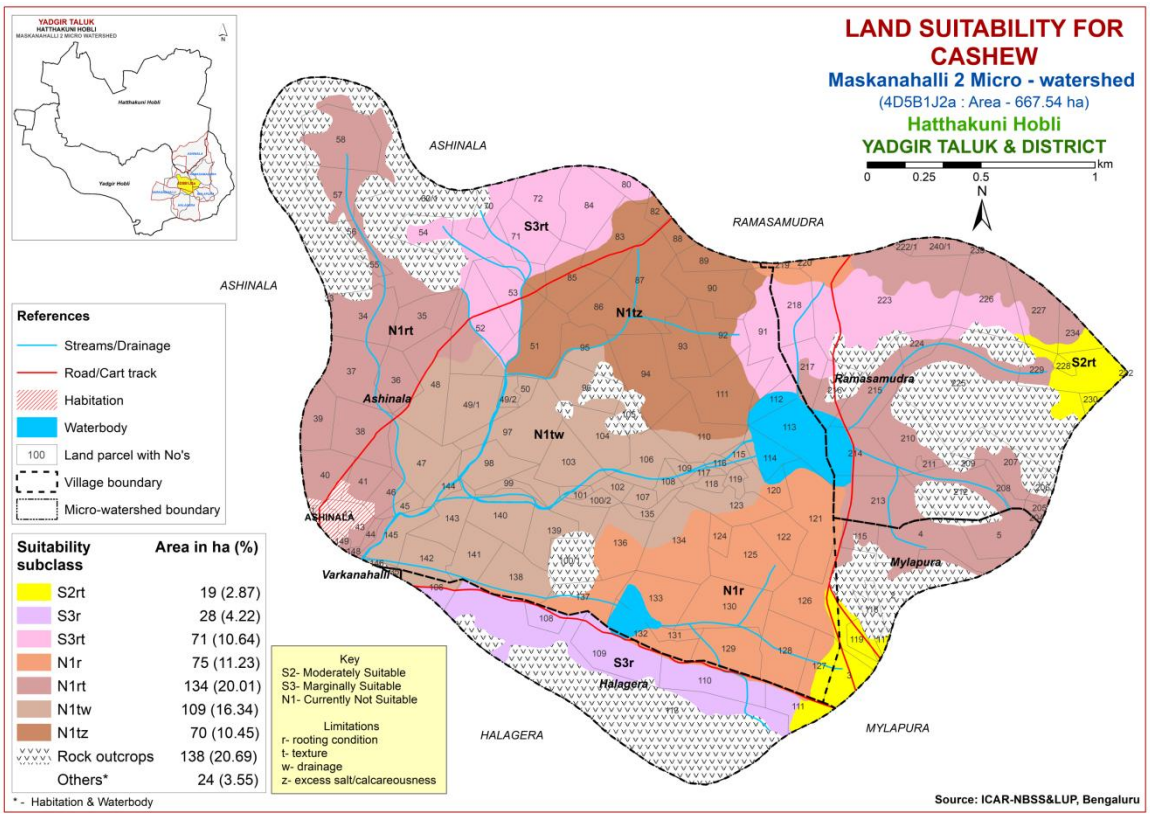


Fig. 7.22 Land Suitability map of Cashew

7. 23 Land Suitability for Jackfruit (*Artocarpus heterophyllus*)

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

No highly (Class S1) suitable lands available for growing jackfruit in the microwatershed. Moderately suitable (Class S2) lands occur in an area of 89 ha (13%) and are distributed in the northern, eastern and southeastern part of the microwatershed with minor limitations of rooting depth and calcareousness. An area of about 287 ha (43%) is marginally suitable (Class S3) for growing jackfruit and are distributed in all parts of the microwatershed except north. They have moderate limitations of rooting depth, texture and drainage. An area of about 129 ha (19%) is currently not suitable (Class N1) for growing jackfruit and occur in the western, southern, southeastern, northern, eastern and northeastern part of the microwatershed. They have severe limitations of rooting depth and texture.

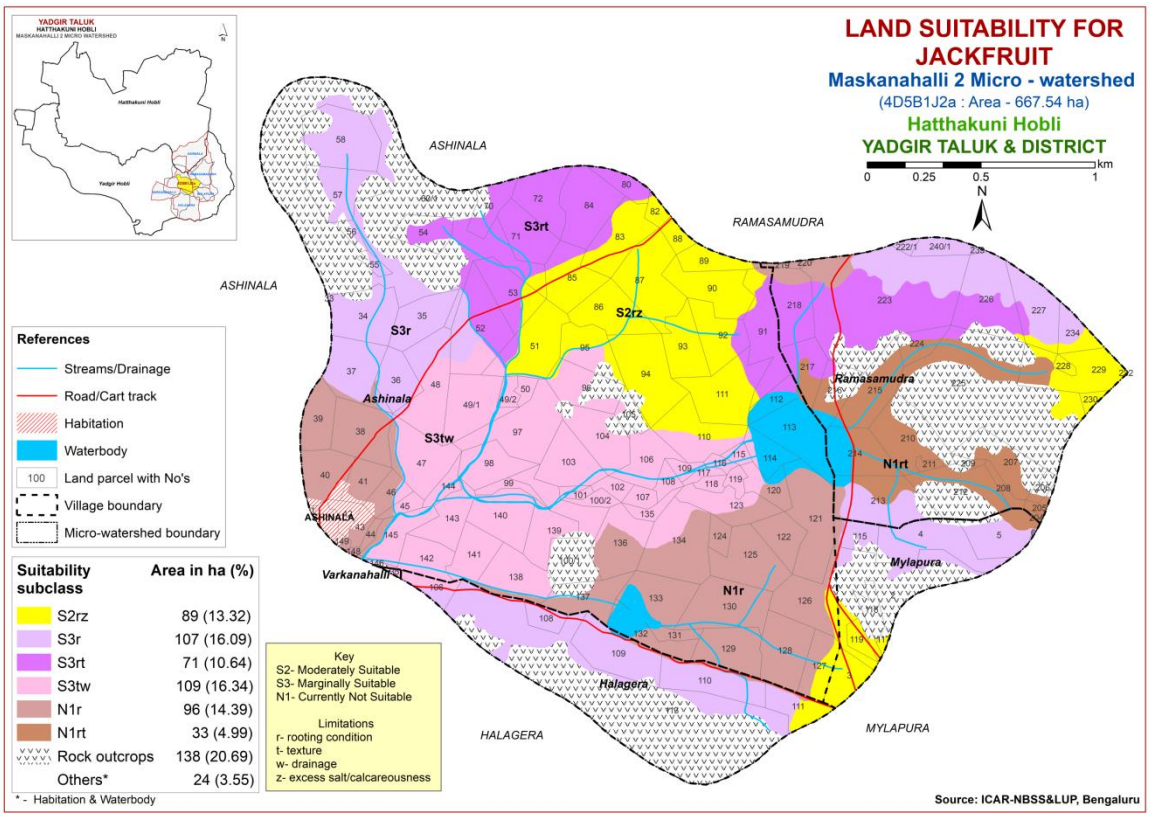


Fig. 7.23 Land Suitability map of Jackfruit

7.24 Land Suitability for Jamun (*Syzygium cumini*)

Jamun is an important fruit crop grown in almost all the districts of the State. The crop requirements for growing jamun (Table 25) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing jamun was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.24.

There are no highly (Class S1) suitable lands available for growing jamun in the microwatershed. An area of about 109 ha (16%) is moderately suitable (Class S2) for jamun and is distributed in the central and western part of the microwatershed. They have minor limitations of texture and drainage. Marginally suitable lands (Class S3) for growing jamun occupy an area of about 267 ha (40%) and occur in all parts of the microwatershed except central. They have moderate limitations of rooting depth, texture and calcareousness. Currently not suitable (Class N1) lands for growing jamun occur in an area of 129 ha (19%) and are distributed in the western, southern, southeastern, northern, eastern and northeastern part of the microwatershed. They have severe limitations of rooting depth and texture.

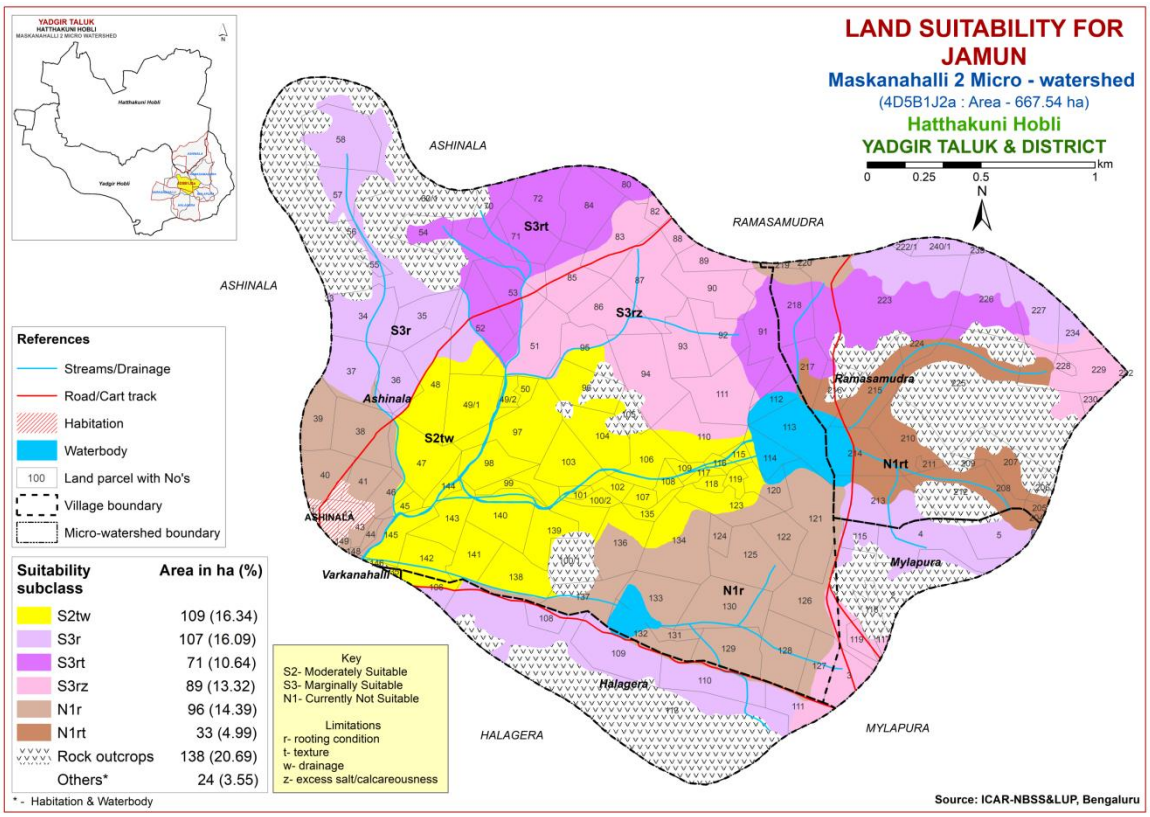


Fig. 7.24 Land Suitability map of Jamun

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

Custard apple is one of the most important fruit crop grown in almost all the districts of the State. The crop requirements for growing custard apple (Table7.26) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing custard apple was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.25.

Highly suitable (Class S1) lands for growing custard apple occur in an area of 198 ha (30%) and are distributed in the central, northern, western, eastern and southeastern part of the microwatershed. Moderately suitable (Class S2) lands are found to occur in an area of 107 ha (16%). These soils have minor limitation of rooting depth. They are distributed in the northwestern, southern, southeastern and northeastern part of the microwatershed. Marginally suitable (Class S3) lands for custard apple occur in an area of 200 ha (30%) with moderate limitations of rooting depth and texture. They are distributed in all parts of the microwatershed except north and central.

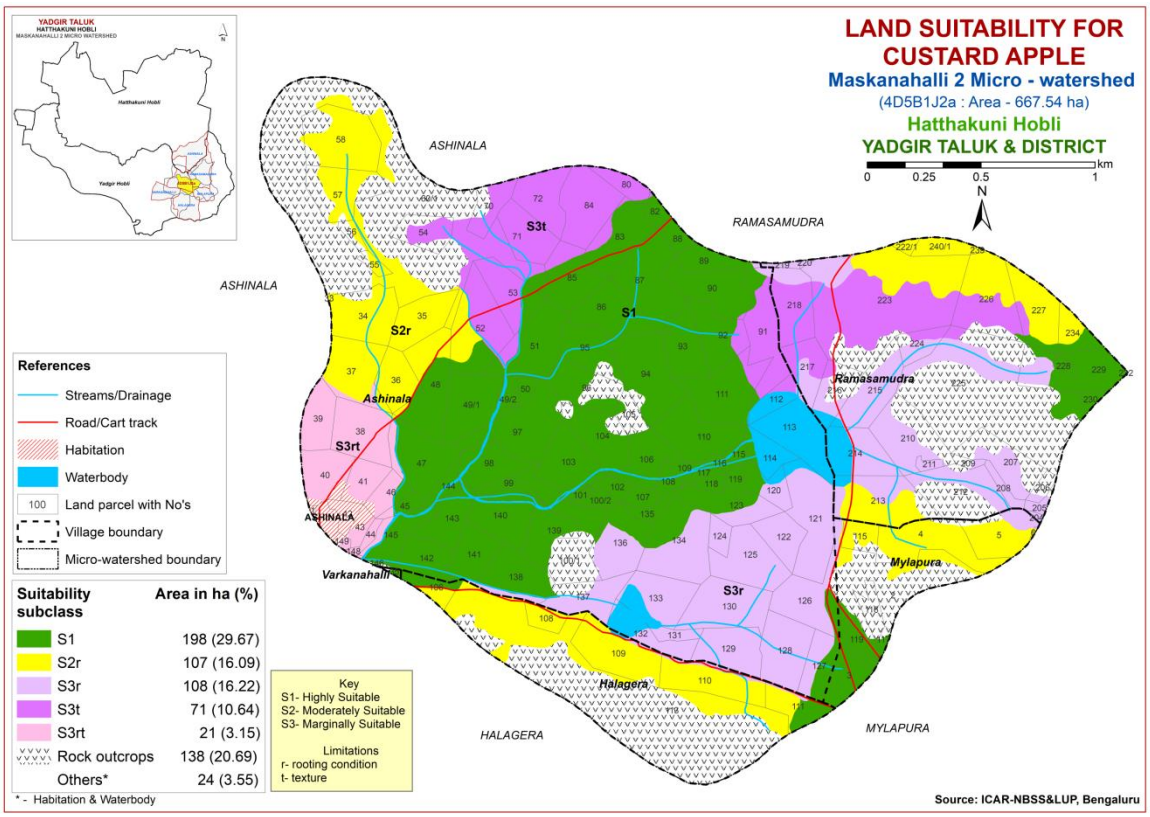


Fig. 7.25 Land Suitability map of Custard Apple

7.26 Land Suitability for Tamarind (*Tamarindus indica*)

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

No highly suitable (Class S1) lands available for growing Tamarind in the microwatershed. An area of about 109 ha (16%) is moderately suitable (Class S2) for growing Tamarind and are distributed in the central and western part of the microwatershed. They have minor limitations of texture and drainage. Marginally suitable (Class S3) lands for growing Tamarind occupy an area of about 89 ha (13%) and are distributed in the northern, eastern and southeastern part of the microwatershed. They have moderate limitation of rooting depth. Maximum area of about 307 ha (46%) is currently not suitable (Class N1) for growing Tamarind and occur in all parts of the microwatershed except north and central. They have severe limitations of rooting depth and texture.

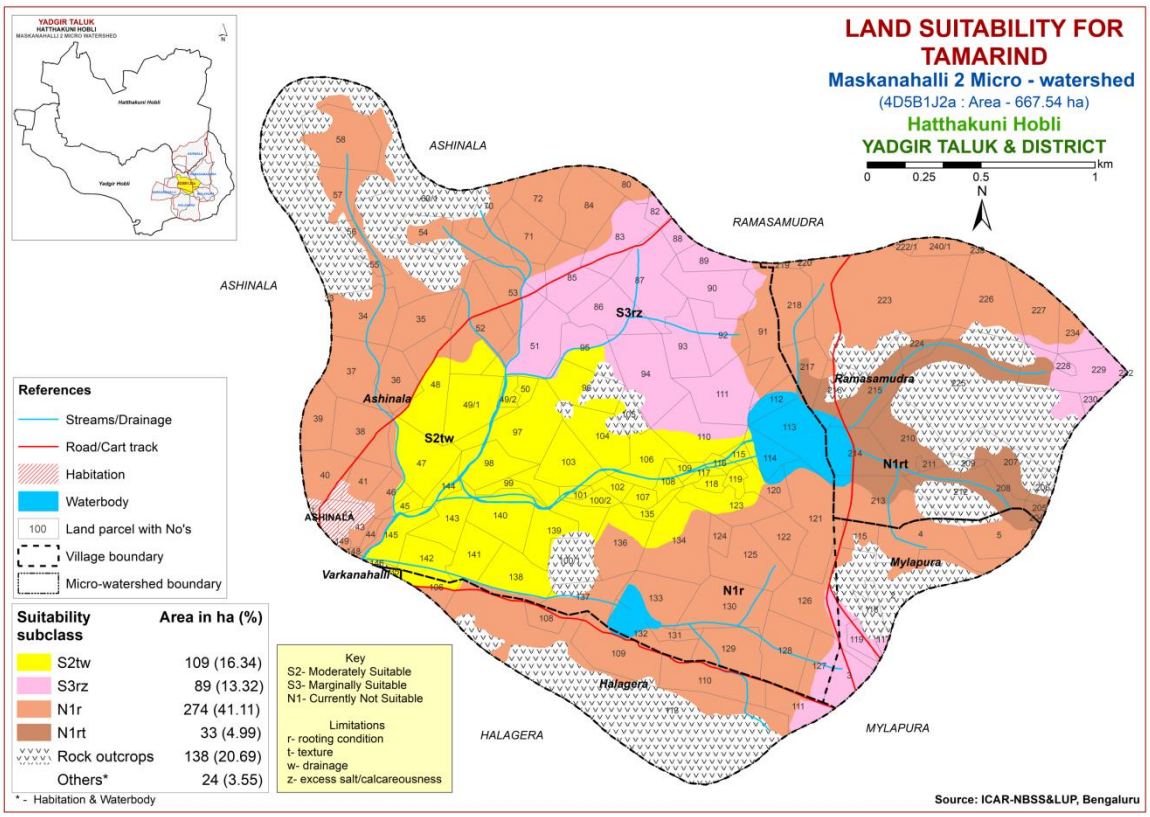


Fig. 7.26 Land Suitability map of Tamarind

7.27 Land Suitability for Mulberry (*Morus nigra*)

Mulberry is one of the important leaf crop grown for rearing silk worms in about 1.6 lakh ha area in all the districts of the state. The crop requirements for growing mulberry (Table 7.28) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing mulberry was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.27.

No highly (Class S1) suitable lands available for growing mulberry in the microwatershed. Moderately suitable (Class S2) lands occur in an area of 89 ha (13%) and are distributed in the northern, eastern and southeastern part of the microwatershed with minor limitations of calcareousness and rooting depth. An area of about 287 ha (43%) is marginally suitable (Class S3) for growing mulberry and are distributed in all parts of the microwatershed except north. They have moderate limitations of rooting depth, drainage and texture. Currently not suitable (Class N1) lands for growing mulberry occur in an area of 129 ha (19%) and are distributed in the western, southern, southeastern, northern, eastern and northeastern part of the microwatershed. They have severe limitations of rooting depth and texture.

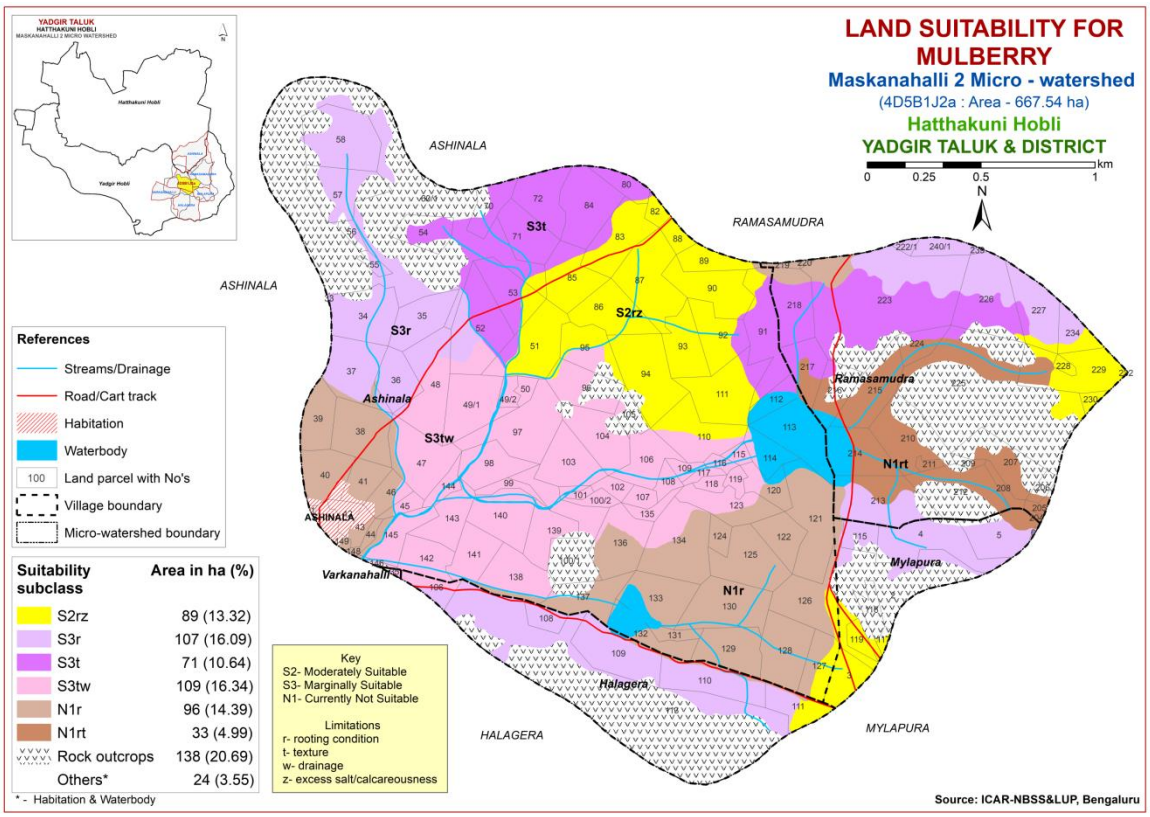


Fig 7.27 Land Suitability map of Mulberry

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

Marigold is one of the most important flower crop grown in an area of 9108 ha in almost all the districts of the State. The crop requirements (Table 7.29) for growing marigold were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing marigold was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.28.

No highly (Class S1) suitable lands available for growing marigold in the microwatershed. Moderately suitable (Class S2) lands occur in an area of 306 ha (46%) and are distributed in the major part of the microwatershed with minor limitations of calcareousness, drainage, texture, gravelliness and rooting depth. An area of about 200 ha (30%) is marginally suitable (Class S3) for growing marigold and are distributed in all parts of the microwatershed except north and central. They have moderate limitations of rooting depth and texture.

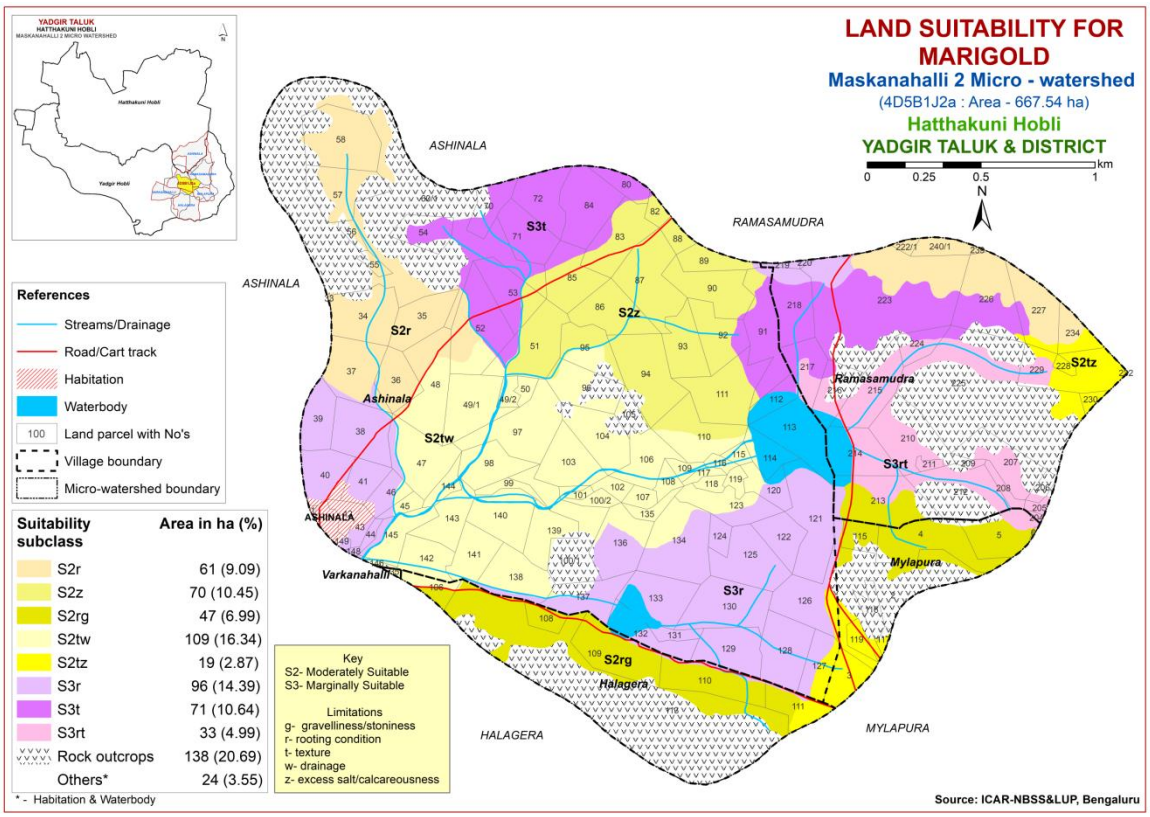


Fig. 7.28 Land Suitability map of Marigold

7.29 Land Suitability for Chrysanthemum (*Dendranthema grandiflora*)

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

No highly (Class S1) suitable lands available for growing chrysanthemum in the microwatershed. Moderately suitable (Class S2) lands occur in an area of 306 ha (46%) and are distributed in the major part of the microwatershed with minor limitations of calcareousness, drainage, texture, gravelliness and rooting depth. An area of about 200 ha (30%) is marginally suitable (Class S3) for growing chrysanthemum and are distributed in all parts of the microwatershed except north and central. They have moderate limitations of rooting depth and texture.

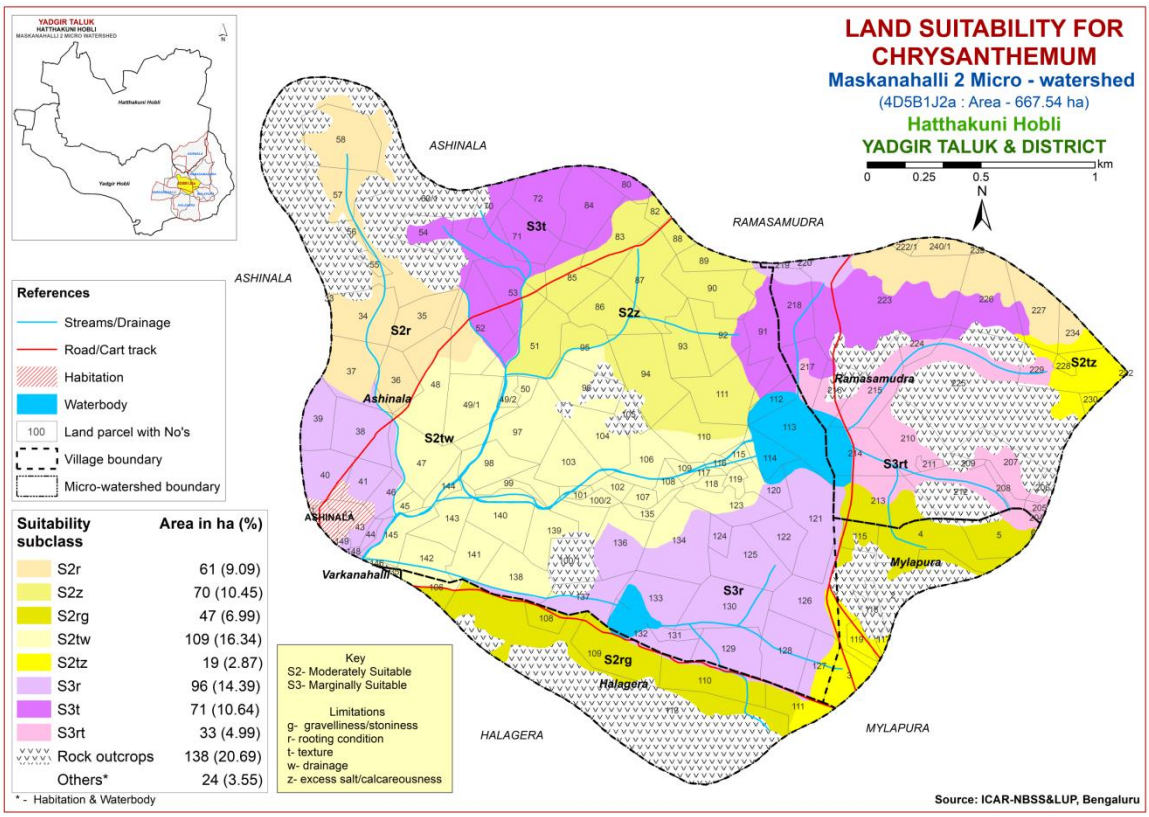


Fig. 7.29 Land Suitability map of Chrysanthemum

Table 7.1 Soil-site characteristics of Maskanahalli-2 microwatershed

Soil Map Units	Climate (P) (mm)	Growing period (Days)	Drain-age Class	Soil depth (cm)	Soil texture		Gravelliness		AWC (mm/m)	Slope (%)	Erosion	pH	EC (dSm^{-1})	ESP (%)	CEC [Cmol (p^{+})kg^{-1}]	BS (%)
					Sur-face	Sub-surface	Surface (%)	Sub-surface (%)								
BDLhB2	866	150	W	25-50	scl	sl	<15	-	<50	1-3	Moderate	6.20	0.074	0.20	4.20	93
VNKcB2	866	150	W	25-50	sl	sc	<15	-	<50	1-3	Moderate	5.37	0.11	2.22	6.27	75
VNKiB2	866	150	W	25-50	sc	ls	<15	-	<50	1-3	Moderate	5.37	0.11	2.22	6.27	75
SBRcB2	866	150	sed	50-75	sl	scl	<15	-	<50	1-3	Moderate	8.24	0.145	1.15	7.50	100
JNKcB2	866	150	W	50-75	sl	c	<15	-	51-100	1-3	Moderate	8.42	0.148	0.18	14.50	100
JNKhB2g1	866	150	W	50-75	scl	scl	15-35	-	51-100	1-3	Moderate	8.42	0.148	0.18	14.50	100
JNKhB2	866	150	W	50-75	scl	sc	<15	-	51-100	1-3	Moderate	8.42	0.148	0.18	14.50	100
YLRcB2g1	866	150	W	50-75	sl	sl	15-35	15-35	51-100	1-3	Moderate	6.91	0.069	0.45	6.90	100
BLCcB2	866	150	W	75-100	sl	c	<15	-	51-100	1-3	Moderate	6.75	0.19	1.31	16.80	95
BLCiB2	866	150	W	75-100	sc	sl	<15	-	51-100	1-3	Moderate	6.75	0.19	1.31	16.80	95
BLCcB2g1	866	150	W	75-100	sl	sc	15-35	-	51-100	1-3	Moderate	6.75	0.19	1.31	16.80	95
HSLcB2g1	866	150	MW	75-100	sl	ls	15-35	-	101-150	1-3	Moderate	7.16	0.117	5.94	4.90	97
HTKbB2g1	866	150	W	25-50	ls	scl	15-35	10-25	<50	1-3	Moderate	6.81	0.062	0.38	3.00	100
SGRhB2	866	150	MW	>150	scl	c	<15	-	>200	1-3	Moderate	8.3	6.49	11.61	34.77	100

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

Table 7.2 Land suitability criteria for Sorghum

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

Table 7.3 Land suitability criteria for Maize

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

Table 7.4 Land suitability criteria for Bajra

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

Table 7.5 Land suitability criteria for Groundnut

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

Table 7.6 Land suitability criteria for Sunflower

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

Table 7.7 Land suitability criteria for Redgram

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

Table 7.8 Land suitability criteria for Bengal gram

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

Table 7.9 Land suitability criteria for Cotton

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

Table 7.10 Land suitability criteria for Chilli

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

Table 7.11 Land suitability criteria for Tomato

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

Table 7.12 Land suitability criteria for Brinjal

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

Table 7.13 Land suitability criteria for Onion

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

Table 7.14 Land suitability criteria for Bhendi

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

Table 7.15 Land suitability criteria for Drumstick

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

Table 7.16 Land suitability criteria for Mango

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

Table 7.17 Land suitability criteria for Guava

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

Table 7.18 Land suitability criteria for Sapota

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

Table 7.19 Land suitability criteria for Pomegranate

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

Table 7.20 Land suitability criteria for Musambi

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

Table 7.21 Land suitability criteria for Lime

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

Table 7.22 Land suitability criteria for Amla

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

Table 7.23 Land suitability criteria for Cashew

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

Table 7.24 Land suitability criteria for Jackfruit

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

Table 7.25 Land suitability criteria for Jamun

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

Table 7.26 Land suitability criteria for Custard apple

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

Table 7.27 Land suitability criteria for Tamarind

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

Table 7.28 Land suitability criteria for Mulberry

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

Table 7.29 Land suitability criteria for Marigold

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

Table 7.30 Land suitability criteria for Chrysanthemum

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

7.30 Land Management Units (LMUs)

The 14 soil map units identified in Maskanahalli-2 microwatershed have been grouped into 8 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. 7.30) has been generated. These Land Management Units are expected to behave similarly for a given level of management.

The 14 map units that have been grouped into 8 Land Management Units along with brief description of soil and site characteristics are given below.

LMU NO.	Soil map units	Soil and site characteristics
1	142.SGRhB2	Very deep, lowland calcareous clay soils, 1-3% slopes, non gravelly, moderate erosion
2	37.BLCcB2 38.BLCiB2 155.BLCcB2g1	Moderately deep, red loamy soils, 1-3% slopes, non gravelly to gravelly, moderate erosion
3	160.HSLcB2g1	Moderately deep, black clay soils, 0-3% slopes, non gravelly to gravelly, moderate erosion
4	160.HSLcB2g1	Moderately shallow, red clay soils, 1-3% slopes, non gravelly to gravelly, moderate erosion
5	20.JNKcB2 21.JNKcB2g1 110.JNKhB2	Moderately shallow, black loamy soils, 1-3% slopes, non gravelly to gravelly, moderate erosion
6	11.SBRcB2	Moderately shallow, loamy sand soils, 1-3% slopes, non gravelly, moderate erosion
7	161.HTKbB2g1	Shallow sandy loam soils, 1-3% slopes, non gravelly to gravelly, moderate erosion
8	4.BDLhB2 9.VNKcB2 10.VNKiB2	Shallow, sandy clay to sandy loam soils, 1-3% slopes, non gravelly, moderate erosion

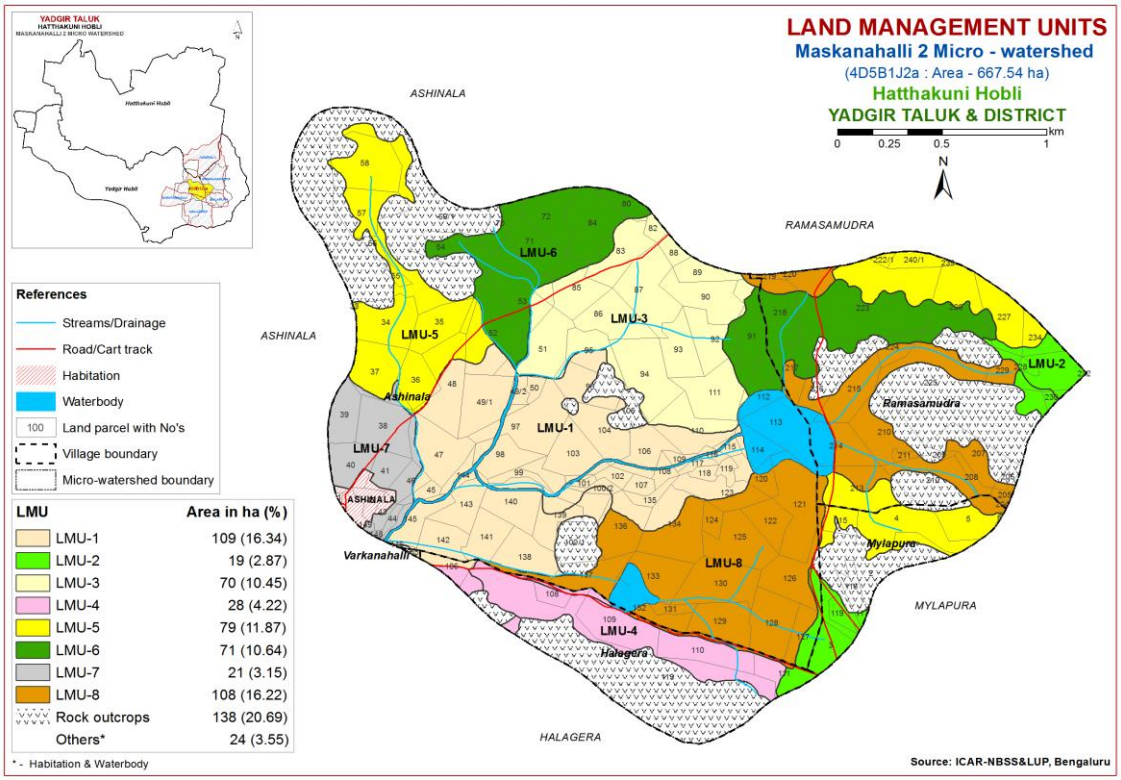


Fig. 7.30 Land Management Units Map- Maskanahalli-2 Microwatershed

7.31 Proposed Crop Plan for Maskanahalli-2 Microwatershed

After assessing the land suitability for the 29 crops, the Proposed Crop Plan has been prepared for the 8 identified LMUs by considering only the highly (Class S1) and moderately (Class S2) suitable lands for each of the 29 crops. The resultant proposed crop plan is presented below in Table 7.31.

Table 7.31 Proposed Crop Plan for Maskanahalli-2 Microwatershed

LMU	Mapping Units	Survey Number	Soil Characteristics	Field Crops	Horticulture Crops	Suitable Interventions
1	142.SGRhB2	**Ashinala:**45,47,48,49/1,49/2,50,96,97,98,99,100/2,101,102,103,104,106,107,108,109,115,116,117,118,119,123,135,138,139,140,141,142,143,144,145,146 **Halagera :** 106	Very deep, lowland calcareous clay soils, 1-3% slopes, non gravelly, moderate erosion	Sorghum, Maize, Bajra	**Fruit crops:** Custard Apple, Amla, Aonla, Ber **Vegetable crops:** Brinjal, Tomato, Chillies, Drumstick, Coriander **Flower crops:** Marigold, Chrysanthemum, Jasmine	Providing proper drainage, addition of organic manures, green leaf manuring, suitable conservation practices
2	37.BLCcB2 38.BLCiB2 155.BLCcB2g1	**Mylapura:**3,117,119,127 **Ramasamudra:**228,229,230,232	Moderately deep, red loamy soils, 1-3% slopes, non gravelly to gravelly, moderate erosion	Maize, Sorghum, Sunflower, Bajra, Finger millet, Groundnut, Red gram, Cowpea, Field bean, Castor, Mulberry	**Fruit crops:** Pomegranate, Guava, Sapota, Jackfruit, Lime, Musambi, Amla, Custard apple, Cashew **Vegetable crops:** Drumstick, Tomato, Bhendi, Chilli, Brinjal, Onion, Curry leaves **Flower crops:** Marigold, Chrysanthemum, Jasmine, Crossandra	Drip irrigation, mulching, suitable soil and water conservation practices (Crescent Bunding with Catch Pit etc)
3	160.HSLcB2g1	**Ashinala:**1,82,83,85,86,87,88,89,90,92,93,94,95, 110,111	Moderately deep, black clay soils, 0-3% slopes, non gravelly to gravelly, moderate erosion	Sunflower, Sorghum, Maize, Soybean, Cotton, Bengal gram, Safflower, Linseed, Bajra	**Fruit crops:** Pomegranate, Lime, Musambi, Tamarind, Jamun, Amla, Custard apple **Vegetables:** Drumstick, Chilli, Bhendi, Cluster bean, Coriander **Flowers:** Marigold, Chrysanthemum	Application of FYM, biofertilizers and micronutrients, drip irrigation, Mulching, suitable soil and water conservation practices

4	160.HSLcB2g1	**Halagera:**108,109,110,111	Moderately shallow, red clay soils, 1-3% slopes, non gravelly to gravelly, moderate erosion	Sorghum, Maize, Bajra, Red gram , Finger millet	**Fruit crops:** Amla, Custard apple **Vegetables:** Tomato, Chilli **Flowers:** Marigold Chrysanthemum	Drip irrigation, mulching, suitable soil and water conservation practices (Crescent Bunding with Catch Pit etc)
5	20.JNKcB2 21.JNKcB2g1 110.JNKhB2	**Ashinala:**33,34,35,36,37,55,57,58 **Mylapura :** 115,4,5,6 **Ramasamudra:**13,222/1,226,227,234,239,240/1,240/2	Moderately shallow, black loamy soils, 1-3% slopes, non gravelly to gravelly, moderate erosion	Sorghum, Bajra, Coriander	**Fruit crops:** Amla, Custard apple **Vegetables**: Coriander, Bhendi **Flowers:** Marigold, Jasmine Chrysanthemum	Application of FYM, biofertilizers and micronutrients, drip irrigation, mulching, suitable soil and water conservation practices
6	11.SBRcB2	**Ashinala:**52,53,54,70,71,72,80,84,91 **Ramasamudra:**217,218,223	Moderately shallow, loamy sand soils, 1-3% slopes, non gravelly, moderate erosion	-	**Agri- silvi- Pasture:** Hybrid napier, *Styloxanthes hamata*, *Styloxanthes scabra*	Use of short duration varieties, sowing across the slope and split application of nitrogenous fertilizers
7	161.HTKbB2g1	**Ashinala:**38,39,40,41,43,44,46,148, 149	Shallow sandy loam soils, 1-3% slopes, non gravelly to gravelly, moderate erosion	-	**Agri-Silvi-Pasture:** Hybrid Napier, *Styloxanthes hamata*, *Styloxanthes scabra*	Use of short duration varieties, sowing across the slope, drip irrigation and mulching is recommended
8	4.BDLhB2 9.VNKcB2 10.VNKiB2	**Ashinala:**120,121,122,124,125,126,127,128,129,130,131,132,133,134,136,137 **Mylapura :** 121 **Ramasamudra:**121,204,205,208,210,211,214,215,219,220,224	Shallow, sandy clay to sandy loam soils, 1-3% slopes, non gravelly, moderate erosion	-	**Agri-Silvi-Pasture:** Hybrid Napier, *Styloxanthes hamata*, *Styloxanthes scabra*	Use of short duration varieties, 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 unfavorable conditions occur

Characteristics of Maskanahalli-2 Microwatershed

- The soil phases identified in the microwatershed belonged to the soil series of SGR series occupies maximum area of 109 ha (16%) followed by JNK 80 ha (12%), VNK 75 ha (11%), SBR 71 ha (11%), HSL 70 ha (10%), BDL 33 ha (5%), YLR 28 ha (4%), HTK 21 ha (3%) and BLC 19 ha (3%).
- As per land capability classification entire area of the microwatershed falls under arable land category (Class II & III). The major limitations identified in the arable lands were soil, erosion and drainage.
- On the basis of soil reaction, about 92 ha (14%) is slightly acid (pH 6.0-6.5), 389 ha (58%) is neutral (pH 6.5-7.3) and 25 ha (4 %) is slightly alkaline (pH 7.3-7.8).

❖ **Soil Health Management**

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

Acid soils

Slightly acidic soils cover about 92 ha area in the microwatershed.

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

Liming materials:

1. $CaCO_3$ (Calcium Carbonate).
2. Dolomite [Ca Mg $(Co_3)_2$]
3. Quick lime (Cao)
4. Slaked lime [Ca $(OH)_2$]

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

Alkaline soils

Slightly alkaline soils cover about 25 ha area in the microwatershed.

1. Regular addition of organic manure, green manuring, green leaf manuring, crop residue incorporation and mulching needs to be taken up to improve the soil organic matter status.
2. Application of biofertilizers (Azospirullum, 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 389 ha area in the microwatershed.

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

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

Soil Degradation

Soil erosion is one of the major factor affecting the soil health in the microwatershed. Entire area of the microwatershed is suffering from moderate erosion. In

these areas of moderate erosion, immediate soil and water conservation and other land development and land husbandry practices are required 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 Plan for each plot or farm.
2. Productivity enhancement measures/ interventions for existing crops/livestock/other farm enterprises.
3. Diversification of farming mainly with perennial horticultural crops and livestock.
4. Improving livelihood opportunities and income generating activities.

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

- **Soil Depth:** The depth of a soil decides the amount of moisture and nutrients it can hold, what crops can be taken up or not, depending on the rooting depth and the length of growing period available for raising any crop. Deeper the soil, better for a wide variety of crops. If sufficient depth is not available for growing deep rooted crops, either choose medium or short duration crops or deeper planting pits need to be opened and additional good quality soil brought from outside has to be filled into the planting pits.
- **Surface Soil Texture:** Lighter soil texture in the top soil means, better rain water infiltration, less run-off and soil moisture conservation, less capillary rise and less evaporation losses. Lighter surface textured soils are amenable to good soil tilth and are highly suitable for crops like groundnut, root vegetables (carrot, raddish, potato etc) but not ideal for crops that need stagnant water like lowland paddy. Heavy textured soils are poor in water infiltration and percolation. They are prone for sheet erosion; such soils can be improved by sand mulching. The technology that is developed by the AICRP-Dryland Agriculture, Vijayapura, Karnataka can be adopted.

- **Gravelliness:** More gravel content is favorable for run-off harvesting but poor in soil moisture storage and nutrient availability. It is a significant parameter that decides the kind of crop to be raised.
- **Land Capability Classification:** The land capability map shows the areas suitable and not suitable for agriculture and the major constraints in each of the plot/survey number. Hence, one can decide what kind of enterprise is possible in each of these units. In general, erosion and soil are the major constraints in Maskanahalli-2 microwatershed.
- **Organic Carbon:** The OC content (an index of available Nitrogen) is medium (0.5-0.75) in 484 ha (72%) and high (>0.75%) in 22 (3%). These medium and low in OC needs to be further improved by applying farmyard manure and rotating crops with cereals and legumes or mixed cropping.
- **Promoting Green Manuring:** Growing of green manuring crops costs Rs. 1250/ha (green manuring seeds) and about Rs. 2000/ha towards cultivation that totals to Rs. 3250/- per ha. On the other hand, application of organic manure @ 10 tons/ha costs Rs. 5000/ha. The practice needs to be continued for 2-3 years or more. Nitrogen fertilizer needs to be supplemented by 25% in addition to the recommended level in 484 ha area where OC is medium (<0.5 - 0.75%). For example, for rainfed maize, recommended level is 50 kg N per ha and an additional 12 kg /ha needs to be applied for all the crops grown in these plots.
- **Available Phosphorus**: Available Phosphorus is low (<23 kg/ha) in 14 ha (2%) of the microwatershed, medium (23-57 kg/ha) in an area of 484 ha (73%) and high (23-57 kg/ha) in an area of 7 ha (1%) In low and medium areas, for all the crops 25% additional P needs to be applied.
- **Available Potassium:** Available potassium is medium (145-337 kg/ha) in an area of 223 ha (33%) of the microwatershed and low (<145 kg/ha) in an area of 283 ha (42%). All the plots, where available potassium is low and medium, for all the crops, additional 25% potassium may be applied.
- **Available Sulphur:** Available sulphur is a very critical nutrient for oilseed crops. It is low in an area of 238 ha (36%) and medium in an area of 267 ha (40%). Low and medium areas 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.
- **Available Boron:** Available boron content of the entire microwatershed area is low (<0.5 ppm). For these areas, application of sodium tetra borate @ 10 kg/ha as soil application or 0.2 % borax as foliar spray is recommended.
- **Available Iron:** Entire area of the microwatershed is sufficient (>4.5 ppm) in available iron content.
- **Available Manganese:** All the soils in the microwatershed are sufficient (>1.0 ppm) in available manganese.

- **Available Copper:** All the soils in the microwatershed are sufficient (>0.2 ppm) in available copper.
- **Available Zinc:** Maximum area of about 434 ha (65%) is deficient (<0.6 ppm) in available zinc content. Application of zinc sulphate @ 25 kg/ha is recommended for these areas. About 72 ha (11%) area is sufficient (>0.6 ppm).
- **Soil Alkalinity**: An area of 25 ha (56%) in the microwatershed has soils that are slightly alkaline. These areas need application of gypsum and wherever calcium is in excess, iron pyrites and element sulphur can be recommended. Management practices like treating repeatedly with good quality water to drain out the excess salts and provision of subsurface drainage and growing of salt tolerant crops like Casuarina, Acacia, Neem, Ber etc, are recommended.

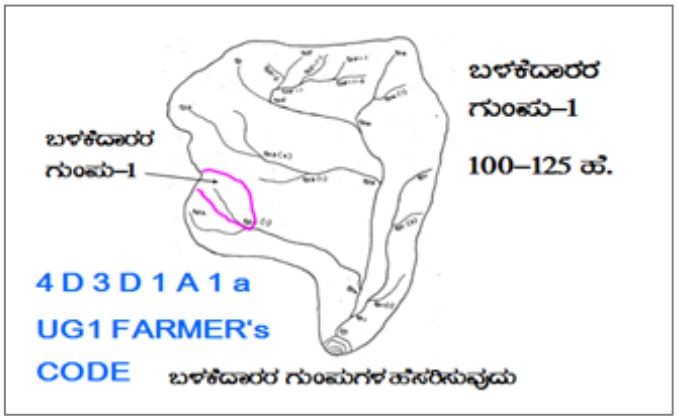
Land Suitability for Various Crops: Areas that are highly, moderately and marginally suitable and not suitable for growing various crops are indicated. Along with the suitability, various constraints that are limiting the productivity are also indicated. For example, in case of cotton, gravel content,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

Chapter 9

SOIL AND WATER CONSERVATION TREATMENT PLAN

For preparing soil and water conservation treatment plan for Maskanahalli-2 microwatershed, the land resource inventory database generated under Sujala-III project has been transformed as information through series of interpretative (thematic) maps using soil phase map as a base. The various thematic maps (1:7920 scale) generated were

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



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

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

Steps for Survey and Preparation of Treatment Plan

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

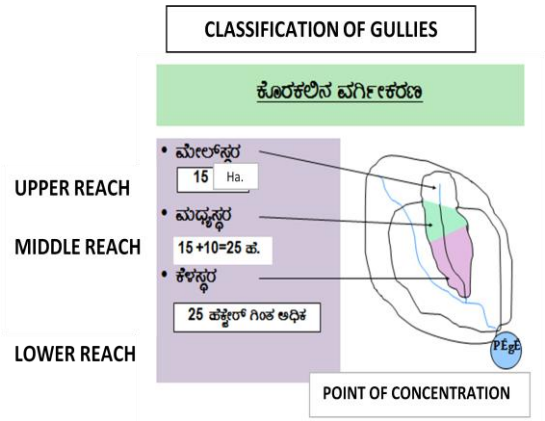
- Naming of user groups and farmers
- Identification of arable and non arable lands
- Identification of drainage lines and gullies
- Identification of non treatable areas
- Identification of priority areas in the arable lands
- Treatment plan for arable lands
- Location of water harvesting and recharge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

9.1 Treatment Plan

The treatment plan recommended for arable lands is briefly described below

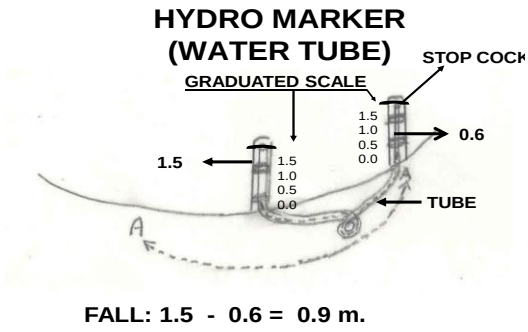
9.1.1 Arable Land Treatment

A. BUNDING

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

Measurement of Land Slope

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



FALL: 1.5 - 0.6 = 0.9 m.

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

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

Note: (i) The above intervals are maximum.

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

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

Section of the Bund

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

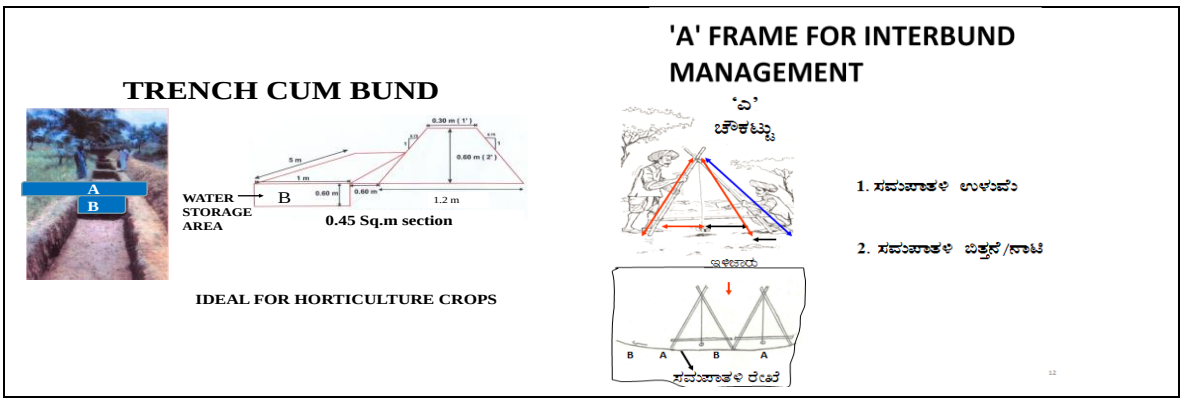
Recommended Bund Section

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

Formation of Trench cum Bund

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

Details of Borrow Pit dimensions are given below:



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

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

B. Water Ways

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

C. Farm Ponds

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

D. Diversion Channel

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

9.1.2 Non-Arable Land Treatment

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

9.1.3 Treatment of Natural Water Course/ Drainage Lines

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

9.2 Recommended Soil and Water Conservation Measures

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

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

A map (Fig. 9.1) showing soil and water conservation plan with different kinds of structures recommended has been prepared which shows the spatial distribution and extent of area. An area of about 122 ha (18%) needs Trench Cum Bunding and a maximum area of about 383 ha (57%) needs Graded Bunding. The conservation plan prepared may be presented to all the stakeholders including farmers and after considering their suggestions, the conservation plan for the microwatershed may be finalised in a participatory approach.

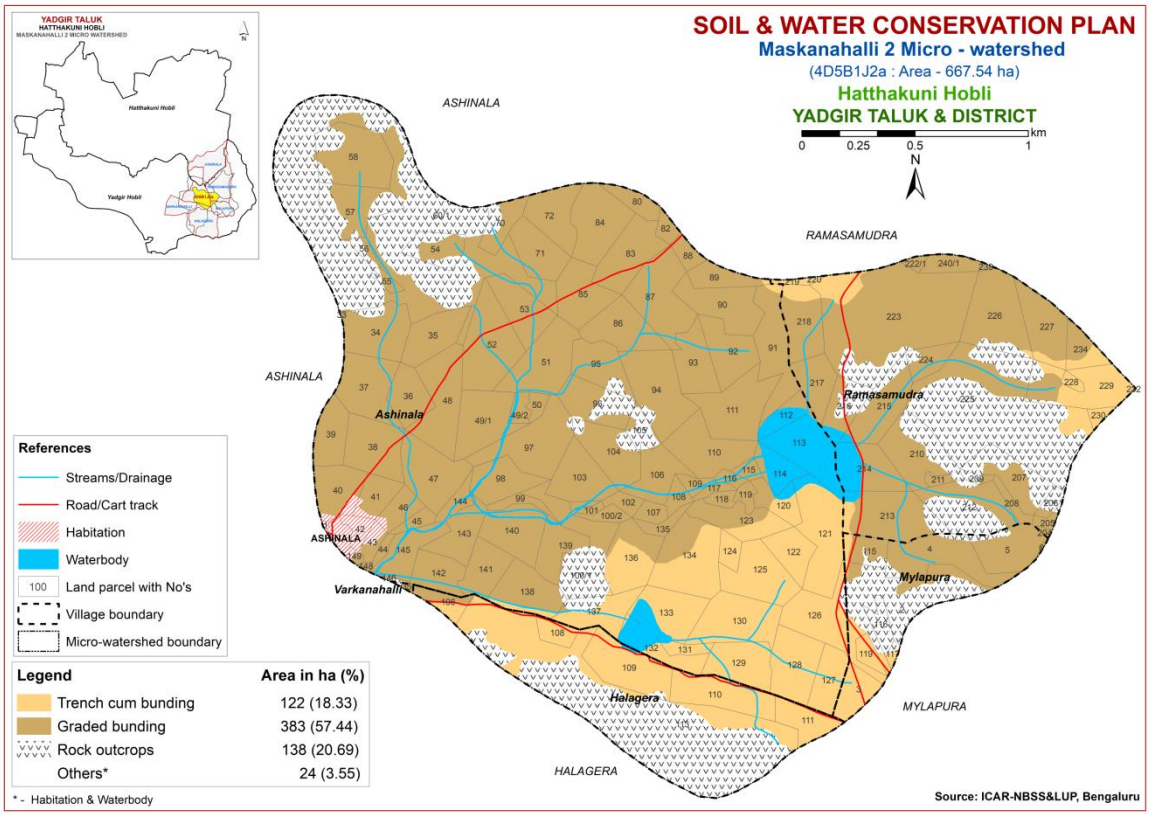


Fig. 9.1 Soil and Water Conservation Plan map of Maskanahalli-2 Microwatershed

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

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

Maskanahalli-2 (1J2a) 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
Ashinala	1	0.11	Habitation	Others	Others	Others	Others	Others	Others	Others	Redgram (Rg)	Not Available	Others	Others
Ashinala	33	0.05	JNKcB2	LMU-5	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram (Gg)	Not Available	IIes	Graded bunding
Ashinala	34	6.24	JNKcB2	LMU-5	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut+Paddy (Gn+Pd)	Not Available	IIes	Graded bunding
Ashinala	35	4.52	JNKcB2	LMU-5	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Bajra+Groundnut (Bj+Gn)	Not Available	IIes	Graded bunding
Ashinala	36	3.65	JNKcB2	LMU-5	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram (Gg)	Not Available	IIes	Graded bunding
Ashinala	37	6.38	JNKcB2	LMU-5	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	Graded bunding
Ashinala	38	5.98	HTKbB2g1	LMU-7	Shallow (25-50 cm)	Loamy sand	Gravelly (15-35%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	1 Borewell	IIIes	Graded bunding
Ashinala	39	3.74	HTKbB2g1	LMU-7	Shallow (25-50 cm)	Loamy sand	Gravelly (15-35%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIIes	Graded bunding
Ashinala	40	4.42	HTKbB2g1	LMU-7	Shallow (25-50 cm)	Loamy sand	Gravelly (15-35%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIIes	Graded bunding
Ashinala	41	2.66	HTKbB2g1	LMU-7	Shallow (25-50 cm)	Loamy sand	Gravelly (15-35%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIIes	Graded bunding
Ashinala	42	1.26	Habitation	Others	Others	Others	Others	Others	Others	Others	SETTLEMENT	Not Available	Others	Others
Ashinala	43	1.17	HTKbB2g1	LMU-7	Shallow (25-50 cm)	Loamy sand	Gravelly (15-35%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	SETTLEMENT	Not Available	IIIes	Graded bunding
Ashinala	44	0.57	HTKbB2g1	LMU-7	Shallow (25-50 cm)	Loamy sand	Gravelly (15-35%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIIes	Graded bunding
Ashinala	45	1.05	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIws	Graded bunding
Ashinala	46	2.2	HTKbB2g1	LMU-7	Shallow (25-50 cm)	Loamy sand	Gravelly (15-35%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIIes	Graded bunding
Ashinala	47	6.46	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram (Gg)	Not Available	IIws	Graded bunding
Ashinala	48	7.43	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram+Groundnut +Paddy (Gg+Gn+Pd)	Not Available	IIws	Graded bunding
Ashinala	49/1	6.14	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut (Gn)	Not Available	IIws	Graded bunding
Ashinala	49/2	1.06	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram (Gg)	Not Available	IIws	Graded bunding
Ashinala	50	0.84	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram (Gg)	Not Available	IIws	Graded bunding
Ashinala	51	6.98	HSLcB2g1	LMU-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram (Gg)	Not Available	IIes	Graded bunding
Ashinala	52	8.32	SBRcB2	LMU-6	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram (Gg)	1 Borewell	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
Ashinala	53	4.71	SBRcB2	LMU-6	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram (Gg)	1 Borewell	IIes	Graded bunding
Ashinala	54	3.27	SBRcB2	LMU-6	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Ro	Not Available	IIes	Graded bunding
Ashinala	55	0.74	JNKcB2	LMU-5	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	Graded bunding
Ashinala	56	0.84	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Redgram (Rg)	Not Available	Ro	Ro
Ashinala	57	5.92	JNKcB2	LMU-5	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	Graded bunding
Ashinala	58	8.17	JNKcB2	LMU-5	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	Graded bunding
Ashinala	60/1	47.34	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Not Available	Ro	Ro
Ashinala	70	2.87	SBRcB2	LMU-6	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
Ashinala	71	4.4	SBRcB2	LMU-6	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	1 Borewell	IIes	Graded bunding
Ashinala	72	4.7	SBRcB2	LMU-6	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram (Gg)	Not Available	IIes	Graded bunding
Ashinala	80	1.87	SBRcB2	LMU-6	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram (Gg)	Not Available	IIes	Graded bunding
Ashinala	82	0.97	HSLcB2g1	LMU-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram (Gg)	Not Available	IIes	Graded bunding
Ashinala	83	5.81	HSLcB2g1	LMU-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram (Gg)	1 Borewell	IIes	Graded bunding
Ashinala	84	6.6	SBRcB2	LMU-6	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram (Gg)	Not Available	IIes	Graded bunding
Ashinala	85	5.2	HSLcB2g1	LMU-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Ashinala	86	5.34	HSLcB2g1	LMU-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIes	Graded bunding
Ashinala	87	7.69	HSLcB2g1	LMU-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Bajra+Greengram (Bj+Gg)	1 Borewell	IIes	Graded bunding
Ashinala	88	1.25	HSLcB2g1	LMU-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram (Gg)	Not Available	IIes	Graded bunding
Ashinala	89	2.6	HSLcB2g1	LMU-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram (Gg)	Not Available	IIes	Graded bunding
Ashinala	90	5.7	HSLcB2g1	LMU-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram+Ro (Gg+Rc)	Not Available	IIes	Graded bunding
Ashinala	91	6.61	SBRcB2	LMU-6	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
Ashinala	92	4.79	HSLcB2g1	LMU-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIes	Graded bunding
Ashinala	93	4.49	HSLcB2g1	LMU-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram (Gg)	Not Available	IIes	Graded bunding
Ashinala	94	7.98	HSLcB2g1	LMU-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram (Gg)	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
Ashinala	95	4.51	HSLcB2g1	LMU-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut+Paddy (Gn+Pd)	2 Borewell	IIes	Graded bunding
Ashinala	96	5	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram (Gg)	Not Available	IIws	Graded bunding
Ashinala	97	7.83	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram+Redgram (Gg+Rg)	Not Available	IIws	Graded bunding
Ashinala	98	4.22	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut (Gn)	Not Available	IIws	Graded bunding
Ashinala	99	1.08	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut (Gn)	Not Available	IIws	Graded bunding
Ashinala	100/1	7.57	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Not Available	Ro	Ro
Ashinala	100/2	1.42	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIws	Graded bunding
Ashinala	101	0.4	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIws	Graded bunding
Ashinala	102	1.1	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIws	Graded bunding
Ashinala	103	5.11	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram+Groundnut (Gg)	Not Available	IIws	Graded bunding
Ashinala	104	5.48	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram (Gg)	Not Available	IIws	Graded bunding
Ashinala	105	1.7	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Greengram (Gg)	Not Available	Ro	Ro
Ashinala	106	4.17	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram+Paddy (Gg+Pd)	Not Available	IIws	Graded bunding
Ashinala	107	1.11	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIws	Graded bunding
Ashinala	108	1.15	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIws	Graded bunding
Ashinala	109	0.91	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIws	Graded bunding
Ashinala	110	6.31	HSLcB2g1	LMU-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram (Gg)	Not Available	IIes	Graded bunding
Ashinala	111	7.27	HSLcB2g1	LMU-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Ashinala	112	2.1	Waterbody	Others	Others	Others	Others	Others	Others	Others	Waterbody	Not Available	Others	Others
Ashinala	113	6.16	Waterbody	Others	Others	Others	Others	Others	Others	Others	Waterbody	Not Available	Others	Others
Ashinala	114	2.65	Waterbody	Others	Others	Others	Others	Others	Others	Others	Waterbody	Not Available	Others	Others
Ashinala	115	0.8	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIws	Graded bunding
Ashinala	116	0.68	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIws	Graded bunding
Ashinala	117	0.65	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIws	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
Ashinala	118	0.8	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIws	Graded bunding
Ashinala	119	0.87	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIws	Graded bunding
Ashinala	120	2.61	VNKiB2	LMU-8	Shallow (25-50 cm)	Sandy clay	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram+Ro (Rg+Rc)	Not Available	IIIes	Trench cum bunding
Ashinala	121	8.2	VNKiB2	LMU-8	Shallow (25-50 cm)	Sandy clay	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram (Gg)	Not Available	IIIes	Trench cum bunding
Ashinala	122	3.29	VNKiB2	LMU-8	Shallow (25-50 cm)	Sandy clay	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram (Gg)	Not Available	IIIes	Trench cum bunding
Ashinala	123	4.61	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIws	Graded bunding
Ashinala	124	1.33	VNKiB2	LMU-8	Shallow (25-50 cm)	Sandy clay	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram (Gg)	Not Available	IIIes	Trench cum bunding
Ashinala	125	6.27	VNKiB2	LMU-8	Shallow (25-50 cm)	Sandy clay	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram (Gg)	Not Available	IIIes	Trench cum bunding
Ashinala	126	6.12	VNKiB2	LMU-8	Shallow (25-50 cm)	Sandy clay	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram (Gg)	Not Available	IIIes	Trench cum bunding
Ashinala	127	3.52	VNKiB2	LMU-8	Shallow (25-50 cm)	Sandy clay	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram (Gg)	Not Available	IIIes	Trench cum bunding
Ashinala	128	6.02	VNKiB2	LMU-8	Shallow (25-50 cm)	Sandy clay	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram (Gg)	Not Available	IIIes	Trench cum bunding
Ashinala	129	5.09	VNKiB2	LMU-8	Shallow (25-50 cm)	Sandy clay	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram (Gg)	Not Available	IIIes	Trench cum bunding
Ashinala	130	7.11	VNKiB2	LMU-8	Shallow (25-50 cm)	Sandy clay	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram (Gg)	Not Available	IIIes	Trench cum bunding
Ashinala	131	1.14	VNKiB2	LMU-8	Shallow (25-50 cm)	Sandy clay	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram (Gg)	Not Available	IIIes	Trench cum bunding
Ashinala	132	3.56	VNKiB2	LMU-8	Shallow (25-50 cm)	Sandy clay	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram (Gg)	Not Available	IIIes	Trench cum bunding
Ashinala	133	5.79	VNKiB2	LMU-8	Shallow (25-50 cm)	Sandy clay	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram+Paddy (Gg+Pd)	Not Available	IIIes	Trench cum bunding
Ashinala	134	8.67	VNKiB2	LMU-8	Shallow (25-50 cm)	Sandy clay	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram+Paddy (Gg+Pd)	Not Available	IIIes	Trench cum bunding
Ashinala	135	1.19	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIws	Graded bunding
Ashinala	136	5.91	VNKiB2	LMU-8	Shallow (25-50 cm)	Sandy clay	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy+Redgram (Pd+Rg)	Not Available	IIIes	Trench cum bunding
Ashinala	137	4.62	VNKiB2	LMU-8	Shallow (25-50 cm)	Sandy clay	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIIes	Trench cum bunding
Ashinala	138	5.4	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut+Redgram (Gn+Rg)	Not Available	IIws	Graded bunding
Ashinala	139	3.76	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIws	Graded bunding
Ashinala	140	5.54	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIws	Graded bunding
Ashinala	141	3.83	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut+Redgram (Gn+Rg)	Not Available	IIws	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
Ashinala	142	3.48	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIws	Graded bunding
Ashinala	143	3.95	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIws	Graded bunding
Ashinala	144	1.42	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIws	Graded bunding
Ashinala	145	3.81	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIws	Graded bunding
Ashinala	146	0.32	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIws	Graded bunding
Ashinala	148	0.17	HTKbB2g1	LMU-7	Shallow (25-50 cm)	Loamy sand	Gravelly (15-35%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIIes	Graded bunding
Ashinala	149	0.42	HTKbB2g1	LMU-7	Shallow (25-50 cm)	Loamy sand	Gravelly (15-35%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	SETTLEMENT	Not Available	IIIes	Graded bunding
Halagera	106	1.95	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIws	Graded bunding
Halagera	108	1.66	YLRcB2g1	LMU-4	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Trench cum bunding
Halagera	109	6.86	YLRcB2g1	LMU-4	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Trench cum bunding
Halagera	110	6.07	YLRcB2g1	LMU-4	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Trench cum bunding
Halagera	111	3.33	YLRcB2g1	LMU-4	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	Not Available	IIes	Trench cum bunding
Halagera	113	43.14	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Not Available	Ro	Ro
Mylapura	2	13.35	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Not Available	Ro	Ro
Mylapura	3	3.02	BLCiB2	LMU-2	Moderately deep (75-100 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Trench cum bunding
Mylapura	4	7.1	JNKcB2g1	LMU-5	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Mylapura	5	5.22	JNKcB2g1	LMU-5	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Mylapura	6	0.07	JNKcB2g1	LMU-5	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram (Gg)	Not Available	IIes	Graded bunding
Mylapura	115	1.96	JNKcB2g1	LMU-5	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Mylapura	116	1.64	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Redgram (Rg)	Not Available	Ro	Ro
Mylapura	117	0.41	BLCiB2	LMU-2	Moderately deep (75-100 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Trench cum bunding
Mylapura	119	1.25	BLCiB2	LMU-2	Moderately deep (75-100 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Trench cum bunding
Ramasamudra	204	0.17	BDLhB2	LMU-8	Shallow (25-50 cm)	Sandy clay loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIIes	Graded bunding
Ramasamudra	205	0.63	BDLhB2	LMU-8	Shallow (25-50 cm)	Sandy clay loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram (Gg)	Not Available	IIIes	Graded bunding

Village	Survey No	Area (ha)	Soil Phase	LMU	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	Wells	Land Capability	Conservation Plan
Ramasamudra	206	0.9	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Greengram (Gg)	Not Available	Ro	Ro
Ramasamudra	207	5.27	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Greengram (Gg)	Not Available	Ro	Ro
Ramasamudra	208	0.94	BDLhB2	LMU-8	Shallow (25-50 cm)	Sandy clay loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram (Gg)	Not Available	IIIes	Graded bunding
Ramasamudra	209	0.53	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Greengram (Gg)	Not Available	Ro	Ro
Ramasamudra	210	6.9	BDLhB2	LMU-8	Shallow (25-50 cm)	Sandy clay loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut (Gn)	Not Available	IIIes	Graded bunding
Ramasamudra	211	0.52	BDLhB2	LMU-8	Shallow (25-50 cm)	Sandy clay loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut (Gn)	Not Available	IIIes	Graded bunding
Ramasamudra	212	7.57	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Greengram (Gg)	Not Available	Ro	Ro
Ramasamudra	213	8.16	JNKcB2g1	LMU-5	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram (Gg)	Not Available	IIes	Graded bunding
Ramasamudra	214	5.38	BDLhB2	LMU-8	Shallow (25-50 cm)	Sandy clay loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram (Gg)	Not Available	IIIes	Graded bunding
Ramasamudra	215	5.83	BDLhB2	LMU-8	Shallow (25-50 cm)	Sandy clay loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIIes	Graded bunding
Ramasamudra	216	3.58	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Groundnut+Paddy (Gn+Pd)	Not Available	Ro	Ro
Ramasamudra	217	3.61	SBRcB2	LMU-6	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut (Gn)	Not Available	IIes	Graded bunding
Ramasamudra	218	5.37	SBRcB2	LMU-6	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram+Groundnut (Gg+Gn)	Not Available	IIes	Graded bunding
Ramasamudra	219	0.39	VNKcB2	LMU-8	Shallow (25-50 cm)	Sandy loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIIes	Trench cum bunding
Ramasamudra	220	0.14	VNKcB2	LMU-8	Shallow (25-50 cm)	Sandy loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIIes	Trench cum bunding
Ramasamudra	222/1	0.49	JNKhB2	LMU-5	Moderately shallow (50-75 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
Ramasamudra	223	26.18	SBRcB2	LMU-6	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram+Groundnut +Redgram (Gg+Gn+Rg)	Not Available	IIes	Graded bunding
Ramasamudra	224	2.29	BDLhB2	LMU-8	Shallow (25-50 cm)	Sandy clay loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut (Gn)	Not Available	IIIes	Graded bunding
Ramasamudra	225	28.77	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Not Available (NA)	Not Available	Ro	Ro
Ramasamudra	226	8.3	JNKhB2	LMU-5	Moderately shallow (50-75 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Banana+Ragi (Ba+Ra)	Not Available	IIes	Graded bunding
Ramasamudra	227	5.39	JNKhB2	LMU-5	Moderately shallow (50-75 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Banana (Ba)	Not Available	IIes	Graded bunding
Ramasamudra	228	0.52	BLCcB2	LMU-2	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram (Gg)	Not Available	IIes	Trench cum bunding
Ramasamudra	229	7.06	BLCcB2	LMU-2	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut+Redgram (Gn+Rg)	Not Available	IIes	Trench cum bunding
Ramasamudra	230	0.62	BLCcB2g1	LMU-2	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Trench cum 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
Ramasamudra	232	0.02	BLCcB2	LMU-2	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Trench cum bunding
Ramasamudra	234	2.47	JNKhB2	LMU-5	Moderately shallow (50-75 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram+Redgram (Gg+Rg)	Not Available	IIes	Graded bunding
Ramasamudra	239	0.15	JNKhB2	LMU-5	Moderately shallow (50-75 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Banana (Ba)	Not Available	IIes	Graded bunding
Ramasamudra	240/1	1.79	JNKhB2	LMU-5	Moderately shallow (50-75 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
Ramasamudra	240/2	0	JNKhB2	LMU-5	Moderately shallow (50-75 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Banana (Ba)	Not Available	IIes	Graded bunding
Varkanahalli	35	0.19	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIws	Graded bunding

Ro-Rock outcrops

Appendix II

Maskanhalli-2 (1J2a) Microwatershed

Soil Fertility Information

Village	Survey Number	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Ashinala	1	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Ashinala	33	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)
Ashinala	34	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)
Ashinala	35	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)
Ashinala	36	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)
Ashinala	37	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)
Ashinala	38	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)
Ashinala	39	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)
Ashinala	40	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Ashinala	41	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Ashinala	42	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Ashinala	43	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Ashinala	44	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Ashinala	45	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Ashinala	46	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Ashinala	47	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)
Ashinala	48	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)
Ashinala	49/1	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)
Ashinala	49/2	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)
Ashinala	50	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Ashinala	51	Neutral (pH 6.5 – 7.3)	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)
Ashinala	52	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)
Ashinala	53	Neutral (pH 6.5 – 7.3)	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)

Village	Survey Number	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Ashinala	54	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)
Ashinala	55	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)
Ashinala	56	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro
Ashinala	57	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)
Ashinala	58	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)
Ashinala	60/1	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro
Ashinala	70	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 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)
Ashinala	71	Neutral (pH 6.5 – 7.3)	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)
Ashinala	72	Neutral (pH 6.5 – 7.3)	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)
Ashinala	80	Neutral (pH 6.5 – 7.3)	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)
Ashinala	82	Neutral (pH 6.5 – 7.3)	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)
Ashinala	83	Neutral (pH 6.5 – 7.3)	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)
Ashinala	84	Neutral (pH 6.5 – 7.3)	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)
Ashinala	85	Neutral (pH 6.5 – 7.3)	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)
Ashinala	86	Neutral (pH 6.5 – 7.3)	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)
Ashinala	87	Neutral (pH 6.5 – 7.3)	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)
Ashinala	88	Neutral (pH 6.5 – 7.3)	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)
Ashinala	89	Neutral (pH 6.5 – 7.3)	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)
Ashinala	90	Neutral (pH 6.5 – 7.3)	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)
Ashinala	91	Neutral (pH 6.5 – 7.3)	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)
Ashinala	92	Neutral (pH 6.5 – 7.3)	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)
Ashinala	93	Neutral (pH 6.5 – 7.3)	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)
Ashinala	94	Neutral (pH 6.5 – 7.3)	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)
Ashinala	95	Neutral (pH 6.5 – 7.3)	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)
Ashinala	96	Neutral (pH 6.5 – 7.3)	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)

Village	Survey Number	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Ashinala	97	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)
Ashinala	98	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)
Ashinala	99	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)
Ashinala	100/1	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro
Ashinala	100/2	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)
Ashinala	101	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)
Ashinala	102	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)
Ashinala	103	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)
Ashinala	104	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Ashinala	105	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro
Ashinala	106	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Ashinala	107	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)
Ashinala	108	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)
Ashinala	109	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Ashinala	110	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Ashinala	111	Neutral (pH 6.5 – 7.3)	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)
Ashinala	112	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Ashinala	113	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Ashinala	114	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Ashinala	115	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Ashinala	116	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Ashinala	117	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Ashinala	118	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Ashinala	119	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Ashinala	120	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)

Village	Survey Number	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Ashinala	121	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Ashinala	122	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Ashinala	123	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Ashinala	124	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Ashinala	125	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Ashinala	126	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Ashinala	127	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Ashinala	128	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Ashinala	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)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Ashinala	130	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Ashinala	131	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)
Ashinala	132	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)
Ashinala	133	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)
Ashinala	134	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)
Ashinala	135	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)
Ashinala	136	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)
Ashinala	137	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)
Ashinala	138	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)
Ashinala	139	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)
Ashinala	140	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)
Ashinala	141	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)
Ashinala	142	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Ashinala	143	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)
Ashinala	144	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)

Village	Survey Number	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Ashinala	145	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Ashinala	146	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Ashinala	148	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Ashinala	149	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Halagera	106	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Halagera	108	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)
Halagera	109	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)
Halagera	110	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)
Halagera	111	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Halagera	113	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro
Mylapura	2	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro
Mylapura	3	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Mylapura	4	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)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Mylapura	5	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 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)
Mylapura	6	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (> 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)
Mylapura	115	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Mylapura	116	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro
Mylapura	117	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)
Mylapura	119	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Ramasamudra	204	Slightly acid (pH 6.0 – 6.5)	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)
Ramasamudra	205	Slightly acid (pH 6.0 – 6.5)	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)
Ramasamudra	206	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro
Ramasamudra	207	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro
Ramasamudra	208	Slightly acid (pH 6.0 – 6.5)	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)
Ramasa	209	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro

Village	Survey Number	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
mudra												
Ramasa mudra	210	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Ramasa mudra	211	Slightly acid (pH 6.0 – 6.5)	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)	Sufficient (> 0.6 ppm)
Ramasa mudra	212	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro
Ramasa mudra	213	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Ramasa mudra	214	Neutral (pH 6.5 – 7.3)	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)
Ramasa mudra	215	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Ramasa mudra	216	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro
Ramasa mudra	217	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Ramasa mudra	218	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Ramasa mudra	219	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Ramasa mudra	220	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Ramasa mudra	222/1	Slightly acid (pH 6.0 – 6.5)	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)	Sufficient (> 0.6 ppm)
Ramasa mudra	223	Slightly acid (pH 6.0 – 6.5)	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)	Sufficient (> 0.6 ppm)
Ramasa mudra	224	Slightly acid (pH 6.0 – 6.5)	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)	Sufficient (> 0.6 ppm)
Ramasa mudra	225	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro
Ramasa mudra	226	Slightly acid (pH 6.0 – 6.5)	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)	Sufficient (> 0.6 ppm)
Ramasa mudra	227	Slightly acid (pH 6.0 – 6.5)	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)	Sufficient (> 0.6 ppm)
Ramasa mudra	228	Slightly acid (pH 6.0 – 6.5)	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)
Ramasa mudra	229	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	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)	Sufficient (> 0.6 ppm)
Ramasa mudra	230	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	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)
Ramasa mudra	232	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	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)	Sufficient (> 0.6 ppm)
Ramasa mudra	234	Slightly acid (pH 6.0 – 6.5)	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)	Sufficient (> 0.6 ppm)
Ramasa mudra	239	Slightly acid (pH 6.0 – 6.5)	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)	Sufficient (> 0.6 ppm)

Village	Survey Number	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Ramasa mudra	240/1	Slightly acid (pH 6.0 – 6.5)	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)	Sufficient (> 0.6 ppm)
Ramasa mudra	240/2	Slightly acid (pH 6.0 – 6.5)	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)	Sufficient (> 0.6 ppm)
Varkana halli	35	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)

Appendix III

Maskanhalli-2 (1J2a) Microwatershed

Soil Suitability Information

Village	Survey Number	Mango	Maize	Sapota	Sorghum	Guava	Cotton	Tamarind	Lime	Bengal gram	Sunflower	Red gram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Onion	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Brinjal	Bhendi	Drumstick	Mulberry
Ashinala	1	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Ashinala	33	N1r	S2t	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	N1rt	S3r	S3r	S3t	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r
Ashinala	34	N1r	S2t	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	N1rt	S3r	S3r	S3t	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r
Ashinala	35	N1r	S2t	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	N1rt	S3r	S3r	S3t	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r
Ashinala	36	N1r	S2t	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	N1rt	S3r	S3r	S3t	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r
Ashinala	37	N1r	S2t	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	N1rt	S3r	S3r	S3t	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r
Ashinala	38	N1r	S3rt	N1r	S3rt	N1r	N1t	N1r	N1r	N1t	N1r	N1r	S3rt	N1r	S3rt	N1rt	N1r	N1r	S3rt	S3r	S3rt	S3rt	S3r	S3r	N1r	S3rt	S3rt	S3r	N1r	N1r
Ashinala	39	N1r	S3rt	N1r	S3rt	N1r	N1t	N1r	N1r	N1t	N1r	N1r	S3rt	N1r	S3rt	N1rt	N1r	N1r	S3rt	S3r	S3rt	S3rt	S3r	S3r	N1r	S3rt	S3rt	S3r	N1r	N1r
Ashinala	40	N1r	S3rt	N1r	S3rt	N1r	N1t	N1r	N1r	N1t	N1r	N1r	S3rt	N1r	S3rt	N1rt	N1r	N1r	S3rt	S3r	S3rt	S3rt	S3r	S3r	N1r	S3rt	S3rt	S3r	N1r	N1r
Ashinala	41	N1r	S3rt	N1r	S3rt	N1r	N1t	N1r	N1r	N1t	N1r	N1r	S3rt	N1r	S3rt	N1rt	N1r	N1r	S3rt	S3r	S3rt	S3rt	S3r	S3r	N1r	S3rt	S3rt	S3r	N1r	N1r
Ashinala	42	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Ashinala	43	N1r	S3rt	N1r	S3rt	N1r	N1t	N1r	N1r	N1t	N1r	N1r	S3rt	N1r	S3rt	N1rt	N1r	N1r	S3rt	S3r	S3rt	S3rt	S3r	S3r	N1r	S3rt	S3rt	S3r	N1r	N1r
Ashinala	44	N1r	S3rt	N1r	S3rt	N1r	N1t	N1r	N1r	N1t	N1r	N1r	S3rt	N1r	S3rt	N1rt	N1r	N1r	S3rt	S3r	S3rt	S3rt	S3r	S3r	N1r	S3rt	S3rt	S3r	N1r	N1r
Ashinala	45	S3tw	S2tw	S3tw	S1	S3tw	S1	S2tw	S2w	S1	S1	S3tw	S1	S3tw	S1	N1tw	S2tw	S2w	S3tw	S2t	S2tw	S3tw	S2tw	S2tw	S2tw	S2t	S2t	S2t	S2tw	S3tw
Ashinala	46	N1r	S3rt	N1r	S3rt	N1r	N1t	N1r	N1r	N1t	N1r	N1r	S3rt	N1r	S3rt	N1rt	N1r	N1r	S3rt	S3r	S3rt	S3rt	S3r	S3r	N1r	S3rt	S3rt	S3r	N1r	N1r
Ashinala	47	S3tw	S2tw	S3tw	S1	S3tw	S1	S2tw	S2w	S1	S1	S3tw	S1	S3tw	S1	N1tw	S2tw	S2w	S3tw	S2t	S2tw	S3tw	S2tw	S2tw	S2tw	S2t	S2t	S2t	S2tw	S3tw
Ashinala	48	S3tw	S2tw	S3tw	S1	S3tw	S1	S2tw	S2w	S1	S1	S3tw	S1	S3tw	S1	N1tw	S2tw	S2w	S3tw	S2t	S2tw	S3tw	S2tw	S2tw	S2tw	S2t	S2t	S2t	S2tw	S3tw
Ashinala	49/1	S3tw	S2tw	S3tw	S1	S3tw	S1	S2tw	S2w	S1	S1	S3tw	S1	S3tw	S1	N1tw	S2tw	S2w	S3tw	S2t	S2tw	S3tw	S2tw	S2tw	S2tw	S2t	S2t	S2t	S2tw	S3tw
Ashinala	49/2	S3tw	S2tw	S3tw	S1	S3tw	S1	S2tw	S2w	S1	S1	S3tw	S1	S3tw	S1	N1tw	S2tw	S2w	S3tw	S2t	S2tw	S3tw	S2tw	S2tw	S2tw	S2t	S2t	S2t	S2tw	S3tw
Ashinala	50	S3tw	S2tw	S3tw	S1	S3tw	S1	S2tw	S2w	S1	S1	S3tw	S1	S3tw	S1	N1tw	S2tw	S2w	S3tw	S2t	S2tw	S3tw	S2tw	S2tw	S2tw	S2t	S2t	S2t	S2tw	S3tw
Ashinala	51	S3rz	S2tz	S2rz	S2tz	S2rz	S3tz	S3rz	S2rz	S3tz	S2rz	S2rz	S2tz	S2rz	S1	N1tz	S3rz	S2rz	S2z	S1	S2z	S2z	S2z	S2z	S2rz	S2z	S2t	S1	S2rz	S2rz
Ashinala	52	N1r	S3t	S3rt	S3t	S3rt	N1t	N1r	S3rt	N1t	S3t	S3t	S3t	S3rt	S3t	S3rt	S3rt	S3rt	S3t	S3t	S3t	S3t	S3t	S3t	S3rt	S3t	S3t	S3t	S3t	S3t
Ashinala	53	N1r	S3t	S3rt	S3t	S3rt	N1t	N1r	S3rt	N1t	S3t	S3t	S3t	S3rt	S3t	S3rt	S3rt	S3rt	S3t	S3t	S3t	S3t	S3t	S3t	S3rt	S3t	S3t	S3t	S3t	S3t
Ashinala	54	N1r	S3t	S3rt	S3t	S3rt	N1t	N1r	S3rt	N1t	S3t	S3t	S3t	S3rt	S3t	S3rt	S3rt	S3rt	S3t	S3t	S3t	S3t	S3t	S3t	S3rt	S3t	S3t	S3t	S3t	S3t

Village	Survey Number	Mango	Maize	Sapota	Sorghum	Guava	Cotton	Tamarind	Lime	Bengal gram	Sunflower	Red gram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Onion	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Brinjal	Bhendi	Drumstick	Mulberry
Ashinala	55	N1r	S2t	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	N1rt	S3r	S3r	S3t	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r
Ashinala	56	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro
Ashinala	57	N1r	S2t	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	N1rt	S3r	S3r	S3t	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r
Ashinala	58	N1r	S2t	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	N1rt	S3r	S3r	S3t	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r
Ashinala	60/1	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro
Ashinala	70	N1r	S3t	S3rt	S3t	S3rt	N1t	N1r	S3rt	N1t	S3t	S3t	S3t	S3rt	S3t	S3rt	S3rt	S3rt	S3t	S3t	S3t	S3t	S3t	S3t	S3rt	S3t	S3t	S3t	S3t	S3t
Ashinala	71	N1r	S3t	S3rt	S3t	S3rt	N1t	N1r	S3rt	N1t	S3t	S3t	S3t	S3rt	S3t	S3rt	S3rt	S3rt	S3t	S3t	S3t	S3t	S3t	S3t	S3rt	S3t	S3t	S3t	S3t	S3t
Ashinala	72	N1r	S3t	S3rt	S3t	S3rt	N1t	N1r	S3rt	N1t	S3t	S3t	S3t	S3rt	S3t	S3rt	S3rt	S3rt	S3t	S3t	S3t	S3t	S3t	S3t	S3rt	S3t	S3t	S3t	S3t	S3t
Ashinala	80	N1r	S3t	S3rt	S3t	S3rt	N1t	N1r	S3rt	N1t	S3t	S3t	S3t	S3rt	S3t	S3rt	S3rt	S3rt	S3t	S3t	S3t	S3t	S3t	S3t	S3rt	S3t	S3t	S3t	S3t	S3t
Ashinala	82	S3rz	S2tz	S2rz	S2tz	S2rz	S3tz	S3rz	S2rz	S3tz	S2rz	S2rz	S2tz	S2rz	S1	N1tz	S3rz	S2rz	S2z	S1	S2z	S2z	S2z	S2z	S2rz	S2z	S2t	S1	S2rz	S2rz
Ashinala	83	S3rz	S2tz	S2rz	S2tz	S2rz	S3tz	S3rz	S2rz	S3tz	S2rz	S2rz	S2tz	S2rz	S1	N1tz	S3rz	S2rz	S2z	S1	S2z	S2z	S2z	S2z	S2rz	S2z	S2t	S1	S2rz	S2rz
Ashinala	84	N1r	S3t	S3rt	S3t	S3rt	N1t	N1r	S3rt	N1t	S3t	S3t	S3t	S3rt	S3t	S3rt	S3rt	S3rt	S3t	S3t	S3t	S3t	S3t	S3t	S3rt	S3t	S3t	S3t	S3t	S3t
Ashinala	85	S3rz	S2tz	S2rz	S2tz	S2rz	S3tz	S3rz	S2rz	S3tz	S2rz	S2rz	S2tz	S2rz	S1	N1tz	S3rz	S2rz	S2z	S1	S2z	S2z	S2z	S2z	S2rz	S2z	S2t	S1	S2rz	S2rz
Ashinala	86	S3rz	S2tz	S2rz	S2tz	S2rz	S3tz	S3rz	S2rz	S3tz	S2rz	S2rz	S2tz	S2rz	S1	N1tz	S3rz	S2rz	S2z	S1	S2z	S2z	S2z	S2z	S2rz	S2z	S2t	S1	S2rz	S2rz
Ashinala	87	S3rz	S2tz	S2rz	S2tz	S2rz	S3tz	S3rz	S2rz	S3tz	S2rz	S2rz	S2tz	S2rz	S1	N1tz	S3rz	S2rz	S2z	S1	S2z	S2z	S2z	S2z	S2rz	S2z	S2t	S1	S2rz	S2rz
Ashinala	88	S3rz	S2tz	S2rz	S2tz	S2rz	S3tz	S3rz	S2rz	S3tz	S2rz	S2rz	S2tz	S2rz	S1	N1tz	S3rz	S2rz	S2z	S1	S2z	S2z	S2z	S2z	S2rz	S2z	S2t	S1	S2rz	S2rz
Ashinala	89	S3rz	S2tz	S2rz	S2tz	S2rz	S3tz	S3rz	S2rz	S3tz	S2rz	S2rz	S2tz	S2rz	S1	N1tz	S3rz	S2rz	S2z	S1	S2z	S2z	S2z	S2z	S2rz	S2z	S2t	S1	S2rz	S2rz
Ashinala	90	S3rz	S2tz	S2rz	S2tz	S2rz	S3tz	S3rz	S2rz	S3tz	S2rz	S2rz	S2tz	S2rz	S1	N1tz	S3rz	S2rz	S2z	S1	S2z	S2z	S2z	S2z	S2rz	S2z	S2t	S1	S2rz	S2rz
Ashinala	91	N1r	S3t	S3rt	S3t	S3rt	N1t	N1r	S3rt	N1t	S3t	S3t	S3t	S3rt	S3t	S3rt	S3rt	S3rt	S3t	S3t	S3t	S3t	S3t	S3t	S3rt	S3t	S3t	S3t	S3t	S3t
Ashinala	92	S3rz	S2tz	S2rz	S2tz	S2rz	S3tz	S3rz	S2rz	S3tz	S2rz	S2rz	S2tz	S2rz	S1	N1tz	S3rz	S2rz	S2z	S1	S2z	S2z	S2z	S2z	S2rz	S2z	S2t	S1	S2rz	S2rz
Ashinala	93	S3rz	S2tz	S2rz	S2tz	S2rz	S3tz	S3rz	S2rz	S3tz	S2rz	S2rz	S2tz	S2rz	S1	N1tz	S3rz	S2rz	S2z	S1	S2z	S2z	S2z	S2z	S2rz	S2z	S2t	S1	S2rz	S2rz
Ashinala	94	S3rz	S2tz	S2rz	S2tz	S2rz	S3tz	S3rz	S2rz	S3tz	S2rz	S2rz	S2tz	S2rz	S1	N1tz	S3rz	S2rz	S2z	S1	S2z	S2z	S2z	S2z	S2rz	S2z	S2t	S1	S2rz	S2rz
Ashinala	95	S3rz	S2tz	S2rz	S2tz	S2rz	S3tz	S3rz	S2rz	S3tz	S2rz	S2rz	S2tz	S2rz	S1	N1tz	S3rz	S2rz	S2z	S1	S2z	S2z	S2z	S2z	S2rz	S2z	S2t	S1	S2rz	S2rz
Ashinala	96	S3tw	S2tw	S3tw	S1	S3tw	S1	S2tw	S2w	S1	S1	S3tw	S1	S3tw	S1	N1tw	S2tw	S2w	S3tw	S2t	S2tw	S3tw	S2tw	S2tw	S2tw	S2t	S2t	S2t	S2tw	S3tw
Ashinala	97	S3tw	S2tw	S3tw	S1	S3tw	S1	S2tw	S2w	S1	S1	S3tw	S1	S3tw	S1	N1tw	S2tw	S2w	S3tw	S2t	S2tw	S3tw	S2tw	S2tw	S2tw	S2t	S2t	S2t	S2tw	S3tw
Ashinala	98	S3tw	S2tw	S3tw	S1	S3tw	S1	S2tw	S2w	S1	S1	S3tw	S1	S3tw	S1	N1tw	S2tw	S2w	S3tw	S2t	S2tw	S3tw	S2tw	S2tw	S2tw	S2t	S2t	S2t	S2tw	S3tw

Village	Survey Number	Mango	Maize	Sapota	Sorghum	Guava	Cotton	Tamarind	Lime	Bengal gram	Sunflower	Red gram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Onion	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Brinjal	Bhendi	Drumstick	Mulberry
Ashinala	99	S3tw	S2tw	S3tw	S1	S3tw	S1	S2tw	S2w	S1	S1	S3tw	S1	S3tw	S1	N1tw	S2tw	S2w	S3tw	S2t	S2tw	S3tw	S2tw	S2tw	S2tw	S2t	S2t	S2t	S2tw	S3tw
Ashinala	100/1	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro
Ashinala	100/2	S3tw	S2tw	S3tw	S1	S3tw	S1	S2tw	S2w	S1	S1	S3tw	S1	S3tw	S1	N1tw	S2tw	S2w	S3tw	S2t	S2tw	S3tw	S2tw	S2tw	S2tw	S2t	S2t	S2t	S2tw	S3tw
Ashinala	101	S3tw	S2tw	S3tw	S1	S3tw	S1	S2tw	S2w	S1	S1	S3tw	S1	S3tw	S1	N1tw	S2tw	S2w	S3tw	S2t	S2tw	S3tw	S2tw	S2tw	S2tw	S2t	S2t	S2t	S2tw	S3tw
Ashinala	102	S3tw	S2tw	S3tw	S1	S3tw	S1	S2tw	S2w	S1	S1	S3tw	S1	S3tw	S1	N1tw	S2tw	S2w	S3tw	S2t	S2tw	S3tw	S2tw	S2tw	S2tw	S2t	S2t	S2t	S2tw	S3tw
Ashinala	103	S3tw	S2tw	S3tw	S1	S3tw	S1	S2tw	S2w	S1	S1	S3tw	S1	S3tw	S1	N1tw	S2tw	S2w	S3tw	S2t	S2tw	S3tw	S2tw	S2tw	S2tw	S2t	S2t	S2t	S2tw	S3tw
Ashinala	104	S3tw	S2tw	S3tw	S1	S3tw	S1	S2tw	S2w	S1	S1	S3tw	S1	S3tw	S1	N1tw	S2tw	S2w	S3tw	S2t	S2tw	S3tw	S2tw	S2tw	S2tw	S2t	S2t	S2t	S2tw	S3tw
Ashinala	105	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro
Ashinala	106	S3tw	S2tw	S3tw	S1	S3tw	S1	S2tw	S2w	S1	S1	S3tw	S1	S3tw	S1	N1tw	S2tw	S2w	S3tw	S2t	S2tw	S3tw	S2tw	S2tw	S2tw	S2t	S2t	S2t	S2tw	S3tw
Ashinala	107	S3tw	S2tw	S3tw	S1	S3tw	S1	S2tw	S2w	S1	S1	S3tw	S1	S3tw	S1	N1tw	S2tw	S2w	S3tw	S2t	S2tw	S3tw	S2tw	S2tw	S2tw	S2t	S2t	S2t	S2tw	S3tw
Ashinala	108	S3tw	S2tw	S3tw	S1	S3tw	S1	S2tw	S2w	S1	S1	S3tw	S1	S3tw	S1	N1tw	S2tw	S2w	S3tw	S2t	S2tw	S3tw	S2tw	S2tw	S2tw	S2t	S2t	S2t	S2tw	S3tw
Ashinala	109	S3tw	S2tw	S3tw	S1	S3tw	S1	S2tw	S2w	S1	S1	S3tw	S1	S3tw	S1	N1tw	S2tw	S2w	S3tw	S2t	S2tw	S3tw	S2tw	S2tw	S2tw	S2t	S2t	S2t	S2tw	S3tw
Ashinala	110	S3rz	S2tz	S2rz	S2tz	S2rz	S3tz	S3rz	S2rz	S3tz	S2rz	S2rz	S2tz	S2rz	S1	N1tz	S3rz	S2rz	S2z	S1	S2z	S2z	S2z	S2z	S2rz	S2z	S2t	S1	S2rz	S2rz
Ashinala	111	S3rz	S2tz	S2rz	S2tz	S2rz	S3tz	S3rz	S2rz	S3tz	S2rz	S2rz	S2tz	S2rz	S1	N1tz	S3rz	S2rz	S2z	S1	S2z	S2z	S2z	S2z	S2rz	S2z	S2t	S1	S2rz	S2rz
Ashinala	112	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Ashinala	113	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Ashinala	114	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Ashinala	115	S3tw	S2tw	S3tw	S1	S3tw	S1	S2tw	S2w	S1	S1	S3tw	S1	S3tw	S1	N1tw	S2tw	S2w	S3tw	S2t	S2tw	S3tw	S2tw	S2tw	S2tw	S2t	S2t	S2t	S2tw	S3tw
Ashinala	116	S3tw	S2tw	S3tw	S1	S3tw	S1	S2tw	S2w	S1	S1	S3tw	S1	S3tw	S1	N1tw	S2tw	S2w	S3tw	S2t	S2tw	S3tw	S2tw	S2tw	S2tw	S2t	S2t	S2t	S2tw	S3tw
Ashinala	117	S3tw	S2tw	S3tw	S1	S3tw	S1	S2tw	S2w	S1	S1	S3tw	S1	S3tw	S1	N1tw	S2tw	S2w	S3tw	S2t	S2tw	S3tw	S2tw	S2tw	S2tw	S2t	S2t	S2t	S2tw	S3tw
Ashinala	118	S3tw	S2tw	S3tw	S1	S3tw	S1	S2tw	S2w	S1	S1	S3tw	S1	S3tw	S1	N1tw	S2tw	S2w	S3tw	S2t	S2tw	S3tw	S2tw	S2tw	S2tw	S2t	S2t	S2t	S2tw	S3tw
Ashinala	119	S3tw	S2tw	S3tw	S1	S3tw	S1	S2tw	S2w	S1	S1	S3tw	S1	S3tw	S1	N1tw	S2tw	S2w	S3tw	S2t	S2tw	S3tw	S2tw	S2tw	S2tw	S2t	S2t	S2t	S2tw	S3tw
Ashinala	120	N1r	S3r	N1r	S3r	N1r	S3r	N1r	N1r	S3r	N1r	S3r	S3r	N1r	S3r	N1r	N1r	N1r	S3rt	S3r	S3r	S3r	S3r	S3r	N1r	S3r	S3r	S3r	N1r	N1r
Ashinala	121	N1r	S3r	N1r	S3r	N1r	S3r	N1r	N1r	S3r	N1r	S3r	S3r	N1r	S3r	N1r	N1r	N1r	S3rt	S3r	S3r	S3r	S3r	S3r	N1r	S3r	S3r	S3r	N1r	N1r
Ashinala	122	N1r	S3r	N1r	S3r	N1r	S3r	N1r	N1r	S3r	N1r	S3r	S3r	N1r	S3r	N1r	N1r	N1r	S3rt	S3r	S3r	S3r	S3r	S3r	N1r	S3r	S3r	S3r	N1r	N1r
Ashinala	123	S3tw	S2tw	S3tw	S1	S3tw	S1	S2tw	S2w	S1	S1	S3tw	S1	S3tw	S1	N1tw	S2tw	S2w	S3tw	S2t	S2tw	S3tw	S2tw	S2tw	S2tw	S2t	S2t	S2t	S2tw	S3tw

Village	Survey Number	Mango	Maize	Sapota	Sorghum	Guava	Cotton	Tamarind	Lime	Bengal gram	Sunflower	Red gram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Onion	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Brinjal	Bhendi	Drumstick	Mulberry
Ashinala	124	N1r	S3r	N1r	S3r	N1r	S3r	N1r	N1r	S3r	N1r	S3r	S3r	N1r	S3r	N1r	N1r	N1r	S3rt	S3r	S3r	S3r	S3r	S3r	N1r	S3r	S3r	S3r	N1r	N1r
Ashinala	125	N1r	S3r	N1r	S3r	N1r	S3r	N1r	N1r	S3r	N1r	S3r	S3r	N1r	S3r	N1r	N1r	N1r	S3rt	S3r	S3r	S3r	S3r	S3r	N1r	S3r	S3r	S3r	N1r	N1r
Ashinala	126	N1r	S3r	N1r	S3r	N1r	S3r	N1r	N1r	S3r	N1r	S3r	S3r	N1r	S3r	N1r	N1r	N1r	S3rt	S3r	S3r	S3r	S3r	S3r	N1r	S3r	S3r	S3r	N1r	N1r
Ashinala	127	N1r	S3r	N1r	S3r	N1r	S3r	N1r	N1r	S3r	N1r	S3r	S3r	N1r	S3r	N1r	N1r	N1r	S3rt	S3r	S3r	S3r	S3r	S3r	N1r	S3r	S3r	S3r	N1r	N1r
Ashinala	128	N1r	S3r	N1r	S3r	N1r	S3r	N1r	N1r	S3r	N1r	S3r	S3r	N1r	S3r	N1r	N1r	N1r	S3rt	S3r	S3r	S3r	S3r	S3r	N1r	S3r	S3r	S3r	N1r	N1r
Ashinala	129	N1r	S3r	N1r	S3r	N1r	S3r	N1r	N1r	S3r	N1r	S3r	S3r	N1r	S3r	N1r	N1r	N1r	S3rt	S3r	S3r	S3r	S3r	S3r	N1r	S3r	S3r	S3r	N1r	N1r
Ashinala	130	N1r	S3r	N1r	S3r	N1r	S3r	N1r	N1r	S3r	N1r	S3r	S3r	N1r	S3r	N1r	N1r	N1r	S3rt	S3r	S3r	S3r	S3r	S3r	N1r	S3r	S3r	S3r	N1r	N1r
Ashinala	131	N1r	S3r	N1r	S3r	N1r	S3r	N1r	N1r	S3r	N1r	S3r	S3r	N1r	S3r	N1r	N1r	N1r	S3rt	S3r	S3r	S3r	S3r	S3r	N1r	S3r	S3r	S3r	N1r	N1r
Ashinala	132	N1r	S3r	N1r	S3r	N1r	S3r	N1r	N1r	S3r	N1r	S3r	S3r	N1r	S3r	N1r	N1r	N1r	S3rt	S3r	S3r	S3r	S3r	S3r	N1r	S3r	S3r	S3r	N1r	N1r
Ashinala	133	N1r	S3r	N1r	S3r	N1r	S3r	N1r	N1r	S3r	N1r	S3r	S3r	N1r	S3r	N1r	N1r	N1r	S3rt	S3r	S3r	S3r	S3r	S3r	N1r	S3r	S3r	S3r	N1r	N1r
Ashinala	134	N1r	S3r	N1r	S3r	N1r	S3r	N1r	N1r	S3r	N1r	S3r	S3r	N1r	S3r	N1r	N1r	N1r	S3rt	S3r	S3r	S3r	S3r	S3r	N1r	S3r	S3r	S3r	N1r	N1r
Ashinala	135	S3tw	S2tw	S3tw	S1	S3tw	S1	S2tw	S2w	S1	S1	S3tw	S1	S3tw	S1	N1tw	S2tw	S2w	S3tw	S2t	S2tw	S3tw	S2tw	S2tw	S2tw	S2t	S2t	S2t	S2tw	S3tw
Ashinala	136	N1r	S3r	N1r	S3r	N1r	S3r	N1r	N1r	S3r	N1r	S3r	S3r	N1r	S3r	N1r	N1r	N1r	S3rt	S3r	S3r	S3r	S3r	S3r	N1r	S3r	S3r	S3r	N1r	N1r
Ashinala	137	N1r	S3r	N1r	S3r	N1r	S3r	N1r	N1r	S3r	N1r	S3r	S3r	N1r	S3r	N1r	N1r	N1r	S3rt	S3r	S3r	S3r	S3r	S3r	N1r	S3r	S3r	S3r	N1r	N1r
Ashinala	138	S3tw	S2tw	S3tw	S1	S3tw	S1	S2tw	S2w	S1	S1	S3tw	S1	S3tw	S1	N1tw	S2tw	S2w	S3tw	S2t	S2tw	S3tw	S2tw	S2tw	S2tw	S2t	S2t	S2t	S2tw	S3tw
Ashinala	139	S3tw	S2tw	S3tw	S1	S3tw	S1	S2tw	S2w	S1	S1	S3tw	S1	S3tw	S1	N1tw	S2tw	S2w	S3tw	S2t	S2tw	S3tw	S2tw	S2tw	S2tw	S2t	S2t	S2t	S2tw	S3tw
Ashinala	140	S3tw	S2tw	S3tw	S1	S3tw	S1	S2tw	S2w	S1	S1	S3tw	S1	S3tw	S1	N1tw	S2tw	S2w	S3tw	S2t	S2tw	S3tw	S2tw	S2tw	S2tw	S2t	S2t	S2t	S2tw	S3tw
Ashinala	141	S3tw	S2tw	S3tw	S1	S3tw	S1	S2tw	S2w	S1	S1	S3tw	S1	S3tw	S1	N1tw	S2tw	S2w	S3tw	S2t	S2tw	S3tw	S2tw	S2tw	S2tw	S2t	S2t	S2t	S2tw	S3tw
Ashinala	142	S3tw	S2tw	S3tw	S1	S3tw	S1	S2tw	S2w	S1	S1	S3tw	S1	S3tw	S1	N1tw	S2tw	S2w	S3tw	S2t	S2tw	S3tw	S2tw	S2tw	S2tw	S2t	S2t	S2t	S2tw	S3tw
Ashinala	143	S3tw	S2tw	S3tw	S1	S3tw	S1	S2tw	S2w	S1	S1	S3tw	S1	S3tw	S1	N1tw	S2tw	S2w	S3tw	S2t	S2tw	S3tw	S2tw	S2tw	S2tw	S2t	S2t	S2t	S2tw	S3tw
Ashinala	144	S3tw	S2tw	S3tw	S1	S3tw	S1	S2tw	S2w	S1	S1	S3tw	S1	S3tw	S1	N1tw	S2tw	S2w	S3tw	S2t	S2tw	S3tw	S2tw	S2tw	S2tw	S2t	S2t	S2t	S2tw	S3tw
Ashinala	145	S3tw	S2tw	S3tw	S1	S3tw	S1	S2tw	S2w	S1	S1	S3tw	S1	S3tw	S1	N1tw	S2tw	S2w	S3tw	S2t	S2tw	S3tw	S2tw	S2tw	S2tw	S2t	S2t	S2t	S2tw	S3tw
Ashinala	146	S3tw	S2tw	S3tw	S1	S3tw	S1	S2tw	S2w	S1	S1	S3tw	S1	S3tw	S1	N1tw	S2tw	S2w	S3tw	S2t	S2tw	S3tw	S2tw	S2tw	S2tw	S2t	S2t	S2t	S2tw	S3tw
Ashinala	148	N1r	S3rt	N1r	S3rt	N1r	N1t	N1r	N1r	N1t	N1r	N1r	S3rt	N1r	S3rt	N1rt	N1r	N1r	S3rt	S3r	S3rt	S3rt	S3r	S3r	N1r	S3rt	S3rt	S3r	N1r	N1r
Ashinala	149	N1r	S3rt	N1r	S3rt	N1r	N1t	N1r	N1r	N1t	N1r	N1r	S3rt	N1r	S3rt	N1rt	N1r	N1r	S3rt	S3r	S3rt	S3rt	S3r	S3r	N1r	S3rt	S3rt	S3r	N1r	N1r
Halagera	106	S3tw	S2tw	S3tw	S1	S3tw	S1	S2tw	S2w	S1	S1	S3tw	S1	S3tw	S1	N1tw	S2tw	S2w	S3tw	S2t	S2tw	S3tw	S2tw	S2tw	S2tw	S2t	S2t	S2t	S2tw	S3tw

Village	Survey Number	Mango	Maize	Sapota	Sorghum	Guava	Cotton	Tamarind	Lime	Bengal gram	Sunflower	Red gram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Onion	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Brinjal	Bhendi	Drumstick	Mulberry
Halagera	108	N1r	S2rg	S3r	S2rg	S3r	S2rg	N1r	S3r	S2rg	S3rg	S3rg	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2rg	S2rg	S2rg	S2rg	S3r	S2r	S2r	S2r	S3r	S3r
Halagera	109	N1r	S2rg	S3r	S2rg	S3r	S2rg	N1r	S3r	S2rg	S3rg	S3rg	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2rg	S2rg	S2rg	S2rg	S3r	S2r	S2r	S2r	S3r	S3r
Halagera	110	N1r	S2rg	S3r	S2rg	S3r	S2rg	N1r	S3r	S2rg	S3rg	S3rg	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2rg	S2rg	S2rg	S2rg	S3r	S2r	S2r	S2r	S3r	S3r
Halagera	111	N1r	S2rg	S3r	S2rg	S3r	S2rg	N1r	S3r	S2rg	S3rg	S3rg	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2rg	S2rg	S2rg	S2rg	S3r	S2r	S2r	S2r	S3r	S3r
Halagera	113	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro
Mylapura	2	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro
Mylapura	3	S3rz	S2z	S2rz	S2z	S2rt	S2rz	S3rz	S2rz	S2tz	S2rz	S2rz	S1	S2rz	S1	S2rt	S3rz	S2rz	S2tz	S1	S2tz	S2z	S2tz	S2tz	S2rz	S2z	S1	S1	S2rz	S2rz
Mylapura	4	N1r	S2tg	S3r	S2rg	S3r	S2rg	N1r	S3r	S2rg	S3r	S3r	S2r	S3r	S2r	N1rt	S3r	S3r	S3t	S2r	S2rg	S2rg	S2rg	S2rg	S3r	S2r	S2r	S2r	S3r	S3r
Mylapura	5	N1r	S2tg	S3r	S2rg	S3r	S2rg	N1r	S3r	S2rg	S3r	S3r	S2r	S3r	S2r	N1rt	S3r	S3r	S3t	S2r	S2rg	S2rg	S2rg	S2rg	S3r	S2r	S2r	S2r	S3r	S3r
Mylapura	6	N1r	S2tg	S3r	S2rg	S3r	S2rg	N1r	S3r	S2rg	S3r	S3r	S2r	S3r	S2r	N1rt	S3r	S3r	S3t	S2r	S2rg	S2rg	S2rg	S2rg	S3r	S2r	S2r	S2r	S3r	S3r
Mylapura	115	N1r	S2tg	S3r	S2rg	S3r	S2rg	N1r	S3r	S2rg	S3r	S3r	S2r	S3r	S2r	N1rt	S3r	S3r	S3t	S2r	S2rg	S2rg	S2rg	S2rg	S3r	S2r	S2r	S2r	S3r	S3r
Mylapura	116	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro
Mylapura	117	S3rz	S2z	S2rz	S2z	S2rt	S2rz	S3rz	S2rz	S2tz	S2rz	S2rz	S1	S2rz	S1	S2rt	S3rz	S2rz	S2tz	S1	S2tz	S2z	S2tz	S2tz	S2rz	S2z	S1	S1	S2rz	S2rz
Mylapura	119	S3rz	S2z	S2rz	S2z	S2rt	S2rz	S3rz	S2rz	S2tz	S2rz	S2rz	S1	S2rz	S1	S2rt	S3rz	S2rz	S2tz	S1	S2tz	S2z	S2tz	S2tz	S2rz	S2z	S1	S1	S2rz	S2rz
Ramasamudra	204	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3r	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	S3r	S3r	N1rt	N1rt
Ramasamudra	205	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3r	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	S3r	S3r	N1rt	N1rt
Ramasamudra	206	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro
Ramasamudra	207	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro
Ramasamudra	208	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3r	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	S3r	S3r	N1rt	N1rt
Ramasamudra	209	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro
Ramasamudra	210	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3r	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	S3r	S3r	N1rt	N1rt
Ramasamudra	211	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3r	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	S3r	S3r	N1rt	N1rt
Ramasamudra	212	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro
Ramasamudra	213	N1r	S2tg	S3r	S2rg	S3r	S2rg	N1r	S3r	S2rg	S3r	S3r	S2r	S3r	S2r	N1rt	S3r	S3r	S3t	S2r	S2rg	S2rg	S2rg	S2rg	S3r	S2r	S2r	S2r	S3r	S3r

Village	Survey Number	Mango	Maize	Sapota	Sorghum	Guava	Cotton	Tamarind	Lime	Bengal gram	Sunflower	Red gram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Onion	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Brinjal	Bhendi	Drumstick	Mulberry
Ramasamudra	214	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3r	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	S3r	S3r	N1rt	N1rt
Ramasamudra	215	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3r	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	S3r	S3r	N1rt	N1rt
Ramasamudra	216	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro
Ramasamudra	217	N1r	S3t	S3rt	S3t	S3rt	N1t	N1r	S3rt	N1t	S3t	S3t	S3t	S3rt	S3t	S3rt	S3rt	S3rt	S3t	S3t	S3t	S3t	S3t	S3t	S3rt	S3t	S3t	S3t	S3t	S3t
Ramasamudra	218	N1r	S3t	S3rt	S3t	S3rt	N1t	N1r	S3rt	N1t	S3t	S3t	S3t	S3rt	S3t	S3rt	S3rt	S3rt	S3t	S3t	S3t	S3t	S3t	S3t	S3rt	S3t	S3t	S3t	S3t	S3t
Ramasamudra	219	N1r	S3r	N1r	S3r	N1r	S3r	N1r	N1r	S3r	N1r	S3r	S3r	N1r	S3r	N1r	N1r	N1r	S3rt	S3r	S3r	S3r	S3r	S3r	N1r	S3r	S3r	S3r	N1r	N1r
Ramasamudra	220	N1r	S3r	N1r	S3r	N1r	S3r	N1r	N1r	S3r	N1r	S3r	S3r	N1r	S3r	N1r	N1r	N1r	S3rt	S3r	S3r	S3r	S3r	S3r	N1r	S3r	S3r	S3r	N1r	N1r
Ramasamudra	222/1	N1r	S2t	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	N1rt	S3r	S3r	S3t	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r
Ramasamudra	223	N1r	S3t	S3rt	S3t	S3rt	N1t	N1r	S3rt	N1t	S3t	S3t	S3t	S3rt	S3t	S3rt	S3rt	S3rt	S3t	S3t	S3t	S3t	S3t	S3t	S3rt	S3t	S3t	S3t	S3t	S3t
Ramasamudra	224	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3r	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	S3r	S3r	N1rt	N1rt
Ramasamudra	225	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro	Ro
Ramasamudra	226	N1r	S2t	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	N1rt	S3r	S3r	S3t	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r
Ramasamudra	227	N1r	S2t	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	N1rt	S3r	S3r	S3t	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r
Ramasamudra	228	S3rz	S2z	S2rz	S2z	S2rt	S2rz	S3rz	S2rz	S2tz	S2rz	S2rz	S1	S2rz	S1	S2rt	S3rz	S2rz	S2tz	S1	S2tz	S2z	S2tz	S2tz	S2rz	S2z	S1	S1	S2rz	S2rz
Ramasamudra	229	S3rz	S2z	S2rz	S2z	S2rt	S2rz	S3rz	S2rz	S2tz	S2rz	S2rz	S1	S2rz	S1	S2rt	S3rz	S2rz	S2tz	S1	S2tz	S2z	S2tz	S2tz	S2rz	S2z	S1	S1	S2rz	S2rz
Ramasamudra	230	S3rz	S2z	S2rz	S2z	S2rt	S2rz	S3rz	S2rz	S2tz	S2rz	S2rz	S1	S2rz	S1	S2rt	S3rz	S2rz	S2tz	S1	S2tz	S2z	S2tz	S2tz	S2rz	S2z	S1	S1	S2rz	S2rz
Ramasamudra	232	S3rz	S2z	S2rz	S2z	S2rt	S2rz	S3rz	S2rz	S2tz	S2rz	S2rz	S1	S2rz	S1	S2rt	S3rz	S2rz	S2tz	S1	S2tz	S2z	S2tz	S2tz	S2rz	S2z	S1	S1	S2rz	S2rz
Ramasamudra	234	N1r	S2t	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	N1rt	S3r	S3r	S3t	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r
Ramasamudra	239	N1r	S2t	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	N1rt	S3r	S3r	S3t	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r
Ramasamudra	240/1	N1r	S2t	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	N1rt	S3r	S3r	S3t	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r
Ramasamudra	240/2	N1r	S2t	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	N1rt	S3r	S3r	S3t	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r

Village	Survey Number	Mango	Maize	Sapota	Sorghum	Guava	Cotton	Tamarind	Lime	Bengal gram	Sunflower	Red gram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Onion	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Brinjal	Bhendi	Drumstick	Mulberry
Varkanahalli	35	S3tw	S2tw	S3tw	S1	S3tw	S1	S2tw	S2w	S1	S1	S3tw	S1	S3tw	S1	N1tw	S2tw	S2w	S3tw	S2t	S2tw	S3tw	S2tw	S2tw	S2tw	S2t	S2t	S2t	S2tw	S3tw

Ro-Rock out crops

PART-B

SOCIO-ECONOMIC STATUS OF FARM HOUSEHOLDS

CONTENTS

LIST OF TABLES

Chapter 1

SALIENT FINDINGS OF THE SURVEY

- *The data indicated that there were 102 (61.45%) men and 64 (38.55%) women among the sampled households.*
- *The average family size of landless farmers' was 5.5, marginal farmers' was 4.4, small farmers' was 4.9, semi medium farmers' was 5.6 and medium farmers' was 3.7.*
- *The data indicated that, 18 (16.87%) people were in 0-15 years of age, 76 (45.78%) were in 16-35 years of age, 51 (30.72%) were in 36-60 years of age and 11 (6.63%) were above 61 years of age.*
- *The results indicated that Maskanahalli-2 had 64.42 per cent illiterates, 20.48 per cent of them had primary school, 5.42 per cent of them had middle school, 3.61 per cent of them had high school education, 2.41 per cent of them had PUC and 1.2 per cent of them had degree education.*
- *The results indicate that, 91.43 per cent of household heads were practicing agriculture, 8.57 per cent of the household heads were agricultural laborers and 2.86 per cent of the household's heads were General Labour and housewives.*
- *The results indicate that agriculture was the major occupation for 72.29 per cent of the household members, 5.42 per cent were agricultural laborers, 1.81 per cent were in general labour and housewives, 0.60 per cent were private service, 14.46 per cent were student and 2.41 per cent were children.*
- *The results show that, 1.2 per cent of the population in the micro watershed has participated in raitha sangha and 98.80 per cent of the population in the micro watershed has not participated in local institution.*
- *The results indicate that 31.43 per cent of the households possess thatched, 54.29 per cent of the households possess katcha house and 14.29 per cent of the households possess pucca/RCC house.*
- *The results show that 71.43 per cent of the households possess TV, 57.14 per cent of the households possess mixer/grinder, 5.71 per cent of the households possess bicycle and auto, 28.57 per cent of the households possess motor cycle, 2.86 per cent of the households possess tempo and computer/ laptop, 97.14 per cent of the households possess mobile phones.*
- *The results show that the average value of television was Rs. 5,456, mixer/grinder was Rs. 1,707, bicycle was Rs. 3,000, motor cycle was Rs. 42,800, auto was Rs. 57,500, tempo was Rs. 200,000, mobile phone was Rs. 1,814 and computer/laptop was Rs. 10,000.*
- *About 14.29 per cent each of the households possess bullock cart, 57.14 per cent of the households possess plough, 5.71 per cent of the households possess seed/fertilizer drill, 20 per cent of the households possess sprayer, 91.43 per cent of the households possess weeder and 25.71per cent of the households possess thresher.*

- *The results show that the average value of bullock cart was Rs. 13,560, plough was Rs. 1,945, seed/ fertilizer drill was Rs. 3,550, sprayer was Rs. 4,100, weeder was Rs. 89 and the average value of thresher was Rs. 158.*
- *The results indicate that, 40 per cent of the households possess bullocks, 20 per cent of the households possess local cow, 5.71 per cent of the households possess buffalo and 2.86 per cent of the households possess sheep.*
- *The results indicate that, average own labour men available in the micro watershed was 1.79, average own labour (women) available was 1.82, average hired labour (men) available was 11.12 and average hired labour (women) available was 11.30.*
- *The results indicate that, 100 per cent of the households opined that the hired labour was adequate.*
- *The results indicate that, households of the Maskanahalli-2 micro-watershed possess 25.16 ha (58.57%) of dry land and 17.79 ha (41.43%) of irrigated land. Marginal farmers possess 7.36 ha (100 %) of dry land. Small farmers possess 17.8 ha (100%) of dry land. Semi medium farmers possess 6.46 ha (100%) of irrigated land. Medium farmers possess 11.34 ha (100%) of irrigated land.*
- *The results indicate that, the average value of dry land was Rs. 381,467.19 and the average value of irrigated land was Rs. 306,151.92. In case of marginal famers, the average land value was Rs. 624,972.49 for dry land. In case of small famers, the average land value was Rs. 280,809.46 for dry land. In case of semi medium famers, the average land value was Rs. 479,761.91 for irrigated land. In case of medium farmers, the average land value was Rs. 207,229.56 for irrigated land.*
- *The results indicate that, there were 7 functioning bore wells in the micro watershed.*
- *The results indicate that, bore well was the major irrigation source in the micro water shed for 20 per cent of the farmers.*
- *The results indicate that, the depth of bore well was found to be 17.7 meters.*
- *The results indicate that, small, semi medium and medium farmers had an irrigated area of 1.62 ha, 3.72 ha and 6.48 ha respectively.*
- *The results indicate that, farmers have grown groundnut (18.93 ha), cotton (11.96 ha), horse gram (5.98 ha), red gram (2.49 ha), green gram (1.86 ha), mandarin (1.62 ha), groundnut (1.21 ha) and paddy (0.81 ha). Marginal farmers have grown groundnut, cotton, red gram and green gram. Small farmers have grown groundnut, cotton, horse gram, green gram and mandarin. Semi medium farmers have grown groundnut and horse gram. Medium farmers have grown groundnut, cotton and paddy.*
- *The results indicate that, the cropping intensity in Maskanahalli-2 micro-watershed was found to be 85.8 per cent.*
- *The results indicate that, 57.14 per cent of the households have bank account.*
- *The results indicate that, 62.86 per cent of the households have availed credit from different sources.*

- *The results indicate that, 4.55 per cent of the households have borrowed from cooperative bank.*
- *The results indicate that, the average credit amount borrowed by households in micro-watershed was Rs, 2,727.27.*
- *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 not paid their loan borrowed from institutional sources.*
- *The results indicate that, 83.33 per cent opined that the loan amount borrowed from forced to sell the produce at low price to repay loan in time.*
- *The results indicate that, the total cost of cultivation for Cotton was Rs. 45643.18. The gross income realized by the farmers was Rs. 82923.49. The net income from Cotton cultivation was Rs. 37280.31. Thus the benefit cost ratio was found to be 1:1.82.*
- *The total cost of cultivation for groundnut was Rs. 33417.23. The gross income realized by the farmers was Rs. 57542.62. The net income from groundnut cultivation was Rs. 24125.39. Thus the benefit cost ratio was found to be 1:1.72.*
- *The total cost of cultivation for Red gram was Rs. 30757.10. The gross income realized by the farmers was Rs. 42762.27. The net income from Red gram cultivation was Rs. 12005.17. Thus the benefit cost ratio was found to be 1:1.39.*
- *The total cost of cultivation for Paddy was Rs. 36668.43. The gross income realized by the farmers was Rs. 172900. The net income from Paddy cultivation was Rs. 136231.57. Thus the benefit cost ratio was found to be 1:4.72.*
- *The total cost of cultivation for Green gram was Rs. 19353.24. The gross income realized by the farmers was Rs. 19042.22. The net income from Green gram cultivation was Rs. -3112. Thus the benefit cost ratio was found to be 1:0.98.*
- *The total cost of cultivation for Maize was Rs. 195857. The gross income realized by the farmers was Rs. 24082.50. The net income from Maize cultivation was Rs. 4497.43. Thus the benefit cost ratio was found to be 1:1.23.*
- *The total cost of cultivation for Horse gram was Rs. 17866.94. The gross income realized by the farmers was Rs. 40883.93. The net income from Horse gram cultivation was Rs. 23016.99. Thus the benefit cost ratio was found to be 1:2.29.*
- *The results indicate that, 57.14 per cent of the households opined that dry fodder was adequate, 22.86 per cent of the households opined that green fodder was adequate and 2.86 per cent of the households opined that green fodder was inadequate.*
- *The results indicate that the annual gross income was Rs. 72,416.67 for marginal farmers, for small farmers it was Rs. 139,481.67, semi medium farmers it was Rs. 112,600 and medium farmers it was Rs. 143,550.*

- *The results indicate that the average annual expenditure is Rs. 6,953.17. For marginal farmers it was Rs. 4,625, for small farmers it was Rs. 10,231.48, for semi medium farmers it was Rs. 5,666.67 and medium farmers it was Rs. 9,187.50.*
- *The results indicate that, households have planted 4 coconut, 2 lemon and 12 mango trees in their field.*
- *The results indicate that, households have planted 1 eucalyptus, 59 neem, 5 tamarind and 4 banyan trees in their field.*
- *The results indicated that, households have an average investment capacity of Rs. 7,686.14 for land development; households have an average investment capacity of Rs. 371.43 for irrigation facility, households have an average investment capacity of Rs. 2,657.14 for improved crop production and households have an average investment capacity of Rs. 800 for improved livestock management.*
- *The results indicated that loan from bank was the source of additional investment for 65.71 per cent for land development 5.71 per cent for irrigation facility, 45.71 per cent for improved crop production and 14.29 per cent for improved livestock management.*
- *The results indicated that, cotton was sold to the extent of 100 per cent, green gram was sold to the extent of 71.43 per cent, groundnut was sold to the extent of 86.63 per cent, horse gram was sold to the extent of 66.67 per cent, maize was sold to the extent of 93.33 per cent, paddy was sold to the extent of 60 per cent and red gram was sold to the extent of 68.75 per cent.*
- *The results indicated that, about 105.71 per cent of the farmers sold their produce to local/village merchant.*
- *The results indicated that, 102.86 per cent of the households have used tractor and 2.86 per cent of the households have used cart as a mode of transportation.*
- *The results indicated that, 88.57 per cent of the households have experienced soil and water erosion problems in the farm.*
- *The results indicated that, 91.43 per cent have shown interest in soil test.*
- *The results indicated that, 97.14 per cent of the households used firewood and 5.71 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 100 per cent of the households in the micro watershed.*
- *Electricity was the major source of light for 97.41 per cent of the households in micro watershed.*
- *The results indicated that, 28.57 per cent of the households possess sanitary toilet facility.*
- *The results indicated that, 97.14 per cent of the sampled households possessed BPL cards.*
- *The results indicated that, 82.86 per cent of the households participated in NREGA programme.*

- *The results indicated that, cereals and pulses were adequate for 94.29 per cent of the households, oilseed were adequate for 80 per cent, vegetables were adequate for 68.57 per cent, fruits were adequate for 5.71 per cent, milk were adequate for 80 per cent, egg were adequate for 22.86 per cent and meat were adequate for 2.86 per cent.*
- *The results indicated that, pulses were inadequate for 2.86 per cent, oilseeds and milk were inadequate for 14.29 per cent, vegetables were inadequate for 28.57 per cent, fruits were inadequate for 88.57 per cent, egg were inadequate for 68.57 per cent and meat were inadequate for 91.43 per cent of the households.*
- *The results indicated that, lower fertility status of the was the constraint experienced by 91.43 per cent of the households, wild animal menace on farm field (88.57%), frequent incidence of pest and diseases, high cost of fertilizer and plant protection chemicals and lack of marketing facilities in the area (85.71%), Inadequacy of irrigation water (17.41%), (80%), high rate of interest on credit (80%), low price for the agricultural commodities (82.86%), inadequate extension service (5.71%), Lack of transport for safe transport of the Agril produce to the market (71.43%) and Source of Agri-technology information(2.86%)*

Chapter 2

INTRODUCTION

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

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

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

Scope and importance of survey

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

Chapter 3

METHODOLOGY

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

Description of the study area

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

Yadgir district is the second smallest district in the state, area wise is very rich in cultural traditions. The vast stretch of fertile black soil of the district is known for bumper red gram and 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 Yadgir district has a population of 1, 172,985, roughly equal to the nation of Timor-Lesteor the US state of Rhode Island. This gives it a ranking of 404th in India (out of a total of 640). The district has a population density of 224 inhabitants per square kilometre (580/sq mi). Its population growth rate over the decade 2001-2011 was 22.67%. Yadgir has a sex ratio of 984 females for every 1000 males, and a literacy rate of 52.36%.

Description of the micro watershed

Maskanahalli-2 micro-watershed in Haligeri sub-watershed (Yadgir taluk and district) is located in between $16^0$46’4.805’’ to 16^0 44’45.347’’North latitudes and 77^0 14’43.535’’ to $77^0$12’31.261’’ East longitudes, covering an area of about 667.26 ha, bounded by Ramasamudra, Halagera, Mylapura and Ashinala 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 Maskanahalli-2 micro-watershed is presented in Table 1 and it indicated that 35 farmers were sampled in Maskanahalli-2 micro-watershed among them 2 (5.71%) were landless, 12 (34.29%) were marginal and small farmers, 5 (14.29%) were semi medium farmers and 4 (11.43%) were medium farmers.

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

Sl.No.	Particulars	LL (2)		MF (12)		SF (12)		SMF (5)		MDF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Farmers	2	5.71	12	34.29	12	34.29	5	14.29	4	11.43	35	100

Population characteristics: The population characteristics of households sampled for socio-economic survey in Maskanahalli-2 micro-watershed is presented in Table 2. The data indicated that there were 102 (61.45%) men and 64 (38.55%) women among the sampled households. The average family size of landless farmers' was 5.5, marginal farmers' was 4.4, small farmers' was 4.9, semi medium farmers' was 5.6 and medium farmers' was 3.7.

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

Sl.No.	Particulars	LL (11)		MF (53)		SF (59)		SMF (28)		MDF (15)		All (166)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Men	6	54.55	33	62.26	37	62.71	18	64.29	8	53.33	102	61.45
2	Women	5	45.45	20	37.74	22	37.29	10	35.71	7	46.67	64	38.55
Total		11	100	53	100	59	100	28	100	15	100	166	100
Average		5.5		4.4		4.9		5.6		3.7		4.7	

Age wise classification of population: The age wise classification of household members in Maskanahalli-2 micro-watershed is presented in Table 3. The data indicated that, 18 (16.87%) people were in 0-15 years of age, 76 (45.78%) were in 16-35 years of age, 51 (30.72%) were in 36-60 years of age and 11 (6.63%) were above 61 years of age.

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

Sl. No.	Particulars	LL (11)		MF (53)		SF (59)		SMF (28)		MDF(15)		All (166)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	0-15 years of age	4	36.36	3	5.66	7	11.86	10	35.71	4	26.67	28	16.87
2	16-35 years of age	3	27.27	29	54.72	24	40.68	14	50	6	40	76	45.78
3	36-60 years of age	2	18.18	18	33.96	22	37.29	4	14.29	5	33.33	51	30.72
4	> 61 years	2	18.18	3	5.66	6	10.17	0	0	0	0	11	6.63
Total		11	100	53	100	59	100	28	100	15	100	166	100

Education level of household members: Education level of household members in Maskanahalli-2 micro-watershed is presented in Table 4. The results indicated that Maskanahalli-2 had 64.42 per cent illiterates, 20.48 per cent of them had primary school,

5.42 per cent of them had middle school, 3.61 per cent of them had high school education, 2.41 per cent of them had PUC and 1.2 per cent of them had degree education.

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

Sl. No.	Particulars	LL (11)		MF (53)		SF (59)		SMF (28)		MDF (15)		All (166)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Illiterate	5	45.45	39	73.58	35	59.32	19	67.86	9	60	107	64.46
2	Primary School	2	18.18	6	11.32	14	23.73	6	21.43	6	40	34	20.48
3	Middle School	0	0	3	5.66	4	6.78	2	7.14	0	0	9	5.42
4	High School	2	18.18	1	1.89	3	58	0	0	0	0	6	3.61
5	PUC	0	0	3	5.66	0	0	1	3.57	0	0	4	2.41
6	Degree	0	0	1	1.89	1	1.69	0	0	0	0	2	1.20
7	Others	2	18.18	0	0	2	3.39	0	0	0	0	4	2.41
Total		11	100	53	100	59	100	28	100	15	100	166	100

Occupation of household heads: The data regarding the occupation of the household heads in Maskanahalli-2 micro-watershed is presented in Table 5. The results indicate that, 91.43 per cent of household heads were practicing agriculture, 8.57 per cent of the household heads were agricultural laborers and 2.86 per cent of the household's heads were General Labour and housewives.

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

Sl.No.	Particulars	LL (2)		MF (12)		SF (12)		SMF (5)		MDF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Agriculture	0	0	10	83.33	14	116.67	5	100	3	75	32	91.43
2	Agricultural Labour	1	50	1	8.33	0	0	0	0	1	25	3	8.57
3	General Labour	1	50	0	0	0	0	0	0	0	0	1	2.86
4	Housewife	0	0	1	8.33	0	0	0	0	0	0	1	2.86
Total		2	100	12	100	14	100	5	100	4	100	37	100

Occupation of the household members: The data regarding the occupation of the household members in Maskanahalli-2 micro-watershed is presented in Table 6. The results indicate that agriculture was the major occupation for 72.29 per cent of the household members, 5.42 per cent were agricultural laborers, 1.81 per cent were in general labour and housewives, 0.60 per cent were private service, 14.46 per cent were student and 2.41 per cent were children.

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

Sl.No.	Particulars	LL (11)		MF (53)		SF (59)		SMF (28)		MDF (15)		All (166)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Agriculture	0	0	43	81.13	49	835	18	64.29	10	66.67	120	72.29
2	Agricultural Labour	3	27.27	3	5.66	2	3.39	0	0	1	6.67	9	5.42
3	General Labour	3	27.27	0	0	0	0	0	0	0	0	3	1.81
4	Private Service	0	0	1	1.89	0	0	0	0	0	0	1	0.60
5	Student	3	27.27	4	7.55	5	8.47	8	28.57	4	26.67	24	14.46
6	Others	0	0	0	0	0	0	2	7.14	0	0	2	1.20
7	Housewife	0	0	2	3.77	1	1.69	0	0	0	0	3	1.81
8	Children	2	18.18	0	0	2	3.39	0	0	0	0	4	2.41
Total		11	100	53	100	59	100	28	100	15	100	166	100

Institutional participation of the household members: The data regarding the institutional participation of the household members in Maskanahalli-2 micro-watershed is presented in Table 7. The results show that, 1.2 per cent of the population in the micro watershed has participated in raitha sangha and 98.80 per cent of the population in the micro watershed has not participated in local institution.

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

Sl.No.	Particulars	LL (11)		MF (53)		SF (59)		SMF (28)		MDF (15)		All (166)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Raitha Sangha	0	0	1	1.89	0	0	0	0	1	6.67	2	1.20
2	No Participation	11	100	52	98.11	59	100	28	100	14	93.33	164	98.80
Total		11	100	53	100	59	100	28	100	15	100	166	100

Type of house owned: The data regarding the type of house owned by the households in Maskanahalli-2 micro-watershed is presented in Table 8. The results indicate that 31.43 per cent of the households possess thatched, 54.29 per cent of the households possess katcha house and 14.29 per cent of the households possess pucca/RCC house.

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

Sl.No.	Particulars	LL (2)		MF (12)		SF (12)		SMF (5)		MDF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Thatched	0	0	3	25	4	33.33	3	60	1	25	11	31.43
2	Katcha	2	100	9	75	6	50	1	20	1	25	19	54.29
3	Pucca/RCC	0	0	0	0	2	16.67	1	20	2	50	5	14.29
Total		2	100	12	100	12	100	5	100	4	100	35	100

Durable Assets owned by the households: The data regarding the Durable Assets owned by the households in Maskanahalli-2 micro-watershed is presented in Table 9. The results show that 71.43 per cent of the households possess TV, 57.14 per cent of the households possess mixer/grinder, 5.71 per cent of the households possess bicycle and auto, 28.57 per cent of the households possess motor cycle, 2.86 per cent of the households possess tempo and computer/ laptop, 97.14 per cent of the households possess mobile phones.

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

Sl.No.	Particulars	LL (2)		MF (12)		SF (12)		SMF (5)		MDF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Television	1	50	6	50	10	83.33	4	80	4	100	25	71.43
2	Mixer/Grinder	0	0	6	50	8	66.67	2	40	4	100	20	57.14
3	Bicycle	0	0	0	0	0	0	2	40	0	0	2	5.71
4	Motor Cycle	0	0	3	25	4	33.33	0	0	3	75	10	28.57
5	Auto	0	0	0	0	1	8.33	0	0	1	25	2	5.71
6	Tempo	0	0	1	8.33	0	0	0	0	0	0	1	2.86
7	Mobile Phone	1	50	12	100	12	100	5	100	4	100	34	97.14
8	Computer/Laptop	1	50	0	0	0	0	0	0	0	0	1	2.86

Average value of durable assets: The data regarding the average value of durable assets owned by the households in Maskanahalli-2 micro-watershed is presented in Table 10. The results show that the average value of television was Rs. 5,456, mixer/grinder was Rs. 1,707, bicycle was Rs. 3,000, motor cycle was Rs. 42,800, auto was Rs. 57,500, tempo was Rs. 200,000, mobile phone was Rs. 1,814 and computer/laptop was Rs. 10,000.

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

Average value (Rs.)

Sl.No.	Particulars	LL (2)	MF (12)	SF (12)	SMF (5)	MDF (4)	All (35)
1	Television	4,000	6,000	5,200	5,750	5,350	5,456
2	Mixer/Grinder	0	1,716	1,781	1,500	1,650	1,707
3	Bicycle	0	0	0	3,000	0	3,000
4	Motor Cycle	0	43,333	42,500	0	42,666	42,800
5	Auto	0	0	20,000	0	95,000	57,500
6	Tempo	0	200,000	0	0	0	200,000
7	Mobile Phone	2,000	1,450	1,590	3,580	2,450	1,814
8	Computer/Laptop	10,000	0	0	0	0	10,000

Farm Implements owned: The data regarding the farm implements owned by the households in Maskanahalli-2 micro-watershed is presented in Table 11. About 14.29 per cent each of the households possess bullock cart, 57.14 per cent of the households possess plough, 5.71 per cent of the households possess seed/fertilizer drill, 20 per cent of the households possess sprayer, 91.43 per cent of the households possess weeder and 25.71per cent of the households possess thresher.

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

Sl.No.	Particulars	LL (2)		MF (12)		SF (12)		SMF (5)		MDF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Bullock Cart	0	0	1	8.33	1	8.33	1	20	2	50	5	14.29
2	Plough	0	0	5	41.67	8	66.67	3	60	4	100	20	57.14
3	Seed/Fertilizer Drill	0	0	0	0	1	8.33	0	0	1	25	2	5.71
4	Sprayer	0	0	2	16.67	3	25	0	0	2	50	7	20
5	Weeder	0	0	12	100	11	91.67	5	100	4	100	32	91.43
6	Thresher	0	0	2	16.67	6	50	0	0	1	25	9	25.71
7	Blank	2	100	0	0	1	8.33	0	0	0	0	3	8.57

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

Average Value (Rs.)

Sl.No.	Particulars	LL (2)	MF (12)	SF (12)	SMF (5)	MDF (4)	All (35)
1	Bullock Cart	0	18,000	1,800	15,000	16,500	13,560
2	Plough	0	1,780	2,012	1,700	2,200	1,945
3	Seed/Fertilizer Drill	0	0	3,900	0	3,200	3,550
4	Sprayer	0	3,100	4,500	0	4,500	4,100
5	Weeder	0	71	150	73	37	89
6	Thresher	0	180	148	0	180	158

Average value of farm implements: The data regarding the average value of farm Implements owned by the households in Maskanahalli-2 micro-watershed is presented in Table 12. The results show that the average value of bullock cart was Rs. 13,560, plough was Rs. 1,945, seed/ fertilizer drill was Rs. 3,550, sprayer was Rs. 4,100, weeder was Rs. 89 and the average value of thresher was Rs. 158.

Livestock possession by the households: The data regarding the Livestock possession by the households in Maskanahalli-2 micro-watershed is presented in Table 13. The results indicate that, 40 per cent of the households possess bullocks, 20 per cent of the households possess local cow, 5.71 per cent of the households possess buffalo and 2.86 per cent of the households possess sheep.

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

Sl.No.	Particulars	LL (2)		MF (12)		SF (12)		SMF (5)		MDF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Bullock	0	0	1	8.33	5	41.67	4	80	4	100	14	40
2	Local cow	0	0	1	8.33	2	16.67	3	60	1	25	7	20
3	Buffalo	0	0	1	8.33	0	0	1	20	0	0	2	5.71
4	Sheep	0	0	0	0	1	8.33	0	0	0	0	1	2.86
5	blank	2	100	10	83.33	6	50	1	20	0	0	19	54.29

Average Labour availability: The data regarding the average labour availability in Maskanahalli-2 micro-watershed is presented in Table 14. The results indicate that, average own labour men available in the micro watershed was 1.79, average own labour (women) available was 1.82, average hired labour (men) available was 11.12 and average hired labour (women) available was 11.30.

In case of marginal farmers, average own labour men available was 1.92, average own labour (women) was 1.58, average hired labour (men) was 8 and average hired labour (women) available was 8.33 In case of small farmers, average own labour men available was 1.83 average own labour (women) was 1.75, average hired labour (men) was 13.83 and average hired labour (women) available was 13.42. In case of semi medium farmers, average own labour men available was 1.6 average own labour (women) was 2.8, average hired labour (men) was 8.2 and average hired labour (women) available was 9.8. In case of medium farmers, average own labour men available and average own labour (women) was 1.50, average hired labour (men) was 16 and average hired labour (women) available was 15.75.

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

Sl.No.	Particulars	LL (2)	MF (12)	SF (12)	SMF (5)	MDF (4)	All (35)
1	Hired labour Female	0	8.33	13.42	9.80	15.75	11.30
2	Own Labour Female	0	1.58	1.75	2.80	1.50	1.82
3	Own labour Male	0	1.92	1.83	1.60	1.50	1.79
4	Hired labour Male	0	8	13.83	8.20	16	11.12

Adequacy of Hired Labour: The data regarding the adequacy of hired labour in Maskanahalli-2 micro-watershed is presented in Table 15. The results indicate that, 100 per cent of the households opined that the hired labour was adequate.

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

Sl.No.	Particulars	LL (2)		MF (12)		SF (12)		SMF (5)		MDF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Adequate	0	0	12	100	12	100	6	120	4	100	35	100

Distribution of land (ha): The data regarding the distribution of land (ha) in Maskanahalli-2 micro-watershed is presented in Table 16. The results indicate that, households of the Maskanahalli-2 micro-watershed possess 25.16 ha (58.57%) of dry land and 17.79 ha (41.43%) of irrigated land. Marginal farmers possess 7.36 ha (100 %) of dry land. Small farmers possess 17.8 ha (100%) of dry land. Semi medium farmers possess 6.46 ha (100%) of irrigated land. Medium farmers possess 11.34 ha (100%) of irrigated land.

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

Sl.No.	Particulars	LL (2)		MF (12)		SF (12)		SMF (5)		MDF (4)		All (35)	
		ha	%	ha	%	ha	%	ha	%	ha	%	ha	%
1	Dry	0	0	7.36	100	17.80	100	0	0	0	0	25.16	58.57
2	Irrigated	0	0	0	0	0	0	6.46	100	11.34	100	17.79	41.43
Total		0	100	7.36	100	17.80	100	6.46	100	11.34	100	42.95	100

Average land value (Rs./ha): The data regarding the average land value (Rs./ha) in Maskanahalli-2 micro-watershed is presented in Table 17. The results indicate that, the average value of dry land was Rs. 381,467.19 and the average value of irrigated land was Rs. 306,151.92. In case of marginal famers, the average land value was Rs. 624,972.49 for dry land. In case of small famers, the average land value was Rs. 280,809.46 for dry land. In case of semi medium famers, the average land value was Rs. 479,761.91 for irrigated land. In case of medium farmers, the average land value was Rs. 207,229.56 for irrigated land.

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

Sl.No.	Particulars	LL (2)	MF (12)	SF (12)	SMF (5)	MDF (4)	All (35)
1	Dry	0	624,972.49	280,809.46	0	0	381,467.19
2	Irrigated	0	0	0	479,761.91	207,229.56	306,151.92

Status of bore wells: The data regarding the status of bore wells in Maskanahalli-2 micro-watershed is presented in Table 18. The results indicate that, there were 7 functioning bore wells in the micro watershed.

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

Sl.No.	Particulars	LL (2)	MF (12)	SF (12)	SMF (5)	MDF (4)	All (35)
		N	N	N	N	N	N
1	Functioning	0	0	1	3	3	7

Source of irrigation: The data regarding the source of irrigation in Maskanahalli-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 20 per cent of the farmers.

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

Sl.No.	Particulars	LL (2)		MF (12)		SF (12)		SMF (5)		MDF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Bore Well	0	0	0	0	1	8.33	3	60	3	75	7	20

Depth of Water (Avg. in meters): The data regarding the depth of water in Maskanahalli-2 micro-watershed is presented in Table 20. The results indicate that, the depth of bore well was found to be 17.7 meters.

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

Sl.No.	Particulars	LL (2)	MF (12)	SF (12)	SMF (5)	MDF (4)	All (35)
1	Bore Well	0	0	7.62	6.41	46.48	17.7

Irrigated Area (ha): The data regarding the irrigated area (ha) in Maskanahalli-2 micro-watershed is presented in Table 21. The results indicate that, small, semi medium and medium farmers had an irrigated area of 1.62 ha, 3.72 ha and 6.48 ha respectively.

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

Sl.No.	Particulars	LL (2)	MF (12)	SF (12)	SMF (5)	MDF (4)	All (35)
1	Kharif	0	0	1.62	3.72	6.48	11.82

Cropping pattern: The data regarding the cropping pattern in Maskanahalli-2 micro-watershed is presented in Table 22. The results indicate that, farmers have grown groundnut (18.93 ha), cotton (11.96 ha), horsegram (5.98 ha), red gram (2.49 ha), green gram (1.86 ha), mandarin (1.62 ha), groundnut (1.21 ha) and paddy (0.81 ha). Marginal farmers have grown groundnut, cotton, red gram and green gram. Small farmers have grown groundnut, cotton, horse gram, green gram and mandarin. Semi medium farmers have grown groundnut and horse gram. Medium farmers have grown groundnut, cotton and paddy.

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

Sl.No.	Particulars	LL (2)	MF (12)	SF (12)	SMF (5)	MDF (4)	All (35)
1	Kharif - Groundnut	0	1.42	3.5	6.32	7.69	18.93
2	Kharif - Cotton	0	2.24	8.1	0	1.62	11.96
3	Kharif - Horsegram	0	0	3.32	2.66	0	5.98
4	Kharif - Red gram	0	2.49	0	0	0	2.49
5	Kharif - Greengram	0	15	0.81	0	0	1.86
6	Kharif - Mandarin	0	0	1.62	0	0	1.62
7	Rabi - Groundnut	0	0	1.21	0	0	1.21
8	Kharif - Paddy	0	0	0	0	0.81	0.81
Total		0	7.2	18.56	8.97	10.12	44.85

Cropping intensity: The data regarding the cropping intensity in Maskanahalli-2 micro-watershed is presented in Table 23. The results indicate that, the cropping intensity in Maskanahalli-2 micro-watershed was found to be 85.8 per cent.

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

Sl.No.	Particulars	LL (2)	MF (12)	SF (12)	SMF (5)	MDF (4)	All (35)
1	Cropping Intensity	0	100	89.41	100	64.10	85.8

Possession of Bank account and savings: The data regarding the possession of bank account and saving in Maskanahalli-2 micro-watershed is presented in Table 24. The results indicate that, 57.14 per cent of the households have bank account.

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

Sl.No.	Particulars	LL (2)		MF (12)		SF (12)		SMF (5)		MDF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Account	0	0	6	50	6	50	4	80	4	100	20	57.14

Borrowing status: The data regarding the borrowing status in Maskanahalli-2 micro-watershed is presented in Table 25. The results indicate that, 62.86 per cent of the households have availed credit from different sources.

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

Sl.No.	Particulars	LL (2)		MF (12)		SF (12)		SMF (5)		MDF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Credit Availed	0	0	6	50	8	66.67	4	80	4	100	22	62.86

Source of credit availed by households: The data regarding the source of credit availed by households in Maskanahalli-2 micro-watershed is presented in Table 26. The results indicate that, 4.55 per cent of the households have borrowed from cooperative bank.

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

Sl.No.	Particulars	MF (6)		SF (8)		SMF (4)		MDF (4)		All (22)	
		N	%	N	%	N	%	N	%	N	%
1	Cooperative Bank	0	0	0	0	0	0	1	25	1	4.55

Avg. Credit amount: The data regarding the avg. Credit amount in Maskanahalli-2 micro-watershed is presented in Table 27. The results indicate that, the average credit amount borrowed by households in micro-watershed was Rs, 2,727.27.

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

Sl.No.	Particulars	MF (6)	SF (8)	SMF (4)	MDF (4)	All (22)
1	Average Credit	0	0	0	15,000	2,727.27

Purpose of credit borrowed - Institutional Credit: The data regarding the purpose of credit borrowed - Institutional Credit in Maskanahalli-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 Maskanahalli-2 micro-watershed

Sl.No.	Particulars	MDF (1)		All (1)	
		N	%	N	%
1	Agriculture production	1	100	1	100

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

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

Sl.No.	Particulars	MDF (1)		All (1)	
		N	%	N	%
1	Un paid	1	100	1	100

Opinion on institutional sources of credit: The data regarding the opinion on institutional sources of credit in Maskanahalli-2 micro watershed is presented in Table 30. The results indicate that, 83.33 per cent opined that the loan amount borrowed from forced to sell the produce at low price to repay loan in time.

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

Sl.No.	Particulars	MDF (1)		All (1)	
		N	%	N	%
1	Forced to sell the produce at low price to repay loan in time	1	100	1	100

Cost of cultivation of Cotton: The data regarding the cost of cultivation of Cotton in Maskanahalli-2 micro-watershed is presented in Table 31. The results indicate that, the total cost of cultivation for Cotton was Rs. 45643.18. The gross income realized by the farmers was Rs. 82923.49. The net income from Cotton cultivation was Rs. 37280.31. Thus the benefit cost ratio was found to be 1:1.82.

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

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	43.91	7300.53	15.99
2	Bullock		Pairs/day	5.98	2988.52	6.55
3	Tractor		Hours	4.62	3467.46	7.60
4	Machinery		Hours	0	0	0
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	55	4745.13	10.40
6	Seed Inter Crop		Kgs.	0	0	0
7	FYM		Quintal	16.91	2029.70	4.45
8	Fertilizer + micronutrients		Quintal	5.28	4295.67	9.41
9	Pesticides (PPC)		Kgs / liters	2.66	27475	62
10	Irrigation		Number	1.65	0	0
11	Repairs			0	0	0
12	Msc. Charges (Marketing costs etc)			0	0	0
13	Depreciation charges			0	118.33	0.26
14	Land revenue and Taxes			0	4.88	01
II	**Cost B1**					
16	Interest on working capital				1658.10	3.63
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**				29355.36	64.31
III	**Cost B2**					
18	Rental Value of Land				410.26	0.90
19	**Cost B2 = (Cost B1 + Rental value)**				29765.62	65.21
IV	**Cost C1**					
20	Family Human Labour			58.58	11728.18	25.70
21	**Cost C1 = (Cost B2 + Family Labour)**				41493.80	90.91
V	**Cost C2**					
22	Risk Premium				0	0
23	**Cost C2 = (Cost C1 + Risk Premium)**				41493.80	90.91
VI	**Cost C3**					
24	Managerial Cost				4149.38	99
25	**Cost C3 = (Cost C2 + Managerial Cost)**				45643.18	100
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		18.98	82923.49	
		b) Main Crop Sales Price (Rs.)			4369.23	
b.	Gross Income (Rs.)				82923.49	
c.	Net Income (Rs.)				37280.31	
d.	Cost per Quintal (Rs./q.)				2404.93	
e.	Benefit Cost Ratio (BC Ratio)				1:1.82	

Cost of cultivation of Groundnut: The data regarding the cost of cultivation of groundnut in Maskanahalli-2 micro-watershed is presented in Table 32. The results indicate that, the total cost of cultivation for groundnut was Rs. 33417.23. The gross income realized by the farmers was Rs. 57542.62. The net income from groundnut cultivation was Rs. 24125.39. Thus the benefit cost ratio was found to be 1:1.72.

Table 32. Cost of Cultivation of Groundnut in Maskanahalli-2 micro-watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	32.58	5275.55	15.79
2	Bullock		Pairs/day	1.64	867.74	2.60
3	Tractor		Hours	2.85	2138.46	6.40
4	Machinery		Hours	0	0	0
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	116.92	14236.39	42.60
6	Seed Inter Crop		Kgs.	0	0	0
7	FYM		Quintal	0	0	0
8	Fertilizer + micronutrients		Quintal	1.73	1364.27	48
9	Pesticides (PPC)		Kgs / liters	0.85	9445	2.83
10	Irrigation		Number	1.85	0	0
11	Repairs			0	0	0
12	Msc. Charges (Marketing costs etc)			0	0	0
13	Depreciation charges			0	83.79	0.25
14	Land revenue and Taxes			0	5.35	02
II	**Cost B1**					
16	Interest on working capital				1985.37	5.94
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**				26900.97	80.50
III	**Cost B2**					
18	Rental Value of Land				333.33	1
19	**Cost B2 = (Cost B1 + Rental value)**				27234.30	81.50
IV	**Cost C1**					
20	Family Human Labour			14.85	3145	9.41
21	**Cost C1 = (Cost B2 + Family Labour)**				30379.30	90.91
V	**Cost C2**					
22	Risk Premium				0	0
23	**Cost C2 = (Cost C1 + Risk Premium)**				30379.30	90.91
VI	**Cost C3**					
24	Managerial Cost				3037.93	99
25	**Cost C3 = (Cost C2 + Managerial Cost)**				33417.23	100
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		12.13	57510.46	
		b) Main Crop Sales Price (Rs.)			4741.67	
	By Product	e) Main Product (q)		1.93	32.16	
		f) Main Crop Sales Price (Rs.)			16.67	
b.	Gross Income (Rs.)				57542.62	
c.	Net Income (Rs.)				24125.39	
d.	Cost per Quintal (Rs./q.)				2755.21	
e.	Benefit Cost Ratio (BC Ratio)				1:1.72	

Cost of cultivation of Red gram: The data regarding the cost of cultivation of Red gram in Maskanahalli-2 micro-watershed is presented in Table 33. The results indicate that, the total cost of cultivation for Red gram was Rs. 30757.10. The gross income realized by the farmers was Rs. 42762.27. The net income from Red gram cultivation was Rs. 12005.17. Thus the benefit cost ratio was found to be 1:1.39.

Table 33. Cost of Cultivation of Red gram in Maskanahalli-2 micro-watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	49.49	8270.19	26.89
2	Bullock		Pairs/day	1.65	823.33	2.68
3	Tractor		Hours	4.83	3618.84	11.77
4	Machinery		Hours	0.41	308.75	1
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	12.33	1850.59	62
6	Seed Inter Crop		Kgs.	0	0	0
7	FYM		Quintal	30.88	4446	14.46
8	Fertilizer + micronutrients		Quintal	2	16835	5.47
9	Pesticides (PPC)		Kgs / liters	1.21	1206.28	3.92
10	Irrigation		Number	0	0	0
11	Repairs			0	0	0
12	Msc. Charges (Marketing costs etc)			0	0	0
13	Depreciation charges			0	204.13	0.66
14	Land revenue and Taxes			0	4.94	02
II	**Cost B1**					
16	Interest on working capital				1102.31	3.58
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**				23518.40	76.46
III	**Cost B2**					
18	Rental Value of Land				466.67	1.52
19	**Cost B2 = (Cost B1 + Rental value)**				239857	77.98
IV	**Cost C1**					
20	Family Human Labour			18.97	3975.93	12.93
21	**Cost C1 = (Cost B2 + Family Labour)**				27961	90.91
V	**Cost C2**					
22	Risk Premium				0	0
23	**Cost C2 = (Cost C1 + Risk Premium)**				27961	90.91
VI	**Cost C3**					
24	Managerial Cost				2796.10	99
25	**Cost C3 = (Cost C2 + Managerial Cost)**				30757.10	100
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		12.83	42762.27	
		b) Main Crop Sales Price (Rs.)			3333.33	
b.	Gross Income (Rs.)				42762.27	
c.	Net Income (Rs.)				12005.17	
d.	Cost per Quintal (Rs./q.)				2397.53	
e.	Benefit Cost Ratio (BC Ratio)				1:1.39	

Cost of Cultivation of Paddy: The data regarding the cost of cultivation of Paddy in Maskanahalli-2 micro-watershed is presented in Table 34. The results indicate that, the total cost of cultivation for Paddy was Rs. 36668.43. The gross income realized by the farmers was Rs. 172900. The net income from Paddy cultivation was Rs. 136231.57. Thus the benefit cost ratio was found to be 1:4.72.

Table 34. Cost of Cultivation of Paddy in Maskanahalli-2 micro-watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	74.10	11732.50	32
2	Bullock		Pairs/day	4.94	2470	6.74
3	Tractor		Hours	7.41	5557.50	15.16
4	Machinery		Hours	0	0	0
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	92.63	6946.88	18.95
6	Seed Inter Crop		Kgs.	0	0	0
7	FYM		Quintal	0	0	0
8	Fertilizer + micronutrients		Quintal	1.24	494	1.35
9	Pesticides (PPC)		Kgs / liters	1.24	1235	3.37
10	Irrigation		Number	6.18	0	0
11	Repairs			0	0	0
12	Msc. Charges (Marketing costs etc)			0	0	0
13	Depreciation charges			0	417.43	1.14
14	Land revenue and Taxes			0	4.94	01
II	**Cost B1**					
16	Interest on working capital				1041.11	2.84
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**				29899.35	81.54
III	**Cost B2**					
18	Rental Value of Land				533.33	1.45
19	**Cost B2 = (Cost B1 + Rental value)**				30432.68	82.99
IV	**Cost C1**					
20	Family Human Labour			13.59	2902.25	7.91
21	**Cost C1 = (Cost B2 + Family Labour)**				33334.93	90.91
V	**Cost C2**					
22	Risk Premium				0	0
23	**Cost C2 = (Cost C1 + Risk Premium)**				33334.93	90.91
VI	**Cost C3**					
24	Managerial Cost				3333.49	99
25	**Cost C3 = (Cost C2 + Managerial Cost)**				36668.43	100
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		24.70	49400	
		b) Main Crop Sales Price (Rs.)			2000	
	By Product	e) Main Product (q)		247	123500	
		f) Main Crop Sales Price (Rs.)			500	
b.	Gross Income (Rs.)				172900	
c.	Net Income (Rs.)				136231.57	
d.	Cost per Quintal (Rs./q.)				1484.55	
e.	Benefit Cost Ratio (BC Ratio)				1:4.72	

Cost of cultivation of Green gram: The data regarding the cost of cultivation of Green gram in Maskanahalli-2 micro-watershed is presented in Table 35. The results indicate that, the total cost of cultivation for Green gram was Rs. 19353.24. The gross income realized by the farmers was Rs. 19042.22. The net income from Green gram cultivation was Rs. -3112. Thus the benefit cost ratio was found to be 1:0.98.

Table 35. Cost of Cultivation of Green gram in Maskanahalli-2 micro-watershed

Sl.No	Particulars	Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**				
1	Hired Human Labour	Man days	18.56	3135	16.20
2	Bullock	Pairs/day	1.87	934.17	4.83
3	Tractor	Hours	2.60	1947.50	106
4	Machinery	Hours	0	0	0
5	Seed Main Crop (Establishment and Maintenance)	Kgs (Rs.)	123	1279.33	6.61
6	Seed Inter Crop	Kgs.	0	0	0
7	FYM	Quintal	24.70	2964	15.32
8	Fertilizer + micronutrients	Quintal	2.19	1748	93
9	Pesticides (PPC)	Kgs / liters	1.14	1222.33	6.32
10	Irrigation	Number	0	0	0
11	Repairs		0	0	0
12	Msc. Charges (Marketing costs etc)		0	0	0
13	Depreciation charges		0	65.61	0.34
14	Land revenue and Taxes		0	4.94	03
II	**Cost B1**				
16	Interest on working capital			865.64	4.47
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**			14166.52	73.20
III	**Cost B2**				
18	Rental Value of Land			400	27
19	**Cost B2 = (Cost B1 + Rental value)**			14566.52	75.27
IV	**Cost C1**				
20	Family Human Labour		15.14	3027.33	15.64
21	**Cost C1 = (Cost B2 + Family Labour)**			17593.85	90.91
V	**Cost C2**				
22	Risk Premium			0	0
23	**Cost C2 = (Cost C1 + Risk Premium)**			17593.85	90.91
VI	**Cost C3**				
24	Managerial Cost			1759.39	99
25	**Cost C3 = (Cost C2 + Managerial Cost)**			19353.24	100
VII	**Economics of the Crop**				
a.	Main Product	a) Main Product (q)	2.60	19042.22	
		b) Main Crop Sales Price (Rs.)		7333.33	
b.	Gross Income (Rs.)			19042.22	
c.	Net Income (Rs.)			-3112	
d.	Cost per Quintal (Rs./q.)			7453.11	
e.	Benefit Cost Ratio (BC Ratio)			1:0.98	

Cost of cultivation of Maize: The data regarding the cost of cultivation of Maize in Maskanahalli-2 micro-watershed is presented in Table 36. The results indicate that, the total cost of cultivation for Maize was Rs. 195857. The gross income realized by the farmers was Rs. 24082.50. The net income from Maize cultivation was Rs. 4497.43. Thus the benefit cost ratio was found to be 1:1.23.

Table 36. Cost of Cultivation of Maize in Maskanahalli-2 micro-watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	16.67	2723.18	13.90
2	Bullock		Pairs/day	0	0	0
3	Tractor		Hours	3.71	2815.80	14.38
4	Machinery		Hours	0	0	0
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	24.70	2470	12.61
6	Seed Inter Crop		Kgs.	0	0	0
7	FYM		Quintal	12.35	1482	7.57
8	Fertilizer + micronutrients		Quintal	3.71	2531.75	12.93
9	Pesticides (PPC)		Kgs / liters	1.24	1482	7.57
10	Irrigation		Number	0	0	0
11	Repairs			0	0	0
12	Msc. Charges (Marketing costs etc)			0	0	0
13	Depreciation charges			0	30.63	0.16
14	Land revenue and Taxes			0	4.94	03
II	**Cost B1**					
16	Interest on working capital				955.89	4.88
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**				14496.18	742
III	**Cost B2**					
18	Rental Value of Land				400	24
19	**Cost B2 = (Cost B1 + Rental value)**				14896.18	766
IV	**Cost C1**					
20	Family Human Labour			14.20	2908.43	14.85
21	**Cost C1 = (Cost B2 + Family Labour)**				17804.61	90.91
V	**Cost C2**					
22	Risk Premium				0	0
23	**Cost C2 = (Cost C1 + Risk Premium)**				17804.61	90.91
VI	**Cost C3**					
24	Managerial Cost				1780.46	99
25	**Cost C3 = (Cost C2 + Managerial Cost)**				195857	100
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		18.53	24082.50	
		b) Main Crop Sales Price (Rs.)			1300	
b.	Gross Income (Rs.)				24082.50	
c.	Net Income (Rs.)				4497.43	
d.	Cost per Quintal (Rs./q.)				1057.22	
e.	Benefit Cost Ratio (BC Ratio)				1:1.23	

Cost of Cultivation of Horse gram: The data regarding the cost of cultivation of Horse gram in Maskanahalli-2 micro-watershed is presented in Table 37. The results indicate that, the total cost of cultivation for Horse gram was Rs. 17866.94. The gross income realized by the farmers was Rs. 40883.93. The net income from Horse gram cultivation was Rs. 23016.99. Thus the benefit cost ratio was found to be 1:2.29.

Table 37. Cost of Cultivation of Horse gram in Maskanahalli-2 micro-watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	30	4943.82	27.67
2	Bullock		Pairs/day	0.76	380	2.13
3	Tractor		Hours	4.26	3195.65	17.89
4	Machinery		Hours	0	0	0
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	11.73	1964.18	10.99
6	Seed Inter Crop		Kgs.	0	0	0
7	FYM		Quintal	0	0	0
8	Fertilizer + micronutrients		Quintal	1.71	1557.52	8.72
9	Pesticides (PPC)		Kgs / liters	0.68	719.40	43
10	Irrigation		Number	0	0	0
11	Repairs			0	0	0
12	Msc. Charges (Marketing costs etc)			0	0	0
13	Depreciation charges			0	1187	0.66
14	Land revenue and Taxes			0	4.94	03
II	**Cost B1**					
16	Interest on working capital				508.93	2.85
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**				13392.51	74.96
III	**Cost B2**					
18	Rental Value of Land				225	1.26
19	**Cost B2 = (Cost B1 + Rental value)**				13617.51	76.22
IV	**Cost C1**					
20	Family Human Labour			12.72	2625.17	14.69
21	**Cost C1 = (Cost B2 + Family Labour)**				16242.67	90.91
V	**Cost C2**					
22	Risk Premium				0	0
23	**Cost C2 = (Cost C1 + Risk Premium)**				16242.67	90.91
VI	**Cost C3**					
24	Managerial Cost				1624.27	99
25	**Cost C3 = (Cost C2 + Managerial Cost)**				17866.94	100
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		10.22	40883.93	
		b) Main Crop Sales Price (Rs.)			4000	
b.	Gross Income (Rs.)				40883.93	
c.	Net Income (Rs.)				23016.99	
d.	Cost per Quintal (Rs./q.)				17487	
e.	Benefit Cost Ratio (BC Ratio)				1:2.29	

Adequacy of fodder: The data regarding the adequacy of fodder in Maskanahalli-2 micro-watershed is presented in Table 38. The results indicate that, 57.14 per cent of the households opined that dry fodder was adequate, 22.86 per cent of the households opined that green fodder was adequate and 2.86 per cent of the households opined that green fodder was inadequate

Table 38. Adequacy of fodder in Maskanahalli-2 micro-watershed

Sl.No.	Particulars	LL (2)		MF (12)		SF (12)		SMF (5)		MDF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Adequate-Dry Fodder	0	0	5	41.67	7	58.33	4	80	4	100	20	57.14
2	Adequate-Green Fodder	0	0	2	16.67	1	8.33	4	80	1	25	8	22.86
3	Inadequate-Green Fodder	0	0	0	0	0	0	0	0	1	25	1	2.86

Annual gross income: The data regarding the annual gross income in Maskanahalli-2 micro-watershed is presented in Table 39. The results indicate that the annual gross income was Rs. 72,416.67 for marginal farmers, for small farmers it was Rs. 139,481.67, semi medium farmers it was Rs. 112,600 and medium farmers it was Rs. 143,550.

Table 39. Annual gross income in Maskanahalli-2 micro-watershed

(Avg value in Rs.)

Sl.No.	Particulars	LL (2)	MF (12)	SF (12)	SMF (5)	MDF (4)	All (35)
1	Service/salary	0	12,500	0	0	0	4,285.71
2	Business	0	3,333.33	12,500	0	0	5,428.57
3	Wage	0	19,166.67	22,750	15,000	22,500	19,085.71
4	Agriculture	0	37,416.67	98,858.33	80,400	121,050	72,042.86
5	Dairy Farm	0	0	5,373.33	17,200	0	4,299.43
Income(Rs.)		0	72,416.67	139,481.67	112,600	143,550	105,142.29

Average annual expenditure: The data regarding the average annual expenditure in Maskanahalli-2 micro-watershed is presented in Table 40. The results indicate that the average annual expenditure is Rs. 6,953.17. For marginal farmers it was Rs. 4,625, for small farmers it was Rs. 10,231.48, for semi medium farmers it was Rs. 5,666.67 and medium farmers it was Rs. 9,187.50.

Table 40. Average annual expenditure in Maskanahalli-2 micro-watershed

(Avg value in Rs.)

Sl.No.	Particulars	LL (2)	MF (12)	SF (12)	SMF (5)	MDF (4)	All (35)
1	Service/salary	0	40,000	0	0	0	1,142.86
2	Business	0	0	50,000	0	0	1,428.57
3	Wage	0	3,500	6,111.11	3,333.33	5,500	3,485.71
4	Agriculture	0	12,000	58,166.67	16,000	31,250	29,571.43
5	Dairy Farm	0	0	8,500	9,000	0	1,500
Total		0	55,500	122,777.78	28,333.33	36,750	243,361.11
Average		0	4,625	10,231.48	5,666.67	9,187.50	6,953.17

Horticulture plants grown: The data regarding horticulture plants grown in Maskanahalli-2 micro-watershed is presented in Table 41. The results indicate that, households have planted 4 coconut, 2 lemon and 12 mango trees in their field.

Table 41: Horticulture plants grown in Maskanahalli-2 micro-watershed

Sl.No.	Particulars	LL (2)		MF (12)		SF (12)		SMF (5)		MDF (4)		All (35)	
		F	B	F	B	F	B	F	B	F	B	F	B
1	Coconut	0	0	0	0	1	0	0	0	3	0	4	0
2	Lemon	0	0	0	0	2	0	0	0	0	0	2	0
3	Mango	0	0	3	0	2	0	0	0	7	0	12	0

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

Forest species grown: The data regarding forest species grown in Maskanahalli-2 micro-watershed is presented in Table 42. The results indicate that, households have planted 1 eucalyptus, 59 neem, 5 tamarind and 4 banyan trees in their field.

Table 42: Forest species grown in Maskanahalli-2 micro-watershed

Sl.No.	Particulars	LL (2)		MF (12)		SF (12)		SMF (5)		MDF (4)		All (35)	
		F	B	F	B	F	B	F	B	F	B	F	B
1	Eucalyptus	0	0	1	0	0	0	0	0	0	0	1	0
2	Neem	0	0	18	0	27	0	5	0	9	0	59	0
3	Tamarind	0	0	0	0	1	0	0	0	4	0	5	0
4	Banyan	0	0	2	0	2	0	0	0	0	0	4	0

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

Average Additional investment capacity: The data regarding average additional investment capacity in Maskanahalli-2 micro-watershed is presented in Table 43. The results indicated that, households have an average investment capacity of Rs. 7,686.14 for land development; households have an average investment capacity of Rs. 371.43 for irrigation facility, households have an average investment capacity of Rs. 2,657.14 for improved crop production and households have an average investment capacity of Rs. 800 for improved livestock management.

Table 43: Source of funds for additional investment capacity in Maskanahalli-2 micro-watershed

Sl.No.	Particulars	LL (2)	MF (12)	SF (12)	SMF(5)	MDF (4)	All (35)
1	Land development	0	3,916.67	12,000	3,203	15,500	7,686.14
2	Irrigation facility	0	0	0	1,000	2,000	371.43
3	Improved crop production	0	1,750	3,083.33	2,000	6,250	2,657.14
4	Improved livestock management	0	500	500	1,000	2,750	800

Table 44: Source of funds for additional investment capacity in Maskanahalli-2 micro –watershed

Sl. No	Item	Land development		Irrigation facility		Improved crop production		Improved livestock management	
		N	%	N	%	N	%	N	%
1	Loan from bank	23	65.71	2	5.71	16	45.71	5	14.29

Source of additional investment: The data regarding source of funds for additional investment in Maskanahalli-2 micro-watershed is presented in Table 44. The results

indicated that loan from bank was the source of additional investment for 65.71 per cent for land development 5.71 per cent for irrigation facility, 45.71 per cent for improved crop production and 14.29 per cent for improved livestock management.

Marketing of the agricultural produce: The data regarding marketing of the agricultural produce in Maskanahalli-2 micro-watershed is presented in Table 45. The results indicated that, cotton was sold to the extent of 100 per cent, green gram was sold to the extent of 71.43 per cent, groundnut was sold to the extent of 86.63 per cent, horse gram was sold to the extent of 66.67 per cent, maize was sold to the extent of 93.33 per cent, paddy was sold to the extent of 60 per cent and red gram was sold to the extent of 68.75 per cent.

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

Sl.No	Crops	Output obtained (q)	Output retained (q)	Output sold (q)	Output sold (%)	Avg. Price obtained (Rs/q)
1	Cotton	161	0	161	100	4369.23
2	Greengram	7	2	5	71.43	7333.33
3	Groundnut	187	25	162	86.63	4741.67
4	Horsegram	60	20	40	66.67	4000
5	Maize	30	2	28	93.33	1300
6	Paddy	20	8	12	60	2000
7	Redgram	32	10	22	68.75	3333.33

Marketing Channels used for sale of agricultural produce: The data regarding marketing channels used for sale of agricultural produce in Maskanahalli-2 micro-watershed is presented in Table 46. The results indicated that, about 105.71 per cent of the farmers sold their produce to local/village merchant.

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

Sl. No.	Particulars	LL (2)		MF (12)		SF (12)		SMF (5)		MDF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Local/village Merchant	0	0	11	91.67	14	116.67	5	100	7	175	37	105.71

Mode of transport of agricultural produce: The data regarding mode of transport of agricultural produce in Maskanahalli-2 micro-watershed is presented in Table 47. The results indicated that, 102.86 per cent of the households have used tractor and 2.86 per cent of the households have used cart as a mode of transportation.

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

Sl.No.	Particulars	LL (2)		MF (12)		SF (12)		SMF (5)		MDF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Cart	0	0	1	8.33	0	0	0	0	0	0	1	2.86
2	Tractor	0	0	10	83.33	14	116.67	5	100	7	175	36	102.86

Incidence of soil and water erosion problems: The data regarding incidence of soil and water erosion problems in Maskanahalli-2 micro-watershed is presented in Table 48. The

results indicated that, 88.57 per cent of the households have experienced soil and water erosion problems in the farm.

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

Sl.No.	Particulars	LL (2)		MF (12)		SF (12)		SMF (5)		MDF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Soil and water erosion problems in the farm	0	0	11	91.67	12	100	5	100	3	75	31	88.57

Interest shown towards soil testing: The data regarding Interest shown towards soil testing in Maskanahalli-2 micro-watershed is presented in Table 49. The results indicated that, 91.43 per cent have shown interest in soil test.

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

Sl.No.	Particulars	LL (2)		MF (12)		SF (12)		SMF (5)		MDF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Interest in soil test	0	0	11	91.67	12	100	5	100	4	100	32	91.43

Usage pattern of fuel for domestic use: The data regarding usage pattern of fuel for domestic use in Maskanahalli-2 micro-watershed is presented in Table 50. The results indicated that, 97.14 per cent of the households used firewood and 5.71 per cent of the households used LPG as a source of fuel.

Table 50. Usage pattern of fuel for domestic use in Maskanahalli-2 micro-watershed

Sl.No.	Particulars	LL (2)		MF (12)		SF (12)		SMF (5)		MDF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Fire Wood	2	100	12	100	11	91.67	5	100	4	100	34	97.14
2	LPG	0	0	0	0	2	16.67	0	0	0	0	2	5.71

Source of drinking water: The data regarding source of drinking water in Maskanahalli-2 micro-watershed is presented in Table 51. The results indicated that, piped supply was the major source of drinking water for 100 per cent of the households in the micro watershed.

Table 51. Source of drinking water in Maskanahalli-2 micro-watershed

Sl.No.	Particulars	LL (2)		MF (12)		SF (12)		SMF (5)		MDF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Piped supply	2	100	12	100	12	100	5	100	4	100	35	100

Source of light: The data regarding source of light in Maskanahalli-2 micro-watershed is presented in Table 52. The results indicated that, Electricity was the major source of light for 97.41 per cent of the households in micro watershed.

Table 52. Source of light in Maskanahalli-2 micro-watershed

Sl.No.	Particulars	LL (2)		MF (12)		SF (12)		SMF (5)		MDF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Electricity	2	100	12	100	12	100	4	80	4	100	34	97.14

Existence of Sanitary toilet facility: The data regarding existence of sanitary toilet facility in Maskanahalli-2 micro-watershed is presented in Table 53. The results indicated that, 28.57 per cent of the households possess sanitary toilet facility.

Table 53. Existence of Sanitary toilet facility in Maskanahalli-2 micro-watershed

Sl.No.	Particulars	LL (2)		MF (12)		SF (12)		SMF (5)		MDF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Sanitary toilet facility	2	100	2	16.67	3	25	1	20	2	50	10	28.57

Possession of PDS card: The data regarding possession of PDS card in Maskanahalli-2 micro-watershed is presented in Table 54. The results indicated that, 97.14 per cent of the sampled households possessed BPL cards.

Table 54. Possession of PDS card in Maskanahalli-2 micro-watershed

Sl.No.	Particulars	LL (2)		MF (12)		SF (12)		SMF (5)		MDF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	BPL	2	100	12	100	12	100	4	80	4	100	34	97.14

Participation in NREGA program: The data regarding participation in NREGA programme in Maskanahalli-2 micro-watershed is presented in Table 55. The results indicated that, 82.86 per cent of the households participated in NREGA programme.

Table 55. Participation in NREGA programme in Maskanahalli-2 micro-watershed

Sl.No.	Particulars	LL (2)		MF (12)		SF (12)		SMF (5)		MDF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Participation in NREGA programme	2	100	11	91.67	9	75	3	60	4	100	29	82.86

Adequacy of food items: The data regarding adequacy of food items in Maskanahalli-2 micro-watershed is presented in Table 56. The results indicated that, cereals and pulses were adequate for 94.29 per cent of the households, oilseed were adequate for 80 per cent, vegetables were adequate for 68.57 per cent, fruits were adequate for 5.71 per cent, milk were adequate for 80 per cent, egg were adequate for 22.86 per cent and meat were adequate for 2.86 per cent.

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

Sl.No.	Particulars	LL (2)		MF (12)		SF (12)		SMF (5)		MDF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Cereals	2	100	12	100	11	91.67	4	80	4	100	33	94.29
2	Pulses	2	100	12	100	11	91.67	4	80	4	100	33	94.29
3	Oilseed	0	0	11	91.67	10	83.33	4	80	3	75	28	80
4	Vegetables	2	100	9	75	7	58.33	3	60	3	75	24	68.57
5	Fruits	0	0	1	8.33	0	0	1	20	0	0	2	5.71
6	Milk	2	100	10	83.33	9	75	3	60	4	100	28	80
7	Egg	0	0	3	25	3	25	2	40	0	0	8	22.86
8	Meat	0	0	0	0	0	0	1	20	0	0	1	2.86

Response on Inadequacy of food items: The data regarding inadequacy of food items in Maskanahalli-2 micro-watershed is presented in Table 57. The results indicated that,

pulses were inadequate for 2.86 per cent, oilseeds and milk were inadequate for 14.29 per cent, vegetables were inadequate for 28.57 per cent, fruits were inadequate for 88.57 per cent, egg were inadequate for 68.57 per cent and meat were inadequate for 91.43 per cent of the households.

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

Sl.No.	Particulars	LL (2)		MF (12)		SF (12)		SMF (5)		MDF (4)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Pulses	0	0	0	0	1	8.33	0	0	0	0	1	2.86
2	Oilseed	2	100	1	8.33	1	8.33	0	0	1	25	5	14.29
3	Vegetables	0	0	3	25	5	41.67	1	20	1	25	10	28.57
4	Fruits	2	100	11	91.67	11	91.67	3	60	4	100	31	88.57
5	Milk	0	0	2	16.67	2	16.67	1	20	0	0	5	14.29
6	Egg	2	100	9	75	8	66.67	2	40	3	75	24	68.57
7	Meat	2	100	12	100	11	91.67	4	80	3	75	32	91.43

Farming constraints: The data regarding farming constraints experienced by households in Maskanahalli-2 micro-watershed is presented in Table 58. The results indicated that, lower fertility status of the was the constraint experienced by 91.43 per cent of the households, wild animal menace on farm field (88.57%), frequent incidence of pest and diseases, high cost of fertilizer and plant protection chemicals and lack of marketing facilities in the area (85.71%), Inadequacy of irrigation water (17.41%), (80%), high rate of interest on credit (80%), low price for the agricultural commodities (82.86%), inadequate extension service (5.71%), Lack of transport for safe transport of the Agril produce to the market (71.43%) and Source of Agri-technology information(2.86%)

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

Sl.No.	Particulars	MF(12)		SF(12)		SMF(5)		MDF(4)		All(35)	
		N	%	N	%	N	%	N	%	N	%
1	Lower fertility status of the soil	12	100	12	100	4	80	4	100	32	91.43
2	Wild animal menace on farm field	12	100	11	91.67	4	80	4	100	31	88.57
3	Frequent incidence of pest and diseases	12	100	11	91.67	4	80	3	75	30	85.71
4	Inadequacy of irrigation water	3	25	1	8.33	0	0	2	50	6	17.14
5	High cost of Fertilizers and plant protection chemicals	12	100	11	91.67	4	80	3	75	30	85.71
6	High rate of interest on credit	9	75	12	100	4	80	3	75	28	80
7	Low price for the agricultural commodities	12	100	9	75	4	80	4	100	29	82.86
8	Lack of marketing facilities in the area	13	108.33	9	75	4	80	4	100	30	85.71
9	Inadequate extension services	0	0	1	8.33	0	0	1	25	2	5.71
10	Lack of transport for safe transport of the Agril produce to the market.	11	91.67	8	66.67	4	80	2	50	25	71.43
11	Source of Agri-technology information	0	0	1	8.33	0	0	0	0	1	2.86

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 indicated that there were 102 (61.45%) men and 64 (38.55%) women among the sampled households. The average family size of landless farmers' was 5.5, marginal farmers' was 4.4, small farmers' was 4.9, semi medium farmers' was 5.6 and medium farmers' was 3.7. The data indicated that, 18 (16.87%) people were in 0-15 years of age, 76 (45.78%) were in 16-35 years of age, 51 (30.72%) were in 36-60 years of age and 11 (6.63%) were above 61 years of age.

The results indicated that Maskanahalli-2 had 64.42 per cent illiterates, 20.48 per cent of them had primary school, 5.42 per cent of them had middle school, 3.61 per cent of them had high school education, 2.41 per cent of them had PUC and 1.2 per cent of them had degree education.

The results indicate that, 91.43 per cent of household heads were practicing agriculture, 8.57 per cent of the household heads were agricultural laborers and 2.86 per cent of the household's heads were General Labour and housewives. The results indicate that agriculture was the major occupation for 72.29 per cent of the household members, 5.42 per cent were agricultural laborers, 1.81 per cent were in general labour and housewives, 0.60 per cent were private service, 14.46 per cent were student and 2.41 per cent were children.

The results show that, 1.2 per cent of the population in the micro watershed has participated in raitha sangha and 98.80 per cent of the population in the micro watershed has not participated in local institution. The results indicate that 31.43 per cent of the households possess thatched, 54.29 per cent of the households possess katcha house and 14.29 per cent of the households possess pucca/RCC house.

The results show that 71.43 per cent of the households possess TV, 57.14 per cent of the households possess mixer/grinder, 5.71 per cent of the households possess bicycle and auto, 28.57 per cent of the households possess motor cycle, 2.86 per cent of the households possess tempo and computer/ laptop, 97.14 per cent of the households possess mobile phones. The results show that the average value of television was Rs. 5,456, mixer/grinder was Rs. 1,707, bicycle was Rs. 3,000, motor cycle was Rs. 42,800, auto

was Rs. 57,500, tempo was Rs. 200,000, mobile phone was Rs. 1,814 and computer/laptop was Rs. 10,000.

About 14.29 per cent each of the households possess bullock cart, 57.14 per cent of the households possess plough, 5.71 per cent of the households possess seed/fertilizer drill, 20 per cent of the households possess sprayer, 91.43 per cent of the households possess weeder and 25.71per cent of the households possess thresher. The results show that the average value of bullock cart was Rs. 13,560, plough was Rs. 1,945, seed/ fertilizer drill was Rs. 3,550, sprayer was Rs. 4,100, weeder was Rs. 89 and the average value of thresher was Rs. 158.

The results indicate that, 40 per cent of the households possess bullocks, 20 per cent of the households possess local cow, 5.71 per cent of the households possess buffalo and 2.86 per cent of the households possess sheep.

The results indicate that, average own labour men available in the micro watershed was 1.79, average own labour (women) available was 1.82, average hired labour (men) available was 11.12 and average hired labour (women) available was 11.30. The results indicate that, 100 per cent of the households opined that the hired labour was adequate.

The results indicate that, households of the Maskanahalli-2 micro-watershed possess 25.16 ha (58.57%) of dry land and 17.79 ha (41.43%) of irrigated land. Marginal farmers possess 7.36 ha (100 %) of dry land. Small farmers possess 17.8 ha (100%) of dry land. Semi medium farmers possess 6.46 ha (100%) of irrigated land. Medium farmers possess 11.34 ha (100%) of irrigated land.

The results indicate that, the average value of dry land was Rs. 381,467.19 and the average value of irrigated land was Rs. 306,151.92. In case of marginal famers, the average land value was Rs. 624,972.49 for dry land. In case of small famers, the average land value was Rs. 280,809.46 for dry land. In case of semi medium famers, the average land value was Rs. 479,761.91 for irrigated land. In case of medium farmers, the average land value was Rs. 207,229.56 for irrigated land.

The results indicate that, there were 7 functioning bore wells in the micro watershed. The results indicate that, bore well was the major irrigation source in the micro water shed for 20 per cent of the farmers. The results indicate that, the depth of bore well was found to be 17.7 meters.

The results indicate that, small, semi medium and medium farmers had an irrigated area of 1.62 ha, 3.72 ha and 6.48 ha respectively. The results indicate that, farmers have grown groundnut (18.93 ha), cotton (11.96 ha), horse gram (5.98 ha), red gram (2.49 ha), green gram (1.86 ha), mandarin (1.62 ha), groundnut (1.21 ha) and paddy

(0.81 ha). Marginal farmers have grown groundnut, cotton, red gram and green gram. Small farmers have grown groundnut, cotton, horse gram, green gram and mandarin. Semi medium farmers have grown groundnut and horse gram. Medium farmers have grown groundnut, cotton and paddy. The results indicate that, the cropping intensity in Maskanahalli-2 micro-watershed was found to be 85.8 per cent.

The results indicate that, 57.14 per cent of the households have bank account. The results indicate that, 62.86 per cent of the households have availed credit from different sources. The results indicate that, 4.55 per cent of the households have borrowed from cooperative bank. The results indicate that, the average credit amount borrowed by households in micro-watershed was Rs, 2,727.27. 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 not paid their loan borrowed from institutional sources. The results indicate that, 83.33 per cent opined that the loan amount borrowed from forced to sell the produce at low price to repay loan in time.

The results indicate that, the total cost of cultivation for Cotton was Rs. 45643.18. The gross income realized by the farmers was Rs. 82923.49. The net income from Cotton cultivation was Rs. 37280.31. Thus the benefit cost ratio was found to be 1:1.82. The total cost of cultivation for groundnut was Rs. 33417.23. The gross income realized by the farmers was Rs. 57542.62. The net income from groundnut cultivation was Rs. 24125.39. Thus the benefit cost ratio was found to be 1:1.72. The total cost of cultivation for Red gram was Rs. 30757.10. The gross income realized by the farmers was Rs. 42762.27. The net income from Red gram cultivation was Rs. 12005.17. Thus the benefit cost ratio was found to be 1:1.39. The total cost of cultivation for Paddy was Rs. 36668.43. The gross income realized by the farmers was Rs. 172900. The net income from Paddy cultivation was Rs. 136231.57. Thus the benefit cost ratio was found to be 1:4.72. The total cost of cultivation for Green gram was Rs. 19353.24. The gross income realized by the farmers was Rs. 19042.22. The net income from Green gram cultivation was Rs. -3112. Thus the benefit cost ratio was found to be 1:0.98. The total cost of cultivation for Maize was Rs. 195857. The gross income realized by the farmers was Rs. 24082.50. The net income from Maize cultivation was Rs. 4497.43. Thus the benefit cost ratio was found to be 1:1.23. The total cost of cultivation for Horse gram was Rs. 17866.94. The gross income realized by the farmers was Rs. 40883.93. The net income from Horse gram cultivation was Rs. 23016.99. Thus the benefit cost ratio was found to be 1:2.29.

The results indicate that, 57.14 per cent of the households opined that dry fodder was adequate, 22.86 per cent of the households opined that green fodder was adequate and 2.86 per cent of the households opined that green fodder was inadequate. The results indicate that the annual gross income was Rs. 72,416.67 for marginal farmers, for small

farmers it was Rs. 139,481.67, semi medium farmers it was Rs. 112,600 and medium farmers it was Rs. 143,550.The results indicate that the average annual expenditure is Rs. 6,953.17. For marginal farmers it was Rs. 4,625, for small farmers it was Rs. 10,231.48, for semi medium farmers it was Rs. 5,666.67 and medium farmers it was Rs. 9,187.50.

The results indicate that, households have planted 4 coconut, 2 lemon and 12 mango trees in their field. The results indicate that, households have planted 1 eucalyptus, 59 neem, 5 tamarind and 4 banyan trees in their field.

The results indicated that, households have an average investment capacity of Rs. 7,686.14 for land development; households have an average investment capacity of Rs. 371.43 for irrigation facility, households have an average investment capacity of Rs. 2,657.14 for improved crop production and households have an average investment capacity of Rs. 800 for improved livestock management.

The results indicated that loan from bank was the source of additional investment for 65.71 per cent for land development 5.71 per cent for irrigation facility, 45.71 per cent for improved crop production and 14.29 per cent for improved livestock management.

The results indicated that, cotton was sold to the extent of 100 per cent, green gram was sold to the extent of 71.43 per cent, groundnut was sold to the extent of 86.63 per cent, horse gram was sold to the extent of 66.67 per cent, maize was sold to the extent of 93.33 per cent, paddy was sold to the extent of 60 per cent and red gram was sold to the extent of 68.75 per cent.

The results indicated that, about 105.71 per cent of the farmers sold their produce to local/village merchant. The results indicated that, 102.86 per cent of the households have used tractor and 2.86 per cent of the households have used cart as a mode of transportation.

The results indicated that, 88.57 per cent of the households have experienced soil and water erosion problems in the farm. The results indicated that, 91.43 per cent have shown interest in soil test.

The results indicated that, 97.14 per cent of the households used firewood and 5.71 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 100 per cent of the households in the micro watershed.

Electricity was the major source of light for 97.41 per cent of the households in micro watershed. The results indicated that, 28.57 per cent of the households possess sanitary toilet facility. The results indicated that, 97.14 per cent of the sampled households possessed BPL cards. The results indicated that, 82.86 per cent of the households participated in NREGA programme.

The results indicated that, cereals and pulses were adequate for 94.29 per cent of the households, oilseed were adequate for 80 per cent, vegetables were adequate for 68.57 per cent, fruits were adequate for 5.71 per cent, milk were adequate for 80 per cent, egg were adequate for 22.86 per cent and meat were adequate for 2.86 per cent.

The results indicated that, pulses were inadequate for 2.86 per cent, oilseeds and milk were inadequate for 14.29 per cent, vegetables were inadequate for 28.57 per cent, fruits were inadequate for 88.57 per cent, egg were inadequate for 68.57 per cent and meat were inadequate for 91.43 per cent of the households.

The results indicated that, lower fertility status of the was the constraint experienced by 91.43 per cent of the households, wild animal menace on farm field (88.57%), frequent incidence of pest and diseases, high cost of fertilizer and plant protection chemicals and lack of marketing facilities in the area (85.71%), Inadequacy of irrigation water (17.41%), (80%), high rate of interest on credit (80%), low price for the agricultural commodities (82.86%), inadequate extension service (5.71%), Lack of transport for safe transport of the Agril produce to the market (71.43%) and Source of Agri-technology information(2.86%)