हर कदम, हर डगर
किसानों का हमसफर
भारतीय कृषि अनुसंधान परिषद
Agrisearch with a human touch

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

KIDADHALA-1 (4D3A9C1d) MICROWATERSHED

Koppal Taluk and District, Karnataka

Karnataka Watershed Development Project – II

SUJALA – III

World Bank funded Project

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.

Citation: Rajendra Hegde, Ramesh Kumar, S.C., K.V. Niranjana, S. Srinivas, M.Lalitha, B.A. Dhanorkar, R.S. Reddy and S.K. Singh (2019). “Land Resource Inventory and socio-economic status of farm households for watershed planning and development of Kidadhala-1 (4D3A9C1d) Microwatershed, Koppal Taluk and District, Karnataka”, ICAR-NBSS&LUP Sujala MWS Publ.215, ICAR – NBSS & LUP, RC, Bangalore. p.111 &31.

TO OBTAIN COPIES,

Please write to:
Director, ICAR - NBSS & LUP,

Amaravati Road, NAGPUR - 440 033, India

Phone : (0712) 2500386, 2500664, 2500545 (O)

Telefax : 0712-2522534

E-Mail : director@nbsslup.ernet.in

Website URL : nbsslup.in

Or

Head, Regional Centre, ICAR - NBSS&LUP, Hebbal, Bangalore - 560 024

Phone : (080) 23412242, 23510350 (O)

Telefax : 080-23510350

E-Mail : nbssrcb@gmail.com

ICAR-NBSS&LUP Sujala MWS Publ.215

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

KIDADHALA-1 (4D3A9C1d) MICROWATERSHED

Koppal Taluk and District, Karnataka

Karnataka Watershed Development Project – II

Sujala-III

World Bank funded Project

ICAR – NATIONAL BUREAU OF SOIL SURVEY AND LAND USE PLANNING

WATERSHED DEVELOPMENT DEPARTMENT, GOVT. OF KARNATAKA, BANGALORE

PREFACE

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

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

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

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

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

ICAR-NBSS&LUP, Regional Centre, Bangalore has taken up a project sponsored by the Karnataka Watershed Development Project-II, (Sujala-III), Government of Karnataka funded by the World Bank under Component -1 Land Resource Inventry. This study was taken up to demonstrate the utility of such a database in reviewing, monitoring and evaluating all the land based watershed development programs on a scientific footing. To meet the requirements of various land use planners at grassroots level, the present study on "Land Resource Inventory and Socio-Economic Status of Farm Households for Watershed Planning and Development of for Kidadhala-1 microwatershed in Koppal Taluk, Koppal 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
Date: 13.06.2019

S.K. SINGH
Director, ICAR - NBSS&LUP Nagpur

Contributors

Dr. Rajendra Hegde Principal Scientist, Head & Project Leader, Sujala-III Project ICAR-NBSS&LUP, Regional Centre, Bangalore	**Dr. S.K.Singh** Director, ICAR-NBSS&LUP Coordinator, Sujala-III Project Nagpur
Soil Survey, Mapping & Report Preparation	
Dr. K.V. Niranjana	Sh. R.S. Reddy
Dr. B.A. Dhanorkar	Ms. Arpitha, G.M
	Smt. Chaitra, S.P.
	Dr. Savitha, H.R.
	Dr. Gayathri, B.
	Dr. Gopali Bardhan
	Sh. Nagendra, B.R.
	Sh. Somashekar T.N
Field Work	
Sh. C. Bache Gowda	Sh. Mayur Patil
Sh. Somashekar	Sh. Arun Kumar, S.
Sh. M. Jayaramaiah	Sh. Sunil Raj
	Sh. Yogesh Kumar, B.
	Sh. Vikas, N.K.
	Sh. Arun Kumar, S.G.
	Sh. Umesh Jadiyappa Madolli
	Sh. Praveen Kumar P. Achalkar
	Sh. Veerabhadraswamy
	Sh. Vinay
	Sh. Shankarappa, K.
	Sh. Lankesh, R.S.
	Sh. Appanna B. Hattigoudar
	Sh. Maharudra
GIS Work	
Dr. S.Srinivas	Sh. A.G. Devendra Prasad
Sh. D.H.Venkatesh	Sh. Abhijith Sastry, N.S.
Smt. K.Sujatha	Sh. Nagendra Babu Kolukondu
Smt. K.V.Archana	Sh. Avinash
Sh. N.Maddileti	Sh. Amar Suputhra, S.
	Sh. Deepak M.J.
	Sh. Madappaswamy
	Smt. K.Karunya Lakshmi
	Ms. Seema, K.V.
	Ms. Ramireddy Lakshmi Silpa
	Ms. Bhanu Rekha, T.
	Ms. Rajata Bhat
	Ms. Shruthi
	Ms. Suman, S.

Laboratory Analysis	
Dr. M. Lalitha	Ms. Thara, V.R.
Smt. Arti Koyal	Ms. Roopa, G.
Smt. Parvathy, S.	Ms. Vindhya, N.G.
	Ms. Shwetha N.K.
	Ms. Pavana Kumari, P.
	Ms. Leelavathy, K.U.
	Ms. Rashmi, N.
	Ms. Padmaja, S.
	Ms. Veena, M.
	Ms. Chaithrashree B
	Ms. Shwetha N
Socio-economic Analysis	
Dr. Ramesh Kumar, S.C.	Sh. M.K. Prakashanaik
	Ms. Karuna V. Kulkarni
	Mrs. Sowmya A.N
	Sh. Vinod R
	Sh. Basavaraja
	Sh. Vijay Kumar Lamani
	Ms. Sowmya K.B
	Mrs. Prathibha, D.G
	Sh. Rajendra,D
Soil & Water Conservation	
Sh. Sunil P. Maske	
Watershed Development Department, GoK, Bangalore	
Sh. Rajeev Ranjan IFS Project Director & Commissioner, WDD	Dr. A. Natarajan NRM Consultant, Sujala-III Project
Dr. S.D. Pathak IFS Executive Director & Chief Conservator of Forests, WDD	

PART-A

LAND RESOURCE INVENTORY

Contents

LIST OF TABLES

LIST OF FIGURES

EXECUTIVE SUMMARY

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

The present study covers an area of 522 ha in Koppal taluk and district, Karnataka. The climate is semiarid and categorized as drought - prone with an average annual rainfall of 662 mm, of which about 424 mm is received during south –west monsoon, 161 mm during north-east and the remaining 77 mm during the rest of the year. An area of about 89 per cent is covered by soils, <1 per cent by rock-out crops, <1 per cent be mining/industrial area and 9 per cent by water bodies, settlements and others. The salient findings from the land resource inventory are summarized briefly below.

- *The soils belong to 10 soil series and 19 soil phases (management units) and 6 land use classes.*
- *The length of crop growing period is <90 days and starts from 2nd week of August to 2nd week of November.*
- *From the master soil map, several interpretative and thematic maps like land capability, soil depth, surface soil texture, soil gravelliness, available water capacity, soil slope and soil erosion were generated.*
- *Soil fertility status maps for macro and micronutrients were generated based on the surface soil samples collected at every 320 m grid interval.*
- *Land suitability for growing 28 major agricultural and horticultural crops were assessed and maps showing the degree of suitability along with constraints were generated.*
- *Entire area is suitable for agriculture.*
- *About 1 per cent is moderately shallow (50-75 cm), 61 per cent moderately deep (75-100 cm) and 27 per cent has deep to very deep soils (100 ->150 cm).*
- *About 7 per cent of the area is having sandy soils, 81 per cent loamy soils and 1 per cent has clayey soils at the surface.*
- *About 7 per cent of the area has non-gravelly (<15%) soils, 70 per cent has gravelly soils (15-35 % gravel) and 11 per cent has very gravelly (35- 60% gravel) soils.*
- *With respect to available water capacity 52 per cent of the area has very low (<50mm/m), 21 per cent of the area has low (51-100 mm/m), 14 per cent medium (101-150 mm/m) and 2 per cent area has very high (>200mm/m).*

- *An area of about <1 per cent has nearly level (0-1%) lands, 87 per cent has very gently sloping (1-3%) lands and 1 per cent has moderately sloping lands (5-10%).*
- *An area of about 6 per cent is slightly eroded (e1), 82 per cent is moderately eroded (e2) and 1 per cent is severely eroded (e3) lands.*
- *An area of about 15 per cent has neutral (pH 6.5 to 7.3) soils, 42 per cent slightly alkaline (pH 7.3 to 7.8), 29 per cent moderately alkaline (pH 7.8 to 8.4) and 3 per cent strongly alkaline (pH 8.4 to 9.0).*
- *An area of about 87 of the soils are non saline (<2 dsm^{-1}) and 2 per cent has slightly saline (2-4 dsm^{-1}) soils.*
- *Organic carbon is low (<0.5%) in about 11 per cent, medium (0.5-0.75%) in 29 per cent and high (>0.75%) in 49 per cent area of the soils.*
- *Available phosphorus is low (<23 kg/ha) in 4 per cent, medium (23-57 kg/ha) in 46 per cent and high (>57 kg/ha) in 39 per cent of the soils.*
- *Available potassium is low (<145 kg/ha) in 14 per cent, medium (145-337 kg/ha) in 54 per cent and high (>337 kg/ha) in 21 per cent of the soils.*
- *Available sulphur is low (<10 ppm) in <1 per cent, medium (10-20 ppm) in 39 per cent and high (>20 ppm) in 49 per cent area of the soils*
- *Available boron is low (<0.5 ppm) in about 74 per cent and medium (0.5-1.0 ppm) in 15 per cent area of the soils.*
- *Available iron is sufficient (>4.5 ppm) in the entire area.*
- *Available zinc is deficient (<0.6 ppm) in 14 per cent of the area and sufficient (>0.6 ppm) in 75 per cent of the area.*
- *Available manganese and copper are sufficient in the entire area.*
- *The land suitability for 28 major agricultural and horticultural crops grown in the microwatershed was assessed and the areas that are highly suitable (class S1) and moderately suitable (class 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	*12(2)*	*99 (19)*		*Pomegranate*	*4(<1)*	*364(70)*
Maize	*4(<1)*	*121(23)*		*Guava*	*2(<1)*	*364(70)*
Bajra	*4(<1)*	*349(67)*		*Jackfruit*	*4(1)*	*363(70)*
Redgram	*4(<1)*	*101(19)*		*Jamun*	*2(<1)*	*365(70)*
Bengal gram	*7(1)*	*103 (20)*		*Musambi*	*4(<1)*	*364 (70)*
Groundnut	*2(<1)*	*386 (74)*		*Lime*	*4(<1)*	*370 (71)*
Sunflower	*4(<1)*	*108(21)*		*Cashew*	-	*373(71)*
Cotton	*9 (2)*	*101(20)*		*Custard apple*	*56 (11)*	*378(73)*
Chilli	*4(<1)*	*99(19)*		*Amla*	*49(9)*	*385(74)*
Tomato	*4(<1)*	*65(12)*		*Tamarind*	*2(<1)*	*62 (12)*
Drumstick	*4(<1)*	*165(31)*		*Marigold*	*4(<1)*	*107 (20)*
Mulberry	*4(<1)*	*425(81)*		*Chrysanthemum*	*4(<1)*	*107(20)*
Mango	*2(<1)*	*62(11)*		*Jasmine*	*4(<1)*	*107(20)*
Sapota	*4(<1)*	*357(68)*		*Crossandra*	*4(<1)*	*99(19)*

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

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

Chapter 1

INTRODUCTION

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

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

In this critical juncture, the challenge before us is not only to increase the productivity per unit area which is steadily declining and showing a fatigue syndrome, but also to prevent or at least reduce the severity of degradation. If the situation is not reversed at the earliest, then the sustainability of the already fragile crop production system and the overall ecosystem will be badly affected in the state. The continued neglect and unscientific use of the resources for a long time has led to the situation observed at present in the state. It is a known fact and established beyond doubt by many studies in the past that the cause for all kinds of degradation is the neglect and irrational use of the land resources. Hence, there is urgent need to generate a detailed site-specific farm level database on various land resources for all the villages/watersheds in a time bound manner that would help to protect the valuable soil and land resources and also to stabilize the farm production.

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

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

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

The land resource inventory aims to provide site specific database for Kidadhala-1 microwatershed in Koppal Taluk, Koppal 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 Kidadhala-1 micro-watershed is located in the central part of Karnataka in Koppal taluk and district (Fig2.1). It lies between $15^0$20' and $15^0$21' North latitudes and $76^0$11'and $76^0$13' East longitudes and covers an area of about 522 ha. It comprises parts of Kidadhala, Basapura and Koppal. It is about 45 km from Koppal town and is surrounded by Kidadhala on the northwestern and western part, Koppal on the south west, Koppal airport on the north, and Basapura on the northern, southern and eastern part of the microwatershed.

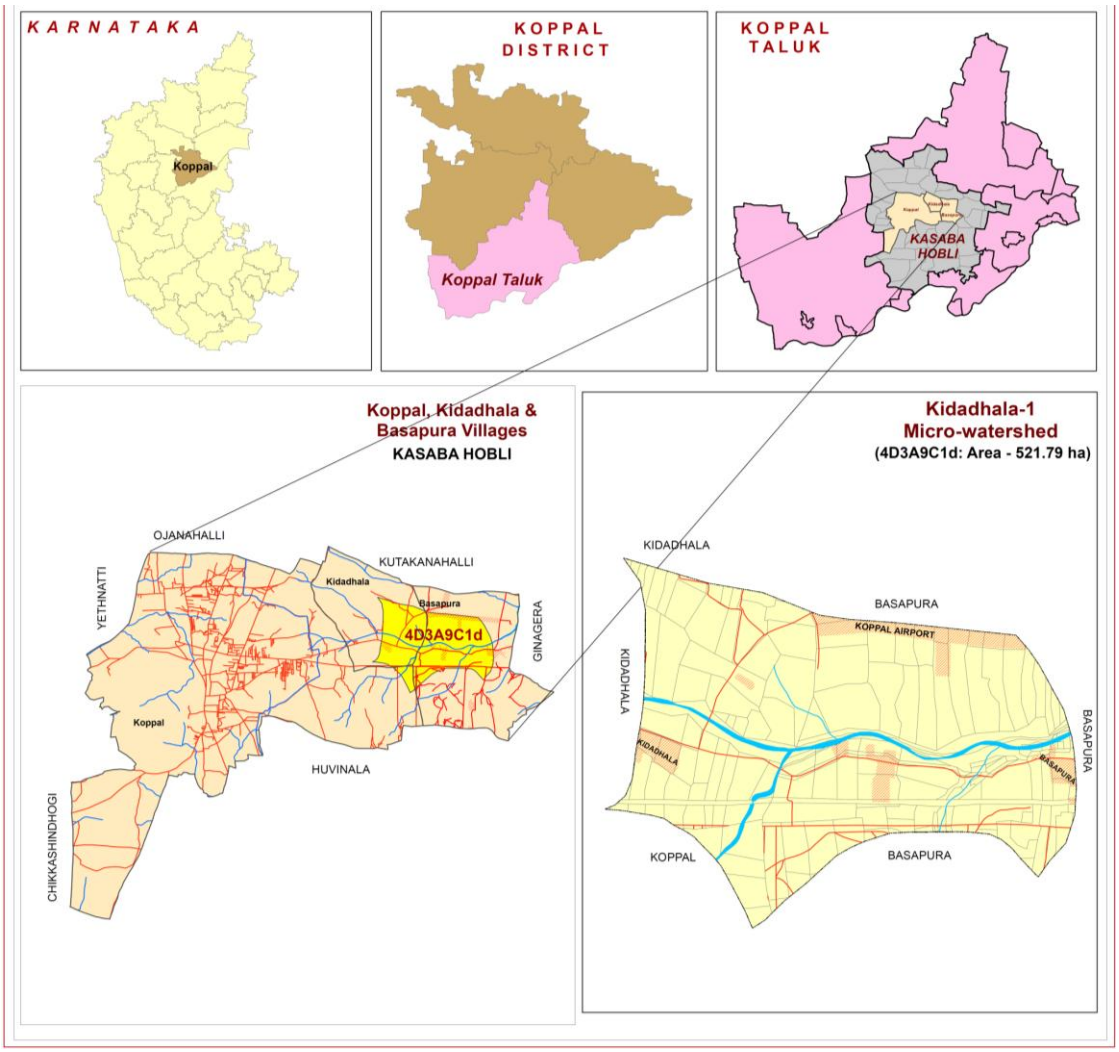


Fig.2.1 Location map of Kidadhala-1 Microwatershed

2.2 Geology

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

gray granite gneisses are highly weathered, fractured and fissured upto a depth of about 10 m. Dolerite dykes and quartz veins are common with variable width and found to occur in Kidadhala-1 village. The thickness of the alluvium generally is limited to less than a meter, except in river valleys where it is very deep extending to tens of meters. Such soils are transported and represent paleo black soils originally formed at higher elevation, but now occupying river valleys.

Fig.2.2a Granite and granite gneiss rocks

Fig.2.2 b Alluvium

2.3 Physiography

Physiographically, the area has been identified as Granite gneiss and Alluvial landscapes based on geology. The microwatershed area has been further divided into mounds/ridges, summits, side slopes and very gently sloping uplands and nearly level plains based on slope and its relief features. The elevation ranges from 540 to 566 m in the gently sloping uplands. The mounds and ridges are mostly covered by rock outcrops.

2.4 Drainage

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

2.5 Climate

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

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

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

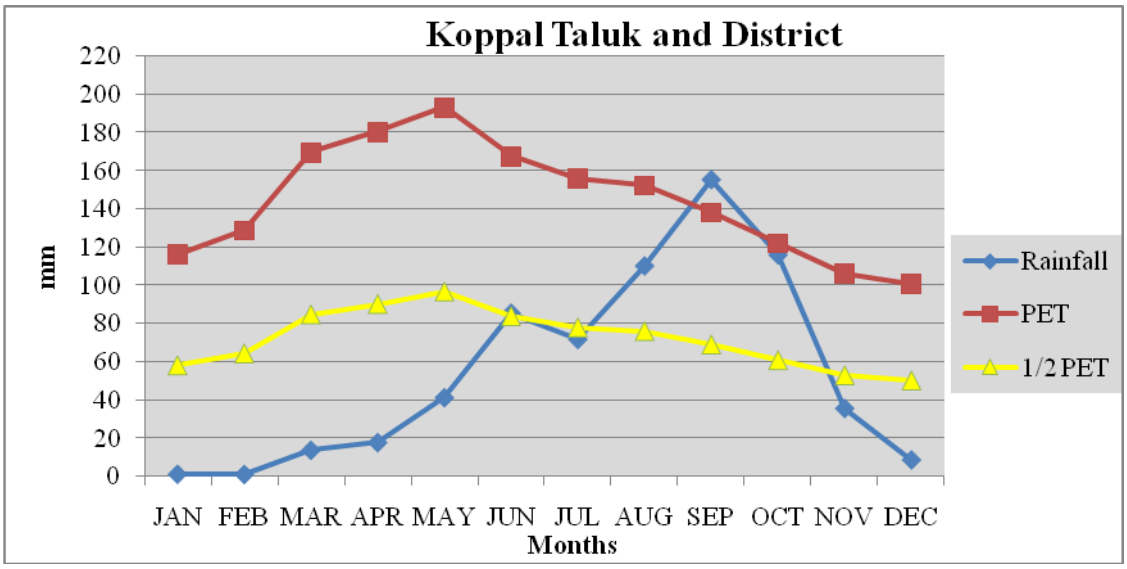


Fig. 2.3 Rainfall distribution in Koppal Taluk and District

2.6 Natural Vegetation

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

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

Fig 2.4 Natural vegetation of Kidadhala-1 microwatershed

2.7 Land Utilization

About 91 per cent area (Table 2.2) in Koppal district is cultivated at present and about 17 per cent of the area is sown more than once. An area of about 3 per cent is currently barren. Forests occupy a small area of about 5 per cent and the tree cover is in a very poor state. Most of the mounds, ridges and boulder areas have very poor vegetative cover. Major crops grown in the area are sorghum, maize, bajra, cotton, safflower, sunflower, red gram, horse gram, onion, mulberry, pomegranate, sugarcane, bengalgram and groundnut (Fig 2.5 a & b). While carrying out land resource inventory, the land use/land cover particulars are collected from all the survey numbers and a current land use map of the microwatershed is prepared. The current land use map prepared shows the arable and non-arable lands, other land uses and different types of crops grown in the area. The current land use map of Kidadhala-1 microwatershed is presented in Fig.2.6.

Table 2.2 Land Utilization in Koppal District

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

Fig.2.5a Different crops and cropping systems in Kidadhala-1 Microwatershed

Fig.2.5b Different crops and cropping systems in Kidadhala-1 Microwatershed

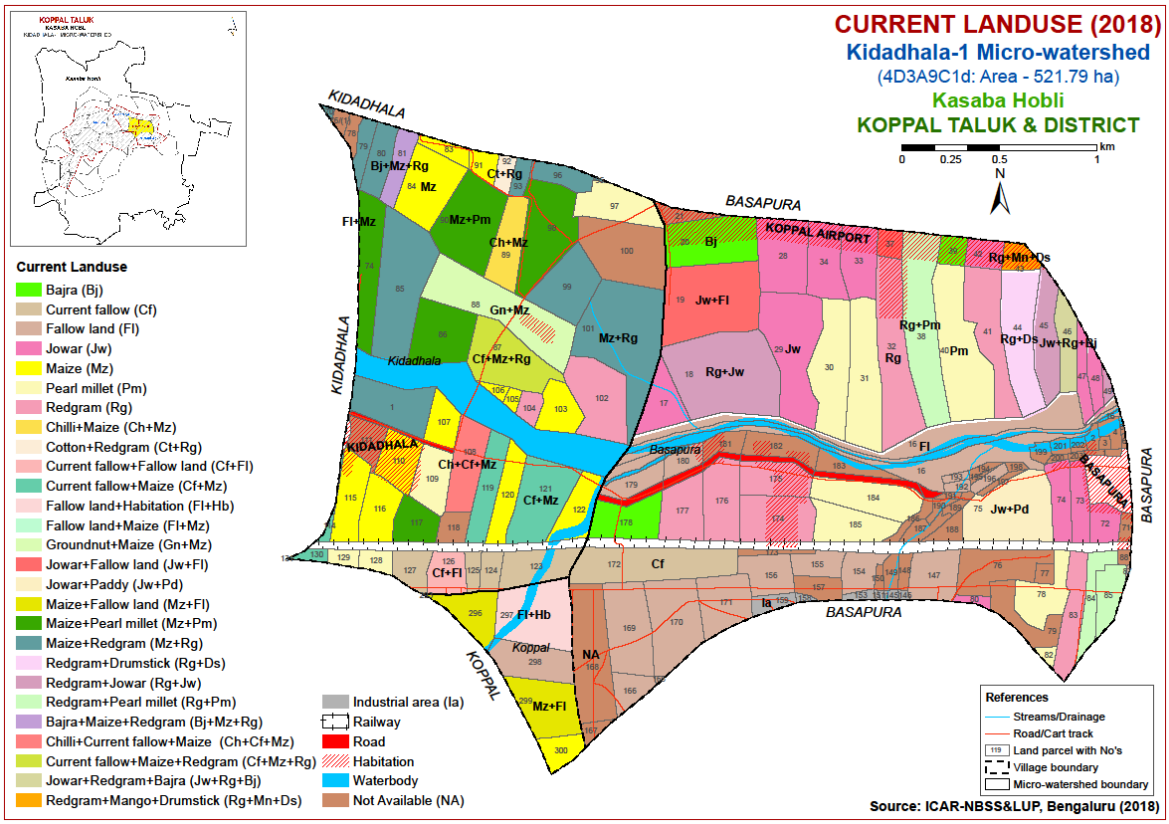


Fig.2.6 Current Land Use – Kidadhala-1 Microwatershed

Chapter 3

SURVEY METHODOLOGY

The purpose of land resource inventory is to delineate similar areas (soil series and phases), which respond or expected to respond similarly to a given level of management. This was achieved in Kidadhala-1 microwatershed by the detailed study of all the soil characteristics (depth, texture, colour, structure, consistence, coarse fragments, porosity, soil reaction, soil horizons etc.) and site characteristics(slope, erosion, drainage, occurrence of rock fragments etc.) followed by grouping of similar areas based on soil-site characteristics into homogeneous (management units) units and showing their extent and geographic distribution on the microwatershed cadastral map. The detailed soil survey at 1:7920 scale was carried out in 522 ha area. The methodology followed for carrying out land resource inventory was as per the guidelines given in Soil Survey Manual (IARI, 1971; Soil Survey Staff, 2006; Natarajan *et al.,* 2015) which is briefly described below.

3.1 Base Maps

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

3.2 Image Interpretation for Physiography

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

Image Interpretation Legend for Physiography

G- Granite gneiss landscape

G1 Hills/ Ridges/ Mounds

G11 Summits

G12 Side slopes

G121 Side slopes with dark grey tones

G2 Uplands

G21 Summits

G22 Gently sloping uplands

G221 Gently sloping uplands, yellowish green (eroded)

G222 Gently sloping uplands, yellowish white (severely eroded)

G23 Very gently sloping uplands

G231 Very gently sloping uplands, yellowish green

G232 Very gently sloping uplands, medium green and pink

G233 Very gently sloping uplands, pink and green (scrub land)

G234 Very gently sloping uplands, medium greenish grey

G235 Very gently sloping uplands, yellowish white (eroded)

G236 Very gently sloping uplands, dark green

G237 Very gently sloping uplands, medium pink (coconut garden)

G238 Very gently sloping uplands, pink and bluish white (eroded)

DSe -Alluvial landscape

DSe 1 Summit

DSe 11 Nearly level Summit with dark grey tone

DSe 12 Nearly level Summit with medium grey tone

DSe 13 Nearly level Summit with whitish grey tone

DSe 14 Nearly level Summit with whitish tone (Calcareousness)

DSe 15 Nearly level Summit with pinkish grey tone

DSe 16 Nearly level Summit with medium pink tone

DSe 17 Nearly level Summit with bluish white tone

DSe 18 Nearly level Summit with greenish grey tone

DSe 2 Very gently sloping

DSe 21 Very gently sloping, whitish tone

DSe 22 Very gently sloping, greyish pink tone

DSe 23 Very gently sloping, whitish grey tone

DSe 24 Very gently sloping, medium grey tone

DSe 25 Very gently sloping, medium pink tone

DSe 26 Very gently sloping, dark grey tone

DSe 27 Very gently sloping, bluish grey tone

DSe 28 Very gently sloping, greenish grey tone

DSe 29 Very gently sloping, Pinkish grey

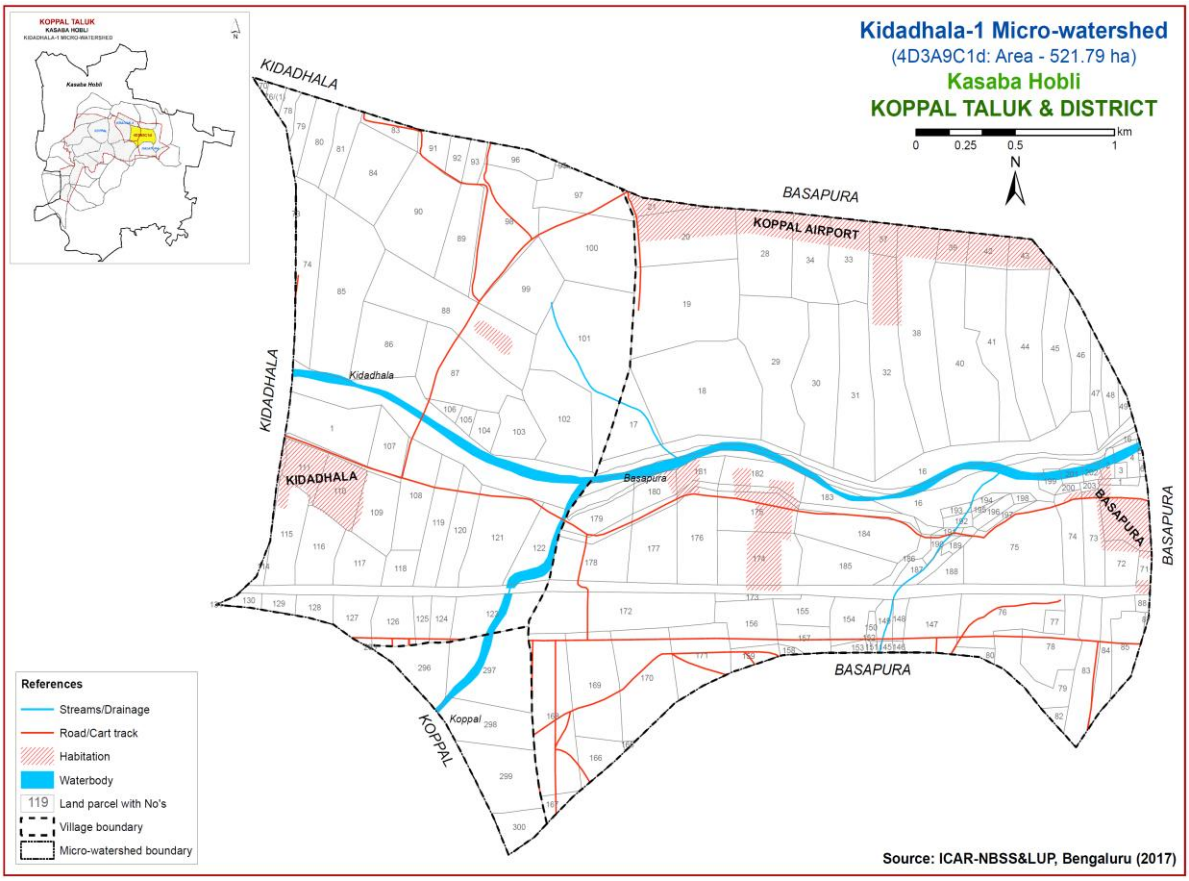


Fig 3.1 Scanned and Digitized Cadastral map of Kidadhala-1 Microwatershed

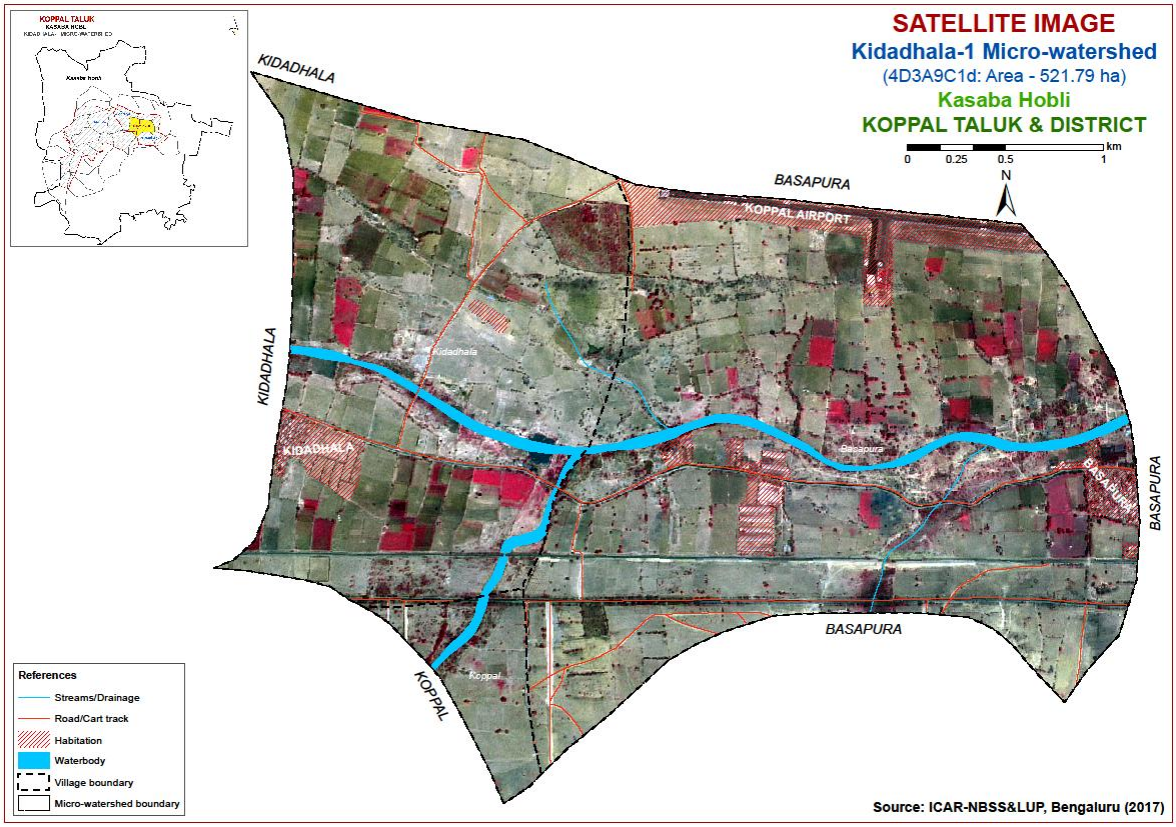


Fig.3.2 Satellite Image of Kidadhala-1 Microwatershed

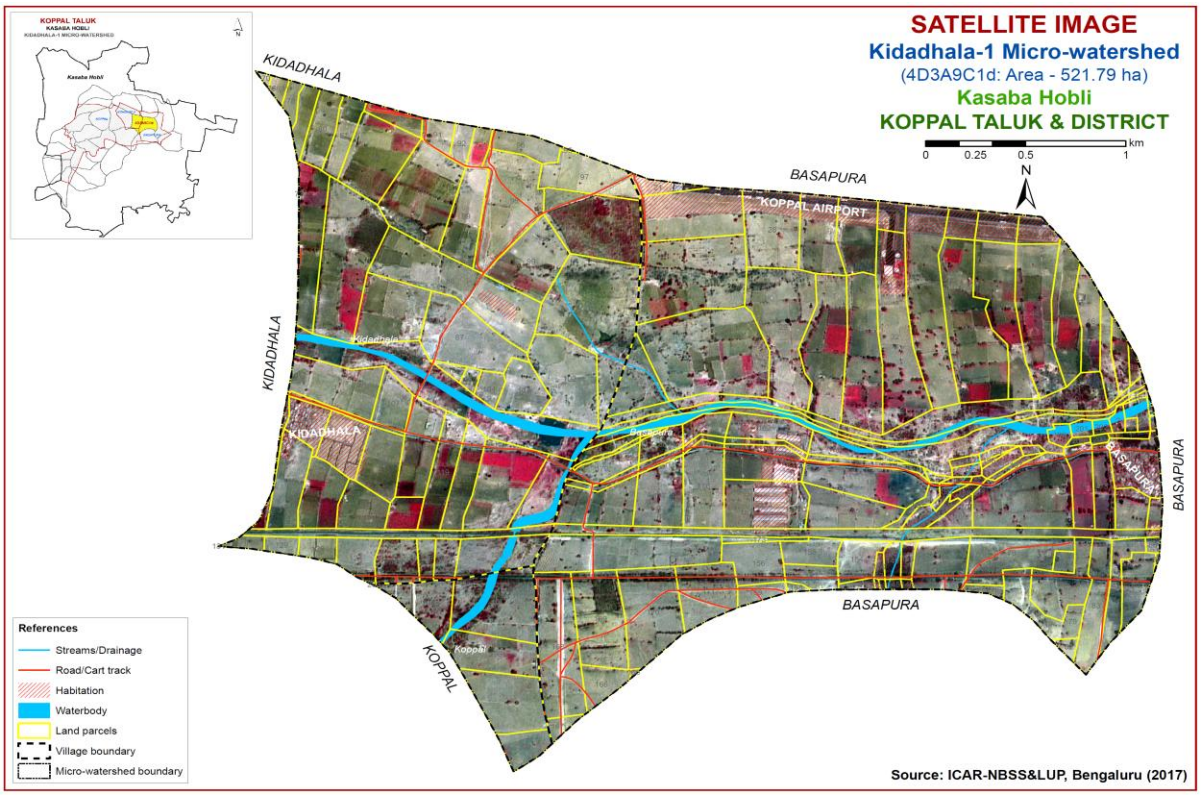


Fig.3.3 Cadastral map overlaid on IRS PAN+LISS IV merged imagery of Kidadhala-1 Microwatershed

3.3 Field Investigation

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

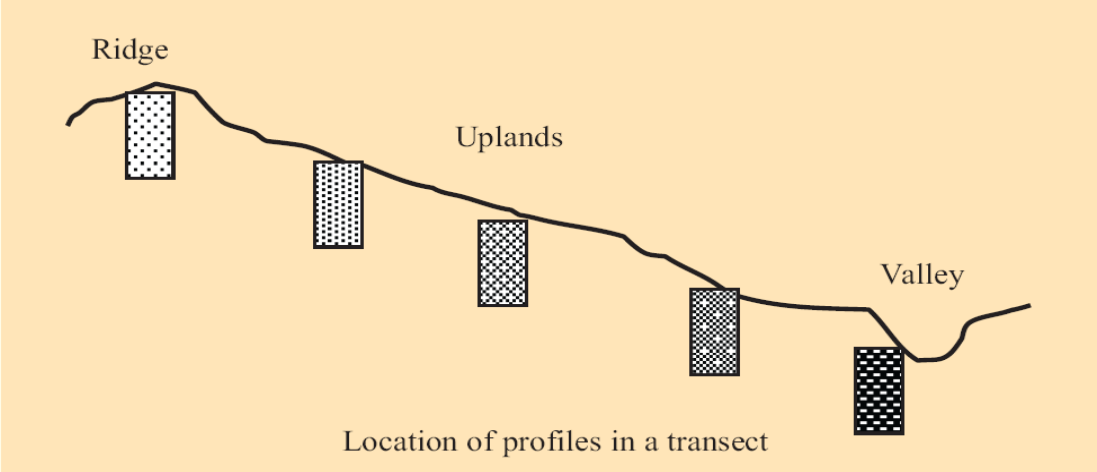


Fig: 3.4. Location of profiles in a transect

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

Based on the soil characteristics, the soils were grouped into different soil series. Soil series is the most homogeneous unit having similar horizons and properties and behaves similarly for a given level of management. Soil depth, texture, colour, kind of horizon and horizon sequence, amount and nature of gravel present, calcareousness, nature of substratum etc, were used as the major differentiating characteristics for identifying soil series occurring in the area. The differentiating characteristics used for identifying the soil series are given in Table 3.1. Based on the above characteristics, 10 soil series were identified in Kidadhala-1 microwatershed.

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

Soils of Granite Gneiss Landscape							
Sl. No	**Soil Series**	**Depth (cm)**	**Colour (moist)**	**Texture**	**Gravel (%)**	**Horizon sequence**	**Calcareo-usness**
1	**Thammadahalli (TDH)**	50-75	2.5YR2.5/4,3/6	sc-c	<15	Ap-Bt-Cr	-
2	**Hooradhahalli (HDH)**	75-100	2.5YR2.5/4,3/4, 3/6	gsc-gc	>35	Ap-Bt-Cr	-
3	**Chikkamegheri (CKM)**	75-100	2.5YR2.5/3,3/4, 3/6	sc	-	Ap-Bt-Cr	-
4	**Mornal (MNL)**	100-150	5YR 3/4, 2.5 YR 3/4, 4/6	gsc-gscl	15-35	Ap-Bt-Cr	-
5	**Balapur (BPR)**	100-150	2.5YR2.5/4,3/4	gsc-gc	>35	Ap-Bt-Cr	-
6	**Giddadapalya (GDP)**	100-150	2.5YR3/4, 3/6	gsc-gc	30-60 after 60 cm	Ap-Bt-Cr	-
7	**Hallikere (HLK)**	>150	5YR3/3,3/4 7.5YR3/3,3/4	c	<15	Ap-Bt	-
8	**Niduvalalu (NDL)**	>150	2.5YR2.5/3,2.5/4, 3/3,4/6	gsc	>35	Ap-Bt	-
9	**Thondigere (TDG)**	>150	7.5YR3/3,3/4,4/6 10YR3/3,4/3, 4/4,4/6	scl	-	Ap-Bw-C	-
Soils of Alluvial Landscape							
10	**Narasapura (NSP)**	75-100	10 YR 3/1, 3/2, 4/2,	c	-	Ap-Bw-Cr	e-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 mini pits 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 mini pits, road cuts, terrace cuts etc., were studied to validate the soil boundaries on the soil map.

The soil map shows the geographic distribution of 19 mapping units representing 10 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 19 phases mapped in the microwatershed. Each mapping unit (soil phase) delineated on the map has similar soil and site characteristics. In other words, all the farms or survey numbers included in one phase will have similar management needs and have to be treated accordingly.

3.5 Land Management Units

The 19 soil phases identified and mapped in the microwatershed were regrouped into six 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 Kidadhala-1 microwatershed, five soil and site characteristics, namely soil depth, soil texture, slope, erosion and gravel content have been considered for defining LMUs. The Land Management Units are expected to behave similarly for a given level of management.

3.5 Laboratory Characterization

Soil samples for each series were collected from representative master profiles for laboratory characterization by following the methods outlined in the Laboratory Manual (Sarma *et al*, 1987). Surface soil samples collected in the year 2017 from farmer's fields in Kidadhala-1 microwatershed (53 samples) for fertility status (major and micronutrients) at 320 m grid interval were analyzed in the laboratory (Katyal and Rattan, 2003). By linking the soil fertility data to the survey numbers through GIS, soil fertility maps were generated using Kriging method for the microwatershed.

Table 3.2 Soil map unit description of Kidadhala-1 Microwatershed

Soil map unit No*	Soil Series	Soil Phase Symbol	Mapping Unit Description	Area in ha (%)
Soils of Granite and Granite gneiss landscape				
	TDH	Thammadahalli soils are moderately shallow (50-75cm), well drained, have dark red to dark reddish brown red sandy clay to clay soils occurring on very gently sloping uplands under cultivation		**5 (1.03)**
56		TDHcB2g1	Sandy loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)	5 (1.03)
	HDH	Hooradhahalli soils are moderately deep (75-100 cm), well drained, dark red to dark reddish brown, red gravelly sandy clay to clay soils occurring on nearly level to moderately sloping uplands under cultivation		**271 (51.74)**
106		HDHcA1g1	Sandy loam surface, slope 0-1%, slight erosion, gravelly (15-35%)	5 (0.94)
111		HDHcB2g1	Sandy loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)	113 (21.57)
117		HDHcD3g2	Sandy loam surface, slope 5-10%, severe erosion, very gravelly (35-60%)	8 (1.44)
121		HDHhB1g2	Sandy clay loam surface, slope 1-3%, slight erosion, very gravelly (35-60%)	24 (4.62)
123		HDHhB2g1	Sandy clay loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)	121 (23.17)

	CKM	Chikkamegheri soils are moderately deep (75-100 cm), well drained, have dark brown to dark reddish brown red sandy clay soils occurring on nearly level to very gently sloping uplands under cultivation		**40 (7.75)**
170		CKMbB2g1	Loamy sand surface, slope 1-3%, moderate erosion, gravelly (15-35%)	34 (6.57)
173		CKMcB2g2	Sandy loam surface, slope 1-3%, moderate erosion, very gravelly (35-60%)	6 (1.18)
	MNL	Mornal soils are deep (100-150 cm), well drained, have dark reddish brown to red gravelly sandy clay loam gravelly sandy clay soils occurring on very gently sloping uplands under cultivation		**2 (0.42)**
204		MNLcB2	Sandy loam surface, slope 1-3%, moderate erosion	2 (0.42)
	BPR	Balapur soils are deep (100-150 cm), well drained, have dark reddish brown to dark red gravelly sandy clay to clay soils occurring on nearly level to gently sloping uplands under cultivation		**55 (10.49)**
225		BPRcB2g1	Sandy loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)	23 (4.32)
226		BPRcB2g2	Sandy loam surface, slope 1-3%, moderate erosion, very gravelly (35-60%)	22 (4.24)
230		BPRhB2	Sandy clay loam surface, slope 1-3%, moderate erosion	10 (1.93)
	GDP	Giddadapalya soils are deep (100-150 cm), well drained, have dark reddish brown to dark red gravelly sandy clay to clay soils occurring on very gently sloping uplands under cultivation		**2 (0.41)**
268		GDPhB2	Sandy clay loam surface, slope 1-3%, moderate erosion	2 (0.41)
	HLK	Hallikere soils are very deep (>150 cm), well drained, have dark brown to dark reddish brown clayey soils occurring on nearly level to very gently sloping uplands under cultivation		**2 (0.41)**
271		HLKhB2g1	Sandy clay loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)	2 (0.41)
	NDL	Niduvalalu soils are very deep (>150 cm), well drained, have red to dark reddish brown red gravelly sandy clay soils occurring on nearly level to very gently sloping uplands under cultivation		**50(9.5)**
291		NDLcB2g1	Sandy loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)	10 (1.86)
296		NDLhB2g1	Sandy clay loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)	40 (7.64)
	TDG	Thondigere soils are very deep (>150 cm), well drained, have dark brown to dark yellowish brown, black sandy clay loam soils occurring on nearly level to very gently sloping lowlands under cultivation		**22** (4.27)
440		TDGcB2	Sandy loam surface, slope 1-3%, moderate erosion	22 (4.27)

Soils of Alluvial landscape				
	NSP	Narasapura soils are moderately deep (75-100 cm), moderately well drained, have dark grayish brown to very dark grayish brown and very dark gray, black cracking clay soils occurring on nearly level to very gently sloping plains under cultivation		**7 (1.4)**
358		NSPiB2g1	Sandy clay surface, slope 1-3%, moderate erosion, gravelly (15-35%)	7 (1.4)
992	Railway	Railway lands		**6 (1.11)**
994	Mining/Industrial	Mining /Industrial area		**4 (0.82)**
999	Rock outcrops	Rock lands, both massive and bouldery with little or no soil		**1 (0.17)**
100	Others	Habitation and Water body		**46 (8.89)**

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

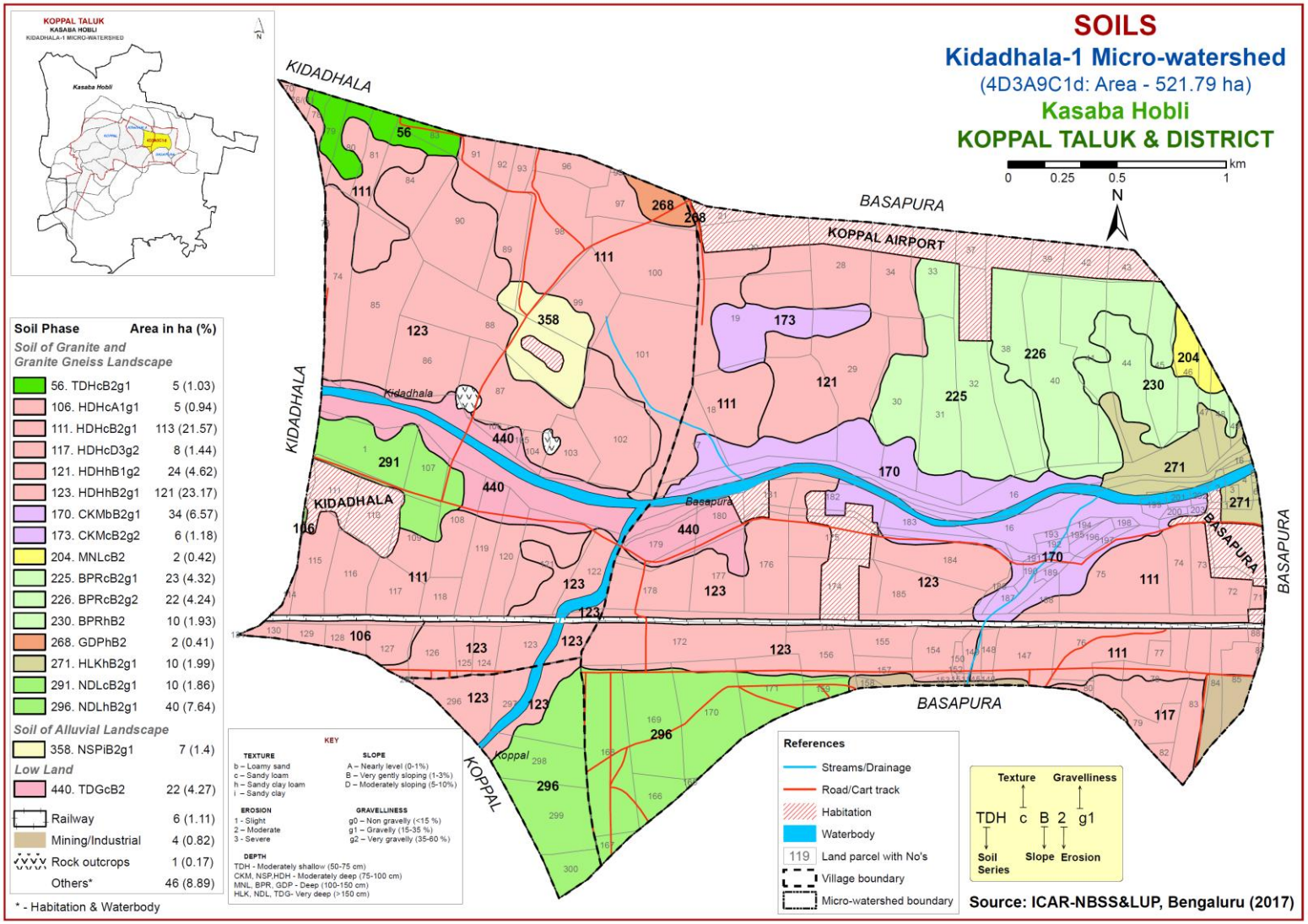


Fig 3.5 Soil Phase or Management Units- Kidadhala-1 Microwatershed

Chapter 4

THE SOILS

Detailed information pertaining to the nature, extent and distribution of different kinds of soils occurring in Kidadhala-1 microwatershed is provided in this chapter. The microwatershed area has been identified as granite gneiss and alluvial landscapes based on geology. In all, 10 soil series were identified. Soil formation is the result of the combined effect of environmental and terrain factors that are reflected in soil morphology. The soil formation is dominantly influenced by the parent material, climate, time and relief.

A brief description of each of the 10 soil series identified followed by 19 soil phases (management units) mapped (Fig. 3.5) are furnished below. The physical and chemical characteristics of soil series identified in Kidadhala-1 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 were identified and mapped. The brief description of the soil series along with the soil phases identified and mapped is given below.

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

The thickness of the solum ranges from 54 to 75 cm. The thickness of A horizon ranges from 11 to 19 cm. Its colour is in 7.5 YR, 5YR and 2.5 YR hue with value 2.5 to 4 and chroma 2 to 6. The texture varies from sandy clay loam to clay with 10 to 20 per cent gravel. The thickness of B horizon ranges from 43 to 60 cm. Its colour is in 2.5 YR hue with value 3 and chroma 4 to 6. Its texture is sandy clay to clay. The available water capacity is medium (100-150 mm/m). One soil phase was identified and mapped.

Landscape and soil profile characteristics of Thammadahalli (TDH) Series

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

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

Landscape and soil profile characteristics of Hooradhahalli (HDH) Series

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

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

Landscape and soil profile characteristics of Chikkamegheri (CKM) Series

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

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

Landscape and soil profile characteristics of Mornal (MNL) Series

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

The thickness of the solum ranges from 102 to 147 cm. The thickness of A horizon ranges from 12 to 17cm. Its colour is in 5 YR and 2.5 YR hue with value and chroma 3 to 4. The texture ranges from loamy sand to sandy clay with 15 to 50 per cent gravel. The thickness of B horizon ranges from 90 to 132 cm. Its colour is in 2.5 YR hue with value 2.5 to 3 and chroma 4 to 6. Texture is sandy clay to clay with 35 to 50 per cent gravel. The available water capacity is medium (100-150 mm/m). Three soil phases were identified and mapped

Landscape and soil profile characteristics of Balapur (BPR) Series

4.1.6 Giddadapalya (GDP) Series: Giddadapalya soils are deep (100-150 cm), well drained, have dark reddish brown to dark red gravelly sandy clay to clay soils. They are developed from weathered granite gneiss and occur on very gently sloping uplands under cultivation. The Giddadapalya series has been classified as a member of the fine, mixed, isohyperthermic family of Rhodic Paleustalfs.

The thickness of the solum ranges from 106 to 145 cm. The thickness of A-horizon ranges from 12 to 13 cm. Its colour is in 5 YR hue with value and chroma 3 to 4. The texture ranges from sandy loam with 10 to 15 per cent gravel. The thickness of B-horizon ranges from 106 to 123 cm. Its colour is in 2.5 YR hue with value 3 to 4 and chroma 3 to 6. Texture is sandy clay to clay with 35 to 75 per cent gravel. The available water capacity is low (51-100 mm/m). One soil phase was identified and mapped.

Landscape and soil profile characteristics of Giddadapalya (GDP) Series

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

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

Landscape Soil Profile Characteristics of Hallikere (HLK) Series

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

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

Landscape Soil Profile Characteristics of Niduvalalu (NDL) Series

4.1.9 Thondigere (TDG) Series: Thondigere soils are very deep (>150 cm), well drained, have dark brown to dark yellowish brown, sandy clay loam stratified soils. They have developed from alluvio- colluvium and occur on nearly level to very gently sloping lowlands under cultivation. The Thondigere series has been classified as a member of the fine- loamy, mixed, isohyperthermic family of Fluventic Haplustepts.

The thickness of the solum is more than 150 cm. The thickness of A-horizon ranges from 12 to 19 cm. Its colour is in 10 YR, 5 YR and 7.5 YR hue with value 3 to 4 and chroma 4. The texture is sandy clay loam. The thickness of B horizon is more than 150 cm. Its colour is in 10 YR and 7.5 YR hue with value 3 to 4 and chroma 3 to 6. Its texture is sandy loam, sandy clay loam and sandy clay. The available water capacity is medium (101-150 mm/m). One soil phase was identified and mapped.

Landscape and soil profile characteristics of Thondigere (TDG) Series

4.2 Soils of Alluvial Landscape

In this landscape, only one soil series was identified and mapped. The brief description of soil series along with the soil phases identified and mapped is given below.

4.2.1 Narasapura (NSP) series: Narasapura soils are moderately deep (75-100 cm), moderately well drained, have dark grayish brown to very dark grayish brown and very dark gray, black calcareous cracking clay soils They have developed from alluvium and occur on very gently sloping uplands. The Narasapura series has been classified as a member of the very fine, smectitic, isohyperthermic (calc) family of Typic Haplustepts.

The thickness of the solum is 76 to 98 cm. The thickness of A horizon ranges from 15 to 19 cm. Its colour is in 10 YR hue with value 3 and chroma 1 to 2.The texture is clay with no gravel. The thickness of B horizon ranges from 57 to 83 cm. Its colour is in 10 YR hue with value 3 to 5 and chroma 1 to 3. Its texture is clay and is calcareous. The available water capacity is medium (101-150 mm/m). One soil phase was identified and mapped.

Landscape and soil profile characteristics of Narasapura (NSP) series

Table: 4.1 Physical and Chemical Characteristics of Soil Series identified in Kidadhala-1 microwatershed

Soil Series: Thammadahalli (TDH), Pedon-TR_1/1
Location: $15^0$03'41.7"N, $75^0$36'65.2"E, (4D4A3G2d), Nilogal village, Shirahatti taluk, Gadag district
Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Fine, mixed, isohyperthermic Rhodic Paleustalfs

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-25	Ap	85.71	7.34	6.94	14.79	13.28	16.10	24.75	16.80	20	ls		
25-65	Bt	47.76	7.96	44.28	15.30	9.78	6.24	7.91	8.53	10	sc		

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-25	9.19			0.18	0.35	1.29	-	-	0.08	0.52	0.60	3.57	0.51	100.00	14.57
25-65	8.00			0.17	0.35	0.58	-	-	0.15	1.31	1.46	13.87	0.31	100.00	9.44

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

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

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

Series Name: Chikkamegheri (CKM), **Pedon:** RM-2

Location: $15^0$21'40"N, $76^0$16'43"E, Gudanahalli village, Koppal Taluk and district

Analysis at: NBSS&LUP, Regional Centre, Bangalore **Classification:** Fine, mixed, isohyperthermic, Rhodic Paleustalfs

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

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-10	7.99			0.326	0.83	4.44	9.35	4.76	0.28	0.54	14.93	12.50	0.45	119	4.33
10-25	7.36			0.345	0.99	2.40	10.37	4.84	0.10	1.18	16.48	17.60	0.33	94	6.68
25-38	6.69			0.477	0.79	0.00	10.25	4.20	0.09	1.61	16.15	16.10	0.32	100	10.01
38-55	6.45			0.548	0.63	0.00	9.43	2.86	0.10	1.52	13.91	14.80	0.31	94	10.27
55-70	6.35			0.532	0.71	0.00	9.59	2.79	0.11	1.66	14.16	14.60	0.31	97	11.39
70-90	6.44			0.613	0.27	0.00	9.58	3.10	0.19	1.87	14.74	14.70	0.41	100	12.69

Series Name: Mornal (MNL), Pedon: R-12
Location: $15^0$22'75"N, $76^0$05'16.1" Halageri village, Koppal taluk and district
Analysis at: NBSS&LUP, Regional Centre, Bangalore **Classification:** Fine mixed, isohyperthermic Typic Rhodustalfs

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-17	Ap	81.48	5.14	13.39	14.07	12.15	17.00	27.53	10.73	70	sl	9.64	4.93
17-31	Bt1	51.43	10.24	38.33	6.67	7.72	9.52	19.26	8.25	30	sc	23.97	11.70
31-56	Bt2	45.62	8.77	45.62	17.85	7.31	8.14	8.87	3.44	30	sc	25.94	12.45
56-104	Bt3	53.10	10.62	36.28	21.87	10.30	8.10	7.99	4.84	<30	sc	20.95	10.16
104-126	Bc	54.21	12.88	32.91	12.28	8.84	15.92	10.20	6.97	<30	scl	19.96	10.21

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}							%	%
0-17	7.89			0.137	0.33	0.00	4.92	3.35	0.35	0.45	9.07	9.01	0.67	101	5.04
17-31	8.19			0.31	0.45	0.00	7.24	5.16	0.16	0.15	12.70	13.57	0.35	94	1.12
31-56	8.2			0.414	0.53	0.00	6.49	5.32	0.11	0.13	12.05	18.55	0.41	65	0.71
56-104	8.64			0.422	0.37	0.00	6.21	4.64	0.16	0.14	11.15	15.16	0.42	74	0.95
104-126	8.71			0.436	0.2	0.00	7.06	6.31	0.09	0.33	13.79	14.52	0.44	95	2.31

Soil Series: Balapur (BPR), **Pedon:** RM-78

Location: $13^0$26'39"N, $76^0$35'03"E, (4D3D8G2c), Kasaba, Chikkanayakanahalli taluk, Tumakuru district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Clayey-skeletal, mixed, isohyperthermic, Typic Rhodustalfs

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

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

Series Name: Giddadapalya (GDP), Pedon: R-8
Location: $15^0$23'01"N, $76^0$10'55"E, Tenakanakallu village, Koppal taluk and district
Analysis at: NBSS&LUP, Regional Centre, Bangalore Classification: Fine, mixed, isohyperthermic Rhodic Paleustalfs

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-18	Ap	73.96	9.66	16.38	18.31	13.12	11.29	18.41	12.82	-	sl	7.71	4.11
18-55	Bt1	49.53	10.48	39.99	23.81	11.06	4.43	5.80	4.43	-	sc	20.83	10.68
55-80	Bt2	50.53	12.63	36.84	27.10	6.41	7.35	3.89	5.78	30	sc	16.66	9.25
80-130	Bt3	53.28	15.54	31.18	24.30	11.78	8.13	4.59	4.48	60	scl	15.20	7.86

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	5.54			0.027	0.67	0.00	2.37	1.35	0.09	0.03	3.85	5.60	0.34	69	0.58
18-55	6.31			0.036	0.75	0.00	7.42	3.37	0.09	0.08	10.95	13.00	0.33	84	0.62
55-80	6.51			0.031	0.39	0.00	8.45	3.81	0.11	0.14	12.50	14.50	0.39	86	0.96
80-130	6.7			0.049	0.41	0.00	7.93	3.61	0.08	0.19	11.81	12.10	0.39	98	1.60

Soil Series: Thondigere (TDG), Pedon: RM-24

Location: $13^0$28'21"N, $76^0$52'50"E, (4B3D3N1b), Sanabanahalli village, Gubbi taluk, Tumakuru district

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

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-17	Ap	73.83	10.36	15.81	11.20	16.19	15.99	18.84	11.61	-	sl		
17-30	A2	77.02	9.01	13.97	10.12	18.83	18.72	19.43	9.92	-	sl		
30-39	A3	76.42	8.45	15.13	7.49	13.36	15.59	26.01	13.97	-	sl		
39-50	Bw1	63.75	9.90	26.35	5.80	9.27	10.49	18.53	19.65	-	scl		
50-71	Bw2	53.49	15.81	30.70	1.44	4.72	10.57	22.28	14.48	-	scl		
71-95	Bw3	36.35	22.32	41.33	1.46	5.83	16.25	6.25	6.56	-	c		
95-114	Bc1	57.96	13.88	28.16	4.39	12.35	14.18	16.94	10.10	-	scl		
114 - >150	Bc2	50.16	16.94	32.91	3.64	12.90	11.34	13.11	9.16	-	scl		

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-17	7.02			0.05	0.62	0.00	4.33	1.14	0.28	0.08	5.83	5.77	0.36	100.00	1.44
17-30	7.80			0.07	0.37	0.00	4.64	0.44	0.06	0.01	5.15	5.15	0.37	100.02	0.24
30-39	7.55			0.04	0.29	0.00	4.27	0.33	0.05	0.03	4.69	4.64	0.31	100.00	0.75
39-50	7.69			0.05	0.25	0.00	7.03	0.49	0.07	0.07	7.66	8.45	0.32	90.66	0.82
50-71	8.09			0.04	0.12	0.00	9.09	1.43	0.13	0.38	11.02	12.26	0.40	89.94	3.10
71-95	7.97			0.08	0.29	0.00	11.84	1.27	0.11	0.46	13.68	14.42	0.35	94.85	3.21
95-114	8.32			0.05	0.29	0.00	9.28	1.23	0.15	0.31	10.97	11.74	0.42	93.44	2.65
114 - >150	8.34			0.07	0.25	0.00	13.90	1.71	0.13	0.83	16.57	17.61	0.54	94.07	4.70

Series Name: Narasapura (NSP), Pedon: A2/RM-2

Location: $15^0$19'86.9"N, $75^0$57'86.1"E, Kavalura village, Koppal taluk and district

Analysis at: NBSS&LUP, Regional Centre, Bangalore. **Classification:** Very fine, smectitic, isohyperthermic (calc) 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
0-29	Ap	31.32	16.52	52.16	5.51	5.40	5.51	9.83	5.08	10	c	38.86	27.64
29-52	Bw1	13.30	22.08	64.62	2.52	2.41	2.41	3.67	2.29	05	c	49.88	40.05
52-77	BW2	13.22	17.39	69.40	3.56	2.41	1.95	2.76	2.53	05	c	51.33	41.55

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-29	9.16			0.615	0.23	9.36			0.72	10.98		51.09	0.98		21.49
29-52	8.69			2.01	0.5	8.64			0.55	24.42		60.63	0.94		40.27
52-77	8.52			2.68	0.46	7.68			0.50	25.65		60.74	0.88		42.24

Chapter 5

INTERPRETATION FOR LAND RESOURCE MANAGEMENT

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

5.1 Land Capability Classification

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

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

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

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

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

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

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

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

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

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

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

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

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

The land capability subclasses are recognized 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 19 soil map units identified in the Kidadhala-1 microwatershed are grouped under two land capability classes and four land capability subclasses (Fig. 5.1).

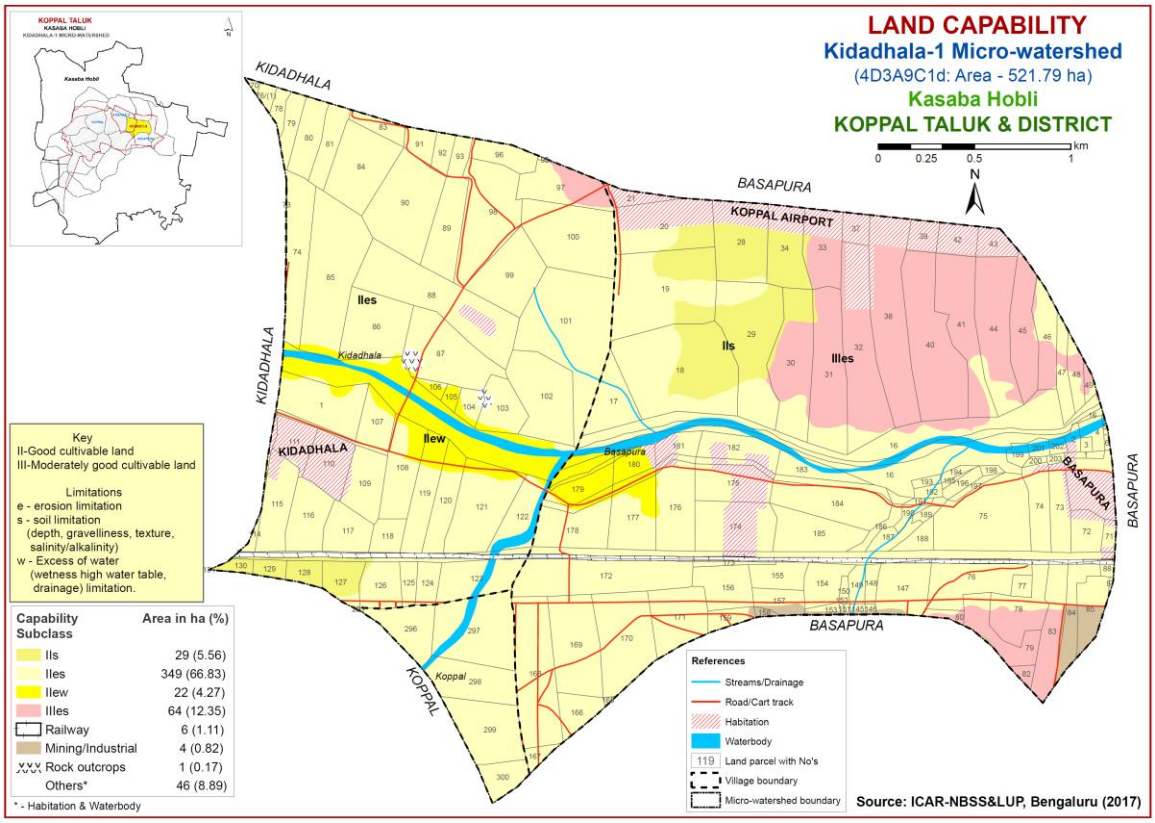


Fig. 5.1 Land Capability map of Kidadhala-1 Microwatershed

Entire area in the microwatershed is suitable for agriculture. Good lands (Class II) cover maximum area of about 400 ha (77 %) and distributed in the major part of the microwatershed with moderate problems of soil, drainage and erosion. Moderately good lands (Class III) occupy an area of about 64 ha (12 %) and distributed in the northern, northeastern and southern part of the microwatershed with severe limitations of soil and erosion.

5.2 Soil Depth

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

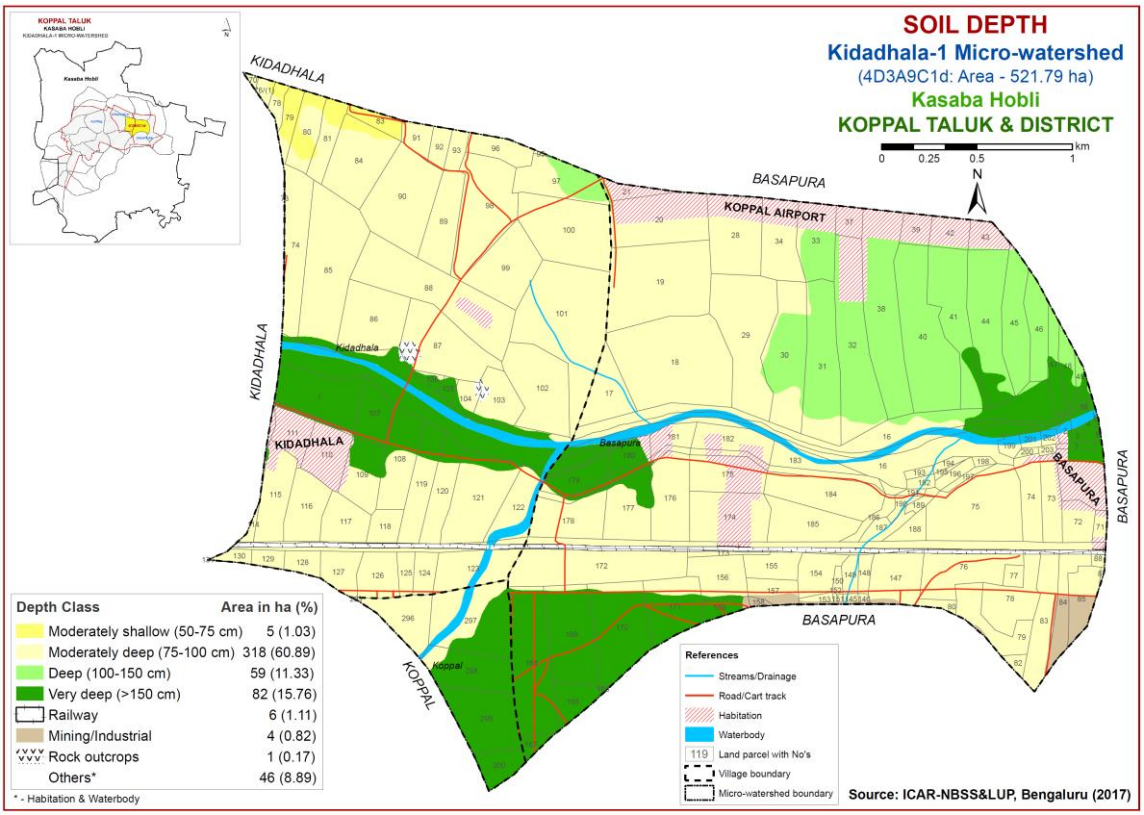


Fig. 5.2 Soil Depth map of Kidadhala-1 Microwatershed

Moderately shallow soils (50-75 cm) occupy about 5 ha (1%) and occur in the northwestern part of the microwatershed. Maximum area of about 318 ha (61%) is moderately deep (75-100 cm) and distributed in the major part of the microwatershed.

Deep to Very deep (100- >150 cm) soils occupy an area of about 141 ha (27%) and occur in the eastern, southern, central and western part of the microwatershed.

The most productive lands cover about 141 ha (27%) where all climatically adapted long duration crops be grown.

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 behavior, 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 Fig 5.3.

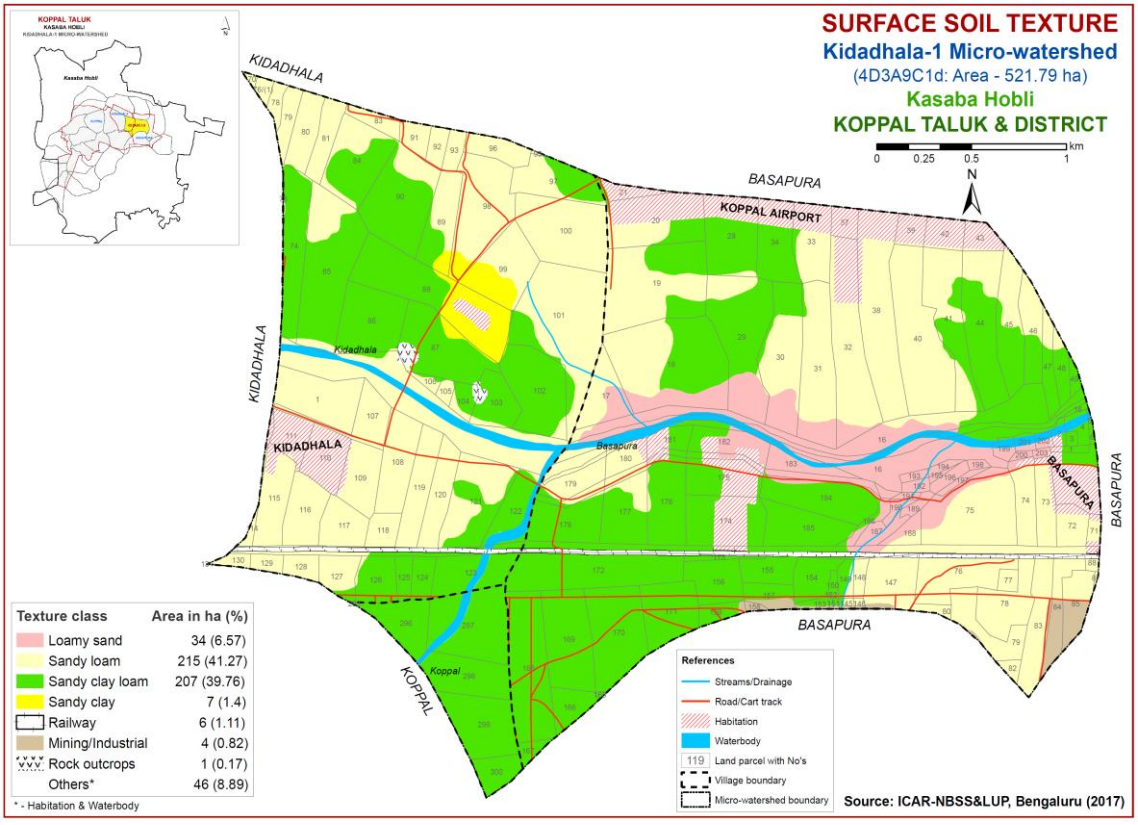


Fig. 5.3 Surface Soil Texture map of Kidadhala-1 Microwatershed

An area of about 34 ha (7%) is sandy at the surface and distributed in the central part of the microwatershed. Maximum area of about 422 ha (81%) is loamy at the surface and distributed in the major part of the microwatershed. An area of about 7 ha (1%) is clayey at the surface and distributed in the northern part of the microwatershed.

The most productive lands with respect to surface soil texture are clayey soils(1%) that have high potential for soil-water retention and availability and nutrient retention and availability, but have problems of drainage, infiltration, workability and other physical problems. The other productive lands are loamy (81%) soils which also have high potential for soil-water retention and nutrient availability but have no drainage or other physical problems. The problem soils are sandy covering 7 per cent area that has moisture and nutrient constraints.

5.4 Soil Gravelliness

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

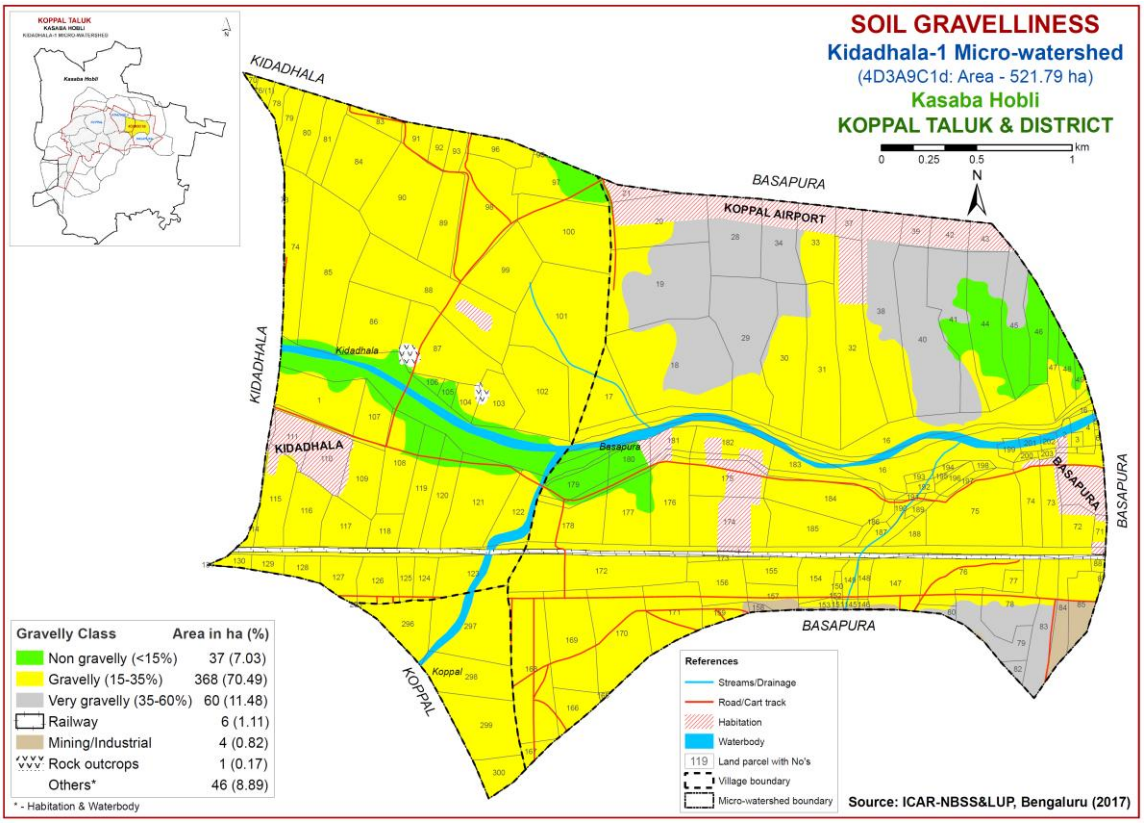


Fig. 5.4 Soil Gravelliness map of Kidadhala-1 Microwatershed

The soils that are non-gravelly (<15% gravel) cover an area of about 37 ha (7 %) and distributed in the western, central and northeastern part of the microwatershed. Maximum area of about 368 ha (70%) is covered by gravelly (15-35% gravel) soils and are distributed in the major part of the microwatershed. An area of about 60 ha (11%) is

covered by very gravelly (35-60%) and distributed in the southern and northern part of the microwatershed (Fig. 5.4).

The most productive lands with respect to gravelliness are found to be 7 per cent. They are non-gravelly with less than 15 per cent gravel and have potential for growing both annual and perennial crops. The problem soils that are very gravelly (35-60%) cover about 11 per cent where only short duration can be grown.

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 shown in Fig. 5.5.

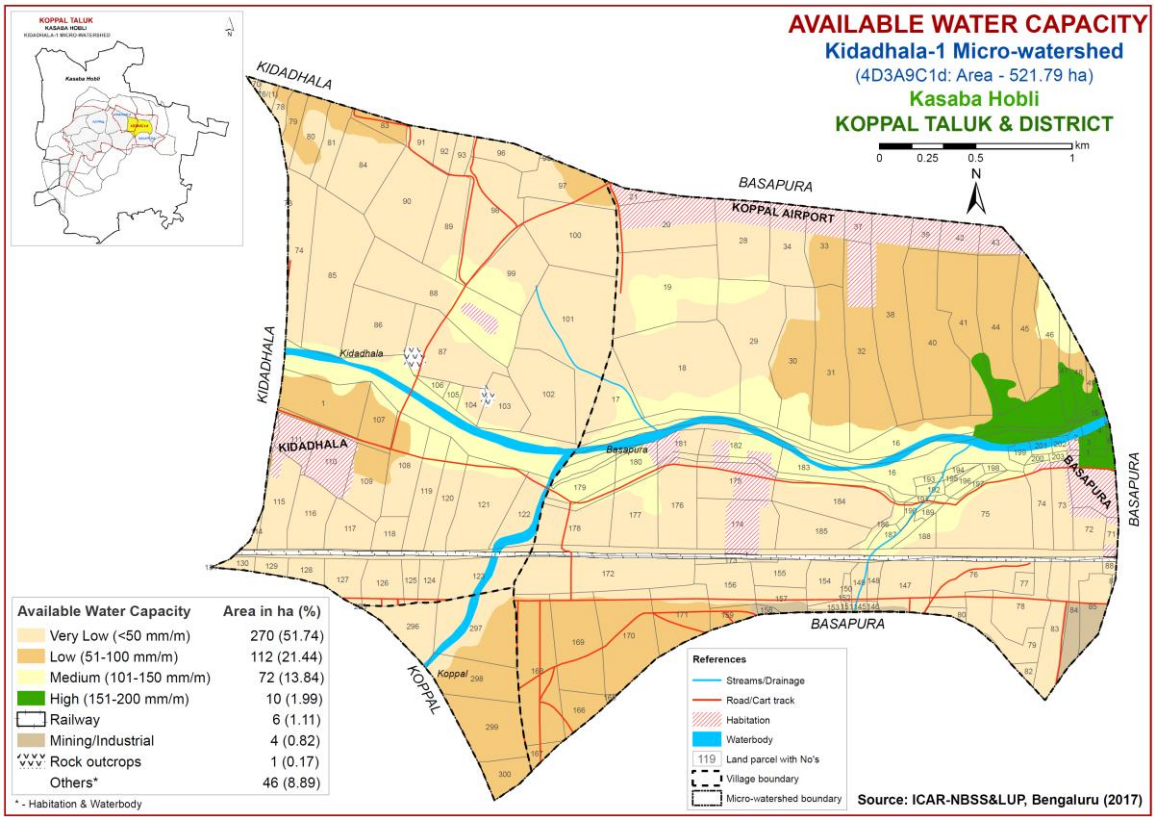


Fig. 5.5 Soil Available Water Capacity map of Kidadhala-1 Microwatershed

Maximum area of about 270 ha (52%) in the microwatershed has soils that are very low (<50 mm/m) in available water capacity and are distributed in the major part of the microwatershed. An area of about 112 ha (21%) has soils that are low (51 to 100

mm/m) in available water capacity and are distributed in the southern, western, northern and northeastern part of the microwatershed. An area of about 72 ha (14%) has soils that are medium (101-150 mm/m) in available water capacity and are distributed in the western and central part of the microwatershed. An area of about 10 ha (2 %) is high (151-200 mm/min) in available water capacity and distributed in the eastern part of the microwatershed.

An area of about 270 ha (52 %) in the microwatershed has soils that are problematic with regard to available water capacity. Here, only short duration crops can be grown and the probability of crop failure is very high. These areas are best put to other alternative uses. An area of about 10 ha (2 %) has soils that have high potential (151-200 mm/m) with regard to available water capacity where all climatically adapted long duration crops can be grown successfully.

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 three slope classes and a slope map was generated showing the area extent and their geographic distribution of different slope classes in the microwatershed (Fig. 5.6).

An area of about 5 ha (1%) falls under nearly level (0-1% slope) lands and distributed in the western part of the microwatershed. Very gently sloping (1-3%) lands cover a maximum area of about 452 ha (87%) and distributed in the major part of the microwatershed. Moderately sloping (5-10%) lands cover an area of about 8 ha (1%) and distributed in the southeastern part of the microwatershed. In all these areas, all climatically adapted annual and perennial crops can be grown without much soil and water conservation and other land development measures. Except ana rea of 8ha(1%) which are moderately sloping and need soil and water conservation measures.

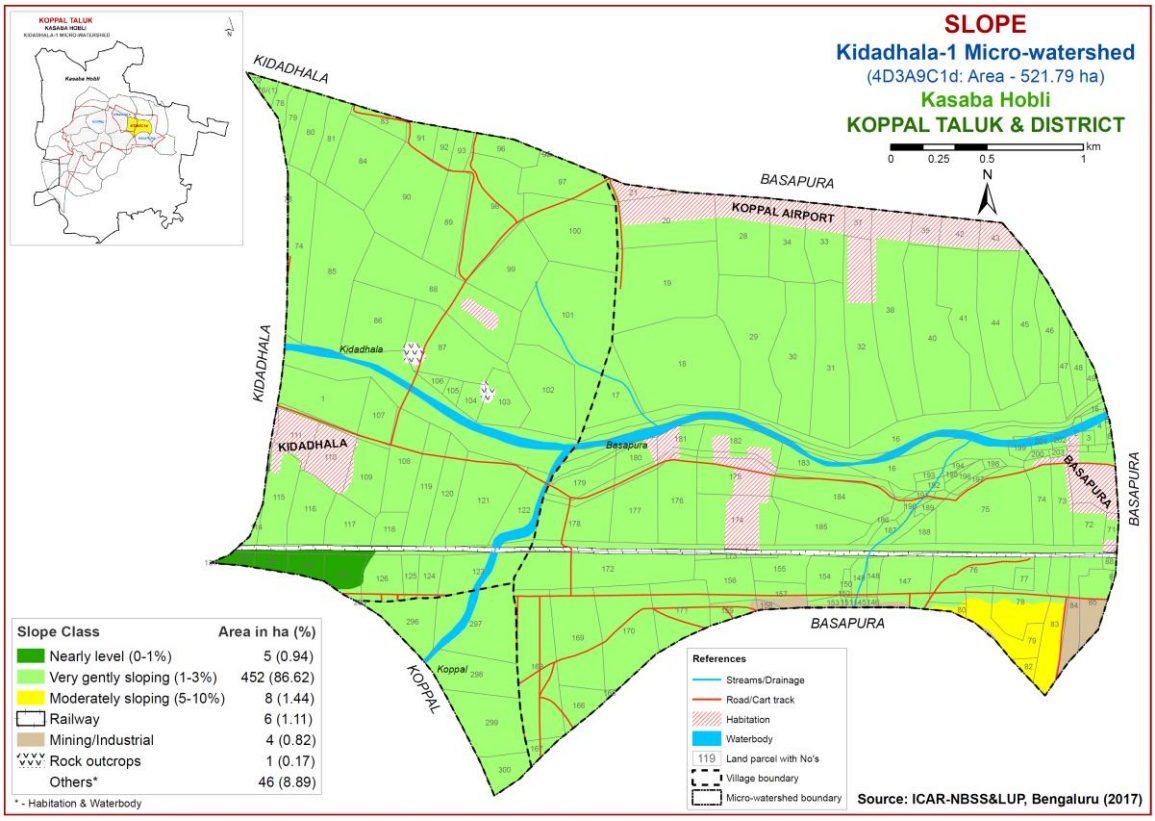


Fig. 5.6 Soil Slope map of Kidadhala-1 Microwatershed

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.

Slightly eroded lands cover an area of about 29 ha (6%) and distributed in the southwestern and northern part of the microwatershed. Maximum area of about 428 ha (82 %) is moderately eroded (e2 class) and distributed in the major part of the microwatershed. Severely eroded (e3) lands cover an area of about 8 ha (1%) and distributed in the southeastern part of the microwatershed.

Moderately and severely eroded lands are problematic and need appropriate soil and water conservation and other land development measures.

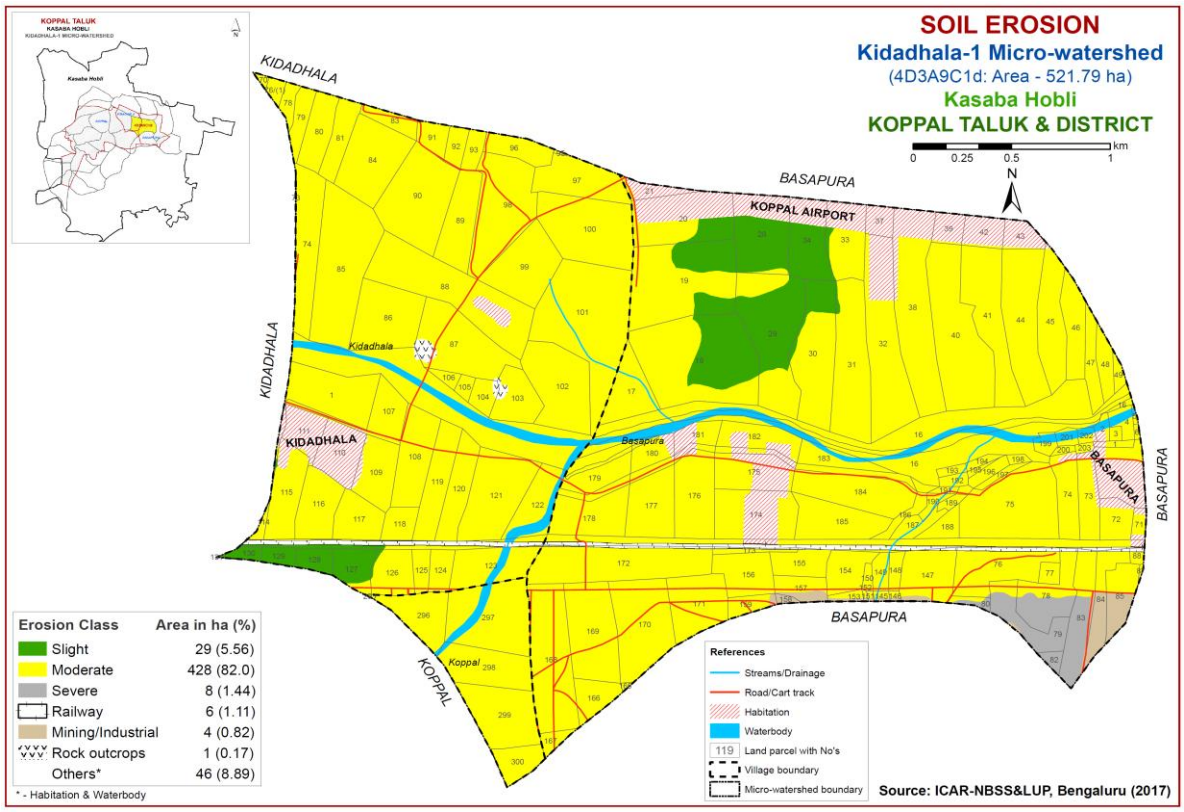


Fig. 5.7 Soil Erosion map of Kidadhala-1 Microwatershed

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 characterized by low rainfall and high temperatures. Hence, it is necessary to know the fertility (macro and micro nutrients) status of the soils of the watersheds for assessing the kind and amount of fertilizers required for each of the crop intended to be grown. For this purpose, the surface soil samples collected from the grid points (one soil sample at every 320 m grid interval) all over the microwatershed through land resource inventory in the year 2017 were analyzed for pH, EC, organic carbon, available phosphorus and potassium, and for micronutrients like zinc, boron, copper, iron and manganese, and secondary nutrient sulphur.

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

6.1 Soil Reaction (pH)

The soil analysis of the Kidadhala-1 microwatershed for soil reaction (pH) showed that neutral soils cover an area of about 79 ha (15%) and distributed in the southwestern, central, northern and southeastern part of the microwatershed. Maximum area of about 221 ha (42%) is slightly alkaline (pH 7.3-7.8) and distributed in the major part. Moderately alkaline (pH 7.8-8.4) soils cover about 151 ha (29%) area and distributed in the western, central and eastern part of the microwatershed. Strongly alkaline (pH 8.4-9.0) soils cover an area of about 14 ha (3%) and are distributed in the central part of the microwatershed (Fig.6.1). Thus, major portion of the soils in the microwatershed are alkaline in reaction.

6.2 Electrical Conductivity (EC)

Electrical conductivity of the soils of the microwatershed is non saline (<2 dSm^{-1}) in maximum area of about 456 ha (87%) and distributed in the major part of the microwatershed. An area of about 10 ha (2%) is low (2-4 dSm^{-1}) indicating that the soils are slightly saline and distributed in the central part of the microwatershed (Fig 6.2).

6.3 Organic Carbon

An area of about 58 ha (11%) is low (<0.5%) in organic carbon and distributed in the western, southern and northern part of the microwatershed. An area of about 153 ha (29%) is medium (0.5-0.75%) and distributed in the western, northern, northeastern and southern part of the microwatershed. Maximum area of about 254 ha (49%) is high in organic carbon and distributed in the major part of the microwatershed (Fig.6.3).

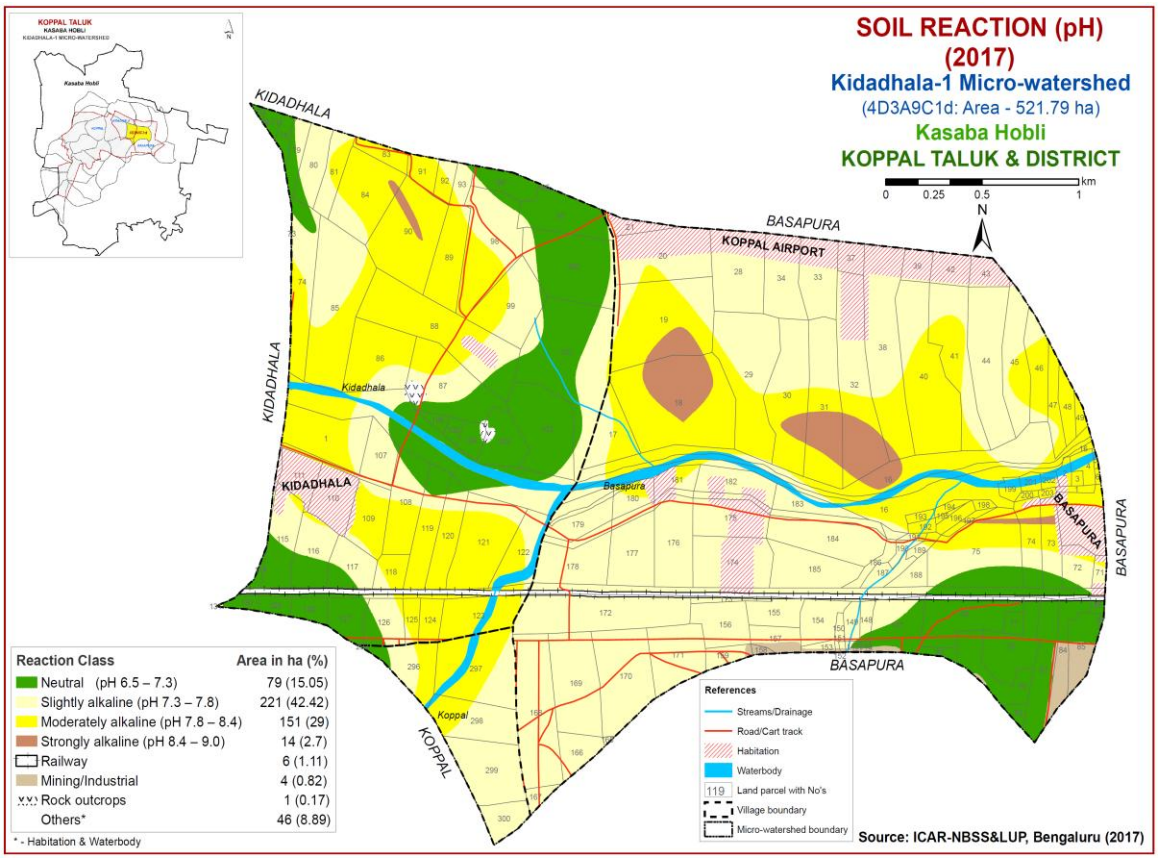


Fig.6.1 Soil Reaction (pH) map of Kidadhala-1 Microwatershed

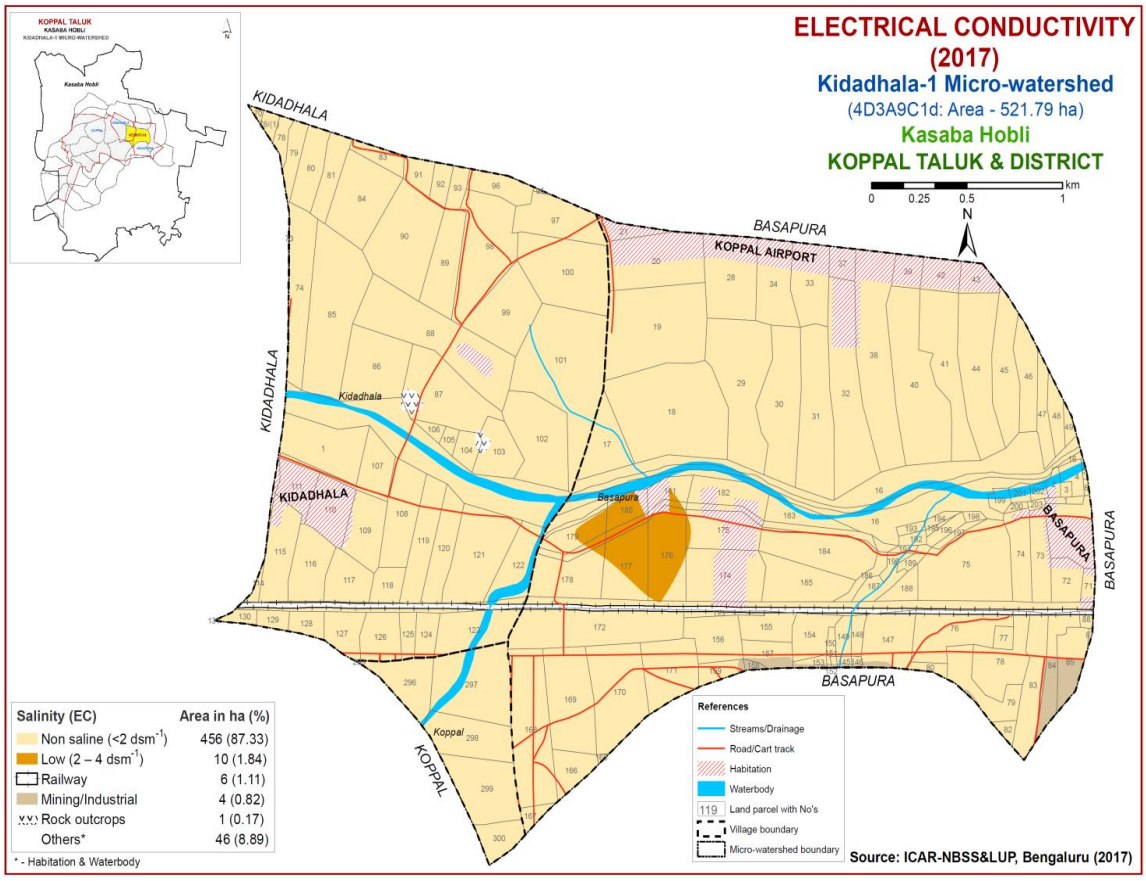


Fig.6.2 Electrical Conductivity (EC) map of Kidadhala-1 Microwatershed

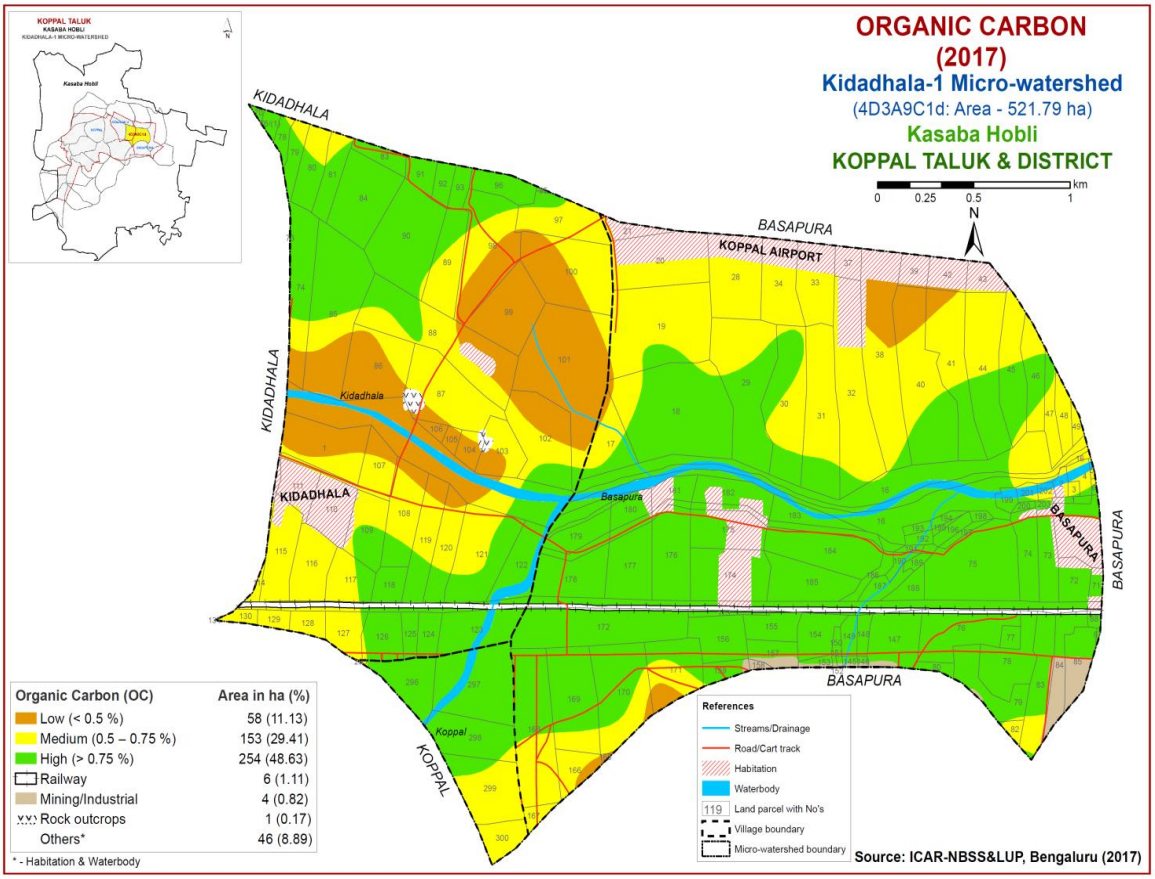


Fig.6.3 Soil Organic Carbon map of Kidadhala-1 Microwatershed

6.4 Available Phosphorus

An area of about 22 ha (4%) is low (<23 kg/ha) in available phosphorus and distributed in the northeastern and central part of the microwatershed. Available phosphorus is medium (23-57 kg/ha) in an area of about 238 ha (46%) and distributed in the major part of the microwatershed. An area of about 206 ha (39%) is high (>57 kg/ha) and distributed in the western, central and northeastern part of the microwatershed. The areas with high phosphorus content needs to reduce 25 per cent from the recommended dose to avoid the excess application of fertilizer and apply additional 25 phosphorus in areas where it is low and medium (Fig 6.4).

6.5 Available Potassium

An area of about 74 ha (14%) is low (<145 kg/ha) in available potassium and distributed in the southern and northeastern part of the microwatershed. Maximum area of about 283 ha (54%) is medium (145-337 kg/ha) and distributed in the major part of the microwatershed. An area of about 108 ha (21 %) is high in available potassium content and distributed in the western, southwestern and southern part of the microwatershed. The areas with high potassium content needs to reduce 25 per cent from the recommended dose to avoid the excess application of fertilizer and apply additional 25% potassium in areas where it is low and medium (Fig 6.5).

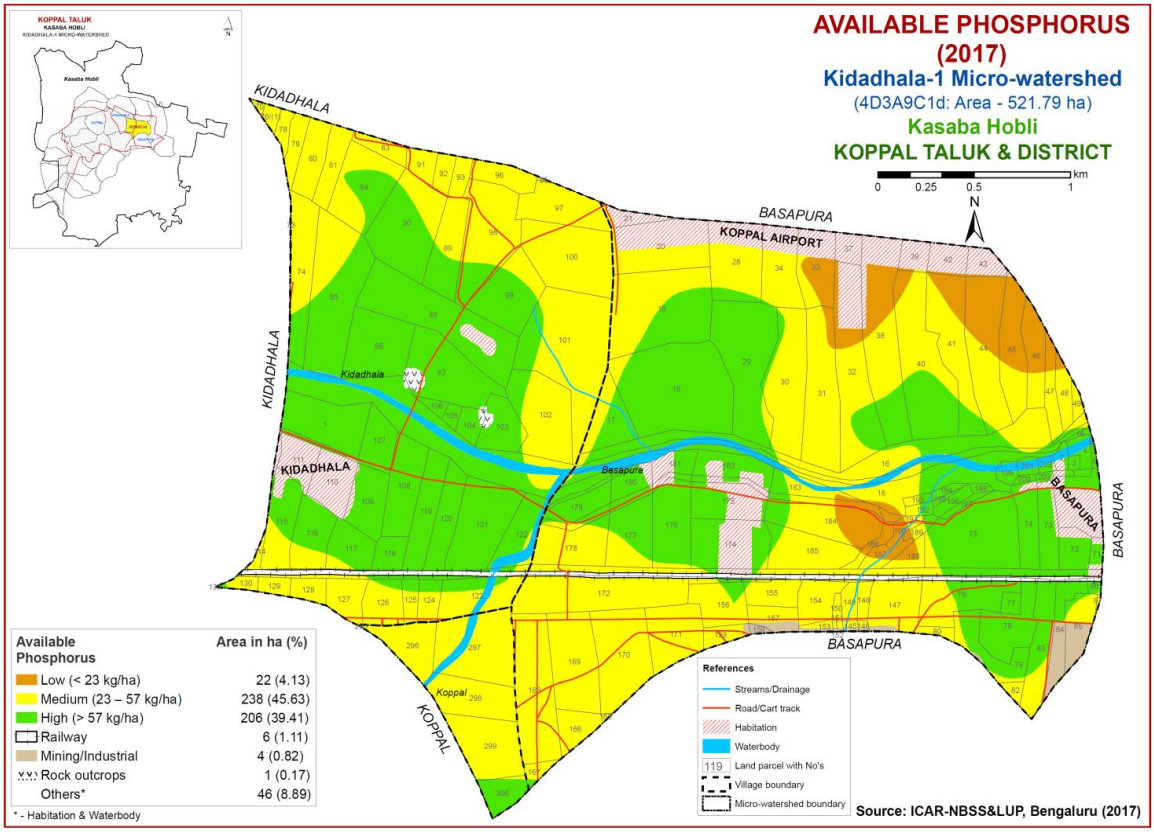


Fig.6.4 Soil Available Phosphorus map of Kidadhala-1 Microwatershed

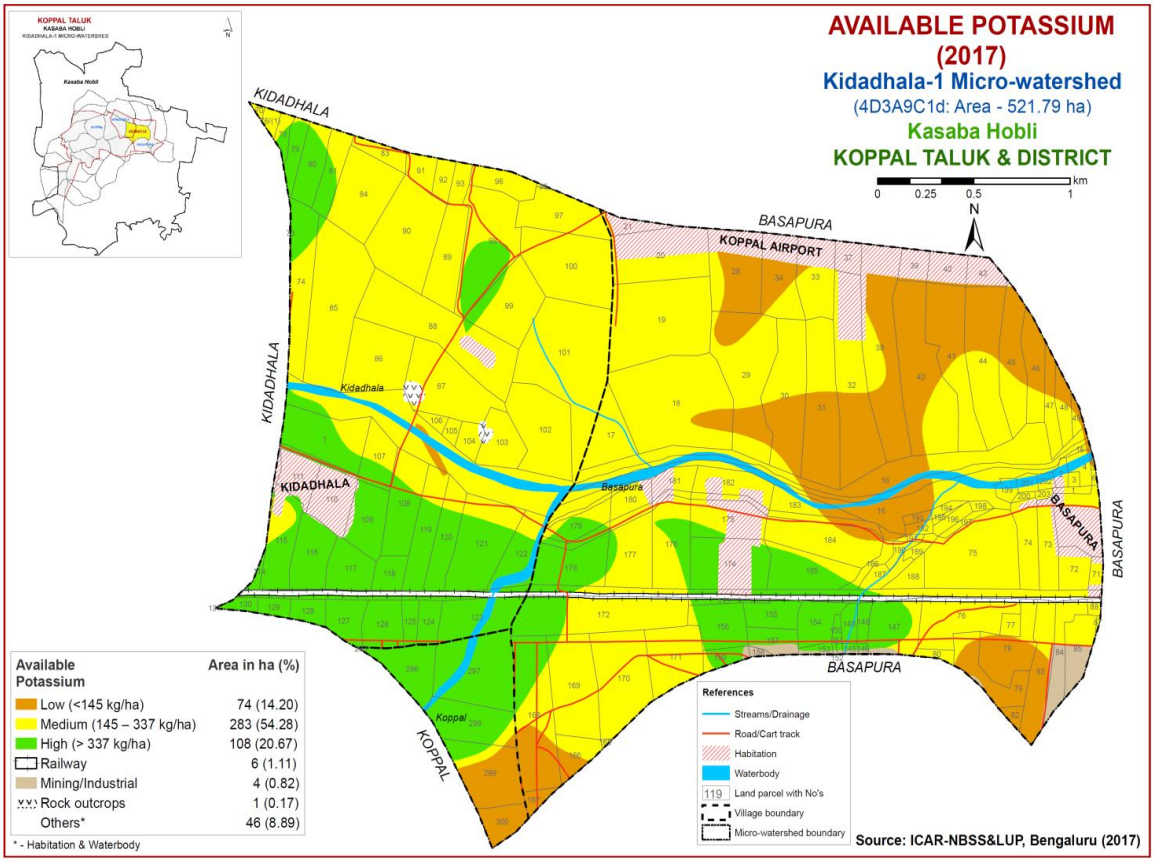


Fig.6.5 Soil Available Potassium map of Kidadhala-1 Microwatershed

6.6 Available Sulphur

Soil analysis of available sulphur content in Kidadhala-1 microwatershed showed that an area of about 5 ha (1%) is low (<10 ppm) in available sulphur content and distributed in the eastern part of the microwatershed. An area of about 205 ha (39 %) is medium (10-20 ppm) and distributed in the central, southern, eastern and northern part of the microwatershed. Maximum area of about 255 ha (49%) is high (>20ppm) in available sulphur and distributed in the major part of the microwatershed (Fig.6.6). The areas that are low and medium in available sulphur need to be applied with magnesium sulphate or gypsum or factomphos (p) fertilizer (13% sulphur) for 2-3 years for the deficiency to be corrected.

6.7 Available Boron

Soil analysis of available boron content in Kidadhala-1 microwatershed showed that maximum area of about 387 ha (74%) is low (<0.5ppm) in available boron content and distributed in the major part of the microwatershed. An area of about 79 ha (15%) is medium (0.5-1.0 ppm) in available boron content and distributed in the western, central, southern and eastern part of the microwatershed (Fig.6.7).

6.8 Available Iron

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

6.9 Available Manganese

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

6.10 Available Copper

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

6.11 Available Zinc

Available zinc content is deficient (<0.6 ppm) in an area of about 72 ha (14%) and distributed in the northwestern and northern part of the microwatershed. Maximum area of about 393 ha (75 %) is sufficient (>0.6) in zinc content and distributed in the major part of the microwatershed (Fig 6.11).

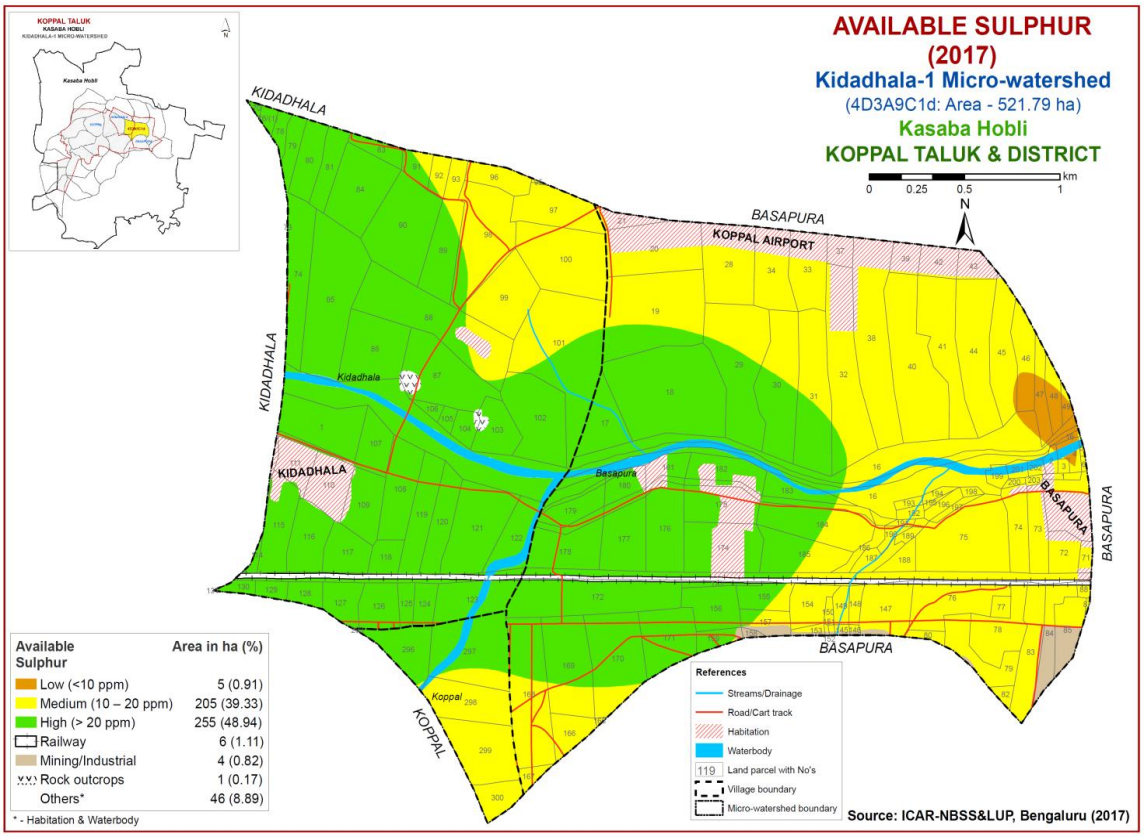


Fig.6.6 Soil Available Sulphur map of Kidadhala-1 Microwatershed

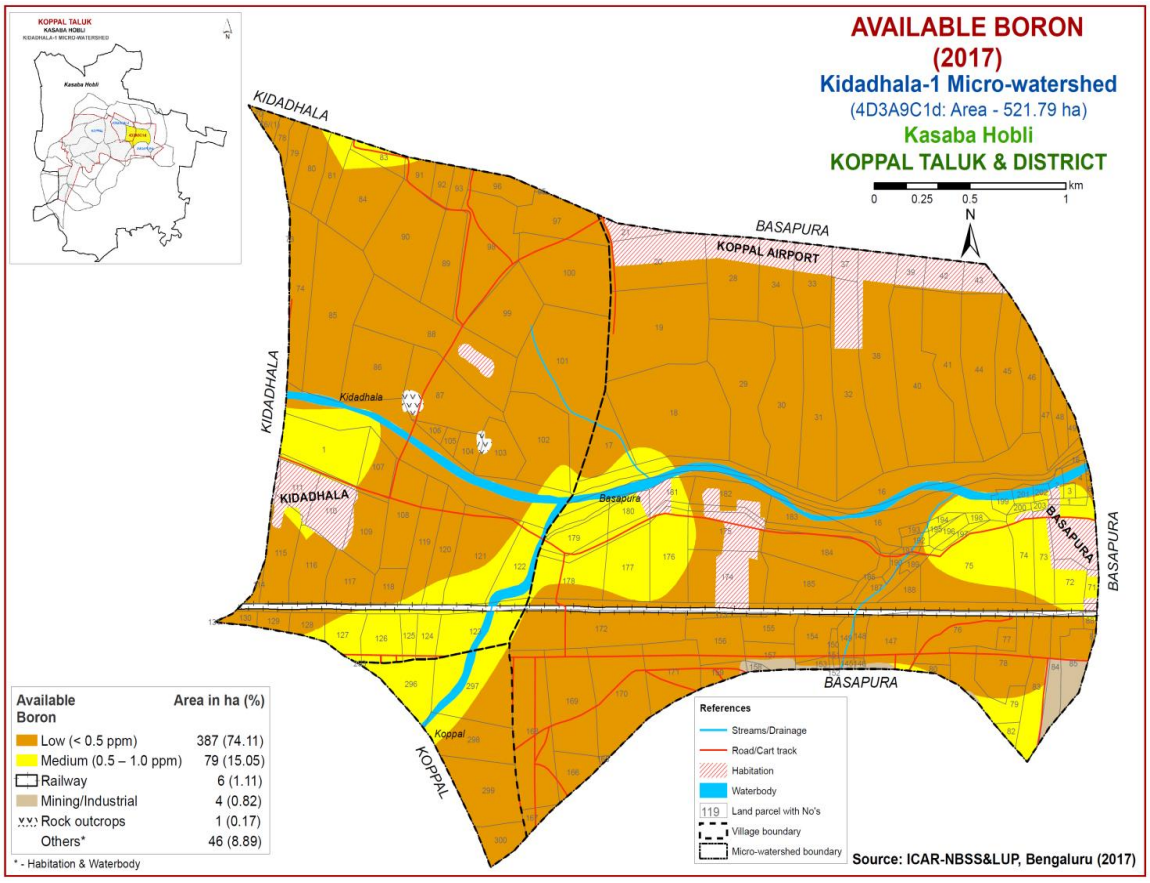


Fig.6.7 Soil Available Boron map of Kidadhala-1 Microwatershed

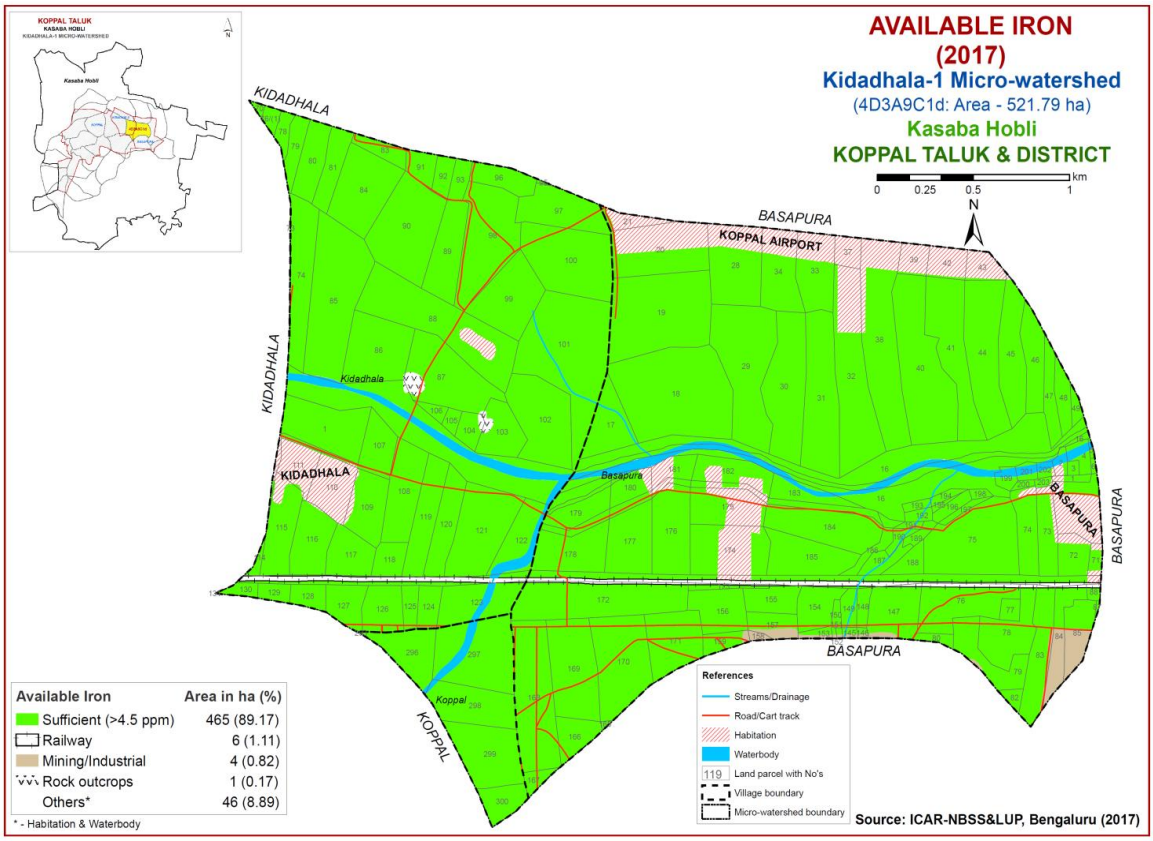


Fig.6.8 Soil Available Iron map of Kidadhala-1 Microwatershed

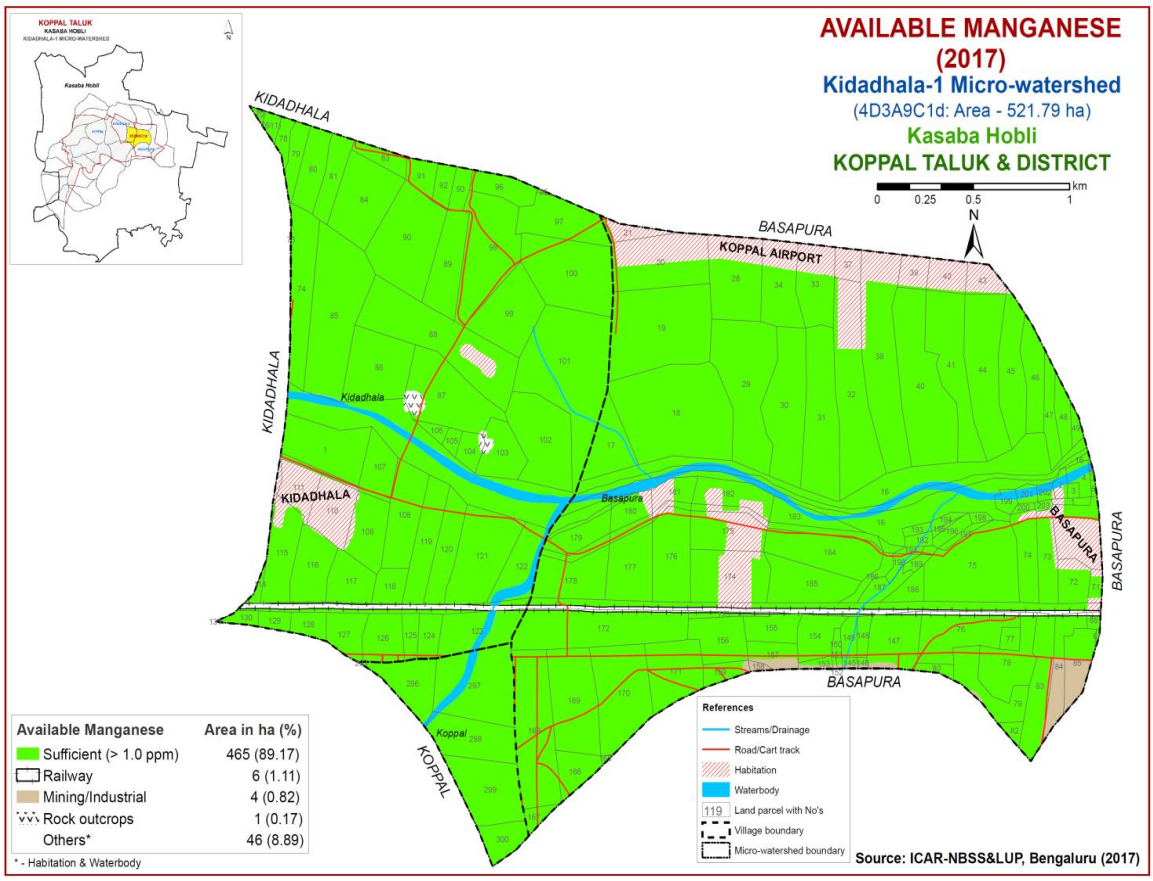


Fig.6.9 Soil Available Manganese map of Kidadhala-1 Microwatershed

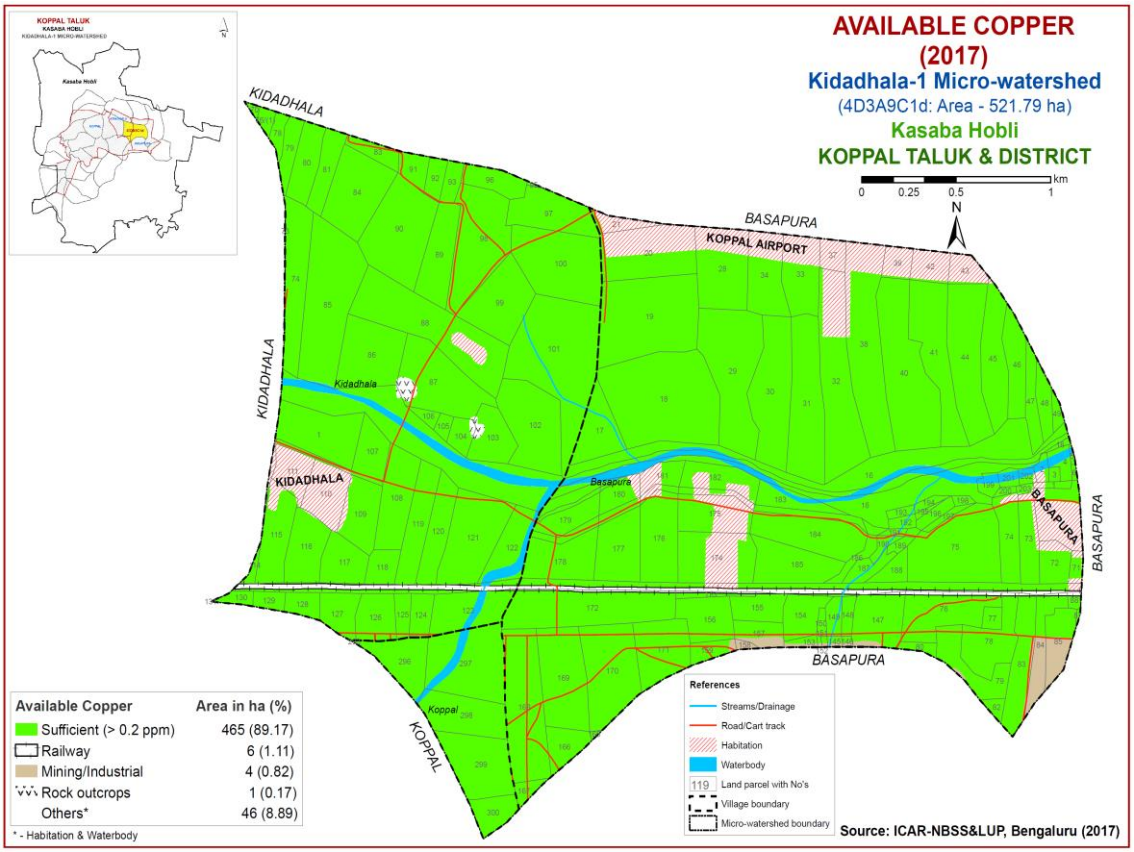


Fig.6.10 Soil Available Copper map of Kidadhala-1 Microwatershed

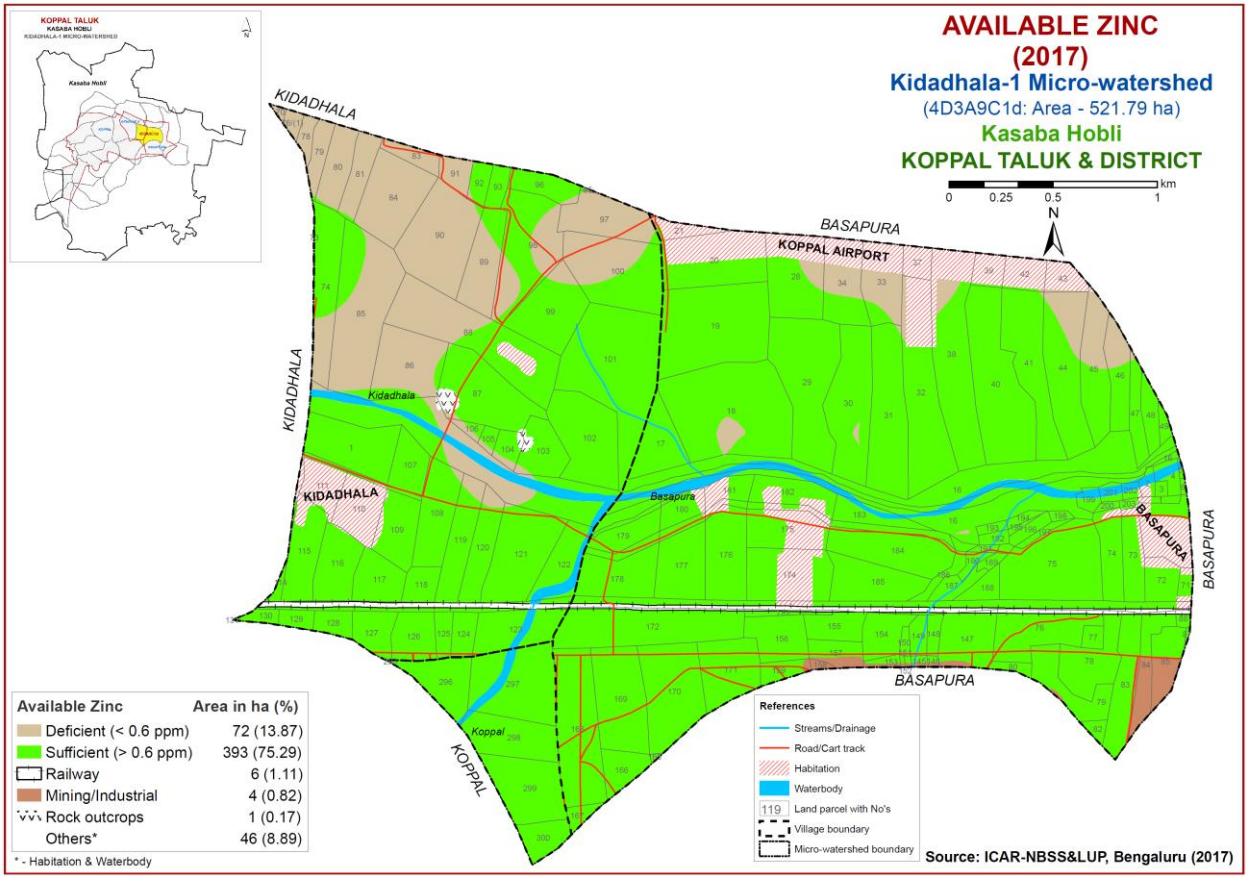


Fig.6.11 Soil Available Zinc map of Kidadhala-1 Microwatershed

Chapter 7

LAND SUITABILITY FOR MAJOR CROPS

The soil and land resource units (soil phases) of Kidadhala-1 microwatershed were assessed for their suitability for growing food, fodder, fibre and other horticulture crops by following the procedure as outlined in FAO, 1976 and 1983. Crop requirements were developed for each of the crop from the available research data and also by referring to Naidu *et. al.* (2006) and Natarajan *et. al* (2015). The crop requirements were matched with the soil and land characteristics (Table 7.1) to arrive at the crop suitability. In FAO land suitability classification, two orders are recognized. Order S-Suitable and Order N-Not suitable. The orders have classes, subclasses and units. Order-S has three classes, Class S1- Highly Suitable, Class S2- Moderately Suitable and Class S3- Marginally Suitable. Order N has two Classes, N1- Currently not Suitable and N2- Permanently not Suitable. There are no subclasses within the Class S1 as they will have very minor or no limitations for crop growth. Classes S2, S3 and N1 are divided into subclasses based on the kinds of limitations encountered. The limitations that affect crop production are 'c' for erratic rainfall and its distribution and length of growing period (LGP), 'e' for erosion hazard, 'r' for rooting condition, 't' for lighter or heavy texture, 'g' for gravelliness or stoniness, 'n' for nutrient availability, 'l' for topography, 'm' for moisture availability, 'z' for calcareousness and 'w' for drainage. These limitations are indicated as lower case letters to the class symbol. For example, moderately suitable lands with the limitations of soil depth and erosion are designated as S2re. For the microwatershed, the soil mapping units were evaluated and classified up to subclass level.

Using the above criteria, the soil map units of the microwatershed were evaluated and land suitability maps for 28 major agricultural and horticultural crops were generated. The detailed information on the kind of suitability of each of the soil phase for the crops assessed are given village/ survey number wise for the microwatershed in Appendix-III.

7.1 Land Suitability for Sorghum (*Sorghum bicolor*)

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

Highly suitable (Class S1) lands occupy an area of about 12 ha (2 %) for growing sorghum and occur in the northern part of the microwatershed. An area of about 99 ha (19%) is moderately suitable (Class S2) for growing sorghum and distributed in the southern, western, central and eastern part of the microwatershed with minor limitations of gravelliness, texture and rooting depth.

Table 7.1 Soil-Site Characteristics of Kidadhala-1 Microwatershed

Soil Map Units	Climate (P)(mm)	Growing period (Days)	Drainage Class	Soil depth (cm)	Soil texture		Gravelliness		AWC (mm/m)	Slope (%)	Erosion	pH	EC (dSm^{-1})	ESP	CEC [Cmol $(p^{+})kg^{-1}$]	BS (%)
					Surf-ace	Sub-surface	Sur-face	Sub-surface								
TDHcB2g1	662	<90	WD	50-75	sl	sc-c	15-35	<15	100-150	1-3	moderate	9.19	0.18	14.57	3.57	100
HDHcA1g1	662	<90	WD	75-100	sl	gsc-gc	15-35	>35	51-100	0-1	slight	6.54	0.07	7.11	5.84	84.07
HDHcB2g1	662	<90	WD	75-100	sl	gsc-gc	15-35	>35	51-100	1-3	moderate	6.54	0.07	7.11	5.84	84.07
HDHcD3g2	662	<90	WD	75-100	sl	gsc-gc	35-60	>35	51-100	5-10	severe	6.54	0.07	7.11	5.84	84.07
HDHhB1g2	662	<90	WD	75-100	scl	gsc-gc	35-60	>35	51-100	1-3	slight	6.54	0.07	7.11	5.84	84.07
HDHhB2g1	662	<90	WD	75-100	scl	gsc-gc	15-35	>35	51-100	1-3	moderate	6.54	0.07	7.11	5.84	84.07
CKMbB2g1	662	<90	WD	75-100	ls	sc	15-35	>35-	100-150	1-3	moderate	7.99	0.32	4.33	12.50	119
CKMcB2g2	662	<90	WD	75-100	sl	sc	35-60	-	100-150	1-3	moderate	7.99	0.32	4.33	12.50	119
MNLcB2	662	<90	WD	100-150	sl	gscl	-	15-35	100-150	1-3	moderate	7.89	0.13	5.04	9.01	101
BPRcB2g1	662	<90	WD	100-150	sl	gsc-gc	15-35	>35	100-150	1-3	moderate	6.64	0.03	0.51	5.45	63.48
BPRcB2g2	662	<90	WD	100-150	sl	gsc-gc	35-60	>35	100-150	1-3	moderate	6.64	0.03	0.51	5.45	63.48
BPRhB2	662	<90	WD	100-150	scl	gsc-gc	-	>35	100-150	1-3	moderate	6.64	0.03	0.51	5.45	63.48
GDPhB2	662	<90	WD	100-150	scl	gsc-gc	-	30-60	51-100	1-3	moderate	5.54	0.02	0.58	5.60	69.00
HLKhB2g1	662	<90	WD	>150	scl	c	15-35	<15	150-200	1-3	moderate	-	-	-	-	-
NDLcB2g1	662	<90	WD	>150	sl	gsc	15-35	>35	50-100	1-3	moderate	-	-	-	-	-
NDLhB2g1	662	<90	WD	>150	scl	gsc	15-35	>35	50-100	1-3	moderate	-	-	-	-	-
NSPiB2g1	662	<90	MWD	75-100	sc	c	15-35	-	100-150	1-3	moderate	9.16	0.61	21.49	51.09	-
TDGcB2	662	<90	WD	>150	sl	scl	-	-	100-150	1-3	moderate	7.02	0.05	1.44	5.77	100

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

Maximum area of about 353 ha (68 %) is marginally suitable for growing sorghum and distributed in the major part of the microwatershed. They have moderate limitations of gravelliness, texture and topography.

Table 7.2 Crop suitability criteria for Sorghum

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

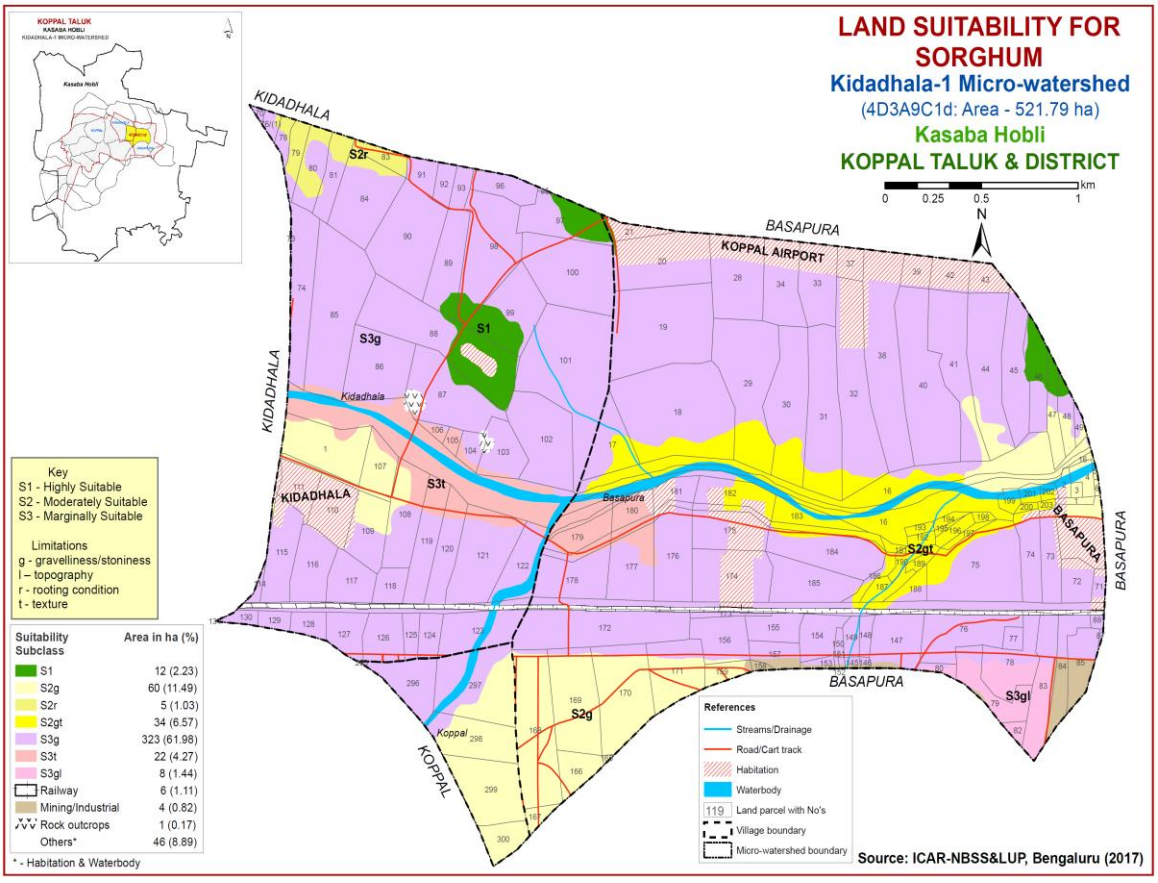


Fig. 7.1 Land Suitability map of Sorghum

7.2 Land Suitability for Maize (*Zea mays*)

Maize is one of the most important food crop grown in an area of 13.37 lakh ha in almost all the districts of the State. The crop requirements for growing maize (Table 7.3)

were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing maize was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.2.

Table 7.3 Crop suitability criteria for Maize

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

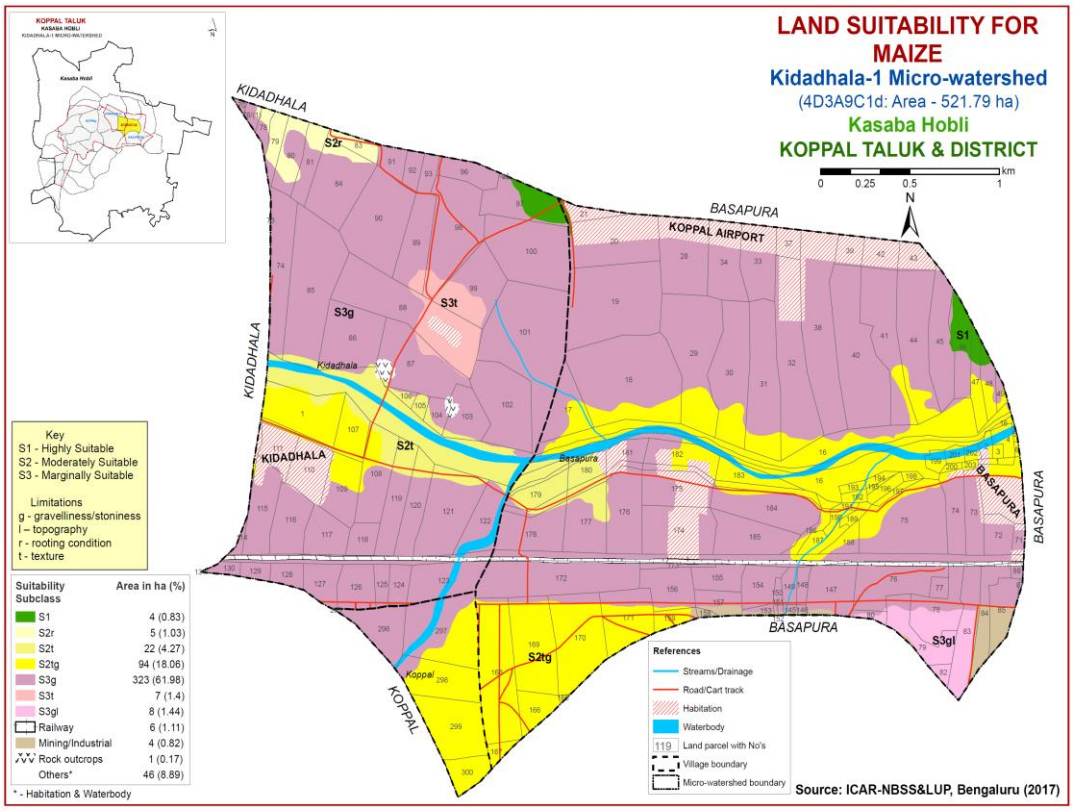


Fig. 7.2 Land Suitability map of Maize

Highly suitable (S1) lands cover an area of about 4 ha (<1%) and distributed in the eastern part of the microwatershed. Moderately suitable (S2) lands for growing maize cover an area of about 121 ha (23%) and distributed in the western, central, southern and eastern part of the microwatershed. They have minor limitations of rooting depth, texture

and gravelliness. Marginally suitable (Class S3) lands cover a maximum area of about 338 ha (65%) and occur in the major part of the microwatershed. They have moderate limitations of gravelliness, texture and topography.

7.3 Land Suitability for Bajra (*Pennisetum glaucum)*

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

Highly suitable (S1) lands cover an area of about 4 ha (<1%) and distributed in the eastern part of the microwatershed. Moderately suitable (S2) lands for growing bajra cover a maximum area of about 349 ha (67%) and distributed in the major part of the microwatershed. They have minor limitations of rooting depth, texture and gravelliness. Marginally suitable (Class S3) lands cover an area of about 111 ha (21%) and occur in the southeastern, northeastern and central part of the microwatershed. They have moderate limitations of gravelliness, texture and topography.

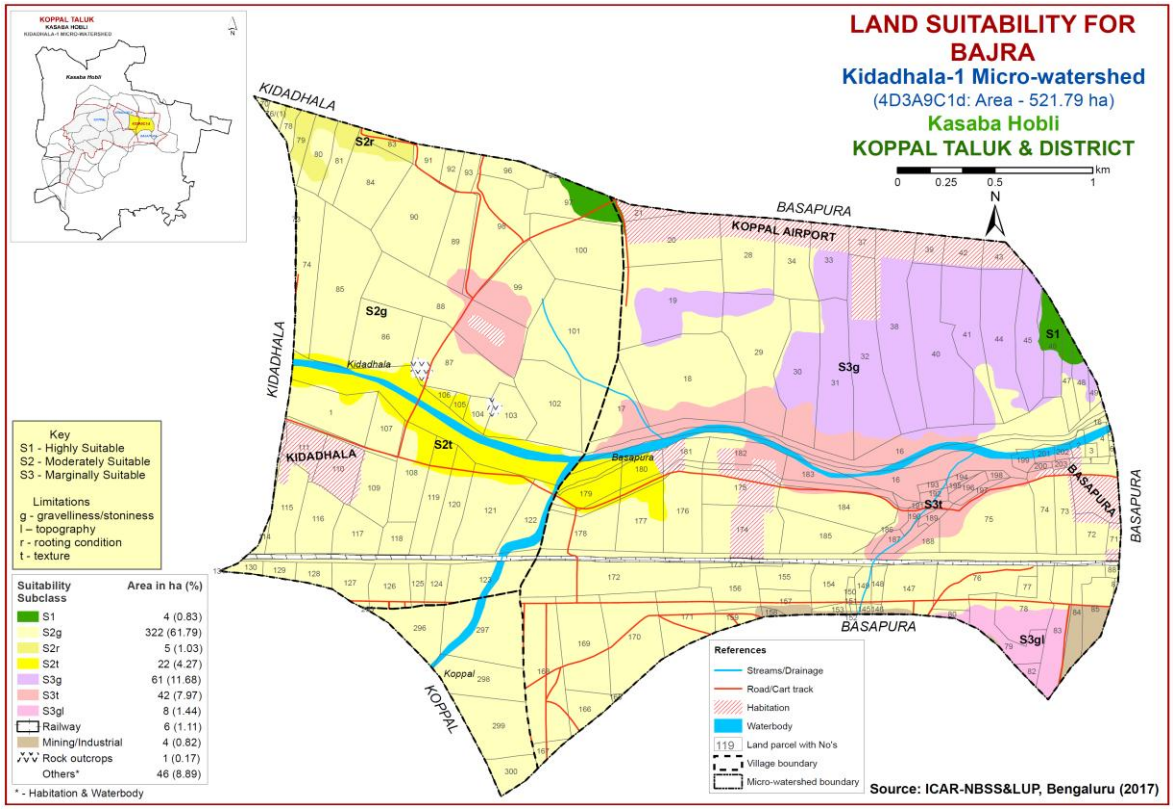


Fig. 7.3 Land Suitability map of Bajra

Table 7.4 Crop suitability criteria for Bajra

Crop requirement		Rating			
Soil –site characteristics	**Unit**	**Highly suitable (S1)**	**Moderately suitable(S2)**	**Marginally suitable(S3)**	**Not suitable (N)**
Slope	%	2-3	3-8	8-15	>15
LGP	Days	120-150	120-90	<90	
Soil drainage	Class	Well to mod.Well drained	imperfect	Poorly/excessively	V.poorly
Soil reaction	pH	5.5-8.0	5.0-5.5,7.8-8.4	8.4-9.0	>9.0
Surface soil texture	Class	c(red), sicl, sc,sl, cl	l, c (black) scl, sil, sic	sl, ls	S, fragmental skeletal
Soil depth	cm	100-75	50-75	25-50	<25
Gravel content	% vol.	15-35	35-60	60-80	-
Salinity (EC)	dSm^{-1}	2-4	4-8	8-10	>10
Sodicity (ESP)	%	5-8	8-10	10-15	>15

7.4 Land Suitability for Redgram (*Cajanus cajana*)

Redgram is one of the most important pulse crop grown in an area of 7.28 lakh ha in almost all the districts of the State. The crop requirements for growing redgram (Table 7.5) 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 7.4.

Highly suitable (S1) lands cover an area of about 4 ha (<1%) and distributed in the eastern part of the microwatershed. An area of about 101 ha (19 %) is moderately suitable (Class S2) for growing redgram and occur in the western, central, southern and eastern part of the microwatershed. They have minor limitations of texture and gravelliness. Marginally suitable lands (Class S3) occupy maximum area of about 358 ha (69 %) and occur in the major part of the microwatershed. They have moderate limitations of rooting depth, gravelliness, texture, and topography.

Table 7.5 Crop suitability criteria for Red gram

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

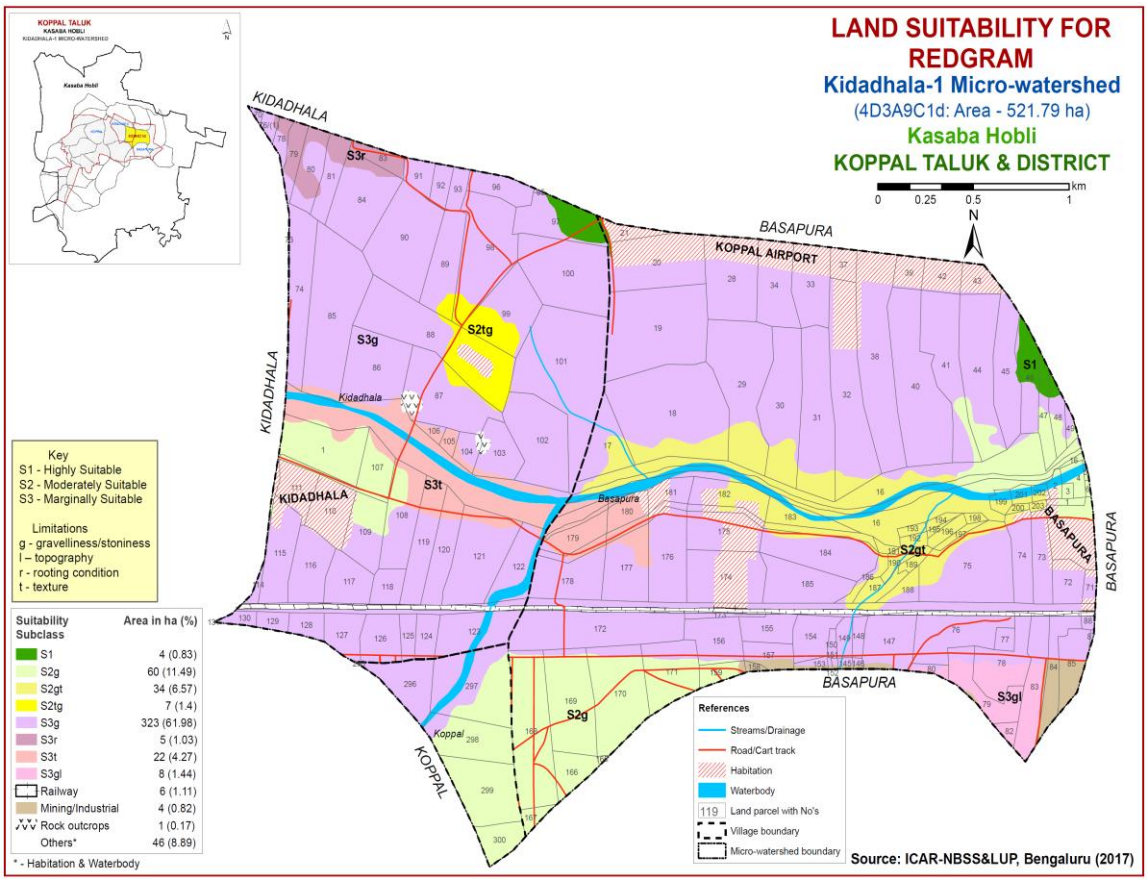


Fig. 7.4 Land Suitability map of Redgram

7.5 Land Suitability for Bengal gram (*Cicer arietinum*)

Bengal gram is one of the major pulse crop grown in an area of 9.39 lakh ha in northern Karnataka in Bijapur, Gulbarga, Raichur, Bidar, Belgaum, Dharwad and Bellary districts. The crop requirements for growing Bengal gram (Table 7.6) were matched with the soil-site characteristics (Table 7.1) of the soils of the microwatershed and a land suitability map for growing Bengal gram was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.5.

An area of about 7 ha (1%) in the microwatershed has soils that are highly suitable (Class S1) for growing Bengal gram and are distributed in the central part of the microwatershed. An area of about 103 ha (20 %) is moderately suitable (Class S2) for growing bengalgram and are distributed in the western, southern, central and eastern part of the microwatershed. They have minor limitations of rooting depth, texture and gravelliness. Marginally suitable (class S3) lands cover maximum area of about 331 ha (63%) and are distributed in the major part of the microwatershed. They have moderate limitations of gravelliness and topography. Area currently not suitable (Class N1) for growing Bengal gram cover about 22 ha (4%) and distributed in the western and central part of the microwatershed with severe limitation of texture.

Table 7.6 Crop suitability criteria for Bengal gram

Crop requirement		Rating			
Soil–site characteristics	**Unit**	**Highly suitable(S1)**	**Moderately suitable (S2)**	**Marginally suitable (S3)**	**Not suitable(N)**
Slope	%	<3	3-5	5-10	>10
LGP	Days	>100	90-100	70-90	<70
Soil drainage	class	Well drained	Mod. to well drained; Imper.drained	Poorly drained; excessively drained	Very Poorly drained
Soil reaction	pH	6.0-7.5	5.5-5.77.6-8.0	8.1-9.0;4.5-5.4	>9.0
Surface soil texture	Class	l, scl, sil, cl,	sicl, sic, c	sl, c>60%	S,fragmental
Soil depth	cm	>75	51-75	25-50	<25
Gravel content	% vol.	<15	15-35	35-60	>60
Salinity (EC)	dSm^{-1}	<1.0	1.0-2.0	>2.0	
Sodicity (ESP)	%	<10	10-15	>15	

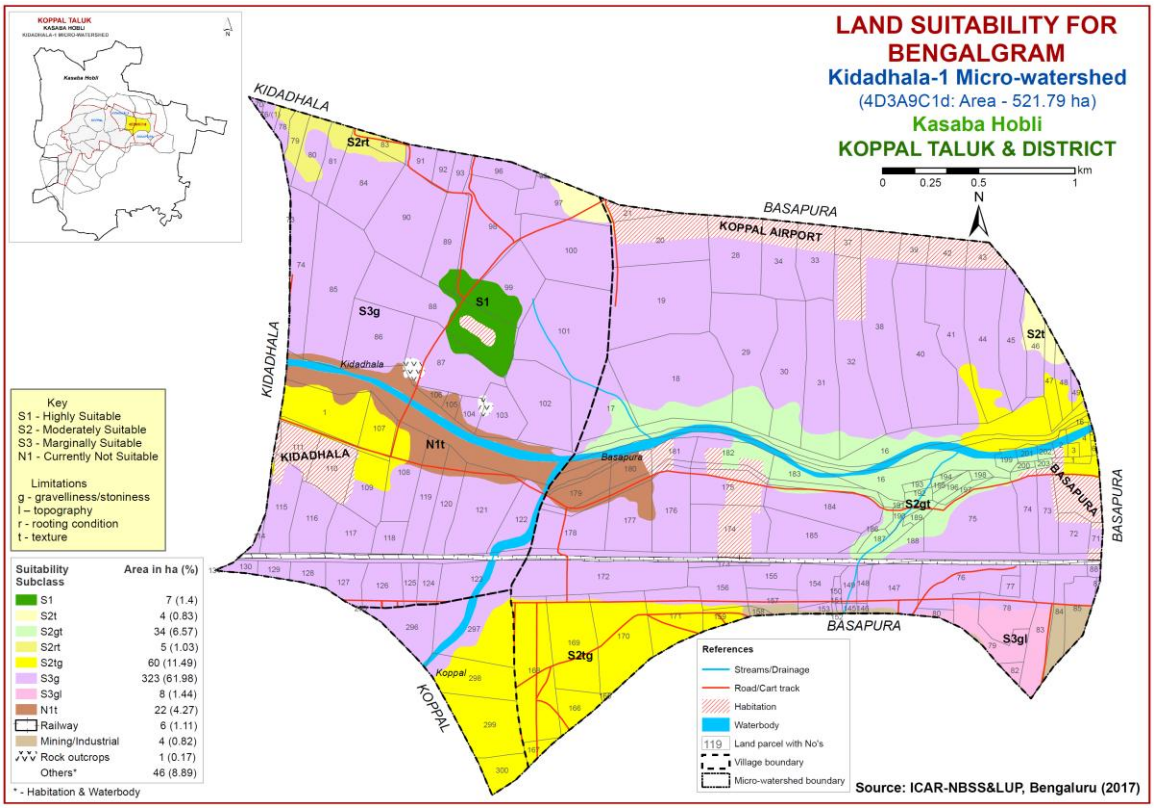


Fig. 7.5 Land Suitability map of Bengal gram

7.6 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 7.7) 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 7.6.

Table 7.7 Crop suitability criteria for Groundnut

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

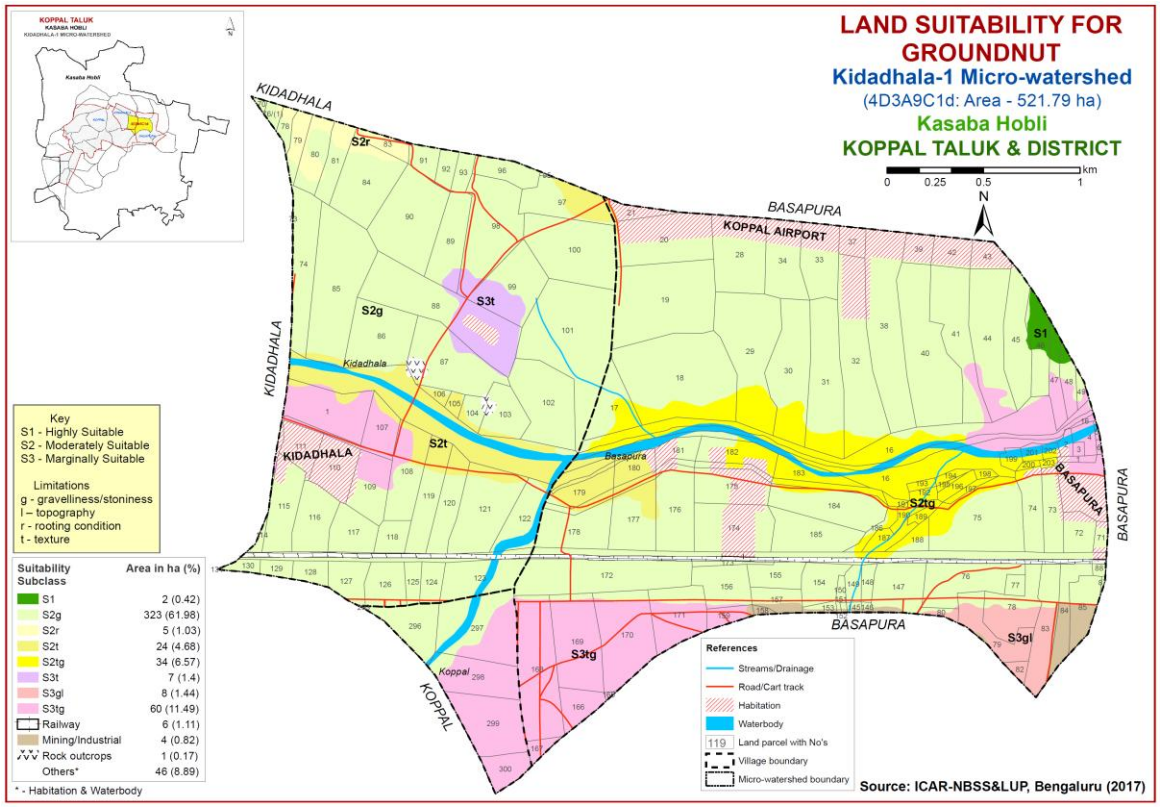


Fig. 7.6 Land Suitability map of Groundnut

Highly suitable (S1) lands cover an area of about 2 ha (<1%) and distributed in the eastern part of the microwatershed. Maximum area of about 386 ha (74 %) is moderately suitable (Class S2) for growing groundnut and distributed in the major part of the microwatershed. They have minor limitations of texture, rooting depth and gravelliness. Marginally suitable lands (Class S3) occupy an area of about 75 ha (14 %) and occur in the eastern, southern, central and western part of the microwatershed. They have moderate limitations of gravelliness, texture, and topography.

7.7 Land Suitability for Sunflower (*Helianthus annus*)

Sunflower is one of the most important oilseed crop grown in an area of 3.56 lakh ha in the State in all the districts. The crop requirements for growing sunflower (Table 7.8) 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 7.7.

Table 7.8 Crop suitability criteria for Sunflower

Crop requirement		Rating			
Soil–site characteristics	**Unit**	**Highly suitable(S1)**	**Moderately suitable(S2)**	**Marginally suitable(S3)**	**Not suitable(N)**
Slope	%	<3	3-5	5-10	>10
LGP	Days	>90	80-90	70-80	<70
Soil drainage	class	Well drained	mod. Well drained	imperfectly drained	Poorly drained
Soil reaction	pH	6.5-8.0	8.1-8.5:5.5-6.4	8.6-9.0;4.5-5.4	>9.0:<4.5
Surface soil texture	Class	l, cl, sil, sc	Scl, sic, c,	c (>60%), sl	ls, s
Soil depth	cm	>100	75-100	50-75	<50
Gravel content	%vol.	<15	15-35	35-60	>60
Salinity (EC)	dSm^{-1}	<1.0	1.0-2.0	>2.0	
Sodicity (ESP)	%	<10	10-15	>15	

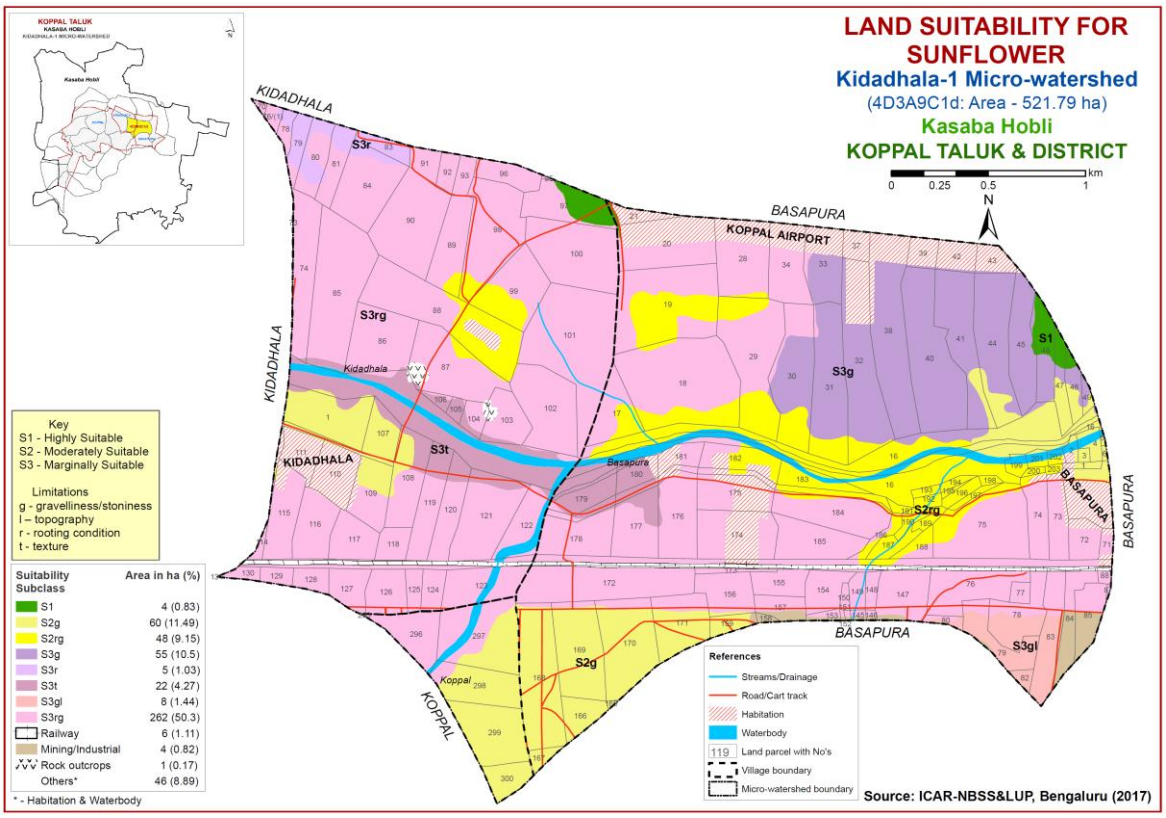


Fig. 7.7 Land Suitability map of Sunflower

Highly suitable (S1) lands cover an area of about 4 ha (<1%) and distributed in the northern and eastern part of the microwatershed. An area of about 108 ha (21 %) is moderately suitable (Class S2) for growing sunflower and are distributed in the western, central, southern and eastern part of the microwatershed. They have minor limitations of rooting depth and gravelliness. Marginally suitable lands (Class S3) occupy maximum area of about 352 ha (68%) and occur in the major part of the microwatershed. They have moderate limitations of rooting depth, gravelliness, texture and topography.

7.8 Land Suitability for Cotton (*Gossypium hirsutum*)

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

An area of about 9 ha (2%) in the microwatershed has soils that are highly suitable (Class S1) for growing cotton and are distributed in the northern part of the microwatershed. An area of about 101 ha (20 %) is moderately suitable (Class S2) for growing cotton and are distributed in the western, southern, central and eastern part of the microwatershed. They have minor limitations of rooting depth, texture and gravelliness. Marginally suitable (Class S3) lands cover a maximum area of about 323 ha (62%) and are distributed in the major part of the microwatershed. They have moderate limitations of gravelliness and rooting depth. Area currently not suitable (Class N1) for growing cotton cover about 30 ha (6%) and distributed in the western and central part of the microwatershed with severe limitations of texture, gravelliness and topography.

Table 7.9 Crop suitability criteria for Cotton

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

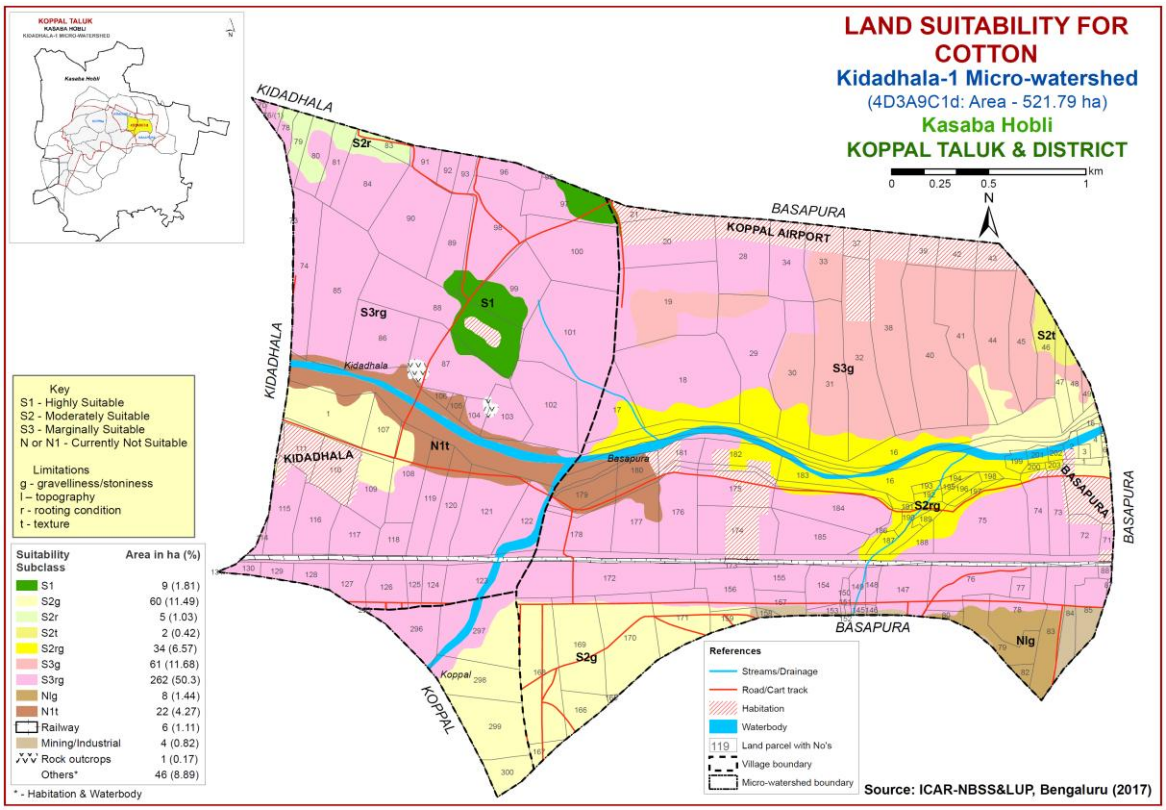


Fig. 7.8 Land Suitability map of Cotton

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

Chilli is one of the major spice crop grown in an area of 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) of the soils of the microwatershed and a land suitability map for growing chilli was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.9.

Table 7.10 Crop suitability criteria for Chilli

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

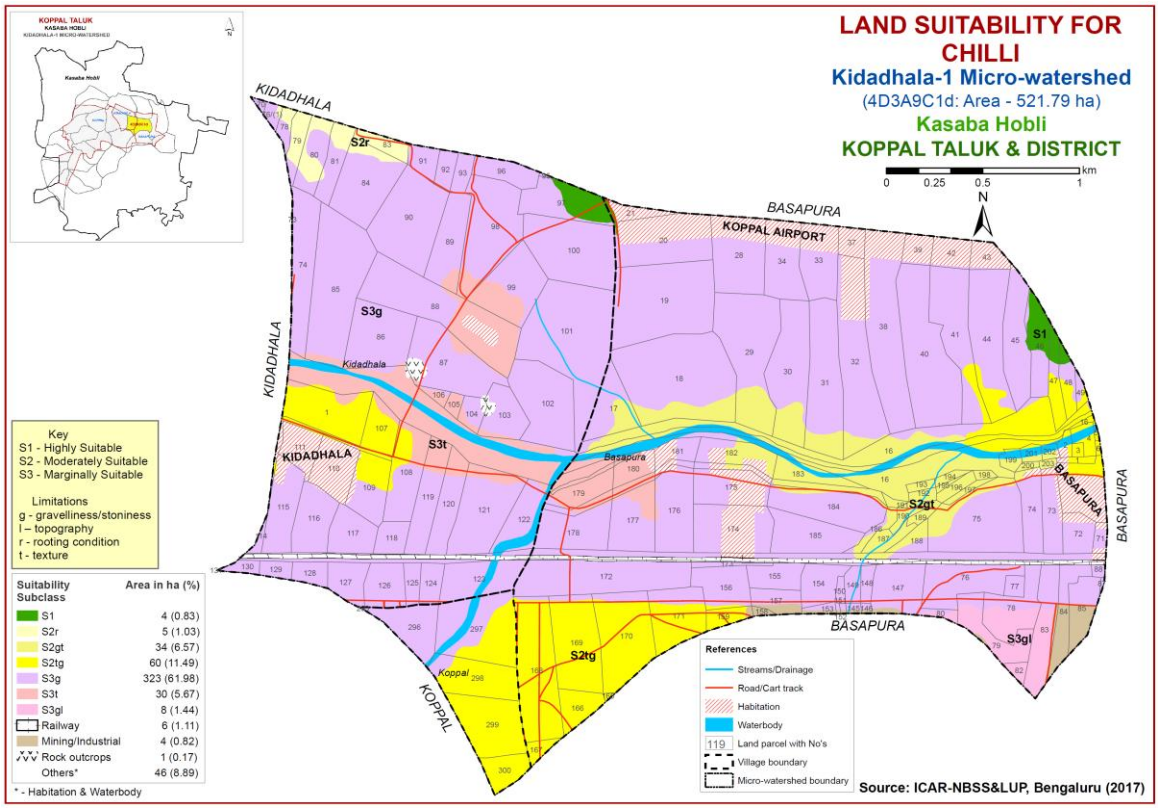


Fig. 7.9 Land Suitability map of Chilli

Highly suitable (S1) lands cover an area of about 4 ha (<1%) and distributed in the northern and eastern part of the microwatershed. An area of about 99 ha (19 %) is moderately suitable (Class S2) for growing chilli and distributed in the western, central, southern and eastern part of the microwatershed. They have minor limitations of rooting depth, texture and gravelliness. Marginally suitable lands (Class S3) occupy maximum area of about 361 ha (69%) and occur in the major part of the microwatershed. They have moderate limitations of gravelliness, texture and topography.

7.10 Land Suitability for Tomato (*Solanum lycopersicum*)

Tomato is one of the most important vegetable crop grown in an area of 0.65 lakh ha in almost all the districts of the State. The crop requirements (Table 7.11) for growing tomato were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing tomato was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.10.

Highly suitable (S1) lands for growing tomato cover an area of about 4 ha (<1%) and distributed in the northern and eastern part of the microwatershed. An area of about 65 ha (12 %) is moderately suitable (Class S2) for growing tomato and are distributed in the western, southern and eastern part of the microwatershed. They have minor limitations of rooting depth, texture and gravelliness. Marginally suitable lands (Class S3) occupy maximum area of about 395 ha (76%) and occur in the major part of the microwatershed. They have moderate limitations of gravelliness, texture and topography.

Table 7.11 Crop suitability criteria for Tomato

Crop requirement			Rating			
Soil-site characteristics		**Unit**	**Highly suitable(S1)**	**Moderately suitable(S2)**	**Marginally suitable(S3)**	**Not suitable(N)**
Climate	Temperature in growing season	^{0}C	25-28	29-32 20-24	15-19 33-36	<15 >36
Soil moisture	Growing period	Days	>150	120-150	90-120	
Soil aeration	Soil drainage	Class	Well drained	Moderately well drained	Imperfectly drained	Poorly drained
Nutrient availability	Texture	Class	l, sl, cl, scl	Sic,sicl,sc,c(m/k)	C (ss)	ls, s
	pH	1:2.5	6.0-7.0	5.0-5.9:7.1-8.5	<5;>8.5	
	$CaCO_3$ in root zone	%	Non calcareous	Slightly calcareous	Strongly calcareous	
Rooting conditions	Soil depth	cm	>75	50-75	25-50	<25
	Gravel content	% vol.	<15	15-35	>35	
Soil toxicity	Salinity	dS/m	Non saline	slight	strongly	
	Sodicity (ESP)	%	<10	10-15	>15	-
Erosion	Slope	%	1-3	3-5	5-10	>10

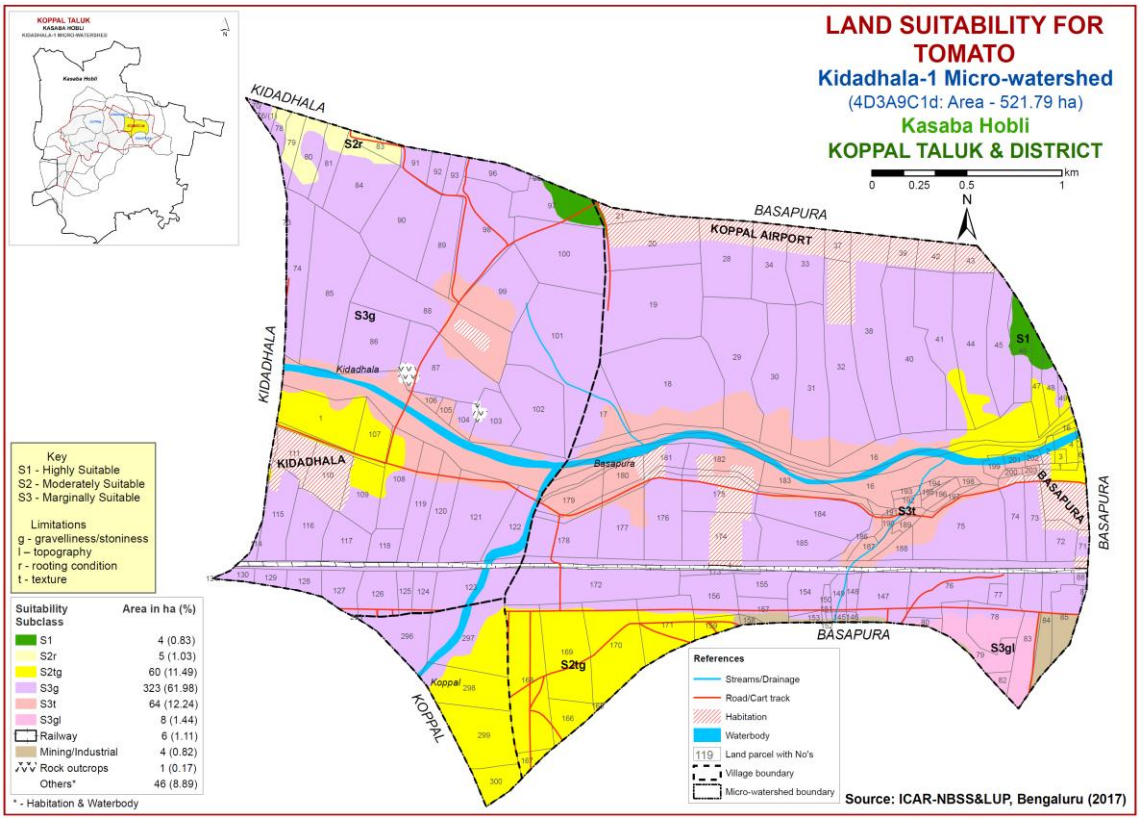


Fig. 7.10 Land Suitability map of Tomato

7.11 Land Suitability for Drumstick (*Moringa oleifera)*

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

Table 7.12 Crop suitability criteria for Drumstick

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

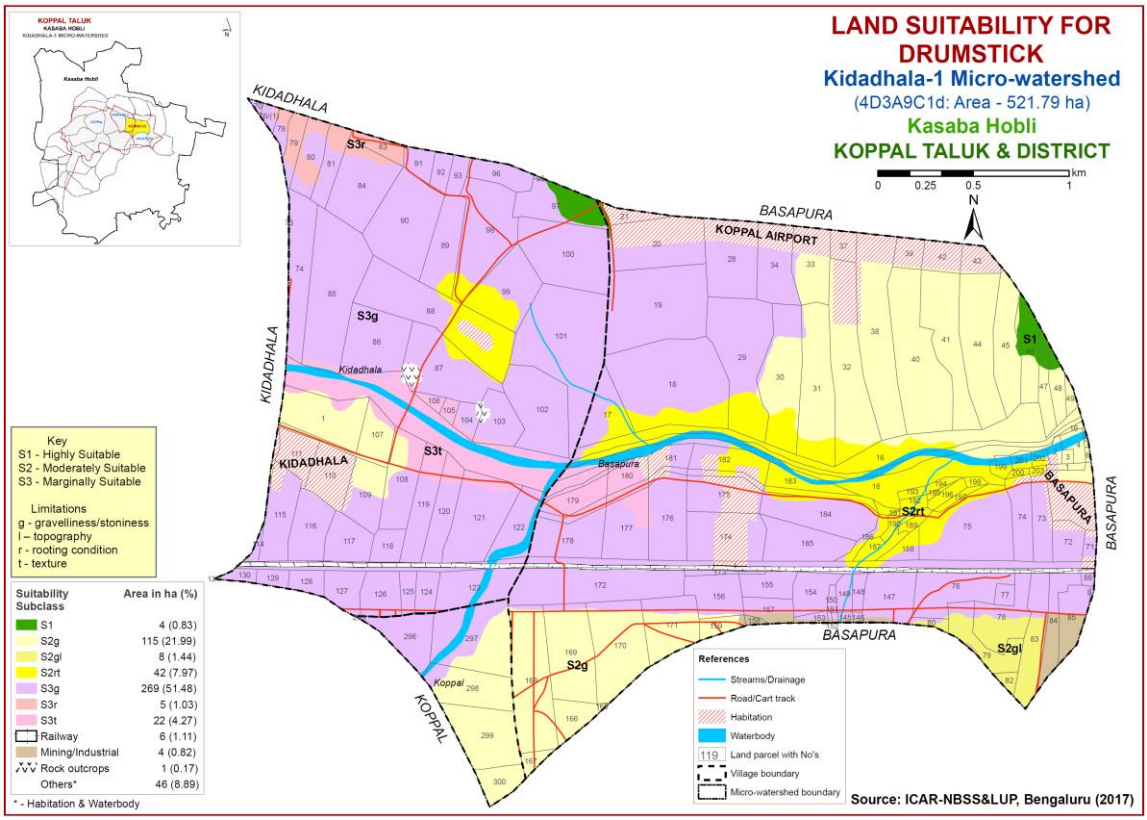


Fig. 7.11 Land Suitability map of Drumstick

Highly suitable (S1) lands for growing drumstick cover an area of about 4 ha (<1%) and distributed in the eastern part of the microwatershed. An area of about 165 ha (31 %) is moderately suitable (Class S2) for growing drumstick and are distributed in the

western, southern, central and eastern part of the microwatershed. They have minor limitations of rooting depth, topography and gravelliness. Marginally suitable lands (Class S3) occupy maximum area of about 296 ha (57%) and occur in the major part of the microwatershed. They have moderate limitations of gravelliness, texture and rooting depth.

7.12 Land Suitability for Mulberry (*Morus nigra*)

Mulberry is the most important leaf crop grown for rearing silkworms in about 1.66 lakh ha in all the districts of the state. The crop requirements for growing mulberry (Table 7.13) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing mulberry was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.12.

Highly suitable (S1) lands for growing mulberry cover an area of about 4 ha (<1%) and distributed in the eastern part of the microwatershed. Maximum area of about 425 ha (81%) is moderately suitable (Class S2) for growing mulberry and are distributed in the major part of the microwatershed. They have minor limitations of rooting depth, texture and gravelliness. Marginally suitable lands (Class S3) occupy an area of about 35 ha (7%) and occur in the western, central and southeastern part of the microwatershed. They have moderate limitations of rooting depth, gravelliness, texture and topography.

Table 7.13 Crop suitability criteria for Mulberry

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

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

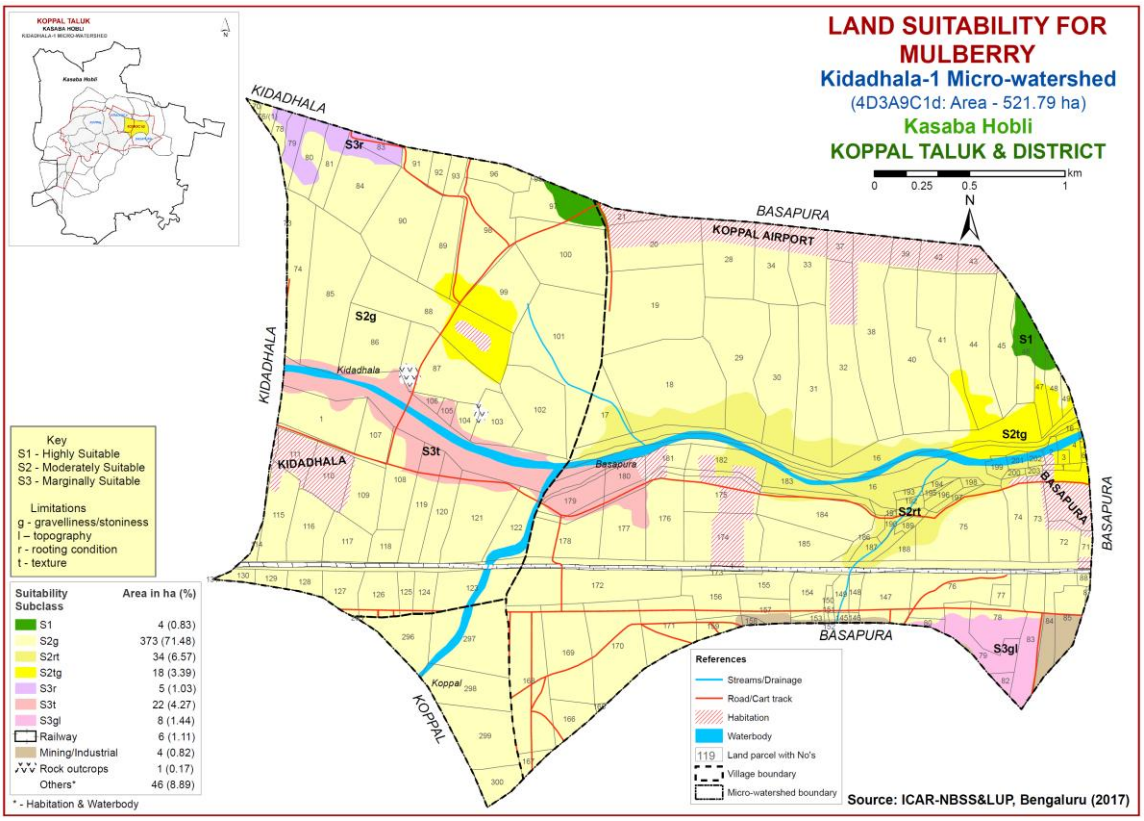


Fig. 7.12 Land Suitability map of Mulberry

7.13 Land suitability for Mango (*Mangifera indica*)

Mango is one of the most important fruit crop grown in about 1.73 lakh ha in almost all the districts of the State. The crop requirements (Table 7.14) for growing mango were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing mango was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.13.

Highly suitable (S1) lands for growing mango cover a small area of about 2 ha (<1%) and distributed in the northern part of the microwatershed. An area of about 62 ha (11 %) is moderately suitable (Class S2) for growing mango and are distributed in the western, southern and eastern part of the microwatershed. They have minor limitations of rooting depth and gravelliness. Marginally suitable lands (Class S3) occupy maximum area of about 395 ha (76%) and occur in the major part of the microwatershed. They have moderate limitations of gravelliness, rooting depth, texture and topography. Area not suitable (Class N1) for growing mango cover about 5 ha (1%) and distributed in the northern part of the microwatershed with severe limitation of rooting depth.

Table 7.14 Crop suitability criteria for Mango

Crop requirement			Rating			
Soil-site characteristics		Unit	Highly suitable(S1)	Moderately suitable (S2)	Marginally suitable(S3)	Not suitable (N)
Climate	Temp. in growing season	^{0}C	28-32	24-27 33-35	36-40	20-24
	Min. temp. before flowering	^{0}C	10-15	15-22	>22	
Soil moisture	Growing period	Days	>180	150-180	120-150	<120
Soil aeration	Soil drainage	Class	Well drained	Mod. To imper.drained	Poor drained	Very poorly drained
	Water table	M	>3	2.50-3.0	2.5-1.5	<1.5
Nutrient availability	Texture	Class	Sc,l, sil, cl	Sl, sc,sic,l,c	C (<60%)	C(>60%),
	pH	1:2.5	5.5-7.5	7.6-8.5:5.0-5.4	8.6-9.0:4.0-4.9	>9.0<4.0
	OC	%	High	medium	low	
	$CaCO_3$ in root zone	%	Non calcareous	<5	5-10	>10
Rooting conditions	Soil depth	cm	>200	125-200	75-125	<75
	Gravel content	%vol	Non gravelly	<15	15-35	>35
Soil toxicity	Salinity	dS/m	Non saline	<2.0	2.0-3.0	>3.0
	Sodicity	%	Non sodic	<10	10-15	>15
Erosion	Slope	%	<3	3-5	5-10	

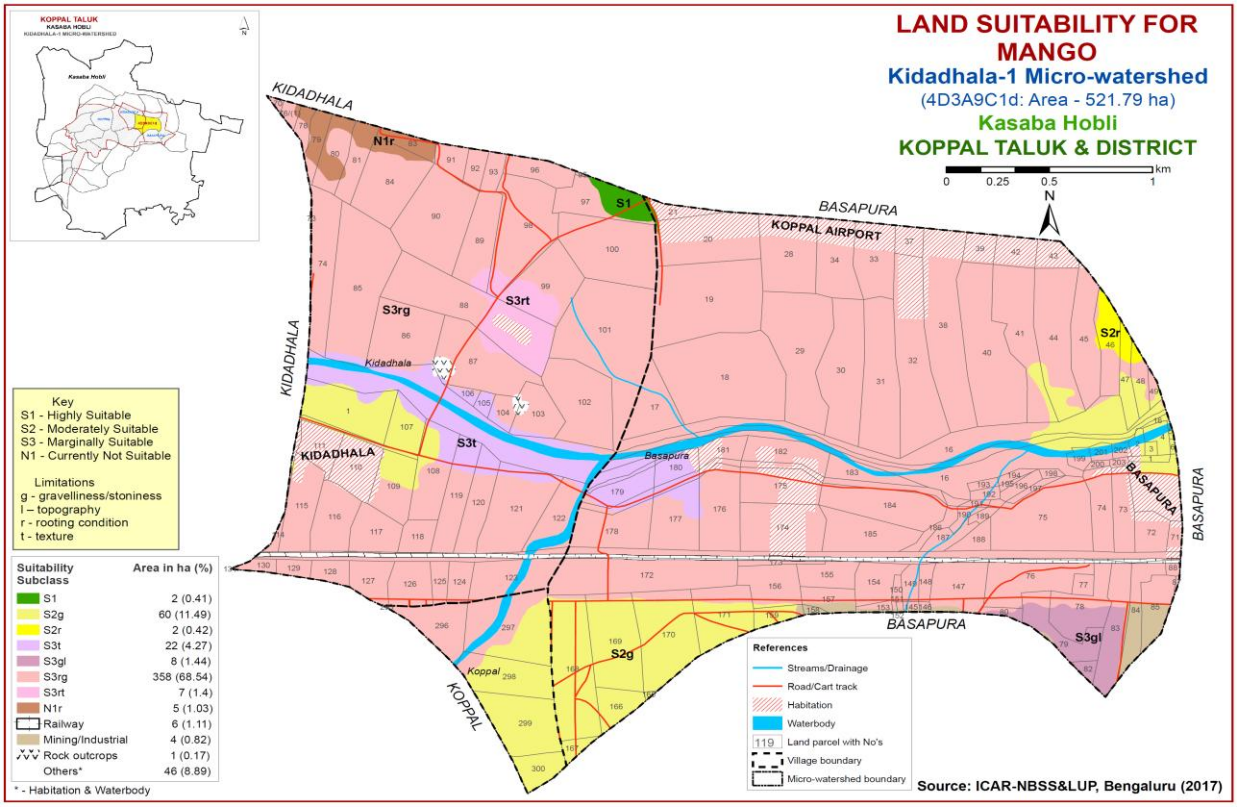


Fig. 7.13 Land Suitability map of Mango

7.14 Land suitability for Sapota (*Manilkara zapota*)

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

Table 7.15 Crop suitability criteria for Sapota

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

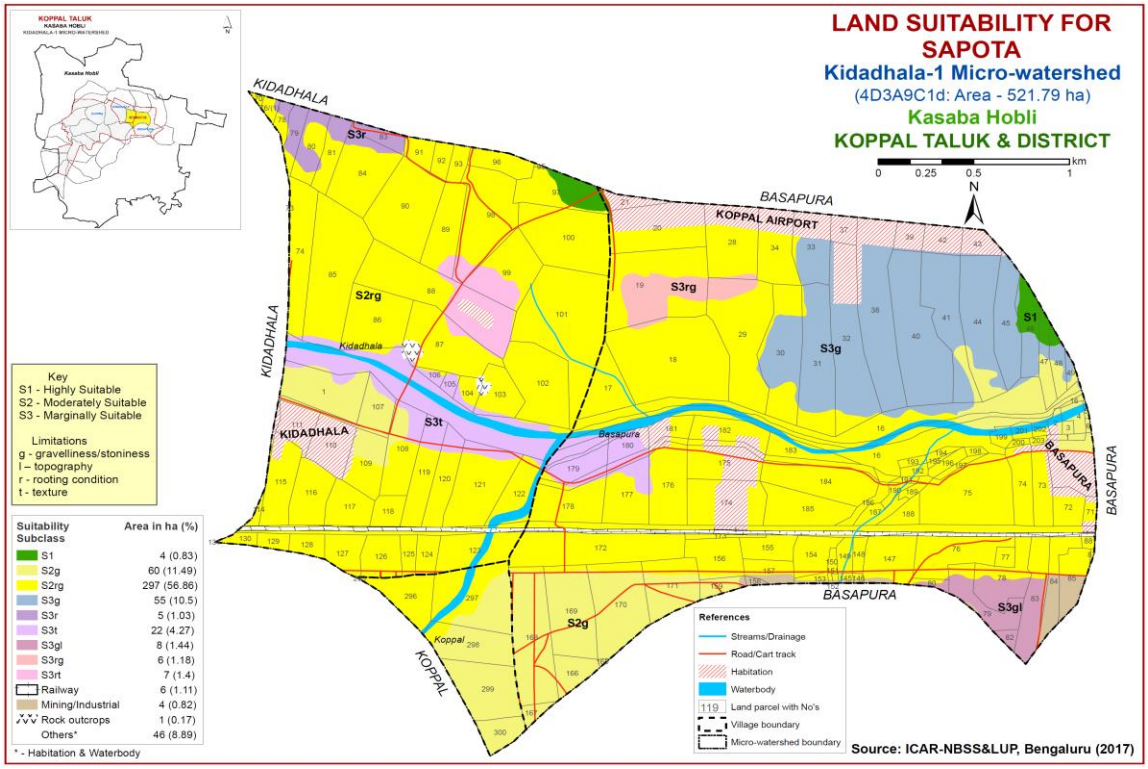


Fig. 7.14 Land Suitability map of Sapota

Highly suitable (S1) lands occupy an area of about 4 ha (<1%) for growing sapota and distributed in the northern and eastern part of the microwatershed. Maximum area of about 357 ha (68%) is moderately suitable (Class S2) for growing sapota and are distributed in the major part of the microwatershed. They have minor limitations of rooting depth and gravelliness. Marginally suitable lands (Class S3) occupy an area of about 103 ha (20%) and occur in the western, central, northern, southeastern and northeastern part of the microwatershed. They have moderate limitations of gravelliness, rooting depth, texture and topography.

7.15 Land Suitability for Pomegranate (*Punica granatum*)

Pomegranate is one of the commercially grown fruit crop in about 18488 ha in Karnataka mainly in Bijapur, Bagalkot, Koppal, Gadag and Chitradurga districts. The crop requirements for growing pomegranate (Table 7.16) were matched with the soil-site characteristics (Table 7.1) of the soils of the microwatershed and a land suitability map for growing pomegranate was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.15.

Highly suitable (S1) lands occupy an area of about 4 ha (<1%) and distributed in the northern and eastern part of the microwatershed. Maximum area of about 364 ha (70%) is moderately suitable (Class S2) for growing pomegranate and are distributed in the major part of the microwatershed. They have minor limitations of rooting depth, texture and gravelliness. Marginally suitable lands (Class S3) occupy an area of about 96 ha (18 %) and occur in the northern, western, central, northeastern and southeastern part of the microwatershed. They have moderate limitations of gravelliness, rooting depth, texture and topography.

Table 7.16 Crop suitability criteria for Pomegranate

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

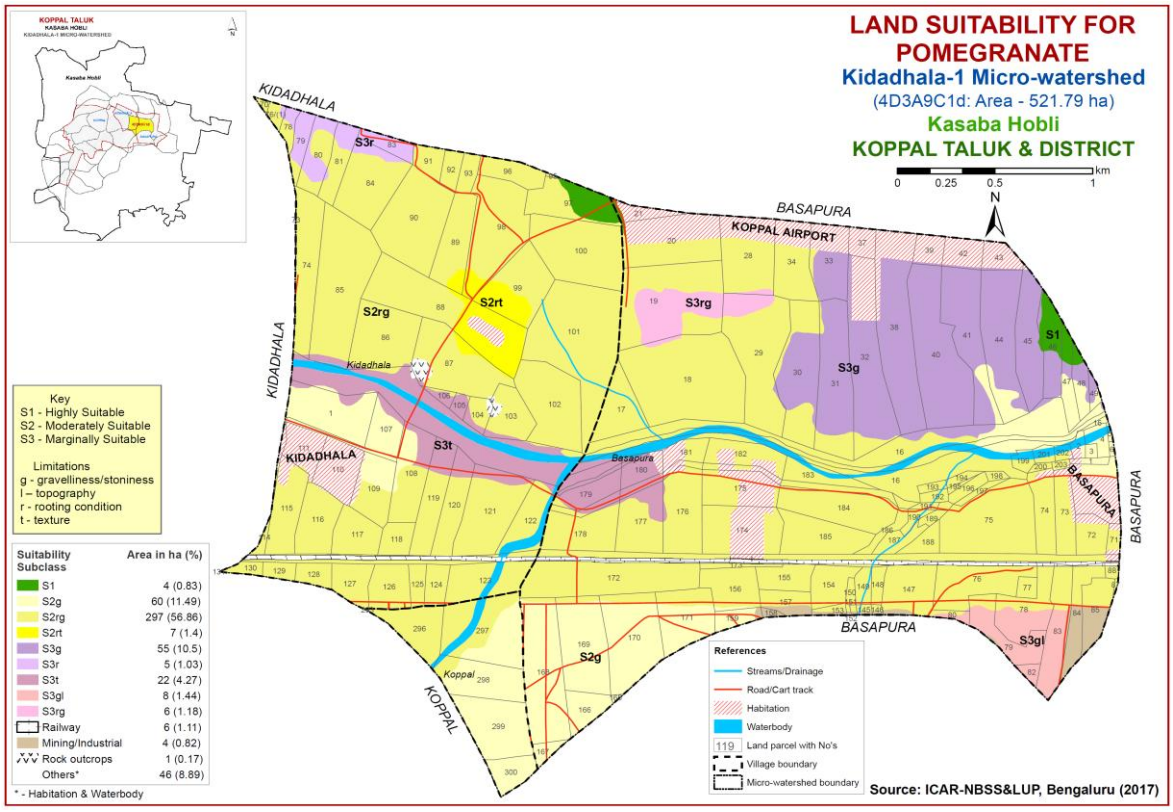


Fig. 7.15 Land Suitability map of Pomegranate

7.16 Land suitability for Guava (*Psidium guajava*)

Guava is one of the most important fruit crop grown in an area of about 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 (Table 7.1) and a land suitability map for growing guava was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.16.

Table 7.17 Crop suitability criteria for Guava

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

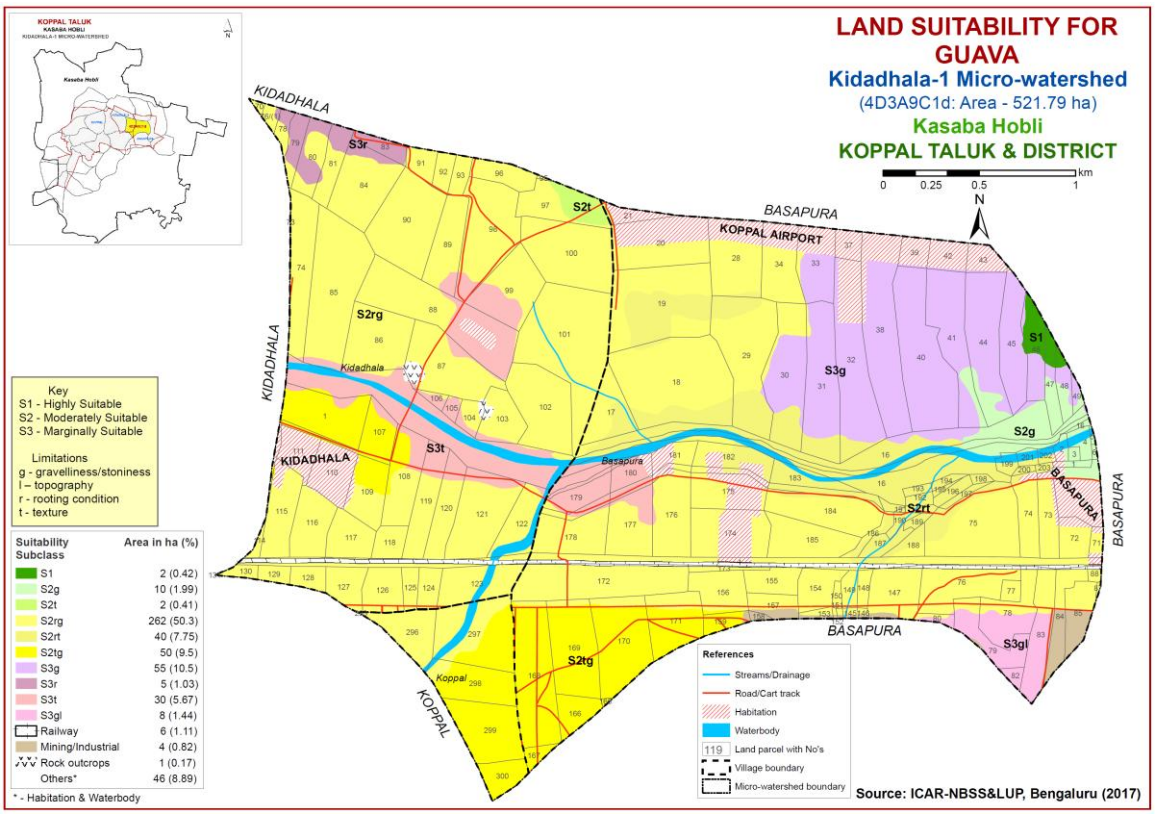


Fig. 7.16 Land Suitability map of Guava

Highly suitable (S1) lands occupy an area of about 2 ha (<1%) and distributed in the eastern part of the microwatershed. Maximum area of about 364 ha (70 %) is moderately suitable (Class S2) for growing guava and are distributed in the major part of the microwatershed. They have minor limitations of rooting depth, texture and gravelliness. Marginally suitable lands (Class S3) occupy an area of about 98 ha (19%) and occur in the northern, western, central, southeastern and northwestern part of the microwatershed. They have moderate limitations of gravelliness, rooting depth, texture and topography.

7.17 Land Suitability for Jackfruit (*Artocarpus heterophyllus*)

Jackfruit is one of the most important fruit crop grown in 5368 ha in all the districts of the state. The crop requirements (Table.7.18) for growing jackfruit were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing jackfruit was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in figure 7.17.

Highly suitable (S1) lands for growing jackfruit cover an area of about 4 ha (<1%) and distributed in the northern and eastern part of the microwatershed. An area of about 363 ha (70 %) is moderately suitable (Class S2) for growing jackfruit and are distributed in the major part of the microwatershed. They have minor limitations of rooting depth and gravelliness. Marginally suitable lands (Class S3) occupy an area of about 98 ha (19%)

and occur in the western, central, northeastern and southeastern part of the microwatershed. They have moderate limitations of gravelliness, rooting depth, texture and topography.

Table 7.18 Crop suitability criteria for Jackfruit

Crop requirement			Rating			
Soil site characteristics		Unit	Highly suitable(S1)	Moderately Suitable(S2)	Marginally suitable(S3)	Not suitable(N)
Soil aeration	Soil drainage	class	well	Mod. well	Poorly	V. Poorly
Nutrient availability	Texture	Class	Scl, cl, sc, c (red)	-	Sl, ls, c (black)	-
	pH	1:2.5	5.5-7.3	5.0-5.5,7.3-7.8	7.8-8.4	>8.4
Rooting conditions	Soil depth	cm	>100	75-100	50-75	<50
	Gravel content	% vol.	<15	15-35	35-60	>60
Erosion	Slope	%	0-3	3-5	>5	-

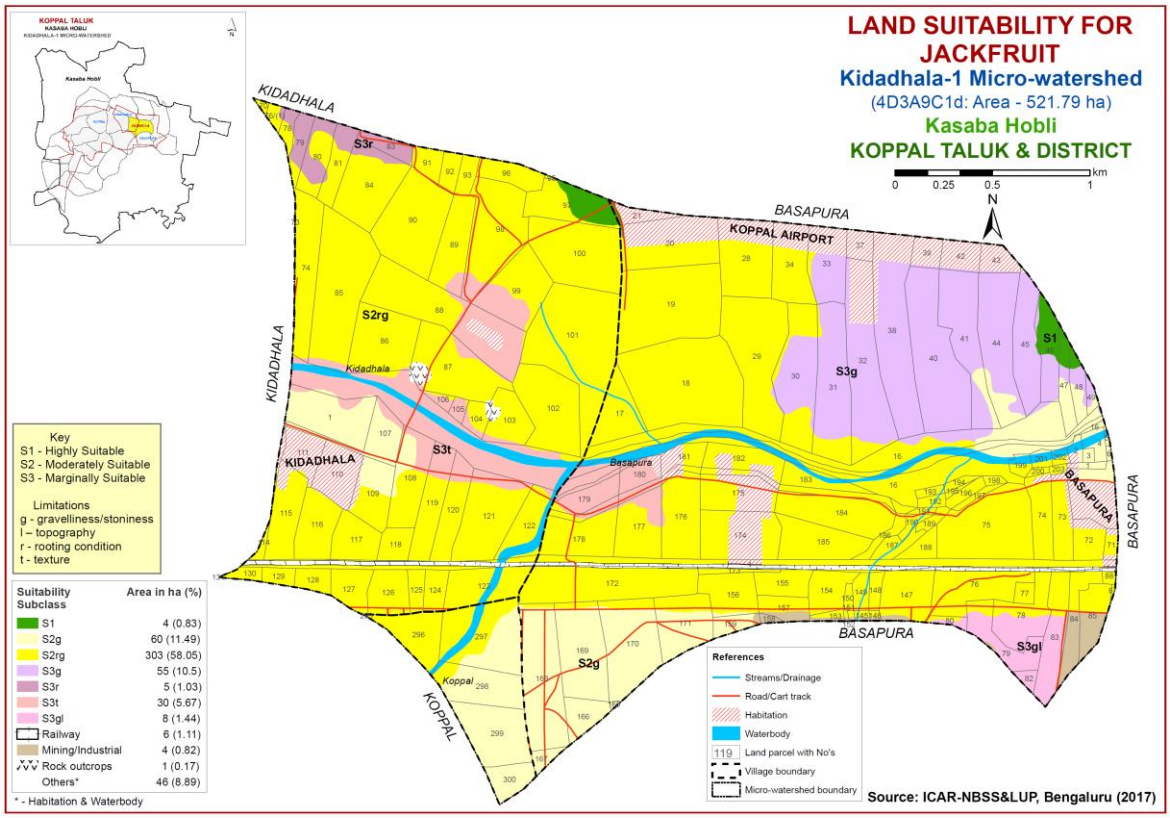


Fig. 7.17 Land Suitability map of Jackfruit

7.18 Land Suitability for Jamun (*Syzygium cumini*)

Jamun is an important fruit crop grown in almost all the districts of the state. The crop requirements (Table 7.19) for growing jamun were matched with the soil-site characteristics and a land suitability map for growing jamun was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.18.

Highly suitable (S1) lands for growing jamun cover an area of about 2 ha (<1%) and distributed in the northern part of the microwatershed. Moderately suitable (Class S2) lands cover a maximum area of about 365 ha (70 %) and are distributed in the major part of the microwatershed. They have minor limitations of rooting depth and gravelliness. Marginally suitable lands (Class S3) occupy maximum area of about 97 ha (19%) and occur in the western, central, northeastern and southeastern part of the microwatershed. They have moderate limitations of gravelliness, rooting depth, texture and topography

Table 7.19 Crop suitability criteria for Jamun

Crop requirement			**Rating**			
Soil- site characteristics		**Unit**	**Highly suitable(S1)**	**Moderately Suitable(S2)**	**Marginally suitable(S3)**	**Not suitable (N)**
Soil aeration	Soil drainage	Class	Well	Mod. well	Poorly	V.Poorly
Nutrient availability	Texture	Class	Scl, cl, sc, C(red)	Sl, C (black)	ls	-
	pH	1:2.5	6.0-7.8	5.0-6.0	7.8-8.4	>8.4
Rooting conditions	Soil depth	Cm	>150	100-150	50-100	<50
	Gravel content	% vol.	<15	15-35	35-60	>60
Erosion	Slope	%	0-3	3-5	5-10	>10

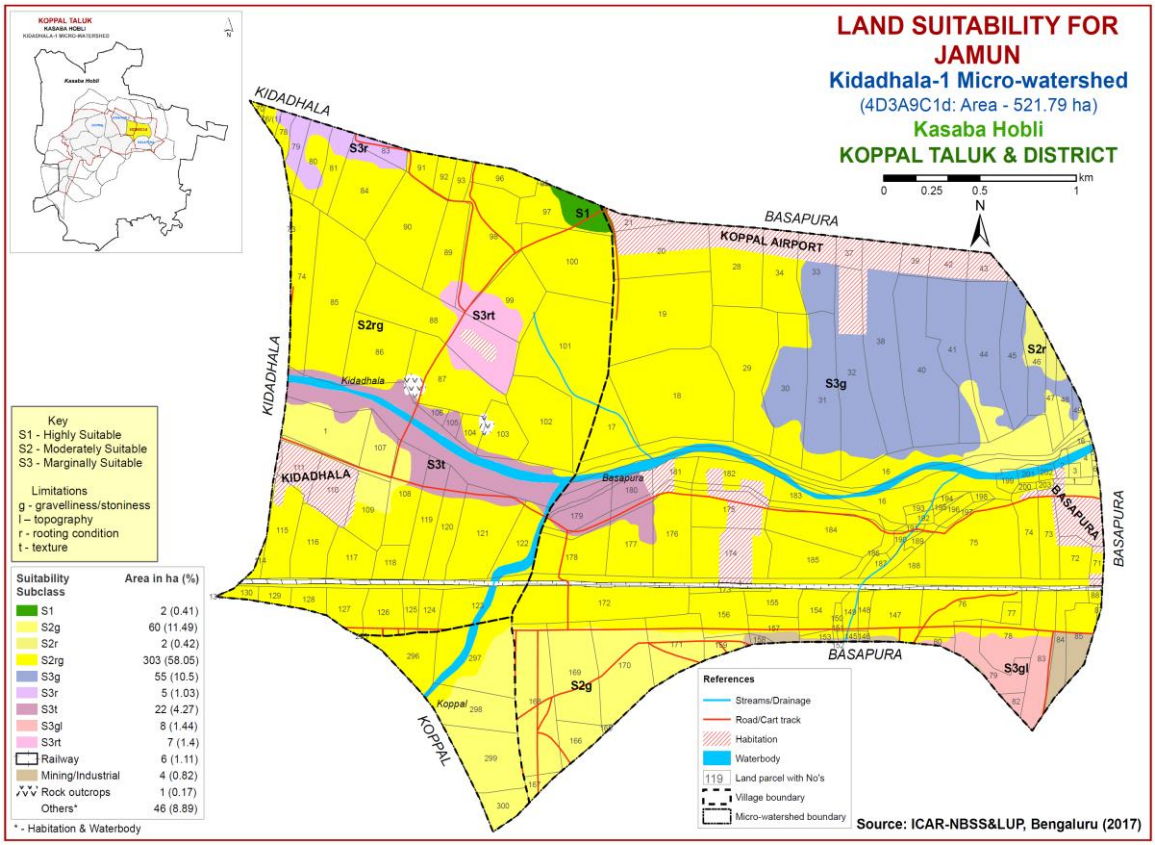


Fig. 7.18 Land Suitability map of Jamun

7.19 Land Suitability for Musambi (*Citrus limetta*)

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

Table 7.20 Crop suitability criteria for Musambi

Crop requirement			Rating			
Soil –site characteristics		Unit	Highly suitable(S1)	Moderately suitable(S2)	Marginally suitable(S3)	Not suitable(N)
Climate	Temperature in growing season	^{0}C	28-30	31-35 24-27	36-40 20-23	>40 <20
Soil moisture	Growing period	Days	240-265	180-240	150-180	<150
Soil aeration	Soil drainage	Class	Well drained	Mod. to imper. drained	Poorly	Very poorly
Nutrient availability	Texture	Class	Scl, l, sicl, cl,s	Sc, sc, c	C(>70%)	S, ls
	pH	1:2.5	6.0-7.5	5.5-6.47.6-8.0	4.0-5.4,8.1-8.5	<4.0,>8.5
	$CaCO_3$ in root zone	%	Non calcareous	Upto 5	5-10	>10
Rooting conditions	Soil depth	cm	>150	100-150	50-100	<50
	Gravel content	% vol.	Non gravelly	15-35	35-55	>55
Soil toxicity	Salinity	dS/m	Non saline	Upto 1.0	1.0-2.5	>2.5
	Sodicity	%	Non sodic	5-10	10-15	>15
Erosion	Slope	%	<3	3-5	5-10	

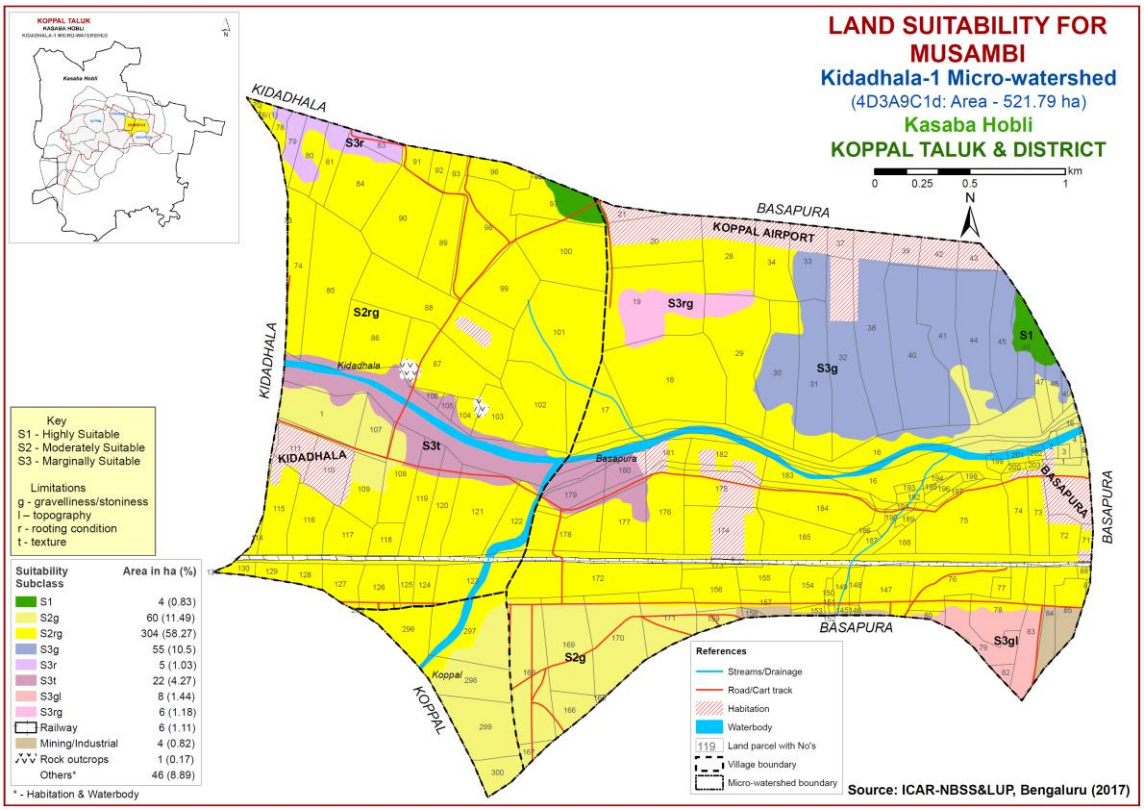


Fig. 7.19 Land Suitability map of Musambi

An area of about 4 ha (<1%) is highly suitable (Class S1) for growing musambi and are distributed in the eastern and northern part of the microwatershed. Moderately suitable (Class S2) lands cover a maximum area of about 364 ha (70%) and distributed in the major part of the microwatershed. They have minor limitations of rooting depth and gravelliness. An area of about 96 ha (18%) is marginally suitable (Class S3) for growing musambi and distributed in the western, central and northeastern and southeastern part of the microwatershed with moderate limitations of gravelliness, rooting depth, topography and texture.

7.20 Land Suitability for Lime (*Citrus sp*)

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

An area of about 4 ha (<1%) is highly suitable (Class S1) for growing lime and are distributed in the eastern and northern part of the microwatershed. Moderately suitable (Class S2) lands cover a maximum area of about 370 ha (71%) and distributed in the major part of the microwatershed. They have minor limitations of rooting depth and gravelliness. An area of about 90 ha (17%) is marginally suitable (Class S3) for growing lime and distributed in the western, central, northeastern and southern part of the microwatershed with moderate limitations of gravelliness, rooting depth, topography and texture.

Table 7.21 Crop suitability criteria for Lime

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

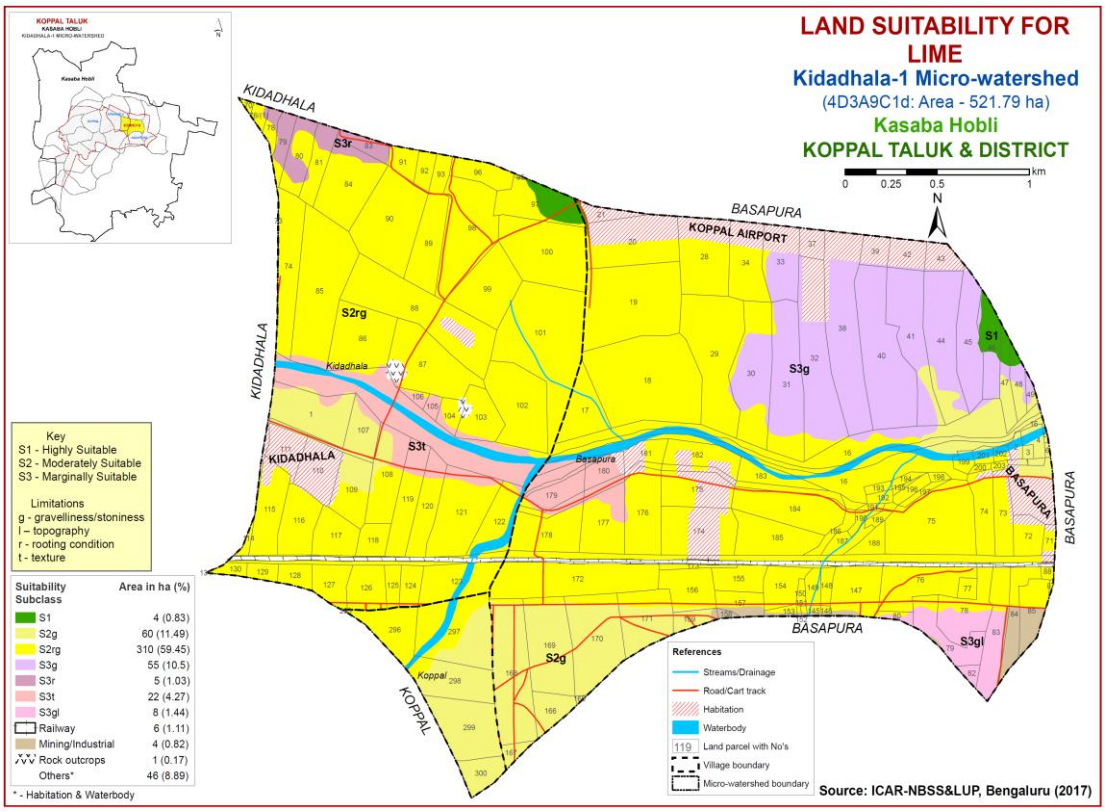


Fig. 7.20 Land Suitability map of Lime

7.21 Land Suitability for Cashew (*Anacardium occidentale)*

Cashew is one of the most important nut crop grown in an area of 7052 ha in almost all the districts of the State. The crop requirements for growing cashew (Table 7.22) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing cashew was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.21.

Table 7.22 Crop suitability criteria for Cashew

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

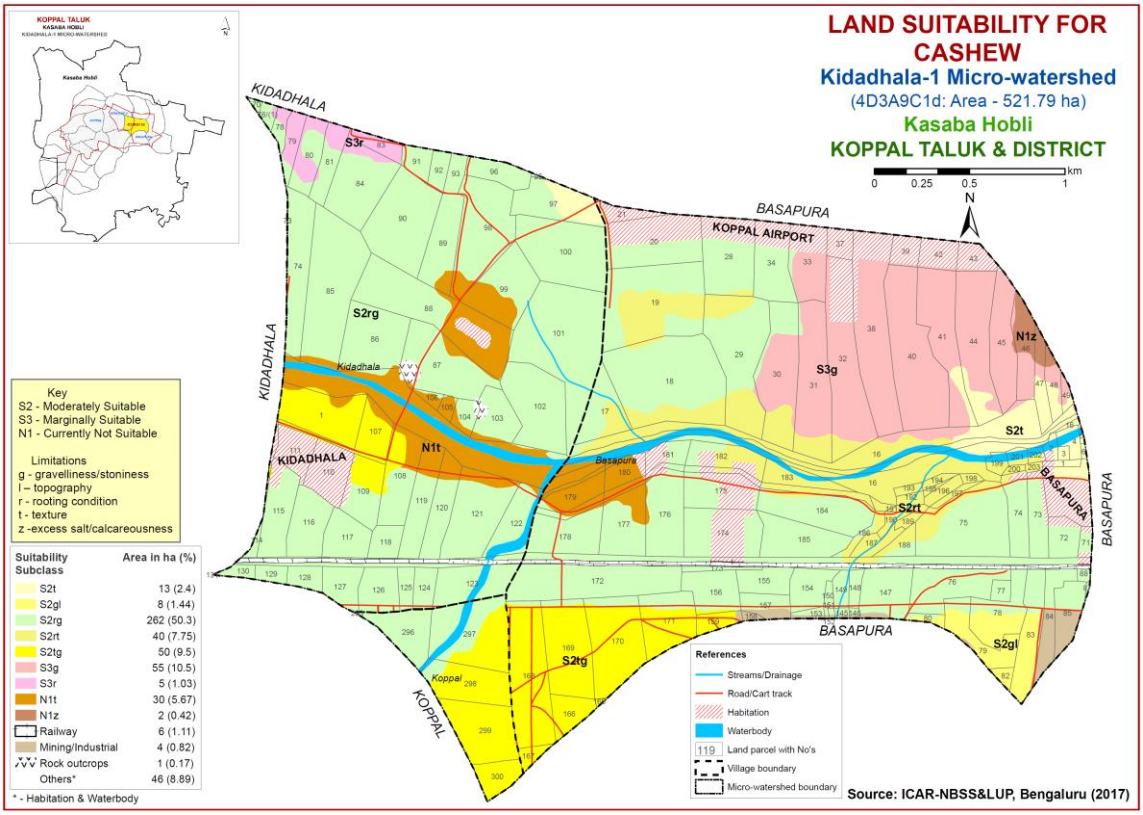


Fig. 7.21 Land Suitability map of Cashew

Moderately suitable (Class S2) lands cover a maximum area of about 373 ha (71%) and distributed in the major part of the microwatershed. They have minor limitations of rooting depth, texture, topography and gravelliness. An area of about 60 ha (12%) is marginally suitable (Class S3) for growing cashew and distributed in the northeastern part of the microwatershed with moderate limitations of rooting depth and gravelliness. An area of about 32 ha (6 %) is currently not suitable (Class N1) for growing cashew and distributed in the western and central part of the microwatershed with severe limitations of texture and calcareousness.

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

Custard apple is one of the most important fruit crop grown in 1426 ha in almost all the districts of the State. The crop requirements(Table 7.23) for growing custard apple were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing custard apple was generated .The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.22.

An area of about 56 ha (11%) is highly suitable (Class S1) for growing custard apple and are distributed in the eastern, northern and central part of the microwatershed. Moderately suitable (Class S2) lands cover a maximum area of about 378 ha (73%) and distributed in the major part of the microwatershed. They have minor limitations of rooting depth and gravelliness. An area of about 30 ha (6 %) is marginally suitable (Class

S3) for growing custard apple and distributed in the western, central and southern part of the microwatershed with moderate limitations of topography and texture.

Table 7.23 Crop suitability criteria for Custard apple

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

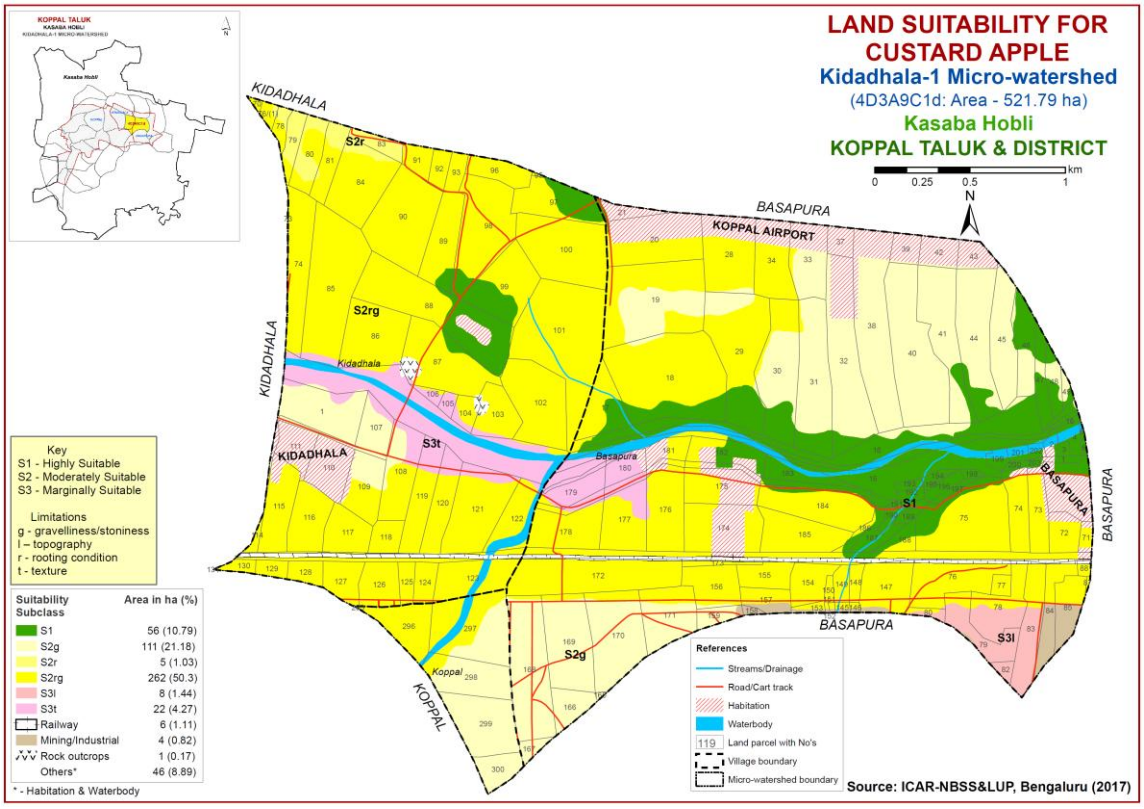


Fig. 7.22 Land Suitability map of Custard Apple

7.23 Land Suitability for Amla (*Phyllanthus emblica*)

Amla is one of the most important fruit and medicinal crop grown in an area of 151 ha and distributed in almost all the districts of the state. The crop requirements (Table 7.24) for growing amla were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing amla was generated. The area extent and their

geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.23.

Table 7.24 Crop suitability criteria criteria for Amla

Crop requirement			Rating			
Soil –site characteristics		Unit	Highly suitable(S1)	Moderately Suitable(S2)	Marginally suitable(S3)	Not suitable(N)
Soil aeration	Soil drainage	Class	Well drained	Mod.well drained	Poorly drained	V. Poorly drained
Nutrient availability	Texture	Class	Scl, cl,sc,c (red)	C (black)	ls, sl	-
	pH	1:2.5	5.5-7.3	5.0-5.5	7.8-8.4	>8.4
Rooting conditions	Soil depth	cm	>75	50-75	25-50	<25
	Gravel content	% vol.	<15-35	35-60	60-80	
Erosion	Slope	%	0-3	3-5	5-10	>10

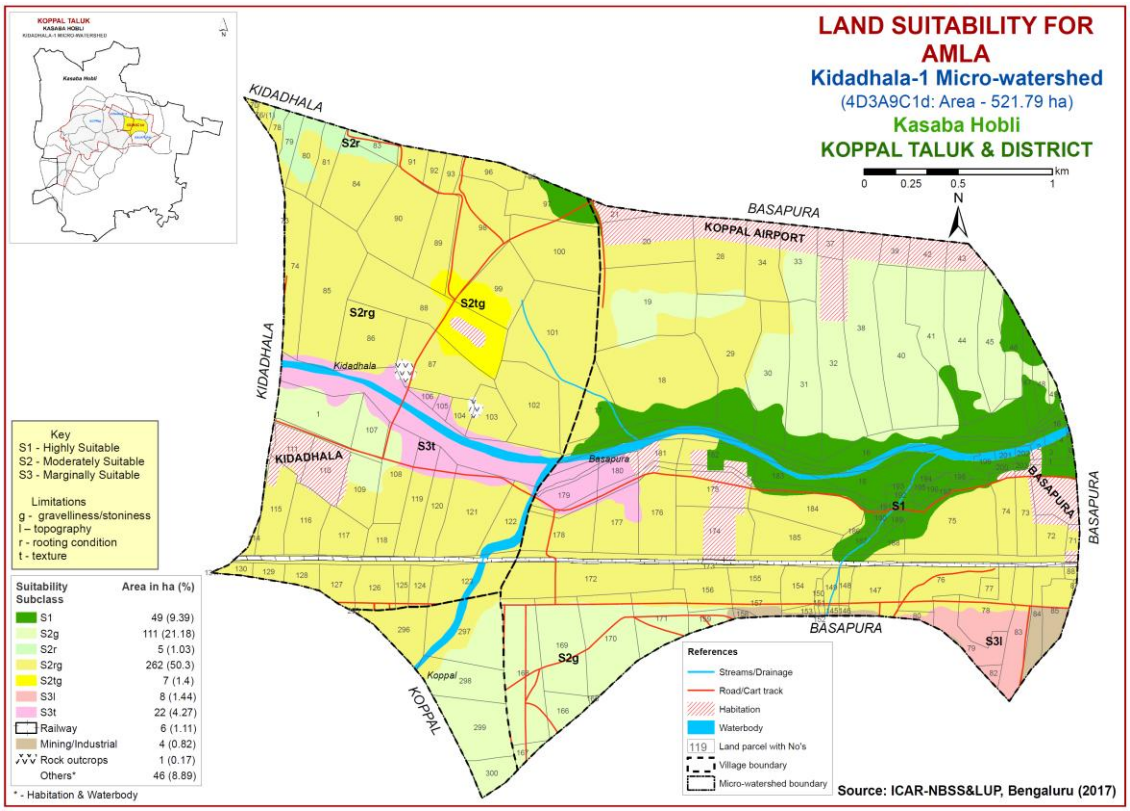


Fig. 7.23 Land Suitability map of Amla

Highly suitable (S1) lands cover an area of about 49 ha (9%) and distributed in the northern, central and eastern part of the microwatershed. Moderately suitable (Class S2) lands cover a maximum area of about 385 ha (74%) and distributed in the major part of the microwatershed. They have minor limitations of rooting depth, texture and gravelliness. Marginally suitable lands (Class S3) cover an area of about 30 ha (6 %) and distributed in the western, central and southern part of the microwatershed. They have moderate limitations of texture and topography.

7.24 Land Suitability for Tamarind (*Tamarindus indica*)

Tamarind is one of the most important spice crop grown in 14897 ha in all the districts of the state. The crop requirements (Table 7.25) for growing tamarind were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing tamarind was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.24.

Table 7.25 Crop suitability criteria for Tamarind

Crop requirement			Rating			
Soil –site characteristics		Unit	Highly suitable(S1)	Moderately Suitable(S2)	Marginally suitable(S3)	Not suitable(N)
Soil aeration	Soil drainage	Class	Well drained	Mod.well drained	Poorly drained	V.Poorly drained
Nutrient availability	Texture	Class	Scl, cl,sc, c (red)	Sl, c (black)	ls	-
	pH	1:2.5	6.0-7.3	5.0-6.0;7.3-7.8	7.8-8.4	>8.4
Rooting conditions	Soil depth	cm	>150	100-150	75-100	<75
	Gravel content	% vol.	<15	15-35	35-60	60-80
Erosion	Slope	%	0-3	3-5	5-10	>10

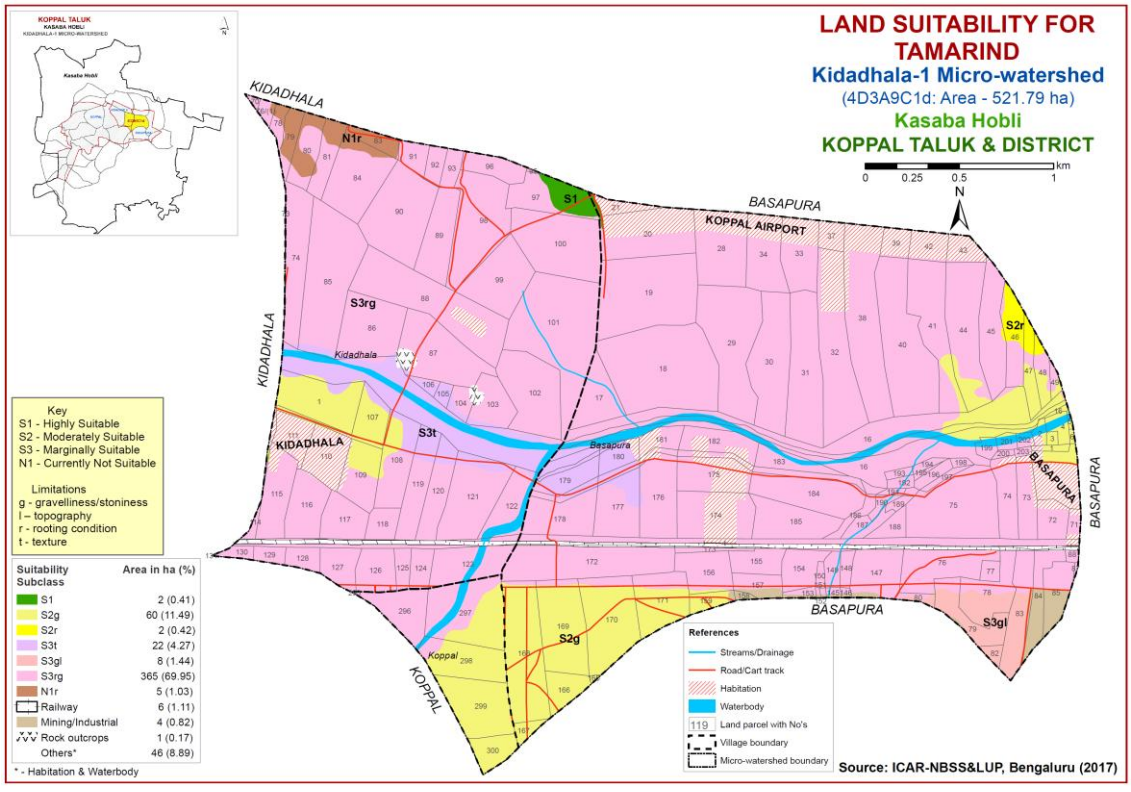


Fig. 7.21 Land Suitability map of Tamarind

Highly suitable (S1) lands for growing tamarind cover an area of about 2 ha (<1%) and distributed in the northern part of the microwatershed. An area of about 62 ha (12%) is moderately suitable (Class S2) for growing tamarind and distributed in the western, southern and eastern part of the microwatershed. They have minor limitations of

rooting depth and gravelliness. Marginally suitable lands (Class S3) occupy maximum area of about 395 ha (75%) and occur in the major part of the microwatershed. They have moderate limitations of rooting depth, gravelliness, texture, and topography. Area currently not suitable (Class N1) for growing tamarind cover about 5 ha (1%) and distributed in the northern part of the microwatershed with severe limitation of rooting depth.

7.25 Land Suitability for Marigold (*Tagetes erecta*)

Marigold is one of the most important flower crop grown in an area of 9108 ha in almost all the districts of the state. The crop requirements (Table 7.26) for growing marigold were matched with the soil-site characteristics and a land suitability map for growing marigold was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.25.

Highly suitable (S1) lands cover an area of about 4 ha (<1%) and distributed in the northern and eastern part of the microwatershed. An area of about 107 ha (20%) is moderately suitable (Class S2) for growing marigold and distributed in the northern, western, central, southern and eastern part of the microwatershed. They have minor limitations of rooting depth, texture and gravelliness. Marginally suitable lands (Class S3) cover a maximum area of about 353 ha (68 %) and occur in the major part of the microwatershed. They have moderate limitations of gravelliness, texture and topography.

Table 7.26 Crop suitability criteria for Marigold

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

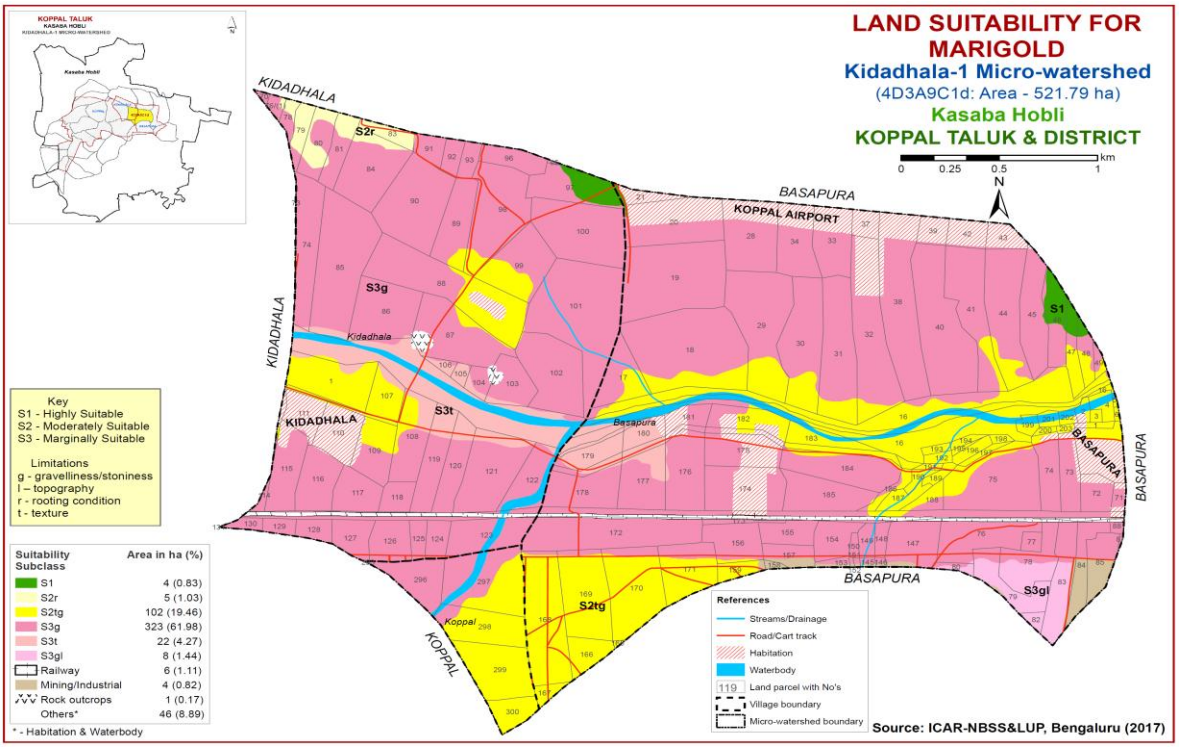


Fig. 7.25 Land Suitability map of Marigold

7.26 Land Suitability for Chrysanthemum (*Chrysanthemum indicum*)

Chrysanthemum is one of the most important flower crop grown in an area of 4978 ha in almost all the districts of the State. The crop requirements (Table 7.27) for growing chrysanthemum were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing chrysanthemum was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed is given in Figure 7.26.

Table 7.27 Crop suitability criteria for Chrysanthemum

Crop requirement			Rating			
Soil–site characteristics		Unit	Highly suitable(S1)	Moderately suitable(S2)	Marginally suitable(S3)	Not suitable(N)
Climate	Temperature in growing season		18-23	17-15 24-35	35-40 10-14	>40 <10
Soil aeration	Soil drainage	class	Well drained	Moderately well drained	Imperfectly drained	Poorly drained
Nutrient availability	Texture	Class	l ,sl, scl, cl, sil	sicl, sc, sic, c	c	ls, s
	pH	1:2.5	7.0-7.5	5.5-5.9;7.6-8.5	<5;>8.5	
	$CaCO_3$ in root zone	%	Non calcareous	Slightly calcareous	Strongly calcareous	

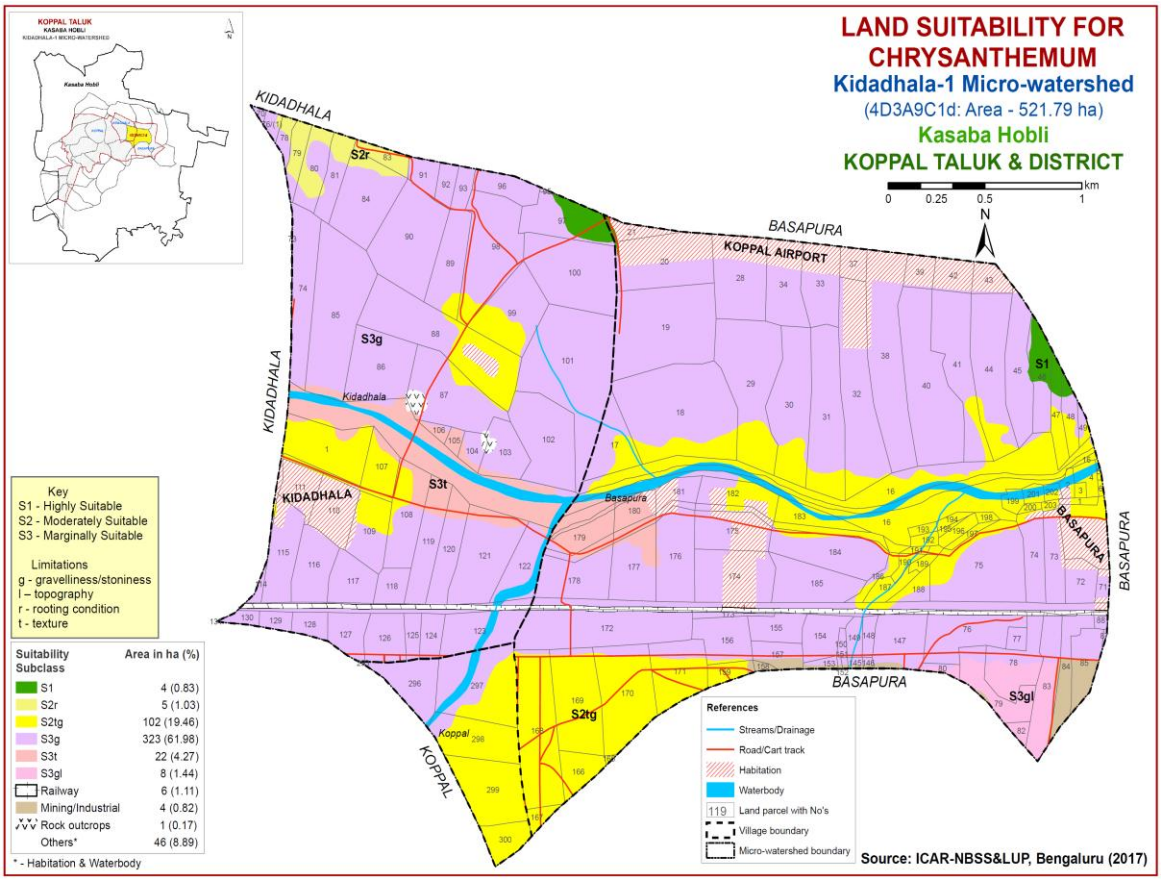


Fig. 7.26 Land Suitability map of Chrysanthemum

Highly suitable (S1) lands cover an area of about 4 ha (<1%) and distributed in the northern and eastern part of the microwatershed. An area of about 107 ha (20%) is moderately suitable (Class S2) for growing chrysanthemum and distributed in the northern, western, central, southern and eastern part of the microwatershed. They have minor limitations of rooting depth, texture and gravelliness. Marginally suitable lands (Class S3) cover a maximum area of about 353 ha (68 %) and occur in the major part of the microwatershed. They have moderate limitations of gravelliness, texture and topography.

7.27 Land Suitability for Jasmine *(Jasminum sp.)*

Jasmine is one of the most important flower crop grown in an area of 803 ha in almost all the districts of the State. The crop requirements (Table 7.28) for growing jasmine were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing jasmine was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.27.

Highly suitable (S1) lands for growing jasmine cover an area of about 4 ha (<1%) and distributed in the northern and eastern part of the microwatershed. An area of about 107 ha (20%) is moderately suitable (Class S2) and distributed in the northern, western, central, southern and eastern part of the microwatershed. They have minor limitations of

rooting depth, texture and gravelliness. Marginally suitable lands (Class S3) cover a maximum area of about 353 ha (68 %) and occur in the major part of the microwatershed. They have moderate limitations of gravelliness, texture and topography.

. **Table 7.28 Crop suitability criteria for jasmine (irrigated)**

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

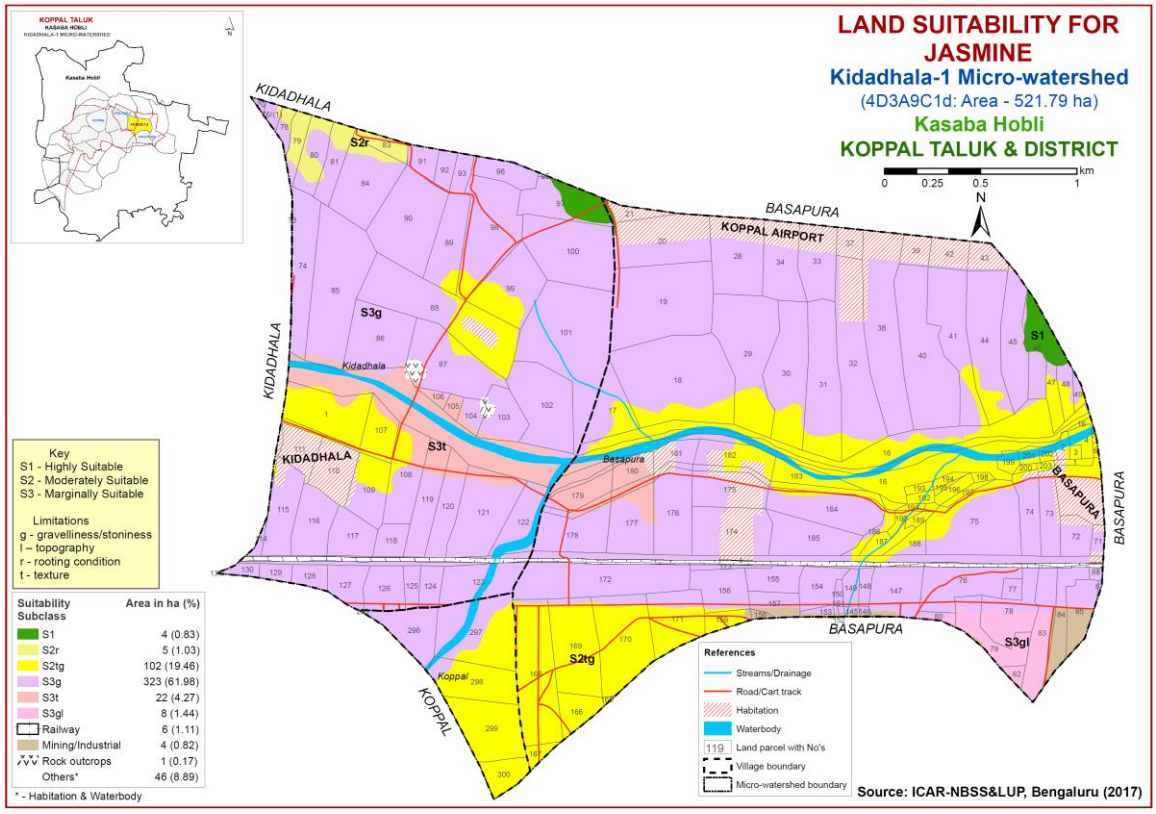


Fig. 7.27 Land Suitability map of Jasmine

7. 28 Land Suitability for Crossandra *(Crossandra infundibuliformis)*

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

Highly suitable (S1) lands for growing crossandra cover an area of about 4 ha (<1%) and distributed in the northern and eastern part of the microwatershed. An area of about 99 ha (19%) is moderately suitable (Class S2) for growing crossandra and are distributed in the western, southern and eastern part of the microwatershed. They have minor limitations of rooting depth, texture and gravelliness. Marginally suitable lands (Class S3) occupy a maximum area of about 361 ha (69%) and occur in the major part of the microwatershed. They have moderate limitations of gravelliness, texture and topography.

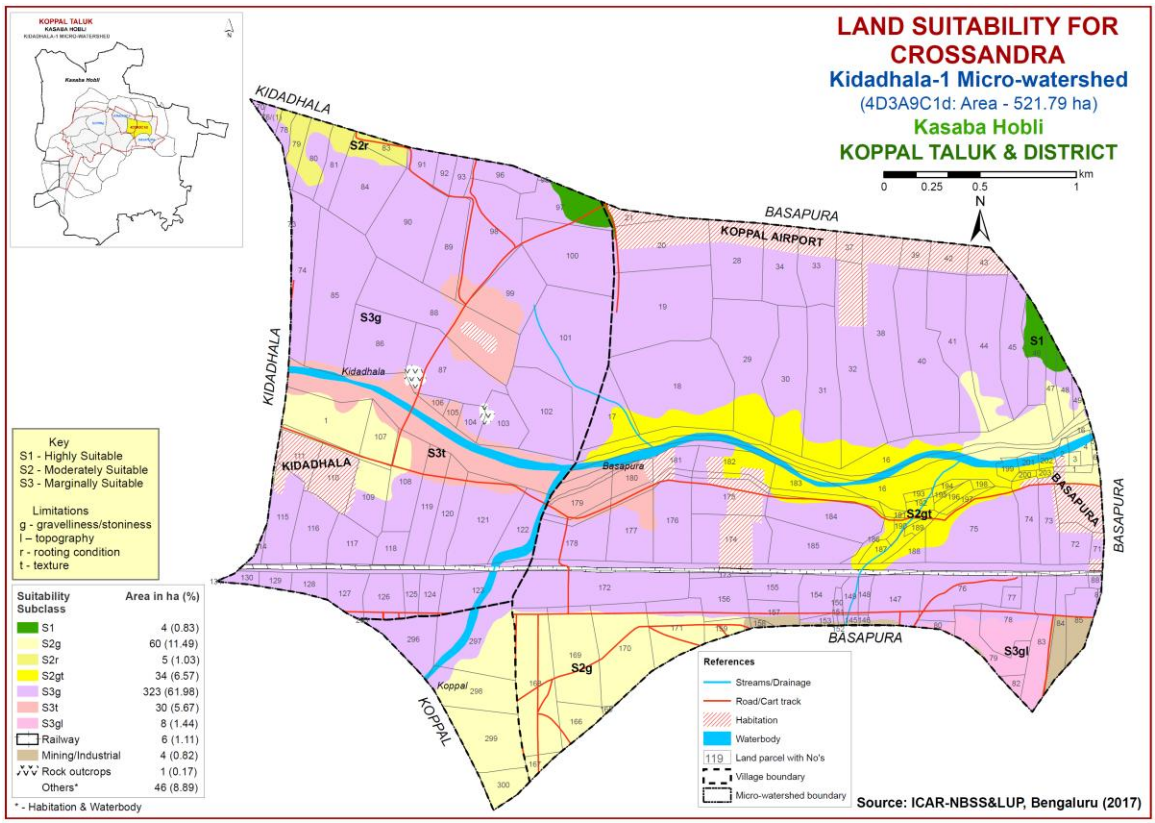


Fig. 7.28 Land Suitability map of Crossandra

7.29 Land Management Units (LMUs)

The 19 soil map units identified in Kidadhala-1 microwatershed have been grouped into six Land Management Units (LMUs) for the purpose of preparing a Proposed Crop Plan. Land Management Units are grouped based on the similarities in respect of the type of soil, the depth of the soil, the surface soil texture, gravel content, AWC, slope, erosion etc. and a Land Management Units map (Fig.7.29) has been generated. These Land Management Units are expected to behave similarly for a given level of management.

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

LMU	Mapping unit	Soil and site characteristics
1	TDGcB2	Very deep, sandy loam to sandy lowland soils with slopes of 1-3%, moderate erosion
2	HLKhB2g1, CKMbB2g1, CKMcB2g2 ,MNLcB2	Moderately deep to very deep, red sandy clay to sandy clay loam soils with slopes of 1-3%, moderate erosion, gravelly (15-60%)
3	NDLcB2g1, NDLhB2g1, BPRcB2g1, BPRcB2g2, BPRhB2, GDPhB2, HDHhB1g2 ,HDHhB2g1 , HDHcA1g1, HDHcB2g1	Moderately deep to very deep, red gravelly sandy clay to sandy clay loam soils with slopes of 0-3%, slight to moderate erosion, gravelly (15-60%)
4	NSPiB2g1	Moderately deep, black clay soils with slopes of 1-3%, moderate erosion, gravelly (15-35%)
5	TDHcB2g1	Moderately shallow, red clay soils with slopes of 1-3%, moderate erosion, gravelly (15-35%)
6	HDHcD3g2	Moderately deep, red gravelly sandy clay to sandy clay loam soils with slopes of 5-10%, severe erosion, gravelly (35-60%)

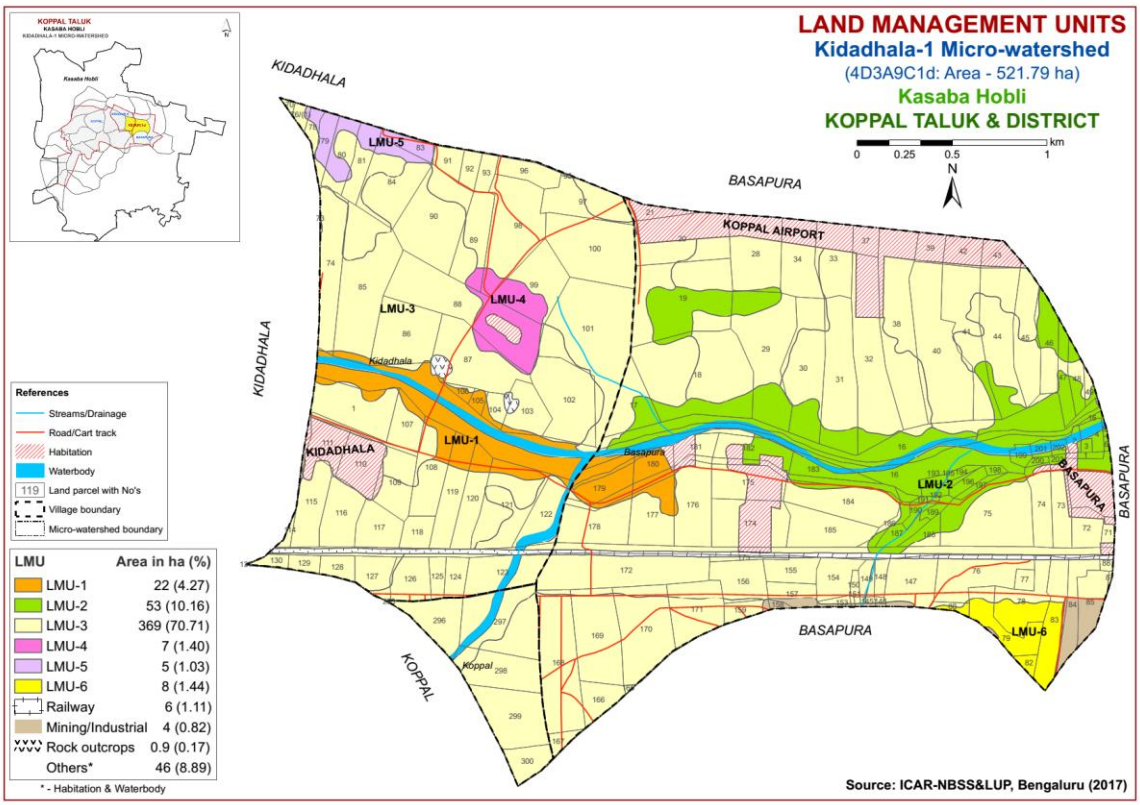


Fig 7.29 Land Management Units map of Kidadhala-1 microwatershed

7.30 Proposed Crop Plan for Kidadhala-1 Microwatershed

After assessing the land suitability for the 28 crops, the proposed crop plan has been prepared for the six identified LMUs by considering only the highly (Class S1) and moderately (Class S2) suitable lands for each of the 28 crops. The resultant proposed crop plan is presented in Table 7.29.

Table 7.29 Proposed Crop Plan for Kidadhala-1 Microwatershed

Proposed Land Use Class	Soil Map Units	Survey Number	Field Crops	Horticulture Crops	Suitable Interventions
1	440. TDGcB2 (Very deep, sandy loam to sandy lowland soils)	**Basapura :** 179,180 **Kidadhala:** 105,106	-	**Vegetables:** Brinjal, Tomato, Carrot, Beetroot **Flower crops:** Marigold, Chrysanthemum, Jasmine	Providing proper drainage, addition of organic manures, green leaf manuring, suitable conservation practices
2	271.HLKhB2g1 170.CKMbB2g1 173.CKMcB2g2 204.MNLcB2 (Moderately deep to very deep, red sandy clay to sandy clay loam soils)	**Basapura :** 1,3,4,5,6,16,19,46,47,48,182, 183,186, 187,188,189,190,191,192,193, 194,195,196,197, 198,199,200,203	Maize, Sorghum, Bajra, Groundnut, Redgram, Castor	**Fruit crops:** Pomegranate, Guava, Sapota, Mango, Jackfruit, Jamun, Tamarind, Lime, Musambi, Amla, Custard apple **Vegetables:** Drumstick, Tomato, Chilli, Brinjal **Flowers:** Marigold, Chrysanthemum, Jasmine	Drip irrigation, mulching, suitable soil and water conservation practices (Crescent Bunding with Catch Pit *etc*)
3	291.NDLcB2g1 296.NDLhB2g1 225.BPRcB2g1 226.BPRcB2g2 230.BPRhB2 268.GDPhB2 121.HDHhB1g2 123.HDHhB2g1 106.HDHcA1g1 111.HDHcB2g1 (Moderately deep to	**Basapura :** 17,28,29,30,31,32,33,34,38,40,41, 44,45,49,71,72,73,74,75,76,77,87, 88,145,146,147,148,149,150,151, 152,153,154,155, 156,157,159,165, 166,167,168,169, 170,171,172,173, 174,176, 177,178, 18,181,184,185 **Kidadhala :** 1,70,73,74,76/(1),78, 80,81,84,85,86,87,88,89,90,91, 92,93,95,96,97,98,99,100,101,	Groundnut, Redgram, Bajra, Horsegram, Castor	**Fruit crops:** Lime, Musambi, Jackfruit, Jamun, Amla, Cashew, Custard apple **Vegetables:** Drumstick	Drip irrigation, mulching, suitable soil and water conservation practices (Crescent Bunding with Catch Pit *etc*)

	very deep, red gravelly sandy clay to sandy clay loam soils)	102,103,104,107,108,109,114,115, 116,117,118,119,120,121, 122,123, 124,125,126,127,128,129, 130,131 **Koppal :** 293,296,297,298,299,300			
4	358. NSPiB2g1 (Moderately deep, black clay soils)	**Kidadhala :** 87,88,89,98,99,101, 102	Sorghum, Sunflower, Cotton, Bengal gram, Safflower, Linseed, Bajra	**Fruit crops:** Pomegranate, Jamun, Lime, Musambi, Tamarind, Amla, Custard apple **Vegetables:** Drumstick, Chilli, Coriander **Flowers:** Marigold, Chrysanthemum	Application of FYM, Biofertilizers and micronutrients, drip irrigation, mulching, suitable soil and water conservation practices
5	56. TDHcB2g1 (Moderately shallow, red clay soils)	**Kidadhala :** 79,83	Groundnut,Bajra, Horsegram, Castor	**Fruit crops:** Lime, Musambi, Amla, Custard apple **Flowers:** Marigold, Chrysanthemum	Drip irrigation, Mulching, suitable soil and water conservation practices (Crescent Bunding with Catch Pit etc)
6	117. HDHcD3g2 (Moderately deep, red gravelly sandy clay to sandy clay loam soils)	**Basapura :** 78,79,80,82,83	Groundnut, Castor, Horsegram, Bajra	**Agri-Silvi-**Pasture: Custard apple, Amla- Hybrid Napier, *Styloxanthes hamata, Glyricidia, Styloxanthes scabra*	Sowing across the slope and split application of nitrogen fertilizers. soil and water conservation practices (Crescent Bunding with Catch Pit etc)

Chapter 8

SOIL HEALTH MANAGEMENT

8.1 Soil Health

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

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

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

The most important characteristics of a healthy soil are

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

Characteristics of Kidadhala-1 Microwatershed

- The soil phases with sizeable area identified in the microwatershed belonged to the soil series of HDH (271 ha), BPR (55 ha), NDL (50 ha), CKM (40 ha), TDG (22 ha), NSP (7 ha), TDH (10 ha), MNL (2 ha), GDP (2 ha) and HLK (2 ha).
- As per land capability classification, entire area in the microwatershed falls under arable land category (Class II and III). The major limitations identified in the arable lands were soil, wetness and erosion.
- On the basis of soil reaction, an area of about 79 ha (15%) is neutral (pH 7.3-7.8), 221 ha (42%) is slightly alkaline (pH 7.3-7.8), 151 ha (29 %) is moderately alkaline (pH 7.8-8.4),

14 ha (3 %) under strongly alkaline (pH 8.4-9.0) in reaction. Thus, major portion of the soils in the microwatershed are alkaline in reaction.

Soil Health Management

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

Alkaline soils

An area of about 386 ha (74%) is under alkaline soil. The following actions are recommended.

(Slightly alkaline to strongly alkaline soils)

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

Neutral soils

Neutral soils cover about 79 ha (15%) and the following actions are recommended.

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

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

Soil Degradation

Soil erosion is one of the major factors affecting the soil health in the microwatershed. An area of about 428 ha (82 %) is under moderate and 8 ha (1%) under severe erosion. The areas with moderate and severe erosion need immediate soil and water conservation and, other land development and land husbandry practices for restoring soil health.

Dissemination of Information and Communication of Benefits

Any large scale implementation of soil health management requires that supporting information is made available widely, particularly through channels familiar to farmers and extension workers. Given the very high priority attached to soil health

especially by the Central Government on issuing Soil-Health Cards to all the farmers, media outlets like Regional, State and National Newspapers, Radio and Dooradarshan programs in local languages but also modern information and communication technologies such as Cellular phones and the Internet, which can be much more effective in reaching the younger farmers.

Inputs for Net Planning (Saturation Plan) and Interventions needed

Net planning in IWMP is focusing on preparation of

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

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

- **Soil Depth:** The depth of a soil decides the amount of moisture and nutrients it can hold, what crops can be taken up or not, depending on the rooting depth and the length of growing period available for raising any crop. Deeper the soil, better for a wide variety of crops. If sufficient depth is not available for growing deep rooted crops, either choose medium or short duration crops or deeper planting pits need to be opened and additional good quality soil brought from outside has to be filled into the planting pits.
- **Surface Soil Texture:** Lighter soil texture in the top soil means, better rain water infiltration, less run-off and soil moisture conservation, less capillary rise and less evaporation losses. Lighter surface textured soils are amenable to good soil tilth and are highly suitable for crops like groundnut, root vegetables (carrot, radish, potato etc) but not ideal for crops that need stagnant water like lowland paddy. Heavy textured soils are poor in water infiltration and percolation. They are prone for sheet erosion; such soils can be improved by sand mulching. The technology that is developed by the AICRP-Dryland Agriculture, Vijayapura, Karnataka 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 Kidadhala-1 Microwatershed.
- **Organic Carbon:** An area of about 58 ha (11 %) is low in OC content, medium (0.5-0.75%) in 153 ha (29%) and high (0.5-0.75%) in 254 ha (49%). The areas that are low and medium in OC needs to be further improved by applying farmyard manure and rotating crops with cereals and legumes or mixed cropping.

- **Promoting green manuring:** Growing of green manuring crops costs Rs. 1250/ha (green manuring seeds) and about Rs. 2000/ha towards cultivation that totals to Rs. 3250/- per ha. On the other hand, application of organic manure @ 10 tons/ha costs Rs. 5000/ha. The practice needs to be continued for 2-3 years or more. Nitrogen fertilizer needs to be supplemented by 25% in addition to the recommended level in the 211 ha area where OC is less than 0.75 per cent. 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 22 ha (4%), medium (23-57 kg/ha) in 238 ha (46 %) of the soils and high (>57 kg/ha) in 206 ha (39%). The areas where phosphorus content is high reduce 25% from the RDF to avoid the excess application of fertilizer and apply additional 25% phosphorus in areas where it is low and medium
- **Available Potassium:** Available potassium is low (<23 kg/ha) in 74 ha (14%), medium (145-337 kg/ha) in 283 ha (54%) and high (>337 kg/ha) in 108 ha (21%) area of the microwatershed. The areas where potassium content is high reduce 25% from the RDF to avoid the excess application of fertilizer and apply additional 25% potassium in areas where it is low and medium.
- **Available Sulphur:** Available sulphur is a very critical nutrient for oilseed crops. Available sulphur is low (<10 ppm) in 5 ha (<1%), medium in 205 ha (39 %) and high (>20ppm) in 255 ha (49%) area of the microwatershed. Areas with low and medium in available sulphur need to be applied with magnesium sulphate or gypsum or Factamphos (p) fertilizer (13% of sulphur) for 2-3 years for the deficiency to be corrected.
- **Available iron:** It is sufficient (>4.5 ppm) in the entire area of the microwatershed.
- **Available Zinc:** It is deficient (<0.6 ppm) in 72 ha (14%) and sufficient (>0.6ppm) in 393 ha (75%) area of the microwatershed. Application of zinc sulphate @ 25kg/ha is to be followed in areas that are deficient in available zinc.
- **Available Boron:** An area of about 387 ha (74 %) is low (<0.5 ppm) and 79 ha (15 %) is medium (05-1.0 ppm) in available boron content. The areas with low and medium in boron content need to be applied with sodium borate @ 10kg/ha as soil application or 0.2% borax as foliar spray to correct the deficiency.
- **Available Manganese**: It is sufficient in the entire area of the microwatershed**.**
- **Available Copper:** It is sufficient in the entire area of the microwatershed**.**
- **Soil alkalinity:** The major area of about 386 ha (74%) in the microwatershed has soils that are slightly to strongly alkaline. These areas need application of gypsum and wherever calcium is in excess, iron pyrites and element sulphur can be recommended. Management practices like treating repeatedly with good quality water to drain out the excess salts and provision of subsurface drainage and growing of salt tolerant crops like Casuarina, Acasia, Neem, Ber etc, are recommended.

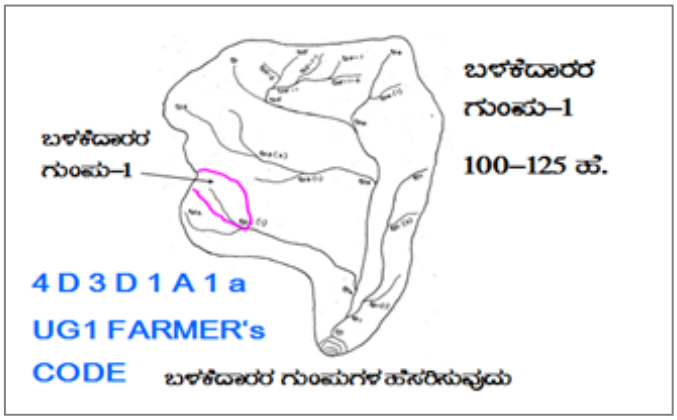
Land Suitability for various crops: Areas that are highly, moderately and marginally suitable for growing various crops are indicated. Along with the suitability, various constraints that are limiting the productivity are also indicated. For example, in case of cotton, gravel content, rooting depth and salinity/alkalinity are the major constraints in various plots. With suitable management interventions, the productivity can be enhanced. In order to increase water holding capacity of light textured soils, growing of green manure crops and application of organic manure is recommended.

Chapter 9

SOIL AND WATER CONSERVATION TREATMENT PLAN

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

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



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

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

Steps for Survey and Preparation of Treatment Plan

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

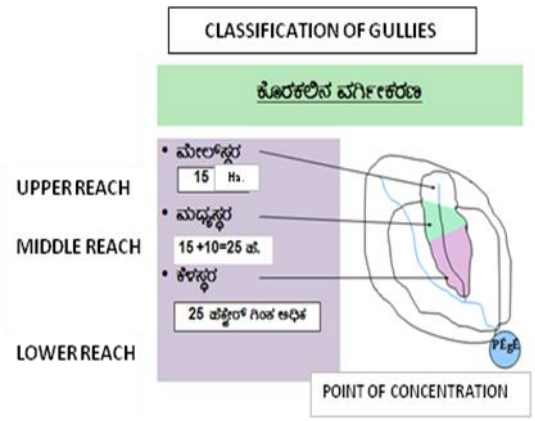
- Naming of user groups and farmers
- Identification of arable and non arable lands
- Identification of drainage lines and gullies
- Identification of non treatable areas
- Identification of priority areas in the arable lands
- Treatment plan for arable lands
- Location of water harvesting and recharge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

9.1 Treatment Plan

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

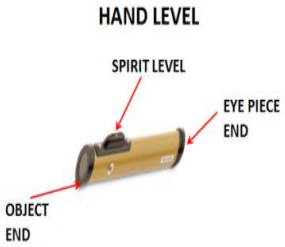
9.1.1 Arable Land Treatment

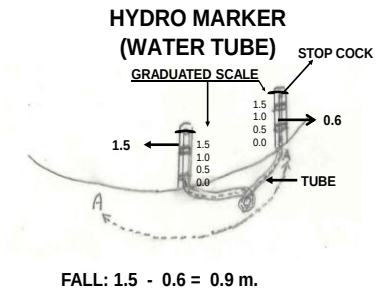
A. BUNDING

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

Measurement of Land Slope

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





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

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

Note: i) The above intervals are maximum.

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

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

Section of the Bund

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

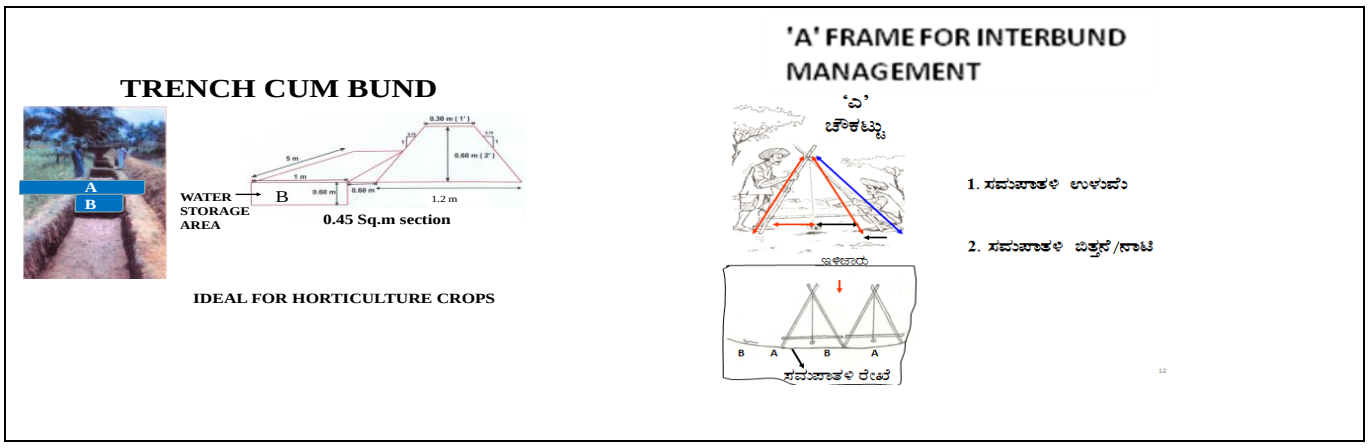
Recommended Bund Section

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

Formation of Trench cum Bund

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

Details of Borrow Pit dimensions are given below



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

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

B. Waterways

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

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

c) The design details are given in the Manual.

C. Farm Ponds

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

D. Diversion Channel

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

9.1.2 Non-Arable Land Treatment

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

9.1.3 Treatment of Natural Water Course/ Drainage Lines

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

9.2 Recommended Soil and Water Conservation Measures

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

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

A map (Fig. 9.1) showing soil and water conservation plan with different kinds of structures recommended has been prepared which shows the spatial distribution and extent of area. A maximum area of about 422 ha (81 %) needs trench cum bunding, an area of about 30 ha (6 %) needs graded bunding, 5 ha (<1%) area requires strengthening of existing bunds and 8 ha (1%) requires terracing. 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 finalized in a participatory approach.

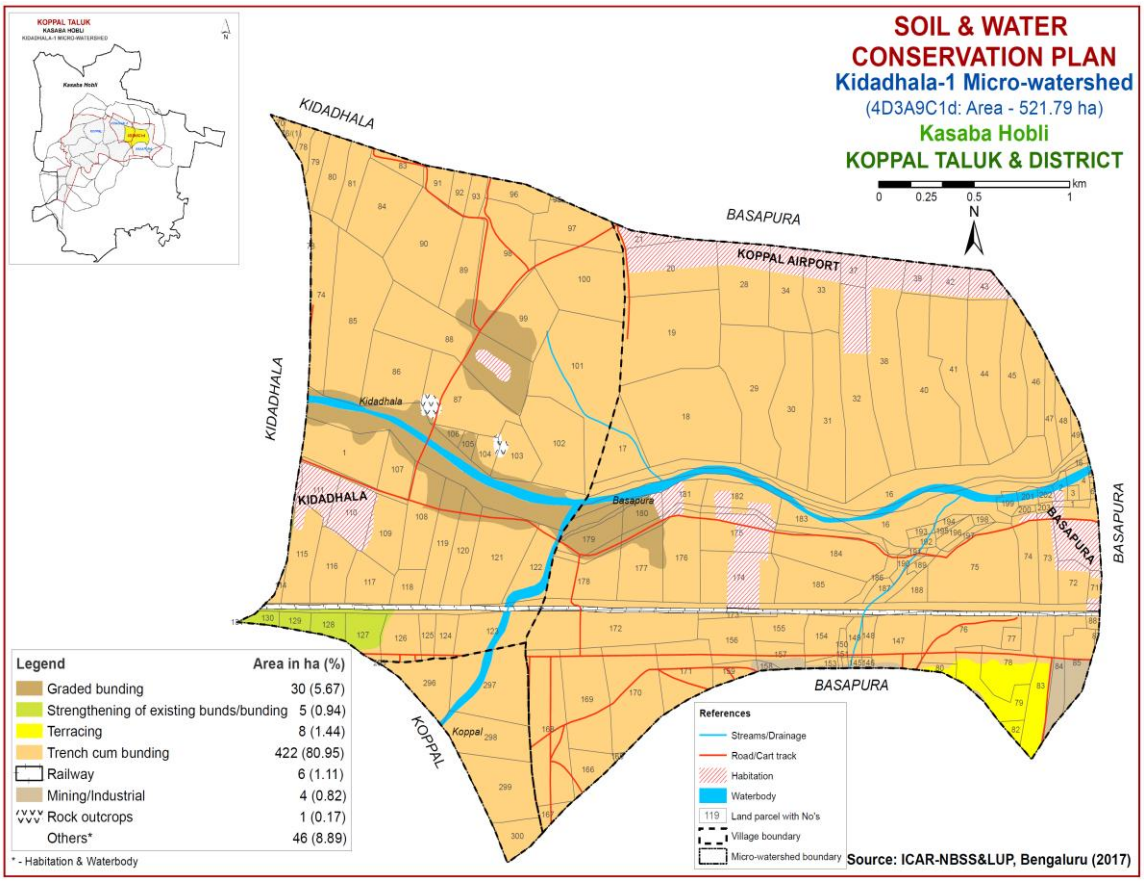


Fig. 9.1 Soil and Water Conservation Plan map of Kidadhala-1 Microwatershed

9.3 Greening of Microwatershed

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

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

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

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

References

1. FAO (1976) Framework for Land Evaluation, Food and Agriculture Organization, Rome.72 pp.
2. FAO (1983) Guidelines for Land Evaluation for Rainfed Agriculture, FAO, Rome, 237 pp.
3. IARI (1971) Soil Survey Manual, All India Soil and Land Use Survey Organization, IARI, New Delhi, 121 pp.
4. Katyal, J.C. and Rattan, R.K. (2003) Secondary and Micronutrients; Research Gap and future needs. Fert. News 48 (4); 9-20.
5. Naidu, L.G.K., Ramamurthy, V., Challa, O., Hegde, R. and Krishnan, P. (2006) Manual Soil Site Suitability Criteria for Major Crops, NBSS Publ. No. 129, NBSS &LUP, Nagpur, 118 pp.
6. Natarajan, A. and Dipak Sarkar (2010) Field Guide for Soil Survey, National Bureau of Soil Survey and Land Use Planning (ICAR), Nagpur, India.
7. Natarajan, A., Rajendra Hegde, Raj, J.N. and Shivananda Murthy, H.G. (2015) Implementation Manual for Sujala-III Project, Watershed Development Department, Bengaluru, Karnataka.
8. Sarma, V.A.K., Krishnan, P. and Budihal, S.L. (1987) Laboratory Manual, Tech. Bull. 23, NBSS &LUP, Nagpur.
9. Sehgal, J.L. (1990) Soil Resource Mapping of Different States of India; Why and How?, National Bureau of Soil Survey and Land Use Planning, Nagpur, 49 pp.
10. Shivaprasad, C.R., R.S. Reddy, J. Sehgal and M. Velayuthum (1998) Soils of Karntaka for Optimising Land Use, NBSS Publ. No. 47b, NBSS & LUP, Nagpur, India.
11. Soil Survey Staff (2006) Keys to Soil Taxonomy, Tenth edition, U.S. Department of Agriculture/ NRCS, Washington DC, U.S.A.
12. Soil Survey Staff (2012) Soil Survey Manual, Handbook No. 18, USDA, Washington DC, USA.

Appendix I

Kidadhala-1 Microwatershed

Soil Phase Information

Village	Sy No.	Area (ha)	Soil Phase	LUC	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	Wells	Land Capability	Conservation Plan
Basapura	1	0.34	HLKhB2g1	LUC-2	Very deep (>150 cm)	Sandy clay loam	Gravelly (15-35%)	High (151-200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	2	0.45	Waterbody	Others	Others	Others	Others	Others	Others	Others	Not Available (NA)	Not Available	Others	Others
Basapura	3	0.23	HLKhB2g1	LUC-2	Very deep (>150 cm)	Sandy clay loam	Gravelly (15-35%)	High (151-200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	4	0.82	HLKhB2g1	LUC-2	Very deep (>150 cm)	Sandy clay loam	Gravelly (15-35%)	High (151-200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	5	0.1	HLKhB2g1	LUC-2	Very deep (>150 cm)	Sandy clay loam	Gravelly (15-35%)	High (151-200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	6	0.11	HLKhB2g1	LUC-2	Very deep (>150 cm)	Sandy clay loam	Gravelly (15-35%)	High (151-200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	16	18.27	CKMbB2g1	LUC-2	Moderately deep (75-100 cm)	Loamy sand	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	17	3.2	HDHcB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	18	12.94	HDHhB1g2	LUC-3	Moderately deep (75-100 cm)	Sandy clay loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Not Available (NA)	Not Available	IIs	TCB
Basapura	19	10.63	CKMcB2g2	LUC-2	Moderately deep (75-100 cm)	Sandy loam	Very gravelly (35-60%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	20	6.49	Habitation	Others	Others	Others	Others	Others	Others	Others	Not Available (NA)	Not Available	Others	Others
Basapura	21	1.08	Habitation	Others	Others	Others	Others	Others	Others	Others	Not Available (NA)	Not Available	Others	Others
Basapura	28	5.66	HDHhB1g2	LUC-3	Moderately deep (75-100 cm)	Sandy clay loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Not Available (NA)	Not Available	IIs	TCB
Basapura	29	9.05	HDHhB1g2	LUC-3	Moderately deep (75-100 cm)	Sandy clay loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Not Available (NA)	Not Available	IIs	TCB
Basapura	30	6.97	BPRcB2g1	LUC-3	Deep (100-150 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIIes	TCB
Basapura	31	7.22	BPRcB2g1	LUC-3	Deep (100-150 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIIes	TCB
Basapura	32	8.9	BPRcB2g1	LUC-3	Deep (100-150 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIIes	TCB
Basapura	33	3.81	BPRcB2g1	LUC-3	Deep (100-150 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIIes	TCB
Basapura	34	4.09	HDHhB1g2	LUC-3	Moderately deep (75-100 cm)	Sandy clay loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Not Available (NA)	Not Available	IIs	TCB
Basapura	37	1.08	Habitation	Others	Others	Others	Others	Others	Others	Others	Not Available (NA)	Not Available	Others	Others
Basapura	38	9.48	BPRcB2g2	LUC-3	Deep (100-150 cm)	Sandy loam	Very gravelly (35-60%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIIes	TCB
Basapura	39	1.21	Habitation	Others	Others	Others	Others	Others	Others	Others	Not Available (NA)	Not Available	Others	Others

Village	Sy No.	Area (ha)	Soil Phase	LUC	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	Wells	Land Capability	Conservation Plan
Basapura	40	9.59	BPRcB2g2	LUC-3	Deep (100-150 cm)	Sandy loam	Very gravelly (35-60%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIIes	TCB
Basapura	41	6.31	BPRcB2g2	LUC-3	Deep (100-150 cm)	Sandy loam	Very gravelly (35-60%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIIes	TCB
Basapura	42	1.62	Habitation	Others	Others	Others	Others	Others	Others	Others	Not Available (NA)	Not Available	Others	Others
Basapura	43	1.32	Habitation	Others	Others	Others	Others	Others	Others	Others	Not Available (NA)	Not Available	Others	Others
Basapura	44	6.97	BPRhB2	LUC-3	Deep (100-150 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIIes	TCB
Basapura	45	4.29	BPRhB2	LUC-3	Deep (100-150 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIIes	TCB
Basapura	46	2.7	MNLcB2	LUC-2	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	47	1.6	HLKhB2g1	LUC-2	Very deep (>150 cm)	Sandy clay loam	Gravelly (15-35%)	High (151-200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	48	1.27	HLKhB2g1	LUC-2	Very deep (>150 cm)	Sandy clay loam	Gravelly (15-35%)	High (151-200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	49	0.43	BPRhB2	LUC-3	Deep (100-150 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIIes	TCB
Basapura	71	0.57	HDHcB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	72	1.73	HDHcB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	73	2.27	HDHcB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	74	2.55	HDHcB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	75	8.07	HDHcB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	76	4.89	HDHcB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	77	0.58	HDHcB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	78	3.75	HDHcD3g2	LUC-6	Moderately deep (75-100 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Moderately sloping (5-10%)	Severe	Not Available (NA)	Not Available	IIIes	Terracing
Basapura	79	3.02	HDHcD3g2	LUC-6	Moderately deep (75-100 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Moderately sloping (5-10%)	Severe	Not Available (NA)	Not Available	IIIes	Terracing
Basapura	80	0.5	HDHcD3g2	LUC-6	Moderately deep (75-100 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Moderately sloping (5-10%)	Severe	Not Available (NA)	Not Available	IIIes	Terracing
Basapura	82	0.44	HDHcD3g2	LUC-6	Moderately deep (75-100 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Moderately sloping (5-10%)	Severe	Not Available (NA)	Not Available	IIIes	Terracing
Basapura	83	3.78	HDHcD3g2	LUC-6	Moderately deep (75-100 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Moderately sloping (5-10%)	Severe	Not Available (NA)	Not Available	IIIes	Terracing
Basapura	84	2.41	MI	MI	MI	MI	MI	MI	MI	MI	Not Available (NA)	Not Available	MI	MI
Basapura	85	2.39	MI	MI	MI	MI	MI	MI	MI	MI	Not Available (NA)	Not Available	MI	MI

Village	Sy No.	Area (ha)	Soil Phase	LUC	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	Wells	Land Capability	Conservation Plan
Basapura	87	0.07	HDHcB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	88	0.3	HDHcB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	145	0.22	HDHcB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	146	0.15	HDHcB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	147	3.64	HDHcB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	148	0.65	HDHcB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	149	0.8	HDHhB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	150	0.32	HDHhB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	151	0.09	HDHhB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	152	0.06	HDHhB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	153	0.42	HDHhB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	154	2.18	HDHhB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	155	1.95	HDHhB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	156	3.01	HDHhB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	157	1.59	HDHhB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	158	0.22	MI	MI	MI	MI	MI	MI	MI	MI	Not Available (NA)	Not Available	MI	MI
Basapura	159	1.07	NDLhB2g1	LUC-3	Very deep (>150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	165	0.08	NDLhB2g1	LUC-3	Very deep (>150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	166	1.84	NDLhB2g1	LUC-3	Very deep (>150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	167	0.64	NDLhB2g1	LUC-3	Very deep (>150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	168	7.77	NDLhB2g1	LUC-3	Very deep (>150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	169	6.18	NDLhB2g1	LUC-3	Very deep (>150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	170	6.71	NDLhB2g1	LUC-3	Very deep (>150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	171	4.29	NDLhB2g1	LUC-3	Very deep (>150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB

Village	Sy No.	Area (ha)	Soil Phase	LUC	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	Wells	Land Capability	Conservation Plan
Basapura	172	8.15	HDHhB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	173	0.58	HDHhB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	174	5.3	HDHhB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	175	3.61	Habitation	Others	Others	Others	Others	Others	Others	Others	Not Available (NA)	Not Available	Others	Others
Basapura	176	4.54	HDHhB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	177	3.94	HDHhB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	178	4	HDHhB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	179	2.73	TDGcB2	LUC-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIew	Graded bunding
Basapura	180	1.49	TDGcB2	LUC-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIew	Graded bunding
Basapura	181	1.34	HDHhB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	182	2.67	CKMbB2g1	LUC-2	Moderately deep (75-100 cm)	Loamy sand	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	183	1.81	CKMbB2g1	LUC-2	Moderately deep (75-100 cm)	Loamy sand	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	184	4.98	HDHhB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	185	4.08	HDHhB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	186	0.77	CKMbB2g1	LUC-2	Moderately deep (75-100 cm)	Loamy sand	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	187	1.07	CKMbB2g1	LUC-2	Moderately deep (75-100 cm)	Loamy sand	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	188	1.05	CKMbB2g1	LUC-2	Moderately deep (75-100 cm)	Loamy sand	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	189	0.35	CKMbB2g1	LUC-2	Moderately deep (75-100 cm)	Loamy sand	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	190	0.47	CKMbB2g1	LUC-2	Moderately deep (75-100 cm)	Loamy sand	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	191	0.23	CKMbB2g1	LUC-2	Moderately deep (75-100 cm)	Loamy sand	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	192	0.45	CKMbB2g1	LUC-2	Moderately deep (75-100 cm)	Loamy sand	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	193	0.34	CKMbB2g1	LUC-2	Moderately deep (75-100 cm)	Loamy sand	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	194	0.36	CKMbB2g1	LUC-2	Moderately deep (75-100 cm)	Loamy sand	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	195	0.16	CKMbB2g1	LUC-2	Moderately deep (75-100 cm)	Loamy sand	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB

Village	Sy No.	Area (ha)	Soil Phase	LUC	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	Wells	Land Capability	Conservation Plan
Basapura	196	0.68	CKMbB2g1	LUC-2	Moderately deep (75-100 cm)	Loamy sand	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	197	0.4	CKMbB2g1	LUC-2	Moderately deep (75-100 cm)	Loamy sand	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	198	0.25	CKMbB2g1	LUC-2	Moderately deep (75-100 cm)	Loamy sand	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	199	0.57	CKMbB2g1	LUC-2	Moderately deep (75-100 cm)	Loamy sand	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	200	0.21	CKMbB2g1	LUC-2	Moderately deep (75-100 cm)	Loamy sand	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Basapura	201	0.48	Waterbody	Others	Others	Others	Others	Others	Others	Others	Not Available (NA)	Not Available	Others	Others
Basapura	202	0.35	Waterbody	Others	Others	Others	Others	Others	Others	Others	Not Available (NA)	Not Available	Others	Others
Basapura	203	0.21	CKMbB2g1	LUC-2	Moderately deep (75-100 cm)	Loamy sand	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Kidadhala	1	5.09	NDLcB2g1	LUC-3	Very deep (>150 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Kidadhala	70	0.16	HDHcB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Kidadhala	73	0	HDHcB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Kidadhala	74	5.07	HDHhB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Kidadhala	79	1.37	TDHcB2g1	LUC-5	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Kidadhala	80	2.55	HDHcB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Kidadhala	81	2.15	HDHcB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Kidadhala	83	1.18	TDHcB2g1	LUC-5	Moderately shallow (50-75 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Kidadhala	84	5.66	HDHhB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Kidadhala	85	10.07	HDHhB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Kidadhala	86	5.44	HDHhB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Kidadhala	87	6.58	HDHhB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Kidadhala	88	10	HDHhB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Kidadhala	89	3.88	HDHcB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Kidadhala	90	7.52	HDHhB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB

Village	Sy No.	Area (ha)	Soil Phase	LUC	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	Wells	Land Capability	Conservation Plan
Kidadhala	91	1.18	HDHcB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Kidadhala	92	0.98	HDHcB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Kidadhala	93	0.93	HDHcB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Kidadhala	95	0.06	HDHcB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Kidadhala	96	1.92	HDHcB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Kidadhala	97	4.08	HDHcB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Kidadhala	98	7.36	HDHcB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Kidadhala	99	5.17	HDHcB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Kidadhala	100	7.59	HDHcB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Kidadhala	101	12.31	HDHcB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Kidadhala	102	6.29	HDHhB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Kidadhala	103	2.79	HDHhB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Kidadhala	104	1.06	HDHhB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Kidadhala	105	0.46	TDGcB2	LUC-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIew	Graded bunding
Kidadhala	106	0.45	TDGcB2	LUC-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIew	Graded bunding
Kidadhala	107	2.21	NDLcB2g1	LUC-3	Very deep (>150 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Kidadhala	108	4.26	HDHcB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Kidadhala	109	3.26	HDHcB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Kidadhala	110	3.08	Habitation	Others	Others	Others	Others	Others	Others	Others	Not Available (NA)	Not Available	Others	Others
Kidadhala	111	2.08	Habitation	Others	Others	Others	Others	Others	Others	Others	Not Available (NA)	Not Available	Others	Others
Kidadhala	114	0.43	HDHcB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Kidadhala	115	3.71	HDHcB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Kidadhala	116	3.4	HDHcB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Kidadhala	117	2.62	HDHcB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB

Village	Sy No.	Area (ha)	Soil Phase	LUC	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	Wells	Land Capability	Conservation Plan
Kidadhala	118	1.41	HDHcB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Kidadhala	119	3.63	HDHcB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Kidadhala	120	3.08	HDHcB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Kidadhala	121	6.31	HDHcB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Kidadhala	122	3.26	HDHhB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Kidadhala	123	3.84	HDHhB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Kidadhala	124	1.27	HDHhB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Kidadhala	125	0.93	HDHhB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Kidadhala	126	2.48	HDHhB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Kidadhala	127	2.02	HDHcA1g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Nearly level (0-1%)	Slight	Not Available (NA)	Not Available	IIs	Field bunds
Kidadhala	128	1.12	HDHcA1g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Nearly level (0-1%)	Slight	Not Available (NA)	Not Available	IIs	Field bunds
Kidadhala	129	0.76	HDHcA1g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Nearly level (0-1%)	Slight	Not Available (NA)	Not Available	IIs	Field bunds
Kidadhala	130	0.58	HDHcA1g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Nearly level (0-1%)	Slight	Not Available (NA)	Not Available	IIs	Field bunds
Kidadhala	131	0	HDHcA1g1	LUC-3	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Nearly level (0-1%)	Slight	Not Available (NA)	Not Available	IIs	Field bunds
Koppal	293	0.01	HDHhB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Koppal	296	3.33	HDHhB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Koppal	297	7.12	HDHhB2g1	LUC-3	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Koppal	298	4.26	NDLhB2g1	LUC-3	Very deep (>150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Koppal	299	5.09	NDLhB2g1	LUC-3	Very deep (>150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB
Koppal	300	1.84	NDLhB2g1	LUC-3	Very deep (>150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	TCB

Mi-Mining/Industrial

Appendix II

Kidadhala-1Microwatershed

Soil Fertility Information

Village	Sy NO.	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Basapura	1	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	2	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Basapura	3	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	4	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	5	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	6	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	16	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	17	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	18	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	19	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	20	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Basapura	21	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Basapura	28	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)	Sufficient (> 0.6 ppm)
Basapura	29	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	30	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	31	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)	Sufficient (> 0.6 ppm)
Basapura	32	Strongly alkaline (pH 8.4 – 9.0)	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)	Sufficient (> 0.6 ppm)
Basapura	33	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Basapura	34	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)	Sufficient (> 0.6 ppm)
Basapura	37	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Basapura	38	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)	Sufficient (> 0.6 ppm)
Basapura	39	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Basapura	40	Moderately alkaline (pH 7.8 – 8.4)	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)	Sufficient (> 0.6 ppm)

Village	Sy NO.	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Basapura	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)	Sufficient (> 0.6 ppm)
Basapura	42	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Basapura	43	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Basapura	44	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	45	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	46	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	47	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	48	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	49	Moderately alkaline (pH 7.8 – 8.4)	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)
Basapura	71	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	72	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	73	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	74	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	75	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	76	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	77	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	78	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	79	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	80	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)	Sufficient (> 0.6 ppm)
Basapura	82	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	83	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	84	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi
Basapura	85	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi
Basapura	87	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)	Sufficient (> 0.6 ppm)
Basapura	88	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)

Village	Sy NO.	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Basapura	145	Mining/Industrial	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	146	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	147	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	148	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	149	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	150	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	151	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	152	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	153	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	154	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	155	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	156	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	157	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	158	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi
Basapura	159	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	165	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	166	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	167	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)	Sufficient (> 0.6 ppm)
Basapura	168	Slightly alkaline (pH 7.3 – 7.8)	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)	Sufficient (> 0.6 ppm)
Basapura	169	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	170	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	171	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	172	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	173	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)

Village	Sy NO.	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Basapura	174	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	175	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Basapura	176	Slightly alkaline (pH 7.3 – 7.8)	Low (2 – 4 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	177	Slightly alkaline (pH 7.3 – 7.8)	Low (2 – 4 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	178	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	179	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	180	Slightly alkaline (pH 7.3 – 7.8)	Low (2 – 4 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	181	Others	Others	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Others	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	182	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	183	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	184	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	185	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	186	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	187	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	188	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	189	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	190	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	191	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	192	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	193	Moderately alkaline (pH 7.8 – 8.4)	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)	Sufficient (> 0.6 ppm)
Basapura	194	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	195	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	196	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	197	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)

Village	Sy NO.	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Basapura	198	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	199	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	200	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Basapura	201	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Basapura	202	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Basapura	203	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kidadhala	1	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (< 0.5 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kidadhala	70	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kidadhala	73	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kidadhala	74	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kidadhala	76/(1)	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kidadhala	78	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kidadhala	79	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kidadhala	80	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kidadhala	81	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kidadhala	83	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kidadhala	84	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kidadhala	85	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kidadhala	86	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (< 0.5 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kidadhala	87	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kidadhala	88	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kidadhala	89	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kidadhala	90	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kidadhala	91	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kidadhala	92	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)

Village	Sy NO.	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Kidadhala	93	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kidadhala	95	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)
Kidadhala	96	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)	Sufficient (> 0.6 ppm)
Kidadhala	97	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)
Kidadhala	98	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kidadhala	99	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kidadhala	100	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kidadhala	101	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kidadhala	102	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kidadhala	103	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kidadhala	104	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kidadhala	105	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kidadhala	106	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kidadhala	107	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kidadhala	108	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kidadhala	109	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kidadhala	110	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Kidadhala	111	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Kidadhala	114	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kidadhala	115	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kidadhala	116	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kidadhala	117	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kidadhala	118	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kidadhala	119	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kidadhala	120	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)

Village	Sy NO.	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Kidadhala	121	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kidadhala	122	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kidadhala	123	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kidadhala	124	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kidadhala	125	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kidadhala	126	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kidadhala	127	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kidadhala	128	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kidadhala	129	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kidadhala	130	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Kidadhala	131	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Koppal	293	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Koppal	296	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Koppal	297	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Koppal	298	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Koppal	299	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)	Sufficient (> 0.6 ppm)
Koppal	300	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)

Mi-Mining/Industrial

Appendix III

Kidadhala-1Microwatershed

Soil Suitability Information

Village	Survey No.	Mango	Maize	Sapota	Sorgham	Guava	Cotton	Tamarind	Lime	Bengalgram	Sunflower	Redgram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Jasmine	Crossandra	Drumstick	Mulberery
Basapura	1	S2g	S2tg	S2g	S2g	S2g	S2g	S2g	S2g	S2tg	S2g	S2g	S1	S2g	S1	S2t	S2g	S2g	S3tg	S2tg	S2tg	S2tg	S2tg	S2g	S2g	S2tg	S2g	S2g	S2tg
Basapura	2	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
Basapura	3	S2g	S2tg	S2g	S2g	S2g	S2g	S2g	S2g	S2tg	S2g	S2g	S1	S2g	S1	S2t	S2g	S2g	S3tg	S2tg	S2tg	S2tg	S2tg	S2g	S2g	S2tg	S2g	S2g	S2tg
Basapura	4	S2g	S2tg	S2g	S2g	S2g	S2g	S2g	S2g	S2tg	S2g	S2g	S1	S2g	S1	S2t	S2g	S2g	S3tg	S2tg	S2tg	S2tg	S2tg	S2g	S2g	S2tg	S2g	S2g	S2tg
Basapura	5	S2g	S2tg	S2g	S2g	S2g	S2g	S2g	S2g	S2tg	S2g	S2g	S1	S2g	S1	S2t	S2g	S2g	S3tg	S2tg	S2tg	S2tg	S2tg	S2g	S2g	S2tg	S2g	S2g	S2tg
Basapura	6	S2g	S2tg	S2g	S2g	S2g	S2g	S2g	S2g	S2tg	S2g	S2g	S1	S2g	S1	S2t	S2g	S2g	S3tg	S2tg	S2tg	S2tg	S2tg	S2g	S2g	S2tg	S2g	S2g	S2tg
Basapura	16	S3rg	S2tg	S2rg	S2gt	S2rt	S2rg	S3rg	S2rg	S2gt	S2rg	S2gt	S1	S2rg	S1	S2rt	S2rg	S2rg	S2tg	S2gt	S3t	S2tg	S2tg	S2rg	S3t	S2tg	S2gt	S2rt	S2rt
Basapura	17	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Basapura	18	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Basapura	19	S3rg	S3g	S3rg	S3g	S2rt	S3g	S3rg	S2rg	S3g	S2rg	S3g	S2g	S2rg	S2g	S2rt	S2rg	S3rg	S2g	S3g	S3g	S3g	S3g	S3rg	S3g	S3g	S3g	S3g	S2g
Basapura	20	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
Basapura	21	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
Basapura	28	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Basapura	29	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Basapura	30	S3rg	S3g	S3g	S3g	S3g	S3g	S3rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g
Basapura	31	S3rg	S3g	S3g	S3g	S3g	S3g	S3rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g
Basapura	32	S3rg	S3g	S3g	S3g	S3g	S3g	S3rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g
Basapura	33	S3rg	S3g	S3g	S3g	S3g	S3g	S3rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g
Basapura	34	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Basapura	37	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
Basapura	38	S3rg	S3g	S3g	S3g	S3g	S3g	S3rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g

Village	Survey No.	Mango	Maize	Sapota	Sorgham	Guava	Cotton	Tamarind	Lime	Bengalgram	Sunflower	Redgram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Jasmine	Crossandra	Drumstick	Mulberery
Basapura	39	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
Basapura	40	S3rg	S3g	S3g	S3g	S3g	S3g	S3rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g
Basapura	41	S3rg	S3g	S3g	S3g	S3g	S3g	S3rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g
Basapura	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
Basapura	43	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
Basapura	44	S3rg	S3g	S3g	S3g	S3g	S3g	S3rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g
Basapura	45	S3rg	S3g	S3g	S3g	S3g	S3g	S3rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g
Basapura	46	S2r	S1	S1	S1	S1	S2t	S2r	S1	S2t	S1	S1	S1	S1	S1	N1z	S2r	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
Basapura	47	S2g	S2tg	S2g	S2g	S2g	S2g	S2g	S2g	S2tg	S2g	S2g	S1	S2g	S1	S2t	S2g	S2g	S3tg	S2tg	S2tg	S2tg	S2tg	S2g	S2g	S2tg	S2g	S2g	S2tg
Basapura	48	S2g	S2tg	S2g	S2g	S2g	S2g	S2g	S2g	S2tg	S2g	S2g	S1	S2g	S1	S2t	S2g	S2g	S3tg	S2tg	S2tg	S2tg	S2tg	S2g	S2g	S2tg	S2g	S2g	S2tg
Basapura	49	S3rg	S3g	S3g	S3g	S3g	S3g	S3rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g
Basapura	71	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Basapura	72	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Basapura	73	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Basapura	74	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Basapura	75	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Basapura	76	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Basapura	77	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Basapura	78	S3gl	S3gl	S3gl	S3gl	S3gl	Nlg	S3gl	S3gl	S3gl	S3gl	S3gl	S3l	S3gl	S3l	S2gl	S3gl	S3gl	S3gl	S3gl	S3gl	S3gl	S3gl	S3gl	S3gl	S3gl	S3gl	S2gl	S3gl
Basapura	79	S3gl	S3gl	S3gl	S3gl	S3gl	Nlg	S3gl	S3gl	S3gl	S3gl	S3gl	S3l	S3gl	S3l	S2gl	S3gl	S3gl	S3gl	S3gl	S3gl	S3gl	S3gl	S3gl	S3gl	S3gl	S3gl	S2gl	S3gl
Basapura	80	S3gl	S3gl	S3gl	S3gl	S3gl	Nlg	S3gl	S3gl	S3gl	S3gl	S3gl	S3l	S3gl	S3l	S2gl	S3gl	S3gl	S3gl	S3gl	S3gl	S3gl	S3gl	S3gl	S3gl	S3gl	S3gl	S2gl	S3gl
Basapura	82	S3gl	S3gl	S3gl	S3gl	S3gl	Nlg	S3gl	S3gl	S3gl	S3gl	S3gl	S3l	S3gl	S3l	S2gl	S3gl	S3gl	S3gl	S3gl	S3gl	S3gl	S3gl	S3gl	S3gl	S3gl	S3gl	S2gl	S3gl
Basapura	83	S3gl	S3gl	S3gl	S3gl	S3gl	Nlg	S3gl	S3gl	S3gl	S3gl	S3gl	S3l	S3gl	S3l	S2gl	S3gl	S3gl	S3gl	S3gl	S3gl	S3gl	S3gl	S3gl	S3gl	S3gl	S3gl	S2gl	S3gl

Village	Survey No.	Mango	Maize	Sapota	Sorgham	Guava	Cotton	Tamarind	Lime	Bengalgram	Sunflower	Redgram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Jasmine	Crossandra	Drumstick	Mulberery
Basapura	84	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi
Basapura	85	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi
Basapura	87	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Basapura	88	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Basapura	145	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Basapura	146	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Basapura	147	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Basapura	148	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Basapura	149	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Basapura	150	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Basapura	151	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Basapura	152	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Basapura	153	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Basapura	154	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Basapura	155	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Basapura	156	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Basapura	157	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Basapura	158	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi	Mi
Basapura	159	S2g	S2tg	S2g	S2g	S2tg	S2g	S2g	S2g	S2tg	S2g	S2g	S2g	S2g	S2g	S2tg	S2g	S2g	S3tg	S2tg	S2tg	S2tg	S2tg	S2g	S2g	S2tg	S2g	S2g	S2g
Basapura	165	S2g	S2tg	S2g	S2g	S2tg	S2g	S2g	S2g	S2tg	S2g	S2g	S2g	S2g	S2g	S2tg	S2g	S2g	S3tg	S2tg	S2tg	S2tg	S2tg	S2g	S2g	S2tg	S2g	S2g	S2g
Basapura	166	S2g	S2tg	S2g	S2g	S2tg	S2g	S2g	S2g	S2tg	S2g	S2g	S2g	S2g	S2g	S2tg	S2g	S2g	S3tg	S2tg	S2tg	S2tg	S2tg	S2g	S2g	S2tg	S2g	S2g	S2g
Basapura	167	S2g	S2tg	S2g	S2g	S2tg	S2g	S2g	S2g	S2tg	S2g	S2g	S2g	S2g	S2g	S2tg	S2g	S2g	S3tg	S2tg	S2tg	S2tg	S2tg	S2g	S2g	S2tg	S2g	S2g	S2g
Basapura	168	S2g	S2tg	S2g	S2g	S2tg	S2g	S2g	S2g	S2tg	S2g	S2g	S2g	S2g	S2g	S2tg	S2g	S2g	S3tg	S2tg	S2tg	S2tg	S2tg	S2g	S2g	S2tg	S2g	S2g	S2g

Village	Survey No.	Mango	Maize	Sapota	Sorgham	Guava	Cotton	Tamarind	Lime	Bengalgram	Sunflower	Redgram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Jasmine	Crossandra	Drumstick	Mulberery
Basapura	169	S2g	S2tg	S2g	S2g	S2tg	S2g	S2g	S2g	S2tg	S2g	S2g	S2g	S2g	S2g	S2tg	S2g	S2g	S3tg	S2tg	S2tg	S2tg	S2tg	S2g	S2g	S2tg	S2g	S2g	S2g
Basapura	170	S2g	S2tg	S2g	S2g	S2tg	S2g	S2g	S2g	S2tg	S2g	S2g	S2g	S2g	S2g	S2tg	S2g	S2g	S3tg	S2tg	S2tg	S2tg	S2tg	S2g	S2g	S2tg	S2g	S2g	S2g
Basapura	171	S2g	S2tg	S2g	S2g	S2tg	S2g	S2g	S2g	S2tg	S2g	S2g	S2g	S2g	S2g	S2tg	S2g	S2g	S3tg	S2tg	S2tg	S2tg	S2tg	S2g	S2g	S2tg	S2g	S2g	S2g
Basapura	172	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Basapura	173	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Basapura	174	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Basapura	175	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
Basapura	176	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Basapura	177	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Basapura	178	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Basapura	179	S3t	S2t	S3t	S3t	S3t	N1t	S3t	S3t	N1t	S3t	S3t	S3t	S3t	S3t	N1t	S3t	S3t	S2t	S3t	S3t	S3t	S3t	S3t	S2t	S3t	S3t	S3t	S3t
Basapura	180	S3t	S2t	S3t	S3t	S3t	N1t	S3t	S3t	N1t	S3t	S3t	S3t	S3t	S3t	N1t	S3t	S3t	S2t	S3t	S3t	S3t	S3t	S3t	S2t	S3t	S3t	S3t	S3t
Basapura	181	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Basapura	182	S3rg	S2tg	S2rg	S2gt	S2rt	S2rg	S3rg	S2rg	S2gt	S2rg	S2gt	S1	S2rg	S1	S2rt	S2rg	S2rg	S2tg	S2gt	S3t	S2tg	S2tg	S2rg	S3t	S2tg	S2gt	S2rt	S2rt
Basapura	183	S3rg	S2tg	S2rg	S2gt	S2rt	S2rg	S3rg	S2rg	S2gt	S2rg	S2gt	S1	S2rg	S1	S2rt	S2rg	S2rg	S2tg	S2gt	S3t	S2tg	S2tg	S2rg	S3t	S2tg	S2gt	S2rt	S2rt
Basapura	184	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Basapura	185	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Basapura	186	S3rg	S2tg	S2rg	S2gt	S2rt	S2rg	S3rg	S2rg	S2gt	S2rg	S2gt	S1	S2rg	S1	S2rt	S2rg	S2rg	S2tg	S2gt	S3t	S2tg	S2tg	S2rg	S3t	S2tg	S2gt	S2rt	S2rt
Basapura	187	S3rg	S2tg	S2rg	S2gt	S2rt	S2rg	S3rg	S2rg	S2gt	S2rg	S2gt	S1	S2rg	S1	S2rt	S2rg	S2rg	S2tg	S2gt	S3t	S2tg	S2tg	S2rg	S3t	S2tg	S2gt	S2rt	S2rt
Basapura	188	S3rg	S2tg	S2rg	S2gt	S2rt	S2rg	S3rg	S2rg	S2gt	S2rg	S2gt	S1	S2rg	S1	S2rt	S2rg	S2rg	S2tg	S2gt	S3t	S2tg	S2tg	S2rg	S3t	S2tg	S2gt	S2rt	S2rt
Basapura	189	S3rg	S2tg	S2rg	S2gt	S2rt	S2rg	S3rg	S2rg	S2gt	S2rg	S2gt	S1	S2rg	S1	S2rt	S2rg	S2rg	S2tg	S2gt	S3t	S2tg	S2tg	S2rg	S3t	S2tg	S2gt	S2rt	S2rt
Basapura	190	S3rg	S2tg	S2rg	S2gt	S2rt	S2rg	S3rg	S2rg	S2gt	S2rg	S2gt	S1	S2rg	S1	S2rt	S2rg	S2rg	S2tg	S2gt	S3t	S2tg	S2tg	S2rg	S3t	S2tg	S2gt	S2rt	S2rt
Basapura	191	S3rg	S2tg	S2rg	S2gt	S2rt	S2rg	S3rg	S2rg	S2gt	S2rg	S2gt	S1	S2rg	S1	S2rt	S2rg	S2rg	S2tg	S2gt	S3t	S2tg	S2tg	S2rg	S3t	S2tg	S2gt	S2rt	S2rt

Village	Survey No.	Mango	Maize	Sapota	Sorgham	Guava	Cotton	Tamarind	Lime	Bengalgram	Sunflower	Redgram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Jasmine	Crossandra	Drumstick	Mulberery
Basapura	192	S3rg	S2tg	S2rg	S2gt	S2rt	S2rg	S3rg	S2rg	S2gt	S2rg	S2gt	S1	S2rg	S1	S2rt	S2rg	S2rg	S2tg	S2gt	S3t	S2tg	S2tg	S2rg	S3t	S2tg	S2gt	S2rt	S2rt
Basapura	193	S3rg	S2tg	S2rg	S2gt	S2rt	S2rg	S3rg	S2rg	S2gt	S2rg	S2gt	S1	S2rg	S1	S2rt	S2rg	S2rg	S2tg	S2gt	S3t	S2tg	S2tg	S2rg	S3t	S2tg	S2gt	S2rt	S2rt
Basapura	194	S3rg	S2tg	S2rg	S2gt	S2rt	S2rg	S3rg	S2rg	S2gt	S2rg	S2gt	S1	S2rg	S1	S2rt	S2rg	S2rg	S2tg	S2gt	S3t	S2tg	S2tg	S2rg	S3t	S2tg	S2gt	S2rt	S2rt
Basapura	195	S3rg	S2tg	S2rg	S2gt	S2rt	S2rg	S3rg	S2rg	S2gt	S2rg	S2gt	S1	S2rg	S1	S2rt	S2rg	S2rg	S2tg	S2gt	S3t	S2tg	S2tg	S2rg	S3t	S2tg	S2gt	S2rt	S2rt
Basapura	196	S3rg	S2tg	S2rg	S2gt	S2rt	S2rg	S3rg	S2rg	S2gt	S2rg	S2gt	S1	S2rg	S1	S2rt	S2rg	S2rg	S2tg	S2gt	S3t	S2tg	S2tg	S2rg	S3t	S2tg	S2gt	S2rt	S2rt
Basapura	197	S3rg	S2tg	S2rg	S2gt	S2rt	S2rg	S3rg	S2rg	S2gt	S2rg	S2gt	S1	S2rg	S1	S2rt	S2rg	S2rg	S2tg	S2gt	S3t	S2tg	S2tg	S2rg	S3t	S2tg	S2gt	S2rt	S2rt
Basapura	198	S3rg	S2tg	S2rg	S2gt	S2rt	S2rg	S3rg	S2rg	S2gt	S2rg	S2gt	S1	S2rg	S1	S2rt	S2rg	S2rg	S2tg	S2gt	S3t	S2tg	S2tg	S2rg	S3t	S2tg	S2gt	S2rt	S2rt
Basapura	199	S3rg	S2tg	S2rg	S2gt	S2rt	S2rg	S3rg	S2rg	S2gt	S2rg	S2gt	S1	S2rg	S1	S2rt	S2rg	S2rg	S2tg	S2gt	S3t	S2tg	S2tg	S2rg	S3t	S2tg	S2gt	S2rt	S2rt
Basapura	200	S3rg	S2tg	S2rg	S2gt	S2rt	S2rg	S3rg	S2rg	S2gt	S2rg	S2gt	S1	S2rg	S1	S2rt	S2rg	S2rg	S2tg	S2gt	S3t	S2tg	S2tg	S2rg	S3t	S2tg	S2gt	S2rt	S2rt
Basapura	201	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
Basapura	202	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
Basapura	203	S3rg	S2tg	S2rg	S2gt	S2rt	S2rg	S3rg	S2rg	S2gt	S2rg	S2gt	S1	S2rg	S1	S2rt	S2rg	S2rg	S2tg	S2gt	S3t	S2tg	S2tg	S2rg	S3t	S2tg	S2gt	S2rt	S2rt
Kidadhala	1	S2g	S2tg	S2g	S2g	S2tg	S2g	S2g	S2g	S2tg	S2g	S2g	S2g	S2g	S2g	S2tg	S2g	S2g	S3tg	S2tg	S2tg	S2tg	S2tg	S2g	S2g	S2tg	S2g	S2g	S2g
Kidadhala	70	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	73	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	74	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	76/(1)	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	78	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	79	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2rt	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r
Kidadhala	80	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	81	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	83	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2rt	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r
Kidadhala	84	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g

Village	Survey No.	Mango	Maize	Sapota	Sorgham	Guava	Cotton	Tamarind	Lime	Bengalgram	Sunflower	Redgram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Jasmine	Crossandra	Drumstick	Mulberery
Kidadhala	85	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	86	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	87	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	88	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	89	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	90	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	91	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	92	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	93	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	95	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	96	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	97	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	98	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	99	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	100	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	101	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	102	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	103	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	104	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	105	S3t	S2t	S3t	S3t	S3t	N1t	S3t	S3t	N1t	S3t	S3t	S3t	S3t	S3t	N1t	S3t	S3t	S2t	S3t	S3t	S3t	S3t	S3t	S2t	S3t	S3t	S3t	S3t
Kidadhala	106	S3t	S2t	S3t	S3t	S3t	N1t	S3t	S3t	N1t	S3t	S3t	S3t	S3t	S3t	N1t	S3t	S3t	S2t	S3t	S3t	S3t	S3t	S3t	S2t	S3t	S3t	S3t	S3t
Kidadhala	107	S2g	S2tg	S2g	S2g	S2tg	S2g	S2g	S2g	S2tg	S2g	S2g	S2g	S2g	S2g	S2tg	S2g	S2g	S3tg	S2tg	S2tg	S2tg	S2tg	S2g	S2g	S2tg	S2g	S2g	S2g
Kidadhala	108	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g

Village	Survey No.	Mango	Maize	Sapota	Sorgham	Guava	Cotton	Tamarind	Lime	Bengalgram	Sunflower	Redgram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Jasmine	Crossandra	Drumstick	Mulberery
Kidadhala	109	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	110	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
Kidadhala	111	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
Kidadhala	114	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	115	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	116	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	117	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	118	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	119	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	120	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	121	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	122	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	123	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	124	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	125	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	126	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	127	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	128	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	129	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	130	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Kidadhala	131	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Koppal	293	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Koppal	296	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g

Village	Survey No.	Mango	Maize	Sapota	Sorgham	Guava	Cotton	Tamarind	Lime	Bengalgram	Sunflower	Redgram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Jasmine	Crossandra	Drumstick	Mulberery
Koppal	297	S3rg	S3g	S2rg	S3g	S2rg	S3rg	S3rg	S2rg	S3g	S3rg	S3g	S2rg	S2rg	S2rg	S2rg	S2rg	S2rg	S2g	S3g	S3g	S3g	S3g	S2rg	S2g	S3g	S3g	S3g	S2g
Koppal	298	S2g	S2tg	S2g	S2g	S2tg	S2g	S2g	S2g	S2tg	S2g	S2g	S2g	S2g	S2g	S2tg	S2g	S2g	S3tg	S2tg	S2tg	S2tg	S2tg	S2g	S2g	S2tg	S2g	S2g	S2g
Koppal	299	S2g	S2tg	S2g	S2g	S2tg	S2g	S2g	S2g	S2tg	S2g	S2g	S2g	S2g	S2g	S2tg	S2g	S2g	S3tg	S2tg	S2tg	S2tg	S2tg	S2g	S2g	S2tg	S2g	S2g	S2g
Koppal	300	S2g	S2tg	S2g	S2g	S2tg	S2g	S2g	S2g	S2tg	S2g	S2g	S2g	S2g	S2g	S2tg	S2g	S2g	S3tg	S2tg	S2tg	S2tg	S2tg	S2g	S2g	S2tg	S2g	S2g	S2g

Mi-Mining/Industrial

PART-B

SOCIO-ECONOMIC STATUS OF FARM HOUSEHOLDS

CONTENT SHEET

LIST OF TABLES

Chapter 1

FINDINGS OF THE SOCIO-ECONOMIC SURVEY

- *The survey was conducted in Kidadhala-1 is located at North latitude 15^0 21' 47.551" and 15^0 20' 28.719" and East longitude 76^0 13' 39.692" and 76^0 11' 46.69" covering an area of about 521.98 ha coming under under Kidadhala, Koppala and Basapura Villages of Koppala taluk.*
- *Socio-economic analysis of Kidadhala-1 micro watersheds of Bhagyanagar sub-watershed, Koppal taluk & District indicated that, out of the total sample of 35 total respondents, 12 (34.29 %) were marginal, 7 (20.00%) were small, 5 (14.29 %) were Semi medium and 5 (14.29 %) were medium and 1 (2.86 %) were large farmers.*
- *The population characteristics of households indicated that, there were 91 (50.28%) men and 89 (49.17 %) were women.*
- *Majority of the respondents (39.78%) were in the age group of 16-35 years.*
- *Education level of the sample households indicated that, there were 49.17 per cent illiterates, 1.10 percent were functional literates, 45.30 per cent pre university education and 1.66 per cent attained graduation.*
- *About, 28.57 per cent of household heads practicing agriculture and 68.57 per cent of the household heads were engaged as agricultural labourers.*
- *Agriculture was the major occupation for 9.94 per cent of the household members.*
- *In the study area, 88.57 per cent of the households possess katcha house and 2.86 per cent possess pucca house.*
- *The durable assets owned by the households showed that, 91.43 per cent possess TV, 85.71 per cent possess mixer grinder, 100.00 per cent possess mobile phones and 22.86 per cent possess motor cycles.*
- *Farm implements owned by the households indicated that, 2.86 per cent of the households possess plough, 2.86 per cent possess tractor and 5.71 per cent possess sprayer.*
- *Regarding livestock possession by the households, 22.86 per cent possess local cow and 11.43 per cent possess buffalo.*
- *The average labour availability in the study area showed that, own men and women labour availability in the micro watershed was 6.40 each, while the hired labour (men) availability was 1.97.*
- *Further, 22.86 per cent of the households opined that hired labour was inadequate during the agricultural season.*
- *Out of the total land holding of the sample respondents 81.64 per cent (77.81 ha) of the area is under dry condition and the remaining 16.14 per cent area is irrigated land.*
- *There were 9.00 live bore wells among the sampled households.*
- *Bore/open well was the major source of irrigation for 31.42 per cent of the households.*
- *The major crops grown by sample farmers are Maize, Bajra, Cotton, Red gram and Sunflower and cropping intensity was recorded as 77.86 per cent.*

- *The per hectare cost of cultivation for Maize, Bajra, Cotton, Red gram and Sunflower was Rs.45125.41, 27940.51, 38832.25, 29911.57 and 37509.54 with benefit cost ratio of 1:1.10, 1: 1.50, 1: 2.60, 1: 0.90 and 1:0.80 respectively.*
- *Further, 31.43 per cent of the households opined that dry fodder was adequate and 42.86 per cent of the households have opined that the green fodder was adequate.*
- *The average annual gross income of the farmers was Rs. 90614.57 in micro-watershed, of which Rs. 65941.43 comes from agriculture.*
- *Sampled households have grown 19 horticulture trees and 103 forestry trees together in the fields and back yards.*
- *Households have an average investment capacity of Rs. 3142.86 for land development and Rs. 1200.00 for irrigation facility.*
- *Source of funds for additional investment is concerned, 14.29 per cent depends on own funds and 45.71 per cent depends on bank loan for land development activities.*
- *Regarding marketing channels, 82.86 per cent of the households have sold agricultural produce to the local/village merchants, while, 25.71 per cent have sold in regulated markets.*
- *Further, 111.43 per cent of the households have used tractor for the transport of agriculture commodity.*
- *Majority of the farmers (57.14%) have experienced soil and water erosion problems in the watershed and 57.14 per cent of the households were interested towards soil testing.*
- *Fire was the major source of fuel for domestic use for 94.29 per cent of the households and 5.71 per cent households has LPG connection.*
- *Piped supply was the major source for drinking water for 77.14 per cent of the households.*
- *Electricity was the major source of light for 100.00 per cent of the households.*
- *In the study area, 45.71 per cent of the households possess toilet facility.*
- *Regarding possession of PDS card, 88.57 per cent of the households possessed BPL card, 5.71 per cent of the household's possessed APL card and 0.00 per cent of the household's were not having ration cards.*
- *Households opined that, the requirement of cereals (94.29%), pulses (80.00%) and oilseeds (5.71%) are adequate for consumption.*
- *Farming constraints experienced by households in the micro watersheds were lower fertility status of the soil (31.43%) wild animal menace on farm field (37.14%), frequent incidence of pest and diseases (68.57%), inadequacy of irrigation water (22.86%), high cost of fertilizers and plant protection chemicals (57.14%), high rate of interest on credit (42.86%), low price for the agricultural commodities (60.00%), lack of marketing facilities in the area (54.29%), inadequate extension services (5.71%), lack of transport for safe transport of the agricultural produce to the market (5.71%), Less rainfall (22.86%) and Source of Agri-technology information (Newspaper/ TV/Mobile) (22.86%).*

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, labor 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.

1. Description of the study area

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

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

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

2. Locale of the survey and description of the micro-watershed and

The study was conducted in Kidadhala-1 micro-watershed (Bhagyanagar sub-watershed, Koppal taluk & District) is located at North latitude 15^0 21’ 47.551” and 15^0 20’ 28.719” and East longitude 76^0 13’ 39.692" and 76^0 11’ 46.69”covering an area of about 521.98 ha bounded by under under Kidadhala, Koppala and Basapura Villages.

3. Selection of the respondents for the study

The micro-watershed is marked with 320 square meters grids. One farmer from every alternate grid in the micro-watershed was selected for the study and interviewed for socio-economic data. Totally 35 households were interviewed for the survey.

4. The parameters considered for socio-economic survey of households

Two forms of data were collected from the micro-watershed which includes primary data from the farm households and secondary data about the villages under the micro-watershed jurisdiction.

The following parameters were considered for the primary data collection about the socio-economic data of the households, (1) Demographic information, (2) Farm and durable assets owned by households, (3) Livestock possession, (4) Labour availability, (5) Level of migration in the village, Land holding, (7) Cropping pattern, (8) Source of irrigation, (9) Borrowing status, (10) Cost of cultivation of major crops, (11) Economics of subsidiary activities, (12) Fodder availability, (13) Family annual income from different sources, (14) Horticulture and forestry species grown, (15) Additional investment capacity, (16) Marketing practices, (17) Status of soil and water conservation structure, (18) Access to basic needs and (19) Constraints and suggestion.

The following parameters were considered for the secondary data regarding the villages under the micro-watershed jurisdiction, (1) Number of villages in each micro-watershed jurisdiction, (2) Village wise number of households, (3) Geographical area of the villages, (4) Cultivable are a including rainfed and irrigated, (5) Number and type of house in each village, (6) Human and livestock population, (7) Facilities in the village such as roads, transport facility for conveyance, drinking water supply, street light and (8) Community based organizations in the villages.

5. Development of interview schedule and data collection

Taking into the consideration the objectives of the survey, an interview schedule was prepared after thorough consultation with the experts in the field of social sciences. A comprehensive interview schedule covering all the major parameters for measuring the socio-economic situation was developed.

6. Tools used to analyze the data

The statistical components such as frequency and percentage were used to analyze the data.

Abbreviations used in the report

LL=Landless
MF=Marginal Farmers
SF=Small farmers
SMF=Semi medium farmers
MDF=Medium farmers
LF=Large Farmers

Chapter 4

FINDINGS OF THE SURVEY

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

Households sampled for socio-economic survey: The data on households sampled for socio economic survey in Kidadhala-1 Micro watershed is presented in Table 1 and it indicated that 35 farmers were sampled in Kidadhala-1 micro-watershed among households surveyed 12 (34.29%) were marginal, 7(20.00%) were small, 5 (14.29 %) were semi medium, 5 (14.29 %) were medium and 1 (2.86 %) were large farmers. 5 landless farmers were also interviewed for the survey.

Table 1. Households sampled for socio economic survey in Kidadhala-1 micro-watershed

Sl. No.	Particulars	LL (5)		MF (12)		SF (7)		SMF (5)		MDF (5)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Farmers	5	14.3	12	34.3	7	20	5	14.3	5	14.3	1	3	35	100

Population characteristics: The population characteristics of households sampled for socio-economic survey in Kidadhala-1 Micro watershed is presented in Table 2. The data indicated that, there were 91 (50.28%) men and 89 (49.17%) were women.

Table 2. Population characteristics in Kidadhala-1 micro-watershed

Sl.No.	Particulars	LL (22)		MF (49)		SF (38)		SMF (29)		MDF (35)		LF (8)		All (181)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Men	10	45.5	24	49	23	61	17	58.6	15	42.9	2	25	91	50.3
2	Women	12	54.6	24	49	15	39	12	41.4	20	57.1	6	75	89	49.2
3	Other	0	0	1	2	0	0	0	0	0	0	0	0	1	0.55
Total		22	100	49	100	38	100	29	100	35	100	8	100	181	100
Average		4.4		4.1		5.4		5.8		7.0		8.0		5.2	

Age wise classification of population: The age wise classification of household members in Kidadhala-1 Micro watershed is presented in Table 3. The indicated that, 48 (26.52%) of population were 0-15 years of age, 72 (39.78%) were 16-35 years of age, 49(27.07%) were 36-60 years of age and 12 (6.63 %) were above 61 years of age.

Table 3: Age wise classification of members of the household in Kidadhala-1 micro-watershed

Sl. No.	Particulars	LL (22)		MF (49)		SF (38)		SMF (29)		MDF (35)		LF (8)		All (181)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	0-15 years of age	8	36.4	14	28.6	7	18.4	5	17.24	11	31	3	38	48	26.52
2	16-35 years of age	10	45.5	18	36.7	12	31.6	14	48.28	14	40	4	50	72	39.78
3	36-60 years of age	4	18.2	14	28.6	14	36.8	8	27.59	8	23	1	13	49	27.07
4	> 61 years	0	0	3	6.12	5	13.2	2	6.9	2	5.7	0	0	12	6.63
Total		22	100	49	100	38	100	29	100	35	100	8	100	181	100

Education level of household members: Education level of household members in Kidadhala-1 Micro watershed is presented in Table 4. The results indicated that, there were 49.17 per cent of illiterates, 1.10 per cent of functional literate, 22.10 per cent of them had primary school education, 2.21 per cent middle school education, and 11.05 per cent high school education, 4.97 per cent of them had PUC education, 1.66 per cent attained graduation, and 7.73 them had other education.

Table 4. Education level of members of the household in Kidadhala-1 micro-watershed

Sl. No.	Particulars	LL (22)		MF (49)		SF (38)		SMF (29)		MDF (35)		LF (8)		All (181)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Illiterate	9	40.9	25	51	21	55.3	19	65.5	14	40	1	13	89	49.2
2	Functional Literate	0	0	1	2.04	1	2.63	0	0	0	0	0	0	2	1.1
3	Primary School	7	31.8	11	22.5	1	2.63	2	6.9	16	45.71	3	38	40	22.1
4	Middle School	2	9.09	0	0	1	2.63	1	3.45	0	0	0	0	4	2.21
5	High School	3	13.6	5	10.2	3	7.89	3	10.3	2	5.71	4	50	20	11.1
6	PUC	0	0	2	4.08	4	10.5	2	6.9	1	2.86	0	0	9	4.97
7	Degree	0	0	0	0	2	5.26	0	0	1	2.86	0	0	3	1.66
8	Others	1	4.55	5	10.2	5	13.2	2	6.9	1	2.86	0	0	14	7.73
Total		22	100	49	100	38	100	29	100	35	100	8	100	181	100

Occupation of head of households: The data regarding the occupation of the household heads in Kidadhala-1 Micro watershed is presented in Table 5. The results indicate that, 28.57 per cent of households heads were practicing agriculture, 68.57 per cent of the household heads were agricultural Labour and housewife (2.86%).

Table 5: Occupation of heads of households in Kidadhala-1 micro-watershed

Sl. No.	Particulars	LL (22)		MF (49)		SF (38)		SMF (29)		MDF (35)		LF (8)		All (181)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Agriculture	0	0	6	50	0	0	1	20	2	40	1	100	10	28.57
2	Agricultural Labour	5	100	6	50	7	100	4	80	2	40	0	0	24	68.57
3	Housewife	0	0	0	0	0	0	0	0	1	20	0	0	1	2.86
Total		5	100	12	100	7	100	5	100	5	100	1	100	35	100

Occupation of the members of the household: The data regarding the occupation of the household members in Kidadhala-1 Micro watershed is presented in Table 6. The results indicate that, agriculture was the major occupation for 9.94 per cent of the household members, 56.35 per cent were agricultural labour, 0.55 per cent were general labour, 20.99 per cent were working in pursuing education, 1.66 per cent were involved as housewife, and 8.84 per cent were childrens.

Institutional Participation of household members: The data regarding the institutional participation of the household members in Kidadhala-1 Micro watershed is presented in Table 7. The results show that, 0.55 per cent of them was participating in cooperative bank and rest of were not participating in any of the institutions.

Table 6: Occupation of members of the household in Kidadhala-1 micro-watershed

Sl. No.	Particulars	LL (22)		MF (49)		SF (38)		SMF (29)		MDF (35)		LF (8)		All (181)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Agriculture	0	0	7	14.3	0	0	5	17.24	5	14	1	13	18	9.94
2	Agricultural Labour	14	63.6	26	53.1	26	68.42	15	51.72	16	46	5	63	102	56.4
3	General Labour	0	0	0	0	1	2.63	0	0	0	0	0	0	1	0.55
4	Private Service	0	0	0	0	2	5.26	0	0	1	2.9	0	0	3	1.66
5	Student	6	27.3	10	20.4	4	10.53	6	20.69	10	29	2	25	38	21
6	Housewife	0	0	0	0	0	0	1	3.45	2	5.7	0	0	3	1.66
7	Children	2	9.09	6	12.2	5	13.16	2	6.9	1	2.9	0	0	16	8.84
Total		22	100	49	100	38	100	29	100	35	100	8	100	181	100

Table 7: Institutional Participation of household member in Kidadhala-1 micro-watershed

Sl. No.	Particulars	LL (22)		MF (49)		SF (38)		SMF (29)		MDF (35)		LF (8)		All (181)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Cooperative bank	0	0	0	0	1	2.63	0	0	0	0	0	0	1	0.55
2	No Participation	22	100	49	100	37	97.4	29	100	35	100	8	100	180	99.5
Total		22	100	49	100	38	100	29	100	35	100	8	100	181	100

Type of house owned: The data regarding the type of house owned by the households in Kidadhala-1 Micro watershed is presented in Table 8. The results indicate that, 8.57 percent possess thatched house, 88.57 per cent of the households possess katcha house, 2.86 per cent possess pacca house.

Table 8. Type of house owned by households in Kidadhala-1 micro-watershed

Sl.No.	Particulars	LL (5)		MF (12)		SF (7)		SMF (5)		MDF (5)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Thatched	0	0	1	8.3	0	0	1	20	1	20	0	0	3	8.57
2	Katcha	5	100	11	92	7	100	3	60	4	80	1	100	31	88.57
3	Pucca/RCC	0	0	0	0	0	0	1	20	0	0	0	0	1	2.86
Total		5	100	12	100	7	100	5	100	5	100	1	100	35	100

Durable assets owned by the households: The data regarding the Durable Assets owned by the households in Kidadhala-1 Micro watershed is presented in Table 9. The results shows that 91.43 per cent possess TV, 85.71 per cent possess mixer grinder, 8.57 per cent possess Bicycle, 22.86 per cent possess motor cycle and 100.00 per cent possess mobile phones.

Average value of durable assets: The data regarding the average value of durable assets owned by the households in Kidadhala-1 Micro watershed is presented in Table 10. The result shows that, the average value of television was Rs.8187.00, mixer grinder was

Rs.1840.00, bicycle was Rs.700.00, motor cycle was Rs. 40000.00 and mobile phone was Rs.2603.00.

Table 9. Durable assets owned by households in Kidadhala-1 micro-watershed

Sl.No.	Particulars	LL (5)		MF (12)		SF (7)		SMF (5)		MDF (5)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Radio	0	0	2	17	0	0	0	0	0	0	0	0	2	5.71
2	Television	5	100	10	83	6	85.7	5	100	5	100	1	100	32	91.43
3	Mixer/Grinder	5	100	9	75	7	100	4	80	4	80	1	100	30	85.71
4	Bicycle	0	0	2	17	0	0	0	0	1	20	0	0	3	8.57
5	Motor Cycle	0	0	2	17	1	14.3	1	20	4	80	0	0	8	22.86
6	Auto	0	0	0	0	0	0	0	0	1	20	0	0	1	2.86
7	Car/Four Wheeler	0	0	0	0	0	0	0	0	1	20	0	0	1	2.86
8	Mobile Phone	5	100	12	100	7	100	5	100	5	100	1	100	35	100

Table 10. Average value of durable assets owned in Kidadhala-1 micro-watershed

Average Value (Rs.)

Sl.No.	Particulars	LL (5)	MF (12)	SF (7)	SMF (5)	MDF (5)	LF (1)	All (35)
1	Radio	0	1900	0	0	0	0	1900
2	Television	9000	8300	9000	8800	6800	2000	8187
3	Mixer/Grinder	2000	1855	2000	1875	1500	1000	1840
4	Bicycle	0	550	0	0	1000	0	700
5	Motor Cycle	0	50000	40000	40000	35000	0	40000
6	Auto	0	0	0	0	700000	0	700000
7	Car/Four Wheeler	0	0	0	0	300000	0	300000
8	Mobile Phone	4000	2733	2923	2857	1545	1000	2603

Farm implements owned: The data regarding the farm implements owned by the households in Kidadhala-1 Micro watershed is presented in Table 11. About 2.86 per cent of the households possess Eart remover/Duster, 2.86 per cent possess plough and 5.71 per cent possess Chaff cutter, 5.71 per cent possess Sprayer, 71.43 per cent possess Weeder and 2.86 per cent possess tractor.

Table 11. Farm implements owned in Kidadhala-1 micro-watershed

Sl. No.	Particulars	LL (5)		MF (12)		SF (7)		SMF (5)		MDF (5)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Plough	0	0	0	0	0	0	1	20	0	0	0	0	1	2.86
2	Tractor	0	0	0	0	0	0	0	0	1	20	0	0	1	2.86
3	Sprayer	0	0	0	0	0	0	0	0	2	40	0	0	2	5.71
4	Weeder	5	100	4	33.3	7	100	4	80	4	80	1	100	25	71.43
5	Chaff Cutter	0	0	0	0	0	0	0	0	2	40	0	0	2	5.71
6	Earth remover/Duster	0	0	0	0	0	0	0	0	1	20	0	0	1	2.86
7	Blank	0	0	8	66.7	0	0	1	20	1	20	0	0	10	28.57

Average value of farm implements: The data regarding the average value of farm Implements owned by the households in Kidadhala-1 Micro watershed is presented in

Table 12. The results show that the average value of plough was Rs.2500.00, sprayer was Rs.2750.00, weeder was Rs.48.00 and tractor Rs. 300000.

Table 12. Average value of farm implements in Kidadhala-1 micro-watershed

Average Value (Rs.)

Sl.No.	Particulars	LL(5)	MF(12)	SF(7)	SMF(5)	MDF(5)	LF(1)	All(35)
1	Plough	0	0	0	2500	0	0	2500
2	Tractor	0	0	0	0	300000	0	300000
3	Sprayer	0	0	0	0	2750	0	2750
4	Weeder	52	42	51	50	40	100	48
5	Chaff Cutter	0	0	0	0	1350	0	1350
6	Earth remover/Duster	0	0	0	0	1500	0	1500

Livestock possession by the households: The data regarding the Livestock possession by the households in Kidadhala-1 Micro watershed is presented in Table 13. The indicate that, 14.29 per cent of the households possess bullocks, 22.86 per cent possess local cow, 11.43 per cent possess buffalo and 8.57 per cent possess crossbred cow.

Table 13. Livestock possession by households in Kidadhala-1 micro-watershed

Sl.No.	Particulars	LL (5)		MF (12)		SF (7)		SMF (5)		MDF (5)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Bullock	0	0	0	0	2	28.57	1	20	2	40	0	0	5	14.29
2	Local cow	0	0	0	0	4	57.14	3	60	1	20	0	0	8	22.86
3	Crossbred cow	0	0	1	8.3	0	0	1	20	1	20	0	0	3	8.57
4	Buffalo	0	0	1	8.3	1	14.29	1	20	1	20	0	0	4	11.43
5	blank	5	100	10	83	2	28.57	0	0	1	20	1	100	19	54.29

Average Labour availability: The data regarding the average labour availability in Kidadhala-1 Micro watershed is presented in Table 14. The indicated that, own labour men available in the micro watershed was 4.87, women available in the micro watershed was 1.53, hired labour (men) available was 1.97 and hired labour (women) available was 6.37.

Table 14. Average labour availability in Kidadhala-1 micro-watershed

Sl. No.	Particulars	LL (5)	MF (12)	SF (7)	SMF (5)	MDF (5)	LF (1)	All (35)
		N	N	N	N	N	N	N
1	Hired labour Female	0	4	5	5	7	3	4.87
2	Own Labour Female	0	1.25	1.43	1.4	2.2	3	1.53
3	Own labour Male	0	1.25	3	2.4	1.8	2	1.97
4	Hired labour Male	0	5.67	5.71	8	8	3	6.37

Adequacy of hired labour: The data regarding the adequacy of hired labour in Kidadhala-1 Micro watershed is presented in Table 15. The results indicate that, 62.86 per cent of the household opined that hired labour was adequate, 22.86 per cent of the household opined that hired labour was Inadequate.

Table 15. Adequacy of hired labour in Kidadhala-1 micro-watershed

Sl. No.	Particulars	LL (5)		MF (12)		SF (7)		SMF (5)		MDF (5)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Adequate	0	0	8	66.7	7	100	5	100	2	40	0	0	22	62.9
2	Inadequate	0	0	4	33.3	0	0	0	0	3	60	1	100	8	22.9

Distribution of land (ha): The data regarding the distribution of land (ha) in Kidadhala-1 Micro watershed is presented in Table 16. The results indicate that, 63.53 ha (81.64%) of dry land and 12.56 ha (16.14 %) of irrigated land.

Table 16. Distribution of land (ha) in Kidadhala-1 micro-watershed

Sl. No.	Particulars	LL (5)		MF (12)		SF (7)		SMF (5)		MDF (5)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Dry	0	0	7.32	93.78	6.82	72.65	4.32	51.15	13.91	66.2	31.2	100	63.53	81.64
2	Irrigated	0	0	0.49	6.22	2.57	27.35	4.13	48.85	5.38	25.6	0	0	12.56	16.14
3	Permanent Fallow	0	0	0	0	0	0	0	0	1.72	8.2	0	0	1.72	2.22
Total		0	100	7.8	100	9.38	100	8.45	100	21.02	100	31.2	100	77.81	100

Average value of land (ha): The data regarding the average land value (Rs./ha) in Kidadhala-1 Micro watershed is presented in Table 17. The results show that the average value of dry land was Rs.194333.31 and the average value of irrigated land was Rs.441639.82.

Table 17. Average value of land (ha) in Kidadhala-1 micro-watershed

Sl.No.	Particulars	LL (5)	MF (12)	SF (7)	SMF (5)	MDF (5)	LF (1)	All (35)
		N	N	N	N	N	N	N
1	Dry	0	724059.7	308016.6	242837.1	244341	16038.96	194333.3
2	Irrigated	0	1029167	720741.3	435882.4	260000	0	441639.8
3	Permanent Fallow	0	0	0	0	289906.1	0	289906.1

Status of bore wells: The data regarding the status of bore wells in Kidadhala-1 Micro watershed is presented in Table 18. The results indicate that, there were 9 functioning bore wells among the sampled households in micro watershed.

Table 18. Status of bore wells in Kidadhala-1 micro-watershed

Sl.No.	Particulars	LL (5)	MF (12)	SF (7)	SMF (5)	MDF (5)	LF (1)	All (35)
		N	N	N	N	N	N	N
1	De-functioning	0	0	0	0	0	0	0
2	Functioning	0	1	4	3	1	0	9

Status of open wells: The data regarding the status of open wells in Kidadhala-1 Micro watershed is presented in Table 19. The results indicate that, there were 2 functioning open wells among the sampled households in micro watershed.

Table 19. Status of open wells in Kidadhala-1 micro-watershed

Sl.No.	Particulars	LL (5)	MF (12)	SF (7)	SMF (5)	MDF (5)	LF (1)	All (35)
		N	N	N	N	N	N	N
1	De-functioning	0	0	0	0	0	0	0
2	Functioning	0	0	0	0	2	0	2

Source of irrigation: The data regarding the source of irrigation in Kidadhala-1 Micro watershed is presented in Table 20. The results that open well were major source of irrigation for 5.71 per cent of the households and bore well for 25.71 per cent of the households.

Table 20. Source of irrigation in Kidadhala-1 micro-watershed

Sl.No.	Particulars	LL (5)		MF (12)		SF (7)		SMF (5)		MDF (5)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Bore Well	0	0	1	8.33	4	57.14	3	60	1	20	0	0	9	25.71
2	Open Well	0	0	0	0	0	0	0	0	2	40	0	0	2	5.71

Depth of water (Avg. In meters): The data regarding the depth of water in Kidadhala-1 Micro watershed is presented in Table 21. The results revealed that, the depth of open well was 3.48 meter and depth of bore well was 27.87 meter.

Table 21. Depth of water (Avg. In meters) in Kidadhala-1 micro-watershed

Sl.No.	Particulars	LL (5)	MF (12)	SF (7)	SMF (5)	MDF (5)	LF (1)	All (35)
		N	N	N	N	N	N	N
1	Bore Well	0	8.89	60.96	64.01	24.38	0	27.87
2	Open Well	0	0	0	0	24.38	0	3.48

Irrigated Area (ha): The data regarding the irrigated area (ha) in Kidadhala-1 Micro watershed is presented in Table 22. The results indicate that, the availability of irrigation water was used for kharif crops was 12.57 ha.

Table 22. Irrigated Area (ha) in Kidadhala-1 micro-watershed

Sl.No.	Particulars	LL (5)	MF (12)	SF (7)	SMF (5)	MDF (5)	LF (1)	All (35)
1	Kharif	0	0.49	2.57	4.13	5.38	0	12.57

Cropping pattern: The data regarding the cropping pattern in Kidadhala-1 Micro watershed is presented in Table 23. The results indicate that, farmers have grown Maize (15 ha), Bajra (12.4 ha), Red gram (togari) (4.2 ha), Cotton (3.8 ha), Sunflower (3.5 ha), Bengal gram (3.2 ha), Navane (Fox Millet) (2.4 ha), Chilly (1.2 ha), Paddy (0.5 ha), Brinjal (0.4 ha) and Onion (0.1 ha).

Table 23. Cropping pattern in Kidadhala-1 micro-watershed (Area (ha)

Sl.No.	Particulars	LL (5)	MF (12)	SF (7)	SMF (5)	MDF (5)	LF (1)	All (35)
1	Kharif - Maize	0	3.58	4.13	2.43	4.86	0	15
2	Kharif - Bajra	0	3.16	2.56	5.06	1.62	0	12.4
3	Kharif - Red gram	0	0.4	0	0	3.24	0.5	4.15
4	Kharif - Cotton	0	0.81	0.81	0	2.15	0	3.77
5	Kharif - Sunflower	0	0	0.94	0	2.59	0	3.53
6	Rabi - Bengal gram	0	0	0	0	3.24	0	3.24
7	Kharif - Navane	0	0	0	0.81	1.62	0	2.43
8	Kharif - Chilly	0	0	0.81	0	0	0	0.81
9	Kharif - Paddy	0	0.49	0	0	0	0	0.49
10	Kharif - Brinjal	0	0	0	0	0.4	0	0.4
11	Rabi - Chilly	0	0	0	0	0.4	0	0.4
12	Kharif - Onion	0	0	0.14	0	0	0	0.14
Total		0	8.44	9.38	8.3	20.12	0.5	46.75

Cropping intensity: The data regarding the cropping intensity in Kidadhala-1 Micro watershed is presented in Table 24. The results indicate that, the cropping intensity was 77.86 per cent.

Table 24. Cropping intensity (%) in Kidadhala-1 micro-watershed

Sl.No.	Particulars	LL (5)	MF (12)	SF (7)	SMF (5)	MDF (5)	LF (1)	All (35)
1	Cropping Intensity	0	86.62	100	79.43	67.16	100	77.86

Cost of Cultivation of Maize: The data regarding the cost of cultivation (Rs/ha) of Maize in Kidadhala-1 micro watershed is presented in Table 25.a. The results indicate that, the total cost of cultivation (Rs/ha) for Maize was Rs. 45125.41. The gross income realized by the farmers was Rs. 52024.91. The net income from Maize cultivation was Rs.6899.49, thus the benefit cost ratio was found to be 1:1.10.

Table 25(a). Cost of Cultivation of Maize in Kidadhala-1 micro-watershed

Sl.No	Particulars	Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**				
1	Hired Human Labour	Man days	48.66	8527.33	18.9
2	Bullock	Pairs/day	2.88	1674.19	3.71
3	Tractor	Hours	3.81	3020.23	6.69
4	Machinery	Hours	0.27	164.03	0.36
5	Seed Main Crop (Establishment and Maintenance)	Kgs (Rs.)	18.17	1784.74	3.96
6	Seed Inter Crop	Kgs.	0	0	0
7	FYM	Quintal	3.54	707.55	1.57
8	Fertilizer + micronutrients	Quintal	9.21	15640.15	34.66
9	Pesticides (PPC)	Kgs / liters	1.2	1202.96	2.67
10	Irrigation	Number	0	0	0
11	Repairs		0	0	0
12	Msc. Charges (Marketing costs etc)		0	0	0
13	Depreciation charges		0	6.51	0.01

14	Land revenue and Taxes			0	2.79	0.01
II	**Cost B1**					
16	Interest on working capital				2320.54	5.14
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**				35051.02	77.67
III	**Cost B2**					
18	Rental Value of Land				305.13	0.68
19	**Cost B2 = (Cost B1 + Rental value)**				35356.15	78.35
IV	**Cost C1**					
20	Family Human Labour			26.61	5664.57	12.55
21	**Cost C1 = (Cost B2 + Family Labour)**				41020.72	90.9
V	**Cost C2**					
22	Risk Premium				2.38	0.01
23	**Cost C2 = (Cost C1 + Risk Premium)**				41023.1	90.91
VI	**Cost C3**					
24	Managerial Cost				4102.31	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**				45125.41	100
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		23.79	42281.15	
		b) Main Crop Sales Price (Rs.)			1776.92	
	By Product	e) Main Product (q)		12.18	9743.76	
		f) Main Crop Sales Price (Rs.)			800	
b.	Gross Income (Rs.)				52024.91	
c.	Net Income (Rs.)				6899.49	
d.	Cost per Quintal (Rs./q.)				1896.46	
e.	Benefit Cost Ratio (BC Ratio)				1:1.1	

Cost of Cultivation of Bajra: The data regarding the cost of cultivation (Rs/ha) of Bajra in Kidadhala-1 micro watershed is presented in Table 25.b. The results indicate that, the total cost of cultivation (Rs/ha) for Bajra was Rs. 27940.51. The gross income realized by the farmers was Rs. 42806.51. The net income from Bajra cultivation was Rs.14865.99, thus the benefit cost ratio was found to be 1:1.50.

Table 25(b). Cost of Cultivation of Bajra in Kidadhala-1 micro-watershed

Sl.No	Particulars	Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**				
1	Hired Human Labour	Man days	39.68	6561.2	23.48
2	Bullock	Pairs/day	2.48	1447.06	5.18
3	Tractor	Hours	2.3	1781.49	6.38
4	Machinery	Hours	0.21	123.5	0.44
5	Seed Main Crop (Establishment and Maintenance)	Kgs (Rs.)	11.82	1376.87	4.93
6	Seed Inter Crop	Kgs.	0	0	0
7	FYM	Quintal	2.32	573	2.05
8	Fertilizer + micronutrients	Quintal	6.5	6065.39	21.71
9	Pesticides (PPC)	Kgs / liters	1.23	1231.01	4.41
10	Irrigation	Number	0	0	0
11	Repairs		0	0	0
12	Msc. Charges (Marketing costs etc)		0	0	0
13	Depreciation charges		0	7.05	0.03

14	Land revenue and Taxes		0	2.88	0.01
II	**Cost B1**				
16	Interest on working capital			1109.93	3.97
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**			20279.37	72.58
III	**Cost B2**				
18	Rental Value of Land			369.44	1.32
19	**Cost B2 = (Cost B1 + Rental value)**			20648.81	73.9
IV	**Cost C1**				
20	Family Human Labour		24.6	4748.48	16.99
21	**Cost C1 = (Cost B2 + Family Labour)**			25397.3	90.9
V	**Cost C2**				
22	Risk Premium			3.17	0.01
23	**Cost C2 = (Cost C1 + Risk Premium)**			25400.46	90.91
VI	**Cost C3**				
24	Managerial Cost			2540.05	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**			27940.51	100
VII	**Economics of the Crop**				
a.	Main Product	a) Main Product (q)	15.41	34988.25	
		b) Main Crop Sales Price (Rs.)		2270.83	
	By Product	e) Main Product (q)	8.61	7818.26	
		f) Main Crop Sales Price (Rs.)		908.33	
b.	Gross Income (Rs.)			42806.51	
c.	Net Income (Rs.)			14865.99	
d.	Cost per Quintal (Rs./q.)			1813.42	
e.	Benefit Cost Ratio (BC Ratio)			1:1.5	

Cost of Cultivation of Cotton: The data regarding the cost of cultivation (Rs/ha) of Cotton in Kidadhala-1 micro watershed is presented in Table 25.c. The results indicate, the total cost of cultivation (Rs/ha) for Cotton was Rs.38832.25. The gross income realized by the farmers was Rs. 102404.02. The net income from Cotton cultivation was Rs. 63571.77, thus the benefit cost ratio was found to be 1:2.60.

Table 25(c). Cost of Cultivation of Cotton in Kidadhala-1 micro-watershed

Sl.No	Particulars	Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**				
1	Hired Human Labour	Man days	34.39	5344.29	13.76
2	Bullock	Pairs/day	1.65	988	2.54
3	Tractor	Hours	3.25	2558.55	6.59
4	Machinery	Hours	0.31	186.42	0.48
5	Seed Main Crop (Establishment and Maintenance)	Kgs (Rs.)	6.39	5140.78	13.24
6	Seed Inter Crop	Kgs.	0	0	0
7	FYM	Quintal	1.96	640.03	1.65
8	Fertilizer + micronutrients	Quintal	10.71	10856.82	27.96
9	Pesticides (PPC)	Kgs / liters	0.98	978.68	2.52
10	Irrigation	Number	2.8	0	0
11	Repairs		0	0	0
12	Msc. Charges (Marketing costs etc)		0	0	0

13	Depreciation charges		0	949.66	2.45
14	Land revenue and Taxes		0	2.2	0.01
II	**Cost B1**				
16	Interest on working capital			2114.44	5.45
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**			29759.85	76.64
III	**Cost B2**				
18	Rental Value of Land			333.33	0.86
19	**Cost B2 = (Cost B1 + Rental value)**			30093.18	77.5
IV	**Cost C1**				
20	Family Human Labour		23.78	5204.86	13.4
21	**Cost C1 = (Cost B2 + Family Labour)**			35298.04	90.9
V	**Cost C2**				
22	Risk Premium			4	0.01
23	**Cost C2 = (Cost C1 + Risk Premium)**			35302.04	90.91
VI	**Cost C3**				
24	Managerial Cost			3530.2	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**			38832.25	100
VII	**Economics of the Crop**				
a.	Main Product	a) Main Product (q)	24	102404.02	
		b) Main Crop Sales Price (Rs.)		4266.67	
b.	Gross Income (Rs.)			102404.02	
c.	Net Income (Rs.)			63571.77	
d.	Cost per Quintal (Rs./q.)			1617.95	
e.	Benefit Cost Ratio (BC Ratio)			1:2.6	

Cost of Cultivation of Red gram: The data regarding the cost of cultivation (Rs/ha) of Red gram in Kidadhala-1 micro watershed is presented in Table 25.d. The results indicate that, the total cost of cultivation (Rs/ha) for Red gram was Rs. 29911.57. The gross income realized by the farmers was Rs.27966.44. The net income from Red gram cultivation was Rs. -1945.13, thus the benefit cost ratio was found to be 1:0.90.

Table 25(d). Cost of Cultivation of Red gram in Kidadhala-1 micro-watershed

Sl.No	Particulars	Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**				
1	Hired Human Labour	Man days	31.43	4979.17	16.65
2	Bullock	Pairs/day	2.82	1548.4	5.18
3	Tractor	Hours	0.82	617.5	2.06
4	Machinery	Hours	0.82	494	1.65
5	Seed Main Crop (Establishment and Maintenance)	Kgs (Rs.)	16.13	1380.41	4.61
6	Seed Inter Crop	Kgs.	0	0	0
7	FYM	Quintal	4.94	4940	16.52
8	Fertilizer + micronutrients	Quintal	4.08	5441.97	18.19
9	Pesticides (PPC)	Kgs / liters	0.41	411.67	1.38
10	Irrigation	Number	2.47	0	0
11	Repairs		0	0	0
12	Msc. Charges (Marketing costs etc)		0	0	0
13	Depreciation charges		0	7.34	0.02

14	Land revenue and Taxes		0	0	0
II	**Cost B1**				
16	Interest on working capital			1462.09	4.89
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**			21282.55	71.15
III	**Cost B2**				
18	Rental Value of Land			250	0.84
19	**Cost B2 = (Cost B1 + Rental value)**			21532.55	71.99
IV	**Cost C1**				
20	Family Human Labour		29.08	5649.79	18.89
21	**Cost C1 = (Cost B2 + Family Labour)**			27182.34	90.88
V	**Cost C2**				
22	Risk Premium			10	0.03
23	**Cost C2 = (Cost C1 + Risk Premium)**			27192.34	90.91
VI	**Cost C3**				
24	Managerial Cost			2719.23	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**			29911.57	100
VII	**Economics of the Crop**				
a.	Main Product	a) Main Product (q)	12.97	27894.4	
		b) Main Crop Sales Price (Rs.)		2150	
	By Product	e) Main Product (q)	0.21	72.04	
		f) Main Crop Sales Price (Rs.)		350	
b.	Gross Income (Rs.)			27966.44	
c.	Net Income (Rs.)			-1945.13	
d.	Cost per Quintal (Rs./q.)			2305.48	
e.	Benefit Cost Ratio (BC Ratio)			1:0.9	

Cost of Cultivation of Sunflower: The data regarding the cost of cultivation (Rs/ha) of Sunflower in Kidadhala-1 micro watershed is presented in Table 25.e. The results indicate that, the total cost of cultivation (Rs/ha) for Sunflower was Rs.37509.54. The gross income realized by the farmers was Rs. 31779.40. The net income from Sunflower cultivation was Rs. -5730.14, thus the benefit cost ratio was found to be 1:0.80.

Table 25(e). Cost of Cultivation of Sunflower in Kidadhala-1 micro-watershed

Sl.No	Particulars	Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**				
1	Hired Human Labour	Man days	36.1	4416.44	11.77
2	Bullock	Pairs/day	4.4	2477.32	6.6
3	Tractor	Hours	3.05	2177.81	5.81
4	Machinery	Hours	0.75	900.23	2.4
5	Seed Main Crop (Establishment and Maintenance)	Kgs (Rs.)	13.31	7429.91	19.81
6	Seed Inter Crop	Kgs.	0	0	0
7	FYM	Quintal	1.91	381.64	1.02
8	Fertilizer + micronutrients	Quintal	8.38	8391.88	22.37
9	Pesticides (PPC)	Kgs / liters	0.95	954.1	2.54
10	Irrigation	Number	0	0	0
11	Repairs		0	0	0
12	Msc. Charges (Marketing costs etc)		0	0	0

13	Depreciation charges		0	19.53	0.05
14	Land revenue and Taxes		0	3.29	0.01
II	**Cost B1**				
16	Interest on working capital			2059.02	5.49
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**			29211.18	77.88
III	**Cost B2**				
18	Rental Value of Land			333.33	0.89
19	**Cost B2 = (Cost B1 + Rental value)**			29544.51	78.77
IV	**Cost C1**				
20	Family Human Labour		21.8	4554.07	12.14
21	**Cost C1 = (Cost B2 + Family Labour)**			34098.58	90.91
V	**Cost C2**				
22	Risk Premium			1	0
23	**Cost C2 = (Cost C1 + Risk Premium)**			34099.58	90.91
VI	**Cost C3**				
24	Managerial Cost			3409.96	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**			37509.54	100
VII	**Economics of the Crop**				
a.	Main Product	a) Main Product (q)	10.59	31779.4	
		b) Main Crop Sales Price (Rs.)		3000	
b.	Gross Income (Rs.)			31779.4	
c.	Net Income (Rs.)			-5730.14	
d.	Cost per Quintal (Rs./q.)			3540.93	
e.	Benefit Cost Ratio (BC Ratio)			1:0.8	

Adequacy of fodder: The data regarding the adequacy of fodder in Kidadhala-1 Micro watershed is presented in Table 26. The results indicate that, 31.43 per cent of the households opined that dry fodder was adequate and 11.43 per cent of them opined dry fodder was inadequate. With respect to green fodder availability, 42.86 percent of them opined it was sufficient

Table 26. Adequacy of fodder in Kidadhala-1 micro-watershed

Sl. No.	Particulars	LL (5)		MF (12)		SF (7)		SMF (5)		MDF (5)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Adequate-Dry Fodder	0	0	1	8.33	5	71.43	4	80	1	20	0	0	11	31.43
2	Inadequate-Dry Fodder	0	0	1	8.33	0	0	0	0	3	60	0	0	4	11.43
3	Adequate-Green Fodder	0	0	2	16.67	5	71.43	4	80	4	80	0	0	15	42.86

Average annual gross income: The data regarding the annual gross income in Kidadhala-1 Micro watershed is presented in Table 27. The results indicate that, the farmers have annual gross income of Rs. 90614.57 in micro-watershed, of which Rs. 65941.43 is from agriculture itself.

Average annual Expenditure: The data regarding the average annual expenditure in Kidadhala-1 Micro watershed is presented in Table 28. The results indicate that, the farmers have annual gross expenditure of Rs. 253540.48 in micro-watershed, of which Rs. 26914.29 is from agriculture itself.

Table 27. Average annual gross income in Kidadhala-1 micro-watershed

Sl. No.	Particulars	LL (5)	MF (12)	SF (7)	SMF (5)	MDF (5)	LF (1)	All (35)
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1	Service/salary	0	15500	0	16000	9600	0	8971.43
2	Business	0	0	0	0	6000	0	857.14
3	Wage	21000	11916.7	14714.3	13000	6400	0	12800
4	Agriculture	0	22379.2	53157.1	34540	295200	18600	65941.4
5	Non Farm income	0	750	0	0	6000	0	1114.29
6	Dairy Farm	0	0	0	1808	4704	0	930.29
Income(Rs.)		21000	50545.8	67871.4	65348	327904	18600	90614.6

Table 28. Average annual Expenditure in Kidadhala-1 micro-watershed

Sl. No.	Particulars	LL (5)	MF (12)	SF (7)	SMF (5)	MDF (5)	LF (1)	All (35)
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1	Service/salary	0	10000	0	5000	10000	0	1000
2	Business	0	0	0	0	10000	0	285.71
3	Wage	10800	8000	9166.67	6600	8000	0	6571.43
4	Agriculture	0	11416.7	34857.1	20800	90400	5000	26914.3
5	Non Farm income	0	0	0	0	10000	0	285.71
6	Dairy Farm	0	0	0	1500	2000	0	142.86
Total		10800	29416.7	44023.8	33900	130400	5000	253540

Horticulture species grown: The data regarding horticulture species grown in Kidadhala-1 Micro watershed is presented in Table 29. The results indicate that, the total number of horticultural trees grown (both field and backyard) by the sampled households were coconut (15) and Mango (4).

Table 29. Horticulture species grown in Kidadhala-1 micro-watershed

Sl.No.	Particulars	LL (5)		MF (12)		SF (7)		SMF (5)		MDF (5)		LF (1)		All (35)	
		F	B	F	B	F	B	F	B	F	B	F	B	F	B
1	Coconut	0	0	0	0	0	0	0	0	15	0	0	0	15	0
2	Mango	0	0	0	0	0	0	2	0	2	0	0	0	4	0

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

Forest species grown: The data regarding forest species grown in Kidadhala-1 Micro watershed is presented in Table 30. The results indicate that, households have planted 87 neem trees, 6 tamarind trees, 1 pongamia trees and 9 banyan trees together in both field and backyard.

Table 30. Forest species grown in Kidadhala-1 micro-watershed

Sl.No.	Particulars	LL (5)		MF (12)		SF (7)		SMF (5)		MDF (5)		LF (1)		All (35)	
		F	B	F	B	F	B	F	B	F	B	F	B	F	B
1	Neem	0	0	20	2	8	6	6	3	38	4	0	0	72	15
2	Tamarind	0	0	1	0	0	0	1	0	4	0	0	0	6	0
3	Pongamia	0	0	0	0	0	0	1	0	0	0	0	0	1	0
4	Banyan	0	0	1	1	4	0	2	0	1	0	0	0	8	1

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

Average additional investment capacity: The data regarding average additional investment capacity in Kidadhala-1 Micro watershed is presented in Table 31. The results indicate that, households have an average investment capacity of Rs. 3142.86 for land development, Rs. 1200.00 for creation of irrigation facility, Rs.2428.57 for adoption of improved livestock breeds, Rs.142.86 for adoption of improved crop production activities and Rs. 114.29 for investment for orchard development.

Table 31. Average additional investment capacity of households in Kidadhala-1 micro-watershed

Sl. No.	Particulars	LL (5)	MF (12)	SF (7)	SMF (5)	MDF (5)	LF (1)	All (35)
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1	Land development	0	2666.67	5428.57	4800	3200	0	3142.86
2	Irrigation facility	0	583.33	3000	2800	0	0	1200
3	Improved crop production	0	2083.33	4142.86	3400	2800	0	2428.57
4	Improved livestock management	0	0	0	0	1000	0	142.86
5	Orchard development/ maintenance	0	0	0	0	800	0	114.29

Source of funds for additional investment: The data regarding source of funds for additional investment in Kidadhala-1 Micro watershed is presented in Table 32. The results indicate that, the sources of finance raised from bank as a loan and from own sources for land development was 45.71 and 14.29 per cent, for irrigation facility was 25.71 and 2.86 per cent, for improved crop production was 48.57 and 11.43 per cent, for improved livestock adoption was 2.86 per cent and for orchard development/ maintenance.

Table 32. Source of funds for additional investment in Kidadhala-1 micro-watershed

Sl. No	Item	Land development		Irrigation facility		Improved crop production		Improved livestock management		Orchard development/ maintenance	
		N	%	N	%	N	%	N	%	N	%
1	Loan from bank	16	45.71	9	25.7	17	48.57	1	2.86	1	2.86
2	Own funds	5	14.29	1	2.86	4	11.43	0	0	0	0

Marketing of agricultural produce: The data regarding marketing of the agricultural produce in Kidadhala-1 Micro watershed is presented in Table 33. The results indicated that, 98.88 percent of output of Bajra was sold in the market with average price of Rs. 2270.83; 100.00 percent of output of Bengal gram was sold in the market with average price of Rs. 5000.00; 100.00 percent of output of Brinjal was sold in the market with average price of Rs. 3500.00; 95.65 percent of output of Chilly was sold in the market with average price of Rs. 7000.00 and 100.00 percent of output of Cotton was sold in the market with average price of Rs. 4266.67.

Table 33. Marketing of agricultural produce in Kidadhala-1 micro-watershed

Sl.No	Crops	Output obtained (q)	Output retained (q)	Output sold (q)	Output sold (%)	Avg. Price obtained (Rs/q)
1	Bajra	178	2	176	99	2271
2	Bengalgram	96	0	96	100	5000
3	Brinjal (Round)	32	0	32	100	3500
4	Chilly	23	1	22	96	7000
5	Cotton	105	0	105	100	4267
6	Maize	329	38	291	88	1777
7	Navane	5	1	4	80	2000
8	Onion	20	2	18	90	1000

Marketing channels used for sale of agricultural produce: The data regarding marketing channels used for sale of agricultural produce in Kidadhala-1 Micro watershed is presented in Table 34. The results indicated that, 82.86 cent of the households have sold agricultural produce to the local/village merchants, 25.71 per cent of regulated market and 8.57 per cent of cooperative marketing society.

Table 34. Marketing channels used for sale of agricultural produce in Kidadhala-1 micro-watershed

Sl. No.	Particulars	LL (5)		MF (12)		SF (7)		SMF (5)		MDF (5)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Local/village Merchant	0	0	9	75	9	129	7	140	4	80	0	0	29	82.86
2	Regulated Market	0	0	4	33	0	0	0	0	4	80	1	100	9	25.71
3	Cooperative marketing Society	0	0	0	0	0	0	0	0	3	60	0	0	3	8.57

Mode of transport of agricultural produce: The data regarding mode of transport of agricultural produce in Kidadhala-1 Micro watershed is presented in Table 35. The results indicated that, 111.43 cent of the households have used tractor, 2.86 per cent carry by Head load for the transport of agriculture commodity.

Table 35. Mode of transport of agricultural produce in Kidadhala-1 micro-watershed

Sl.No.	Particulars	LL (5)		MF (12)		SF (7)		SMF (5)		MDF (5)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Head Load	0	0	0	0	0	0	1	20	0	0	0	0	1	2.86
2	Tractor	0	0	13	108	9	129	6	120	10	200	1	100	39	111.4
3	Truck	0	0	0	0	0	0	0	0	1	20	0	0	1	2.86

Incidence of soil and water erosion problems: The data regarding incidence of incidence of soil and water erosion problems in Kidadhala-1 Micro watershed is presented in Table 36. The results indicate that, 57.14 per cent of the households have experienced soil and water erosion problems.

Table 36. Incidence of soil and water erosion problems in Kidadhala-1 micro-watershed

Sl. No.	Particulars	LL(5)		MF(12)		SF(7)		SMF(5)		MDF(5)		LF(1)		All(35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Soil and water erosion problems in the farm	0	0	7	58	7	100	4	80	2	40	0	0	20	57.14

Interest towards soil testing: The data regarding Interest shown towards soil testing in Kidadhala-1 Micro watershed is presented in Table 37. The results indicated that, 57.14 per cent of the households were interested towards soil testing.

Table 37. Interest regarding soil testing in Kidadhala-1 micro-watershed

Sl. No.	Particulars	LL (5)		MF (12)		SF (7)		SMF (5)		MDF (5)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Interest in soil test	0	0	7	58	7	100	4	80	2	40	0	0	20	57.14

Usage pattern of fuel for domestic use: The data on usage pattern of fuel for domestic use in Kidadhala-1 Micro watershed is presented in Table 38. The results indicated that, firewood was the major source of fuel for domestic use for 94.29 per cent of the households followed by LPG (5.71%).

Table 38. Usage pattern of fuel for domestic use in Kidadhala-1 micro-watershed

Sl.No.	Particulars	LL (5)		MF (12)		SF (7)		SMF (5)		MDF (5)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Fire Wood	4	80	12	100	7	100	5	100	4	80	1	100	33	94.29
2	LPG	1	20	0	0	0	0	0	0	1	20	0	0	2	5.71

Source of drinking water: The data on source of drinking water in Kidadhala-1 Micro watershed is presented in Table 39. The results indicated that, piped supply of water was the major source for drinking water for 77.14 per cent of the households followed by bore well water (20.00%) and Canal/nala (2.86%).

Table 39. Source of drinking water in Kidadhala-1 micro-watershed

Sl. No.	Particulars	LL (5)		MF (12)		SF (7)		SMF (5)		MDF (5)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Piped supply	5	100	9	75	7	100	4	80	2	40	0	0	27	77.14
2	Bore Well	0	0	3	25	0	0	0	0	3	60	1	100	7	20
3	Canal/Nala	0	0	0	0	0	0	1	20	0	0	0	0	1	2.86

Source of light: The data on source of light in Kidadhala-1 Micro watershed is presented in Table 40. The results indicated that, electricity was the major source of light for 100.00 per cent of the households.

Table 40. Source of light in Kidadhala-1 micro-watershed

Sl.No.	Particulars	LL (5)		MF (12)		SF (7)		SMF (5)		MDF (5)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Electricity	5	100	12	100	7	100	5	100	5	100	1	100	35	100

Existence of sanitary toilet facility: The data on availability of toilet facility in Kidadhala-1 Micro watershed is presented in Table 41. The results indicated that, 45.71 per cent of the households possess toilets.

Table 41. Existence of sanitary toilet facility in Kidadhala-1 micro-watershed

Sl.No.	Particulars	LL (5)		MF (12)		SF (7)		SMF (5)		MDF (5)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Sanitary toilet facility	5	100	3	25	2	28.57	4	80	1	20	1	100	16	45.7

Possession of PDS card: The data regarding possession of PDS card in Kidadhala-1 Micro watershed is presented in Table 42. The results indicated that, 88.57per cent of the households possessed BPL card and 5.71 per cent possessed APL card.

Table 42. Possession of PDS card in Kidadhala-1 micro-watershed

Sl.No.	Particulars	LL (5)		MF (12)		SF (7)		SMF (5)		MDF (5)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	APL	0	0	1	8.33	0	0	0	0	1	20	0	0	2	5.71
2	BPL	5	100	10	83.3	7	100	5	100	3	60	1	100	31	88.57

Participation in NREGA programme: The data regarding Participation in NREGA programme in Kidadhala-1 Micro watershed is presented in Table 43. The results indicated that, only 28.57 percent of the participate have participated in NREGA programme.

Table 43. Participation in NREGA programme in Kidadhala-1 micro-watershed

Sl. No.	Particulars	LL (5)		MF (12)		SF (7)		SMF (5)		MDF (5)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Participation in NREGA programme	0	0	3	25	4	57.1	2	40	1	20	0	0	10	28.6

Table 44. Adequacy of food items in Kidadhala-1 micro-watershed

Sl. No.	Particulars	LL (5)		MF (12)		SF (7)		SMF (5)		MDF (5)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Cereals	4	80	12	100	7	100	5	100	4	80	1	100	33	94.29
2	Pulses	3	60	10	83.3	6	85.71	5	100	4	80	0	0	28	80
3	Oilseed	0	0	0	0	1	14.29	1	20	0	0	0	0	2	5.71
4	Vegetables	5	100	7	58.3	6	85.71	4	80	2	40	0	0	24	68.57
5	Fruits	1	20	1	8.33	0	0	0	0	2	40	0	0	4	11.43
6	Milk	5	100	9	75	7	100	4	80	4	80	0	0	29	82.86
7	Egg	5	100	8	66.7	7	100	5	100	2	40	0	0	27	77.14
8	Meat	5	100	8	66.7	7	100	4	80	2	40	0	0	26	74.29

Adequacy of food items: The data regarding adequacy of food items in Kidadhala-1 Micro watershed is presented in Table 44. The results indicated that, the extent of adequacy of food items for cereals, pulses, Oilseeds and vegetables were 94.29, 80.00, 5.71 and 68.57 per cent respectively, similarly for Fruits (11.43%), milk (82.86%), Egg (77.14%), and Meat (74.29%).

Inadequacy of food items: The data regarding in adequacy of food items in Kidadhala-1 Micro watershed is presented in Table 45. The results indicated that, the extent of in adequacy of food items for cereals, pulses, Oilseeds and vegetables were 5.71, 20.00, 71.43, 8.57 and 2.86 per cent respectively, similarly for fruits (65.71%), milk (8.57%), egg (17.14%) and meat (2.86%).

Table 45. Inadequacy of food items in Kidadhala-1 micro-watershed

Sl. No.	**Particulars**	**LL** (5)		**MF** (12)		**SF** (7)		**SMF** (5)		**MDF** (5)		**LF** (1)		**All (35)**	
		N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
1	Cereals	1	20	0	0	0	0	0	0	1	20	0	0	2	5.71
2	Pulses	2	40	2	16.7	1	14.29	0	0	1	20	1	100	7	20
3	Oilseed	5	100	8	66.7	6	85.71	4	80	2	40	0	0	25	71.43
4	Vegetables	0	0	1	8.33	1	14.29	1	20	0	0	0	0	3	8.57
5	Fruits	4	80	7	58.3	7	100	5	100	0	0	0	0	23	65.71
6	Milk	0	0	2	16.7	0	0	0	0	0	0	1	100	3	8.57
7	Egg	0	0	3	25	0	0	0	0	2	40	1	100	6	17.14
8	Meat	0	0	0	0	0	0	1	20	0	0	0	0	1	2.86

Response on market surplus of food items: The data regarding adequacy of food items in Kidadhala-1 Micro watershed is presented in Table 46. The results indicated that, the extent of adequacy of food items for Oilseeds and vegetables were 22.86, 22.86 per cent respectively, similarly for fruits egg (2.86%).

Table 46. Response on market surplus of food items in Kidadhala-1 micro-watershed

Sl. No.	**Particulars**	**LL** (5)		**MF** (12)		**SF** (7)		**SMF** (5)		**MDF** (5)		**LF** (1)		**All (35)**	
		N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
1	Oilseed	0	0	4	33.3	0	0	0	0	3	60	1	100	8	22.86
2	Vegetables	0	0	4	33.3	0	0	0	0	3	60	1	100	8	22.86
3	Egg	0	0	0	0	0	0	0	0	1	20	0	0	1	2.86

Farming constraints: The data regarding farming constraints experienced by households in Kidadhala-1 Micro watershed is presented in Table 47. The results indicated that, lower fertility status of the soil was the constraint experienced by (31.43 %) per cent of the households, wild animal menace on farm field (37.14%), frequent incidence of pest and diseases (68.57%), inadequacy of irrigation water (22.86%), high cost of fertilizers and plant protection chemicals (57.14%), high rate of interest on credit (42.86%), low price for the agricultural commodities (60.00 %), lack of marketing facilities in the area (54.29%),

inadequate extension services (5.71 %), lack of transport for safe transport of the agricultural produce to the market (5.71%), less rainfall (22.86%), source of agri-technology information (Newspaper/Tv/Mobile) (22.86%).

Table 47. Farming constraints experienced in Kidadhala-1 micro-watershed

SN	Particulars	LL (5)		MF (12)		SF (7)		SMF (5)		MDF (5)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Lower fertility status of the soil	0	0	6	50	3	42.86	1	20	1	20	0	0	11	31.43
2	Wild animal menace on farm field	0	0	2	16.67	4	57.14	2	40	4	80	1	100	13	37.14
3	Frequent incidence of pest and diseases	0	0	12	100	5	71.43	3	60	4	80	0	0	24	68.57
4	Inadequacy of irrigation water	0	0	0	0	4	57.14	3	60	1	20	0	0	8	22.86
5	High cost of Fertilizers and plant protection chemicals	0	0	8	66.67	7	100	4	80	1	20	0	0	20	57.14
6	High rate of interest on credit	0	0	8	66.67	5	71.43	1	20	1	20	0	0	15	42.86
7	Low price for the agricultural commodities	0	0	8	66.67	7	100	4	80	2	40	0	0	21	60
8	Lack of marketing facilities in the area	0	0	7	58.33	7	100	3	60	2	40	0	0	19	54.29
9	Inadequate extension services	0	0	0	0	1	14.29	0	0	1	20	0	0	2	5.71
10	Lack of transport for safe transport of the Agril produce to the market.	0	0	1	8.33	0	0	0	0	0	0	1	100	2	5.71
11	Less rainfall	0	0	4	33.33	0	0	0	0	3	60	1	100	8	22.86
12	Source of Agri-technology information	0	0	4	33.33	0	0	0	0	3	60	1	100	8	22.86

Chapter 5

SUMMARY AND IMPLICATIONS

In order to assess the socio-economic condition of the farmers in the watershed 35 households located in the micro watershed were interviewed for the survey. The study was conducted in Kidadhala-1 micro-watershed (Bhagyanagar sub-watershed, Koppal taluk & District) is located at North latitude 15^0 21' 47.551" and 15^0 20' 28.719" and East longitude 76^0 13' 39.692" and 76^0 11' 46.69"covering an area of about 521.98 ha bounded by under under Kidadhala, Koppala and Basapura Villages.

Socio-economic analysis indicated that, out of the total sample of 35 respondents, -12 (34.29%) were marginal, 7(20.00%) were small and 5 (14.29%) were semi medium, 5 (14.29%) were medium, 1(2.86%) were large farmers. The population characteristics of households indicated that, there were 91 (50.28%) men and 89 (49.17%) were women. Majority of the respondents (39.78%) were in the age group of 35-60 years. Education level of the sample households indicated that, majority there were 49.17 per cent illiterates, 1.10 per cent were functional literates and only 1.66 per cent attained graduation. About, 28.57 per cent of household heads practicing agriculture and 68.57 per cent of the household heads were engaged as agricultural labourers. Agriculture was the major occupation for 9.94 per cent of the household members.

In the study area, 88.57 per cent of the households possess katcha house and 2.86 per cent possess pucca house. The durable assets owned by the households showed that, 91.43 per cent possess TV, 85.71 per cent possess mixer grinder and 100.00 per cent possess mobile phones. Farm implements owned by the households indicated that, 2.86 per cent of the households possess plough and only 5.71 per cent sprayer. Regarding livestock possession by the households, 22.86 per cent possess local cow and 11.43 per cent possess buffalo respectively.

The average labour availability in the study area showed that**,** own men and women labour availability in the micro watershed was 6.40 each, while the hired labour (men) availability was 1.97. Further, 22.86 per cent of the households opined that hired labour was inadequate during the agricultural season.

Out of the total land holding of the sample respondents (77.81 ha), 81.64 per cent of the area is under dry condition and the remaining 16.14 per cent area is irrigated land. There were 9.00 bore wells among the sampled households. Bore well was the major source of irrigation for 25.71 per cent of the households. The major crops grown by sample farmers are Maize, Bajra, Cotton, Red gram and Sunflower and cropping intensity was recorded as 77.86 per cent.

The per hectare cost of cultivation for Maize, Bajra, Cotton, Red gram and Sunflower was Rs.45125.41, 27940.51, 38832.25, 29911.57 and 37509.54 with benefit cost ratio of 1:1.10, 1: 1.50, 1: 2.60, 1: 0.90 and 1:0.80 respectively.

Further, 31.43 per cent of the households opined that dry fodder was adequate and 42.86 per cent of the households have opined that the green fodder was adequate.

The average annual gross income of the farmers was Rs. 90614.57 in micro-watershed, of which Rs. 65941.43 comes from agriculture.

Sampled households have grown Mango and Coconut trees in the fields. None of the households shown interest to cultivate horticultural crops.

Households have an average investment capacity of Rs 3142.86 for land development, Rs 1200 for irrigation facility creation, Rs. 2428.57 for improved crop production, 142.86 for improved livestock management and Rs 114.29 for orchard development/ maintenance. Source of funds for additional investment is concerned, 14.29 per cent depends on own funds and 45.71 per cent depends on bank loan for land development activities.

Regarding marketing channels, 82.86 per cent of the households have sold agricultural produce to the local/village merchants, while, 25.71 per cent have sold by Agents/Traders. Further, 111.43 per cent of the households have used tractor for the transport of agriculture commodity.

Majority of the farmers (57.14 %) have experienced soil and water erosion problems in the watershed and 57.14 per cent of the households were interested towards soil testing.

Firewood connection was the major source of fuel for domestic use for 94.29 per cent of the households and 5.71 per cent households has LPG. Piped supply was the major source for drinking water for 77.14 per cent of the households. Electricity was the major source of light for 100.00 per cent of the households. In the study area, 45.71 per cent of the households possess toilet facility. Regarding possession of PDS card, 88.57 per cent of the households possessed BPL card. Cereals (94.29%), pulses (80.00%), oilseeds (5.71%) were adequate for consumption.

Farming constraints experienced by households in the micro watersheds were lower fertility status of the soil (31.43%) wild animal menace on farm field (37.14%), frequent incidence of pest and diseases (68.57%), inadequacy of irrigation water (22.86%), high cost of fertilizers and plant protection chemicals (57.14%), high rate of interest on credit (42.86%), low price for the agricultural commodities (60.00%), lack of marketing facilities in the area (54.29%), inadequate extension services (5.71%), lack of transport for safe transport of the agricultural produce to the market (5.71%), Less rainfall (22.86%) and Source of Agri-technology information(Newspaper/TV/Mobile) (22.86%).

Implications of the survey

- ✓ Result indicated that, there were 49.17 per cent were illiterate hence, extension methodologies such as demonstration, street play, drama, video shows will be effective in dissemination of the technologies in the micro watershed.
- ✓ The data indicate that, 88.57 per cent of the households possess katcha house. Hence, the development department while implementing the watershed plan should focus on agriculture to enhance the productivity of major crops in the area to increase the income of the farmers.
- ✓ Results indicated that the local institutional participation of the household members in the micro watershed is minimal hence, activities like membership campaign, awareness creation about the benefits of membership in local institutions and strengths of organized groups must be conveyed.
- ✓ Majority of the households in the watershed have experience in use of mobile phones, and television hence, these mass media can be effectively utilized for transfer of technology as well as for information dissemination.
- ✓ The farm machinery/implement possession in the micro watershed was found to be minimum the reasons may lack of knowledge or lack of financial ability which can be addressed through training on use of different farm implements, providing information on different sources of finance for purchase of farm implements.
- ✓ The possession of livestock such as crossbred cow found is less hence, farmers must be made aware of the benefits of crossbred cow in increased milk production.
- ✓ The possession of livestock such as sheep, goat and poultry was found to be low hence, farmers may be informed the role of subsidiary enterprises in enhancing the income and information on financial support for subsidiary activities.
- ✓ The data indicate that, job/work was the reason for all the migrants hence, farmers may be trained on profitable agriculture or self employment such has animal husbandry, plate making, sheep rearing, goat rearing, rabbit rearing with suitable information on sources of financial support.
- ✓ The results indicate that there was a change in quality of life due to migration hence, the developmental departments should take actions to arrest migration and to improve the quality of the life in rural areas.
- ✓ Households possess 63.53 ha (81.64 %) of dry land and 12.56ha (16.14 %) of irrigated land hence, the availability of the dryland agricultural technologies such as short duration crops, high yielding drought resistance crop varieties, drip irrigation technology and subsidy information will be helpful for the farmers to enhance the productivity of land and as well as farmers income.
- ✓ Few of the bore well in micro watershed found non functional hence, farmers may be trained on possibility of bore well rejuvenation.
- ✓ Bore well was major source of irrigation for 25.71 per cent of the households. Hence, in order to increase the area under irrigation as well as to increase the water use

efficiency farmers may trained on drip irrigation and provide the information on subsidy for drip irrigation equipment's along with the information on different agencies which provides the financial assistance for drip irrigation.

- ✓ Farmers have grown 15 coconut and 4 mangos trees in the fields. Hence, production technologies related to these crops can be made available to the farmers for better adoption.
- ✓ The cropping intensity in the micro watershed was found to be (77.86 %) hence, care must be taken by the implementing agency to bring uncultivated land into cultivation through suitable measures.
- ✓ Many of the household members have borrowed loan from cooperative banks which has higher rate of interest hence, farmers may be sensitized on the different sources of credit with lesser interest rate such SHGs etc.
- ✓ The results indicated the non availability of both green and dry fodder throughout the year hence, fodder development activities can be taken up in the micro watershed.
- ✓ The average annual gross income of the households Rs.65941.43 from agriculture, Rs.857.14 from business and Rs. 12800.00 from wages and. Agriculture was found to be the major source of income for households hence; the development activities should focus on productivity enhancement, marketing arrangements and agricultural technology dissemination to have a direct impact on the farmers.
- ✓ The cultivation of forest species is found minimal hence, information and production technology related to agro-forestry and integrated farming system.
- ✓ The data indicated that, 57.14 per cent of the households have experienced soil and water erosion problems. Hence, those farmers who reported the soil and water erosion problems may be given attention while implementation of the watershed development plan.
- ✓ The data indicated that, 57.14 per cent of the households have interest in soil testing hence, farmers must be provided with the information on various institutions which are involved in soil testing for the benefit of the farmers.
- ✓ Except summer ploughing the adoption of other soil and water conservation structures is minimum hence, the farmers in the micro watershed should be sensitized on the use of different conservation structures for soil water conservation.
- ✓ Cereals and pulses found be adequate for per cent of the households respectively hence, farm households and the farm women must be trained on importance of balanced nutrition and role of vegetable, milk, egg, meat in balanced diet.
- ✓ Lower fertility status of the soil (31.43%), wild animal menace on farm field (37.14%), frequent incidence of pest and diseases (68.57%), high cost of fertilizers and plant protection chemicals (57.14%), high rate of interest on credit (42.86%), low price for the agricultural commodities (60.00%), lack of marketing facilities in the area (54.29%), inadequate extension services (5.71%), lack of transport for safe transport of the agricultural produce to the market (5.71%) were the major farming

constraints experienced hence, these constraints must be addressed immediately for the welfare of the farmers. Awareness to be created among the farmers to approach nearest KVKs/RSKs and other developmental departments for technical and for subsidized inputs and utilize the well established regulated markets, approaching the contract firms, direct markets to avoid the involvement of middlemen.